

|   |                                    |                             |
|---|------------------------------------|-----------------------------|
| PANAMA CANAL AUTHORITY                        | VARIATION                          | PAGE 1 OF 6                 |
| 1. REQUEST FOR PROPOSAL No.:<br><br>RFP-76161 | 2. CONTRACT No.:<br><br>CMC-221427 | 3. DATE:<br>July 4, 2012    |
|   |                                    | 4. VARIATION No.:<br>38 (R) |

5. ISSUED BY:

PANAMA CANAL AUTHORITY  
Employer's Representative  
Locks Project Management Division  
Building 740, Corozal  
Panama, Republic of Panama

|   |   |
|---|---|
| 6. NAME AND ADDRESS OF CONTRACTOR (INCLUDE PHYSICAL & POSTAL ADDRESS)<br><br>Grupo Unidos por el Canal, S.A.<br>Building 22B, Brujas Road<br>Cocoli, Republic of Panama | 7. CONTRACTOR'S TELEPHONE NUMBER:<br><br>507-316-9900 |
|   | 8. CONTRACTOR'S FACSIMILE NUMBER:                     |

9. VARIATION:

☒ The contract referred to in item No. 2 is hereby varied as set forth in item 10, entitled "DESCRIPTION OF VARIATION".

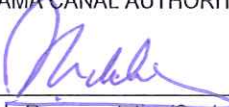
☒ YES. ☐ NO. The contractor shall send a copy, duly signed, of this Variation to the Employer's Representative/Contracting Officer.

|   |   |
|---|---|
|   | 9 A. THIS VARIATION IS EXECUTED ON THE BASIS OF: (Specify the legal authority).<br><br>THE VARIATION DESCRIBED IN ITEM 10 IS HEREBY INCORPORATED AND MADE A PART OF THE CONTRACT.   |
|   | 9 B. THE CONTRACT REFERRED TO IN ITEM NO. 2, IS VARIED TO INCORPORATE ADMINISTRATIVE CHANGES (such as the paying office, account numbers, etc.).  |
| X | 9 C. THIS BILATERAL AGREEMENT IS SIGNED AND INCORPORATED INTO THE CONTRACT REFERRED TO IN ITEM NO. 2 OF THIS FORM, ON THE BASIS OF: (Specify the legal authority) Volume III, Conditions of Contract, Sub-Clause 1.16 [Entire Agreement], 4 <sup>th</sup> Paragraph |
|   | 9 D. OTHER. (Specify manner and the legal authority).   |
|   | 9 E. ACCOUNT NUMBER (If required):  |

10. DESCRIPTION OF THE VARIATION (List in accordance with the order of the Contract. If additional space is required, use blank sheets).

**See attached**

Except for the variation(s) herein specified, all other terms and conditions of the Contract remain unchanged.

|   |   |
|---|---|
| 11. NAME AND TITLE OF THE PERSON AUTHORIZED TO SIGN (Type or print)<br><br>Bernardo Gonzalez<br>Contractor's Representative         | 12. NAME AND TITLE OF THE EMPLOYER'S REPRESENTATIVE/CONTRACTING OFFICER (Type or print)<br><br>Jorge de la Guardia, Employer's Representative   |
| 13. CONTRACTOR<br><br><br>(Authorized signature) | 14. DATE:<br>17/07/2012   |
|   | 15. PANAMA CANAL AUTHORITY<br><br><br>(Employer's Representative/Contracting Officer's signature) |
|   | 16. DATE:<br>4/01/2012  |

Variation No. 38 is issued to incorporate the following:

1. **Volume II, Part 2, Section 26 05 43 [Underground Ducts & Raceways for Electrical Systems]** - Delete Paragraph 1.04.B.2.c entirely and replace it with the following:

*"c. **Ground Rods:** In each electrical manhole and at a convenient point close to the wall, two ground rods shall be installed, each in a diagonally opposing corner. Ground rods shall be as detailed in Section 26 05 26 [Grounding and Bonding for Electrical Systems]. As an alternative, in lieu of installing ground rods, the Contactor may install 4/0 AWG or larger bare conductors for connecting the manhole's copper ring bus to the Lock's Grounding System at two locations."*

(RFV-120)

