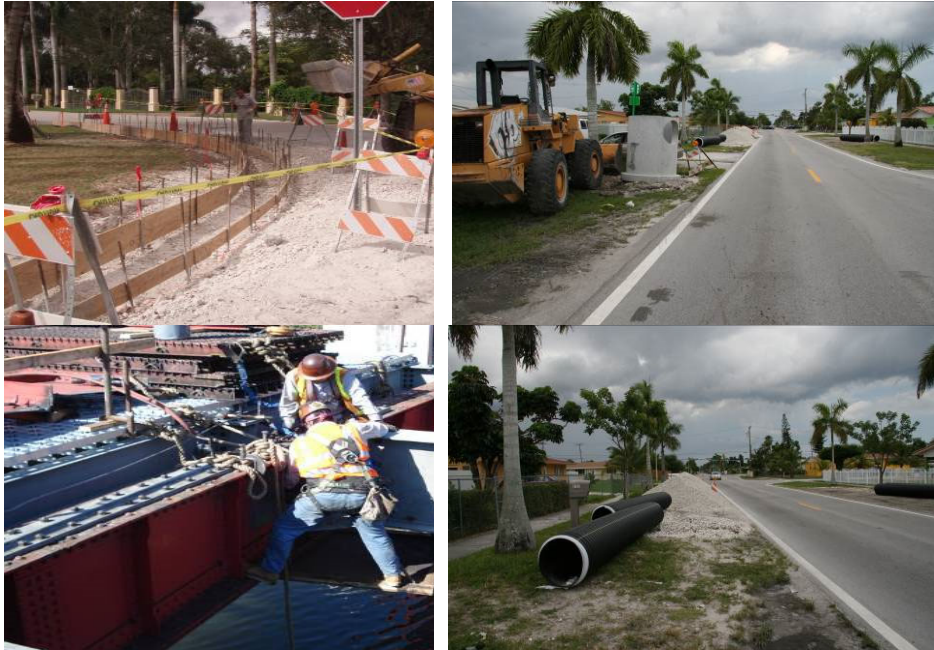


## ELECTRONIC DOCUMENTS DISCLAIMER

1. Electronic copies of the solicitation documents are made available on this website solely for the convenience of prospective bidders (whether as a prime contractor or sub-contractor) on the Project, and are not considered part of the Contract Documents. No representation or warranty is made, either expressed or implied, with regard to the accuracy or suitability of these electronic copies for any purpose whatsoever. In the event of discrepancies or conflicts between the County's originally published document(s) and any other version distributed or submitted by other parties, the County's original hard copy version shall prevail.
2. Miami-Dade County Department of Transportation and Public Works (DTPW) does not track or monitor downloads of Project documents from this website. Therefore, prospective bidders who choose to use this method of distribution shall also be responsible for monitoring the site and downloading any applicable addenda or supplemental information. DTPW will distribute hard copy addenda or supplemental information only to those persons or firms who we have purchased a hard copy of the original solicitation documents.
3. Miami-Dade County shall not be responsible for errors and omissions occurring in the transmission or downloading of any documents or specifications from this website. In the event of any discrepancy between information obtained from this website and the DTPW hard copy solicitation documents and specifications, the terms of the hard copy documents will prevail.
4. Miami-Dade County does not guarantee continuous, uninterrupted or secure access to this or other related websites. Operation of this website may be affected from time to time by numerous factors outside of our control. In the event that we are notified of any problems in a timely manner we will do our best to assist with those problems that fall within our control. For assistance, contact us at 305-375-2930. Solicitation documents are removed from this website as soon as possible after the due date.
5. DTPW does not accept facsimile or electronic bid responses of any kind. All bids must be submitted in writing, on the forms provided by the County, to the address designated in the bid package. It is the bidder's responsibility to ensure that their submittals are received at the designated location, complete and on time. Bids received after the due date will be rejected, even if the solicitation is still appearing on this site.
6. With regards to Miscellaneous Construction Contracts (MCC) 7040 Plan Request for Price Quotations:
  - a. Only bidders included on the Project's Bidders List, provided by the Internal Service Department, Procurement Management Division to the DTPW, can submit a bid.
  - b. Only timely bids received from bidders included in the Project's Bidders List will be considered.
7. These documents shall not be altered in any manner. Utilization or viewing of these electronic documents shall constitute implicit acknowledgement and acceptance of these provisions. Failure to comply with these provisions may result in rejection of your bid.



**Biscayne Shores Pump Station Retrofit  
Nos. 109 & 110 and  
MIC Stormwater Pump Station Trash Rack Repair**

**Volume 2 of 2**

Miami-Dade County

Supplemental Solicitation  
and  
Contract Documents

**Small Business Enterprise-Construction Program (SBE-CONST.):**  
1.43%

**Community Workforce Program:**  
N/A

**DTPW Capital Improvements Engineer:**  
Elva Rosa Reyes

**RPQ Issue Date:**  
December 14, 2023

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## **SECTION 7: SPECIAL PROVISIONS**

## SPECIAL PROVISIONS

# SPECIAL PROVISIONS

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Authorization Agreement for Automatic Deposit

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Technical Specifications

## 1. GENERAL REQUIREMENTS

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### 1.01 MISCELLANEOUS CONSTRUCTION CONTRACTS (MCC) PLAN. GENERAL TERMS AND CONDITIONS AND SPECIAL CONDITIONS

- A. Division 01 (General Requirements) of the DTPW Specifications amends the MCC Plan, and other provisions of the Contract Documents. All requirements of the MCC Plan, Resolution and amendments', or portions thereof, which are not specifically modified, deleted, or superseded by Division 01, remain in full effect. In the event a conflict between these two complementary portions of the Contract Documents occurs, Division 1 will prevail and Engineer will provide clarification and final determination. These Special Provisions also amend, complement, modify or delete items from the DTPW Construction Specifications of these Solicitation and Contract Documents.

### 1.02 SCOPE OF WORK

- A. Work under this Contract includes furnishing of all supervision, labor, materials, tools, equipment and performing all operations required to construct the Work in accordance with the Contract Documents.

Biscayne Shores Pump Station Retrofit No. 109 & 110:

1. The Biscayne Shores 109 and 110 Stormwater Pump Stations are located on NE 109 Street and NE 110 Street along Bayshore Drive. The retrofit project includes upgrades to both pump stations such as a new roof and floor on 110 pump house, new pumps and generators and replacement of the seawalls. Currently, both stations are tethered electrically to each other. The contractor will install all electrical components and supply FPL service to the newly independent station. The Contractor will install all other miscellaneous items as proposed in the contract plans.
2. During the entire duration of construction, the contractor must provide and maintain the pumps necessary to continue the existing emergency pumping capabilities for the drainage system servicing the neighborhood.

MIC (Miami Intermodal Center), Stormwater Pump Station Trash Rack Repair:

1. The MIC Stormwater Pump Station project is located at NW 25th Street and NW 39th Avenue within the roadway median area, in Miami-Dade County. This neighborhood includes mostly commercial and office developments.
2. The proposed improvements will include the retrofit of the existing trash rack at the MIC Stormwater Pump Station, the preparation of the wet well structure as indicated in plans, furnishing and installing the trash rack, aluminum hatch, MOT, mobilization and other miscellaneous items necessary for the complete and satisfactory installation.
3. During the entire duration of construction, the contractor must provide and maintain the pumps necessary to continue the existing emergency pumping capabilities for the drainage system servicing the neighborhood.

- B. If any changes are required due to conflict of design and or field conditions, the Engineer will make the final determination.
- C. Contractor and all subcontractors, under this Contract, are prohibited from performing any work, other than specified in the Contract and/or directed by the Engineer, within the limits of the project site, without prior written notification to the Engineer. This includes any work for private or commercial entities.

### 1.03 LOCATION OF WORK

- A. This is a work order driven contract. The locations of work to be performed under the terms of this Contract have been tentatively listed as follows:
  - 1. South Bayshore Dr. between NE 109 Street and NE 110 Street.
  - 2. At NW 25th Street and NW 39th Ave., Miami Intermodal Center (MIC).
- B. The County may update the sites above subsequent to the Award of this Contract by adding, deleting, or substituting with comparable sites. Work orders will identify the location, description and amount of work to be accomplished. The combined total cost for all work authorized by the Work Order(s) shall not exceed the Contract Award amount.

### 1.04 PLANS

- A. Engineering Drawings titled "Biscayne Shores Pump Station Retrofit No. 109 and 110, Project #20180139, and Repair of Stormwater Pump Station NW 25 ST and NW 39 AVE, Project #20200316", Miami Dade County, Department of Transportation and Public Works, Highway Division, are included with these Contract Documents. Additional standard details are available in the Miami-Dade County Public Works Manual and the latest edition of the Florida Department of Transportation's Design Standards for Design, Construction, Maintenance and Utility Operations on The State Highway System.
- B. The County through its Engineer shall have the right to modify the details and/or sketches, to supplement the sketches with additional plans and/or with additional information as work proceeds; all of which shall be considered as plans accompanying these Specifications herein generally referred to as the "Plans." In case of disagreement between the Plans and Specifications, the Engineer shall make a final determination as to which shall govern.

### 1.05 TIME FOR COMPLETION

- A. This is a Work order driven Contract. The total Contract duration is 410 days. Perform each work order fully, entirely, and in accordance with the Contract Documents within the Contract Time specified in each Work Order. Time commences to run once the first Work Order is issued. Each work order is subject to the requirements of Subarticle 1.06, F, 4, Additional Requirements for work order contracts and Subarticle 1.06 J, Liquidated Damages of the General Requirements (Division 1). And as expanded under Article 1.12, Liquidated Damages, of the Supplementary Conditions.
- B. The effective date of the "Notice to Proceed" will be established during the Preconstruction Conference which is held shortly after the Award of Contract and which is attended by members of



Department of Transportation and Public Works, the Contractor, representatives of utility companies, and others affected by the Work. The effective date shall be set as a date no later than 30 calendar days after the date of execution of the Contract Documents, unless a later date acceptable to both parties is agreed upon in writing.

## 2. GENERAL CONSTRUCTION

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### 2.01 FIELD OFFICE

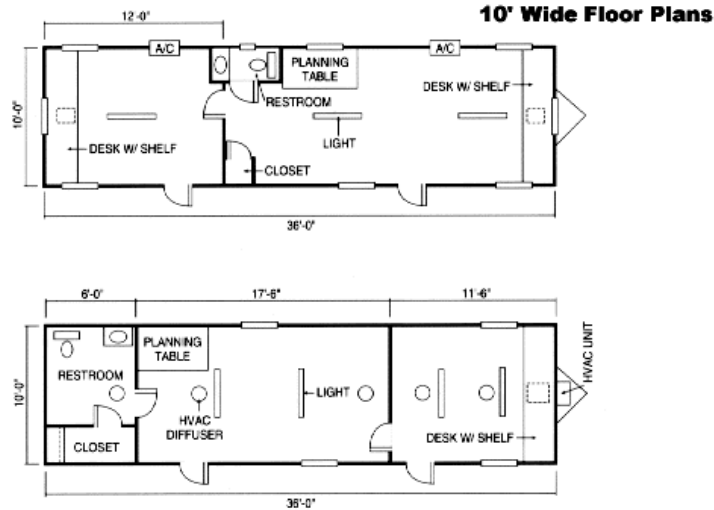
#### A. Description:

1. This section specifies the furnishing, installing, and maintaining of a field office for the exclusive use of the Engineer and Miami-Dade County (MDC) in the administration of the Contract. The aforementioned office shall be separated from, but in close proximity to the Contractor's office. The Contractor shall not use this office or its equipment, in particular the telephone.
2. In the event a mobile office unit cannot be used, the Engineer may direct the Contractor to forgo the aforementioned mobile office unit and instead provide a Field Office located in available commercial space within close proximity to the project site. It shall be the responsibility of the Contractor to identify said availability and to secure the required office space upon the Engineer's written approval. All of the requirements and conditions, set forth herein regarding the Field Office Article, shall remain unless otherwise specifically provided in writing from the Engineer.
3. Contractor will provide a proposed field office layout and location to the Engineer for his review within 5 days of the issuance of the "Notice to Proceed." The location of the field office shall be as directed by the Engineer. The Field Office shall be located within one (1) mile from the project site.
4. Utilities, potable water and telephone connection, use and service charges shall be paid by the Contractor during the term of the contract. Long distance calls, made by MDC personnel, will be the responsibility of MDC. (Telephone calls to Monroe, Broward and Palm Beach Counties will not be considered as long distance).
5. No work shall commence until the Field Office is completely set up. Including electricity, functioning telephone/internet and air conditioning along with the appropriate Certificate of Occupancy. No exception will be made unless specifically authorized by the Engineer.

#### B. Products

##### 1. Field Office

- a. Furnish and install one (1) new, factory manufactured, mobile field office unit not less than 10'X36'. Floor space shall be divided and shall include no less than one restroom and one private office. The private office shall be approximately 120 square feet. The Mobile Unit layout shall be consistent with either of the diagrams below. The private office will be located at an end of the mobile unit.
- b. Layout:



- c. The following items, materials and services shall be included and/or provided:
- 1) The Field Office shall be weather tight and have a structurally sound foundation and superstructure;
  - 2) Exterior walls, floors, and ceilings shall be insulated;
  - 3) Interior walls and ceilings shall be refinished plywood paneling;
  - 4) Interior Floors shall have resilient flooring;
  - 5) Restroom furnishings shall include: Water closet, lavatory with hot and cold water supply, mirror, soap holder, toilet tissue dispenser, and paper towel dispenser;
  - 6) The interior lighting shall not be less than 100 foot candles at desk height except in the restroom. The restroom lighting shall be adequate. Exterior lighting shall be located over each entrance door;
  - 7) Electrical receptacles shall be of the duplex receptacle type, not more than 10 feet from center-to-center, on all interior walls except in the restroom;
  - 8) An electrical water cooler shall be provided with hot and cold taps, bottled water, and a supply of drinking cups and cup disposal as needed by the Engineer and Staff;
  - 9) An electrical refrigerator, with a capacity of no less than 1.7 c.f. and of energy efficient design shall be provided;
  - 10) The Field Office shall include a Hot Water Heater with no less than a 20 gallon capacity;
  - 11) The Field Office shall have a heating and air-conditioning, thermostatically controlled, system capable of maintaining office spaces at an ambient temperature between 68 and 78 degrees Fahrenheit;
  - 12) The exterior doors to the private office and any interconnecting doors between offices shall be fitted with door locks and keyed alike. Three sets of keys shall be provided to the Engineer. Any door between the central space and the restroom shall have privacy locks;
  - 13) The Field Office shall have one telephone with an answering machine. Additionally, provide a dedicated phone line for a fax machine; and one jack for Internet broadband access;

- 14) The private office within the Field Office shall be equipped with Broadband Internet service, no less than 1 GB of speed, including e-mail capabilities for the duration of the Contract;
- 15) Contractor will provide a laptop computer having the following minimum configuration or better:
  - a) Processor - Intel® Core i5-5200U CPU (or equivalent)
  - b) Graphics Processor - Intel HD Graphics 5500 GPU
  - c) Display - 15.4 inch 16:9 format, 1920 x 1080 Pixels, IPS, matte finish
  - d) Storage - 250 GB SSD
  - e) Memory - 8.0 GB RAM
  - f) USB 3.0 Ports (Minimum of 2)
  - g) LAN - Gigabit Ethernet Port
  - h) WLAN - Dual Band Wireless-AC (802.11 a/b/g/n/ac)
  - i) Backlit QWERTY Keyboard
  - j) Operating System - Windows 7 Professional Series (or newer)
  - k) Replaceable Battery (Not Built-in)
  - l) Kensington Lock/Security Locking Cable (Combination Lock)
  - m) Three years Manufacturer's Warranty (parts/labor/on site)
  - n) Carrying case
- 16) Contractor will deliver laptop computer specified above to the County Project Manager no later than 5 days from their receipt of the Notice to Proceed. The Project Manager will submit the laptop to the information Technology Department (ITD) for certification that it meets the minimum specifications set forth herein. The Project Manager will provide a written confirmation to the Contractor upon certification by ITD;
- 17) Contractor will provide one fax machine, of the plain paper type. The Contractor shall supply an adequate supply of ink/toner for the fax machine, as needed by the Engineer;
- 18) Contractor will provide one color printer and scanner to be operational in conjunction with the aforementioned computer. The Contractor to provide adequate supply of ink for the referenced printer, as needed by the Engineer;
- 19) Contractor will provide six Reams (500 count) of standard plain white letter paper to be used with the color printer and the fax machine;
- 20) Contractor will provide all cables, power cords, surge protector and software required to properly connect and operate the computer, printer, scanner and fax machine;
- 21) The fax machine and color printer and scanner may be combined into one unit, as long as it is operational in conjunction with the referenced computer;
- 22) The laptop computer, fax machine, color printer, scanner and all accessories shall remain the property of Miami-Dade County upon completion of the contract. Said equipment shall be delivered to the Department as instructed by the Engineer.
- 23) The Field Office shall have an operational burglar alarm system, maintained and monitored by a qualified monitoring service for the duration of the contract or until such time the Engineer approves its termination. In the event the monitoring service receives an alert from the alarm, the Engineer shall be notified immediately;

- 24) The Field Office shall be equipped and secured with hurricane tie-downs, complying with current Miami-Dade County Ordinances;
- 25) The Field Office shall have ADA compatible steps, landings, and a handicap ramp with handrails. The steps, landings, decks and ramps shall all be constructed utilizing pressure treated lumber and hot dipped galvanized nails and bolts. A sketch design and layout of the aforementioned items shall be provided along with the proposed location and layout described in subarticle B above and will be subject to the approval of the Engineer;
- 26) Furnishings for the Field Office shall be supplied by the Contractor and shall include the following:
  - a) Two desks, having a surface area of 3x5 feet.
  - b) Two desk chair
  - c) One lockable wooden or metal locker of a size suitable for storing field testing and surveying equipment.

