C Solutions Inc.

Bid Contact **Mark Drummond**
mdrummond@csolutions-us.com
Ph 954-320-7899
Fax 954-320-7860

Address **610 SE 14th Court, No. 2**
Fort Lauderdale, FL 33316

Qualifications MBE SB

Item #	Line Item	Notes	Unit Price	Qty/Unit	Attch.	Docs
PNC2116651P1--01-01	Regional Transmission System Master Plan	**Supplier Product Code:**	**First Offer -**	1 / each	**Y**	**Y**

Supplier Total $0.00

C Solutions Inc.

Item: **Regional Transmission System Master Plan**

Attachments

BCWWS.pdf

Evaluation criteria.doc

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Broward County Solicitation PNC2116651P1
Regional Transmission System Master Plan

Submitted by:

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610 SE 14th Court, Unit 2
Fort Lauderdale, FL 33316
Mark Drummond, P.E., BCEE
954.764.7589

Submitted to:

BROWARD COUNTY
FLORIDA

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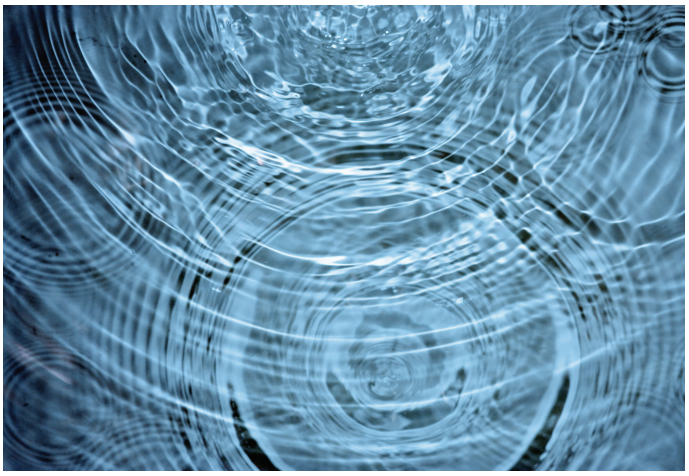
Letter of Interest



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July 13, 2018

Broward County

Robert Wilson, Project Manager

Email: rwilson@broward.org

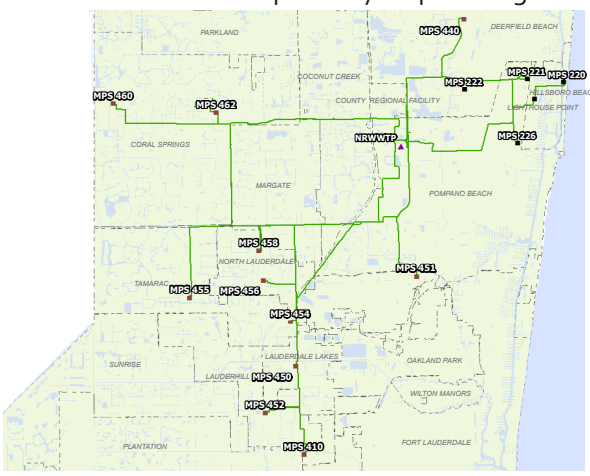
C Solutions
610 SE 14th Court, No. 2
Fort Lauderdale, FL 33316

Re: C Solutions, Inc. Letter of Transmittal PNC2116651P1-0101 Regional Transmission System Masterplan

To Whom it May Concern:

C Solutions, Inc. (C Solutions) appreciates the opportunity to submit our statement of qualifications for the Broward County's Solicitation PNC211665-P1. As requested, we are providing an electronic submittal as required for your consideration.

Established in 2005, C Solutions is a Broward County Certified CBE and one hundred percent (100%) owned African-American Minority Business Enterprise headquartered in Broward County. C Solutions has been focused primarily on providing water and wastewater consulting engineering services for municipal clients over the past thirteen years. Our firm includes four senior professionals with municipal water and wastewater engineering consulting experience. The project manager for this project will be Mark Drummond, P.E., BCEE, President of C Solutions. Our corporate office location is specified below:



Corporate Office
610 SE 14th Court, No. 2
Fort Lauderdale, FL 33316
Tel. 954.320.7899

C Solutions will serve as the prime engineering firm and be closely teamed with ***Brown and Caldwell*** and ***Chen Moore and Associates***. Additional hydraulic modeling support services will be provided by Broward County CBE ***Tobon Engineering***. Our team offers a combination of expertise ideally suited to provide the services described in the Request for Qualifications. We are committed to providing seamless team integration and focused individuals with the expertise to deliver reliable, value optimized, efficient engineering consulting services.

Since the 1990s, our team has provided engineering services on multiple projects for Broward County Water and Wastewater Services (WWS) totaling hundreds of millions in capital improvements. These projects included, but are not limited to, master planning, master pump station assessments, sewer system designs, effluent pump station improvements, hydraulic modeling, CIP development, Neighborhood Improvement Program (NIP) designs, and various feasibility studies related to septic tank elimination and analysis of forcemains. We were part of the team that prepared the Broward County Retail Potable Water and Wastewater Masterplan and our team has worked on many portions of the regional wastewater system. We have an intimate understanding of Broward County's regional wastewater transmission system and WWS's need to develop a risk-based prioritization of transmission system capital improvements and an emergency response plan to allow for the continued high level of service to WWS wastewater customers. Our team is committed to continuing our successful relationship through open communication with WWS's staff and the delivery of high quality work in a timely manner.

C Solutions, Brown and Caldwell, Chen Moore & Associates and Tobon Engineering have an excellent working relationship together. We provide a wealth of expertise for the complete range of engineering consulting services required by Broward County WWS for the successful completion of the Regional Transmission System Masterplan. A team's experience is only realized in the people assigned to work on your projects; and to that end, we have assigned highly qualified individuals with the proven expertise and existing knowledge of Broward County's wastewater system.

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We believe we are the right team for this important project and look forward to your favorable consideration and our continued work with Broward County.

Best Regards,

Mark Drummond, P.E., BCEE
President
C Solutions Inc.

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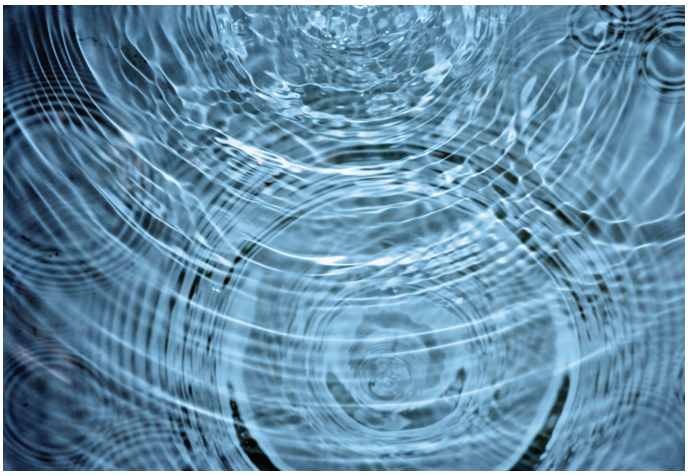
Responsiveness Criteria



LOBBYIST REGISTRATION REQUIREMENT CERTIFICATION FORM

The completed form should be submitted with the solicitation response but must be submitted within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

The Vendor certifies that it understands if it has retained a lobbyist(s) to lobby in connection with a competitive solicitation, it shall be deemed non-responsive unless the firm, in responding to the competitive solicitation, certifies that each lobbyist retained has timely filed the registration or amended registration required under Broward County Lobbyist Registration Act, Section 1-262, Broward County Code of Ordinances; and it understands that if, after awarding a contract in connection with the solicitation, the County learns that the certification was erroneous, and upon investigation determines that the error was willful or intentional on the part of the Vendor, the County may, on that basis, exercise any contractual right to terminate the contract for convenience.

The Vendor hereby certifies that: (select one)

☒ It has not retained a lobbyist(s) to lobby in connection with this competitive solicitation; however, if retained after the solicitation, the County will be notified.

☐ It has retained a lobbyist(s) to lobby in connection with this competitive solicitation and certified that each lobbyist retained has timely filed the registration or amended registration required under Broward County Lobbyist Registration Act, Section 1-262, Broward County Code of Ordinances.

It is a requirement of this solicitation that the names of any and all lobbyists retained to lobby in connection with this solicitation be listed below:

Name of Lobbyist:

Lobbyist's Firm:

Phone:

E-mail:

Name of Lobbyist:

Lobbyist's Firm:

Phone:

E-mail:

Authorized Signature/Name: Mark Drummond P.E., BCEE **Date:** 6/19/2018

Title: President

Vendor Name: C Solutions, Inc.

2

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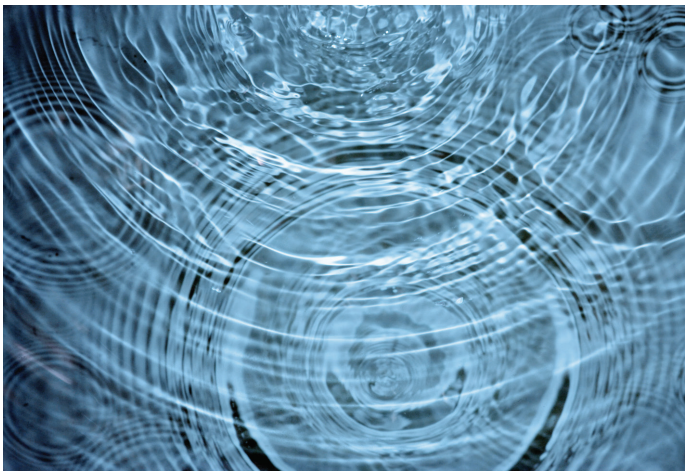
Responsibility Criteria



LITIGATION HISTORY FORM

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

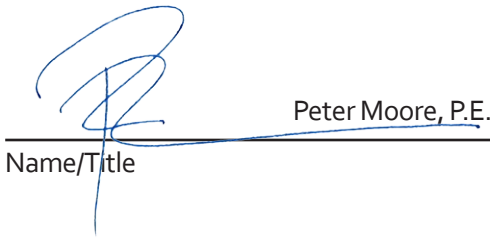
☒ There are no material cases for this Vendor; or
☐ Material Case(s) are disclosed below:

Is this for a: (check type) ☐ Parent, ☐ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Or No ☐
Party	
Case Number, Name, and Date Filed	
Name of Court or other tribunal	
Type of Case	Bankruptcy ☐ Civil ☐ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	
Brief description of the Subject Matter and Project Involved	
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☐ Settled ☐ Dismissed ☐ Judgment Vendor's Favor ☐ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: Email: Telephone Number:

Vendor Name: C Solutions, Inc.

CHEN·MOORE
&ASSOCIATES

Chen Moore and Associates has had no cases filed, pending or resolved with Broward County during our firm's history.



Peter Moore, P.E., LEED AP, F.ASCE — July 13, 2018

Name/Title — Date

LITIGATION HISTORY FORM

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☐ There are no material cases for this Vendor; or
☒ Material Case(s) are disclosed below:

Is this for a: (check type) ☐ Parent, ☐ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Or No ☐
Party	
Case Number, Name, and Date Filed	Case No: 11-30999 CA 02; Date Filed: June 4, 2012
Name of Court or other tribunal	11th Circuit Court of Miami-Dade
Type of Case	Bankruptcy ☐ Civil ☒ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	During a streetscaping project, the complaint asserts that the plaintiff fell off their motor scooter while driving through a construction zone.
Brief description of the Subject Matter and Project Involved	Chen Moore and Associates is a co-defendant in a personal injury suit with one count for negligence.
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☐ Settled ☐ Dismissed ☒ Judgment Vendor's Favor ☒ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: David A. Hagen, P.A. Email: hagen.esq@lawyer.com Telephone Number: 305.373.4200

Vendor Name: Chen Moore and Associates

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

☐ There are no material cases for this Vendor; or
☒ Material Case(s) are disclosed below:

Is this for a: (check type) ☒ Parent, ☐ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Or No ☐
Party	
Case Number, Name, and Date Filed	Case No: 13-025280 CA-01 (05); Date Filed: March 12, 2014
Name of Court or other tribunal	11th Circuit Court of Miami-Dade
Type of Case	Bankruptcy ☐ Civil ☒ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	Chen Moore and Associates is a co-defendant in a wrongful death action with one count of negligence.
Brief description of the Subject Matter and Project Involved	The complaint asserts that, during a streetscaping project, the decedent fell off the back of a motorcycle while driving through a construction zone.
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☐ Settled ☐ Dismissed ☒ Judgment Vendor's Favor ☒ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☒ Yes ☐ No
Opposing Counsel	Name: Hyram M. Montero, P.A. Email: hmontero@monterolaw.com Telephone Number: 954.767.6500

Vendor Name: Chen Moore and Associates

LITIGATION HISTORY FORM

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

☐ There are no material cases for this Vendor; or
☒ Material Case(s) are disclosed below:

Is this for a: (check type) ☒ Parent, ☐ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Or No ☐
Party	
Case Number, Name, and Date Filed	Case No: 16-011970 CA-01, May 11, 2016
Name of Court or other tribunal	11th Judicial Circuit Court in and for Miami-Dade County, 175 NW 1st Avenue, Miami, FL 33128; City of Miami Beach
Type of Case	Bankruptcy ☐ Civil ☒ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	The complaint asserts that, during a streetscaping project, the complainant was ejected from a motorcycle while driving through a construction zone
Brief description of the Subject Matter and Project Involved	See below.
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☐ Settled ☐ Dismissed ☒ Judgment Vendor's Favor ☐ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: Hugo V. Alvarez, P.A. Email: halvarez@alvarezbarbara.com Telephone Number: 305.263.7700

Vendor Name: Chen Moore and Associates

Similar to the Nazario Case, in Castro v. M. Vila, City of Miami Beach, Metro Express, and CMA; Case Number 2016-011970-CA-01, CMA was similarly sued despite having no contractual responsibility with respect to the alleged defective work. This negligence action arose out of the death of a passenger on a motorcycle that is alleged to have hit a sanitary sewer manhole located within the City of Miami Beach. CMA had no responsibility whatsoever relating to sanitary sewer placement or construction

LITIGATION HISTORY FORM

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☐ There are no material cases for this Vendor; or
☒ Material Case(s) are disclosed below:

Is this for a: (check type) ☒ Parent, ☐ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Or No ☐
Party	
Case Number, Name, and Date Filed	17-017197-CA-06, 7/31/17
Name of Court or other tribunal	11th Judicial Circuit Court in and for Miami-Dade County, 175 NW 1st Avenue, Miami, FL 33128; City of Miami Beach
Type of Case	Bankruptcy ☐ Civil ☒ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	CMA is a co-defendant in a slip and fall accident with one count of negligence.
Brief description of the Subject Matter and Project Involved	The complaint asserts that, after a streetscaping project, the plaintiff fell and injured themselves on an uneven sidewalk.
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☐ Settled ☒ Dismissed ☐ Judgment Vendor's Favor ☐ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: Email: Telephone Number:

Vendor Name: Chen Moore and Associates

LITIGATION HISTORY FORM

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☐ There are no material cases for this Vendor; or
☑ Material Case(s) are disclosed below:

Is this for a: (check type) ☑ Parent, ☐ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Brown and Caldwell Or No ☐
Party	
Case Number, Name, and Date Filed	CV2015-010237, Hans and Barbara Gaiser and Villa Ventura Apartments LLC v. Valley Metro Rail et al., August 19, 2015
Name of Court or other tribunal	Maricopa County Superior Court
Type of Case	Bankruptcy ☐ Civil ☑ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	Negligence; property damage
Brief description of the Subject Matter and Project Involved	Plaintiffs alleged that Brown and Caldwell and others were negligent and caused damage to an apartment complex adjacent to a light rail line expansion p
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☐ Settled ☐ Dismissed ☑ Judgment Vendor's Favor ☐ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: Jamie L. Mayrose, Gordon & Rees Email: Telephone Number: 602-794-2460

Vendor Name: Brown and Caldwell

LITIGATION HISTORY FORM

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

☐ There are no material cases for this Vendor; or
☑ Material Case(s) are disclosed below:

Is this for a: (check type) ☐ Parent, ☑ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Brown and Caldwell Constructors (BCC) Or No ☐
Party	
Case Number, Name, and Date Filed	Case No. MID-L-003363 17, Timothy Pearson, Plaintiff v. BASF, Inc.; Brown and Caldwell, Inc.; John Does (1-5); ABC Cos (1-5), Defendants, 6/2/2017
Name of Court or other tribunal	Superior Court of New Jersey
Type of Case	Bankruptcy ☐ Civil ☑ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	Injury due to slip and fall
Brief description of the Subject Matter and Project Involved	Plaintiff alleges slip & fall accident occurred due to ice, snow at a site where BCC performed O&M operations
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☑ Settled ☐ Dismissed ☐ Judgment Vendor's Favor ☐ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: Keith Murphy, Gordon & Rees Email: Telephone Number: 973-549-2517

Vendor Name: Brown and Caldwell

LITIGATION HISTORY FORM

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

☐ There are no material cases for this Vendor; or
☑ Material Case(s) are disclosed below:

Is this for a: (check type) ☐ Parent, ☑ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Brown and Caldwell Constructors (BCC) Or No ☐
Party	
Case Number, Name, and Date Filed	Case No. 17-CV-132, Renfrow Brothers, Inc., Plaintiff v. The Haskell Company, Brown and Caldwell, Inc., David Froula, John Diedrich and Bush Brothers and
Name of Court or other tribunal	Chancery Court for Jefferson County, Tennessee
Type of Case	Bankruptcy ☐ Civil ☑ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	subcontractor change order/cost claim
Brief description of the Subject Matter and Project Involved	Plaintiff alleges it is owed monies for additional work performed on a project for the construction of a wastewater facility
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☑ Settled ☐ Dismissed ☐ Judgment Vendor's Favor ☐ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: David Garst, Lewis Thomason King Krieg & Waldrop Email: Telephone Number: 865-546-4646

Vendor Name: Brown and Caldwell

LITIGATION HISTORY FORM

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

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☐ Material Case(s) are disclosed below:

Is this for a: (check type) ☐ Parent, ☐ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Or No ☐
Party	
Case Number, Name, and Date Filed	
Name of Court or other tribunal	
Type of Case	Bankruptcy ☐ Civil ☐ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	
Brief description of the Subject Matter and Project Involved	
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☐ Settled ☐ Dismissed ☐ Judgment Vendor's Favor ☐ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: Email: Telephone Number:

Vendor Name: Tobon Engineering

State of Florida
Department of State

I certify from the records of this office that C SOLUTIONS, INC. is a corporation organized under the laws of the State of Florida, filed on March 24, 2005, effective March 21, 2005.

The document number of this corporation is P05000044397.

I further certify that said corporation has paid all fees due this office through December 31, 2018, that its most recent annual report/uniform business report was filed on March 6, 2018, and that its status is active.

I further certify that said corporation has not filed Articles of Dissolution.

Given under my hand and the Great Seal of the State of Florida at Tallahassee, the Capital, this the Twenty-fifth day of April, 2018

Ken Detzner

Secretary of State

Tracking Number: CU9267219577

To authenticate this certificate,visit the following site,enter this number, and then follow the instructions displayed.

https://services.sunbiz.org/Filings/CertificateOfStatus/CertificateAuthentication

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Affiliated Entities of the Principal(s)

All Vendors are required to disclose the names and addresses of "affiliated entities" of the Vendor's principal(s) over the last five (5) years (from the solicitation opening deadline) that have acted as a prime Vendor with the County. The Vendor is required to provide all information required on the Affiliated Entities of the Principal(s) Certification Form.

b. The County will review all affiliated entities of the Vendor's principal(s) for contract performance evaluations and the compliance history with the County's Small Business Program, including CBE, DBE and SBE goal attainment requirements. "Affiliated entities" of the principal(s) are those entities related to the Vendor by the sharing of stock or other means of control, including but not limited to a subsidiary, parent or sibling entity.

c. The County will consider the contract performance evaluations and the compliance history of the affiliated entities of the Vendor's principals in its review and determination of responsibility.

N/A

AFFILIATED ENTITIES OF THE PRINCIPAL(S) CERTIFICATION FORM

The completed form should be submitted with the solicitation response but must be submitted within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

a. All Vendors are required to disclose the names and addresses of "affiliated entities" of the Vendor's principal(s) over the last five (5) years (from the solicitation opening deadline) that have acted as a prime Vendor with the County.

b. The County will review all affiliated entities of the Vendor's principal(s) for contract performance evaluations and the compliance history with the County's Small Business Program, including CBE, DBE and SBE goal attainment requirements. "Affiliated entities" of the principal(s) are those entities related to the Vendor by the sharing of stock or other means of control, including but not limited to a subsidiary, parent or sibling entity.

c. The County will consider the contract performance evaluations and the compliance history of the affiliated entities of the Vendor's principals in its review and determination of responsibility.

The Vendor hereby certifies that: (select one)

☒ No principal of the proposing Vendor has prior affiliations that meet the criteria defined as "Affiliated entities"

☐ Principal(s) listed below have prior affiliations that meet the criteria defined as "Affiliated entities"

Principal's Name:

Names of Affiliated Entities:

Principal's Name:

Names of Affiliated Entities:

Principal's Name:

Names of Affiliated Entities:

Authorized Signature Name: Mark Drummond P.E., BCEE

Title: President

Vendor Name: C Solutions, Inc.

Date: 6/19/2018

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Insurance Requirements

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 06/25/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Lassiter-Ware Insurance, Inc. 1317 Citizens Blvd. Leesburg FL 34748	CONTACT NAME: Paula O'Shea PHONE (A/C, No, Ext): (800)845-8437 FAX (A/C, No): (888)883-8680 E-MAIL ADDRESS: paulao@lassiterware.com INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A : Crum & Forster Specialty Insurance Co — 44520
INSURED C Solutions, Inc. 610 SE 14th Court, Suite 2 Fort Lauderdale FL 33316	INSURER B : INSURER C : INSURER D : INSURER E : INSURER F :

COVERAGES — CERTIFICATE NUMBER: 17/18 MASTER CERT — REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	COMMERCIAL GENERAL LIABILITY CLAIMS-MADE / OCCUR Contractors Pollution GEN'L AGGREGATE LIMIT APPLIES PER: POLICY / PRO-JECT / LOC OTHER:			EPK118747	08/24/2017	08/24/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 2,000,000 $ 50,000 $ 5,000 $ 2,000,000 $ 2,000,000 $ 2,000,000
	AUTOMOBILE LIABILITY ANY AUTO OWNED AUTOS ONLY / SCHEDULED AUTOS HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ $ $ $
	UMBRELLA LIAB / OCCUR EXCESS LIAB / CLAIMS-MADE DED / RETENTION $						EACH OCCURRENCE AGGREGATE	$ $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					PER STATUTE / OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ $ $
A	Professional Liability Limits included with General Liability Limits			EPK118747 Claims-Made	08/24/2017	08/24/2018	Each Claim Aggregate	$2,000,000 $2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER	CANCELLATION
Broward County 115 South Andrews Avenue Fort Lauderdale FL 33301-1818	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Paula L. O'Shea

ACORD 25 (2016/03) The ACORD name and logo are registered marks of ACORD

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 04/30/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Steve Botkin Ins. Agency Inc. 3038 North Federal Highway, Suite A Fort Lauderdale, Florida 33306-1493	CONTACT NAME: David E. Jelonek PHONE (A/C, No, Ext): 954-537-3333 FAX (A/C, No): 954-251-4139 E-MAIL ADDRESS: davidjelonek@verizon.net INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A : State Farm Insurance Company — 10739
INSURED C Solutions Inc. 610 S.E. 14th Court, Suite 2 Fort Lauderale, Florida 33316-2680	INSURER B : INSURER C : INSURER D : INSURER E : INSURER F :

COVERAGES — CERTIFICATE NUMBER: — REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY CLAIMS-MADE / OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY / PRO-JECT / LOC OTHER:						EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ $ $ $ $ $
	AUTOMOBILE LIABILITY ANY AUTO OWNED AUTOS ONLY / SCHEDULED AUTOS HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY			E93-9852-D30-59	04/30/2018	10/30/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ $ 1,000,000 $ 1,000,000 $ 1,000,000
	UMBRELLA LIAB / OCCUR EXCESS LIAB / CLAIMS-MADE DED / RETENTION $						EACH OCCURRENCE AGGREGATE	$ $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					PER STATUTE / OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ $ $

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
FORD F-150 2017 XL CREW CAB CAB 4 VIN # 1FTEW1EP0HFA64337

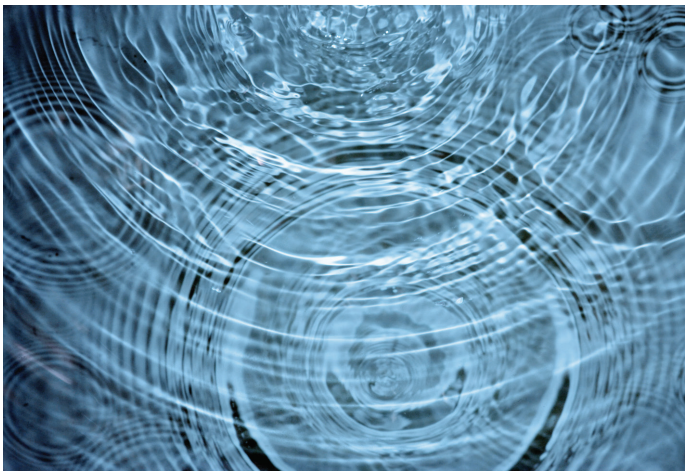
CERTIFICATE HOLDER	CANCELLATION
Broward County 115 South Andrews Avenue Fort Lauderdale, Florida 33301-1818	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE David Jelonek

ACORD 25 (2016/03) The ACORD name and logo are registered marks of ACORD

1001486 132849.12 03-16-2016

CSOLUTIONS
bringing solutions to mind

Additional Information and Certification



VENDOR QUESTIONNAIRE AND STANDARD CERTIFICATIONS
Request for Proposals, Request for Qualifications, or Request for Letters of Interest

Vendor should complete questionnaire and complete and acknowledge the standard certifications and submit with the solicitation response. If not submitted with solicitation response, it must be submitted within three business days of County's request. Failure to timely submit may affect Vendor's evaluation.

If a response requires additional information, the Vendor should upload a written detailed response with submittal; each response should be numbered to match the question number. The completed questionnaire and attached responses will become part of the procurement record. It is imperative that the person completing the Vendor Questionnaire be knowledgeable about the proposing Vendor's business and operations.

1. Legal business name: C Solutions, Inc.
2. Doing Business As/ Fictitious Name (if applicable):
3. Federal Employer I.D. no. (FEIN): 20-2591227
4. Dun and Bradstreet No.:
5. Website address (if applicable): www.csolutions-us.com
6. Principal place of business address: 610 SE 14th Ct., No. 2
   Ft Lauderdale, FL 33316
7. Office location responsible for this project: 610 SE 14th Ct. No. 2
   Ft Lauderdale, FL33316
8. Telephone no.: 954-320-7899 Fax no.: 954-320-7860
9. Type of business (check appropriate box):
   - ☒ Corporation (specify the state of incorporation): Florida
   - ☐ Sole Proprietor
   - ☐ Limited Liability Company (LLC)
   - ☐ Limited Partnership
   - ☐ General Partnership (State and County Filed In)
   - ☐ Other - Specify
10. List Florida Department of State, Division of Corporations document number (or registration number if fictitious name): P05000044397
11. List name and title of each principal, owner, officer, and major shareholder:
    a) Mark Drummond P.E., BCEE President
    b)
    c)
    d)

12. AUTHORIZED CONTACT(S) FOR YOUR FIRM:

Name: Mark Drummond
Title: President
E-mail: mdrummond@csolutions-us.com
Telephone No.: 954-320-7899

Name: Ann Petley
Title: Executive Assistant
E-mail: apetley@csolutions-us.com
Telephone No.: 954-320-7899

13. Has your firm, its principals, officers or predecessor organization(s) been debarred or suspended by any government entity within the last three years? If yes, specify details in an attached written response. ☐ Yes ☒ No

14. Has your firm, its principals, officers or predecessor organization(s) ever been debarred or suspended by any government entity? If yes, specify details in an attached written response, including the reinstatement date, if granted. ☐ Yes ☒ No

15. Has your firm ever failed to complete any services and/or delivery of products during the last three (3) years? If yes, specify details in an attached written response. ☐ Yes ☒ No

16. Is your firm or any of its principals or officers currently principals or officers of another organization? If yes, specify details in an attached written response. ☐ Yes ☒ No

17. Have any voluntary or involuntary bankruptcy petitions been filed by or against your firm, its parent or subsidiaries or predecessor organizations during the last three years? If yes, specify details in an attached written response. ☐ Yes ☒ No

18. Has your firm's surety ever intervened to assist in the completion of a contract or have Performance and/or Payment Bond claims been made to your firm or its predecessor's sureties during the last three years? If yes, specify details in an attached written response, including contact information for owner and surety. ☐ Yes ☒ No

19. Has your firm ever failed to complete any work awarded to you, services and/or delivery of products during the last three (3) years? If yes, specify details in an attached written response. ☐ Yes ☒ No

20. Has your firm ever been terminated from a contract within the last three years? If yes, specify details in an attached written response. ☐ Yes ☒ No

21. Living Wage solicitations only: In determining what, if any, fiscal impacts(s) are a result of the Ordinance for this solicitation, provide the following for informational purposes only. Response is not considered in determining the award of this contract.
Living Wage had an effect on the pricing. ☐ Yes ☐ No ☒ N/A

If yes, Living Wage increased the pricing by ____ % or decreased the pricing by ____ %.

Cone of Silence Requirement Certification:
The Cone of Silence Ordinance, Section 1-266, Broward County Code of Ordinances prohibits certain communications among Vendors, Commissioners, County staff, and Selection or Evaluation Committee members. Identify on a separate sheet any violations of this Ordinance by any members of the responding firm or its joint ventures. After the application of the Cone of Silence, inquiries regarding this solicitation should be directed to the Director of Purchasing or designee. The Cone of Silence terminates when the County Commission or other awarding authority takes action which ends the solicitation.

The Vendor hereby certifies that: (check each box)

☒ The Vendor has read Cone of Silence Ordinance, Section 1-266, Broward County Code of Ordinances; and

☒ The Vendor understands that the Cone of Silence for this competitive solicitation shall be in effect beginning upon the appointment of the Selection or Evaluation Committee, for communication regarding this solicitation with the County Administrator, Deputy County Administrator, Assistant County Administrators, and Assistants to the County Administrator and their respective support staff or any person, including Evaluation or Selection Committee members, appointed to evaluate or recommend selection in this RFP/RLI process. For Communication with County Commissioners and Commission staff, the Cone of Silence allows communication until the initial Evaluation or Selection Committee Meeting.

☒ The Vendor agrees to comply with the requirements of the Cone of Silence Ordinance.

Drug-Free Workplace Requirements Certification:
Section 21.31.a. of the Broward County Procurement Code requires awards of all competitive solicitations requiring Board award be made only to firms certifying the establishment of a drug free workplace program. The program must consist of:

1. Publishing a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the offeror's workplace, and specifying the actions that will be taken against employees for violations of such prohibition;

2. Establishing a continuing drug-free awareness program to inform its employees about:
   a. The dangers of drug abuse in the workplace;
   b. The offeror's policy of maintaining a drug-free workplace;
   c. Any available drug counseling, rehabilitation, and employee assistance programs; and
   d. The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

3. Giving all employees engaged in performance of the contract a copy of the statement required by subparagraph 1;

4. Notifying all employees, in writing, of the statement required by subparagraph 1, that as a condition of employment on a covered contract, the employee shall:
   a. Abide by the terms of the statement; and
   b. Notify the employer in writing of the employee's conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or of any state, for a violation occurring in the workplace NO later than five days after such conviction.

5. Notifying Broward County government in writing within 10 calendar days after receiving notice under subdivision 4.b above, from an employee or otherwise receiving actual notice of such conviction. The notice shall include the position title of the employee;

6. Within 30 calendar days after receiving notice under subparagraph 4 of a conviction, taking one of the following actions with respect to an employee who is convicted of a drug abuse violation occurring in the workplace:
   a. Taking appropriate personnel action against such employee, up to and including termination; or
   b. Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency; and

7. Making a good faith effort to maintain a drug-free workplace program through implementation of subparagraphs 1 through 6.

The Vendor hereby certifies that: (check box)

☒ The Vendor certifies that it has established a drug free workplace program in accordance with the above

requirements.

Non-Collusion Certification:

Vendor shall disclose, to their best knowledge, any Broward County officer or employee, or any relative of any such officer or employee as defined in Section 112.3135 (1) (c), Florida Statutes, who is an officer or director of, or has a material interest in, the Vendor's business, who is in a position to influence this procurement. Any Broward County officer or employee who has any input into the writing of specifications or requirements, solicitation of offers, decision to award, evaluation of offers, or any other activity pertinent to this procurement is presumed, for purposes hereof, to be in a position to influence this procurement. Failure of a Vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the Broward County Procurement Code.

The Vendor hereby certifies that: (select one)

☒ The Vendor certifies that this offer is made independently and free from collusion; or

☐ The Vendor is disclosing names of officers or employees who have a material interest in this procurement and is in a position to influence this procurement. Vendor must include a list of name(s), and relationship(s) with its submittal.

Public Entities Crimes Certification:

In accordance with Public Entity Crimes, Section 287.133, Florida Statutes, a person or affiliate placed on the convicted vendor list following a conviction for a public entity crime may not submit on a contract: to provide any goods or services; for construction or repair of a public building or public work; for leases of real property to a public entity; and may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in s. 287.017 for Category Two for a period of 36 months following the date of being placed on the convicted vendor list.

The Vendor hereby certifies that: (check box)

☒ The Vendor certifies that no person or affiliates of the Vendor are currently on the convicted vendor list and/or has not been found to commit a public entity crime, as described in the statutes.

Scrutinized Companies List Certification:

Any company, principals, or owners on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List is prohibited from submitting a response to a solicitation for goods or services in an amount equal to or greater than $1 million.

The Vendor hereby certifies that: (check each box)

☒ The Vendor, owners, or principals are aware of the requirements of Sections 287.135, 215.473, and 215.4275, Florida Statutes, regarding Companies on the Scrutinized Companies with Activities in Sudan List the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List; and

☒ The Vendor, owners, or principals, are eligible to participate in this solicitation and are not listed on either the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List; and

☒ If awarded the Contract, the Vendor, owners, or principals will immediately notify the County in writing if any of its principals are placed on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List.

I hereby certify the information provided in the Vendor Questionnaire and Standard Certifications:

	President	6/19/2018
*AUTHORIZED SIGNATURE/NAME	TITLE	DATE

Vendor Name: C Solutions, Inc.

* I certify that I am authorized to sign this solicitation response on behalf of the Vendor as indicated in Certificate as to Corporate Principal, designation letter by Director/Corporate Officer, or other business authorization to bind on behalf of the Vendor. As the Vendor's authorized representative, I attest that any and all statements, oral, written or otherwise, made in support of the Vendor's response, are accurate, true and correct. I also acknowledge that inaccurate, untruthful, or incorrect statements made in support of the Vendor's response may be used by the County as a basis for rejection, rescission of the award, or termination of the contract and may also serve as the basis for debarment of Vendor pursuant to Section 21.119 of the Broward County Procurement Code. I certify that the Vendor's response is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a response for the same items/services, and is in all respects fair and without collusion or fraud. I also certify that the Vendor agrees to abide by all terms and conditions of this solicitation, acknowledge and accept all of the solicitation pages as well as any special instructions sheet(s).

The Vendor hereby certifies that: (check each box)

☒ The Vendor has read Cone of Silence Ordinance, Section 1-266, Broward County Code of Ordinances; and

☒ The Vendor understands that the Cone of Silence for this competitive solicitation shall be in effect beginning upon the appointment of the Selection or Evaluation Committee, for communication regarding this solicitation with the County Administrator, Deputy County Administrator, Assistant County Administrators, and Assistants to the County Administrator and their respective support staff or any person, including Evaluation or Selection Committee members, appointed to evaluate or recommend selection in this RFP/RLI process. For Communication with County Commissioners and Commission staff, the Cone of Silence allows communication until the initial Evaluation or Selection Committee Meeting.

☒ The Vendor agrees to comply with the requirements of the Cone of Silence Ordinance.

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1. Publishing a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the offeror's workplace, and specifying the actions that will be taken against employees for violations of such prohibition;

2. Establishing a continuing drug-free awareness program to inform its employees about:
   a. The dangers of drug abuse in the workplace;
   b. The offeror's policy of maintaining a drug-free workplace;
   c. Any available drug counseling, rehabilitation, and employee assistance programs; and
   d. The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

3. Giving all employees engaged in performance of the contract a copy of the statement required by subparagraph 1;

4. Notifying all employees, in writing, of the statement required by subparagraph 1, that as a condition of employment on a covered contract, the employee shall:
   a. Abide by the terms of the statement; and
   b. Notify the employer in writing of the employee's conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or of any state, for a violation occurring in the workplace NO later than five days after such conviction.

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6. Within 30 calendar days after receiving notice under subparagraph 4 of a conviction, taking one of the following actions with respect to an employee who is convicted of a drug abuse violation occurring in the workplace:
   a. Taking appropriate personnel action against such employee, up to and including termination; or
   b. Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency; and

7. Making a good faith effort to maintain a drug-free workplace program through implementation of subparagraphs 1 through 6.

The Vendor hereby certifies that: (check box)

☒ The Vendor certifies that it has established a drug free workplace program in accordance with the above

requirements.

Non-Collusion Certification:

Vendor shall disclose, to their best knowledge, any Broward County officer or employee, or any relative of any such officer or employee as defined in Section 112.3135 (1) (c), Florida Statutes, who is an officer or director of, or has a material interest in, the Vendor's business, who is in a position to influence this procurement. Any Broward County officer or employee who has any input into the writing of specifications or requirements, solicitation of offers, decision to award, evaluation of offers, or any other activity pertinent to this procurement is presumed, for purposes hereof, to be in a position to influence this procurement. Failure of a Vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the Broward County Procurement Code.

The Vendor hereby certifies that: (select one)

☒ The Vendor certifies that this offer is made independently and free from collusion; or

☐ The Vendor is disclosing names of officers or employees who have a material interest in this procurement and is in a position to influence this procurement. Vendor must include a list of name(s), and relationship(s) with its submittal.

Public Entities Crimes Certification:

In accordance with Public Entity Crimes, Section 287.133, Florida Statutes, a person or affiliate placed on the convicted vendor list following a conviction for a public entity crime may not submit on a contract: to provide any goods or services; for construction or repair of a public building or public work; for leases of real property to a public entity; and may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in s. 287.017 for Category Two for a period of 36 months following the date of being placed on the convicted vendor list.

The Vendor hereby certifies that: (check box)

☒ The Vendor certifies that no person or affiliates of the Vendor are currently on the convicted vendor list and/or has not been found to commit a public entity crime, as described in the statutes.

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The Vendor hereby certifies that: (check each box)

☒ The Vendor, owners, or principals are aware of the requirements of Sections 287.135, 215.473, and 215.4275, Florida Statutes, regarding Companies on the Scrutinized Companies with Activities in Sudan List the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List; and

☒ The Vendor, owners, or principals, are eligible to participate in this solicitation and are not listed on either the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List; and

☒ If awarded the Contract, the Vendor, owners, or principals will immediately notify the County in writing if any of its principals are placed on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List.

I hereby certify the information provided in the Vendor Questionnaire and Standard Certifications:

Mark Drummond P.E., BCEE	President	6/19/2018
*AUTHORIZED SIGNATURE/NAME	TITLE	DATE

Vendor Name: C Solutions, Inc.

* I certify that I am authorized to sign this solicitation response on behalf of the Vendor as indicated in Certificate as to Corporate Principal, designation letter by Director/Corporate Officer, or other business authorization to bind on behalf of the Vendor. As the Vendor's authorized representative, I attest that any and all statements, oral, written or otherwise, made in support of the Vendor's response, are accurate, true and correct. I also acknowledge that inaccurate, untruthful, or incorrect statements made in support of the Vendor's response may be used by the County as a basis for rejection, rescission of the award, or termination of the contract and may also serve as the basis for debarment of Vendor pursuant to Section 21.119 of the Broward County Procurement Code. I certify that the Vendor's response is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a response for the same items/services, and is in all respects fair and without collusion or fraud. I also certify that the Vendor agrees to abide by all terms and conditions of this solicitation, acknowledge and accept all of the solicitation pages as well as any special instructions sheet(s).

SUBCONTRACTORS/SUBCONSULTANTS/SUPPLIERS REQUIREMENT FORM
Request for Proposals, Request for Qualifications, or Request for Letters of Interest

The following forms and supporting information (if applicable) should be returned with Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit may affect Vendor's evaluation.

A. The Vendor shall submit a listing of all subcontractors, subconsultants and major material suppliers (firms), if any, and the portion of the contract they will perform. A major material supplier is considered any firm that provides construction material for construction contracts, or commodities for service contracts in excess of $50,000, to the Vendor.

B. If participation goals apply to the contract, only non-certified firms shall be identified on the form. A non-certified firm is a firm that is not listed as a firm for attainment of participation goals (ex. County Business Enterprise or Disadvantaged Business Enterprise), if applicable to the solicitation.

C. This list shall be kept up-to-date for the duration of the contract. If subcontractors, subconsultants or suppliers are stated, this does not relieve the Vendor from the prime responsibility of full and complete satisfactory performance under any awarded contract.

D. After completion of the contract/final payment, the Vendor shall certify the final list of non-certified subcontractors, subconsultants, and suppliers that performed or provided services to the County for the referenced contract.

E. The Vendor has confirmed that none of the recommended subcontractors, subconsultants, or suppliers' principal(s), officer(s), affiliate(s) or any other related companies have been debarred from doing business with Broward County or any other governmental agency.

If none, state "none" on this form. Use additional sheets as needed. Vendor should scan and upload any additional form(s) in BidSync.

1. Subcontracted Firm's Name: Chen Moore and Associates

   Subcontracted Firm's Address: 500 W Cypress Creek Road Suite 630 Fort Lauderdale, FL 33309

   Subcontracted Firm's Telephone Number: 954.730.2030

   Contact Person's Name and Position: Peter Moore, P.E., LEED AP, F.ASCE, President

   Contact Person's E-Mail Address: pmoore@chenmoore.com

   Estimated Subcontract/Supplies Contract Amount: TBD

   Type of Work/Supplies Provided: Project Director/ GIS/Pump Station Inspections/Pump Station O&M Analysis/ Capital Improvement Plan

2. Subcontracted Firm's Name:

   Subcontracted Firm's Address:

   Subcontracted Firm's Telephone Number:

   Contact Person's Name and Position:

SUBCONTRACTORS/SUBCONSULTANTS/SUPPLIERS REQUIREMENT FORM
Request for Proposals, Request for Qualifications, or Request for Letters of Interest

The following forms and supporting information (if applicable) should be returned with Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit may affect Vendor's evaluation.

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C. This list shall be kept up-to-date for the duration of the contract. If subcontractors, subconsultants or suppliers are stated, this does not relieve the Vendor from the prime responsibility of full and complete satisfactory performance under any awarded contract.

D. After completion of the contract/final payment, the Vendor shall certify the final list of non-certified subcontractors, subconsultants, and suppliers that performed or provided services to the County for the referenced contract.

E. The Vendor has confirmed that none of the recommended subcontractors, subconsultants, or suppliers' principal(s), officer(s), affiliate(s) or any other related companies have been debarred from doing business with Broward County or any other governmental agency.

If none, state "none" on this form. Use additional sheets as needed. Vendor should scan and upload any additional form(s) in BidSync.

1. Subcontracted Firm's Name: BROWN AND CALDWELL

   Subcontracted Firm's Address: 1560 Sawgrass Corporate Parkway, Suite 240, Sunrise, FL 33323

   Subcontracted Firm's Telephone Number: 954-200-7611

   Contact Person's Name and Position: Dr. Celia Earle, Vice President

   Contact Person's E-Mail Address: cearle@brwncald.com

   Estimated Subcontract/Supplies Contract Amount: TBD

   Type of Work/Supplies Provided: Wastewater Hydraulic Model /Surge Hydraulic Model/ Emergency Response Plan/ Risk Based Prioritization

2. Subcontracted Firm's Name:

   Subcontracted Firm's Address:

   Subcontracted Firm's Telephone Number:

   Contact Person's Name and Position:

SUBCONTRACTORS/SUBCONSULTANTS/SUPPLIERS REQUIREMENT FORM
Request for Proposals, Request for Qualifications, or Request for Letters of Interest

The following forms and supporting information (if applicable) should be returned with Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit may affect Vendor's evaluation.

A. The Vendor shall submit a listing of all subcontractors, subconsultants and major material suppliers (firms), if any, and the portion of the contract they will perform. A major material supplier is considered any firm that provides construction material for construction contracts, or commodities for service contracts in excess of $50,000, to the Vendor.

B. If participation goals apply to the contract, only non-certified firms shall be identified on the form. A non-certified firm is a firm that is not listed as a firm for attainment of participation goals (ex. County Business Enterprise or Disadvantaged Business Enterprise), if applicable to the solicitation.

C. This list shall be kept up-to-date for the duration of the contract. If subcontractors, subconsultants or suppliers are stated, this does not relieve the Vendor from the prime responsibility of full and complete satisfactory performance under any awarded contract.

D. After completion of the contract/final payment, the Vendor shall certify the final list of non-certified subcontractors, subconsultants, and suppliers that performed or provided services to the County for the referenced contract.

E. The Vendor has confirmed that none of the recommended subcontractors, subconsultants, or suppliers' principal(s), officer(s), affiliate(s) or any other related companies have been debarred from doing business with Broward County or any other governmental agency.

If none, state "none" on this form. Use additional sheets as needed. Vendor should scan and upload any additional form(s) in BidSync.

1. Subcontracted Firm's Name: Tobon Engineering

   Subcontracted Firm's Address: 5504 nw 86 way coral springs, fl 33067

   Subcontracted Firm's Telephone Number: 9544155594

   Contact Person's Name and Position: Mauricio Tobon

   Contact Person's E-Mail Address: toboneng@bellsouth.net

   Estimated Subcontract/Supplies Contract Amount: $ 7%

   Type of Work/Supplies Provided: [Emergency Response Plan / Wastewater Hydraulic Model]

2. Subcontracted Firm's Name:

   Subcontracted Firm's Address:

   Subcontracted Firm's Telephone Number:

   Contact Person's Name and Position:

BROWARD COUNTY
FLORIDA

Office of Economic and
Small Business Development

Governmental Center Annex
115 S. Andrews Avenue, Room A680 • Fort Lauderdale, Florida 33301 • 954-357-6400 • FAX 954-357-6010 • TTY 954-357-5664

This Certificate is Awarded to:

C SOLUTIONS, INC.

As set forth in the Broward County Business Opportunity Act of 2012, the certification requirements have been met for:

County Business Enterprise
Small Business Enterprise
Anniversary Date: March 4th

Chris Atkinson
Small Business Development Manager

The Office of Economic and Small Business Development must be notified within 30 days of any material changes in the business which may affect ownership and control. Failure to do so may result in the revocation of this certificate and/or imposition of other sanctions.

A service of the Broward County Board of County Commissioners
www.broward.org/smallbusiness

© GOES 440

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BROWARD COUNTY FLORIDA
OFFICE OF ECONOMIC AND SMALL BUSINESS DEVELOPMENT

LETTER OF INTENT

BETWEEN BIDDER/OFFEROR AND COUNTY BUSINESS ENTERPRISE (CBE) FIRM/SUPPLIER

This form is to be completed and signed for each CBE firm. If the PRIME is a CBE firm, please indicate the percentage performing with your own forces.

Solicitation No.: Broward County Solicitation PNC2116651P1

Project Title: Regional Transmission System Master Plan

Bidder/Offeror Name: C Solutions, Inc.

Address: 610 SE 14th Court, Unit 2 City: Fort Lauderdale State: FL Zip: 33316

Authorized Representative: Mark Drummond, P.E., BCEE Phone: 954.764.7589

CBE Firm/Supplier Name: Tobon Engineering

Address: 5504 nw 86 way City: coral springs State: fl Zip: 33067

Authorized Representative: Mauricio Tobon, P.E. Phone: 9544155594

A. This is a letter of intent between the bidder/offeror on this project and a CBE firm for the CBE to perform work on this project.

B. By signing below, the bidder/offeror is committing to utilize the above-named CBE to perform the work described below.

C. By signing below, the above-named CBE is committing to perform the work described below.

D. By signing below, the bidder/offeror and CBE affirm that if the CBE subcontracts any of the work described below, it may only subcontract that work to another CBE.

Work to be performed by CBE Firm

Description	NAICS[1]	CBE Contract Amount[2]	CBE Percentage of Total Project Value
Engineering Consulting	541330		7.00 %
			%
			%

AFFIRMATION: I hereby affirm that the information above is true and correct.

CBE Firm/Supplier Authorized Representative

Signature: Mauricio Tobon Digitally signed by Mauricio Tobon Date: 2018.06.28 12:39:52 -04'00' Title: President Date: 06/28/2018

Bidder/Offeror Authorized Representative

Signature: [signature] Title: President Date: 7/13/2018

[1] Visit Census.gov and select NAICS to search and identify the correct codes. Match type of work with NAICS code as closely as possible.

[2] To be provided only when the solicitation requires that bidder/offeror include a dollar amount in its bid/offer.

In the event the bidder/offeror does not receive award of the prime contract, any and all representations in this Letter of Intent and Affirmation shall be null and void.

Rev.: June 2018 **Compliance Form No. 004**

BROWARD COUNTY FLORIDA

Office of Economic and
Small Business Development

Governmental Center Annex
115 S. Andrews Avenue, Room A680 • Fort Lauderdale, Florida 33301 • 954-357-6400 • FAX 954-357-5674 • TTY 954-357-5664

This Certificate is Awarded to:

TOBON ENGINEERING & DEVELOPMENT, LLC

As set forth in the Broward County Business Opportunity Act of 2012, the certification requirements have been met for:

County Business Enterprise(CBE)
Small Business Enterprise (SBE)
Anniversary Date: February 13th

Authorized Representative

The Office of Economic and Small Business Development must be notified within 30 days of any material changes in the business which may affect ownership and control. Failure to do so may result in the revocation of this certificate and/or imposition of other sanctions.

A Service of the Broward County Board of County Commissioners
www.broward.org/smallbusiness

Broward County Purchasing Division Solicitation

DOMESTIC PARTNERSHIP ACT CERTIFICATION FORM (REQUIREMENT AND TIEBREAKER)

Refer to Special Instructions to identify if Domestic Partnership Act is a requirement of the solicitation or acts only as a tiebreaker. If Domestic Partnership is a requirement of the solicitation, the completed and signed form should be returned with the Vendor's submittal. If the form is not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes. To qualify for the Domestic Partnership tiebreaker criterion, the Vendor must currently offer the Domestic Partnership benefit and the completed and signed form must be returned at time of solicitation submittal.

The Domestic Partnership Act, Section 16 ½ -157, Broward County Code of Ordinances, requires all Vendors contracting with the County, in an amount over $100,000 provide benefits to Domestic Partners of its employees, on the same basis as it provides benefits to employees' spouses, with certain exceptions as provided by the Ordinance.

For all submittals over $100,000.00, the Vendor, by virtue of the signature below, certifies that it is aware of the requirements of Broward County's Domestic Partnership Act, Section 16-½ -157, Broward County Code of Ordinances; and certifies the following: (check only one below).

- ☑ 1. The Vendor currently complies with the requirements of the County's Domestic Partnership Act and provides benefits to Domestic Partners of its employees on the same basis as it provides benefits to employees' spouses
- ☐ 2. The Vendor will comply with the requirements of the County's Domestic Partnership Act at time of contract award and provide benefits to Domestic Partners of its employees on the same basis as it provides benefits to employees' spouses.
- ☐ 3. The Vendor will not comply with the requirements of the County's Domestic Partnership Act at time of award.
- ☐ 4. The Vendor does not need to comply with the requirements of the County's Domestic Partnership Act at time of award because the following exception(s) applies: (check only one below).

  - ☐ The Vendor is a governmental entity, not-for-profit corporation, or charitable organization.
  - ☐ The Vendor is a religious organization, association, society, or non-profit charitable or educational institution.
  - ☐ The Vendor provides an employee the cash equivalent of benefits. (Attach an affidavit in compliance with the Act stating the efforts taken to provide such benefits and the amount of the cash equivalent).
  - ☐ The Vendor cannot comply with the provisions of the Domestic Partnership Act because it would violate the laws, rules or regulations of federal or state law or would violate or be inconsistent with the terms or conditions of a grant or contract with the United States or State of Florida. Indicate the law, statute or regulation (State the law, statute or regulation and attach explanation of its applicability).

Authorized Signature/Name	Title	Vendor Name	Date
	President	C Solutions, Inc.	7/13/2018

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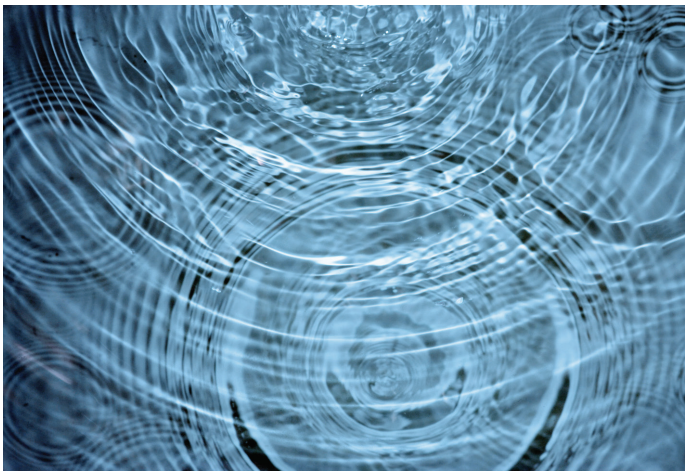
Standard Agreement Language Requirements



AGREEMENT EXCEPTION FORM

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, it shall be deemed an affirmation by the Vendor that it accepts the terms and conditions of the County's Agreement as disclosed in the solicitation.

The Vendor must either provide specific proposed alternative language on the form below. Additionally, a brief justification specifically addressing each provision to which an exception is taken should be provided.

☒ There are no exceptions to the terms and conditions of the County Agreement as referenced in the solicitation; or

☐ The following exceptions are disclosed below: (use additional forms as needed; separate each Article/ Section number)

Term or Condition Article / Section	Insert version of exception or specific proposed alternative language	Provide brief justification for change

Vendor Name: C Solutions, Inc.

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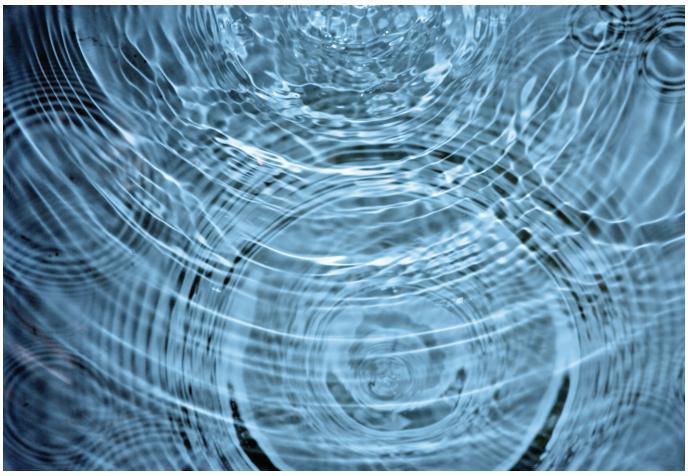
Evaluation Criteria



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A. Ability of Professional Personnel

"We believe that experience is realized with the people assigned work on your project"

The team we have assembled to meet the requirements of this RFQ, C Solutions, Inc., Brown & Caldwell, Chen Moore and Associates, and Tobon Engineering, allows us the ability to provide you with very focused, accessible, senior professionals backed by a consortium of strong technical resources. The prime firm, C Solutions, brings a high level of expertise along with the personal service that a small firm provides, and is supplemented by the vast resources and Broward County experience provided Brown and Caldwell and Chen Moore and Associates.

Established in 2005, C Solutions Inc. is a minority owned and certified local small business corporation headquartered in Broward County. Our vision is to provide senior professionals with ability to focus on a client's need. We believe that providing the right solution relies on quality of the client relationship and are committed to a shared understanding of the challenge, the need and the desired result. Our expertise includes the planning, design, permitting, and construction management of water, wastewater and reclaimed water infrastructure projects for public municipalities in Florida, including:

- Water Supply Systems
- Water Treatment Facilities
- Water Distribution Systems
- Wastewater Collection Systems
- Wastewater Treatment Facilities
- Pump Stations
- Hydraulic Modeling
- Value Engineering
- Directional Drilled installations of Pipelines

C Solutions is experienced in providing analysis and capital improvement planning for multiple South Florida Municipalities recently including: Broward County, Palm Beach County and the City of Riviera Beach. C Solutions assisted in providing the preparation of the Broward County Water and Wastewater Retail Masterplan, the Palm Beach County Wastewater Masterplan, the Glades Regional Wastewater Masterplan and the Riviera Beach Water and Wastewater Masterplan.

Tobon Engineering is a minority owned small consulting business founded by Maurice Tobon, a Professional Engineer with over 28 years of experience in water, wastewater and stormwater engineering in south Florida. Tobon Engineering is solely focused on engineering consultant and utility management for municipalities.

Tobon Engineering
Engineering and Utility Management

The owner and president of Tobon Engineering, Maurice Tobon served for nineteen years at the highest management levels of two of the largest water utilities in south Florida (Palm Beach County and City of Fort Lauderdale) and was responsible for nearly $ 1 billion in program management capital improvements. Mr. Tobon has unique experience and insight from many years in government and understands the issues faced by water utilities.

Chen Moore and Associates is a multi-discipline consulting firm with offices in Broward, Miami-Dade, Palm Beach, Orange and Alachua Counties. Founded in 1986, Chen Moore and Associates specializes in civil and environmental engineering; landscape architecture; planning; GIS analysis and mapping; transportation, streetscaping and traffic improvements; construction administration; wastewater collection, transmission, treatment, reuse and disposal; pump station design and rehabilitation; water supply, treatment, and distribution; stormwater system design and master plans; and modeling and permitting of drainage, water distribution, and sewer collection. Dr. Chen founded Chen Moore and Associates with a belief that relationships are the key to the planning, design and construction of successful projects.

CHEN·MOORE
&ASSOCIATES

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Since 1947, Brown and Caldwell (BC) has been at the forefront of water and wastewater innovations with one primary goal: providing effective and sustainable solutions. With a principal focus on water and wastewater engineering, more than 60 offices, and over 1,600 professionals, we have the resources to deliver your utility projects to meet your high standards of safety and strategic plans. Our national reputation is based on exceptional client service and an unwavering commitment to quality. We are an employee-owned, 100% environmental firm. That makes us truly unique in our industry.

Brown AND Caldwell

Our firm's size enables us to customize solutions, and our culture encourages practical innovation. We collaborate as one with our clients and, in doing so, we have earned their respect and continuing trust. As a result, each member of our team has been specifically selected for this contract based on his/her technical expertise, prior working relationships with each other, and previously demonstrated ability to be responsive and reliable. Work for this contract will be performed out of Brown and Caldwell's office situated at 1560 Sawgrass Corporate Parkway, Suite 240, Sunrise, FL 33323.

Since the early 1980's, Brown and Caldwell has supported the engineering needs of several Florida utility systems across a diverse array of service areas. We have delivered impactful results in planning, compliance, operational optimization, asset management and implementation of improvements that are well aligned with the County's needs.

Brown and Caldwell has worked alongside County staff and has considered itself to be a partner with Broward County in dealing with challenges faced by the County. Our team has relevant experience solving similar challenges for 25 other Florida systems. Our team offers valuable continuity that will assure responsive and impactful results that build upon lessons learned from the past.

For this contract, related projects that we have performed within the past five years for Broward County include:

- Master Pump Station 462 Assessment Study
- Basis of Design Report, Detailed Design, Permitting and Bidding for the Reclaimed Water Plant Expansion Project
- North County Reuse Feasibility Study
- Effluent Pump Station Electrical Assessment
- 3BC Sanitary Sewer System Feasibility Study
- 3A Collection System Hydraulic Model
- Collection System Chloride Infiltration Study
- Hillsboro Pines NIP Survey
- Sanitary System Survey
- NRWWTP Disposal System Survey
- Analysis of Alternatives for implementing a replacement for Intracoastal Waterway Forcemain Crossing
- 3BC Septic Elimination Analysis Memorandum
- Modeling of Reclaimed Water Transmission System

Mark Drummond, P.E., BCEE

Mr. Drummond has over 22 years of engineering design experience on water and wastewater infrastructure projects and has designed water infrastructure projects for clients in Florida, the Caribbean and Latin America totaling over $300 million. These projects include the Headworks Rehabilitation for the 38 mgd Fort Lauderdale Wastewater Treatment Plant; new Aguadulce 12 mgd Surface Water Treatment Plant and surface water intake facility; conversion of Riviera Beach's 16mgd wet-pit dry pit master wastewater pump station to a new above-ground inline booster pump station; and Value Engineering for MDWASD for the Headworks Rehabilitation at 112 mgd North District Wastewater Treatment Plant (WWTP) and for the new Injection Well Surface Facilities at the 143 mgd Central District WWTP.

John Hill, P.E.

Mr. Hill has 52 years of experience in civil and environmental engineering with expertise in all phases of the planning, design, quality review, and construction management for municipal wastewater and water facilities. Mr. Hill has design and construction management experience on multiple large-scale wastewater and water projects totaling over $750 million in construction. These projects include: Atlanta's largest wastewater treatment

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facility, the 180 mgd R.M. Clayton Wastewater Treatment Plant; Tampa Bay's Regional 122 mgd Surface Water Treatment Plant DBO where he was involved in the design and day-to-day onsite construction management; and Orange County's 11 mgd Wastewater Master Pump Station with a interceptor wetwell 110 feet deep and 40 feet wide.

Richard Moore, P.E., BCEE

Mr. Moore specializes in engineering and project management services related to biosolids management, drinking water, and wastewater treatment, and has over 45 years of experience in the planning, design, and construction of major water and wastewater facilities in the United States and overseas. Mr. Moore's project involvement includes managing major public utility projects in the areas of biosolids management and solids handling, water supply, treatment, and distribution; wastewater collection, treatment, and disposal. These projects the 122 mgd Tampa Bay Regional Surface Water Treatment Plant (Phase I and II) where he was the Project Manager and lead design engineer for solids handling improvements; Tampa Bay Water's surface water supply project including two intake pump stations, a repump station, and 17 miles of 84-inch and 72-inch pipelines; and Senior Technical Advisor for Miami Dade County Biosolids Master Plan which evaluated the existing biosolids program for all of MDWASDs three regional wastewater treatment plants.

Maurice Tobon, P.E.

Mr. Tobon has over 25 years of hydraulic modeling experience using KYPIPE, Cybernet, and Infowater software. Mr. Tobon has developed hydraulic models up to 75,000 pipes for both water and wastewater systems, including pump and booster stations and is experienced in model development using data from GIS databases, SCADA data, and field test data. For wastewater systems this experience includes static as well as extended period simulation of multiple wastewater pump station, booster stations and force main systems, incorporating knowledge on the simulation of collection area flow patterns, pump operations, and analysis of resultant force main pressures, flows and pump station cycling.

The following is a listing of hydraulic modeling projects;

- Avenir and Ancient Tree Development Water and Wastewater (ongoing)
- Palm Beach County Water Reuse (ongoing)
- Palm Beach County Water Model Update (ongoing)
- North Lauderdale Wastewater (pending approval)
- Royal Utility Company Water
- Seacoast Utility Authority Reclaimed Water
- Seacoast Utility Authority Potable Water
- City of Coral Springs Water and Wastewater
- City of Boca Raton Water and Reclaimed Water
- City of Port Charlotte Rotonda Area Water
- City of Miami Beach Wastewater
- City of Fort Lauderdale Water and Wastewater
- Palm Beach County Water Reclaimed Water Transmission System Raw Water and Wastewater
- Palm Beach County Water Raw Water Pumping and Transmission System for various WTP facilities
- Palm Beach County Water Wastewater Pumping and Transmission System

Nigel O. Grace, P.E.

Nigel Grace brings more than 28 years of experience serving in wide-ranging roles in the management and direction of complex multi-disciplinary projects that draw on diverse skill sets in areas of technology applications, regulatory negotiations, and operational/process optimization. In addition to being one of the firm's drinking water leads, he currently serves as one of the firm's water technology leaders and through this experience brings broad insights on emerging issues of concern and the complex challenges faced by the utility community. For over 25 years, he has served a wide array engineering needs for Broward County Water and Wastewater Services inclusive of master planning, water supply and water treatment system optimization, reclaimed water planning and regulatory advocacy, and ongoing distribution system water quality optimization. Through his

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efforts, he has played an instrumental role in supporting the development of the City's diverse portfolio of water supplies as well as a modified plan for complying with the Ocean Outfall Legislation that resulted in concessions that saved the City an estimated $200 Million.

Chris Garrett, P.E.

Chris Garrett, P.E. specializes in all aspects of wet weather flow studies and utility infrastructure evaluation, rehabilitation, design, and program management projects. His specialties include conventional and alternative sanitary sewer designs, stormwater drainage design and water quality improvement initiatives, infrastructure rehabilitation, and GIS-CMMS for utility management. He is also a trainer for the NASSCO PACP/MACP/LACP program and presently assisting with the next version of the training and reference manual. As a co-leader of Brown and Caldwell's national Aging Infrastructure initiative, Chris is promoting advanced condition assessment technologies and criticality based decision making for prioritizing inspection and system rehabilitation that promotes BC's Four R's of reinspection, repair, rehabilitation and replacement. Chris has written and presented a number of papers on water quality and infrastructure rehabilitation with projects highlighted in a number of periodicals, including Trenchless Technology magazine.

V. "Ravi" Ravisangar, PhD, PE, BCEE

Dr. Ravisangar has more than 19 years of experience in water and wastewater pumping and treatment related work. His experience spans a broad range from studies and design to construction and startup. His subject matter expertise includes water and wastewater pumping system analysis and design, pumping system rehabilitation, water and wastewater plant hydraulic analyses, water distribution system modeling, dynamic and transient hydraulic analysis of piping networks, surge protection systems design, and sludge and slurry rheology and hydraulics of non-Newtonian fluids. He is also an active technical reviewer for ASCE Journal of Pipeline Systems. He led the design effort to adding new pumps for existing deep injection well pumping system and is is ready to leverage that experience to benefit the County.

Brian Scott, P.E.

Brian Scott has 10 years of experience in a variety of water and wastewater planning, design, and construction management projects. His expertise includes the evaluation and optimization of unidirectional flushing programs, the study of water quality issues in distribution systems, and the use of hydraulic modeling software such as InfoWorks, InfoWater, InfoSWMM, H2OMAP Water, WaterGEMS, SewerGEMS, and DHI Mike Urban. He has been involved in the development of master plans for numerous clients across the country and is skilled in the development and analysis of water, wastewater, and reclaimed water models. Additionally, his experience includes proficiency with AutoCAD and ArcGIS, pump station and pipeline design, statistical analysis, construction management, pilot testing, and permitting.

Peter Moore, P.E., LEED AP, ENV SP, F.ASCE

Mr. Moore is the president of CMA with more than 21 years of experience with a wide variety of utility, stormwater, transportation and other infrastructure projects. Since joining CMA in 1999, Mr. Moore has focused on the management, planning, design, permitting, and construction of various utility infrastructure projects for public clients throughout South Florida. Mr. Moore has worked on literally dozens of unique projects for Broward County valued at $100M in his career, literally serving in every role in a project team. Of particular note is Mr. Moore's experience in value engineering, including projects for Broward County WWS, Miami-Dade Water and Sewer Department and a development client in Saudi Arabia. Including his assistance as a reviewer and design guideline developer for the firm's work in the Republic of Panama, Mr. Moore has an additional $500M of international project exposure to give him the full arsenal of tools to serve Broward County. A lifelong Broward County Resident, Mr. Moore has his Bachelor of Science and Master of Engineering in Civil Engineering, is a licensed professional engineer in Florida and has been elected as a Fellow of the American Society of Civil Engineers (ASCE) for his lifetime achievements and contributions to civil engineering. To show his understanding of today's issues, Mr. Moore also is

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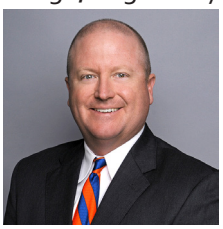
an Envision Sustainability Professional and a LEED Accredited Professional (two additional certifications specializing in sustainability). He is a past president and board member of numerous local, regional and national professional societies and non-profit organizations.

