

**FLOW MEASUREMENT PLAN  
FOR  
SEWER SYSTEM EVALUATION AND REHABILITATION PROGRAM  
SEWERAGE AND WATER BOARD OF NEW ORLEANS**

**January 2, 1997**

The primary objective of this Flow Measurement Plan is to identify a plan to measure flow in the Sewerage and Water Board wastewater collection system. Specifically, this Plan shall be designed such that current system-wide flow levels and flow patterns can be determined.

Approximately seventy (70) flow meters will be installed at key points in the New Orleans wastewater collection system. These flow meters will assist in calibration of the hydraulic model. The data collected will be used to determine BWF, GWI, and RDI/I characteristics. Table 1 is a partial list of manholes where flow meters will be installed. In addition, approximately twenty (20) rainfall gauges will be installed throughout Orleans Parish. The data collected will be used to develop design storm characteristics and event sequences, including spatial patterns of monitored storms.

Additional efforts that address aspects of flow measurement will include the identification of temporary and permanent flow monitoring points and rainfall gauge locations needed to perform the hydraulic modeling analysis for the Sewerage and Water Board wastewater collection system.

Attached to this Flow Measurement Plan is a copy of the agreement for services between Montgomery Watson and ADS Environmental Services, Inc. This agreement provides for the services necessary for flow monitoring for the Sewer System Evaluation and Rehabilitation Program. Services included in the agreement specifically addresses the following:

1. Mobilization
2. Site Access
3. Project Management and Assistance
4. Flow Monitoring
5. Site Investigations of Monitoring Sites
6. Manhole Inspections

7. Installation, Operation and Maintenance of Flow Meters
8. Calibration Procedures
9. Flow Monitoring Period and Equipment
10. Rainfall Event Monitoring
11. High Water Level Indicators
12. Data Management
13. Cleaning
14. Wet Well Cleaning
15. Television Inspection
16. By-pass Pumping
17. Up-time
18. First Data Shipment
19. Deliverables

Table 1  
Sewer System Evaluation And Rehabilitation Program  
Sewerage and Water Board of New Orleans  
Proposed Flow Monitor Locations

<u>Basin</u>	<u>Street Ref.</u>	<u>S&amp;WB Map I.D.</u>	<u>Manhole No.</u>	<u>Nominal Pipe Diameter</u>	<u>Site No.</u>
A	Country Club & Marcia	8	08	18"	36
A	Fleur de Lis & W. Harney	10	01	24"	37
A	Fleur de Lis & W. Harney	10	01	18"	38
A	Service Alley Between Memphis & Gen. Diaz @ Mouton	236	01	24"	39
A	Memphis & Filmore	235	01	36"	40
A	Memphis & Filmore	235	01	15"	41
A	Florida & Vicksburg	230	01	24"	42
A	Vicksburg under Interstate	220	03	30"	43
A	Perlita & Athis	247	01	24"	44
A	Perlita & Athis	247	01	21"	45
A	Milton & Jumonville	297	02	33"	46
A	Milton & Jumonville	297	02	27"	47
B	Cohn & Lowerline	45	05	27"	01
B	Oak & Broadway	55	20	24"	02
B	Olive & Eagle	27	Influent Line to PS 3 Wetwell	20"	03
B	Jefferson Davis & Washington	135	02	33"	04
C	State & Magnolia	72	04	27:	05
C	Jefferson & Magnolia	84	02	27:	06
C	Valence & Magnolia	97	30	27"	07
C	Marengo & Clara	107	01	27"	08
C	Marengo & Clara	107	05	48"	09
C	S. Claiborne & Gen. Pershing	108	01	24"	10
C	Louisiana & Magnolia	116	40	24"	11
C	Washington & Magnolia	130	46	27"	12
D	S. Solomon & Palmyra	205	Influent Line to PS 6 Wetwell	21"	13
D	Dorgenois & Palmyra	201	01	33"	14
D	Rocheblave & Palmyra	200	01	21"	15
D	N. Broad & Toulouse	272	01	24"	16
D	N. Claiborne & Gov. Nichols	285	29	27"	17
D	N. Claiborne & St. Bernard	303	11	36"	18

