

***CITY OF FORT LAUDERDALE  
SPECIFICATIONS PACKAGE***

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**623-11010**

**Wastewater Flow, Rainfall Monitoring and  
Related Services Annual Contract**



**Rick Andrews**

**954-828-4357**

## Bid 623-11010

# Wastewater Flow, Rainfall Monitoring and Related Services Annual Contract

Bid Number            623-11010  
 Bid Title              Wastewater Flow, Rainfall Monitoring and Related Services Annual Contract

Bid Start Date        Jun 6, 2012 4:04:43 PM EDT  
 Bid End Date         Jul 12, 2012 2:00:00 PM EDT  
 Question & Answer  
 End Date             Jul 9, 2012 5:00:00 PM EDT

Bid Contact            Rick Andrews  
                              Procurement Specialist II  
                              Procurement  
                              954-828-4357  
                              Randrews@fortlauderdale.gov

Contract Duration    See Specifications  
 Contract Renewal    Not Applicable  
 Prices Good for      90 days  
 Pre-Bid Conference Jun 27, 2012 10:00:00 AM EDT  
                              Attendance is optional  
                              Location: City of Fort Lauderdale  
                              City Hall  
                              100 North Andrews Avenue  
                              5th Floor Conference Room  
                              Fort Lauderdale, FL 33301.

Bid Comments        The City of Fort Lauderdale, Florida (City) is seeking bids from qualified bidders, hereinafter referred to as the Contractor or Bidder to provide wastewater flow monitoring, rainfall monitoring, night flow isolation, smoke testing, manhole inspection, dye-water testing and final summary inflow/infiltration data analysis report on an annual basis for the City's Public Works Department, Engineering Division (ENGINEER) in accordance with the terms, conditions, and specifications contained in this Invitation For Bid (ITB). Services shall be authorized through individual Work Orders and Purchase Orders on an as-needed basis during the term of the contract.

### Item Response Form

Item                    623-11010--01-01 - Mobilization and Demobilization  
 Quantity              1 lump sum  
 Unit Price              
 Delivery Location    City of Fort Lauderdale  
                              [See ITB Specifications](#)  
                              See ITB Specifications  
                              Fort Lauderdale FL 33301  
                              Qty 1

#### Description

Lump sum price for Mobilization. Bid price may not exceed 7% of the total for items 2 through 9.

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Item                    623-11010--01-02 - Flow Monitoring  
 Quantity              35 each

Unit Price

Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications  
 Fort Lauderdale FL 33301  
**Qty 35**

**Description**

Flow monitoring price per meter site per week for a period of eight (8) weeks. For a total of 35 meter sites per contract year (maximum)

Item **623-11010--01-03 - Rainfall Monitoring**

Quantity **10 each**

Unit Price

Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications  
 Fort Lauderdale FL 33301  
**Qty 10**

**Description**

Rainfall monitoring price per rain gauge site per week for a period of eight (8) weeks. For a total of 10 rain gauges sites per contract year (maximum)

Item **623-11010--01-04 - Night Flow Isolations**

Quantity **10 each**

Unit Price

Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications  
 Fort Lauderdale FL 33301  
**Qty 10**

**Description**

Night flow isolations to be performed per contract year (maximum). Night flow isolation set-ups will range between 1,000 and 1,500 feet depending on field conditions.

Item **623-11010--01-05 - Flow, Rainfall Monitoring and Final Inflow & Infiltration Report**

Quantity **1 lump sum**

Unit Price

Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications  
 Fort Lauderdale FL 33301  
**Qty 1**

**Description**

Preparation of Flow, rainfall Monitoring and Final Summary I/I Report. One report per contract year (maximum)

Item **623-11010--01-06 - Smoke Testing**

Quantity **35000 linear foot**

Unit Price

Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications

Fort Lauderdale FL 33301  
**Qty 35000**

**Description**

Smoke Testing. Estimated footage per contract year.

Item **623-11010--01-07 - Dye-Water Flooding**  
 Quantity **10000 linear foot**  
 Unit Price   
 Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications  
 Fort Lauderdale FL 33301  
**Qty 10000**

**Description**

Dye-water flooding for line segment defect identification. Estimated footage per contract year.

Item **623-11010--01-08 - Local Spot Dye-Water Flooding**  
 Quantity **20 each**  
 Unit Price   
 Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications  
 Fort Lauderdale FL 33301  
**Qty 20**

**Description**

Local Spot Dye-water flooding. Estimated locations per contract year.

Item **623-11010--01-09 - Manhole Inspection**  
 Quantity **35 each**  
 Unit Price   
 Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications  
 Fort Lauderdale FL 33301  
**Qty 35**

**Description**

Manhole Inspection. Estimated manholes per contract year.

Item **623-11010--01-10 - Additional Flow Monitoring**  
 Quantity **35 each**  
 Unit Price   
 Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
 See ITB Specifications  
 Fort Lauderdale FL 33301  
**Qty 35**

**Description**

Additional flow monitoring price per meter site per week basis for a period of up to one month as required and authorized by the City.

Item **623-11010--01-11 - Additional Rainfall Monitoring**  
Quantity **10 each**  
Unit Price   
Delivery Location **City of Fort Lauderdale**  
See ITB Specifications  
See ITB Specifications  
Fort Lauderdale FL 33301  
**Qty 10**

**Description**

Additional rainfall monitoring per rain gauge site per week basis for a period of up to one month as required and authorized by the City.

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**PART I - INFORMATION SPECIAL CONDITIONS**

01. PURPOSE

The City of Fort Lauderdale, Florida (City) is seeking bids from qualified bidders, hereinafter referred to as the Contractor or Bidder to provide wastewater flow monitoring, rainfall monitoring, night flow isolation, smoke testing, manhole inspection, dye-water testing and final summary inflow/infiltration data analysis report on an annual basis for the City's Public Works Department, Engineering Division (ENGINEER) in accordance with the terms, conditions, and specifications contained in this Invitation For Bid (ITB). Services shall be authorized through individual Work Orders and Purchase Orders on an as-needed basis during the term of the contract.

02. INFORMATION OR CLARIFICATION

For information concerning procedures for responding to this solicitation, contact Procurement Specialist Rick Andrews at (954) 828-4357 or email at [randrews@fortlauderdale.gov](mailto:randrews@fortlauderdale.gov). Such contact shall be for clarification purposes only.

For information concerning technical specifications please utilize the question / answer feature provided by BidSync at [www.bidsync.com](http://www.bidsync.com). Questions of a material nature must be received prior to the cut-off date specified in the solicitation. Material changes, if any, to the scope of services or bidding procedures will only be transmitted by written addendum. (See addendum section of BidSync Site). Contractors please note: No part of your bid can be submitted via FAX. No variation in price or conditions shall be permitted based upon a claim of ignorance. Submission of a bid will be considered evidence that the Contractor has familiarized themselves with the nature and extent of the work, and the equipment, materials, and labor required. The entire bid response must be submitted in accordance with all specifications contained in this solicitation.

It is the sole responsibility of the Contractor to ensure that their bid is submitted electronically through BidSync at [www.bidsync.com](http://www.bidsync.com) or reaches the City of Fort Lauderdale City Hall, Procurement Services Division, 6<sup>th</sup> floor, Room 619, 100 N. Andrews Avenue, Fort Lauderdale, FL 33301 in a sealed envelope marked on the outside with the ITB solicitation number and Contractor's name, no later than the time and date specified in this solicitation.

03. TRANSACTION FEES

The City of Fort Lauderdale uses BidSync ([www.bidsync.com](http://www.bidsync.com)) to distribute and receive bids and proposals. There is no charge to vendors/contractors to register and participate in the solicitation process, nor will any fees be charged to the awarded contractor.

04. PRE-BID CONFERENCE AND/OR SITE VISIT

There will be a pre-bid conference and/or site visit scheduled for Wednesday, June 27, 2012 at 10:00 a.m., City Hall, 100 N. Andrews Avenue, 5th floor Engineering conference room, Fort Lauderdale, FL 33301. It is strongly suggested that all Contractor's attend the pre-proposal conference and/or site visit. While attendance is not mandatory, pre-bid conferences and/or site visits at other times will not be available.

It will be the sole responsibility of the bidder to inspect the City's location(s) facilities systems prior to submitting a bid.

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While attendance is not mandatory, it is the sole responsibility of the Contractor to become familiar with the scope of the City's requirements and systems prior to submitting a proposal. No variation in price or conditions shall be permitted based upon a claim of ignorance. It is strongly suggested that all Contractor's attend the pre-bid meeting and/or site visit.

**05. ELIGIBILITY**

To be eligible for award of a contract in response to this solicitation, the Contractor must demonstrate that they have successfully completed services, as specified in the Technical Specifications / Scope of Services section of this solicitation are normally and routinely engaged in performing such services, and are properly and legally licensed to perform such work. In addition, the Contractor must have no conflict of interest with regard to any other work performed by the Contractor for the City of Fort Lauderdale.

**06. PRICING**

Contractor must quote a firm, fixed annual price for all services stated in the ITB, which includes any travel associated with coming to the City of Fort Lauderdale.

**Failure to provide costs as requested in this ITB may deem your bid non-responsive.**

**07. COMPLETION SCHEDULE**

Under the proposed contract, individual Work Orders (WO) will be issued by the City's Project Manager on an as-needed basis. Each WO will be authorized through an individual Purchase Order in accordance ITB prices. Each WO will stipulate the scope of work items to be performed by the Bidder in accordance with ITB bid items. A completion schedule will be determined and agreed upon for each WO and based upon the City's needs and requirements.

**08. BID DOCUMENTS**

The Contractor shall examine this bid carefully. Ignorance of the requirements will not relieve the Contractor from liability and obligation under the Contract.

**09. AWARD**

Award may be by Group or Item, whichever is determined to be in the best interest of the City. Award will be made to the responsive and responsible bidder, quoting the lowest price, for that product/service that will best serve the needs of the City of Fort Lauderdale.

The City reserves the right to waive minor variations in the specifications and in the bidding process. The City further reserves the right to accept or reject any and/or all bids and to award or not award a contract based on this bid solicitation.

**10. GENERAL CONDITIONS**

General Conditions Form G-107 Rev. 12/11 (GC) are included and made a part of this ITB.

**11. NEWS RELEASES/PUBLICITY**

News releases, publicity releases, or advertisements relating to this contract or the tasks or projects associated with the project shall not be made without prior City approval.

**12. CONTRACTORS' COSTS**

The City shall not be liable for any costs incurred by proposers in responding to this solicitation.

**INVITATION TO BID (ITB) 623-11010****Wastewater Flow, Rainfall Monitoring and Related Services Annual Contract****13. RULES AND SUBMITTALS OF BIDS**

The signer of the bid must declare that the only person(s), company or parties interested in the proposal as principals are named therein; that the bid is made without collusion with any other person(s), company or parties submitting a bid; that it is in all respects fair and in good faith, without collusion or fraud; and that the signer of the bid has full authority to bind the principal bidder.

**14. APPROVED EQUAL OR ALTERNATIVE PRODUCT PROPOSALS**

The Technical Specifications contained in this solicitation are to be used as a reference only and are not to be considered of a proprietary nature. These specifications represent a level of quality and features that are desired by the City of Fort Lauderdale. The City is receptive to any product that would be considered by qualified City personnel as an approved equal.

The Contractor must state clearly in their bid pages any variance to the specifications. If proposing an approved equal or alternate product, it will be the Contractor's responsibility to provide adequate information in their proposal to enable the City to ensure that the Contractor meets the required criteria. If adequate information is not submitted with the bid, it may be rejected.

The City of Fort Lauderdale will be the sole judge in determining if the product proposed qualifies as approved equal. The City reserves the right to award to that Contractor which will best serve the interest of the City as determined by the City. The City further reserves the right to waive minor variations to specifications and in the bidding process.

**15. CONTRACT PERIOD**

The initial contract term shall commence upon date of award by the City and shall expire one (1) year from that date. The City reserves the right to extend the contract for four (4), additional one (1) year terms, providing all terms conditions and specifications remain the same, both parties agree to the extension, and such extension is approved by the City.

In the event services are scheduled to end because of the expiration of this contract, the Contractor shall continue the service upon the request of the City as authorized by the awarding authority. The extension period shall not extend for more than ninety (90) days beyond the expiration date of the existing contract. The Contractor shall be compensated for the service at the rate in effect when this extension clause is invoked by the City.

**16. COST ADJUSTMENTS**

Prices quoted shall be firm for the initial contract term. No cost increases shall be accepted in this initial contract term. Please consider this when providing pricing for this request for proposal.

Thereafter, any extensions which may be approved by the City shall be subject to an adjustment only if increases or decreases occur in the industry. Such adjustment shall be based on the latest yearly percentage increase in the All Urban Consumers Price Index (CPI-U) as published by the Bureau of Labor Statistics, U.S. Department of Labor, and shall not exceed five percent (5%).

The yearly increase or decrease in the CPI shall be that latest Index published and available for the calendar year ending 12/31, prior to the end of the contract year then in effect, as compared to the index for the comparable month, one-year prior.

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Any requested adjustment shall be fully documented and submitted to the City at least ninety (90) days prior to the contract anniversary date. Any approved cost adjustments shall become effective on the beginning date of the approved contract extension.

The City may, after examination, refuse to accept the adjusted costs if they are not properly documented, or considered to be excessive, or if decreases are considered to be insufficient. In the event the City does not wish to accept the adjusted costs and the matter cannot be resolved to the satisfaction of the City, the Contract will be considered cancelled on the scheduled expiration date.

**17. SERVICE TEST PERIOD**

If the Contractor has not previously performed the services to the city, the City reserves the right to require a test period to determine if the Contractor can perform in accordance with the requirements of the contract, and to the City's satisfaction. Such test period can be from thirty to ninety days, and will be conducted under all specifications, terms and conditions contained in the contract. This trial period will then become part of the initial contract period.

A performance evaluation will be conducted prior to the end of the test period and that evaluation will be the basis for the City's decision to continue with the Contractor or to select another Contractor (if applicable).

**18. CONTRACT COORDINATOR (PROJECT MANAGER)**

The City may designate a Contract Coordinator (Project Manager) whose principal duties shall be:

Liaison with Contractor

Coordinate and approve all work under the contract.

Resolve disputes.

Assure consistency and quality of Contractor's performance.

Schedule and conduct Contractor performance evaluations and document findings.

Review and approve for payment all invoices for work performed or items delivered.

**19. CONTRACTOR PERFORMANCE REVIEWS AND RATINGS**

The City Contract Coordinator may develop a Contractor performance evaluation report. This report shall be used to periodically review and rate the Contractor's performance under the contract with performance rating as follows:

Excellent	Far exceeds requirements.
Good	Exceeds requirements
Fair	Just meets requirements.
Poor	Does not meet all requirements and contractor is subject to penalty provisions under the contract.
Non-compliance	Either continued poor performance after notice or a performance level that does not meet a significant portion of the requirements. This rating makes the Contractor subject to the default or cancellation for cause provisions of the contract.

The report shall also list all discrepancies found during the review period. The Contractor shall be provided with a copy of the report, and may respond in writing if he takes exception to the

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report or wishes to comment on the report. Contractor performance reviews and subsequent reports will be used in determining the suitability of the contract extension.

**20. INVOICES/PAYMENT**

A payment schedule based upon agreed upon deliverables may be developed with the awarded vendor.

**21. NO EXCLUSIVE CONTRACT/ADDITIONAL SERVICES**

While this contract is for services provided to the department referenced in this Invitation For Bid, the City may require similar work for other City departments. Contractor agrees to take on such work unless such work would not be considered reasonable or become an undue burden to the Contractor.

Contractor agrees and understands that the contract shall not be construed as an exclusive arrangement and further agrees that the City may, at any time, secure similar or identical services from another vendor at the City's sole option.

The City may require additional items or services of a similar nature, but not specifically listed in the contract. The Contractor agrees to provide such items or services, and shall provide the City prices on such additional items or services based upon a formula or method, which is the same or similar to that used in establishing the prices in his proposal. If the price(s) offered are not acceptable to the City, and the situation cannot be resolved to the satisfaction of the City, the City reserves the right to procure those items or services from other vendors, or to cancel the contract upon giving the Contractor thirty (30) days written notice.

**22. DELETION OR MODIFICATION OF SERVICES**

The City reserves the right to delete any portion of the Contract at any time without cause, and if such right is exercised by the City, the total fee shall be reduced in the same ratio as the estimated cost of the work deleted bears to the estimated cost of the work originally planned. If work has already been accomplished on the portion of the Contract to be deleted, the Contractor shall be paid for the deleted portion on the basis of the estimated percentage of completion of such portion.

If the Contractor and the City agree on modifications or revisions to services, after the City has approved work to begin on such services, and a budget has been established for those services, the Contractor will submit a revised budget to the City for approval prior to proceeding with the work.

**23. SUBSTITUTION OF PERSONNEL**

It is the intention of the City that the Contractor's personnel proposed for the contract will be available for the initial contract term. In the event the Contractor wishes to substitute personnel, he shall propose personnel of equal or higher qualifications and all replacement personnel are subject to City approval. In the event substitute personnel are not satisfactory to the City and the matter cannot be resolved to the satisfaction of the City, the City reserves the right to cancel the Contract for cause. See Section 5.09 General Conditions.

**24. INSURANCE**

The Contractor shall furnish proof of insurance requirements as indicated below. The coverage is to remain in force at all times during the contract period. The following minimum insurance coverage is required. The City is to be added as an "additional insured" with relation to General Liability Insurance. This MUST be written in the description section of the insurance

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certificate, even if you have a check-off box on your insurance certificate. Any costs for adding the City as “additional insured” will be at the contractor’s expense.

The City of Fort Lauderdale shall be given notice 10 days prior to cancellation or modification of any stipulated insurance. The insurance provided shall be endorsed or amended to comply with this notice requirement. In the event that the insurer is unable to accommodate, it shall be the responsibility of the Contractor to provide the proper notice. Such notification will be in writing by registered mail, return receipt requested and addressed to the Procurement Services Division.

The Contractor’s insurance must be provided by an A.M. Best’s “A-“ rated or better insurance company authorized to issue insurance policies in the State of Florida, subject to approval by the City’s Risk Manager. Any exclusions or provisions in the insurance maintained by the contractor that precludes coverage for work contemplated in this ITB shall be deemed unacceptable, and shall be considered breach of contract.

### **Workers’ Compensation and Employers’ Liability Insurance**

Limits: Workers’ Compensation – Per Florida Statute 440  
Employers’ Liability - \$500,000

Any firm performing work on behalf of the City of Fort Lauderdale must provide Workers’ Compensation insurance. Exceptions and exemptions can only be made if they are in accordance with Florida Statute. For additional information contact the Department of Financial Services, Workers’ Compensation Division at (850) 413-1601 or on the web at [www.fldfs.com](http://www.fldfs.com).

### **Commercial General Liability Insurance**

Covering premises-operations, products-completed operations, independent contractors and contractual liability.

Limits: Combined single limit bodily injury/property damage \$1,000,000.

This coverage must include, but not limited to:

- a. Coverage for the liability assumed by the contractor under the indemnity provision of the contract.
- b. Coverage for Premises/Operations
- c. Products/Completed Operations
- d. Broad Form Contractual Liability
- e. Independent Contractors

### **Automobile Liability Insurance**

Covering all owned, hired and non-owned automobile equipment.

Limits: Bodily injury	\$250,000 each person \$500,000 each occurrence
Property damage	\$100,000 each occurrence

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**Professional Liability (Errors & Omissions)**

Limits: \$2,000,000 per occurrence

A copy of **ANY** current Certificate of Insurance should be included with your proposal.

In the event that you are the successful bidder, you will be required to provide a certificate naming the City as an "additional insured" for General Liability.

Certificate holder should be addressed as follows:

City of Fort Lauderdale  
Procurement Services Division  
100 N. Andrews Avenue, Room 619  
Fort Lauderdale, FL 33301

25. SUBCONTRACTORS

If the Contractor proposes to use subcontractors in the course of providing these services to the City, this information shall be a part of the bid response. Such information shall be subject to review, acceptance and approval of the City, prior to any contract award. The City reserves the right to approve or disapprove of any subcontractor candidate in its best interest and to require Contractor to replace subcontractor with one that meets City approval.

Contractor shall ensure that all of Contractor's subcontractors perform in accordance with the terms and conditions of this Contract. Contractor shall be fully responsible for all of Contractor's subcontractors' performance, and liable for any of Contractor's subcontractors' non-performance and all of Contractor's subcontractors' acts and omissions. Contractor shall defend, at Contractor's expense, counsel being subject to the City's approval or disapproval, and indemnify and hold harmless the City and the City's officers, employees, and agents from and against any claim, lawsuit, third-party action, or judgment, including any award of attorney fees and any award of costs, by or in favor of any Contractor's subcontractors for payment for work performed for the City.

26. INSURANCE – SUBCONTRACTORS

Contractor shall require all of its sub-contractors to provide the aforementioned coverage as well as any other coverage that the contractor may consider necessary, and any deficiency in the coverage or policy limits of said sub-contractors will be the sole responsibility of the contractor.

27. BID SURETY

A bid security payable to the City of Fort Lauderdale shall be submitted with the bid response in the amount of five percent 5% of the total bid amount. A bid security can be in the form of a bid bond or cashiers check. Bid security will be returned to the unsuccessful contractor as soon as practicable after opening of bids. Bid security will be returned to the successful bidder after acceptance of the Payment and Performance Bond, if required; acceptance of insurance coverage, if required; and full execution of contract documents, if required; or other conditions as stated in Special Conditions or elsewhere in the ITB.

Contractors that are submitting their bids electronically through BidSync must submit a scanned copy of their bid bond form with their bid submittal and must submit their original bid bond form within five (5) calendar days from the bid end date for this ITB to the City of Fort

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Lauderdale City Hall, Procurement Services Division, 6<sup>th</sup> floor, Room 619, 100 N. Andrews Avenue, Fort Lauderdale, FL 33301 or they will be determined as non-responsive. A bid security in the form of a cashiers check must be an original document and must be submitted at time of the bid due date.

Failure of the successful bidder to execute a contract, provide a Performance Bond, and furnish evidence of appropriate insurance coverage, as provided herein, within thirty (30) days after written notice of award has been given, shall be just cause for the annulment of the award and the forfeiture of the bid security to the City, which forfeiture shall be considered, not as a penalty, but as liquidation of damages sustained.

28. PAYMENT AND PERFORMANCE BOND

The Contractor shall within fifteen (15) working days after notification of award, furnish to the City a Payment and Performance Bond, in the amount of the proposed bid price as surety for faithful performance under the terms and conditions of the contract. If the bond is on an annual coverage basis, renewal for each succeeding year shall be submitted to the City thirty (30) days prior to the termination date of the existing Payment and Performance Bond. The Performance Bond must be executed by a surety company or recognized standing to do business in the State of Florida and having a resident agent.

The Contractor must have a Financial Size Categories (FSC) rating of no less than "A-" by the latest edition of Best's Key Rating Guide, or acceptance of insurance company that holds a valid Florida Certificate of Authority issued by the State of Florida, Department of Insurance, and are members of the Florida Guarantee Fund.

Acknowledgement and agreement is given by both parties that the amount herein set for the Payment and Performance Bond is not intended to be nor shall be deemed to be in the nature of liquidated damages nor is it intended to limit the liability of the Contractor to the City in the event of a material breach of this Agreement by the Contractor.

29. OWNERSHIP OF WORK

The City shall have full ownership and the right to copyright, otherwise limit, reproduce, modify, sell, or use all of the work or product produced under this contract without payment of any royalties or fees to the Contractor above the agreed hourly rates and related costs.

30. UNCONTROLLABLE CIRCUMSTANCES ("Force Majeure")

The City and Contractor will be excused from the performance of their respective obligations under this agreement when and to the extent that their performance is delayed or prevented by any circumstances beyond their control including, fire, flood, explosion, strikes or other labor disputes, act of God or public emergency, war, riot, civil commotion, malicious damage, act or omission of any governmental authority, delay or failure or shortage of any type of transportation, equipment, or service from a public utility needed for their performance, provided that:

A. The non performing party gives the other party prompt written notice describing the particulars of the Force Majeure including, but not limited to, the nature of the occurrence and its expected duration, and continues to furnish timely reports with respect thereto during the period of the Force Majeure;

B. The excuse of performance is of no greater scope and of no longer duration than is required by the Force Majeure;

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C. No obligations of either party that arose before the Force Majeure causing the excuse of performance are excused as a result of the Force Majeure; and

D. The non performing party uses its best efforts to remedy its inability to perform.

Notwithstanding the above, performance shall not be excused under this Section for a period in excess of two (2) months, provided that in extenuating circumstances, the City may excuse performance for a longer term. Economic hardship of the Contractor will not constitute Force Majeure. The term of the agreement shall be extended by a period equal to that during which either party's performance is suspended under this Section.

**31. PUBLIC ENTITY CRIMES**

NOTE: Contractor, by submitting a proposal attests she/he/it has not been placed on the convicted vendor list.

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, 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 Section 287.017, Florida Statutes, for Category Two for a period of 36 months from the date of being placed on the convicted vendor list.

**32. DAMAGE TO PUBLIC OR PRIVATE PROPERTY**

Extreme care shall be taken to safeguard all existing facilities, site amenities, irrigation systems, vehicles, etc. on or around the job site. Damage to public and/or private property shall be the responsibility of the Contractor and shall be repaired and/or replaced at no additional cost to the City.

**33. SAFETY**

The Contractor(s) shall adhere to the Florida Department of Transportation's Uniform manual on Traffic Control for construction and maintenance work zones when working on or near a roadway. It will be the sole responsibility of the Contractor to make themselves and their employees fully aware of these provisions, especially those applicable to safety.

**34. CANADIAN COMPANIES**

The City may enforce in the United States of America or in Canada or in both countries a judgment entered against the Contractor. The Contractor waives any and all defenses to the City's enforcement in Canada, of a judgment entered by a court in the United States of America. All monetary amounts set forth in this Contract are in United States dollars.

**35. LOBBYING ACTIVITIES**

ALL CONTRACTORS PLEASE NOTE: Any contractor submitting a response to this solicitation must comply, if applicable, with City of Fort Lauderdale Ordinance No. C-00-27 & Resolution No. 07-101, Lobbying Activities. Copies of Ordinance No. C-00-27 and Resolution No. 07-101 may be obtained from the City Clerk's Office on the 7th Floor of City Hall, 100 N. Andrews Avenue, Fort Lauderdale, Florida. The ordinance may also be viewed on the City's website at <http://www.fortlauderdale.gov/clerk/LobbyistDocs/lobbyistord1009.pdf> .

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36. BID TABULATIONS/INTENT TO AWARD

Notice of Intent to Award Contract/Bid, resulting from the City's Formal solicitation process, requiring City Commission action, may be found at: [http://www.fortlauderdale.gov/purchasing/notices\\_of\\_intent.htm](http://www.fortlauderdale.gov/purchasing/notices_of_intent.htm) . Tabulations of receipt of those parties responding to a formal solicitation may be found at: <http://www.fortlauderdale.gov/purchasing/bidresults.htm> , or any interested party may call the Procurement Services Division at 954-828-5933.