Jason McClair, P.E., CFM, LEED AP



Mr. McClair is a senior civil engineer with more than 22 years of experience in utility infrastructure design, regulatory permitting, geotechnical engineering, and computer aided flow modeling for stormwater collection, water distribution, and sanitary transmission systems. Since joining CMA in 2001, Mr. McClair has focused on the management, planning, design, permitting, and construction of various utility infrastructure projects for public clients throughout South Florida, including for BCAD. He has extensive experience with hydraulic and hydrologic modeling for the analysis of stormwater, water, and wastewater systems. Mr. McClair has over 10 years of experience working directly for BCAD. He was the project manager for the Fort Lauderdale-Hollywood International Airport Stormwater Master Plan Update Project from 2008 through 2013 and is currently responsible for the stormwater design and permitting on the FLL North Airfield Pavement Rehabilitation Project. He also is currently working on the stormwater design and permitting on various projects at Fort Lauderdale Executive Airport.

Paula Fonseca, P.E.

Paula Fonseca, P.E. is a civil engineering graduate with nine years of experience. She serves as senior engineer for Chen Moore and Associates and serves as the primary hydraulic modeler for the firm. Ms. Fonseca has worked for CMA for seven (7) years with focus on hydraulic modeling using InfoWater. She assists with design work using AutoCAD, GIS, WaterCAD, SewerCAD, StormCAD, and InfoWater 8.1v. Ms. Fonseca has worked on neighborhood improvement projects for Broward County, utility coordination projects for Riviera Beach Utility District, including water and sewer designs and permitting, Design of GIS Utility Atlases for the City of Pompano Beach and Solid Waste Authority, as well as civil engineering design, drafting, permitting, cost evaluations and construction inspection for various project involving water and force main improvements for the City of Margate. Moreover, Ms. Fonseca has worked on the Palm Beach County Water Master Plan and Glades Regional Water Master Plan through the use of water modeling software (InfoWater) and GIS. In addition, she has worked on hydraulic models for the City of Margate evaluating the robustness of its water and force main systems.

Patrick Kaimrajh, P.E.

Patrick D Kaimrajh, PE serves as a senior engineer for CMA and specializes in civil engineering design, drafting, permitting, and construction inspection. His 9 years of design experience at CMA includes paving, drainage and stormwater management, sanitary sewer and stormwater pump stations, water main, site development, and neighborhood improvement projects. He has prepared engineering drawings, cost evaluations, design reports and various permit applications. In addition, Mr. Kaimrajh has performed construction inspections for drainage, watermain, sanitary sewer, and pavement. He also is skilled in AutoCAD Civil3D, ICPR, EPA SWMM, Cascade, HY-8, WaterCAD, SewerCAD, and StormCAD, modeling and design software. Mr. Kaimrajh will be responsible for the planning and modeling efforts related to the stormwater, water, and wastewater infrastructure of this project.

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BROWARD COUNTY
FLORIDA

QA/QC
Richard Moore, P.E., BCEE

Project Director
Peter Moore, P.E.,LEED AP, ENV SP, F.ASCE

Project Manager
Mark Drummond, P.E., BCEE

Hydraulic Modeling	Pump Station Inspections / Condition Assessment	Risk Based Prioritization	Emergency Response Plan	Capital Improvement Plan
GIS Paula Fonseca, P.E. **Surge Hydraulic Model** V. "Ravi" Ravisangar, PhD, PE, BCEE **Wastewater Hydraulic Model** Brian J. Scott, P.E. Maurice Tobon, P.E., PMP	**Pump Station Inspections** Mark Drummond, P.E., BCEE Patrick Kaimrajh, P.E. **Pump Station O&M Analysis** John Hill, P.E. Jason McClair, P.E., CFM, LEED AP	**Pipelines** Nigel O. Grace, PE Christopher S. Garrett, P.E. Paula Fonseca, P.E.	Christopher S. Garrett, P.E. Maurice Tobon, P.E., PMP	Mark Drummond, P.E., BCEE Nigel O. Grace, PE Jason McClair, P.E., CFM, LEED AP

Subconsultants
Chen Moore and Associates
Brown and Caldwell
Tobon Engineering (Broward County CBE)

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Mark S. Drummond, P.E., BCEE

President

Project Manager / Capital Improvement Plan/Pump Station Inspections / Condition Assessment

Education

B.S. – Civil Engineering, Florida International University, 1996

(Minor in International Relations)

Registration

Professional Engineer: Florida (License No: 57428)

Professional Engineer: Jamaica (Registration No: PE/01/0583)

Certified NASSCO PACP, MACP, LACP

Professional Activities

Water Environment Federation (WEF)
FWEA Chairman of International Committee (2002-2006)
Caribbean Water and Waste Water Association (CWWA)
Florida Engineering Society (FES)
American Water Works Association (AWWA)
Chairman of Distribution Committee (2000-2002)
American Society of Civil Engineers (ASCE)
Inter-American Association of Sanitary Engineering (AIDIS)

Mark Drummond is a civil / environmental engineer experienced in water and wastewater treatment process design, water distribution systems, wastewater collection and transmission systems, water reuse systems, hydraulic modeling, water supply projects, horizontal directional drilling design, sanitary sewer evaluation surveys, management consulting, information management systems, and permitting.

MASTERPLANS

Project Engineer, Retail Potable Water and Wastewater Masterplan, Broward County, Florida. This project provided the retail water and wastewater masterplan for Broward County. Mr. Drummond evaluated alternate wastewater treatment and effluent disposal suppliers for certain regions in the County, assisted in the calibration of the water and wastewater hydraulic models, provided growth forecast through the year 2040 to estimate potable water demand and wastewater flows, provided studies to estimate infiltration and inflow, performed a condition assessment for the County's wastewater lift stations, and provided recommendations for future capital improvement and rehabilitation and replacement projects.

Project Engineer, Wastewater Masterplan, Palm Beach County Water Utilities, Florida. This project provided the wastewater masterplan for Palm Beach County. Mr. Drummond assisted with the analysis of the existing wastewater service area and the evaluation of infiltration and inflow into the wastewater collection system.

Project Engineer, Utility Water and Wastewater Masterplan, City of Riviera Beach, Florida. This project provided the creation of the initial Water and Wastewater Masterplan for the Riviera Beach Utility District. The Masterplan summarized the existing conditions of the water and wastewater system, created hydraulic models for both the water distribution and wastewater collection systems and prioritized improvements for the water supply, water treatment, water distribution and wastewater collection systems.

Project Engineer, Glades Wastewater Masterplan, Palm Beach County Water Utilities, Florida. This project provided the creation of the initial Wastewater Masterplan for the municipalities of South Bay, Belle Glade and Pahokee. The Masterplan summarized the existing

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conditions wastewater system, refined the hydraulic model for wastewater collection systems and prioritized improvements for the wastewater collection and treatment systems. Mr. Drummond assisted in the collection of data for the existing wastewater collection and treatment systems, preparation of sanitary sewer evaluation surveys (SSES), and preparation of the capacity analysis reports for the wastewater treatment plants.

Project Manager, Treasure Cay Water & Wastewater Utility, Abaco, Bahamas. Responsible for the review of existing water, wastewater, and irrigation services and the analysis of the capital improvements needed to bring the utility to an acceptable level of service. This evaluation included hydraulic modeling of the water distribution and wastewater collection systems, capital and O&M cost analyses, and the preliminary design of a water distribution system, wastewater collection system, and the water and wastewater treatment plants.

WATER SUPPLY

Design Engineer, Winding Bay Water Supply Project, The Abaco Club on Winding Bay, Abaco, Bahamas. This project included the design of a raw water well field, water storage facilities, and hydraulic modeling of the water transmission and distribution system.

Technical Advisor, Value Engineering Floridan Water Supply Wells, Miami Dade Water & Sewer Department, Florida. Mr. Drummond provided value engineering of the Floridan wells, submersible well pumps, piping, and appurtenances for five new Upper Floridan Wells designed by Miami Dade County totaling 4.7 mgd (firm capacity).

Design Engineer, Hobe Sound Polo Club Fire Protection Floridan Water Supply Well, Hobe Sound, Florida. Mr. Drummond provided the design of a Floridan Water Supply Well to supply fire protection for the Hobe Sound Polo Club consisting of polo grounds, horse barns, and large single family homes located on 20-acre lots.

Technical Advisor, 9 MGD Shrimp Farm Seawater Pump Station, Belize Aquaculture Ltd., Belize Central America. Provided technical expertise for the modifications to an existing salt water supply system. The modifications included the upsizing of the existing saltwater pump station, intake structures, and dual 5-mile transmission mains to provide 9 MGD to an inland shrimp farm. The dual 24-inch transmission mains transfer saltwater between the island seawater pump station and two 16-acre reservoirs and includes a 2-mile sub-aqueous saltwater bay crossing of an active waterway.

Project Engineer, Family Islands Water Supply Expansion, The Bahamas Water and Sewerage Corporation, Bahamas. Assisted in the design of water supply wells and distribution systems for the Bahamas Water and Sewer Corporation's potable water system expansion program in the Islands of Abaco, Eleuthera, and Exuma.

WATER TREATMENT

Project Manager, 17.5 MGD Sodium Hypochlorite Disinfection Facility, City of Riviera Beach, Florida. Mr. Drummond is the Engineer of Record for the design of sodium hypochlorite (NaOCl) disinfection facilities for an existing 17.5mgd conventional lime softening Water Treatment Plant. This design entails the conversion of an existing gaseous chlorine disinfection to a sodium hypochlorite and includes new: NaOCl storage and chemical feed facilities; chemical piping, valves and appurtenances; flow meters for measurement of WTP flow and flow pacing of NaOCl chemical injection; re-carbonation system for pH control and new motor control center to consolidate various electrical equipment into the new facility.

Project Manager, 12 MGD Aguadulce Water Treatment Plant, IDAAN, Aguadulce, Panama. This project included the design of a new 12mgd Surface WTP including, surface water intake from the Santa Maria river, raw water transfer pump station, flocculation and coagulation basins, dual media self-backwashing filters, solids handling and backwash recycle water basins, finished water storage and high service pump station to distribute water to remote storage tanks to serve 50 cities/towns through 200km of transmission pipeline.

Project Manager, Packed Tower Aerator Design Evaluation, City of Riviera Beach, Florida. Mr. Drummond provided the base design criteria required to renovate and provide media replacement of the four packed tower aerators for the 17.5mgd Water Treatment Plant.

Project Manager, WTP Hydraulic Profile Analysis, City of Riviera Beach, Florida. This project includes the development of a Hydraulic Profile depicting the process flow through the existing WTP and the analysis of the existing WTP hydraulics to identify issues and formulate recommendations for improvements to the existing WTP

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design and operation.

Project Manager, Preliminary Design of Lime Feed System, City of Riviera Beach, Florida. This project includes an analysis of the existing lime feed system, recommendations for improvements and the generation of a conceptual lime system improvement plan that defines the design criteria for the recommended improvements.

Project Engineer, West WTP Expansion, Phase II, City of Deerfield, Florida. Responsible for the design of a 9 MGD blending water treatment train including: lime softening unit, aerators, and associated chemical systems. Other responsibilities included the design of bulk storage tanks, piping, feed pumps, and injection points associated with the chemical systems of a new 10.5 MGD nanofiltration membrane plant.

Design Engineer, Rehabilitation of 16 MGD Water Treatment Plant, City of Lauderhill, Florida. Responsible for the design of lime sludge systems including vacuum filters, thickeners, and thickened lime transfer pumps; lime chemical feed ejectors; waste lime transfer pumps; and filter backwash pumps. Other responsibilities included the crosscheck of drawings and the writing and editing of specifications for upgrade modifications to the entire treatment plant.

Design Engineer, Preliminary Design for WTP Improvements, City of North Lauderdale, Florida. Mr. Drummond provided services to prepare a preliminary design for the design-build modifications being provided to the City's 7.5 mgd lime softening water treatment plant.

Project Engineer, Water Supply, Treatment and Distribution System Regulatory Review, City of Riviera Beach, Florida. This project provided a review of the existing and proposed drinking water regulations as they relate to operation of the City's water treatment and distribution system. A report summarizing existing and proposed drinking water regulations and identifying the City's current and potential near compliance status was provided.

Design Engineer, Evaluation of WTP Disinfection, City of Riviera Beach, Florida. Mr. Drummond provided the feasibility study to evaluate various alternatives to the existing disinfection system at the City's existing 17.5mgd lime softening water treatment plant.

Design Engineer, 2 MGD Concentrate Pump Station, City of Deerfield Beach, Florida. Mr. Drummond was responsible for the design of a 12-inch directionally drilled concentrate disposal water main for 2.0-mgd concentrate disposal pump station.

Project Engineer, Norwood-Oeffler Water Treatment Plant Concentrate Deep Injection Well Construction Review Report, City of North Miami Beach, Florida. This project included the review of technical details for the construction of a concentrate deep injection well and a dual-zone monitor well. A Construction Review Report was prepared that compared the construction, testing, and performance of the wells to the contract documents.

WATER DISTRIBUTION AND TRANSMISSION SYSTEMS

Project Engineer, Evaluation and Design of Secondary Disinfection Alternatives, City of Riviera Beach, Florida. Provided an evaluation of the existing system conditions and various secondary disinfection alternatives to help alleviate low total chlorine residuals experienced in the remote regions of the City's potable water distribution system and designed a secondary disinfection system at the remote pump stations to enhance the total chlorine residual.

Project Manager, Hillsboro Water Repump Station CaOCl Feed System, City of Coconut Creek, Florida. This project included the design-build of a secondary disinfection system for the City of Coconut Creek's 5 MGD potable water repump station.

Project Manager, Preliminary Hydraulics Evaluation Guaynabo – Gurabo Transmission System, Puerto Rico. This project included the evaluation of existing and proposed water systems for the provision of 40 MGD of water to distributed service areas spanning 40km. The evaluation included hydraulic modeling, surge analysis, site selection, and preliminary design recommendations for storage tanks, a 42-inch 40km transmission main, and rehabilitation and replacement of a 40 MGD pump station.

Design Engineer, Broward County District 2 Potable Water Booster Station, Broward County, Florida. This project included the evaluation of a new in-line 9.7 MGD booster pump station to maintain system pressures. Responsible for the preparation of a technical design memorandum outlining the feasibility of the project, comparing pump station alternatives, and defining the hydraulic design conditions based on the previously performed hydraulic

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model.

Design Engineer, Repair of 36-inch Water Main, City of Miami Beach, Florida. Responsible for the design of a 450 linear foot directional drill for emergency repair of a 36-inch water main rupture under a major highway.

Technical Advisor, La Placida Fire Flow Review, City of Coral Springs, Florida. Mr. Drummond provided the review of fire flow test calculations and methodologies to show minimum fire flow requirements for the redevelopment of 37 single family homes.

Design Engineer, Downtown Water Main Improvements Phase I City of Dania Beach, Florida. Responsible for the design of a 650 linear foot directional drill of a 14-inch water main under a City canal.

Design Engineer, Military Mains Project, City of Boca Raton, Florida. Responsible for the design of three directionally drilled 16-inch water main crossings totaling approximately 1,100 linear feet.

Design Engineer, Davie Boulevard Water Transmission and Force Main, City of Fort Lauderdale, Florida. Designed 5 miles of 24-inch water main through a highly urbanized and constricted corridor to replace a 75 year old water main and assisted in the design of a 54-inch force main. The design included routing and financial analysis for water mains and existing force mains ranging from 24 to 54-inches, design of a 2,000 foot directional drill underneath a heavily traveled interstate and waterway, and design of a jack and bore under active railroads.

WASTEWATER TREATMENT

Project Manager, 38 MGD GTL WWTP Influent Bar Screen Rehabilitation Design Build, City of Fort Lauderdale, Florida. Mr. Drummond was the Engineer of Record for the design and permitting of the replacement of influent screening devices at the 38 mgd GTL Wastewater Treatment Plant. The rehabilitation included the design of four (4) new plate screens to replace all existing influent screening devices while keeping the WWTP in continuous operation.

Project Manager, Value Engineering North District Wastewater Treatment Plant Headworks Rehabilitation Project, Miami Dade Water & Sewer Department, Florida. Mr. Drummond provided value engineering for the rehabilitation of the influent screening, primary sludge degritting, and sludge transfer systems along with the replacement and relocation of the electrical switchgear for the 240-mgd North District Wastewater Treatment Plant.

Design Engineer, 9 MGD Advanced Wastewater Treatment Facility, City of Fort Myers, Florida. Performed the process and hydraulic design of the treatment and pumping systems. This project included the design of a new 9-mgd Advanced Wastewater Treatment Facility (AWWTF) at the City's existing South Wastewater Treatment Plant to enhance the City's reuse water capabilities. The AWWTF included tertiary filtration, disinfection, transfer and high service pump stations, and two 5 MG storage tanks.

Project Manager, Central District WWTP Injection Well Pump Station Surface Facilities Value Engineering, Miami Dade Water & Sewer Department, Florida. Mr. Drummond provided value engineering for the design of the Injection Well Pump Station Surface Facilities for the 143mgd Central District WWTP. The design included the construction of two 19.9mgd Class I Deep Injection Wells and pump station to dispose Leachate from the Virginia Key Landfill and dewatering centrate, digester gas scrubber wastewater and secondary treated effluent from the WWTP.

Design Engineer, Permit Modification North District WWRF, Miami Dade Water & Sewer Department, Florida. Mr. Drummond provided engineering services to prepare and submit a modification to the wastewater operations permit to upgrade the reuse treatment facilities for the North District advanced wastewater treatment facility.

Technical Advisor, WWTP Reform Industrial Park, Lee Young & Partners, Port of Spain, Trinidad. Provided quality review services for all design aspects of the waste water treatment plant (WWTP). This project included the design of sewerage collection system and an activated sludge extended aeration WWTP to serve a 25 lot industrial estate.

Project Engineer, Sawgrass 20-mgd Wastewater Treatment Plant (WWTP), City of Sunrise, Florida. Responsibilities included the design of: onsite drainage, lift stations, sodium hypochlorite system, equalization basins and the securing of necessary permits. Assisted in the design of site piping, return activated sludge/waste activated sludge systems, cost estimating, writing and editing specifications, and bid evaluations.

Project Engineer, Springtree 9-mgd Wastewater Treatment Plant (WWTP) Rehabilitation, City of Sunrise,

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Florida. Assisted in the design and permitting of the 9-mgd Springtree WWTP Rehabilitation.

Project Engineer, Park City Wastewater Treatment Plant (WWTP), City of Sunrise, Florida. Responsible for the preparation of the Florida Department of Environmental Protection (FDEP) WWTP permit for the City of Sunrise's Park City WWTP that was located in the Town of Davie.

WASTEWATER COLLECTION AND TRANSMISSION SYSTEMS

Project Manager, LS 10 & 50 Rehabilitation and Replacement, City of Riviera Beach, Florida. Mr. Drummond is the Engineer of Record for the rehabilitation of an existing critical master submersible pump station and the rehabilitation and conversion of an existing 16mgd wet-pit / dry-pit master pump station to an above ground inline booster station.

Project Manager, Preliminary Design of Lift Station No. 47, City of Riviera Beach, Florida. This project includes the generation of a preliminary design report for the rehabilitation and conversion of the existing 9.8mgd submersible master lift station to an above ground inline booster station on constrained project site with limited additional space.

Design Engineer, Master Lift Station 21 Modifications, City of Pompano Beach, Florida. This project included the relocation and design of the City's 6.5 MGD master lift station. Responsible for providing technical expertise on assessing hydraulic design criteria for the master lift station, for the analysis of odor control issues, and for providing overall design quality reviews.

Design Engineer, Wastewater Lift Station Design Upgrades, City of Riviera Beach, Florida. As part of the Utility Water and Wastewater Masterplan, Mr. Drummond performed condition assessments and provided recommendations for the repair and replacement (R&R) of all lift stations within the Utility's service area. As pump replacements are required, Mr. Drummond is re-evaluating hydraulic design conditions to provide new pump selections that increase pump efficiency and reduce O&M issues with the lift stations.

Technical Advisor, Broadview Park Neighborhood Improvement Project, Broward County, Florida. This project included the design of wastewater collection system for a 700 acre mixed-use area. Responsible for training the design team on the use of sanitary sewer hydraulic modeling software, providing technical expertise for both gravity sewer and pump station design, and for the review of all pump station designs in the project area.

Design Engineer, Design of Sanitary Sewer Collection Systems, City of Fort Lauderdale, Florida. As part of the City of Fort Lauderdale's $250 million wastewater CIP, Mr. Drummond was the design engineer for the design of sanitary sewer collection systems totaling $32 million in construction cost. This included hydraulic gravity sewer modeling, value engineering, constructability reviews, construction inspections, the preparation and/or review of preliminary design reports, and the layout and sizing of gravity sewers and pump stations.

Design Engineer, Davie Boulevard Water Transmission and Force Main, City of Fort Lauderdale, Florida. Designed 5 miles of 24-inch water main through a highly urbanized and constricted corridor to replace a 75 year old water main and assisted in the design of a 54-inch force main. The design included routing and financial analysis for water mains and existing force mains ranging from 24 to 54-inches, design of a 2,000 foot directional drill underneath a heavily traveled interstate and waterway, and design of a jack and bore under active railroads.

Project Engineer, Park City Force Main, City of Sunrise, Florida. This project included the design of 9 mile force main through a heavily urbanized area. Responsible for designing five 24-inch directionally drilled sub-aqueous crossings totaling 1,800 linear feet and securing the permits from six separate permitting agencies.

OTHER:

Expert Witness, Water Wastewater and Fire Protection Systems, Florida Keys, Florida. Mr. Drummond served as an expert witness for legal proceedings to ascertain an island property's fair market value before and after denial of vehicular access. Mr. Drummond provided expert opinions and reports to assess the feasibility of the provision of potable water, wastewater treatment, and fire protection for the types of redevelopment allowed by the property's zoning.

Design Engineer, Weir Modification and Freshwater Canal Pumping Station, City of Cape Coral, Florida. This project

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included the modification of fixed weirs and two new Freshwater Canal Transfer Pump Stations. Performed the preliminary and final design required to modify two existing fixed weirs to adjustable weirs and construct two new freshwater canal pumping stations. These improvements will increase wet weather storage within the freshwater canal system and provide an estimated 4.3MGD of additional reuse water in the dry season.

Project Manager, Development of FDOT District IV's Web-based NPDES MS4 Database Management System, FDOT District Four, Florida. This five year $3.0 million customized web-based database management system application manages FDOT's NPDES program. This web-based distributed application manages work flow for users in multiple departments extended across a 5200 sq. mile area. The application utilizes an Oracle database, .NET, ASP, and Visual Basic forms with integrated GIS functionality utilizing ESRI's ARC IMS, ARC Info, and ARC SDE. Other projects managed for FDOT District Four include the inventory and inspection of storm water systems as well as NPDES annual reports for the permit areas of Fort Lauderdale, Hollywood, Broward County, and Palm Beach County.

Project Manager, Sanitary Sewer Special Assessment Study, City of Fort Lauderdale, Florida. The study included developing a special assessment methodology to provide an equitable distribution of benefits to affected properties, based on allowable property usage, to parallel existing design criteria for the sanitary sewer improvements.

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Richard D. Moore, P.E., BCEE

QA/QC

Education

M.S. – Civil/Environmental Engineering, University of Massachusetts at Lowell, 1977

B.S. – Civil Engineering, Michigan State University, 1978

Registration

Professional Engineer: Florida (License No:34083)

Professional Engineer: California (License No: 23122)

Professional Activities

American Water Works Association Water Environment Federation Florida Engineering Society
National Society of Professional Engineers
Member and former Chair of the Florida Engineering Society Conservation and Environmental Quality Committee

Richard Moore specializes in engineering and project management services related to biosolids management, drinking water, and wastewater treatment, and has over 37 years of experience in the planning, design, and construction of major water and wastewater facilities in the United States and overseas. Mr. Moore's project involvement includes managing major public utility projects in the areas of biosolids management and solids handling, water supply, treatment, and distribution; wastewater collection, treatment, and disposal. Amongst other roles, Mr. Moore served as CDM's Division Quality Manager and was responsible for developing and overseeing the division's Quality Implementation Plan, including training of staff, monitoring compliance with quality management (QM) procedures, and performing and overseeing independent QM audits and technical reviews for CDM's ten Florida offices. Mr.

Moore was a lead author for CDM's QMP-4, the Quality Management Process Manual for Design-Build projects.

Biosolids and Residuals Management Experience:

Lead Design Engineer, Tampa Bay Regional Surface Water Treatment Plant, Tampa Bay, Florida. This project included the expansion the Regional Surface Water Treatment Plant to 120mgd under a design/build/operate agreement with Veolia Water and Tampa Bay Water. Mr. Moore was lead design engineer for solids handling improvements including gravity thickeners, belt filter press dewatering, sludge conveyor systems, backwash solids clarifiers, and recycle surge basins.

Lead Design Engineer, Okaloosa County 10 mgd Arbennie Pritchett Water Reclamation Facility Design/Build Project, Florida. Mr. Moore was lead design engineer for for biosolids handling facilities including rotary drum thickener, aerobic digesters, centrifuge dewatering, and sludge pumps.

Lead Design Engineer, Babcock Ranch Town & Country Utilities, Florida. Mr. Moore was the lead design engineer for the biosolids processing facilities for a small water reclamation facility expandable up to 7 mgd. Facilities include sludge drying beds and aerated static pile composting systems.

Technical Advisor, Orange County Utilities Biosolids

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Management Program, Florida. Mr. Moore prepared summary of regulatory and market changes affecting biosolids land application programs in Florida, and evaluation of alternative biosolids processing technologies as part of a long range regional master plan.

Senior Technical Advisor, Palm Beach County Solid Waste Authority Biosolids Processing Facility, Florida. This design/build/operate project was for a regional $30 million biosolids pelletization facility. Mr. Moore was the senior technical advisor for preparation of the Request for Qualifications (RFQ) and the Request for Proposals (RFP) including design criteria package. He evaluated responses and recommended award to the design/build/operate (DBO) contractor and assisted in oversight of the project implementation during design and construction.

Senior Technical Advisor, Miami Dade County Biosolids Master Plan, Dade County, Florida. Mr. Moore assisted in the performance of a Biosolids disposal evaluation. As senior technical advisor, he provided assistance in evaluating the existing biosolids program for the County's three regional wastewater treatment plants, and evaluating alternative processing technology alternatives for a long range master plan.

Project Director, Residuals Treatment and Disposal Study, Tallahassee, Florida. For the Florida Department of Corrections (FDOC), Mr. Moore prepared a report on impacts new sludge regulations may have on wastewater treatment facilities operated by the FDOC throughout the state. This project evaluated the U.S. Environmental Protection Agency's (EPA's) Chapter 503 residuals treatment and disposal regulations, reviewed the facilities operated by the FDOC, and prepared a residuals treatment and disposal report. Residuals disposal alternatives included landfilling, contract hauling, and land spreading. Dewatering alternatives included drying beds, mechanized dewatering, and no dewatering. Stabilization alternatives included aerobic digestion, anaerobic digestion, and lime stabilization.

Other Biosolids and residuals management Projects

- Tampa Bay Water Regional Surface Water Treatment Plant residuals handling and dewatering with beneficial reuse as agricultural soil amendment
- Sarasota County sludge composting study and design of yard waste co-composting facilities
- Manatee County compost facility design
- City of Fort Myers sludge master plan, and design and construction of digester improvements
- Manatee County Southwest WWTP anaerobic digesters
- Lee County sludge composting feasibility study
- Dewatering facility design for the City of West Palm Beach East Central WWTP
- City of Venice lime stabilization and land application program

Other Wastewater Experience:

Senior Technical Advisor, City of Fort Lauderdale Wastewater Improvements Program, Florida. Mr. Moore provided QA/QC reviews on various design projects including pump stations, collection systems, and improvements at the G.T. Lohmeyer Wastewater Treatment Plant.

Project Director East Port Water Reclamation Facility Upgrade/Expansion, Charlotte County, Florida. This project involved a capacity expansion from 3 mgd to 5 mgd, and an upgrade of the treatment process to a Modified Ludzack-Ettinger (MLE) advance secondary treatment process with high-level disinfection for effluent reuse on area golf courses and a 95- million-gallon reclaimed water storage reservoir. The design provided for the future expansion to 10 mgd with eventual residential reuse. As Project Director, Mr. Moore oversaw the design, bidding, and construction services associated with the upgrade and expansion of the county's East Port water reclamation facility (WRF).

Senior Technical Advisor, Wastewater System Expansion Program, Charlotte County, Florida. In 1993, Charlotte County developed a 25-year water and sewer master plan to meet growth demands in compliance with environmental regulations. Implementation of this plan by the year 2000 was required by the county's comprehensive plan and the Florida Department of Community Affairs. To assist the county in implementing this wastewater expansion program, this project consisted of program management, technical, and financial expertise in two distinct stages: (1) project management/planning and preliminary design/permitting and (2) final design and bidding. These program management responsibilities included financial planning

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and management, 201 facilities plan update, permitting, surveying, geotechnical, design reports, public information, design, bidding, and construction management.

Project Director, Bee Ridge Water Reclamation Facilities, Sarasota County, Florida. This project included the design of a new 1.5 mgd water reclamation facility for urban reuse of reclaimed water. The facility was designed with provisions for expansion in phases to an ultimate capacity of 15 mgd and to meet AWT standards for surface water discharge on an as- needed basis.

Other Water Experience:

Project Manager, Tampa Bay 66 mgd Regional Surface Water Treatment Plant Design Build Operate, Tampa Bay, Florida. This D/B/O project included the construction of a 66 mgd surface water treatment plant. The treatment process included high rate ballasted flocculation sedimentation, deep bed granular activated carbon (GAC) filters, and ozone disinfection. Mr.

Moore was also project director for Tampa Bay Water's surface water supply project, which included design, permitting, land acquisition, and construction services for two intake pump stations, a repump station, and 17 miles of 84-inch and 72-inch pipelines for Tampa Bay Water.

Officer in Charge, Membrane WTP Expansion and Construction Services, Collier County, Florida. This project included the value engineering and management for the design and construction of the Collier County Membrane Water Treatment Plant expansion from 12mgd to 20mgd. Mr. Moore provided project oversight for a complete membrane process evaluation, constructability review of design done by another firm, bidding services, on-site project management, construction engineering, and construction administration services, and a detailed observation/inspection of the construction work. He also managed the engineering services during construction.

Project Manager, Manatee County Water Treatment Plant (WTP) Expansion and Wellfield, Florida. This project included the Lake Manatee Watershed water resources development report, a 30-mgd WTP expansion involving a dual-purpose process train for lime softening of groundwater supply or coagulation/sedimentation/filtration for surface water supply. The project also included developing a new 15-mgd wellfield for alternate water supply.

Publications / Presentations

"Tampa Bay Water's Experience with Design-Build-Operate Project Delivery for its Regional Surface Water Treatment Plant", Richard D. Moore, Jonathan M. Kennedy, and William Mayer, Florida Engineering Society Journal, March 2010.

"Ballasted Sedimentation Boosts Floc Settling," Don Thompson and Richard Moore, AWWA Opflow, June 2005.

A Case Study in Permitting a Design/Build/Operate Water treatment Plant in Florida: Tampa Bay Water. Florida Water Resources Conference Proceedings, 2001 (with C. Carden, S. Solters, D. Thompson).

Role of Trenchless Technology in a Large Diameter Raw Water Pipeline Project. Florida Water Resource Conference Proceedings, 2000 (with C.M. Tappan and W.L. Moscinski).

Evaluation of Tampa Bay Water's Surface Water Supply Alternatives. Florida Water Resources Conference Proceedings, 2000 (with C.C. Montgomery and M. Coates).

Implementing Septic Tank Replacement in Florida. Florida Water Resources Conference Proceedings, 1998 (with T.G. Walker).

Maximizing Aerobic Digestion System Capacity Using Bench Scale Testing. Presented at the 1995 Florida Water Resources Conference (with J.L. Hagerty, E. Dixon, and T. Briggs).

Pilot Testing of High Solids Centrifuges and Belt Filter Presses for Biosolids Dewatering in West Palm Beach, Florida. Presented at the 1994 Florida Water Resources Conference, and the 1995 Water Environment Federation Annual Conference (with J.L. Hagerty, D. Holtz, and D. Hubbs).

Construction of Reuse Distribution Systems in Existing Developments. Presented at the 1992 Water Environment Federation Urban and Agricultural Water Reuse Specialty Conference (with C.T. Rose).

Financing Reclaimed Water Programs. Presented at the 1991 Water Pollution Control Federation Annual Conference (with D.C. Kemp).

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John R. Hill, P.E.

Pump Station O&M Analysis

Education

B.S. – Civil Engineering, University of Central Florida, 1978

Registration

Professional Engineer: Florida (License No: 37948)

Professional Engineer: Georgia (License No: PE020712)

Professional Activities

Florida Engineering Society (FES)

American Water Works Association (AWWA)

Publications / Presentations

"Landfill Gas and Wastewater Residuals = Marketable Fertilizer Pellets," Presented at the 2003 proceedings of the 78th Annual Florida Water Resources Conference, May 4-7, 2003, Tampa, Florida (with Martin Lewis and John Booth).

"Upgrade of the Daytona Beach Bethune Point Wastewater Treatment Plant," Proceedings of the 71st Annual Florida Water Resources Conference, pp 207-212, May 5-8, 1996, Fort Myers, Florida (with R.D. Reardon and W.C. Banks).

"Sludge Composting Alternatives for Florida." Presented at the 1988 joint Technical Conference of the FSAWWA, FPCA, and FWPCOA, November 2-4, 1988, Fort Lauderdale, Florida (with R.D. Reardon and C.S. Kohl).

John Hill is a Senior Engineering Consultant with 52 years of experience in consulting civil/environmental engineering. Mr. Hill has experience with multiple engineering firms including 19 years HNTB, 18 years with Camp Dresser & McKee Inc. (CDM), and 15 years as an Environmental Engineering Consultant. His qualifications include all phases of the planning, design and construction management for municipal water, wastewater, and stormwater facilities. Mr. Hill has expertise in value engineering, cost estimating and technical reviews for quality control and civil design projects including urban redevelopment streetscape and parking lot facilities. Over the last 39 years he has worked exclusively as a project manager, project engineer and design engineer on various water, wastewater, and stormwater projects. He has been involved in the design of biological nutrient removal wastewater treatment systems as well as the design of several water treatment facilities, water pumping supply systems and distribution networks including supply wellfields.

Wastewater Experience:

Task Leader / Lead Design Engineer, R.L. Sutton Water Reclamation Facility, Cobb County, Georgia. This project included the expansion of the 60mgd (AADF) R.L. Sutton water reclamation facility for Cobb County Georgia. The expansion included the addition of a new 160mgd pump station, headworks, flocculation basins, primary clarifiers, ABW filters, ultraviolet disinfection, a new outfall structure and odor control for the pump station and headworks. The 160mgd raw wastewater pump station included 6 pumps and a 200 foot deep by 50-ft circular diameter wetwell.

Lead Design Engineer, R.M. Clayton Water Reclamation Facility, City of Atlanta, Georgia. This project included the expansion of the 122mgd (AADF) R.M. Clayton water reclamation facility. The expansion included modifications and addition of a new headworks, new mix and aeration basins, new onsite pump station capable of pumping 330mgd, ten (10) 150' diameter clarifiers, 22 deep bed filters, ultraviolet disinfection and a new outfall structure.

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Technical Advisor, Value Engineering North District Wastewater Treatment Plant Headworks Rehabilitation Project, Miami Dade Water & Sewer Department, Florida. Mr. Hill provided value engineering for the rehabilitation of the influent screening, primary sludge degritting, and sludge transfer systems or the 240mgd North District WWTP.

Design Engineer, 9 MGD Advanced Wastewater Treatment Facility, City of Fort Myers, Florida. Design Engineer for the process and hydraulic design of the treatment and pumping systems. This project included the design of a new 9-mgd Advanced Wastewater Treatment Facility (AWWTF) at the City's existing South Wastewater Treatment Plant to enhance the City's reuse water capabilities. The AWWTF included tertiary filtration, disinfection, 18mgd transfer and high service pump stations utilizing vertical turbine pumps, and two 5 MG storage tanks.

Design Engineer, 38 MGD GTL WWTP Influent Bar Screen Rehabilitation Design Build, City of Fort Lauderdale, Florida. Design Engineer for the replacement of the influent screening devices at the 38 mgd GTL Wastewater Treatment Plant. The rehabilitation included the design of four (4) new mechanical rake bar screens to replace all existing influent screening devices while keeping the WWTP in continuous operation.

Additional Wastewater Experience. Mr. Hill's Florida wastewater experience includes the final design of the Jerry Sellers Wastewater Treatment Plant (WWTP) upgrade and expansion for the City of Cocoa; design and construction administration of the odor control system at the Regional WWTP for the City of Daytona Beach; preparation of the Daytona Beach WWTP evaluation report; project manager in charge of the preliminary and final design for the expansion of the Bethune Point plant to a 10-mgd advanced wastewater treatment (AWT) facility in Daytona Beach; project director responsible for the coordination of the design expansion of the Regional Advanced Wastewater Treatment (AWT) facility for the City of Daytona Beach; design of a force main and master pump station for the Florida Community Services Corporation in Kissimmee; assistance with the design of the 1-mgd (AWT) Woodlea Road water reclamation facility for the City of Tavares; assistance with the City of Lake Mary's wastewater master plan report; preparation of an environmental impact statement for the second crossing at the Caloosahatchee River; the design of the of the City of Tampa's Dale Mabry oxiation ditch WWTP; and the design and construction administration of an 11.0-mgd master lift station for Orange County.

Water Experience:

Mr. Hill's Florida has experience on various water projects including preliminary design for the expansion of the City of Cocoa's Dyal WTP to a 48-mgd facility; construction of the western wellfield for the City of Daytona Beach; four water treatment systems in Orange County; and the upgrade and expansion of the Taft WTP for the City of Taft. Other project experience is shown below.

Task Leader / Lead Design Engineer, Tampa Bay Regional Surface Water Treatment Plant. Mr. Hill led the design of the 66-mgd surface water treatment plant for Tampa Bay Florida. The design included new process basins, utilizing the ACTIVE FLOW process followed by deep bed filters with disinfection and an onsite high service pump station. Also included in the design was lime sludge holding tanks followed by a sludge dewatering facility with sludge loading for off-site disposal.

Project Engineer, Chattahootchee WTP, City of Atlanta, Georgia. This project involved the expansion of the 64-mgd Chattahootchee water treatment plant (WTP) for the City of Atlanta. The expansion included modifications and expansion of the intake structure, new flashmix chamber and flow distribution chambers to sedimentation basins, and new gravity thickeners and pump stations.

Project Manager, Hidden Springs Water Treatment Plant, Orange County, Florida. Mr. Hill was responsible for the design of the Hidden Springs Water Treatment Plant consisting of wells, high service pumping, ground storage tank with gravity tray aeration, chlorine disinfection and hydropneumatic tank.

Project Manager, Enonolochhantchee Water Treatment Plant. Mr. Hill was responsible for the design of the first phase of the Enonolochhatchee Water Treatment Plant consisting of Wells, MSP, Ground Storage tanks with gravity tray aeration, chlorine disinfection and variable speed pumping.

Project Manager, Mt. Plymouth Water Treatment Plant. Mr. Hill was responsible for the design of a ground storage tank with tray aeration, high service pumping and controls with chlorine disinfection.

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Project Manager, Oak Meadows Water Treatment Plant. Mr. Hill was responsible for the design of the Oak Meadows Water Treatment Plant consisting of wells, variable speed-high servicing pumping, and a ground storage tank with tray aeration with chlorine disinfection.

Solid Waste Experience:

Project Manager, Solid Waste Authority, Palm Beach County. Mr. Hill was responsible for the preliminary design report for a 400 wet ton per day sludge pelietization facility. The preliminary design included the sizing of the equipment, site layout, odor control and developed off-site utilities to provide landfill gas to be used as a heat source for the dryers.

Storm Water Experience:

In the stormwater area, Mr. Hill served on the Oleander Avenue stormwater improvements project for the City of Daytona Beach; assisted with the first phase of the City of Rockledge's stormwater utility study; and oversaw CDM's participation in the City of Ocala's Lake Tuskawilla stormwater treatment demonstration project.

Additional Experience:

Boston Whaler Manufacturing Facility, Edgewater, Florida. Mr. Hill was also involved in the design and construction administration efforts for the construction of the $6 million Boston Whaler boat manufacturing facility in Edgewater, Florida.

Structural Designer, Pre-stressed beam bridges, Florida. Mr. Hill spent 7 years designing pre-stressed beam bridges in Florida including bridges in the Maitland city area, Bee-Line expressway, and on the I-4 eastbound east-west connection.

Engineer, Southern Bell Telephone Bee-Line phone cable, Florida. Mr. Hill was Involved in the development of a 47-mile phone cable alignment within Bee-Line expressway for Southern Bell Telephone with placement of signal booster stations along the route.

Project Engineer, Maitland Boulevard, Maitland, Florida. Mr. Hill was the Project Engineer responsible for the re-alignment of Maitland Boulevard including preparing rightway descriptions of individual parcels on both the east and west sides of the property, the coordinating the stormwater improvements and the relocation/replacement of all service connections to water and sewer lines within the roadway right-of-way.

Project Manager, Bob Carr Auditorium, City of Orlando, Florida. Mr. Hil was in charge of the design and construction administration of the parking facility for the Bob Carr Auditorium.

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Maurice Tobon, P.E., PMP

Wastewater Hydraulic Model/ Emergency Response Plan

Education

M.E. – Civil Engineering, University of Florida (92)

B.S. – Civil Engineering, University of Florida (90)

Registration

Professional Engineer: Florida (License No. 49373)

Project Management Professional (PMP)

Publications

Tobon M., Pettit C. (2017), Toolkit for Climate-Water Utility Operations, USAID.

Professional And Volunteer Activities

Water Environment Federation (WEF)

American Water Works Association (AWWA)

American Society of Civil Engineers (ASCE)

ENGINEERS WITHOUT BORDERS Mentor and Technical Advisory Committee

- Engineers without Borders (EWB) Professional Mentor University of Florida Student Chapter, Shree Janahit Higher Secondary School water supply project Khanalthok, Nepal (ongoing)
- Engineers without Borders (EWB) Professional Mentor Rutgers University, village water supply project Karatu, Tanzania (ongoing)

ASCE/EWB International Development Conference, Panama City, Panama Special Topics Course-Water Treatment Instructor. Water system assessment towns of San Francisco and La Paz, Panama (2014)

Tobon Engineering
Engineering and Utility Management

Professional water engineer with over 28 years of experience in water and wastewater engineering in south Florida, including development of water and wastewater hydraulic models. Served for over fifteen years at the highest management levels of two of the largest water utilities in south Florida and was responsible for nearly $ 1 billion in program management capital improvements. Mr. Tobon has unique experience and insight from being in government for many years and understands the issues faced by water and wastewater utilities. Presently serving as an advisor on various hydraulic modeling tasks through other consulting firms.

Professional History

- 2016 to present Tobon Engineering, President
- 2007 to 2016 Palm Beach County Water Utilities Department, Director of Engineering/Program Manager
- 1997 to 2007 City of Fort Lauderdale, Engineering Design Manager/Assistant Program Manager
- 1990 to 1997 Camp Dresser & McKee Inc., Project Manager

HYDRAULIC MODELING

Over 25 years of hydraulic modeling experience using KYPIPE, Cybernet, and Infowater software. Mr. Tobon has developed hydraulic models up to 75,000 pipes for both water and wastewater systems, including pump and booster stations. Experienced in model development from GIS databases, calibration based on field test data, capital planning, and evaluation. This experience includes steady state as well as extended period simulation of multiple water distribution systems and the generation of various scenarios to account for hourly demand patterns, seasonal variations as well as fire flow demands. For wastewater systems experience includes static as well as extended period simulation of multiple wastewater pump station and force main systems, incorporating knowledge on the simulation of collection area flow patterns, pump operations, and analysis of resultant force main pressures, flows and pump station cycling. The following is a list of water and wastewater hydraulic modeling projects:

North Lauderdale Wastewater Pump Station Evaluation

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- Royal Utility Water
- Avenir Development Water and Wastewater
- Ancient Tree Development Water and Wastewater
- Seacoast Utility Authority Reclaimed Water
- Seacoast Utility Authority Potable Water
- City of Coral Springs Water and Wastewater
- City of Boca Raton Water and Reclaimed Water
- City of Port Charlotte Rotonda Area Water
- City of Miami Beach Wastewater
- City of Fort Lauderdale Water and Wastewater
- Palm Beach County Water, Reclaimed Water, Raw Water and Wastewater

WATER AND WASTEWATER MASTERPLANS

Director of Engineering, 2012 Water and Wastewater Masterplan, Palm Beach County Water Utilities Department. This project was for the development of the 2012 Water and Wastewater Masterplan for Palm Beach County Water Utilities Department. Both masterplans recommended over 500 million dollars in capital projects which served as the basis for ongoing Capital Improvement Program. The masterplans were developed by consultants under the direction and supervision of Mr. Tobon.

Director of Engineering, 2014 Glades Region Water and Wastewater Masterplan, Palm Beach County Water Utilities. This project provided the creation of the first Water and Wastewater Masterplan for the municipalities of South Bay, Belle Glade and Pahokee. The masterplan summarized the existing conditions of the water and wastewater systems, created hydraulic models for water and wastewater collection systems and prioritized improvements including treatment systems. The masterplans were developed by consultants under the direction and supervision of Mr. Tobon.

Engineering Design Manager, 2007 Water and Wastewater Masterplan, City of Fort Lauderdale Public Services, Florida. This project provided for the 2007 Water and Wastewater Masterplans for the City of Fort Lauderdale. Both master plans developed over 550 million dollars in capital projects, which served as the basis for Waterwork 2011 Program Management. Consultants under the guidance, direction and supervision of Mr. Tobon developed the Masterplans.

Project Manager(CDM), Water and Wastewater Masterplan, City of Coral Springs. This project provided the Water and Wastewater Masterplan for the City of Coral Springs, Florida. Both master plans created the first hydraulic models of the water and wastewater systems for the City of Coral Springs. Mr. Tobon served the Project Manager for the effort and was fully responsible for all deliverables.

Project Manager(CDM), Wastewater Masterplan, City of Miami Beach. This project provided for the Wastewater Masterplan for the City of Miami Beach, Florida. Mr. Tobon was responsible for the hydraulic model of the wastewater system and analysis of population growth with subsequent capital improvements.

WASTEWATER COLLECTION AND TRANSMISSION SYSTEMS

Director of Engineering, Lift Station Rehabilitation Phases 1-4, Palm Beach County Water Utilities Department. Rehabilitation of 38 lift stations during a 4 year period, rehabilitation included new wet well coatings, valves, piping, pumps and control panels. Mr. Tobon was responsible for the directing and advising staff from preliminary design through construction.

Director of Engineering, Booster Station 5241 Improvements, Palm Beach County Water Utilities Department. Rehabilitation of a major inline wastewater booster station, improvements included new valves and piping. The design build contract was carried out under the direction of Mr. Tobon.

Director of Engineering, South Bay Wastewater Lift Station Rehabilitation, Palm Beach County Water Utilities Department. Rehabilitation of 4 lift stations, rehabilitation included new wet well coatings, valves, piping, pumps and control panels. Under Mr. Tobon's direction all grant requirements were met and he was responsible for the directing and advising on the design and provided guidance during construction.

Director of Engineering, Pahokee I&I and Wastewater Lift Station Improvements, Palm Beach County Water Utilities Department. Mr. Tobon was responsible for ensuring

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successful in-house design and construction project which was ARRA Funded. All grant requirements were carried out under his direction by engineering division staff.

Engineering Design Manager, Pump Station Rehabilitation: Pump Stations No. A-11, B-8, D-39, D-47 and E-5, City of Fort Lauderdale Public Services, Florida. Rehabilitation of 6 major lift stations, some of the improvements included replacement of can stations for submersible stations. Rehabilitation included new wet well coatings, valves, piping, pumps and control panels. New sanitary sewer, manholes and force mains were also constructed. Mr. Tobon was responsible for the directing and advising on the design and guidance during construction.

Engineering Design Manager, Pump Station Rehabilitation: Pump Stations No. A-2, A-17, A-18, A-19 and A-21, City of Fort Lauderdale Public Services, Florida. Rehabilitation of major lift stations, rehabilitation included new wet well coatings, valves, piping, pumps and control panels. New sanitary sewer, manholes and force mains were also constructed. Mr. Tobon was responsible for the directing and advising on the design and facilitating construction of the improvements.

Engineering Design Manager, Pump Station Rehabilitation: Pump Stations No. D-41, A-9, B-5, B-6 and B-13, City of Fort Lauderdale Public Services, Florida. Rehabilitation of major lift stations, rehabilitation included new wet well coatings, valves, piping, pumps and control panels. Some of the duplex can stations were demolished and new submersible stations constructed. New sanitary sewer, manholes and force mains were also constructed. Mr. Tobon was responsible for the directing and advising on the design and facilitating construction.

Project Manager(CDM), Park City Wastewater Booster Station, City of Sunrise, Florida. Design Engineer for a 5 mgd inline wastewater booster station. The station was designed to repump wastewater from a decommission WTTP located in the Town of Davie to the Springtree WWTP in Sunrise.

LARGE DIAMETER RECLAIMED AND WASTEWATER TRANSMISSION PIPING

Director of Engineering, FPL 36 Inch Reclaimed Water Pipeline, Palm Beach County Water Utilities Department. Construction of an 18 mile 36-inch Reclaimed Water Pipeline from the East Central Regional Wastewater Treatment Plant to the West County Energy Center. The project consisted of 11 direction drills including under the Florida Turnpike and thru the West Palm Beach Water Catchment Area. The total $ 52 million project was a Public Private Partnership between Palm Beach County and FPL. The pipeline portion of the project was designed by Palm Beach County staff under the supervision of Mr. Tobon who was also involved during construction, the total cost of the pipeline was $ 19 million.

Engineering Design Manager, A1A 24-inch Wastewater Force main, City of Fort Lauderdale Public Services, Florida. The project was for the construction of 3,600 feet of a new 24-inch force main along A1A and Seabreeze Blvd in Fort Lauderdale. The new force main relieved a hydraulic restriction in the wastewater system and reduced system pressures, which increased wastewater to flow to the wastewater treatment plant. The project was designed by City staff under the supervision of Mr. Tobon and constructed under his direction.

Engineering Design Manager, Oakland Park 48 and 36-inch Water Mains, City of Fort Lauderdale Public Services, Florida. Removal of 900 LF of existing 36" PCCP water main, fittings, valves and existing 54" steel casing. Installation of approximately 140 LF of 30" DIP pipe through an existing 54" Steel Casing and installation of 920 LF of 30" DIP water main including valves, fittings and appurtenances. Designed by City staff under the supervision of Mr. Tobon who was also involved substantially during construction.

Engineering Design Manager, Davie Blvd 24-inch Water Main, City of Fort Lauderdale Public Services, Florida. Construction of 5,000 feet of 24-inch water main along Davie Blvd from Federal Highway west. The project was designed by a consultant under the supervision of Mr. Tobon and was completed in 2005.

WATER DISTRIBUTION AND TRANSMISSION SYSTEMS

Director of Engineering, South County Water Service Replacement Phases I-III, Palm Beach County Water Utilities Department. Replacement of approximately 2,000 water services and replacement of AC water mains in the southern portion of Palm Beach County. Project was a multiyear multimillion dollar effort that involved a consultant design team and various construction contracts. Mr. Tobon

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was responsible for the directing and advising on the design and facilitating construction of the improvements.

Director of Engineering, Water and Sewer Service to North County Airport, Palm Beach County Water Utilities Department. Construction of a 3-mile water main and sewer force main to serve North County Airport. Project also consisted of a jack and bore under an active railroad track. Project was designed and managed during construction by County staff. Mr. Tobon was responsible for the directing and advising on the design and guidance during construction.

Engineering Design Manager, Poinciana Park 2 MG storage tank, City of Fort Lauderdale Public Services, Florida. Project was for the demolition of an existing steel standpipe and construction of a new 2MG ground storage tank and pump station at Poinciana Park. Mr. Tobon was responsible for the directing and advising on the design and also involved during construction.

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Nigel O. Grace, P.E.

Risk Based Prioritization/Capital Improvement Plan

Education

BS, Chemical Engineering, University of Florida

ME, Environmental Engineering, University of Florida

Registration

Professional Engineer: 46605, Florida, 1992
Diplomate, American Academy of Environmental Engineers (BCEE), 2003
Risk Assessment Methodology for Water (RAM-WSMSM), 2002

Brown AND Caldwell

Nigel Grace brings more than 28 years of experience serving in wide-ranging roles in the management and direction of complex multi-disciplinary projects that draw on diverse skill sets in areas of technology applications, regulatory negotiations, and operational/process optimization. In addition to being one of the firm's drinking water leads, he currently serves as one of the firm's water technology leaders and through this experience brings broad insights on emerging issues of concern and the complex challenges faced by the utility community. For over 25 years, he has served a wide array engineering needs for Broward County Water and Wastewater Services inclusive of master planning, water supply and water treatment system optimization, reclaimed water planning and regulatory advocacy, and ongoing distribution system water quality optimization. Through his efforts, he has played an instrumental role in supporting the development of the City's diverse portfolio of water supplies as well as a modified plan for complying with the Ocean Outfall Legislation that resulted in concessions that saved the City an estimated $200 Million.

Master Pump Station 462 Ragging Assessment, Broward County Water and Wastewater Services, Broward County, Florida. Technical Director. Conducted an assessment of underlying contributing factors to operational challenges arising from the rapid formation of rag balls that affected Master Pump Station 462 (MPS 462) performance and requires frequent maintenance intervention. The current inline station configuration is a change from the original wetwell arrangement. The analysis included a review of station hydraulics, pump selection and operating characteristics relative to the range of flow/pressure conditions, modeling of parent-child pumping systems impacted by current operation. Hydraulic modeling was performed to evaluate the transmission hydraulics to estimate normal point-of-connection pressures, as well as the conditions encountered when rag balls form and constrain transmission.

3BC Septic Tank Elimination Analysis Memorandum, Broward County Water and Wastewater Services, Broward County, Florida. Project Director. This project included permitting requirements for proposed gravity sewer system improvements within the 3C Area of District

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3BC; Utility identification within project area; preparation of a hydraulic model determining overall hydraulic factors and conditions of a proposed forcemain to tie into Master Pump Station 320 (MPS 320); and Proposed modifications to existing MPS 320 in order to receive modeled flows from the study area.

Water and Wastewater System Master Plan, West Palm Beach, Florida. Technical Director. Developed Water and Wastewater System Master Plan including demand forecasting, all-pipe hydraulic modeling of both the water and wastewater systems, criticality assessment, asset prioritization for condition assessment and development of infrastructure CIP. The Master Plan also included an analysis of operational as well as Renewal and Replacement (R&R) improvement needs focused on the following areas:

- Operational performance assessment of distribution system water quality and developed strategies for further system optimization
- Cost-effective reduction of infiltration and inflow (I/I) in the wastewater collection system;
- Systematic replacement of high risk infrastructure to reduce major pipe failures and the resultant response costs;
- Assessment of the City's numerous lift stations for improved operational efficiency, peak flow capacity adequacy and reduced operations and maintenance costs; and
- Operational troubleshooting, construction impact assessment, performance optimization of the water distribution and wastewater collection systems as part of post-planning model applications

North Regional WWTP Reclaimed Water Plant Expansion, Broward County Water and Wastewater Services' (BCWWS), Broward County, Florida. Project Director. Project included surge analysis efforts for the pump station associated with the expansion of BCWWS' existing reclaimed facility to increase its firm rated capacity from 10 mgd to approximately 26 mgd. This project is a result of the Ocean Outfall Legislation. The expansion will treat secondary effluent to meet High Level Disinfection (HLD) standards as defined by the Florida Department of Environmental Protection (FDEP). The proposed expansion is estimated at $53 million construction cost and includes construction of a new filter feed pump station, additional filters, chemical storage and feed, chlorine contact basins, reclaimed water pump station, electrical power distribution and requisite back-up emergency power.

Condition Assessment and R&R Planning for Critical Lift Stations, West Palm Beach, Florida. Project Director. Performed condition assessment activities for 11 of the highest risk lift stations (of which, all are master repump stations). Lift station condition assessment activities included:

- Developed lift station condition assessment protocol and forms which were used by BC's field assessment teams to record the condition of assets. The forms were in an electronic database format.
- A team covering electrical, I&C, mechanical, and structural visited each lift station and used visual, auditory, tactile, and olfactory senses to assign performance and condition rankings based on these observations using the lift station condition assessment form. Where applicable, field crews conducted visual, above ground condition assessment of the wet well, including pH tests of the wet well sidewalls, utilized gas meters to determine the presence of hydrogen sulfide concentrations and used pole cameras to examine the wet well walls for signs of corrosion.
- Identify prioritized Rehabilitation and Replacement (R&R) needs for the sanitary sewer lift stations based on condition that can be used to develop a lift station Capital Improvement Plan (CIP).

Lift Station 5 System Modeling and Discharge Force Main Sizing Analysis, West Palm Beach, Florida. Project Director. Performed a hydraulic modeling analysis in order to determine the required size for the upsizing of the LS5 discharge force main. LS5 is located at the southeast corner of Flagler Drive and Southern Boulevard. Wastewater from this lift station is pumped through a 14-in/16-in/18-in force main to the wetwell of LS13. LS13 is located at Parker Avenue and Park Place. LS13 has historically repumped wastewater from LS5 along with several other City-owned lift stations. LS13 discharges to a 24-in force main that eventually manifolds to the City's 42-in force main that discharges to ECRWRF. The City has constructed an 18-in bypass force main around LS13 so that wastewater from

LS5 can discharge to the downstream side of LS13 without being repumped. The bypass has not yet been activated due to concerns about the integrity of the 14-in and 16-in force main segments, specifically in areas of close proximity to the air release valves (ARV), connected to the LS5 discharge.

3A Collection System Hydraulic Model 300 Development, Broward County Water and Wastewater Services, Broward County, Florida. Project Director. Hydraulic modeling of the force main system inclusive of the pump stations, wet wells and gravity system access structures immediately upstream (up to the first upstream manhole) of lift stations within the District 3A collection system that connect directly to the City of Hollywood's regional wastewater system.

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Christopher S. Garrett, PE

Emergency Response Plan/ Risk Based Prioritization

Education

ME Environmental Engineering, Old Dominion University, Norfolk, Virginia

BS Civil Engineering, Old Dominion University, Norfolk, Virginia

Registration

Professional Engineer, Virginia, #022888

Professional Engineer, Maryland, #45699

Brown AND Caldwell

Chris Garrett specializes in all aspects of wet weather flow studies and utility infrastructure evaluation, rehabilitation, design, and program management projects. His specialties include conventional and alternative sanitary sewer designs, stormwater drainage design and water quality improvement initiatives, infrastructure rehabilitation, and GIS-CMMS for utility management. He is also a trainer for the NASSCO PACP/MACP/LACP program and presently assisting with the next version of the training and reference manual. As a co-leader of Brown and Caldwell's national Aging Infrastructure initiative, Chris is promoting advanced condition assessment technologies and criticality based decision making for prioritizing inspection and system rehabilitation that promotes BC's Four R's of reinspection, repair, rehabilitation and replacement. Chris has written and presented a number of papers on water quality and infrastructure rehabilitation with projects highlighted in a number of periodicals, including Trenchless Technology magazine.

Pompano Beach I/I Study, City of Pompano Beach, Florida. Project Manager. Oversight for this I/I reduction and utility infrastructure improvement project. The project involved evaluation of approximately 950,000 L.F. of wastewater gravity piping utilizing flow monitoring devices, CCTV inspection equipment and smoke generators to establish the levels of and sources of excessive I/I. The project also included extensive data collection of more than 10,000 utility (water and sewer) assets and condition surveys of over 4,000 structures. Project design included 40,000 lf of sewer rehabilitation consisting of cured-in-place, grouting, point repairs, lateral rehabilitation, and manhole rehabilitation.

Contingency and Emergency Response Plan, City of Wichita, Kansas. Technical Lead. Under Consent Order provisions, the City of Wichita was required to prepare a Contingency and Emergency Response Plan (CERP) for its 66-inch diameter reinforced concrete force main that conveys flow from Plant 1 to Plant 2. At over 17,000 lf traversing a river, two landfills and residential areas, eight areas of concern were identified within the CERP. The plan was delivered to regulators (KDHE) in 26 calendar days,

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which included two workshops and a 50–page document, identifying the risks, the Incident Management team, Incident scenarios, and Response and Recovery plans.

Contingency and Emergency Response Plans, Washington Suburban Sanitation Commission; Laurel, Maryland. Technical Lead. As part of the risk assessment program for their large diameter gravity sanitary sewers and force mains, WSSC contracted with Brown and Caldwell to review their Emergency Response Plans (ERPs), make recommendations for a strawman ERP based on a gap analysis, and develop ERPs for three high criticality assets. In support of the ERP, Mr. Garrett developed a tabletop exercise for testing of the ERPs. Mr. Garrett also provided a gap analysis on WSSC's force main criticality evaluation program.

North Trunk Sewer Section D Evaluation and Repair, Hampton Roads Sanitation District (HRSD), Norfolk, Virginia. Project Manager. Evaluation and design services for emergency repairs for HRSD. The project included evaluating rehabilitation and replacement alternatives for approximately 900 lf of 30-inch gravity interceptor and approx. 900 lf of 24-inch force main. The design portion focused on replacement of approximately 300 lf of 24-inch PCCP force main in areas that previously failed or were in imminent danger of failing. The design included tying into the existing main, transitioning to a PVC force main and connecting to an existing 54-inch gravity interceptor. Because of the expedited schedule, the project was awarded to one of three contractors on an RFP basis. Project completed on time and within budget. Evaluation Report finished in two weeks, with draft submitted in less than one week. Design, including survey, was completed in less than 3 weeks.

Municipal Consent Order Services, Hampton Roads Sanitation District, Virginia Beach, Virginia. Technical Lead - Elizabeth River Crossing Emergency Force Main Repair for HRSD. Prepared emergency repair drawings for approximately 200 lf of 24-inch diameter ductile iron force main identified as near failure based on non-destructive side wall testing due to external corrosion from exposure to daily tidal fluctuations at a river crossing. The design included the replacement of a gate valve with a plug valve, installation of pipe clamps on the unrestrained portions of the line (approximately 15 clamps) upstream of the failure area, and replacement of the force main from the valve to a point just beyond where the pipe became subaqueous. Coordinated the aspects of flow control and pump and haul operations to maintain system operation during the construction period. Because of its location, a Joint Permit Application (JPA) and CBPA stormwater permitting was required and expedited in less than 3 weeks with a signed permit by the Governor due to HRSD's status as a state commission. To facilitate the quick permit approvals, a porta-dam temporary coffer dam system and living shoreline restoration concept were employed to minimize the disturbed areas and improve the restored areas.

Technical Lead – Warwick and Woodhaven Emergency Repair for HRSD. Prepared emergency repair drawings for approximately 1,400 lf of 24-inch diameter ductile iron force main identified as needing replacement because of previous failures of the pipe in the area and results of non-destructive side wall testing due to external corrosion. The design included the replacement of isolation valving, open cut installation of pipe in intersections, roadways and medians, landscaping plans, maintenance of traffic, pump and haul requirements and corrosion control for the pipe. Because of the high visibility of work and traffic control considerations, coordination with the City of Newport News was the critical path for the project in relation to traffic control, allowable days and hours of construction, and landscape restoration. The ultimate success of the project was due to the close coordination and collective work of HRSD, BC and the contractor to identify the pipe alignment, utility location and acquiring materials for the project.

Technical Lead. For HRSD prepared emergency Find and Fix of 18- and 24-inch gravity sanitary sewers that were causing a roadway subsidence due to loss of backfill material through actively leaking joints. The repair included manhole grouting, installation of LinkPipe and CIPP sectional liners, and repair of the failed roadway pavement section. This work from notification to completion was less than four business days with work performed during nighttime hours because of traffic control concerns.

Technical Lead and Advisor. For HRSD developed risk profile based on a consequence and likelihood of failure model for 110 water crossings to identify low, medium and high-risk candidates for customized contingency plans. Developed a prototype contingency planning document

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for an identified high-risk river crossing that included a risk evaluation; immediate, short-term, intermediate and long term response and planning steps, and recommended response team and training for a catastrophic failure scenario for the river crossing.

On-Call Pipeline Rehabilitation, Baltimore County, Maryland (March 1998/September 2012). Project Manager and Technical Advisor. Long-term relationship on several repeat on-call services contracts encompassing sanitary and storm system investigation, evaluation, modeling, design, construction and post rehabilitation. Projects include evaluation and rehabilitation services for the Patapsco Interceptor and Relief (38,590 lf of 21- to 72-inch pipe), featured in Trenchless Technology magazine and the South Avenue Interceptor Emergency Replacement project (1,200 lf of 30- to 36-inch pipe), named Project of the Year by the APWA Virginia/MD/DC Chapter. The project conditions have varied widely, including work in residential, commercial, and densely wooded areas, as well as along highways. Pipe diameters range from 6 to 66 inches and rehabilitation technologies utilized include fold and form, cured-in-place, and replacement.

Pump Station Rehabilitation Services under Annual Services Contracts in Hampton Roads, Virginia. Project Manager. Due to its flat topography and relatively high groundwater, Hampton Roads, Virginia has over 1,000 pump stations that were constructed as municipal projects or were constructed by developers and proffered to municipalities. The resultant is aging infrastructure with antiquated controls, oversized and corroding wet wells and pumps that suffer from wear due to excessive cycling and dramatically varying head conditions. Mr. Garrett has been assisting multiple municipal clients by providing pump station condition assessment, technical evaluation, design and construction administration services for over 40 pump stations in the range of 0.5 to 8 mgd rated capacities.

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V. "Ravi" Ravisangar, PhD, PE, BCEE

Surge Hydraulic Model

Education

Ph.D., Environmental Engineering, Georgia Institute of Technology

M.S., Civil Engineering, Environmental Hydraulics and Water Resources, Georgia Institute of Technology

M.S., Environmental Engineering, Georgia Institute of Technology

B.Sc., Civil Engineering, University of Sri Lanka at Peradeniya

Registration

Professional Engineer PE029284, Georgia, 2003

Brown AND Caldwell

Dr. Ravisangar has more than 19 years of experience in water and wastewater pumping and treatment related work. His experience spans a broad range from studies and design to construction and startup. His subject matter expertise includes water and wastewater pumping system analysis and design, pumping system rehabilitation, water and wastewater plant hydraulic analyses, water distribution system modeling, dynamic and transient hydraulic analysis of piping networks, surge protection systems design, and sludge and slurry rheology and hydraulics of non-Newtonian fluids. He is also an active technical reviewer for ASCE Journal of Pipeline Systems. He led the design effort to adding new pumps for existing deep injection well pumping system and is is ready to leverage that experience to benefit MDWASD

Wastewater Pumping Systems

North Regional WWTP Reclaimed Water Plant Expansion, Broward County Water and Wastewater Services' (BCWWS), Broward County, Florida. Lead Pumping Systems Engineer. Dr. Ravisangar led the surge analysis efforts for the pump station associated with the expansion of BCWWS' existing reclaimed facility to increase its firm rated capacity from 10 mgd to approximately 26 mgd. This project is a result of the Ocean Outfall Legislation. The expansion will treat secondary effluent to meet High Level Disinfection (HLD) standards as defined by the Florida Department of Environmental Protection (FDEP). The proposed expansion is estimated at $53 million construction cost and includes construction of a new filter feed pump station, additional filters, chemical storage and feed, chlorine contact basins, reclaimed water pump station, electrical power distribution and requisite back-up emergency power.