Table 1  
Sewer System Evaluation And Rehabilitation Program  
Sewerage and Water Board of New Orleans  
Proposed Flow Monitor Locations

(continued)

<u>Basin</u>	<u>Street Ref.</u>	<u>S&amp;WB Map I.D.</u>	<u>Manhole No.</u>	<u>Nominal Pipe Diameter</u>	<u>Site No.</u>
D	New Orleans & Law	310	14	30"	19
D	Allen & N. Robertson	326	21	30"	20
E	St. Ann & Villere	269	09	84"	21
E	Canal & Robertson	198	21	30"	22
E	Canal & Robertson	198	36	24"	23
E	Poydras & Magnolia	180	33	24"	24
E	S. Claiborne & Girod	175	01	72"	25
E	Thalia & Clara	143	07	27"	26
E	Thalia & Willow	143	11	27"	27
E	Felicity & Magnolia	143	27	27"	28
E	Jackson & Clara	143	50	30"	29
F	Selma & Spain	355	02	24"	48
F	Mandeville & Dreux	355	49	36"	49
F	Selma & Marigny	355	46	27"	50
F	Treasure & Arts	349	01	27"	51
F	Treasure & Painters	367	34	48"	52
F	Abundance & Almonaster	388	03	27"	53
F	Dwyer & Louisa	250	01	18"	54
F	Dwyer & Louisa	250	03	21"	55
F	Dwyer & Louisa	250	02	30"	56
G	Sister & Marais	435	01	4'1 1/2"x2'9"	31
G	Jourdan & St. Claude	435	49	24"	32
G	Jourdan & Marais	435	24	24"	33
G	N. Tonti & Forstall	445	01	15"	34
G	N. Tonti & Forstall	445	01	18"	35

MONTGOMERY WATSON CLIENT NAME: Sewerage and Water Board of New Orleans

MONTGOMERY WATSON JOB NO.: 1709.0100 CONTRACT NO.:

## SUBCONTRACT AGREEMENT FOR SERVICES

This Agreement, dated \_\_\_\_\_, is made and entered into between MONTGOMERY WATSON AMERICAS, INC., a California corporation (herein "MONTGOMERY WATSON"), and ADS Environmental Services, Inc. (herein called "CONSULTANT").

In consideration of the mutual promises herein contained, MONTGOMERY WATSON and CONSULTANT agree as follows:

### 1. SCOPE OF SERVICES

During the term of this Agreement, CONSULTANT shall furnish the services set forth in the Schedule A, attached hereto and made a part hereof. Such services shall be performed by individuals as employees of CONSULTANT, an independent Contractor, and not as employees of MONTGOMERY WATSON. If the services are to be performed at MONTGOMERY WATSON's offices, CONSULTANT's employees shall abide by all rules established by MONTGOMERY WATSON.

### 2. TERM OF AGREEMENT

The agreement shall commence on the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_ and terminate on the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_.

### 3. PAYMENT RATES AND BILLING

3.1 As compensation for services to be performed by CONSULTANT, MONTGOMERY WATSON will pay CONSULTANT the amount set forth in the Schedule B attached hereto and made part of this Agreement. MONTGOMERY WATSON shall not have any liability for any other expenses or costs incurred by CONSULTANT, unless otherwise provided in the Schedule.

3.2 CONSULTANT shall keep accurate records of the time expended by it. Payment for services performed by CONSULTANT shall be made by MONTGOMERY WATSON upon the submission by CONSULTANT of invoices or time statements, (which shall be subject to verification prior to payment), to MONTGOMERY WATSON as follows:

MONTGOMERY WATSON AMERICAS, INC.  
3501 N. Causeway Blvd.  
Suite 400  
Metairie, LA 70002

Attn: Mr. Ernie Upton

Invoices submitted by CONSULTANT will:

- A. Accurately describe services rendered during the invoice period, including hours and respective dates of performance and any reports submitted or percent of work completed during the invoice period, as determined by CONSULTANT and verified by MONTGOMERY WATSON.
- B. Identify any other authorized expenses incurred hereunder; and
- C. Make reference to this Agreement or otherwise identify the invoice in such manner as MONTGOMERY WATSON may reasonably require.