37. SAMPLE CONTRACT AGREEMENT

A sample of the formal agreement template, which may be required to be executed by the awarded vendor can be found at our website <http://fortlauderdale.gov/purchasing/general/contractsample021412.pdf>

**END OF PART I**

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**PART II - TECHNICAL SPECIFICATIONS/SCOPE OF SERVICES**

**PART 1 GENERAL**

**1.1 REQUIREMENTS**

- A. The City of Fort Lauderdale (City) will require SERVICE PROVIDER to provide wastewater flow monitoring, rainfall monitoring, night flow isolation, smoke testing, manhole inspection, dye-water testing and Final Summary Inflow/Infiltration Data Analysis Report for the City's Public Works Department, Engineering Division (ENGINEER) in accordance with the terms, conditions, and specifications. The City will award a yearly contract, which would be renewed yearly through City Commission approval for a period of up to five years. Under the awarded contract the work will be issued through Work Orders on an as-needed basis and individual Purchase Orders would be issued to the SERVICE PROVIDER for each Work Order.
- B. The purpose of flow and rainfall monitoring, night flow isolations, smoke testing, manhole inspection and dye-water testing is to document and or evaluate inflow/infiltration before and/or after rehabilitation activities throughout the sanitary sewer system. A Final Summary I/I Report shall be generated by the SERVICE PROVIDER which will document such findings in order to evaluate existing capacity concerns and be able to determine which areas will require additional rehabilitation.
- C. The work of this section includes the installation of flow meters and rain gauges, operation and maintenance of flow meters and rain gauges, routine calibration of flow meters and rain gauges, installation of weirs and flow measurement during night flow isolations, performance of smoke testing, manhole inspection documentation, dye-water testing performance and documentation, mobilization and demobilization of crews needed to perform these tasks, and weekly and final data submittal packages to ENGINEER. The SERVICE PROVIDER shall perform all work utilizing an ISO-9001 certified quality assurance programs and procedures to support data integrity, accuracy, and uptime.
- D. The SERVICE PROVIDER shall be responsible for the installation, maintenance and operation of the flow meters and rain gauges on a weekly basis for all sewer sub-basins or basins as appropriate. After each flow and rainfall monitoring period, the SERVICE PROVIDER will be responsible for the removal of the flow meters, rain gauges and all ancillary equipment. The SERVICE PROVIDER will be responsible for all plugging and MOT required during the performance of night flow isolations utilizing weirs, as well as, providing labor and equipment for performance of smoke testing, manhole inspection, and dye-water testing.

**1.2 SCOPE OF WORK**

- A. The SERVICE PROVIDER shall provide services which will include but not be

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limited to wastewater flow and rainfall monitoring, night flow isolations, documentation of I/I through smoke and dye-water testing, I/I flow data analysis which would provide dry and wet weather wastewater flows to quantify I/I quantities contributed upstream of each meter site, and a Final Summary I/I Report documenting such findings in order to evaluate existing capacity concerns and be able to determine which areas will require subsequent rehabilitation (done by others).

- B. The SERVICE PROVIDER selected must provide, install/uninstall, collect/archive data, maintain all equipment, and be responsible for the quality of the data. Additionally, periodic quality assurance and quality control (QA/QC) must be performed after each data collection period to ensure that such data is adequate for the analysis to be performed.
- C. All flow meters, rain gauges, weirs, manhole inspection, smoke and dye-water testing must be performed during the time period selected by the ENGINEER. The data will be utilized for Post-rehabilitation I/I flow data analysis; therefore it is crucial to perform such data collection during the wet-weather and dry-weather periods determined by the ENGINEER. The ENGINEER will communicate with the SERVICE PROVIDER's contract administrator to provide enough time to plan ahead for mobilization and equipment procurement in advance of each Work Order issuance.
- D. The SERVICE PROVIDER shall have in-house capability to prepare the Final Summary Report quantifying inflow and infiltration (I/I) quantities upstream of each meter site. Additionally, the report shall identify areas with the highest rainfall dependent infiltration and inflow (RDII). The results of the flow monitoring will help identify problem areas and provide flow data for future reference. Such flow and rainfall data information would be utilized as evidence on the reduction of I/I flows achieved by the rehabilitation effort performed thus far, as well as, the impact of wet weather on the ability of the collection system to transport flows without sanitary sewer overflows.
- E. Flow meter and rain gauge data shall be analyzed to prepare summaries of dry and wet weather flow characteristics for each site. Additionally, representative dry and wet weather hydrographs shall be prepared and submitted to the City for each site for future reference in electronic (CD) and hard copy formats. Furthermore, all flow and rainfall data collected for all sites during the monitoring period shall be provided to the owner in electronic (CD) and hard copy formats.
- F. All electronic data and hydrographs shall be provided in Microsoft Excel format (most current version). Data provided in a format that would require other proprietary software to be viewed and utilized for further analysis will not be accepted.
- G. SERVICE PROVIDER interested in performing these services must exhibit considerable relevant experience with this type of work, and should emphasize both the experience and capability of the particular personnel who will actually perform the work. The City is very concerned with the experience history of specific personnel of the entire project team to be used for this project. A minimum of ten (10) similar projects with complete I/I analysis must be referenced to verify

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this experience.

- H. Based on a previously performed pre-rehabilitation flow and rainfall monitoring effort, a suggested list of the manhole sites to install flow meters and a City map which depicts the PS areas for such sites, as well as, proposed rain gauge locations to be installed during the I/I flow monitoring period under this contract would be provided to the SERVICE PROVIDER. For sewer basins which were not previously monitored, a recommended flow monitoring program would have to be developed by the SERVICE PROVIDER, depending upon inspection of recommended flow monitoring sites to determine if hydraulic conditions are adequate to obtain acceptable data. The SERVICE PROVIDER will be responsible to ensure that the quality of data will be acceptable to perform an I/I analysis for each flow meter site.
- I. Additionally, there may be a need to perform night flow isolations throughout the City in lieu of flow monitoring depending on hydraulic site conditions. Such sites will be determined on an as-needed basis and a table and figure summarizing suggested preliminary site locations for night flow isolations will be agreed upon by the SERVICE PROVIDER and ENGINEER. Night flow isolation set-ups will range between 1,000 and 1,500 feet depending on field conditions.
- J. Additionally, an example of the type of final report content and analysis, as well as, data summary per monitoring site expected to be part of the Final Summary I/I Report is included under Appendix A.

**1.3 SUBMITTALS**

- A. The SERVICE PROVIDER shall submit to the ENGINEER in writing the number of each type of monitors proposed for each basin in which flow monitoring work will be performed. The SERVICE PROVIDER shall receive written approval from the ENGINEER specifying the number of monitors to be installed in each basin before installing any monitoring equipment.
- B. Experience/References for the SERVICE PROVIDER, the field manager, and all field personnel performing data collection services for the type of work describe herein, shall be submitted to the ENGINEER.
- C. The SERVICE PROVIDER shall submit the manufacturer's technical literature on the proposed area velocity flow meters conforming to this specification and standards referenced in this specification.
- D. The SERVICE PROVIDER shall submit flow monitor forms to the ENGINEER for review and approval. These forms shall be used by the SERVICE PROVIDER to record field inspection data.
- E. The SERVICE PROVIDER shall submit a plan summarizing the procedures and forms to notify the affected public where a flow meter or rain gauge is located on private property or easements.
- F. Flow Meters:

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The SERVICE PROVIDER shall prepare an inspection form for each site selected for monitoring. The inspection report will include the following:

1. Completed Site Inspection Forms: Data shall include site identification, manhole number (utilizing the City of Fort Lauderdale's numbering system), street location, size of all pipes entering the manhole, manhole and pipe material, schematic sketch showing the pipe configuration at the manhole, location sketch showing site location relative to permanent landmarks and other manholes, flow direction, rim to invert depth, manually measured diameter of all lines entering and leaving the manhole, drops (internal or external), and comments regarding the presence or evidence of surcharges, debris, and/or overflows.

G. Rain Gauges:

The SERVICE PROVIDER shall document the site location information.

- H. The SERVICE PROVIDER shall submit a safety plan in compliance with OSHA standards and City field safety plan requirements and all regulations pertaining to the work including confined space entry. Failure to meet the standards will result in immediate shutdown of the field operations and mandatory meeting with the SERVICE PROVIDER and ENGINEER.

**1.4 WARRANTY**

- A. Equipment Warranty: SERVICE PROVIDER shall provide written guarantee indicating that all monitoring equipment to be utilized for this project is in good operational condition and that in the event of failure, defective equipment will be replaced immediately to minimize loss of data. All costs associated with replacement of such equipment will be the responsibility of the SERVICE PROVIDER.

**PART 2 PRODUCTS****2.1 EQUIPMENT**

A. Flow monitors:

1. Gravity flow monitors shall be suitable for continuous, high-humidity conditions and have a solid-state memory that stores date, time, unit serial number, site location, flow rate, battery voltage and other programmable information, and shall measure and report depth, velocity and flow.
2. Instrument accuracy shall be +/- 5 percent of actual. The monitors shall have depth and velocity sensors such that the depth sensor measures the actual depth of flow under surcharged pipe conditions and when flow is 1 inch in depth. The sensors shall be low profile and have non-clogging features.
3. The ultrasonic flow sensor shall be able to measure from 0.75" to 10' from the face of the sensor and have an accuracy of 0.1675" with no drift. Ultrasonic sensor readings shall be checked by comparing readings from

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each ultrasonic depth sensor against its past performance, against the other ultrasonic depth sensors and against field confirmations.

4. The pressure depth sensor shall contain a differential integrated circuit pressure transducer to measure the hydrostatic pressure of the liquid to determine the liquid depth. The pressure transducer shall be factory calibrated. The pressure depth sensor will not be used as a primary depth measuring device and will only be used as a backup to ultrasonic depth and/or to measure the depth of flow in a manhole. Accuracy shall be 0.2% of full scale.
5. Velocity sensor shall be ultrasonic Doppler type. The sensor shall transmit ultrasonic signals throughout the entire flow cross-section. Accuracy shall be +/- 0.8% full scale -0.0 to 5.0 fps; +/- 1-1/2% full scale - 5.0 to 10.0 fps; +/- 2.8% full scale 10.0 to 15.0 fps.
6. The flow module shall be housed in a sealed, watertight, corrosion resistant enclosure (self-certified NEMA 6 and IP67).

**B. Rain Gauges:**

1. Continuously recording rain gages shall measure depth of rainfall in 0.01-inch increments. They shall employ a solid state memory device to record the date and times for each 0.01-inch of rainfall. Rain gauge and flow monitor time clocks shall be synchronized.
2. The rain gauge shall be constructed of stainless steel, aluminum, and plastic. All metal parts shall be coated, plated or painted. There shall be screens on all openings to prevent leaves, insects and other debris from clogging the rain gauge.

**C. Velocity Probes:**

1. Velocity probes (for independent calibration purposes) shall themselves be accurate to within +/- 5 percent and shall be furnished with a field calibration device for verification as required.

**PART 3 EXECUTION****3.1 GENERAL**

- A. The SERVICE PROVIDER shall have all flow monitoring and rain gauge equipment installed and calibrated after 15 days of contract authorization by City Commission. The monitoring period will begin when all flow meters and rain gauges are continuously recording and have been calibrated. All equipment shall be time synchronized together and remain synchronized throughout the project.

**3.2 FLOW METERS**

- A. The data shall be collected and reviewed twice per week during the initial 2 weeks. After the initial two weeks period, data shall be collected weekly and routine maintenance and service shall be performed at each monitoring site as required. Each instrument and all sensors will be inspected to ensure that they are operating properly free of any debris. A formal log of each maintenance check will be

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recorded and filed. The manhole number (meter location) and site number will be recorded on the log. During this phase, maintenance forms will be completed each time a site is checked, and provided in the Final Report.

- B. Hydraulic calibrations shall be accomplished by obtaining at least 3 independent verifications (by independent device) of the depth of flow and the peak velocity at various times of the day to capture the full range of flows for each site (i.e., early morning, mid-day, late night). The distribution of flow velocities within the wetted cross section will be obtained using the hydraulic profiling method. Hydraulic profiling will be accomplished by measuring independent point velocities at pre-defined coordinates within the wetted cross-section and then integrating them to produce the average velocity. At least 3 hydraulic profiles will be captured at each site. If indicated by hydraulic profiles, volumetric tests, or weir tests will be performed to augment hydraulic calibration effort.
- C. The calibration data must be documented for each site. The calibration data form must include the following, at a minimum:
  - 1. Date and time
  - 2. Depth of sediment (Ds) from pipe invert to top of sediment, at the cross-section where the depth sensing probe is installed. Measure depth to nearest 0.01 foot.
  - 3. Manual measured depth (Dm) from location of pipe invert to free-water surface (this may be greater than the pipe diameter when surcharged conditions exist. Measure depth to nearest 0.01 foot.
  - 4. Monitor read depth (Dr), read from the flow monitor at the same time when Dm was taken. Measure depth to the nearest 0.001 foot.
  - 5. Manual measured velocity (Vm), using the velocity profiling method.
  - 6. Monitor read velocity (Vr), read from the flow monitor over the same period as Vm. Measure velocity to the nearest 0.01 foot per second.
  - 7. Comments regarding condition of the site, current weather and weather for the 2 previous days, sensor cleanliness, debris accumulation on probe (grease, rags, sediment, etc), changing probe, corrective measures, etc.
- D. Additional flow monitoring equipment, computer equipment and appurtenances costs: The SERVICE PROVIDER will be responsible for additional flow monitoring equipment, computer equipment and appurtenances required to perform the Work. The SERVICE PROVIDER shall be responsible for providing and maintaining all said equipment required for the successful completion of the work.

**3.3 RAIN GAUGES**

The SERVICE PROVIDER shall calibrate the rain gages during initial setup. Each continuously recording rain gauge shall be visited once each week. Rain gages shall be calibrated for accuracy.

**3.4 DATA REPORTING AND REVIEW****A. GENERAL**

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1. Raw data shall be submitted to the ENGINEER every week for the purpose of reviewing the data for operational consistency and do not relieve the SERVICE PROVIDER of final data submittal responsibilities.
2. The ENGINEER will review the data and will contact the SERVICE PROVIDER on the following or second business day after submission to advise which monitors appear not to be operating properly, or providing questionable data. This does not relieve the SERVICE PROVIDER from reviewing their data or being responsible for the data quality. The SERVICE PROVIDER shall develop a quality assurance / quality control program to verify the accuracy and completeness of the data collected. The SERVICE PROVIDER shall repair or replace monitors, equipment or portions of equipment, which are not operating properly. These repairs/replacements shall be made without additional compensation.

**B. FLOW METERS**

The data for each flow monitor shall be retrieved during each site visit. Within seven days after the last data collected, the SERVICE PROVIDER shall submit a package of data from the previous week to the ENGINEER. The package shall include the following:

1. An electronic file containing raw flow meter data in depth, velocity and flow in a five minute interval - Microsoft EXCEL format (most current version).
2. An electronic file containing the calibrated flow monitoring data in Microsoft EXCEL (most current version) containing fifteen minute averages of depth, velocity, and computed flow (mgd.)
3. Description of any maintenance, adjustments, meter operation anomalies, or site observations.
4. Two copies each of all flow monitor data sheets (calibration, flow, site visit log).

**C. RAIN GAUGES**

Data from recording rain gages shall be submitted to the ENGINEER with the flow meters, but shall cover the time period through the last date of submitted flow meter data. Submitted data shall include the following:

1. An electronic file of raw rain gauge data showing time of each 0.01 inch of rainfall in or Microsoft EXCEL format (most current version), with the CD disk clearly marked as to sites numbers and dates of data collection.
2. Calibration Reports
3. Description of any maintenance, adjustments, gage operation anomalies, or site observations.
4. Two copies each of all rain gauge data forms (site visit log)

**3.5 PAYMENT**

- A. Compensation will be based on unit cost per flow meter and rain gauge per weekly basis. The unit prices submitted by the SERVICE PROVIDER shall be

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representative of the actual cost of labor, equipment and material costs, including allowances for overhead, profit and expenses. OWNER will not begin paying weekly costs until all flow meters and rain gauges have been properly calibrated, synchronized and are working properly.

- B. The SERVICE PROVIDER shall agree to a deduction in compensation for flow monitoring anytime four hours or greater of continuous unrecorded raw data occurs due to mechanical problems or mechanical failure of monitoring equipment between 4 hours prior to a rainfall event's initial recorded rainfall amount and 36 hours after the last recorded rainfall amount. Uncontrollable events beyond the SERVICE PROVIDER's control (e.g., force majeure, unusual amounts of debris and sewer collapses) are excluded from penalty. The ENGINEER will evaluate extenuating circumstances. The deductions shall be 25 percent of the unit price for one week for each monitor site having the missing data. The deduction shall be additive if the condition reoccurs for subsequent rain events. Any deduction will be applied to the partial or final payment, whichever in the opinion of the ENGINEER is applicable.
- C. The SERVICE PROVIDER'S bid submittal shall provide itemized costs for the following items:
1. Flow monitoring cost per meter site per week for a period of eight (8) weeks. For a total of thirty five (35) meter sites per contract year (maximum). Lump Sum.
  2. Rainfall monitoring cost per rain gauge site per week for a period of eight weeks. For a total of nine (10) rain gauges per contract year (maximum). Lump Sum.
  3. Ten (10) night flow isolations to be performed per contract year (maximum). Linear footages to range between 1,000 and 1,500 feet. Lump Sum.
  4. Preparation of Flow, Rainfall Monitoring and Final Summary I/I Report. One report per contract year (maximum). Lump Sum.

Additionally, alternate costs shall be provided for the following additional unit quantities which may be needed and authorized at the discretion of the City's Project Engineer:

1. Additional flow monitoring cost per meter site per week basis for a period of up to one month. Number of additional weeks will be determined and authorized by the City's Project Engineer. Unit item cost.
2. Additional rainfall monitoring per rain gauge site per week basis for a period of up to one month. Number of additional weeks will be determined and authorized by the City's Project Engineer. Unit item cost.

**3.6 MAINTENANCE OF TRAFFIC**

1. The SERVICE PROVIDER shall be responsible for furnishing and maintaining of all required barricades, either the lighted or the reflector type, to ensure the public's safety during construction activities. Barricades shall be located and displayed in conformance with the most stringent regulations required by the governing agencies. All costs for barricading,

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- including any permits, shall be the responsibility of the SERVICE PROVIDER. No additional compensation will be provided by the City.
2. All work in public rights-of-way and on private property shall be done in strict compliance with these specifications and Florida Department of Transportation Minimum Standards. Failure to so comply will result in cessation of operations and the removal of project related obstructions from the right-of-way until compliance is achieved.
  3. Traffic Control
    - a. The SERVICE PROVIDER shall provide all necessary traffic control devices in order to redirect, protect, warn or maintain existing vehicular and pedestrian traffic during the course of construction.
    - b. SERVICE PROVIDER shall propose a phasing plan that allows the City and FDOT to provide partial use of the roadway and walkway.
    - c. If required, the SERVICE PROVIDER shall submit a conceptual Traffic Control Plan. This preliminary plan should identify traffic flows during performance of the work. If required, Broward County, FDOT and the City will review this plan, depending on road jurisdiction. Broward County, FDOT and the City will have ten (10) days to notify the SERVICE PROVIDER of any comments. Once the conceptual plan for maintaining traffic has been approved, the SERVICE PROVIDER will be required to submit a detailed plan to the governing agency showing each phase's Maintenance and Protection Plan prior to starting work of any phase.
    - d. The "Maintenance of traffic" plan shall include pedestrian traffic as well as vehicular traffic.
    - e. It shall be the responsibility of the SERVICE PROVIDER for any necessary Construction, Pavement Marking and signage or any Pedestrian Signalization and/or Signal Modification to accommodate an alternate safe walk route.
    - f. The SERVICE PROVIDER, at all times, shall conduct the work in such a manner as to insure the least obstruction to traffic as is practical. Convenience of the general public and of the residents adjacent to the work shall be provided for in a satisfactory manner, as determined by the City and governing agency.
    - g. Sidewalks, gutters, drains, fire hydrants and private drives shall, insofar as practical, be kept in condition of their intended uses. Fire hydrants on or adjacent to the work shall be kept accessible to fire apparatus at all times, and no material or obstruction shall be placed within twenty (20) feet of any such hydrant.
    - h. All existing stop and street name signs will be maintained as long as deemed necessary by the City and governing agency.
    - i. The SERVICE PROVIDER shall furnish a sufficient number of protective devices to protect and divert the vehicular and pedestrian traffic from working areas closed to traffic, or to protect any new work. Failure to comply with these requirements will result in the City and governing agency shutting down the work until the SERVICE PROVIDER provides the necessary protection.

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**3.7 FINAL SUMMARY I/I DATA REPORT – SEWER CAPACITY ASSESSMENT**

- A. Final Summary I/I Data Report. The service provider shall provide the City with a project data report presenting the data collected during the flow monitoring period. The report shall provide a brief narrative summary of observed flow conditions and shall be supported by a graphical and tabular presentation of flow depth, velocity, and quantity data, along with any associated rainfall data. The project data report shall specifically include the following items for each flow monitor location:
1. Commentary – A brief narrative summary of general hydraulic conditions recorded and flow monitor service and maintenance performed during the flow monitoring period.
  2. Scattergraph Report – A graphical plot of flow depth versus velocity data recorded during the flow monitoring period.
  3. Hydrograph Report – A graphical time-series plot of hourly average flow depth, velocity, and quantity data, as well as associated rainfall data recorded during the flow monitoring period. A hydrograph shall be provided for each consecutive monthly portion and for each consecutive seven-day portion of the flow monitoring period.
  4. Tabular Report – A table of daily average flow depth, velocity, and quantity data, as well as associated daily total rainfall data recorded during the flow monitoring period. A table of hourly average flow depth, velocity, and quantity data, as well as associated hourly total rainfall data recorded during each consecutive seven-day period of the flow monitoring period.
  5. Monitoring Data – Instantaneous flow depth, velocity, and quantity as well as hydrographs generated from such data shall be provided in Microsoft® Excel® (latest version).
  6. Installation Report – a brief summary of the installation details associated with each flow monitoring location, including a color image of the general location of the manhole in which the flow monitor is installed, a color image of a plan view of the manhole interior as viewed from the manhole opening, and a color image of the sensor installation as viewed from the manhole bench and channel.
- B. Project Analysis Report. The service provider shall provide the City with a project analysis report presenting an interpretation of the data collected during the flow monitoring period. The report shall provide a characterization of average dry weather flow conditions and up to five (5)

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observed wet weather events, an assessment of hydraulic performance under such conditions, and recommendations to improve system performance based on observed flow observations and performance indicators. The project analysis report shall specifically include the following items for each flow monitor location:

1. Dry Weather Analysis – A characterization of the conditions observed during weekday and weekend periods of the flow monitoring period during dry weather periods, excluding periods of extended system recovery to previous rain events. Summarized as a time-series hydrograph of the average diurnal flow quantities for weekday and weekend dry weather periods. Hydrographs generated shall also be provided in electronic Microsoft® Excel® (latest version).
2. Dry Weather Flow Summary – A table of the most commonly used dry weather flow quantity data provided on a gross and net basis. The table includes the minimum, average, and maximum flow quantities that characterize the average dry weather diurnal conditions at each flow monitoring location during weekday and weekend portions of the flow monitoring period. Hydrographs generated shall also be provided in electronic Microsoft® Excel® (latest version).
3. Wet Weather Analysis – A characterization of the conditions observed during specific wet weather events observed during the flow monitoring period; summarized as a time-series hydrograph comparing observed flow quantities to average diurnal flow quantities for corresponding weekday and weekend dry weather periods. Hydrographs generated shall also be provided in electronic Microsoft® Excel® (latest version).
4. Wet Weather Summary – A characterization of the conditions observed during the maximum rain event of the flow monitoring period; summarized as the maximum hourly average flow quantity observed during the flow monitoring period.
5. Wet Weather Prioritization – A column chart of the rain-dependent inflow and infiltration (RDII) determined for each flow monitoring location for each wet weather event. Column chart provides a prioritized ranking based on net RDII or net RDII per linear foot of sewer per inch of rain when linear footage information is provided to the service provider by the City. All RDII hydrographs generated and summary table shall be provided in electronic Microsoft® Excel® (latest version).
6. Hydraulic Performance Evaluation – A narrative interpretation of hydraulic performance recorded at each flow monitoring location as determined using a scattergraph of flow depth and velocity data. The scattergraph interpretation shall evaluate the ability of

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each flow monitoring location to accommodate flow quantities observed during average dry weather and maximum wet weather conditions observed during the flow monitoring period.

7. Capacity Indicators – A tabular summary of capacity indicators including the ratio of maximum observed dry weather flow rate to as-built or designed full-pipe flow rate, the ratio of maximum observed wet weather flow rate to as-built or designed full-pipe flow rate, the ratio of maximum observed dry weather flow depth to diameter, the ratio of maximum observed wet weather flow depth to diameter, calculation of percent backwater, number of days in which a surcharge condition was observed during both dry weather and wet weather periods, the ratio of maximum observed silt depth to diameter, and the average dry day velocity. Tabular summary table shall be provided in electronic Microsoft® Excel® (latest version).
  8. Recommendations – A narrative summary and discussion of recommendations based on the flow monitoring data and associated analysis performed during the flow monitoring period. Recommendations shall include operation and maintenance considerations, modifications to the existing flow monitoring strategy, and/or further investigative needs identified for consideration by the City.
- C. The project data and analysis reports shall be provided to the City on recordable CD-ROM in a format compatible with Adobe® Acrobat Reader®. The report shall be provided to the City within sixty (30) calendar days following the conclusion of the flow monitoring period.
  - D. The project data and analysis reports shall be consolidated into an electronic format that provides the City ready access and review of flow monitoring data, analyses, and recommendations. The electronic format shall incorporate an interactive geographically-based interface developed from existing system maps provided by the City.
  - E. The SERVICE PROVIDER shall present and review the final report with the City's Project Engineer upon conclusion during an on-site interactive meeting.

**PART 4 QUALIFICATIONS AND EXPERIENCE OF THE PROJECT TEAM****4.1 GENERAL**

- A. The SERVICE PROVIDER or SERVICE PROVIDER's qualifier must possess the required licenses for the work to be performed. Provide documentation of required licenses with bid documents.

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- B. SERVICE PROVIDER's firm shall have experience performing similarly sized projects involving wastewater and rainfall monitoring, data analysis and I/I report writing. Responding service provider shall have a minimum of at least five years of successful, documented experience in providing integrated flow and rain monitoring, field maintenance, data processing, analysis and hydraulic reporting in gravity sewer systems.
- C. SERVICE PROVIDER shall submit, at a minimum, with the bid, project descriptions from ten (10) different projects of similar scope that SERVICE PROVIDER has performed within the last 5 years. The project descriptions shall include the following:
1. Name of the project and contract value.
  2. Description of the services performed and project role.
  3. Contact name and phone number and email address of project reference.
- D. The City will contact a reference once. Additional attempts will not be made. Your qualifications will be based responses received. Provide the best means of contacting your reference.
- E. SERVICE PROVIDER shall submit documented evidence of Field Superintendent and Project Manager for the project having, at a minimum, five years experience performing similar project scopes.
- F. The SERVICE PROVIDER shall employ a competent superintendent who can communicate verbally in the English language and who shall be in attendance at the project site full-time when any and all work is in progress. The superintendent shall be satisfactory to the City's Project Engineer and shall not be changed except with the consent of the City. The SERVICE PROVIDER's superintendent shall represent the SERVICE PROVIDER, and all communications given to the superintendent shall be as binding as if given to the SERVICE PROVIDER.
- G. All employees of the SERVICE PROVIDER and its sub-contractors shall be considered to be, at all times, the sole employees of the SERVICE PROVIDER under its sole discretion and not an employee or agent of the City. The City may require the SERVICE PROVIDER to remove any employee it deems careless, incompetent, insubordinate or otherwise objectionable and whose continued employment on this project is not in the best interest of the City.
- H. Responding SERVICE PROVIDER shall submit detailed technical submittals describing services and products utilized in this project. These technical submittals will describe in detail how the service provider's systems comply with each specification requirement, including:
1. Technical summaries explaining graphs, charts, tables and related information deliverables that will be provided at the conclusion of the project.
  2. Documentation substantiating training and certification of data processing and analysis systems used to convert data into reports.
  3. Documentation (e.g. a flow chart) substantiating quality control procedures for equipment installation to ensure accuracy.

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4. Documentation substantiating quality assurance procedures for maintaining accuracy and data uptime.
- I. Other SERVICE PROVIDER qualifications: In determining the most acceptable bid, the City of Fort Lauderdale shall also consider whether the service provider has submitted evidence of the following:
    1. Project Mobilization Qualifications: The service provider shall submit satisfactory evidence of having adequate personnel, management, technical experience, data processing and analysis capability, equipment inventory and financial capability to meet project obligations incident to the work, to include bonding capacity as required by the City.
    2. Patent and Hold Harmless Certifications: The service provider shall submit certification that they hold or have license to all applicable patents and shall indemnify and save harmless the City from all liabilities, judgments, costs, damages and expenses which may result from the infringement of any patents, trademarks, and copyrights by reason of the use of any proprietary materials, devices, equipment or processes incorporated in or used in the performance of the work under this contract.