Pump Stations 301, 414, 415, 416 and 417 Improvements BODRs, NDWWTP Service Area, MDWASD, Miami, Florida. Lead Pumping System Engineer. Dr Ravisangar served as lead pumping system engineer and subject matter expert for the preliminary design (BODR) of major rehabilitation work at Pump Stations 301, 414, 415, 416 and 417. Project involved detailed hydraulic evaluation of existing systems and recommendations for pumping system replacement to optimize performance. Working closely with the PMCM, condition assessments and alternatives evaluations were also performed.

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NDWWTP Deep Injection Well Pump Station Improvements, MDWASD, Miami, FL. Lead Pumping Systems Engineer. Dr. Ravisangar ledd the design effort of adding new pumps for existing deep injection well pump station. Project involved detailed evaluation of existing pumping system, deep injection well performance, recommendation for replacement pumps, modifications to existing well heads, and developing new control strategies for pump and well operation for optimized performance.

Rehabilitation of Potomac Pumping Station, Water and Sewer Authority, DC. Lead Hydraulic Analyst. For the rehabilitation of the Potomac Pumping Station, Dr. Ravisangar served as the lead hydraulic analyst to increase capacity 460 mgd. The project included pump re-engineering, pump impeller replacements for higher capacity, and additional surge control measures for the expanded capacity.

Springtree WWTP Headworks Design, City of Sunrise, Sunrise, Florida QA/QC Technical Advisor. For the Headworks Design, particularly the hydraulic elements. The project design included creating a plant-wide hydraulic profile, raising the height of the existing channels, and a new passive overflow for improved O&M flexibility. The project involved the replacement of three automatic bar screens with 6 mm perforated plates and screening washer-compactors, as well as the replacement of two grit vortex drives, two recessed impeller grit pumps, and two hydrocyclone/ degritter units. A new biotrickling filter type odor control system was included to treat foul air generated at the Headworks Structure.

Rehabilitation of Flood Damaged Pump Stations for City of Clarksville, Tennessee. Lead Hydraulic Analyst. For the City of Clarksville, Dr. Ravisangar provided the design for the rehabilitation of the following flood damaged pump stations: Main, McClure, Gallows Hollow, Red River, Old Russellville Pike, Talley Drive, Southern Hills, Pettus Street, and Providence Cabinet Shop.

Design of the Alcovy River Wastewater Pumping Station, Gwinnett County, Georgia. Lead Engineer. This unique wastewater pumping system design included two in-line booster pumping stations and three lift stations to deliver a firm pumping flow of 35 mgd.

Hopkins Lift Station and Forcemain Project, MCES, Minnesota. Lead Hydraulic Analyst. For Hopkins Lift Station and Forcemain Project, Dr. Ravisangar was the lead hydraulic analyst. The project included replacement of the main lift station (L-27), construction of a new forcemain, and rehabilitation of sections of existing forcemain. Analyses included sizing of the new lift station, hydraulic/transient analysis of existing forcemain, preliminary transient control strategy for new dual forcemain, design criteria for a new forcemain.

Marlboro Meadows PS, Washington Suburban Sanitary Commission, Washington, DC. Lead Hydraulic Analyst. Dr. Ravisangar served as the lead hydraulic analyst for the design of a new pump station and force main system.

Improvements to Influent Pumping Station and Intermediate Pumping Station, Kingsport, Tennessee. Lead Hydraulic Analyst. For pump station improvements at the City of Kingsport's wastewater treatment plant, Dr. Ravisangar's analyses included pump replacement, impeller replacement, and addition of new pumps to increase the firm pumping capacity of both stations to 35 mgd.

Improvements to North Pump Station and Stevens Avenue Pump Station, Lancaster, Pennsylvania. Lead Hydraulic Analyst. For the City of Lancaster, Dr. Ravisangar is the lead hydraulic analyst for design of improvements to two of the city's pump stations. The North pumping stations will be expanded to 43 mgd while the Stevens Avenue pump station will be expanded to 11 mgd. Additional improvements will include new surge control measures at the pump stations to handle an intermittent line velocity over 9 ft/sec.

Improvements to Five Pump Stations (PS), Clarksville, Tennessee. Lead Hydraulic Analyst. For the City of Clarksville, Dr. Ravisangar was the lead hydraulic analyst for improvements to the Brownsville PS, Gateway PS, Countryside PS, Mary's Garden PS, and Red Coat Run PS. Improvements included new submersible-type pumps and manifolded force main systems.

Rehabilitation and Expansion of Three Pump Stations, Upper Occoquan Sewage Authority (UOSA), Virginia. Lead Hydraulic Analyst. Lead hydraulic analyst for rehabilitation and expansion of the Winters Branch Pumping Station, Cockrell Branch Pumping Station, and Russia Branch Pumping Station. The project included new dry pit submersible-type pumps and new surge control measures.

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Brian J. Scott, P.E.

Wastewater Hydraulic Model

Education

M.S. Civil & Environmental Engineering

University of Wisconsin–Madison

B.S. Civil Engineering

University of Wisconsin–Platteville

Registration

PE: Florida 78420

Brian Scott has ten years of experience in a variety of water and wastewater planning, design, and construction management projects. His expertise includes the evaluation and optimization of unidirectional flushing programs, the study of water quality issues in distribution systems, and the use of hydraulic modeling software such as InfoWorks, InfoWater, InfoSWMM, H2OMAP Water, WaterGEMS, SewerGEMS, and DHI Mike Urban. He has been involved in the development of master plans for numerous clients across the country and is skilled in the development and analysis of water, wastewater, and reclaimed water models. Additionally, his experience includes proficiency with AutoCAD and ArcGIS, pump station and pipeline design, statistical analysis, construction management, pilot testing, and permitting.

Reclaimed Water Plant Expansion, Broward County Water and Wastewater Services, Broward County, Florida. Technical Lead - Modeling. Hydraulic modeling to support pump selection for a 26 MGD reclaimed water pump station and transmission system. Analyzed ability of the transmission system to meet anticipated build-out conditions and determined required system configuration and operation to balance system demands due to high peaking factors. Communicated results to Client and emphasized the importance of large user demand management considerations required to maintain service within the design limits while meeting the average-day reuse requirements mandated by the Ocean Outfall Legislation.

3BC Septic Tank Elimination Analysis Memorandum. Technical Lead - Modeling. Hydraulic modeling to determine overall hydraulic factors and conditions of a proposed forcemain to tie into Master Pump Station 320 (MPS 320).

3A Collection System Hydraulic Model 300 Development. Technical Lead - Modeling. Hydraulic modeling of the force main system inclusive of the pump stations, wet wells and gravity system access structures immediately upstream (up to the first upstream manhole) of lift stations within the District 3A collection system that connect directly to the City of Hollywood's regional wastewater system.

Brown AND Caldwell

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Master Pump Station 462 Ragging Assessment. Technical Lead - Modeling. Hydraulic modeling to evaluate the transmission hydraulics to estimate normal point-of-connection pressures, as well as the conditions encountered when rag balls form and constrain transmission.

Potable Water Main Replacement Projects, City of Hollywood, Florida. Senior Project Engineer. Design, permitting, and construction management services for water distribution system improvements for approximately 29,000 linear feet of new potable water main. This project involved work within a busy Florida Department of Transportation (FDOT) right-of-way, advanced permitting requirements, complex maintenance of traffic (MOT) considerations, the use of trenchless construction methods such as horizontal directional drill (HDD), and work with existing large diameter pre-stressed concrete cylinder pipe (PCCP). A second project that is in process involves the surveying, geotechnical investigations, design, permitting, bidding, and limited construction administration services for the replacement of approximately 60,500 linear feet of water mains. Included is the replacement of all water mains located within the Hollywood Boulevard right-of-way including FDOT permit applications for Roadway Right-of-Way construction. It also includes the design of five horizontal directional drills (HDDs).

Distribution System Water Quality Improvements, Hollywood, Florida. Senior Project Engineer. The City of Hollywood had observed declining chlorine residuals along the north part of the barrier island during its routine water sampling activities. Nigel led the efforts to rapidly mobilize the firm to identify the source of the issue, recommended actions that could be implemented immediately to begin addressing it, and proposed longer-term solutions that could enhance overall distribution system operations and reduce the risk of similar issues occurring in the future. Initial recommendations implemented have resulted in a significant improvement in chlorine residuals maintained in the distribution system, particularly in the area of the barrier island with a history of low chlorine residuals.

Ocean Outfall Legislation – Reuse Compliance Strategy, City of Hollywood, Florida. Senior Project Engineer. Development of an integrated Ocean Outfall Legislation strategy that has resulted in agreement on a feasible reclaimed water compliance approach that leverages contracted reuse opportunities and maximizes the use of effluent that is not impacted by brackish groundwater influences. Working closely with the City and FDEP, the aquifer recharge element of the original plan was eliminated and the actual reuse to be implemented was limited only to the amount determined to be technically, environmentally and economically feasible. The City has realized an estimated cost savings of approximately $200 Million from its baseline plan of approximately $300 Million.

Water and WW Master Plan, City of West Palm Beach, Florida. Technical Lead - Modeling. Created, calibrated, and utilized the utilities all pipe wastewater collection system hydraulic model and water distribution system model as part of the master planning process. Determined system deficiencies for a 30-year planning period and recommended system upgrades to maintain adequate service. Recommendations were establishing for prioritizing critical assets for condition assessment and to establish a 7-year capital improvement program (CIP) to improve reliability and performance while expanding capacity where required to support continued growth. As part of Amendment 3 to the project, verified and updated fire flows for the entire system and determined fire flow deficiencies, developed proposed solutions, and prepared a technical memorandum summarizing the results including engineer's opinion of probable construction costs.

Water and WW Master Plan As-Needed Services, City of West Palm Beach, Florida. Technical Lead - Modeling. Utilized the City's all pipe water distribution system model and the City's all pipe sanitary collection system model to support City staff with engineering decision making. Analyzed waterway crossing criticality and assessed impacts of construction related shutdowns. Developed an operational strategy to support the launch and transport of electromagnetic tools used to assess the conditions of the City's 42/48-inch diameter PCCP force main. Assessed the impact of adding sanitary flows from adjacent municipalities to the City's sanitary collection system and developed cost estimates for necessary system improvements.

Lift Station 114, 123, 125, 132, and 148 Rehabilitation, City of Sunrise, Florida. Project Engineer. Performed design of five sanitary lift stations, converting pump stations from wet/dry pit to wet pit submersible. Conducted hydraulic modeling of the sanitary force main network to establish design conditions and pump selection. Overcame site space constrictions, with the final design resulting in improved security, accessibility, and aesthetics at each site.

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Hydraulic Modeling, Sarasota County, Florida. Project Engineer. Wastewater hydraulic modeling of an existing manifold force main system for current, 20-year, and build-out flows for a new pump station and 20-inch transmission force main including data collection and review, model verification, modeling proposed system, developing three alternatives, and producing technical memorandum summarizing the results.

Water Distribution System Hydraulic Model, Panama City, Florida. Technical Lead - Modeling. Calibrated and ran utilities all pipe water distribution system hydraulic model using InfoWater to determine system controls to allow for turnover in a proposed elevated tank. Set up multiple system scenarios and calibrated system based on field data. Performed fire flow simulations using final control scenario.

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Peter Moore, P.E., LEED AP, ENV SP, F. ASCE

Project Director

Education

Bachelor of Science, Civil Engineering, University of Florida, 1997

Master of Engineering, Civil Engineering, University of Florida, 2004

Registration

Professional Engineer, Florida, 58709, 2002

Professional Affiliations

American Society of Civil Engineers
American Water Works Association
Florida Engineering Society
Florida Engineering Leadership Institute
FICE
FEF
Florida Stormwater Association
National Society of Professional Engineers

Certifications

Certified Stormwater Inspector
LEED Accredited Professional

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Mr. Moore is the president of CMA with more than 21 years of experience with a wide variety of utility, stormwater, transportation and other infrastructure projects. Since joining CMA in 1999, Mr. Moore has focused on the management, planning, design, permitting, and construction of various utility infrastructure projects for public clients throughout South Florida. Mr. Moore has worked on literally dozens of unique projects for Broward County valued at $100M in his career, literally serving in every role in a project team. Of particular note is Mr. Moore's experience in value engineering, including projects for Broward County WWS, Miami-Dade Water and Sewer Department and a development client in Saudi Arabia. Including his assistance as a reviewer and design guideline developer for the firm's work in the Republic of Panama, Mr. Moore has an additional $500M of international project exposure to give him the full arsenal of tools to serve Broward County. A lifelong Broward County Resident, Mr. Moore has his Bachelor of Science and Master of Engineering in Civil Engineering, is a licensed professional engineer in Florida and has been elected as a Fellow of the American Society of Civil Engineers (ASCE) for his lifetime achievements and contributions to civil engineering. To show his understanding of today's issues, Mr. Moore also is an Envision Sustainability Professional and a LEED Accredited Professional (two additional certifications specializing in sustainability). He is a past president and board member of numerous local, regional and national professional societies and non-profit organizations.

Project Experience

Fort Lauderdale-Hollywood International Airport Stormwater Master Plan Update. Under Phase 1 of this project, Broward County Aviation Department (BCAD) retained Chen Moore and Associates (CMA) to update the FLL Stormwater Master Plan (SWMP), which was completed by a previous consultant in 2001. CMA reviewed the data and analysis from all prior reports, converted the existing stormwater model from SWMM to ICPR, and updated the ICPR model with any new system data and new projects provided by BCAD. CMA updated the existing conditions stormwater model and created the future conditions stormwater model to assess alternative drainage improvements needed to achieve required and desired Levels of Service (LOS) for various storm events. The

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stormwater model was used to run rainfall scenarios for the comparison of pre-development (existing) conditions versus post-development (future) conditions from a water quantity (runoff) and water quality (storage) perspective. The stormwater model was used to analyze the performance of the existing Primary Stormwater Management System (PSMS). Phase 1 for this project included the following work items:

- Review and verify earlier work by other consultants during 2001-2005
- Convert previous SWMM stormwater model to ICPR model
- Obtain updated topographic data for TIN development
- Calculate updated hydrologic parameter for drainage basins
- Conduct analysis of various system improvement alternatives
- Prepare Stormwater Master Plan Update

Broadview Park Neighborhood Improvement Program. The Broadview Park Neighborhood Improvement Program (BPNIP) was the last of the Neighborhood Infrastructure Improvements projects to be carried out by Broward County in the unincorporated areas. Chen Moore and Associates was selected as the prime consultant for the Basis of Design Report (BODR) and to design and administer the construction of improvements to subsequent bid packages. The three Bid Packages addressed water, sanitary sewer and drainage improvements, while introducing sidewalks and enhancing the community's roadway and landscape.

The basis of design report included population projections, an analysis of water source and sewage discharge points and a hydraulic model of the water, wastewater and stormwater systems.

The first bid package included the replacement of the entire water distribution system within the neighborhood, which was previously owned and maintained by a private utility. This project was designed utilizing digital orthography and aerial maps to fast track the replacement.

The second and third bid packages included conversion of the entire area from septic to gravity collection, the installation of a backbone forcemain network and connection into an inline booster station, installation of a positive drainage system, sidewalks, hardscape and landscape improvements.

An added fourth bid package was the design of a 20" water main to serve as the transmission source water for the area. Also change ordered into the project was the installation of a 20" raw water main for future use. The project was complicated by groundwater contamination, proximity to a wellfield, the existence of a fire station and elementary school in the neighborhood and the existence of rock in the area. All of the projects were completed on budget and on or ahead of schedule.

Ft Lauderdale FM Rehab, HDD & Swageline (1-4). Chen Moore and Associates (CMA) is the prime consultant for the 30" Emergency Force Main Rehabilitation project in the City of Fort Lauderdale. This innovative design-build project, led by Murphy Pipeline Contractors (MPC) was undertaken to provide both mainline force main replacement for aging infrastructure and to provide additional redundancy in case of future issues. The contract was divided into four (4) phases within the City of Fort Lauderdale. The nearly 20,000 linear feet of pipeline is being rehabilitated through a combination of swagelining, directional drilling, and traditional open cut installation over these four phases. CMA provided planning, design, permitting and engineering services during construction. Environmental compliance, subaqueous crossing, public involvement and maintenance of traffic in the busy Sistrunk and Himmarshee Business Districts were some of the additional project complexities. CMA also provided dewatering permitting and groundwater modeling due to contaminated sites within quarter mile of the projects.

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Jason McClair, P.E., CFM, LEED AP

Pump Station O&M Analysis / Capital Improvement Plan

Education

Bachelor of Science, Civil Engineering, University of Florida, 1996

Registration

Professional Engineer, Florida, 56962, 2001

Professional Affiliations

American Public Works Association
American Society of Civil Engineers
American Water Works Association
Broward County Gator Club
Florida Engineering Society
National Society of Professional Engineers
University of Florida Alumni Association

Certifications

SewerCAD Master Modeler (Haestad Methods)
WaterCAD Master Modeler (Haestad Methods)
ICPR Modeler (Streamline Technologies)
Certified Floodplain Manager
FDOT LAP Compliance
SWMM Stormwater Modeler
FDOT LAP Compliance update June 2014
SWMM Modeling Software Training

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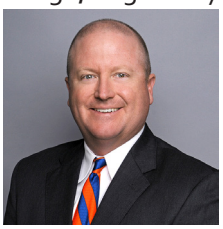

Mr. McClair is a senior civil engineer with more than 22 years of experience in utility infrastructure design, regulatory permitting, geotechnical engineering, and computer aided flow modeling for stormwater collection, water distribution, and sanitary transmission systems. Since joining CMA in 2001, Mr. McClair has focused on the management, planning, design, permitting, and construction of various utility infrastructure projects for public clients throughout South Florida, including for BCAD. He has extensive experience with hydraulic and hydrologic modeling for the analysis of stormwater, water, and wastewater systems. Mr. McClair has over 10 years of experience working directly for BCAD. He was the project manager for the Fort Lauderdale-Hollywood International Airport Stormwater Master Plan Update Project from 2008 through 2013 and is currently responsible for the stormwater design and permitting on the FLL North Airfield Pavement Rehabilitation Project. He also is currently working on the stormwater design and permitting on various projects at Fort Lauderdale Executive Airport.

Project Experience

Fort Lauderdale-Hollywood International Airport Stormwater Master Plan Update. Under Phase 1 of this project, Broward County Aviation Department (BCAD) retained Chen Moore and Associates (CMA) to update the FLL Stormwater Master Plan (SWMP), which was completed by a previous consultant in 2001. CMA reviewed the data and analysis from all prior reports, converted the existing stormwater model from SWMM to ICPR, and updated the ICPR model with any new system data and new projects provided by BCAD. CMA updated the existing conditions stormwater model and created the future conditions stormwater model to assess alternative drainage improvements needed to achieve required and desired Levels of Service (LOS) for various storm events. The stormwater model was used to run rainfall scenarios for the comparison of pre-development (existing) conditions versus post-development (future) conditions from a water quantity (runoff) and water quality (storage) perspective. The stormwater model was used to analyze the performance of the existing Primary Stormwater Management System (PSMS). Phase 1 for this project included the following work items:

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- Review and verify earlier work by other consultants during 2001-2005
- Convert previous SWMM stormwater model to ICPR model
- Obtain updated topographic data for TIN development
- Calculate updated hydrologic parameter for drainage basins
- Conduct analysis of various system improvement alternatives
- Prepare Stormwater Master Plan Update

Pompano Beach Stormwater Master Plan. Chen Moore and Associates (CMA) prepared a Stormwater Master Plan (SWMP) for the entire City of Pompano Beach limits, which encompasses approximately 24.6 square miles. The City operates and maintains its own stormwater facilities within City right-of-way and properties to provide flood control and water quality treatment within the City limits. Existing drainage facilities within the City include catch basins, manholes, control structures, gravity pipes, outfalls, and canals that connect to the Intracoastal Waterway.

The purpose of this SWMP was to identify any deficiencies in the existing stormwater management system in regards to flood control and water quality treatment. The SWMP will allow the City to understand the necessary drainage improvements over the next few years and to budget accordingly. CMA will recommend system improvements to meet regulatory Level of Service (LOS) criteria in regards to peak flood stage, peak discharge, and water quality. Within the SWMP, CMA will provide recommendations for improvements to the system that will eliminate or reduce the ponding currently encountered within right-of-way areas during or after rainfall events. The SWMP will define the existing stormwater management system; summarize the results of the stormwater model for the existing conditions; prioritize the proposed improvements to the stormwater management system; and provide an estimated cost to construct these upgrades to the stormwater management system.

As part of this project, CMA assisted the City with the documentation of how the Floodplain Management Plan was prepared per the requirements of FEMA. The SWMP will be configured to address the relevant FEMA requirements related to Floodplain Management, including Activity 510 – Floodplain Management Planning, Activity 530 – Flood Protection, and Activity 540 – Drainage System Maintenance. CMA will submit the Floodplain Management Plan to FEMA for review.

In conjunction with CIP Implementation Plan to be defined within the Stormwater Master Plan document, an annual budget for the stormwater management system was developed. The annual budget includes operational expenditures necessary for appropriate maintenance activities and capital expenditures necessary to implement the recommended system improvements defined within the Stormwater Master Plan. CMA reviewed these annual expenditures to verify the adequacy of the existing stormwater utility fee and provided recommendations for an adjustment to the stormwater utility fee for consideration by the City. CMA provided revised calculations for the stormwater utility fee and language for the City Commission to consider for updating the ordinance.

Stormwater Master Plan Modeling and Design Implementation. CMA is providing engineering design services for the under Stormwater Improvement Master Plan Modeling and Design Implementation Project under the for the City of Fort Lauderdale. CMA is responsible for the planning, modeling, design, and permitting for the proposed stormwater improvements within the Victoria Park neighborhood, which was identified as one of the 7 priority neighborhoods with the City. A combination of multiple improvements to the stormwater management system have been developed to alleviate the existing flooding issues within the Victoria Park neighborhood. The proposed stormwater improvements within the Victoria Park neighborhood include separate alternatives for the eastern and western portions of the neighborhood. Within the western portions of the Victoria Park neighborhood, the proposed stormwater improvements consist of installing additional pipe interconnectivity of various existing independent drainage networks located throughout the neighborhood, installing new exfiltration trench, and completing limited roadway swale restoration where feasible. Within the easter portions of the Victoria Park neighborhood, the proposed improvements consist of interconnecting 6 independent positive outfalls into the

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Middle River, installing new backflow prevention, and adding a new stormwater pump station. The proposed stormwater improvements within the Victoria Park neighborhood are estimated to be approximately $13 million in construction costs.

Western Sunrise Basin 8 Stormwater Study. Chen Moore and Associates has been contracted by the City of Sunrise to update the existing model for the Western Sunrise Basin 8. The project includes implementing updates to the 1999 version of the stormwater master plan with developments and permit modifications processed by South Florida Water Management District, Broward County and the City of Sunrise to create a new 'existing condition.' The area consists of approximately 2,305 acres of the western portion of the City including Sawgrass Mills and the BB&T Center.

The tasks of the stormwater study includes the following:

- Preparation of a report based on findings and results prior to the other options being discussed to be done at a future date;
- Utilize the updated model and add future upcoming large proposed developments within the City of Sunrise;
- Update the model to include potential improvements that may be required as a result of future developments;
- Coordination meetings with the City and potential developers; and
- Prepare a submittal for a modification of the Western Sunrise Basin 8 conceptual permit with Broward County and South Florida Water Management District

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Paula Fonseca, P.E.

GIS/ Risk Based Prioritization

Education

Bachelor of Science, Civil Engineering, Florida Atlantic University, 2008

Registration

Professional Engineer, Florida, 2014

Professional Affiliations

American Society of Civil Engineers
American Water Works Association
Florida Engineering Society

Certifications

Stormwater Management Inspector

InfoWater Software Training

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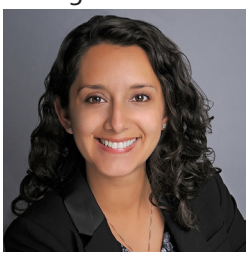

Paula Fonseca, P.E. is a civil engineering graduate with nine years of experience. She serves as senior engineer for Chen Moore and Associates and serves as the primary hydraulic modeler for the firm. Ms. Fonseca has worked for CMA for seven (7) years with focus on hydraulic modeling using InfoWater. She assists with design work using AutoCAD, GIS, WaterCAD, SewerCAD, StormCAD, and InfoWater 8.1v. Ms. Fonseca has worked on neighborhood improvement projects for Broward County, utility coordination projects for Riviera Beach Utility District, including water and sewer designs and permitting, Design of GIS Utility Atlases for the City of Pompano Beach and Solid Waste Authority, as well as civil engineering design, drafting, permitting, cost evaluations and construction inspection for various project involving water and force main improvements for the City of Margate. Moreover, Ms. Fonseca has worked on the Palm Beach County Water Master Plan and Glades Regional Water Master Plan through the use of water modeling software (InfoWater) and GIS. In addition, she has worked on hydraulic models for the City of Margate evaluating the robustness of its water and force main systems.

Project Experience

Palm Beach County Water Utilities Department Water Master Plan Update. Chen Moore and Associates was a subconsultant to Carollo Engineers on the Palm Beach County Water Utilities Department (PBCWUD) Water Master Plan Update. The service area for PBCWUD covers approximately 429 square miles and serves a population of 438,090. The transmission and distribution system includes over 2,400 miles of pipeline and four water treatment plants which produce a combined annual average flow of about 56 million gallons per day. Chen Moore assisted with the data compilation and analysis, distribution system hydraulic and water quality modeling with the InfoWater software, report preparation, cost estimating for proposed alternatives, and development of the Capital Improvements Plan.

Palm Beach County Water Utilities Department Glades Utility Area Water Master Plan. The purpose of the project was to update the hydraulic distribution system model and evaluate the water system to develop a Capital Improvements Program and Water Master Plan report. The Water Master Plan includes model calibration and future

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modeling scenarios analyses with the InfoWater software.

The water model development and calibration includes data collection to develop water demands, diurnal peaking factors, and diurnal curves to complete the planning framework and criteria that will be used to evaluate the adequacy of the water distribution system and its infrastructure. The calibration aspect of the project requires collection and verification of GIS infrastructure, operational information, and water demand allocation for present and future water consumption.

The water system will be evaluated against established performance criteria to identify deficiencies and determine adequacy of existing infrastructure such as water treatment plant, storage and pumping capacity. The water master plan will develop and evaluate future scenarios forecasting water demands for 5-year, 10-year, and 20-year periods which will assess water system conditions such as fire flow, water age and critical pipes.

Modeling Services - Margate. CMA, through Carollo engineers, was requested by the City of Margate to perform updates to their water and force main hydraulic models using the InfoWater software. For the water modeling, the tasks included performing water main break analysis, identifying areas with poor redundancy, assessing location of critical valves, verifying fire flows for proposed developments, and modeling proposed improvements identified by the City. For the force main model, the tasks included force main failure analysis to identify lack of system redundancy and inadequate valve placement; evaluation of proposed improvements in the system which included model calibration and analysis; a comparison of the entire system to the wastewater flow entering the plant; an inflow and infiltration analysis that utilized both the lift station run times as well as the gravity pipe condition; a feasibility analysis for utilizing alternate flow routes, including adjusting pump characteristics in the lift stations; and a feasibility analysis of force main tie ins. For the sewer modeling, tasks included inflow and infiltration studies and running new scenarios and calibration efforts that incorporate more lift station information. While all of the described tasks have been completed, the City wishes to utilize the project on a continuing basis for model updates. The results of the model have been used for projects that CMA have completed or are conducting under separate task orders.

Hydraulic Wastewater Model-Updates & Analysis. CMA is assisting the City of Margate with an update of the lift stations and force main information in the existing hydraulic wastewater model in InfoWater software and further evaluation of the system to determine feasibility of the proposed force main along Southgate Boulevard to provide system redundancy. The scope of services includes updating the hydraulic model; calibrating the model and creating an additional scenario for evaluation; determining feasibility of the proposed force main along Southgate Boulevard during average and wet weather event conditions; and providing a technical memorandum report summarizing the latest model updates and results of the system evaluation.

Force Main Modeling and Design. CMA, as a subconsultant to Carollo Engineers, was contracted by the City of Margate to perform modeling, design and permitting for force main improvements. The modeling is based on the previous models that CMA completed for the City and will evaluate two different options for connecting existing force mains. These connections will allow the City to direct the flow to their other wastewater treatment plant. In addition to the modeling, the project includes the design and permitting of over 2,600 LF of new force main and abandonment of over 1,000 LF of existing force main. The new force main design incorporates a directional drill under a City-owned canal.

Hydraulic Wastewater Model-Updates & Analysis. CMA is assisting the City of Margate with an update of the lift stations and force main information in the existing hydraulic wastewater model and further evaluation of the system to determine feasibility of the proposed force main along Southgate Boulevard to provide system redundancy. The scope of services includes updating the hydraulic model; calibrating the model and creating an additional scenario for evaluation; determining feasibility of the proposed force main along Southgate Boulevard during average and wet weather event conditions; and providing a technical memorandum report summarizing the latest model updates and results of the system evaluation.

Lift Station & Force Main Analysis. Chen Moore (CMA) is providing engineering services to develop a hydraulic model for the City of North Lauderdale forcemain network. The hydraulic model will be used to analyze the flow conditions within the forcemain network under various lift station

operating conditions and to identify potential modifications to the lift stations. Modification will improve the system's efficiency and decrease operational and maintenance costs. Modeling of the City's infrastructure will entail analysis of approximately 11 miles of forcemain infrastructure and 28 lift station stations.

During the modeling analysis CMA will develop various system improvement alternatives and review possible activities to alleviate the peak pressures within the forcemain network. The hydraulic model will analyze the effectiveness of proposed improvement alternatives to the existing system. CMA shall also prioritize the need for each system improvement alternative based on the results of the analysis. After performing the hydraulic analysis CMA shall provide capital improvements recommendations with a list of priorities and a rough order of magnitude estimate. The CIP recommendations will identify the infrastructure elements that are in need of upgrade based on assumptions that will be identified in the report.

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Patrick D Kaimrajh, PE

Pump Station Inspections / Condition Assessment

Education

Bachelor of Science, Civil Engineering, University of Miami, 2010

Registration

Professional Engineer, Florida, 78535, 2015

Professional Affiliations

American Society of Civil Engineers
American Water Works Association
Florida Engineering Society

Certifications

ICPR Software Training

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Patrick D Kaimrajh, PE serves as a senior engineer for CMA and specializes in civil engineering design, drafting, permitting, and construction inspection. His 9 years of design experience at CMA includes paving, drainage and stormwater management, sanitary sewer and stormwater pump stations, water main, site development, and neighborhood improvement projects. He has prepared engineering drawings, cost evaluations, design reports and various permit applications. In addition, Mr. Kaimrajh has performed construction inspections for drainage, watermain, sanitary sewer, and pavement. He also is skilled in AutoCAD Civil3D, ICPR, EPA SWMM, Cascade, HY-8, WaterCAD, SewerCAD, and StormCAD, modeling and design software. Mr. Kaimrajh will be responsible for the planning and modeling efforts related to the stormwater, water, and wastewater infrastructure of this project.

Project Experience

Victoria Park Stormwater Master Plan Design. CMA is providing field and preliminary engineering design services for the Victoria Park Neighborhood project for the City of Fort Lauderdale. CMA will provide data collection of stormwater infrastructure and other survey information needed to develop preliminary designs for stormwater management improvements in seven specific neighborhoods; utilize model results to inform the development of conceptual solutions for seven specific neighborhoods capital improvement projects (CIP); develop preliminary improvement plans and opinions of probable construction costs based on conceptual solutions based on the implementation of minimum levels of services (LOS) within each neighborhood, developed using the aforementioned information; and provide permitting coordination with primary regulatory agencies.

Broward County UAZ 110/111 & 113 Water Sewer Improvements 113B. The Water and Sanitary Sewer Improvements for the UAZ 110/111 & 113 Project will include the improvements to the existing water distribution system, sanitary sewer system, and transmission systems within the project area along with the restoration of surface areas disturbed for the construction of said improvements. The existing system being replaced consists of approximately 168,100LF of water mains, 122,100 LF of sanitary sewer mains and 23,600 LF force main. The existing water main consists of asbestos cement, cast iron, ductile iron,

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galvanized steel, polyvinyl chloride pipe ranging from 2" - 24" in diameter size. The sanitary sewer consists of vitrified clay, fold and form liner, cured in place liner and ductile iron pipe ranging from 8" – 15" in diameter size. The force main consists of asbestos cement, cured in place liner, ductile iron and polyvinyl chloride pipe ranging from 6" – 16" in diameter size. There are 8 Broward County lift stations in these UAZ areas and 1 private lift station which sanitary sewer systems will need to connect to. Two of these stations will need rehabilitation/replacement, the extent of rehabilitation of existing stations will be determined. The restoration of roadways, sidewalks, driveways, and landscape areas will need to be performed as needed for water and sanitary sewer improvement construction.

FKAA Cudjoe Regional Wastewater Collection. Chen Moore was prime consultant designing this $90 million design-build water main replacement and sanitary sewer collection system that will convey sewage from four of the lower keys to a transmission force main and/or master lift station located along US1/Overseas Highway. The project includes replacement of 35,579 LF of 4" C-900 water main, 21,831 LF of 6" C-900 water main and 205 LF of 8" C-900 water main. The project – the single largest in terms of value and number of customers served ever undertaken by Monroe County – consists of wastewater service and water replacement to the islands of Ramrod Key, Lower Sugarloaf Key, Little Torch Key, and Big Pine Key. The wastewater collection system includes approximately 500,000 linear feet of gravity sewer and low-pressure grinder sewer with over 62 neighborhood lift stations that serve approximately 4,500 customers. The transmission system consists of four master pump stations and PVC and HDPE pipeline laid along US Highway 1. The project requires close coordination with the local, state and federal permitting agencies.

Twin Lakes Stormwater Improvements. Chen Moore and Associates assisted the City of Sunrise in preparing surveying documents, civil engineering and construction administration services for stormwater improvements in the existing Twin Lakes residential neighborhood located in the following general boundary in the City of Sunrise: Flamingo Road to the west, Oakland Park Boulevard to the north, NW 28th Court to the south and NW 113th Avenue to the east. CMA previously conducted a stormwater study of the Twin Lakes neighborhood for the City of Sunrise to propose alternatives to improve existing conditions that resulted in large flooding events, including heavy flooding reported during and after Tropical Storm Isaac on August 27, 2012. The study defined causes for the flooding and identified key improvements and alternatives that could alleviate the potential for future flooding. The stormwater study identified the following improvements that were included in this design and permitting scope including:

- Removal of existing culverts and installing a new 38" x 60" culvert north of NW 30th Street on NW 115th Terrace addressing several water main and sanitary sewer conflicts
- Modification of an existing grate adjacent to the C-42 Canal and the SFWMD S-125 Canal
- Removal of an existing Tideflex Valve and installation of a flap gate on an existing structure adjacent to the C-42 Canal
- Proposing three (3) new boat ramps at various locations within the neighborhood
- Proposing the reconstruction of four (4) existing boat ramps within the neighborhood
- Replacement of a manatee gate

OOL Program Pipeline Design Projects. Chen Moore and Associates (CMA) is a sub-consultant on the Miami-Dade Water and Sewer Department (WASD) Ocean Outfall Legislation (OOL) program SL 3.2A pipeline project. This project consists of the design, permitting, and preparation of bid documents for a 60" diameter sanitary sewer transmission force main to redirect wastewater from the existing outfall at the WASD Central District Wastewater Treatment Plant on Virginia key to high-level disinfection injection wells at the South District Wastewater Treatment Plant. This project includes the transmission force main along SW 137th Avenue from SW 152nd Street to SW 176th Street in unincorporated Miami-Dade County.

OOL Program Pipeline Design Project SL-2.1. Chen Moore and Associates (CMA) is a sub-consultant on the Miami-Dade Water and Sewer Department (WASD) Ocean Outfall Legislation (OOL) program SL 3.1 pipeline project. This

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project consists of the design, permitting, and preparation of bid documents for a 60" diameter sanitary sewer transmission force main to redirect wastewater from the existing outfall at the WASD Central District Wastewater Treatment Plant on Virginia key to high-level disinfection injection wells at the South District Wastewater Treatment Plant. This project includes the transmission force main along SW 137th Avenue from SW 176th Street to SW 200th Street, along SW 200th Street from SW 137th Avenue to SW 134th Avenue, and along SW 134th Avenue from SW 200th Street to SW 208th Street in unincorporated Miami-Dade County.

CMA is responsible for the maintenance of traffic and permitting.

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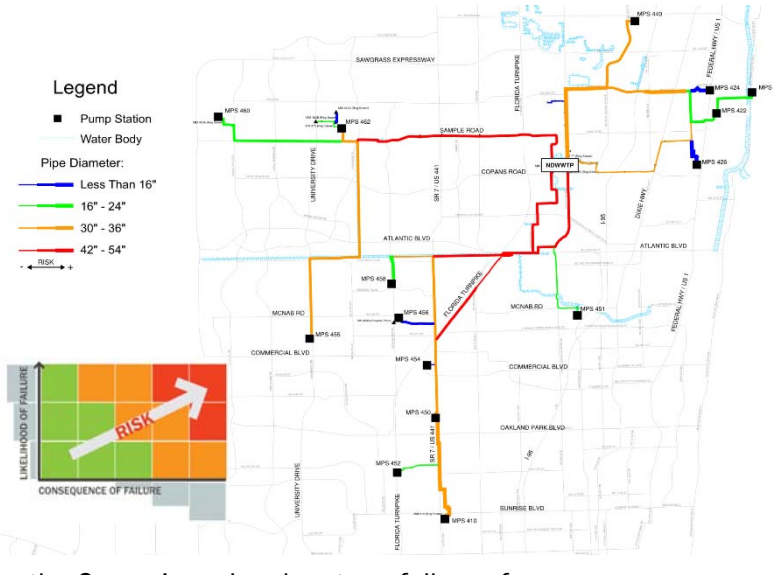
B. Project Approach

Broward County Water and Wastewater Services, (BC WWS) operates a wastewater system that provides retail service as well as regional service to 11 Large Users that that manage their respective collection systems but transmit flows to WWSs North Regional WWTP (NRWWTP) for treatment and disposal. The regional system that serves these Large Users begins at Master Pump Stations (MPS). In addition to the MPSs that receive flows from Large Users, retail MPSs also connect to and deliver flows through the regional transmission system, which is comprised of a system of force mains, to the headworks of the NRWWTP.

The regional transmission system which was initially constructed in the 1970s and expanded throughout the years, is composed of different materials, service environments and operating configuration. The County's objectives are to proactively identify and plan for the mitigation of critical vulnerabilities and to identify improvements that will maximize capacity utilization while maintaining desired level of service. The configuration of the regional transmission system and approximate locations of the MPSs are shown in the figure below. General characteristics of the system include:

1. 15 MPSs contribute flow to the system;
2. The transmission core is well looped but has a notable single point of failure vulnerability;
3. Approx. 80% of piping is ductile iron (DI) pipe & 13% is unknown;
4. Approx. 50% of the system was installed prior to 1980;
5. Force mains range in size up to 54 in with the largest size being among the oldest.



With a system as large and networked as the County's regional system, failure of any component can produce significant impacts. A wide range of factors can impact the vulnerability of transmission infrastructure to failure as well as the consequence of failure and ability to recover quickly. A well-conceived risk based plan should consider all factors that can impact vulnerability, failure rate, consequence and recovery efforts.

Asset	Operational
• Configuration, age & materials • Environment/service condition • Single points of failure/looping • Integrity/history/forensic reviews • Placement of isolation & air relief valves • Economically and environmentally critical corridors	• ARV maintenance/venting • Emergency preparedness • Operability of valves • Maintenance practices • Pump station/surge control • Monitoring/excursion detection • Operational efficiency

The exhibit below presents the overall approach for developing the Regional Transmission Master Plan and follows the

structure of the approach performed for similar previous projects. This approach provides a comprehensive framework for addressing all critical elements, inclusive of asset characteristics and operational factors, that impact system capacity, operational flexibility, risk of failure and the ability to recover quickly for unplanned outages. Key project implementation steps include:

1. Kick-off Activities and Preliminary Assessment
2. Detailed Assessment and Prioritization of Needs
3. Improvement Program Development Priorities
4. Final Master Plan Development

By taking a balanced view of assets that consider not only the physical condition and risk factors but also the operating environment, pumping controls and maintenance considerations, our proposed approach will yield more cost effective and sustainable improvements that will maximize the capacity and life of existing assets, reduce failure risk and enhance recovery strategies. Effective emergency preparedness and response addresses the critical need for well thought out and practiced protocols for effectively responding to failure of the most critical and high consequence assets. Given its importance and distinct goals from the master planning process, we dedicated a separate approach section to review the key considerations in effective emergency response planning. Important highlights of our balanced approach and benefits of our team to Broward County are summarized below.

Comprehensive Assessment of Failure Risks – O&M, asset condition, operational controls, and emergency preparedness. Our team brings local and national experience in key areas:

a. Performance assessment and improvement recommendations for wastewater master pump stations including Broward

WWS MPSs 462 and 320.

b. Inspection and Condition assessments of wastewater pump stations including annual inspections of all Broward WWS Master PSs

c. Hydraulic assessment in support of condition assessment inspection of large diameter forcemains.

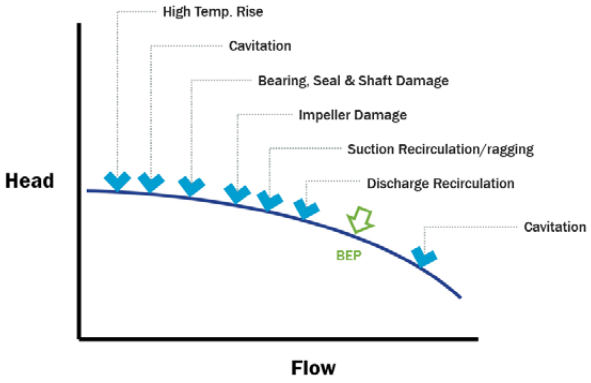
d. Emergency response planning for critical force mains

Hydraulic Modeling and Surge Analysis – assessment of surge conditions, suppression measures and operational application modeling to improve reliability and capacity.

System Configuration Considerations – The appropriate placement and serviceability of isolation valves throughout a looped system is of critical importance particularly in emergencies when steps must be quickly taken to isolate and re-route flows in event of a pipe failure. The lack of adequate valves can result in unabated discharge resulting from piping failure that can result in significant property and environmental impacts. In systems such as Broward's that relies heavily on the use of inline booster MPSs, the available storage within the regional system is negligible in relation to the flow. This increases the need to be equipped to take rapid action to intervene in emergency situations.

Recognizing the important relationships among configuration, serviceability and emergency preparedness, our approach is to additionally assess and identify opportunities to improve the configuration of the system to reduce inherent risks and enhance emergency response posture. Examples of measures that will be addressed includes the appropriateness of valve placement, adequacy of valve exercise programs, parts inventory, the potential benefit of in-system storage, and system looping/bypass enhancements.

Operational Factors Affect Pumping Performance – WWS utilizes an inline booster pumping configuration for most of its MPSs which makes coordinated controls, bypass operations and weighting of check valves important factors in operational reliability and pumping capacity. Suboptimal conditions can induce ragging that impairs MPS capacity, increased vibration that impacts reliability, inefficient operation and required maintenance intervention. Inappropriate sizing of pumps relative to the range of expected flows can be a significant contributing factor. Members of our team have inspected all of BC WWSs MPS in the last three years and recently concluded an in-depth evaluation of underlying factors contributing to recurring ragging challenges in one station. Lessons learnt are in the process of being applied to other MPSs with similar operational configurations.



Maintenance Practices – Failures of force main piping commonly occur near unvented air pockets where corrosive acidic conditions can develop from the accumulation of hydrogen sulfide gases. The placement of air release valves at high points along a force main and regular venting of accumulated gases is critical to preventing the development of conditions that can ultimately lead to premature piping failure. Inherent to the operating environment, air release valves require regular maintenance to prevent plugging that can impact their ability to properly vent.

The review of practices extends to other elements of the infrastructure that can impact reliability and risk of high consequence failure. Our approach includes an O&M review of the pertinent areas to identify improvements in asset monitoring capabilities, protocols and systems that will support proactive intervention.

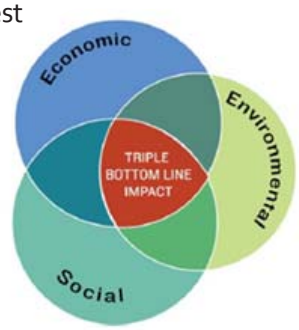
Monitoring and Excursion Detection Systems – Valuable information about the integrity of the regional transmission infrastructure may be derived from diverse sources inclusive of service/repair history, forensic review/documentation of failed components and analysis of data captured as part of routine operation. As part of this planning effort, we will conduct

a review of available system data, interview staff to define how system data are utilized for decision making and identify opportunities for enhanced monitoring and excursion detection and associated capital investment where required.

Collectively, these elements of our master planning approach will provide balanced and fully integrated planning recommendations that address improvements to the physical assets as well as improvements to operational, maintenance and supporting systems.

EMERGENCY RESPONSE PLANNING CONSIDERATIONS

Emergency Response Planning (ERP) is a forward-thinking document for addressing preparedness, incident response and public outreach for potentially catastrophic spill events for at-risk assets – namely large diameter wastewater transmission assets, such as interceptors, force mains and treatment plant influent sewers. Whether as a best practice measure or stipulated from a regulatory action, the goals and program elements should be the same: proactive emergency response planning for high risk assets with plan elements that establish a framework for spill response that should 1) minimize discharges to the environment; 2) prevent public exposure to the spill; and 3) return the asset to full service as rapidly as possible. Candidate assets for supplementary response plans should be vetted through a risk evaluation based on Consequence of Failure (CoF) and Likelihood of Failure (LoF) to establish its criticality.



Applying Triple Bottom Line (TBL) concepts is recommended for internal buy-in as a documented method for establishing the need and anticipated benefit of the ERCP. General criteria for consideration when developing a criticality evaluation include the following:

Economic or Tangible Costs

Measurable costs resulting from responding to a failure of significant spill event include: 1) response cost; 2) potential fines; repair cost; and 4) economic losses. Understanding the potential magnitude of direct and indirect costs is an important consideration in planning for specific emergencies that are tied to the failure of critical and high consequence assets.

Environmental Costs

Environmental costs are a driver of concern regarding anticipated regulatory actions. A well-reasoned ERCP is considered an affirmative defense marker when dealing with regulators before or after an incident. It can also be a powerful defense tool for the agency should a third-party lawsuit arise from an incident. Simply stated, an ERCP does not necessarily prevent an incident but provides a means for logically preparing and responding to an event to limit environmental damage.

Social Costs

Social costs include: 1) potential impacts to water supplies/wellfields; 2) erosion of public confidence; 3) community impacts and 4) vulnerability considerations. They are difficult to quantify or considered intangible.

After identifying the assets that are candidates for an ERP, the contents of the plan should be developed that reflect the goals of the program. There is no industry standard for the ERP goals; however, one should consider the following when developing goals:

- Effective spill response in a timely manner
- Rapid restoration to normal operations
- Minimize impact customers
- Minimize negative impacts on public health, environment and responders
- Provide appropriate and timely emergency information and effective communications to stakeholders

Recommended Elements of an ERCP

Well-reasoned plans are site specific, prepared in accordance with best practices, and capable of implementation as intended. They are also complementary to other emergency response plans, including sanitary sewer overflow (SSO) response plans. To ensure that the spirit of the plan is documented, regulators may stipulate plan requirements that include General Information; Preparedness and Risk Mitigation; and Plan Updates. Within a baseline planning strategy, the document should include each of these program elements as summarized below:

General Information

This section of the plan emphasizes how and when to use the plan in conjunction with other contingency and spill response programs. It should also contain salient information about the pipeline asset.

Preparedness and Risk Mitigation

This reflects the ability to respond to a spill event, but also includes measures taken to reduce risk and improve response and recovery efforts. The spill response and recovery activities should include knowledge and proficiency in executing existing spill response plans that are augmented with additional measures to effectively respond to a pipeline failure or unconventional spill event due to the magnitude or unique location of the spill event.

A satisfactory spill response includes a list of steps and timelines to minimize discharges from the spill including, but not limited to, the following:

- Diversion of flow to redundant or adjacent infrastructure. Lack of redundancy or effective flow control may result in an action item for a capital construction project or procurement of equipment for bypassing and/or flow control
- Spill containment. This involve evaluating volumes, pathways and prescriptive mitigation efforts as part of the spill response.
- Tankering, if deemed feasible.
- Emergency discharge locations (to be used only if no other practicable contingencies exist)
- Notification to community stakeholders that includes customers, affected property owners, industry, regulators, local government, community groups and the media.
- Repair or Mitigation. In addition to spill containment equipment, this includes the identification of specialty contractors for response and repair services.

Incident Command

This is the command and control structure for declaring an emergency condition; deployment of resources; addressing short-term legal issues and identifying potential litigants; and promoting a positive and transparent message to stakeholders and media.

Plan Updates

To meet the goals of the plan, periodic review and update of plan content is required. This should include a dedicated tabletop exercise as part of the initial ERP development to vet participant roles, reviewing their actions and identifying areas for improvement through a "hot wash" process.

Regardless of the contents of the ERP, a Gap Analysis is recommended to identify information that is available, information that must be developed and agreement about the roles and responsibilities of the Incident Command team.

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OUR PERTINENT EXPERIENCE, SYSTEM-SPECIFIC KNOWLEDGE, AND INSIGHTS WILL YIELD A ROBUST PLAN THAT APPROPRIATELY ADDRESS YOUR PRIORITIES

1. Extensive knowledge of BC WWS MPSs derived from annual inspections, and assessments to troubleshoot and develop improvements to mitigate existing limitations
2. Extensive collection system and force main modeling experience, inclusive of hydraulic and surge modeling, for BC WWS (MPS 462 system, reclaimed water transmission, District 3A system, and District 3B/C proposed system)
3. Applied modeling of pressure system for performance optimization, reliability assessment, capacity scenario analysis, troubleshooting and emergency contingency planning
4. Developed and conducted preliminary modeling assessment of Regional Transmission System
5. Extensive local/national experience with risk based buried infrastructure and pump station asset criticality, prioritization and capital program development experience
6. Extensive experience planning and implementing condition assessment and rehabilitation of pressure pipe systems including selecting and applying inspection technologies
7. Contingency emergency response planning for force main/pumping failure scenarios
8. Extensive master planning experience including business case analysis to support CIP development

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C. Past Performance

Important to the review of any firm or team's qualifications is a review of its past performance. As requested in the RFQ, this section provides a summary of our team's experience. We are proud of our experience and work and invite you to contact our references.

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Client	Project	Scope of Work Area						Firm	Prime / Subconsultant
		Hydraulic Model	WW Inline Booster PS	WW Submersible PS	PS Condition Assessments	Emergency Response Planning	R&R/Criticality		
Broward County WWS	Retail Potable Water and Wastewater Masterplan	X		X	X		X	C Solutions	Sub
MDWASD	Central District WWTP Injection Well Pump Station Surface Facilities Value Engineering				X			C Solutions	Prime
PBC WUD	Forcemain and Sanitary Sanitary Sewer Evaluation Survey				X		X	C Solutions	Sub
Pompano Beach	Pompano Beach Master LS No. 21			X				CMA / C Solutions	Sub
Riviera Beach	Rehabilitation and Replacement of Lift Station No. 10 and No. 50	X	X	X				C Solutions	Prime
PBC WUD	Palm Beach County Wastewater Masterplan	X			X	X	X	C Solutions	Sub
PBC WUD	Glades Wastewater Masterplan						X	C Solutions	Sub
Riviera Beach	LS No. 47 Preliminary Design Report	X	X		X			C Solutions	Prime
Riviera Beach	Waster and Wastewater Masterplan	X		X	X	X	X	C Solutions	Sub
Broward County WWS	Turnpike 48" Force Main Relocation							CMA	Sub
Broward County WWS	30-inch Force Main BODR							CMA	Prime
Palm Beach County WUD	South County Reclaimed Water Transmission Pipeline Phase 1A (R2018-0296)							CMA	Prime
MDWASD	72" Force Main NW/NE 159th Street Between NW 17th Ave & NE 10th Ave							CMA	Sub

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Client	Project	Scope of Work Area						Firm	Prime / Subconsultant
		Hydraulic Model	WW Inline Booster PS	WW Submersible PS	PS Condition Assessments	Emergency Response Planning	R&R/Criticality		
Davie	Additional Force Main Analysis							CMA	Prime
Marathon	Area 3 Force Main Analysis	X						CMA	Prime
Margate	Force Main Modeling and Design							CMA	Sub
West Palm Beach	WPB Force Main Assessment							CMA	Sub
MDWASD	WASD VE Study - 60" Force Main (S-804)							CMA	Prime
Pompano Beach	Pompano Beach Force Main Model	X						CMA	Prime
Davie	Town of Davie East Side Force Main Study	X						CMA	Prime
Broward County WWS	Broadview Park Neighborhood Improvement Program	X		X				CMA	Prime
Broward County WWS	Broward County UAZ Improvements							CMA	Prime
Broward County WWS	Master Pump Station Ragging Assessment	X	X	X	X			B&C	Prime
Broward County WWS	3BC Sanitary Sewer Feasibility Study							B&C	Prime
Broward County WWS	3BC Septic Tank Elimination Analysis Memorandum	X						B&C	Prime
Broward County WWS	3A Collection System Hydraulic Model 300 Development	X						B&C	Prime

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Client	Project	Scope of Work Area						Firm	Prime / Subconsultant
		Hydraulic Model	WW Inline Booster PS	WW Submersible PS	PS Condition Assessments	Emergency Response Planning	R&R/Criticality		
Broward County WWS	Hydraulic Modeling of Reclaimed Water Transmission System	X						B&C	Prime
West Palm Beach	Water and Wastewater Master Plan	X						B&C	Prime
West Palm Beach	Master Lift Station 5 Assessments				X			B&C	Prime
West Palm Beach	City of West Palm As-Needed Services	X			X	X	X	B&C	Prime
West Palm Beach	Condition Assessment and R&R Planning for Critical Lift Stations				X	X		B&C	Prime
Wichita	Contingency and Emergency Response Planning					X		B&C	Prime
HRSD	Pipeline Prompt Repairs				X	X		B&C	Prime
HRSD	Pumping Station Condition Assessment and Compliance Audits				X		X	B&C	Prime
HRSD	Pipeline Inspection, Condition Assessment, and Renewal and Replacement Program				X		X	B&C	Prime
HRSD	Replacement Planning Model				X		X	B&C	Prime

Broward County Board of
County Commissioners

Vendor Reference Verification Form

Broward County Solicitation No. and Title:

PNC2116651P1 Regional Transmission System Master Plan

Reference for: C Solutions Inc.

Organization/Firm Name providing reference: Riviera Beach Utility Special District

Contact Name: Giles Rhoads, P.E. Title: Former Assistant Director Reference date: 7/9/2018

Contact Email: GRhoads@lakeworth.org Contact Phone: 561-779-7591

Name of Referenced Project: Rehabilitation LS 10&50 - Design

Contract No.	Date Services Provided:		Project Amount:
371-12	2/6/2013	to 6/1/2015	$289,500.00

Vendor's role in Project: [X] Prime Vendor [ ] Subconsultant/Subcontractor

Would you use this vendor again? [X] Yes [ ] No If No, please specify in Additional Comments (below).

Description of services provided by Vendor: Analysis of upstream Lift Stations through SCADA; Refinement of hydraulic sanitary computer model to provide design conditions; technical memorandums and client meetings; Design of new in-line regional booster station to replace 16mgd dry pit master station; Major rehabilitation design of a sub-master submersible station including reconfiguration of wetwell and valve vault; Bidding Services; RFI's and addendum's

Please rate your experience with the referenced Vendor:	Needs Improvement	Satisfactory	Excellent	Not Applicable
1. Vendor's Quality of Service				
a. Responsive	[ ]	[ ]	[X]	[ ]
b. Accuracy	[ ]	[ ]	[X]	[ ]
c. Deliverables	[ ]	[ ]	[X]	[ ]
2. Vendor's Organization:				
a. Staff expertise	[ ]	[ ]	[X]	[ ]
b. Professionalism	[ ]	[ ]	[X]	[ ]
c. Turnover	[ ]	[ ]	[X]	[ ]
3. Timeliness of:				
a. Project	[ ]	[ ]	[X]	[ ]
b. Deliverables	[ ]	[ ]	[X]	[ ]
4. Project completed within budget	[ ]	[ ]	[X]	[ ]
5. Cooperation with:				
a. Your Firm	[ ]	[ ]	[X]	[ ]
b. Subcontractor(s)/Subconsultant(s)	[ ]	[ ]	[X]	[ ]
c. Regulatory Agency(ies)	[ ]	[ ]	[X]	[ ]

Additional Comments: (provide on additional sheet if needed)

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Verified via: ___EMAIL ___VERBAL Verified by: _____ Division: _____ Date: _____

All information provided to Broward County is subject to verification. Vendor acknowledges that inaccurate, untruthful, or incorrect statements made in support of this response may be used by the County as a basis for rejection, rescission of the award, or termination of the contract and may also serve as the basis for debarment of Vendor pursuant to Section 21.119 of the Broward County Procurement Code.

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Broward County Board of
County Commissioners

BROWARD COUNTY FLORIDA

Vendor Reference Verification Form

Broward County Solicitation No. and Title:

PNC2116651P1 Regional Transmission System Master Plan

Reference for: C Solutions Inc.

Organization/Firm Name providing reference: RIVIERA BEACH UTILITY DISTRICT

Contact Name: MARIO E. LOAIZA, P.E. Title: ASST. DIRECTOR Reference date: 7/10/18

Contact Email: mloaiza@tji.martin.fl.us Contact Phone: 772-546-6259

Name of Referenced Project: Riviera Beach Water/Wastewater Master Plan

Contract No.	Date Services Provided:		Project Amount:
42010-001	February 2012	to 12/12/1012	$84,700.00

Vendor's role in Project: ☐ Prime Vendor ☒ Subconsultant/Subcontractor

Would you use this vendor again? ☑ Yes ☐ No If No, please specify in Additional Comments (below).

Description of services provided by Vendor:

CSOLUTIONS PROVIDED ENGINEERING CONSULTING SERVICES INCLUDING COST ESTIMATES, DESIGN, PLANNING AND MODELING AS PART OF MASTER PLAN.

Please rate your experience with the referenced Vendor:	Needs Improvement	Satisfactory	Excellent	Not Applicable
1. Vendor's Quality of Service				
a. Responsive	☐	☐	☑	☐
b. Accuracy	☐	☐	☑	☐
c. Deliverables	☐	☐	☑	☐
2. Vendor's Organization:				
a. Staff expertise	☐	☐	☑	☐
b. Professionalism	☐	☐	☑	☐
c. Turnover	☐	☐	☑	☐
3. Timeliness of:				
a. Project	☐	☐	☑	☐
b. Deliverables	☐	☐	☑	☐
4. Project completed within budget	☐	☐	☑	☐
5. Cooperation with:				
a. Your Firm	☐	☐	☐	☑
b. Subcontractor(s)/Subconsultant(s)	☐	☐	☑	☐
c. Regulatory Agency(ies)	☐	☐	☑	☐

Additional Comments: (provide on additional sheet if needed)

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BROWARD COUNTY FLORIDA

Vendor Reference Verification Form

Broward County Solicitation No. and Title:

PNC2116651P1 Regional Transmission System Master Plan

Reference for: C Solutions Inc.

Organization/Firm Name providing reference:

Palm Beach County Water Utilities Department

Contact Name: Jennifer Prettel, P.E. Title: Professional Engineer Reference date: 7/9/2018

Contact Email: jprettel@pbcwater.com Contact Phone: 561.493.6098

Name of Referenced Project: Glades Region Infiltration/Inflow Project (GL09)

Contract No.	Date Services Provided:		Project Amount:
WUD 15-024	May 2015 to	November 2017	$187,116.00

Vendor's role in Project: ☐ Prime Vendor ☒ Subconsultant/Subcontractor

Would you use this vendor again? ☒ Yes ☐ No If No, please specify in Additional Comments (below).

Description of services provided by Vendor: As follow up and based on the recommendations of the 2014 Glades Region Waste Water Master Plan, C Solutions was involved with Phases 1-3 of the Glades Infiltration/Inflow Project and their scope included I&I analysis, sanitary sewer evaluation survey, video inspection and review and development of the rehabilitation plan.

Please rate your experience with the referenced Vendor:	Needs Improvement	Satisfactory	Excellent	Not Applicable
1. Vendor's Quality of Service				
a. Responsive	☐	☐	☒	☐
b. Accuracy	☐	☐	☒	☐
c. Deliverables	☐	☐	☒	☐
2. Vendor's Organization:				
a. Staff expertise	☐	☐	☒	☐
b. Professionalism	☐	☐	☒	☐
c. Turnover	☐	☐	☒	☐
3. Timeliness of:				
a. Project	☐	☐	☒	☐
b. Deliverables	☐	☐	☒	☐
4. Project completed within budget	☐	☐	☒	☐
5. Cooperation with:				
a. Your Firm	☐	☐	☐	☒
b. Subcontractor(s)/Subconsultant(s)	☐	☐	☐	☒
c. Regulatory Agency(ies)	☐	☐	☐	☒

Additional Comments: (provide on additional sheet if needed)

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Retail Potable Water and Wastewater Masterplan

Owner

Broward County WW

Client

CDM-Smith

Reference

Jon Goldman, P. E.
Associate
621 NW 53rd Street
Boca Raton, FL 33487
Phone: (561) 571-3800
Email: goldmanjz@cdmsmith.com

Completion Year

October 2016

Cost

Design Cost $96,000

The Broward County Water and Wastewater Services Department (BCWWS) owns and operates both regional and retail facilities for water distribution and wastewater collection system and was required to update the Masterplan for its retail potable water and wastewater system. The retail system is comprised of four service areas, Districts 1, 2, 3A and 3BC and supplies potable water and wastewater collection for retail customers in serval municipalities and unincorporated areas in Broward County. To continue to provide high satisfaction to its customers and minimize service interruptions the Masterplan updated the water and wastewater hydraulic models and assessed the extent of needed rehabilitation and replacement of the potable water distribution system and wastewater collection and transmission systems to prioritize and implement the rehabilitation and repairs. The Masterplan identified and quantified asset risks and performed condition assessments to prioritize rehabilitation or replacement of the assets through the year 2040 in County's Potable Water and Wastewater Retail Service Area.

C Solutions Inc. provided services to evaluate alternate wastewater treatment and effluent disposal suppliers for certain regions in the County, assisted in the calibration of the water and wastewater hydraulic models, provided growth forecast through the year 2040 to estimate potable water demand and wastewater flows, provided studies to estimate infiltration and inflow, performed a condition assessment for the County's wastewater lift stations, and provided recommendations for future capital improvement and rehabilitation and replacement projects.

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Central District WWTP Injection Well Pump Station Surface Facilities Value Engineering

Owner

Miami Dade Water and Sewer Department

Client

Miami Dade Water and Sewer Department

Reference

Sonia Villamil, P.E.
Engineer II
3071 SW 38th Avenue, Room 554-8
Miami, FL 33146
Phone: (786) 552-8234
Email: villas@miamidade.gov.com

Completion Date

June 2015

Cost

$49,999

The City of Miami entered into an agreement with Miami Dade County for the long-term disposal of its municipal solid waste and in return, Miami Dade County agreed to construct a Groundwater Remediation System (GRS) and improve the existing landfill closure system at the City of Miami's Virginia Key Landfill. Since the Virginia Key landfill was unlined, leachate from the landfill contaminated the groundwater and the GRS must remove and dispose of this contaminated groundwater. A Class I injection well disposal system at the Central District Wastewater Treatment Plant (CDWWTP) site, located adjacent to the Virginia Key Landfill, was identified as the most cost effective strategy for the disposal of leachate contaminated groundwater (GRS leachate). Miami Dade Water and Sewer Department (MDWASD) owns and operates the 143 mgd CDWWTP and hired MWH to prepare the CDWWTP Injection Well Surface Facilities Basis of Design Report (April 2014) that identified the design approach to provide surface facilities to inject leachate from the Virginia Key GRS. The design proposed by MWH includes the construction of two 19.9mgd Class I Deep Injection Wells (Industrial Injection Wells) and pump station (surface facilities) to dispose Leachate from the Virginia Key GRS, Centrate from the Dewatering Building, Plant 1 Digester Gas Scrubber Unit Waste Water, Plant 2 Digester Gas Scrubber Unit Waste Water and Plant 2 Secondary Treated Effluent. Leachate from the GRS is required as part of the blended waste stream for the allowable operation of the two Class I injection wells.

C Solutions Inc. provided value engineering (VE) services on the design of the mechanical (process), structural, instrumentation and electrical equipment at the thirty percent (30%) design phase for the Injection Well Pump Station Surface Facilities.

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Forcemain and Sanitary Sanitary Sewer Evaluation Survey

Owner

Palm Beach County WUD

Client

CDM-Smith
Reference
Jon Goldman, P. E.
Associate
621 NW 53rd Street
Boca Raton, FL 33487
Phone: (561) 571-3800
Email: goldmanjz@cdmsmith.com

Completion Year

June 2017

Cost

Design Cost $244,657

The Palm Beach County Water Utilities Department (PBCWUD) owns and operates a wastewater collection system consisting of approximately 1,250 miles of gravity sewer pipe ranging from 4- to 30-inches in diameter, 650 miles of force main ranging in size from 2- to 66-inches in diameter, 762 wastewater pump stations, and 10 Master Pump Stations. Much of the utility infrastructure is aging and in need of rehabilitation. In order to continue to provide high satisfaction to its customers and minimize service interruptions the PBCWUD is taking a proactive approach toward infrastructure improvements by implementing a program to assess the extent of needed rehabilitation and replacement of the wastewater collection and transmission systems and prioritize and implement the rehabilitation and repairs. This program will identify and quantify asset risks, prioritize required condition assessments, rehabilitations, or replacement of the assets over the next 10 years in the eastern portion of the County.

C Solutions Inc. provided services to perform NASSCO MACP inspections and the evaluation of sanitary sewer manholes for the identification of capital improvement projects to reduce infiltration and inflow to the County's sanitary sewer collection system.

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Pompano Beach Master LS No. 21

Owner

City of Pompano Beach

Client

Chen Moore and Associates Inc.

Reference

Peter Moore, P.E.
President
500 West Cypress Creek Road Suite 410
Fort Lauderdale, FL 33309
Phone: (954) 730-0707 x 104
pmoore@chenmoore.com

Completion Year

August 2009 (Design)

Cost

Construction Cost $3,774,000

The City of Pompano Beach (City) has a wastewater service area of approximately 12,000 acres and collects wastewater for transmission to Broward County's North Regional Wastewater Treatment Plant. Part of the City's service area is on a barrier island separated from the mainland by the Intracoastal Waterway. All collected sewage on the barrier island is directed to the City's aging Master Pump Station (LS No. 21) for transmittal to Broward County's WWTP. The City decided to relocate LS No. 21 to free up valuable beach development property and construct a new aesthetically pleasing 6.5MGD Master pump station with minimized environmental impacts.

C Solutions Inc. provided the mechanical design for pump station and odor control system. Additionally, technical expertise was provided for assessing hydraulic design criteria, odor control issues, and for providing overall design quality reviews.

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Rehabilitation and Replacement of Lift Station No. 10 and No. 50

Owner

City of Riviera Beach

Client

City of Riviera Beach
Reference
Giles Rhoads, P. E.
Acting Executive Director
600 West Blue Heron Boulevard
Riviera Beach, FL 33404
Phone: (561) 845-4185
Email: Grhoads@Rivierabch.com

Completion Year

June 2015

Cost

Design Cost $289,500
Construction Services Cost $389,000
Construction Cost $3.8M

The City of Riviera Beach Utility District (RBUD) owns and operates 51 wastewater lift stations in its service area. Of these, five lift stations (LS) are considered master pump stations: LS50, LS47, LS1A, LS10 and LS12. The existing LS50 is 16mgd wet-pit dry pit station designed to repump all flow in the eastern portion of the City to the East Central Regional Water Reclamation Facility (ECRWRF). LS10 is a duplex submersible station that repumps all flow from Singer Island to LS1A where it is repumped with other flows from the eastern part of the City to LS50. Lift Stations 10 and 50 are critical to the collection and transmission of wastewater on Singer Island and in a larger part the entire eastern portion of the City. LS10 and 50 have both passed the end of their estimated useful design lives and LS50 is in need of major repairs. Due to the critical nature of the lift stations, RBUD decided to rehabilitate both lift stations.