2. **Volume II, Part 2, Section 26 12 19 [Pad-Mounted Liquid Filled Medium Voltage Transformer]** - Delete Paragraph 1.06.E.2 entirely and replace it with the following:

**"2. Testing the Insulation Fluid:** The Employer reserves the right to conduct any of the tests listed in part of this paragraph. The comparison parameters shall be supplied by the oil manufacturer. The tables listed below are based on the standards for Natural (Vegetable Oil) Ester Fluids IEEE C57.147 and ASTM D 6871. The Employer's Representative will not accept a transformer that does not pass these tests.

a. These tests values apply only to new insulating fluid as received prior to any processing. The Contractor shall test the oil for the transformers as per the ASTM standard listed below. Fluid exhibiting the following characteristics shall be considered acceptable.

| PROPERTY                              | VALUE | ASTM No. |
|---------------------------------------|-------|----------|
| Dielectric Breakdown voltage at 60 Hz |       |          |
| Disk Electrodes, min, kV              | 30    | D877     |
| VDE Electrodes, min, kV, 1mm gap      |       | D1816    |
| Sampled from bulk tanker              | 20    |          |
| Sampled from drums/totes              | 35    |          |
| VDE Electrodes, min, kV, 2mm gap      |       |          |
| Sampled from bulk tanker              | 35    |          |

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| Sampled from drums/totes  | 60               |       |
| Dielectric Breakdown voltage, impulse conditions 25°C, min, kV, 25.4 mm gap | 130              | D3300 |
| Neutralization number, max, mg KOH/g  | 0.06             | D974  |
| Color, max  | L1.0             | D1500 |
| Visual Examination  | Bright and Clear | D1524 |
| Water Content, max, mg/kg at 20°C   |                  | D1533 |
| Sampled from bulk tanker  | 200              |       |
| Sampled from drums/totes  | 100              |       |
| Dissipation factor at 60 Hz, max, (%)                                       |                  | D924  |
| 25 °C   | 0.2              |       |
| 100 °C  | 4.0              |       |
| Flash Point, min, °C  | 275              | D92   |
| Fire Point, min, °C   | 300              | D92   |
| Pour Point, max, °C   | -10              | D97   |
| Viscosity, max, mm <sup>2</sup> /s (cSt)                                    |                  | D445  |
| 100 °C  | 15               |       |
| 40 °C   | 50               |       |
| 0 °C  | 500              |       |

(RFI-434)

3. Volume II, Part 2, Section 26 90 00 [Field Testing Electrical System] - Delete Paragraph 1.03.L.8 entirely and replace it with the following:

**"8. Testing the Insulation Fluid:** The Employer's Representative reserves the right to conduct any of the oil tests listed in part Section 26 12 19 (Pad Mounted Transformer Liquid Filled Medium Voltage Transformer). The Employer's Representative will not accept a transformer that does not pass this test. Test that does not meet the pass criteria shall be paid by the Contractor. When tested, the fluid shall exhibit the following characteristics to be considered acceptable.

| PROPERTY                            | VALUE<br>(Voltage ≤ 69 kV) | ASTM<br>No. |
|-------------------------------------|----------------------------|-------------|
| Dielectric Strength, min, kV        |                            | D1816       |
| 1 mm gap                            | 25                         |             |
| 2 mm gap                            | 45                         |             |
| Dissipation factor, max, (%), 25 °C | 0.5                        | D924        |



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| Color, max, ASTM units                            | L1.0             | D1500 |
| Visual Examination                                | Bright and Clear | D1524 |
| Neutralization number, max, mg KOH/g              | 0.06             | D974  |
| Water Content, max, mg/kg                         | 300              | D1533 |
| Fire Point, min, °C                               | 300              | D92   |
| Viscosity, max, mm <sup>2</sup> /s (cSt) at 40 °C | 50               | D445  |

(RFI-434)

4. **Volume II, Part 2, Section 27 10 00 [Structured Cabling System for Communication Inside Plant]** – In the Table located in Paragraph 1.03.B.4.b.7.j, delete the following row:

|                             |                |
|-----------------------------|----------------|
| Operating Temperature Range | 0 °C to +85 °C |
|-----------------------------|----------------|

And replace it with the following:

|                             |              |
|-----------------------------|--------------|
| Operating Temperature Range | 10°C to 60°C |
|-----------------------------|--------------|

