

SECTION 012000

MEASUREMENT AND PAYMENT

Applies only to Collier County Public Utilities Projects or Works and Utilities Portions of Collier County Transportation Projects, but not to Private Developments

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Explanation and Definitions
- B. Measurement
- C. Payment
- D. Schedule of Values

1.2 EXPLANATION AND DEFINITIONS

- A. The following explanation of the Measurement and Payment for the Bid Schedule items is made for information and guidance. The omission of reference to any item in this description shall not, however, alter the intent of the Bid Schedule or relieve the CONTRACTOR of the necessity of furnishing such as a part of the Contract. Measurement and payment for all Contract Items shall be made in accordance with this section or as modified by the Supplemental Terms and Conditions.

1.3 MEASUREMENT

- A. The quantities set forth in the Bid Schedule are approximate and are given to establish a uniform basis for the comparison of bids. The COUNTY reserves the right to increase or decrease the quantity of any class or portion of the work during the progress of construction in accord with the terms of the Contract.

1.4 PAYMENT

- A. Make payment for the items listed on the Bid Schedule on the basis of the work actually performed and completed, such work including but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, clean up, restoration of disturbed areas, and all other appurtenances to complete the construction and installation of the work as shown on the drawings and described in the specifications.

- B. Unit prices are used as a means of computing the final figures for bid and Contract purposes, for periodic payments for work performed, for determining value of additions or deletions and wherever else reasonable.

1.5 SCHEDULE OF VALUES

- A. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Prepare preliminary schedule in accordance with the Supplemental Terms and Conditions. Submit preliminary schedule of values within 10 calendar days after the Effective Date of the Agreement. Submit final schedule of values in accordance with the Supplemental Terms and Conditions.
- B. Format: Utilize a format similar to the Table of Contents of the Project Specifications. Identify each line item with number and title of the major specification items. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of CONTRACTOR's overhead profit.
- C. Revisions: With each Application for Payment, revise schedule to list approved Change Orders.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 MEASUREMENT AND PAYMENT

- A. Make payment on the basis of work actually performed completing each item in the Bid, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the drawings and described in the specifications. Payment for each item includes compensation for cleanup and restorations. Cost of cleanup and surface restorations (including pavement replacement) will be considered as the percentage retained in accordance with the Contract Documents, and complete payment will not be made until cleanup, restorations and as-builts are completed.

SECTION 1: GENERAL

1. **Mobilization/Demobilization:** Payment for all mobilization and demobilization will be made at the Contract lump sum price in accordance with Collier County specifications. The Contractor may be required to mobilize and demobilize multiple times during the course of this project. See the *Construction Sequence Specification* provided in the bid package.
2. **Maintenance of Traffic:** Payment for maintenance of traffic in accordance with the COUNTY Maintenance of Traffic Policy will be made at the Contract lump sum price.
3. **Survey & Record Drawings:** Payment for providing all survey and record drawings will be made at the Contract lump sum price in accordance with the Collier County specifications.
4. **Pre-Construction Video Recording:** Payment for providing Pre-Construction Video will be made at the Contract lump sum price in accordance with Collier County specifications.

SECTION 2: WATER SYSTEM

5. **Install 30" Cross and Gate Valves using Double Line Stop with Bypass:** Payment for installing 30" cross and gate valves using double line stop with bypass will be made at the appropriate Contract unit price for the items listed under a. through g. as stated in the Bid Schedule. Note that Items b., c., e., and f. are ***installation only*** and Items a., d. and g. include installation and materials. Payment for each item listed for the installation of the 30" cross and gate valves using double line stop with bypass includes all work necessary to complete the installation and must conform to the details in the Construction Plans and the current Collier County Standards. **Some material to be purchased by Collier County for this item.** The Contractor will be responsible for providing necessary fittings, appurtenances, and materials not included in the County's list of pre-purchased materials. Contractor shall provide imported backfill, if needed.

Connections to the existing 30" PCCP water main requires use of specific adapters/fittings obtained from Thompson Pipe Group. The Contractor shall be responsible for purchasing the required fittings for the connections. The type of fittings will be determined through Item 25 Allowance to Field Verify Existing 30" PCCP WM Joint Type. The Contractor shall coordinate with Charles Sullivan from Thompson Pipe Group at the below email or phone number for purchasing the fittings and scheduling the connections to have a Thompson Pipe

Group Representative on site. Contact information:

Charles Sullivan
Manager, Business Development
Thompson Pipe Group
Mobile: 407-625-0200
Email: csullivan@thompsonpipegroup.com