C Solutions Inc. evaluated the conditions of both lift stations and made recommendations for the improvement and rehabilitation of both stations. For LS50, C Solutions recommended a small reconfiguration of the transmission system, finding that LS1A could pump directly to ECRWRF, and replacing LS50 with an above ground 5.8mgd inline booster station. This provided a large capital cost savings for the rehabilitation of LS50 while improving system reliability and greatly reducing operations and maintenance cost. For LS10, C Solutions recommended rehabilitating the existing wetwell and reconfiguring the station to a triplex submersible pump station with smaller pumps, to better handle the seasonal changes in flow on Singer Island. Following the approval of the recommendations, C Solutions provided the design, permitting and construction bidding assistance for the rehabilitation of LS10 and replacement of LS50 with an above ground inline booster station and is currently providing the Engineering Services during Construction.

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Utility District Water and Wastewater Masterplan

Owner

City of Riviera Beach

Client

Mario E. Loaiza, P. E.
Former Assistant Director RBUD
Current Utility Director SMRU
9650 SE Water Street
Hobe Sound, FL 33455
Phone: (772) 546-6259
Email: mloaiza@tji.martin.fl.us

Completion Year

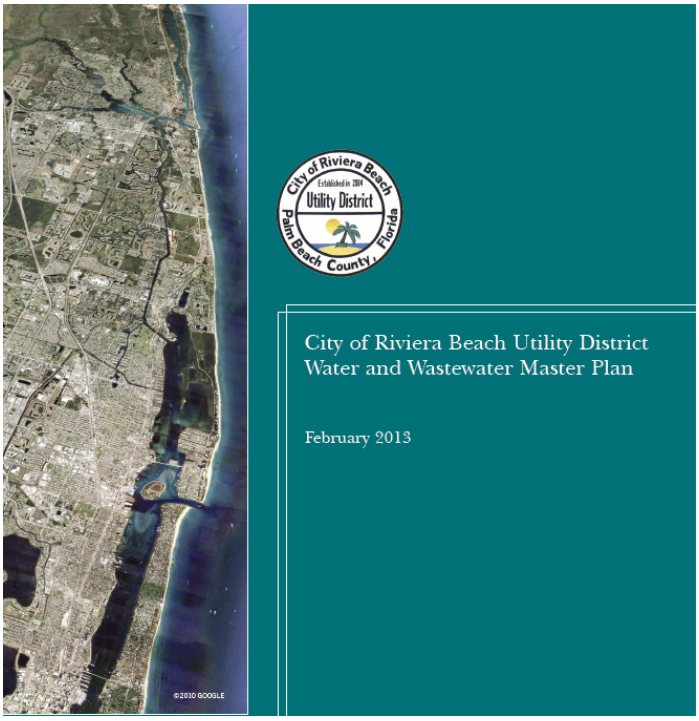
February 2013

Cost

C Solutions Fee $84,700

The City of Riviera Beach Utility District (RBUD) desired to develop an initial water and wastewater masterplan that defined both short and long-term planning goals, identified operational and maintenance needs, and provided risk-based prioritization of needed capital improvements for both the water supply, treatment and distribution system and the wastewater collection and transmission system. Additionally, RBUD required the development of a new water distribution system hydraulic model and a system-wide wastewater hydraulic model.

C Solutions Inc. performed the condition assessments of all wastewater pump stations and transmission system piping in the RBUD's service area and provided an analysis of the systems reliability and needed repairs and replacements. From this analysis C Solutions provided risk-based prioritization of future capital improvements required over the capital improvement plan time period. C Solutions also assisted with the development of both the water and wastewater hydraulic models. Finally C Solutions assisted in the preparation of the capital improvement plan presented in the masterplan.



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Preliminary Design Report Master LS No. 47

Owner

City of Riviera Beach

Client

Giles Rhoads, P. E.
Former Assistant Director RBUD
Current Water Utilities Engineer Lake Worth
414 Lake Avenue
Lake Worth, FL 33460
Phone: (561) 586-1640
Email: grhoads@lakeworth.org

Completion Year

2015

Cost

$99,530

The City of Riviera Beach Utility District (RBUD) owns and operates 51 waste water lift stations (LS) in its service area. Of these, five lift stations (LS) are considered master pump stations: LS50, LS47, LS1A, LS10 and LS12. The existing LS47 is a 9.8mgd submersible pump station designed to repump wastewater flow in the western portion of the City to the East Central Regional Water Reclamation Facility (ECRWRF). LS 47 has passed its useful life and is critical to the collection and transmission of wastewater in the western portion of the City and is in critical need of rehabilitation / replacement. The lift station is comprised of three 150hp 5300gpm variable speed submersible pumps located in a large 36 square foot wetwell.

RBUD has decided to replace Lift Station No. 47 (LS 47) with an inline booster station located at the existing LS 47 site (6522 N. Haverhill Road Riviera Beach, FL 33407). This scope of services is intended to provide the preliminary engineering design report for the rehabilitation / replacement of LS No. 47.

C Solutions Inc. evaluated the conditions of lift stations and made recommendations for the replacement of the existing station with an in-line booster station constructed on the same site while maintaining wastewater pumping operations during construction. The wastewater hydraulic model was updated and refined to develop the design hydraulic operational envelop for the pump station and a preliminary design report prepared.

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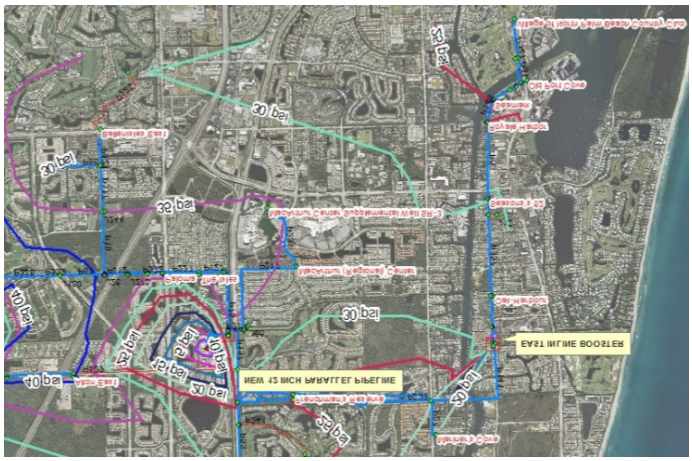
Hydraulic Modeling



Over 20 years' experience in hydraulic modeling, proficient in using KYPIPE, Cybernet, and Infowater software. Responsible for development of hydraulic models up to 75,000 pipes. Experienced in model development from GIS, calibration, steady state and extended period simulations, pumping system hydraulics, capital planning, and evaluation.

The following is a listing of hydraulic modeling projects;

- Avenir and Ancient Tree Development Water and Wastewater
- Seacoast Utility Authority Reclaimed Water
- Seacoast Utility Authority Potable Water
- City of Coral Springs Water and Wastewater
- City of Boca Raton Water and Reclaimed Water
- City of Port Charlotte Rotonda Area Water
- City of Miami Beach Wastewater
- City of Fort Lauderdale Water and Wastewater
- Palm Beach County Water Reclaimed Water Transmission System Raw Water and Wastewater
- Palm Beach County Water Raw Water Pumping and Transmission System for various Wtp facilities
- Palm Beach County Water Wastewater Pumping and Transmission System

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Engineering and Utility Management

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Water and Wastewater Master Plans

Over 25 years' experience in the development of water and wastewater master plans as both a consultant and as the client. Particular experience in hydraulic modeling and the optimization and implementation of capital improvement programs developed from the work products.

The following is a listing of master plans;

- Town of Davie Water and Wastewater Master Plan (ongoing)
- Palm Beach County Water and Wastewater Master Plans (2008 and 2012)
- Glades Region Water and Wastewater Master Plans (2014)
- City of Fort Lauderdale Water and Wastewater Master Plans (2002 and 2007)
- RiverOaks Stormwater Master Plan (2002)
- City of Miami Beach Wastewater Master Plan (1992)
- City of Coral Springs Water and Wastewater Master Plan (1990)

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Turnpike 48" Force Main Relocation

Broward County, Florida

Estimated Completion Date

2006

Fee

$380,969

Client

Ric-Man International
Rene Castillo, Sr.
1545 NW 27th Avenue
Pompano Beach, FL 33069
(954) 426-1042

Chen Moore and Associates was the prime consultant of a design-build team tasked to design, permit and construct the relocation of a 48" Force Main in the Turnpike Right-of-Way. This project involved the open cut installation of approximately 5,400 LF of 48" DIP followed by the removal of the existing PCCP. Coordination activities included Florida's Turnpike Enterprise of the Florida Department of Transportation, South Florida Water Management District, the Florida Department of Environmental Protection and Broward County Water and Wastewater Services. The project schedule was an aggressive 112 days from Notice to Proceed to completion.

This project involved extensive permitting and coordination with the FDOT Turnpike as the entirety of the pipeline project fell within the Turnpike's Limited Access ROW. MOT and utility plans were permitted through the Turnpike including staging areas for pipe stringing and lay-down yards. Additionally, extensive coordination with the Turnpike Construction Office was required as this project immediatelypreceded a Turnpike widening project and several restoration efforts were as-built and communicated. Finally, coordination with the Turnpike environmental coordinator and their subconsultant Handex was required as the dewatering permitting operations discovered contamination at the FDOT Rest Area adjacent to the project site and monitoring was required throughout the dewatering operations.

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30-inch Force Main BODR

Broward County, Florida

Estimated Completion Date

2007

Fee

$43,073

Client

Hazen and Sawyer
Janeen Wietgrefe, PE
4000 Hollywood Blvd Ste 750N
Hollywood, FL 33021-6751
(954) 987-0066

Chen Moore and Associates was contracted by Hazen and Sawyer to prepare the Basis of Design Report for the routing of a 30" Force Main for Broward County Water and Wastewater Services. The purpose of this main is to provide relief and bypass to the master pump stations in the City of Coral Springs. Routes along Wiles Road and Sample Road west of Rock Island road were studied. The cost to prepare this Basis of Design Report was approximately $43,000.

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South County Reclaimed Water Transmission Pipeline Phase 1A (R2018-0296)

Palm Beach, Florida

Estimated Completion Date
2019

Fee
$855,990

Client
Palm Beach County
John Visconti
Water Utilities Department
8100 Forest Hill Blvd
W Palm Beach, FL 33413
(954) 846-0401

CMA is providing project management and coordination; field services; preliminary design services; detailed design services; permitting services; public outreach services; and bidding support services for the South County Reclaimed Water Pipeline project for Palm Beach County.

Palm Beach County and Broward County have an Interlocal Agreement related to the construction, ownership, operation, and maintenance of a Regional Reclaimed Water System to deliver reclaimed water from Broward County's northern wastewater treatment plant to the Palm Beach County Water Utilities Department service area. The service initiation to Palm Beach County will be 2 MGD of annual average daily flow by April 2021.

The expansion is being designed in phases for multiple competitively bid construction sub-projects. Detailed construction documents and related permits will be provided to allow the construction of approximately 3.7 miles of reclaimed water pipeline and related facilities to be completed and placed into service before April 2021.

The field investigation will include records review, site investigation and photo study; environmental assessments; subsurface utility engineering; geotechnical investigation; and survey.

The design portions of the project will include a detailed investigation of pipeline design requirements and a tree Disposition/restoration/planting plan.

The permitting process will be extensive, requiring permitting for the Hillsboro Canal Crossing with the SFWMD / USACE; environmental permitting for the corridor; permitting for impacts to County roads; permitting for impacts to trees and wellfields; permitting of reclaimed pipeline; permitting for dewatering during construction; and compliance with the ENVISION Certification Process (Institute for Sustainable Infrastructure).

CMA will also provide bidding support services.

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72" Force Main NW/NE 159th Street Between NW 17th Ave & NE 10th Ave

Miami, Florida

Estimated Completion Date
2013

Fee
$48,247

Client
Lockwood Andrews & Newnam Inc
Ricardo Vieira, PE
9100 S Dadeland Blvd Ste 1500
Miami, FL 33156
(305) 444.6454

As part of the LAN Team, Chen Moore prepared plans for the design build package for the rehabilitation/replacement of a 72" existing force main from NW/NE 159th Street between NW 17th Avenue and NE 10th Avenue for Miami-Dade Water and Sewer Department (WASD). CMA tasks include the following: review and collection of available aerial photography, maps and LIDAR data; utility coordination; meetings with local agencies to acquire existing/available geotechnical data; preparation of existing condition corridor plans; preparation of rights-of-way designation plans; identification of municipal pavement repair requirements and proposed pavement resurfacing methods and limits; preparation of preliminary maintenance of traffic plan; preparation of and engineer's opinion of probable construction cost; and utility investigation/WASD as-built/repair and rehabilitation documentation review and recommendations.

CMA coordinated with FDOT and local municipalities to review existing utilities and future projects which may work concurrently with the force main rehabilitation project. The project team evaluated force main replacement and rehabilitation alternatives including different routes which could be used for a new 72" force main. CMA prepared plans and cross sections to represent these different replacement layouts. Furthermore, CMA prepared plans representing the different rehabilitation options investigated by the project team. With this initial analysis, CMA also prepared typical MOT cross sections and MOT plans to represent the impacts on traffic for the different options.

The project team evaluated the impacts of this force main rehabilitation on the existing nearby lift stations to verify the sanitary sewer system functionality throughout the construction and completion of the project. An alternative was selected and further detailed plans were prepared. CMA used LIDAR elevation data combined with survey information to generate an existing grade surface from which profile views were generated. CMA prepared plans and profiles for the selected force main rehabilitation method. These documents represented the existing pipeline, the portions to be rehabilitated by slip-lining, the portions to be rehabilitated with a cured in place pipe (CIPP), and the existing utilities which crossed the force main.

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Additional Force Main Analysis

Davie, FL

Estimated Completion Date
2004

Fee
$1,000

Client
Town of Davie
Ronald Bolton
6901 Orange Drive
Davie, FL 33314-3348
(954) 797-1114

Chen Moore and Associates provided continuing services to verify the pressures within the Town's force main network using the computer model of the Town's entire force main network. Chen Moore and Associates provided additional analysis of the force main system to determine the impact of various proposed developments within the Town's service area. The existing and projected force main pressures at the connection point(s) were needed to size the pumps within the proposed lift station at the various proposed development locations.

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Area 3 Force Main Analysis

Marathon, Florida

Estimated Completion Date

2014

Fee

$9,540

Client

City of Marathon
Carlos Solis, PE
9805 Overseas Hwy
Marathon, FL 33050
(305) 289-5008

Recent projects for Marathon include work relating to repairs of the existing vacuum system and projects to address additionally required capacity. They include:

- Marathon Area 3 FM Analysis
- Vacuum Sewer Collection System Evaluation-Area 6
- Grassy Key Sewer Connection
- Stormwater/Wastewater Utility GIS Map Updates 14-05
- Vacuum Sewer Collection System Evaluation-Area 4

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Force Main Modeling and Design

Margate, Florida

Estimated Completion Date

2015

Fee

$100,239

Client

Carollo Engineers
Thomas Gillogly, PhD,PE
3440 Hollywood Blvd Ste 465
Hollywood, FL 33021
(954) 837-0030

CMA, as a subconsultant to Carollo Engineers, was contracted by the City of Margate to perform modeling, design and permitting for force main improvements using the InfoWater software. The modeling is based on the previous models that CMA completed for the City and will evaluate two different options for connecting existing force mains. These connections will allow the City to direct the flow to their other wastewater treatment plant. In addition to the modeling, the project includes the design and permitting of over 2,600 LF of new force main and abandonment of over 1,000 LF of existing force main. The new force main design incorporates a directional drill under a City-owned canal.

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WPB Force Main Assessment

West Palm Beach, Florida

Estimated Completion Date
2016

Fee
$107,560

Client
Jacobs Engineering Group Inc
Ray Thomson
10 10th Street NW Ste 1400
Atlanta, GA 30309
(404) 751-2141

CMA, under Jacobs Engineering, is assisting with the condition assessment for the 42 and 48-inch force main for the City of West Palm Beach. The force main is a critical pipeline that transmits wastewater from the City of West Palm Beach and the Town of Palm Beach to the East Central Regional Water Reclamation Facility. The PCCP has already been assessed for damages to the pipe walls. This project incorporates the assessment data, and provides GIS data to the City for the critical points. Also included in this project is utility coordination and GIS design to accomodate the bypass construction and lining entry pits.

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WASD VE Study - 60" Force Main (S-804)

Miami, FL

Estimated Completion Date
2010

Fee
$22,675

Client
Miami Dade Water and Sewer Department
Carlos Benavides
3071 S.W. 38th Avenue
Miami, FL 33146
(786) 268-5285

Chen Moore and Associates was retained by the Miami-Dade Water and Sewer Department to perform a value engineering study for the 60" force main between the South Miami Heights Water Treatment Plant and South District Wastewater Treatment Plant. This force main is for the disposal of the reject water from the membrane water treatment units currently under construction at the water plant. Major cost saving ideas proposed included: Twin 42" directional drilled HDPE pipe under the Turnpike and C-1 Canal instead of the single 60" micro-tunneling DIP crossing; shallowing and open cut across US-1 instead of deeper micro-tunneling; narrowing the size and reducing the number of isolation plug valves; and modifying the 24" outlets. The VE report also increased the allowance for the trench overcut, sheeting, flowable fill, and dewatering. Despite these cost increases, an overall $1.6 million in cost savings were realized.

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Pompano Beach Force Main Model

Pompano Beach, FL

Estimated Completion Date
2005

Fee
$45,000

Client
City of Pompano Beach
Bobby Clayton
1201 NE 5th Ave
Pompano Beach, FL 33060
(954) 786-4154

Chen Moore and Associates was contracted by the City of Pompano Beach to design the rehabilitation of Lift Station 24 serving the barrier island of the City between Intracoastal Waterway and Atlantic Ocean. The proposed improvements included the installation of new force main, the replacement of an existing water main, and the rehabilitation of an existing lift station. Under this contract, Chen Moore and Associates was responsible for developing a comprehensive computer model of the City's entire force main network using the SewerCAD software to allow analysis of the pressures within the network. This force main model was developed based on the City's sanitary system atlas along with documentation on each lift station. CMA used this SewerCAD model to conduct various steady-state analyses to estimate the flows and pressures throughout the City's existing force main network.

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Town of Davie East Side Force Main Study

Davie, FL

Estimated Completion Date

2004

Fee

$16,450

Client

Town of Davie
Ronald Bolton
6901 Orange Drive
Davie, FL 33314-3348
(954) 797-1114

Chen Moore and Associates provided professional engineering services for the analysis of the existing force main system for the east side of the Town's utility system. The computer model analysis was performed on the existing force main system serving the east side of the Town's sewer system to determine what upgrades would be required to address the system issues. The computer model of the existing force main, which was prepared with SewerCAD software, included all 11 existing lift stations between Lift Station #8 and the Town's wastewater treatment plant. The computer analysis investigated the potential route for a parallel force main from Lift Station #8 to the wastewater treatment plant and the upgrade for the valving at the wastewater treatment plant site to help relieve the pressure head within the force main. Chen Moore and Associates prepared a design memorandum which recommended the force main sizing, pump modifications, and any lift station modifications required due to the future pressure conditions.

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Broadview Park Neighborhood Improvement Program

Broward County, Florida

Estimated Completion Date
2013

Fee
$616,690

Client
Broward County
Patrick MacGregor
2555 West Copans Road
Pompano Beach, FL 33069-1233
(954) 831-0904

The Broadview Park Neighborhood Improvement Program (BPNIP) was the last of the Neighborhood Infrastructure Improvements projects to be carried out by Broward County in the unincorporated areas. Chen Moore and Associates was selected as the prime consultant for the Basis of Design Report (BODR) and to design and administer the construction of improvements to subsequent bid packages. The three Bid Packages addressed water, sanitary sewer and drainage improvements, while introducing sidewalks and enhancing the community's roadway and landscape.

The basis of design report included population projections, an analysis of water source and sewage discharge points and a hydraulic model of the water, wastewater and stormwater systems.

The first bid package included the replacement of the entire water distribution system within the neighborhood, which was previously owned and maintained by a private utility. This project was designed utilizing digital orthography and aerial maps to fast track the replacement.

The second and third bid packages included conversion of the entire area from septic to gravity collection, the installation of a backbone forcemain network and connection into an inline booster station, installation of a positive drainage system, sidewalks, hardscape and landscape improvements.

An added fourth bid package was the design of a 20" water main to serve as the transmission source water for the area. Also change ordered into the project was the installation of a 20" raw water main for future use. The project was complicated by groundwater contamination, proximity to a wellfield, the existence of a fire station and elementary school in the neighborhood and the existence of rock in the area. All of the projects were completed on budget and on or ahead of schedule.

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Broward County UAZ Improvements

Broward County, Florida

Estimated Completion Date

2019

Fee

Varies

Client

Broward County
Patrick MacGregor
2555 West Copans Road
Pompano Beach, FL 33069-1233
(954) 831-0904

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Broward County UAZs. UAZ 307 / 315 - The Broward County UAZ 307 / 315 Utilities project included replacing existing water main and providing sanitary sewer for County Service Areas in the City of Dania Beach, near Griffin Road and Ravenswood Road. The main technical components included replacing a 12-inch water main on Ravenswood Road, replacing the residential water distribution system, providing sanitary sewer to connect existing septic tanks and rehabilitating and installation of new lift stations and force main. In order to achieve the necessary information, site visits concentrated on contacting residents to determine the location of existing tanks. A great deal of coordination was required to accommodate developer projects, tie into County projects, and obtain easements for crossing private properties. A total of 20,000 linear feet of water main replacement, three lift stations and 14,000 linear feet of sanitary sewer, which will tie in over 400 parcels, were designed for this project. Chen Moore and Associates is also performing construction administration for this project.

UAZ 303, 314 and 318 - The Broward County UAZ 303,314 and 318 project was part 1 of what was projected to be an $8.8 million project replacing existing water and providing sanitary sewer for County Service Areas in the City of Dania Beach, just east of State Road 7, north and south of Griffin Road. The main technical components included replacing water mains on County roads, replacing the residential water distribution system, providing sanitary sewer systems to eliminate existing septic tanks, and rehabilitating or installing new lift stations. GIS was used to keep track of all ongoing projects, log pertinent site information, determine the projected flow rates, track questions from residents of the area and track responses from utility companies regarding their existing facilities. The design of these improvements began in January 2009 and UAZ 303 has been completed.

UAZ 316 - The Broward County UAZ 316 project is part 2 of the estimated $8.8 million project servicing Broward County utility zones in the City of Dania Beach which includes replacing existing water and providing sanitary sewer just east of State Road 7, and south of Griffin Road. The main technical components include replacing water mains, replacing the residential water distribution system, providing sanitary sewer systems to eliminate existing septic tanks and rehabilitating or installing new lift stations.

UAZ 110/111 & 113 Water Sewer Improvements 113B - The Water and Sanitary Sewer Improvements for the UAZ 110/111 & 113 Project will include the improvements to the existing water distribution system, sanitary sewer system, and transmission systems within the project area along with the restoration of surface areas disturbed for the construction of said improvements. The existing system being replaced consists of approximately 168,100LF of water mains, 122,100 LF of sanitary sewer mains and 23,600 LF force main. The existing water main consists of asbestos cement, cast iron, ductile iron, galvanized steel, polyvinyl chloride pipe ranging from 2" - 24" in diameter size. The sanitary sewer consists of vitrified clay, fold and form liner, cured in place liner and ductile iron pipe ranging from 8" – 15" in diameter size. The force main consists of asbestos cement, cured in place liner, ductile iron and polyvinyl chloride pipe ranging from 6" – 16" in diameter size. There are 8 Broward County lift stations in these UAZ areas and 1 private lift station which sanitary sewer systems will need to connect to. Two of these stations will need rehabilitation/replacement, the extent of rehabilitation of existing stations will be determined. The restoration of roadways, sidewalks, driveways, and landscape areas will need to be performed as needed for water and sanitary sewer improvement construction.

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Water and Wastewater Master Plan

City of West Palm Beach, Florida

Fees (to date):

$2M

Project Dates

Start: May 2012
Completion: February 2015

Reference

Laura Le, PE
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Brown AND Caldwell

Brown and Caldwell (BC) was awarded a contract with the City of West Palm Beach (City) for the development of a Water and Wastewater Master Plan. The plan includes the City's water distribution and wastewater collection systems and identifies areas for improvement, along with a clear and defensible initial seven-year roadmap for a Capital Improvements Plan (CIP) required over the 20-year planning period. The plan included the development of all-pipe models of the water transmission/distribution system as well as an integrated model of the wastewater collection, pumping and force main system to provide a comprehensive assessment of water and wastewater system needs and CIP development. Additional-ly, the models were developed to support City staff with ongoing operational assessments, condition assessment prioriti-zation, water quality improvements, and project impact assessment (in support of construction implementation).

The Master Plan also included a comprehensive analysis of Renewal and Replacement (R&R) projects focused on the following defined objectives:

- Cost-effective reduction of infiltration and inflow (I/I) in the wastewater collection system;
- Systematic replacement of high risk infrastructure to reduce major pipe failures and the resultant response costs;
- Assessment of the City's numerous lift stations for improved operational efficiency, peak flow capacity adequacy and reduced operations and maintenance costs; and
- Operational troubleshooting, construction impact assessment, performance optimization of the water distribution and wastewater collection systems as part of post-planning model applications;

For this project, BC leveraged the work already performed on the Asset Management Program for the City, which consid-ered asset criticality, risk and level of service objectives, and a business case evaluation to provide a clear definition of the most important projects. This project also examined criticality and consequence of failure of key infrastructure and utilized the BC's Replacement Planning Model (RPM), a proven planning tool that provides decision makers a high level of confidence that the defined level of spending

satisfies long-term objectives of customer service and sustainable infrastruc-ture and provides a defensible and rational basis for long-term forecasting of R&R needs.

Since completion, the models have been used for diverse practical applications inclusive of: 1) assessing and recommending system operating procedures to accommodate the condition assessment and subsequent rehabilitation planning for approximately 5 miles of 42/48-inch PCCP force main; 2) assessing force main reliability and capacity improvement alternatives; 3) operational sensitivity evaluations; 4) troubleshoot performance issues and develop improvement upgrades for lift stations in the Ibis basin; 5) modeling updates to reflect most current population forecasts. Water system applications include optimized stored water inventory management to reduce water age for 6 storage tank facilities and developing modified system operational protocols in response to removing a major water transmission main from service for replacement.

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Master Lift Station 5 Assessments

City of West Palm Beach, Florida

Fees

Lift Station 5 Assessmen
$31,237
LS 5 Force Main Modeling & Improvement Assessment
$25,375

Project Dates

Contract valid from September 2014 To November 2019

Reference

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Brown AND Caldwell

Brown and Caldwell (BC) has been working with the City of West Palm Beach since 2014. Under various general engineering services/multi-project contracts, BC has assisted the City with important projects such as the Water and Wastewater Master Plan and Asset Management Plan. In 2014, BC was awarded a General Engineering Services contract. Under this contract, BC has received several assignments, a representative selection of which is summarized below.

Lift Station 5 System Modeling and Discharge Force Main Sizing Analysis

BC performed a hydraulic modeling analysis in order to determine the required size for the upsizing of the LS5 discharge force main. LS5 is located at the southeast corner of Flagler Drive and Southern Boulevard. Wastewater from this lift station is pumped through a 14-in/16-in/18-in force main to the wetwell of LS13. LS13 is located at Parker Avenue and Park Place. LS13 has historically repumped wastewater from LS5 along with several other City-owned lift stations. LS13 discharges to a 24-in force main that eventually manifolds to the City's 42-in force main that discharges to ECRWRF. The City has constructed an 18-in bypass force main around LS13 so that wastewater from LS5 can discharge to the downstream side of LS13 without being repumped. The bypass has not yet been activated due to concerns about the integrity of the 14-in and 16-in force main segments, specifically in areas of close proximity to the air release valves (ARV), connected to the LS5 discharge.

The force main between LS5 and LS13 includes a 14-in CIP (3,910 linear feet) segment between LS5 and the intersection of Southern Boulevard/Georgia Avenue, a 16-in DIP (5,200 linear feet) segment between Southern Boulevard/Georgia Avenue and Lake Avenue/Omar Road, and an 18-in DIP/HDPE (4,230 linear feet) segment between Lake Avenue/Omar Road and LS13. During the City's Water and Wastewater Master Plan efforts, it was identified that the largest driver for many of the potential future projects are the simulated overflows associated with LS5 during a 10-year wet weather event. The Master Plan also identified the need to upsize the 14-in diameter force main segment (about 3,500 feet) to an 18-in or 20-in diameter in order to avoid high velocities and reduce the head requirements at the lift station. Due to the FDOT's Southern Blvd/SR80 Utility Improvements project, the City plans to upsize about

600 linear feet of the LS5 discharge force main to either 16-in, 18-in or 20-in diameter. The remaining 14-in segment will be upsized at a later time.

The objective of this work authorization is to confirm the appropriate upsize diameter for the LS5 discharge force main based on conditions and recommendations expressed in the Master Plan. The wastewater collection system hydraulic model was updated to reflect the proposed changes on the lift station operating conditions in order to assess the impact on system performance (overflow potential, lift station operating performance, and force main capacity). The scope of services included the following:

- Record Drawing and Pump Performance Review - In order to evaluate the existing operating conditions of LS5, a drawdown test of each pump installed and pressure monitoring was performed on June 16th, 2016.
- Update Wastewater System Hydraulic Model and Assess Capacity Impact – The existing wastewater model was updated with pump performance curves based on the drawdown test results. The model identified the appropriate size that satisfies current operating requirements while preserving future options to align with alternative force main configurations and the tradeoff between headloss and flow velocity. The model analysis included the following system improvements.
- Replacement of approximately 3,310 linear feet of 14-in CIP force main from LS5 to Georgia Avenue.
- Replacement of approximately 600 linear feet of 14-in CIP force main within the FDOT project limits (between LS5 and Washington Road) with 2,710 linear feet of 14-in CIP to remain on Southern Boulevard.

Force Main Sizing Recommendations – Prepare letter summarizing the results of the evaluation and recommended size and supporting basis for the portion of the force main to be replaced.

Lift Station 5 Assessment (Phase I)

Lift Station 5 (LS5) is located at the southeast corner of Flagler Drive and Southern Boulevard. Wastewater from this lift station is pumped through a 14-in/16-in/18-in force main to the wetwell of Lift Station 13 (LS13). LS5 treats the wastewater collected from two residential areas to the north and south of the station. Lift Station 27 (LS27) flows are conveyed into LS5 via a 24-in gravity sewer main. Lift Station 3 (LS3) pumps flows into LS5 via a 12-in force main (approximately 6,300 linear feet in length).

LS5 falls within the project limits of the Southern Boulevard Bridge construction project by the Florida Department of Transportation (FDOT). This project is expected to begin in 2017 where a new bridge will be constructed and the existing bridge will be demolished. In order to minimize disruption to the general public and ensure that FDOT's work will not affect the station, the City contracted BC to assess and evaluate the following at LS5:

- Evaluate and assess the existing condition of the structures at LS5;
- Evaluate the FDOT construction methodology for potential impacts on the lift station during construction and provide feedback to City;
- Assess the physical condition of the incoming 24-in gravity sewer line (including associated manholes) to LS5 on South Flagler Drive within the FDOT project limit.

BC prepared a letter for the City to use and document issues that FDOT will need to address to mitigate risks to LS5 during construction.

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City of West Palm As-Needed Services

City of West Palm Beach, FL

Completion Date

August 2015

Reference

Laura Le, P.E. – Utilities Department
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Brown AND Caldwell

The City of West Palm Beach wastewater collection system consists of approximately 274 miles of gravity mains, 7,100 manholes, 124 lift stations, and 86 miles of pressurized force mains that convey approximately 13 mgd of sewage to the East Central Regional Water Reclamation Facility (ECRWRF).

The progressive expansion of sewer assets has resulted in a variety of existing buried infrastructure materials, design standards, ages, and service environments. The condition of the existing infrastructure impacts system reliability, level of service provided, operational performance, and cost. Consistent with utilities across the nation with aging infrastructure, failure of critical components, which tends to increase in frequency as condition deteriorates, can potentially be disruptive to the local economy, and adversely impact public safety and the environment. Brown and Caldwell's prepared a Master Plan that established a road map for prioritizing critical assets for condition assessment and to establish a 7-year capital improvement program (CIP) to improve reliability and performance while expanding capacity where required to support continued growth. The need to conduct a condition assessment of the City's major force main emerged as a high priority due to its vulnerability and high consequence of failure. This follow-up project involved hydraulic assessments in support of the condition assessment of this major force main.

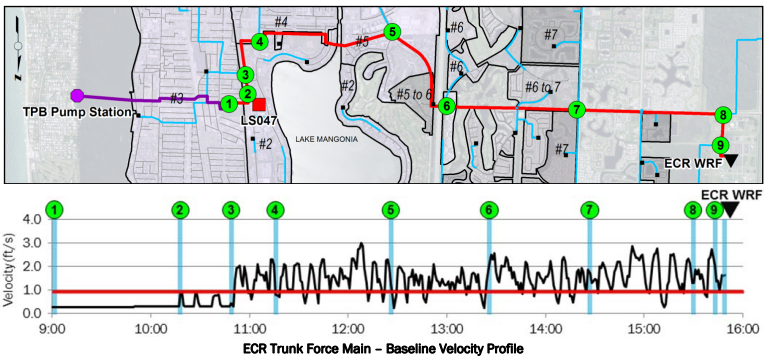
Wastewater Force Main Criticality Analysis

BC performed a Sanitary Sewer Collection System Criticality Assessment to identify sewer pipes that pose the most risk to the City with regard to likelihood and consequence of failure. Using the likelihood of failure and risk scoring results, the gravity and force mains were grouped into candidate project areas for purposes of condition assessment. Of particular importance to the City's force main system is a 42-inch and 48-inch diameter pre-stressed concrete cylinder pipe (PCCP) sewer force main, which is about 6 miles in length, which transmits flow from the City of West Palm Beach and the Town of Palm Beach to the ECRWRF. This force main was identified as having a high likelihood and consequence of failure in the criticality assessment and poses a number of concerns for the City, as follows:

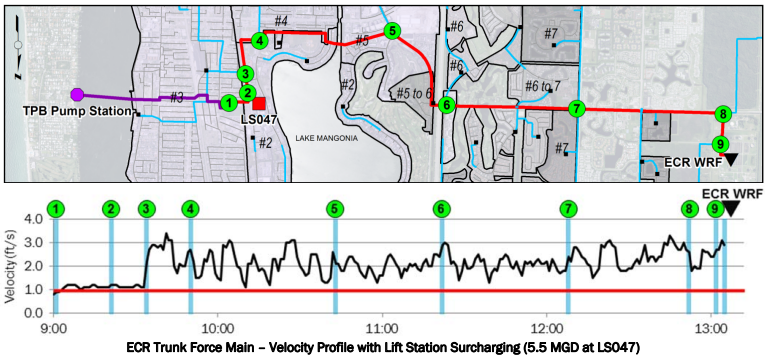
– This force main is currently the only way to transmit flows to ECRWRF from the eastern portion of the City (lift

stations east of ECRWRF). This equates to 90 percent of the total flow conveyed to ECRWRF from the City and Town.

- The force main was constructed between 1974 and 1975 using PCCP that has been known to have a high incidence of failures.
- The force main crosses I-95, two canals, and Lake Mangonia which serves as the City's water supply and several major FDOT and Palm Beach County transportation corridors.



ECR Trunk Force Main – Baseline Velocity Profile



ECR Trunk Force Main – Velocity Profile with Lift Station Surcharging (5.5 MGD at LS047)

Following BC's recommendations, the City initiated a condition assessment of the 42-inch and 48-inch force main using electromagnetic technologies to determine broken wire zones and defects in pre-stressed concrete cylinder pipes. The assessment utilized two acoustic inspection systems: SmartBall and PipeDiver (by PURE Technologies). For this analysis, the City retained BC to perform a hydraulic analysis of the wastewater collection system to develop strategies to maintain a velocity of 1.0 to 4.0 fps in the 42-inch and 48-inch PCCP force main.

Force Main Velocity Profile Analysis

BC utilized the sanitary model developed during the Master Plan to establish a velocity profile for the PCCP force main under dry weather conditions for the existing system and assess the time period when flow conditions are most favorable for launching the assessment tool. The analysis identified a number of segments where the velocity was consistently below the minimum threshold of 1.0 fps.

Development of Operational Strategies & Implementation

To provide a consistent flow velocity above the minimum threshold of 1 fps, Brown and Caldwell explored multiple lift station surcharging options including surcharging at the Town of Palm Beach master lift station and at the City of West Palm Beach Lift Station 47. Through consultation and coordination with the Town of Palm Beach Utility staff, it was determined to be feasible to surcharge the Town's system to provide the minimum flow for the initial segment (Connection Point 1 to 2) of the condition assessment. Following the initial segment, Lift Station 47 would be used to supplement flow and maintain a velocity of 1 fps until the assessment tools reach the East Coast Regional Water Reclamation Facility (ECR WRF). The advantages of using Lift Station 47 include its proximity to the upstream end of the trunk force main, its former use as a master pump station with 4 pumps available, and the proximity of a canal to provide make-up water to the wet well.

Various flow conditions were explored at Lift Station 47 to determine the minimum flow required to sustain a minimum flow velocity of 1 ft per sec (plus practically achievable safety factor) to transport the tool to ECR WRF. At a minimum, a flow of 5.5 MGD was required at Lift Station 47. To achieve this flow, water from an adjacent canal was pumped into the lift station wet well to provide make-up feed water for the lift station and two pumps at Lift Station 47 were operated at a minimum to achieve a discharge rate of 5.5 MGD. The operational strategy provided sufficient operational redundancy and capacity to achieve the desired 1 fps minimum flow velocity, satisfying the project requirements.

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Condition Assessment and R&R Planning for Critical Lift Stations

City of West Palm Beach, FL

Project Value
BC Fees: $52,000

Project Dates
Start: August 2014
Completion: December 2014 (est.)

Reference
Laura Le, P.E.
Utilities Engineering Manager
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Brown AND Caldwell

The City of West Palm Beach Public Utilities Department manages, operates and maintains a 55 mgd Wastewater Treatment Plant, a 47 mgd Water Treatment Plant, over 1,000 miles of water and sewer mains, and 125 lift stations. In 2010, the Department contracted with BC to embark on the development of an Asset Management Program (AMP) with a vision to develop an effective asset management organization that reduces the life cycle cost and impacts of asset ownership and enhances customer service through:

– Effective and efficient processes

– Enhanced systems

– Highly trained and motivated staff

– Commitment to continuous improvement

Earlier phases of the AMP included conducting an assessment to evaluate the current state of Public Utilities as compared to asset management best practices to identify opportunities for improvement. Phase 2 of the AMP initiated implementation of the highest priority improvement areas recommended under the Action Plan.

Phase 3 continues implementation of the AMP at the City's Most Critical Sanitary Sewer Lift Stations. The goal for this phase of the AMP for the lift stations is:

– Identify prioritized Rehabilitation and Replacement (R&R) needs for the sanitary sewer lift stations based on condition that can be used to develop a lift station Capital Improvement Plan (CIP).

– BC performed condition assessment activities for eleven (11) of the highest risk lift stations (of which, all are master repump stations). Lift station condition assessment activities included:

– Developed lift station condition assessment protocol and forms which were used by BC's field assessment teams to record the condition of assets. The forms were in an electronic database format.

– A team covering electrical, I&C, mechanical, and structural visited each lift station and used visual, auditory, tactile, and olfactory senses to assign performance and condition rankings based on these observations using the lift station condition assessment form. Where applicable, field crews conducted visual, above ground condition assessment of

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the wet well, including pH tests of the wet well sidewalls, utilized gas meters to determine the presence of hydrogen sulfide concentrations and used pole cameras to examine the wet well walls for signs of corrosion.

– Identify prioritized Rehabilitation and Replacement (R&R) needs for the sanitary sewer lift stations based on condition that can be used to develop a lift station Capital Improvement Plan (CIP).

Based on the results of the field condition assessments, BC developed a prioritized list of candidate improvements necessary to address serious condition defects at the assessed lift stations. BC developed planning level cost estimates (i.e. design/engineering costs, construction costs and contingency) for any rehabilitation or replacement recommended capital improvements. BC developed a Rehabilitation and Replacement Plan that identified immediate, short-term and long-term needs. BC prepared a Technical Memorandum documenting the condition assessment and candidate improvements.

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Broward County Water and Wastewater Services

Broward County, FL

Project Value
BC Fees: $278,000

Project Dates
Start: August 2013
Completion: ongoing

Reference
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Brown AND Caldwell

Master Pump Station 462 Ragging Assessment

Broward County Water and Wastewater Services' (WWS or COUNTY) operates a regional wastewater transmission system that receives and transmits sewage from large user communities and transmits the flow to the North Regional WWTP (NRWWTP) through a network of master pump stations (MPS) and transmission mains. Master Pump Station 462 (MPS 462) is an inline booster pump station that serves areas in northwestern Broward County. It receives flow from three Large User utilities.

Brown and Caldwell was retained to conduct an assessment of underlying contributing factors to operational challenges arising from the rapid formation of rag balls that affected pump station performance and requires frequent maintenance intervention. The current inline station configuration is a change from the original wetwell arrangement. Our analysis included a review of station hydraulics, pump selection and operating characteristics relative to the range of flow/pressure conditions, modeling of parent-child pumping systems impacted by current operation.

Brown and Caldwell identified a number of conditions that contribute to the tendency to form rag balls and identified recommendations that when implemented will improve operating efficiency, increase reliability and reduce the tendency to form rag balls and the attendant maintenance requirement. As a result of these findings, WWS is currently working to apply these improvements to other Master Pump Stations that have similar operational challenges.

3BC Sanitary Sewer Feasibility Study

WWS provides water supply but limited sewer service to the District 3BC Area. Unsewered areas currently utilize septic tanks, the elimination of which are an identified County priority. Brown and Caldwell was retained to conduct a feasibility assessment that evaluated alternative approaches for eliminating septic tanks from within the 3B/C service area that includes the North Perry Airport (HWO), commercial, and residential areas. The assessment developed a plan that provided for the implementation of approximately 116,000 lf of gravity mains, 7 lift stations, almost 7 miles of force mains that included horizontal directional drilled crossings of major thoroughfares that include the Florida Turnpike and Ste Road 441 at an estimated construction cost of almost $40 million. Our effort included engagement of the representatives of the North Perry Airport as well as the

surrounding cities of Miramar and Hollywood as candidate systems to receive collected sewage for treatment and disposal.

3BC Septic Tank Elimination Analysis Memorandum

Subsequent to the completion of the feasibility study, the County retained Brown and Caldwell to conduct a more in-depth technical analysis in order to refine implementation requirements. Brown and Caldwell addressed:

- Permitting requirements for proposed gravity sewer system improvements within the 3C Area of District 3BC,
- Utility identification within project area,
- Preparation of a hydraulic model determining overall hydraulic factors and conditions of a proposed forcemain to tie into Master Pump Station 320 (MPS 320),
- Proposed modifications to existing MPS 320 in order to receive modeled flows from the study area.

Surveys were also performed at the two locations where horizontal directional drilling would need to be performed.

3A Collection System Hydraulic Model 300 Development

The County desired to prepare an extended-period hydraulic model of its collection system in the District 3A service area that may be used for various applications inclusive of planning and operational scenario evaluations. Brown and Caldwell modeled the force main system inclusive of the pump stations, wet wells and gravity system access structures immediately upstream from each lift station manhole. Brown and Caldwell developed a functional and calibrated model of the District 3A pump station system. Initial test runs were conducted to validate the functionality of the model and document the initial characterization of system performance.

The project incorporated lift stations, pump stations, master meters, force mains, and gravity mains (including gravity main segments for upstream lift stations) immediately upstream (up to the first upstream manhole) of lift stations within the District 3A collection system that connect directly to the City of Hollywood's regional wastewater system.

Hydraulic Modeling of Reclaimed Water Transmission System

The County retained Brown and Caldwell to provide design, permitting, bid support and construction administration services in support of the expansion of its existing reclaimed water treatment and pumping facilities to a capacity of 26 mgd. During BODR development, the County was required to furnish information that reflected the initial and future operating conditions of the proposed high service pump station. Improvised steady state demand assumptions were made to preliminarily estimate pump station sizing, however, a dynamic model was required to validate the proposed pump station design under a range of operating conditions and to additionally confirm that basic delivery commitments provided for in the proposed interlocal agreement between Broward County and Palm Beach County (PBC) may be satisfied. Brown and Caldwell developed this hydraulic model and performed the following:

- Reviewed steady state model furnished by WWS and further defined demand updates required. Loaded the model and conduct a test run to confirm the functionality of the furnished model.
- Developed demand distribution assumptions for each prospective large customer of the reuse system.
- Updated the model to reflect the proposed high service pumps, system control settings and demand distribution assumptions developed. Documented simplifying assumptions made. Conducted test runs of the model to troubleshoot execution problems and establish functionality.
- Analyzes buildout PBC supply scenario based on a peak demand of 15 mgd with supply to currently identified residential services areas and large users in Broward County with no supplemental offsite storage
- Analyzed initial operating conditions when average demand from PBCWUD is limited to approximately 2 mgd.
- Documented results, summarized the operating scenarios, assumptions, and forecasted limits of operation that may be used to check the pump station discharge conditions.

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On-Call Utility Condition Assessment, Emergency Repair, Renewal and Replacement Services

Hampton Roads Sanitation District (HRSD), VA

Project Dates
Start: 2005
Completion: Ongoing

Since 2005, Brown and Caldwell has supported Hampton Roads Sanitation District (HRSD) in the planning, investigation, analysis, design, and construction of its assets. Our work has ranged from EPA and DOJ Consent Order negotiation support to development and implementation of a Regional Wet Weather Management Plan (RWWMP), support for a regional hydraulic model, and fast-track urgent repairs. The Engineers Club of Hampton Roads recognized Brown and Caldwell's force main inspection and condition assessment program with an Outstanding Engineering Award in 2012. Following are highlights of relevant work.

Pipeline Inspection, Condition Assessment, and Renewal and Replacement Program. Brown and Caldwell developed a programmatic approach to condition assessment R/R planning for HRSD. A comprehensive condition assessment program was conducted for the pumping stations and piping network, including the use of GIS and EAM systems and NASSCO PACP methodology. For force main, Brown and Caldwell developed a multi-tiered program that included progressive levels of testing beginning with noninvasive acoustic inspection, sonar, CCTV, laser profiling, and ultrasonic testing.

Pipeline Prompt Repairs. Brown and Caldwell has directly managed an emergency repair contract to replace thousands of feet of damaged gravity sewer, corroded force mains, and deteriorated manholes, primarily stemming from condition assessment findings. Brown and Caldwell's work has included quick turn-around designs of pipeline replacements, structural evaluations of existing piping under roads, manhole and pipeline rehabilitation specifications including trenchless, as well as more specialized expertise such as aerial crossing evaluation, hatch loading analysis, graphitic corrosion evaluation of ferrous pipelines, and lime-leaching analysis of asbestos cement force mains. Over its first two years alone, the contract facilitated over $10M in asset improvements.

Pumping Station Condition Assessment and Compliance Audits. In 2008 Brown and Caldwell performed a condition assessment on all of HRSD's 81 pumping stations, performing inspections, photographing and recording observations, and assigning condition ratings. In 2012, Brown and Caldwell returned to each station for the next round of required condition assessments, including inspection, photographic and observational record, assigning condition ratings, SCAT compliance audits, drawdown testing, flooding risk analysis,

Brown AND Caldwell

lightning strike evaluation, and dual-feed power assessment.

Replacement Planning Model. To enhance the R/R program, Brown and Caldwell developed a replacement planning model (RPM) for HRSD's pumping facilities and piping network (gravity and pressure). The RPM produces a long-term forecast of R/R costs by infrastructure segment. The condition data collected has been used to adjust the remaining useful lives for pumping station equipment. The long-term forecast will be used to build the R/R component of a funding plan for HRSD.

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Contingency and Emergency Response Plan

City of Wichita, KS

Project Value
BC Fees: $48,000

Project Dates
Start: June 2014
Completion: June 2015

The City of Wichita hired Brown and Caldwell to conduct a Contingency and Emergency Response Plan (CERP), which was one of seven projects associated with a Kansas Department of Health and Environment 2013 Consent Order. The order was issued because of discharge from a leaking slide gate that had gone undetected for two years. The goal of the order was to identify and reduce risks to the Arkansas River and other waterways due to potential failure of important infrastructure.

The infrastructure in question was a 3.5-mile-long force main that conveyed 60 percent of the City's wastewater between two plants in a 66-inch reinforced concrete pipe. Additionally, the pipeline at the Arkansas River was a 605-foot siphon constructed of prestressed concrete cylinder pipe. This pipeline crossed over the Arkansas River, the Kansas Turnpike, and an abandoned unlined municipal landfill. Due to the critical nature of buried infrastructure, the City required a completed CERP prior to the condition assessment – a separate project that was also being performed by Brown and Caldwell. The CERP provided the framework for the City to responds to a sanitary sewer overflow that represented an explicit violation of Kanas state law.

This plan gave the City a strategy and procedure to response to the sanitary sewer overflow and the structural failure associated with the 66-inch force main. The goals of the CERP were to: rapidly restore wastewater transport and treatment services, minimize impacts and lose of wastewater systems to customers, provide appropriate and timely emergency information to stakeholders, facilitate effective communication between those involved in an incident, and define protocol for the City to notify KDHE.

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D. Workload of Firm

C Solutions believes the best way to overcome a challenging project is through communication and risk assessment. C Solutions conducts our work process to minimize changes in the work generated by our design efforts and project production through frequent meetings with stakeholders and constructability review. This can involve visioning sessions to outline the client's expectations, budget and schedule; community workshops to get feedback from residents; and design review workshops to instill reassurance with the community.

Client	Project No.	Job Description	Project Status
CDM	1010-07	PBC Collection System Rehabilitation	Completed
Chen Moore	1020-10	Miccosukee Service Plaza Design	Open
URS	1090-01	Comcast Redlands Office - Potable Water System Regulatory Review	Completed
Riviera Beach Utility District	1100-02	Rehabilitation / Replacement LS No. 10 and LS No. 50	Completed
Riviera Beach Utility District	1100-02-01	LS No. 10 and 50 – Construction Services	Completed
Riviera Beach Utility District	1100-02-02	LS No. 10 and 50 – Construction Services (Additional Services)	Open
Riviera Beach Utility District	1100-02-03	LS10 and LS50 Services During Construction (Contract Ammendment)	Completed
Riviera Beach Utility District	1100-03	Packed Tower Aerators Design Evaluation	Completed
Riviera Beach Utility District	1100-04	Rehabilitation / Replacement LS No. 47 - Preliminary Design	Completed
Riviera Beach Utility District	1100-05	Emergency Engineering Assistance	Completed
Riviera Beach Utility District	1100-06	Preliminary Design of Lime Feed System	Completed
Riviera Beach Utility District	1100-07	WTP - Site Survey and Drawing	Completed
Riviera Beach Utility District	1100-08	Development of WTP Electrical Drawings and Hydraulic Profile	Completed
Riviera Beach Utility District	1100-09	Emergency Engineering Assistance 2014-2	Completed
Riviera Beach Utility District	1100-10	Hydraulic Model Refinement – Singer Island Service Area	Completed
Riviera Beach Utility District	1100-11	Chlorine Risk Management Program Assistance	Completed
Riviera Beach Utility District	1100-12	Secondary Disinfection (Avenue U Repump) – Electrical Design	Completed
Riviera Beach Utility District	1100-13	Record Drawing Organization	Completed
Riviera Beach Utility District	1100-14	Bidding Assistance – WTP Sodium Hypochlorite Core Facility Design Build	Completed
Riviera Beach Utility District	1100-15	Emergency Engineering Services 2015 -1	Completed
Riviera Beach Utility District	1100-16	Record Drawing Organization	Completed
Riviera Beach Utility District	1100-17	Electronic Record Drawing Organization	Completed
Riviera Beach Utility District	1100-18	Electronic Record Drawing Organization	Completed
Riviera Beach Utility District	1100-19	Sodium Hypochlorite Core Facility – Design, Permitting and Bidding	Open
Riviera Beach Utility District	1100-20	Temporary Staff Support GIS/CAD Technician	Completed
Riviera Beach Utility District	1100-21	WTP HGL Analysis	Completed
Riviera Beach Utility District	1100-22	Construction Testing Services (LS 10 and LS 50 Rehabilitation)	Completed
Riviera Beach Utility District	1100-23	Main Electrical Room Modifications - Electrical Code Compliance	Completed
Riviera Beach Utility District	1100-24	Construction Additional Testing Services (LS 10 and LS 50 Rehabilitation)	Completed
Riviera Beach Utility District	1100-26	Water Distribution System Flushing Plan Development	Open
Riviera Beach Utility District	1100-27	North Chemical Building Structural Rehabiltation	Completed
Riviera Beach Utility District	1100-28	Lift Station 19 Design Services	Open
Riviera Beach Utility District	1100-29	Additional Engineering Services LS10&50	Completed
Riviera Beach Utility District	1100-30	LS47 Design Services	Open
Hazen and Sawyer	1140-01	Palm Beach County Wasteater Master Plan	Completed
Hazen and Sawyer	1140-02	City of Riviera Beach Water and Wastewater Master Plan	Completed
Hazen and Sawyer	1140-03	Glades Wastewater Master Plan	Completed

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Client	Project No.	Job Description	Project Status
Hazen and Sawyer	1140-04	Glades SSES Initial Flow Monitoring	Completed
Hazen and Sawyer	1140-05	GladesSSES Smoke Testing and Manhole Inspections	Completed
Hazen and Sawyer	1140-06	Glades SSES Video Inspection	Completed
Hazen and Sawyer	1140-07	Glades Infiltration / Inflow Projects – Belle Glade Video Survey	Completed
Hazen and Sawyer	1140-08	Glades SSES Additional Services and Sewer Rehabilitation Biddin	Completed
Hazen and Sawyer	1140-09	Deerfield Beach Stormwater Utility Study	Completed
MDWASD	1150-01	VE North District WWTP Pretreatment Upgrade	Completed
MDWASD	1150-02	VE Central District WWTP Injection Well Pump Station	Completed
MDWASD	1150-03	CDWWTP Oxygenation Basins Rehabiltation	Open
MDWASD	1150-04	Design of Wastewater PS D-2-D3	Open
Poole and Kent	1180-01	North District WTP Pretreatment/Sludge Transfer Rehab Headworks Upgrade	Completed
Poole and Kent	1180-02	Interceptor Box	Completed
Poole and Kent	1180-03	BioRem Tower Analysis	Completed
Poole and Kent	1180-04	Wet well Design	Completed
Black and Veach	1190-02	MDWASD Filter Pilot Testing	Awaiting NTP
Black and Veatch	1190-03	CDWWTP Filtration and Disinfection System Design	Open
Brown and Caldwell	1200 -01	Hollywood Pipeline	Open
Brown and Caldwell	1200 -02	PBC Pahokee WWTP Review	Completed
Brown and Caldwell	1200 -03	PBC WRNWWTF Facilities Plan	Open
Reiss Engineering	1210-01	Lift Station218 Structural	Open
Reiss Engineering	1210-02	City of Orlando Emergency Generator Building	Open

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E. Location

RFP-RFQ-RLI LOCATION ATTESTATION FORM (EVALUATION CRITERIA)

The completed and signed form and supporting information (if applicable, for Joint Ventures) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit this form and supporting information may affect the Vendor's evaluation. Provided information is subject to verification by the County.

A Vendor's principal place of business location (also known as the nerve center) within Broward County is considered in accordance with Evaluation Criteria. The County's definition of a principal place of business is:

1. As defined by the Broward County Local Preference Ordinance, "Principal place of business means the nerve center or center of overall direction, control and coordination of the activities of the bidder [Vendor]. If the bidder has only one (1) business location, such business location shall be considered its principal place of business."

2. A principal place of business refers to the place where a corporation's officers direct, control, and coordinate the corporation's day-to-day activities. It is the corporation's 'nerve center' and in practice it should normally be the place where the corporation maintains its headquarters; provided that the headquarters is the actual center of direction, control, and coordination, i.e., the 'nerve center', and not simply an office where the corporation holds its board meetings (for example, attended by directors and officers who have traveled there for the occasion).

The Vendor's principal place of business in Broward County shall be the Vendor's "Principal Address" as indicated with the Florida Department of State Division of Corporations, for at least six months prior to the solicitation's due date.

Check one of the following:

☒ The Vendor certifies that it has a principal place of business location (also known as the nerve center) within Broward County, as documented in Florida Department of State Division of Corporations (Sunbiz), and attests to the following statements:

1. Vendor's address listed in its submittal is its principal place of business as defined by Broward County;

2. Vendor's "Principal Address" listed with the Florida Department of State Division of Corporations is the same as the address listed in its submittal and the address was listed for at least six months prior to the solicitation's opening date. A copy of Florida Department of State Division of Corporations (Sunbiz) is attached as verification.

3. Vendor must be located at the listed "nerve center" address ("Principal Address") for at least six (6) months prior to the solicitation's opening date;

4. Vendor has not merged with another firm within the last six months that is not headquartered in Broward County and is not a wholly owned subsidiary or a holding company of another firm that is not headquartered in Broward County;

5. If awarded a contract, it is the intent of the Vendor to remain at the referenced address for the duration of the contract term, including any renewals, extensions or any approved interim contracts for the services provided under this contract; and

6. The Vendor understands that if after contract award, the County learns that the attestation was erroneous, and upon investigation determines that the error was willful or intentional on

the part of the Vendor, the County may, on that basis exercise any contractual right to terminate the contract. Further any misleading, inaccurate, false information or documentation submitted by any party affiliated with this procurement may lead to suspension and/or debarment from doing business with Broward County as outlined in the Procurement Code, Section 21.119.

If the Vendor is submitting a response as a Joint Venture, the following information is required to be submitted:

a. Name of the Joint Venture Partnership
b. Percentage of Equity for all Joint Venture Partners
c. A copy of the executed Agreement(s) between the Joint Venture Partners

☐ Vendor does not have a principal place of business location (also known as the nerve center) within Broward County.

Vendor Information:

Vendor Name: C Solutions, Inc.

Vendor's address listed in its submittal is:

610 SE 14th Ct. No. 2
Ft. Lauderdale, FL 33316

The signature below must be by an individual authorized to bind the Vendor. The signature below is an attestation that all information listed above and provided to Broward County is true and accurate.

Mark Drummen P.E., BCEE	President	C Solutions, Inc.	6/19/2018
Authorized Signature/Name	Title	Vendor Name	Date

RFP-RLI-RFQ LOCAL PREFERENCE AND TIE BREAKER CERTIFICATION FORM

The completed and signed form should be returned with the Vendor's submittal to determine Local Preference eligibility, however it must be returned at time of solicitation submittal to qualify for the Tie Break criteria. If not provided with submittal, the Vendor must submit within three business days of County's request for evaluation of Local Preference. Proof of a local business tax should be submitted with this form. Failure to timely submit this form or local business tax receipt may render the business ineligible for application of the Local Preference or Tie Break Criteria.

In accordance with Section 21.31.d. of the Broward County Procurement Code, to qualify for the Tie Break Criteria, the undersigned Vendor hereby certifies that (check box if applicable):

☐ The Vendor is a local Vendor in Broward County and:

a. has a valid Broward County local business tax receipt;
b. has been in existence for at least six-months prior to the solicitation opening;
c. at a business address physically located within Broward County;
d. in an area zoned for such business;
e. provides services from this location on a day-to-day basis, and
f. services provided from this location are a substantial component of the services offered in the Vendor's proposal.

In accordance with Local Preference, Section 1-74, et. seq., Broward County Code of Ordinances, a local business meeting the below requirements is eligible for Local Preference. To qualify for the Local Preference, the undersigned Vendor hereby certifies that (check box if applicable):

☒ The Vendor is a local Vendor in Broward and:

a. has a valid Broward County local business tax receipt issued at least one year prior to solicitation opening;
b. has been in existence for at least one-year prior to the solicitation opening;
c. provides services on a day-to-day basis, at a business address physically located within the Broward County limits in an area zoned for such business; and
d. the services provided from this location are a substantial component of the services offered in the Vendor's proposal.

Local Business Address: 610 SE 14th Ct., No. 2
Ft. Lauderdale, FL 33316

Vendor does not qualify for Tie Break Criteria or Local Preference, in accordance with the above requirements. The undersigned Vendor hereby certifies that (check box if applicable): The Vendor is not a local Vendor in Broward County.

Mark Drummond P.E., BCEE	President	C Solutions, Inc.	6/19/2018
AUTHORIZED SIGNATURE/NAME	**TITLE**	**COMPANY**	**DATE**

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F. Willingness to Meet Time and Budget Requirements

The Request for Qualifications requires an indication of the firm's ability to meet budget and schedule. C Solutions is committed to providing quality, cost-efficient deliverables within the schedule and budget provided.

"A shared understanding of the problem, the need, and the goal is critical to achieving the right solution within the required schedule and budget."

We believe that meeting the triple constraint of time, budget and quality is necessary for every project and relies on the quality of the client-consultant relationship. A shared understanding of the problem, the need, and the goal is critical to achieving the right solution within the required schedule and budget. C Solutions' quality assurance program includes project scheduling and management and budgetary control measures as well as quality assurance and control. The use of senior professionals and focus on client relationships gives us the confidence to clearly define project parameters and commit to achieving project design deliverables within the specified time and budget.

A shared understanding of the problem, the need, and the goal is critical to achieving the right solution within the required schedule and budget

Our approach is simple – provide focused expertise to meet our client's needs. Project focus and continued momentum are key to the efficiency of project delivery. To this end, C Solutions creates a detailed and individualized plan for each work order assigned to us; establishes project standards for the team; provides a committed senior professional with the required experience to perform the assigned tasks; routinely monitors schedule and cost against the developed work plan; maintains timely communication and coordination between the project team; and provides a senior design professional, not involved in day-to-day design, to review project deliverables at all critical stages of project delivery.

We pride ourselves on providing a quality product and having a thorough understanding of the client's expectations and a project's desired end result and commit to doing that for Broward County's Water and Wastewater Services (WWS).

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G. Volume of Work

VOLUME OF PREVIOUS WORK ATTESTATION FORM

The completed and signed form should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to provide timely may affect the Vendor's evaluation. This completed form must be included with the Vendor's submittal at the time of the opening deadline to be considered for a Tie Breaker criterion (if applicable).

The calculation for Volume of Previous Work is all amounts paid to the prime Vendor by Broward County Board of County Commissioners at the time of the solicitation opening date within a five-year timeframe. The calculation of Volume of Previous Work for a prime Vendor previously awarded a contract as a member of a Joint Venture firm is based on the actual equity ownership of the Joint Venture firm.

In accordance with Section 21.31.d. of the Broward County Procurement Code, the Vendor with the lowest dollar volume of work previously paid by the County over a five-year period from the date of the submittal opening will receive the Tie Breaker.

Vendor must list all projects it received payment from Broward County Board of County Commissioners during the past five years. If the Vendor is submitting as a joint venture, the information provided should encompass the joint venture and each of the entities forming the joint venture. The Vendor attests to the following:

Item No.	Project Title	Solicitation/ Contract Number:	Department or Division	Date Awarded	Paid to Date Dollar Amount
1					
2					
3					
4					
5					
				Grand Total	0.00

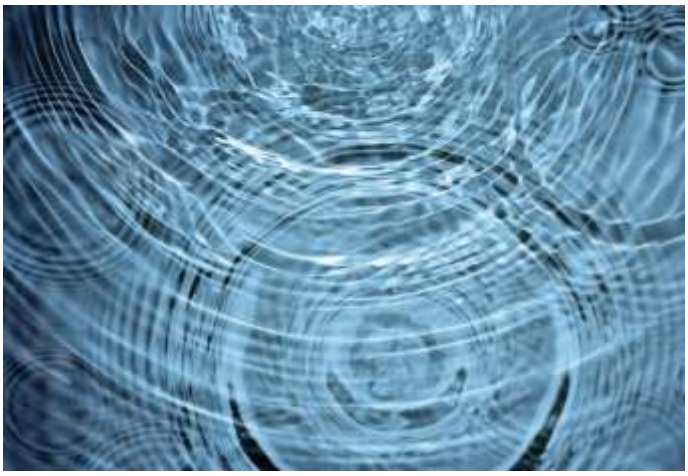
Has the Vendor been a member/partner of a Joint Venture firm that was awarded a contract by the County?
Yes ☐ No ☒

If Yes, Vendor must submit a **Joint Vendor Volume of Work Attestation Form**.

Vendor Name: C Solutions, Inc.

Mark Drummond P.E., BCEE	President	6/19/2018
Authorized Signature/ Name	**Title**	**Date**

Evaluation Criteria



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A Ability of Professional Personnel

We believe that experience is realized with the people assigned work on your project

The team we have assembled to meet the requirements of this RFQ, C Solutions, Inc., Brown & Caldwell, Chen Moore and Associates, and Tobon Engineering, allows us the ability to provide you with very focused, accessible, senior professionals backed by a consortium of strong technical resources. The prime firm, C Solutions, brings a high level of expertise along with the personal service that a small firm provides, and is supplemented by the vast resources and Broward County experience provided Brown and Caldwell and Chen Moore and Associates.

Established in 2005, C Solutions Inc. is a minority owned and certified local small business corporation headquartered in Broward County. Our vision is to provide senior professionals with ability to focus on a client's need. We believe that providing the right solution relies on quality of the client relationship and are committed to a shared understanding of the challenge, the need and the desired result. Our expertise includes the planning, design, permitting, and construction management of water, wastewater and reclaimed water infrastructure projects for public municipalities in Florida, including:

- Water Supply Systems
- Water Treatment Facilities
- Water Distribution Systems
- Wastewater Collection Systems
- Wastewater Treatment Facilities
- Pump Stations
- Hydraulic Modeling
- Value Engineering
- Directional Drilled installations of Pipelines

C Solutions is experienced in providing analysis and capital improvement planning for multiple South Florida Municipalities recently including: Broward County, Palm Beach County and the City of Riviera Beach. C Solutions assisted in providing the preparation of the Broward County Water and Wastewater Retail Masterplan, the Palm Beach County Wastewater Masterplan, the Glades Regional Wastewater Masterplan and the Riviera Beach Water and Wastewater Masterplan.

Tobon Engineering is a minority owned small consulting business founded by Maurice Tobon, a Professional Engineer with over 28 years of experience in water, wastewater and stormwater engineering in south Florida. Tobon Engineering is solely focused on engineering consultant and utility management for municipalities.

Tobon Engineering
Engineering and Utility Management

The owner and president of Tobon Engineering, Maurice Tobon served for nineteen years at the highest management levels of two of the largest water utilities in south Florida (Palm Beach County and City of Fort Lauderdale) and was responsible for nearly $ 1 billion in program management capital improvements. Mr. Tobon has unique experience and insight from many years in government and understands the issues faced by water utilities.

Chen Moore and Associates is a multi-discipline consulting firm with offices in Broward, Miami-Dade, Palm Beach, Orange and Alachua Counties. Founded in 1986, Chen Moore and Associates specializes in civil and environmental engineering; landscape architecture; planning; GIS analysis and mapping; transportation, streetscaping and traffic improvements; construction administration; wastewater collection, transmission, treatment, reuse and disposal; pump station design and rehabilitation; water supply, treatment, and distribution; stormwater system design and master plans; and modeling and permitting of drainage, water distribution, and sewer collection. Dr. Chen founded Chen Moore and Associates with a belief that relationships are the key to the planning, design and construction of successful projects.