#### C. Execution

##### 1. Access and Parking

- a. Field Office shall be located as to provide clear access from public streets including parking spaces for not less than five vehicles immediately adjacent to the field office. Signs shall be posted indicating that these spaces are reserved for the Engineer and/or Miami-Dade County personnel only. The parking area will be graded for drainage and surfaced with gravel, asphalt paving, or concrete paving.

##### 2. Restroom Sewer Connection

- a. Restroom in the Field Office shall be connected to two 700 gallon chemical holding tanks. The holding tanks shall be serviced as often as necessary to prevent accumulation of wastes and unsanitary conditions, but no less than two times per week.

##### 3. Maintenance

- a. Contractor must clean and service the Field Office and parking area three times per week during normal working hours. Cleaning and servicing includes complete janitorial services, soap, paper towels, and toilet tissue. Contractor will made all repairs in a timely manner at no additional compensation.

#### D. Measurement and Payment

##### 1. Measurement

- E. The work under this Section will not be measured separately for payment. No separate payment will be made for the Engineer's Field Office, and it is to be included by the Contractor in prices bid for the various items of the work.

## 2.02 MOBILIZATION (ARTICLE 101)

- A. DTPW Construction Specification, Page 1, Article 101-B.2.b - "Payment will be made under...."; is deleted in its entirety and replaced with the following:

1. No item for "Mobilization" has been provided in the Bid Form of the Proposal; however, the Contractor will be entitled to collect a Mobilization fee of \$500 per Work Order. This amount will be paid from a dedicated allowance established by the County.

#### 2.03 MAINTENANCE OF TRAFFIC (ARTICLE 102)

- A. Delete DTPW Construction Specification, Page 8, Article 102-K.1 and replace it with the following:

1. Method of Measurement.

- a. Work under MOT will be compensated at, but not to exceed, 2 percent of each invoice from an appropriate dedicated allowance. The total compensation under this item shall not exceed 2 percent of the Contract Subtotal Amount. Payment shall be full compensation for all work and costs specified under this Section including furnishing, installing, operating, maintaining and removing all required traffic control devices, signs, warning devices, barriers and other MOT devices or requirements not specifically covered for payment under the MOT items listed below. Such price and payment shall constitute full compensation for furnishing (including hardware, lights and posts if required), installing, relocating, maintaining, and removing of temporary traffic control devices.

#### 2.04 TECHNICAL SPECIFICATIONS

- A. The contractor is responsible to comply with all the requirements and Technical Specifications under Appendix "B" to Special Provisions of the Contract Documents, Volume 2 of 2.

APPENDIX "A" TO SPECIAL PROVISIONS  
AUTHORIZATION AGREEMENT FOR AUTOMATIC DEPOSIT



## ACH AUTHORIZATION AGREEMENT FOR AUTOMATIC DIRECT DEPOSIT OF MIAMI-DADE COUNTY WARRANTS

We hereby authorize the Finance Department to initiate credit entries and, if necessary, a debit entry in order to reverse a credit entry made in error in accordance with NACHA rules.

**Original form** must be received before we can process your request for ACH deposits. Please refer to page 2 for instructions. Processing of the form is approximately 15 days from receipt of completed original form. This authority is to remain in effect until revoked in writing and received by the Finance Department. Account changes must be reported at a minimum **fifteen (15) days prior to actual change**.

### Section 1 (TO BE COMPLETED BY VENDOR) - ALL FIELDS ARE REQUIRED

TRANSACTION TYPE:                  New                           Change                           Terminate

**FEDERAL IDENTIFICATION NUMBER**

--	--	--	--	--	--	--	--	--	--	--	--	--	--

(AS PER CURRENT W-9)

--	--	--

(FOR INTERNAL USE ONLY)

VENDOR NAME : \_\_\_\_\_  
 DBA (DOING BUSINESS AS) : \_\_\_\_\_  
 TELEPHONE NUMBER : \_\_\_\_\_  
 FISCAL OFFICER NAME AND TITLE : \_\_\_\_\_  
 FISCAL OFFICER'S EMAIL : \_\_\_\_\_  
 ACH NOTIFICATION EMAIL: \_\_\_\_\_  
*(This is the email where payment information will be sent)*

**ROUTING NUMBER**

--	--	--	--	--	--	--	--	--	--	--	--	--

--	--	--

(FOR INTERNAL USE ONLY)

**VENDOR'S BANK ACCOUNT NUMBER**

--	--	--	--	--	--	--	--	--	--	--	--	--	--

TYPE OF ACCOUNT                  Checking                                   Savings

AUTHORIZED SIGNATURE \_\_\_\_\_                  DATE : \_\_\_\_\_  
 PRINTED NAME \_\_\_\_\_

**A VOIDED CHECK OR REDACTED COPY OF A BANK STATEMENT FOR THE ACCOUNT LISTED ABOVE MUST BE PROVIDED. PLEASE REFER TO INSTRUCTIONS FOR OUR MAILING ADDRESS. SUBMISSION OF YOUR E-MAIL ADDRESS IS MANDATORY IN ORDER TO PARTICIPATE IN THIS PAYMENT OPTION.**

### Section 2 (TO BE COMPLETED BY FINANCIAL INSTITUTION)

FINANCIAL INSTITUTION NAME: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_  
 BANK OFFICIAL NAME (PRINTED) AND TITLE : \_\_\_\_\_  
 TELEPHONE NUMBER : \_\_\_\_\_                          EMPLOYEE ID NO. : \_\_\_\_\_  
 EMAIL : \_\_\_\_\_

I have verified that the account and routing number provided above is correct and corresponds to vendor noted above.  
 I have also verified that the person signing is an authorized signer on the account specified.

SIGNATURE \_\_\_\_\_                          DATE : \_\_\_\_\_

### Section 3 (TO BE COMPLETED BY MIAMI-DADE FINANCE DEPARTMENT)

Accounts Payable Verifications	Cash Management	Input/Output
Corp. Officer Name : _____ Verified by: _____ A/P Staff: _____	Routing # verified by : _____ Date: _____	ACH Indicator updated by : _____ Date of Update : _____
Corp. Officer Title : _____ Bank Officer: _____ Date: _____ A/P Supervisor: _____ Date: _____	Verified by : _____ Verification Date: _____	Verified by : _____ Verification Date: _____





## ACH AUTHORIZATION AGREEMENT FOR AUTOMATIC DIRECT DEPOSIT OF MIAMI-DADE COUNTY WARRANTS

### INSTRUCTIONS

Please contact us at (305) 375-5111 or email at [FIN-ACHN@miamidade.gov](mailto:FIN-ACHN@miamidade.gov) if you have any questions or need assistance with this form.

You may obtain blank copies of this form at : [http://www.miamidade.gov/finance/library/ach\\_form.pdf](http://www.miamidade.gov/finance/library/ach_form.pdf)

At our Vendor Payment Inquiry (VPI) website you can obtain payment information as well as status of invoices, payment due date and other important information. You can reach the VPI site at :

<https://w85exp.miamidade.gov/VInvoice/login.do>

### Section 1

#### Transaction Type

New : If vendor is currently not on ACH deposits with Miami-Dade County.

Change : If vendor is currently on ACH deposits with Miami-Dade County and would like to make changes to their information ( example : change of financial institution, account number, etc.)

Terminate : If vendor is currently on ACH deposits with Miami-Dade County and would like to switch to either Check or AP Control disbursement type )

**Federal Identification Number** : Enter your Federal Employer Identification Number (FEIN) or Social Security Number (SSN) used to register you as a vendor with Miami-Dade County. Name and FEIN/SS must be exactly as provided on IRS Form W-9.

**Vendor Name** : Enter the name of your business or individual name used to register you as a vendor with Miami-Dade County.

**DBA (Doing Business As)** : If you have registered a DBA for your business or for you as an individual, please enter it here.

**Fiscal Officer Name, Title and E-Mail** : Name of Authorized Corporate officer, Title and E-Mail address to be contacted to. Corporate officer signing this form must be an authorized signatory in the corporate bank account listed on this form.

**ACH Notification E-Mail** : This is the E-Mail address where payment information will be sent to.

### Section 2

This section must be completed in full and legible manner by your banking institution in order to prevent delays in processing change to ACH. Both acknowledgment statements must be checked off by Bank Official signing and dating the form.

### Section 3

This section will be completed by Miami-Dade County Finance Department.

#### ORIGINAL FORM AND VOIDED CHECK OR REDACTED STATEMENT MUST BE MAILED TO :

##### Accounts Payable Manager

**Miami-Dade County Finance Department**

**111 NW First Street, Suite 2620**

**Miami, Florida 33128**

#### Terms and Conditions

Completed form should not contain any changes (scratched off /white out) or altered information; otherwise, form will not be accepted.

Processing time is approximately fifteen (15) days from receipt of complete form and voided check or redacted Bank statement.

Providing account information does not authorize Miami-Dade County to access bank account activity.

ACH deposits can be made into **only** one (1) bank account. Payments can not be split between multiple accounts.

Notification E-mail providing payment information can be sent to one (1) single E-mail address **only**.

Proper verification will be conducted by Miami-Dade County Finance Department Staff, via a telephone call to confirm the information being provided is accurate.

This authorization shall remain in effect until terminated in writing with sufficient notice to Miami-Dade County Finance Department.

Miami-Dade County will not be responsible for any loss that may arise solely by reason of error, mistake or fraud regarding information provided on this ACH Authorization Agreement Form.

APPENDIX "B" TO SPECIAL PROVISIONS  
TECHNICAL SPECIFICATIONS

## TECHNICAL SPECIFICATIONS

SECTION 13630

REMOTE TERMINAL UNITS

## SECTION 13630 – REMOTE TERMINAL UNITS

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. General: Work under this Section is subject to the requirements of the Contract Documents.
- B. This specification covers the technical requirements for the fabrication, installation, engineering, wiring, adjustment, testing, start-up, commissioning, and training for the remote terminal unit (RTU) required for:
  - Miami – Dade County Public Works Telemetry System  
Miami, Florida
- C. The RTU shall be provided complete, including all hardware, system cabling, network cabling, and installation which may be necessary for a complete and working system.
- D. The programming of the RTUs shall be covered under this contract.

#### 1.2 RELATED WORK

- A. Division 13: General Instrumentation and Control
- B. Division 13: Instrument Panel and Enclosure Construction.
- C. Division 16: Grounding
- D. Division 16: Wires and Cables

#### 1.3 QUALITY ASSURANCE

- A. Electrical Component Standards: Components and installation shall comply with the latest edition of NFPA 70, National Electrical Code (NEC).
- B. All work and materials of the remote terminal unit (RTU) systems shall be furnished by Emerson Process Management.
- C. Drawings and specifications shown are intended to convey information required for a complete control system for the purposes specified. The

System Integrator shall be responsible for all details (such as load resistors, surge protectors, signal isolators, interposing relays, etc.), which may be necessary to properly install, adjust, and place in operation a complete and working system.

- D. The System Integrator and the Contractor shall be responsible for all coordination between the RTU systems and the field mounted process equipment and instrumentation.
- E. Installation shall be in strict compliance with the equipment manufacturer's instructions. The System Integrator shall assume full responsibility for additional costs which may result from unauthorized deviation from these specifications and from the equipment manufacturer's instructions.

#### 1.4 SUBMITTALS

- A. Submittals shall comply with the Contract Documents. Shop drawings shall be submitted complete, in a single submittal. Partial submittals will be returned unchecked. Exceptions can only be made with prior approval from the Engineer.
- B. Submit shop drawings in the following sequence:
  - 1. Submit for approval: system hardware configuration block diagrams, equipment cut-sheets, and instruction bulletin for each type used.
- C. After system hardware configuration is reviewed, submit the following:
  - 1. Panel/enclosure shop drawings, which shall include front elevation, internal panel elevation, conduit hole penetrations, and panel bill of material. Each item of panel mounted equipment shall be shown.
  - 2. Panel wiring diagrams, which shall show input/output wiring and terminations, and panel power wiring and terminations.
  - 3. Detailed calculations, including power supply sizing calculation.
  - 4. Other descriptive information that will assist the Engineer with approval of the shop drawings.

5. Submit the RTU system and the operator interface system technical manuals and instruction bulletins, which shall include but not be limited to the following items:
  - a. Complete system overview
  - b. Programming instructions
  - c. Installation and start-up instructions
  - d. Trouble shooting instructions
  - e. Specifications of the various I/O devices
  - f. Specifications of the various programming devices

## 1.5 EQUIPMENT IDENTIFICATION AND TAG NUMBERS

All apparatus, control equipment and instruments, both panel and field mounted, shall be identified by engraved laminated labels. Description on the labels and methods of attachment shall be as approved by the Owner / Engineer during shop drawing approval. Labels shall be in accordance with Division 16 – Electrical Identification.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. RTU System: Emerson Bristol®,
  1. ControlWave-Micro or FB3000 for sites with utility supplied power.
  2. ControlWave-Micro or FB3000 for solar-powered sites
- B. All RTU panels to be manufactured and supplied by Emerson Bristol®.

### 2.2 GENERAL

- A. See Division 13 General Instrumentation and Controls for the Process Control Description.
- B. All input and output modules, racks, power supplies, etc. shall be by one RTU manufacturer.
- C. Racks or housings shall accept any mixture of inputs, outputs, communication cards, etc. as required. Dedicated racks for any I/O type are not acceptable.
- D. All input and output circuits shall be optically isolated from the RTU.

- E. Provide removable terminal strips to allow replacement of modules without disturbing panel wiring. Use wiring harnesses where available for connecting the I/O modules to the interposing relays.
- F. LED indicators shall show status of each I/O to aid in troubleshooting.
- G. Provide power supplies as required to operate and protect all I/O modules, communication cards, processors, remote I/O adapters, etc. as required.
- H. The equipment manufacturer shall provide remote-access and phone support to the Owner for a period of 1 year from the date of system delivery.

### 2.3 OVERVIEW

- A. The controller shall be an industrial-grade, microprocessor-based unit capable of accepting inputs from discrete (single point), analog, and high speed pulse data sources.
- B. The controller shall execute user-entered logic instructions from memory and perform output functions as required by the logic instructions to discrete, analog, parallel, and serial data outputs.
- C. The central processor unit (CPU) shall not require the use of external storage devices (i.e., disk drives) to execute user programs.
- D. The controller shall be fully modular in design and have a pin-and-socket connector for easy field upgrades or card placement.

### 2.4 CENTRAL PROCESSOR UNIT (CPU)

- A. The central processing unit shall be a single printed circuit board assembly utilizing surface mount technology.
- B. The CPU shall plug directly into the I/O base and have integral wiring to the base, power supply, and the local I/O system.
- C. The unit will have indicators on the front bezel that monitor the controller operation, the battery (if required), the status and the CPU's mode of operation.
- D. Shall include integral communication ports: Two(2) Ethernet, two(2) RS232, and two(2) RS485 ports.



## 2.5 MEMORY

- A. The standard user program storage medium shall consist of flash EPROMs. The flash EPROM shall store the RTU program plus all program documentation including symbols and ladder rung comments. All symbols and ladder rung comments must remain resident in the RTU memory.
- B. The CPU and associated memory shall be incorporated into the same printed circuit board assembly.
- C. Under normal operating conditions, the RAM or storage medium shall retain setpoint values for no less than six months in the event of power failure. Under normal operating conditions, the FLAHS or storage medium shall retain a program for 5 years in the event of power failure.
- D. Main program memory size of 4 Mbytes minimum, with word lengths of 32 bits. Unit shall include an additional memory for data storage. The RTU must be able to store the program, plus all symbols and comments for the program.