6. **Install Above Ground Valve Assembly:** Payment for installing above ground valve assembly will be made at the appropriate Contract unit price for the items listed under a. through n. as stated in the Bid Schedule. Note that Items a. through h. and j. are ***installation only*** and Items i., and k., through n. include installation and materials. Payment for each item listed for the installation of above ground valve assembly includes all work necessary to complete the installation and must conform to the Details in the Construction Plans and the current Collier County Standards. Note that Item 6i. shall match the existing fence height. **Some material to be purchased by Collier County for this item.** The Contractor will be responsible for providing necessary fittings, appurtenances, and materials not included in the County's list of pre-purchased materials. Contractor shall provide imported backfill, if needed.
7. **Coordinate Bypass Valves Startup with Bernad Representative:** Payment to coordinate Bypass valves startup with Bernad representative will be made at the Contract unit lump sum price and includes all necessary labor and equipment required.
8. **Coordinate MOV Startup with Rotork Representative:** Payment to coordinate MOV startup with Rotork representative will be made at the Contract unit lump sum price and includes all necessary labor and equipment required.
9. **SCADA Integration for Bypass Valves and MOVs:** Payment for SCADA integration for Bypass Valves and MOVs will be made at the Contract lump sum price. This item includes all necessary labor and equipment required to integrate the installed Bernad valves and Rotork Actuators in accordance with the Construction Plans, current Collier County Standards, Bypass Valve (Bernad) and MOV (Rotork) Specifications, and the Sequence of Operations Specification included in the bid package. The following integrators are approved for this project:
 - Tetra Tech
 - Carollo Engineers
 - McKim & Creed

10. **Install Water Main Pipeline (Installation Only):** Payment for installing water main pipelines (Items a. - d.) will be made at the Contract unit price per linear foot of pipe installed in accordance with the current Collier County Standards and Details shown in the Construction Plans. This item includes clearing and disposal of trees and bushes, all necessary fittings, pipe coatings and linings, connections to existing mains, labor, equipment and materials for the furnishing and laying of the pipe, signs, maintenance of traffic, dewatering, compaction, pipe bedding, backfilling, sheeting, restrained joint piping, detectable tape, clamps, harnessing, plugs and caps, adapters, excavation of all material encountered, including rock, backfill, replacement of grass, sod, clearing and grubbing, landscaping, pavement, driveways, sidewalks, mailboxes, culverts, storm sewers, and other surface materials not specifically designated in the Bid, coordination with other contractors, stubs and valves for future connections to existing pipes, clean-up, disinfection and sterilization, temporary facilities for testing and tests. Measure pipe to the nearest foot along the centerline including the lengths of manholes, valves and fittings. Measure lineal footage horizontally. Measure cuts from proposed grade to the invert elevation of the pipe. Pipe installed within casing pipe is included in this item. **Pipe material to be purchased by Collier County for this item.** The Contractor will be responsible for providing necessary fittings, appurtenances, and materials not included in the County's list of pre-purchased materials. Contractor shall provide imported backfill, if needed.
11. **Install 16" Gate Valves (Installation Only):** Payment for installing 16" gate valves will be made at the appropriate Contract unit price per valve acceptably installed. This item includes the valve, valve box, vault or housing, concrete work, operators, incidentals, and all necessary labor, materials and equipment for installation, including valve stem, valve box extensions and adjustments. This item also includes the installation of base material below the valve in accordance with the Construction Plans and current Collier County Standards. **Valves to be purchased by Collier County for this item.** The Contractor will be responsible for providing necessary fittings, appurtenances, and materials not included in the County's list of pre-purchased materials. Contractor shall provide imported backfill, if needed.
12. **Install 48" Tee and Valves (Installation Only):** Payment to Install 48" Tee and Valves will be made at the appropriate Contract unit price listed in the Bid Schedule (Items a. through g.). This item includes all work to complete the installation of the 48" tee, valves, and other items specified in the bid schedule in accordance with the Construction Plans and current Collier County Standards. **Some material to be purchased by Collier County for this item.** The Contractor will be responsible for providing necessary fittings, appurtenances, and materials not included in the County's list of pre-purchased materials. Contractor shall provide imported backfill, if needed.

13. **Install Fire Hydrant Assembly (Installation Only)**: Payment for the installation of fire hydrant assembly will be made at the Contract unit price for each fire hydrant assembly acceptably installed. This item includes the tee installed on the utility main, all necessary fittings, joint restraint from the valve to the tee, necessary piping from the tee to the hydrant location with the installation of barrel section to meet finished grade, control gate valve, valve box and any concrete work. Be responsible to set the hydrant to grade in accordance with the Details shown on the Construction Plans and current Collier County Standards. **Fire Hydrant Assembly to be purchased by Collier County for this item.** The Contractor will be responsible for providing necessary fittings, appurtenances, and materials not included in the County's list of pre-purchased materials. Contractor shall provide imported backfill, if needed.

14. **Connect to Existing Water Main (Installation Only)**: Payment for connecting to existing water main (Items a. and b.) will be made at the contract unit price for each connection acceptably made. This item includes all installation necessary to make connections to the existing water mains in accordance with the Details shown on the Construction Plans and current Collier County Standards. **Some material to be purchased by Collier County for this item.** The Contractor will be responsible for providing necessary fittings, appurtenances, and materials not included in the County's list of pre-purchased materials. Contractor shall provide imported backfill, if needed.

15. **Interconnect Existing 12" Cast Iron and 16" DIP Water Mains (Installation Only)**: Payment to interconnect existing 12" cast iron and 16" DIP water mains will be made at the lump sum Contract price. This item includes all labor and materials necessary to complete the interconnects in accordance with the current Collier County Standards and the Details shown on the Construction Plans. **Some material to be purchased by Collier County for this item.** The Contractor will be responsible for providing necessary fittings, appurtenances, and materials not included in the County's list of pre-purchased materials. Contractor shall provide imported backfill, if needed.