3.3 CONSULTANT shall not take any action hereunder which could cause the amount for which MONTGOMERY WATSON would be obligated to CONSULTANT to exceed the sum of \$688,000. For other than lump sum (fixed price) Agreements, CONSULTANT shall advise MONTGOMERY WATSON in writing when costs incurred under this Agreement are equal to 75% of the aforesaid sum. Notwithstanding any other provisions of this Agreement, MONTGOMERY WATSON shall not be obligated to pay to CONSULTANT any amount in excess of the aforementioned sum, provided however that this sum may be increased from time-to-time by MONTGOMERY WATSON in writing.

#### 4. DATA

CONSULTANT agrees that all data and information, including without limitation, computer software, computer data bases, computer software documentation, specifications, designs, drawings, reports, and blueprints, generated in the performance of this Agreement and data and information which are specified to be delivered or which are, in fact, delivered pursuant to this Agreement shall be and remain the sole property of MONTGOMERY WATSON. CONSULTANT understands and agrees that all rights under copyright and patent laws under this Agreement belong to MONTGOMERY WATSON, unless otherwise stated. CONSULTANT hereby assigns any and all rights under copyright and patent law to MONTGOMERY WATSON, and agrees to assist MONTGOMERY WATSON in perfecting the same. CONSULTANT shall deliver all data and information to MONTGOMERY WATSON upon MONTGOMERY WATSON'S request and in any event upon the completion of all work hereunder or the termination or expiration hereof, whichever shall first occur, and shall be fully responsible for the care and protection thereof until such delivery. Except as otherwise provided in this Agreement, said documents shall be delivered to MONTGOMERY WATSON without additional cost to MONTGOMERY WATSON.

#### 5. SUBCONTRACTING

Performance of this Agreement may not be subcontracted in whole or in part without the prior written consent of MONTGOMERY WATSON.

#### 6. SUSPENSION OF SERVICES

MONTGOMERY WATSON may, at any time and with or without cause, suspend the services of CONSULTANT or any portion thereof for a period of not more than 90 days by notice in writing to CONSULTANT. CONSULTANT shall resume the services on receipt from MONTGOMERY WATSON of a notice of resumption of services. CONSULTANT may be allowed an increase in fee or an extension of time, or both, if CONSULTANT makes an approved claim therefor as provided in Paragraph 8, herein.

7. **TERMINATION**

MONTGOMERY WATSON may terminate this Agreement at any time by giving CONSULTANT written notice thereof. Upon said termination, CONSULTANT will be reimbursed for that portion of the work completed prior to termination.

8. **CHANGES**

MONTGOMERY WATSON, within the general scope of this Agreement may, at any time, by written notice to CONSULTANT, issue additional instructions, require additional services or direct the omission of services covered by this Agreement. In such event, there will be made an equitable adjustment in price and/or time of performance, but any claim for such an adjustment must be made within 30 days of the receipt of said written notice.

9. **NOTICES**

Any notice or order provided for in this Agreement shall be considered as having been given, if mailed by registered mail, postage prepaid to:

MONTGOMERY WATSON

MONTGOMERY WATSON AMERICAS, INC.  
3501 N. Causeway Blvd.  
Suite 400  
Metairie, LA 70002

Attn: Mr. Ernie Upton

or,

CONSULTANT

ADS Environmental Services, Inc.  
10715 Plano Road  
Suite 200  
Dallas, TX 75238

Attn: Mr. Jeff Plymale

10. **COMPLIANCE WITH LAWS**

To the extent applicable hereto, CONSULTANT shall in the performance of this Agreement comply with: The Fair Labor Standards Act of 1939 (29 U.S.C. 201-219); The Walsh-Healey Public Contracts Act (41 U.S.C. 35-45); The Contract Work Hours Standards Act - Overtime Compensation (40 U.S.C. 327-330); Laws restraining the Use of Convict Labor; Utilization of Small Business and Small Disadvantaged Business Concerns (Public Law 95-507); all other federal, state and local laws; and all regulations and orders issued under any applicable law, and the following:

10.1 The Equal Employment Opportunity clause in Section 202 of Executive Order (E.O.) 11246, as amended, and the implementing rules and regulations (41 CFR, Part 60) which are incorporated herein by reference, unless this order is exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of E.O. 11246 or provisions of any superseding Executive Order superseding E.O. 11246. As used in said clause, "Contractor" means "CONSULTANT."