**PART 5 SEWER AND MANHOLE – SMOKE TESTING****I – GENERAL****1.1 SCOPE OF WORK**

- A. It is the intent of this specification to provide the smoke testing materials and procedures to be used in the investigation of the sanitary sewer facilities as shown on the Project Maps. All materials and procedures shall be consistent with these specifications, current industry standards, and as approved by the ENGINEER.
- B. The SERVICE PROVIDER shall minimize the physical entry of personnel into the sanitary sewer facilities. If required, manhole entry shall be in accordance with Federal, State and local regulations for confined space entry and other regulations that may apply. The SERVICE PROVIDER shall provide all safety equipment required for manhole entry operations, including harness, ventilation equipment, etc.

**1.2 SUBMITTALS WITH THIS SECTION**

- A. Work Permits from applicable local, state and federal agencies
- B. Notification Documents
- C. Method of Smoke Production
- D. Field Log Worksheets written and in CD format
- E. Final Compiled Reports written and in CD format
- F. Identification for all Employees on-site

**INVITATION TO BID (ITB) 623-11010****Wastewater Flow, Rainfall Monitoring and Related Services Annual Contract****1.3 PERSONNEL QUALIFICATIONS**

- A. A single crew performing the testing shall be no less than 3 persons. One supervisor and two helpers per crew. One person operates the blower and smoke device. The other two inspect the run for evidence of smoke.
- B. The SERVICE PROVIDER's employees performing the smoke testing under the provisions of these specifications shall be properly trained and thoroughly experienced in the use of the equipment and procedures. The supervisor shall have at least two years of previous testing experience obtained in the last four years prior to the date of award. As a minimum, the helpers shall have at least five (5) days of verifiable, previous testing experience. The five (5) days of experience shall have been acquired within a maximum of six (6) months prior to the date of award of this contract, unless specifically waived by the ENGINEER.
- C. A list of the employees to be used shall be provided to the ENGINEER to keep on file at the Public Works Engineering Department offices. The information provided shall include the name and copy of the driver's license of each individual. Each employee shall be provided with a photo ID identifying him by name, the name and contact information for the company. All job supervisors will have cards with contact information for the supervisor and company to provide to the residents if requested.
- D. The SERVICE PROVIDER shall require all personnel to demonstrate good judgment, in performing the testing.
- E. The SERVICE PROVIDER shall take appropriate action to ensure that his employees are polite to the public in all aspects of the work and that immediate assistance is provided to property owners if needed.

**II – PRODUCTS****2.1 BLOWERS**

- A. The SERVICE PROVIDER shall provide a portable blower designed and built specifically for the use of smoke testing. The blower shall be self-contained and powered by a minimum of three (3) horsepower (HP) gasoline engine and be capable of producing a minimum of 2000 cubic feet of air per minute (cfm) when working as a blow-in ventilator and 4000 cfm when working as a suction ventilator.
- B. The base of the blower shall have appropriate adapters and seals to make a good connection to the manhole without excessive loss of air and smoke.

**2.2 SMOKE PRODUCTION**

- A. Smoke bombs shall produce a chemical reaction generating white to gray smoke, leaving no residue, and shall be non-toxic and non-explosive. Each bomb shall be capable of producing adequate volume of smoke when used alone or in combination with a number of bombs for the duration of the test.
- B. Smoke fluid shall produce smoke when exposed to heat of the exhaust system of the motor of the blower. The smoke generated shall be white to

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gray smoke, leaving no residue, and shall be non-toxic and non-explosive.

**2.3 OTHER EQUIPMENT**

- A. In addition to the blower, the SERVICE PROVIDER will provide all other equipment, tools, and incidentals required to perform smoke testing as required by these specifications and as directed by the ENGINEER including but not limited to sewer line stoppers, sand bags, cameras, confined space entry equipment, field data worksheets, etc.

**III – EXECUTION****3.1 WORK PROGRESS** – The work shall generally progress as follows:

- A. The SERVICE PROVIDER shall apply for and obtain work permits for all work to be performed in State and/or County Highways as required. All required insurances, traffic control measures, and other terms of the permit shall be provided to the satisfaction of the Agency Permit Engineer and/or Project Engineer.
- B. The SERVICE PROVIDER shall have all submittals required reviewed, including the form of the field worksheet, etc., by the ENGINEER. Work shall not proceed until acceptance of all submittals by the ENGINEER.
- C. A Work Schedule shall be submitted for review and approval by the ENGINEER. No field testing or notification may proceed until the schedule has been approved by the ENGINEER. After approval of the Work Schedule by the ENGINEER, the SERVICE PROVIDER shall not make any revisions or modifications to it without written approval by the ENGINEER.
- D. Pre-notifications – With the first notification, the SERVICE PROVIDER shall notify all affected residents in the City that smoke testing will occur no more than two weeks prior or less than one week prior to the date of the testing. This notification will be by using a printed flyer hung on each door of affected homeowners and/or a press release in the official newspaper of the City. The flyer and/or press release shall include:
1. Contact numbers of the SERVICE PROVIDER and the City, if residents want additional information. (*ALL persons who will be in contact with the public should be well versed in the smoke testing procedures, work schedule and content of all public notices*).
  2. Warnings to the homeowner that individuals with respiratory, heart problems, or others who should never be exposed to smoke, should be removed from the premises prior to the tests. Others, such as house confined invalids, sleeping shift workers and locked in animals should be identified and evacuated before the test. The notice should also request that homes with these individuals be requested to be registered as “Homes of Special Concern.”
- E. Regulatory Notifications – The SERVICE PROVIDER shall notify the Local Police and Fire Departments of the City, the County, the County Department of Health and the State Department of Environmental

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protection, just prior to distributing the flyers and publishing the Press Release to the General Public.

- F. Daily Notifications – In the Area of Daily Testing, the SERVICE PROVIDER shall notify:
  - 1. All providers of emergency services by phone providing the area to be tested during the next day of work. Notification shall be 24 hours in advance of the testing.
  - 2. The SERVICE PROVIDER shall notify, by hand delivery of a notification letter, door knob hangtags or other acceptable methods to each address, all residents and businesses in the area to be tested 24 hours in advance of the testing. All notification letters or hangtags shall be bilingual in Spanish and English.
  - 3. The day of the testing, the SERVICE PROVIDER shall check with all homes of special concerns to be sure that all persons that may be sensitive to smoke will be out of the home prior to testing.
- G. It shall be the SERVICE PROVIDER's responsibility to keep adequate records of all notification to emergency services and to produce them upon request by the ENGINEER. Failure to comply with this requirement may be cause to suspend SERVICE PROVIDER's operations until compliance is achieved.
- H. Performing the Testing
- I. Reporting the Data.

### 3.2 WORK SCHEDULE

- A. Upon award of the Contract and prior to commencing any work, the SERVICE PROVIDER shall provide a complete Work Schedule to the ENGINEER for review and approval. The Work Schedule shall be typed and shall indicate the planned progress for the proposed work.
- B. The Work Schedule shall indicate the following:
  - 1. Street Name (when in easements – the names of the abutting streets).
  - 2. Street Limits (cross streets or property addresses).
  - 3. Upstream and Downstream Manhole Numbers (from Project Maps).
  - 4. Date of Testing.
  - 5. Starting Time.
  - 6. Ending Time.
- C. Acceptable Periods of Work
  - 1. The SERVICE PROVIDER shall not commence testing before 8:00 a.m. and shall terminate testing no less than 5:00 p.m. each day.
  - 2. If the SERVICE PROVIDER wishes to test before 8:00 a.m. in commercial areas, such testing shall be shown on the submitted Work Schedule and is subject to approval of the ENGINEER.
  - 3. Work times in Commercial areas shall be scheduled to be prior to the opening of the majority of the businesses in that area.
  - 4. Smoke testing shall not be performed on weekends or on holidays without the prior approval of the ENGINEER.

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- D. SERVICE PROVIDER shall not perform smoke testing on days that, in the opinion of the ENGINEER, will hinder the result of the test (For example, when high winds, heavy rains, or excessive high groundwater levels would interfere with the effectiveness of the testing).

**3.3 PERFORMING THE TESTING AND REPORT REQUIREMENTS****A. Procedure****1. Safety**

- (a) The SERVICE PROVIDER and his personnel shall be aware of and shall follow Federal, State, and Local safety laws and regulations.
  - (b) No entry into any part of the collection system shall be permitted until SERVICE PROVIDER has demonstrated that on-site personnel has been trained in applicable safety procedures and has the equipment on-site to allow those procedures to be followed.
  - (c) Traffic Control. The area of work shall at all times be protected by means of an adequate number of cones, barricades, flags, or whatever means is necessary to properly and safely protect both vehicular and pedestrian traffic. Flag men shall be provided in all streets. Further requirements for traffic control may be imposed by the specific traffic agency having jurisdiction.
  - (d) Any condition deemed to be an unsafe condition shall be immediately corrected by the SERVICE PROVIDER. The failure of the ENGINEER or his representatives to bring potentially dangerous situations to the SERVICE PROVIDER's attention shall not relieve the SERVICE PROVIDER from his responsibility for providing a safe work area.
2. Unless otherwise approved by the ENGINEER, the sections of sewer subject to testing shall:
- (a) Consist of a central manhole, where the blower will be positioned, and an upstream and downstream manhole and the sewer pipe between them. With three (3) manholes and two pipe sections, lengths should not exceed 800 feet.
  - (b) Consist of sections two (2) manholes and one pipe section. This allows a run of 400 to 800 ft. of pipe.
3. Flow Control – It is the intent of this specification that the smoke testing be accomplished without the need for bypass pumping. The SERVICE PROVIDER shall provide temporary plugs, sandbags, or flow barriers as required to contain an adequate volume of smoke within the section of sewer being tested, or to limit the extent of sewer subjected to pressurized smoke. The SERVICE PROVIDER shall monitor the resulting surcharged sewer at the manhole upstream of the section of sewer being tested, and prevent overflow conditions from occurring by removing the flow barriers.

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4. Prior to placing any smoke into a manhole, the SERVICE PROVIDER shall first evacuate the system with a blower to ensure that any collection of explosive gas and odor that may be introduced into the homes and businesses have been dispersed prior to pressurizing the sewer with smoke. Evacuation may be accomplished by removing the manhole covers of all manholes in the run, then placing a vacuum on the manhole where the blower is located, or the blowing air into the manhole.
5. All smoke testing information shall be accurately and neatly recorded on field worksheets and on 200 scale maps (1 in. = 200 ft.) or other maps of suitable scale as provided by the ENGINEER. The final report and information shall be transferred to a computer generated log sheet together with related digital photographs taken during the smoke testing execution for each test set up. All electronic files shall be provided to the ENGINEER in CD format. All photographs must be in color.
6. For each sewer main tested, the SERVICE PROVIDER shall prepare a field log identifying each point of smoke exfiltration from:
  - (a) Roof gutters
  - (b) Sewer cleanouts
  - (c) Leakage in house laterals
  - (d) Patio or area drains
  - (e) Storm drain cross connections
  - (f) Any other source not stated above
  - (g) Indicate if roof vents showed evidence of smoke or not
7. The points of exfiltration, as identified above, shall be referenced and dimensioned to permanent marks or house lot numbers.
8. A photograph of all leaks using a digital camera or approved substitute shall be included in the field log. Photographs of smoke evidence shall have a location indicated in the photograph using a heavy marker and heavy card stock and/or recorded on a DVD disk. All photographs shall be clearly cross-referenced to the typed and/or computer generated log indicating the location of the leak. All field information such as defects and photographs (or DVD) pertaining to a particular sewer main tested must be kept together in the same file when submitted to the ENGINEER.
9. The report shall reference the alphanumeric manhole numbers shown on the project maps.
10. The SERVICE PROVIDER shall prepare a bound report and DVD record of the smoke testing as herein specified. The report shall:
  - (a) Contain a typed log that clearly identifies each sewer main tested.
  - (b) Have all field data checked for accuracy and compiled into typewritten reports.
  - (c) Contain the digital data (i.e. photographs) at the end of the project.
  - (d) Contain copies of the materials used to make notifications and a log of the daily notifications to the emergency and safety personnel.

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- (e) Submit two (2) complete copies of the report and a DVD of such report to the ENGINEER for review. Upon receiving the ENGINEER's review comments, the SERVICE PROVIDER shall edit or revise the report and DVD as necessary and resubmit five copies of the final report and DVD to the ENGINEER.

**3.4 MEASUREMENT AND PAYMENT**

- A. Smoke testing will be paid for at the unit price bid per linear foot of sewer line tested. Measurement of the number of feet tested is measured from the center of manholes. The written report including documentation, photographs, DVDs and all other incidentals to generate such report is included in the unit price bid for smoke testing.
- B. It is estimated that a maximum of 35,000 linear feet per contract year will be smoke tested.

**PART 6 DYE-WATER TESTING (FLOODING)****I – GENERAL****1.1 SCOPE OF WORK:**

- A. Dye-water testing (flooding) will be used to perform leak investigations, test manhole connections and locate cross connections between sanitary and storm sewer systems. Dye-water testing will be accomplished by flooding the ground surface or a pipe segment with color-dyed water to simulate a storm water runoff condition. Dye-water flooding may or may not be performed in conjunction with CCTV inspection. It will be at the discretion of the ENGINEER to determine which lines will be dye-water tested and televised. If CCTV is required the ENGINEER will coordinate with Operation and Maintenance staff to provide CCTV support.

**II – PRODUCTS**

- 2.1 Introduction of dye shall be in the method and amounts recommended by the manufacturer.
- 2.2 Dye products shall be non-toxic and biodegradable designed for plumbing testing. Water used to dilute the dye shall be clean to develop a clear color mixture.
- 2.3 SERVICE PROVIDER shall maintain multiple copies of the MSDS sheets of the dye products on site to respond to all inquiries for information.

**III – EXECUTION**

- 3.1 Public notification and coordination with the City's Police and Fire Departments shall be accomplished to the following:

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- A. Seven days prior to the test of any line segment and prior to beginning the testing, the SERVICE PROVIDER shall go door-to-door to distribute an Owner approved Homeowner Notification Door Hanger describing dye testing.
  - B. On the day of the test, prior to commencing operations, SERVICE PROVIDER shall knock on the doors of all structures potentially impacted by the testing to personally notify occupants. Also SERVICE PROVIDER shall notify the appropriate authorities prior to the beginning of any dye testing and will be responsible for maintaining close coordination with the local Police and Fire Departments regarding the dye tests.
  - C. CONTACTOR shall maintain multiple copies of MSDS sheets of dye product on site for response to inquiries.
- 3.2** Introduce dye treated water into the containment structure and visually observe or video leaks of dye into areas of interest.
- 3.3** The results of the observations of dye-water flooding and testing shall be recorded in an electronic "Dye Flood Testing Field Form" provided by the SERVICE PROVIDER. A copy shall be printed and certified by signature of the SERVICE PROVIDER that the results are correct. The information recorded on this form shall include the upstream manhole number, locations of the manhole or line flooding, lines plugged, location(s) flooded along the line, locations of leaks observed in sanitary sewer pipe, and any other pertinent information regarding the test results which would affect a sewer rehabilitation decision.
- 3.4** Photographs shall be taken of the dye-water flooding in progress and, when possible, photographs shall be made of leaks located. An electronic database will be provided by SERVICE PROVIDER for this purpose. All photographs shall be included as part of the "Dye Flood Testing Field Form" for each testing site and be submitted as part of the final printed copy report and electronic CD submittal to the ENGINEER.

**IV – MEASUREMENT**

- 4.1** Measurement for dye water flooding when used to locate cross connection identification shall be the actual count of each set-up where dye water flooding was performed with or without CCTV inspection. If a segment or section of pipe is to be inspected, the dye water flooding is to be measured by the actual linear feet of flooded section.

**V – PAYMENT**

- 5.1** Payment of the amount bid for dye water testing or flooding for cross connection identification will be based on the quantity as measured which shall be full compensation for dye products, sewer flow control,

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equipment set-up, cleanup, electronic and hard copy reports in accordance with the specifications, and all incidentals thereto for which separate payment is not provided under other items. If CCTV is required for inspection during testing ENGINEER will coordinate with City staff or others to provide such service.

**VI – PAY ITEMS**

<u>Item</u>	<u>Unit</u>
Dye-Water Flooding for Line Segment Defect Identification (Manhole to Manhole)	L.F.
Local Spot Dye-Water Flooding	EA

- 6.1** It is estimated that a total of 10,000 linear feet per contract year of dye-water flooding for line segment defect identification would be utilized (maximum).
- 6.2** It is estimated that a total of twenty (20) local spot dye-water flooding set-ups per contract year would be utilized (maximum).

**PART 7 MANHOLE INSPECTION****I – GENERAL****1.1 SCOPE OF WORK**

- A. Manhole Inspection aims to evaluate the condition of the manhole structure and its component parts: cover, frame, corbel, walls, base, and connecting conduits. The inspectors must look for deterioration and evidence of structural cracks or openings that allow I/I to enter the manhole. The manhole location shall be evaluated considering the potential for runoff to enter through the manhole cover and frame (e.g. does the manhole sit in a depressed area where water ponds over the cover). A detailed inspection record shall be prepared including color photographs showing the manhole, the surrounding area, and views within the connecting conduits. The data recorded during manhole inspection shall include manhole cover type, type of frame, manhole depth, type of construction used for manhole walls, and an assessment of problems and repairs needed. Color photographs shall be taken at each manhole, showing the manhole, its' surrounding area, and views within the connecting conduits (i.e. lamping).

**INVITATION TO BID (ITB) 623-11010****Wastewater Flow, Rainfall Monitoring and Related Services Annual Contract****1.2 SUBMITTALS WITH THIS SECTION**

- A. Work Permits from applicable local, state and federal agencies
- B. Notification Documents
- C. Manhole Field Inspection Form to be used for recording inspection data shall be submitted to the ENGINEER for approval
- D. Identification for all Employees on-site
- E. MOT plan for manhole inspection work
- F. A Schedule of Work must be submitted to the ENGINEER.
- G. If available, an example of a SERVICE PROVIDER proposed, Final Manhole Inspection Report including all field gathered inspection data (defect data), photographs, I/I estimates, maps and rehabilitation recommendations, shall be submitted to the ENGINEER for review and approval.

**1.3 PERSONNEL QUALIFICATIONS AND INSPECTION REQUIREMENTS**

- A. A single crew performing manhole inspections shall be no less than 2 persons. One supervisor and one helper per crew. One person records the manhole inspection information while the other observes and relates the information. The safety of the person in the manhole must be considered at all times.
- B. The SERVICE PROVIDER's employees performing the manhole inspections under the provisions of these specifications shall be properly trained and thoroughly experienced in all inspection procedures.
- C. Prior to inspection, the manhole should be allowed to vent and when possible, a blower should be used to introduce fresh air. The inspector must always wear a hard hat, harness and lanyard, and have at least one other person at the surface before entering the manhole.
- D. A list of the employees to be used shall be provided to the ENGINEER to keep on file at the Public Works Engineering Department offices. The information provided shall include the name and copy of the driver's license of each individual. Each employee shall be provided with a photo ID identifying him by name, the name and contact information for the company.
- E. The information entered on the manhole inspection form is necessary to provide a classification of deficiencies in the sewer system. If the coded information provided by the form is not sufficient to describe field conditions an additional written comment will be required. For major defects, comments should be made to explain the type and extent of the deficiency. Any comments providing meaningful information should be made. In addition, digital photographs should also be taken when distinctive problems are found.
- F. Work to conform to all applicable regulations of governing safety requirements. Confirm training compliance in the following:
  - 1. Confined entry space entry
  - 2. Ventilation requirements

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3. Atmospheric monitoring
  4. Personal protective equipment
  5. Safety work procedures
- G. Provide written confirmation to the ENGINEER that workers have knowledge of confined entry space entry practices and of equipment required for confined entry space.

**II – PRODUCTS**

- 2.1 Digital camera to be capable of producing clear sharp images at a minimum of 800 X 600 pixels (no less than 4 mega pixels and a 3X optical zoom).
- 2.2 Software capable of annotating images with the required information and reducing images to 640 X 480 pixels at a JPEG conversion of 80% for report insertion. First reduce pictures to 640 X 480 pixels and annotate with font type Times New Roman bold; font size 18; font color white or black depending on background.
- 2.3 The SERVICE PROVIDER shall provide a portable blower designed and built specifically for the use of manhole ventilation. The blower shall be self-contained and powered by a minimum of three (3) horsepower (HP) gasoline engine and be capable of producing a minimum of 2000 cubic feet of air per minute (cfm) when working as a blow-in ventilator and 4000 cfm when working as a suction ventilator.
- 2.4 In addition to the blower, the SERVICE PROVIDER will provide all other equipment, tools, and incidentals required to perform manhole inspection as required by these specifications and as directed by the ENGINEER including but not limited to sewer line stoppers, sand bags, cameras, confined space entry equipment, field data worksheets, etc.
- 2.5 Data storage to be CD ROM.
- 2.6 ENGINEER will facilitate a sewer map for the pump station area(s) to be inspected for SERVICE PROVIDER use and to highlight those manholes to be field inspected.

**III – EXECUTION****3.1 INSPECTION PROCESS**

- A. Notification and coordination with the City's Police and Fire Departments shall be accomplished at least three days (3) prior to manhole inspections. SERVICE PROVIDER shall provide a map of the pump station area(s) to be inspected.
- B. Report and record on condition of all features on the inside of the manhole such as frame and cover, chimney, corbel, barrel, bench

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and pipe connections, together with the ground condition within a four foot radius of the manhole cover.

- C. Each manhole to be inspected and assessed according to the ENGINEER preapproved standard inspection form, previously reviewed and approved during the submittal process. Any variation from the standard form shall be noted in the manhole inspection report.
- D. No inspection surveys shall be carried out under this contract until an acceptance sample inspection form has been approved by the ENGINEER.

**3.2 PHOTOGRAPHS AND/OR DIGITAL IMAGES**

- A. Photograph the interior of each manhole to be inspected perpendicular to the base.
- B. Photograph the ground level characteristics surrounding the manhole cover around a four foot radius from the outside edge of the casting lid so that any defects and physical ground features impacting the manhole at ground level are recorded. An orientation north arrow shall be placed on the ground in a location that will not inhibit assessment. Picture must be sufficiently illuminated and outside of the shadow of operator.
- C. Photograph manhole structural, mineral/staining and infiltration defects and provide a rating for such severity (minor, medium excessive). If possible provide a GPM estimate for I/I flow quantities. Provide a maximum of two images for each defect. These images shall be acknowledged in the comments field. Provide sufficient illumination and zoom to assess manhole deficiencies.
- D. Overlay on photographs the following data in alpha-numeric form such that it will not interfere with the image of the defect condition reported:
  - 1. Pump station area, road or easement name (upper left corner)
  - 2. Unique manhole identification number and nearest street address to manhole (lower left corner)
  - 3. Date of inspection survey (lower right corner)
- E. Include white information board with the ground level photograph with the following data:
  - 1. Pump station area, road and easement name (upper left corner).
  - 2. Unique manhole identification number and nearest street address to manhole (lower left corner)
  - 3. Date of inspection survey (lower right corner)

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- F. Capture photograph and alpha-numeric data as a digital image in a JPEG format. Each JPEG image file to be identified by the PS name, manhole #, manhole inspection report # and photograph #. (E.G. PS A-1\_MH-82\_insp. report#\_001)
- G. Inside capture manhole deficiencies images shall be identified by the same naming convention as listed in 3.1.F with the inclusion of the position of the deficiency area. (E.G. PS A-1\_MH-82\_insp. Report#\_bench\_001; PS A-1\_MH-82\_insp. Report#\_corbel\_001; PS A-1\_MH-82\_insp. Report#\_barrel\_001; PS A-1\_MH-82\_insp. Report#\_chimney\_001)

**3.3 INSPECTION FORM CODING SHEETS**

- A. Condition of each manhole's component to be recorded according to the standard manhole inspection form supplied by the SERVICE PROVIDER and pre-approved by the ENGINEER complete with associated defect codes and written comments.

**3.4 INSPECTION REPORTING HARD COPIES AND DIGITAL FORMAT**

- A. Submit three (3) manhole inspection reports to ENGINEER within seven (7) working days of completion of field work for each pump station area, as the inspection work is finalized per pump station area.
- B. Present manhole inspection reports in printed (hard copy) binder and CD ROM format to the ENGINEER for review and approval.
  - 1. Each inspection report binder to commence with an index of all survey inspection reports and a map of the pump station area highlighting which manholes were inspected.
  - 2. Hard copy of manhole reports to be presented in accordance with standard pre-approved manhole inspection reports.
  - 3. CD ROM copy of manhole inspection report shall contain identical report information as the printed report version (including photographs, maps, etc.).
  - 4. After resizing and annotation, digital images, documenting manhole defects shall be inserted within each corresponding manhole inspection report.
  - 5. CD ROM of inspection report, including digital photographs, shall be labeled with SERVICE PROVIDER name, contract information, Pump Station name, location of project and date.
  - 6. CD ROM shall include all field inspection report data used to generate the manhole inspection report including digital images, etc.

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7. Include scale drawings showing the highlight inspected manholes. Drawings to be included in each relevant report binder.
  8. After review and approval by ENGINEER of "draft" manhole inspection report(s) submit three (3) final inspection reports.
- C. Provide three (3) final approved manhole inspection reports in a hard copy binder format for each PS area inspected.
- D. Attach CD ROM copy of manhole report in plastic CD sheet holder in the back of the report(s). CD ROM copy of manhole inspection shall contain identical report information as the printed report version (including photographs, maps, etc.).

**IV – MEASUREMENT AND PAYMENT**

- 4.1** Measurement and payment for manhole inspection will be for each complete inspection as described in the specifications.
- 4.2** Unit rates shall include traffic control, site preparation and cleanup requirements and all other costs incidental to the work including, but not limited to, preparation of the manhole inspection report.
- 4.3** It is estimated that a total of thirty five (35) manhole inspections will be required per contract year (maximum).

**ATTACHMENTS:****Appendix A:**

- a. **Example of Flow, Rainfall Monitoring and Final Summary I/I Report**

**END OF PART II**

**DRAFT - FINAL REPORT**

OF

**TEMPORARY FLOW MONITORING SERVICES**

PREPARED FOR THE



**CITY OF FORT LAUDERDALE, FLORIDA**

PREPARED BY:



**SEVERN TRENT  
PIPELINE SERVICES**

IN ASSOCIATION WITH:



**CH2MHILL**

**MARCH 2002**

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## CITY OF FORT LAUDERDALE FLOW MONITORING REPORT – MARCH 2002

**I. Executive Summary**

The City of Fort Lauderdale is developing a wastewater conveyance system long-term remediation program. In assisting the development this program CH2M Hill sub-contracted with Severn Trent Pipeline Services to monitor and assess sanitary flows throughout the Fort Lauderdale system. The purpose of this study is to identify areas with the highest Rainfall Induced Infiltration and Inflow (RDII). The results of the study will help identify problem areas and provide flow data for future reference.

The goals of this report are to:

1. Provide dry and wet weather sewer flows to evaluate existing capacity concerns and direct future rehabilitation efforts.
2. Quantify inflow and infiltration (I/I) quantities contributed upstream of each meter site.

This information serves as engineering evidence on the impact of wet weather on the ability of the collection system to transport flows without sanitary sewer overflows. This report presents the findings and recommendations.

Fifty-five temporary flow meters and 9 rain gauges were installed to record flow entering 23 pump stations and rainfall in the study area. The temporary flow meters captured approximately 70 percent of the total wastewater flow in 186 of the 330 miles of the entire gravity collection system. The overall service area is displayed in Figure I-1. The monitoring period began on August 11, 2001 and ended after fifty-six days on October 5, 2001.

Upon completion of the monitoring period, data from the flow meters were analyzed to prepare summaries of dry and wet weather flow characteristics for each site. Additionally, analyses were performed on each basin in order to quantify and isolate RDII within the service areas. Table I-1 summarizes the major results of this study for each pump station basin.