## 2.6 COMMUNICATIONS

- A. Protocols: RTU shall natively communicate through ModBus, DF1, BSAP, HART, and/or **DNP3** SCADA Telemetry protocols. BSAP and/or DNP3 shall also provide complete access to RTU configuration and diagnostics.
- B. Sampling: RTU shall provide polled, report-on-exception (alarms/events), and report-by-exception (RBE) data-acquisition of SCADA signals.
- C. Media: RTU shall have built-in connections to Ethernet (RJ45), RS232 (D9), and RS485 (D9). RTU shall provide additional ports if needed by application or instrumentation.

## 2.7 PROGRAM EXECUTION

- A. Memory scan time shall be less than 0.1 milliseconds per 1000 Boolean instructions. The entire ladder logic program shall be completed once each scan. Each scan cycle shall allocate time to update all I/O, execute the program, communicate with special function I/O modules and execute specific task request.
- B. The processor shall be equipped with no less than 16,384 internal relay equivalents and shall be capable of employing Master Control Relays to perform program control functions.

- C. The processor shall contain no less than 65,536 variable memory registers, and each register shall be capable of storing 32-bit floating-point decimal values. Variable memory shall be have non-volatile backup.

## 2.8 TIMERS AND COUNTERS

- A. The controller shall have the capability of up to 4096 counters and 4096 timers. Each counter can store 32-bit floating-point values, and each timer shall be capable of storing double-integer values (milliseconds).

## 2.9 INPUTS AND OUTPUTS

- A. The system shall have the capacity to accommodate no less than 96 inputs or outputs in increments of four, eight, or sixteen points within rack limitations. Modules and their rack assemblies shall contain all circuitry for interfacing inputs and outputs to the controller.

- B. The I/O assemblies will provide mounting slots for the processor, power supply and I/O modules. The following standard I/O modules shall be utilized.

1. Discrete Inputs: 24 VDC, 16 point.
2. Discrete Outputs: 24 VDC, 16 point
3. Analog Inputs: 8 channel, isolated, accept 4-20 mA DC or 1-5 VDC input signals. Each channel pair shall be configurable.
4. Analog Outputs: 4 channel, isolated, individually configurable as 4-20 mA DC or 1-5 VDC.

- C. Provide interposing relays for all discrete inputs and outputs. See Div 13 Instrument Panel and Enclosure Construction sub-part Interposing Relays. Provide pre-wired cable assemblies where available for connecting the inputs and outputs to the interposing relays

- D. Provide signal isolation for all analog inputs and outputs. See specification "Instrument Panel and Enclosure Construction" sub-part "Signal Isolation and Protection". Provide pre-wired cable assemblies where available for connecting the inputs and outputs to the isolators

## 2.9 RATINGS

- A. Electrical

1. Input power supplied by a power supply module
2. Input Voltage Requirements: +5 VDC

B. Environmental

1. Operating Temperature: -40°C to 75°C (-40°F to 167 °F)
2. Storage Temperature: -40°C to 85°C (-40°F to 185°F)
3. Relative Humidity: IEC68-2-3; 5-95% non-condensing
4. Vibration: 1g over 10 to 150 — 0.5g over 150 to 200 Hz
5. Noise Immunity: NEMA (ICS-304) and EN 61326-1:2013

2.10 STANDARDS AND REGULATORY AGENCY APPROVALS

A. The CPU and associated racks, power supplies and I/O modules shall have major approvals include:

1. UL Listing
2. CSA Certification

2.11 RELAY LADDER INSTRUCTIONS

A. There shall exist, instructions which will skip any number of ladder logic rungs to a specified rung. There shall also exist, an end program instruction to skip all unprogrammed lines in memory.

B. There shall exist, discrete and motor alarm timer instructions which shall use a feedback loop to confirm control action occurrence. In the event control actions to not occur in the desired time, an alarm bit shall be set.

C. The RTU and its software shall provide all five programming languages standard as referenced by the PLC IEC 61131-3 standard.

D. Ladder logic documentation shall consist of one comment block for each output coil and a synonym for each contact or output coil. The I/O documentation shall display on a case-by-case basis what type module is in each slot and the synonym for each I/O point. All documentation shall be able to be printed out for reference (variable and constant memory documentation, program title), and stored in the RTU memory.

E. Ladder Logic Labeling

1. All inputs shall be labeled with a description that indicates its function when the input is "true", "energized", or "on". For example, "Sump Level GE 12 in." instead of "Sump Low Level". All descriptions shall be expressed in a positive fashion, i.e.,

"Shearpin Limit Switch OK", instead of "Shearpin Limit Switch Not Tripped".

2. Ladder logic contacts and coils shall be labeled in a similar fashion. Modify labels accordingly for normally closed contacts. Example, a normally open contact indicating "Sump Level GE 12 in." should become "Sump Level LT 12 in" for a normally closed contact.

- F. The system logic shall be structured into logical code blocks to facilitate future code revision and troubleshooting.

## 2.12 POWER SUPPLY AND BATTERIES

- A. Input power shall be 10.7 to 30 VDC from power supplies as specified in Division 13, Instrument Panel and Enclosure Construction.
- B. Provide diagnostic indication (LED) and alarm for memory backup battery.
- C. Provide capability for redundant configurations utilizing second or third power supply in critical areas of plant as specified. Provide failure detection.

## 2.13 SOFTWARE

- A. Transfer all software licenses and service to the Engineer

# PART 3 - EXECUTION

## 3.1 SYSTEM INSTALLATION

- A. The Contractor shall provide all materials and work necessary for a complete and functioning RTU system and shall have full coordination responsibility of the electrical, instrumentation and control, variable speed drives, mechanical, and structural work as specified in these specifications and/or shown on the drawings.
- B. The Contractor shall ensure that RTU system work is properly interfaced with equipment and other work not furnished by the system provider.
- C. The Contractor shall install, make final connections to, adjust, test, and start-up the complete RTU system utilizing the technical services of the system provider.

### 3.2 COMMISSIONING

- A. This activity shall consist of two sequential performance tests:
  - 1. Operational test
  - 2. Functional test
- B. The proposed format and documentation of these tests shall be submitted to the Engineer for review and comment prior to commencement of this activity.
- C. Each test shall be witnessed by representatives of the RTU system provider, the Contractor, the Engineer and the Owner.
- D. The objective of the Operational Test shall be to demonstrate that the RTU system is ready for final operation. The system shall be checked for proper installation, adjustment, and calibration on a loop-by-loop basis to verify that it is ready to function as specified.
- E. The objective of the Functional Test is to demonstrate that the RTU systems are operating properly and are in compliance with the specified performance requirement, and that the system is ready for use by the Engineer.

### 3.3 ACCEPTANCE

- A. Upon the successful completion of commissioning and training activities, the RTU system provider may request formal acceptance of the system.
- B. All plans, cd's, documentation, etc. to be given to the Engineer. Obtain receipt for same.
- C. Assist Engineer with transferring licensing of all software.
- D. Back-up and restore all programs and data after system is on-line. Train Engineer in procedure.

### 3.4 SPARE PARTS

- A. Provide the following spare parts.
  - 1. Provide 1 spare input/output cards of each type.
- B. Deliver all spare parts to the Engineer. Obtain receipt for same.

END OF SECTION 13630

SECTION 13660  
RADIO TELEMETRY SYSTEM

## SECTION 13660 - RADIO TELEMETRY SYSTEM

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. This specification section covers the technical requirements for the Radio Telemetry System as described in Division 13, "General Instrumentation and Control", and as shown on the Drawings.
- B. It is the intent of these specifications that all components necessary for a complete and functioning system shall be included. This includes but is not limited to the following: programming of all radios, maintenance software, mounting brackets, grounding systems, 120 VAC power surge suppressors, lighting arresters, poles, directional antennas, 12/24 VDC power supplies, enclosures, etc.
- C. The field radio path survey shall be complete before purchasing of radio and antenna equipment for that site.

#### 1.2 SUBMITTALS

- A. Submittals shall be as specified in the following specification sections:
- B. Division 01: General Requirements
- C. Division 13: General Instrumentation and Control
- D. Submit agenda for all coordination meetings at least one week in advance. Prepare and distribute meeting minutes within two weeks following each coordination meeting.
- E. Submit product brochures and installation guidelines on all radios, antennas, cables, grounding kits, mounting hardware, surge suppressors, diagnostic software, management software, etc.

#### 1.3 QUALITY ASSURANCE

- A. Comply with NFPA 70 "National Electrical Code (NEC)", latest edition, for components and installation.
- B. Listing and Labeling: Provide products specified in this section that are listed and labeled as defined in NEC article #100.
- C. Comply with all Federal Communications Commission (FCC) requirements for a licensed 5-watt data telemetry radio system.

- D. Comply with all Federal Communications Commission (FCC) requirements for an unlicensed 1-watt spread spectrum data telemetry radio system.
- E. The radio manufacturer shall be certified as an ISO 9001 approved facility. A certificate of ISO 9001 registration shall be included with the bid documents.
- F. Company performing installation work shall have a minimum of 2 years' experience in wireless communications for SCADA systems.

#### 1.4 DEFINITIONS

- A. Bridge: A device for connecting different types of physical media networks, i.e. coaxial cable to twisted pair cable. Protocols are the same on both networks.
- B. Router: A managed Ethernet type switch that isolates traffic from one network to another. It provides network address translation (NAT) and may serve as firewall.
- C. Master / Access Point (AP): The transceiver in the network that provides synchronization information to one or more remote units.
- D. Latency: The delay expressed in milliseconds between when data is received at the input port of one radio and it appears at the output port of another radio.
- E. Slave / Remote: A transceiver in a network that communicates with an associated AP or master radio.

#### 1.5 GUARANTEE

- A. The radio vendor shall guarantee in writing that if it is contracted to plan, design, and deploy the wireless network: The radio network shall meet or exceed all promised levels of performance and functionality including accurate, complete coverage, signal strength, and data throughput.

#### 1.6 SERVICES PROVIDED BY OWNER

- A. Person designated as Engineer liaison. This person shall serve as the point of contact for the contractor and vendors.
- B. Copy of On-Site Radio Survey that includes the latitude and longitude in decimal format for all master, repeater and remote locations.
- C. Assistance in identifying other facilities, buildings, poles, etc. that can be used as master / repeater locations.



- D. Soils report prepared by a local testing firm.

## PART 2 - PRODUCTS

### 2.1 FIELD RADIO SURVEY

- A. The field radio survey will be provided.

### 2.2 MANUFACTURERS

- A. The radio manufacturer must be certified as an ISO 9001 approved facility. A certificate of ISO 9001 registration must be included with the bid documents.
- B. Radio Equipment
  - 1. Microwave Data Systems (MDS), #9710A
  - 2. No substitutions will be allowed.
- C. Antennas
  - 1. MDS Clearwave
  - 2. Dataradio
  - 3. Maxrad
  - 4. Andrew
  - 5. PCTEL
  - 6. Or approved equal
- D. Cables
  - 1. Andrew Company, Heliex types FSJ and VXL
  - 2. Times Microwave Systems, type LMR-400, LMR-600, LMR-1200
- E. Antenna Cable Surge Arrestors
  - 1. Polyphaser
  - 2. Phoenix Contact type CoaxTRAB
  - 3. Or approved equal

### 2.3 LICENSED LOW SPEED DATA RADIOS

- A. General
  - 1. Integrated wireless modem hardware shall be supplied which complies with applicable Federal Communications Commission (FCC) or National Telecommunications and Information Administration (NTIA) requirements for FCC Part 15. The radio

and the modem must be packaged together and internally interfaced with each other.

2. Wireless modems shall operate within the 800 to 960 MHz frequency band.
3. On-line, non-intrusive RF network diagnostic monitoring shall be provided as a standard feature in the system architecture.
4. Wireless modem hardware of a 'packetized' design may not be used. Units shall be data transparent to allow for a minimum amount of data transmission latency, and to limit data transmission overhead thus to allowing the wireless modem to obtain the data rates specified.
5. The wireless modem hardware must be protocol transparent and independent. It must support 7 or 8 data bits, 1 or 2 stop bits, even, odd, or no parity in any combination. Communication port speeds shall be 9600 bps.
6. Units shall operate in a Master / Remote configuration.
7. Front panel mounted LED indicators shall be available for status monitoring. RUN/POWER, CS/SYN, RX/TX, AND RD/TD.
8. Separate data ports must be provided for both application data and for on-line, non-intrusive diagnostic monitoring.
9. Field configurable as 'Master' or 'Remote'.

#### B. Physical / Environmental

1. Shall operate on 10 to 16 VDC nominal
2. Operating temperature range: -30<sup>o</sup> C to +60<sup>o</sup> C.
3. Rated for Class 1 Division 2 environments
4. Humidity: Less than 95% non-condensing
5. Standard

#### C. Transmitters

1. RF output power of at least 5 watt (30 dBm) and must be adjustable down to 0.1 watt (20 dBm) and any level in between in 0.5 dB increments.
2. Frequency Stability: 1.5 ppm between -30 to +60 Celsius
3. RTS-CTS Delay for RTS Mode: 0 to 255 ms.
4. RF Output Impedance: 50 ohms.

#### D. Receivers

1. Type: Dual conversion, superheterodyne
2. Sensitivity (at antenna input port): -110 dBm with  $1 \times 10^{-6}$  BER
3. Conducted Spurious: Per FCC Part 15
4. Frequency Stability: 1.5 ppm from -30 to +60 Celsius.
5. RF Input Impedance: 50 ohms.

E. Diagnostics

1. The wireless modem shall be capable of passing both on-line, non-intrusive system diagnostic capability, as well as off-line diagnostic capability with loop-back testing.
2. On-line diagnostics shall originate at each remote site and will be compiled at the master station. Each remote site with each transmission of data generates diagnostics.
3. Diagnostics shall support an OPC driver and deliver data in an I/O tagged format.
4. Diagnostics reported to the central polling location shall include the following parameters:
  - a. A unique ID number.
  - b. Receive signal strength in dBm for local and remote units.
  - c. Temperature.
  - d. Power supply voltage.
  - e. Forward and reflected RF power.
  - f. A receive quality based on the last 15 data blocks received. This information must be communicated seamlessly over the air with RTU data, during the polling cycle.
5. Off-line intrusive diagnostics must also be supported that provide for the active and immediate querying of remote units, independent of the system polling cycle.
6. Off-line diagnostics must provide the following additional functionality:
  - a. Retrieving statistics of operation from any particular remote site.
  - b. Sampling of the last 10 stations heard in the network by the remote unit.
  - c. Cause the remote unit to send a 'fox' type message over the air.
7. The following off-line diagnostic parameters must be made available over the air, from a remote unit(s):
  - a. Remote transmitter B+ voltage.
  - b. Analog supply voltage.
  - c. Transmitter and receiver voltages.
  - d. Temperature.
  - e. Forward and reflected RF power.
8. Diagnostic data must be digital in nature and may not use DTMF (Dual Tone Modulated Frequency) encoding for reasons of

- security, for the off-line diagnostic capability can disrupt wireless data network operations.
9. The equipment vendor must supply off-line diagnostic software as is available from the wireless modem manufacturer.
  10. Support for on-line diagnostics must be written into and supported as an integral function of the system control/polling software.
    - a. The wireless system control software must provide alarm capability. Alarms are to be issued on the control system CRT when unusual RF network diagnostic values are received at the control point.
    - b. The wireless system control software must log diagnostic data to hard disk for later review. Diagnostic data from at least the previous fourteen days must be retained on computer hard disk.
    - c. A catalog of diagnostic data, which reflects system start-up values, must be retained for later review.
    - d. Diagnostic parameters must be examined weekly by the control software to detect any significant system operational trends.
  11. Diagnostics shall include the capability to acquire spectrum usage analysis from both the local unit and a specified or series of specified remote units. This spectrum analysis information shall be a part of the programming software. The tool shall reflect the Received Signal Strength Indication (RSSI) in dBm, the channel associated with the RSSI indication, and a dynamically placed noise floor indication based on a user selected dBm indication. Information will be available as a dynamic graphic presentation.
  12. The programming software shall have the capability to display the number of synchronization counts on a per-band/per-channel basis. This information shall be accessible from both the local unit and a specified remote unit (or remotes). All information shall be available as a dynamic graphic presentation.
  13. **Master-Station Radio shall provide Terminal-Server connections to SCADA Server. This connection will provide:**
    - a. **Redundant encapsulated serial transmissions through two Ethernet connections to the SCADA Server.**
    - b. **Radio Diagnostics using the GE-MDS PulseNET management software running in the SCADA Server.**

## 2.4 CABLES

- A. Cables shall be installed in strict accordance with manufacturer's recommendations and industry practices. Cables shall be supported every 10 feet maximum.