CHEN·MOORE
&ASSOCIATES

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Since 1947, Brown and Caldwell (BC) has been at the forefront of water and wastewater innovations with one primary goal: providing effective and sustainable solutions. With a principal focus on water and wastewater engineering, more than 60 offices, and over 1,600 professionals, we have the resources to deliver your utility projects to meet your high standards of safety and strategic plans. Our national reputation is based on exceptional client service and an unwavering commitment to quality. We are an employee-owned, 100% environmental firm. That makes us truly unique in our industry.

Our firm's size enables us to customize solutions, and our culture encourages practical innovation. We collaborate as one with our clients and, in doing so, we have earned their respect and continuing trust. As a result, each member of our team has been specifically selected for this contract based on his/her technical expertise, prior working relationships with each other, and previously demonstrated ability to be responsive and reliable. Work for this contract will be performed out of Brown and Caldwell's office situated at 1560 Sawgrass Corporate Parkway, Suite 240, Sunrise, FL 33323.

Since the early 1980's, Brown and Caldwell has supported the engineering needs of several Florida utility systems across a diverse array of service areas. We have delivered impactful results in planning, compliance, operational optimization, asset management and implementation of improvements that are well aligned with the County's needs.

Brown and Caldwell has worked alongside County staff and has considered itself to be a partner with Broward County in dealing with challenges faced by the County. Our team has relevant experience solving similar challenges for 25 other Florida systems. Our team offers valuable continuity that will assure responsive and impactful results that build upon lessons learned from the past.

For this contract, related projects that we have performed within the past five years for Broward County include:

- Master Pump Station 462 Assessment Study
- Basis of Design Report, Detailed Design, Permitting and Bidding for the Reclaimed Water Plant Expansion Project
- North County Reuse Feasibility Study
- Effluent Pump Station Electrical Assessment
- 3BC Sanitary Sewer System Feasibility Study
- 3A Collection System Hydraulic Model
- Collection System Chloride Infiltration Study
- Hillsboro Pines NIP Survey
- Sanitary System Survey
- NRWWTP Disposal System Survey
- Analysis of Alternatives for implementing a replacement for Intracoastal Waterway Forcemain Crossing
- 3BC Septic Elimination Analysis Memorandum
- Modeling of Reclaimed Water Transmission System

Mark Drummond, P.E., BCEE

Mr. Drummond has over 22 years of engineering design experience on water and wastewater infrastructure projects and has designed water infrastructure projects for clients in Florida, the Caribbean and Latin America totaling over $300 million. These projects include the Headworks Rehabilitation for the 38 mgd Fort Lauderdale Wastewater Treatment Plant; new Aguadulce 12 mgd Surface Water Treatment Plant and surface water intake facility; conversion of Riviera Beach's 16mgd wet-pit dry pit master wastewater pump station to a new above-ground inline booster pump station; and Value Engineering for MDWASD for the Headworks Rehabilitation at 112 mgd North District Wastewater Treatment Plant (WWTP) and for the new Injection Well Surface Facilities at the 143 mgd Central District WWTP.

John Hill, P.E.

Mr. Hill has 52 years of experience in civil and environmental engineering with expertise in all phases of the planning, design, quality review, and construction management for municipal wastewater and water facilities. Mr. Hill has design and construction management experience on multiple large-scale wastewater and water projects totaling over $750 million in construction. These projects include: Atlanta's largest wastewater treatment

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facility, the 180 mgd R.M. Clayton Wastewater Treatment Plant; Tampa Bay's Regional 122 mgd Surface Water Treatment Plant DBO where he was involved in the design and day-to-day onsite construction management; and Orange County's 11 mgd Wastewater Master Pump Station with a interceptor wetwell 110 feet deep and 40 feet wide.

Richard Moore, P.E., BCEE

Mr. Moore specializes in engineering and project management services related to biosolids management, drinking water, and wastewater treatment, and has over 45 years of experience in the planning, design, and construction of major water and wastewater facilities in the United States and overseas. Mr. Moore's project involvement includes managing major public utility projects in the areas of biosolids management and solids handling, water supply, treatment, and distribution; wastewater collection, treatment, and disposal. These projects the 122 mgdTampa Bay Regional Surface Water Treatment Plant (Phase I and II) where he was the Project Manager and lead design engineer for solids handling improvements; Tampa Bay Water's surface water supply project including two intake pump stations, a repump station, and 17 miles of 84-inch and 72-inch pipelines; and Senior Technical Advisor for Miami Dade County Biosolids Master Plan which evaluated the existing biosolids program for all of MDWASDs three regional wastewater treatment plants.

Maurice Tobon, P.E.

Mr.Tobonhasover25yearsofhydraulicmodelingexperience using KYPIPE, Cybernet, and Infowater software. Mr.Tobon has developed hydraulic models up to 75,000 pipes for both water and wastewater systems, including pump and booster stations and is experienced in model development using data from GIS databases, SCADA data, and field test data. For wastewater systems this experience includes static as well as extended period simulation of multiple wastewater pump station, booster stations and force main systems, incorporating knowledge on the simulation of collection area flow patterns, pump operations, and analysis of resultant force main pressures, flows and pump station cycling.

The following is a listing of hydraulic modeling projects;

- Avenir and Ancient Tree Development Water and Wastewater (ongoing)
- Palm Beach County Water Reuse (ongoing)
- Palm Beach County Water Model Update (ongoing)
- North Lauderdale Wastewater (pending approval)
- Royal Utility Company Water
- Seacoast Utility Authority Reclaimed Water
- Seacoast Utility Authority Potable Water
- City of Coral Springs Water and Wastewater
- City of Boca Raton Water and Reclaimed Water
- City of Port Charlotte Rotonda Area Water
- City of Miami Beach Wastewater
- City of Fort Lauderdale Water and Wastewater
- Palm Beach County Water Reclaimed Water Transmission System Raw Water and Wastewater
- Palm Beach County Water Raw Water Pumping and Transmission System for various WTP facilities
- Palm Beach County Water Wastewater Pumping and Transmission System

Nigel O. Grace, P.E.

Nigel Grace brings more than 28 years of experience serving in wide-ranging roles in the management and direction of complex multi-disciplinary projects that draw on diverse skill sets in areas of technology applications, regulatory negotiations, and operational/process optimization. In addition to being one of the firm's drinking water leads, he currently serves as one of the firm's water technology leaders and through this experience brings broad insights on emerging issues of concern and the complex challenges faced by the utility community. For over 25 years, he has served a wide array engineering needs for Broward County Water and Wastewater Services inclusive of master planning, water supply and water treatment system optimization, reclaimed water planning and regulatory advocacy, and ongoing distribution system water quality optimization. Through his

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efforts, he has played an instrumental role in supporting the development of the City's diverse portfolio of water supplies as well as a modified plan for complying with the Ocean Outfall Legislation that resulted in concessions that saved the City an estimated $200 Million.

Chris Garrett, P.E.

Chris Garrett, P.E. specializes in all aspects of wet weather flow studies and utility infrastructure evaluation, rehabilitation, design, and program management projects. His specialties include conventional and alternative sanitary sewer designs, stormwater drainage design and water quality improvement initiatives, infrastructure rehabilitation, and GIS-CMMS for utility management. He is also a trainer for the NASSCO PACP/MACP/LACP program and presently assisting with the next version of the training and reference manual. As a co-leader of Brown and Caldwell's national Aging Infrastructure initiative, Chris is promoting advanced condition assessment technologies and criticality based decision making for prioritizing inspection and system rehabilitation that promotes BC's Four R's of reinspection, repair, rehabilitation and replacement. Chris has written and presented a number of papers on water quality and infrastructure rehabilitation with projects highlighted in a number of periodicals, including Trenchless Technology magazine.

V. "Ravi" Ravisangar, PhD, PE, BCEE

Dr. Ravisangar has more than 19 years of experience in water and wastewater pumping and treatment related work. His experience spans a broad range from studies and design to construction and startup. His subject matter expertise includes water and wastewater pumping system analysis and design, pumping system rehabilitation, water and wastewater plant hydraulic analyses, water distribution system modeling, dynamic and transient hydraulic analysis of piping networks, surge protection systems design, and sludge and slurry rheology and hydraulics of non-Newtonian fluids. He is also an active technical reviewer for ASCE Journal of Pipeline Systems. He led the design effort to adding new pumps for existing deep injection well pumping system and is is ready to leverage that experience to benefit the County.

Brian Scott, P.E.

Brian Scott has 10 years of experience in a variety of water and wastewater planning, design, and construction management projects. His expertise includes the evaluation and optimization of unidirectional flushing programs, the study of water quality issues in distribution systems, and the use of hydraulic modeling software such as InfoWorks, InfoWater, InfoSWMM, H2OMAP Water, WaterGEMS, SewerGEMS, and DHI Mike Urban. He has been involved in the development of master plans for numerous clients across the country and is skilledinthedevelopmentandanalysisofwater,wastewater, and reclaimed water models. Additionally, his experience includes proficiency with AutoCAD and ArcGIS, pump station and pipeline design, statistical analysis, construction management, pilot testing, and permitting.

Peter Moore, P.E., LEED AP, ENV SP, F.ASCE

Mr. Moore is the president of CMA with more than 21 years of experience with a wide variety of utility, stormwater, transportation and other infrastructure projects. Since joining CMA in 1999, Mr. Moore has focused on the management, planning, design, permitting, and construction of various utility infrastructure projects for public clients throughout South Florida. Mr. Moore has worked on literally dozens of unique projects for Broward County valued at $100M in his career, literally serving in every role in a project team. Of particular note is Mr. Moore's experience in value engineering, including projects for Broward County WWS, Miami-Dade Water and Sewer Department and a development client in Saudi Arabia. Including his assistance as a reviewer and design guideline developer for the firm's work in the Republic of Panama, Mr. Moore has an additional $500M of international project exposure to give him the full arsenal of tools to serve Broward County. A lifelong Broward County Resident, Mr. Moore has his Bachelor of Science and Master of Engineering in Civil Engineering, is a licensed professional engineer in Florida and has been elected as a Fellow of the American Society of Civil Engineers (ASCE) for his lifetime achievements and contributions to civil engineering. To show his understanding of today's issues, Mr. Moore also is

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an Envision Sustainability Professional and a LEED Accredited Professional (two additional certifications specializing in sustainability). He is a past president and board member of numerous local, regional and national professional societies and non-profit organizations.

Jason McClair, P.E., CFM, LEED AP

Mr. McClair is a senior civil engineer with more than 22 years of experience in utility infrastructure design, regulatory permitting, geotechnical engineering, and computer aided flow modeling for stormwater collection, water distribution, and sanitary transmission systems. Since joining CMA in 2001, Mr. McClair has focused on the management, planning, design, permitting, and construction of various utility infrastructure projects for public clients throughout South Florida, including for BCAD. He has extensive experience with hydraulic and hydrologic modeling for the analysis of stormwater, water, and wastewater systems. Mr. McClair has over 10 years of experience working directly for BCAD. He was the project manager for the Fort Lauderdale-Hollywood International Airport Stormwater Master Plan Update Project from 2008 through 2013 and is currently responsible for the stormwater design and permitting on the FLL North Airfield Pavement Rehabilitation Project. He also is currently working on the stormwater design and permitting on various projects at Fort Lauderdale Executive Airport.

Paula Fonseca, P.E.

Paula Fonseca, P.E. is a civil engineering graduate with nine years of experience. She serves as senior engineer for Chen Moore and Associates and serves as the primary hydraulic modeler for the firm. Ms. Fonseca has worked for CMA for seven (7) years with focus on hydraulic modeling using InfoWater. She assists with design work using AutoCAD, GIS, WaterCAD, SewerCAD, StormCAD, and InfoWater 8.1v. Ms. Fonseca has worked on neighborhood improvement projects for Broward County, utility coordination projects for Riviera Beach Utility District, including water and sewer designs and permitting, Design of GIS Utility Atlases for the City of Pompano Beach and Solid Waste Authority, as well as civil engineering design, drafting, permitting, cost evaluations and construction inspection for various project involving water and force main improvements for the City of Margate. Moreover, Ms. Fonseca has worked on the Palm Beach County Water Master Plan and Glades Regional Water Master Plan through the use of water modeling software (InfoWater) and GIS. In addition, she has worked on hydraulic models for the City of Margate evaluating the robustness of its water and force main systems.

Patrick Kaimrajh, P.E.

Patrick D Kaimrajh, PE serves as a senior engineer for CMA and specializes in civil engineering design, drafting, permitting, and construction inspection. His 9 years of design experience at CMA includes paving, drainage and stormwater management, sanitary sewer and stormwater pump stations, water main, site development, and neighborhood improvement projects. He has prepared engineering drawings, cost evaluations, design reports and various permit applications. In addition, Mr. Kaimrajh has performed construction inspections for drainage, watermain, sanitary sewer, and pavement. He also is skilled in AutoCAD Civil3D, ICPR, EPA SWMM, Cascade, HY-8, WaterCAD, SewerCAD, and StormCAD, modeling and design software. Mr. Kaimrajh will be responsible for the planning and modeling efforts related to the stormwater, water, and wastewater infrastructure of this project.

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BROWARD COUNTY
FLORIDA

QA/QC
Richard Moore, P.E., BCEE

Project Director
Peter Moore, P.E.,LEED AP, ENV SP, F.ASCE

Project Manager
Mark Drummond, P.E., BCEE

Hydraulic Modeling	Pump Station Inspections / Condition Assessment	Risk Based Prioritization	Emergency Response Plan	Capital Improvement Plan
GIS Paula Fonseca, P.E. **Surge Hydraulic Model** V. "Ravi" Ravisangar, PhD, PE, BCEE **Wastewater Hydraulic Model** Brian J. Scott, P.E. Maurice Tobon, P.E., PMP	**Pump Station Inspections** Mark Drummond, P.E., BCEE Patrick Kaimrajh, P.E. **Pump Station O&M Analysis** John Hill, P.E. Jason McClair, P.E., CFM, LEED AP	**Pipelines** Nigel O. Grace, PE Christopher S. Garrett, P.E. Paula Fonseca, P.E.	Christopher S. Garrett, P.E. Maurice Tobon, P.E., PMP	Mark Drummond, P.E., BCEE Nigel O. Grace, PE Jason McClair, P.E., CFM, LEED AP

Subconsultants
Chen Moore and Associates
Brown and Caldwell
Tobon Engineering (Broward County CBE)

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Mark S. Drummond, P.E., BCEE

President

Project Manager / Capital Improvement Plan/Pump Station Inspections / Condition Assessment

Education

B.S. – Civil Engineering, Florida International University, 1996

(Minor in International Relations)

Registration

Professional Engineer: Florida (License No: 57428)

Professional Engineer: Jamaica (Registration No: PE/01/0583)

Certified NASSCO PACP, MACP, LACP

Professional Activities

Water Environment Federation (WEF)
FWEA Chairman of International Committee (2002-2006)
Caribbean Water and Waste Water Association (CWWA)
Florida Engineering Society (FES)
American Water Works Association (AWWA)
Chairman of Distribution Committee (2000-2002)
American Society of Civil Engineers (ASCE)
Inter-American Association of Sanitary Engineering (AIDIS)

Mark Drummond is a civil / environmental engineer experienced in water and wastewater treatment process design, water distribution systems, wastewater collection and transmission systems, water reuse systems, hydraulic modeling, water supply projects, horizontal directional drilling design, sanitary sewer evaluation surveys, management consulting, information management systems, and permitting.

MASTERPLANS

Project Engineer, Retail Potable Water and Wastewater Masterplan, Broward County, Florida. This project provided the retail water and wastewater masterplan for Broward County. Mr. Drummond evaluated alternate wastewater treatment and effluent disposal suppliers for certain regions in the County, assisted in the calibration of the water and wastewater hydraulic models, provided growth forecast through the year 2040 to estimate potable water demand and wastewater flows, provided studies to estimate infiltration and inflow, performed a condition assessment for the County's wastewater lift stations, and provided recommendations for future capital improvement and rehabilitation and replacement projects.

Project Engineer, Wastewater Masterplan, Palm Beach County Water Utilities, Florida. This project provided the wastewater masterplan for Palm Beach County. Mr. Drummond assisted with the analysis of the existing wastewater service area and the evaluation of infiltration and inflow into the wastewater collection system.

Project Engineer, Utility Water and Wastewater Masterplan, City of Riviera Beach, Florida. This project provided the creation of the initial Water and Wastewater Masterplan for the Riviera Beach Utility District. The Masterplan summarized the existing conditions of the water and wastewater system, created hydraulic models for both the water distribution and wastewater collection systems and prioritized improvements for the water supply, water treatment, water distribution and wastewater collection systems.

Project Engineer, Glades Wastewater Masterplan, Palm Beach County Water Utilities, Florida. This project provided the creation of the initial Wastewater Masterplan for the municipalities of South Bay, Belle Glade and Pahokee. The Masterplan summarized the existing

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conditions wastewater system, refined the hydraulic model for wastewater collection systems and prioritized improvements for the wastewater collection and treatment systems. Mr. Drummond assisted in the collection of data for the existing wastewater collection and treatment systems, preparation of sanitary sewer evaluation surveys (SSES), and preparation of the capacity analysis reports for the wastewater treatment plants.

Project Manager, Treasure Cay Water & Wastewater Utility, Abaco, Bahamas. Responsible for the review of existing water, wastewater, and irrigation services and the analysis of the capital improvements needed to bring the utility to an acceptable level of service. This evaluation included hydraulic modeling of the water distribution and wastewater collection systems, capital and O&M cost analyses, and the preliminary design of a water distribution system, wastewater collection system, and the water and wastewater treatment plants.

WATER SUPPLY

Design Engineer, Winding Bay Water Supply Project, The Abaco Club on Winding Bay, Abaco, Bahamas.This project included the design of a raw water well field, water storage facilities, and hydraulic modeling of the water transmission and distribution system.

Technical Advisor, Value Engineering Floridan Water Supply Wells, Miami Dade Water & Sewer Department, Florida. Mr. Drummond provided value engineering of the Floridan wells, submersible well pumps, piping, and appurtenances for five new Upper Floridan Wells designed by Miami Dade County totaling 4.7 mgd (firm capacity).

Design Engineer, Hobe Sound Polo Club Fire Protection Floridan Water Supply Well, Hobe Sound, Florida. Mr. Drummond provided the design of a Floridan Water Supply Well to supply fire protection for the Hobe Sound Polo Club consisting of polo grounds, horse barns, and large single family homes located on 20-acre lots.

Technical Advisor, 9 MGD Shrimp Farm Seawater Pump Station, Belize Aquaculture Ltd., Belize Central America. Provided technical expertise for the modifications to an existing salt water supply system. The modifications included the upsizing of the existing saltwater pump station, intake structures, and dual 5-mile transmission mains to provide 9 MGD to an inland shrimp farm. The dual 24-inch transmission mains transfer saltwater between the island seawater pump station and two 16-acre reservoirs and includes a 2-mile sub-aqueous saltwater bay crossing of an active waterway.

Project Engineer, Family Islands Water Supply Expansion, The BahamasWater andSewerageCorporation, Bahamas. Assisted in the design of water supply wells and distribution systems for the Bahamas Water and Sewer Corporation's potable water system expansion program in the Islands of Abaco, Eleuthera, and Exuma.

WATER TREATMENT

Project Manager, 17.5 MGD Sodium Hypochlorite Disinfection Facility, City of Riviera Beach, Florida. Mr. Drummond is the Engineer of Record for the design of sodium hypochlorite (NaOCl) disinfection facilities for an existing 17.5mgd conventional lime softening Water Treatment Plant. This design entails the conversion of an existing gaseous chlorine disinfection to a sodium hypochlorite and includes new: NaOCl storage and chemical feed facilities; chemical piping, valves and appurtenances; flow meters for measurement of WTP flow and flow pacing of NaOCl chemical injection; re-carbonation system for pH control and new motor control center to consolidate various electrical equipment into the new facility.

Project Manager, 12 MGD Aguadulce Water Treatment Plant, IDAAN, Aguadulce, Panama. This project included the design of a new 12mgd Surface WTP including, surface water intake from the Santa Maria river, raw water transfer pump station, flocculation and coagulation basins, dual media self-backwashing filters, solids handling and backwash recycle water basins, finished water storage and high service pump station to distribute water to remote storage tanks to serve 50 cities/towns through 200km of transmission pipeline.

Project Manager, PackedTowerAerator Design Evaluation, City of Riviera Beach, Florida. Mr. Drummond provided the base design criteria required to renovate and provide media replacement of the four packed tower aerators for the 17.5mgd Water Treatment Plant.

Project Manager, WTP Hydraulic Profile Analysis, City of Riviera Beach, Florida. This project includes the development of a Hydraulic Profile depicting the process flow through the existing WTP and the analysis of the existing WTP hydraulics to identify issues and formulate recommendations for improvements to the existing WTP

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design and operation.

Project Manager, Preliminary Design of Lime Feed System, City of Riviera Beach, Florida. This project includes an analysis of the existing lime feed system, recommendations for improvements and the generation of a conceptual lime system improvement plan that defines the design criteria for the recommended improvements.

Project Engineer, West WTP Expansion, Phase II, City of Deerfield, Florida. Responsible for the design of a 9 MGD blending water treatment train including: lime softening unit, aerators, and associated chemical systems. Other responsibilities included the design of bulk storage tanks, piping, feed pumps, and injection points associated with the chemical systems of a new 10.5 MGD nanofiltration membrane plant.

Design Engineer, Rehabilitation of 16 MGD Water Treatment Plant, City of Lauderhill, Florida. Responsible for the design of lime sludge systems including vacuum filters, thickeners, and thickened lime transfer pumps; lime chemical feed ejectors; waste lime transfer pumps; and filter backwash pumps. Other responsibilities included the crosscheck of drawings and the writing and editing of specifications for upgrade modifications to the entire treatment plant.

Design Engineer, Preliminary Design for WTP Improvements, City of North Lauderdale, Florida. Mr. Drummond provided services to prepare a preliminary design for the design-build modifications being provided to the City's 7.5 mgd lime softening water treatment plant.

ProjectEngineer,WaterSupply,TreatmentandDistribution System Regulatory Review, City of Riviera Beach, Florida. This project provided a review of the existing and proposed drinking water regulations as they relate to operation of the City's water treatment and distribution system. A report summarizing existing and proposed drinking water regulations and identifying the City's current and potential near compliance status was provided.

Design Engineer, Evaluation of WTP Disinfection, City of Riviera Beach, Florida. Mr. Drummond provided the feasibility study to evaluate various alternatives to the existing disinfection system at the City's existing 17.5mgd lime softening water treatment plant.

Design Engineer, 2 MGD Concentrate Pump Station, City of Deerfield Beach, Florida. Mr. Drummond was responsible for the design of a 12-inch directionally drilled concentrate disposal water main for 2.0-mgd concentrate disposal pump station.

Project Engineer, Norwood-Oeffler WaterTreatment Plant Concentrate Deep Injection Well Construction Review Report, City of North Miami Beach, Florida. This project included the review of technical details for the construction of a concentrate deep injection well and a dual-zone monitor well. A Construction Review Report was prepared that compared the construction, testing, and performance of the wells to the contract documents.

WATER DISTRIBUTION AND TRANSMISSION SYSTEMS

Project Engineer, Evaluation and Design of Secondary Disinfection Alternatives, City of Riviera Beach, Florida. Provided an evaluation of the existing system conditions and various secondary disinfection alternatives to help alleviate low total chlorine residuals experienced in the remote regions of the City's potable water distribution system and designed a secondary disinfection system at the remote pump stations to enhance the total chlorine residual.

Project Manager, Hillsboro Water Repump Station CaOCl Feed System, City of Coconut Creek, Florida. This project included the design-build of a secondary disinfection system for the City of Coconut Creek's 5 MGD potable water repump station.

Project Manager, Preliminary Hydraulics Evaluation Guaynabo – Gurabo Transmission System, Puerto Rico. This project included the evaluation of existing and proposed water systems for the provision of 40 MGD of water to distributed service areas spanning 40km. The evaluation included hydraulic modeling, surge analysis, site selection, and preliminary design recommendations for storage tanks, a 42-inch 40km transmission main, and rehabilitation and replacement of a 40 MGD pump station.

Design Engineer, Broward County District 2 Potable Water Booster Station, Broward County, Florida. This project included the evaluation of a new in-line 9.7 MGD booster pump station to maintain system pressures. Responsible for the preparation of a technical design memorandum outlining the feasibility of the project, comparing pump station alternatives, and defining the hydraulic design conditions based on the previously performed hydraulic

model.

Design Engineer, Repair of 36-inch Water Main, City of Miami Beach, Florida. Responsible for the design of a 450 linear foot directional drill for emergency repair of a 36-inch water main rupture under a major highway.

Technical Advisor, La Placida Fire Flow Review, City of Coral Springs, Florida. Mr. Drummond provided the review of fire flow test calculations and methodologies to show minimum fire flow requirements for the redevelopment of 37 single family homes.

Design Engineer, Downtown Water Main Improvements Phase I City of Dania Beach, Florida. Responsible for the design of a 650 linear foot directional drill of a 14-inch water main under a City canal.

Design Engineer, Military Mains Project, City of Boca Raton, Florida. Responsible for the design of three directionally drilled 16-inch water main crossings totaling approximately 1,100 linear feet.

Design Engineer, Davie BoulevardWaterTransmission and Force Main, City of Fort Lauderdale, Florida. Designed 5 miles of 24-inch water main through a highly urbanized and constricted corridor to replace a 75 year old water main and assisted in the design of a 54-inch force main. The design included routing and financial analysis for water mains and existing force mains ranging from 24 to 54-inches, design of a 2,000 foot directional drill underneath a heavily traveled interstate and waterway, and design of a jack and bore under active railroads.

WASTEWATER TREATMENT

Project Manager, 38 MGD GTL WWTP Influent Bar Screen Rehabilitation Design Build, City of Fort Lauderdale, Florida. Mr. Drummond was the Engineer of Record for the design and permitting of the replacement of influent screening devices at the 38 mgd GTL Wastewater Treatment Plant. The rehabilitation included the design of four (4) new plate screens to replace all existing influent screening devices while keeping the WWTP in continuous operation.

Project Manager, Value Engineering North District Wastewater Treatment Plant Headworks Rehabilitation Project, Miami Dade Water & Sewer Department, Florida. Mr. Drummond provided value engineering for the rehabilitation of the influent screening, primary sludge degritting, and sludge transfer systems along with the replacement and relocation of the electrical switchgear for the 240-mgd North District Wastewater Treatment Plant.

Design Engineer, 9 MGD AdvancedWastewaterTreatment Facility, City of Fort Myers, Florida. Performed the process and hydraulic design of the treatment and pumping systems. This project included the design of a new 9-mgd Advanced Wastewater Treatment Facility (AWWTF) at the City's existing South Wastewater Treatment Plant to enhance the City's reuse water capabilities. The AWWTF included tertiary filtration, disinfection, transfer and high service pump stations, and two 5 MG storage tanks.

Project Manager, Central District WWTP Injection Well Pump Station Surface Facilities Value Engineering, Miami DadeWater & Sewer Department, Florida. Mr. Drummond provided value engineering for the design of the Injection Well Pump Station Surface Facilities for the 143mgd Central District WWTP. The design included the construction of two 19.9mgd Class I Deep Injection Wells and pump station to dispose Leachate from the Virginia Key Landfill and dewatering centrate, digester gas scrubber wastewater and secondary treated effluent from the WWTP.

Design Engineer, Permit Modification North District WWRF, Miami Dade Water & Sewer Department, Florida. Mr. Drummond provided engineering services to prepare and submit a modification to the wastewater operations permit to upgrade the reuse treatment facilities for the North District advanced wastewater treatment facility.

Technical Advisor, WWTP Reform Industrial Park, Lee Young & Partners, Port of Spain,Trinidad. Provided quality review services for all design aspects of the waste water treatment plant (WWTP). This project included the design of sewerage collection system and an activated sludge extended aeration WWTP to serve a 25 lot industrial estate.

Project Engineer,Sawgrass20-mgdWastewaterTreatment Plant (WWTP), City of Sunrise, Florida. Responsibilities included the design of: onsite drainage, lift stations, sodium hypochlorite system, equalization basins and the securing of necessary permits. Assisted in the design of site piping, return activated sludge/waste activated sludge systems, cost estimating, writing and editing specifications, and bid evaluations.

Project Engineer, Springtree 9-mgd Wastewater Treatment Plant (WWTP) Rehabilitation, City of Sunrise,

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Florida. Assisted in the design and permitting of the 9-mgd Springtree WWTP Rehabilitation.

Project Engineer, Park City Wastewater Treatment Plant (WWTP), City of Sunrise, Florida. Responsible for the preparation of the Florida Department of Environmental Protection (FDEP) WWTP permit for the City of Sunrise's Park City WWTP that was located in the Town of Davie.

WASTEWATER COLLECTION AND TRANSMISSION SYSTEMS

Project Manager, LS 10 & 50 Rehabilitation and Replacement, City of Riviera Beach, Florida. Mr. Drummond is the Engineer of Record for the rehabilitation of an existing critical master submersible pump station and the rehabilitation and conversion of an existing 16mgd wet-pit / dry-pit master pump station to an above ground inline booster station.

Project Manager, Preliminary Design of Lift Station No. 47, City of Riviera Beach, Florida. This project includes the generation of a preliminary design report for the rehabilitation and conversion of the existing 9.8mgd submersible master lift station to an above ground inline booster station on constrained project site with limited additional space.

Design Engineer, Master Lift Station 21 Modifications, City of Pompano Beach, Florida. This project included the relocation and design of the City's 6.5 MGD master lift station. Responsible for providing technical expertise on assessing hydraulic design criteria for the master lift station, for the analysis of odor control issues, and for providing overall design quality reviews.

Design Engineer, Wastewater Lift Station Design Upgrades, City of Riviera Beach, Florida. As part of the Utility Water and Wastewater Masterplan, Mr. Drummond performed condition assessments and provided recommendations for the repair and replacement (R&R) of all lift stations within the Utility's service area. As pump replacements are required, Mr. Drummond is re-evaluating hydraulic design conditions to provide new pump selections that increase pump efficiency and reduce O&M issues with the lift stations.

Technical Advisor, Broadview Park Neighborhood Improvement Project, Broward County, Florida. This project included the design of wastewater collection system for a 700 acre mixed-use area. Responsible for training the design team on the use of sanitary sewer hydraulic modeling software, providing technical expertise for both gravity sewer and pump station design, and for the review of all pump station designs in the project area.

Design Engineer, Design of Sanitary Sewer Collection Systems, City of Fort Lauderdale, Florida. As part of the City of Fort Lauderdale's $250 million wastewater CIP, Mr. Drummond was the design engineer for the design of sanitary sewer collection systems totaling $32 million in construction cost. This included hydraulic gravity sewer modeling, value engineering, constructability reviews, construction inspections, the preparation and/or review of preliminary design reports, and the layout and sizing of gravity sewers and pump stations.

Design Engineer, Davie BoulevardWaterTransmission and Force Main, City of Fort Lauderdale, Florida. Designed 5 miles of 24-inch water main through a highly urbanized and constricted corridor to replace a 75 year old water main and assisted in the design of a 54-inch force main. The design included routing and financial analysis for water mains and existing force mains ranging from 24 to 54-inches, design of a 2,000 foot directional drill underneath a heavily traveled interstate and waterway, and design of a jack and bore under active railroads.

Project Engineer, Park City Force Main, City of Sunrise, Florida. This project included the design of 9 mile force main through a heavily urbanized area. Responsible for designing five 24-inch directionally drilled sub-aqueous crossings totaling 1,800 linear feet and securing the permits from six separate permitting agencies.

OTHER:

Expert Witness, Water Wastewater and Fire Protection Systems, Florida Keys, Florida. Mr. Drummond served as an expert witness for legal proceedings to ascertain an island property's fair market value before and after denial of vehicular access. Mr. Drummond provided expert opinions and reports to assess the feasibility of the provision of potable water, wastewater treatment, and fire protection for the types of redevelopment allowed by the property's zoning.

Design Engineer, Weir Modification and Freshwater Canal Pumping Station, City of Cape Coral, Florida. This project

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included the modification of fixed weirs and two new Freshwater Canal Transfer Pump Stations. Performed the preliminary and final design required to modify two existing fixed weirs to adjustable weirs and construct two new freshwater canal pumping stations. These improvements will increase wet weather storage within the freshwater canal system and provide an estimated 4.3 MGD of additional reuse water in the dry season.

Project Manager, Development of FDOT District IV's Web-based NPDES MS4 Database Management System, FDOT District Four, Florida. This five year $3.0 million customized web-based database management system application manages FDOT's NPDES program. This web-based distributed application manages work flow for users in multiple departments extended across a 5200 sq. mile area. The application utilizes an Oracle database, .NET, ASP, and Visual Basic forms with integrated GIS functionality utilizing ESRI's ARC IMS, ARC Info, and ARC SDE. Other projects managed for FDOT District Four include the inventory and inspection of storm water systems as well as NPDES annual reports for the permit areas of Fort Lauderdale, Hollywood, Broward County, and Palm Beach County.

Project Manager, Sanitary Sewer Special Assessment Study, City of Fort Lauderdale, Florida. The study included developing a special assessment methodology to provide an equitable distribution of benefits to affected properties, based on allowable property usage, to parallel existing design criteria for the sanitary sewer improvements.

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Richard D. Moore, P.E., BCEE

QA/QC

Education

M.S. – Civil/Environmental Engineering, University of Massachusetts at Lowell, 1977

B.S. – Civil Engineering, Michigan State University, 1978

Registration

Professional Engineer: Florida (License No:34083)

Professional Engineer: California (License No: 23122)

Professional Activities

American Water Works Association Water Environment Federation Florida Engineering Society
National Society of Professional Engineers
Member and former Chair of the Florida Engineering Society Conservation and Environmental Quality Committee

Richard Moore specializes in engineering and project management services related to biosolids management, drinking water, and wastewater treatment, and has over 37 years of experience in the planning, design, and construction of major water and wastewater facilities in the United States and overseas. Mr. Moore's project involvement includes managing major public utility projects in the areas of biosolids management and solids handling, water supply, treatment, and distribution; wastewater collection, treatment, and disposal. Amongst other roles, Mr. Moore served as CDM's Division Quality Manager and was responsible for developing and overseeing the division's Quality Implementation Plan, including training of staff, monitoring compliance with quality management (QM) procedures, and performing and overseeing independent QM audits and technical reviews for CDM's ten Florida offices. Mr.

Moore was a lead author for CDM's QMP-4, the Quality Management Process Manual for Design-Build projects.

Biosolids and Residuals Management Experience:

Lead Design Engineer, Tampa Bay Regional Surface Water Treatment Plant, Tampa Bay, Florida. This project included the expansion the Regional Surface Water Treatment Plant to 120mgd under a design/build/operate agreement with Veolia Water and Tampa Bay Water. Mr. Moore was lead design engineer for solids handling improvements including gravity thickeners, belt filter press dewatering, sludge conveyor systems, backwash solids clarifiers, and recycle surge basins.

Lead Design Engineer, Okaloosa County 10 mgd Arbennie Pritchett Water Reclamation Facility Design/Build Project, Florida. Mr. Moore was lead design engineer for for biosolids handling facilities including rotary drum thickener, aerobic digesters, centrifuge dewatering, and sludge pumps.

Lead Design Engineer, Babcock Ranch Town & Country Utilities, Florida. Mr. Moore was the lead design engineer for the biosolids processing facilities for a small water reclamation facility expandable up to 7 mgd. Facilities include sludge drying beds and aerated static pile composting systems.

Technical Advisor, Orange County Utilities Biosolids

Management Program, Florida. Mr. Moore prepared summary of regulatory and market changes affecting biosolids land application programs in Florida, and evaluation of alternative biosolids processing technologies as part of a long range regional master plan.

Senior Technical Advisor, Palm Beach County Solid Waste Authority Biosolids Processing Facility, Florida. This design/build/operate project was for a regional $30 million biosolids pelletization facility. Mr. Moore was the senior technical advisor for preparation of the Request for Qualifications (RFQ) and the Request for Proposals (RFP) including design criteria package. He evaluated responses and recommended award to the design/build/operate (DBO) contractor and assisted in oversight of the project implementation during design and construction.

Senior Technical Advisor, Miami Dade County Biosolids Master Plan, Dade County, Florida. Mr. Moore assisted in the performance of a Biosolids disposal evaluation. As senior technical advisor, he provided assistance in evaluating the existing biosolids program for the County's three regional wastewater treatment plants, and evaluating alternative processing technology alternatives for a long range master plan.

Project Director, Residuals Treatment and Disposal Study, Tallahassee, Florida. For the Florida Department of Corrections (FDOC), Mr. Moore prepared a report on impacts new sludge regulations may have on wastewater treatment facilities operated by the FDOC throughout the state. This project evaluated the U.S. Environmental Protection Agency's (EPA's) Chapter 503 residuals treatment and disposal regulations, reviewed the facilities operated by the FDOC, and prepared a residuals treatment and disposal report. Residuals disposal alternatives included landfilling, contract hauling, and land spreading. Dewatering alternatives included drying beds, mechanized dewatering, and no dewatering. Stabilization alternatives included aerobic digestion, anaerobic digestion, and lime stabilization.

Other Biosolids and residuals management Projects

- Tampa Bay Water Regional Surface Water Treatment Plant residuals handling and dewatering with beneficial reuse as agricultural soil amendment
- Sarasota County sludge composting study and design of yard waste co-composting facilities
- Manatee County compost facility design
- City of Fort Myers sludge master plan, and design and construction of digester improvements
- Manatee County Southwest WWTP anaerobic digesters
- Lee County sludge composting feasibility study
- Dewatering facility design for the City of West Palm Beach East Central WWTP
- City of Venice lime stabilization and land application program

Other Wastewater Experience:

Senior Technical Advisor, City of Fort Lauderdale Wastewater Improvements Program, Florida. Mr. Moore provided QA/QC reviews on various design projects including pump stations, collection systems, and improvements at the G.T. Lohmeyer Wastewater Treatment Plant.

Project Director East Port Water Reclamation Facility Upgrade/Expansion, Charlotte County, Florida. This project involved a capacity expansion from 3 mgd to 5 mgd, and an upgrade of the treatment process to a Modified Ludzack-Ettinger (MLE) advance secondary treatment process with high-level disinfection for effluent reuse on area golf courses and a 95- million-gallon reclaimed water storage reservoir. The design provided for the future expansion to 10 mgd with eventual residential reuse. As Project Director, Mr. Moore oversaw the design, bidding, and construction services associated with the upgrade and expansion of the county's East Port water reclamation facility (WRF).

Senior Technical Advisor, Wastewater System Expansion Program, Charlotte County, Florida. In 1993, Charlotte County developed a 25-year water and sewer master plan to meet growth demands in compliance with environmental regulations. Implementation of this plan by the year 2000 was required by the county's comprehensive plan and the Florida Department of Community Affairs. To assist the county in implementing this wastewater expansion program, this project consisted of program management, technical, and financial expertise in two distinct stages: (1) project management/planning and preliminary design/ permitting and (2) final design and bidding. These program management responsibilities included financial planning

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and management, 201 facilities plan update, permitting, surveying, geotechnical, design reports, public information, design, bidding, and construction management.

Project Director, Bee Ridge Water Reclamation Facilities, Sarasota County, Florida. This project included the design of a new 1.5 mgd water reclamation facility for urban reuse of reclaimed water.The facility was designed with provisions for expansion in phases to an ultimate capacity of 15 mgd and to meet AWT standards for surface water discharge on an as- needed basis.

Other Water Experience:

Project Manager, Tampa Bay 66 mgd Regional Surface WaterTreatment Plant Design Build Operate,Tampa Bay, Florida.This D/B/O project included the construction of a 66 mgd surface water treatment plant. The treatment process included high rate ballasted flocculation sedimentation, deep bed granular activated carbon (GAC) filters, and ozone disinfection. Mr.

Moore was also project director for Tampa Bay Water's surface water supply project, which included design, permitting, land acquisition, and construction services for two intake pump stations, a repump station, and 17 miles of 84-inch and 72-inch pipelines for Tampa Bay Water.

Officer in Charge, Membrane WTP Expansion and Construction Services, Collier County, Florida. This project included the value engineering and management for the design and construction of the Collier County Membrane Water Treatment Plant expansion from 12mgd to 20mgd. Mr. Moore provided project oversight for a complete membrane process evaluation, constructability review of design done by another firm, bidding services, on-site project management, construction engineering, and construction administration services, and a detailed observation/inspection of the construction work. He also managed the engineering services during construction.

Project Manager, Manatee County Water Treatment Plant (WTP) Expansion and Wellfield, Florida. This project included the Lake Manatee Watershed water resources development report, a 30-mgd WTP expansion involving a dual-purposeprocesstrainforlimesofteningofgroundwater supply or coagulation/sedimentation/filtration for surface water supply. The project also included developing a new 15-mgd wellfield for alternate watersupply.

Publications / Presentations

"Tampa Bay Water's Experience with Design-Build-Operate Project Delivery for its Regional Surface Water Treatment Plant", Richard D. Moore, Jonathan M. Kennedy, and William Mayer, Florida Engineering Society Journal, March 2010.

"Ballasted Sedimentation Boosts Floc Settling," Don Thompson and Richard Moore, AWWA Opflow, June 2005.

A Case Study in Permitting a Design/Build/Operate Water treatment Plant in Florida: Tampa Bay Water. Florida Water Resources Conference Proceedings, 2001 (with C. Carden, S. Solters, D. Thompson).

Role of Trenchless Technology in a Large Diameter Raw Water Pipeline Project. Florida Water Resource Conference Proceedings, 2000 (with C.M. Tappan and W.L. Moscinski).

Evaluation of Tampa Bay Water's Surface Water Supply Alternatives. Florida Water Resources Conference Proceedings, 2000 (with C.C. Montgomery and M. Coates).

Implementing Septic Tank Replacement in Florida. Florida Water Resources Conference Proceedings, 1998 (with T.G. Walker).

Maximizing Aerobic Digestion System Capacity Using Bench Scale Testing. Presented at the 1995 Florida Water Resources Conference (with J.L. Hagerty, E. Dixon, and T. Briggs).

Pilot Testing of High Solids Centrifuges and Belt Filter Presses for Biosolids Dewatering in West Palm Beach, Florida. Presented at the 1994 Florida Water Resources Conference, and the 1995 Water Environment Federation Annual Conference (with J.L. Hagerty, D. Holtz, and D. Hubbs).

Construction of Reuse Distribution Systems in Existing Developments. Presented at the 1992 Water Environment Federation Urban and Agricultural Water Reuse Specialty Conference (with C.T. Rose).

Financing Reclaimed Water Programs. Presented at the 1991 Water Pollution Control Federation Annual Conference (with D.C. Kemp).

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John R. Hill, P.E.

Pump Station O&M Analysis

Education

B.S. – Civil Engineering, University of Central Florida, 1978

Registration

Professional Engineer: Florida (License No: 37948)

Professional Engineer: Georgia (License No: PE020712)

Professional Activities

Florida Engineering Society (FES)

American Water Works Association (AWWA)

Publications / Presentations

"Landfill Gas and Wastewater Residuals = Marketable Fertilizer Pellets," Presented at the 2003 proceedings of the 78th Annual Florida Water Resources Conference, May 4-7, 2003, Tampa, Florida (with Martin Lewis and John Booth).

"Upgrade of the Daytona Beach Bethune Point Wastewater Treatment Plant," Proceedings of the 71st Annual Florida Water Resources Conference, pp 207-212, May 5-8, 1996, Fort Myers, Florida (with R.D. Reardon and W.C. Banks).

"Sludge Composting Alternatives for Florida." Presented at the 1988 jointTechnical Conference of the FSAWWA, FPCA, and FWPCOA, November 2-4, 1988, Fort Lauderdale, Florida (with R.D. Reardon and C.S. Kohl).

John Hill is a Senior Engineering Consultant with 52 years of experience in consulting civil/environmental engineering. Mr. Hill has experience with multiple engineering firms including 19 years HNTB, 18 years with Camp Dresser & McKee Inc. (CDM), and 15 years as an Environmental Engineering Consultant. His qualifications include all phases of the planning, design and construction management for municipal water, wastewater, and stormwater facilities. Mr. Hill has expertise in value engineering, cost estimating and technical reviews for quality control and civil design projects including urban redevelopment streetscape and parking lot facilities. Over the last 39 years he has worked exclusively as a project manager, project engineer and design engineer on various water, wastewater, and stormwater projects. He has been involved in the design of biological nutrient removal wastewater treatment systems as well as the design of several water treatment facilities, water pumping supply systems and distribution networks including supply wellfields.

Wastewater Experience:

Task Leader / Lead Design Engineer, R.L. Sutton Water Reclamation Facility, Cobb County, Georgia. This project included the expansion of the 60mgd (AADF) R.L. Sutton water reclamation facility for Cobb County Georgia. The expansion included the addition of a new 160mgd pump station, headworks, flocculation basins, primary clarifiers, ABW filters, ultraviolet disinfection, a new outfall structure and odor control for the pump station and headworks. The 160mgd raw wastewater pump station included 6 pumps and a 200 foot deep by 50-ft circular diameter wetwell.

Lead Design Engineer, R.M. Clayton Water Reclamation Facility, City of Atlanta, Georgia. This project included the expansion of the 122mgd (AADF) R.M. Clayton water reclamation facility. The expansion included modifications and addition of a new headworks, new mix and aeration basins, new onsite pump station capable of pumping 330mgd, ten (10) 150' diameter clarifiers, 22 deep bed filters, ultraviolet disinfection and a new outfall structure.

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Technical Advisor, Value Engineering North District Wastewater Treatment Plant Headworks Rehabilitation Project, Miami Dade Water & Sewer Department, Florida. Mr. Hill provided value engineering for the rehabilitation of the influent screening, primary sludge degritting, and sludge transfer systems or the 240mgd North District WWTP.

Design Engineer, 9 MGD AdvancedWastewaterTreatment Facility, City of Fort Myers, Florida. Design Engineer for the process and hydraulic design of the treatment and pumping systems. This project included the design of a new 9-mgd Advanced Wastewater Treatment Facility (AWWTF) at the City's existing South Wastewater Treatment Plant to enhance the City's reuse water capabilities. The AWWTF included tertiary filtration, disinfection, 18mgd transfer and high service pump stations utilizing vertical turbine pumps, and two 5 MG storage tanks.

Design Engineer, 38 MGD GTL WWTP Influent Bar Screen Rehabilitation Design Build, City of Fort Lauderdale, Florida. Design Engineer for the replacement of the influent screening devices at the 38 mgd GTLWastewaterTreatment Plant. The rehabilitation included the design of four (4) new mechanical rake bar screens to replace all existing influent screening devices while keeping the WWTP in continuous operation.

Additional Wastewater Experience. Mr. Hill's Florida wastewater experience includes the final design of the Jerry Sellers Wastewater Treatment Plant (WWTP) upgrade and expansion for the City of Cocoa; design and construction administration of the odor control system at the Regional WWTP for the City of Daytona Beach; preparation of the Daytona Beach WWTP evaluation report; project manager in charge of the preliminary and final design for the expansion of the Bethune Point plant to a 10-mgd advanced wastewater treatment (AWT) facility in Daytona Beach; project director responsible for the coordination of the design expansion of the Regional Advanced Wastewater Treatment (AWT) facility for the City of Daytona Beach; design of a force main and master pump station for the Florida Community Services Corporation in Kissimmee; assistancewiththedesignofthe1-mgd(AWT)WoodleaRoad water reclamation facility for the City of Tavares; assistance with the City of Lake Mary's wastewater master plan report; preparation of an environmental impact statement for the second crossing at the Caloosahatchee River; the design of the of the City of Tampa's Dale Mabry oxiation ditch WWTP; and the design and construction administration of an 11.0-mgd master lift station for Orange County.

Water Experience:

Mr. Hill's Florida has experience on various water projects including preliminary design for the expansion of the City of Cocoa's Dyal WTP to a 48-mgd facility; construction of the western wellfield for the City of Daytona Beach; four water treatment systems in Orange County; and the upgrade and expansion of the Taft WTP for the City of Taft. Other project experience is shown below.

Task Leader / Lead Design Engineer, Tampa Bay Regional Surface Water Treatment Plant. Mr. Hill led the design of the 66-mgd surface water treatment plant for Tampa Bay Florida. The design included new process basins, utilizing the ACTIVE FLOW process followed by deep bed filters with disinfection and an onsite high service pump station. Also included in the design was lime sludge holding tanks followed by a sludge dewatering facility with sludge loading for off-site disposal.

Project Engineer, Chattahootchee WTP, City of Atlanta, Georgia. This project involved the expansion of the 64-mgd Chattahootchee water treatment plant (WTP) for the City of Atlanta. The expansion included modifications and expansion of the intake structure, new flashmix chamber and flow distribution chambers to sedimentation basins, and new gravity thickeners and pumpstations.

Project Manager, Hidden Springs Water Treatment Plant, Orange County, Florida. Mr. Hill was responsible for the design of the Hidden Springs Water Treatment Plant consisting of wells, high service pumping, ground storage tank with gravity tray aeration, chlorine disinfection and hydropneumatic tank.

Project Manager, Enonolochhantchee Water Treatment Plant. Mr. Hill was responsible for the design of the first phase of the Enonolochhatchee Water Treatment Plant consisting of Wells, MSP, Ground Storage tanks with gravity tray aeration, chlorine disinfection and variable speed pumping.

Project Manager, Mt. Plymouth Water Treatment Plant. Mr. Hill was responsible for the design of a ground storage tank with tray aeration, high service pumping and controls with chlorine disinfection.

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Project Manager, Oak Meadows Water Treatment Plant. Mr. Hill was responsible for the design of the Oak Meadows Water Treatment Plant consisting of wells, variable speed-high servicing pumping, and a ground storage tank with tray aeration with chlorine disinfection.

Solid Waste Experience:

Project Manager, Solid Waste Authority, Palm Beach County. Mr. Hill was responsible for the preliminary design report for a 400 wet ton per day sludge pelietization facility. The preliminary design included the sizing of the equipment, site layout, odor control and developed off-site utilities to provide landfill gas to be used as a heat source for the dryers.

Storm Water Experience:

In the stormwater area, Mr. Hill served on the Oleander Avenue stormwater improvements project for the City of Daytona Beach; assisted with the first phase of the City of Rockledge's stormwater utility study; and oversaw CDM's participation in the City of Ocala's Lake Tuskawilla stormwater treatment demonstration project.

Additional Experience:

Boston Whaler Manufacturing Facility, Edgewater, Florida. Mr. Hill was also involved in the design and construction administration efforts for the construction of the $6 million Boston Whaler boat manufacturing facility in Edgewater, Florida.

Structural Designer, Pre-stressed beam bridges, Florida. Mr. Hill spent 7 years designing pre-stressed beam bridges in Florida including bridges in the Maitland city area, Bee-Line expressway, and on the I-4 eastbound east-west connection.

Engineer, Southern Bell Telephone Bee-Line phone cable, Florida. Mr. Hill was Involved in the development of a 47-mile phone cable alignment within Bee-Line expressway for Southern Bell Telephone with placement of signal booster stations along the route.

Project Engineer, Maitland Boulevard, Maitland, Florida. Mr. Hill was the Project Engineer responsible for the re-alignment of Maitland Boulevard including preparing rightway descriptions of individual parcels on both the east and west sides of the property, the coordinating the stormwater improvements and the relocation/replacement of all service connections to water and sewer lines within the roadway right-of-way.

Project Manager, Bob Carr Auditorium, City of Orlando, Florida. Mr. Hil was in charge of the design and construction administration of the parking facility for the Bob Carr Auditorium.

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Maurice Tobon, P.E., PMP

Wastewater Hydraulic Model/ Emergency Response Plan

Education

M.E. – Civil Engineering, University of Florida (92)

B.S. – Civil Engineering, University of Florida (90)

Registration

Professional Engineer: Florida (License No. 49373)

Project Management Professional (PMP)

Publications

Tobon M., Pettit C. (2017), Toolkit for Climate-Water Utility Operations, USAID.

Professional And Volunteer Activities

Water Environment Federation (WEF)

American Water Works Association (AWWA)

American Society of Civil Engineers (ASCE)

ENGINEERS WITHOUT BORDERS Mentor and Technical Advisory Committee

- Engineers without Borders (EWB) Professional Mentor University of Florida Student Chapter, Shree Janahit Higher Secondary School water supply project Khanalthok, Nepal (ongoing)
- Engineers without Borders (EWB) Professional Mentor Rutgers University, village water supply project Karatu, Tanzania (ongoing)

ASCE/EWB International Development Conference, Panama City, Panama Special Topics Course-Water Treatment Instructor. Water system assessment towns of San Francisco and La Paz, Panama (2014)

Tobon Engineering
Engineering and Utility Management

Professional water engineer with over 28 years of experience in water and wastewater engineering in south Florida, including development of water and wastewater hydraulic models. Served for over fifteen years at the highest management levels of two of the largest water utilities in south Florida and was responsible for nearly $ 1 billion in program management capital improvements. Mr. Tobon has unique experience and insight from being in government for many years and understands the issues faced by water and wastewater utilities. Presently serving as an advisor on various hydraulic modeling tasks through other consulting firms.

Professional History

- 2016 to present Tobon Engineering, President
- 2007 to 2016 Palm Beach County Water Utilities Department, Director of Engineering/Program Manager
- 1997 to 2007 City of Fort Lauderdale, Engineering Design Manager/Assistant Program Manager
- 1990 to 1997 Camp Dresser & McKee Inc., Project Manager

HYDRAULIC MODELING

Over 25 years of hydraulic modeling experience using KYPIPE, Cybernet, and Infowater software. Mr. Tobon has developed hydraulic models up to 75,000 pipes for both water and wastewater systems, including pump and booster stations. Experienced in model development from GIS databases, calibration based on field test data, capital planning, and evaluation. This experience includes steady state as well as extended period simulation of multiple water distribution systems and the generation of various scenarios to account for hourly demand patterns, seasonal variations as well as fire flow demands. For wastewater systems experience includes static as well as extended period simulation of multiple wastewater pump station and force main systems, incorporating knowledge on the simulation of collection area flow patterns, pump operations, and analysis of resultant force main pressures, flows and pump station cycling. The following is a list of water and wastewater hydraulic modeling projects:

North Lauderdale Wastewater Pump Station Evaluation

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- Royal Utility Water
- Avenir Development Water and Wastewater
- Ancient Tree Development Water and Wastewater
- Seacoast Utility Authority Reclaimed Water
- Seacoast Utility Authority Potable Water
- City of Coral Springs Water and Wastewater
- City of Boca Raton Water and Reclaimed Water
- City of Port Charlotte Rotonda Area Water
- City of Miami Beach Wastewater
- City of Fort Lauderdale Water and Wastewater
- Palm Beach County Water, Reclaimed Water, Raw Water and Wastewater

WATER AND WASTEWATER MASTERPLANS

Director of Engineering, 2012 Water and Wastewater Masterplan, Palm Beach County Water Utilities Department. This project was for the development of the 2012 Water and Wastewater Masterplan for Palm Beach County Water Utilities Department. Both masterplans recommended over 500 million dollars in capital projects which served as the basis for ongoing Capital Improvement Program. The masterplans were developed by consultants under the direction and supervision of Mr. Tobon.

Director of Engineering, 2014 Glades Region Water and Wastewater Masterplan, Palm Beach County Water Utilities. This project provided the creation of the first Water and Wastewater Masterplan for the municipalities of South Bay, Belle Glade and Pahokee. The masterplan summarized the existing conditions of the water and wastewater systems, created hydraulic models for water and wastewater collection systems and prioritized improvements including treatment systems. The masterplans were developed by consultants under the direction and supervision of Mr. Tobon.

Engineering Design Manager, 2007 Water and Wastewater Masterplan, City of Fort Lauderdale Public Services, Florida. This project provided for the 2007 Water and Wastewater Masterplans for the City of Fort Lauderdale. Both master plans developed over 550 million dollars in capital projects, which served as the basis for Waterwork 2011 Program Management. Consultants under the guidance, direction and supervision of Mr. Tobon developed the Masterplans.

Project Manager(CDM), Water and Wastewater Masterplan, City of Coral Springs. This project provided the Water and Wastewater Masterplan for the City of Coral Springs, Florida. Both master plans created the first hydraulic models of the water and wastewater systems for the City of Coral Springs. Mr. Tobon served the Project Manager for the effort and was fully responsible for all deliverables.

Project Manager(CDM), Wastewater Masterplan, City of Miami Beach. This project provided for the Wastewater Masterplan for the City of Miami Beach, Florida. Mr. Tobon was responsible for the hydraulic model of the wastewater system and analysis of population growth with subsequent capital improvements.

WASTEWATER COLLECTION AND TRANSMISSION SYSTEMS

Director of Engineering, Lift Station Rehabilitation Phases 1-4, Palm Beach County Water Utilities Department. Rehabilitation of 38 lift stations during a 4 year period, rehabilitation included new wet well coatings, valves, piping, pumps and control panels. Mr. Tobon was responsible for the directing and advising staff from preliminary design through construction.

Director of Engineering, Booster Station 5241 Improvements, Palm Beach County Water Utilities Department. Rehabilitation of a major inline wastewater booster station, improvements included new valves and piping. The design build contract was carried out under the direction of Mr. Tobon.

Director of Engineering, South Bay Wastewater Lift Station Rehabilitation, Palm Beach County Water Utilities Department. Rehabilitation of 4 lift stations, rehabilitation included new wet well coatings, valves, piping, pumps and control panels. Under Mr. Tobon's direction all grant requirements were met and he was responsible for the directing and advising on the design and provided guidance during construction.

Director of Engineering, Pahokee I&I and Wastewater Lift Station Improvements, Palm Beach County Water Utilities Department. Mr. Tobon was responsible for ensuring

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successful in-house design and construction project which was ARRA Funded. All grant requirements were carried out under his direction by engineering division staff.

Engineering Design Manager,PumpStation Rehabilitation: Pump Stations No. A-11, B-8, D-39, D-47 and E-5, City of Fort Lauderdale Public Services, Florida. Rehabilitation of 6 major lift stations, some of the improvements included replacement of can stations for submersible stations. Rehabilitation included new wet well coatings, valves, piping, pumps and control panels. New sanitary sewer, manholes and force mains were also constructed. Mr. Tobon was responsible for the directing and advising on the design and guidance during construction.

Engineering Design Manager,PumpStation Rehabilitation: Pump Stations No. A-2, A-17, A-18, A-19 and A-21, City of Fort Lauderdale Public Services, Florida. Rehabilitation of major lift stations, rehabilitation included new wet well coatings, valves, piping, pumps and control panels. New sanitary sewer, manholes and force mains were also constructed. Mr. Tobon was responsible for the directing and advising on the design and facilitating construction of the improvements.

Engineering Design Manager,PumpStation Rehabilitation: Pump Stations No. D-41, A-9, B-5, B-6 and B-13, City of Fort Lauderdale Public Services, Florida. Rehabilitation of major lift stations, rehabilitation included new wet well coatings, valves, piping, pumps and control panels. Some of the duplex can stations were demolished and new submersible stations constructed. New sanitary sewer, manholes and force mains were also constructed. Mr. Tobon was responsible for the directing and advising on the design and facilitating construction.

Project Manager(CDM), Park City Wastewater Booster Station, City of Sunrise, Florida. Design Engineer for a 5 mgd inline wastewater booster station. The station was designed to repump wastewater from a decommission WTTP located in theTown of Davie to the Springtree WWTP in Sunrise.

LARGE DIAMETER RECLAIMED AND WASTEWATER TRANSMISSION PIPING

Director of Engineering, FPL 36 Inch Reclaimed Water Pipeline, Palm Beach County Water Utilities Department. Construction of an 18 mile 36-inch ReclaimedWater Pipeline from the East Central Regional WastewaterTreatment Plant to the West County Energy Center. The project consisted of 11 direction drills including under the Florida Turnpike and thru the West Palm Beach Water Catchment Area. The total $ 52 million project was a Public Private Partnership between Palm Beach County and FPL. The pipeline portion of the project was designed by Palm Beach County staff under the supervision of Mr. Tobon who was also involved during construction, the total cost of the pipeline was $ 19 million.

Engineering Design Manager, A1A 24-inch Wastewater Force main, City of Fort Lauderdale Public Services, Florida. The project was for the construction of 3,600 feet of a new 24-inch force main along A1A and Seabreeze Blvd in Fort Lauderdale. The new force main relieved a hydraulic restriction in the wastewater system and reduced system pressures, which increased wastewater to flow to the wastewater treatment plant. The project was designed by City staff under the supervision of Mr.Tobon and constructed under his direction.

Engineering Design Manager, Oakland Park 48 and 36-inch Water Mains, City of Fort Lauderdale Public Services, Florida. Removal of 900 LF of existing 36" PCCP water main, fittings, valves and existing 54" steel casing. Installation of approximately 140 LF of 30" DIP pipe through an existing 54" Steel Casing and installation of 920 LF of 30" DIP water main including valves, fittings and appurtenances. Designed by City staff under the supervision of Mr. Tobon who was also involved substantially during construction.

Engineering Design Manager, Davie Blvd 24-inch Water Main, City of Fort Lauderdale Public Services, Florida. Construction of 5,000 feet of 24-inch water main along Davie Blvd from Federal Highway west. The project was designed by a consultant under the supervision of Mr.Tobon and was completed in 2005.

WATER DISTRIBUTION AND TRANSMISSION SYSTEMS

Director of Engineering, South County Water Service Replacement Phases I-III, Palm Beach County Water Utilities Department. Replacement of approximately 2,000 water services and replacement of AC water mains in the southern portion of Palm Beach County. Project was a multiyearmultimilliondollareffortthatinvolvedaconsultant design team and various construction contracts. Mr. Tobon

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was responsible for the directing and advising on the design and facilitating construction of the improvements.

Director of Engineering, Water and Sewer Service to North County Airport, Palm Beach County Water Utilities Department. Construction of a 3-mile water main and sewer force main to serve NorthCountyAirport. Project also consisted of a jack and bore under an active railroad track. Project was designed and managed during construction by County staff. Mr.Tobon was responsible for the directing and advising on the design and guidance during construction.

Engineering Design Manager, Poinciana Park 2 MG storage tank, City of Fort Lauderdale Public Services, Florida. Project was for the demolition of an existing steel standpipe and construction of a new 2MG ground storage tank and pump station at Poinciana Park. Mr. Tobon was responsible for the directing and advising on the design and also involved during construction.

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Nigel O. Grace, P.E.

Risk Based Prioritization/Capital Improvement Plan

Education

BS, Chemical Engineering, University of Florida

ME, Environmental Engineering, University of Florida

Registration

Professional Engineer: 46605, Florida, 1992
Diplomate, American Academy of Environmental Engineers (BCEE), 2003
Risk Assessment Methodology for Water (RAM-WSMSM), 2002

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Nigel Grace brings more than 28 years of experience serving in wide-ranging roles in the management and direction of complex multi-disciplinary projects that draw on diverse skill sets in areas of technology applications, regulatory negotiations, and operational/process optimization. In addition to being one of the firm's drinking water leads, he currently serves as one of the firm's water technology leaders andthrough this experience brings broad insights on emerging issues of concern and the complex challenges faced by the utility community. For over 25 years, he has served a wide array engineering needs for Broward County Water and Wastewater Services inclusive of master planning, water supply and water treatment system optimization, reclaimed water planning and regulatory advocacy, and ongoing distribution system water quality optimization. Through his efforts, he has played an instrumental role in supporting the development of the City's diverse portfolio of water supplies as well as a modified plan for complying with the Ocean Outfall Legislation that resulted in concessions that saved the City an estimated $200 Million.

Master Pump Station 462 Ragging Assessment, Broward CountyWater andWastewaterServices, BrowardCounty, Florida. Technical Director. Conducted an assessment of underlying contributing factors to operational challenges arising from the rapid formation of rag balls that affected Master Pump Station 462 (MPS 462) performance and requires frequent maintenance intervention. The current inline station configuration is a change from the original wetwell arrangement. The analysis included a review of station hydraulics, pump selection and operating characteristics relative to the range of flow/pressure conditions, modeling of parent-child pumping systems impacted by current operation. Hydraulic modeling was performed to evaluate the transmission hydraulics to estimate normal point-of-connection pressures, as well as the conditions encountered when rag balls form and constrain transmission.

3BC Septic Tank Elimination Analysis Memorandum, Broward County Water and Wastewater Services, Broward County, Florida. Project Director. This project included permitting requirements for proposed gravity sewer system improvements within the 3C Area of District

3BC; Utility identification within project area; preparation of a hydraulic model determining overall hydraulic factors and conditions of a proposed forcemain to tie into Master Pump Station 320 (MPS 320); and Proposed modifications to existing MPS 320 in order to receive modeled flows from the study area.

Water and Wastewater System Master Plan, West Palm Beach, Florida. Technical Director. Developed Water and Wastewater System Master Plan including demand forecasting, all-pipe hydraulic modeling of both the water and wastewater systems, criticality assessment, asset prioritization for condition assessment and development of infrastructure CIP. The Master Plan also included an analysis of operational as well as Renewal and Replacement (R&R) improvement needs focused on the following areas:

- Operational performance assessment of distribution system water quality and developed strategies for further system optimization
- Cost-effective reduction of infiltration and inflow (I/I) in the wastewater collection system;
- Systematic replacement of high risk infrastructure to reduce major pipe failures and the resultant response costs;
- Assessment of the City's numerous lift stations for improved operational efficiency, peak flow capacity adequacy and reduced operations and maintenance costs; and
- Operational troubleshooting, construction impact assessment, performance optimization of the water distribution and wastewater collection systems as part of post-planning model applications

North Regional WWTP Reclaimed Water Plant Expansion, Broward County Water and Wastewater Services' (BCWWS), Broward County, Florida. Project Director. Project included surge analysis efforts for the pump station associated with the expansion of BCWWS' existing reclaimed facility to increase its firm rated capacity from 10 mgd to approximately 26 mgd. This project is a result of the Ocean Outfall Legislation. The expansion will treat secondary effluent to meet High Level Disinfection (HLD) standards as defined by the Florida Department of Environmental Protection (FDEP). The proposed expansion is estimated at $53 million construction cost and includes construction of a new filter feed pump station, additional filters, chemical storage and feed, chlorine contact basins, reclaimed water pump station, electrical power distribution and requisite back-up emergency power.

Condition Assessment and R&R Planning for Critical Lift Stations, West Palm Beach, Florida. Project Director. Performed condition assessment activities for 11 of the highest risk lift stations (of which, all are master repump stations). Lift station condition assessment activities included:

- Developed lift station condition assessment protocol and forms which were used by BC's field assessment teams to record the condition of assets. The forms were in an electronic database format.
- A team covering electrical, I&C, mechanical, and structural visited each lift station and used visual, auditory, tactile, and olfactory senses to assign performance and condition rankings based on these observations using the lift station condition assessment form. Where applicable, field crews conducted visual, above ground condition assessment of the wet well, including pH tests of the wet well sidewalls, utilized gas meters to determine the presence of hydrogen sulfide concentrations and used pole cameras to examine the wet well walls for signs of corrosion.
- Identify prioritized Rehabilitation and Replacement (R&R) needs for the sanitary sewer lift stations based on condition that can be used to develop a lift station Capital Improvement Plan (CIP).

Lift Station 5 System Modeling and Discharge Force Main Sizing Analysis, West Palm Beach, Florida. Project Director. Performed a hydraulic modeling analysis in order to determine the required size for the upsizing of the LS5 discharge force main. LS5 is located at the southeast corner of Flagler Drive and Southern Boulevard. Wastewater from this lift station is pumped through a 14-in/16-in/18-in force main to the wetwell of LS13. LS13 is located at Parker Avenue and Park Place. LS13 has historically repumped wastewater from LS5 along with several other City-owned lift stations. LS13 discharges to a 24-in force main that eventually manifolds to the City's 42-in force main that discharges to ECRWRF. The City has constructed an 18-in bypass force main around LS13 so that wastewater from

LS5 can discharge to the downstream side of LS13 without being repumped.The bypass has not yet been activated due to concerns about the integrity of the 14-in and 16-in force main segments, specifically in areas of close proximity to the air release valves (ARV), connected to the LS5 discharge.