SECTION 3: RESTORATION

16. **General Restoration**: Payment for restoration will be made at the appropriate Contract Unit price per lump sum. This item includes all labor and materials required for clearing and grubbing, clean-up, replacement of grass, sod, landscaping, sidewalks, brick pavers, pavement, mailboxes and post, culverts, private sprinkler systems damaged within the right of way, storm sewers and other surface materials not specifically designated in the Bid. This item also includes removing and replacing any driveway or entrance to match

existing elevations and materials.

17. **Asphalt Pavement Restoration**: Payment for asphalt pavement restoration will be made at the appropriate Contract price per square yard. This item includes all necessary labor and materials required for asphalt pavement restoration, including replacing all pavement surface and base, in accordance with the current Collier County Standards and Details shown on the Construction Plans.
18. **Abandon and Grout Existing Water Main**: Payment to abandon and grout existing water main (Items a. through c.) will be made at the Contract unit price per linear foot listed in the Bid Schedule. This item includes all necessary labor and materials required (including caps) to abandon and grout existing water main in accordance with the current Collier County Standards and the Details shown on the Construction Plans.
19. **Abandon and Remove Existing Water Main**: Payment to abandon and remove existing water main (Items a. through j.) will be made at the Contract unit price per linear foot listed in the Bid Schedule. This item includes all necessary labor and materials required to abandon and remove existing water main in accordance with the current Collier County Standards and the Details shown on the Construction Plans.
20. **Locate and Protect Existing 16" Raw Water Main During Construction**: Payment to locate and protect existing 16" raw water main during construction will be made the at the Contract lump sum price for all labor and materials necessary to locate and protect existing 16" reuse water main during construction of this project. The 16" raw water main will be in close proximity to existing water mains that are to be removed. Note that the 16" raw water main is owned and maintained by the City of Naples Utilities. See the Construction plans for contact information.
21. **Abandon and Remove Fire Hydrant Assembly**: Payment to abandon and remove fire hydrant assembly will be made at the Contract unit price for each assembly abandoned and removed. This item includes all necessary labor and material required to abandon and remove fire hydrant assembly in accordance with the current Collier County Standards and the Details shown on the Construction Plans.
22. **Abandon and Remove Existing Below Ground Valve Vault and 30" Valve**: Payment to abandon and remove existing below ground valve vault and 30" valve will be made at the Contract unit lump sum price. This item includes all necessary labor and materials required to abandon and remove the existing below ground concrete valve vault, 30" valve, and control panel in accordance with the current Collier County Standards and the Details shown on the Construction Plans.

23. **Remove Existing 30" Valve Stem and Pad:** Payment to remove existing 30" valve stem and pad will be made at the contract unit price for each existing 30" valve stem and pad acceptably removed and disposed of. This item includes all necessary labor and materials required to remove existing 30" valve stem and pad in accordance with the current Collier County Standards and the Details shown on the Construction Plans.

SECTION 4: ALLOWANCE

24. **Allowance General:** Allowance for unforeseen general conditions will be made at the appropriate contract price for time and materials, lump sum, and/or contract unit price not to exceed \$150,000.00.
25. **Allowance to Field Verify Existing 30" PCCP Water Main Joint Type and Outer Pipe Diameter:** The allowance to Field Verify Existing 30" PCCP Water Main Joint Type and Outer Pipe Diameter will be made at the Contract Time and Material price not to exceed \$20,000.00. The contractor shall verify the joint types at as many locations necessary to successfully determine the joint type at all proposed connections on the existing 30" PCCP water main.

The joint type on the existing 30" PCCP water main will determine the specific adaptors / fittings that will be required to make connections. The adaptors and fittings are obtained from Thompson Pipe Group. The Contractor shall coordinate with Charles Sullivan from Thompson Pipe Group at the below email or phone number to have a Thompson Pipe Group representative onsite to verify the type of joint and outer diameter of the pipe.

Charles Sullivan
Manager, Business Development
Thompson Pipe Group
Mobile: 407-625-0200
Email: csullivan@thompsonpipegroup.com

26. **Allowance to Field Verify Existing 30" PCCP Water Main Joint Restraint:** The allowance to Field Verify Existing 30" PCCP Water Main Joint Restraint will be made at the Contract Time and Material price not to exceed \$20,000.00. This item is intended to determine the whether the existing 30" PCCP water main will need to be restrained as part of the proposed improvements. If required, restraint material will be purchased by the Contractor under Pay Item 39.

The Contractor shall coordinate with Charles Sullivan from Thompson Pipe Group at the below email or phone number to have a Thompson

Pipe Group representative onsite to verify whether the existing 30” PCCP water main is restrained per the Pipe Restraint Schedule Detail in the Construction Plans.

Charles Sullivan
Manager, Business Development
Thompson Pipe Group
Mobile: 407-625-0200
Email: csullivan@thompsonpipegroup.com

27. **Allowance to Coordination with Collier County Water Department and Valve Team:** The allowance to coordinate with Collier County Water Department and Valve Team will be made at the Contract Time and Material price not to exceed \$5,000.00. This item will include all necessary coordination, planning, and scheduling with the County Water Department to shut down sections of water main to perform the proposed work.