10.2 The Affirmative Action for Handicapped Workers Clause in Title 41, Code of Federal Regulations, Part 60, Subsection 741.4 and the implementing rules and regulations

of the Department of Labor associated therewith which are incorporated herein by reference unless this order is under \$2,500. As used in said clause, "Contractor" means CONSULTANT.

10.3 The Affirmative Action for Disabled Veterans and Veterans of the Vietnam Era Clause of Title 41, Code of Federal Regulations, Part 60, Subsection 250.4 and the implementing rules and regulations of the Department of Labor associated therewith which are incorporated herein by reference unless this order is under \$10,000. As used in said clause, "Contractor" means CONSULTANT and "Contract" means this Agreement.

## 11. INSURANCE

CONSULTANT shall purchase and maintain the insurance required under this paragraph. MONTGOMERY WATSON shall be named as an additional insured in each policy as herein provided, except for Worker's Compensation and Professional Liability insurance. All insurance shall be maintained continuously during the life of the Agreement except for CONSULTANT'S Professional Liability Insurance which shall be continued in force for 3 years after completion of the services furnished under this Agreement or until completion of any construction contemplated by this Agreement. CONSULTANT shall furnish MONTGOMERY WATSON certificates showing the type, amount, class of operations, effective dates and dates of expiration of policies. It is understood and agreed that MONTGOMERY WATSON shall be entitled to notification at least 30 days prior to the expiration of such policies. Failure by the CONSULTANT to maintain insurance coverage as agreed shall be a material breach of this Agreement and will result in termination of this Agreement. The types and amounts of insurance required are as follows:

### 11.1 Workers' Compensation

State:	Statutory
Employer's Liability:	\$100,000

### 11.2 Comprehensive General Liability

Bodily Injury and Property Damage Combined Single Limit	\$1,000,000
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### 11.3 Automobile Liability

Bodily Injury and Property Damage Combined Single Limit	\$1,000,000
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### 11.4 Professional Liability

\$1,000,000

## 12. INDEMNITY AND LIABILITY

CONSULTANT agrees to indemnify, defend, and hold MONTGOMERY WATSON, its directors, officers, agents, and employees, harmless from and against any and all liability, claims, suits, loss, damages, costs, and expenses, including but not limited to, attorney's fees and court costs, including all costs of appeals arising out of or resulting from any negligent acts, errors, or omissions, or willful misconduct of CONSULTANT in the performance of its services and duties hereunder. This indemnification obligation will not be limited in any way by any limitation on the amount or type of insurance carried by



CONSULTANT or by the amount or type of damages, compensation, or benefits payable by or for the CONSULTANT or any lower-tier consultant under Workers' Compensation Acts, Disability Benefit Acts, or other Employee Benefit Acts.

### 13. STANDARDS

All services hereunder shall be performed by employees or agents of CONSULTANT who are experienced and skilled in their profession and in accordance with the standards of workmanship in their professions. CONSULTANT's findings, recommendations and professional advice shall be based on practices and procedures customary in its profession. CONSULTANT asserts it shall provide additional services needed to correct its deficiencies at no additional cost to MONTGOMERY WATSON.

### 14. RECORDS

14.1 MONTGOMERY WATSON, its Client, and, if the services to be performed hereunder relate to a Federal Government Contract, the Comptroller General of the United States and the Department or Agency of the Government having cognizance over said Prime Contract, and any of their duly authorized representatives, shall, until the expiration of 3 years after final payment under this Agreement, have access to and the right to examine any directly pertinent books, documents, papers and records of CONSULTANT involving transactions related to this Agreement.

14.2 CONSULTANT warrants that its accounting books and records are kept on a job cost basis in accordance with generally accepted accounting practices and that its overall accounting system is sufficient to sustain an audit by local, State or Federal Audit Agencies. CONSULTANT agrees that should a local, State or Federal audit disallow CONSULTANT's costs based on inadequate or insufficient records, CONSULTANT will reimburse MONTGOMERY WATSON all such costs disallowed.

