

PANAMA CANAL AUTHORITY	VARIATION	PAGE 1 OF 6
1. REQUEST FOR PROPOSAL No.: RFP-76161	2. CONTRACT No.: CMC-221427	3. DATE: June 9, 2011
		4. VARIATION No.: 013 (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) Grupo Unidos por el Canal, S.A. Building 12R85, Cocoli Panama, Republic of Panama	7. CONTRACTOR'S TELEPHONE NUMBER: 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). 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 th 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) Bernardo Gonzalez Contractor's Representative	12. NAME AND TITLE OF THE EMPLOYER'S REPRESENTATIVE/CONTRACTING OFFICER (Type or print) Jorge de la Guardia, Employer's Representative
13. CONTRACTOR  (Authorized signature)	14. DATE: 15/06/2011
	15. PANAMA CANAL AUTHORITY  (Employer's Representative/Contracting Officer's signature)
	16. DATE: 9/11/2011

Variation No. 013 is issued to incorporate the following changes:

1. **Volume II, Part 1, Section 01 81 29 [Elect and Lighting Systems]-** Delete Paragraph 1.05 C.2, and replace it with the following:

"2. Reserved"

(RFV 023)

2. **Volume II, Part 1, Section 01 81 29 [Elect. and Lighting Systems]-** Delete Paragraph 1.04 H, and replace it with the following:

"H. Crossunder:

1. The Crossunder tunnel for electrical, control, communication, and power cables shall be separate from the water, air, and oil tunnel. There shall be at least two electrical/control/ communication Crossunder tunnels, one in the higher level and another in the lower level. All cables shall be run in cable trays, except medium voltage cables, which shall run under the floor in concrete encased ducts, with access provided by manholes at both ends of the crossing, or as an alternative as indicated in paragraph 2 below. Cable trays shall be separate and dedicated for power, as well as separate and dedicated for communication and control. Cable tray and hardware support shall be corrosion resistant. Illumination in the tunnels shall be connected to alternate sources and provided with battery operated emergency power source. Tunnels shall be provided with alarm systems to alarm locally, at the control building, and at the guard booth, in the event of flooding condition or loss of forced air ventilation.

2. In lieu of installing the medium voltage cables in concrete encased ducts under the floor with access provided by manholes at both ends of the crossing, the concrete duct banks could be installed in the tunnel as follows.

*a) **Access:** Cable vaults, with a minimum dimension of 3 meter wide, 2.5 meter deep and 2.5 meter high, shall be provided at both end of the crossing for each of the duct banks. Doors shall be hinged or sliding for ease of access to the vault. Ducts banks shall enter at each side wall at midpoint between the front door and back wall. Contractor shall install cables in the conduits of the duct banks located toward the back of the vault and leave the unused conduits (spare) in the front. Ducts shall be provided with end bells. Vaults shall be provided with pulling irons and cable trays.*

*b) **Aisle:** The duct banks shall be arranged so that the walking aisle in the crossunder tunnel has a minimum width of 2.0 meter.*

c) **Conduits Arrangement:** All bends shall be done using manufactured elbows. Elbows shall have a minimum radius of 36 inches.

1) The numbers of conduit bends between the upper manholes and the vaults shall not exceed a maximum of four totaling 270 degrees or less. The elbows next to the manholes shall have a minimum radius of 48 inches (Elbows #1 and #12 in Figure #1).

2) The numbers of conduit bends between vaults shall not exceed a maximum of four totaling 180 degrees or less. The elbows next to the vaults shall have a minimum radius of 48 inches (Elbows #5 and #8 in Figure #1).