The *National Oceanic and Atmospheric Administration (NOAA)* rainfall intensity-duration charts for south Florida provided a basis for making a relative comparison of the rainfall observed during the study period. From these NOAA charts it was estimated that the *1-year 24-hour* rainfall is approximately 4.5 inches, the *2-year 24-hour* rainfall is approximately 5.75 inches and the *5-year 24-hour* rainfall is approximately 8.0 inches. During the first rain event, the largest daily rainfall total was approximately 3.9 inches, which is less than the *1-year 24-hour* rain event. The largest daily rainfall total for the second rain event was approximately 6.4 inches recorded at rain gauge 105 on September 29. This is the only recorded daily average rainfall to exceed the *2-year 24-hour* storm rainfall. The rainfall recorded by all rain gauges for the second event exceeded the *1-year 24-hour* storm of 4.5 inches of rainfall. The two storms collectively made September 2001 the wettest month over the past 51 years.

The results of dry and wet weather analyses indicated that:

- Sewer capacity concerns exist within the Fort Lauderdale sanitary sewer system. Sites A-17.1, A-27.2, A-27.3, B-13.1, D-37.1 and D-40.1 experienced a peak dry weather depth in excess of 75% of the pipe diameter. Four of these sites, Sites A-27.2, A-27.3, B-13.1 and D-40.1, were surcharged during dry weather.
- Dry weather infiltration is significant on a system wide basis. Infiltration averaged 5,269 GPD/Inch-Mile. For this project, pump stations and metering sites with rates greater than 3,000 GPD/Inch-Mile are considered to be significant contributors. Eighteen of the 23 pump stations and 38 of the 55 metering sites exceeded this threshold.
- Capacity problems were much more significant during the wet weather events. Surcharging occurred at 53 of the 55 sites.

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- Rainfall dependent infiltration and inflow (RDII) is significant. Seventeen of the 23 pump stations and 33 of the 55 metering sites experienced discrete RDII at a rate greater than 5.0 gal/LF/inch of rain, which indicates excessive RDII.
- Fourteen pump stations (>3,500 GPD/Inch-Mile) contributed 80% of the total system dry weather infiltration in approximately 52% of the collection system footage. (See Table VI-1 and Figure VI-1) More specifically, twenty-six of 55 metering sites (>5,000GPD/Inch-Mile) contributed 80% of the total system dry weather infiltration in approximately 36% of the collection system footage.
- Fourteen pump stations (>6.0 GPD/LF/inch of rain) contributed 80% of the total system RDII in approximately 56% of the collection system footage. More specifically, twenty-five metering sites (>7.0GPD/LF/inch of rain) contributed 80% of the total system RDII in approximately 38% of the collection system footage.

## Recommendations for further evaluation of the Sanitary Sewer System:

- This flow monitoring study should be used to determine the remaining sewer study projects.
- Conduct a partial Sanitary Sewer Evaluation Survey (SSES) consisting of manhole inspection, flow isolation and TV inspection in those basins exhibiting potentially significant dry weather infiltration.
- Conduct a partial SSES consisting of manhole inspection, smoke testing and TV inspection in those basins exhibiting potentially significant dependent rainfall RDII rates.
- Conduct a full SSES consisting of manhole inspection, smoke testing, flow isolation and TV inspection in those basins exhibiting both dry weather infiltration and rainfall dependent infiltration and inflow.
- Continue field studies to optimize the pump station performance of each pump station.
- Continue implementing a cleaning program for the basins with a permanent presence of silt or debris in the sewer line based upon the results of the flow monitoring study and the measurements of debris during the field visits.
- Continue implementing the ongoing program of locating and rehabilitating sewers contributing significant dry weather infiltration and/or RDII problems.

All basins should be routinely inspected approximately every ten years. A minimum program consisting of manhole inspections and smoke testing should be implemented on a scheduled basis. This work can be prioritized according to the rates noted on Figures VI-1 and VI-2 Dry Weather Infiltration Ranking and/or Figures VIII-1 and VIII-2 Discrete Wet Weather Ranking. The greater Discrete Infiltration Rate (GPD/Inch-Mile) or Average Normalized RDII Rate (gal/LF/inch of rain) indicates a higher importance of conducting a sanitary sewer evaluation survey.

This final report contains the main body of text which explains the work accomplished, dry weather analysis, wet weather analysis and summaries of all results. Tables and figures are presented to illustrate the results. A glossary section is presented explaining definitions and terminology. Detailed cumulative results for each meter location are presented in the Appendices respectively by meter name. Each appendix for each meter location contains attributes and flow information presented in the Site Summaries, Site Photographs, Site Sheets and the Daily Hydraulic Summaries. Each site is graphically represented with Site Hydrographs and Flow Component Hydrographs in each respective site appendix.

## CITY OF FORT LAUDERDALE FLOW MONITORING REPORT – MARCH 2002

**TABLE I-1**  
**City of Fort Lauderdale**  
**Pump Station Summary**

Pump Station	Total # of Flow Meters	Gravity Sewer (MILES)	Base Flow (MGD)	Avg. Dry Infiltration Rate (GPD/IN-MI)	Avg. Norm. RDII Rate (Gal/LF/IN)
A-01	3	7.981	0.52	3,468	14.2
A-07	2	7.128	1.84	15,557	5.2
A-11	1	4.712	0.78	10,074	16.5
A-12	3	9.686	1.06	7,486	8.7
A-17	2	8.865	0.64	3,218	5.9
A-18	3	8.607	1.00	7,027	1.5
A-19	4	7.051	0.52	3,314	7.9
A-20	2	5.411	0.43	4,096	10.0
A-21	4	5.586	0.33	2,889	6.6
A-23	2	8.086	0.55	3,638	5.1
A-27	3	5.968	0.66	6,350	15.3
A-29	4	8.787	1.09	6,864	4.7
B-01	3	13.370	0.27	862	4.1
B-02	2	4.690	0.92	9,514	2.6
B-04	2	6.780	0.89	7,617	9.8
B-06	2	8.369	0.54	3,450	1.8
B-10	3	14.651	0.79	2,317	7.2
B-11	2	9.248	1.16	2,907	11.9
B-13	2	13.242	0.47	2,093	1.1
B-14	2	5.200	0.56	5,605	7.7
D-37	1	12.050	0.83	3,996	6.4
D-40	1	2.233	0.63	11,050	9.0
D-43	2	7.972	1.26	9,859	7.0
Total Length of Gravity Sewer		185.673	Average per Basin	5,794	6.5
			Weighted Average	5,269	

### Figure I-1 Project Location Map

Figure I-1 presents the project location map providing a general overview and site layout in the City of Fort Lauderdale. The project location map shows the general location of the pump stations and rain gauges. The flow meters were located immediately upstream of the pump stations.



## CITY OF FORT LAUDERDALE FLOW MONITORING REPORT – MARCH 2002

**II. Project Background**

Beginning in August 2001, Severn Trent Pipeline Services, acting as a sub-consultant to CH2M Hill performed a short term flow metering study of the sanitary sewer system for the City of Fort Lauderdale. The overall purpose of this study was to monitor the existing sewer flows and use the monitoring data to determine the current dry and wet weather flows in the system and to identify areas within the collection system that have significant rain dependent infiltration and inflow.

The flow monitoring information is critical in establishing future Sanitary Sewer Evaluation Survey (SSES) work. The results within this report contain the priority rankings for future SSES studies.

CH2M Hill proposed fifty-five temporary flow meter locations and 9 rain gauges to measure data during a short-term metering period. The monitoring period began on August 11, 2001 and ended after fifty-six days on October 5, 2001.

This report summarizes the findings and conclusions of the short-term flow monitoring program.

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### III. System Description

The City of Fort Lauderdale has a regional wastewater treatment plant, G. T. Lohmeyer Wastewater Treatment Plant (WWTP), with a treatment capacity of 43 million gallons per day. The 330-mile wastewater collection system consists of a series of pump stations and underground piping which collect and transport wastewater from the City of Fort Lauderdale, as well as other adjacent municipalities in Broward County, to the WWTP.

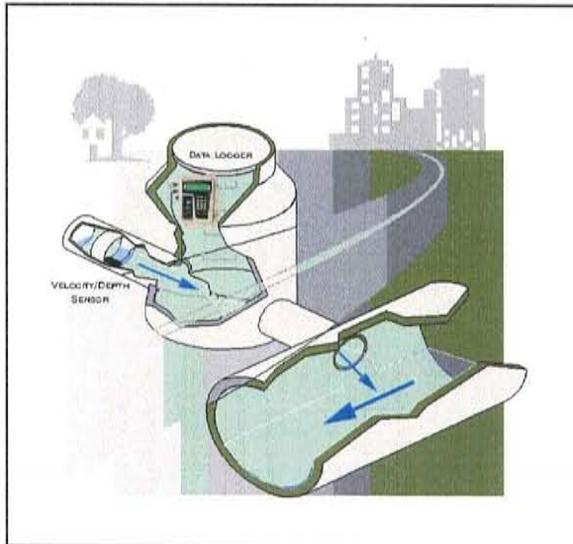
Fifty-five flow meters were placed to monitor influent flows to twenty-three strategic pump stations, which represents approximately 70 percent of flow in the collection system and 186 of the 330 miles of the entire collection system. Each metering site is given a site identification name or number that includes the pump station name and an extension. For example, Pump Station A-01 has three flow meters, which are considered to be three different metering sites and are labeled as A-01.1, A-01.2 and A-01.3. By labeling sites in this manner, it is easier to match the site with the specific pump station. Meter location is shown in each site's respective appendix. The appendix for each metering site contains a Site Summary, Site Photographs, Site Sheets, Daily Hydraulic Summary, Site Hydrographs and Flow Component Hydrographs.

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**IV. Equipment Installation and Operation**

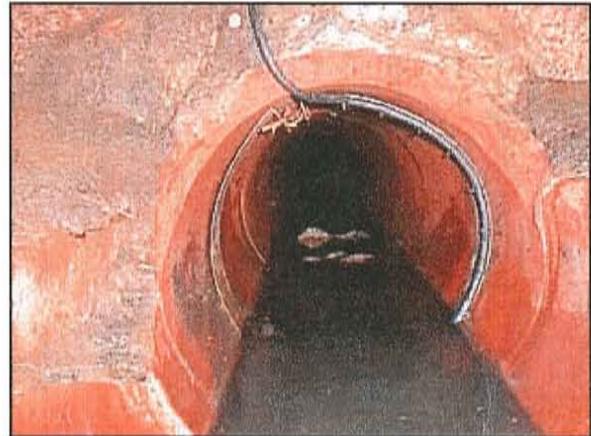
Field crews verified the flow hydraulics at each site selection prior to installation. Where hydraulics are poor due to abrupt changes in flow direction, large silt deposits and/or restrictions, an alternative meter location was selected. This site selection procedure was followed to ensure proper hydraulic conditions so that accurate flow data could be obtained.

The methodology and equipment used to measure wastewater can vary depending on the application. For this project, temporary area velocity (AV) meters were utilized to obtain flow data under various hydraulic conditions and temporary rain gauges were utilized to obtain rainfall data.



Fifty-five temporary gravity flow meters were installed and measured flow during the monitoring period. Each site utilized an American Sigma 900 series AV flow meter. The meter used a Doppler ultrasonic probe configuration to measure wastewater velocity and either a pressure or bubbler sensor to determine flow depths. The meter, which contains the control unit, electronic data memory, sensor inputs and a connection to download the data into a computer, was mounted near the top of the manhole. The sensors were mounted onto a metal band and inserted into the pipe invert. The picture below shows a typical sensor installation.

All of the flow meters were powered through batteries. Each meter was calibrated prior to and after installation. Calibration is a simple procedure consisting of comparing the depth and velocity measurements of the flow meter with physical measurements taken on site. The field crew then made any adjustments that were required. The meter was then secured in the manhole and activated at set sampling intervals. A logging interval of fifteen minutes was used for each meter. Maintenance and service were performed weekly to confirm normal operation and to retrieve the flow data.



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**American Sigma Rain Gauge**

Nine rain gauges were installed during the monitoring period at key locations throughout the Fort Lauderdale system. The rain gauges were separated or spaced to provide an adequate rainfall pattern across the flow metering basins. The locations provided security and adequate rainfall coverage. The locations chosen were isolated from trees and other objects that may obstruct the free flow of rain. All rain gauges were American Sigma tipping bucket rain gauges. The rain gauge collects rainfall in a funnel and channels it into the tipping bucket that tips at every 0.01 inch. A logger located inside the rain gauge records the number of bucket tips within the recording interval and stores this value in the electronic memory. A logging interval of five minutes was used for every rain gauge. As with the flow meters, maintenance and service were performed weekly to confirm normal operation and to retrieve the rainfall data.

## CITY OF FORT LAUDERDALE FLOW MONITORING REPORT – MARCH 2002

**V. Data Analysis Procedures**

Throughout the duration of this monitoring project, trained staff reviewed the flow data at weekly intervals. The data was examined for evidence of changes in flow conditions, monitor malfunctions or other problems that may affect the accuracy of the flow data. Any adjustments deemed necessary were immediately forwarded to the field crew.

Once the raw flow depth and velocity data had been reviewed, the flow rate was computed based on the pipe cross sectional area. The base method of calculation utilized the Continuity Flow Equation that is expressed as:



$Q = A V$  where;

Q = Flow Rate  
A = Cross-sectional Flow Area  
V = Average Flow Velocity

This equation is applicable for all flow conditions including free flow, surcharge and backwater. In rare instances where the velocity data was unreliable due to debris obstructing the probe sensor, but good depth data was available, Manning's Equation was used to calculate the flow rate. Manning's Equation is expressed as:

$Q = \frac{A (1.486) R^{0.67} S^{0.5}}{n}$  where;

Q = Flow Rate  
A = Cross-sectional Flow Area  
R = Hydraulic Radius  
S = Slope of hydraulic gradient  
n = Pipe roughness coefficient (default 0.013)

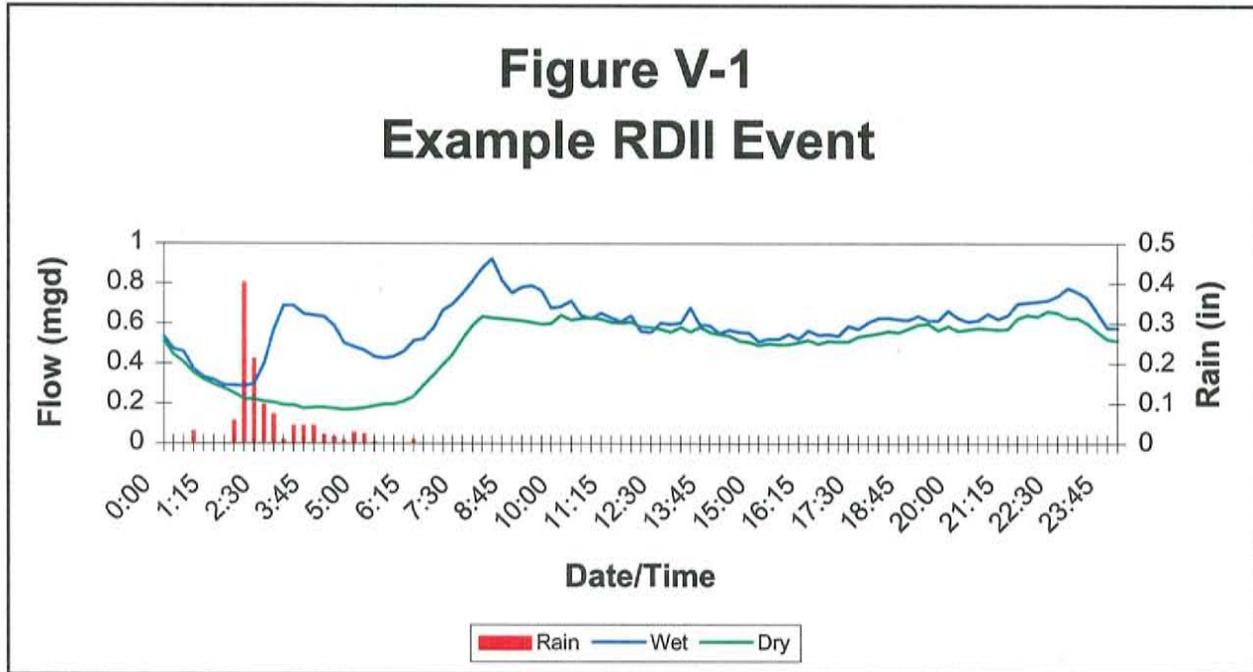
The final flow rate for a given site was calculated by using the Continuity Equation, Manning's Equation or by a combination of both. Once the flow data for each site was established, a cumulative dry weather analysis was performed on each meter site. A continuous dry weather period of seven days was selected from the entire monitoring duration. This period was selected to include only those days in which there was little or no rainfall or influence of recent rain events on the basin. The flow data during the dry weather period was analyzed to produce a summary of the dry weather flow that is characteristic of the site. It should be noted that the dry weather analysis could possibly be skewed high due to heavy rains prior to the monitoring period. A tropical storm event did occur prior to the monitoring period, which could adversely affect the dry weather analysis.

A rainfall analysis was performed on the data collected by the rain gauges. Rain events producing more than 0.5 inches of total rainfall in a 24-hour period were designated as significant rain events. The size of each significant rain event was compared to different return period design storms of the same duration for the study area. This comparison provided the approximate return period of each observed rain event. The total rainfall over the monitoring period was compared to the normal rainfall of the study area for the monitoring period. This established a relative measure of the rainfall for the monitoring period.

A two-part cumulative wet weather analysis was performed for each monitoring site. The first part was a peak response analysis that quantified the maximum discharge and flow depth observed at the site in response to rain. The second part was a volumetric inflow analysis that quantified the amount of rainfall dependent infiltration and inflow (RDII) contributed to the basin as a result of wet weather events. Significant rain events occurring within the monitoring period were analyzed to produce a summary of the wet weather response characteristics for each site.

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Rain dependent inflow and infiltration are designated as any increase in flow during a wet weather event above the established dry weather flow for each respective monitoring site. Figure V-1 graphically illustrates this concept.



RDII was computed by subtracting the composite seven-day dry weather period from the wet weather day. The composite seven-day dry weather period is computed by averaging the seven days from the dry weather period. Typically, the composite dry weather day provides a good basis of an average day with groundwater infiltration and base-wastewater as the two primary components. If the rain-related response on the wet weather day is over a multiple-day period, each day is included in the analysis. The RDII from each significant rain event was normalized according to the rainfall amount. An average normalized flow volume from the two significant rain events was calculated for each metering site. This average normalized flow volume was used to determine the RDII rankings of each metering site in the study area. The sum of normalized flow volumes of the sites contributing to each pump station was used to determine RDII rankings of each pump station in the study area. The ranking of metering sites further identifies the greatest contributing RDII areas to each pump station.

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## VI. Dry Weather Analysis

Seven days, August 22, 2001 through August 28, 2001, were chosen as the representative dry weather period. Due to lost data, some sites required an alternative dry weather period. The site summary for each site indicates the dry weather period used during the dry weather analysis. The site summary for each monitoring site, located in each respective appendix, presents cumulative dry weather flow data for each site observed during the monitoring period. Definitions of the parameters presented in the appendices are given in the glossary section of the report.

A review of the Peak Percent Depth Used (d/D) computations in the Site Summary for each site indicated that the majority of the monitoring sites had sufficient dry weather sewer line capacity. Sites A-17.1, A-27.2, A-27.3, B-13.1, D-37.1 and D-40.1 had a measured peak percent depth greater than 75%. This may limit the ability of these parts of the wastewater collection system to handle rain related flow increases and to accommodate future growth.

Field crews recorded silt levels in the sewer line during routine visits to the sites. Sites A-17.1, A-17.2, A-18.2, A-29.1, B-04.1, D-43.1 and D-43.2 were observed to have the presence of silt in the sewer line during the monitoring period. Generally, debris or silt deposition in a sewer line indicates that the velocities in the line are not high enough to prevent debris and silt from settling out of the waste stream. Debris and silt deposition in a sewer line reduces the hydraulic capacity of the sewer line by increasing pipe friction and reducing flow area. Such a reduction may lead to inadequate sewer line capability to transport peak flows during dry or wet weather.

An infiltration analysis was performed as part of the dry weather analysis. Nighttime minimum flow was used to estimate infiltration. This method of estimating infiltration is based upon the understanding that the majority of the minimum flow in a typical sewer system is infiltration, especially in those systems that consist mostly of residential or daytime business users. In most cases, the minimum flow occurs between 1:00 am and 4:00 am. After the minimum flow has been identified, a percentage of this flow is estimated to be infiltration. In general, infiltration upstream of a flow meter site is considered to be significant if the minimum flow was at least 50% or greater than the average dry weather flow.

Infiltration can be estimated as a percentage of the minimum flow. The percentage used as an estimate of infiltration can vary from basin to basin and region to region. Percentages generally range between 50 and 80 percent of the minimum flow. In the Fort Lauderdale system, 80% of the minimum flow was used to estimate infiltration. The results from each monitoring location are presented in the Site Summary as estimated groundwater infiltration in each respective appendix. While this flow is thought to be infiltration, it may also be the result of nighttime users.

Once infiltration was estimated, the base flow was computed by subtracting the infiltration from the average daily flow. Infiltration rates were calculated for each pump station and metering location. Infiltration rates require knowledge of the sewer system relative to the footage and size of pipe within each basin. CH2M Hill provided pipe footages and sizes for each metering site. The infiltration rate is defined here as the estimated groundwater infiltration divided by the product of the pipe sizes and lengths within the metering basin. The results of this cumulative analysis are presented on the Site Summary form in each respective appendix of this report.

Discrete infiltration consists of infiltration contributed by a particular basin. In this project, all of the sites are independent and have no upstream contributors. Therefore, the flows are representative for that particular basin and are considered discrete flows. Tables VI-1 and VI-2 present the discrete estimated sanitary flow, estimated groundwater infiltration and the calculated infiltration rate for each pump station and each metering site, respectively. Figure VI-1 and VI-2 ranks each pump station and each metering site, respectively, with respect to the discrete infiltration rate per inch-mile of sewer pipe. The linear footage of sewer pipe used in calculating the discrete infiltration rates does not include the private mains, service laterals or private services that exist within the Fort Lauderdale study area. Discrete infiltration rates greater than 3,000 GPD/Inch-Mile are considered to be significant.

## CITY OF FORT LAUDERDALE FLOW MONITORING REPORT – MARCH 2002

**Table VI-1**  
**Discrete Dry Weather Summary of Pump Stations**

Pump Station	Inch-Miles Of Gravity Sewer	Estimated Sanitary Flow (mgd)	Estimated Groundwater Infiltration (mgd)	Infiltration Rate (gpd/inch-miles)
A-01	69.199	0.277	0.240	3,468
A-07	73.020	0.703	1.136	15,557
A-11	42.088	0.360	0.424	10,074
A-12	84.019	0.428	0.629	7,486
A-17	84.224	0.373	0.271	3,218
A-18	87.805	0.378	0.617	7,027
A-19	70.009	0.294	0.232	3,314
A-20	56.147	0.203	0.230	4,096
A-21	54.682	0.175	0.158	2,889
A-23	81.631	0.256	0.297	3,638
A-27	59.682	0.282	0.379	6,350
A-29	88.866	0.479	0.610	6,864
B-01	114.891	0.174	0.099	862
B-02	38.681	0.547	0.368	9,514
B-04	64.201	0.450	0.489	7,617
B-06	70.734	0.293	0.244	3,450
B-10	126.047	0.498	0.292	2,317
B-11	82.212	0.920	0.239	2,907
B-13	57.811	0.344	0.121	2,093
B-14	43.504	0.313	0.244	5,605
D-37	99.857	0.430	0.399	3,996
D-40	21.720	0.390	0.240	11,050
D-43	69.681	0.572	0.687	9,859

## CITY OF FORT LAUDERDALE FLOW MONITORING REPORT – MARCH 2002

**Table VI-2**  
**Discrete Dry Weather Summary of Metering Sites**

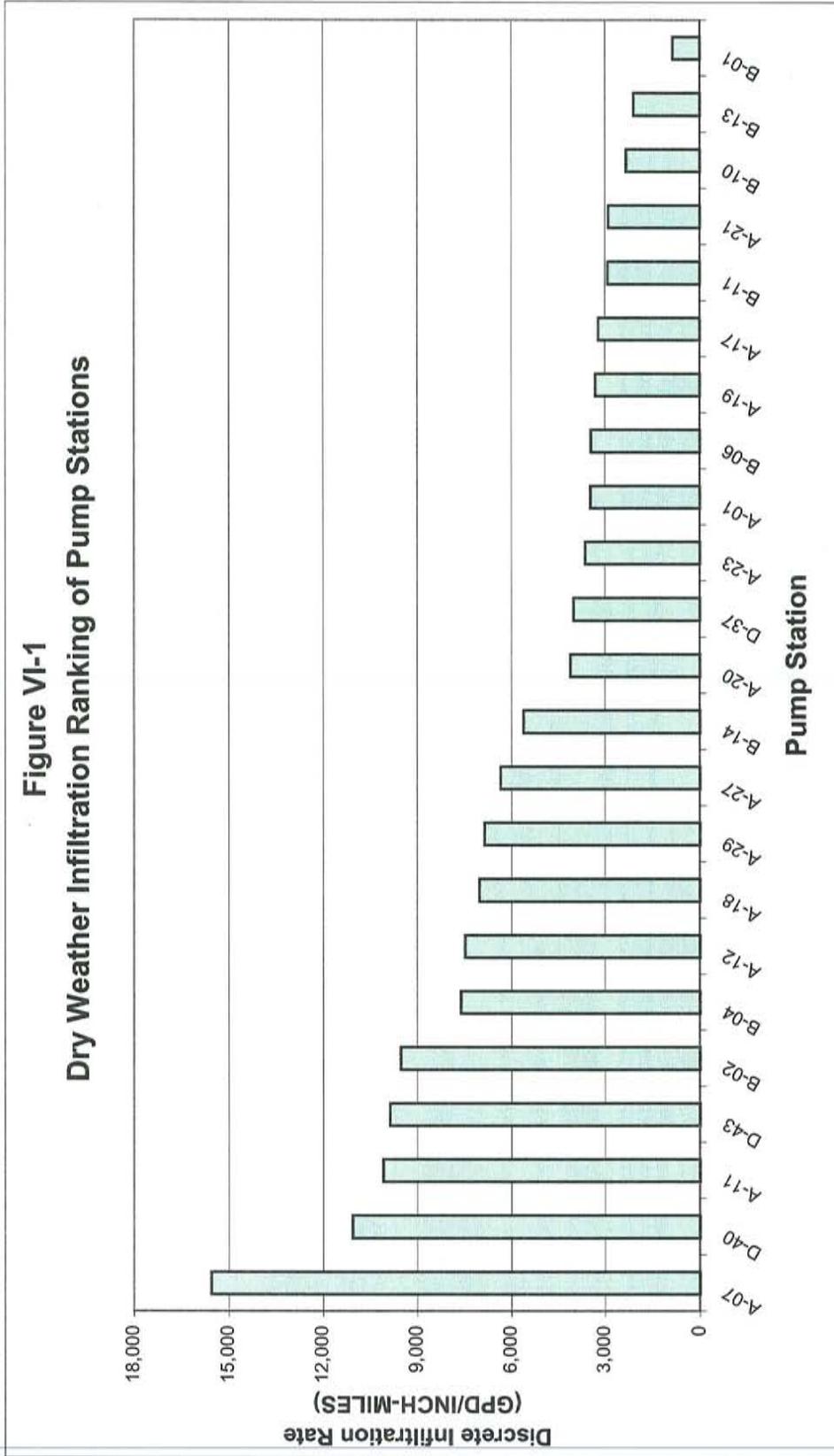
Site	Inch-Miles Of Gravity Sewer	Estimated Sanitary Flow (mgd)	Estimated Groundwater Infiltration (mgd)	Infiltration Rate (gpd/inch-miles)
A-01.1	47.528	0.126	0.090	1,900
A-01.2	8.434	0.071	0.062	7,358
A-01.3	13.237	0.080	0.088	6,631
A-07.1	5.216	0.063	0.020	3,922
A-07.2	67.804	0.640	1.116	16,452
A-11.0	42.088	0.360	0.424	10,080
A-12.1	18.185	0.173	0.214	11,746
A-12.2	6.907	0.250	0.414	59,995
A-12.3	58.927	0.005	0.001	17
A-17.1	38.334	0.238	0.158	4,114
A-17.2	45.890	0.135	0.113	2,468
A-18.1	8.996	0.049	0.066	7,355
A-18.2	30.358	0.197	0.342	11,271
A-18.3	48.451	0.132	0.209	4,310
A-19.1	3.684	0.025	0.015	3,971
A-19.2	0.284	0.012	0.003	10,057
A-19.3	11.941	0.069	0.076	6,355
A-19.4	54.100	0.188	0.138	2,550
A-20.1	24.370	0.109	0.145	5,970
A-20.2	31.777	0.094	0.085	2,690
A-21.1	0.900	0.012	0.001	762
A-21.2	12.029	0.011	0.009	760
A-21.3	8.256	0.047	0.031	3,724
A-21.4	33.497	0.105	0.117	3,497
A-23.1	41.756	0.072	0.094	2,261
A-23.2	39.875	0.184	0.203	5,099
A-27.1	18.400	0.109	0.121	6,578
A-27.2	11.184	0.066	0.077	6,888
A-27.3	30.098	0.107	0.181	5,999
A-29.1	17.545	0.097	0.113	6,423
A-29.2	2.225	0.002	0.000	0
A-29.3	21.648	0.155	0.234	10,817
A-29.4	47.448	0.225	0.263	5,533
B-01.1	1.386	0.001	0.000	0
B-01.2	34.466	0.033	0.016	461
B-01.3	79.039	0.140	0.083	1,044
B-02.1	35.772	0.447	0.299	8,371
B-02.2	9.938	0.100	0.069	23,689

