

# WIEDEMAN AND SINGLETON, INC.

CIVIL AND ENVIRONMENTAL ENGINEERS

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March 17, 2020

Mr. J. Sidney Forsyth  
Director Water Department  
Water Department  
City of Cartersville  
P.O. Box 1390  
Cartersville, GA 30120

RE: Cartersville Water Plant  
HSPS No.2 Electrical Upgrade  
027-20-120

Dear Mr. Forsyth:

We appreciate the opportunity to provide a proposal for engineering services to upgrade the electrical gear for the pumps at the water plant.

The purpose of the project is to replace the original electrical starter for High Service Pumps No.3 and No.4 in High Service Pump Station No.2 at the water plant. The starters are near the end of their service life. The existing starters were manufactured by G.E. and installed in 1991. Since then, G.E. has stopped producing these types of starters, and sold the starters division of their company to ABB. ABB performed the last maintenance service in February of 2019, and had to make mechanical adjustments to get the starters to operate within the manufacturer's specifications. A copy of the maintenance service report is attached. The existing starters need to be replaced to maintain the reliability of the plant.

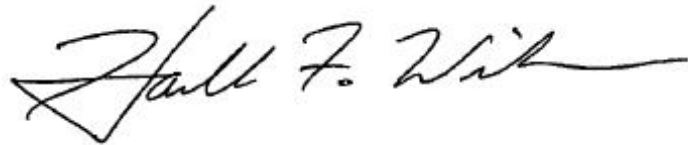
We propose an engineering services budget of \$65,000, which will cover design, procurement, and construction (field and office) services.

<b>Engineering Services Budget</b>	
Phase 1 – Design	\$ 35,000
Phase 2 – Bid	\$ 5,000
Phase 3 – Construction Services	\$ 25,000
<b>Total</b>	<b>\$ 65,000</b>

We have attached a more detailed narrative of the project. Our preliminary opinion of the total cost for the project is \$ 635,000, including material and installation costs for Solid-State starters, engineering and services, and 20% construction contingency. Our general contract terms and conditions will follow our existing contract with the City.

If this proposal is acceptable, please let us know at your earliest convenience and we will begin work immediately. We appreciate your consideration of our firm for these services. We look forward to working with you and your staff.

Sincerely,

A handwritten signature in black ink, appearing to read "Harold F. Wiedeman". The signature is fluid and cursive, with a long horizontal stroke at the end.

WIEDEMAN AND SINGLETON, INC.

Harold F. Wiedeman  
President

EMAIL ONLY



**ABB Inc.**  
Michael Ledbetter  
Lead Field Engineer  
2018 Powers Ferry Rd  
LL Lab 020  
Atlanta, GA 30339

March 29, 2019

Ahmed  
Wiedemann and Singleton

Dear Mr. Ahmed,

ABB Electrification Products Services performed inspection and maintenance services performed as well as troubleshooting on Pump 3 and 4 at the Clarence B. Walker WTP in Cartersville, GA on February 22-26<sup>th</sup>. The following the flowing is a summary on what was found during this inspection.

- **Both MCC's were serviced and tested.**
- **Electrical tests passed**
- **The air contacts were adjusted and serviced on all starters.**
- **The problems with starter 3 operating was found to be a ground in the wiring installed to the pump valve in the pump valve housing. These were corrected by using spare wires.**
- **There were some broken barriers. These need to be replaced or repaired.**

Please feel free to contact me with questions.

-Michael Ledbetter  
770 317 3506



# Medium Voltage Starter/Contactor (Air Break)

Date 2/22/2019 Project/Task No.: 7014443 Performed by: M Ledbetter

**Work Order Data:**

Project/Task Number: \_\_\_\_\_ Customer: Cartersville WTP Location: City of Cartersville.  
Project/Task Type: Prev. Maint. Cust. PO: \_\_\_\_\_ Other: \_\_\_\_\_

**Equipment Data:**

GE Equip. ID: Limitamp Substation: HSPS#2 Unit Location: Indoor  
Cust. Equip ID: P303A Circuit: High Service Pump 3 Atmosphere: Wet & Dirty  
Manufacturer: GE Circuit ID: P303A Poles: 3  
Model: IC716001176 Diagram: 264B2452 Voltage Rating: 4140  
Cat#: 506x030502-d01 Inst. Manual: \_\_\_\_\_ Current Rating: 231

**Inspection:**

Status Legend: SAT=Satisfactory, AR=Action Recommended, RR=Repair Required, RP=Repaired, RFS=Removed from Serv., NA=Not Applicable  
Deficiency Legend: B = Burned, W = Worn, D = Damaged/Broken, IO = Inoperable, OS = Out of Spec., M = Missing, IA = Imp. Adjustment/Alignment, NA = Not Applicable

