Embassy of the United States of America
September 03, 2020

To: Prospective Offerors
SUBJECT: **Solicitation Number 19EG3020Q0021 Cairo II Chiller Installation.**

Dear Prospective Offerors,

The Embassy of the United States of America invites you to submit a price quotation for **Cairo II Chiller Installation** at **US Embassy Cairo 8 Kamal El Din Salah, Garden City, Cairo – Egypt**.

If you would like to submit a quotation, you should thoroughly examine all documents contained in the Request for Quotation package, and submit your quotation according to section J.

Your offer must be submitted by e-mail to CairoContracts@state.gov on or before **September 20, 2020 at 02:00 PM.**

The Site visit will be on **September 09, 2020 at 10:00 AM** at **US Embassy Cairo.**

In order to attend the site visit, you are kindly requested to provide the name and Egyptian ID number / Passport # of each of your representatives that will attend maximum by COB **Sept 07, 2020**. Please e-mail this information to ShoukryNF@state.gov to prepare for your access to the Site Visit premises.

The order price will be fixed, with no adjustment for any escalation in costs or prices of labor or materials. Each offeror will be responsible for determining the amount of labor and materials that will be required to complete the project, and for pricing his proposal accordingly.

The Contracting Officer reserves the right to reject any and all offers and to waive any informality in offers received. In addition, the Embassy reserves the right to establish a competitive range of one or more offerors, and to conduct further negotiations concerning price and other terms before awarding the order, or to award without discussions.

The U.S. Government intends to award an order to the lowest priced, technically acceptable offeror who is a responsible contractor.

In order for your company to do business with the US Federal Government, you need to register it in the below web site and provide us with the registration number.
https://www.sam.gov

The Completion of the entire work will be within **60 Calendar Days** from receipt of the notice to proceed. In the event of an unauthorized or unexcused delay in completing the project, liquidated damages in the amount of **EGP 875.00** per calendar day will be assessed until substantial completion of the project is achieved.

Any questions regarding this Request for quotation may be directed by letter, Email MohamedSH@state.gov or by telephone to Sherif Mohamed at Tel +20(2)2797-3922 during business hours. For any technical matters kindly contact Eng. Alfred Louis.

Sincerely,

Omar Ali
Contracting Officer

Enclosure

TABLE OF CONTENTS

REQUEST FOR QUOTATION (THIS IS NOT AN ORDER)

THIS RFQ ☐ IS ☒ IS NOT A SMALL BUSINESS SET-ASIDE

PAGE 1 OF PAGES 160

1. REQUEST NO.	2. DATE ISSUED	3. REQUISITION/PURCHASE REQUEST NO.	4. CERT. FOR NAT. DEF. UNDER BDSA REG. 2 AND/OR DMS REG. 1	RATING
19EG3020Q0021	09/03/2020	PR9364967		

5a. ISSUED BY
AMERICAN EMBASSY CAIRO
US EMBASSY CAIRO 8 KAMAL EL DIN SALAH, ATTN: PROCUREMENT/CONTRACTING OFFICE
CAIRO 11519
EGYPT

6. DELIVER BY (Date)
09/20/2020

5b. FOR INFORMATION CALL (NO COLLECT CALLS)

NAME	TELEPHONE NUMBER	
	AREA CODE	NUMBER
Sherif Mohamed		01222186445

7. DELIVERY
☒ FOB DESTINATION ☐ OTHER (See Schedule)

9. DESTINATION
a. NAME OF CONSIGNEE
AMERICAN EMBASSY CAIRO

8. TO:

a. NAME	b. COMPANY

b. STREET ADDRESS
US EMBASSY CAIRO 8 KAMAL EL DIN SALAH, ATTN: SPM
RECEIVING OFFICE

c. STREET ADDRESS

c. CITY
CAIRO

d. CITY	e. STATE	f. ZIP CODE	d. STATE	e. ZIP CODE
				11519

10. PLEASE FURNISH QUOTATIONS TO THE ISSUING OFFICE IN BLOCK 5a ON OR BEFORE CLOSE OF BUSINESS (Date)
09/20/2020

IMPORTANT: This is a request for information and quotations furnished are not offers. If you are unable to quote, please so indicate on this form and return it to the address in Block 5a. This request does not commit the Government to pay any costs incurred in the preparation of the submission of this quotation or to contract for supplies or service. Supplies are of domestic origin unless otherwise indicated by quoter. Any representations and/or certifications attached to this Request for Quotation must be completed by the quoter.