3A Collection System Hydraulic Model 300 Development, BrowardCountyWater andWastewater Services, Broward County, Florida. Project Director. Hydraulic modeling of the force main system inclusive of the pump stations, wet wells and gravity system access structures immediately upstream (up to the first upstream manhole) of lift stations within the District 3A collection system that connect directly to the City of Hollywood's regional wastewater system.

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Christopher S. Garrett, PE

Emergency Response Plan/ Risk Based Prioritization

Education

ME Environmental Engineering, Old Dominion University, Norfolk, Virginia

BS Civil Engineering, Old Dominion University, Norfolk, Virginia

Registration

Professional Engineer, Virginia, #022888

Professional Engineer, Maryland, #45699

Brown AND Caldwell

Chris Garrett specializes in all aspects of wet weather flow studies and utility infrastructure evaluation, rehabilitation, design, and program management projects. His specialties include conventional and alternative sanitary sewer designs, stormwater drainage design and water quality improvement initiatives, infrastructure rehabilitation, and GIS-CMMS for utility management. He is also a trainer for the NASSCO PACP/MACP/LACP program and presently assisting with the next version of the training and reference manual. As a co-leader of Brown and Caldwell's national Aging Infrastructure initiative, Chris is promoting advanced condition assessment technologies and criticality based decision making for prioritizing inspection and system rehabilitation that promotes BC's Four R's of reinspection, repair, rehabilitation and replacement. Chris has written and presented a number of papers on water quality and infrastructure rehabilitation with projects highlighted in a number of periodicals, including Trenchless Technology magazine.

Pompano Beach I/I Study, City of Pompano Beach, Florida. Project Manager. Oversight for this I/I reduction and utility infrastructure improvement project. The project involved evaluation of approximately 950,000 L.F. of wastewater gravity piping utilizing flow monitoring devices, CCTV inspection equipment and smoke generators to establish the levels of and sources of excessive I/I. The project also included extensive data collection of more than 10,000 utility (water and sewer) assets and condition surveys of over 4,000 structures. Project design included 40,000 lf of sewer rehabilitation consisting of cured-in-place, grouting, point repairs, lateral rehabilitation, and manhole rehabilitation.

Contingency and Emergency Response Plan, City of Wichita, Kansas. Technical Lead. Under Consent Order provisions, the City of Wichita was required to prepare a Contingency and Emergency Response Plan (CERP) for its 66-inch diameter reinforced concrete force main that conveys flow from Plant 1 to Plant 2. At over 17,000 lf traversing a river, two landfills and residential areas, eight areas of concern were identified within the CERP. The plan was delivered to regulators (KDHE) in 26 calendar days,

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which included two workshops and a 50–page document, identifying the risks, the Incident Management team, Incident scenarios, and Response and Recovery plans.

Contingency and Emergency Response Plans, Washington Suburban Sanitation Commission; Laurel, Maryland. Technical Lead. As part of the risk assessment program for their large diameter gravity sanitary sewers and force mains, WSSC contracted with Brown and Caldwell to review their EmergencyResponse Plans (ERPs), makerecommendations for a strawman ERP based on a gap analysis, and develop ERPs for three high criticality assets. In support of the ERP, Mr. Garrett developed a tabletop exercise for testing of the ERPs. Mr. Garrett also provided a gap analysis on WSSC's force main criticality evaluation program.

North Trunk Sewer Section D Evaluation and Repair, Hampton Roads Sanitation District (HRSD), Norfolk, Virginia. Project Manager. Evaluation and design services for emergency repairs for HRSD. The project included evaluating rehabilitation and replacement alternatives for approximately 900 lf of 30-inch gravity interceptor and approx. 900 lf of 24-inch force main. The design portion focused on replacement of approximately 300 lf of 24-inch PCCP force main in areas that previously failed or were in imminent danger of failing. The design included tying into the existing main, transitioning to a PVC force main and connecting to an existing 54-inch gravity interceptor. Because of the expedited schedule, the project was awarded to one of three contractors on an RFP basis. Project completed on time and within budget. Evaluation Report finished in two weeks, with draft submitted in less than one week. Design, including survey, was completed in less than 3 weeks.

Municipal Consent Order Services, Hampton Roads Sanitation District, Virginia Beach, Virginia. Technical Lead - Elizabeth River Crossing Emergency Force Main Repair for HRSD. Prepared emergency repair drawings for approximately 200 lf of 24-inch diameter ductile iron force main identified as near failure based on non-destructive side wall testing due to external corrosion from exposure to daily tidal fluctuations at a river crossing. The design included the replacement of a gate valve with a plug valve, installation of pipe clamps on the unrestrained portions of the line (approximately 15 clamps) upstream of the failure area, and replacement of the force main from the valve to a point just beyond where the pipe became subaqueous. Coordinated the aspects of flow control and pump and haul operations to maintain system operation during the construction period. Because of its location, a Joint Permit Application (JPA) and CBPA stormwater permitting was required and expedited in less than 3 weeks with a signed permit by the Governor due to HRSD's status as a state commission. To facilitate the quick permit approvals, a porta-dam temporary coffer dam system and living shoreline restoration concept were employed to minimize the disturbed areas and improve the restored areas.

Technical Lead – Warwick and Woodhaven Emergency Repair for HRSD. Prepared emergency repair drawings for approximately 1,400 lf of 24-inch diameter ductile iron force main identified as needing replacement because of previous failures of the pipe in the area and results of non-destructive side wall testing due to external corrosion. The design included the replacement of isolation valving, open cut installation of pipe in intersections, roadways and medians, landscaping plans, maintenance of traffic, pump and haul requirements and corrosion control for the pipe. Because of the high visibility of work and traffic control considerations, coordination with the City of Newport News was the critical path for the project in relation to traffic control, allowable days and hours of construction, and landscape restoration. The ultimate success of the project was due to the close coordination and collective work of HRSD, BC and the contractor to identify the pipe alignment, utility location and acquiring materials for the project.

Technical Lead. For HRSD prepared emergency Find and Fix of 18- and 24-inch gravity sanitary sewers that were causing a roadway subsidence due to loss of backfill material through actively leaking joints. The repair included manhole grouting, installation of LinkPipe and CIPP sectional liners, and repair of the failed roadway pavement section. This work from notification to completion was less than four business days with work performed during nighttime hours because of traffic control concerns.

Technical Lead and Advisor. For HRSD developed risk profile based on a consequence and likelihood of failure model for 110 water crossings to identify low, medium and high-risk candidates for customized contingency plans. Developed a prototype contingency planning document

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for an identified high-risk river crossing that included a risk evaluation; immediate, short-term, intermediate and long term response and planning steps, and recommended response team and training for a catastrophic failure scenario for the river crossing.

On-Call Pipeline Rehabilitation, Baltimore County, Maryland (March 1998/ September 2012). Project Manager and Technical Advisor. Long-term relationship on several repeat on-call services contracts encompassing sanitary and storm system investigation, evaluation, modeling, design, construction and post rehabilitation. Projects include evaluation and rehabilitation services for the Patapsco Interceptor and Relief (38,590 lf of 21- to 72-inch pipe), featured in Trenchless Technology magazine and the South Avenue Interceptor Emergency Replacement project (1,200 lf of 30- to 36-inch pipe), named Project of the Year by the APWAVirginia/MD/DC Chapter.The project conditions have varied widely, including work in residential, commercial, and densely wooded areas, as well as along highways. Pipe diameters range from 6 to 66 inches and rehabilitation technologies utilized include fold and form, cured-in-place, and replacement.

Pump Station Rehabilitation Services under Annual Services Contracts in Hampton Roads, Virginia. Project Manager. Due to its flat topography and relatively high groundwater, Hampton Roads, Virginia has over 1,000 pump stations that were constructed as municipal projects or were constructed by developers and proffered to municipalities. The resultant is aging infrastructure with antiquated controls, oversized and corroding wet wells and pumps that suffer from wear due to excessive cycling and dramatically varying head conditions. Mr. Garrett has been assisting multiple municipal clients by providing pump station condition assessment, technical evaluation, design and construction administration services for over 40 pump stations in the range of 0.5 to 8 mgd rated capacities.

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V. "Ravi" Ravisangar, PhD, PE, BCEE Surge Hydraulic Model

Education

Ph.D., Environmental Engineering, Georgia Institute of Technology
M.S., Civil Engineering, Environmental Hydraulics and Water Resources, Georgia Institute of Technology
M.S., Environmental Engineering, Georgia Institute of Technology
B.Sc., Civil Engineering, University of Sri Lanka at Peradeniya

Registration

Professional Engineer PE029284, Georgia, 2003

Brown AND Caldwell

Dr. Ravisangar has more than 19 years of experience in water and wastewater pumping and treatment related work. His experience spans a broad range from studies and design to construction and startup. His subject matter expertise includes water and wastewater pumping system analysis and design, pumping system rehabilitation, water and wastewater plant hydraulic analyses, water distribution system modeling, dynamic and transient hydraulic analysis of piping networks, surge protection systems design, and sludge and slurry rheology and hydraulics of non-Newtonian fluids. He is also an active technical reviewer for ASCE Journal of Pipeline Systems. He led the design effort to adding new pumps for existing deep injection well pumping system and is is ready to leverage that experience to benefit MDWASD

Wastewater Pumping Systems

North Regional WWTP Reclaimed Water Plant Expansion, Broward County Water and Wastewater Services' (BCWWS), Broward County, Florida. Lead Pumping Systems Engineer. Dr. Ravisangar led the surge analysis efforts for the pump station associated with the expansion of BCWWS' existing reclaimed facility to increase its firm rated capacity from 10 mgd to approximately 26 mgd. This project is a result of the Ocean Outfall Legislation. The expansion will treat secondary effluent to meet High Level Disinfection (HLD) standards as defined by the Florida Department of Environmental Protection (FDEP). The proposed expansion is estimated at $53 million construction cost and includes construction of a new filter feed pump station, additional filters, chemical storage and feed, chlorine contact basins, reclaimed water pump station, electrical power distribution and requisite back-up emergency power.

Pump Stations 301, 414, 415, 416 and 417 Improvements BODRs, NDWWTP Service Area, MDWASD, Miami, Florida. Lead Pumping System Engineer. Dr Ravisangar served as lead pumping system engineer and subject matter expert for the preliminary design (BODR) of major rehabilitation work at Pump Stations 301, 414, 415, 416 and 417. Project involved detailed hydraulic evaluation of existing systems and recommendations for pumping system replacement to optimize performance. Working closely with the PMCM, condition assessments and alternatives evaluations were also performed.

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NDWWTP Deep Injection Well Pump Station Improvements, MDWASD, Miami, FL. Lead Pumping Systems Engineer. Dr. Ravisangar ledd the design effort of adding new pumps for existing deep injection well pump station. Project involved detailed evaluation of existing pumping system, deep injection well performance, recommendation for replacement pumps, modifications to existing well heads, and developing new control strategies for pump and well operation for optimized performance.

Rehabilitation of Potomac Pumping Station, Water and Sewer Authority, DC. Lead Hydraulic Analyst. For the rehabilitation of the Potomac Pumping Station, Dr. Ravisangar served as the lead hydraulic analyst to increase capacity 460 mgd. The project included pump re-engineering, pump impeller replacements for higher capacity, and additional surge control measures for the expanded capacity.

Springtree WWTP Headworks Design, City of Sunrise, Sunrise, Florida QA/QC Technical Advisor. For the Headworks Design, particularly the hydraulic elements. The project design included creating a plant-wide hydraulic profile, raising the height of the existing channels, and a new passive overflow for improved O&M flexibility. The project involved the replacement of three automatic bar screens with 6 mm perforated plates and screening washer-compactors, as well as the replacement of two grit vortex drives, two recessed impeller grit pumps, and two hydrocyclone/ degritter units. A new biotrickling filter type odor control system was included to treat foul air generated at the Headworks Structure.

Rehabilitation of Flood Damaged Pump Stations for City of Clarksville, Tennessee. Lead Hydraulic Analyst. For the City of Clarksville, Dr. Ravisangar provided the design for the rehabilitation of the following flood damaged pump stations: Main, McClure, Gallows Hollow, Red River, Old Russellville Pike, Talley Drive, Southern Hills, Pettus Street, and Providence Cabinet Shop.

Design of the Alcovy River Wastewater Pumping Station, Gwinnett County, Georgia. Lead Engineer. This unique wastewater pumping system design included two in-line booster pumping stations and three lift stations to deliver a firm pumping flow of 35 mgd.

Hopkins Lift Station and Forcemain Project, MCES, Minnesota. Lead Hydraulic Analyst. For Hopkins Lift Station and Forcemain Project, Dr. Ravisangar was the lead hydraulic analyst. The project included replacement of the main lift station (L-27), construction of a new forcemain, and rehabilitation of sections of existing forcemain. Analyses included sizing of the new lift station, hydraulic/transient analysis of existing forcemain, preliminary transient control strategy for new dual forcemain, design criteria for a new forcemain.

Marlboro Meadows PS, Washington Suburban Sanitary Commission, Washington, DC. Lead Hydraulic Analyst. Dr. Ravisangar served as the lead hydraulic analyst for the design of a new pump station and force main system.

Improvements to Influent Pumping Station and Intermediate Pumping Station, Kingsport, Tennessee. Lead Hydraulic Analyst. For pump station improvements at the City of Kingsport's wastewater treatment plant, Dr. Ravisangar's analyses included pump replacement, impeller replacement, and addition of new pumps to increase the firm pumping capacity of both stations to 35 mgd.

Improvements to North Pump Station and Stevens Avenue Pump Station, Lancaster, Pennsylvania. Lead Hydraulic Analyst. For the City of Lancaster, Dr. Ravisangar is the lead hydraulic analyst for design of improvements to two of the city's pump stations. The North pumping stations will be expanded to 43 mgd while the Stevens Avenue pump station will be expanded to 11 mgd. Additional improvements will include new surge control measures at the pump stations to handle an intermittent line velocity over 9 ft/sec.

Improvements to Five Pump Stations (PS), Clarksville, Tennessee. Lead Hydraulic Analyst. For the City of Clarksville, Dr. Ravisangar was the lead hydraulic analyst for improvements to the Brownsville PS, Gateway PS, Countryside PS, Mary's Garden PS, and Red Coat Run PS. Improvements included new submersible-type pumps and manifolded force main systems.

Rehabilitation and Expansion of Three Pump Stations, Upper Occoquan Sewage Authority (UOSA), Virginia. Lead Hydraulic Analyst. Lead hydraulic analyst for rehabilitation and expansion of the Winters Branch Pumping Station, Cockrell Branch Pumping Station, and Russia Branch Pumping Station. The project included new dry pit submersible-type pumps and new surge control measures.

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Brian J. Scott, P.E.

Wastewater Hydraulic Model

Education

M.S. Civil & Environmental Engineering

University of Wisconsin–Madison

B.S. Civil Engineering

University of Wisconsin–Platteville

Registration

PE: Florida 78420

Brown AND Caldwell

Brian Scott has ten years of experience in a variety of water and wastewater planning, design, and construction management projects. His expertise includes the evaluation and optimization of unidirectional flushing programs, the study of water quality issues in distribution systems, and the use of hydraulic modeling software such as InfoWorks, InfoWater, InfoSWMM, H2OMAP Water, WaterGEMS, SewerGEMS, and DHI Mike Urban. He has been involved in the development of master plans for numerous clients across the country and is skilled in the development and analysis of water, wastewater, and reclaimed water models. Additionally, his experience includes proficiency with AutoCAD and ArcGIS, pump station and pipeline design, statistical analysis, construction management, pilot testing, and permitting.

Reclaimed Water Plant Expansion, Broward County Water and Wastewater Services, Broward County, Florida. Technical Lead - Modeling. Hydraulic modeling to support pump selection for a 26 MGD reclaimed water pump station and transmission system. Analyzed ability of the transmission system to meet anticipated build-out conditions and determined required system configuration and operation to balance system demands due to high peaking factors. Communicated results to Client and emphasized the importance of large user demand management considerations required to maintain service within the design limits while meeting the average-day reuse requirements mandated by the Ocean Outfall Legislation.

3BC Septic Tank Elimination Analysis Memorandum. Technical Lead - Modeling. Hydraulic modeling to determine overall hydraulic factors and conditions of a proposed forcemain to tie into Master Pump Station 320 (MPS 320).

3A Collection System Hydraulic Model 300 Development. Technical Lead - Modeling. Hydraulic modeling of the force main system inclusive of the pump stations, wet wells and gravity system access structures immediately upstream (up to the first upstream manhole) of lift stations within the District 3A collection system that connect directly to the City of Hollywood's regional wastewater system.

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Master Pump Station 462 Ragging Assessment. Technical Lead - Modeling. Hydraulic modeling to evaluate the transmission hydraulics to estimate normal point-of-connection pressures, as well as the conditions encountered when rag balls form and constraintransmission.

Potable Water Main Replacement Projects, City of Hollywood, Florida. Senior Project Engineer. Design, permitting, and construction management services for water distribution system improvements for approximately 29,000 linear feet of new potable water main. This project involved work within a busy Florida Department of Transportation (FDOT) right-of-way, advanced permitting requirements, complex maintenance of traffic (MOT) considerations, the use of trenchless construction methods such as horizontal directional drill (HDD), and work with existing large diameter pre-stressed concrete cylinder pipe (PCCP). A second project that is in process involves the surveying, geotechnical investigations, design, permitting, bidding, and limited construction administration services for the replacement of approximately 60,500 linear feet of water mains. Included is the replacement of all water mains located within the Hollywood Boulevard right-of-way including FDOT permit applications for Roadway Right- of-Way construction. It also includes the design of five horizontal directional drills (HDDs).

Distribution System Water Quality Improvements, Hollywood, Florida. Senior Project Engineer. The City of Hollywood had observed declining chlorine residuals along the north part of the barrier island during its routine water sampling activities. Nigel led the efforts to rapidly mobilize the firm to identify the source of the issue, recommended actions that could be implemented immediately to begin addressing it, and proposed longer-term solutions that could enhance overall distribution system operations and reduce the risk of similar issues occurring in the future. Initial recommendations implemented have resulted in a significant improvement in chlorine residuals maintained in the distribution system, particularly in the area of the barrier island with a history of low chlorine residuals.

Ocean Outfall Legislation – Reuse Compliance Strategy, City of Hollywood, Florida. Senior Project Engineer. Development of an integrated Ocean Outfall Legislation strategy that has resulted in agreement on a feasible reclaimed water compliance approach that leverages contracted reuse opportunities and maximizes the use of effluent that is not impacted by brackish groundwater influences. Working closely with the City and FDEP, the aquifer recharge element of the original plan was eliminated and the actual reuse to be implemented was limited only to the amount determined to be technically, environmentally and economically feasible. The City has realized an estimated cost savings of approximately $200 Million from its baseline plan of approximately $300 Million.

Water and WW Master Plan, City of West Palm Beach, Florida. Technical Lead - Modeling. Created, calibrated, and utilized the utilities all pipe wastewater collection system hydraulicmodelandwaterdistributionsystemmodelaspartof the master planning process. Determined system deficiencies for a 30-year planning period and recommended system upgrades to maintain adequate service. Recommendations were establishing for prioritizing critical assets for condition assessment and to establish a 7-year capital improvement program (CIP) to improve reliability and performance while expanding capacity where required to support continued growth. As part of Amendment 3 to the project, verified and updated fire flows for the entire system and determined fire flow deficiencies, developed proposed solutions, and prepared a technical memorandum summarizing the results including engineer's opinion of probable construction costs.

Water and WW Master Plan As-Needed Services, City of West Palm Beach, Florida. Technical Lead - Modeling. Utilized the City's all pipe water distribution system model and the City's all pipe sanitary collection system model to support City staff with engineering decision making. Analyzed waterway crossing criticality and assessed impacts of construction related shutdowns. Developed an operational strategy to support the launch and transport of electromagnetic tools used to assess the conditions of the City's 42/48-inch diameter PCCP force main. Assessed the impact of adding sanitary flows from adjacent municipalities to the City's sanitary collection system and developed cost estimates for necessary system improvements.

Lift Station 114, 123, 125, 132, and 148 Rehabilitation, City of Sunrise, Florida. Project Engineer. Performed design of five sanitary lift stations, converting pump stations from wet/dry pit to wet pit submersible. Conducted hydraulic modeling of the sanitary force main network to establish design conditions and pump selection. Overcame site space constrictions, with the final design resulting in improved security, accessibility, and aesthetics at each site.

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Hydraulic Modeling, Sarasota County, Florida. Project Engineer. Wastewater hydraulic modeling of an existing manifold force main system for current, 20-year, and build-out flows for a new pump station and 20-inch transmission force main including data collection and review, model verification, modeling proposed system, developing three alternatives, and producing technical memorandum summarizing the results.

Water Distribution System Hydraulic Model, Panama City, Florida.Technical Lead - Modeling. Calibrated and ran utilities all pipe water distribution system hydraulic model using InfoWater to determine system controls to allow for turnover in a proposed elevated tank. Set up multiple system scenarios and calibrated system based on field data. Performed fire flow simulations using final controlscenario.

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Peter Moore, P.E., LEED AP, ENV SP, F. ASCE
Project Director

Education

Bachelor of Science, Civil Engineering, University of Florida, 1997

Master of Engineering, Civil Engineering, University of Florida, 2004

Registration

Professional Engineer, Florida, 58709, 2002

Professional Affiliations

American Society of Civil Engineers
American Water Works Association
Florida Engineering Society
Florida Engineering Leadership Institute
FICE
FEF
Florida Stormwater Association
National Society of Professional Engineers

Certifications

Certified Stormwater Inspector
LEED Accredited Professional

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Mr. Moore is the president of CMA with more than 21 years of experience with a wide variety of utility, stormwater, transportation and other infrastructure projects. Since joining CMA in 1999, Mr. Moore has focused on the management, planning, design, permitting, and construction of various utility infrastructure projects for public clients throughout South Florida. Mr. Moore has worked on literally dozens of unique projects for Broward County valued at $100M in his career, literally serving in every role in a project team. Of particular note is Mr. Moore's experience in value engineering, including projects for Broward County WWS, Miami-Dade Water and Sewer Department and a development client in Saudi Arabia. Including his assistance as a reviewer and design guideline developer for the firm's work in the Republic of Panama, Mr. Moore has an additional $500M of international project exposure to give him the full arsenal of tools to serve Broward County. A lifelong Broward County Resident, Mr. Moore has his Bachelor of Science and Master of Engineering in Civil Engineering, is a licensed professional engineer in Florida and has been elected as a Fellow of the American Society of Civil Engineers (ASCE) for his lifetime achievements and contributions to civil engineering. To show his understanding of today's issues, Mr. Moore also is an Envision Sustainability Professional and a LEED Accredited Professional (two additional certifications specializing in sustainability). He is a past president and board member of numerous local, regional and national professional societies and non-profit organizations.

Project Experience

Fort Lauderdale-Hollywood International Airport Stormwater Master Plan Update. Under Phase 1 of this project, Broward County Aviation Department (BCAD) retained Chen Moore and Associates (CMA) to update the FLL Stormwater Master Plan (SWMP), which was completed by a previous consultant in 2001. CMA reviewed the data and analysis from all prior reports, converted the existing stormwater model from SWMM to ICPR, and updated the ICPR model with any new system data and new projects provided by BCAD. CMA updated the existing conditions stormwater model and created the future conditions stormwater model to assess alternative drainage improvements needed to achieve required and desired Levels of Service (LOS) for various storm events.The

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stormwater model was used to run rainfall scenarios for the comparison of pre-development (existing) conditions versus post-development (future) conditions from a water quantity (runoff) and water quality (storage) perspective. The stormwater model was used to analyze the performance of the existing Primary Stormwater Management System (PSMS). Phase 1 for this project included the following work items:

- Review and verify earlier work by other consultants during 2001-2005
- Convert previous SWMM stormwater model to ICPR model
- Obtain updated topographic data for TIN development
- Calculate updated hydrologic parameter for drainage basins
- Conduct analysis of various system improvement alternatives
- Prepare Stormwater Master Plan Update

Broadview Park Neighborhood Improvement Program. The Broadview Park Neighborhood Improvement Program (BPNIP) was the last of the Neighborhood Infrastructure Improvements projects to be carried out by Broward County in the unincorporated areas. Chen Moore and Associates was selected as the prime consultant for the Basis of Design Report (BODR) and to design and administer the construction of improvements to subsequent bid packages. The three Bid Packages addressed water, sanitary sewer and drainage improvements, while introducing sidewalks and enhancing the community's roadway and landscape.

The basis of design report included population projections, an analysis of water source and sewage discharge points and a hydraulic model of the water, wastewater and stormwater systems.

The first bid package included the replacement of the entire water distribution system within the neighborhood, which was previously owned and maintained by a private utility. This project was designed utilizing digital orthography and aerial maps to fast track the replacement.

The second and third bid packages included conversion of the entire area from septic to gravity collection, the installation of a backbone forcemain network and connection into an inline booster station, installation of a positive drainage system, sidewalks, hardscape and landscape improvements.

An added fourth bid package was the design of a 20" water main to serve as the transmission source water for the area. Also change ordered into the project was the installation of a 20" raw water main for future use. The project was complicated by groundwater contamination, proximity to a wellfield, the existence of a fire station and elementary school in the neighborhood and the existence of rock in the area. All of the projects were completed on budget and on or ahead of schedule.

Ft Lauderdale FM Rehab, HDD & Swageline (1-4). Chen Moore and Associates (CMA) is the prime consultant for the 30" Emergency Force Main Rehabilitation project in the City of Fort Lauderdale. This innovative design-build project, led by Murphy Pipeline Contractors (MPC) was undertaken to provide both mainline force main replacement for aging infrastructure and to provide additional redundancy in case of future issues. The contract was divided into four (4) phases within the City of Fort Lauderdale. The nearly 20,000 linear feet of pipeline is being rehabilitated through a combination of swagelining, directional drilling, and traditional open cut installation over these four phases. CMA provided planning, design, permitting and engineering services during construction. Environmental compliance, subaqueous crossing, public involvement and maintenance of traffic in the busy Sistrunk and Himmarshee Business Districts were some of the additional project complexities. CMA also provided dewatering permitting and groundwater modeling due to contaminated sites within quarter mile of the projects.

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Jason McClair, P.E., CFM, LEED AP

Pump Station O&M Analysis / Capital Improvement Plan

Education

Bachelor of Science, Civil Engineering, University of Florida, 1996

Registration

Professional Engineer, Florida, 56962, 2001

Professional Affiliations

American Public Works Association
American Society of Civil Engineers
American Water Works Association
Broward County Gator Club
Florida Engineering Society
National Society of Professional Engineers
University of Florida Alumni Association

Certifications

SewerCAD Master Modeler (Haestad Methods)
WaterCAD Master Modeler (Haestad Methods)
ICPR Modeler (Streamline Technologies)
Certified Floodplain Manager
FDOT LAP Compliance
SWMM Stormwater Modeler
FDOT LAP Compliance update June 2014
SWMM Modeling Software Training

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Mr. McClair is a senior civil engineer with more than 22 years of experience in utility infrastructure design, regulatory permitting, geotechnical engineering, and computer aided flow modeling for stormwater collection, water distribution, and sanitary transmission systems. Since joining CMA in 2001, Mr. McClair has focused on the management, planning, design, permitting, and construction of various utility infrastructure projects for public clients throughout South Florida, including for BCAD. He has extensive experience with hydraulic and hydrologic modeling for the analysis of stormwater, water, and wastewater systems. Mr. McClair has over 10 years of experience working directly for BCAD. He was the project manager for the Fort Lauderdale-Hollywood International Airport Stormwater Master Plan Update Project from 2008 through 2013 and is currently responsible for the stormwater design and permitting on the FLL North Airfield Pavement Rehabilitation Project. He also is currently working on the stormwater design and permitting on various projects at Fort Lauderdale Executive Airport.

Project Experience

Fort Lauderdale-Hollywood International Airport Stormwater Master Plan Update. Under Phase 1 of this project, Broward County Aviation Department (BCAD) retained Chen Moore and Associates (CMA) to update the FLL Stormwater Master Plan (SWMP), which was completed by a previous consultant in 2001. CMA reviewed the data and analysis from all prior reports, converted the existing stormwater model from SWMM to ICPR, and updated the ICPR model with any new system data and new projects provided by BCAD. CMA updated the existing conditions stormwater model and created the future conditions stormwater model to assess alternative drainage improvements needed to achieve required and desired Levels of Service (LOS) for various storm events.The stormwater model was used to run rainfall scenarios for the comparison of pre-development (existing) conditions versus post-development (future) conditions from a water quantity (runoff) and water quality (storage) perspective. The stormwater model was used to analyze the performance of the existing Primary Stormwater Management System (PSMS). Phase 1 for this project included the following work items:

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- Review and verify earlier work by other consultants during 2001-2005
- Convert previous SWMM stormwater model to ICPR model
- Obtain updated topographic data for TIN development
- Calculate updated hydrologic parameter for drainage basins
- Conduct analysis of various system improvement alternatives
- Prepare Stormwater Master Plan Update

Pompano Beach Stormwater Master Plan. Chen Moore and Associates (CMA) prepared a Stormwater Master Plan (SWMP) for the entire City of Pompano Beach limits, which encompasses approximately 24.6 square miles. The City operates and maintains its own stormwater facilities within City right-of-way and properties to provide flood control and water quality treatment within the City limits. Existing drainage facilities within the City include catch basins, manholes, control structures, gravity pipes, outfalls, and canals that connect to the Intracoastal Waterway.

The purpose of this SWMP was to identify any deficiencies in the existing stormwater management system in regards to flood control and water quality treatment. The SWMP will allow the City to understand the necessary drainage improvements over the next few years and to budget accordingly. CMA will recommend system improvements to meet regulatory Level of Service (LOS) criteria in regards to peak flood stage, peak discharge, and water quality. Within the SWMP, CMA will provide recommendations for improvements to the system that will eliminate or reduce the ponding currently encountered within right-of-way areas during or after rainfall events. The SWMP will define the existing stormwater management system; summarize the results of the stormwater model for the existing conditions; prioritize the proposed improvements to the stormwater management system; and provide an estimated cost to construct these upgrades to the stormwater management system.

As part of this project, CMA assisted the City with the documentation of how the Floodplain Management Plan was prepared per the requirements of FEMA. The SWMP will be configured to address the relevant FEMA requirements related to Floodplain Management, including Activity 510 – Floodplain Management Planning, Activity 530 – Flood Protection, and Activity 540 – Drainage System Maintenance. CMA will submit the Floodplain Management Plan to FEMA for review.

In conjunction with CIP Implementation Plan to be defined within the Stormwater Master Plan document, an annual budget for the stormwater management system was developed. The annual budget includes operational expenditures necessary for appropriate maintenance activities and capital expenditures necessary to implement the recommended system improvements defined within the Stormwater Master Plan. CMA reviewed these annual expenditures to verify the adequacy of the existing stormwater utility fee and provided recommendations for an adjustment to the stormwater utility fee for consideration by the City. CMA provided revised calculations for the stormwater utility fee and language for the City Commission to consider for updating the ordinance.

Stormwater Master Plan Modeling and Design Implementation. CMA is providing engineering design services for the under Stormwater Improvement Master Plan Modeling and Design Implementation Project under the for the City of Fort Lauderdale. CMA is responsible for the planning, modeling, design, and permitting for the proposed stormwater improvements within the Victoria Park neighborhood, which was identified as one of the 7 priority neighborhoods with the City. A combination of multiple improvements to the stormwater management system have been developed to alleviate the existing flooding issues within the Victoria Park neighborhood. The proposed stormwater improvements within the Victoria Park neighborhood include separate alternatives for the eastern and western portions of the neighborhood. Within the western portions of the Victoria Park neighborhood, the proposed stormwater improvements consist of installing additional pipe interconnectivity of various existing independent drainage networks located throughout the neighborhood, installing new exfiltration trench, and completing limited roadway swale restoration where feasible. Within the easter portions of the Victoria Park neighborhood, the proposed improvements consist of interconnecting 6 independent positive outfalls into the

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Middle River,installing new backflow prevention, and adding a new stormwater pump station. The proposed stormwater improvements within the Victoria Park neighborhood are estimated to be approximately $13 million in construction costs.

Western Sunrise Basin 8 Stormwater Study. Chen Moore and Associates has been contracted by the City of Sunrise to update the existing model for the Western Sunrise Basin 8. The project includes implementing updates to the 1999 version of the stormwater master plan with developments and permit modifications processed by South Florida Water Management District, Broward County and the City of Sunrise to create a new 'existing condition.' The area consists of approximately 2,305 acres of the western portion of the City including Sawgrass Mills and the BB&T Center.

The tasks of the stormwater study includes the following:

- Preparation of a report based on findings and results prior to the other options being discussed to be done at a future date;
- Utilize the updated model and add future upcoming large proposed developments within the City of Sunrise;
- Update the model to include potential improvements that may be required as a result of future developments;
- Coordination meetings with the City and potential developers; and
- Prepare a submittal for a modification of the Western Sunrise Basin 8 conceptual permit with Broward County and South Florida Water Management District

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Paula Fonseca, P.E.

GIS/ Risk Based Prioritization

Education

Bachelor of Science, Civil Engineering, Florida Atlantic University, 2008

Registration

Professional Engineer, Florida, 2014

Professional Affiliations

American Society of Civil Engineers
American Water Works Association
Florida Engineering Society

Certifications

Stormwater Management Inspector

InfoWater Software Training

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Paula Fonseca, P.E. is a civil engineering graduate with nine years of experience. She serves as senior engineer for Chen Moore and Associates and serves as the primary hydraulic modeler for the firm. Ms. Fonseca has worked for CMA for seven (7) years with focus on hydraulic modeling using InfoWater. She assists with design work using AutoCAD, GIS, WaterCAD, SewerCAD, StormCAD, and InfoWater 8.1v. Ms. Fonseca has worked on neighborhood improvement projects for Broward County, utility coordination projects for Riviera Beach Utility District, including water and sewer designs and permitting, Design of GIS Utility Atlases for the City of Pompano Beach and Solid Waste Authority, as well as civil engineering design, drafting, permitting, cost evaluations and construction inspection for various project involving water and force main improvements for the City of Margate. Moreover, Ms. Fonseca has worked on the Palm Beach County Water Master Plan and Glades Regional Water Master Plan through the use of water modeling software (InfoWater) and GIS. In addition, she has worked on hydraulic models for the City of Margate evaluating the robustness of its water and force main systems.

Project Experience

Palm Beach County Water Utilities Department Water Master Plan Update. Chen Moore and Associates was a subconsultant to Carollo Engineers on the Palm Beach County Water Utilities Department (PBCWUD) Water Master Plan Update. The service area for PBCWUD covers approximately 429 square miles and serves a population of 438,090. The transmission and distribution system includes over 2,400 miles of pipeline and four water treatment plants which produce a combined annual average flow of about 56 million gallons per day. Chen Moore assisted with the data compilation and analysis, distribution system hydraulic and water quality modeling with the InfoWater software, report preparation, cost estimating for proposed alternatives, and development of the Capital Improvements Plan.

Palm Beach County Water Utilities Department Glades Utility Area Water Master Plan. The purpose of the project was to update the hydraulic distribution system model and evaluate the water system to develop a Capital Improvements Program and Water Master Plan report. The Water Master Plan includes model calibration and future

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modeling scenarios analyses with the InfoWater software.

The water model development and calibration includes data collection to develop water demands, diurnal peaking factors, and diurnal curves to complete the planning framework and criteria that will be used to evaluate the adequacy of the water distribution system and its infrastructure. The calibration aspect of the project requires collection and verification of GIS infrastructure, operational information, and water demand allocation for present and future water consumption.

The water system will be evaluated against established performance criteria to identify deficiencies and determine adequacy of existing infrastructure such as water treatment plant, storage and pumping capacity.The water master plan will develop and evaluate future scenarios forecasting water demands for 5-year, 10-year, and 20-year periods which will assess water system conditions such as fire flow, water age and critical pipes.

Modeling Services - Margate. CMA, through Carollo engineers, was requested by the City of Margate to perform updates to their water and force main hydraulic models using the InfoWater software. For the water modeling, the tasks included performing water main break analysis, identifying areas with poor redundancy, assessing location of critical valves, verifying fire flows for proposed developments, and modeling proposed improvements identified by the City. For the force main model, the tasks included force main failure analysis to identify lack of system redundancy and inadequate valve placement; evaluation of proposed improvements in the system which included model calibration and analysis; a comparison of the entire system to the wastewater flow entering the plant; an inflow and infiltration analysis that utilized both the lift station run times as well as the gravity pipe condition; a feasibility analysis for utilizing alternate flow routes, including adjusting pump characteristics in the lift stations; and a feasibility analysis of force main tie ins. For the sewer modeling, tasks included inflow and infiltration studies and running new scenarios and calibration efforts that incorporate more lift station information. While all of the described tasks have been completed, the City wishes to utilize the project on a continuing basis for model updates. The results of the model have been used for projects that CMA have completed or are conducting under separate task orders.

Hydraulic Wastewater Model-Updates & Analysis. CMA is assisting the City of Margate with an update of the lift stations and force main information in the existing hydraulic wastewater model in InfoWater software and further evaluation of the system to determine feasibility of the proposed force main along Southgate Boulevard to provide system redundancy.The scope of services includes updating the hydraulic model; calibrating the model and creating an additional scenario for evaluation; determining feasibility of the proposed force main along Southgate Boulevard during average and wet weather event conditions; and providing a technical memorandum report summarizing the latest model updates and results of the system evaluation.

Force Main Modeling and Design. CMA, as a subconsultant to Carollo Engineers, was contracted by the City of Margate to perform modeling, design and permitting for force main improvements. The modeling is based on the previous models that CMA completed for the City and will evaluate two different options for connecting existing force mains. These connections will allow the City to direct the flow to their other wastewater treatment plant. In addition to the modeling, the project includes the design and permitting of over 2,600 LF of new force main and abandonment of over 1,000 LF of existing force main. The new force main design incorporates a directional drill under a City-owned canal.

Hydraulic Wastewater Model-Updates & Analysis. CMA is assisting the City of Margate with an update of the lift stations and force main information in the existing hydraulic wastewater model and further evaluation of the system to determine feasibility of the proposed force main along Southgate Boulevard to provide system redundancy. The scope of services includes updating the hydraulic model; calibrating the model and creating an additional scenario for evaluation; determining feasibility of the proposed force main along Southgate Boulevard during average and wet weather event conditions; and providing a technical memorandum report summarizing the latest model updates and results of the system evaluation.

Lift Station & Force Main Analysis. Chen Moore (CMA) is providing engineering services to develop a hydraulic model for the City of North Lauderdale forcemain network. The hydraulic model will be used to analyze the flow conditions within the forcemain network under various lift station

operating conditions and to identify potential modifications to the lift stations. Modification will improve the system's efficiency and decrease operational and maintenance costs. Modeling of the City's infrastructure will entail analysis of approximately 11 miles of forcemain infrastructure and 28 lift station stations.

During the modeling analysis CMA will develop various system improvement alternatives and review possible activities to alleviate the peak pressures within the forcemain network. The hydraulic model will analyze the effectiveness of proposed improvement alternatives to the existing system. CMA shall also prioritize the need for each system improvement alternative based on the results of the analysis. After performing the hydraulic analysis CMA shall provide capital improvements recommendations with a list of priorities and a rough order of magnitude estimate. The CIP recommendations will identify the infrastructure elements that are in need of upgrade based on assumptions that will be identified inthe report.

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Patrick D Kaimrajh, PE

Pump Station Inspections / Condition Assessment

Education

Bachelor of Science, Civil Engineering, University of Miami, 2010

Registration

Professional Engineer, Florida, 78535, 2015

Professional Affiliations

American Society of Civil Engineers
American Water Works Association
Florida Engineering Society

Certifications

ICPR Software Training

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Patrick D Kaimrajh, PE serves as a senior engineer for CMA and specializes in civil engineering design, drafting, permitting, and construction inspection. His 9 years of design experience at CMA includes paving, drainage and stormwater management, sanitary sewer and stormwater pump stations, water main, site development, and neighborhood improvement projects. He has prepared engineering drawings, cost evaluations, design reports and various permit applications. In addition, Mr. Kaimrajh has performed construction inspections for drainage, watermain, sanitary sewer, and pavement. He also is skilled in AutoCAD Civil3D, ICPR, EPA SWMM, Cascade, HY-8, WaterCAD, SewerCAD, andStormCAD, modeling and design software. Mr. Kaimrajh will be responsible for the planning and modeling efforts related to the stormwater, water, and wastewater infrastructure of this project.

Project Experience

Victoria Park Stormwater Master Plan Design. CMA is providing field and preliminary engineering design services for the Victoria Park Neighborhood project for the City of Fort Lauderdale. CMA will provide data collection of stormwater infrastructure and other survey information needed to develop preliminary designs for stormwater management improvementsinsevenspecificneighborhoods;utilizemodel results to inform the development of conceptual solutions for seven specific neighborhoods capital improvement projects (CIP); develop preliminary improvement plans and opinions of probable construction costs based on conceptual solutions based on the implementation of minimum levels of services (LOS) within each neighborhood, developed using the aforementioned information; and provide permitting coordination with primary regulatory agencies.

Broward County UAZ 110/111 & 113 Water Sewer Improvements 113B. The Water and Sanitary Sewer Improvements for the UAZ 110/111 & 113 Project will include the improvements to the existing water distribution system, sanitary sewer system, and transmission systems within the project area along with the restoration of surface areas disturbed for the construction of said improvements. The existing system being replaced consists of approximately 168,100LF of water mains, 122,100 LF of sanitary sewer mains and 23,600 LF force main. The existing water main consists of asbestos cement, cast iron, ductile iron,

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galvanized steel, polyvinyl chloride pipe ranging from 2" - 24" in diameter size. The sanitary sewer consists of vitrified clay, fold and form liner, cured in place liner and ductile iron pipe ranging from 8" – 15" in diameter size. The force main consists of asbestos cement, cured in place liner, ductile iron and polyvinyl chloride pipe ranging from 6" – 16" in diameter size. There are 8 Broward County lift stations in these UAZ areas and 1 private lift station which sanitary sewer systems will need to connect to. Two of these stations will need rehabilitation/replacement, the extent of rehabilitation of existing stations will be determined. The restoration of roadways, sidewalks, driveways, and landscape areas will need to be performed as needed for water and sanitary sewer improvement construction.

FKAA Cudjoe Regional Wastewater Collection. Chen Moore was prime consultant designing this $90 million design-build water main replacement and sanitary sewer collection system that will convey sewage from four of the lower keys to a transmission force main and/or master lift station located along US1/Overseas Highway. The project includes replacement of 35,579 LF of 4" C-900 water main, 21,831 LF of 6" C-900 water main and 205 LF of 8" C-900 water main. The project – the single largest in terms of value and number of customers served ever undertaken by Monroe County – consists of wastewater service and water replacement to the islands of Ramrod Key, Lower Sugarloaf Key, Little Torch Key, and Big Pine Key. The wastewater collection system includes approximately 500,000 linear feet of gravity sewer and low-pressure grinder sewer with over 62 neighborhood lift stations that serve approximately 4,500 customers. The transmission system consists of four master pump stations and PVC and HDPE pipeline laid along US Highway 1. The project requires close coordination with the local, state and federal permitting agencies.

Twin Lakes Stormwater Improvements. Chen Moore and Associates assisted the City of Sunrise in preparing surveying documents, civil engineering and construction administration services for stormwater improvements in the existing Twin Lakes residential neighborhood located in the following general boundary in the City of Sunrise: Flamingo Road to the west, Oakland Park Boulevard to the north, NW 28th Court to the south and NW 113th Avenue to the east. CMA previously conducted a stormwater study of the Twin Lakes neighborhood for the City of Sunrise to propose alternatives to improve existing conditions that resulted in large flooding events, including heavy flooding reported during and after Tropical Storm Isaac on August 27, 2012. The study defined causes for the flooding and identified key improvements and alternatives that could alleviate the potential for future flooding. The stormwater study identified the following improvements that were included in this design and permitting scope including:

- Removal of existing culverts and installing a new 38" x 60" culvert north of NW 30th Street on NW 115th Terrace addressing several water main and sanitary sewer conflicts
- Modification of an existing grate adjacent to the C-42 Canal and the SFWMD S-125 Canal
- Removal of an existing Tideflex Valve and installation of a flap gate on an existing structure adjacent to the C-42 Canal
- Proposing three (3) new boat ramps at various locations within the neighborhood
- Proposing the reconstruction of four (4) existing boat ramps within the neighborhood
- Replacement of a manatee gate

OOL Program Pipeline Design Projects. Chen Moore and Associates (CMA) is a sub-consultant on the Miami-Dade Water and Sewer Department (WASD) Ocean Outfall Legislation (OOL) program SL 3.2A pipeline project. This project consists of the design, permitting, and preparation of bid documents for a 60" diameter sanitary sewer transmission force main to redirect wastewater from the existing outfall at the WASD Central District Wastewater Treatment Plant on Virginia key to high-level disinfection injection wells at the South District Wastewater Treatment Plant. This project includes the transmission force main along SW 137th Avenue from SW 152nd Street to SW 176th Street in unincorporated Miami-Dade County.

OOL Program Pipeline Design Project SL-2.1. Chen Moore and Associates (CMA) is a sub-consultant on the Miami-Dade Water and Sewer Department (WASD) Ocean Outfall Legislation (OOL) program SL 3.1 pipeline project. This

project consists of the design, permitting, and preparation of bid documents for a 60" diameter sanitary sewer transmission force main to redirect wastewater from the existing outfall at the WASD Central District Wastewater Treatment Plant on Virginia key to high-level disinfection injection wells at the South District Wastewater Treatment Plant. This project includes the transmission force main along SW 137th Avenue from SW 176th Street to SW 200th Street, along SW 200th Street from SW 137th Avenue to SW 134th Avenue, and along SW 134th Avenue from SW 200th Street to SW 208th Street in unincorporated Miami-Dade County.

CMA is responsible for the maintenance of traffic and permitting.

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B. Project Approach

Broward County Water and Wastewater Services, (BC WWS) operates a wastewater system that provides retail service as well as regional service to 11 Large Users that that manage their respective collection systems but transmit flows to WWSs North Regional WWTP (NRWWTP) for treatment and disposal. The regional system that serves these Large Users begins at Master Pump Stations (MPS). In addition to the MPSs that receive flows from Large Users, retail MPSs also connect to and deliver flows through the regional transmission system, which is comprised of a system of force mains, to the headworks of the NRWWTP.

The regional transmission system which was initially constructed in the 1970s and expanded throughout the years, is composed of different materials, service environments and operating configuration. TheCounty's objectives are to proactively identify and plan for the mitigation of critical vulnerabilities and to identify improvements that will maximize capacity utilization while maintaining desired level of service. The configuration of the regional transmission system and approximate locations of the MPSs are shown in the figure below. General characteristics of the system include:

1. 15 MPSs contribute flow to the system;
2. The transmission core is well looped but has a notable single point of failure vulnerability;
3. Approx. 80% of piping is ductile iron (DI) pipe & 13% is unknown;
4. Approx. 50% of the system was installed prior to 1980;
5. Force mains range in size up to 54 in with the largest size being among the oldest.

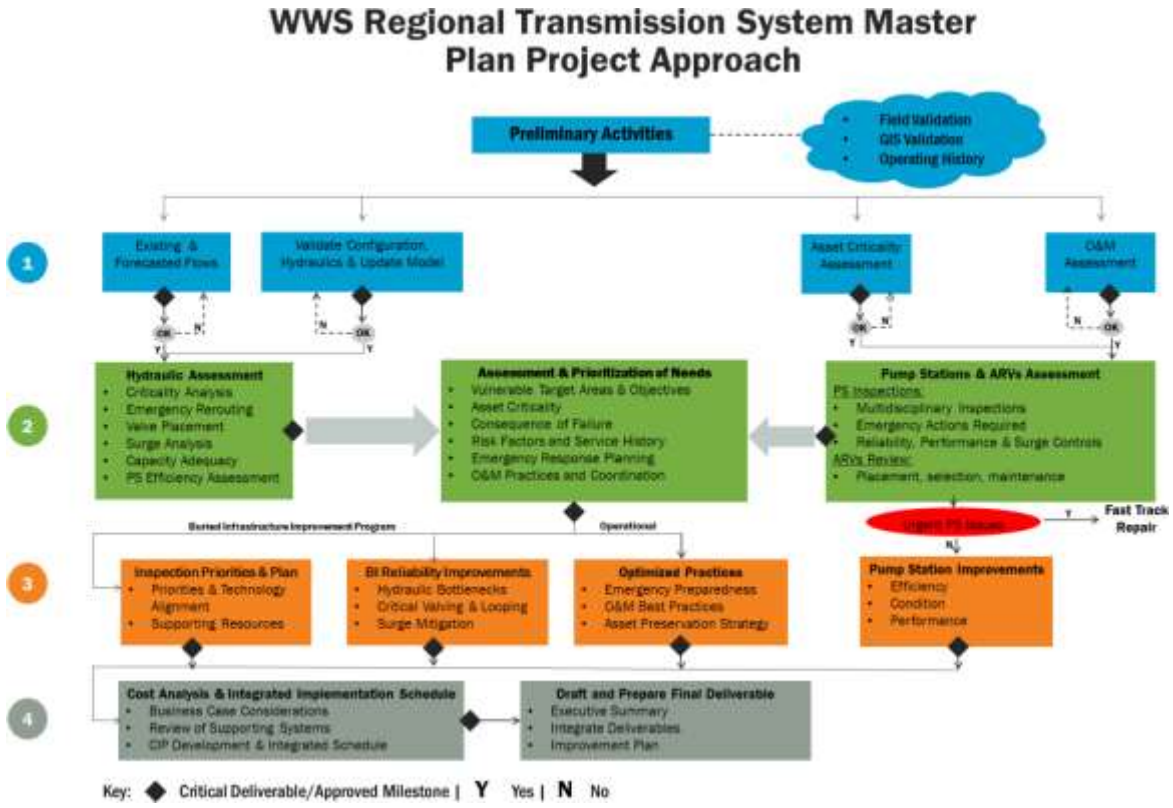
With a system as large and networked as the County's regional system, failure of any component can produce significant impacts. A wide range of factors can impact the vulnerability of transmission infrastructure to failure as well as the consequence of failure and ability to recover quickly. A well-conceived risk based plan should consider all factors that can impact vulnerability, failure rate, consequence and recovery efforts.

Asset	Operational
• Configuration, age & materials • Environment/service condition • Single points of failure/looping • Integrity/history/forensic reviews • Placement of isolation & air relief valves • Economically and environmentally critical corridors	• ARV maintenance/venting • Emergency preparedness • Operability of valves • Maintenance practices • Pump station/surge control • Monitoring/excursion detection • Operational efficiency

The exhibit below presents the overall approach for developing the Regional Transmission Master Plan and follows the

structure of the approach performed for similar previous projects. This approach provides a comprehensive framework for addressing all critical elements, inclusive of asset characteristics and operational factors, that impact system capacity, operational flexibility, risk of failure and the ability to recover quickly for unplanned outages. Key project implementation steps include:

1. Kick-off Activities and Preliminary Assessment
2. Detailed Assessment and Prioritization of Needs
3. Improvement Program Development Priorities
4. Final Master Plan Development



By taking a balanced view of assets that consider not only the physical condition and risk factors but also the operating environment, pumping controls and maintenance considerations, our proposed approach will yield more cost effective and sustainable improvements that will maximize the capacity and life of existing assets, reduce failure risk and enhance recovery strategies. Effective emergency preparedness and response addresses the critical need for well thought out and practiced protocols for effectively responding to failure of the most critical and high consequence assets. Given its importance and distinct goals from the master planning process, we dedicated a separate approach section to review the key considerations in effective emergency response planning. Important highlights of our balanced approach and benefits of our team to Broward County are summarized below.

Comprehensive Assessment of Failure Risks – O&M, asset condition, operational controls, and emergency preparedness. Our team brings local and national experience in key areas:

a. Performance assessment and improvement recommendations for wastewater master pump stations including Broward

WWS MPSs 462 and 320.

b. Inspection and Condition assessments of wastewater pump stations including annual inspections of all Broward WWS Master PSs

c. Hydraulic assessment in support of condition assessment inspection of large diameter forcemains.

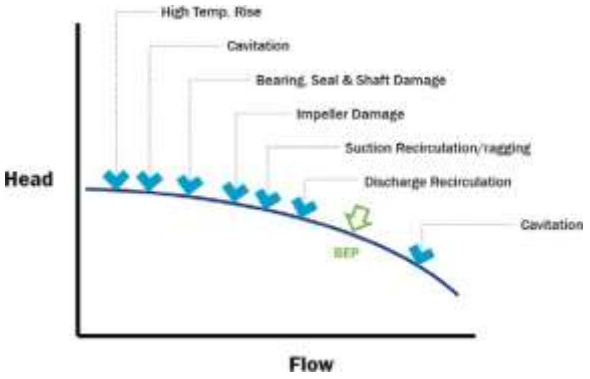
d. Emergency response planning for critical forcemains

Hydraulic Modeling and Surge Analysis – assessment of surge conditions, suppression measures and operational application modeling to improve reliability and capacity.

System Configuration Considerations –The appropriate placement and serviceability of isolation valves throughout a looped system is of critical importance particularly in emergencies when steps must be quickly taken to isolate and re-route flows in event of a pipe failure. The lack of adequate valves can result in unabated discharge resulting from piping failure that can result in significant property and environmental impacts. In systems such as Broward's that relies heavily on the use of inline booster MPSs, the available storage within the regional system is negligible in relation to the flow. This increases the need to be equipped to take rapid action to intervene in emergency situations.

Recognizing the important relationships among configuration, serviceability and emergency preparedness, our approach is to additionally assess and identify opportunities to improve the configuration of the system to reduce inherent risks and enhance emergency response posture. Examples of measures that will be addressed includes the appropriateness of valve placement, adequacy of valve exercise programs, parts inventory, the potential benefit of in-system storage, and system looping/bypass enhancements.

Operational Factors Affect Pumping Performance – WWS utilizes an inline booster pumping configuration for most of its MPSs which makes coordinated controls, bypass operations and weighting of check valves important factors in operational reliability and pumping capacity. Suboptimal conditions can induce ragging that impairs MPS capacity, increased vibration that impacts reliability, inefficient operation and required maintenance intervention. Inappropriate sizing of pumps relative to the range of expected flows can be a significant contributing factor. Members of our team have inspected all of BC WWSs MPS in the last three years and recently concluded an in-depth evaluation of underlying factors contributing to recurring ragging challenges in one station. Lessons learnt are in the process of being applied to other MPSs with similar operational configurations.



Maintenance Practices – Failures of force main piping commonly occur near unvented air pockets where corrosive acidic conditions can develop from the accumulation of hydrogen sulfide gases. The placement of air release valves at high points along a force main and regular venting of accumulated gases is critical to preventing the development of conditions that can ultimately lead to premature piping failure. Inherent to the operating environment, air release valves require regular maintenance to prevent plugging that can impact their ability to properly vent.

The review of practices extends to other elements of the infrastructure that can impact reliability and risk of high consequence failure. Our approach includes an O&M review of the pertinent areas to identify improvements in asset monitoring capabilities, protocols and systems that will support proactive intervention.

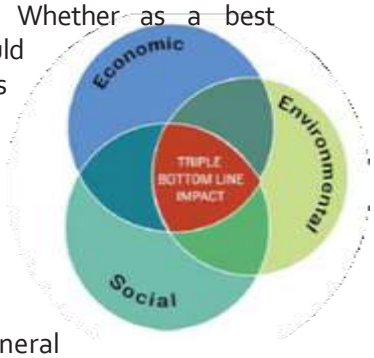
Monitoring and Excursion Detection Systems – Valuable information about the integrity of the regional transmission infrastructure may be derived from diverse sources inclusive of service/repair history, forensic review/documentation of failed components and analysis of data captured as part of routine operation. As part of this planning effort, we will conduct

a review of available system data, interview staff to define how system data are utilized for decision making and identify opportunities for enhanced monitoring and excursion detection and associated capital investment where required.

Collectively, these elements of our master planning approach will provide balanced and fully integrated planning recommendations that address improvements to the physical assets as well as improvements to operational, maintenance and supporting systems.

EMERGENCY RESPONSE PLANNING CONSIDERATIONS

Emergency Response Planning (ERP) is a forward-thinking document for addressing preparedness, incident response and public outreach for potentially catastrophic spill events for at-risk assets – namely large diameter wastewater transmission assets, such as interceptors, force mains and treatment plant influent sewers. Whether as a best practice measure or stipulated from a regulatory action, the goals and program elements should be the same: proactive emergency response planning for high risk assets with plan elements that establish a framework for spill response that should 1) minimize discharges to the environment; 2) prevent public exposure to the spill; and 3) return the asset to full service as rapidly as possible. Candidate assets for supplementary response plans should be vetted through a risk evaluation based on Consequence of Failure (CoF) and Likelihood of Failure (LoF) to establish its criticality.



Applying Triple Bottom Line (TBL) concepts is recommended for internal buy-in as a documented method for establishing the need and anticipated benefit of the ERCP. General criteria for consideration when developing a criticality evaluation include the following:

Economic or Tangible Costs

Measurable costs resulting from responding to a failure of significant spill event include: 1) response cost; 2) potential fines; repair cost; and 4) economic losses. Understanding the potential magnitude of direct and indirect costs is an important consideration in planning for specific emergencies that are tied to the failure of critical and high consequence assets.

Environmental Costs

Environmental costs are a driver of concern regarding anticipated regulatory actions. A well-reasoned ERCP is considered an affirmative defense marker when dealing with regulators before or after an incident. It can also be a powerful defense tool for the agency should a third-party lawsuit arise from an incident. Simply stated, an ERCP does not necessarily prevent an incident but provides a means for logically preparing and responding to an event to limit environmental damage.

Social Costs

Social costs include: 1) potential impacts to water supplies/wellfields; 2) erosion of public confidence; 3) community impacts and 4) vulnerability considerations. They are difficult to quantify or considered intangible.

After identifying the assets that are candidates for an ERP, the contents of the plan should be developed that reflect the goals of the program. There is no industry standard for the ERP goals; however, one should consider the following when developing goals:

- Effective spill response in a timely manner
- Rapid restoration to normal operations
- Minimize impact customers
- Minimize negative impacts on public health, environment and responders
- Provide appropriate and timely emergency information and effective communications to stakeholders

Recommended Elements of an ERCP

Well-reasoned plans are site specific, prepared in accordance with best practices, and capable of implementation as intended. They are also complementary to other emergency response plans, including sanitary sewer overflow (SSO) response plans.To ensure that the spirit of the plan is documented, regulators may stipulate plan requirements that include General Information; Preparedness and Risk Mitigation; and Plan Updates. Within a baseline planning strategy, the document should include each of these program elements assummarized below:

General Information

This section of the plan emphasizes how and when to use the plan in conjunction with other contingency and spill response programs. It should also contain salient information about the pipeline asset.

Preparedness and Risk Mitigation

This reflects the ability to respond to a spill event, but also includes measures taken to reduce risk and improve response and recovery efforts.The spill response and recovery activities should include knowledge and proficiency in executing existing spill response plans that are augmented with additional measures to effectively respond to a pipeline failure or unconventional spill event due to the magnitude or unique location of the spill event.

A satisfactory spill response includes a list of steps and timelines to minimize discharges from the spill including, but not limited to, the following:

- Diversion of flow to redundant or adjacent infrastructure. Lack of redundancy or effective flow control may result in an action item for a capital construction project or procurement of equipment for bypassing and/or flow control
- Spill containment.This involve evaluating volumes, pathways and prescriptive mitigation efforts as part of the spill response.
- Tankering, if deemed feasible.
- Emergency discharge locations (to be used only if no other practicable contingencies exist)
- Notification to community stakeholders that includes customers, affected property owners, industry, regulators, local government, community groups and the media.
- Repair or Mitigation. In addition to spill containment equipment, this includes the identification of specialty contractors for response and repair services.

Incident Command

This is the command and control structure for declaring an emergency condition; deployment of resources; addressing short-term legal issues and identifying potential litigants; and promoting a positive and transparent message to stakeholders and media.

Plan Updates

To meet the goals of the plan, periodic review and update of plan content is required.This should include a dedicated tabletop exercise as part of the initial ERP development to vet participant roles, reviewing their actions and identifying areas for improvement through a "hot wash" process.

Regardless of the contents of the ERP, a Gap Analysis is recommended to identify information that is available, information that must be developed and agreement about the roles and responsibilities of the Incident Command team.

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OUR PERTINENT EXPERIENCE, SYSTEM SPECIFIC KNOWLEDGE, AND INSIGHTS WILL YIELD A ROBUST PLAN THAT APPROPRIATELY ADDRESS YOUR PRIORITIES

1. Extensive knowledge of BC WWS MPSs derived from annual inspections, and assessments to troubleshoot and develop improvements to mitigate existing limitations
2. Extensive collection system and force main modeling experience, inclusive of hydraulic and surge modeling, for BC WWS (MPS 462 system, reclaimed water transmission, District 3A system, and District 3B/C proposed system)
3. Applied modeling of pressure system for performance optimization, reliability assessment, capacity scenario analysis, troubleshooting and emergency contingency planning
4. Developed and conducted preliminary modeling assessment of Regional Transmission System
5. Extensive local/national experience with risk based buried infrastructure and pump station asset criticality, prioritization and capital program development experience
6. Extensive experience planning and implementing condition assessment and rehabilitation of pressure pipe systems including selecting and applying inspection technologies
7. Contingency emergency response planning for force main/pumping failure scenarios
8. Extensive master planning experience including business case analysis to support CIP development

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C Past Performance

Important to the review of any firm or team's qualifications is a review of its past performance. As requested in the RFQ, this section provides a summary of our team's experience. We are proud of our experience and work and invite you to contact our references.

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Client	Project	Scope of Work Area						Firm	Prime / Subconsultant
		Hydraulic Model	WW Inline Booster PS	WW Submersible PS	PS Condition Assessments	Emergency Response Planning	R&R/Criticality		
Broward County WWS	Retail Potable Water and Wastewater Masterplan	X		X	X		X	C Solutions	Sub
MDWASD	Central District WWTP Injection Well Pump Station Surface Facilities Value Engineering				X			C Solutions	Prime
PBC WUD	Forcemain and Sanitary Sanitary Sewer Evaluation Survey				X		X	C Solutions	Sub
Pompano Beach	Pompano Beach Master LS No. 21			X				CMA / C Solutions	Sub
Riviera Beach	Rehabilitation and Replacement of Lift Station No. 10 and No. 50	X	X	X				C Solutions	Prime
PBC WUD	Palm Beach County Wastewater Masterplan	X			X	X	X	C Solutions	Sub
PBC WUD	Glades Wastewater Masterplan						X	C Solutions	Sub
Riviera Beach	LS No. 47 Preliminary Design Report	X	X		X			C Solutions	Prime
Riviera Beach	Waster and Wastewater Masterplan	X		X	X	X	X	C Solutions	Sub
Broward County WWS	Turnpike 48" Force Main Relocation							CMA	Sub
Broward County WWS	30-inch Force Main BODR							CMA	Prime
Palm Beach County WUD	South County Reclaimed Water Transmission Pipeline Phase 1A (R2018-0296)							CMA	Prime
MDWASD	72" Force Main NW/NE 159th Street Between NW 17th Ave & NE 10th Ave							CMA	Sub

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Client	Project	Scope of Work Area						Firm	Prime / Subconsultant
		Hydraulic Model	WW Inline Booster PS	WW Submersible PS	PS Condition Assessments	Emergency Response Planning	R&R/Criticality		
Davie	Additional Force Main Analysis							CMA	Prime
Marathon	Area 3 Force Main Analysis	X						CMA	Prime
Margate	Force Main Modeling and Design							CMA	Sub
West Palm Beach	WPB Force Main Assessment							CMA	Sub
MDWASD	WASD VE Study - 60" Force Main (S-804)							CMA	Prime
Pompano Beach	Pompano Beach Force Main Model	X						CMA	Prime
Davie	Town of Davie East Side Force Main Study	X						CMA	Prime
Broward County WWS	Broadview Park Neighborhood Improvement Program	X		X				CMA	Prime
Broward County WWS	Broward County UAZ Improvements							CMA	Prime
Broward County WWS	Master Pump Station Ragging Assessment	X	X	X	X			B&C	Prime
Broward County WWS	3BC Sanitary Sewer Feasibility Study							B&C	Prime
Broward County WWS	3BC Septic Tank Elimination Analysis Memorandum	X						B&C	Prime
Broward County WWS	3A Collection System Hydraulic Model 300 Development	X						B&C	Prime

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Client	Project	Scope of Work Area						Firm	Prime / Subconsultant
		Hydraulic Model	WW Inline Booster PS	WW Submersible PS	PS Condition Assessments	Emergency Response Planning	R&R/Criticality		
Broward County WWS	Hydraulic Modeling of Reclaimed Water Transmission System	X						B&C	Prime
West Palm Beach	Water and Wastewater Master Plan	X						B&C	Prime
West Palm Beach	Master Lift Station 5 Assessments				X			B&C	Prime
West Palm Beach	City of West Palm As-Needed Services	X			X	X	X	B&C	Prime
West Palm Beach	Condition Assessment and R&R Planning for Critical Lift Stations				X	X		B&C	Prime
Wichita	Contingency and Emergency Response Planning					X		B&C	Prime
HRSD	Pipeline Prompt Repairs				X	X		B&C	Prime
HRSD	Pumping Station Condition Assessment and Compliance Audits				X		X	B&C	Prime
HRSD	Pipeline Inspection, Condition Assessment, and Renewal and Replacement Program				X		X	B&C	Prime
HRSD	Replacement Planning Model				X		X	B&C	Prime

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Vendor Reference Verification Form

Broward County Solicitation No. and Title:

PNC2116651P1 Regional Transmission System Master Plan

Reference for: C Solutions Inc.

Organization/Firm Name providing reference: Riviera Beach Utility Special District

Contact Name: Giles Rhoads, P.E. Title: Former Assistant Director Reference date: 7/9/2018

Contact Email: GRhoads@lakeworth.org Contact Phone: 561-779-7591

Name of Referenced Project: Rehabilitation LS 10&50 - Design

Contract No.	Date Services Provided:		Project Amount:
371-12	2/6/2013 to	6/1/2015	$289,500.00

Vendor's role in Project: [X] Prime Vendor [ ] Subconsultant/Subcontractor

Would you use this vendor again? [X] Yes [ ] No If No, please specify in Additional Comments (below).

Description of services provided by Vendor: Analysis of upstream Lift Stations through SCADA; Refinement of hydraulic sanitary computer model to provide design conditions; technical memorandums and client meetings; Design of new in-line regional booster station to replace 16mgd dry pit master station; Major rehabilitation design of a sub-master submersible station including reconfiguration of wetwell and valve vault; Bidding Services; RFI's and addendum's

Please rate your experience with the referenced Vendor:	Needs Improvement	Satisfactory	Excellent	Not Applicable
1. Vendor's Quality of Service				
a. Responsive	[ ]	[ ]	[X]	[ ]
b. Accuracy	[ ]	[ ]	[X]	[ ]
c. Deliverables	[ ]	[ ]	[X]	[ ]
2. Vendor's Organization:				
a. Staff expertise	[ ]	[ ]	[X]	[ ]
b. Professionalism	[ ]	[ ]	[X]	[ ]
c. Turnover	[ ]	[ ]	[X]	[ ]
3. Timeliness of:				
a. Project	[ ]	[ ]	[X]	[ ]
b. Deliverables	[ ]	[ ]	[X]	[ ]
4. Project completed within budget	[ ]	[ ]	[X]	[ ]
5. Cooperation with:				
a. Your Firm	[ ]	[ ]	[X]	[ ]
b. Subcontractor(s)/Subconsultant(s)	[ ]	[ ]	[X]	[ ]
c. Regulatory Agency(ies)	[ ]	[ ]	[X]	[ ]

Additional Comments: (provide on additional sheet if needed)

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FLORIDA

Vendor Reference Verification Form

Broward County Solicitation No. and Title:

PNC2116651P1 Regional Transmission System Master Plan

C Solutions Inc.