## CITY OF FORT LAUDERDALE FLOW MONITORING REPORT – MARCH 2002

**Table VI-2**  
**Discrete Dry Weather Summary of Metering Sites (cont.)**

Metering Site	Inch-Miles Of Gravity Sewer	Estimated Sanitary Flow (mgd)	Estimated Groundwater Infiltration (mgd)	Infiltration Rate (gpd/inch-miles)
B-04.1	29.604	0.215	0.257	8,678
B-04.2	34.597	0.235	0.232	6,712
B-06.1	56.084	0.267	0.208	3,707
B-06.2	14.650	0.026	0.036	2,434
B-10.1	82.472	0.415	0.263	3,191
B-10.2	38.298	0.072	0.026	677
B-10.3	5.277	0.011	0.003	606
B-11.1	45.326	0.336	0.139	3,066
B-11.2	36.886	0.584	0.100	2,702
B-13.1	15.841	0.263	0.080	5,065
B-13.2	41.970	0.081	0.041	986
B-14.1	26.080	0.157	0.102	3,900
B-14.2	17.424	0.156	0.142	8,133
D-37.1	99.857	0.430	0.399	3,991
D-40.1	21.720	0.390	0.240	11,039
D-43.1	27.282	0.278	0.435	15,960
D-43.2	42.399	0.294	0.252	5,949

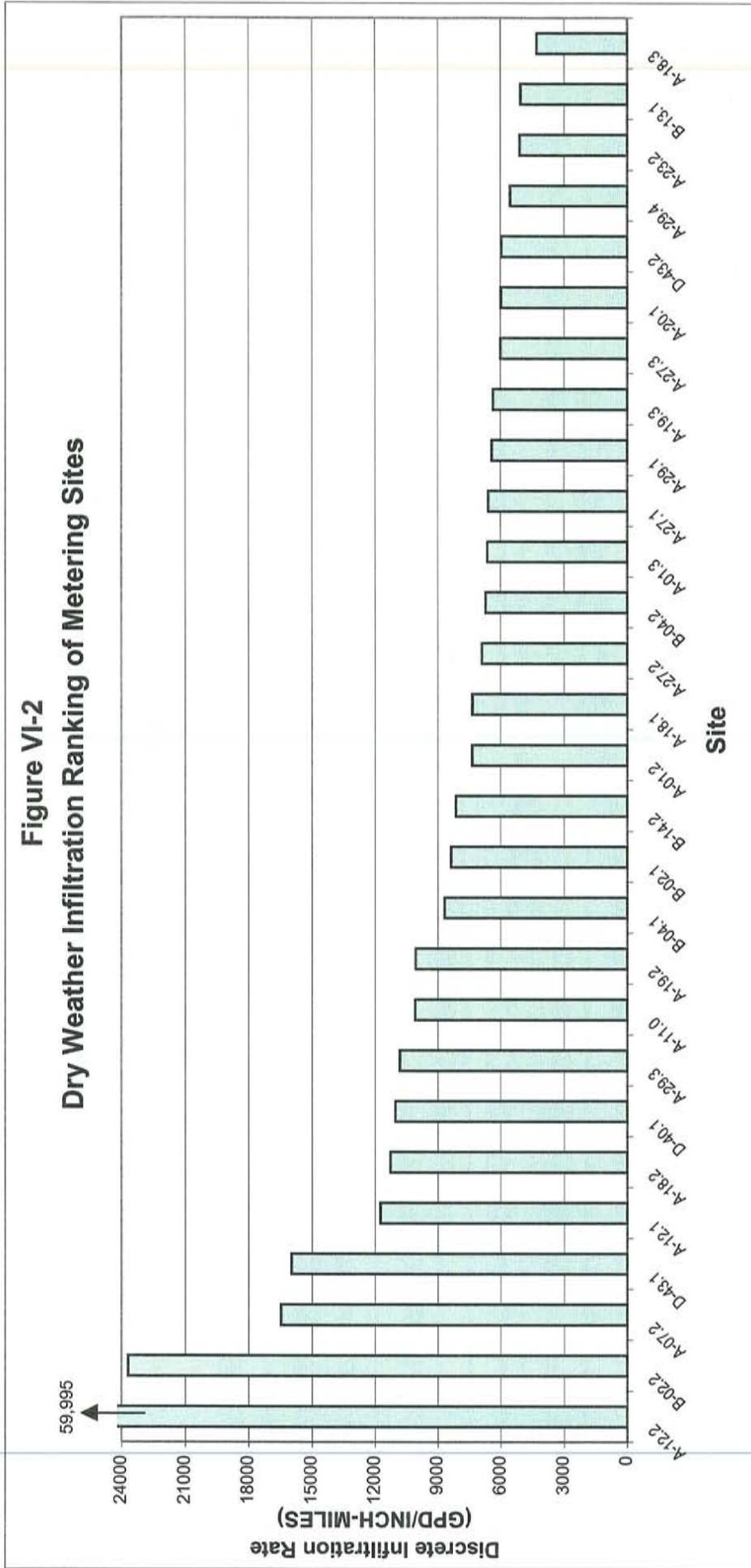
Figure VI-1  
Dry Weather Infiltration Ranking of Pump Stations



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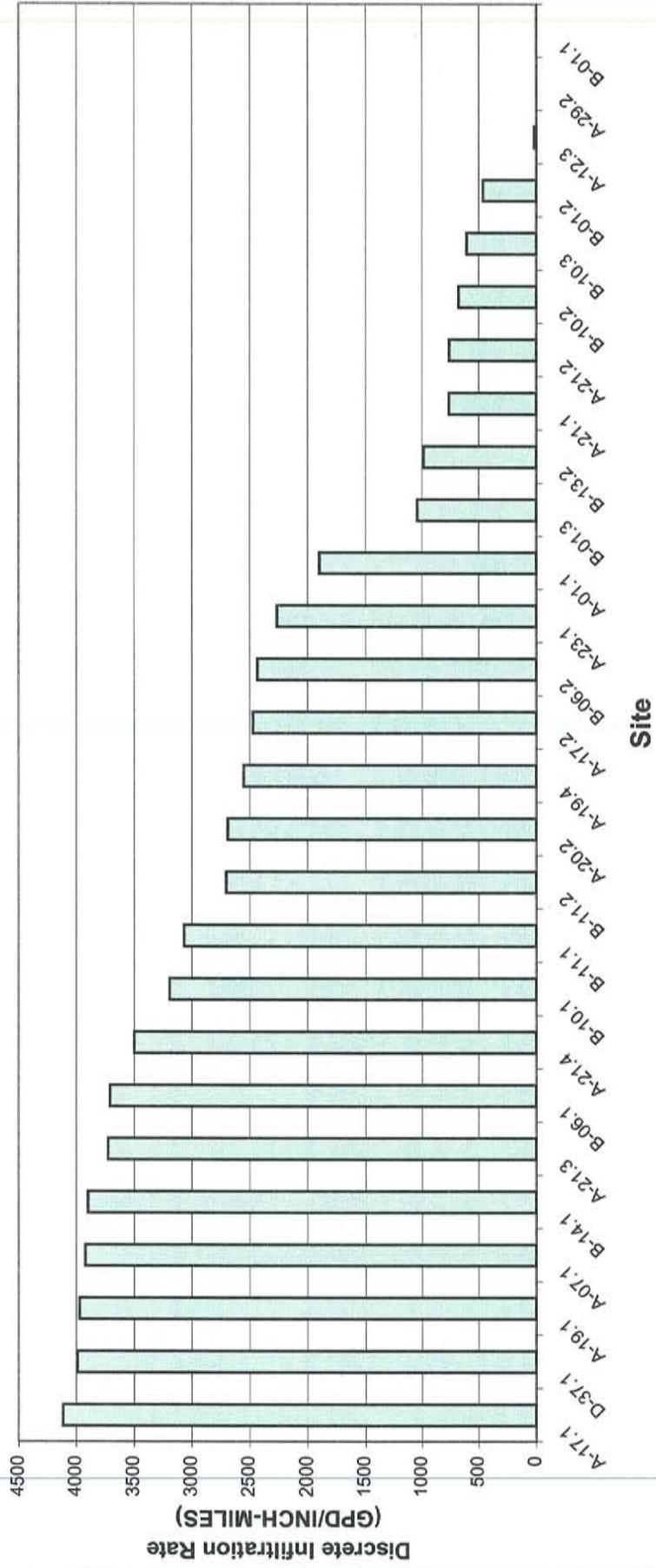


SEVERN TRENT  
PIPELINE SERVICES



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Figure VI-2 (cont.)  
Dry Weather Infiltration Ranking of Metering Sites



CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**VII. Rainfall Analysis**

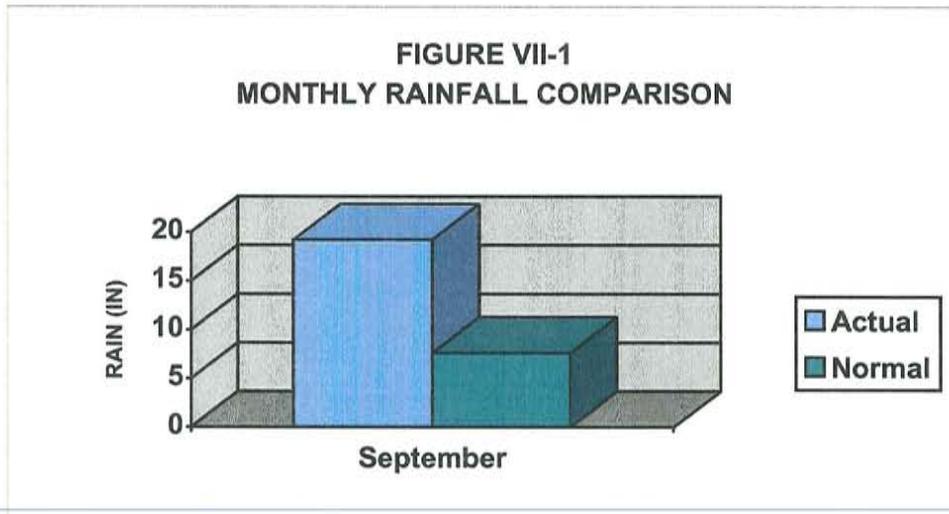
A rainfall analysis consists of evaluating rain events in order to estimate how much rain fell on each basin. Within each basin, the rainfall is assumed to be equivalent to that observed at the nearest rain gauge. Rainfall gauges were spaced throughout the study area with special attention to adjacent areas in order to provide a relatively uniform coverage within and surrounding the study area.

The rain gauge monitoring period matched the flow-monitoring period. Nine rain gauges were installed to capture the varying rainfall patterns, including duration, intensity and coverage. Those rain events with similar daily intensity and duration had different results on particular basins. A basin will respond differently to identical storms if the prior antecedent soil conditions have changed.

The rainfall data from the rain gauges were compared to historical data. Using historical data from the *National Oceanic and Atmospheric Administration (NOAA) – State of Florida No. 81* for the recording site located in Fort Lauderdale, Florida, a comparison between historical data and actual rainfall data can be made. Historically the Fort Lauderdale NOAA station for the month of September records a normal rainfall of 7.61 inches. The average rainfall data from the temporary rain gauges installed under this project was approximately 19.2 inches for the month of September.

NOAA records indicate that September 2001 had the largest rainfall total in the past 51 years. The majority of this rainfall occurred during two rain events, which were separated by 11 days. The first event occurred for seven consecutive days, September 8<sup>th</sup> through the 14<sup>th</sup>, totaling approximately 10.8 inches. The second rain event occurred eleven days later and lasted four consecutive days, September 26<sup>th</sup> through the 29<sup>th</sup>, totaling approximately 9.5 inches. Less than 0.5 inches of rain occurred during the eleven-day period that separates the two rain events.

The NOAA rainfall intensity-duration charts for south Florida provided a basis for making a relative comparison of the rainfall observed during the study period. From these NOAA charts it was estimated that the 1-year 24-hour rainfall is approximately 4.5 inches, the 2-year 24-hour rainfall is approximately 5.75 inches and the 5-year 24-hour rainfall is approximately 8.0 inches. During the first rain event, the largest daily rainfall total was approximately 3.9 inches, which is less than the 1-year 24-hour rain event. The largest daily rainfall total for the second rain event was approximately 6.4 inches recorded at rain gauge 105 on September 29. This is the only recorded daily average rainfall to exceed the 2-year 24-hour storm rainfall. The rainfall recorded by all rain gauges for the second event exceeded the 1-year 24-hour storm of 4.5 inches of rainfall. The two storms collectively made September 2001 the wettest month over the past 51 years. Figure VII-1 graphically compares the observed monthly rainfall against the normal monthly rainfall for the Fort Lauderdale study area.



## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**VIII. Wet Weather Analysis****A. DISCRETE ANALYSIS**

Discrete flows consist of those flows contributed by a particular basin. The discrete flows are normally computed by subtracting the cumulative flow condition at each site upstream of a basin from the cumulative flow condition at the downstream manhole of that basin. In this project, the flow for each site is a discrete flow because each site is independent. Discrete flows are useful in evaluating the I/I response of a particular basin under varying weather conditions. Discrete flows are beneficial to evaluate the rainfall dependent infiltration and inflow for each basin.

Two storm events were used to conduct the volumetric rainfall dependent infiltration and inflow (RDII) analysis. Table VIII-1 presents the results of this analysis. Definitions of the parameters presented in the table are given in the glossary section of the report.

Rainfall dependent inflow is the runoff from a rain event that is discharged directly into a sewer system from such sources as, but not limited to, roof leaders, yard drains, manhole covers, cross connections from storm sewers, and other directly connected surface run-off. Rainfall dependent inflow can be observed in flow data as a rapid increase in the flow rate that occurs during and immediately following a rain event. The inflow portion is relatively short-lived since runoff quickly drains from the basin through the normal storm sewers and is no longer available as a source of inflow. However, storm runoff can occur for several days and result in a temporary increase in groundwater infiltration.

Rainfall dependent infiltration is infiltration present immediately following a rain event. This rainfall induced infiltration normally occurs for one to three days following a rain event. Data obtained during the monitoring period shows a significant amount of rainfall induced infiltration occurring within the study area. Further evaluation is needed to locate, identify and assess the sewer system defects within the study area.

Each of the 23 pump stations, as well as each of the 55 metering sites in this study were ranked according to the average normalized amount of RDII each pump station or metering site contributed on a per linear foot basis of sewer pipe per inch of rain. The ranking provides a priority listing that should guide any future inspection or rehabilitation work. Figure VIII-1 and VIII-2 graphically ranks the pump station and the metering site, respectively, by their average normalized inflow contribution from the greatest to the least (from left to right). Future SSES work is generally considered to be useful if it is conducted in those areas contributing to 80% of the I/I problem. The Discrete Wet Weather Analysis of pump stations indicates that 14 pump stations, the greatest contributors of I/I with an average normalized RDII rate greater than 6 gal/LF/inch of rain, are responsible for 80% of the discrete rain event RDII during the rain events, which occurred in approximately 56% of the total gravity collection system. More specifically, the Discrete Wet Weather Analysis of metering sites indicates that 25 metering sites, the greatest contributors of I/I with an average normalized RDII rate greater than 7 gal/LF/inch of rain, are responsible for 80% of the discrete rain event RDII during the rain events, which occurred in approximately 38% of the total gravity collection system. Therefore, rehabilitation efforts could be concentrated in a portion of the service area and still provide significant reduction in RDII. Results from an SSES study would confirm these conclusions and help focus improvement alternatives.



The Discrete Rain Event RDII presented in Table VIII-1 indicates the RDII entering each basin during the study period. Additional RDII could exist because flow is limited by pipe full conditions. Due to surcharging (Sites A-17.1 and B-06.2) and lost data (Site A-01.1), zero values were omitted from the Discrete Rain Event RDII volumes at each associated pump station to allow these pump stations to have a higher ranking in Figure VIII-1. Therefore, the length of gravity sewer for these sites is not included in the total length for the associated pump station (A-01, A-17, and B-06).

## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**Table VIII-1**  
**Discrete Wet Weather Summary of Pump Stations**

Pump Station	Length of Gravity Sewer (LF)	Rain Event	Calculated Rainfall (inches)	Discrete Rain Event RDII (gal)	Normalized Rain Event RDII (gal/LF/inch of rain)
A-01	13,158*	September 8-14	13.18	3,112,000	17.9*
	42,138	September 26-29	7.04	3,105,571	10.5
A-07	37,635	September 8-14	9.14	1,917,000	5.6
	37,635	September 26-29	6.35	1,115,000	4.7
A-11	24,878	September 8-14	9.14	3,450,000	15.2
	24,878	September 26-29	6.35	2,799,571	17.7
A-12	51,156	September 8-14	9.14	4,211,000	9.0
	51,156	September 26-29	6.35	2,741,286	8.4
A-17	46,806	September 8-14	11.37	4,490,000	8.4
	24,391*	September 26-29	8.12	669,000	3.4*
A-18	45,446	September 8-14	13.18	869,000	1.5
	45,446	September 26-29	7.04	0	SC
A-19	37,231	September 8-14	8.58	3,007,000	9.4
	37,231	September 26-29	8.14	1,906,429	6.3
A-20	28,570	September 8-14	11.37	3,768,000	11.6
	28,570	September 26-29	8.12	1,959,286	8.4
A-21	29,494	September 8-14	11.37	2,537,000	7.6
	29,494	September 26-29	8.12	1,348,856	5.6
A-23	42,695	September 8-14	13.18	2,906,000	5.2
	42,695	September 26-29	7.04	1,462,714	4.9
A-27	31,512	September 8-14	10.83	6,488,000	19.0
	31,512	September 26-29	9.48	3,477,857	11.6
A-29	46,397	September 8-14	10.83	3,581,000	7.1
	46,397	September 26-29	9.48	1,004,428	2.3
B-01	70,594	September 8-14	9.68	2,919,000	4.3
	70,594	September 26-29	9.61	2,589,856	3.8
B-02	24,762	September 8-14	9.68	606,000	2.5
	24,762	September 26-29	9.61	613,714	2.6
B-04	35,801	September 8-14	9.33	3,743,000	11.2
	35,801	September 26-29	9.32	2,766,143	8.3
B-06	44,187	September 8-14	9.68	818,000	1.9
	34,552*	September 26-29	9.61	689,714	1.6*
B-10	77,356	September 8-14	6.51	4,871,000	9.7
	77,356	September 26-29	10.37	3,718,285	4.6
B-11	48,827	September 8-14	7.01	4,497,000	13.1
	48,827	September 26-29	10.03	5,189,571	10.6
B-13	69,919	March 10-11	6.51	639,000	1.4
	69,919	March 19	10.37	506,000	0.7
B-14	27,455	March 10-11	9.68	2,258,000	8.5
	27,455	March 19	9.61	1,800,571	6.8
D-37	63,625	March 10-11	8.70	3,537,000	6.4
	63,625	March 19	8.14	3,241,000	6.3
D-40	11,791	March 10-11	9.33	1,146,000	10.4
	11,791	March 19	9.32	819,714	7.5
D-43	42,090	March 10-11	8.70	2,445,000	6.7
	42,090	March 19	8.14	2,496,857	7.3

\*When averaging RDII volumes per Pump Station, sites with zero values due to surcharging or lost data were omitted, as well as the site's length of gravity sewer.

Note: SC stands for surcharging.

## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**Table VIII-2**  
**Discrete Wet Weather Summary of Metering Sites**

Metering Site	Length of Gravity Sewer (LF)	Rain Event	Calculated Rainfall (inches)	Discrete Rain Event RDII (gal)	Normalized Rain Event RDII (gal/LF/inch of rain)
A-01.1	28,980	September 8-14	13.18	Lost Data	Lost Data
	28,980	September 26-29	7.04	1,690,857	8.3
A-01.2	5,388	September 8-14	13.18	1,927,000	27.1
	5,388	September 26-29	7.04	1,161,571	30.6
A-01.3	7,770	September 8-14	13.18	1,185,000	11.6
	7,770	September 26-29	7.04	253,143	4.6
A-07.1	2,860	September 8-14	9.14	149,000	5.7
	2,860	September 26-29	6.35	219,000	12.1
A-07.2	34,775	September 8-14	9.14	1,768,000	5.6
	34,775	September 26-29	6.35	896,000	4.1
A-11.0	24,878	September 8-14	9.14	3,450,000	15.2
	24,878	September 26-29	6.35	2,799,571	17.7
A-12.1	11,382	September 8-14	9.14	809,000	7.8
	11,382	September 26-29	6.35	869,429	12.0
A-12.2	4,170	September 8-14	9.14	3,357,000	88.1
	4,170	September 26-29	6.35	1,848,000	69.8
A-12.3	35,604	September 8-14	9.14	45,000	0.1
	35,604	September 26-29	6.35	23,857	0.1
A-17.1	22,415	September 8-14	11.37	2,021,000	7.9
	22,415	September 26-29	8.12	0	SC
A-17.2	24,391	September 8-14	11.37	2,469,000	8.9
	24,391	September 26-29	8.12	669,000	3.4
A-18.1	4,750	September 8-14	13.18	518,000	8.3
	4,750	September 26-29	7.04	0	SC
A-18.2	15,516	September 8-14	13.18	176,000	0.9
	15,516	September 26-29	7.04	0	SC
A-18.3	25,180	September 8-14	13.18	175,000	0.5
	25,180	September 26-29	7.04	0	SC
A-19.1	1,945	September 8-14	8.58	402,000	24.1
	1,945	September 26-29	8.14	496,286	31.3
A-19.2	150	September 8-14	8.58	147,000	114.2
	150	September 26-29	8.14	45,286	37.1
A-19.3	6,571	September 8-12	8.58	0	0
	6,571	September 26-29	8.14	135,857	2.5
A-19.4	28,565	September 8-14	8.58	2,458,000	10.0
	28,565	September 26-29	8.14	1,229,000	5.3
A-20.1	12,443	September 8-14	11.37	2,078,000	14.7
	12,443	September 26-29	8.12	1,017,857	10.1
A-20.2	16,127	September 8-14	11.37	1,690,000	9.2
	16,127	September 26-29	8.12	941,429	7.2
A-21.1	475	September 8-14	11.37	101,000	18.7
	475	September 26-29	8.12	53,857	14.0
A-21.2	6,638	September 8-14	11.37	446,000	5.9
	6,638	September 26-29	8.12	218,714	4.1

Note: SC stands for surcharging.

## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**Table VIII-2 (cont.)**  
**Discrete Wet Weather Summary of Metering Basins**

Metering Site	Meter Basin Footage	Rain Event	Calculated Rainfall (inches)	Discrete Rain Event RDII (gal)	Normalized Rain Event RDII (gal/LF/inch of rain)
A-21.3	4,748	September 8-14	11.37	329,000	6.1
	4,748	September 26-29	8.12	156,571	4.1
A-21.4	17,633	September 8-14	11.37	1,661,000	8.3
	17,633	September 26-29	8.12	919,714	6.4
A-23.1	22,445	September 8-14	13.18	1,927,000	6.5
	22,445	September 26-29	7.04	872,000	5.5
A-23.2	20,250	September 8-14	13.18	979,000	3.7
	20,250	September 26-29	7.04	590,714	4.1
A-27.1	9,715	September 8-14	10.83	1,194,000	11.3
	9,715	September 26-29	9.48	141,286	1.5
A-27.2	5,905	September 8-14	10.83	1,207,000	18.9
	5,905	September 26-29	9.48	788,714	14.1
A-27.3	15,892	September 8-14	10.83	4,087,000	23.7
	15,892	September 26-29	9.48	2,547,857	16.9
A-29.1	9,214	September 8-14	10.83	925,000	9.3
	9,214	September 26-29	9.48	119,000	1.4
A-29.2	1,175	September 8-14	10.83	11,000	0.9
	1,175	September 26-29	9.48	0	0
A-29.3	11,430	September 8-14	10.83	1,021,000	8.2
	11,430	September 26-29	9.48	196,714	1.8
A-29.4	24,578	September 8-14	10.83	1,624,000	6.1
	24,578	September 26-29	9.48	688,714	3.0
B-01.1	915	September 8-14	9.68	14,000	1.6
	915	September 26-29	9.61	20,714	2.4
B-01.2	20,845	September 8-14	9.68	663,000	3.3
	20,845	September 26-29	9.61	698,571	3.5
B-01.3	48,834	September 8-14	9.68	2,242,000	4.7
	48,834	September 26-29	9.61	1,870,571	4.0
B-02.1	19,797	September 8-14	9.68	465,000	2.4
	19,797	September 26-29	9.61	520,857	2.7
B-02.2	4,965	September 8-14	9.68	141,000	2.9
	4,965	September 26-29	9.61	92,857	1.9
B-04.1	16,330	September 8-14	9.33	394,000	2.6
	16,330	September 26-29	9.32	469,143	3.1
B-04.2	19,471	September 8-14	9.33	3,349,000	18.4
	19,471	September 26-29	9.32	2,297,000	12.7
B-06.1	34,552	September 8-14	9.68	775,000	2.3
	34,552	September 26-29	9.61	689,714	2.1
B-06.2	9,635	September 8-14	9.68	43,000	0.5
	9,635	September 26-29	9.61	0	SC
B-10.1	49,865	September 8-14	6.51	4,136,000	12.7
	49,865	September 26-29	10.37	3,062,714	5.9
B10.2	24,008	September 8-14	6.51	564,000	3.6
	24,008	September 26-29	10.37	608,714	2.4
B-10.3	3,483	September 8-14	6.51	171,000	7.5
	3,483	September 26-29	10.37	46,857	1.3

Note: SC stands for surcharging.