### 15. GRATUITIES

CONSULTANT warrants that neither it nor any of its employees, agents or representatives has offered or given any gratuities to MONTGOMERY WATSON'S employees, agents, or representatives with a view toward securing this Agreement or securing favorable treatment with respect thereto.

### 16. ASCE MANUAL

Applicable provisions of American Society of Civil Engineers Manual No. 45, Consulting Engineering - A Guide for the Engagement of Engineering Services latest edition shall apply to all matters not otherwise covered by this Agreement.

### 17. CONTROLLING LAW

This Agreement is to be governed by and interpreted in accordance with the laws of the State of Louisiana.

### 18. SUCCESSORS AND ASSIGNS

This Agreement is to be binding on the heirs, successors, and assignees of the parties hereto but is not to be assigned by either party without first obtaining the written consent of the other.



# ADS SUB-AGREEMENT

## SCHEDULE A

### Scope of Services

#### 1. PROJECT DESCRIPTION

The scope of services to be provided by CONSULTANT (ADS) includes all necessary professional and field services for the following:

Provide field services required for the flow monitoring task for the Sewer System Evaluation and Rehabilitation Program in New Orleans.

#### 2. SERVICES INCLUDED

##### SECTION 1 - PROJECT INITIATION

Section 1 shall include, as a minimum, the following major tasks and sub-tasks:

1. Mobilization of CONSULTANT personnel and attend initial meeting with the Sewerage and Water Board of New Orleans staff to review project intent, deliverables and schedule.
2. Assist MONTGOMERY WATSON in developing and maintaining a public relations program for the duration of this project. Crews must have the experience in working with the public and must present a professional image. Crews will wear orange uniforms or traffic vests at all times when performing the work.
3. Routine informal meetings with MONTGOMERY WATSON Project Manager will be conducted as necessary to provide coordination of the work.

##### SECTION 2 - FLOW MONITORING

Section 2 shall include, as a minimum, the following tasks:

1. *Mobilization* will include the provision of all necessary equipment and resources to the project. The CONSULTANT will establish a local project office for the duration of the project.
2. CONSULTANT will initiate contact with property owners where it is necessary to enter their property for the investigation. Where permission is denied, the CONSULTANT will provide MONTGOMERY WATSON with all necessary information including the area, time and anticipated duration of occupancy so that the Sewerage and Water Board of New Orleans can obtain official right of entry. CONSULTANT shall acknowledge that a delay of up to two weeks may be necessary to obtain entry and shall coordinate the work to avoid delays.

3. *Project Management and Assistance* includes the supervision and coordination of CONSULTANT activities with MONTGOMERY WATSON. An individual will be assigned for the duration of this temporary flow monitoring project to assist in specific activities such as map work, field reconnaissance, hydraulic quality control reviews, locating wet weather overflows, site investigations, field measurements, etc. This individual will assist in the coordination of the various field activities to facilitate satisfactory flow monitoring including the coordination and supervision of all cleaning activities. It is understood that activities requiring a significant volume of work or additional labor forces will be compensated per the unit rate schedule or negotiated under a separate contract if outside the scope of this contract.
4. *Flow Monitoring*: An integral part to this contract is the actual monitoring of flows during dry and wet condition seasons. In association with the installation of approximately seventy (70) gravity flow monitors, twenty (20) rain gauges will also be installed for the continuous data collection of rainfall events during the flow monitoring period. All flow monitoring and rainfall data will be supplied to MONTGOMERY WATSON.
5. *Site Investigations of Monitoring Sites*: After selection of the proposed monitoring locations by MONTGOMERY WATSON, the CONSULTANT will conduct a field review of the potential metering sites to confirm the adequacy of the sites from a hydraulic and engineering standpoint. Any debris or sediment that would influence the determination of wastewater flows will be recommended for removal or another appropriate site will be investigated. An "investigation set" includes a full inspection of the targeted flow monitoring site and the immediate upstream and downstream sites. A hydraulic site report will be completed for each location where a flow monitor is placed. A manhole inspection report will be completed for each manhole inspected.