- B. Antenna cables shall be low loss foam filled type. Cable loss shall not exceed 2 dB for the length installed. Cables shall have 900 MHz attenuation not exceeding the following:
  - 1. 4.0 dB per 100 feet for distances up to 50 feet.
  - 2. 2.0 dB per 100 feet for distances between 50 and 100 feet
  - 3. 1.0 dB per 100 feet for distances greater than 100 feet.
- C. Antenna cable shall only be cut with the special cutting tool recommended by the cable manufacturer. After installation, each antenna cable shall be tested with a Time Domain Reflectometer. There shall be no reflections other than from the cable ends.
- D. At all points where a cable enters/exits a conduit and is exposed to the weather, the entry shall be shaped and positioned so as to minimize the danger of water intrusion. Any unused entry space shall be filled to further prevent any water from following the cables into the conduit.
- E. Antenna cables shall be outdoor type 50 ohm Heliax type as manufactured by Andrew Company, (types FSJ4 or VXL), Times Microwave LMR-400-DB, or equal. All connectors shall be by the same manufacturer as the cable.
- F. All connectors shall be corrosion resistant, designed for outdoor installations. Provide “O” ring seals on all connections.
- G. Provide heat shrink type covers or similar to seal all outdoor connectors against moisture and corrosion.

## 2.5 ANTENNAS

- A. REMOTE SITES
  - 1. Frequency Range: 902-928 MHz
  - 2. Gain: 6 dB minimum to 15 dB maximum
  - 3. Lightning Protection: Direct ground protection.
  - 4. Front-to-Back Ratio: 20 dB, minimum.
  - 5. Connector: Flexible extension TNC with neoprene housing to appropriate connector type of antenna cable. Nominal cable length of 72” for radios.
  - 6. Mounting Hardware: Heavy duty weatherproof clamp suitable for direct mount to 2 inch pipe, or as required..
  - 7. Antenna Hardware Kits: All the aforementioned items should be supplied from the equipment provider in a complete, easy to use kit that provides all the necessary items to properly connect the wireless modem to the antenna.

- B. Units shall include gold anodized aluminum radiator components, gold plated connector, solid aluminum mounting clamp, and stainless steel hardware.
- C. Antennas shall be factory tuned to the radio frequencies being used. Coordinate with radio manufacturer for tuning to the frequencies being used for this project. Verify before ordering.
- D. Provide all masts, lightning suppressors, and any other apparatus required to assemble a complete, operable, and reliable fixed wireless data system.

## 2.6 SOFTWARE

- A. Provide three (3) copies of radio management software. Software shall include three (3) years of product support and upgrades. Software shall be MDS NETview MS.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. All radios, antennas, cables, etc. shall be installed in strict accordance with the manufacturer's instructions.
- B. All units shall be programmed with all necessary information for proper operation.

### 3.2 GROUNDING

Provide grounding for all systems as shown on the Drawings and as recommended by the radio systems vendor.

### 3.3 OPERATIONS

- A. Install all antennas, cables, and other equipment as required for a complete system. Place system into operation and tune for optimum operation.
- B. Document radio paths showing data throughput, dB losses, fade margins, etc.
- C. Instruct Owner in basic operations and troubleshooting of the system.

### 3.4 FINAL REPORT

- A. Submit final report of radio system design. This shall include the following:

1. Site listing with GPS coordinates and elevations. Include street addresses where available.
  2. Station radio numbers
  3. System block diagram showing signal routing,
  4. Antenna details: type, mounting arrangement, heights, gain, aiming, etc.
  5. Serial numbers of all radio equipment
  6. Radiated power at all sites
  7. RSSI, BER data, and other signal parameters.
- B. Take a minimum of ten (10) digital photographs of each site after all work is complete. Pictures shall show new and old equipment, general area, access, locations of the new panels and antenna supports, etc. Organize by putting each site into a folder with site name, e.g. Arch Creek Estates 1. At end of project provide two copies of all pictures on CD-ROM or DVD. These are to serve as the post-construction references.

END OF SECTION 13660

SECTION 13661

RADIO TELEMETRY SYSTEM FIELD TESTING



## SECTION 13661 - RADIO TELEMETRY SYSTEM **FIELD TESTING**

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Field testing requirements for the Telemetry System.
- B. Items specified in this section shall conform to general requirements of Division 13, General Instrumentation and Controls.

#### 1.2 SUBMITTALS

- A. In addition to submittal requirements of Division 13, General Instrumentation and Controls, provide completed test documentation and sign-off sheets and punch list forms.
- B. Submit documentation in accordance with Division 13, General Instrumentation and Controls.

### PART 2 - PRODUCTS

(NOT USED)

### PART 3 - PREPARATION

#### 3.1 FIELD TESTING AND DEMONSTRATIONS

- A. General
  - 1. Field testing is intended to check installation of the Telemetry System in addition to provide a diagnostic check of associated field equipment and wiring.
  - 2. Install RTU programming and provide any configuration required to establish communications with the Master-Station Radio in the SPCC Building, 111 NW 1st Street, Miami, FL.
  - 3. Testing shall begin after Remote Terminal Panel (RTU) is installed and all terminations are complete.
- B. Operational Acceptance Test
  - 1. The objective of these tests is to demonstrate that the Telemetry System is ready for operation.
  - 2. The Telemetry System shall be checked for proper installation, adjustment, and calibration on a loop-by-loop basis to verify that it is ready to function as specified.

3. Run hardware diagnostics.
4. Testing of all input and output (I/O) signals by activation or injection of signal at field device.
5. Discrete input signals:
  - a. For all equipment RUNNING signals, test by on - off operation of equipment. If operation of equipment is deemed inadvisable by Owner or System Integrator due to potential process upset, inaccessibility of generating device, hazard to personnel, or other factors, test by jumpering of motor starter auxiliary contact or other source of run signal.
  - b. For all alarm or status signals, test by activation of device generating alarm or status signal. If generation of signal is deemed inadvisable by Owner or System Integrator due to potential process upset, inaccessibility of generating device, hazard to personnel, or other factors, test by jumpering of contact at nearest accessible location to generating device.
  - c. For signals designated as spare, test by jumpering of signal at RTU panel field termination point.
  - d. Demonstrate change of state in local RTU data table.
  - e. Demonstrate change of state at “Master” site.
6. Analog input signals:
  - a. Verify impedance capabilities of transmitting device has not been exceeded by installation of the RTU.
  - b. Disconnect transmitting device and inject 4, 12, and 20 mA D.C. signals into loop.
  - c. Demonstrate proper response to various signals in RTU data table.
  - d. Demonstrate proper response to various signals at “Master” site for that area.
  - e. For signals designated as spare, test by injection of signal at RTU panel field termination point.
7. Discrete output signals:
  - a. Manipulate RTU data table or use forces to test response of all discrete output signals.
  - b. Manipulate signals at “Master” site for that area to force all discrete output signals ON and OFF.
  - c. Verify proper response of other devices in loop to signals.
  - d. For signals designated as spare, test by checking signal at RTU panel field termination point.

8. Analog output signals:
  - a. Verify impedance capabilities of analog output is not exceeded.
  - b. Generate 4, 12, and 20 mA D.C. signals through RTU data table for all analog outputs at "Master" site for that area.
  - c. Verify proper response of other devices in analog loop to various signals. Verify proper loop current through measurement.
  - d. For signals designated as spare, test by measuring of signal at RTU panel field termination point across a 250 ohm resistor or similar.

C. Documentation

1. Prepare field testing, sign-off document. Document shall include following as a minimum:
2. Project description and number.
3. Company name for System integrator, Owner, and Engineer.
4. Include separate line for each I/O point to be tested.
5. Include area for handwritten notes of any corrections required.

D. Problem field devices or wiring.

1. Provide written documentation of any problems encountered with Owner's field devices or wiring during testing.
2. Correction of such problems are not considered part of this project.

E. Alarm displays shall be tested for all analog and digital alarm points.

F. All historical data collection, trending, computation, totalization and reporting functions shall be checked and tested to confirm proper operation and accuracy of data.

G. Any defects or problems found with the Telemetry System or documentation shall be corrected by Contractor and then retested or resubmitted to demonstrate proper operation.

### 3.2 PROVING DEMONSTRATION

- A. Before substantial completion will be considered for any site, all site system functions, including but not limited to RTU and radio, shall be run and fully operational for a continuous 48 hours period.
- B. Contractor shall notify Engineer before each 48 hours test is conducted and shall document any failure that occurs during the test.

- C. Sites that experience any component failure shall be retested until successful completion. Contractor shall submit documentation of each test.

### 3.3 OPERATION DEMONSTRATION

- A. The Operation Demonstration (OD) shall be defined as all Telemetry System components supplied under this contract, in addition to all components modified or connected to this Telemetry System. The OD is intended to demonstrate the operation of the Telemetry System for each site.
- B. OD shall begin following completion of the field testing and the 48-hour Proving Demonstration.
- C. OD shall continue until a time frame has been achieved wherein the Telemetry System (both hardware and software) availability meets or exceeds 99.7 percent for 30 consecutive days and no system failures have occurred that result in starting the OD over again. During the OD, the Telemetry System shall be available to Owner's operating personnel for use in normal operation of the facilities.
- D. The conditions listed below shall constitute system failures that are considered critical to the operability and maintainability of the system. The OD shall be terminated if one or more of these conditions occur. Following correction of the problem, a new 30 consecutive day OD shall begin.
  - 1. Failure to repair a hardware or software problem within 72 consecutive hours from the time of notification of a system failure.
  - 2. Recurrent type hardware or software problems, if the same type of problem occurs three times or more.
  - 3. Software problem causing a RTU processor to halt execution.
- E. The following conditions shall constitute a system failure in determining the system availability based on the equation specified below.
  - 1. Failure of one or more input/output modules.
  - 2. Failures of any type affecting four or more input/output points simultaneously.
  - 3. Failure of a RTU power supply.
  - 4. The system availability shall be calculated based on the following equation:

$$A = \frac{MTBF}{MTBF + MTTR} \times 100 \text{ percent}$$

A = system availability in percent  
MTBF= mean (average) time interval between consecutive system failures  
MTTR = mean (average) time required to repair system failures

5. Time between failures shall be the period between the time that a reported system failure has been corrected and the time of subsequent notification of the Contractor that another system failure has occurred in terms of operating hours.
  6. Time to repair shall be the period between the time that the Contractor is notified of a system failure and the time that the system has been restored to proper operation in terms of operating hours.
  7. Time to repair shall be the period between the time that the Contractor is notified of a system failure and the time that the system has been restored to proper operation in terms of hours, minus an allowance for the following dead times which shall not be counted as part of the time to repair period.
  8. Actual travel time for service personnel to get to the to the plant site up to a maximum of 6 hours from the time the Contractor is notified of a system failure.
  9. Time for receipt of spare parts to the plant site once requested up to a maximum of 24 hours. No work shall be done on the system while waiting for delivery of spare parts.
  10. Completion of a 30 consecutive day period without any restarts of the OD and with a system availability more than 99.7 percent shall constitute acceptance of the Radio Telemetry System.
- F. All parts and maintenance materials required to repair the system prior to completion of the OD shall be supplied by Contractor at no additional cost to the Owner. If parts are obtained from the required plant spare parts inventory, they shall be replaced to provide a full complement of parts as specified.
- G. An instrumentation and control system Malfunction/Repair Reporting Form shall be completed by Engineer to document failures, to record Contractor notification, arrival and repair times and Contractor repair actions. Format of the form shall be developed and agreed upon prior to the start of the OD.

END OF SECTION 13661

MPI WATERMAN SS250 SLIDE GATES  
SPECIFICATION

**WATERMAN VALVE**

# STAINLESS STEEL SLIDE GATES

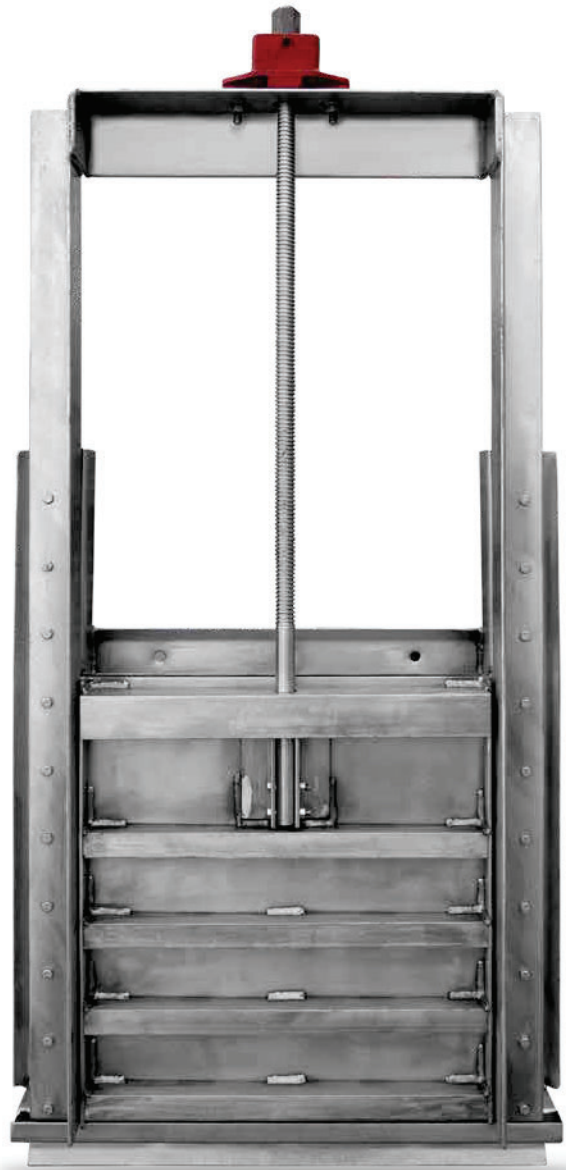
## SS-250 SERIES

AWWA C561 Compliant

NSF 61/372 Compliant

Open Channel, Sluice and  
Weir Configurations

Designed, Manufactured  
and Tested in U.S.A.



**MPI** **MCWANE**  
PLANT & INDUSTRIAL



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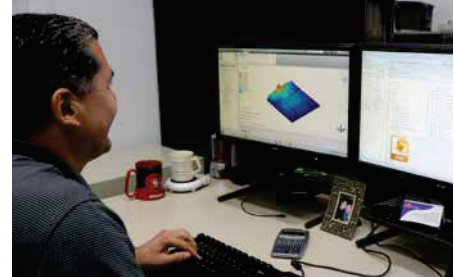
For the latest digital copies of all Waterman specifications and drawings,  
visit our website at [www.WatermanUSA.com](http://www.WatermanUSA.com)



# SS-250 SERIES STAINLESS STEEL FABRICATED SLIDE GATES

## Company Overview:

The experts at Waterman have custom-engineered thousands of flow control gates for projects worldwide. Waterman's team excels at developing innovative custom solutions to project needs. Our commitment to a highly-trained, customer-focused engineering department is unmatched by our competitors. Using computer modeling technology and finite element analysis, Waterman has systematically improved the design and construction of fabricated gates.



## Product Overview:

Best-in-class fabricated water control gates provide reliable performance for water, wastewater and hydropower applications. They are noted for their excellent sealing / leak resistance and for their long service life. Each gate is custom-designed to your project's requirements including seating and unseating heads incorporating safety factors per AWWA standards. SS-250 series gates conform to NSF 61/NSF 372.

## Key Advantages and Performance:

- **Built for longevity and corrosion resistance** high strength 304L stainless steel and low-friction UHMW PE sliding and sealing surfaces lengthen the life of the gate. Optional 316L or 2205 stainless steel for use in unusually corrosive environments.
- **Guardian® seal system** (US Patent #8,820,711) dramatically increases seal life in both top and flush-bottom seals. Reduces leakage at critical corner joints. Offers superior performance to competitors' UHMW J-seal designs. No metal-to-metal contact prevents gate "sticking" and allows reliable open/close even after years of no operation.
- **Best in class leakage performance Guardian®** UHMW PE continually self-adjusting seal system offers leakage rates up superior to the AWWA C561/C562 specification. Waterman will guarantee leakage of no more than 0.05 gpm/ft of seal perimeter in seating head and unseating head conditions including high head service. The sealing system has been tested for 100,000 cycles (4x leading competitor) and continued to outperform the AWWA leakage specification with only negligible wear.