11. SCHEDULE (Include applicable Federal, State and local taxes)

ITEM NO. (a)	SUPPLIES/ SERVICES (b)	QUANTITY (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)
	Installing new screw chiller at Cairo II building 6th floor at US Embassy Compound				

12. DISCOUNT FOR PROMPT PAYMENT	a. 10 CALENDAR DAYS (%)	b. 20 CALENDAR DAYS (%)	c. 30 CALENDAR DAYS (%)	d. CALENDAR DAYS NUMBER	d. CALENDAR DAYS PERCENTAGE

NOTE: Additional provisions and representations ☐ are ☐ are not attached.

13. NAME AND ADDRESS OF QUOTER	14. SIGNATURE OF PERSON AUTHORIZED TO SIGN QUOTATION	15. DATE OF QUOTATION
a. NAME OF QUOTER		
b. STREET ADDRESS	16. SIGNER	
	a. NAME (Type or print)	b. TELEPHONE AREA CODE
c. COUNTY		
d. CITY / e. STATE / f. ZIP CODE	c. TITLE (Type or print)	NUMBER

AUTHORIZED FOR LOCAL REPRODUCTION
Previous edition not usable

STANDARD FORM 18 (REV. 6-95)
Prescribed by GSA-FAR (48 CFR) 53.215-1(a)

REQUEST FOR QUOTATIONS - CONSTRUCTION

A. PRICE

The Contractor shall complete all work, including furnishing all labor, material, equipment and services required under this purchase order for the following firm fixed price and within the time specified. This price shall include all labor, materials, all insurances, overhead and profit.

Total Price (including all labor, materials, overhead and profit)	**EGP**

A.1 VALUE ADDED TAX

VALUE ADDED TAX (VAT). The Government will not reimburse the Contractor for VAT under this contract. The Contractor shall not include a line for VAT on Invoices as the U.S. Embassy has a tax exemption certificate with the host government.

B. SCOPE OF WORK

The character and scope of the work are set forth in the contract. The Contractor shall furnish and install all materials required by this contract to install new Government furnished screw chiller at Cairo II building 6th floor at US Embassy Compound.

In case of differences between small and large-scale drawings, the latter will govern. Where a portion of the work is drawn in detail and the remainder of the work is indicated in outline, the parts drawn in detail shall apply also to all other portions of the work.

C. PACKAGING AND MARKING

Mark materials delivered to the site as follows:

None

The remainder of this page is intentionally blank.

SECTION D - INSPECTION AND ACCEPTANCE

The COR, or his/her authorized representatives, will inspect from time to time the services being performed and the supplies furnished to determine whether work is being performed in a satisfactory manner, and that all supplies are of acceptable quality and standards.

The Contractor shall be responsible for any countermeasures or corrective action, within the scope of this contract, which may be required by the Contracting Officer as a result of such inspection.

D.1 SUBSTANTIAL COMPLETION

(a) "*Substantial Completion*" means the stage in the progress of the work as determined and certified by the Contracting Officer in writing to the Contractor, on which the work (or a portion designated by the Government) is sufficiently complete and satisfactory. Substantial completion means that the property may be occupied or used for the purpose for which it is intended, and only minor items such as touch-up, adjustments, and minor replacements or installations remain to be completed or corrected which:

(1) do not interfere with the intended occupancy or utilization of the work, and
(2) can be completed or corrected within the time period required for final completion.

(b) The "date of substantial completion" means the date determined by the Contracting Officer or authorized Government representative as of which substantial completion of the work has been achieved.

Use and Possession upon Substantial Completion - The Government shall have the right to take possession of and use the work upon substantial completion. Upon notice by the Contractor that the work is substantially complete (a Request for Substantial Completion) and an inspection by the Contracting Officer or an authorized Government representative (including any required tests), the Contracting Officer shall furnish the Contractor a Certificate of Substantial Completion. The certificate will be accompanied by a Schedule of Defects listing items of work remaining to be performed, completed or corrected before final completion and acceptance. Failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The Government's possession or use upon substantial completion shall not be deemed an acceptance of any work under the contract.