**Contactor Assemblies:**

	Status	Def.
1 Verify cleanliness and proper lubrication of all contactor components	SAT	
2 Verify absence of grease, oil, and other foreign material on the contact magnetic faces	RP	
3 Verify proper adjustment of interlocking or stab-in components	SAT	
4 Verify proper integrity of the contact assemblies and absence of damage, chips, cracks, etc.	SAT	
5 Verify clearance between interphase barrier and mounting pole components to the blow-out coil	SAT	

**Drawout Compartments:**

1 Verify correct assembly of the barriers and contactor	AR	D
2 Verify operation (open and close) of the isolation switch with main power off; checked with test power interlock	SAT	
3 Verify proper operation of the controller	SAT	
4 Verify proper operation of door interlocks and bypass features	SAT	
5 Verify proper operation current and voltage sensing devices	SAT	

**Low Voltage Compartments:**

1 Verify cleanliness of relays ensuring absence of foreign material, grease and oil and are not blocked	RP	
2 Verify integrity and proper connection/setting of the relay circuitry	RP	
3 Verify proper operation and pick-up and metering of the relay	SAT	
4 Verify proper operation of the field contactors, push buttons, rheostats, selector switches and other mechanical devices	RP	
5 Verify proper installation and ratings of fuses for control circuits and control power	SAT	
6 Verify control panel is locked in place with appropriate hardware	SAT	

**Comments:**

1) Found the presents foreign material in the MCC compartment. *The Material was removed.*  
4) Found Blown Annunciation lights. *Replaced with Spare lights supplied by the customer.*  
As left, this motor controller operates according to manufacturers specification.  
Found broken Divider in the back of the cubicle. Notified customer. Also found control wiring issue with the pump valve wiring.



# Medium Voltage Starter/Contactor (Air Break)

Date 2/22/2019 Project/Task No.: 7014443 Performed by: M Ledbetter

### Electrical Test and Inspections:

1 Perform insulation resistance testing of MCC bus SAT

Test Voltage: <u>5</u> KV	Criteria: <u>        </u> MΩ		
Phase A - B: <u>120000</u> MΩ	Phase B - C: <u>135000</u> MΩ	Phase A - C: <u>122000</u> MΩ	
Phase A - G: <u>122000</u> MΩ	Phase B - G: <u>143000</u> MΩ	Phase C - G: <u>134000</u> MΩ	
Phase A - G: <u>154000</u> MΩ	Phase B - G: <u>171000</u> MΩ	Phase C - G: <u>165000</u> MΩ	

2 Perform conductor resistance testing of MCC starters RP OS

Section <u>M</u> of <u>        </u>	Criteria: <u>200</u> μΩ		
Phase A - B: <u>225</u> μΩ	Phase B - C: <u>253</u> μΩ	Phase A - C: <u>305</u> μΩ	
Section <u>R</u> of <u>        </u>	Criteria: <u>200</u> μΩ		
Phase A - B: <u>322</u> μΩ	Phase B - C: <u>305</u> μΩ	Phase A - C: <u>279</u> μΩ	
Section <u>S</u> of <u>        </u>	Criteria: <u>200</u> μΩ		
Phase A - B: <u>277</u> μΩ	Phase B - C: <u>271</u> μΩ	Phase A - C: <u>249</u> μΩ	

### Comments:

There were several out of spec measurements taken. Adjustments were made. The equipment operates properly.

These starters operate according to manufacturers specifications. Starter Electrical tests meets manufacturers specifications.

- The wiring for the pump valve has a ground in the valve control box. Customer repaired. The issue with the equipment not operating properly was caused by this.



# Medium Voltage Starter/Contactor

(Air Break)

Date 2/26/2019 Project/Task No.: 7014443 Performed by: M Ledbetter

**Work Order Data:**

Project/Task Number: \_\_\_\_\_ Customer: Cartersville WTP Location: City of Cartersville.  
 Project/Task Type: Prev. Maint. Cust. PO: \_\_\_\_\_ Other: \_\_\_\_\_

**Equipment Data:**

GE Equip. ID: Limitamp Substation: HSPS#2 Unit Location: Indoor  
 Cust. Equip ID: P303A Circuit: High Service Pump4 Atmosphere: Wet & Dirty  
 Manufacturer: GE Circuit ID: P303A Poles: 3  
 Model: IC716001176 Diagram: 264B2452 Voltage Rating: 4140  
 Cat#: 506x030502-d01 Inst. Manual: \_\_\_\_\_ Current Rating: 231