28. **Allowance for Joint Restraint:** Allowance for labor and materials to restrain the existing 30” PCCP water main if determined necessary through field verification (Item 26) will be made at the appropriate price for time and materials not to exceed \$50,000.00. If required, restraint material will be purchased by the Contractor and shall be in accordance with the current Collier County Standards and Details in the Construction Plans.

Contractor shall be responsible for purchasing the required joint restraints for the 30” PCCP water main. The Contractor shall coordinate with Charles Sullivan from Thompson Pipe Group at the below email or phone number for purchasing the joint restraints (if necessary) and scheduling to have a Thompson Pipe Group Representative on site. Contact information:

Charles Sullivan
Manager, Business Development
Thompson Pipe Group
Mobile: 407-625-0200
Email: csullivan@thompsonpipegroup.com

END OF SECTION

Collier County Public Utilities
Carica Pump Station Water Main Improvements

30" Bypass Valve Assembly
Bypass Valve
Bermad Specifications



VICTAULIC BERMAD TECHNOLOGIES

9424 West Little York Road
Houston, Texas 77040
800 821 6825

victaulic.com | bermad.com

Purchase Specification

Model WW-30"M5-710-03-G-C-A5-EV-4DO-NN-NSS66
Solenoid Control Valve

FUNCTION: The valve shall open wide or close drip tight in response to an electrical signal. The valve shall be a single-chambered, diaphragm actuated. A single 3-way solenoid pilot control valves will be provided that alternately adds or relieve line pressure from the upper cover chamber of the valve, causing it to open wide or close tight in response to an electrical signal directed by an electronic controller. Solenoid pilot control valve shall include manual override. Valve shall include Closing and Opening Speed Controls.

MAIN VALVE: The main valve shall be a globe style diaphragm actuated type where flow through the valve is semi-straight with no right angle turns for minimum head loss. The valve shall consist of three major components: the body with replaceable, raised, stainless steel Cage Seat™, the cover with the upper stem guide bearing, and the diaphragm/seal assembly, which should be the only moving part. The diaphragm/seal assembly shall be top guided by a bearing in the cover and bottom guided by the Cage Seat™. The valve will be capable of accepting a static, non-moving, V-port or Cavitation cage installed over the Cage Seat™. All valve components shall be accessible and serviceable without removing the valve from the pipeline. The bottom of the valve flanges shall include horizontal flats to add vertical support. All external bolts and nuts shall be made of stainless steel.

Two diaphragms made of nylon fabric-reinforced synthetic rubber shall be used. The valve diaphragm shall not be used as a sealing surface. Both diaphragms shall be fully supported by the valve body and cover in the open or closed positions. An elastomeric seal shall be retained on 3-1/2 sides by the seal retainer assembly and sealing will be drip tight with a combination of elastomeric and metal to metal sealing. All internal fasteners shall be stainless steel. A dual limit switch assembly shall be included that will signal when the valve is in either the fully open or fully closed position.

PILOT CONTROL SYSTEM: Solenoid pilot controls shall be a 3-way, normally closed solenoid for a normally open main valve. The solenoid will operate a Model 58HC 3-Way Double Chambered, High Capacity Accelerator, which will in turn actuate the main valve. The main valve shall be normally open and shall close when the solenoid is energized. The valve shall be equipped with two Allen Bradley Model 802MC-AZY16LF stainless steel 316, lever operated limit switches with NEMA 4X enclosures, indicator light, and 36' factory installed cable, rated for 24VDC operation; one limit switch shall signal when the valve is fully open and the other shall signal when the valve is fully closed. A 316 Stainless Steel Y-Strainer and upstream and downstream pressure gauges shall be provided.

SOLENOID:

Manufacturer: ASCO

Catalog Number: 8314R121MS 12-24/DC

Valve Actuation: Direct Acting

Function: 3-Way - 3/2 Normally Closed

Max Operating Differential(PSI): 205

Body Material: Stainless Steel

Elastomers: NBR

Voltage: 12-24/DC

Watt Rating: 1.2W

Pipe Size: 1/4"

Enclosure: NEMA 4X Watertight - 1/2" Conduit with 24" Leads

Options: Manual Operator



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Houston, Texas 77040
800 821 6825

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MATERIALS OF CONSTRUCTION: The valve body and cover shall be made of epoxy coated Ductile Iron to ASTM A536 with flanges conforming to ANSI B16.24 class 150 with a maximum non-shock pressure rating of 250 PSI. No fabrication or welding shall be used in the manufacturing process. All iron surfaces shall be shot blasted, preheated and have an electro statically applied, oven cured fusion bonded NFS 61 Approved epoxy coating. The valve seat, operating shaft, all internal screws, bolts, and nuts shall be SAE 303 stainless steel. The valve spring shall be 302 stainless steel. Valve bearing shall be bronze. The disc seal, the nylon fabric bonded rubber diaphragm and all O-rings shall be NBR. Accessories, tubing & fittings shall be 316 Stainless Steel.

MANUFACTURE: The valve shall be a Bermad Model WW-30”M5-710-03-G-C-A5-EV-4DO-NN-NSS66 as manufactured by Victaulic Bermad Technologies, Houston, Texas.