Manhole inspections will include an internal investigation of the structure including all incoming and outgoing lines. Field inspection crews will complete a manhole inspection form and photographs will be taken to record any specific conditions. The manhole inspection report will include the following information:

- the construction materials and condition of the cover, ring, walls, steps, aprons, troughs, and pipes;
- the physical measurements of the manhole depth and opening size;
- the pipe diameter and rim to invert measurement;
- the number of holes in manhole cover;
- any evidence of inflow/infiltration sources and locations;
- any root growth
- the level of the high water mark in the manhole;
- the type and depth of debris;
- the configuration, orientation and flow direction of all lines entering and exiting the manhole; and
- the ground surface material and any ponding.

The investigation will also include a hydraulic rating which will be used as the basis for determining the acceptable up-time percentage for each individual site.

An "A" rating represents the most optimal hydraulic conditions, while a "C" rating represents the least desirable hydraulic characteristics. The ratings will be based on a set of criteria to be used as indicators to establish the hydraulic ratings. While it is the goal to select monitoring locations that have an "A" rating, the collection system configuration may limit the choice of ideal measuring points. MONTGOMERY WATSON may determine that the information from a specific location may be critical to the collection system characterization and request that locations with less than ideal hydraulic characteristics be monitored. These locations will be at greater risk for up-time during critical wet weather events. The ratings will be used to determine the probability of success to allow the sensors to perform within their performance envelopes and to maintain a positive gravity flow environment during peak wet weather events. Additionally, the goal in selecting sites is to reduce the probability for system surcharge and back-up conditions. The ratings will be based on the following criteria:

- a) Flow depth to pipe diameter ratio (d/D) during peak dry weather conditions - sites with a lower d/D ratio allow more system storage which offers a higher probability for up-time during peak wet weather conditions.
- b) Silt depth to diameter ratio (s/D) - sites with lower silt levels have a higher probability for sensor survival and making available additional system storage capacity for capturing wet weather flow rates.
- c) Proximity to a pump station - undersized or poorly performing pump stations may cause the system to back up or surcharge which adds risk to the survival rate of the sensors and may cause flows to be outside their performance envelopes.
- d) Hydraulic indicators - evidence of surcharge and system configuration such as bends, grade changes, multiple influent lines to a manhole, converging pipes, etc. may affect the repeatability of the depth to discharge relationship.
- e) Flow characteristics - the ideal conditions include uniform, laminar, free-flow conditions with a smooth flow surface. The ratings will be based on the following criteria:

	Good	Fair	Poor
a) d/D	< 0.33	< 0.5	> 0.50
b) s/D	< 0.1	< 0.2	> 0.2
c) Proximity to P/S	> 1000 ft	> 500 ft	< 500 ft
d) Hydraulic Indicators	None	Minor	Major
e) Flow Characteristics	Good	Fair	Poor

"A" Rating - All conditions are good

"B" Rating - Any condition is fair and no conditions are poor

"C" Rating - Any condition is poor

All proposed sites will be approved by MONTGOMERY WATSON prior to meter installation.

6. *Manhole Inspections* will be conducted to investigate additional manholes beyond the "investigation set" or to investigate alternate monitoring locations should the primary choice be unsatisfactory. Manhole inspections may also be used to evaluate anomalies within the system and will be performed only after approval by MONTGOMERY WATSON.
7. *Installation, Operation and Maintenance of Flow Meters:* Each proposed monitoring site will be inspected to determine the hydraulic suitability of the measuring location. Once this has been ascertained the flow monitoring units will be installed. All sensors shall be calibrated and verified at the monitoring site upon installation. Routine maintenance and service will be performed at each monitoring site weekly. Each instrument and its sensors will be inspected to determine they are operating and free of any debris. A formal log of each maintenance check will be recorded and filed. The manhole number (meter location), date, time on meter, and time of manual depth measurement will be recorded on the log. During this phase, maintenance computer forms will be completed each time a site is checked, and kept for the duration of the project. Routine and non-routine maintenance, service records, the formal log and maintenance computer forms shall provided to MONTGOMERY WATSON as part of project analysis deliverables.
8. *Calibration procedures* for the equipment will be performed at least once a week. The distribution of flow velocities within the wetted cross-section will be obtained using the hydraulic profile method. Hydraulic profiling is accomplished by measuring independent point velocities at predetermined coordinates within the wetted cross-section and then integrating them to produce the average velocity. At least two (2) hydraulic profiles will be obtained for each site. Also, at least four (4) independent verifications of the depth of flow and the peak velocity measurement will be performed at various times of the day to capture the full range of flows for each site, i.e., early morning, mid-day, late night, etc.