**Inspection:**

Status Legend: SAT=Satisfactory, AR=Action Recommended, RR=Repair Required, RP=Repaired, RFS=Removed from Serv., NA=Not Applicable  
 Deficiency Legend: B = Burned, W = Worn, D = Damaged/Broken, IO = Inoperable, OS = Out of Spec., M = Missing, IA = Imp. Adjustment/Alignment, NA = Not Applicable

**Contactor Assemblies:**

	Status	Def.
1 Verify cleanliness and proper lubrication of all contactor components	SAT	
2 Verify absence of grease, oil, and other foreign material on the contact magnetic faces	RP	
3 Verify proper adjustment of interlocking or stab-in components	SAT	
4 Verify proper integrity of the contact assemblies and absence of damage, chips, cracks, etc.	SAT	
5 Verify clearance between interphase barrier and mounting pole components to the blow-out coil	SAT	

**Drawout Compartments:**

1 Verify correct assembly of the barriers and contactor	SAT	
2 Verify operation (open and close) of the isolation switch with main power off; checked with test power interlock	SAT	
3 Verify proper operation of the controller	SAT	
4 Verify proper operation of door interlocks and bypass features	SAT	
5 Verify proper operation current and voltage sensing devices	SAT	

**Low Voltage Compartments:**

1 Verify cleanliness of relays ensuring absence of foreign material, grease and oil and are not blocked	RP	
2 Verify integrity and proper connection/setting of the relay circuitry	RP	
3 Verify proper operation and pick-up and metering of the relay	SAT	
4 Verify proper operation of the field contactors, push buttons, rheostats, selector switches and other mechanical devices	RP	
5 Verify proper installation and ratings of fuses for control circuits and control power	SAT	
6 Verify control panel is locked in place with appropriate hardware	SAT	

**Comments:**

1) Found the presents foreign material in the MCC compartment. *The Material was removed.*  
 4) Found Blown Annunciation lights. *Replaced with Spare lights supplied by the customer.*  
 As left, this motor controller operates according to manufacturers specification.



# Medium Voltage Starter/Contactor (Air Break)

Date 2/22/2019 Project/Task No.: 7014443 Performed by: M Ledbetter

**Electrical Test and Inspections:**

1 Perform insulation resistance testing of MCC bus SAT

Test Voltage: 5 KV Criteria:          MΩ

Phase A - B: <span style="border: 1px solid black; padding: 2px;">455000</span> MΩ	Phase B - C: <span style="border: 1px solid black; padding: 2px;">343000</span> MΩ	Phase A - C: <span style="border: 1px solid black; padding: 2px;">234000</span> MΩ
Phase A - G: <span style="border: 1px solid black; padding: 2px;">325000</span> MΩ	Phase B - G: <span style="border: 1px solid black; padding: 2px;">235000</span> MΩ	Phase C - G: <span style="border: 1px solid black; padding: 2px;">521000</span> MΩ
Phase A - G: <span style="border: 1px solid black; padding: 2px;">325000</span> MΩ	Phase B - G: <span style="border: 1px solid black; padding: 2px;">325000</span> MΩ	Phase C - G: <span style="border: 1px solid black; padding: 2px;">258000</span> MΩ

2 Perform conductor resistance testing of MCC starters RP OS

Section M of          Criteria: 200 μΩ

Phase A - B: <span style="border: 1px solid black; padding: 2px;">123</span> μΩ	Phase B - C: <span style="border: 1px solid black; padding: 2px;">154</span> μΩ	Phase A - C: <span style="border: 1px solid black; padding: 2px;">139</span> μΩ
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Section R of          Criteria: 200 μΩ

Phase A - B: <span style="border: 1px solid black; padding: 2px;">201</span> μΩ	Phase B - C: <span style="border: 1px solid black; padding: 2px;">198</span> μΩ	Phase A - C: <span style="border: 1px solid black; padding: 2px;">210</span> μΩ
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Section S of          Criteria: 200 μΩ

Phase A - B: <span style="border: 1px solid black; padding: 2px;">211</span> μΩ	Phase B - C: <span style="border: 1px solid black; padding: 2px;">211</span> μΩ	Phase A - C: <span style="border: 1px solid black; padding: 2px;">221</span> μΩ
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**Comments:**

There were several out of spec measurements taken. Adjustments were made. The equipment operates properly.  
These starters operate according to manufacturers specifications. Starter Electrical tests meets manufacturers specifications.

# **CARTERSVILLE WTP** **HIGH SERVICE PUMP No.2 ELECTRICAL UPGRADES**

## ***Project Understanding***

The City of Cartersville wants to replace electrical starters for High Service Pumps No.3 and No.4 (HSP#3 & HSP#4) at High Service Pump Station No.2. This will include replacing the existing starters with a new similar Autotransformer type starters (RVAT). Solid-State (RVSS) type starters or VFDs will be provided as alternates for the City's consideration.