Collier County Public Utilities

Carica Pump Station Water Main Improvements

**30" Bypass Valve Assembly
Motor Operated Valve and Actuator
General Specifications**

Non-intrusive electric valve operators

1. General

The actuators shall be suitable for use on existing power supply nominal single phase and are to incorporate motor, integral reversing starter, local control facilities and terminals for remote control and indication connections housed within a self contained, sealed enclosure.

As a minimum the actuators should meet the requirements set out in EN15714-2 and ISA SP96.02

In order to maintain the integrity of the enclosure, setting of the torque levels, position limits and configuration of the indication contacts etc. shall be carried out without the removal of any actuator covers and without mains power providing the option of Infra red or *Bluetooth*® wireless interface. Sufficient commissioning tools shall be provided with the actuators and must meet the enclosure protection and certification levels of the actuators. Commissioning tools shall not form an integral part of the actuator and must be removable for secure storage / authorised release. In addition, provision shall be made for the protection of configured actuator settings by a means independent of access to the commissioning tool. Provision shall be made to disable *Bluetooth*® communications or only allow a *Bluetooth*® connection initiated by an Infra-Red command for maximum security.

The actuator shall include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel irrespective of the connection sequence of the power supply.

2. Actuator Sizing

The actuator shall be sized to guarantee valve closure at the specified differential pressure and temperature. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10% below nominal. For linear operating valves, the operating speed shall be such as to give valve closing and opening at approximately 10-12 inches per minute unless otherwise stated in the data sheet. For 90° valve types the operating time will be specified.

3. Environmental

Actuators shall be suitable for indoor and outdoor use. The actuator shall be capable of functioning in an ambient temperature ranging from -33°C (22°F) to 70°C (140°F), up to 100% relative humidity.

Actuators for hazardous area applications shall meet the area classification, gas group and surface temperature requirements specified in data sheet.

4. Enclosure

Actuators shall be o-ring sealed, watertight to IP66/IP68 21feet for 72hrs, NEMA 4, 6. The motor and all other internal electrical elements of the actuator shall be protected from ingress of moisture and dust when the terminal cover is removed for site for cabling, the terminal compartment having the same ingress protection rating as the actuator with the terminal cover removed.

Enclosure must allow for temporary site storage without the need for electrical supply connection.

All external fasteners shall be plated stainless steel. The use of un-plated stainless steel or steel fasteners is not permitted.

5. Motor

The motor shall be an integral part of the actuator, designed specifically for valve actuator applications. It shall be a low inertia high torque design, class F insulated with a class B temperature rise giving a time rating of 15 minutes at 40°C (104°F) at an average load of at least 33% of maximum valve torque. Temperature shall be limited by 2 thermostats embedded in the motor end windings and integrated into its control.

Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gearcase.

6. Motor Protection

Protection shall be provided for the motor as follows:

- Stall - the motor shall be de-energized within 8 seconds in the event of a stall when attempting to unseat a jammed valve.
- Over temperature - thermostat will cause tripping of the motor. Auto-reset on cooling
- Single phasing - lost phase protection.
- Direction – phase rotation correction.

7. Gearing

The actuator gearing shall be totally enclosed in an oil-filled gearcase suitable for operation at any angle. Grease lubrication is not permissible. All drive gearing and components must be of metal construction and incorporate a lost-motion hammerblow feature. For rising spindle valves the output shaft shall be hollow to accept a rising stem, and incorporate thrust bearings of the ball or roller type at the base of the actuator. The design should be such as to permit the opening of the gearcase for inspection or disassembled without releasing the stem thrust or taking the valve out of service. For 90° operating type of valves drive gearing shall be self locking to prevent the valve back-driving the actuator.

8. Hand Operation

A handwheel shall be provided for emergency operation, engaged when the motor is declutched by a lever or similar means, the drive being restored to electrical operation automatically by starting the motor. The handwheel or selection lever shall not move on restoration of motor drive. Provision shall be made for the hand/auto selection lever to be locked in both hand and auto positions. It should be possible to select hand

operation while the actuator is running or start the actuator motor while the hand/auto selection lever is locked in hand without damage to the drive train.

Clockwise operation of the handwheel shall give closing movement of the valve unless otherwise stated in the data sheet. For linear valve types the actuator handwheel drive must be mechanically independent of the motor drive and should be such as to permit valve operation in a reasonable time with a manual force not exceeding 400N through stroke and 800N for seating/unseating of the valve.

9. Drive Interface

The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft. The drive bush shall be positioned in a detachable base of the actuator. Thrust bearings shall be sealed for life and the base shall be capable of withstanding five times the rated thrust of the actuator.

10. Local Controls

The actuator shall incorporate local controls for Open, Close and Stop and a Local/Stop/Remote mode selector switch lockable in any one of the following three positions: local control only, stop (no electrical operation), remote control plus local stop only. It shall be possible to select maintained or non-maintained local control.

The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator.

The local controls and display shall be rotatable through increments of 90 degrees to suit valve and actuator orientation.

11. Torque and Limits

Torque and turns limitation to be adjustable as follows:

- Position setting range – multi-turn: 2.5 to 8,000 turns, with resolution to 7.5 deg. of actuator output.
- Position setting range – direct drive part turn actuators: 90° +/-10°, with resolution to 0.1 deg. of actuator output.
- Torque setting: 40% to 100% rated torque.