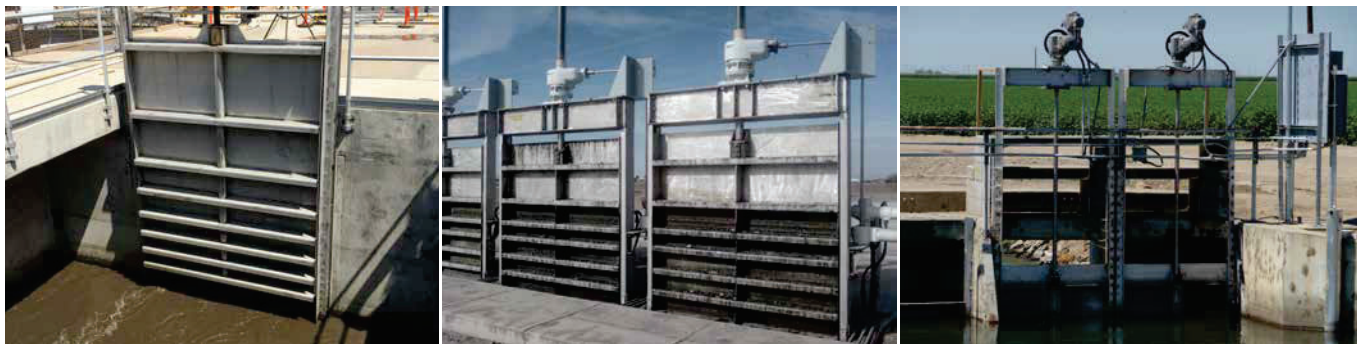


**Options:**

- Models for normal aperture configuration, channel (embedded or surface mounted) as well as weirs (downward opening, often applied for decant and level control)
- SS-250 can be ordered as self-contained gates or with extension stems and separate operators.
- Gate frames can be embedded in channel walls, mounted to a wall with anchor bolts, mounted to a pipe flange or wall thimble. (Waterman offers a complete line of wall thimbles including “F”, “E”, “spigot style” as well as custom configurations.)
- “Q” seal bottom seal for high debris environments.
- Manual, electric or hydraulic actuation.
- Also available: A-250 Series Aluminum Slide Gates

**SS-250 STAINLESS STEEL SLIDE GATE CONFIGURATIONS**

TYPE OF GATE (OPENING)	APERTURE		END OF CHANNEL			IN CHANNEL	
	STANDARD	DOWNWARD OPENING	UPWARD OPENING	DOWNWARD OPENING (WEIR)	NON RESTRICTED FLOW	EMBEDDED GUIDE	WALL MTD. GUIDE
<b>RISING STEM</b>	251	252	253	254	255	256	257
<b>MACHINED FLANGE</b>	251-F	252-F					
<b>CIRCULAR FLANGE</b>	251-CF	252-CF					
<b>FULLY CONTAINED SLIDE IN GUIDE RAIL</b>	251-L	252-L	253-L	254-L	255-L	256-L	257-L
<b>SELF-CONTAINED GATE</b>	251-Y	252-Y	253-Y	254-Y	255-Y	256-Y	257-Y
<b>NRS COVER</b>	251-N	252-N	253-N	254-N	255-N	256-N	257-N
<b>SPECIAL OR MODIFIED APPLICATION</b>	251-X	252-X	253-X	254-X	255-X	256-X	257-X



## FABRICATED STAINLESS STEEL GATES ADDITIONAL INFORMATION

---

### **NSF 61 / NSF 372:**

The SS-250 series water control gates (6" – 120") conform to the requirements of NSF/ANSI 61 Drinking Water System Components – Health Effects and NSF/ANSI 372. They conform with the lead content requirements for "lead free" plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

### **Range of Sizes:**

Waterman offers in-stock gates in standard dimensions for quick delivery and lowest total cost. In addition, we can custom design and manufacture gates in a nearly unlimited range of sizes and configurations.

### **Non-Rising Stem:**

Fabricated gates can be ordered with a non-rising stem for areas with restricted space above the gate operator. The disadvantage of a non-rising stem is the threaded operating nut and stem are always exposed in the gate well. Lubrication of the threads becomes difficult to maintain and can lead to premature wear.

### **Optional Wall Thimbles:**

Waterman can supply wall thimbles for mounting of fabricated gates. A thimble can be requested to ship prior to the gate so that it can be included in concrete forms before the structure is poured. Use of a thimble dramatically reduces the time for installation by eliminating labor of placing and aligning anchor bolts and the potential for misplaced or misaligned anchors. With a properly-installed thimble, the gate can be installed quickly when it arrives on site. See page 19 for a complete range of configurations.

### **Tandem Lifts / Interconnected Actuators:**

For large gates, tandem actuators can be specified. This configuration is often used for gates over 72" width.

### **Actuator Loads for Structures:**

For standard gates that are not self-contained, opening and closing thrusts from the actuator are resisted by the structure. Consult with Waterman's engineering department for appropriate design parameters.

### **Actuators:**

Waterman gates can be supplied with manual, electric or hydraulic actuators.

**Manual actuators** are typically geared "crank type" lifts, although handwheel-type actuators can be applied on small-sized gates with low operating loads. In situations where it will take substantial manual effort / time to open a gate, Waterman can supply electric or gasoline-powered portable operators. Consult with Waterman's engineering department for specifications.

**Electric actuators** provide convenience for frequent opening, faster opening speeds and readily lend themselves to automation.

**Hydraulic cylinders** are frequently used in repetitive cycling applications and where automatic gate opening / closing in the event of a power failure is desired.

# AWWA Fabricated Slide Gate Part Numbering Guide

## PART NUMBER BUILDER

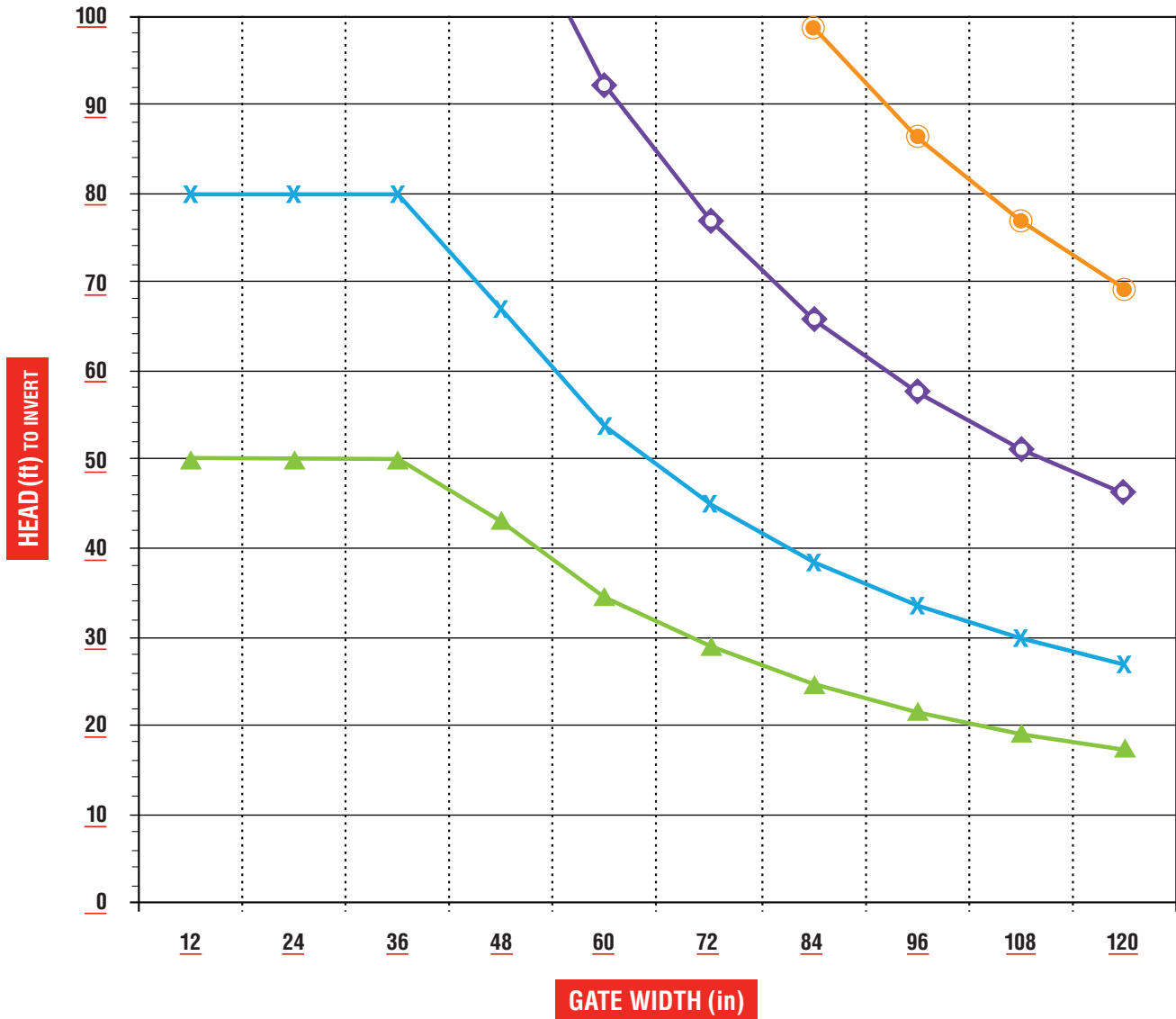
**SS-25      1-      1-      Y-      36 x 42      10**

Material	Opening Configuration Type	Series	Options	Dimensions W x H	Head Rating
<b>A-25</b> = Aluminum <b>SS-25</b> = Stainless Steel	<b>1</b> = Standard <b>2</b> = Downward Opening <b>3</b> = Upward Opening <b>4</b> = Weir <b>5</b> = End of Channel Non Restricted Flow <b>6</b> = Embedded Guide <b>7</b> = Wall Mount	Indicate 1, 1.5, 2, or 3	Indicate <b>F</b> = Flanged <b>CF</b> = Circular Flange Modified ANSI 125# drilling <b>LF</b> = Fully Contained Slide <b>Y</b> = Self Contained Gate <b>N</b> = Non-Rising Stem Cover <b>X</b> = Special or Modified Option <b>Q</b> = Flush Bottom Seal <b>T</b> = Mounted to Wall Thimble	(separate with X), if metric, indicate MM after each number for millimeters	indicate head rating in 5' increment

### SS-251-1-Y-36 x 42-10

Indicates a stainless slide gate, standard series, self-contained, with 36" W x 42" H, rated for 10 feet of head.

## STAINLESS STEEL GATE SERIES HEAD RATINGS FOR CUSTOM SIZES

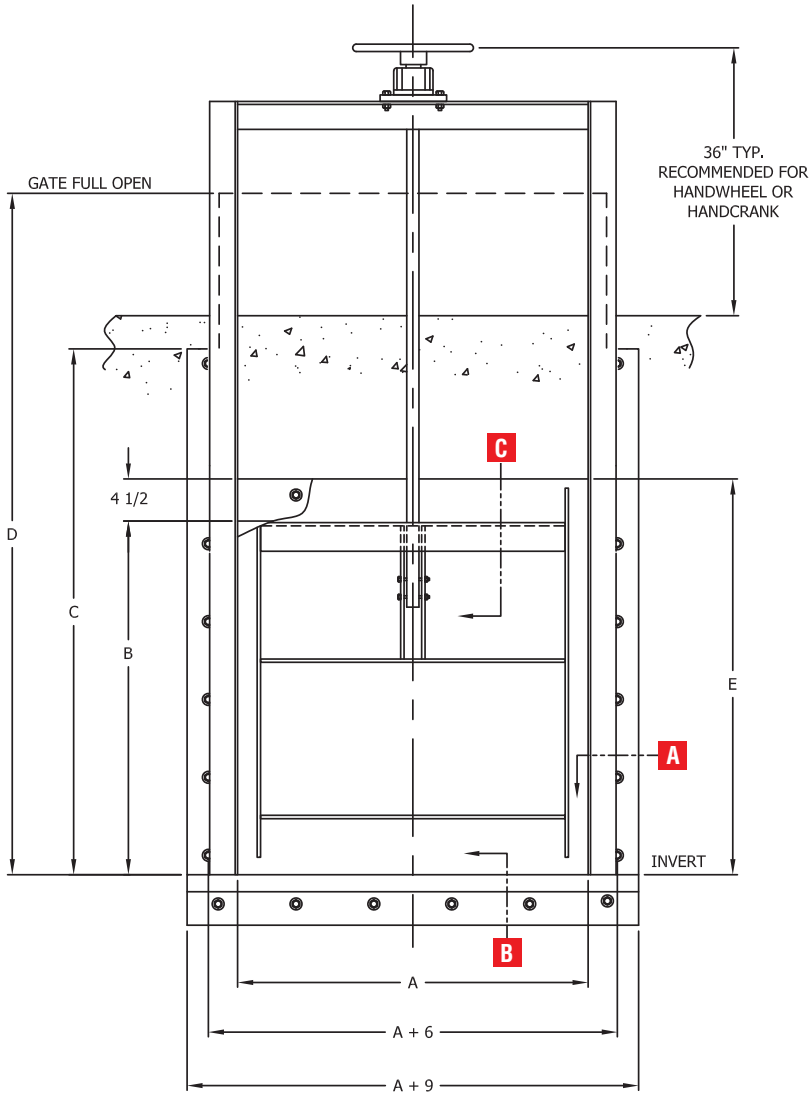


▲ SS-250-1   
 ✕ SS-250-1.5   
 ◇ SS-250-2   
 ● SS-250-3

Drawings shown in this booklet are for 250-1 models only. Request drawings and specs for other models.

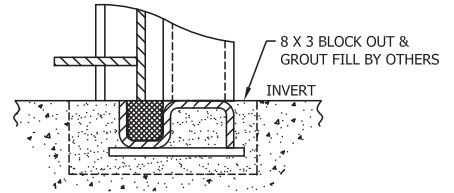
**NOTES:**  
 1) Formula to determine seat pressure:  
 Gate width (in) \* Head (ft) \* .2166

# SS-251-1 SLIDE GATE

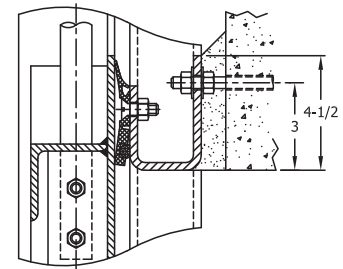


<b>A</b>	Gate Opening Width
<b>B</b>	Gate Opening Height
<b>C</b>	Guide Rail Height = $B + 1/2$ of Slide
<b>D</b>	Gate Full Open = $2B + 4-1/2$
<b>E</b>	Slide Height = $B + 4-1/2$