## ***Scope of Services***

### **Phase 1 - Detailed Design and Engineering Services (Design Phase)**

Detailed design will include the required electrical design, one-line diagrams, schematics, plans, and details of the improvements outlined in the Project Understanding. Engineering Drawings will be prepared in adequate detail as a Bid Ready set. A Request-for-Proposal (RFP) package with technical specifications will also be prepared for distribution to prospective bidding electrical contractors (i.e., East Electrical, Kelly Electric, etc.).

#### **Deliverables**

Wiedeman and Singleton, Inc. will furnish the following deliverables:

- RFP Package with Technical Specifications & Bid Ready Drawings
- Updated Opinion of Construction Cost

### **Phase 2 - Procurement Assistance Services (Procurement Phase)**

We will distribute RFP packages to all prospective contractors, answer questions, issue any addenda to the RFP (if necessary), and evaluate each proposal received and make a recommendation for which proposal should be accepted by the City. Prospective bidders will be electrical contractors with positive previous experience with the City at the Water Plant. The criteria for RFP selection will be determined based on the lowest price. The procurement phase period will be two weeks due to the critical nature of this project.

### **Phase 3 – Construction Services (Construction Phase)**

There are two types of construction services required: Office Construction Services and On-Site Construction Services. Office Construction Services involve the review of schedules, requests for information, progress payment estimates, and shop drawings. Onsite Construction Services will be provided on an "as-needed" basis.

We anticipate the construction phase to last about four (4) to six (6) months with installation inspection required on a part-time basis with approximate 1 or 2 site visits required per week after installer mobilization. We believe that an additional week of various tasks involving preconstruction, punch list items, and other matters will be required.



**Engineering Budget**

<b>Engineering Services Budget</b>	
Phase 1 – Design	\$ 35,000
Phase 2 – Procurement	\$ 5,000
Phase 3 – Construction Services	\$ 25,000
<b>Total</b>	<b>\$ 65,000</b>

**Construction Budgets (without contingency)**

Budget pricing is provided for replacing the existing starters with similar Autotransformer (RVAT) type starters. Budget pricing for Solid-State (RVSS) type starters and VFDs is provided as alternates for the City’s consideration. The table below outlines the advantages and disadvantages of each type of starter.

<b><u>Starter Type</u></b>	<b><u>Advantages</u></b>	<b><u>Disadvantages</u></b>
Autotransformer Starter (RVAT)	<ul style="list-style-type: none"> <li>• Matches existing starter types</li> <li>• Less expensive</li> </ul>	<ul style="list-style-type: none"> <li>• Large footprint</li> <li>• Requires capacitors to protect the motor from voltage spikes (i.e., more maintenance and parts to be replaced)</li> <li>• More mechanically complex, and it uses three (3) contractors vs. two (2) in the solid-state starters.</li> </ul>
Solid State Starter (RVSS)	<ul style="list-style-type: none"> <li>• Much smoother starts. The starting current is reduced from 6 x Full Load Amps (FLA) to 3 x FLA.</li> <li>• Initial torque on the motor is reduced with smooth acceleration</li> <li>• Produce less heat</li> <li>• Reduces peak demand</li> </ul>	<ul style="list-style-type: none"> <li>• More expensive</li> </ul>
Variable Frequency Drive (VFD)	<ul style="list-style-type: none"> <li>• Advantages of RVSS plus</li> <li>• Eliminates energy loss from throttling valve (Greener)</li> <li>• Produces less hydraulic surge</li> <li>• Reduces peak demand</li> </ul>	<ul style="list-style-type: none"> <li>• More expensive</li> </ul>

<b>Construction Budget (Using Autotransformer Starters)</b>	
Material Cost	\$ 220,000
Installation Cost	\$ 200,000
<b>Total</b>	<b>\$ 420,000</b>

<b>Construction Budget (Using Solid-State Starters)</b>	
Material Cost	\$ 275,000
Installation Cost	\$ 200,000
<b>Total</b>	<b>\$ 475,000</b>

<b>Construction Budget (Using VFDs)</b>	
Material Cost	\$ 440,000
Installation Cost	\$ 200,000
<b>Total</b>	<b>\$ 640,000</b>

### **Project Budget**

The recommended budget for the project is presented below based on using Solid-State Starters and includes a 20% contingency.

<b>Project Budget</b>	
Material Cost	\$ 275,000
Installation Cost	\$ 200,000
Engineering Services	\$ 65,000
Contingency (~20%)	\$ 95,000
<b>Total</b>	<b>\$ 635,000</b>