Position measurement – Absolute position measurement should be incorporated within the actuator. The technology must be capable of reliably measuring position even in the case of a single fault. The design must be simple with the minimum amount of moving parts (no more than 5). Technologies such as LEDs or potentiometers for position measurement are considered unreliable and therefore not preferred.

Measurement of torque shall be from direct measurement of force at the output of the actuator. Methods of determining torque-using data derived from the motor such as motor speed, current, flux etc are not acceptable

A means for automatic “torque switch bypass” to inhibit torque off during valve unseating and “latching” to prevent torque switch hammer under maintained or repeated control signals shall be provided.

The electrical circuit diagram of the actuator should not vary with valve type remaining identical regardless of whether the valve is to open or close on torque or position limit.

12. Remote Valve Position and Status Indication

Four contacts shall be provided which can be selected to indicate any position of the valve; Provision shall be made for the selection of a normally closed or open contact form. Contacts shall maintain and update position indication during handwheel operation when all external power to the actuator is isolated.

The contacts shall be rated for 5mA to 5A, 120V AC, 30V DC.

As an alternative to providing valve position indication any of the four above contacts shall be selectable to signal one of the following:

- Valve opening, closing or moving
- Thermostat tripped, lost phase
- Motor tripped on torque in mid travel, motor stalled
- Remote selected
- Actuator being operated by handwheel
- Actuator fault

Provision shall be made in the design for an additional eight contacts having the same functionality.

A configurable monitor relay shall be provided as standard, which can be used to indicate either Availability or Fault. The relay should be a spring return type with a Normally Open / Normally Closed contact pre-wired to the terminal bung.

The Monitor (availability or fault) relay, being energized from the control transformer will de-energise under any one or more the following conditions:

Available Mode

- Loss of main or customer 24V DC power supply
- Actuator control selected to local or stop
- Motor thermostat tripped
- Actuator internal fault
- Loss of main or customer 24V DC power supply
- Motor thermostat tripped
- Actuator internal fault

Provision shall be made in the design for the addition of a contactless transmitter to give a 4-20mA analogue signal corresponding to valve travel and / or torque for remote indication when required. The transmitter will auto range to the set limits

13. Local Position Indication

The actuator display shall include a dedicated numeric/symbol digital position indicator displaying valve position from fully open to fully close in 0.1% increments. Valve closed and open positions shall be indicated by symbols showing valve position in relation to the pipework to ensure that valve status is clearly interpreted. With mains power connected, the display shall be backlit to enhance contrast at all ambient light levels and shall be legible from a distance of at least 5m (16ft).

Red, green, and yellow LEDs corresponding to open, closed and intermediate valve positions shall be included on the actuator display when power is switched on. The yellow LED should also be fully programmable for on/off, blinker and fault indication. The digital display shall be maintained and updated during handwheel operation when mains power to the actuator is isolated. In the event of a (main) power (supply) loss or failure, the position contacts must continue to be able to supply remote position feedback and maintain interlock capabilities. If batteries are required to maintain contact functionality the actuator vendor shall provide a supply sufficient for 45 continuous days of un-powered operation with one complete valve cycle every hour

The actuator display shall include a fully configurable dot-matrix display element with a minimum pixel resolution of 168 x 132 to display operational, alarm, configuration and graphical datalogger information. The text display shall be selectable between English and other languages such as: Spanish, German, French, and Italian. Provision shall be made to upload a different language without removal of any covers or using specialized tools not provided as standard with the actuator.

Datalogger graphical displays should as a minimum be able to display log and trend graphs on the local LCD for the following:

- Torque versus Position
- Number of Starts versus Position
- Number of starts per hour
- Dwell Time
- Average temperature

The main display shall be capable of indicating 4 different home-screens of the following configuration:

- Position and status
- Position and torque (analogue)
- Position and torque (digital)
- Position and demand (positioning)

Provision shall be made for the addition of an optional environmental cover to protect the display from high levels of UV radiation or abrasive materials.

The local controls and display shall be rotatable through increments of 90 degrees to suit valve and actuator orientation.

Actuators that are not accessible shall have the capability of a “mirror image” of the face of the actuator Remote Hand Station. (RHS) shall be suitable for remote connection to an electric actuator up to 100m distance, include local control facilities, a backlit LCD display and terminals for communication highway connection to the host actuator housed within a self-contained, double-sealed enclosure. In order to maintain the integrity of the enclosure, setting of the actuator torque levels, position limits and configuration of the indication contacts etc. shall be carried out without the removal of any covers via a *Bluetooth*® wireless interface.

14. Integral Starter and Transformer

The reversing starter, control transformer and local controls shall be integral with the valve actuator, suitably housed to prevent breathing and condensation. The starter shall be suitable for 60 starts per hour and of rating appropriate to motor size. The controls supply transformer shall be fed from two of the incoming three phases and incorporate overload protection. It shall have the necessary tapping and be adequately rated to provide power for the following functions:

- Energising of the contactor coils.
- 24V DC or 110V AC output for remote controls (maximum 5W/VA)
- Supply for all the internal electrical circuits.

15. Remote Control Facilities

The necessary control, wiring and terminals shall be provided integral to the actuator enclosure. Open and close external interlocks shall be made available to inhibit local and remote valve opening / closing control. It shall be possible to configure the interlocks to be active in remote control only.