It is noted that the New Orleans system may contain sites which require fewer calibrations or more calibrations. MONTGOMERY WATSON reserves the right to reduce the number of calibrations at any particular site and to increase calibrations at another in exchange, such that the total combined effort does not exceed the average of 4 calibrations and (2) hydraulic profiles per site. After the initial 2 weeks of data is delivered to MONTGOMERY WATSON, a calibration acceptance list and an alternative priority calibration list will provided to the CONSULTANT. This alternative priority calibration list will be used to target strategically important sites, hydraulically difficult sites, or system imbalances. It is understood that the calibration exercise will be performed during the monitoring period.

Up to 20 calibrations will be performed at certain locations to verify the sensor readings during high depth of flow conditions. These conditions may result from increased flows due to wet weather events or restrictions that may cause the system to back-up. These calibrations will be performed at sites requested by MONTGOMERY WATSON.

9. *Flow Monitoring Period and Equipment:* The flow monitors will be installed and will be maintained for a period of fifty-six (56) days. The monitors will collect data on 5 minute intervals. The basic instruments used to monitor flows will be ADS microprocessor controlled velocity/depth flow meters (Quadrascan). The measurement of velocity will be achieved using the latest version of the digital

Doppler velocity sensors. The measurement of depth will be achieved by multiple ultrasonic and pressure transducer depth sensors. After data is up-loaded to a computer, it will be printed to compare data from the unit to the calibrations performed by the field crews.

10. *Rainfall Event Monitoring:* Adequate rainfall will be necessary to establish the relationship between peak inflow and rainfall intensity. The rainfall event monitoring will be performed simultaneously with the flow monitoring activity. Rainfall data will be collected continuously during significant rain events and totals recorded every 5 minutes. Field personnel will install continuous recording rain gauges capable of measuring to an accuracy of 0.01 inches. Data from the rain gauges will be used to analyze each storm event and establish the hourly intensity of rainfall and storm event duration. The rain gauge locations will be approved by MONTGOMERY WATSON prior to installation. Each rain gauge will also be inspected weekly and coincide with flow meter inspection.
11. *High water level indicators* will be installed to record the depth of flow within specific structures and pipes. The indicators will be maintained throughout the monitoring period. Field crews will collect the information from these sites on a weekly basis or within 48 hours of a significant rain event. Pressure sensors will be used to record the depth of flow within the pipes or height reached in a manhole structure. These locations will be selected by MONTGOMERY WATSON after the first rain event.
12. *Data Management* includes the processing of data and packaging the deliverables for MONTGOMERY WATSON. This includes data editing, data analysis and hydraulic analysis activities using scattergraphs, field calibrations and site balancing routines to validate the data. Data management will also include the consolidation of the data and the provision of regular status reports for the calibration status, data uptime, and deliverables.
13. *Cleaning* of selected monitoring locations may be required to improve poor hydraulic conditions, in order to obtain more reliable and accurate flow information. Recommended lines shall be cleaned to eliminate obstructions or remove excessive debris. Cleaning shall be accomplished by use of high pressure water jet cleaners. Standard cleaning rates are based on three passes of each line segment. Heavy cleaning rates shall be used for lines where three passes must be exceeded. This activity includes the transportation of debris to a storage or disposal facility provided by the Sewerage and Water Board of New Orleans. The water shall be provided by the Sewerage and Water Board of New Orleans. Any line segments recommended for cleaning will be approved by MONTGOMERY WATSON prior to performing the work.
14. *Wet well cleaning* may be required to increase the performance of a pumping station so that the hydraulic conditions are more suitable for accurate flow monitoring. This includes the removal and disposal of debris to a location provided by the Sewerage and Water Board of New Orleans. These activities will be performed with prior authorization from MONTGOMERY WATSON.
15. *Television inspection* activities may be required to further investigate the cause and location of suspected blockages that may hinder the hydraulic performance. Line segments recommended for television inspection shall be approved by MONTGOMERY WATSON prior to performing the work. Video tapes and voice narratives shall be provided for each line segment televised.