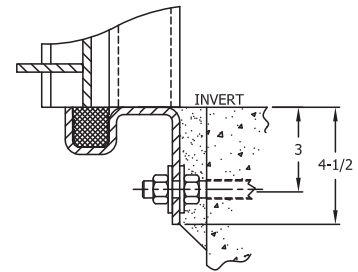
## ALTERNATE "Q" BOTTOM



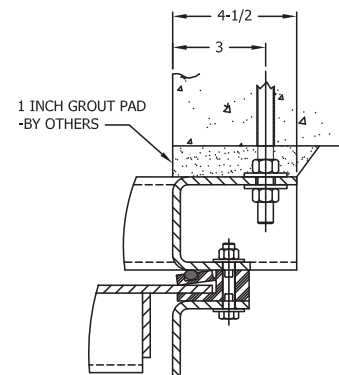
## SECTION C



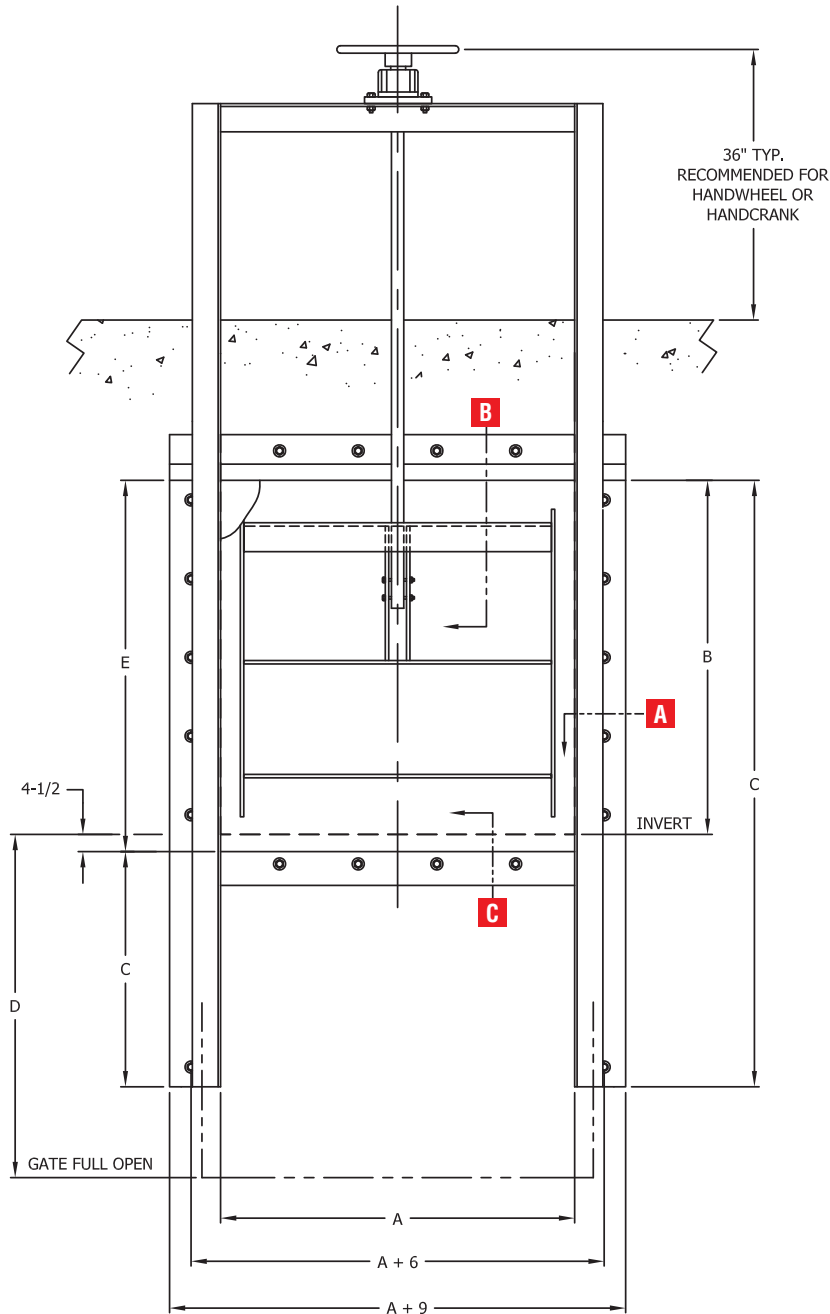
## SECTION B



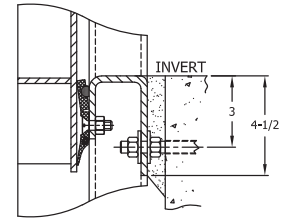
## SECTION A



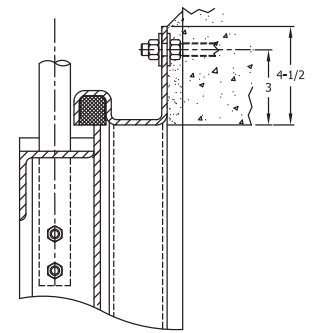
# SS-252-1 SLIDE GATE



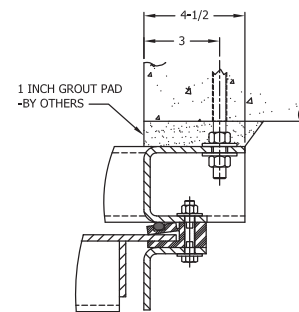
## SECTION C



## SECTION B

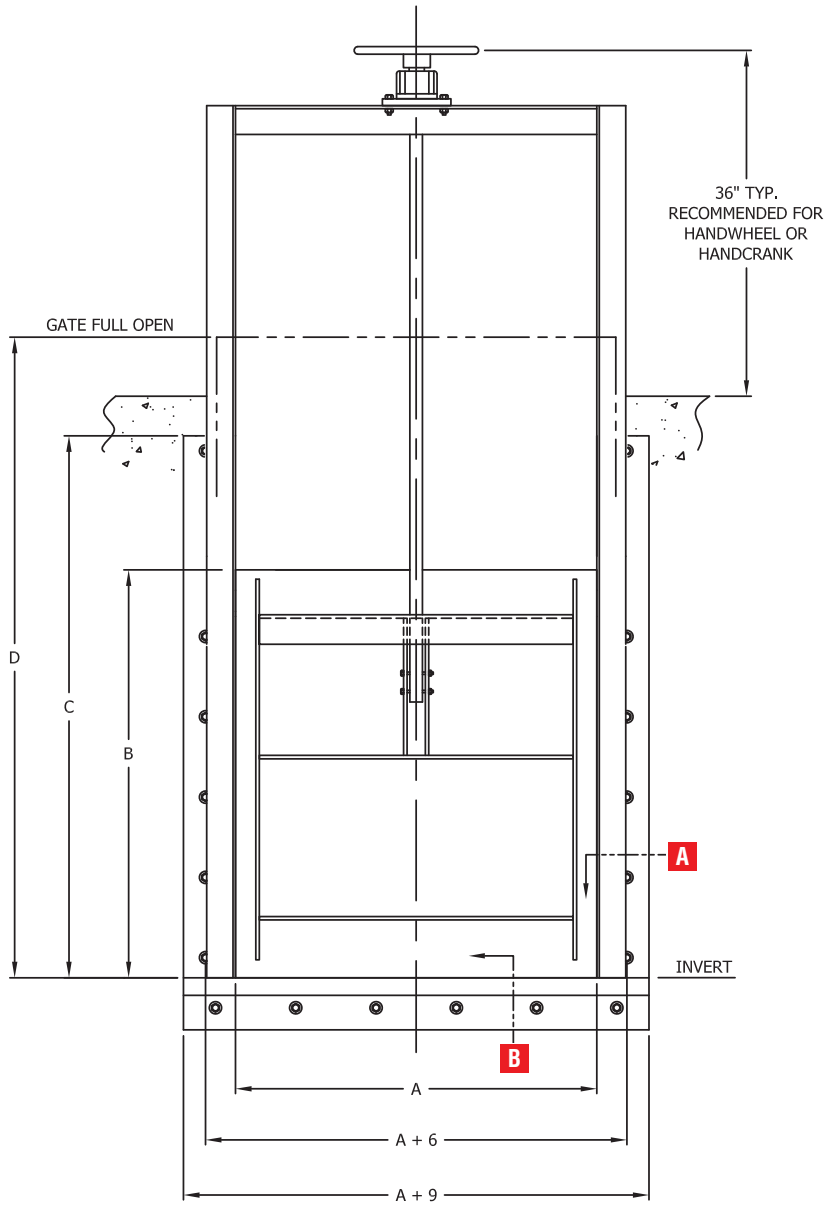


## SECTION A



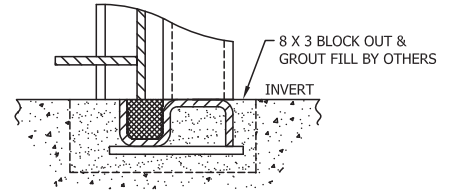
- A** Gate Opening Width
- B** Gate Opening Height
- C** Guide Rail Height =  $B + 1/2$  of Slide
- D** Gate Full Open =  $B + 4-1/2$
- E** Slide Height =  $B + 4-1/2$

# SS-253-1 SLIDE GATE

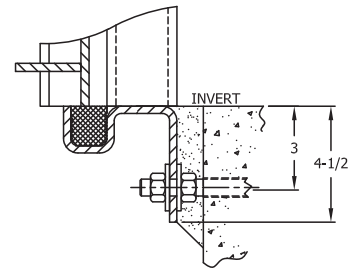


- A** Gate Opening Width
- B** Gate Opening Height
- C** Guide Rail Height =  $B + 1/2$  of Slide
- D** Gate Full Open =  $2B$
- E** Slide Height =  $B$

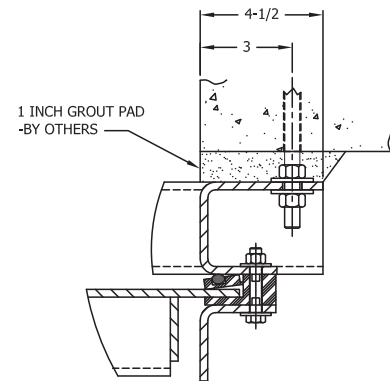
## ALTERNATE "Q" BOTTOM



## SECTION B

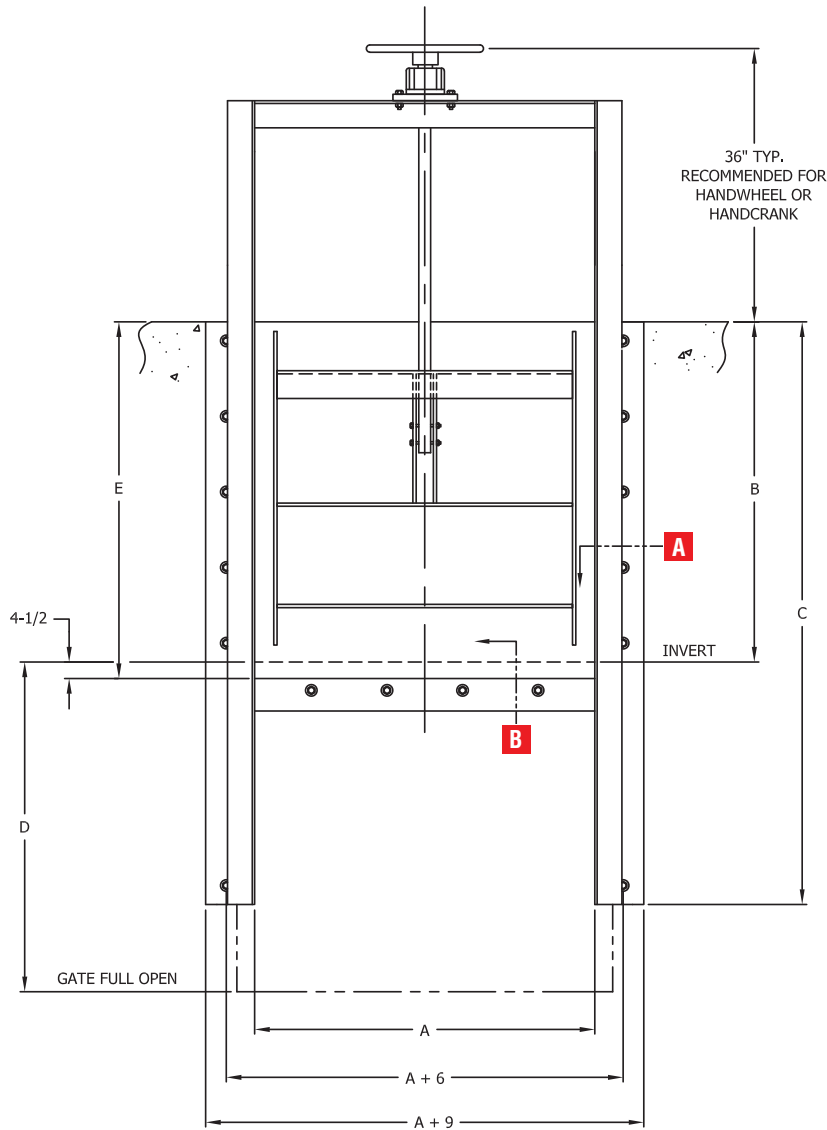


## SECTION A

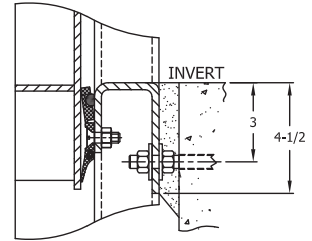




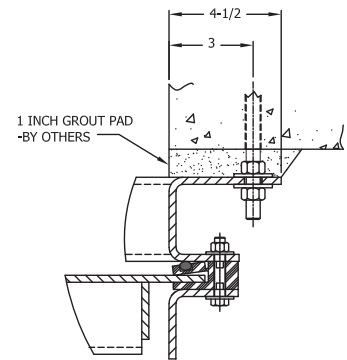
# SS-254-1 SLIDE WEIR GATE



## SECTION B

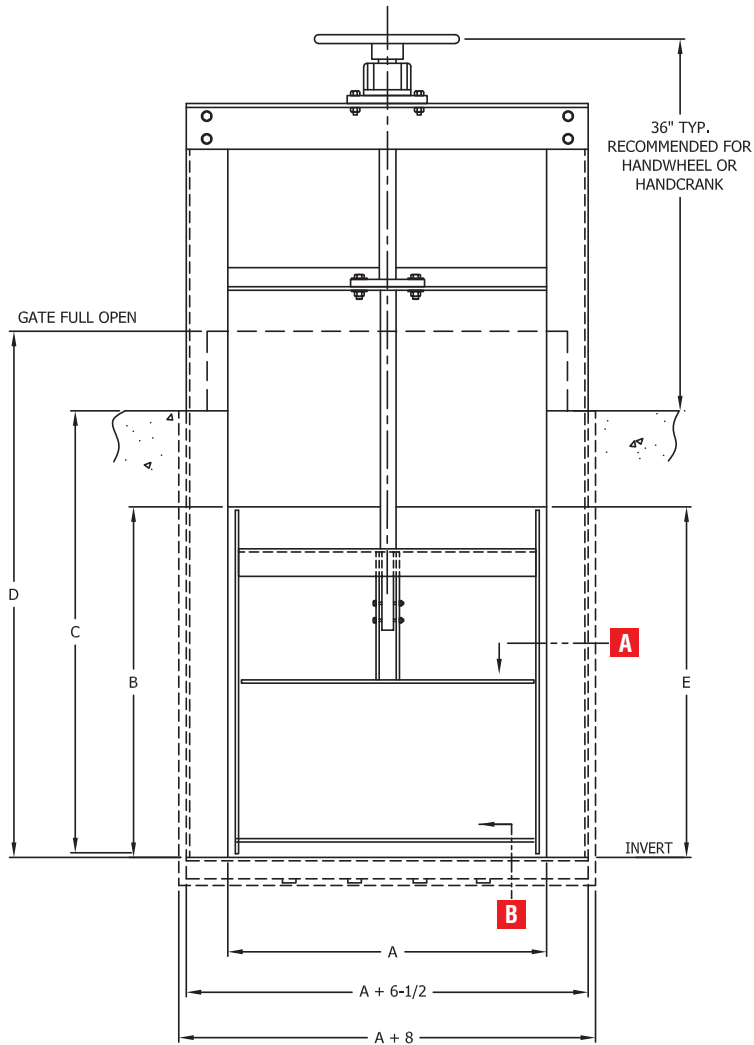


## SECTION A

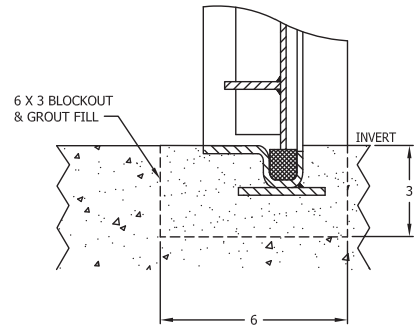


- A** Gate Opening Width
- B** Gate Opening Height
- C** Guide Rail Height =  $B + 1/2$  of Slide
- D** Gate Full Open =  $B + 4-1/2$
- E** Slide Height =  $B + 4-1/2$