Remote control signals fed from an internal 24V DC (or 110VAC) supply and/or from an external supply between 20V and 60 VDC or 40V and 120VAC, to be suitable for any one or more of the following methods of control:

- Open, Close and Stop control.
- Open and Close maintained or “push to run” (inching) control.
- Overriding Emergency Shut-down to close (or open) valve from a normally closed or open contact.
- Two-wire control, energise to close (or open), de-energise to open (or close).

Additionally provision shall be made for a separate ‘drive enable’ input to prevent any unwanted electrical operation.

It shall be possible to reverse valve travel without the necessity of stopping the actuator. The motor starter shall be protected from excessive current surges during

rapid travel reversal. The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 2kV.

Provision shall be made for operation by distributed control system utilising the following network systems:

- Collier County Version Hart

16. Monitoring Facilities

Facilities shall be provided for monitoring actuator operation and availability as follows:

Actuator text display indication of the following status/alarms:

- Closed Limit, open limit, moving open, moving closed, stopped
- Torque trip closing, torque trip opening, stalled
- ESD active, interlock active
- Thermostat trip, phase lost, 24V supply lost, Local control failure
- Configuration error, Position sensor failure, Torque sensor failure
- Battery low, power loss inhibit

Integral datalogger to record and store the following operational data:

- Opening last /average torque against position
- Closing last /average torque against position
- Opening motor starts against position
- Closing motor starts against position
- Total open/closed operations
- Maximum recorded opening and closing torque values
- Event recorder logging operational conditions (valve, control and actuator)

The datalogger shall record relevant time and date information for stored data.

Datalogger data shall be accessed via non-intrusive *Bluetooth®* communication and data displayed on the local LCD. Sufficient standard intrinsically safe tools shall be provided for downloading datalogger and actuator configuration files from the actuators and subsequent uploading to a PC. The actuator manufacturer shall supply PC software to enable datalogger files to be viewed and analysed.

17. Wiring and Termination

Internal wiring shall be tropical grade PVC insulated stranded cable of appropriate size for the control and 3-phase power. Each wire shall be clearly identified at each end. The terminals shall be embedded in a terminal block of high tracking resistance compound.

The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal and shall be provided with a minimum of 3 threaded cable entries with provision for an additional 5 extra conduit entries.

All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable.

A durable terminal identification card showing a plan of terminals shall be provided attached to the inside of the terminal box cover indicating:

- Serial number
- External voltage values
- Wiring diagram number
- Terminal layout

The code card shall be suitable for the contractor to inscribe cable core identification alongside terminal numbers.

18. Commissioning Kit

Each actuator shall be supplied with a start-up kit comprising installation instruction manual, electrical wiring diagram and cover seals to make good any site losses during the commissioning period. In addition, sufficient actuator commissioning tools shall be supplied to enable actuator set up and adjustment during valve/actuator testing and site installation commissioning.

19. Performance and Test Certificate

Each actuator must be performance tested and individual test certificates shall be supplied free of charge. The test equipment should simulate a typical valve load, and the following parameters should be recorded.

- Current at maximum torque setting
- Torque at max. torque setting
- Flash test voltage
- Actuator output speed or operating time.

In addition, the test certificate should record details of specification such as gear ratios for both manual and automatic and second stage gearing if provided, drive closing direction, wiring diagram number.

20. On Site Start Up Assistance:

Prior to start up, contractor shall inform service techs of all requirements of the certificate of proper installation. All forms and documentation required for the certificate of proper installation shall be given to service tech prior to start up. Minimum of 1 day per two actuators. Start-up shall be performed by direct factory tech that resides in Florida.

21. WARRANTY:

Each actuator shall be warranted for a minimum of 24 months of operation up to a maximum of 36 months from shipment.

21. Acceptable Electric Motor Actuator Manufacturer:

Rotork Controls IQ Series (Open/Close) and IQM (Modulating).