(RFI-432)

5. **Volume II, Part 2, Section 27 10 00 [Structured Cabling System for Communication Inside Plant]** – Delete Paragraph 1.03.C.1.c.2 entirely and replace it with the following:

"2) *Splice loss shall not exceed 0.1 dB per fiber optic splice.*" (RFI-432)

6. **Volume II, Part 2, Section 33 82 00 [Cabling for Underground Communication Outside Plant]** - Delete Paragraph 1.03.B.4.c.2 entirely and replace it with the following:

"2) *For specific outdoor areas where 24 or fewer fibers are required, and where small or confined space makes difficult installing and terminating cables with more than 24 fibers, cables shall have 6, 12, or 24 fibers as required. All other cables shall have no less than 48 fibers. These fiber optic cables shall have the following or better characteristics:*" (RFI-443)

7. **Volume II, Part 2, Section 33 82 00 [Cabling for Underground Communication Outside Plant]** – In the Table No. 33 82 00-2, located in Paragraph 1.03.B.4.a.4, delete the following two rows:

|             |  |  |
|-------------|--|--|
| Attenuation | 1.5 dB/km at 1,300 nm<br>3.7 dB/km at 850 nm | 0.4 dB/km at 1,310 nm<br>0.2 dB/km at 1,550 nm |
|-------------|--|--|

|                                    |   |              |
|------------------------------------|---|--------------|
| Polarization Mode Dispersion (PMD) | - | 0.1 ps/(√km) |
|------------------------------------|---|--------------|

and replace them with the following:

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|             |  |  |
|-------------|--|--|
| Attenuation | 1.5 dB/km at 1,300 nm<br>3.7 dB/km at 850 nm | 0.4 dB/km at 1,310 nm<br>0.3 dB/km at 1,550 nm |
|-------------|--|--|

|                                    |   |             |
|------------------------------------|---|-------------|
| Polarization Mode Dispersion (PMD) | - | 0.3ps/(√km) |
|------------------------------------|---|-------------|

(RFI-432)

8. **Volume II, Part 2, Section 33 82 00 [Cabling for Underground Communication Outside Plant]** – In Table No. 33 82 00-3, located in Paragraph 1.03.B.4.c.2 delete the following row:

|                 |   |
|-----------------|---|
| Exterior Jacket | Black polyethylene with minimum thickness of 2.5 mm, suitable for underground use, resistant to sunlight and temperatures up to 60 °C. There shall be no bubbles, cracks, or other imperfections. |
|-----------------|---|

and replace it with the following:

|                 |   |
|-----------------|---|
| Exterior Jacket | Black polyethylene with minimum thickness of 2.5 mm, suitable for underground use, resistant to sunlight and temperatures between 10 and 60°C. There shall be no bubbles, cracks, or other imperfections. |
|-----------------|---|

(RFI-432)

9. **Volume II, Part 2, Section 40 91 00 [Primary Process Measurement Devices]** - Delete Paragraph 1.03.A.2.a entirely and replace it with the following:

*“a. Use 24 VDC power (unless self-powered) or 12 VDC power (where necessary), and shall not require batteries.”* (RFV-119)

10. **Volume II, Part 2, Section 40 91 00 [Primary Process Measurement Devices]** - Delete Paragraph 1.03.B.1.c entirely and replace it with the following:

*“c. Reserved”* (RFV-119)

11. **Volume II, Part 2, Section 40 91 00 [Primary Process Measurement Devices]** – Insert a new paragraph after Paragraph 1.03.B.4.f as follows:

*“g. Modbus TCP/IP encapsulated over Ethernet: Use of this fieldbus is only acceptable for air quality sensors, water quality sensors, and other devices where specified in the Employer’s Requirements.”* (RFV-119)

12. **Volume II, Part 2, Section 40 91 00 [Primary Process Measurement Devices]** – Insert a new paragraph after Paragraph 1.03.C.2.c as follows:

*“d. Units shall be wired to nearest I/O concentrator or PLC by means of any of the fieldbuses listed in subparagraph 1.03.B.4.”* (RFV-119)

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There is no time or cost impact to the Locks Contract as a consequence of this Variation.

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A handwritten signature in blue ink, consisting of a stylized 'B' with a long diagonal stroke extending downwards and to the left.