16. *By-pass pumping* may be required in the event that system back-up or high flow conditions prevent access to the sites for inspection or cleaning activities. This activity is based on an hourly rate and a charge for each set-up. This activity will be performed with prior approval from MONTGOMERY WATSON.
17. *Up-time* for the flow quantity for each site will be determined on the basis of the hydraulic rating given to the site at investigation. Sites with an "A" rating will have a minimum guaranteed up-time of 90%. Sites with a "B" rating will have a minimum guaranteed up-time of 80%. Sites with a "C" rating have no guarantee for minimum up-time. Should this up-time not be met by CONSULTANT, the monitoring period will be extended at no additional cost to capture the dry or wet weather missing data.
18. *The first data shipment* for the flow data will be after 2 weeks of data has been collected and initial calibrations have been performed. Data will be delivered on a bi-weekly basis, thereafter. The data will be considered preliminary until all of the calibrations have been performed and the sites have been finalized. The final data will be delivered 30 days after the flow monitors have been approved for removal.

19. *Deliverables*

- Preliminary bi-weekly shipments in electronic format (Rain, Velocity, Depth, Qmanning, and Qcontinuity in ASCII and Quadrascan binary format) and hard copy (Rain, Depth, and Velocity time series graph, Depth-Velocity Scattergraphs, Qmanning and Qcontinuity hydrographs with rainfall).
- Periodic status reports as established at the project kick-off meeting
- Final flow data at conclusion of monitoring in electronic format (Rain, Velocity, Depth, Qmanning, and Qcontinuity in ASCII and Quadrascan binary format) and in hard copy (Qmanning, Qcontinuity, and Qfinal hydrographs with rainfall).
- Site reports for monitored manholes
- Manhole inspection reports for all manholes inspected or investigated
- A copy of the ADS Quadrascan software for use by MONTGOMERY WATSON for the duration of this temporary monitoring project.



## SCHEDULE B COMPENSATION

MONTGOMERY WATSON will pay to CONSULTANT as full compensation for the services described in this agreement a maximum fee of \$688,000 for field work and flow monitoring, based upon the unit costs shown below. Payment to CONSULTANT will be based upon the actual number of unit cost items completed.

Description	Quantity	Unit Cost	Total
Mobilization	L.S.	\$14,900.00	\$14,900.00
Project Management and Assistance	430 hrs	\$65.00	\$27,950.00
Site investigations	70 ea.	\$150.00	\$10,500.00
Manhole Inspection	150 ea.	\$60.00	\$9,000.00
Site Installation/Calibration	70 ea.	\$350.00	\$24,500.00
Monitoring Period - 56 days	70 ea.	\$80.00	\$313,600.00
Rain Gauges - 56 days	20 ea.	\$15.00	\$16,800.00
High Water Level Indicators - 56 days	30 ea.	\$20.00	\$33,600.00
Data Management - 56 days	70 ea.	\$7.50	\$29,400.00
Standard Cleaning (6"- 15")	20,000 l.f.	\$1.35	\$27,000.00
Heavy Clean (6"-15")	15,000 l.f.	\$2.75	\$41,250.00
Standard Clean (18"-24")	20,000 l.f.	\$2.75	\$55,000.00
Heavy Clean (18"-24")	15,000 l.f.	\$4.00	\$60,000.00
Wet well cleaning	10 ea.	\$750.00	\$7,500.00
TV inspection	10,000 l.f.	\$1.00	\$10,000.00
By-pass pumping	80 hrs	\$50.00	\$4,000.00
By-pass pumping set-up	20 ea.	\$150.00	\$3,000.00
Total Not to Exceed			\$688,000.00

Upon request by MONTGOMERY WATSON, additional flow monitoring beyond the 56 day or additional flow monitors beyond 70 will be compensated at the rate of \$75.00 per monitor per day.