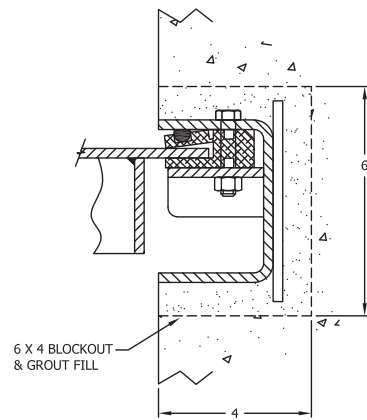
# QSS-256-1 SLIDE GATE



## SECTION B

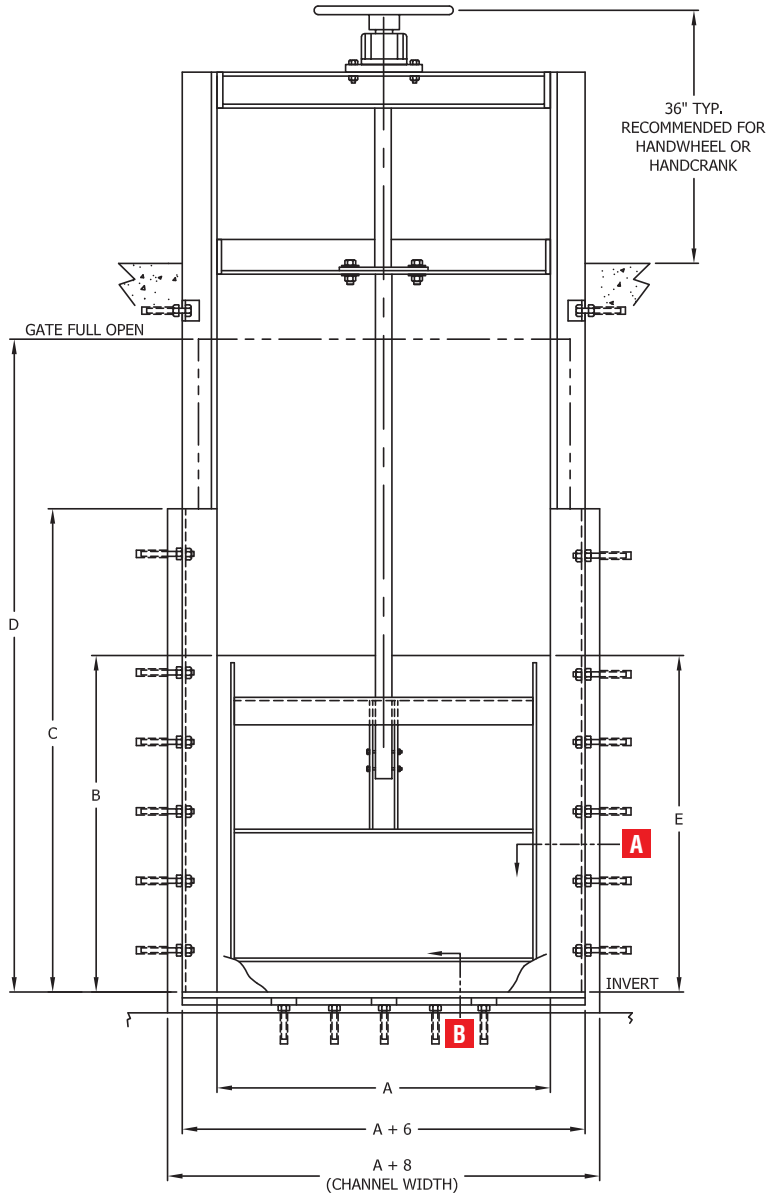


## SECTION A

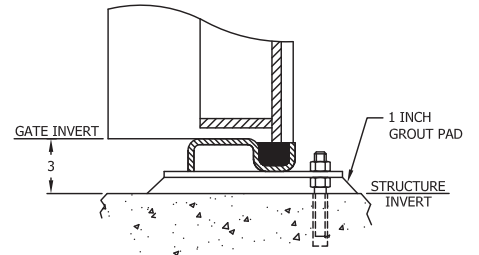


<b>A</b>	Gate Opening Width
<b>B</b>	Gate Opening Height
<b>C</b>	Guide Rail Height = $B + 1/2$ of Slide
<b>D</b>	Gate Full Open = $2B$
<b>E</b>	Slide Height = $B$

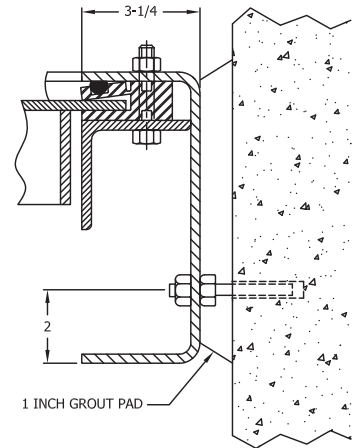
# SS-257-1 SLIDE GATE



## SECTION B



## SECTION A



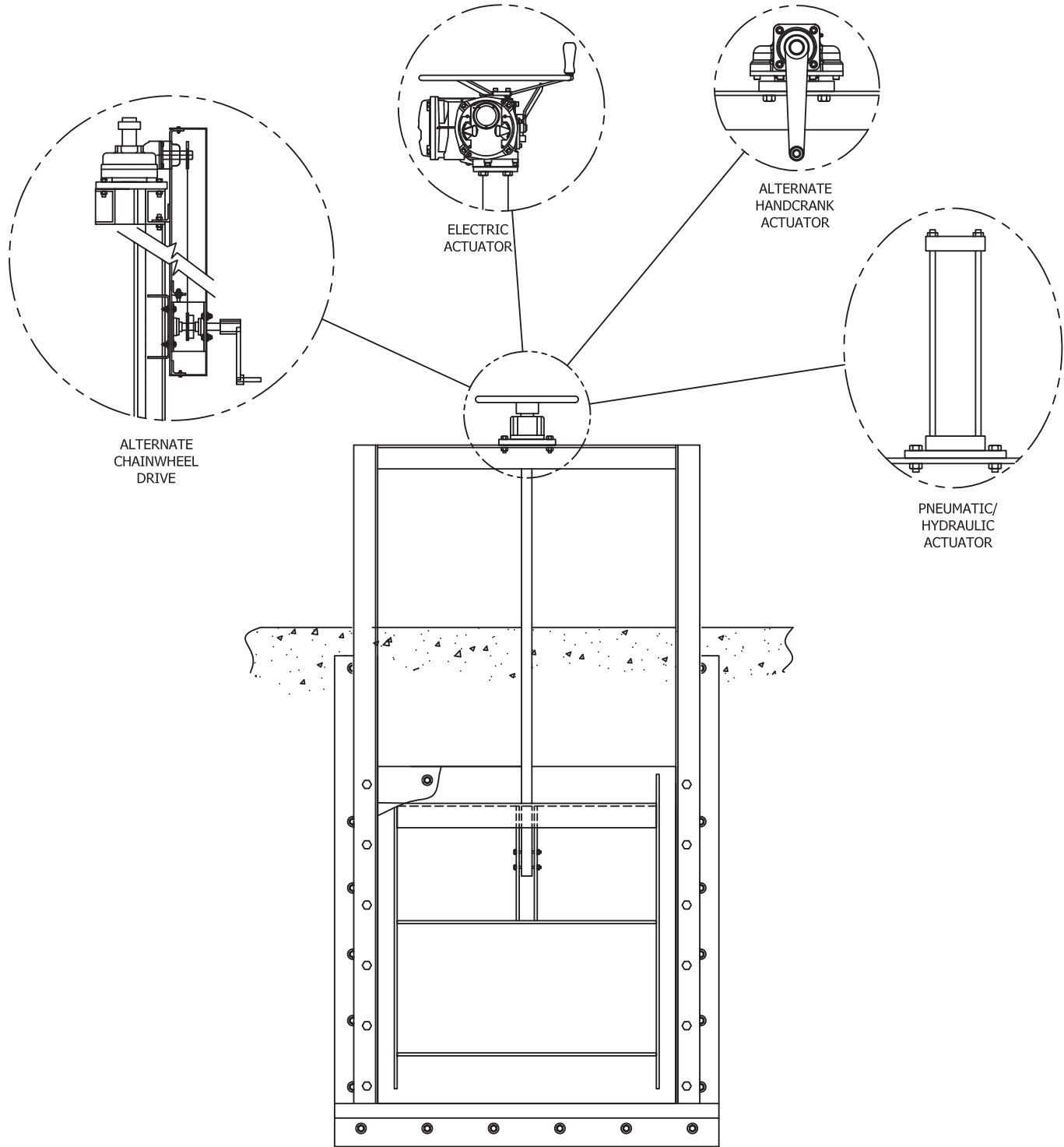
**A** Gate Opening Width

**B** Gate Opening Height

**D** Gate Full Open = 2B

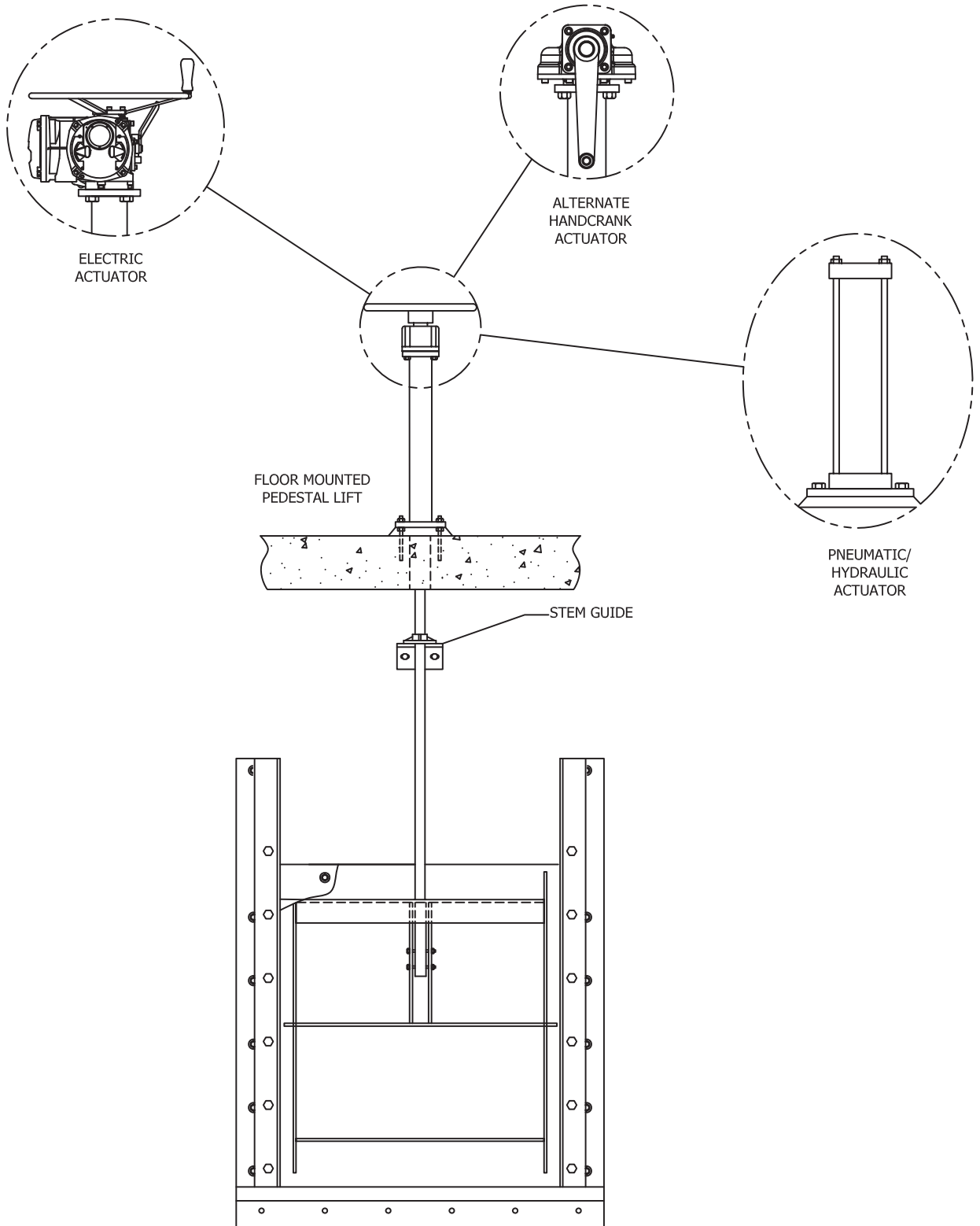
**E** Slide Height = B

# ACTUATORS SELF CONTAINED SLIDE GATES



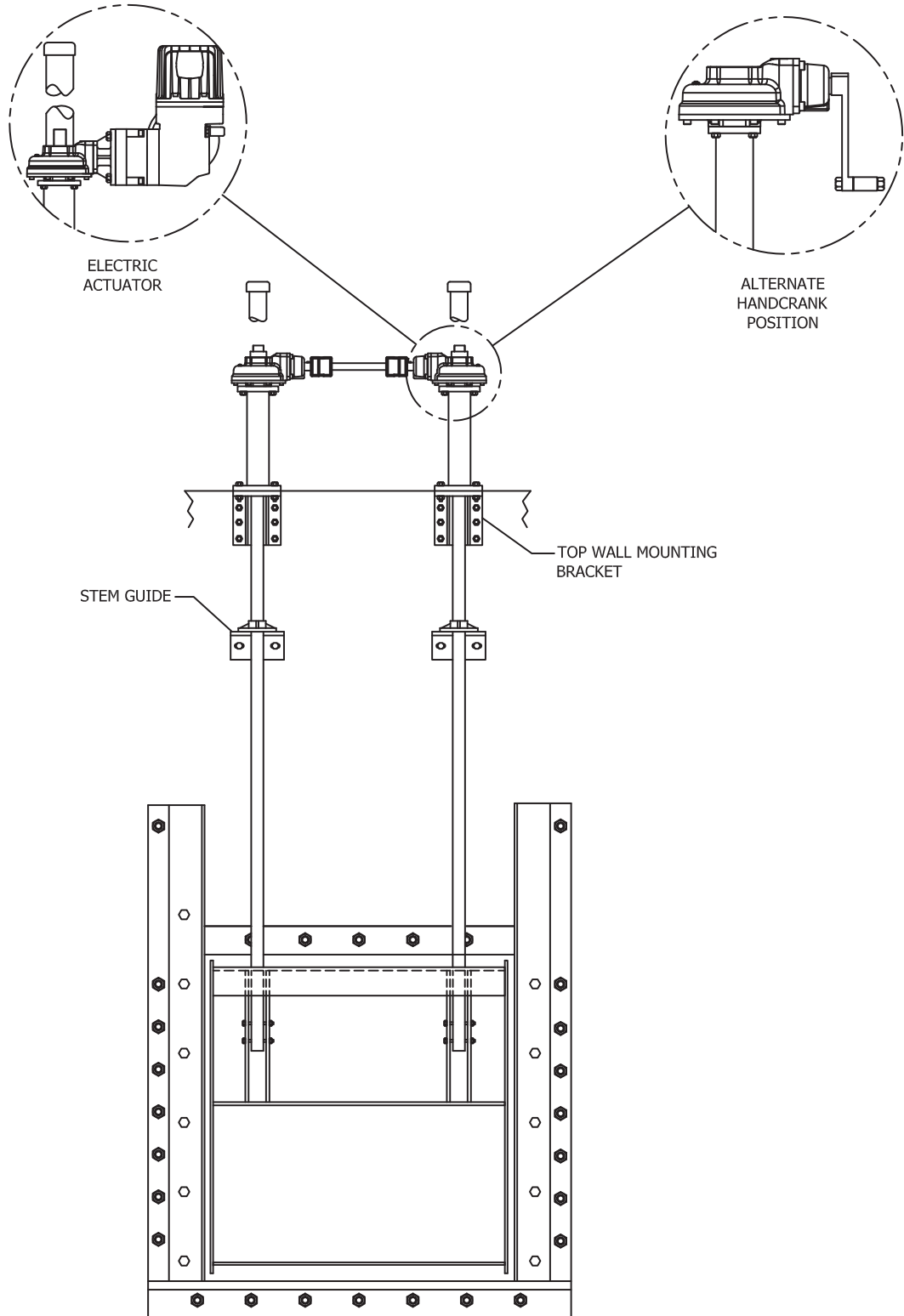
**SINGLE LIFT & STEM**

# ACTUATORS FOR NON-SELF CONTAINED SLIDE GATES



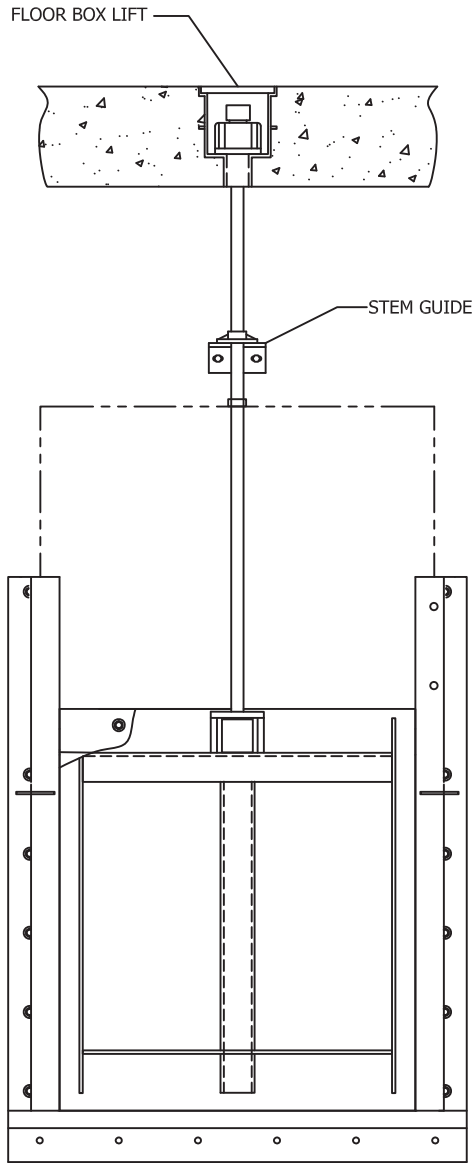
**SINGLE LIFT & STEM**

# ACTUATORS NON-SELF CONTAINED SLIDE GATES

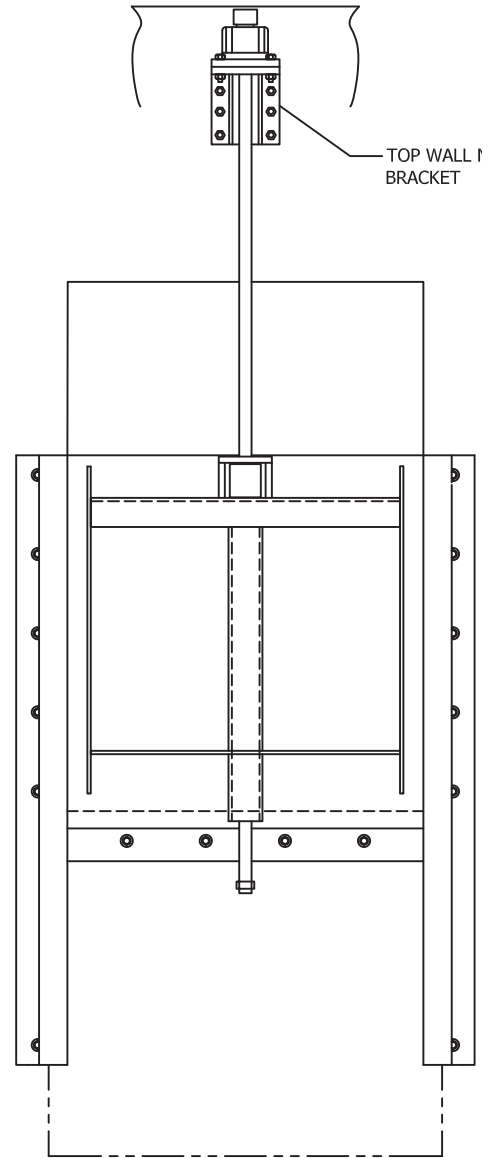


TANDEM LIFTS WITH DUAL STEMS

# NON RISING STEM NON-SELF CONTAINED SLIDE GATES

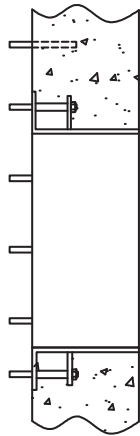
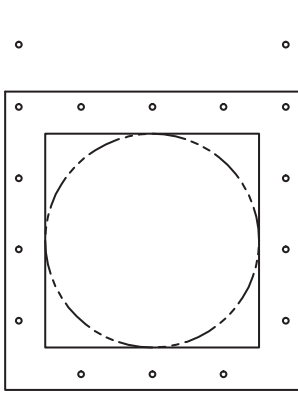