Collier County Public Utilities
Carica Pump Station Water Main Improvements

30" Bypass Valve Assembly
Sequence of Operation

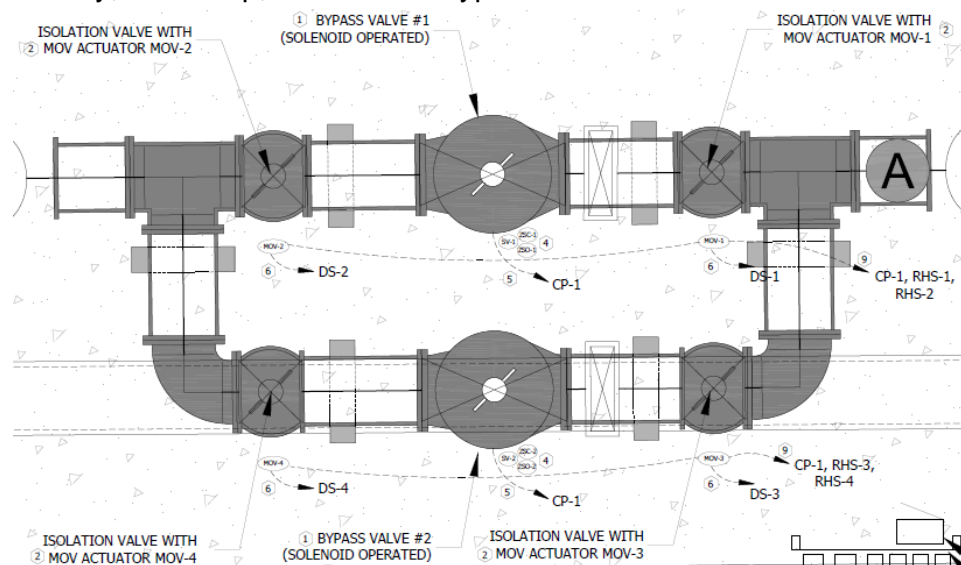
Bypass Valve Assembly

The bypass valve assembly for the Carica Pump Station is intended to allow Collier County staff to direct water flow at the pump station site locally or remotely. The water flow may be directed to either one of two 5-million-gallon storage tanks, or to bypass the tanks and flow to the water distribution system.

The bypass valve assembly will consist of the following:

- Two (2) Bypass Valves (Bypass Valve #1 & #2). The Bypass valves will allow water flow to be directed to the storage tanks or distribution system.
 - Bypass Valve Information
 - Bermad Solenoid-Controlled Diaphragm Valve
 - Model WW-30”M5-710-03-G-C-A5-EV-4DO-NN-NSS66
 - This valve is designed to “Fail Open”
 - See *Bypass Valve Specifications and Construction Plans* provided in the bid package.
- Four (4) Motor Operated Valves (MOV #1 – #4). The Motor Operated Gate Valves will allow for the Bypass Valves to be isolated for maintenance purposes. These valves are to be operated locally ONLY. Each MOV will have its own Remote Hand Station (RHS) located locally at the valve assembly.
 - Valve Information
 - Rotork Multi-Turn Actuators with Gate Valve
 - Model IQ3-40, 86 RPM.
 - See *MOV Actuator Specifications and Construction Plans* provided in the bid documents.

Below is the Schematic of the Proposed Valve Assembly. Bypass Valve #1 is intended to be the primary, while Bypass Valves #2 is intended to be the secondary, or backup, in the event Bypass Valve #1 is out of commission.



Valve Assembly Control Strategy

There will be three (3) modes of operation:

Local HAND Mode

When the HAND-OFF-AUTO selector switch is switched to HAND Mode, the Bypass Valve shall revert to its “shelf state”, de-energize, and open fully. This valve is designed to “fail open”.

Local OFF Mode

When the HAND-OFF-AUTO selector switch is switched to OFF mode, the Bypass Valve shall energize and close fully.

Local AUTO Mode

When the HAND-OFF-AUTO selector switch is switched to AUTO mode, the operator is able to set the operating mode remotely through the SCADA system and the Bypass Valve will be PLC controlled.

Valve Assembly SCADA

The SCADA system shall perform the following:

Bypass Valve #1 and #2

- Remote Operation through the SCADA system

SCADA HAND Mode

When the Bypass Valve is set to AUTO mode locally and the SCADA is switched to HAND Mode remotely, the Bypass Valve shall revert to its “shelf state”, de-energize, and open fully. This valve is designed to “fail open”.

SCADA OFF Mode

When the Bypass Valve is set to AUTO mode locally and the SCADA is switched to OFF mode, the Bypass Valve shall energize and close fully.

SCADA AUTO Mode

When the Bypass Valve is set to AUTO mode locally and the SCADA is switched to AUTO mode, the Bypass Valve is dictated by the following:

Storage Tank Level

If the water level in the storage tank is less than the SCADA setpoint, the Bypass Valve shall open.

Pressure Transmitter at Pump House

If the pressure in the pump house is less than the SCADA setpoint, the Bypass Valve shall open.

Pumps Running

If NO pumps are running in the pump house, the Bypass Valve shall open fully. If at least one (1) pump is running in the pump house, the Bypass Valve shall close.

Bypass Valve Minimum Open Time

If the Bypass Valve receives an open command, the Bypass Valve shall remain open for a minimum of thirty (30) minutes.

- Status
 - Fully Opened
 - Fully Closed
 - Intermediate Position
- Alarms
 - Fail to Open
 - Fail to Close
 - Low Tank Level
 - Low Pressure Level
- SCADA Notifications
 - The SCADA system shall notify the operator if the following conditions are met:
 - If the Bypass Valve opens due to a low tank level.
 - If the Bypass Valve opens due to a low pressure at the pump house.
 - The Bypass valve closes due to at least one (1) pump running in the pump house.
 - The Bypass valve opens due to no pumps running in the pump house.

- History
 - Status History with Time Stamps
 - Alarm History with Time Stamps
 - Number of Openings per Day
 - Number of Closings per Day
 - Total Number of Openings
 - Total Number of Closings

Motor Operated Valves #1 – #4

- Status
 - Opened, Closed, Opening, Closing, Remote Control, Local Control, Actuator Position, Actuator Starts
- Alarms
 - Fail to Open
 - Fail to Close
 - Valve Jammed or Obstructed
 - Torque Trip
 - Monitor Relay
- History
 - Status History with Time Stamps
 - Alarm History with Time Stamps
 - Number of Openings per Day
 - Number of Closings per Day
 - Total Number of Openings
 - Total Number of Closings