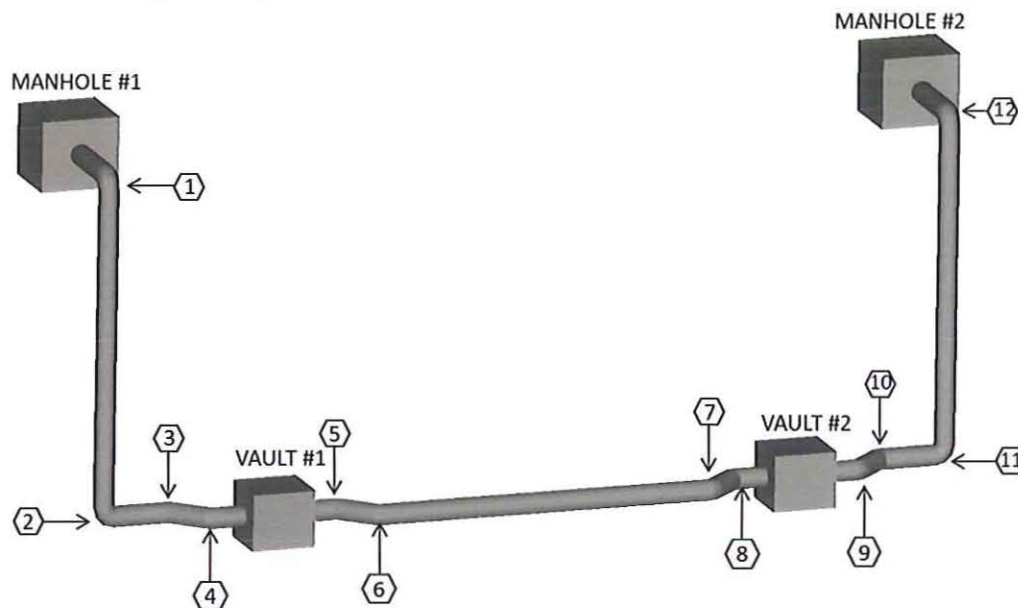


Figure #1

(Pull boxes for cable support at vertical shaft not shown)

Pulling: Each duct bank shall be designed so that the maximum pulling tension shall not exceed 3300 lb when pulling three conductors in a conduit. The sidewall pressure shall be limited to 500 lb/ft for 15 KV conductors and 600 lb/ft for the 44 KV conductors. Calculations shall consider that the pulling is done at the manholes or vaults, a coefficient of friction of 0.35 and that cables are pulled in any direction between Manhole #1 and Vault #1, Vault #1 and Vault #2, Vault #2 and Manhole #2." (RFV 048)

3. **Volume II, Part 1, Section 26 05 43 [Undgd. Ducts & Raceways for Elect. Syst]-** Delete the first two sentences of Paragraph 1.04 C, and replace them with the following:

"1. General: The Contractor shall provide vertical raceways as pathways for all cables to be routed through the Crossunders. From the manholes or cables vaults at the lower end to the upper portion of the shaft there shall be provided raceways to house all types of cables to be routed, in order to provide physical and fire propagation protection of the cables. Adequate support (RFV 048)

4. **Volume II, Part 2, Section 01 86 13 [Plant Mech. Systems and Equipment]-** Delete Paragraph 1.04 F and replace it with the following:

"F. Motorized Capstan Assembly: The type, location, capacity, speed, spacing between capstans, and the number of motorized capstans shall require the approval of the Employer's Representative. Each capstan shall be suitable for use in an outdoor, tropical, marine environment. The capstan assembly shall include but shall not be limited to: base, identity plates, capacity plates, brakes, control panel, indicating lamps and all required safety devices. Enclosure for capstan's controllers shall be made of corrosion resistant materials and rated IP 56. Capstan's motor shall be rated IP 65." (RFV 044)

5. **Volume II, Part 2, Section 26 20 00 [Electrical Low Voltage Distribution Work]-** Delete Paragraph 1.03 D.1 and replace it with the following:

"1. Equipment metal enclosures installed outdoors shall be of corrosion resistant materials and shall be NEMA 4X weatherproof enclosures. Enclosures for capstan's controller shall comply with Paragraph 1.04 F of Section 01 86 13 of the Employer's Requirements." (RFV 044)

6. **Volume II, Part 2, Section 26 29 23 [Variable Frequency Drive]-** Delete Paragraph 1.04 F.7, and replace it with the following:

"7. Cooling system shall be provided to limit the driver's operating temperature and assure the performance of the equipment. As a minimum, the driver's temperature shall be continuously monitored and the equipment shall generate a warning alarm upon an increase of the operating temperature and before reaching shutdown temperature. The warning alarm shall be reported to the Control Building." (RFV 039)

7. **Volume II, Part 2, Section 26 33 00 [Direct Current Equipment]-** Delete Paragraph 1.01 A. 2. e., and replace it with the following:

"e. Backup 120/240 AC to +24 VDC power supplies, or +125VDC to +24 Volt DC-DC converters for process control systems and other systems." (RFV 054)

8. **Volume II, Part 2, Section 26 33 00 [Direct Current Equipment]-** Delete Paragraph 1.03 A. 4.a., and replace it with the following:

"a. Nominal +24 VDC output shall be provided for all process control systems (PCSS) at equipment room of main control building and remote machinery rooms,

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derived from +125 VDC power systems using DC/DC converters, and either 120 VAC using power supplies or redundant +125 to +24 Volt DC-DC converters."

(RFV 054)

9. **Volume II, Part 2, Section 26 33 00 [Direct Current Equipment]-** Delete Paragraph 1.03 A. 4.d, and replace it with the following:

"d. +24 VDC systems shall include, but not be limited to, the following: DC-DC converters (125-to-24) as main sources, distribution panelboards, and either power supplies operable on 120 VAC as redundant sources or redundant DC-DC converters (125-to-24) as redundant sources."

(RFV 054)

10. **Volume II, Part 2, Section 26 33 00 [Direct Current Equipment]-** Incorporate Paragraph 1.03 A. 4.e, as follows:

"e. Regardless of the source of +24 VDC power, 120 VAC shall be furnished for miscellaneous non-critical loads such as heaters, lamps, and power outlets in PCS cabinets."

(RFV 054)

11. **Volume II, Part 2, Section 26 33 00 [Direct Current Equipment]-** Delete the title of Figure No. 26 33 00-5 and replace it with the following:

"Figure No. 26 33 00-6: Typical simplified one-line diagram of +24 VDC power systems for machinery rooms. Note that this figure does not illustrate an allowable configuration with dual 125-to-24 Volt DC-DC converters."

(RFV 054)

12. **Volume II, Part 2, Section 28 50 00 [Evacuation Systems]-** In Paragraph 1.01 B, Table 28 50 00-1, add Row 13 as follows:

"Section 40 95 13.16 - Process Control Hardware for Fire Fighting Control Systems (FFCSs)."

(RFV 041)

13. **Volume II, Part 2, Section 40 95 13.16 [Process Control Hardware for FFCSs]-** In Paragraph 1.01 B, Table 40 95 13.16-1, add Row 6 as follows:

"Section 28 50 00 – Evacuation Systems, and renumber the Rows currently shown as 6, 7 and 8 accordingly."

(RFV 041)

14. **Volume II, Part 2, Section 40 95 13.16 [Process Control Hardware for FFCS's]-** Delete Paragraph 1.03 B.1, and replace it with the following:

"1. A redundant master PLC or controller shall be used to coordinate the system's operation. Each firefighting equipment room (FER) shall use a slave PLC."

(RFV 041)

15. **Volume II, Part 2, Section 40 95 13.16 [Process Control Hardware for FFCS's]-** Delete Paragraph 1.03 B.3, and replace it with the following:

"3. FFCS shall be NFPA compliant " (RFV 041)

16. **Volume II, Part 2, Section 40 95 13.16 [Process Control Hardware for FFCSs]-**
Delete Paragraph 1.03 E. 3, and replace it with the following:

"3. *Reserved*" (RFV 041)

17. **Volume II, Part 2, Section 40 95 13.16 [Process Control Hardware for FFCSs]-**
Delete Paragraph 1.04 A.1,c and replace it with the following:

"c. *Reserved*" (RFV 041)

18. **Volume II, Part 3 Section 01 57 19.13 [Environment Management System]-**
Delete the first sentence of Paragraph 1.05 B.7, and replace it with the following:

"The Contractor shall monitor, on an annual basis, airborne vehicle emissions"
(RFV 051)