Organization/Firm Name providing reference: [illegible]

Contact Email: mloaiza@tjj.martin.fl.us

Contact Phone: [illegible]

Name of Referenced Project:

Riviera Beach Water/Wastewater Master Plan

Contract No.	Date Services Provided:		Project Amount:
42010-001	February 2012	12/12/1012	$84,700.00

Vendor's role in Project: D Prime Vendor I Subconsultant/Subcontractor

Would you use this vendor again? O Yes O No If No, please specify in Additional Comments (below).

Description of services provided by Vendor:

[illegible]

Please rate your experience with the referenced Vendor:

	Needs Improvement	Satisfactory	Excellent	Not Applicable
1. Vendor's Quality of Service			O	
a. Responsive				
c. Deliverables				
2. Vendor's Organization:				
Staf expertise				
a. Professionalism			0'	
b.				
c. Turnover			ffi	
Timeliness of:				
3. a. Project				
b. Deliverables				
4. Project completed within budget			0	
5. Cooperation with:				
a. Your Firm				
b. Subcontractor(s)/Subconsultant(s)				
Regulatory Agency(ies)				
c.			B	

Additional Comments: (provide on additional sheet if needed)

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BROWARD COUNTY FLORIDA

Vendor Reference Verification Form

Broward County Solicitation No. and Title:

PNC2116651P1 Regional Transmission System Master Plan

Reference for: C Solutions Inc.

Organization/Firm Name providing reference:

Palm Beach County Water Utilities Department

Contact Name: Jennifer Prettel, P.E. Title: Professional Engineer Reference date: 7/9/2018

Contact Email: jprettel@pbcwater.com Contact Phone: 561.493.6098

Name of Referenced Project: Glades Region Infiltration/Inflow Project (GL09)

Contract No.	Date Services Provided:		Project Amount:
WUD 15-024	May 2015 to	November 2017	$187,116.00

Vendor's role in Project: ☐ Prime Vendor ☒ Subconsultant/Subcontractor

Would you use this vendor again? ☒ Yes ☐ No If No, please specify in Additional Comments (below).

Description of services provided by Vendor: As follow up and based on the recommendations of the 2014 Glades Region Waste Water Master Plan, C Solutions was involved with Phases 1-3 of the Glades Infiltration/Inflow Project and their scope included I&I analysis, sanitary sewer evaluation survey, video inspection and review and development of the rehabilitation plan.

Please rate your experience with the referenced Vendor:	Needs Improvement	Satisfactory	Excellent	Not Applicable
1. Vendor's Quality of Service				
a. Responsive	☐	☐	☒	☐
b. Accuracy	☐	☐	☒	☐
c. Deliverables	☐	☐	☒	☐
2. Vendor's Organization:				
a. Staff expertise	☐	☐	☒	☐
b. Professionalism	☐	☐	☒	☐
c. Turnover	☐	☐	☒	☐
3. Timeliness of:				
a. Project	☐	☐	☒	☐
b. Deliverables	☐	☐	☒	☐
4. Project completed within budget	☐	☐	☒	☐
5. Cooperation with:				
a. Your Firm	☐	☐	☐	☒
b. Subcontractor(s)/Subconsultant(s)	☐	☐	☐	☒
c. Regulatory Agency(ies)	☐	☐	☐	☒

Additional Comments: (provide on additional sheet if needed)

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Retail Potable Water and Wastewater Masterplan

Owner

Broward County WW

Client

CDM-Smith

Reference

Jon Goldman, P. E.
Associate
621 NW 53rd Street
Boca Raton, FL 33487
Phone: (561) 571-3800
Email: goldmanjz@cdmsmith.com

Completion Year

October 2016

Cost

Design Cost $96,000

The Broward County Water and Wastewater Services Department (BCWWS) owns and operates both regional and retail facilities for water distribution and wastewater collection system and was requiredto update the Masterplan for its retail potable water and wastewater system. The retail system is comprised of four service areas, Districts 1, 2, 3A and 3BC and supplies potable water and wastewater collection for retail customers in serval municipalities and unincorporated areas in Broward County. To continue to provide high satisfaction to its customers and minimize service interruptions the Masterplan updated the water and wastewater hydraulic models and assessed the extent of needed rehabilitation and replacement of the potable water distribution system and wastewater collection and transmission systems to prioritize and implement the rehabilitation and repairs. The Masterplan identified and quantified asset risks and performed condition assessments to prioritize rehabilitation or replacement of the assets through the year 2040 in County's Potable Water and Wastewater Retail Service Area.

C Solutions Inc. provided services to evaluate alternate wastewater treatment and effluent disposal suppliers for certain regions in the County, assisted in the calibration of the water and wastewater hydraulic models, provided growth forecast through the year 2040 to estimate potable water demand and wastewater flows, provided studies to estimate infiltration and inflow, performed a condition assessment for the County's wastewater lift stations, and provided recommendations for future capital improvement and rehabilitation and replacement projects.

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Central District WWTP Injection Well Pump Station Surface Facilities Value Engineering

Owner

Miami Dade Water and Sewer Department

Client

Miami Dade Water and Sewer Department

Reference

Sonia Villamil, P.E.
Engineer II
3071 SW 38th Avenue, Room 554-8
Miami, FL 33146
Phone: (786) 552-8234
Email: villas@miamidade.gov.com

Completion Date

June 2015

Cost

$49,999

The City of Miami entered into an agreement with Miami Dade County for the long-term disposal of its municipal solid waste and in return, Miami Dade County agreed to construct a Groundwater Remediation System (GRS) and improve the existing landfill closure system at the City of Miami's Virginia Key Landfill. Since the Virginia Key landfill was unlined, leachate from the landfill contaminated the groundwater and the GRS must remove and dispose of this contaminated groundwater. A Class I injection well disposal system at the Central District Wastewater Treatment Plant (CDWWTP) site, located adjacent to the Virginia Key Landfill, was identified as the most cost effective strategy for the disposal of leachate contaminated groundwater (GRS leachate). Miami Dade Water and Sewer Department (MDWASD) owns and operates the 143 mgd CDWWTP and hired MWH to prepare the CDWWTP Injection Well Surface Facilities Basis of Design Report (April 2014) that identified the design approach to provide surface facilities to inject leachate from theVirginia Key GRS. The design proposed by MWH includes the construction of two 19.9mgd Class I Deep Injection Wells (Industrial Injection Wells) and pump station (surface facilities) to dispose Leachate from the Virginia Key GRS, Centrate from the Dewatering Building, Plant 1 Digester Gas Scrubber Unit Waste Water, Plant 2 Digester Gas Scrubber Unit Waste Water and Plant 2 Secondary Treated Effluent. Leachate from the GRS is required as part of the blended waste stream for the allowable operation of the two Class I injection wells.

C Solutions Inc. provided value engineering (VE) services on the design of the mechanical (process), structural, instrumentation and electrical equipment at the thirty percent (30%) design phase for the Injection Well Pump Station Surface Facilities.

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Forcemain and Sanitary Sanitary Sewer Evaluation Survey

Owner

Palm Beach County WUD

Client

CDM-Smith
Reference
Jon Goldman, P. E.
Associate
621 NW 53rd Street
Boca Raton, FL 33487
Phone: (561) 571-3800
Email: goldmanjz@cdmsmith.com

Completion Year

June 2017

Cost

Design Cost $244,657

The Palm Beach County Water Utilities Department (PBCWUD) owns and operates a wastewater collection system consisting of approximately 1,250 miles of gravity sewer pipe ranging from 4- to 30-inches in diameter, 650 miles of force main ranging in size from 2- to 66-inches in diameter, 762 wastewater pump stations, and 10 Master Pump Stations. Much of the utility infrastructure is aging and in need of rehabilitation. In order to continue to provide high satisfaction to its customers and minimize service interruptions the PBCWUD is taking a proactive approach toward infrastructure improvements by implementing a program to assess the extent of needed rehabilitation and replacement of the wastewater collection and transmission systems and prioritize and implement the rehabilitation and repairs. This program will identify and quantify asset risks, prioritize required condition assessments, rehabilitations, or replacement of the assets over the next 10 years in the eastern portion of the County.

C Solutions Inc. provided services to perform NASSCO MACP inspections and the evaluation of sanitary sewer manholes for the identification of capital improvement projects to reduce infiltration and inflow to the County's sanitary sewer collection system.

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Pompano Beach Master LS No. 21

Owner

City of Pompano Beach

Client

Chen Moore and Associates Inc.

Reference

Peter Moore, P.E.
President
500 West Cypress Creek Road Suite 410
Fort Lauderdale, FL 33309
Phone: (954) 730-0707 x 104
pmoore@chenmoore.com

Completion Year

August 2009 (Design)

Cost

Construction Cost $3,774,000

The City of Pompano Beach (City) has a wastewater service area of approximately 12,000 acres and collects wastewater for transmission to Broward County's North Regional Wastewater Treatment Plant. Part of the City's service area is on a barrier island separated from the mainland by the Intracoastal Waterway. All collected sewage on the barrier island is directed to the City's aging Master Pump Station (LS No. 21) for transmittal to Broward County's WWTP. The City decided to relocate LS No. 21 to free up valuable beach development property and construct a new aesthetically pleasing 6.5MGD Master pump station with minimized environmental impacts.

C Solutions Inc. provided the mechanical design for pump station and odor control system. Additionally, technical expertise was provided for assessing hydraulic design criteria, odor control issues, and for providing overall design quality reviews.

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Rehabilitation and Replacement of Lift Station No. 10 and No. 50

Owner

City of Riviera Beach

Client

City of Riviera Beach
Reference
Giles Rhoads, P. E.
Acting Executive Director
600 West Blue Heron Boulevard
Riviera Beach, FL 33404
Phone: (561)845-4185
Email: Grhoads@Rivierabch.com

Completion Year

June 2015

Cost

Design Cost $289,500
Construction Services Cost $389,000
Construction Cost $3.8M

The City of Riviera Beach Utility District (RBUD) owns and operates 51 wastewater lift stations in its service area. Of these, five lift stations (LS) are considered master pump stations: LS50, LS47, LS1A, LS10 and LS12. The existing LS50 is 16mgd wet-pit dry pit station designed to repump all flow in the eastern portion of the City to the East Central Regional Water Reclamation Facility (ECRWRF). LS10 is a duplex submersible station that repumps all flow from Singer Island to LS1A where it is repumped with other flows from the eastern part of the City to LS50. Lift Stations 10 and 50 are critical to the collection and transmission of wastewater on Singer Island and in a larger part the entire eastern portion of the City. LS10 and 50 have both passed the end of their estimated useful design lives and LS50 is in need of major repairs. Due to the critical nature of the lift stations, RBUD decided to rehabilitate both liftstations.

C Solutions Inc. evaluated the conditions of both lift stations and made recommendations for the improvement and rehabilitation of both stations. For LS50, C Solutions recommended a small reconfiguration of the transmission system, finding that LS1A could pump directly to ECRWRF, and replacing LS50 with an above ground 5.8mgd inline booster station. This provided a large capital cost savings for the rehabilitation of LS50 while improving system reliability and greatly reducing operations and maintenance cost. For LS10, C Solutions recommended rehabilitating the existing wetwell and reconfiguring the station to a triplex submersible pump station with smaller pumps, to better handle the seasonal changes in flow on Singer Island. Following the approval of the recommendations, C Solutions provided the design, permitting and construction bidding assistance for the rehabilitation of LS10 and replacement of LS50 with an above ground inline booster station and is currently providing the Engineering Services during Construction.

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Utility District Water and Wastewater Masterplan

Owner

City of Riviera Beach

Client

Mario E. Loaiza, P. E.
Former Assistant Director RBUD
Current Utility Director SMRU
9650 SE Water Street
Hobe Sound, FL 33455
Phone: (772) 546-6259
Email: mloaiza@tji.martin.fl.us

Completion Year

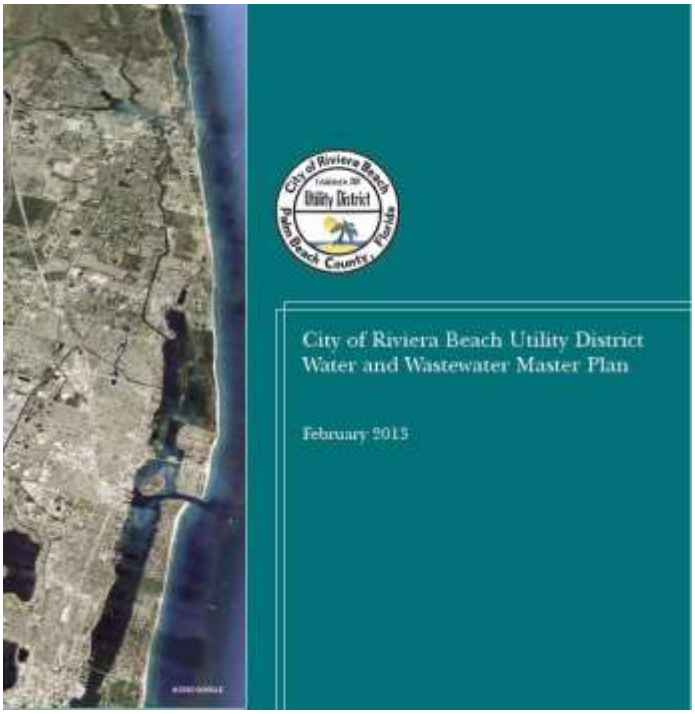
February 2013

Cost

C Solutions Fee $84,700

The City of Riviera Beach Utility District (RBUD) desired to develop an initial water and wastewater masterplan that defined both short and long-term planning goals, identified operational and maintenance needs, and provided risk-based prioritization of needed capital improvements for both the water supply, treatment and distribution system and the wastewater collection and transmission system. Additionally, RBUD required the development of a new water distribution system hydraulic model and a system-wide wastewater hydraulic model.

C Solutions Inc. performed the condition assessments of all wastewater pump stations and transmission system piping in the RBUD's service area and provided an analysis of the systems reliability and needed repairs and replacements. From this analysis C Solutions provided risk-based prioritization of future capital improvements required over the capital improvement plan time period. C Solutions also assisted with the development of both the water and wastewater hydraulic models. Finally C Solutions assisted in the preparation of the capital improvement plan presented in the masterplan.



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Preliminary Design Report Master LS No. 47

Owner

City of Riviera Beach

Client

Giles Rhoads, P. E.
Former Assistant Director RBUD
Current Water Utilities Engineer Lake Worth
414 Lake Avenue
Lake Worth, FL 33460
Phone: (561) 586-1640
Email: grhoads@lakeworth.org

Completion Year

2015

Cost

$99,530

The City of Riviera Beach Utility District (RBUD) owns and operates 51 waste water lift stations (LS) in its service area. Of these, five lift stations (LS) are considered master pump stations: LS50, LS47, LS1A, LS10 and LS12. The existing LS47 is a 9.8mgd submersible pump station designed to repump wastewater flow in the western portion of the City to the East Central Regional Water Reclamation Facility (ECRWRF). LS 47 has passed its useful life and is critical to the collection and transmission of wastewater in the western portion of the City and is in critical need of rehabilitation / replacement. The lift station is comprised of three 150hp 5300gpm variable speed submersible pumps located in a large 36 square foot wetwell.

RBUD has decided to replace Lift Station No. 47 (LS 47) with an inline booster station located at the existing LS 47 site (6522 N. Haverhill Road Riviera Beach, FL 33407). This scope of services is intended to provide the preliminaryengineering design report for the rehabilitation / replacement of LS No. 47.

C Solutions Inc. evaluated the conditions of lift stations and made recommendations for the replacement of the existing station with an in-line booster station constructed on the same site while maintaining wastewater pumping operations during construction. The wastewater hydraulic model was updated and refined to develop the design hydraulic operational envelop for the pump station and a preliminary design report prepared.

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Hydraulic Modeling

Over 20 years' experience in hydraulic modeling, proficient in using KYPIPE, Cybernet, and Infowater software. Responsible for development of hydraulic models up to 75,000 pipes. Experienced in model development from GIS, calibration, steady state and extended period simulations, pumping system hydraulics, capital planning, and evaluation.

The following is a listing of hydraulic modeling projects;

- Avenir and Ancient Tree Development Water and Wastewater
- Seacoast Utility Authority Reclaimed Water
- Seacoast Utility Authority Potable Water
- City of Coral Springs Water and Wastewater
- City of Boca Raton Water and Reclaimed Water
- City of Port Charlotte Rotonda Area Water
- City of Miami Beach Wastewater
- City of Fort Lauderdale Water and Wastewater
- Palm Beach County Water Reclaimed Water Transmission System Raw Water and Wastewater
- Palm Beach County Water Raw Water Pumping and Transmission System for various Wtp facilities
- Palm Beach County Water Wastewater Pumping and Transmission System

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Engineering and Utility Management

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Water and Wastewater Master Plans

Over 25 years' experience in the development of water and wastewater master plans as both a consultant and as the client. Particular experience in hydraulic modeling and the optimization and implementation of capital improvement programs developed from the work products.

The following is a listing of master plans;

- Town of Davie Water and Wastewater Master Plan (ongoing)
- Palm Beach County Water and Wastewater Master Plans (2008 and 2012)
- Glades RegionWater andWastewater Master Plans (2014)
- City of Fort Lauderdale Water and Wastewater Master Plans (2002 and 2007)
- RiverOaks Stormwater Master Plan (2002)
- City of Miami Beach Wastewater Master Plan (1992)
- City of Coral Springs Water and Wastewater Master Plan (1990)

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Turnpike 48" Force Main Relocation

Broward County, Florida

Estimated Completion Date

2006

Fee

$380,969

Client

Ric-Man International
Rene Castillo, Sr.
1545 NW 27th Avenue
Pompano Beach, FL 33069
(954) 426-1042

Chen Moore and Associates was the prime consultant of a design-build team tasked to design, permit and construct the relocation of a 48" Force Main in the Turnpike Right- of-Way. This project involved the open cut installation of approximately 5,400 LF of 48" DIP followed by the removal of the existing PCCP. Coordination activities included Florida's Turnpike Enterprise of the Florida Department of Transportation, South Florida Water Management District, the Florida Department of Environmental Protection and Broward County Water and Wastewater Services. The project schedule was an aggressive 112 days from Notice to Proceed to completion.

This project involved extensive permitting and coordination with the FDOT Turnpike as the entirety of the pipeline project fell within the Turnpike's Limited Access ROW. MOT and utility plans were permitted through the Turnpike including staging areas for pipe stringing and lay-down yards. Additionally, extensive coordination with the Turnpike Construction Office was required as this project immediatelypreceded a Turnpike widening project and several restoration efforts were as-built and communicated. Finally, coordination with the Turnpike environmental coordinator and their subconsultant Handex was required as the dewatering permitting operations discovered contamination at the FDOT Rest Area adjacent to the project site and monitoring was required throughout the dewatering operations.

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30- inch Force Main BODR

Broward County, Florida

Estimated Completion Date

2007

Fee

$43,073

Client

Hazen and Sawyer
Janeen Wietgrefe, PE
4000 Hollywood Blvd Ste 750N
Hollywood, FL 33021-6751
(954) 987-0066

Chen Moore and Associates was contracted by Hazen and Sawyer to prepare the Basis of Design Report for the routing of a 30" Force Main for Broward County Water and Wastewater Services. The purpose of this main is to provide relief and bypass to the master pump stations in the City of Coral Springs. Routes along Wiles Road and Sample Road west of Rock Island road were studied. The cost to prepare this Basis of Design Report was approximately $43,000.

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South County Reclaimed Water Transmission Pipeline Phase 1A (R2018-0296)

Palm Beach, Florida

Estimated Completion Date
2019

Fee
$855,990

Client
Palm Beach County
John Visconti
Water Utilities Department
8100 Forest Hill Blvd
W Palm Beach, FL 33413
(954) 846-0401

CMA is providing project management and coordination; field services; preliminary design services; detailed design services; permitting services; public outreach services; and bidding support services for the South County Reclaimed Water Pipeline project for Palm Beach County.

Palm Beach County and Broward County have an Interlocal Agreement related to the construction, ownership, operation, and maintenance of a Regional Reclaimed Water System to deliver reclaimed water from Broward County's northern wastewater treatment plant to the Palm Beach County Water Utilities Department service area. The service initiation to Palm Beach County will be 2 MGD of annual average daily flow by April 2021.

The expansion is being designed in phases for multiple competitively bid construction sub-projects. Detailed construction documents and related permits will be provided to allow the construction of approximately 3.7 miles of reclaimed water pipeline and related facilities to be completed and placed into service before April 2021.

The field investigation will include records review, site investigation and photo study; environmental assessments; subsurface utility engineering; geotechnical investigation; and survey.

The design portions of the project will include a detailed investigation of pipeline design requirements and a tree Disposition/restoration/planting plan.

The permitting process will be extensive, requiring permitting for the Hillsboro Canal Crossing with the SFWMD / USACE; environmental permitting for the corridor; permitting for impacts to County roads; permitting for impacts to trees and wellfields; permitting of reclaimed pipeline; permitting for dewatering during construction; and compliance with the ENVISION Certification Process (Institute for Sustainable Infrastructure).

CMA will also provide bidding support services.

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72" Force Main NW/NE 159th Street Between NW 17th Ave & NE 10th Ave

Miami, Florida

Estimated Completion Date

2013

Fee

$48,247

Client

Lockwood Andrews & Newnam Inc
Ricardo Vieira, PE
9100 S Dadeland Blvd Ste 1500
Miami, FL 33156
(305) 444.6454

As part of the LANTeam, Chen Moore prepared plans for the design build package for the rehabilitation/replacement of a 72" existing force main from NW/NE 159th Street between NW 17th Avenue and NE 10th Avenue for Miami-Dade Water and Sewer Department (WASD). CMA tasks include the following: review and collection of available aerial photography, maps and LIDAR data; utility coordination; meetings with local agencies to acquire existing/available geotechnical data; preparation of existing condition corridor plans; preparation of rights-of-way designation plans; identification of municipal pavement repair requirements and proposed pavement resurfacing methods and limits; preparation of preliminary maintenance of traffic plan; preparation of and engineer's opinion of probable construction cost; and utility investigation/WASD as-built/repair and rehabilitation documentation review and recommendations.

CMA coordinated with FDOT and local municipalities to review existing utilities and future projects which may work concurrently with the force main rehabilitation project. The project team evaluated force main replacement and rehabilitation alternatives including different routes which could be used for a new 72" force main. CMA prepared plans and cross sections to represent these different replacement layouts. Furthermore, CMA prepared plans representing the different rehabilitation options investigated by the project team. With this initial analysis, CMA also prepared typical MOT cross sections and MOT plans to represent the impacts on traffic for the different options.

The project team evaluated the impacts of this force main rehabilitation on the existing nearby lift stations to verify the sanitary sewer system functionality throughout the construction and completion of the project. An alternative was selected and further detailed plans were prepared. CMA used LIDAR elevation data combined with survey information to generate an existing grade surface from which profile views were generated. CMA prepared plans and profiles for the selected force main rehabilitation method. These documents represented the existing pipeline, the portions to be rehabilitated by slip-lining, the portions to be rehabilitated with a cured in place pipe (CIPP), and the existing utilities which crossed the force main.

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Additional Force Main Analysis

Davie, FL

Estimated Completion Date
2004

Fee
$1,000

Client
Town of Davie
Ronald Bolton
6901 Orange Drive
Davie, FL 33314-3348
(954) 797-1114

Chen Moore and Associates provided continuing services to verify the pressures within the Town's force main network using the computer model of the Town's entire force main network. Chen Moore and Associates provided additional analysis of the force main system to determine the impact of various proposed developments within theTown's service area. The existing and projected force main pressures at the connection point(s) were needed to size the pumps within the proposed lift station at the various proposed development locations.

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Area 3 Force Main Analysis

Marathon, Florida

Estimated Completion Date

2014

Fee

$9,540

Client

City of Marathon
Carlos Solis, PE
9805 Overseas Hwy
Marathon, FL 33050
(305) 289-5008

Recent projects for Marathon include work relating to repairs of the existing vacuum system and projects to address additionally required capacity. They include:

- Marathon Area 3 FM Analysis
- Vacuum Sewer Collection System Evaluation-Area 6
- Grassy Key Sewer Connection
- Stormwater/Wastewater Utility GIS Map Updates 14-05
- Vacuum Sewer Collection System Evaluation-Area 4

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Force Main Modeling and Design

Margate, Florida

Estimated Completion Date

2015

Fee

$100,239

Client

Carollo Engineers
Thomas Gillogly, PhD,PE
3440 Hollywood Blvd Ste 465
Hollywood, FL 33021
(954) 837-0030

CMA, as a subconsultant to Carollo Engineers, was contracted by the City of Margate to perform modeling, design and permitting for force main improvements using the InfoWater software. The modeling is based on the previous models that CMA completed for the City and will evaluate two different options for connecting existing force mains. These connections will allow the City to direct the flow to their other wastewater treatment plant. In addition to the modeling, the project includes the design and permitting of over 2,600 LF of new force main and abandonment of over 1,000 LF of existing force main. The new force main design incorporates a directional drill under a City-owned canal.

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WPB Force Main Assessment

West Palm Beach, Florida

Estimated Completion Date

2016

Fee

$107,560

Client

Jacobs Engineering Group Inc
Ray Thomson
10 10th Street NW Ste 1400
Atlanta, GA 30309
(404) 751-2141

CMA, under Jacobs Engineering, is assisting with the condition assessment for the 42 and 48-inch force main for the City of West Palm Beach. The force main is a critical pipeline that transmits wastewater from the City of West Palm Beach and theTown of Palm Beach to the East Central Regional Water Reclamation Facility. The PCCP has already been assessed for damages to the pipe walls. This project incorporates the assessment data, and provides GIS data to the City for the critical points. Also included in this project is utility coordination and GIS design to accomodate the bypass construction and lining entry pits.

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WASD VE Study - 60" Force Main (S-804) Miami, FL

Estimated Completion Date
2010

Fee
$22,675

Client
Miami Dade Water and Sewer Department
Carlos Benavides
3071 S.W. 38th Avenue
Miami, FL 33146
(786) 268-5285

Chen Moore and Associates was retained by the Miami-Dade Water and Sewer Department to perform a value engineering study for the 60" force main between the South Miami Heights Water Treatment Plant and South District Wastewater Treatment Plant. This force main is for the disposal of the reject water from the membrane water treatment units currently under construction at the water plant. Major cost saving ideas proposed included: Twin 42" directional drilled HDPE pipe under the Turnpike and C-1 Canal instead of the single 60" micro-tunneling DIP crossing; shallowing and open cut across US-1 instead of deeper micro-tunneling; narrowing the size and reducing the number of isolation plug valves; and modifying the 24" outlets. The VE report also increased the allowance for the trench overcut, sheeting, flowable fill, and dewatering. Despite these cost increases, an overall $1.6 million in cost savings were realized.

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Pompano Beach Force Main Model

Pompano Beach, FL

Estimated Completion Date

2005

Fee

$45,000

Client

City of Pompano Beach
Bobby Clayton
1201 NE 5th Ave
Pompano Beach, FL 33060
(954) 786-4154

Chen Moore and Associates was contracted by the City of Pompano Beach to design the rehabilitation of Lift Station 24 serving the barrier island of the City between Intracoastal Waterway and Atlantic Ocean.The proposed improvements included the installation of new force main, the replacement of an existing water main, and the rehabilitation of an existing lift station. Under this contract, Chen Moore and Associates was responsible for developing a comprehensive computer model of the City's entire force main network using the SewerCAD software to allow analysis of the pressures within the network. This force main model was developed based on the City's sanitary system atlas along with documentation on each lift station. CMA used this SewerCAD model to conduct various steady-state analyses to estimate the flows and pressures throughout the City's existing force main network.

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Town of Davie East Side Force Main Study Davie, FL

Estimated Completion Date
2004

Fee
$16,450

Client
Town of Davie
Ronald Bolton
6901 Orange Drive
Davie, FL 33314-3348
(954) 797-1114

Chen Moore and Associates provided professional engineering services for the analysis of the existing force main system for the east side of the Town's utility system. The computer model analysis was performed on the existing force main system serving the east side of the Town's sewer system to determine what upgrades would be required to address the system issues. The computer model of the existing force main, which was prepared with SewerCAD software, included all 11 existing lift stations between Lift Station #8 and the Town's wastewater treatment plant. The computer analysis investigated the potential route for a parallel force main from Lift Station #8 to the wastewater treatment plant and the upgrade for the valving at the wastewater treatment plant site to help relieve the pressure head within the force main. Chen Moore and Associates prepared a design memorandum which recommended the force main sizing, pump modifications, and any lift station modifications required due to the future pressure conditions.

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Broadview Park Neighborhood Improvement Program

Broward County, Florida

Estimated Completion Date
2013

Fee
$616,690

Client
Broward County
Patrick MacGregor
2555 West Copans Road
Pompano Beach, FL 33069-1233
(954) 831-0904

The Broadview Park Neighborhood Improvement Program (BPNIP) was the last of the Neighborhood Infrastructure Improvements projects to be carried out by Broward County in the unincorporated areas. Chen Moore and Associates was selected as the prime consultant for the Basis of Design Report (BODR) and to design and administer the construction of improvements to subsequent bid packages. The three Bid Packages addressed water, sanitary sewer and drainage improvements, while introducing sidewalks and enhancing the community's roadway and landscape.

The basis of design report included population projections, an analysis of water source and sewage discharge points and a hydraulic model of the water, wastewater and stormwater systems.

The first bid package included the replacement of the entire water distribution system within the neighborhood, which was previously owned and maintained by a private utility. This project was designed utilizing digital orthography and aerial maps to fast track the replacement.

The second and third bid packages included conversion of the entire area from septic to gravity collection, the installation of a backbone forcemain network and connection into an inline booster station, installation of a positive drainage system, sidewalks, hardscape and landscape improvements.

An added fourth bid package was the design of a 20" water main to serve as the transmission source water for the area. Also change ordered into the project was the installation of a 20" raw water main for future use. The project was complicated by groundwater contamination, proximity to a wellfield, the existence of a fire station and elementary school in the neighborhood and the existence of rock in the area. All of the projects were completed on budget and on or ahead of schedule.

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Broward County UAZ Improvements

Broward County, Florida

Estimated Completion Date
2019

Fee
Varies

Client
Broward County
Patrick MacGregor
2555 West Copans Road
Pompano Beach, FL 33069-1233
(954) 831-0904

Broward County UAZs. UAZ 307 / 315 - The Broward County UAZ 307 / 315 Utilities project included replacing existing water main and providing sanitary sewer for County Service Areas in the City of Dania Beach, near Griffin Road and Ravenswood Road. The main technical components included replacing a 12-inch water main on Ravenswood Road, replacing the residential water distribution system, providing sanitary sewer to connect existing septic tanks and rehabilitating and installation of new lift stations and force main. In order to achieve the necessary information, site visits concentrated on contacting residents to determine the location of existing tanks. A great deal of coordination was required to accommodate developer projects, tie into County projects, and obtain easements for crossing private properties. A total of 20,000 linear feet of water main replacement, three lift stations and 14,000 linear feet of sanitary sewer, which will tie in over 400 parcels, were designed for this project. Chen Moore and Associates is also performing construction administration for this project.

UAZ 303, 314 and 318 - The Broward County UAZ 303,314 and 318 project was part 1 of what was projected to be an $8.8 million project replacing existing water and providing sanitary sewer for County Service Areas in the City of Dania Beach, just east of State Road 7, north and south of Griffin Road. The main technical components included replacing water mains on County roads, replacing the residential water distribution system, providing sanitary sewer systems to eliminate existing septic tanks, and rehabilitating or installing new lift stations. GIS was used to keep track of all ongoing projects, log pertinent site information, determine the projected flow rates, track questions from residents of the area and track responses from utility companies regarding their existing facilities. The design of these improvements began in January 2009 and UAZ 303 has been completed.

UAZ 316 - The Broward County UAZ 316 project is part 2 of the estimated $8.8 million project servicing Broward County utility zones in the City of Dania Beach which includes replacing existing water and providing sanitary sewer just east of State Road 7, and south of Griffin Road. The main technical components include replacing water mains, replacing the residential water distribution system, providing sanitary sewer systems to eliminate existing septic tanks and rehabilitating or installing new lift stations.

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UAZ 110/111 & 113 Water Sewer Improvements 113B - The Water and Sanitary Sewer Improvements for the UAZ 110/111 & 113 Project will include the improvements to the existing water distribution system, sanitary sewer system, and transmission systems within the project area along with the restoration of surface areas disturbed for the construction of said improvements. The existing system being replaced consists of approximately 168,100LF of water mains, 122,100 LF of sanitary sewer mains and 23,600 LF force main. The existing water main consists of asbestos cement, cast iron, ductile iron, galvanized steel, polyvinyl chloride pipe ranging from 2" - 24" in diameter size. The sanitary sewer consists of vitrified clay, fold and form liner, cured in place liner and ductile iron pipe ranging from 8" – 15" in diameter size. The force main consists of asbestos cement, cured in place liner, ductile iron and polyvinyl chloride pipe ranging from 6" – 16" in diameter size. There are 8 Broward County lift stations in these UAZ areas and 1 private lift station which sanitary sewer systems will need to connect to. Two of these stations will need rehabilitation/replacement, the extent of rehabilitation of existing stations will be determined.The restoration of roadways, sidewalks, driveways, and landscape areas will need to be performed as needed for water and sanitary sewer improvement construction.

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Water and Wastewater Master Plan City of West Palm Beach, Florida Fees (to date):

$2M

Project Dates

Start: May 2012
Completion: February 2015

Reference

Laura Le, PE
Engineering Manager
City of West Palm Beach
401 Clematis Street
3rd Floor
West Palm Beach, FL 33401
P | 561.494.1061
F | 561.494.1115
lle@wpb.org

Brown AND Caldwell

Brown and Caldwell (BC) was awarded a contract with the City of West Palm Beach (City) for the development of a Water and Wastewater Master Plan. The plan includes the City's water distribution and wastewater collection systems and identifies areas for improvement, along with a clear and defensible initial seven-year roadmap for a Capital Improvements Plan (CIP) required over the 20-year planning period. The plan included the development of all-pipe models of the water transmission/distribution system as well as an integrated model of the wastewater collection, pumping and force main system to provide a comprehensive assessment of water and wastewater system needs and CIP development. Additional-ly, the models were developed to support City staff with ongoing operational assessments, condition assessment prioriti-zation, water quality improvements, and project impact assessment (in support of construction implementation).

The Master Plan also included a comprehensive analysis of Renewal and Replacement (R&R) projects focused on the following defined objectives:

- Cost-effective reduction of infiltration and inflow (I/I) in the wastewater collection system;
- Systematic replacement of high risk infrastructure to reduce major pipe failures and the resultant response costs;
- Assessment of the City's numerous lift stations for improved operational efficiency, peak flow capacity adequacy and reduced operations and maintenance costs; and
- Operational troubleshooting, construction impact assessment, performance optimization of the water distribution and wastewater collection systems as part of post-planning model applications;

For this project, BC leveraged the work already performed on the Asset Management Program for the City, which consid-ered asset criticality, risk and level of service objectives, and a business case evaluation to provide a clear definition of the most important projects. This project also examined criticality and consequence of failure of key infrastructure and utilized the BC's Replacement Planning Model (RPM), a proven planning tool that provides decision makers a high level of confidence that the defined level of spending

satisfies long-term objectives of customer service and sustainable infrastruc-ture and provides a defensible and rational basis for long-term forecasting of R&R needs.

Since completion, the models have been used for diverse practical applications inclusive of: 1) assessing and recommending system operating procedures to accommodate the condition assessment and subsequent rehabilitation planning for approximately 5 miles of 42/48-inch PCCP force main; 2) assessing force main reliability and capacity improvement alternatives; 3) operational sensitivity evaluations; 4) troubleshoot performance issues and develop improvement upgrades for lift stations in the Ibis basin; 5) modeling updates to reflect most current population forecasts. Water system applications include optimized stored water inventory management to reduce water age for 6 storage tank facilities and developing modified system operational protocols in response to removing a major water transmission main from service for replacement.

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Master Lift Station 5 Assessments City of West Palm Beach, Florida Fees

Lift Station 5 Assessmen
$31,237
LS 5 Force Main Modeling & Improvement Assessment
$25,375

Project Dates

Contract valid from September 2014 To November 2019

Reference

Laura Le, PE
Engineering Manager
City of West Palm Beach
401 Clematis Street
3rd Floor
West Palm Beach, FL 33401
P | 561.494.1093
F | 561.494.1115
LLe@wpb.org

Brown AND Caldwell

Brown and Caldwell (BC) has been working with the City of West Palm Beach since 2014. Under various general engineering services/multi-project contracts, BC has assisted the City with important projects such as the Water and Wastewater Master Plan and Asset Management Plan. In 2014, BC was awarded a General Engineering Services contract. Under this contract, BC has received several assignments, a representative selection of which is summarized below.

Lift Station 5 System Modeling and Discharge Force Main Sizing Analysis

BC performed a hydraulic modeling analysis in order to determine the required size for the upsizing of the LS5 discharge force main. LS5 is located at the southeast corner of Flagler Drive and Southern Boulevard. Wastewater from this lift station is pumped through a 14-in/16-in/18-in force main to the wetwell of LS13. LS13 is located at Parker Avenue and Park Place. LS13 has historically repumped wastewater from LS5 along with several other City-owned lift stations. LS13 discharges to a 24-in force main that eventually manifolds to the City's 42-in force main that discharges to ECRWRF. The City has constructed an 18-in bypass force main around LS13 so that wastewater from LS5 can discharge to the downstream side of LS13 without being repumped.The bypass has not yet been activated due to concerns about the integrity of the 14-in and 16-in force main segments, specifically in areas of close proximity to the air release valves (ARV), connected to the LS5 discharge.

The force main between LS5 and LS13 includes a 14-in CIP (3,910 linear feet) segment between LS5 and the intersection of Southern Boulevard/Georgia Avenue, a 16-in DIP (5,200 linear feet) segment between Southern Boulevard/Georgia Avenue and Lake Avenue/Omar Road, and an 18-in DIP/HDPE (4,230 linear feet) segment between Lake Avenue/Omar Road and LS13. During the City's Water and Wastewater Master Plan efforts, it was identified that the largest driver for many of the potential future projects are the simulated overflows associated with LS5 during a 10-year wet weather event. The Master Plan also identified the need to upsize the 14-in diameter force main segment (about 3,500 feet) to an 18-in or 20-in diameter in order to avoid high velocities and reduce the head requirements at the lift station. Due to the FDOT's Southern Blvd/SR80 Utility Improvements project, the City plans to upsize about

600 linear feet of the LS5 discharge force main to either 16-in, 18-in or 20-in diameter. The remaining 14-in segment will be upsized at a later time.

The objective of this work authorization is to confirm the appropriate upsize diameter for the LS5 discharge force main based on conditions and recommendations expressed in the Master Plan. The wastewater collection system hydraulic model was updated to reflect the proposed changes on the lift station operating conditions in order to assess the impact on system performance (overflow potential, lift station operating performance, and force main capacity).The scope of services included the following:

- Record Drawing and Pump Performance Review - In order to evaluate the existing operating conditions of LS5, a drawdown test of each pump installed and pressure monitoring was performed on June 16th, 2016.
- Update Wastewater System Hydraulic Model and Assess Capacity Impact –The existing wastewater model was updated with pump performance curves based on the drawdown test results. The model identified the appropriate size that satisfies current operating requirements while preserving future options to align with alternative force main configurations and the tradeoff between headloss and flow velocity. The model analysis included the following system improvements.
- Replacement of approximately 3,310 linear feet of 14-in CIP force main from LS5 to Georgia Avenue.
- Replacement of approximately 600 linear feet of 14-in CIP force main within the FDOT project limits (between LS5 and Washington Road) with 2,710 linear feet of 14-in CIP to remain on Southern Boulevard.

Force Main Sizing Recommendations – Prepare letter summarizing the results of the evaluation and recommended size and supporting basis for the portion of the force main to be replaced.

Lift Station 5 Assessment (Phase I)

Lift Station 5 (LS5) is located at the southeast corner of Flagler Drive and Southern Boulevard.Wastewater from this lift station is pumped through a 14-in/16-in/18-in force main to the wetwell of Lift Station 13 (LS13). LS5 treats the wastewater collected from two residential areas to the north and south of the station. Lift Station 27 (LS27) flows are conveyed into LS5 via a 24-in gravity sewer main. Lift Station 3 (LS3) pumps flows into LS5 via a 12-in force main (approximately 6,300 linear feet in length).

LS5 falls within the project limits of the Southern Boulevard Bridge construction project by the Florida Department of Transportation (FDOT). This project is expected to begin in 2017 where a new bridge will be constructed and the existing bridge will be demolished. In order to minimize disruption to the general public and ensure that FDOT's work will not affect the station, the City contracted BC to assess and evaluate the following at LS5:

- Evaluate and assess the existing condition of the structures at LS5;
- Evaluate the FDOT construction methodology for potential impacts on the lift station during construction and provide feedback to City;
- Assess the physical condition of the incoming 24-in gravity sewer line (including associated manholes) to LS5 on South Flagler Drive within the FDOT project limit.

BC prepared a letter for the City to use and document issues that FDOT will need to address to mitigate risks to LS5 during construction.

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City of West Palm As-Needed Services

City of West Palm Beach, FL

Completion Date

August 2015

Reference

Laura Le, P.E. – Utilities Department
City of West Palm Beach Public Utilities
401 Clematis St.
4th Floor
West Palm Beach, FL 33401
561-494-1093
lle@wpb.org

Brown AND Caldwell

The City of West Palm Beach wastewater collection system consists of approximately 274 miles of gravity mains, 7,100 manholes, 124 lift stations, and 86 miles of pressurized force mains that convey approximately 13 mgd of sewage to the East Central Regional Water Reclamation Facility (ECRWRF).

The progressive expansion of sewer assets has resulted in a variety of existing buried infrastructure materials, design standards, ages, and service environments. The condition of the existing infrastructure impacts system reliability, level of service provided, operational performance, and cost. Consistent with utilities across the nation with aging infrastructure, failure of critical components, which tends to increase in frequency as condition deteriorates, can potentially be disruptive to the local economy, and adversely impact public safety and the environment. Brown and Caldwell's prepared a Master Plan that established a road map for prioritizing critical assets for condition assessment and to establish a 7-year capital improvement program (CIP) to improve reliability and performance while expanding capacity where required to support continued growth. The need to conduct a condition assessment of the City's major force main emerged as a high priority due to its vulnerability and high consequence of failure. This follow-up project involved hydraulic assessments in support of the condition assessment of this major force main.

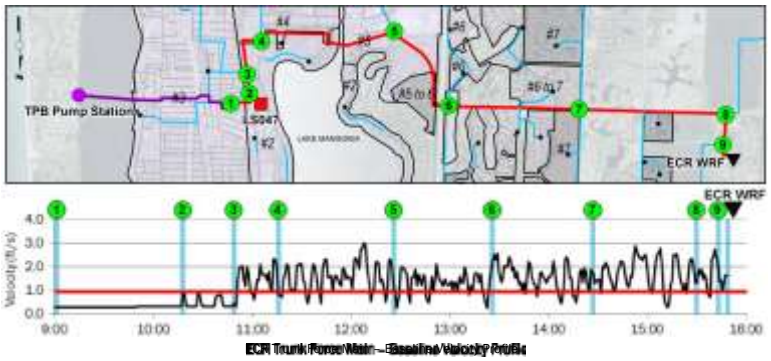
Wastewater Force Main Criticality Analysis

BC performed a Sanitary Sewer Collection System Criticality Assessment to identify sewer pipes that pose the most risk to the City with regard to likelihood and consequence of failure. Using the likelihood of failure and risk scoring results, the gravity and force mains were grouped into candidate project areas for purposes of condition assessment. Of particular importance to the City's force main system is a 42-inch and 48-inch diameter pre-stressed concrete cylinder pipe (PCCP) sewer force main, which is about 6 miles in length, which transmits flow from the City of West Palm Beach and the Town of Palm Beach to the ECRWRF. This force main was identified as having a high likelihood and consequence of failure in the criticality assessment and poses a number of concerns for the City, as follows:

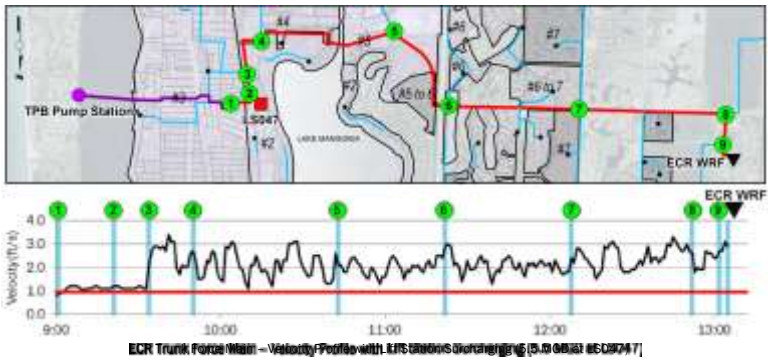
– This force main is currently the only way to transmit flows to ECRWRF from the eastern portion of the City (lift

stations east of ECRWRF). This equates to 90 percent of the total flow conveyed to ECRWRF from the City and Town.

- The force main was constructed between 1974 and 1975 using PCCP that has been known to have a high incidence of failures.
- The force main crosses I-95, two canals, and Lake Mangonia which serves as the City's water supply and several major FDOT and Palm Beach County transportation corridors.



ECR Trunk Force Main – Baseline Velocity Profile



ECR Trunk Force Main – Velocity Profile with Lift Station Surcharging @ 5.0 MGD at LS 047

Following BC's recommendations, the City initiated a condition assessment of the 42-inch and 48-inch force main using electromagnetic technologies to determine broken wire zones and defects in pre-stressed concrete cylinder pipes. The assessment utilized two acoustic inspection systems: SmartBall and PipeDiver (by PURE Technologies). For this analysis, the City retained BC to perform a hydraulic analysis of the wastewater collection system to develop strategies to maintain a velocity of 1.0 to 4.0 fps in the 42-inch and 48-inch PCCP force main.

Force Main Velocity Profile Analysis

BC utilized the sanitary model developed during the Master Plan to establish a velocity profile for the PCCP force main under dry weather conditions for the existing system and assess the time period when flow conditions are most favorable for launching the assessment tool. The analysis identified a number of segments where the velocity was consistently below the minimum threshold of 1.0 fps.

Development of Operational Strategies & Implementation

To provide a consistent flow velocity above the minimum threshold of 1 fps, Brown and Caldwell explored multiple lift station surcharging options including surcharging at the Town of Palm Beach master lift station and at the City of West Palm Beach Lift Station 47. Through consultation and coordination with the Town of Palm Beach Utility staff, it was determined to be feasible to surcharge the Town's system to provide the minimum flow for the initial segment (Connection Point 1 to 2) of the condition assessment. Following the initial segment, Lift Station 47 would be used to supplement flow and maintain a velocity of 1 fps until the assessment tools reach the East Coast Regional Water Reclamation Facility (ECR WRF). The advantages of using Lift Station 47 include its proximity to the upstream end of the trunk force main, its former use as a master pump station with 4 pumps available, and the proximity of a canal to provide make-up water to the wet well.

Various flow conditions were explored at Lift Station 47 to determine the minimum flow required to sustain a minimum flow velocity of 1 ft per sec (plus practically achievable safety factor) to transport the tool to ECR WRF. At a minimum, a flow of 5.5 MGD was required at Lift Station 47. To achieve this flow, water from an adjacent canal was pumped into the lift station wet well to provide make-up feed water for the lift station and two pumps at Lift Station 47 were operated at a minimum to achieve a discharge rate of 5.5 MGD. The operational strategy provided sufficient operational redundancy and capacity to achieve the desired 1 fps minimum flow velocity, satisfying the project requirements.

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Condition Assessment and R&R Planning for Critical Lift Stations

City of West Palm Beach, FL

Project Value
BC Fees: $52,000

Project Dates
Start: August 2014
Completion: December 2014 (est.)

Reference
Laura Le, P.E.
Utilities Engineering Manager
City of West Palm Beach Engineering & Public Works Department
P | 561.494.1093
lle@wpb.org

Brown AND Caldwell

The City of West Palm Beach Public Utilities Department manages, operates and maintains a 55 mgd Wastewater Treatment Plant, a 47 mgd Water Treatment Plant, over 1,000 miles of water and sewer mains, and 125 lift stations. In 2010, the Department contracted with BC to embark on the development of an Asset Management Program (AMP) with a vision to develop an effective asset management organization that reduces the life cycle cost and impacts of asset ownership and enhances customer service through:

- Effective and efficient processes
- Enhanced systems
- Highly trained and motivated staff
- Commitment to continuous improvement

Earlier phases of the AMP included conducting an assessment to evaluate the current state of Public Utilities as compared to asset management best practices to identify opportunities for improvement. Phase 2 of the AMP initiated implementation of the highest priority improvement areas recommended under the Action Plan.

Phase 3 continues implementation of the AMP at the City's Most Critical Sanitary Sewer Lift Stations. The goal for this phase of the AMP for the lift stations is:

- Identify prioritized Rehabilitation and Replacement (R&R) needs for the sanitary sewer lift stations based on condition that can be used to develop a lift station Capital Improvement Plan (CIP).
- BC performed condition assessment activities for eleven (11) of the highest risk lift stations (of which, all are master repump stations). Lift station condition assessment activities included:
- Developed lift station condition assessment protocol and forms which were used by BC's field assessment teams to record the condition of assets. The forms were in an electronic database format.
- A team covering electrical, I&C, mechanical, and structural visited each lift station and used visual, auditory, tactile, and olfactory senses to assign performance and condition rankings based on these observations using the lift station condition assessment form. Where applicable, field crews conducted visual, above ground condition assessment of

the wet well, including pH tests of the wet well sidewalls, utilized gas meters to determine the presence of hydrogen sulfide concentrations and used pole cameras to examine the wet well walls for signs of corrosion.

– Identify prioritized Rehabilitation and Replacement (R&R) needs for the sanitary sewer lift stations based on condition that can be used to develop a lift station Capital Improvement Plan (CIP).

Based on the results of the field condition assessments, BC developed a prioritized list of candidate improvements necessary to address serious condition defects at the assessed lift stations. BC developed planning level cost estimates (i.e. design/engineering costs, construction costs and contingency) for any rehabilitation or replacement recommended capital improvements. BC developeda Rehabilitation and Replacement Plan that identified immediate, short-term and long-term needs. BC prepared a Technical Memorandum documenting the condition assessment and candidate improvements.

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Broward County Water and Wastewater Services

Broward County, FL

Project Value
BC Fees: $278,000

Project Dates
Start: August 2013
Completion: ongoing

Reference
Greg Balicki, P.E.
Engineering Director
Broward County Water and Wastewater Services
2555 W. Copans Rd.
Pompano Beach, FL 33069
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gbalicki@broward.org

Brown AND Caldwell

Master Pump Station 462 Ragging Assessment

Broward County Water and Wastewater Services' (WWS or COUNTY) operates a regional wastewater transmission system that receives and transmits sewage from large user communities and transmits the flow to the North Regional WWTP (NRWWTP) through a network of master pump stations (MPS) and transmission mains. Master Pump Station 462 (MPS 462) is an inline booster pump station that serves areas in northwestern Broward County. It receives flow from three Large User utilities.

Brown and Caldwell was retained to conduct an assessment of underlying contributing factors to operational challenges arising from the rapid formation of rag balls that affected pump station performance and requires frequent maintenance intervention. The current inline station configuration is a change from the original wetwell arrangement. Our analysis included a review of station hydraulics, pump selection and operating characteristics relative to the range of flow/pressure conditions, modeling of parent-child pumping systems impacted by current operation.

Brown and Caldwell identified a number of conditions that contribute to the tendency to form rag balls and identified recommendations that when implemented will improve operating efficiency, increase reliability and reduce the tendency to form rag balls and the attendant maintenance requirement. As a result of these findings, WWS is currently working to apply these improvements to other Master Pump Stations that have similar operational challenges.

3BC Sanitary Sewer Feasibility Study

WWS provides water supply but limited sewer service to the District 3BC Area. Unsewered areas currently utilize septic tanks, the elimination of which are an identified County priority. Brown and Caldwell was retained to conduct a feasibility assessment thatevaluated alternative approaches for eliminating septic tanks from within the 3B/C service area that includes the North Perry Airport (HWO), commercial, and residential areas.The assessment developed a plan that provided for the implementation of approximately 116,000 lf of gravity mains, 7 lift stations, almost 7 miles of force mains that included horizontal directional drilled crossings of major thoroughfares that include the Florida Turnpike and Ste Road 441 at an estimated construction cost of almost $40 million. Our effort included engagement of the representatives of the North Perry Airport as well as the

surrounding cities of Miramar and Hollywood as candidate systems to receive collected sewage for treatment and disposal.

3BC Septic Tank Elimination Analysis Memorandum

Subsequent to the completion of the feasibility study, the County retained Brown and Caldwell to conduct a more in-depth technical analysis in order to refine implementation requirements. Brown and Caldwell addressed:

- Permitting requirements for proposed gravity sewer system improvements within the 3C Area of District 3BC,
- Utility identification within project area,
- Preparation of a hydraulic model determining overall hydraulic factors and conditions of a proposed forcemain to tie into Master Pump Station 320 (MPS 320),
- Proposed modifications to existing MPS 320 in order to receive modeled flows from the study area.

Surveys were also performed at the two locations where horizontal directional drilling would need to be performed.

3A Collection System Hydraulic Model 300 Development

The County desired to prepare an extended-period hydraulic model of its collection system in the District 3A service area that may be used for various applications inclusive of planning and operational scenario evaluations. Brown and Caldwell modeled the force main system inclusive of the pump stations, wet wells and gravity system access structures immediately upstream from each lift station manhole. Brown and Caldwell developed a functional and calibrated model of the District 3A pump station system. Initial test runs were conducted to validate the functionality of the model and document the initial characterization of system performance.

The project incorporated lift stations, pump stations, master meters, force mains, and gravity mains (including gravity main segments for upstream lift stations) immediately upstream (up to the first upstream manhole) of lift stations within the District 3A collection system that connect directly to the City of Hollywood's regional wastewater system.

Hydraulic Modeling of Reclaimed Water Transmission System

The County retained Brown and Caldwell to provide design, permitting, bid support and construction administration services in support of the expansion of its existing reclaimed water treatment and pumping facilities to a capacity of 26 mgd. During BODR development, the County was required to furnish information that reflected the initial and future operating conditions of the proposed high service pump station. Improvised steady state demand assumptions were made to preliminarily estimate pump station sizing, however, a dynamic model was required to validate the proposed pump station design under a range of operating conditions and to additionally confirm that basic delivery commitments provided for in the proposed interlocal agreement between Broward County and Palm Beach County (PBC) may be satisfied. Brown and Caldwell developed this hydraulic model and performed the following:

- Reviewed steady state model furnished by WWS and further defined demand updates required. Loaded the model and conduct a test run to confirm the functionality of the furnished model.
- Developed demand distribution assumptions for each prospective large customer of the reuse system.
- Updated the model to reflect the proposed high service pumps, system control settings and demand distribution assumptions developed. Documented simplifying assumptions made. Conducted test runs of the model to troubleshoot execution problems and establish functionality.
- Analyzes buildout PBC supply scenario based on a peak demand of 15 mgd with supply to currently identified residential services areas and large users in Broward County with no supplemental offsite storage
- Analyzed initial operating conditions when average demand from PBCWUD is limited to approximately 2 mgd.
- Documented results, summarized the operating scenarios, assumptions, and forecasted limits of operation that may be used to check the pump station discharge conditions.

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On-Call Utility Condition Assessment, Emergency Repair, Renewal and Replacement Services

Hampton Roads Sanitation District (HRSD), VA

Project Dates
Start: 2005
Completion: Ongoing

Since 2005, Brown and Caldwell has supported Hampton Roads Sanitation District (HRSD) in the planning, investigation, analysis, design, and construction of its assets. Our work has ranged from EPA and DOJ Consent Order negotiation support to development and implementation of a Regional Wet Weather Management Plan (RWWMP), support for a regional hydraulic model, and fast-track urgent repairs. The Engineers Club of Hampton Roads recognized Brown and Caldwell's force main inspection and condition assessment program with an Outstanding Engineering Award in 2012. Following are highlights of relevantwork.

Pipeline Inspection, Condition Assessment, and Renewal and Replacement Program. Brown and Caldwell developed a programmatic approach to condition assessment R/R planning for HRSD. A comprehensive condition assessment program was conducted for the pumping stations and piping network, including the use of GIS and EAM systems and NASSCO PACP methodology. For force main, Brown and Caldwell developed a multi-tiered program that included progressive levels of testing beginning with noninvasive acoustic inspection, sonar, CCTV, laser profiling, and ultrasonic testing.

Pipeline Prompt Repairs. Brown and Caldwell has directly managed an emergency repair contract to replace thousands of feet of damaged gravity sewer, corroded force mains, and deteriorated manholes, primarily stemming from condition assessment findings. Brown and Caldwell's work has included quick turn-around designs of pipeline replacements, structural evaluations of existing piping under roads, manhole and pipeline rehabilitation specifications including trenchless, as well as more specialized expertise such as aerial crossing evaluation, hatch loading analysis, graphitic corrosion evaluation of ferrous pipelines, and lime-leaching analysis of asbestos cement force mains. Over its first two years alone, the contract facilitated over $10M in asset improvements.

Pumping Station Condition Assessment and Compliance Audits. In 2008 Brown and Caldwell performed a condition assessmentonallofHRSD's81pumpingstations,performing inspections, photographing and recording observations, and assigning condition ratings. In 2012, Brown and Caldwell returned to each station for the next round of required condition assessments, including inspection, photographic and observational record, assigning condition ratings, SCAT compliance audits, drawdown testing, flooding risk analysis,

lightning strike evaluation, and dual-feed power assessment.

Replacement Planning Model. To enhance the R/R program, Brown and Caldwell developed a replacement planning model (RPM) for HRSD's pumping facilities and piping network (gravity and pressure). The RPM produces a long-term forecast of R/R costs by infrastructure segment. The condition data collected has been used to adjust the remaining useful lives for pumping station equipment. The long-term forecast will be used to build the R/R component of a funding plan for HRSD.

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Contingency and Emergency Response Plan City of Wichita, KS

Project Value
BC Fees: $48,000

Project Dates
Start: June 2014
Completion: June 2015

The City of Wichita hired Brown and Caldwell to conduct a Contingency and Emergency Response Plan (CERP), which was one of seven projects associated with a Kansas Department of Health and Environment 2013 Consent Order. The order was issued because of discharge from a leaking slide gate that had gone undetected for two years. The goal of the order was to identify and reduce risks to the Arkansas River and other waterways due to potential failure of important infrastructure.

The infrastructure in question was a 3.5-mile-long force main that conveyed 60 percent of the City's wastewater between two plants in a 66-inch reinforced concrete pipe. Additionally, the pipeline at the Arkansas River was a 605-foot siphon constructed of prestressed concrete cylinder pipe. This pipeline crossed over the Arkansas River, the Kansas Turnpike, and an abandoned unlined municipal landfill. Due to the critical nature of buried infrastructure, the City required a completed CERP prior to the condition assessment – a separate project that was also being performed by Brown and Caldwell. The CERP provided the framework for the City to responds to a sanitary sewer overflow that represented an explicit violation of Kanas state law.

This plan gave the City a strategy and procedure to response to the sanitary sewer overflow and the structural failure associated with the 66-inch force main. The goals of the CERP were to: rapidly restore wastewater transport and treatment services, minimize impacts and lose of wastewater systems to customers, provide appropriate and timely emergency information to stakeholders, facilitate effective communication between those involved in an incident, and define protocol for the City to notify KDHE.

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D. Workload of Firm

C Solutions believes the best way to overcome a challenging project is through communication and risk assessment. C Solutions conducts our work process to minimize changes in the work generated by our design efforts and project production through frequent meetings with stakeholders and constructability review. This can involve visioning sessions to outline the client's expectations, budget and schedule; community workshops to get feedback from residents; and design review workshops to instill reassurance with the community.

Client	Project No.	Job Description	Project Status
CDM	1010-07	PBC Collection System Rehabilitation	Completed
Chen Moore	1020-10	Miccosukee Service Plaza Design	Open
URS	1090-01	Comcast Redlands Office - Potable Water System Regulatory Review	Completed
Riviera Beach Utility District	1100-02	Rehabilitation / Replacement LS No. 10 and LS No. 50	Completed
Riviera Beach Utility District	1100-02-01	LS No. 10 and 50 – Construction Services	Completed
Riviera Beach Utility District	1100-02-02	LS No. 10 and 50 – Construction Services (Additional Services)	Open
Riviera Beach Utility District	1100-02-03	LS10 and LS50 Services During Construction (Contract Ammendment)	Completed
Riviera Beach Utility District	1100-03	Packed Tower Aerators Design Evaluation	Completed
Riviera Beach Utility District	1100-04	Rehabilitation / Replacement LS No. 47 - Preliminary Design	Completed
Riviera Beach Utility District	1100-05	Emergency Engineering Assistance	Completed
Riviera Beach Utility District	1100-06	Preliminary Design of Lime Feed System	Completed
Riviera Beach Utility District	1100-07	WTP - Site Survey and Drawing	Completed
Riviera Beach Utility District	1100-08	Development of WTP Electrical Drawings and Hydraulic Profile	Completed
Riviera Beach Utility District	1100-09	Emergency Engineering Assistance 2014-2	Completed
Riviera Beach Utility District	1100-10	Hydraulic Model Refinement – Singer Island Service Area	Completed
Riviera Beach Utility District	1100-11	Chlorine Risk Management Program Assistance	Completed
Riviera Beach Utility District	1100-12	Secondary Disinfection (Avenue U Repump) – Electrical Design	Completed
Riviera Beach Utility District	1100-13	Record Drawing Organization	Completed
Riviera Beach Utility District	1100-14	Bidding Assistance – WTP Sodium Hypochlorite Core Facility Design Build	Completed
Riviera Beach Utility District	1100-15	Emergency Engineering Services 2015 -1	Completed
Riviera Beach Utility District	1100-16	Record Drawing Organization	Completed
Riviera Beach Utility District	1100-17	Electronic Record Drawing Organization	Completed
Riviera Beach Utility District	1100-18	Electronic Record Drawing Organization	Completed
Riviera Beach Utility District	1100-19	Sodium Hypochlorite Core Facility – Design, Permitting and Bidding	Open
Riviera Beach Utility District	1100-20	Temporary Staff Support GIS/CAD Technician	Completed
Riviera Beach Utility District	1100-21	WTP HGL Analysis	Completed
Riviera Beach Utility District	1100-22	Construction Testing Services (LS 10 and LS 50 Rehabilitation)	Completed
Riviera Beach Utility District	1100-23	Main Electrical Room Modifications - Electrical Code Compliance	Completed
Riviera Beach Utility District	1100-24	Construction Additional Testing Services (LS 10 and LS 50 Rehabilitation)	Completed
Riviera Beach Utility District	1100-26	Water Distribution System Flushing Plan Development	Open
Riviera Beach Utility District	1100-27	North Chemical Building Structural Rehabiltation	Completed
Riviera Beach Utility District	1100-28	Lift Station 19 Design Services	Open
Riviera Beach Utility District	1100-29	Additional Engineering Services LS10&50	Completed
Riviera Beach Utility District	1100-30	LS47 Design Services	Open
Hazen and Sawyer	1140-01	Palm Beach County Wasteater Master Plan	Completed
Hazen and Sawyer	1140-02	City of Riviera Beach Water and Wastewater Master Plan	Completed
Hazen and Sawyer	1140-03	Glades Wastewater Master Plan	Completed

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Client	Project No.	Job Description	Project Status
Hazen and Sawyer	1140-04	Glades SSES Initial Flow Monitoring	Completed
Hazen and Sawyer	1140-05	GladesSSES Smoke Testing and Manhole Inspections	Completed
Hazen and Sawyer	1140-06	Glades SSES Video Inspection	Completed
Hazen and Sawyer	1140-07	Glades Infiltration / Inflow Projects – Belle Glade Video Survey	Completed
Hazen and Sawyer	1140-08	Glades SSES Additional Services and Sewer Rehabilitation Biddin	Completed
Hazen and Sawyer	1140-09	Deerfield Beach Stormwater Utility Study	Completed
MDWASD	1150-01	VE North District WWTP Pretreatment Upgrade	Completed
MDWASD	1150-02	VE Central District WWTP Injection Well Pump Station	Completed
MDWASD	1150-03	CDWWTP Oxygenation Basins Rehabiltation	Open
MDWASD	1150-04	Design of Wastewater PS D-2-D3	Open
Poole and Kent	1180-01	North District WTP Pretreatment/Sludge Transfer Rehab Headworks Upgrade	Completed
Poole and Kent	1180-02	Interceptor Box	Completed
Poole and Kent	1180-03	BioRem Tower Analysis	Completed
Poole and Kent	1180-04	Wet well Design	Completed
Black and Veach	1190-02	MDWASD Filter Pilot Testing	Awaiting NTP
Black and Veatch	1190-03	CDWWTP Filtration and Disinfection System Design	Open
Brown and Caldwell	1200 -01	Hollywood Pipeline	Open
Brown and Caldwell	1200 -02	PBC Pahokee WWTP Review	Completed
Brown and Caldwell	1200 -03	PBC WRNWWTF Facilities Plan	Open
Reiss Engineering	1210-01	Lift Station218 Structural	Open
Reiss Engineering	1210-02	City of Orlando Emergency Generator Building	Open

E Location

RFP-RFQ-RLI LOCATION ATTESTATION FORM (EVALUATION CRITERIA)

The completed and signed form and supporting information (if applicable, for Joint Ventures) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit this form and supporting information may affect the Vendor's evaluation. Provided information is subject to verification by the County.

A Vendor's principal place of business location (also known as the nerve center) within Broward County is considered in accordance with Evaluation Criteria. The County's definition of a principal place of business is:

1. As defined by the Broward County Local Preference Ordinance, "Principal place of business means the nerve center or center of overall direction, control and coordination of the activities of the bidder [Vendor]. If the bidder has only one (1) business location, such business location shall be considered its principal place of business."

2. A principal place of business refers to the place where a corporation's officers direct, control, and coordinate the corporation's day-to-day activities. It is the corporation's 'nerve center' and in practice it should normally be the place where the corporation maintains its headquarters; provided that the headquarters is the actual center of direction, control, and coordination, i.e., the 'nerve center', and not simply an office where the corporation holds its board meetings (for example, attended by directors and officers who have traveled there for the occasion).

The Vendor's principal place of business in Broward County shall be the Vendor's "Principal Address" indicated with the Florida Department of State Division of Corporations, for at least six months prior to the solicitation's due date.

Check one of the following:

☒ The Vendor certifies that it has a principal place of business location (also known as the nerve center) within Broward County, as documented in Florida Department of State Division of Corporations (Sunbiz), and attests to the following statements:

1. Vendor's address listed in its submittal is its principal place of business as defined by Broward County;

2. Vendor's "Principal Address" listed with the Florida Department of State Division of Corporations is the same as the address listed in its submittal and the address was listed for at least six months prior to the solicitation's opening date. A copy of Florida Department of State Division of Corporations (Sunbiz) is attached as verification.

3. Vendor must be located at the listed "nerve center" address ("Principal Address") for at least six (6) months prior to the solicitation's opening date;

4. Vendor has not merged with another firm within the last six months that is not headquartered in Broward County and is not a wholly owned subsidiary or a holding company of another firm that is not headquartered in Broward County;

5. If awarded a contract, it is the intent of the Vendor to remain at the referenced address for the duration of the contract term, including any renewals, extensions or any approved interim contracts for the services provided under this contract; and

6. The Vendor understands that if after contract award, the County learns that the attestation was erroneous, and upon investigation determines that the error was willful or intentional on

the part of the Vendor, the County may, on that basis exercise any contractual right to terminate the contract. Further any misleading, inaccurate, false information or documentation submitted by any party affiliated with this procurement may lead to suspension and/or debarment from doing business with Broward County as outlined in the Procurement Code, Section 21.119.