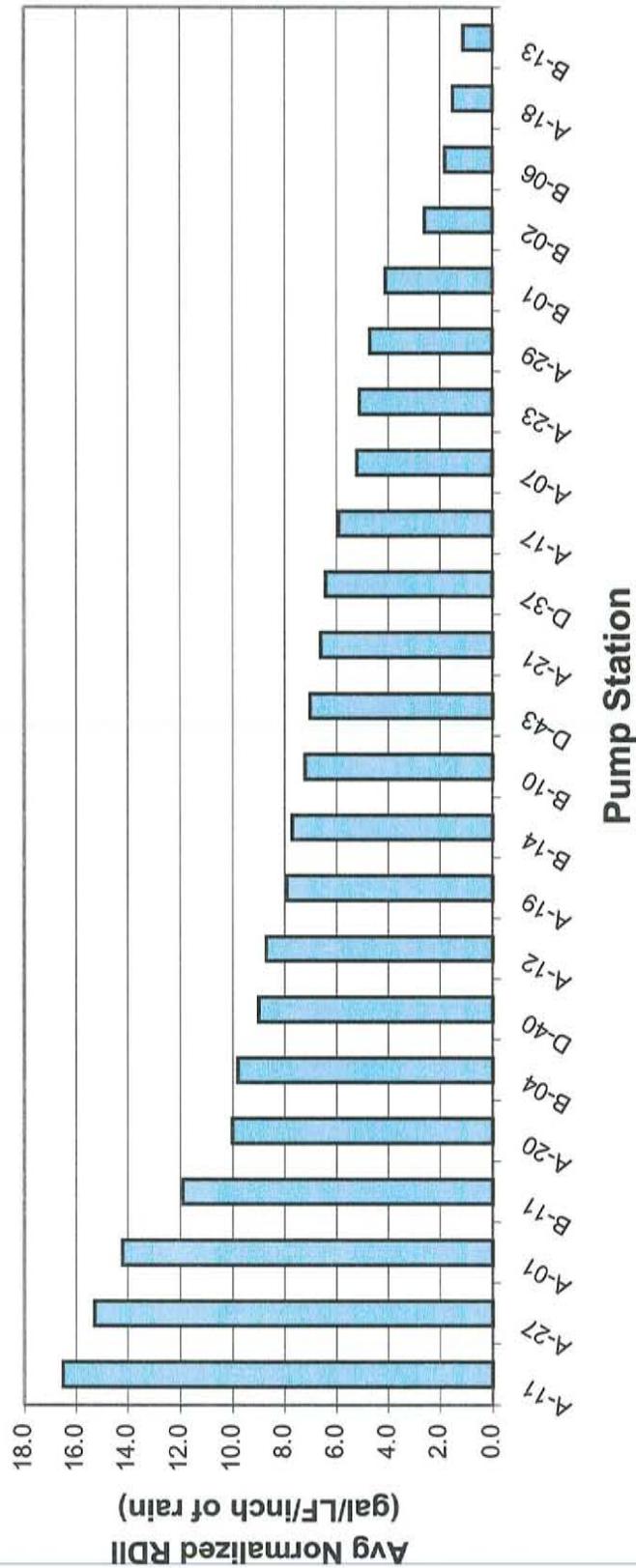
## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**Table VIII-2 (cont.)  
Discrete Wet Weather Summary of Metering Basins**

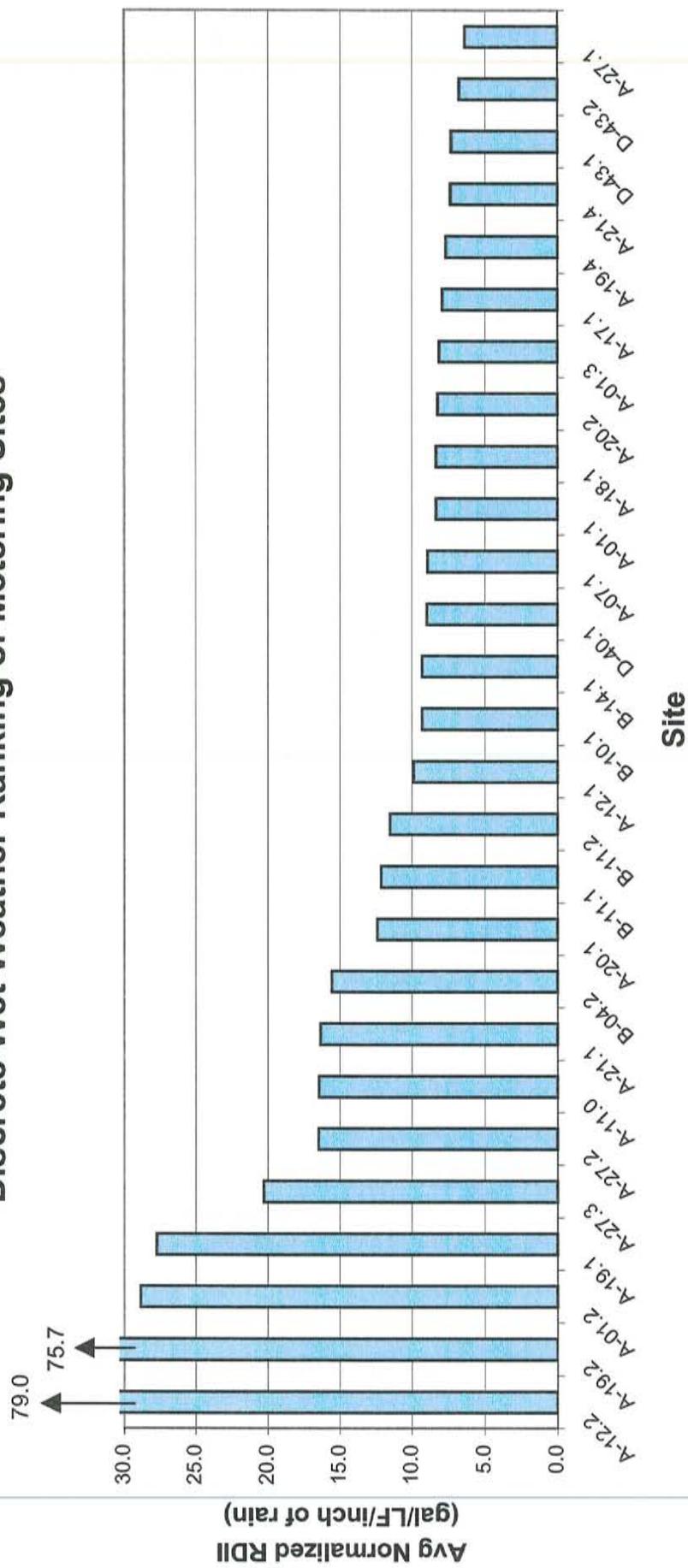
Metering Basin	Meter Basin Footage	Rain Event	Calculated Rainfall (inches)	Discrete Rain Event RDII (gal)	Normalized Rain Event RDII (gal/LF/inch of rain)
B-11.1	25,532	September 8-14	7.01	2,464,000	13.8
	25,532	September 26-29	10.03	2,686,000	10.5
B-11.2	23,295	September 8-14	7.01	2,033,000	12.4
	23,295	September 26-29	10.03	2,503,571	10.7
B-13.1	9,780	September 8-14	6.51	14,000	0.2
	9,780	September 26-29	10.37	187,000	1.8
B-13.2	60,139	September 8-14	6.51	625,000	1.6
	60,139	September 26-29	10.37	319,000	0.5
B-14.1	16,615	September 8-14	9.68	1,765,000	11.0
	16,615	September 26-29	9.61	1,213,000	7.6
B-14.2	10,840	September 8-14	9.68	493,000	4.7
	10,840	September 26-29	9.61	587,571	5.6
D-37.1	63,625	September 8-14	8.70	3,537,000	6.4
	63,625	September 26-29	8.14	3,241,000	6.3
D-40.1	11,791	September 8-14	9.33	1,146,000	10.4
	11,791	September 26-29	9.32	819,714	7.5
D-43.1	17,145	September 8-14	8.70	1,088,000	7.3
	17,145	September 26-29	8.14	1,019,286	7.3
D-43.2	24,945	September 8-14	8.70	1,357,000	6.3
	24,945	September 26-29	8.14	1,477,571	7.3

Note: SC stands for surcharging.

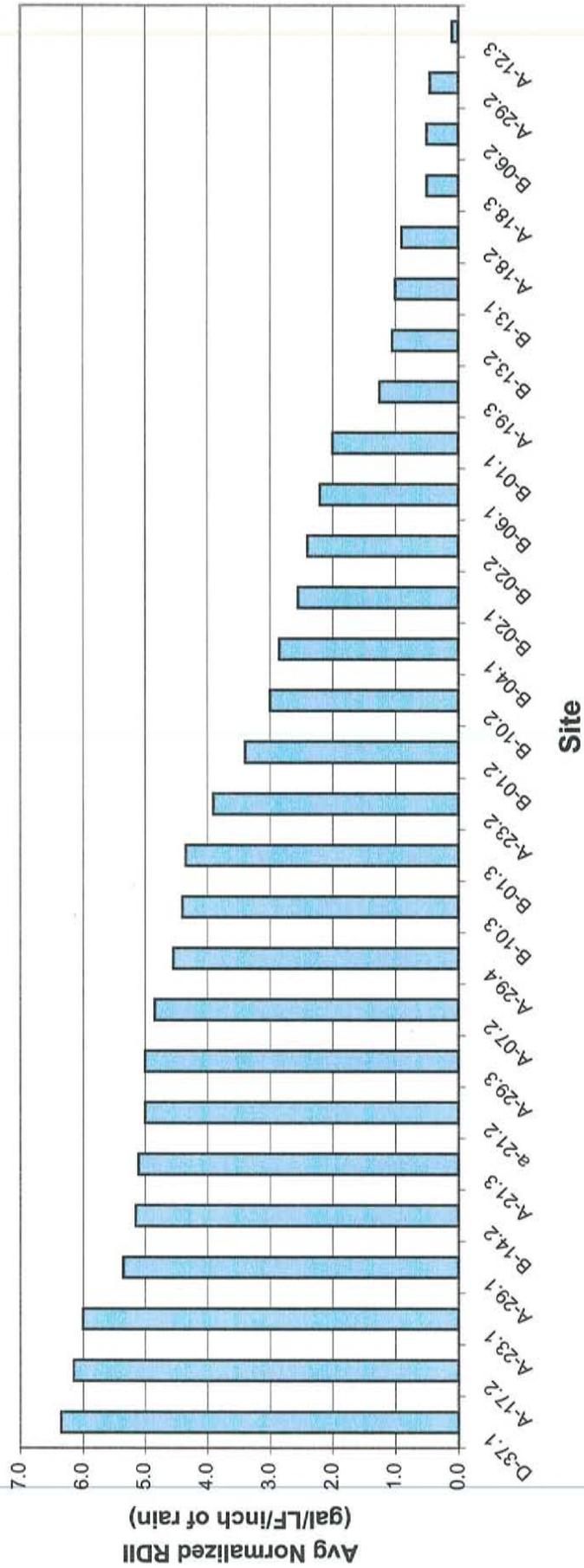
**Figure VIII-1  
Discrete Wet Weather Ranking of Pump Stations**



**Figure VIII-2  
Discrete Wet Weather Ranking of Metering Sites**



**Figure VIII-2  
Discrete Wet Weather Ranking of Metering Sites**



## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**IX. Results and Conclusions**

The data analysis demonstrates that there are significant I/I problems within the city of Fort Lauderdale collection system during both dry and wet weather conditions. The evaluation suggests that capacity is also a concern in some areas. The following conclusions and recommendations are based upon information presented in this report.

The results of the dry weather analysis indicated:

- Lack of adequate capacity is a problem at particular sites. Sites A-17.1, A-27.2, A-27.3, B-13.1, D-37.1 and D-40.1 experienced peak dry weather depths greater than 75% of the pipe diameter. This may limit the ability of the Fort Lauderdale system to handle rain related flow increases and to accommodate future growth.
- Dry weather infiltration is present within the Fort Lauderdale sewer system. Eighteen of the 23 pump stations and 38 of the 55 metering sites had an infiltration rate greater than 3,000 GAL/Inch-Mile, which indicates excessive dry weather infiltration.
- Fourteen pump stations (>3,500 GPD/Inch-Mile) contributed 80% of the total system dry weather infiltration in approximately 52% of the collection system footage (See Table VI-1 and Figure VI-1). More specifically, twenty-six of 55 metering sites (>5,000GPD/Inch-Mile) contributed 80% of the total system dry weather infiltration in approximately 36% of the collection system footage (See Table VI-2 and Figure VI-2).
- Severn Trent flow monitoring field crews witnessed pipe deterioration defects to the sanitary sewer system during flow meter installation. While not representative of the entire system, pipe deterioration was noted at Sites A-12.1 and B-04.2. The following photographs depict these problems.



**A-12.1 Pipe Deterioration**



**B-04.2 Pipe Deterioration**

The results of the discrete wet weather analysis indicated:

- Capacity is an increased concern during rain events. Surcharging occurred at 53 of the 55 sites during the wet weather periods analyzed. This indicates that rain events are creating wet weather capacity problems. It should be noted that additional RDII could exist because flow is limited by pipe full conditions.
- Wet weather Rain Dependent I/I (RDII) is extremely significant on a system wide basis. RDII averaged 6.5 GPD/LF per inch of rain. Typically RDII rates greater than 5.0 Gal/LF per inch of rain are considered to be significant. Seventeen of the 23 pump stations and 33 of the 55 metering sites exceeded this threshold.

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- The wet weather analysis determined that 80% of the RDII is contributed by 14 pump stations, which accounts for 56% of the collection system. More specifically, twenty-five of the 55 metering sites contributed 80% of the RDII, which accounts for approximately 37% of the collection system.

**Recommendations for further evaluation of the Sanitary Sewer System:**

- Conduct a full Sanitary Sewer Evaluation Survey (SSES) consisting of manhole inspection, smoke testing, flow isolation and TV inspection in those basins exhibiting both significant dry weather and rainfall related infiltration. This flow monitoring study can be used to prioritize sanitary sewer system investigations and rehabilitations according to the rates noted on Figures VI-1 and VI-2 *Dry Weather Infiltration Ranking* and Figures VIII-1 and VIII-2 *Discrete Wet Weather Ranking*. A greater Discrete Infiltration Rate (GPD/Inch-Mile) or Average Normalized RDII Rate (gal/LF per inch of rain) indicates a higher importance of conducting a sanitary sewer evaluation survey.
- Conduct a partial Sanitary Sewer Evaluation Survey (SSES) consisting of manhole inspection, flow isolation and TV inspection in those basins exhibiting significant dry weather infiltration. This flow monitoring study can be used to prioritize sanitary sewer system investigations and rehabilitations according to the rates noted on Figures VI-1 and VI-2 *Dry Weather Infiltration Ranking*. A greater Discrete Infiltration Rate (GPD/Inch-Mile) indicates a higher importance of conducting a sanitary sewer evaluation survey.
- Conduct a partial SSES consisting of manhole inspection, smoke testing and TV inspection in those basins exhibiting RDII problems. This flow monitoring study can be used to prioritize sanitary sewer system investigations and rehabilitations according to the rates noted on Figures VIII-1 and VIII-2 *Discrete Wet Weather Ranking*. A greater Average Normalized RDII Rate (gal/LF per inch of rain) indicates a higher importance of conducting a sanitary sewer evaluation survey.
- Continue implementing a cleaning program for the basins with a permanent presence of silt or debris in the sewer line or manholes based upon the results of the flow monitoring study and the measurements of debris during manhole inspection.
- Continue implementing an ongoing program of locating and rehabilitating sewers contributing significant dry weather infiltration and/or RDII problems.

The remaining pump stations and metering sites should also be field-tested such that each is inspected approximately every ten years. A minimum of manhole inspections and smoke testing should be implemented on a scheduled basis. This work can be prioritized according to the rates noted on *Figures VI-1 and VI-2 Dry Weather Infiltration Ranking* and/or *Figures VIII-1 and VIII-2 Discrete Wet Weather Ranking*. A greater Discrete Infiltration Rate (GPD/Inch-Mile) or Average Normalized RDII Rate (gal/LF/inch of rain) indicates a higher importance of conducting a sanitary sewer evaluation survey.

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**X. Glossary****Average Percent Depth Used**

The average rain event depth divided by the Pipe Diameter expressed as a percentage.

**Average Rain Event Depth (in)**

The average depth of each calendar day of the Wet Weather Period.

**Average Rain Event Flow Rate (mgd)**

The average flow rate of each calendar day of the Wet Weather Period.

**Average Velocity**

The velocities at various points within a given cross section of sewer flow are not uniform. They vary with regard to depth and horizontal location. The average velocity is typically obtained by conducting a velocity profile with a hand held point velocity probe. Instantaneous velocities are obtained at pre-determined points, depending on the diameter of pipe and depth of flow, and averaged. The average velocity can also be directly computed by dividing the flow rate, if known, by the area of the flow's cross-section.

**Base Flow**

The daily average dry weather flow.

**Collection System**

The physical components of a sanitary sewer that convey wastewater to one or several treatment facilities. The physical components include the sewer pipelines, manholes, pump stations, flumes and other structures.

**Comparison Dry Depth (in)**

The average depth of those dry days selected to compare with a wet day to determine the quantity of rainfall dependent infiltration and inflow (RDII). The comparison dry day is a day(s), typically immediately preceding a rain event, in which the hourly flow rates corresponding to the rates just prior to the beginning of rain are very similar.

**Comparison Dry Flow (mgd)**

The average depth of those dry days selected to compare with a wet day to determine the quantity of rainfall dependent infiltration and inflow (RDII).

**Cumulative flow**

The total flow upstream of a flow meter site.

**Daily Average Depth (inches)**

The average of every depth value of the dry weather period.

**Daily Average Flow (mgd)**

The average of every flow reading during the dry weather period. The Daily Average Flow consists of Sanitary Flow and Groundwater Infiltration.

**Discrete flow**

The flow contributed by a particular sewer basin. Discrete flow is computed by subtracting the cumulative flow from any upstream flow site.

## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**Downstream**

(1) In the direction of the flow current. (2) In reference to monitoring sites or manholes, refers to the section of pipe conveying flows away from the manhole.

**Dry Weather**

Days within the flow monitoring period in which flows are not influenced by an existing or a previous rain event. Dry weather flows are compared with wet weather flows to determine the influence of rain upon sewer flows.

**Dry Weather Period**

Normally an entire week in which the sewer flows is uninfluenced by a rain event. This dry week is believed to be typical of dry flow throughout the monitoring period. It is not necessarily the dry period used to compare with the wet weather data.

**Estimated Groundwater Infiltration (mgd)**

The estimated rate of infiltration present during the Dry Weather Period. It is directly related to the minimum flow occurring during this period. In a typical system, 80% of the minimum flow is thought to be infiltration. This factor may be lowered for systems with significant 24-hour users or for systems with significant upstream travel delay.

**Estimated Sanitary Flow (mgd)**

The estimated rate of wastewater contributed by residences, businesses or industries. This flow does not include any infiltration or inflow. It is computed by subtracting the Estimated Groundwater Infiltration from the Daily Average Flow.

**Flow Meter**

An instrument used to measure and record hydraulic data, typically depth and velocity in a gravity sewer line, which can be used to calculate flow. Flow meters may also measure pump run times at pump stations or the velocity at force mains.

**Force Main**

A pressure pipe joining the pump discharge at a wastewater pumping station with a point of gravity flow.

**Inch-Mile**

The product of the length of a pipeline segment in miles and its diameter in inches.

**Infiltration**

The discharge of groundwater into sewers through defects in pipelines, joints, manholes or other sewer structures.

**Infiltration rate (gpd/inch-mile)**

Used to compare the significance of infiltration upstream of metering sites. It is logical for larger systems to contribute more infiltration.

**Infiltration/Inflow (I/I)**

The combined discharge of water in sewer lines due to both infiltration and inflow in which there is no way in which to distinguish between the two sources.

## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**Inflow**

The discharge of rain run-off into a sewer system from such sources as roof leaders; yard and area drains; manhole covers; connections with storm water and combined sewers; catch basins; storm water and surface runoff; service or mainline cleanouts or erosion holes.

**Lift or Pumping Station**

A station housing pumps used to lift the wastewater to a higher elevation when the continuance of the sewer at reasonable slopes would involve excessive depths of trench, or to raise wastewater from areas too low to drain into available sewers.

**Manhole**

An opening in a sewer provided to permit a person access to the sewer.

**Manhole Cover**

The strong, heavy typically cast iron lid that fits over the manhole opening.

**Maximum Depth (inches)**

The maximum 15 minute flow depth occurring during the dry weather period.

**Maximum Flow (mgd)**

The maximum 15 minute flow depth occurring during the dry weather period.

**Minimum/Average Velocity (fps)**

The minimum 15-minute velocity that occurred during the dry weather period is summarized along with the average of every velocity reading of the dry weather period. Typically velocity in excess of 2.0 fps is desirable to keep solids in suspension and prevent silt buildup.

**Minimum Depth (inches)**

The minimum 15 minute flow depth occurring during the dry weather period.

**Minimum Flow (mgd)**

The minimum 15 minute flow rate occurring during the dry weather period.

**Monitoring Site**

The manhole, lift station or force main location in which a flow meter has been installed.

**Peak Percent Depth Used**

The Peak Rain Event Depth divided by the Pipe Diameter expressed as a percentage.

**Peak Percent Depth Used (d/D)**

The ratio of Maximum Depth to Pipe Diameter expressed as a percentage.

**Peak Rain Event Depth (in)**

The peak flow depth observed during the Wet Weather Period.

**Peak Rain Event Flow Rate (mgd)**

The peak flow rate observed during the Wet Weather Period.

## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**Peak Wet Flow / Peak Dry Flow**

The Peak Rain Event Flow Rate described above is divided by the peak dry weather rate observed during the comparison dry day.

**Peaking Ratio**

The ratio of Maximum Flow to Daily Average Flow (also known as the peaking factor).

**Pipe Diameter (inches)**

The internal width/height of a sewer pipe measured at the monitoring site.

**Rain or Storm Event**

The occurrence of precipitation in the form of rainfall that is sufficient to result in increased sewer flows.

**Rainfall Dependent Infiltration/Inflow (RDII)**

Infiltration/Inflow due solely to precipitation from a rain or storm event.

**RDII rate (gal/LF)**

The rainfall dependent infiltration and inflow (RDII) volume is divided by the LF upstream of site to establish a ratio that can be used to rate the significance of the cumulative RDII response.

**RDII volume (gal)**

The difference between the Avg. Rain Event Flow Rate and The Comparison Dry Flow Rate is summed for each of the Wet Weather Periods and multiplied by 1,000,000 to establish volume in gallons.

**Runoff**

- (1) That part of precipitation that moves upon the surface and is not absorbed by the ground or ground cover.
- (2) That part of precipitation reaching a stream, drain, sewer or sewer defect.

**Sanitary Sewer**

A sewer intended to carry only sanitary or industrial wastewater from residences, commercial buildings, industrial parks and institutions

**Sanitary Wastewater or Sanitary Flow**

The wastewater discharge from residences, commercial buildings, industrial parks and institutions. Sanitary wastewater does not include any infiltration or inflow.

**Silt Level (inches)**

The average level of mud, sand or other debris at the monitoring site over the entire monitoring period.

**Significant**

A rain event that is sufficient to result in a noticeable rainfall dependent infiltration and inflow (RDII) response or a RDII response that is sufficient to warrant further investigation.

**Slope**

The inclination of the invert of a conduit. Expressed as a dimensionless number where the vertical rise or fall of the conduit is divided by the horizontal length of conduit.

**Stormwater**

The discharge of water due solely to precipitation from a rain or storm event.

## CITY OF FORT LAUDERDALE FLOW MONITORING FINAL REPORT – MARCH 2002

**Surcharge**

The condition in which the liquid depth in the sewer reaches or exceeds the diameter of the conveying pipe.

**Upstream**

(1) In the direction against the current. (2) In reference to monitoring sites, refers to the section of pipe conveying flow into the manhole.

**Wet Weather**

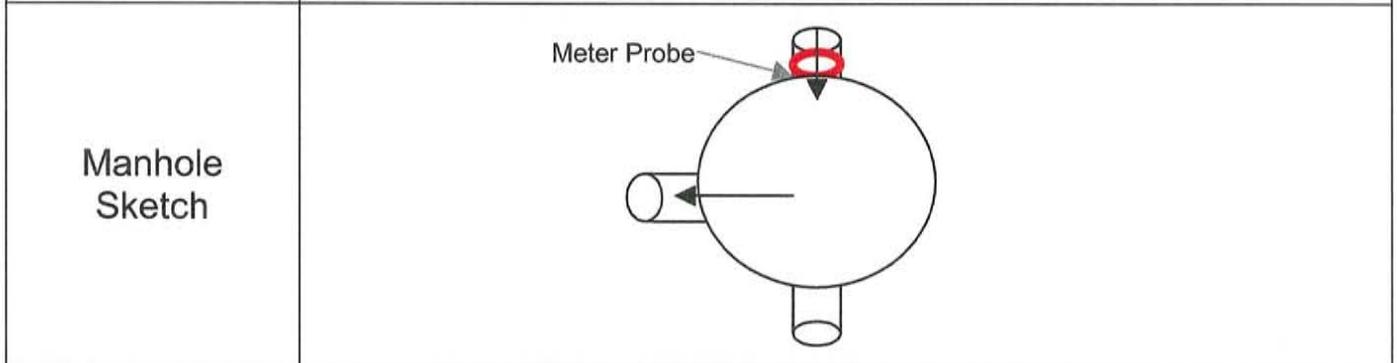
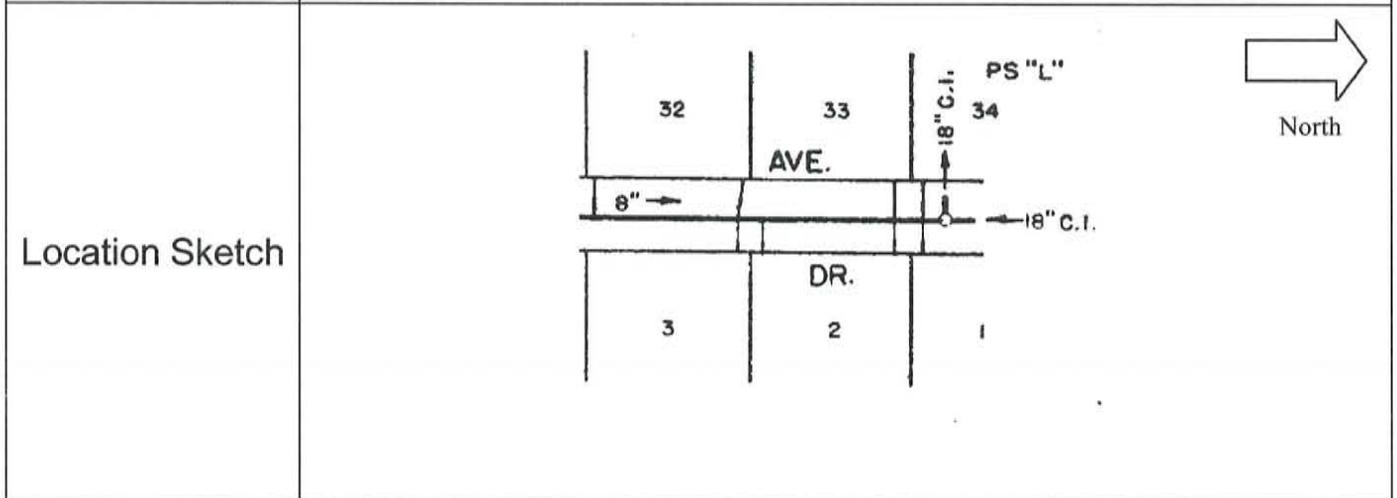
Conditions in which precipitation in the form of rainfall has occurred or is occurring.

**Wet Weather Period**

The calendar day(s) in which rain runoff results in increased sanitary sewer flow. These are the days that are compared with Comparison Dry Days in order to determine the quantity of RDII.