**NON-RISING STEM  
SLIDE GATE**

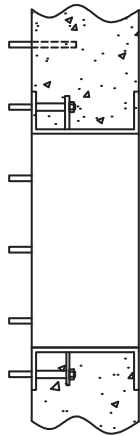


**NON-RISING STEM  
SLIDE (WEIR) GATE**

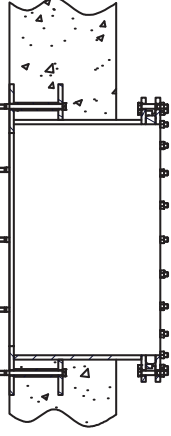
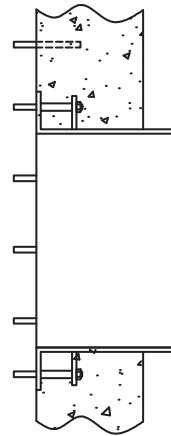
## MOUNTING OPTIONS



'F' TYPE



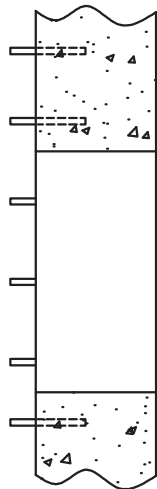
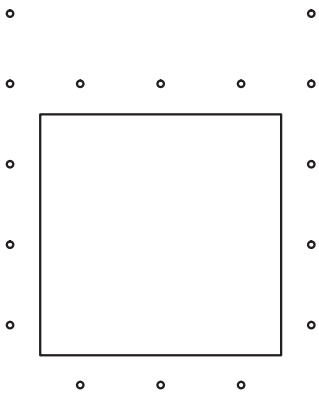
'E' TYPE



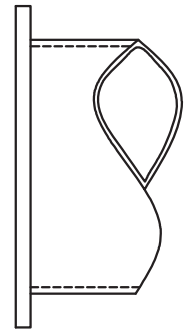
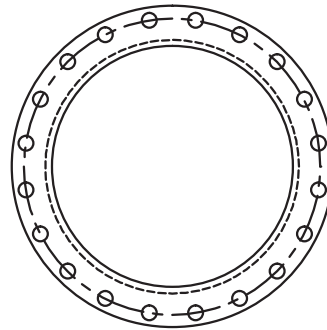
'MJ' TYPE

### WALL THIMBLES

AVAILABLE WITH SQUARE, RECTANGLE OR CIRCULAR OPENING



ANCHOR BOLT MOUNTING



PIPE FLANGE MOUNTING



## SECTION \_\_\_\_\_

# TYPICAL SPECIFICATIONS FOR SS-250 SERIES FABRICATED SLIDE GATE

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

- A. The equipment provided under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer unless exceptions are noted by the engineer.

Gates and operators shall be supplied with all the necessary parts and accessories indicated on the drawings, specified or otherwise required for a complete and properly operating installation, and shall be the latest standard product of a manufacturer regularly engaged in the production of fabricated water control gates.

- B. Unit Responsibility: To insure compatibility of all components directly related to the slide gates, unit responsibility for the slide gates, actuators and accessories as described in this section shall be the responsibility of the slide gate manufacturer unless specified otherwise.

### 1.02 SUBMITTALS

- A. Submittals shall be in accordance with Sections \_\_\_\_\_ and as specified herein.

Submittals shall include as a minimum:

1. Shop Drawings
2. Manufacturer's operation and maintenance manuals and information.
3. Manufacturer's installation certificate.
4. Manufacturer's equipment warranty.
5. Manufacturer's performance affidavit in accordance with Section \_\_\_\_\_.
6. Design calculations demonstrating lift loads and deflection in conformance to the application requirements.  
Design calculations shall be approved by a licensed engineer (PE) and shall be available upon request.

### 1.03 QUALITY ASSURANCE

#### A. Qualifications

1. All of the equipment specified under this Section shall be furnished by a single manufacturer with a minimum of 20-years of experience designing and manufacturing slide gates. The manufacturer shall have manufactured stainless steel slide gates of the type described herein for a minimum of 20 similar projects.
2. The sealing system shall be certified and tested for operation and performance to leakage specifications compliant with AWWA C-561 for a minimum of 100,000 cycles.
3. The project design is based on the Waterman SS-250 Series Fabricated Slide Gate as manufactured by Waterman Valve of Exeter, California. Proposed alternates must be pre-approved, per addendum, at least 14-days prior to close of bid. Requests for alternates must be supplemented with detailed drawings, specifications, and references. Any/all additional costs for structure modifications or other changes associated with utilizing a brand other than Waterman are to be borne by the contractor.
4. To insure quality and consistency, the slide gates listed in this section shall be manufactured and assembled in a facility owned and operated by the slide gate manufacturer. Third-party manufacturers contracted for fabrication and assembly of the slide gates will not be permitted.

## PART 2 EQUIPMENT

### 2.01 GENERAL

- A. The gates shall be either self-contained with yoke and bench stand operators, or non-self-contained with separate stem guides and operator, in accordance with the requirements of these specifications.
- B. The gates shall be compliant with the latest version of AWWA C561, as described below.
- C. Specific configurations shall be as noted on the gate schedule or as shown on the plans.
- D. Materials:

COMPONENTS	MATERIALS
FRAME, YOKE, COVER SLIDE, WALL THIMBLES	Stainless Steel ASTM A240, Type 304L Stainless Steel ASTM A240, Type 316L Stainless Steel ASTM A240, Type 2205 Duplex
SEAT/SEALS & STEM SLEEVES	Ultra-High-Molecular-Weight Polyethylene (UHMWPE) ASTM D4020
CORD SEAL	Neoprene ASTM D2000 Nitrile ASTM D2000 Viton ASTM D1418
FLUSH BOTTOM SEALS	Neoprene ASTM D2000 Viton ASTM D1418
STEMS	Stainless Steel ASTM A276, AISI Type 304 Stainless Steel ASTM A276, AISI Type 316 Stainless Steel ASTM A276, AISI Type 2205 Duplex Stainless Steel ASTM A564, AISI Type 630
STEM COVER	Clear Butyrate with Mylar Strip Galvanized A53 Steel Aluminum
STEM GUIDES	Cast Iron (ASTM 126 Class B) Bronze Bushed Cast Iron (with 2% Nickel) Bronze Bushed Ni-Resist Cast Iron (ASTM A436, Type 2 or 2B) Bronze Bushed Stainless Steel (ASTM A240 Type 304L) UHMW Bushed Stainless Steel (ASTM A240 Type 316L) UHMW Bushed Stainless Steel (ASTM A240 Type 2205) UHMW Bushed
WALL BRACKETS	Not Applicable Cast Iron (ASTM 126 Class B) Cast Iron (with 2% Nickel) Ductile Cast Iron (ASTM A536) Ni-Resist Cast Iron (ASTM A436, Type 2 or 2B) Steel (ASTM A36) Stainless Steel ASTM A240, AISI Type 304L Stainless Steel ASTM A240, AISI Type 316L Stainless Steel ASTM A240, AISI Type 2205
PEDESTALS	Not Applicable Cast Iron (ASTM 126 Class B) Cast Iron (with 2% Nickel) Ductile Cast Iron (ASTM A536) Ni-Resist Cast Iron (ASTM A436, Type 2 or 2B) Steel (ASTM A36/A53) Stainless Steel ASTM A240/A312, AISI Type 304L Stainless Steel ASTM A240/A312, AISI Type 316L Stainless Steel ASTM A240/A312, AISI Type 2205
FASTENERS AND ANCHOR BOLTS	Stainless Steel ASTM A593 & A594, Type 304 CW A193 & A194 Stainless Steel ASTM A593 & A594, Type 316 CW A193 & A194 Stainless Steel ASTM A593 & A594, Type UNS S-32205 Duplex 2205
FINISH	Polyamide Epoxy Coal Tar Epoxy

## E. GATE SCHEDULE

EQUIPMENT NUMBER	GATE SIZE, INCH <sup>1</sup>	GATE TYPE <sup>2</sup>	OPENING DIRECTION <sup>3</sup>	BOTTOM SEATING <sup>4</sup>	DESIGN HEAD, FEET		OPERATOR TYPE
					SEATING	UNSEATING	

Notes: Clear opening width by height. E = embedded frame, W = wall mounted, Y = self-contained, F = flatback U = upward, D = downward FB = flush bottom

### 2.02 FRAME AND GUIDE RAILS

- A. The gate frame shall be composed of stainless steel guide rails with UHMW seat/seals upstream and downstream. The seat/seals shall form a tight seal between the frame and the slide (disc). The guides will be of sufficient length to support ½ the height of the slide when in the full open position.
- B. Yoke shall not deflect more than 1/360th of the span under full head break load.
- C. Seals shall be replaceable without removing the frame from the wall. In the case of embedded gates, they shall be constructed in a manner that allows replacement of the seals without removal of the gate frame from the embedment.

### 2.03 STEM AND STEM GUIDE

- A. Material
  1. The stem shall be solid stainless steel of the specified grade.
- B. Design
  1. Guides shall be adjustable with split stem sleeves. Guides shall be spaced per the manufacturer's recommendations. The stem L/r ratio shall not exceed 200.
  2. Stem threads shall be machine cut 29 degree full Acme or stub Acme type.
  3. Nominal diameter of the stem shall not be less than the crest of the threaded portion.

### 2.04 SEALS

- A. The seals shall be self-adjusting. Seals requiring periodic maintenance and adjustments to maintain specified leakage rates will not be permitted.
- B. The top seal design on upward opening gates consisting of four side seals shall incorporate a self-cleaning wiping function that prevents debris from building-up above the top seal and causing premature wear of the seats, seals, and gate face.
- C. The UHMW seats shall impinge on the slide (disc) by way of a continuous loop cord seal. Seal designs incorporating resilient seals such as "J-bulb" or "P" seals that come in direct contact with the friction surface of the slide will not be considered.
- D. The cord seal shall function as a seal between the frame and the UHMW, and as a spring force to maintain contact between the UHMW and the slide (disc).
- E. The resilient bottom seal shall be set into the invert member of the frame which shall be formed in a manor to protect 3 sides of the seal only exposing the side that will come in contact with the slide. Disc-mounted invert seals exposing additional surface area will not be permitted.
- F. The self-adjusting seal system shall provide an allowable leakage rate of no more 0.05 gpm per peripheral foot of perimeter opening for seating and unseating heads.

## **2.05 SLIDE COVER (DISC)**

- A. The slide cover (disc) shall be stainless steel plate reinforced with structural shapes welded to the plate.
  - 1. The slide cover shall not deflect more than 1/720th of the span, or 1/16" at the seated sealing surface of the gate under maximum specified head.
  - 2. The stem to gate connection shall be either the clevis type, with structural members welded to the slide and a bolt or bolts to act as a securing method, or a threaded and bolted (or keyed) thrust nut supported in a welded nut pocket.
  - 3. The clevis, or pocket and yoke, of the gate shall be capable of taking, without damage, at least twice the rated thrust output of the operator at 40 pounds of pull on a hand wheel or hand crank, and at locked-rotor stall of a motor operator.
  - 4. The slide cover shall be constructed with vertical and horizontal reinforcement ribs.
  - 5. All welds shall be performed by an AWS-certified welding technician.

## **2.06 ANCHOR BOLTS**

- A. Anchor hardware shall be provided by the slide gate manufacturer.
  - 1. The size, quantity, and location of the anchor hardware shall be engineered by the slide gate manufacturer. Upon client request manufacturer shall provide calculations for anchor bolt sizing and quantity.
  - 2. Anchor hardware consisting of studs, nuts and washers shall be provided by the manufacturer.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Installation of the gates shall be performed in accordance with standard industry practices. It shall be the responsibility of the CONTRACTOR to handle, store, and install the equipment specified in this Section in strict accordance with the Manufacturer's recommendations.
- B. The CONTRACTOR shall review the installation drawings and installation instructions prior to installing the gates.
- C. The gate frames shall be installed in a true vertical plane, square and plumb, with no twist, convergence, or divergence between the vertical legs of the guide frame.
- D. The CONTRACTOR shall fill any void between the guide frames and the structure with non-shrink grout as shown on the installation drawing and in accordance with the grout manufacturer's recommendations.
- E. The frame cross rail shall be adjusted as required to maintain consistent seal compression across the full width of the gate.

### **3.02 FIELD TESTING**

- A. After installation, all gates will be field tested in the presence of the ENGINEER and OWNER to ensure that all items of equipment are in full compliance with this Section. Each gate assembly shall be water tested by the CONTRACTOR at the discretion of the ENGINEER and OWNER, to confirm that leakage does not exceed the specified allowed leakage.

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For over 100 years, Waterman has been a leading supplier of gates, valves and specialty components for the water treatment, water delivery, industrial processing and agricultural irrigation markets. With an expanded offering, faster delivery and superior support, Waterman is ready to help with your project needs.

## **Waterman + MPI = Forward-Thinking Products and Support**

Waterman is part of McWane Plant & Industrial (MPI), a single-source manufacturer for valves, gates, pipe and fittings for a total solution for your project. With the combined strength of the industry's top brands: Kennedy Valve, McWane Ductile, Tyler Union and Waterman, MPI offers unmatched portfolio of dependable and forward-thinking solutions. Most importantly, MPI's team of veteran industry experts are ready to listen to your needs and to support you at every phase of your project from design through to start up.

## **Waterman Offers Both In-Stock & Custom-Engineered Solutions**

Waterman offers both standard "in-stock" products as well as fully custom-engineered solutions. Waterman custom solutions incorporate market leading designs: slide gates, sluice gates, radial (tainter) gates, automatic siphons, automatic level control gates, stop gates, stop logs, roller gates, tilting weir gates and more. All Waterman products are engineered for high performance and built-to-last, so you can be confident in your system's performance for decades to come.

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Founded in Exeter, California in 1912, Waterman is a brand built on quality and confidence. Waterman engineers, fabricates and tests its products in company-owned USA-based facilities. The principal manufacturing facility opened in Exeter in 1963. A second manufacturing facility in Calera, Alabama was added in 2020 to serve the Eastern United States and to provide additional capabilities for large and complex water control gates.



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## **SECTION 8: ENGINEERING DRAWINGS**

ENGINEERING DRAWINGS ARE PROVIDED SEPARATELY