If the Vendor is submitting a response as a Joint Venture, the following information is required to be submitted:

a. Name of the Joint Venture Partnership
b. Percentage of Equity for all Joint Venture Partners
c. A copy of the executed Agreement(s) between the Joint Venture Partners

☐ Vendor does not have a principal place of business location (also known as the nerve center) within Broward County.

Vendor Information:

Vendor Name: C Solutions, Inc.

Vendor's address listed in its submittal is:

610 SE 14th Ct. No. 2
Ft. Lauderdale, FL 33316

The signature below must be by an individual authorized to bind the Vendor. The signature below is an attestation that all information listed above and provided to Broward County is true and accurate.

Authorized Signature/Name	Title	Vendor Name	Date
Mark Drummon P.E., BCEE	President	C Solutions, Inc.	6/19/2018

RFP-RLI-RFQ LOCAL PREFERENCE AND TIE BREAKER CERTIFICATION FORM

The completed and signed form should be returned with the Vendor's submittal to determine Local Preference eligibility, however it must be returned at time of solicitation submittal to qualify for the Tie Break criteria. If not provided with submittal, the Vendor must submit within three business days of County's request for evaluation of Local Preference. Proof of a local business tax should be submitted with this form. Failure to timely submit this form or local business tax receipt may render the business ineligible for application of the Local Preference or Tie Break Criteria.

In accordance with Section 21.31.d. of the Broward County Procurement Code, to qualify for the Tie Break Criteria, the undersigned Vendor hereby certifies that (check box if applicable):

☐ The Vendor is a local Vendor in Broward County and:

a. has a valid Broward County local business tax receipt;
b. has been in existence for at least six-months prior to the solicitation opening;
c. at a business address physically located within Broward County;
d. in an area zoned for such business;
e. provides services from this location on a day-to-day basis, and
f. services provided from this location are a substantial component of the services offered in the Vendor's proposal.

In accordance with Local Preference, Section 1-74, et. seq., Broward County Code of Ordinances, a local business meeting the below requirements is eligible for Local Preference. To qualify for the Local Preference, the undersigned Vendor hereby certifies that (check box if applicable):

☒ The Vendor is a local Vendor in Broward and:

a. has a valid Broward County local business tax receipt issued at least one year prior to solicitation opening;
b. has been in existence for at least one-year prior to the solicitation opening;
c. provides services on a day-to-day basis, at a business address physically located within the Broward County limits in an area zoned for such business; and
d. the services provided from this location are a substantial component of the services offered in the Vendor's proposal.

Local Business Address: 610 SE 14th Ct., No. 2
Ft. Lauderdale, FL 33316

Vendor does not qualify for Tie Break Criteria or Local Preference, in accordance with the above requirements. The undersigned Vendor hereby certifies that (check box if applicable): ☐ The Vendor is not a local Vendor in Broward County.

Mark Drummond P.E., BCEE	President	C Solutions, Inc.	6/19/2018
AUTHORIZED SIGNATURE/NAME	**TITLE**	**COMPANY**	**DATE**

CSOLUTIONS
bringing solutions to mind

F. Willingness to Meet Time and Budget Requirements

The Request for Qualifications requires an indication of the firm's ability to meet budget and schedule. C Solutions is committed to providing quality, cost-efficient deliverables within the schedule and budget provided.

A shared understanding of the problem, the need, and the goal is critical to achieving the right solution within the required schedule and budget.

We believe that meeting the triple constraint of time, budget and quality is necessary for every project and relies on the quality of the client-consultant relationship. A shared understanding of the problem, the need, and the goal is critical to achieving the right solution within the required schedule and budget. C Solutions' quality assurance program includes project scheduling and management and budgetary control measures as well as quality assurance and control. The use of senior professionals and focus on client relationships gives us the confidence to clearly define project parameters and commit to achieving project design deliverables within the specified time and budget.

A shared understanding of the problem, the need, and the goal is critical to achieving the right solution within the required schedule and budget

Our approach is simple – provide focused expertise to meet our client's needs. Project focus and continued momentum are key to the efficiency of project delivery. To this end, C Solutions creates a detailed and individualized plan for each work order assigned to us; establishes project standards for the team; provides a committed senior professional with the required experience to perform the assigned tasks; routinely monitors schedule and cost against the developed work plan; maintains timely communication and coordination between the project team; and provides a senior design professional, not involved in day-to-day design, to review project deliverables at all critical stages of project delivery.

We pride ourselves on providing a quality product and having a thorough understanding of the client's expectations and a project's desired end result and commit to doing that for Broward County's Water and Wastewater Services (WWS).

G. Volume of Work

VOLUME OF PREVIOUS WORK ATTESTATION FORM

The completed and signed form should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to provide timely may affect the Vendor's evaluation. This completed form must be included with the Vendor's submittal at the time of the opening deadline to be considered for a Tie Breaker criterion (if applicable).

The calculation for Volume of Previous Work is all amounts paid to the prime Vendor by Broward County Board of County Commissioners at the time of the solicitation opening date within a five-year timeframe. The calculation of Volume of Previous Work for a prime Vendor previously awarded a contract as a member of a Joint Venture firm is based on the actual equity ownership of the Joint Venture firm.

In accordance with Section 21.31.d. of the Broward County Procurement Code, the Vendor with the lowest dollar volume of work previously paid by the County over a five-year period from the date of the submittal opening will receive the Tie Breaker.

Vendor must list all projects it received payment from Broward County Board of County Commissioners during the past five years. If the Vendor is submitting as a joint venture, the information provided should encompass the joint venture and each of the entities forming the joint venture. The Vendor attests to the following:

Item No.	Project Title	Solicitation/ Contract Number:	Department or Division	Date Awarded	Paid to Date Dollar Amount
1					
2					
3					
4					
5					
				Grand Total	0.00

Has the Vendor been a member/partner of a Joint Venture firm that was awarded a contract by the County?
Yes ☐ No ☒

If Yes, Vendor must submit a **Joint Vendor Volume of Work Attestation Form**.

Vendor Name: C Solutions, Inc.

Mark Drummond P.E., BCEE	President	6/19/2018
Authorized Signature/ Name	**Title**	**Date**

Supplier: **C Solutions Inc.**

Standard Instructions to Vendors
Request for Proposals, Request for Qualifications, or Request for Letters of Interest

Vendors are instructed to read and follow the instructions carefully, as any misinterpretation or failure to comply with instructions may lead to a Vendor's submittal being rejected.

Vendor MUST submit its solicitation response electronically and MUST confirm its submittal in order for the County to receive a valid response through BidSync. Refer to the Purchasing Division website or contact BidSync for submittal instructions.

A. Responsiveness Criteria:

In accordance with Broward County Procurement Code Section 21.8.b.65, a Responsive Bidder [Vendor] means a person who has submitted a proposal which conforms in all material respects to a solicitation. The solicitation submittal of a responsive Vendor must be submitted on the required forms, which contain all required information, signatures, notarizations, insurance, bonding, security, or other mandated requirements required by the solicitation documents to be submitted at the time of proposal opening.

Failure to provide the information required below at the time of submittal opening may result in a recommendation Vendor is non-responsive by the Director of Purchasing. The Selection or Evaluation Committee will determine whether the firm is responsive to the requirements specified herein. The County reserves the right to waive minor technicalities or irregularities as is in the best interest of the County in accordance with Section 21.30.f.1(c) of the Broward County Procurement Code.

Below are standard responsiveness criteria; refer to **Special Instructions to Vendors**, for Additional Responsiveness Criteria requirement(s).

1. **Lobbyist Registration Requirement Certification**
   Refer to **Lobbyist Registration Requirement Certification** . The completed form should be submitted with the solicitation response but must be submitted within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

2. **Addenda**
   The County reserves the right to amend this solicitation prior to the due date. Any change(s) to this solicitation will be conveyed through the written addenda process. Only written addenda will be binding. If a "must" addendum is issued, Vendor must follow instructions and submit required information, forms, or acknowledge addendum, as instructed therein. It is the responsibility of all potential Vendors to monitor the solicitation for any changing information, prior to submitting their response.

B. Responsibility Criteria:

Definition of a Responsible Vendor: In accordance with Section 21.8.b.64 of the Broward County Procurement Code, a Responsible Vendor means a Vendor who has the capability in all respects to perform the contract requirements, and the integrity and reliability which will assure good faith performance.

The Selection or Evaluation Committee will recommend to the awarding authority a determination of a Vendor's responsibility. At any time prior to award, the awarding authority may find that a Vendor is

not responsible to receive a particular award.

Failure to provide any of this required information and in the manner required may result in a recommendation by the Director of Purchasing that the Vendor is non-responsive.

Below are standard responsibility criteria; refer to **Special Instructions to Vendors**, for Additional Responsibility Criteria requirement(s).

1. **Litigation History**

   a. All Vendors are required to disclose to the County all "material" cases filed, pending, or resolved during the last three (3) years prior to the solicitation response due date, whether such cases were brought by or against the Vendor, any parent or subsidiary of the Vendor, or any predecessor organization. A case is considered to be "material" if it relates, in whole or in part, to any of the following:

      i. A similar type of work that the vendor is seeking to perform for the County under the current solicitation;
      ii. An allegation of negligence, error or omissions, or malpractice against the vendor or any of its principals or agents who would be performing work under the current solicitation;
      iii. A vendor's default, termination, suspension, failure to perform, or improper performance in connection with any contract;
      iv. The financial condition of the vendor, including any bankruptcy petition (voluntary and involuntary) or receivership; or
      v. A criminal proceeding or hearing concerning business-related offenses in which the vendor or its principals (including officers) were/are defendants.

   b. For each material case, the Vendor is required to provide all information identified on the **Litigation History Form**.

   c. The County will consider a Vendor's litigation history information in its review and determination of responsibility.

   d. If the Vendor is a joint venture, the information provided should encompass the joint venture and each of the entities forming the joint venture.

   e. A Vendor is also required to disclose to the County any and all case(s) that exist between the County and any of the Vendor's subcontractors/subconsultants proposed to work on this project.

   f. Failure to disclose any material case, or to provide all requested information in connection with each such case, may result in the Vendor being deemed non-responsive.

2. **Financial Information**

   a. All Vendors are required to provide the Vendor's financial statements at the time of submittal in order to demonstrate the Vendor's financial capabilities.

   b. Each Vendor shall submit its most recent two years of financial statements for review. The financial statements are not required to be audited financial statements. The annual financial statements will be in the form of:

      i. Balance sheets, income statements and annual reports; or
      ii. Tax returns; or
      iii. SEC filings.

If tax returns are submitted, ensure it does not include any personal information (as defined under Florida Statutes Section 501.171, Florida Statutes), such as social security numbers, bank account or credit card numbers, or any personal pin numbers. If any personal information data is part of financial statements, redact information prior to submitting a response the County.

c. If a Vendor has been in business for less than the number of years of required financial statements, then the Vendor must disclose all years that the Vendor has been in business, including any partial year-to-date financial statements.

d. The County may consider the unavailability of the most recent year's financial statements and whether the Vendor acted in good faith in disclosing the financial documents in its evaluation.

e. Any claim of confidentiality on financial statements should be asserted at the time of submittal. Refer to **Standard Instructions to Vendors**, Confidential Material/ Public Records and Exemptions for instructions on submitting confidential financial statements. The Vendor's failure to provide the information as instructed may lead to the information becoming public.

f. Although the review of a Vendor's financial information is an issue of responsibility, the failure to either provide the financial documentation or correctly assert a confidentiality claim pursuant the Florida Public Records Law and the solicitation requirements (Confidential Material/ Public Records and Exemptions section) may result in a recommendation of non-responsiveness by the Director of Purchasing.

3. **Authority to Conduct Business in Florida**

a. A Vendor must have the authority to transact business in the State of Florida and be in good standing with the Florida Secretary of State. For further information, contact the Florida Department of State, Division of Corporations.

b. The County will review the Vendor's business status based on the information provided in response to this solicitation.

c. It is the Vendor's responsibility to comply with all state and local business requirements.

d. Vendor should list its active Florida Department of State Division of Corporations Document Number (or Registration No. for fictitious names) in the **Vendor Questionnaire**, Question No. 10.

e. If a Vendor is an out-of-state or foreign corporation or partnership, the Vendor must obtain the authority to transact business in the State of Florida or show evidence of application for the authority to transact business in the State of Florida, upon request of the County.

f. A Vendor that is not in good standing with the Florida Secretary of State at the time of a submission to this solicitation may be deemed non-responsible.

g. If successful in obtaining a contract award under this solicitation, the Vendor must remain in good standing throughout the contractual period of performance.

4. **Affiliated Entities of the Principal(s)**

a. All Vendors are required to disclose the names and addresses of "affiliated entities" of the Vendor's principal(s) over the last five (5) years (from the solicitation opening deadline) that have acted as a prime Vendor with the County. The Vendor is required to provide all

information required on the **Affiliated Entities of the Principal(s) Certification Form**.

b. The County will review all affiliated entities of the Vendor's principal(s) for contract performance evaluations and the compliance history with the County's Small Business Program, including CBE, DBE and SBE goal attainment requirements. "Affiliated entities" of the principal(s) are those entities related to the Vendor by the sharing of stock or other means of control, including but not limited to a subsidiary, parent or sibling entity.

c. The County will consider the contract performance evaluations and the compliance history of the affiliated entities of the Vendor's principals in its review and determination of responsibility.

5. Insurance Requirements

The **Insurance Requirement Form** reflects the insurance requirements deemed necessary for this project. It is not necessary to have this level of insurance in effect at the time of submittal, but it is necessary to submit certificates indicating that the Vendor currently carries the insurance or to submit a letter from the carrier indicating it can provide insurance coverages.

C. Additional Information and Certifications

The following forms and supporting information (if applicable) should be returned with Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit may affect Vendor's evaluation.

1. Vendor Questionnaire

Vendor is required to submit detailed information on their firm. Refer to the **Vendor Questionnaire** and submit as instructed.

2. Standard Certifications

Vendor is required to certify to the below requirements. Refer to the **Standard Certifications** and submit as instructed.

a. **Cone of Silence Requirement Certification**
b. **Drug-Free Workplace Certification**
c. **Non-Collusion Certification**
d. **Public Entities Crimes Certification**
e. **Scrutinized Companies List Certification**

3. Subcontractors/Subconsultants/Suppliers Requirement

The Vendor shall submit a listing of all subcontractors, subconsultants, and major material suppliers, if any, and the portion of the contract they will perform. Vendors must follow the instructions included on the **Subcontractors/Subconsultants/Suppliers Information Form** and submit as instructed.

D. Standard Agreement Language Requirements

1. The acceptance of or any exceptions taken to the terms and conditions of the County's Agreement shall be considered a part of a Vendor's submittal and will be considered by the Selection or Evaluation Committee.

2. The applicable Agreement terms and conditions for this solicitation are indicated in the **Special Instructions to Vendors.**

3. Vendors are required to review the applicable terms and conditions and submit the **Agreement Exception Form**. If the **Agreement Exception Form** is not provided with the submittal, it shall

be deemed an affirmation by the Vendor that it accepts the Agreement terms and conditions as disclosed in the solicitation.

4. If exceptions are taken, the Vendor must specifically identify each term and condition with which it is taking an exception. Any exception not specifically listed is deemed waived. Simply identifying a section or article number is not sufficient to state an exception. Provide either a redlined version of the specific change(s) or specific proposed alternative language. Additionally, a brief justification specifically addressing each provision to which an exception is taken should be provided.

5. Submission of any exceptions to the Agreement does not denote acceptance by the County. Furthermore, taking exceptions to the County's terms and conditions may be viewed unfavorably by the Selection or Evaluation Committee and ultimately may impact the overall evaluation of a Vendor's submittal.

E. Evaluation Criteria

1. The Selection or Evaluation Committee will evaluate Vendors as per the **Evaluation Criteria.** The County reserves the right to obtain additional information from a Vendor.

2. Vendor has a continuing obligation to inform the County in writing of any material changes to the information it has previously submitted. The County reserves the right to request additional information from Vendor at any time.

3. For Request for Proposals, the following shall apply:

   a. The Director of Purchasing may recommend to the Evaluation Committee to short list the most qualified firms prior to the Final Evaluation.

   b. The Evaluation Criteria identifies points available; a total of 100 points is available.

   c. If the Evaluation Criteria includes a request for pricing, the total points awarded for price is determined by applying the following formula:

      (Lowest Proposed Price/Vendor's Price) x (Maximum Number of Points for Price)
      = Price Score

   d. After completion of scoring, the County may negotiate pricing as in its best interest.

4. For Requests for Letters of Interest or Request for Qualifications, the following shall apply:

   a. The Selection or Evaluation Committee will create a short list of the most qualified firms.

   b. The Selection or Evaluation Committee will either:

      i. Rank shortlisted firms; or
      ii. If the solicitation is part of a two-step procurement, shortlisted firms will be requested to submit a response to the Step Two procurement.

F. Demonstrations

If applicable, as indicated in **Special Instructions to Vendors**, Vendors will be required to demonstrate the nature of their offered solution. After receipt of submittals, all Vendors will receive a description of, and arrangements for, the desired demonstration. A copy of the demonstration (hard copy, DVD, CD, flash drive or a combination of both) should be given to the Purchasing Agent at the demonstration meeting to retain in the Purchasing files.

G. Presentations

Vendors that are found to be both responsive and responsible to the requirements of the solicitation and/or shortlisted (if applicable) will have an opportunity to make an oral presentation to the Selection or Evaluation Committee on the Vendor's approach to this project and the Vendor's ability to perform. The committee may provide a list of subject matter for the discussion. All Vendor's will have equal time to present but the question-and-answer time may vary.

H. Public Art and Design Program

If indicated in **Special Instructions to Vendors,** Public Art and Design Program, Section 1-88, Broward County Code of Ordinances, applies to this project. It is the intent of the County to functionally integrate art, when applicable, into capital projects and integrate artists' design concepts into this improvement project. The Vendor may be required to collaborate with the artist(s) on design development within the scope of this request. Artist(s) shall be selected by Broward County through an independent process. For additional information, contact the Broward County Cultural Division.

I. Committee Appointment

The Cone of Silence shall be in effect for County staff at the time of the Selection or Evaluation Committee appointment and for County Commissioners and Commission staff at the time of the Shortlist Meeting of the Selection Committee or the Initial Evaluation Meeting of the Evaluation Committee. The committee members appointed for this solicitation are available on the Purchasing Division's website under Committee Appointment.

J. Committee Questions, Request for Clarifications, Additional Information

At any committee meeting, the Selection or Evaluation Committee members may ask questions, request clarification, or require additional information of any Vendor's submittal or proposal. It is highly recommended Vendors attend to answer any committee questions (if requested), including a Vendor representative that has the authority to bind.

Vendor's answers may impact evaluation (and scoring, if applicable). Upon written request to the Purchasing Agent prior to the meeting, a conference call number will be made available for Vendor participation via teleconference. Only Vendors that are found to be both responsive and responsible to the requirements of the solicitation and/or shortlisted (if applicable) are requested to participate in a final (or presentation) Selection or Evaluation committee meeting.

K. Vendor Questions

The County provides a specified time for Vendors to ask questions and seek clarification regarding solicitation requirements. All questions or clarification inquiries must be submitted through BidSync by the date and time referenced in the solicitation document (including any addenda). The County will respond to questions via Bid Sync.

L. Confidential Material/ Public Records and Exemptions

1. Broward County is a public agency subject to Chapter 119, Florida Statutes. Upon receipt, all submittals become "public records" and shall be subject to public disclosure consistent with Chapter 119, Florida Statutes. Submittals may be posted on the County's public website or included in a public records request response, unless there is a declaration of "confidentiality" pursuant to the public records law and in accordance with the procedures in this section.

2. Any confidential material(s) the Vendor asserts is exempt from public disclosure under Florida Statutes must be labeled as "Confidential", and marked with the specific statute and subsection

asserting exemption from Public Records.

3. To submit confidential material, three hardcopies must be submitted in a sealed envelope, labeled with the solicitation number, title, date and the time of solicitation opening to:

   Broward County Purchasing Division
   115 South Andrews Avenue, Room 212
   Fort Lauderdale, FL 33301

4. Material will not be treated as confidential if the Vendor does not cite the applicable Florida Statute (s) allowing the document to be treated as confidential.

5. Any materials that the Vendor claims to be confidential and exempt from public records must be marked and separated from the submittal. If the Vendor does not comply with these instructions, the Vendor's claim for confidentiality will be deemed as waived.

6. Submitting confidential material may impact full discussion of your submittal by the Selection or Evaluation Committee because the Committee will be unable to discuss the details contained in the documents cloaked as confidential at the publicly noticed Committee meeting.

M. Copyrighted Materials

Copyrighted material is not exempt from the Public Records Law, Chapter 119, Florida Statutes. Submission of copyrighted material in response to any solicitation will constitute a license and permission for the County to make copies (including electronic copies) as reasonably necessary for the use by County staff and agents, as well as to make the materials available for inspection or production pursuant to Public Records Law, Chapter 119, Florida Statutes.

N. State and Local Preferences

If the solicitation involves a federally funded project where the fund requirements prohibit the use of state and/or local preferences, such preferences contained in the Local Preference Ordinance and Broward County Procurement Code will not be applied in the procurement process.

O. Local Preference

Except where otherwise prohibited by federal or state law or other funding source restrictions, a local Vendor whose submittal is within 5% of the highest total ranked Vendor outside of the preference area will become the Vendor with whom the County will proceed with negotiations for a final contract. Refer to **Local Vendor Certification Form (Preference and Tiebreaker)** for further information.

P. Tiebreaker Criteria

In accordance with Section 21.31.d of the Broward County Procurement Code, the tiebreaker criteria shall be applied based upon the information provided in the Vendor's response to the solicitation. In order to receive credit for any tiebreaker criterion, complete and accurate information must be contained in the Vendor's submittal.

1. **Local Vendor Certification Form (Preference and Tiebreaker);**
2. **Domestic Partnership Act Certification (Requirement and Tiebreaker);**
3. **Tiebreaker Criteria Form: Volume of Work Over Five Years**

Q. Posting of Solicitation Results and Recommendations

The Broward County Purchasing Division's website is the location for the County's posting of all

solicitations and contract award results. It is the obligation of each Vendor to monitor the website in order to obtain complete and timely information.

R. Review and Evaluation of Responses

A Selection or Evaluation Committee is responsible for recommending the most qualified Vendor(s). The process for this procurement may proceed in the following manner:

1. The Purchasing Division delivers the solicitation submittals to agency staff for summarization for the committee members. Agency staff prepares a report, including a matrix of responses submitted by the Vendors. This may include a technical review, if applicable.

2. Staff identifies any incomplete responses. The Director of Purchasing reviews the information and makes a recommendation to the Selection or Evaluation Committee as to each Vendor's responsiveness to the requirements of the solicitation. The final determination of responsiveness rests solely on the decision of the committee.

3. At any time prior to award, the awarding authority may find that a Vendor is not responsible to receive a particular award. The awarding authority may consider the following factors, without limitation: debarment or removal from the authorized Vendors list or a final decree, declaration or order by a court or administrative hearing officer or tribunal of competent jurisdiction that the Vendor has breached or failed to perform a contract, claims history of the Vendor, performance history on a County contract(s), an unresolved concern, or any other cause under this code and Florida law for evaluating the responsibility of a Vendor.

S. Vendor Protest

Sections 21.118 and 21.120 of the Broward County Procurement Code set forth procedural requirements that apply if a Vendor intends to protest a solicitation or proposed award of a contract and state in part the following:

1. Any protest concerning the solicitation or other solicitation specifications or requirements must be made and received by the County within seven business days from the posting of the solicitation or addendum on the Purchasing Division's website. Such protest must be made in writing to the Director of Purchasing. Failure to timely protest solicitation specifications or requirements is a waiver of the ability to protest the specifications or requirements.

2. Any protest concerning a solicitation or proposed award above the award authority of the Director of Purchasing, after the RLI or RFP opening, shall be submitted in writing and received by the Director of Purchasing within five business days from the posting of the recommendation of award for Invitation to Bids or the final recommendation of ranking for Request for Letters of Interest and Request for Proposals on the Purchasing Division's website.

3. Any actual or prospective Vendor who has a substantial interest in and is aggrieved in connection with the proposed award of a contract which does not exceed the amount of the award authority of the Director of Purchasing, may protest to the Director of Purchasing. The protest shall be submitted in writing and received within three (3) business days from the posting of the recommendation of award for Invitation to Bids or the final recommendation of ranking for Request for Letters of Interest and Request for Proposals on the Purchasing Division's website.

4. For purposes of this section, a business day is defined as Monday through Friday between 8:30 a.m. and 5:00 p.m. Failure to timely file a protest within the time prescribed for a proposed contract award shall be a waiver of the Vendor's right to protest.

5. Protests arising from the decisions and votes of a Selection or Evaluation Committee shall be limited to protests based upon the alleged deviations from established committee procedures set forth in the Broward County Procurement Code and existing written guidelines. Any allegations of misconduct or misrepresentation on the part of a competing Vendor shall not be considered a protest.

6. As a condition of initiating any protest, the protestor shall present the Director of Purchasing a nonrefundable filing fee in accordance with the table below.

Estimated Contract Amount	Filing Fee
$30,000 - $250,000	$ 500
$250,001 - $500,000	$1,000
$500,001 - $5 million	$3,000
Over $5 million	$5,000

If no contract proposal amount was submitted, the estimated contract amount shall be the County's estimated contract price for the project. The County may accept cash, money order, certified check, or cashier's check, payable to Broward County Board of Commissioners.

T. Right of Appeal

Pursuant to Section 21.83.d of the Broward County Procurement Code, any Vendor that has a substantial interest in the matter and is dissatisfied or aggrieved in connection with the Selection or Evaluation Committee's determination of responsiveness may appeal the determination pursuant to Section 21.120 of the Broward County Procurement Code.

1. The appeal must be in writing and sent to the Director of Purchasing within ten (10) calendar days of the determination by the Selection or Evaluation Committee to be deemed timely.

2. As required by Section 21.120, the appeal must be accompanied by an appeal bond by a Vendor having standing to protest and must comply with all other requirements of this section.

3. The institution and filing of an appeal is an administrative remedy to be employed prior to the institution and filing of any civil action against the County concerning the subject matter of the appeal.

U. Rejection of Responses

The Selection or Evaluation Committee may recommend rejecting all submittals as in the best interests of the County. The rejection shall be made by the Director of Purchasing, except when a solicitation was approved by the Board, in which case the rejection shall be made by the Board.

V. Negotiations

The County intends to conduct the first negotiation meeting no later than two weeks after approval of the final ranking as recommended by the Selection or Evaluation Committee. At least one of the representatives for the Vendor participating in negotiations with the County must be authorized to bind the Vendor. In the event that the negotiations are not successful within a reasonable timeframe (notification will be provided to the Vendor) an impasse will be declared and negotiations with the first-ranked Vendor will cease. Negotiations will begin with the next ranked Vendor, etc. until such time that all requirements of Broward County Procurement Code have been met.

W. Submittal Instructions:

1. Broward County does not require any personal information (as defined under Section 501.171, Florida Statutes), such as social security numbers, driver license numbers, passport, military ID, bank account or credit card numbers, or any personal pin numbers, in order to submit a response for ANY Broward County solicitation. DO NOT INCLUDE any personal information data in any document submitted to the County. If any personal information data is part of a submittal, this information must be redacted prior to submitting a response to the County.

2. **Vendor MUST submit its solicitation response electronically and MUST confirm its submittal in order for the County to receive a valid response through BidSync.** It is the Vendor's sole responsibility to assure its response is submitted and received through BidSync by the date and time specified in the solicitation.

3. The County will not consider solicitation responses received by other means. Vendors are encouraged to submit their responses in advance of the due date and time specified in the solicitation document. In the event that the Vendor is having difficulty submitting the solicitation document through Bid Sync, immediately notify the Purchasing Agent and then contact BidSync for technical assistance.

4. Vendor must view, submit, and/or accept each of the documents in BidSync. Web-fillable forms can be filled out and submitted through BidSync.

5. After all documents are viewed, submitted, and/or accepted in BidSync, the Vendor must upload additional information requested by the solicitation (i.e. Evaluation Criteria and Financials Statements) in the Item Response Form in BidSync, under line one (regardless if pricing requested).

6. Vendor should upload responses to Evaluation Criteria in Microsoft Word or Excel format.

7. If the Vendor is declaring any material confidential and exempt from Public Records, refer to Confidential Material/ Public Records and Exemptions for instructions on submitting confidential material.

8. After all files are uploaded, Vendor must submit and **CONFIRM** its offer (by entering password) for offer to be received through BidSync.

9. If a solicitation requires an original Proposal Bond (per Special Instructions to Vendors), Vendor must submit in a sealed envelope, labeled with the solicitation number, title, date and the time of solicitation opening to:

   Broward County Purchasing Division
   115 South Andrews Avenue, Room 212
   Fort Lauderdale, FL 33301

   A copy of the Proposal Bond should also be uploaded into Bid Sync; this does not replace the requirement to have an original proposal bond. Vendors must submit the original Proposal Bond, by the solicitation due date and time.

Supplier: **C Solutions Inc.**

VENDOR QUESTIONNAIRE AND STANDARD CERTIFICATIONS
Request for Proposals, Request for Qualifications, or Request for Letters of Interest

Vendor should complete questionnaire and complete and acknowledge the standard certifications and submit with the solicitation response. If not submitted with solicitation response, it must be submitted within three business days of County's request. Failure to timely submit may affect Vendor's evaluation.

If a response requires additional information, the Vendor should upload a written detailed response with submittal; each response should be numbered to match the question number. The completed questionnaire and attached responses will become part of the procurement record. It is imperative that the person completing the Vendor Questionnaire be knowledgeable about the proposing Vendor's business and operations.

1. Legal business name:**C Solutions, Inc.**
2. Doing Business As/ Fictitious Name (if applicable):
3. Federal Employer I.D. no. (FEIN):**20-2591227**
4. Dun and Bradstreet No.:
5. Website address (if applicable): **www.csolutions-us.com**
6. Principal place of business address: **610 SE 14th Ct., No. 2**
   Ft Lauderdale, FL 33316
7. Office location responsible for this project: **610 SE 14th Ct., No. 2**
   Ft Lauderdale, FL 33316
8. Telephone no.:**954-320-7899** Fax no.:**954-320-7860**
9. Type of business (check appropriate box):
   - ☑ Corporation (specify the state of incorporation):**Florida**
   - ☐ Sole Proprietor
   - ☐ Limited Liability Company (LLC)
   - ☐ Limited Partnership
   - ☐ General Partnership (State and County Filed In)
   - ☐ Other - Specify
10. List Florida Department of State, Division of Corporations document number (or registration number if fictitious name): **P05000044397**
11. List name and title of each principal, owner, officer, and major shareholder:
    a) **Mark Drummond P.E., BCEE**
    b)
    c)
    d)
12. AUTHORIZED CONTACT(S) FOR YOUR FIRM:

Name: **Mark Drummond P.E., BCEE**

Title: **President**

E-mail: **mdrummond@csolutions-us.com**

Telephone No.: **954-320-7899**

Name: **Ann Petley**

Title: **Executive Assistant**

E-mail: **apetley@csolutions-us.com**

Telephone No.: **954-320-7899**

13.	Has your firm, its principals, officers or predecessor organization(s) been debarred or suspended by any government entity within the last three years? If yes, specify details in an attached written response.	☐ Yes ☑ No
14.	Has your firm, its principals, officers or predecessor organization(s) ever been debarred or suspended by any government entity? If yes, specify details in an attached written response, including the reinstatement date, if granted.	☐ Yes ☑ No
15.	Has your firm ever failed to complete any services and/or delivery of products during the last three (3) years? If yes, specify details in an attached written response.	☐ Yes ☑ No
16.	Is your firm or any of its principals or officers currently principals or officers of another organization? If yes, specify details in an attached written response.	☐ Yes ☑ No
17.	Have any voluntary or involuntary bankruptcy petitions been filed by or against your firm, its parent or subsidiaries or predecessor organizations during the last three years? If yes, specify details in an attached written response.	☐ Yes ☑ No
18.	Has your firm's surety ever intervened to assist in the completion of a contract or have Performance and/or Payment Bond claims been made to your firm or its predecessor's sureties during the last three years? If yes, specify details in an attached written response, including contact information for owner and surety.	☐ Yes ☑ No
19.	Has your firm ever failed to complete any work awarded to you, services and/or delivery of products during the last three (3) years? If yes, specify details in an attached written response.	☐ Yes ☑ No
20.	Has your firm ever been terminated from a contract within the last three years? If yes, specify details in an attached written response.	☐ Yes ☑ No
21.	Living Wage solicitations only: In determining what, if any, fiscal impacts(s) are a result of the Ordinance for this solicitation, provide the following for informational purposes only. Response is not considered in determining the award of this contract. Living Wage had an effect on the pricing. If yes, Living Wage increased the pricing by% or decreased the pricing by%.	☐ Yes ☑ No ☑ N/A

Cone of Silence Requirement Certification:

The Cone of Silence Ordinance, Section 1-266, Broward County Code of Ordinances prohibits certain communications among Vendors, Commissioners, County staff, and Selection or Evaluation Committee members. Identify on a separate sheet any violations of this Ordinance by any members of the responding firm or its joint ventures. After the application of the Cone of Silence, inquiries regarding this solicitation should be directed to the Director of Purchasing or designee. The Cone of Silence terminates when the County Commission or other awarding authority takes action which ends the solicitation.

The Vendor hereby certifies that: (check each box)

☑ The Vendor has read Cone of Silence Ordinance, Section 1-266, Broward County Code of Ordinances; and

☑ The Vendor understands that the Cone of Silence for this competitive solicitation shall be in effect beginning

upon the appointment of the Selection or Evaluation Committee, for communication regarding this solicitation with the County Administrator, Deputy County Administrator, Assistant County Administrators, and Assistants to the County Administrator and their respective support staff or any person, including Evaluation or Selection Committee members, appointed to evaluate or recommend selection in this RFP/RLI process. For Communication with County Commissioners and Commission staff, the Cone of Silence allows communication until the initial Evaluation or Selection Committee Meeting.

☑ The Vendor agrees to comply with the requirements of the Cone of Silence Ordinance.

Drug-Free Workplace Requirements Certification:
Section 21.31.a. of the Broward County Procurement Code requires awards of all competitive solicitations requiring Board award be made only to firms certifying the establishment of a drug free workplace program. The program must consist of:

1. Publishing a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the offeror's workplace, and specifying the actions that will be taken against employees for violations of such prohibition;

2. Establishing a continuing drug-free awareness program to inform its employees about:
   a. The dangers of drug abuse in the workplace;
   b. The offeror's policy of maintaining a drug-free workplace;
   c. Any available drug counseling, rehabilitation, and employee assistance programs; and
   d. The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

3. Giving all employees engaged in performance of the contract a copy of the statement required by subparagraph 1;

4. Notifying all employees, in writing, of the statement required by subparagraph 1, that as a condition of employment on a covered contract, the employee shall:
   a. Abide by the terms of the statement; and
   b. Notify the employer in writing of the employee's conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or of any state, for a violation occurring in the workplace NO later than five days after such conviction.

5. Notifying Broward County government in writing within 10 calendar days after receiving notice under subdivision 4.b above, from an employee or otherwise receiving actual notice of such conviction. The notice shall include the position title of the employee;

6. Within 30 calendar days after receiving notice under subparagraph 4 of a conviction, taking one of the following actions with respect to an employee who is convicted of a drug abuse violation occurring in the workplace:
   a. Taking appropriate personnel action against such employee, up to and including termination; or
   b. Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency; and

7. Making a good faith effort to maintain a drug-free workplace program through implementation of subparagraphs 1 through 6.

The Vendor hereby certifies that: (check box)

☑ The Vendor certifies that it has established a drug free workplace program in accordance with the above requirements.

Non-Collusion Certification:
Vendor shall disclose, to their best knowledge, any Broward County officer or employee, or any relative of any such officer or employee as defined in Section 112.3135 (1) (c), Florida Statutes, who is an officer or director of, or has a material interest in, the Vendor's business, who is in a position to influence this procurement. Any Broward

County officer or employee who has any input into the writing of specifications or requirements, solicitation of offers, decision to award, evaluation of offers, or any other activity pertinent to this procurement is presumed, for purposes hereof, to be in a position to influence this procurement. Failure of a Vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the Broward County Procurement Code.

The Vendor hereby certifies that: (select one)

☑ The Vendor certifies that this offer is made independently and free from collusion; or

☐ The Vendor is disclosing names of officers or employees who have a material interest in this procurement and is in a position to influence this procurement. Vendor must include a list of name(s), and relationship(s) with its submittal.

Public Entities Crimes Certification:
In accordance with Public Entity Crimes, Section 287.133, Florida Statutes, a person or affiliate placed on the convicted vendor list following a conviction for a public entity crime may not submit on a contract: to provide any goods or services; for construction or repair of a public building or public work; for leases of real property to a public entity; and may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in s. 287.017 for Category Two for a period of 36 months following the date of being placed on the convicted vendor list.

The Vendor hereby certifies that: (check box)

☑ The Vendor certifies that no person or affiliates of the Vendor are currently on the convicted vendor list and/or has not been found to commit a public entity crime, as described in the statutes.

Scrutinized Companies List Certification:
Any company, principals, or owners on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List is prohibited from submitting a response to a solicitation for goods or services in an amount equal to or greater than $1 million.

The Vendor hereby certifies that: (check each box)

☑ The Vendor, owners, or principals are aware of the requirements of Sections 287.135, 215.473, and 215.4275, Florida Statutes, regarding Companies on the Scrutinized Companies with Activities in Sudan List the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List; and

☑ The Vendor, owners, or principals, are eligible to participate in this solicitation and are not listed on either the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List; and

☑ If awarded the Contract, the Vendor, owners, or principals will immediately notify the County in writing if any of its principals are placed on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List.

I hereby certify the information provided in the Vendor Questionnaire and Standard Certifications:

Mark Drummond, P.E., BCEE	**President**	**7/13/2018**
*AUTHORIZED SIGNATURE/NAME	TITLE	DATE

Vendor Name: **C Solutions, Inc.**

* I certify that I am authorized to sign this solicitation response on behalf of the Vendor as indicated in Certificate as to Corporate Principal, designation letter by Director/Corporate Officer, or other business authorization to bind on behalf of the Vendor. As the Vendor's authorized representative, I attest that any and all statements, oral, written or otherwise, made in support of the Vendor's response, are accurate, true and correct. I also acknowledge that inaccurate, untruthful, or incorrect statements made in support of the Vendor's response may be used by the County as a basis for rejection, rescission of the award, or termination of the contract and may also serve as the basis for debarment of Vendor pursuant to Section 21.119 of the Broward County Procurement Code. I certify that the Vendor's response is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a response for the same items/services, and is in all respects fair and without collusion or fraud. I also certify that the Vendor agrees to abide by all terms and conditions of this solicitation, acknowledge and accept all of the solicitation pages as well as any special instructions sheet(s).

Supplier: **C Solutions Inc.**

Office of Economic and Small Business Requirements: CBE Goal Participation

A. In accordance with the Broward County Business Opportunity Act of 2012, Section 1-81, Code of Ordinances, as amended (the "Business Opportunity Act"), the County Business Enterprise (CBE) Program is applicable to this contract. All Vendors responding to this solicitation are required to utilize CBE firms to perform the assigned participation goal for this contract.

B. The CBE participation goal will be established based on the expected expenditure amount for the proposed scope of services for the project. The Office of Economic and Small Business Development (OESBD) will not include alternate items, optional services or allowances when establishing the CBE participation goal. If the County subsequently chooses to award any alternate items, optional services or allowances as determined by OESBD and the Contract Administrator to be related to the scope of services, OESBD may apply the established CBE participation goal. In such an instance, the County will issue a written notice to the successful Vendor that the CBE participation goal will also apply to the alternate items, optional services or allowances. Vendor shall submit all required forms pertaining to its compliance with the CBE participation goal, as applicable. Failure by Vendor to submit the required forms may result in the rejection of Vendor's solicitation submittal prior to the award or failure to comply with the contract requirements may have an impact on the vendor performance evaluation post award, as applicable.

C. CBE Program Requirements: Compliance with CBE participation goal requirements is a matter of responsibility; Vendor should submit all required forms and information with its solicitation submittal. If the required forms and information are not provided with the Vendor's solicitation submittal, then Vendor must supply the required forms and information no later than three (3) business days after request by OESBD. Vendor may be deemed non-responsible for failure to fully comply with CBE Program Requirements within these stated timeframes.

1. Vendor should include in its solicitation submittal a **Letter Of Intent Between Bidder/Offeror and County Business Enterprise (CBE) Subcontractor/Supplier** for each CBE firm the Vendor intends to use to achieve the assigned CBE participation goal. The form is available at the following link: http://www.broward.org/EconDev/Documents/CBELetterOfIntent.pdf

2. If Vendor is unable to attain the CBE participation goal, Vendor should include in its solicitation submittal an **Application for Evaluation of Good Faith Efforts** and all of the required supporting information. The form is available at the following link: http://www.broward.org/EconDev/WhatWeDo/Documents/GoodFaithEffortEval.pdf

D. OESBD maintains an online directory of CBE firms. The online directory is available for use by Vendors at https://webapps4.broward.org/smallbusiness/sbdirectory.aspx.

E. For detailed information regarding the CBE Program contact the OESBD at (954) 357-6400 or visit the website at: http://www.broward.org/EconDev/SmallBusiness/

F. If awarded the contract, Vendor agrees to and shall comply with all applicable requirements of the Business Opportunity Act and the CBE Program in the award and administration of the contract.

1. No party to this contract may discriminate on the basis of race, color, sex, religion,

national origin, disability, age, marital status, political affiliation, sexual orientation, pregnancy, or gender identity and expression in the performance of this contract.

2. All entities that seek to conduct business with the County, including Vendor or any Prime Contractors, Subcontractors, and Bidders, shall conduct such business activities in a fair and reasonable manner, free from fraud, coercion, collusion, intimidation, or bad faith. Failure to do so may result in the cancellation of this solicitation, cessation of contract negotiations, revocation of CBE certification, and suspension or debarment from future contracts.

3. If Vendor fails to meet or make Good Faith Efforts (as defined in the Business Opportunity Act) to meet the CBE participation commitment (the "Commitment"), then Vendor shall pay the County liquidated damages in an amount equal to fifty percent (50%) of the actual dollar amount by which Vendor failed to achieve the Commitment, up to a maximum amount of ten percent (10%) of the total contract amount, excluding costs and reimbursable expenses. An example of this calculation is stated in Section 1-81.7, Broward County Code of Ordinances.

4. Vendor shall comply with all applicable requirements of the Business Opportunity Act in the award of this contract. Failure by Vendor to carry out any of these requirements shall constitute a material breach of the contract, which shall permit the County to terminate this contract or to exercise any other remedy provided under this contract, the Broward County Code of Ordinances, the Broward County Administrative Code, or other applicable laws, with all such remedies being cumulative.

5. Vendor shall pay its CBE subcontractors and suppliers, within fifteen (15) days following receipt of payment from the County, for all completed subcontracted work and supplies. If Vendor withholds an amount from CBE subcontractors or suppliers as retainage, such retainage shall be released and paid within fifteen (15) days following receipt of payment of retained amounts from the County.

6. Vendor understands that the County will monitor Vendor's compliance with the CBE Program requirements. Vendor must provide OESBD with a Monthly Utilization Report (MUR) to confirm its compliance with the Commitment agreed to in the contract; timely submission of the MUR every month throughout the term of the contract, including amendment and extension terms, is a condition precedent to the County's payment of Vendor under the contract.

Supplier: **C Solutions Inc.**

AFFILIATED ENTITIES OF THE PRINCIPAL(S) CERTIFICATION FORM

The completed form should be submitted with the solicitation response but must be submitted within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

a. All Vendors are required to disclose the names and addresses of "affiliated entities" of the Vendor's principal(s) over the last five (5) years (from the solicitation opening deadline) that have acted as a prime Vendor with the County.

b. The County will review all affiliated entities of the Vendor's principal(s) for contract performance evaluations and the compliance history with the County's Small Business Program, including CBE, DBE and SBE goal attainment requirements. "Affiliated entities" of the principal(s) are those entities related to the Vendor by the sharing of stock or other means of control, including but not limited to a subsidiary, parent or sibling entity.

c. The County will consider the contract performance evaluations and the compliance history of the affiliated entities of the Vendor's principals in its review and determination of responsibility.

The Vendor hereby certifies that: (select one)

☑ No principal of the proposing Vendor has prior affiliations that meet the criteria defined as "Affiliated entities"

☐ Principal(s) listed below have prior affiliations that meet the criteria defined as "Affiliated entities"

Principal's Name:

Names of Affiliated Entities:

Principal's Name:

Names of Affiliated Entities:

Principal's Name:

Names of Affiliated Entities:

Authorized Signature Name: **Mark Drummond, P.E., BCEE**

Title: **President**

Vendor Name: **C Solutions, Inc.**

Date: **7/13/2018**

Supplier: **C Solutions Inc.**

LITIGATION HISTORY FORM

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

☑ There are no material cases for this Vendor; or

☐ Material Case(s) are disclosed below:

Is this for a: (check type) ☐ Parent, ☐ Subsidiary, or ☐ Predecessor Firm?	If Yes, name of Parent/Subsidiary/Predecessor: Or No ☐
Party	
Case Number, Name, and Date Filed	
Name of Court or other tribunal	
Type of Case	Bankruptcy ☐ Civil ☐ Criminal ☐ Administrative/Regulatory ☐
Claim or Cause of Action and Brief description of each Count	
Brief description of the Subject Matter and Project Involved	
Disposition of Case (Attach copy of any applicable Judgment, Settlement Agreement and Satisfaction of Judgment.)	Pending ☐ Settled ☐ Dismissed ☐ Judgment Vendor's Favor ☐ Judgment Against Vendor ☐ If Judgment Against, is Judgment Satisfied? ☐ Yes ☐ No
Opposing Counsel	Name: Email: Telephone Number:

Vendor Name: C Solutions Inc

Supplier: **C Solutions Inc.**

SUBCONTRACTORS/SUBCONSULTANTS/SUPPLIERS REQUIREMENT FORM
Request for Proposals, Request for Qualifications, or Request for Letters of Interest

The following forms and supporting information (if applicable) should be returned with Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit may affect Vendor's evaluation.

A. The Vendor shall submit a listing of all subcontractors, subconsultants and major material suppliers (firms), if any, and the portion of the contract they will perform. A major material supplier is considered any firm that provides construction material for construction contracts, or commodities for service contracts in excess of $50,000, to the Vendor.

B. If participation goals apply to the contract, only non-certified firms shall be identified on the form. A non-certified firm is a firm that is not listed as a firm for attainment of participation goals (ex. County Business Enterprise or Disadvantaged Business Enterprise), if applicable to the solicitation.

C. This list shall be kept up-to-date for the duration of the contract. If subcontractors, subconsultants or suppliers are stated, this does not relieve the Vendor from the prime responsibility of full and complete satisfactory performance under any awarded contract.

D. After completion of the contract/final payment, the Vendor shall certify the final list of non-certified subcontractors, subconsultants, and suppliers that performed or provided services to the County for the referenced contract.

E. The Vendor has confirmed that none of the recommended subcontractors, subconsultants, or suppliers' principal(s), officer(s), affiliate(s) or any other related companies have been debarred from doing business with Broward County or any other governmental agency.

If none, state "none" on this form. Use additional sheets as needed. Vendor should scan and upload any additional form(s) in BidSync.

1. Subcontracted Firm's Name: **Chen Moore and Associates**

   Subcontracted Firm's Address: **500 W Cypress Creek Road Suite 630 Fort Lauderdale, FL 33309**

   Subcontracted Firm's Telephone Number: **954.730.2030**

   Contact Person's Name and Position: **Peter Moore, P.E., LEED AP, F.ASCE, President**
   Contact Person's E-Mail Address: **pmoore@chenmoore.com**

   Estimated Subcontract/Supplies Contract Amount: **TBD**

   Type of Work/Supplies Provided: **Project Director/ GIS/Pump Station Inspections/Pump Station O&M Analysis/**

2. Subcontracted Firm's Name: **BROWN AND CALDWELL**

   Subcontracted Firm's Address: **1560 Sawgrass Corporate Parkway, Suite 240, Sunrise, FL 33323**

   Subcontracted Firm's Telephone Number: **954-200-7611**

   Contact Person's Name and Position: **Dr. Celia Earle, Vice President**

   Contact Person's E-Mail Address: **[illegible]**

Supplier: **C Solutions Inc.**

LOBBYIST REGISTRATION REQUIREMENT CERTIFICATION FORM

The completed form should be submitted with the solicitation response but must be submitted within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes.

The Vendor certifies that it understands if it has retained a lobbyist(s) to lobby in connection with a competitive solicitation, it shall be deemed non-responsive unless the firm, in responding to the competitive solicitation, certifies that each lobbyist retained has timely filed the registration or amended registration required under Broward County Lobbyist Registration Act, Section 1-262, Broward County Code of Ordinances; and it understands that if, after awarding a contract in connection with the solicitation, the County learns that the certification was erroneous, and upon investigation determines that the error was willful or intentional on the part of the Vendor, the County may, on that basis, exercise any contractual right to terminate the contract for convenience.

The Vendor hereby certifies that: (select one)

☑ It has not retained a lobbyist(s) to lobby in connection with this competitive solicitation; however, if retained after the solicitation, the County will be notified.

☐ It has retained a lobbyist(s) to lobby in connection with this competitive solicitation and certified that each lobbyist retained has timely filed the registration or amended registration required under Broward County Lobbyist Registration Act, Section 1-262, Broward County Code of Ordinances.

It is a requirement of this solicitation that the names of any and all lobbyists retained to lobby in connection with this solicitation be listed below:

Name of Lobbyist:
Lobbyist's Firm:
Phone:
E-mail:

Name of Lobbyist:
Lobbyist's Firm:
Phone:
E-mail:

Authorized Signature/Name: Mark Drummond P.E., BCEE Date: 7/13/2018

Title: President

Vendor Name: C Solutions Inc.

Supplier: **C Solutions Inc.**

AGREEMENT EXCEPTION FORM

The completed form(s) should be returned with the Vendor's submittal. If not provided with submittal, it shall be deemed an affirmation by the Vendor that it accepts the terms and conditions of the County's Agreement as disclosed in the solicitation.

The Vendor must either provide specific proposed alternative language on the form below. Additionally, a brief justification specifically addressing each provision to which an exception is taken should be provided.

☐ There are no exceptions to the terms and conditions of the County Agreement as referenced in the solicitation; or

☐ The following exceptions are disclosed below: (use additional forms as needed; separate each Article/ Section number)

Term or Condition Article / Section	Insert version of exception or specific proposed alternative language	Provide brief justification for change

Vendor Name: **C Solutions Inc.**

Supplier: **C Solutions Inc.**

RFP-RFQ-RLI LOCATION ATTESTATION FORM (EVALUATION CRITERIA)

The completed and signed form and supporting information (if applicable, for Joint Ventures) should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit this form and supporting information may affect the Vendor's evaluation. Provided information is subject to verification by the County.

A Vendor's principal place of business location (also known as the nerve center) within Broward County is considered in accordance with Evaluation Criteria. The County's definition of a principal place of business is:

1. As defined by the Broward County Local Preference Ordinance, "Principal place of business means the nerve center or center of overall direction, control and coordination of the activities of the bidder [Vendor]. If the bidder has only one (1) business location, such business location shall be considered its principal place of business."

2. A principal place of business refers to the place where a corporation's officers direct, control, and coordinate the corporation's day-to-day activities. It is the corporation's 'nerve center' and in practice it should normally be the place where the corporation maintains its headquarters; provided that the headquarters is the actual center of direction, control, and coordination, i.e., the 'nerve center', and not simply an office where the corporation holds its board meetings (for example, attended by directors and officers who have traveled there for the occasion).

The Vendor's principal place of business in Broward County shall be the Vendor's "Principal Address" as indicated with the Florida Department of State Division of Corporations, for at least six months prior to the solicitation's due date.

Check one of the following:

☑ The Vendor certifies that it has a principal place of business location (also known as the nerve center) within Broward County, as documented in Florida Department of State Division of Corporations (Sunbiz), and attests to the following statements:

1. Vendor's address listed in its submittal is its principal place of business as defined by Broward County;

2. Vendor's "Principal Address" listed with the Florida Department of State Division of Corporations is the same as the address listed in its submittal and the address was listed for at least six months prior to the solicitation's opening date. A copy of Florida Department of State Division of Corporations (Sunbiz) is attached as verification.

3. Vendor must be located at the listed "nerve center" address ("Principal Address") for at least six (6) months prior to the solicitation's opening date;

4. Vendor has not merged with another firm within the last six months that is not headquartered in Broward County and is not a wholly owned subsidiary or a holding company of another firm that is not headquartered in Broward County;

5. If awarded a contract, it is the intent of the Vendor to remain at the referenced address for the duration of the contract term, including any renewals, extensions or any approved

interim contracts for the services provided under this contract; and

6. The Vendor understands that if after contract award, the County learns that the attestation was erroneous, and upon investigation determines that the error was willful or intentional on the part of the Vendor, the County may, on that basis exercise any contractual right to terminate the contract. Further any misleading, inaccurate, false information or documentation submitted by any party affiliated with this procurement may lead to suspension and/or debarment from doing business with Broward County as outlined in the Procurement Code, Section 21.119.

If the Vendor is submitting a response as a Joint Venture, the following information is required to be submitted:

a. Name of the Joint Venture Partnership
b. Percentage of Equity for all Joint Venture Partners
c. A copy of the executed Agreement(s) between the Joint Venture Partners

☐ Vendor does not have a principal place of business location (also known as the nerve center) within Broward County.

Vendor Information:

Vendor Name: **C Solutions Inc**

Vendor's address listed in its submittal is:

610 SE 14th Ct. No. 2
Ft. Lauderdale, FL 33316

The signature below must be by an individual authorized to bind the Vendor. The signature below is an attestation that all information listed above and provided to Broward County is true and accurate.

Mark Drummond, P.E., BCEE	**President**	**C Solutions Inc**	**7/13/2018**
Authorized Signature/Name	Title	Vendor Name	Date

Supplier: **C Solutions Inc.**

RFP-RLI-RFQ LOCAL PREFERENCE AND TIE BREAKER CERTIFICATION FORM

The completed and signed form should be returned with the Vendor's submittal to determine Local Preference eligibility, however it must be returned at time of solicitation submittal to qualify for the Tie Break criteria. If not provided with submittal, the Vendor must submit within three business days of County's request for evaluation of Local Preference. Proof of a local business tax should be submitted with this form. Failure to timely submit this form or local business tax receipt may render the business ineligible for application of the Local Preference or Tie Break Criteria.

In accordance with Section 21.31.d. of the Broward County Procurement Code, to qualify for the Tie Break Criteria, the undersigned Vendor hereby certifies that (check box if applicable):

☐ The Vendor is a local Vendor in Broward County and:

a. has a valid Broward County local business tax receipt;
b. has been in existence for at least six-months prior to the solicitation opening;
c. at a business address physically located within Broward County;
d. in an area zoned for such business;
e. provides services from this location on a day-to-day basis, and
f. services provided from this location are a substantial component of the services offered in the Vendor's proposal.

In accordance with Local Preference, Section 1-74, et. seq., Broward County Code of Ordinances, a local business meeting the below requirements is eligible for Local Preference. To qualify for the Local Preference, the undersigned Vendor hereby certifies that (check box if applicable):

☑ The Vendor is a local Vendor in Broward and:

a. has a valid Broward County local business tax receipt issued at least one year prior to solicitation opening;
b. has been in existence for at least one-year prior to the solicitation opening;
c. provides services on a day-to-day basis, at a business address physically located within the Broward County limits in an area zoned for such business; and
d. the services provided from this location are a substantial component of the services offered in the Vendor's proposal.

Local Business Address: **610 SE 14th Ct., No. 2**
Ft. Lauderdale, FL 33316

Vendor does not qualify for Tie Break Criteria or Local Preference, in accordance with the above requirements. The undersigned Vendor hereby certifies that (check box if applicable): ☐ The Vendor is not a local Vendor in Broward County.

Mark Drummond, P.E., BCEE	**President**	**C Solutions Inc**	**7/13/2018**
AUTHORIZED SIGNATURE/NAME	**TITLE**	**COMPANY**	**DATE**

Supplier: **C Solutions Inc.**

DOMESTIC PARTNERSHIP ACT CERTIFICATION FORM (REQUIREMENT AND TIEBREAKER)

Refer to Special Instructions to identify if Domestic Partnership Act is a requirement of the solicitation or acts only as a tiebreaker. If Domestic Partnership is a requirement of the solicitation, the completed and signed form should be returned with the Vendor's submittal. If the form is not provided with submittal, the Vendor must submit within three business days of County's request. Vendor may be deemed non-responsive for failure to fully comply within stated timeframes. To qualify for the Domestic Partnership tiebreaker criterion, the Vendor must currently offer the Domestic Partnership benefit and the completed and signed form must be returned at time of solicitation submittal.

The Domestic Partnership Act, Section 16 ½ -157, Broward County Code of Ordinances, requires all Vendors contracting with the County, in an amount over $100,000 provide benefits to Domestic Partners of its employees, on the same basis as it provides benefits to employees' spouses, with certain exceptions as provided by the Ordinance.

For all submittals over $100,000.00, the Vendor, by virtue of the signature below, certifies that it is aware of the requirements of Broward County's Domestic Partnership Act, Section 16-½ -157, Broward County Code of Ordinances; and certifies the following: (check only one below).

- [x] 1. The Vendor currently complies with the requirements of the County's Domestic Partnership Act and provides benefits to Domestic Partners of its employees on the same basis as it provides benefits to employees' spouses
- [ ] 2. The Vendor will comply with the requirements of the County's Domestic Partnership Act at time of contract award and provide benefits to Domestic Partners of its employees on the same basis as it provides benefits to employees' spouses.
- [ ] 3. The Vendor will not comply with the requirements of the County's Domestic Partnership Act at time of award.
- [ ] 4. The Vendor does not need to comply with the requirements of the County's Domestic Partnership Act at time of award because the following exception(s) applies: (check only one below).

    - [ ] The Vendor is a governmental entity, not-for-profit corporation, or charitable organization.
    - [ ] The Vendor is a religious organization, association, society, or non-profit charitable or educational institution.
    - [ ] The Vendor provides an employee the cash equivalent of benefits. (Attach an affidavit in compliance with the Act stating the efforts taken to provide such benefits and the amount of the cash equivalent).
    - [ ] The Vendor cannot comply with the provisions of the Domestic Partnership Act because it would violate the laws, rules or regulations of federal or state law or would violate or be inconsistent with the terms or conditions of a grant or contract with the United States or State of Florida. Indicate the law, statute or regulation (State the law, statute or regulation and attach explanation of its applicability).

Mark Drummond, P.E., BCEE	President	C Solutions Inc	7/13/2018
Authorized Signature/Name	**Title**	**Vendor Name**	**Date**

Supplier: **C Solutions Inc.**

VOLUME OF PREVIOUS WORK ATTESTATION FORM

The completed and signed form should be returned with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to provide timely may affect the Vendor's evaluation. This completed form must be included with the Vendor's submittal at the time of the opening deadline to be considered for a Tie Breaker criterion (if applicable).

The calculation for Volume of Previous Work is all amounts paid to the prime Vendor by Broward County Board of County Commissioners at the time of the solicitation opening date within a five-year timeframe. The calculation of Volume of Previous Work for a prime Vendor previously awarded a contract as a member of a Joint Venture firm is based on the actual equity ownership of the Joint Venture firm.

In accordance with Section 21.31.d. of the Broward County Procurement Code, the Vendor with the lowest dollar volume of work previously paid by the County over a five-year period from the date of the submittal opening will receive the Tie Breaker.

Vendor must list all projects it received payment from Broward County Board of County Commissioners during the past five years. If the Vendor is submitting as a joint venture, the information provided should encompass the joint venture and each of the entities forming the joint venture. The Vendor attests to the following:

Item No.	Project Title	Solicitation/ Contract Number:	Department or Division	Date Awarded	Paid to Date Dollar Amount
1					**0.00**
2					
3					
4					
5					
				Grand Total	**0.00**

Has the Vendor been a member/partner of a Joint Venture firm that was awarded a contract by the County? Yes ☐ No ☑

If Yes, Vendor must submit a **Joint Vendor Volume of Work Attestation Form**.

Vendor Name: C Solutions Inc.

Mark Drummond, P.E.	**President**	**7/13/2018**
Authorized Signature/ Name	**Title**	**Date**

VOLUME OF PREVIOUS WORK ATTESTATION JOINT VENTURE FORM

If applicable, this form and additional required documentation should be submitted with the Vendor's submittal. If not provided with submittal, the Vendor must submit within three business days of County's request. Failure to timely submit this form and supporting documentation may affect the Vendor's evaluation.

The calculation of Volume of Previous Work for a prime Vendor previously awarded a contract as a member of a Joint Venture firm is based on the actual equity ownership of the Joint Venture firm. Volume of Previous Work is not based on the total payments to the Joint Venture firm.

Vendor must list all projects it received payment from Broward County Board of County Commissioners during the past five years as a member of a Joint Venture. The Vendor attests to the following:

Item No.	Project Title	Solicitation/ Contract Number:	Department or Division	Date Awarded	JV Equity %	Paid to Date Dollar Amount
1						
2						
3						
4						
5						
				Grand Total		

Vendor is required to submit an executed Joint Venture agreement(s) and any amendments for each project listed above. Each agreement must be executed prior to the opening date of this solicitation.

Vendor Name: C Solutions Inc.

Mark Drummond, P.E.	**President**	**7/13/2018**
Authorized Signature/ Name	**Title**	**Date**

Supplier: **C Solutions Inc.**

STANDARD CERTIFICATIONS
Request for Proposals, Request for Qualifications, or Request for Letters of Interest

Vendor should complete and acknowledge the standard certifications and submit with the solicitation response. If not submitted with solicitation response, it must be submitted within three business days of County's request. Failure to timely submit may affect Vendor's evaluation. It is imperative that the person completing the standard certifications be knowledgeable about the proposing Vendor's business and operations.

Cone of Silence Requirement Certification:
The Cone of Silence Ordinance, Section 1-266, Broward County Code of Ordinances prohibits certain communications among Vendors, Commissioners, County staff, and Selection or Evaluation Committee members. Identify on a separate sheet any violations of this Ordinance by any members of the responding firm or its joint ventures. After the application of the Cone of Silence, inquiries regarding this solicitation should be directed to the Director of Purchasing or designee. The Cone of Silence terminates when the County Commission or other awarding authority takes action which ends the solicitation.

The Vendor hereby certifies that: (check each box)

☑ The Vendor has read Cone of Silence Ordinance, Section 1-266, Broward County Code of Ordinances; and

☑ The Vendor understands that the Cone of Silence for this competitive solicitation shall be in effect beginning upon the appointment of the Selection or Evaluation Committee, for communication regarding this solicitation with the County Administrator, Deputy County Administrator, Assistant County Administrators, and Assistants to the County Administrator and their respective support staff or any person, including Evaluation or Selection Committee members, appointed to evaluate or recommend selection in this RFP/RLI process. For Communication with County Commissioners and Commission staff, the Cone of Silence allows communication until the initial Evaluation or Selection Committee Meeting.

☑ The Vendor agrees to comply with the requirements of the Cone of Silence Ordinance.

Drug-Free Workplace Requirements Certification:
Section 21.31.a. of the Broward County Procurement Code requires awards of all competitive solicitations requiring Board award be made only to firms certifying the establishment of a drug free workplace program. The program must consist of:

1. Publishing a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the offeror's workplace, and specifying the actions that will be taken against employees for violations of such prohibition;

2. Establishing a continuing drug-free awareness program to inform its employees about:
   a. The dangers of drug abuse in the workplace;
   b. The offeror's policy of maintaining a drug-free workplace;
   c. Any available drug counseling, rehabilitation, and employee assistance programs; and
   d. The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

3. Giving all employees engaged in performance of the contract a copy of the statement

required by subparagraph 1;

4. Notifying all employees, in writing, of the statement required by subparagraph 1, that as a condition of employment on a covered contract, the employee shall:
   a. Abide by the terms of the statement; and
   b. Notify the employer in writing of the employee's conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or of any state, for a violation occurring in the workplace NO later than five days after such conviction.

5. Notifying Broward County government in writing within 10 calendar days after receiving notice under subdivision 4.b above, from an employee or otherwise receiving actual notice of such conviction. The notice shall include the position title of the employee;

6. Within 30 calendar days after receiving notice under subparagraph 4 of a conviction, taking one of the following actions with respect to an employee who is convicted of a drug abuse violation occurring in the workplace:
   a. Taking appropriate personnel action against such employee, up to and including termination; or
   b. Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency; and

7. Making a good faith effort to maintain a drug-free workplace program through implementation of subparagraphs 1 through 6.

The Vendor hereby certifies that: (check box)

☑ The Vendor certifies that it has established a drug free workplace program in accordance with the above requirements.

Non-Collusion Certification:
Vendor shall disclose, to their best knowledge, any Broward County officer or employee, or any relative of any such officer or employee as defined in Section 112.3135 (1) (c), Florida Statutes, who is an officer or director of, or has a material interest in, the Vendor's business, who is in a position to influence this procurement. Any Broward County officer or employee who has any input into the writing of specifications or requirements, solicitation of offers, decision to award, evaluation of offers, or any other activity pertinent to this procurement is presumed, for purposes hereof, to be in a position to influence this procurement. Failure of a Vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the Broward County Procurement Code.

The Vendor hereby certifies that: (select one)

☑ The Vendor certifies that this offer is made independently and free from collusion; or

☐ The Vendor is disclosing names of officers or employees who have a material interest in this procurement and is in a position to influence this procurement. Vendor must include a list of name(s), and relationship(s) with its submittal.

Public Entities Crimes Certification:
In accordance with Public Entity Crimes, Section 287.133, Florida Statutes, a person or affiliate placed on the convicted vendor list following a conviction for a public entity crime may not submit on a contract: to provide any goods or services; for construction or repair of a public building or public work; for leases of real property to a public entity; and may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in s. 287.017 for Category Two for a period of 36 months following the date of being placed on the convicted vendor list.

The Vendor hereby certifies that: (check box)

☑ The Vendor certifies that no person or affiliates of the Vendor are currently on the convicted vendor list and/or has not been found to commit a public entity crime, as described in the statutes.

Scrutinized Companies List Certification:
Any company, principals, or owners on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List is prohibited from submitting a response to a solicitation for goods or services in an amount equal to or greater than $1 million.

The Vendor hereby certifies that: (check each box)

☑ The Vendor, owners, or principals are aware of the requirements of Sections 287.135, 215.473, and 215.4275, Florida Statutes, regarding Companies on the Scrutinized Companies with Activities in Sudan List the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List; and

☑ The Vendor, owners, or principals, are eligible to participate in this solicitation and are not listed on either the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List; and

☑ If awarded the Contract, the Vendor, owners, or principals will immediately notify the County in writing if any of its principals are placed on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or the Scrutinized Companies that Boycott Israel List.

I hereby certify the information provided in the Vendor Questionnaire and Standard Certifications:

Mark Drummond, P.E.	**President**	**7/13/2018**
*AUTHORIZED SIGNATURE/NAME	TITLE	DATE

Vendor Name: **C Solutions Inc**

* I certify that I am authorized to sign this solicitation response on behalf of the Vendor as indicated in Certificate as to Corporate Principal, designation letter by Director/Corporate Officer, or other business authorization to bind on behalf of the Vendor. As the Vendor's authorized representative, I attest that any and all statements, oral, written or otherwise, made in support of the Vendor's response, are accurate, true and correct. I also acknowledge that inaccurate, untruthful, or incorrect statements made in support of the Vendor's response may be used by the County as a basis for rejection, rescission of the award, or termination of the contract and may also serve as the basis for debarment of Vendor pursuant to Section 21.119 of the Broward County Procurement Code. I certify that the Vendor's response is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a response for the same items/services, and is in all respects fair and without collusion or fraud. I also certify that the Vendor agrees to abide by all terms and

conditions of this solicitation, acknowledge and accept all of the solicitation pages as well as any special instructions sheet(s).