### Site Sheet Fort Lauderdale

Site ID	D-37.1
Site Location	Street
Street Address	311 Lido Dr.
Site Condition	Fair
Pipe Diameter	18 inches
Pipe Shape	Round
Pipe Material	CI
Manhole Depth	9 feet



### Daily Hydraulic Summary

#### Site D-37.1

Date	Day	Minimum Depth (inches)	Minimum Velocity (fps)	Minimum Flow (mgd)	Maximum Depth (inches)	Maximum Velocity (fps)	Maximum Flow (mgd)	Average Depth (inches)	Average Velocity (fps)	Average Daily Flow (mgd)	Rain RG 102 (inches)
08/11/01	SAT	5.57	1.96	0.603	8.37	2.78	1.447	6.89	2.40	0.970	0.07
08/12/01	SUN	5.48	2.03	0.598	7.51	2.67	1.158	6.55	2.39	0.903	
08/13/01	MON	5.37	1.97	0.564	8.14	2.78	1.394	6.88	2.39	0.968	
08/14/01	TUE	5.41	1.84	0.535	8.04	2.74	1.337	6.83	2.41	0.964	
08/15/01	WED	5.30	1.89	0.532	9.21	2.82	1.364	6.71	2.38	0.933	
08/16/01	THU	5.13	1.84	0.493	8.48	2.80	1.456	6.72	2.37	0.936	
08/17/01	FRI	5.31	1.75	0.493	8.70	2.73	1.376	7.05	2.34	0.988	
08/18/01	SAT	5.71	1.84	0.571	8.66	2.80	1.466	7.03	2.30	0.965	0.05
08/19/01	SUN	5.15	1.68	0.454	8.66	2.75	1.469	7.07	2.31	0.978	
08/20/01	MON	5.53	1.75	0.523	9.09	2.80	1.489	7.01	2.29	0.954	0.01
08/21/01	TUE	5.54	1.44	0.555	20.08	2.67	2.047	7.12	2.27	0.948	0.08
08/22/01	WED	5.55	1.76	0.528	8.47	2.65	1.314	6.87	2.26	0.915	
08/23/01	THU	5.56	1.74	0.522	8.54	2.49	1.292	6.76	2.22	0.879	
08/24/01	FRI	5.59	1.82	0.568	8.05	2.54	1.185	6.63	2.20	0.848	
08/25/01	SAT	5.50	1.83	0.562	8.22	2.47	1.240	6.74	2.19	0.862	
08/26/01	SUN	5.49	1.70	0.507	7.27	2.44	1.048	6.41	2.16	0.793	
08/27/01	MON	4.86	1.22	0.416	17.90	2.47	1.397	6.30	2.16	0.764	0.11
08/28/01	TUE	4.73	1.60	0.384	7.33	2.59	1.132	6.07	2.16	0.742	
08/29/01	WED	4.79	1.54	0.375	7.69	2.54	1.173	6.25	2.17	0.780	0.20
08/30/01	THU	4.73	1.66	0.398	7.62	2.60	1.179	6.24	2.20	0.786	
08/31/01	FRI	4.68	1.64	0.387	7.34	2.56	1.097	6.18	2.20	0.775	
09/01/01	SAT	4.63	1.64	0.381	7.74	2.56	1.154	6.15	2.17	0.760	
09/02/01	SUN	4.66	1.67	0.394	7.65	2.60	1.174	6.29	2.21	0.799	
09/03/01	MON	4.70	1.63	0.387	8.62	2.62	1.287	6.48	2.23	0.840	0.30
09/04/01	TUE	4.77	1.72	0.418	7.98	2.74	1.313	6.35	2.24	0.817	
09/05/01	WED	4.91	1.74	0.449	7.83	2.54	1.121	6.21	2.18	0.772	
09/06/01	THU	4.72	1.63	0.390	7.16	2.46	1.015	6.17	2.18	0.762	
09/07/01	FRI	4.96	1.73	0.448	7.64	2.54	1.116	6.38	2.23	0.816	
09/08/01	SAT	5.16	1.82	0.495	9.13	2.74	1.375	6.79	2.34	0.933	1.49
09/09/01	SUN	5.85	1.99	0.692	8.54	2.67	1.379	7.23	2.38	1.027	1.05
09/10/01	MON	6.64	2.03	0.907	8.57	2.70	1.283	7.37	2.50	1.103	0.13
09/11/01	TUE	6.09	2.15	0.752	8.17	2.67	1.312	7.01	2.43	1.003	
09/12/01	WED	5.69	1.59	0.603	17.65	2.94	1.889	7.97	2.53	1.226	1.77
09/13/01	THU	7.06	1.49	1.021	33.99	3.49	3.165	17.73	2.26	1.955	2.89
09/14/01	FRI	8.21	1.59	1.430	29.81	3.07	3.033	18.12	2.22	2.093	1.37
09/15/01	SAT	7.82	1.52	1.280	26.61	3.11	2.795	10.82	2.66	1.666	
09/16/01	SUN	7.15	2.36	1.064	14.63	3.08	2.642	8.70	2.74	1.493	
09/17/01	MON	6.94	1.74	1.004	29.40	3.11	2.381	9.51	2.65	1.488	
09/18/01	TUE	6.90	1.80	0.997	27.45	3.17	3.104	9.20	2.73	1.506	
09/19/01	WED	6.94	2.36	1.021	13.19	3.18	2.117	8.39	2.80	1.466	
09/20/01	THU	6.74	2.47	0.965	10.46	3.00	1.849	7.99	2.74	1.350	
09/21/01	FRI	6.54	2.36	0.918	10.59	3.02	1.763	7.74	2.69	1.266	
09/22/01	SAT	6.23	2.24	0.785	8.91	2.88	1.511	7.44	2.62	1.171	
09/23/01	SUN	6.43	2.28	0.843	8.31	2.84	1.465	7.30	2.57	1.120	
09/24/01	MON	6.01	2.24	0.755	8.00	2.76	1.315	7.04	2.55	1.059	0.11
09/25/01	TUE	5.95	2.26	0.752	7.78	2.74	1.295	6.88	2.51	1.010	0.02
09/26/01	WED	5.81	1.15	0.681	15.80	2.78	1.351	6.89	2.43	0.976	0.35
09/27/01	THU	5.48	1.18	0.610	17.64	2.79	2.205	10.54	2.08	1.338	0.87
09/28/01	FRI	7.67	1.05	1.066	17.77	3.10	2.769	11.12	2.49	1.719	3.31
09/29/01	SAT	8.41	1.74	1.524	71.25	3.67	3.533	33.36	2.51	2.524	3.61
09/30/01	SUN	9.73	1.52	1.739	27.37	3.30	3.062	17.75	2.34	2.335	0.03
10/01/01	MON	8.39	1.51	1.477	26.31	3.44	2.885	15.45	2.38	2.062	
10/02/01	TUE	8.04	1.67	1.361	26.68	3.17	2.932	12.15	2.63	1.814	
10/03/01	WED	7.67	1.72	1.267	27.52	3.27	2.503	10.22	2.75	1.684	0.01
10/04/01	THU	7.36	2.08	1.173	12.04	3.23	2.004	8.73	2.72	1.492	
10/05/01	FRI	7.12	2.36	0.996	10.03	2.89	1.894	8.41	2.62	0.544	0.28

Highlights data used for Dry Weather Analysis  
 Highlights data used for Wet Weather Analysis

### Site Summary

#### Site D-37.1

Site Identification	
Project	Fort Lauderdale, Florida
Site ID	D-37.1
Pump Station ID	D-37
Service Area	311 Lido Drive

Site Description	
Pipe Diameter (in)	18.0
Average Silt Level (in)	0
Start of Metering Period	08/11/01
End of Metering Period	10/05/01

Dry Weather Flow Data Summary	
<b>Dry Weather Period</b> 08/22 - 08/28	
Daily Average Depth (in)	6.54
Daily Average Flow (mgd)	0.829
Minimum Depth (in)	4.73
Minimum Flow (mgd)	0.384
Maximum Depth (in)	17.90
Maximum Flow (mgd)	1.397
Peak Percent Depth Used	99%
Estimated Sanitary Flow (mgd)	0.430
<b>Dry Weather I/I</b>	
Est. Groundwater Infiltration (mgd)	0.399
Est. Groundwater Infiltration (gpd)	398,514

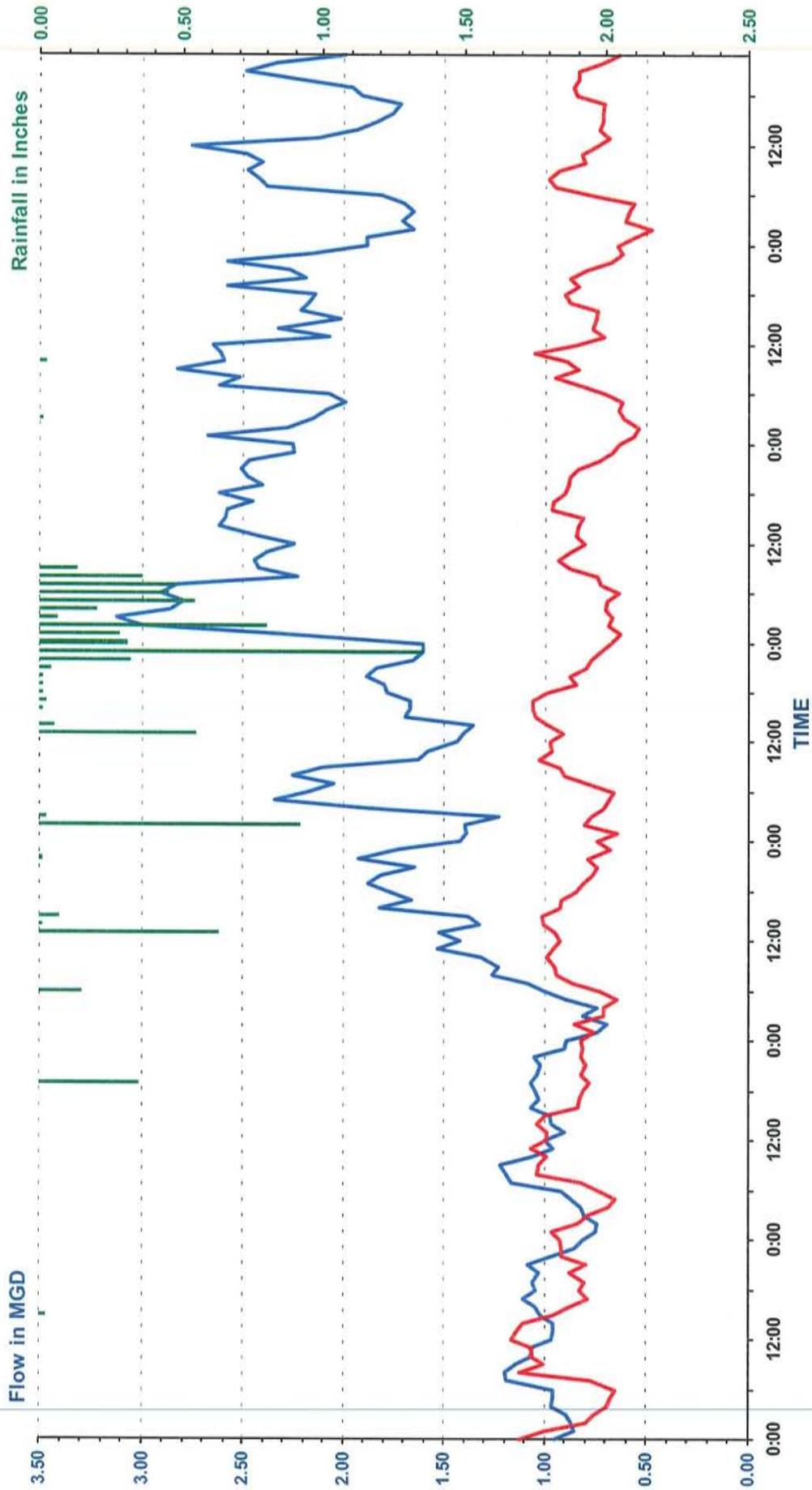
Site Comments
No comments.

Wet Weather Flow Data Summary		
<b>Wet Weather Period</b>		
	09/08 - 09/14	09/26 - 09/29
Avg Rain Event Depth (in)	10.32	15.48
Avg Rain Event Flow Rate (mgd)	1.334	1.639
Peak Rain Event Depth (in)	33.99	71.25
Peak Rain Event Flow Rate (mgd)	3.165	3.533
Avg Percent Depth Used	57%	86%
Peak Percent Depth Used	189%	396%
<b>Wet Weather I/I</b>		
RDII Volume (gal)	3,537,000	3,241,000



# Wet/Dry Comparative Hydrograph

Fort Lauderdale Flow Monitoring Project  
3111 Lido Drive

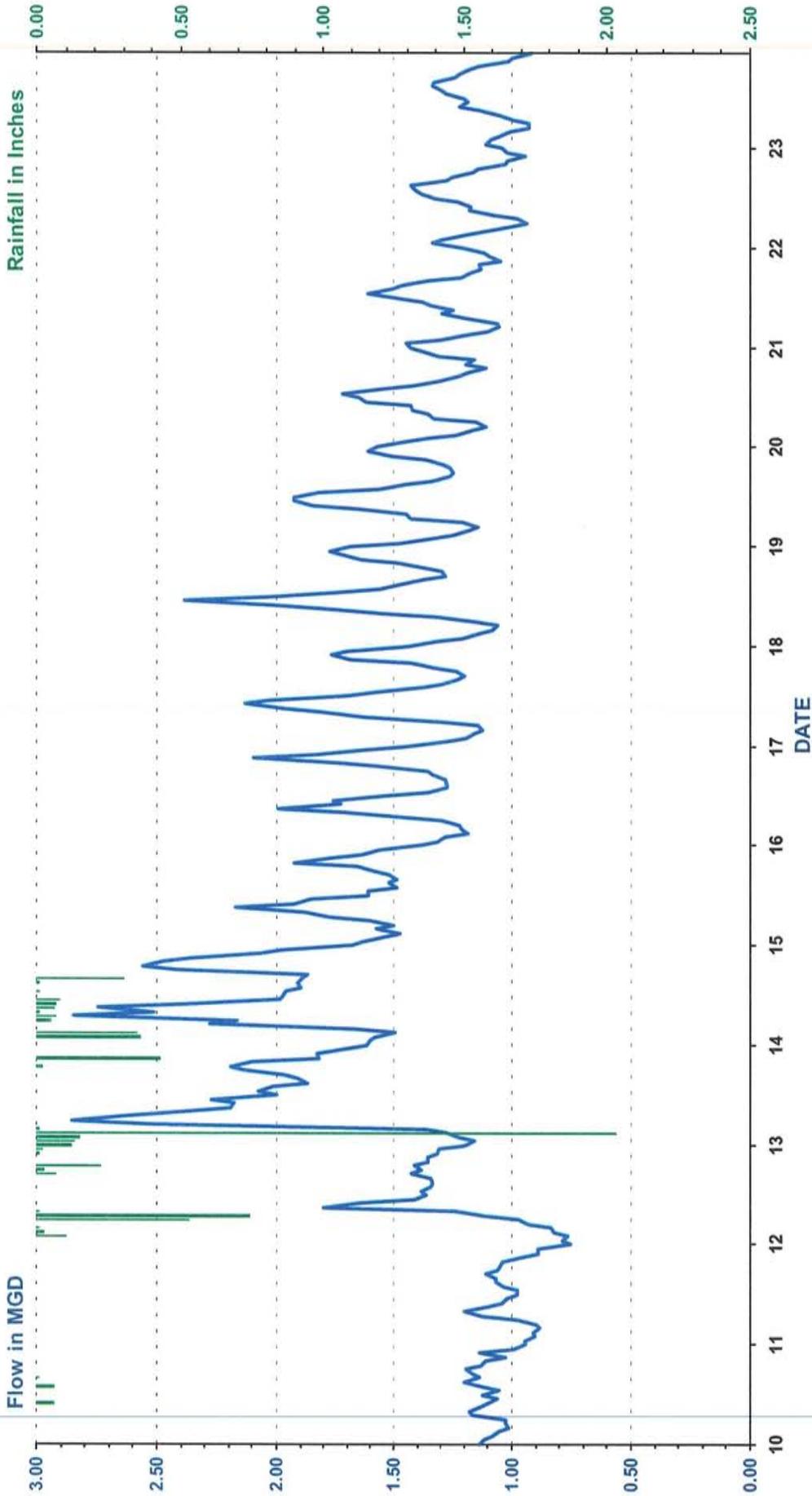


Site D371- WET (09/25/2001 - 10/01/2001) — Site D371- DRY (08/22/2001 - 08/28/2001)  
Rain

Pitometer Pipeline Services

# FLOW HYDROGRAPH

Fort Lauderdale Flow Monitoring Project  
3111 Lido Drive



Flow Data For Site D371: 09/10/2001 - 09/23/2001

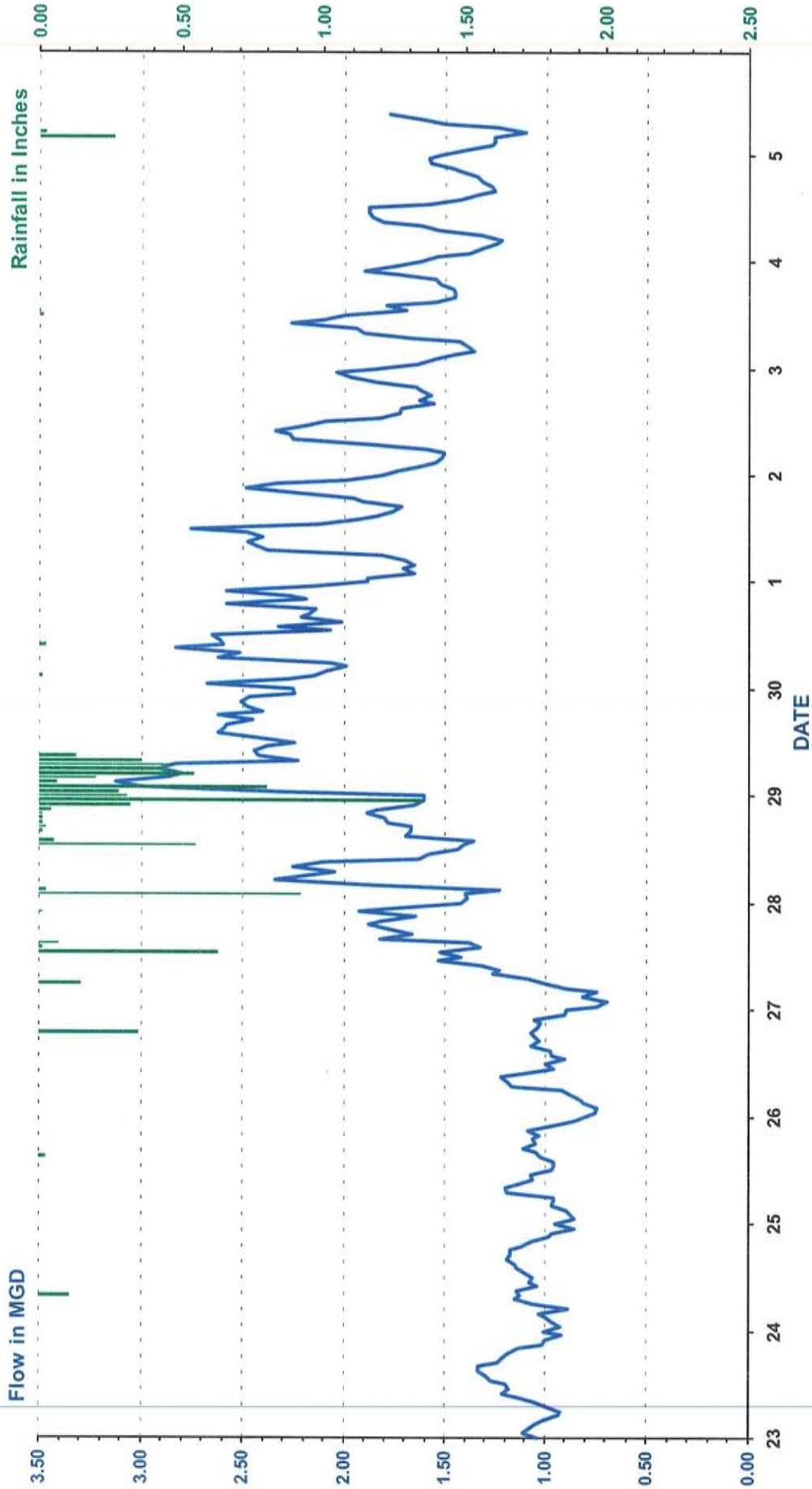
— Site D371

■ Rain

Utility Pipeline Services, Inc.

# FLOW HYDROGRAPH

Fort Lauderdale Flow Monitoring Project  
311 Lido Drive



Flow Data For Site D371: 09/23/2001 - 10/05/2001

— Site D371

■ Rain

Utility Pipeline Services, Inc.

Questionnaire

Please print or type:

- 1. Provide three references for which you have performed similar services.

Company Name:

Address:

Contact Name:

Telephone:

Company Name:

Address:

Contact Name:

Telephone:

Company Name:

Address:

Contact Name:

Telephone:

- 2. Number of years experience the proposer has had in providing similar services:  
 Years

- 3. Have you ever failed to complete work awarded to you? If so, where and why?

- 4. List appropriate licenses as issued by Broward County.

- 5. Briefly describe the number of employees and supervisors available for this contract and the firm's ability to secure subcontractors, if necessary.

6. Briefly describe your firm's financial status and provide proof of adequate line of credit or other financial assets to access funds for construction of multiple projects during the same time period.

The proposer understands that the information contained in these proposal pages is to be relied upon by the City in awarding the proposed contract, and such information is warranted by the proposer to be true. The proposer agrees to furnish such additional information, prior to acceptance of any proposal relating to the qualifications of the proposer, as may be required by the City.

Please review the questionnaire to make sure all questions have been answered. Attach additional sheets if necessary. Failure to answer each question could result in the disqualification of your bid.

**NON-COLLUSION STATEMENT:**

By signing this offer, the vendor/contractor certifies that this offer is made independently and free from collusion. Vendor shall disclose below any City of Fort Lauderdale, FL officer or employee, or any relative of any such officer or employee 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 City of Fort Lauderdale, FL 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.

For purposes hereof, a person has a material interest if they directly or indirectly own more than 5 percent of the total assets or capital stock of any business entity, or if they otherwise stand to personally gain if the contract is awarded to this vendor.

In accordance with City of Fort Lauderdale, FL Policy and Standards Manual, 6.10.8.3,

3.3. City employees may not contract with the City through any corporation or business entity in which they or their immediate family members hold a controlling financial interest (e.g. ownership of five (5) percent or more).

3.4. Immediate family members (spouse, parents and children) are also prohibited from contracting with the City subject to the same general rules.

**Failure of a vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the City Procurement Code.**

**NAME**

**RELATIONSHIPS**

-

**In the event the vendor does not indicate any names, the City shall interpret this to mean that the vendor has indicated that no such relationships exist.**

**CITY OF FORT LAUDERDALE  
GENERAL CONDITIONS**

These instructions are standard for all contracts for commodities or services issued through the City of Fort Lauderdale Procurement Services Division. The City may delete, supersede, or modify any of these standard instructions for a particular contract by indicating such change in the Invitation to Bid (ITB) Special Conditions, Technical Specifications, Instructions, Proposal Pages, Addenda, and Legal Advertisement. In this general conditions document, Invitation to Bid (ITB) and Request for Proposal (RFP) are interchangeable.

**PART I BIDDER PROPOSAL PAGE(S) CONDITIONS:**

- 1.01 BIDDER ADDRESS:** The City maintains automated vendor address lists that have been generated for each specific Commodity Class item through our bid issuing service, BidSync. Notices of Invitations to Bid (ITB'S) are sent by e-mail to the selection of bidders who have fully registered with BidSync or faxed (if applicable) to every vendor on those lists, who may then view the bid documents online. Bidders who have been informed of a bid's availability in any other manner are responsible for registering with BidSync in order to view the bid documents. There is no fee for doing so. If you wish bid notifications be provided to another e-mail address or fax, please contact BidSync. If you wish purchase orders sent to a different address, please so indicate in your bid response. If you wish payments sent to a different address, please so indicate on your invoice.
- 1.02 DELIVERY:** Time will be of the essence for any orders placed as a result of this ITB. The City reserves the right to cancel any orders, or part thereof, without obligation if delivery is not made in accordance with the schedule specified by the Bidder and accepted by the City.
- 1.03 PACKING SLIPS:** It will be the responsibility of the awarded Contractor, to attach all packing slips to the OUTSIDE of each shipment. Packing slips must provide a detailed description of what is to be received and reference the City of Fort Lauderdale purchase order number that is associated with the shipment. Failure to provide a detailed packing slip attached to the outside of shipment may result in refusal of shipment at Contractor's expense.
- 1.04 PAYMENT TERMS AND CASH DISCOUNTS:** Payment terms, unless otherwise stated in this ITB, will be considered to be net 45 days after the date of satisfactory delivery at the place of acceptance and receipt of correct invoice at the office specified, whichever occurs last. Bidder may offer cash discounts for prompt payment but they will not be considered in determination of award. If a Bidder offers a discount, it is understood that the discount time will be computed from the date of satisfactory delivery, at the place of acceptance, and receipt of correct invoice, at the office specified, whichever occurs last.
- 1.05 TOTAL BID DISCOUNT:** If Bidder offers a discount for award of all items listed in the bid, such discount shall be deducted from the total of the firm net unit prices bid and shall be considered in tabulation and award of bid.
- 1.06 BIDS FIRM FOR ACCEPTANCE:** Bidder warrants, by virtue of bidding, that the bid and the prices quoted in the bid will be firm for acceptance by the City for a period of ninety (90) days from the date of bid opening unless otherwise stated in the ITB.
- 1.07 VARIANCES:** For purposes of bid evaluation, Bidder's must indicate any variances, no matter how slight, from ITB General Conditions, Special Conditions, Specifications or Addenda in the space provided in the ITB. No variations or exceptions by a Bidder will be considered or deemed a part of the bid submitted unless such variances or exceptions are listed in the bid and referenced in the space provided on the bidder proposal pages. If variances are not stated, or referenced as required, it will be assumed that the product or service fully complies with the City's terms, conditions, and specifications.
- By receiving a bid, City does not necessarily accept any variances contained in the bid. All variances submitted are subject to review and approval by the City. If any bid contains material variances that, in the City's sole opinion, make that bid conditional in nature, the City reserves the right to reject the bid or part of the bid that is declared, by the City as conditional.
- 1.08 NO BIDS:** If you do not intend to bid please indicate the reason, such as insufficient time to respond, do not offer product or service, unable to meet specifications, schedule would not permit, or any other reason, in the space provided in this ITB. Failure to bid or return no bid comments prior to the bid due and opening date and time, indicated in this ITB, may result in your firm being deleted from our Bidder's registration list for the Commodity Class Item requested in this ITB.
- 1.09 MINORITY AND WOMEN BUSINESS ENTERPRISE PARTICIPATION AND BUSINESS DEFINITIONS:** The City of Fort Lauderdale wants to increase the participation of Minority Business Enterprises (MBE), Women Business Enterprises (WBE), and Small Business Enterprises (SBE) in its procurement activities. If your firm qualifies in accordance with the below definitions please indicate in the space provided in this ITB.

Minority Business Enterprise (MBE) "A Minority Business" is a business enterprise that is owned or controlled by one or more socially or economically disadvantaged persons. Such disadvantage may arise from cultural, racial, chronic economic circumstances or background or other similar cause. Such persons include, but are not limited to: Blacks, Hispanics, Asian Americans, and Native Americans.

The term "Minority Business Enterprise" means a business at least 51 percent of which is owned by minority group members or, in the case of a publicly owned business, at least 51 percent of the stock of which is owned by minority group members. For the purpose of the preceding sentence, minority group members are citizens of the United States who include, but are not limited to: Blacks, Hispanics, Asian Americans, and Native Americans.

Women Business Enterprise (WBE) a "Women Owned or Controlled Business" is a business enterprise at least 51 percent of which is owned by females or, in the case of a publicly owned business, at least 51 percent of the stock of which is owned by females.

Small Business Enterprise (SBE) "Small Business" means a corporation, partnership, sole proprietorship, or other legal entity formed for the purpose of making a profit, which is independently owned and operated, has either fewer than 100 employees or less than \$1,000,000 in annual gross receipts.

BLACK, which includes persons having origins in any of the Black racial groups of Africa.

WHITE, which includes persons whose origins are Anglo-Saxon and Europeans and persons of Indo-European decent including Pakistani and East Indian.

HISPANIC, which includes persons of Mexican, Puerto Rican, Cuban, Central and South American, or other Spanish culture or origin, regardless of race.

NATIVE AMERICAN, which includes persons whose origins are American Indians, Eskimos, Aleuts, or Native Hawaiians.

ASIAN AMERICAN, which includes persons having origin in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.

#### 1.10 MINORITY-WOMEN BUSINESS ENTERPRISE PARTICIPATION

It is the desire of the City of Fort Lauderdale to increase the participation of minority (MBE) and women-owned (WBE) businesses in its contracting and procurement programs. While the City does not have any preference or set aside programs in place, it is committed to a policy of equitable participation for these firms. Proposers are requested to include in their proposals a narrative describing their past accomplishments and intended actions in this area. If proposers are considering minority or women owned enterprise participation in their proposal, those firms, and their specific duties have to be identified in the proposal. If a proposer is considered for award, he or she will be asked to meet with City staff so that the intended MBE/WBE participation can be formalized and included in the subsequent contract.

#### 1.11 SCRUTINIZED COMPANIES

This Section applies to any contract for goods or services of \$1 million or more:

The Contractor certifies that it is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List as provided in section 287.135, Florida Statutes (2011), as may be amended or revised. The City may terminate this Contract at the City's option if the Contractor is found to have submitted a false certification as provided under subsection (5) of section 287.135, Florida Statutes (2011), as may be amended or revised, or been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List.

#### 1.12 DEBARRED OR SUSPENDED BIDDERS OR PROPOSERS

The bidder or proposer certifies, by submission of a response to this solicitation, that neither it nor its principals are presently debarred or suspended by any Federal department or agency.

### Part II DEFINITIONS/ORDER OF PRECEDENCE:

#### 2.01 BIDDING DEFINITIONS The City will use the following definitions in it's general conditions, special conditions, technical specifications, instructions to bidders, addenda and any other document used in the bidding process:

INVITATION TO BID (ITB) when the City is requesting bids from qualified Bidders.

REQUEST FOR PROPOSALS (RFP) when the City is requesting proposals from qualified Proposers.

BID – a price and terms quote received in response to an ITB.

PROPOSAL – a proposal received in response to an RFP.

BIDDER – Person or firm submitting a Bid.

PROPOSER – Person or firm submitting a Proposal.

RESPONSIVE BIDDER – A person whose bid conforms in all material respects to the terms and conditions included in the ITB.

RESPONSIBLE BIDDER – A person who has the capability in all respects to perform in full the contract requirements, as stated in the ITB, and the integrity and reliability that will assure good faith performance.

FIRST RANKED PROPOSER – That Proposer, responding to a City RFP, whose Proposal is deemed by the City, the most advantageous to the City after applying the evaluation criteria contained in the RFP.

SELLER – Successful Bidder or Proposer who is awarded a Purchase Order or Contract to provide goods or services to the City.

CONTRACTOR – Successful Bidder or Proposer who is awarded a Purchase Order, award Contract, Blanket Purchase Order agreement, or Term Contract to provide goods or services to the City.

CONTRACT – A deliberate verbal or written agreement between two or more competent parties to perform or not to perform a certain act or acts, including all types of agreements, regardless of what they may be called, for the procurement or disposal of equipment, materials, supplies, services or construction.

CONSULTANT – Successful Bidder or Proposer who is awarded a contract to provide professional services to the City.

The following terms may be used interchangeably by the City: ITB and/or RFP; Bid or Proposal; Bidder, Proposer, or Seller; Contractor or Consultant; Contract, Award, Agreement or Purchase Order.

#### 2.02 SPECIAL CONDITIONS: Any and all Special Conditions contained in this ITB that may be in variance or conflict with these General Conditions shall have precedence over these General Conditions. If no changes or deletions to General Conditions are made in the Special Conditions, then the General Conditions shall prevail in their entirety,

### PART III BIDDING AND AWARD PROCEDURES:

- 3.01 SUBMISSION AND RECEIPT OF BIDS:** To receive consideration, bids must be received prior to the bid opening date and time. Unless otherwise specified, Bidders should use the proposal forms provided by the City. These forms may be duplicated, but failure to use the forms may cause the bid to be rejected. Any erasures or corrections on the bid must be made in ink and initialed by Bidder in ink. All information submitted by the Bidder shall be printed, typewritten or filled in with pen and ink. Bids shall be signed in ink. Separate bids must be submitted for each ITB issued by the City in separate sealed envelopes properly marked. When a particular ITB or RFP requires multiple copies of bids or proposals they may be included in a single envelope or package properly sealed and identified. Only send bids via facsimile transmission (FAX) if the ITB specifically states that bids sent via FAX will be considered. If such a statement is not included in the ITB, bids sent via FAX will be rejected. Bids will be publicly opened in the Procurement Office, or other designated area, in the presence of Bidders, the public, and City staff. Bidders and the public are invited and encouraged to attend bid openings. Bids will be tabulated and made available for review by Bidder's and the public in accordance with applicable regulations.
- 3.02 MODEL NUMBER CORRECTIONS:** If the model number for the make specified in this ITB is incorrect, or no longer available and replaced with an updated model with new specifications, the Bidder shall enter the correct model number on the bidder proposal page. In the case of an updated model with new specifications, Bidder shall provide adequate information to allow the City to determine if the model bid meets the City's requirements.
- 3.03 PRICES QUOTED:** Deduct trade discounts, and quote firm net prices. Give both unit price and extended total. In the case of a discrepancy in computing the amount of the bid, the unit price quoted will govern. All prices quoted shall be F.O.B. destination, freight prepaid (Bidder pays and bears freight charges, Bidder owns goods in transit and files any claims), unless otherwise stated in Special Conditions. Each item must be bid separately. No attempt shall be made to tie any item or items contained in the ITB with any other business with the City.
- 3.04 TAXES:** The City of Fort Lauderdale is exempt from Federal Excise and Florida Sales taxes on direct purchase of tangible property. Exemption number for EIN is 59-6000319, and State Sales tax exemption number is 85-8013875578C-1.
- 3.05 WARRANTIES OF USAGE:** Any quantities listed in this ITB as estimated or projected are provided for tabulation and information purposes only. No warranty or guarantee of quantities is given or implied. It is understood that the Contractor will furnish the City's needs as they arise.
- 3.06 APPROVED EQUAL:** When the technical specifications call for a brand name, manufacturer, make, model, or vendor catalog number with acceptance of APPROVED EQUAL, it shall be for the purpose of establishing a level of quality and features desired and acceptable to the City. In such cases, the City will be receptive to any unit that would be considered by qualified City personnel as an approved equal. In that the specified make and model represent a level of quality and features desired by the City, the Bidder must state clearly in the bid any variance from those specifications. It is the Bidder's responsibility to provide adequate information, in the bid, to enable the City to ensure that the bid meets the required criteria. If adequate information is not submitted with the bid, it may be rejected. The City will be the sole judge in determining if the item bid qualifies as an approved equal.
- 3.07 MINIMUM AND MANDATORY TECHNICAL SPECIFICATIONS:** The technical specifications may include items that are considered minimum, mandatory, or required. If any Bidder is unable to meet or exceed these items, and feels that the technical specifications are overly restrictive, the bidder must notify the Procurement Services Division immediately. Such notification must be received by the Procurement Services Division prior to the deadline contained in the ITB, for questions of a material nature, or prior to five (5) days before bid due and open date, whichever occurs first. If no such notification is received prior to that deadline, the City will consider the technical specifications to be acceptable to all bidders.
- 3.08 MISTAKES:** Bidders are cautioned to examine all terms, conditions, specifications, drawings, exhibits, addenda, delivery instructions and special conditions pertaining to the ITB. Failure of the Bidder to examine all pertinent documents shall not entitle the bidder to any relief from the conditions imposed in the contract.
- 3.09 SAMPLES AND DEMONSTRATIONS:** Samples or inspection of product may be requested to determine suitability. Unless otherwise specified in Special Conditions, samples shall be requested after the date of bid opening, and if requested should be received by the City within seven (7) working days of request. Samples, when requested, must be furnished free of expense to the City and if not used in testing or destroyed, will upon request of the Bidder, be returned within thirty (30) days of bid award at Bidder's expense. When required, the City may request full demonstrations of units prior to award. When such demonstrations are requested, the Bidder shall respond promptly and arrange a demonstration at a convenient location. Failure to provide samples or demonstrations as specified by the City may result in rejection of a bid.
- 3.10 LIFE CYCLE COSTING:** If so specified in the ITB, the City may elect to evaluate equipment proposed on the basis of total cost of ownership. In using Life Cycle Costing, factors such as the following may be considered: estimated useful life, maintenance costs, cost of supplies, labor intensity, energy usage, environmental impact, and residual value. The City reserves the right to use those or other applicable criteria, in its sole opinion that will most accurately estimate total cost of use and ownership.
- 3.11 BIDDING ITEMS WITH RECYCLED CONTENT:** In addressing environmental concerns, the City of Fort Lauderdale encourages Bidders to submit bids or alternate bids containing items with recycled content. When submitting bids containing items with recycled content, Bidder shall provide documentation adequate for the City to verify the recycled content. The City prefers packaging consisting of materials that are degradable or able to be recycled. When specifically stated in the ITB, the City may give preference to bids containing items manufactured with recycled material or packaging that is able to be recycled.
- 3.12 USE OF OTHER GOVERNMENTAL CONTRACTS:** The City reserves the right to reject any part or all of any bids received and utilize other available governmental contracts, if such action is in its best interest.
- 3.13 QUALIFICATIONS/INSPECTION:** Bids will only be considered from firms normally engaged in providing the types of commodities/services specified herein. The City reserves the right to inspect the Bidder's facilities, equipment, personnel, and organization at any time, or to take any other action necessary to determine Bidder's ability to perform. The Procurement Director

reserves the right to reject bids where evidence or evaluation is determined to indicate inability to perform.

- 3.14 BID SURETY:** If Special Conditions require a bid security, it shall be submitted in the amount stated. A bid security can be in the form of a bid bond or cashiers check. Bid security will be returned to the unsuccessful bidders as soon as practicable after opening of bids. Bid security will be returned to the successful bidder after acceptance of the performance bond, if required; acceptance of insurance coverage, if required; and full execution of contract documents, if required; or conditions as stated in Special Conditions.
- 3.15 PUBLIC RECORDS/TRADE SECRETS/COPYRIGHT:** The Proposer's response to the RFP is a public record pursuant to Florida law, which is subject to disclosure by the City under the State of Florida Public Records Law, Florida Statutes Chapter 119.07 ("Public Records Law"). The City shall permit public access to all documents, papers, letters or other material submitted in connection with this RFP and the Contract to be executed for this RFP, subject to the provisions of Chapter 119.07 of the Florida Statutes.

Any language contained in the Proposer's response to the RFP purporting to require confidentiality of any portion of the Proposer's response to the RFP, except to the extent that certain information is in the City's opinion a Trade Secret pursuant to Florida law, shall be void. If a Proposer submits any documents or other information to the City which the Proposer claims is Trade Secret information and exempt from Florida Statutes Chapter 119.07 ("Public Records Laws"), the Proposer shall clearly designate that it is a Trade Secret and that it is asserting that the document or information is exempt. The Proposer must specifically identify the exemption being claimed under Florida Statutes 119.07. The City shall be the final arbiter of whether any information contained in the Proposer's response to the RFP constitutes a Trade Secret. The city's determination of whether an exemption applies shall be final, and the proposer agrees to defend, indemnify, and hold harmless the city and the city's officers, employees, and agent, against any loss or damages incurred by any person or entity as a result of the city's treatment of records as public records. Proposals purporting to be subject to copyright protection in full or in part will be rejected.

EXCEPT FOR CLEARLY MARKED PORTIONS THAT ARE BONA FIDE TRADE SECRETS PURSUANT TO FLORIDA LAW, DO NOT MARK YOUR RESPONSE TO THE RFP AS PROPRIETARY OR CONFIDENTIAL. DO NOT MARK YOUR RESPONSE TO THE RFP OR ANY PART THEREOF AS COPYRIGHTED.

- 3.16 PROHIBITION OF INTEREST:** No contract will be awarded to a bidding firm who has City elected officials, officers or employees affiliated with it, unless the bidding firm has fully complied with current Florida State Statutes and City Ordinances relating to this issue. Bidders must disclose any such affiliation. Failure to disclose any such affiliation will result in disqualification of the Bidder and removal of the Bidder from the City's bidder lists and prohibition from engaging in any business with the City.
- 3.17 RESERVATIONS FOR AWARD AND REJECTION OF BIDS:** The City reserves the right to accept or reject any or all bids, part of bids, and to waive minor irregularities or variations to specifications contained in bids, and minor irregularities in the bidding process. The City also reserves the right to award the contract on a split order basis, lump sum basis, individual item basis, or such combination as shall best serve the interest of the City. The City reserves the right to make an award to the responsive and responsible bidder whose product or service meets the terms, conditions, and specifications of the ITB and whose bid is considered to best serve the City's interest. In determining the responsiveness of the offer and the responsibility of the Bidder, the following shall be considered when applicable: the ability, capacity and skill of the Bidder to perform as required; whether the Bidder can perform promptly, or within the time specified, without delay or interference; the character, integrity, reputation, judgment, experience and efficiency of the Bidder; the quality of past performance by the Bidder; the previous and existing compliance by the Bidder with related laws and ordinances; the sufficiency of the Bidder's financial resources; the availability, quality and adaptability of the Bidder's supplies or services to the required use; the ability of the Bidder to provide future maintenance, service or parts; the number and scope of conditions attached to the bid.

If the ITB provides for a contract trial period, the City reserves the right, in the event the selected bidder does not perform satisfactorily, to award a trial period to the next ranked bidder or to award a contract to the next ranked bidder, if that bidder has successfully provided services to the City in the past. This procedure to continue until a bidder is selected or the contract is re-bid, at the sole option of the City.

- 3.18 LEGAL REQUIREMENTS:** Applicable provisions of all federal, state, county laws, and local ordinances, rules and regulations, shall govern development, submittal and evaluation of all bids received in response hereto and shall govern any and all claims and disputes which may arise between person(s) submitting a bid response hereto and the City by and through its officers, employees and authorized representatives, or any other person, natural or otherwise; and lack of knowledge by any bidder shall not constitute a cognizable defense against the legal effect thereof.
- 3.19 BID PROTEST PROCEDURE: ANY PROPOSER OR BIDDER WHO IS NOT RECOMMENDED FOR AWARD OF A CONTRACT AND WHO ALLEGES A FAILURE BY THE CITY TO FOLLOW THE CITY'S PROCUREMENT ORDINANCE OR ANY APPLICABLE LAW MAY PROTEST TO THE DIRECTOR OF PROCUREMENT SERVICES DIVISION (DIRECTOR), BY DELIVERING A LETTER OF PROTEST TO THE DIRECTOR WITHIN FIVE (5) DAYS AFTER A NOTICE OF INTENT TO AWARD IS POSTED ON THE CITY'S WEB SITE AT THE FOLLOWING LINK:**  
[http://www.fortlauderdale.gov/purchasing/notices\\_of\\_intent.htm](http://www.fortlauderdale.gov/purchasing/notices_of_intent.htm)

**THE COMPLETE PROTEST ORDINANCE MAY BE FOUND ON THE CITY'S WEB SITE AT THE FOLLOWING LINK:**  
<http://www.fortlauderdale.gov/purchasing/protestordinance.pdf>

#### **PART IV BONDS AND INSURANCE**

- 4.01 PERFORMANCE BOND:** If a performance bond is required in Special Conditions, the Contractor shall within fifteen (15) working days after notification of award, furnish to the City a Performance Bond, payable to the City of Fort Lauderdale, Florida, in the face amount specified in Special Conditions as surety for faithful performance under the terms and conditions of the contract. If the bond is on an annual coverage basis, renewal for each succeeding year shall be submitted to the City thirty (30) days prior to the termination date of the existing Performance Bond. The Performance Bond must be executed by a surety company of recognized standing, authorized to do business in the State of Florida and having a resident agent.

Acknowledgement and agreement is given by both parties that the amount herein set for the Performance Bond is not intended to be nor shall be deemed to be in the nature of liquidated damages nor is it intended to limit the liability of the Contractor to the City in the event of a material breach of this Agreement by the Contractor.

- 4.02 INSURANCE:** If the Contractor is required to go on to City property to perform work or services as a result of ITB award, the Contractor shall assume full responsibility and expense to obtain all necessary insurance as required by City or specified in Special Conditions.

The Contractor shall provide to the Procurement Services Division original certificates of coverage and receive notification of approval of those certificates by the City's Risk Manager prior to engaging in any activities under this contract. The Contractor's insurance is subject to the approval of the City's Risk Manager. The certificates must list the City as an ADDITIONAL INSURED for General Liability Insurance, and shall have no less than thirty (30) days written notice of cancellation or material change. Further modification of the insurance requirements may be made at the sole discretion of the City's Risk Manager if circumstances change or adequate protection of the City is not presented. Bidder, by submitting the bid, agrees to abide by such modifications.

**PART V PURCHASE ORDER AND CONTRACT TERMS:**

- 5.01 COMPLIANCE TO SPECIFICATIONS, LATE DELIVERIES/PENALTIES:** Items offered may be tested for compliance to bid specifications. Items delivered which do not conform to bid specifications may be rejected and returned at Contractor's expense. Any violation resulting in contract termination for cause or delivery of items not conforming to specifications, or late delivery may also result in:
- Bidders name being removed from the City's bidder's mailing list for a specified period and Bidder will not be recommended for any award during that period.
  - All City Departments being advised to refrain from doing business with the Bidder.
  - All other remedies in law or equity.
- 5.02 ACCEPTANCE, CONDITION, AND PACKAGING:** The material delivered in response to ITB award shall remain the property of the Seller until a physical inspection is made and the material accepted to the satisfaction of the City. The material must comply fully with the terms of the ITB, be of the required quality, new, and the latest model. All containers shall be suitable for storage and shipment by common carrier, and all prices shall include standard commercial packaging. The City will not accept substitutes of any kind. Any substitutes or material not meeting specifications will be returned at the Bidder's expense. Payment will be made only after City receipt and acceptance of materials or services.
- 5.03 SAFETY STANDARDS:** All manufactured items and fabricated assemblies shall comply with applicable requirements of the Occupation Safety and Health Act of 1970 as amended, and be in compliance with Chapter 442, Florida Statutes. Any toxic substance listed in Section 38F-41.03 of the Florida Administrative Code delivered as a result of this order must be accompanied by a completed Material Safety Data Sheet (MSDS).
- 5.04 ASBESTOS STATEMENT:** All material supplied must be 100% asbestos free. Bidder, by virtue of bidding, certifies that if awarded any portion of the ITB the bidder will supply only material or equipment that is 100% asbestos free.
- 5.05 OTHER GOVERNMENTAL ENTITIES:** If the Bidder is awarded a contract as a result of this ITB, the bidder may, if the bidder has sufficient capacity or quantities available, provide to other governmental agencies, so requesting, the products or services awarded in accordance with the terms and conditions of the ITB and resulting contract. Prices shall be F.O.B. delivered to the requesting agency.
- 5.06 VERBAL INSTRUCTIONS PROCEDURE:** No negotiations, decisions, or actions shall be initiated or executed by the Contractor as a result of any discussions with any City employee. Only those communications which are in writing from an authorized City representative may be considered. Only written communications from Contractors, which are assigned by a person designated as authorized to bind the Contractor, will be recognized by the City as duly authorized expressions on behalf of Contractors.
- 5.07 INDEPENDENT CONTRACTOR:** The Contractor is an independent contractor under this Agreement. Personal services provided by the Proposer shall be by employees of the Contractor and subject to supervision by the Contractor, and not as officers, employees, or agents of the City. Personnel policies, tax responsibilities, social security, health insurance, employee benefits, procurement policies unless otherwise stated in this ITB, and other similar administrative procedures applicable to services rendered under this contract shall be those of the Contractor.
- 5.08 INDEMNITY/HOLD HARMLESS AGREEMENT:** The Contractor agrees to protect, defend, indemnify, and hold harmless the City of Fort Lauderdale and its officers, employees and agents from and against any and all losses, penalties, damages, settlements, claims, costs, charges for other expenses, or liabilities of every and any kind including attorneys fees, in connection with or arising directly or indirectly out of the work agreed to or performed by Contractor under the terms of any agreement that may arise due to the bidding process. Without limiting the foregoing, any and all such claims, suits, or other actions relating to personal injury, death, damage to property, defects in materials or workmanship, actual or alleged violations of any applicable Statute, ordinance, administrative order, rule or regulation, or decree of any court shall be included in the indemnity hereunder.
- 5.09 TERMINATION FOR CAUSE:** If, through any cause, the Contractor shall fail to fulfill in a timely and proper manner its obligations under this Agreement, or if the Contractor shall violate any of the provisions of this Agreement, the City may upon written notice to the Contractor terminate the right of the Contractor to proceed under this Agreement, or with such part or parts of the Agreement as to which there has been default, and may hold the Contractor liable for any damages caused to the City by reason of such default and termination. In the event of such termination, any completed services performed by the Contractor under this Agreement shall, at the option of the City, become the City's property and the Contractor shall be entitled to receive equitable compensation for any work completed to the satisfaction of the City. The Contractor, however, shall not be relieved of liability to the City for damages sustained by the City by reason of any breach of the Agreement by the Contractor, and the City may withhold any payments to the Contractor for the purpose of setoff until such time as the amount of damages due to the City from the Contractor can be determined.

- 5.10 TERMINATION FOR CONVENIENCE:** The City reserves the right, in its best interest as determined by the City, to cancel contract by giving written notice to the Contractor thirty (30) days prior to the effective date of such cancellation.
- 5.11 CANCELLATION FOR UNAPPROPRIATED FUNDS:** The obligation of the City for payment to a Contractor is limited to the availability of funds appropriated in a current fiscal period, and continuation of the contract into a subsequent fiscal period is subject to appropriation of funds, unless otherwise authorized by law.
- 5.12 RECORDS/AUDIT:** The Contractor shall maintain during the term of the contract all books of account, reports and records in accordance with generally accepted accounting practices and standards for records directly related to this contract. The Contractor agrees to make available to the City Auditor or designee, during normal business hours and in Broward, Miami-Dade or Palm Beach Counties, all books of account, reports and records relating to this contract should be retained for the duration of the contract and for three years after the final payment under this Agreement, or until all pending audits, investigations or litigation matters relating to the contract are closed, whichever is later.
- 5.13 PERMITS, TAXES, LICENSES:** The successful Contractor shall, at their own expense, obtain all necessary permits, pay all licenses, fees and taxes, required to comply with all local ordinances, state and federal laws, rules and regulations applicable to business to be carried out under this contract.
- 5.14 LAWS/ORDINANCES:** The Contractor shall observe and comply with all Federal, state, local and municipal laws, ordinances rules and regulations that would apply to this contract.
- 5.15 NON-DISCRIMINATION:** There shall be no discrimination as to race, sex, color, creed, age or national origin in the operations conducted under this contract.
- 5.16 UNUSUAL CIRCUMSTANCES:** If during a contract term where costs to the City are to remain firm or adjustments are restricted by a percentage or CPI cap, unusual circumstances that could not have been foreseen by either party of the contract occur, and those circumstances significantly affect the Contractor's cost in providing the required prior items or services, then the Contractor may request adjustments to the costs to the City to reflect the changed circumstances. The circumstances must be beyond the control of the Contractor, and the requested adjustments must be fully documented. The City may, after examination, refuse to accept the adjusted costs if they are not properly documented, increases are considered to be excessive, or decreases are considered to be insufficient. In the event the City does not wish to accept the adjusted costs and the matter cannot be resolved to the satisfaction of the City, the City will reserve the following options:
1. The contract can be canceled by the City upon giving thirty (30) days written notice to the Contractor with no penalty to the City or Contractor. The Contractor shall fill all City requirements submitted to the Contractor until the termination date contained in the notice.
  2. The City requires the Contractor to continue to provide the items and services at the firm fixed (non-adjusted) cost until the termination of the contract term then in effect.
  3. If the City, in its interest and in its sole opinion, determines that the Contractor in a capricious manner attempted to use this section of the contract to relieve themselves of a legitimate obligation under the contract, and no unusual circumstances had occurred, the City reserves the right to take any and all action under law or equity. Such action shall include, but not be limited to, declaring the Contractor in default and disqualifying him for receiving any business from the City for a stated period of time.
- If the City does agree to adjusted costs, these adjusted costs shall not be invoiced to the City until the Contractor receives notice in writing signed by a person authorized to bind the City in such matters.
- 5.17 ELIGIBILITY:** If applicable, the Contractor must first register with the Department of State of the State of Florida, in accordance with Florida State Statutes, prior to entering into a contract with the City.
- 5.18 PATENTS AND ROYALTIES:** The Contractor, without exception, shall indemnify and save harmless the City and its employees from liability of any nature and kind, including cost and expenses for or on account of any copyrighted, patented or un-patented invention, process, or article manufactured or used in the performance of the contract, including its use by the City. If the Contractor uses any design, device, or materials covered by letters, patent or copyright, it is mutually agreed and understood without exception that the bid prices shall include all royalties or costs arising from the use of such design, device, or materials in any way involved in the work.
- 5.19 ASSIGNMENT:** Contractor shall not transfer or assign the performance required by this ITB without the prior written consent of the City. Any award issued pursuant to this ITB, and the monies, which may become due hereunder, are not assignable except with the prior written approval of the City Commission or the City Manager or City Manager's designee, depending on original award approval.
- 5.20 LITIGATION VENUE:** The parties waive the privilege of venue and agree that all litigation between them in the state courts shall take place in Broward County, Florida and that all litigation between them in the federal courts shall take place in the Southern District in and for the State of Florida.

**BID/PROPOSAL SIGNATURE PAGE**

**How to submit bids/proposals:** It is preferred that bids/proposals be submitted electronically at [www.bidsync.com](http://www.bidsync.com), unless otherwise stated in the bid packet. If mailing a hard copy, it will be the sole responsibility of the Bidder to ensure that the bid reaches the City of Fort Lauderdale, City Hall, Procurement Services Division, Suite 619, 100 N. Andrews Avenue, Fort Lauderdale, FL 33301, prior to the bid opening date and time listed. Bids/proposals submitted by fax or email will NOT be accepted.

The below signed hereby agrees to furnish the following article(s) or services at the price(s) and terms stated subject to all instructions, conditions, specifications addenda, legal advertisement, and conditions contained in the bid. I have read all attachments including the specifications and fully understand what is required. By submitting this signed proposal I will accept a contract if approved by the CITY and such acceptance covers all terms, conditions, and specifications of this bid/proposal.

**Please Note:** If responding to this solicitation through BidSync, the electronic version of the bid response will prevail, unless a paper version is clearly marked **by the bidder** in some manner to indicate that it will supplant the electronic version. All fields below **must** be completed. If the field does not apply to you, please note N/A in that field.

Submitted by:  (Authorized signature)  (date)

Name (printed)  Title:

Company: (Legal Registration)

**CONTRACTOR, IF FOREIGN CORPORATION, MAY BE REQUIRED TO OBTAIN A CERTIFICATE OF AUTHORITY FROM THE DEPARTMENT OF STATE, IN ACCORDANCE WITH FLORIDA STATUTE §607.1501 (visit <http://www.dos.state.fl.us/>).**

Address:

City:  State:  Zip:

Telephone No.  FAX No.  Email:

Delivery: Calendar days after receipt of Purchase Order (section 1.02 of General Conditions):

Payment Terms (section 1.04):  Total Bid Discount (section 1.05):

Does your firm qualify for MBE or WBE status (section 1.09): MBE  WBE

**ADDENDUM ACKNOWLEDGEMENT** - Proposer acknowledges that the following addenda have been received and are included in the proposal:

<u>Addendum No.</u>	<u>Date Issued</u>
<input type="text"/>	<input type="text"/>

P-CARDS: Will your firm accept the City's Credit Card as payment for goods/services?

YES  NO

**VARIANCES:** State any variations to specifications, terms and conditions in the space provided below or

reference in the space provided below all variances contained on other pages of bid, attachments or bid pages. No variations or exceptions by the Proposer will be deemed to be part of the bid submitted unless such variation or exception is listed and contained within the bid documents and referenced in the space provided below. If no statement is contained in the below space, it is hereby implied that your bid/proposal complies with the full scope of this solicitation. HAVE YOU STATED ANY VARIANCES OR EXCEPTIONS BELOW? BIDDER MUST CLICK THE EXCEPTION LINK IF ANY VARIATION OR EXCEPTION IS TAKEN TO THE SPECIFICATIONS, TERMS AND CONDITIONS. If this section does not apply to your bid, simply mark N/A in the section below.

Variances:

revised 11-29-11

## Question and Answers for Bid #623-11010 - Wastewater Flow, Rainfall Monitoring and Related Services Annual Contract

### OVERALL BID QUESTIONS

There are no questions associated with this bid. If you would like to submit a question, please click on the "Create New Question" button below.