D.2 FINAL COMPLETION AND ACCEPTANCE

D.2.1 "Final completion and acceptance" means the stage in the progress of the work as determined by the Contracting Officer and confirmed in writing to the Contractor, at which all work required under the contract has been completed in a satisfactory manner, subject to

the discovery of defects after final completion, and except for items specifically excluded in the notice of final acceptance.

D.2.2 The "*date of final completion and acceptance*" means the date determined by the Contracting Officer when final completion of the work has been achieved, as indicated by written notice to the Contractor.

D.2.3 FINAL INSPECTION AND TESTS. The Contractor shall give the Contracting Officer at least five (5) days advance written notice of the date when the work will be fully completed and ready for final inspection and tests. Final inspection and tests will be started not later than the date specified in the notice unless the Contracting Officer determines that the work is not ready for final inspection and so informs the Contractor.

D.2.4 FINAL ACCEPTANCE. If the Contracting Officer is satisfied that the work under the contract is complete (with the exception of continuing obligations), the Contracting Officer shall issue to the Contractor a notice of final acceptance and make final payment upon:

- Satisfactory completion of all required tests,
- A final inspection that all items by the Contracting Officer listed in the Schedule of Defects have been completed or corrected and that the work is finally complete (subject to the discovery of defects after final completion), and
- Submittal by the Contractor of all documents and other items required upon completion of the work, including a final request for payment (Request for Final Acceptance).

The remainder of this page is intentionally blank.

SECTION E - DELIVERIES OR PERFORMANCE

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK
(APR 1984)

The Contractor shall be required to:

(a) commence work under this contract within **15 calendar days** after the date the Contractor receives the notice to proceed,
(b) prosecute the work diligently, and,
(c) complete the entire work ready for use not later than **60 days from the Notice To Proceed (NTP) starting date**.

The time stated for completion shall include final cleanup of the premises.

52.211-12 LIQUIDATED DAMAGES - CONSTRUCTION (SEPT 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, the Contractor shall pay liquidated damages to the Government in the amount of **EGP 875.00** for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Default clause.

CONTRACTOR'S SUBMISSION OF CONSTRUCTION SCHEDULES

(a) The time for submission of the schedules referenced in FAR 52.236-15, "Schedules for Construction Contracts", paragraph (a), is hereby modified to reflect the due date for submission as "**10** calendar days after receipt of an executed contract".

(b) These schedules shall include the time by which shop drawings, product data, samples and other submittals required by the contract will be submitted for approval.

(c) The Contractor shall revise such schedules (1) to account for the actual progress of the work, (2) to reflect approved adjustments in the performance schedule, and (3) as required by the Contracting Officer to achieve coordination with work by the Government and any separate contractors used by the Government. The Contractor shall submit a schedule, which sequences work so as to minimize disruption at the job site.

(d) All deliverables shall be in the English language and any system of dimensions (English or metric) shown shall be consistent with that used in the contract. No extension of time shall be allowed due to delay by the Government in approving such deliverables if the Contractor has failed to act promptly and responsively in submitting its deliverables. The Contractor shall identify each deliverable as required by the contract.

(e) Acceptance of Schedule: When the Government has accepted any time schedule; it shall be binding upon the Contractor. The completion date is fixed and may be extended only by a written contract modification signed by the Contracting Officer. Acceptance or approval of any schedule or revision thereof by the Government shall not:

(1) Extend the completion date or obligate the Government to do so,
(2) Constitute acceptance or approval of any delay, or
(3) Excuse the Contractor from or relieve the Contractor of its obligation to maintain the progress of the work and achieve final completion by the established completion date.

NOTICE OF DELAY

If the Contractor receives a notice of any change in the work, or if any other conditions arise which are likely to cause or are actually causing delays which the Contractor believes may result in late completion of the project, the Contractor shall notify the Contracting Officer. The Contractor's notice shall state the effect, if any, of such change or other conditions upon the approved schedule, and shall state in what respects, if any, the relevant schedule or the completion date should be revised. The Contractor shall give such notice promptly, not more than ten (10) days after the first event giving rise to the delay or prospective delay. Only the Contracting Officer may make revisions to the approved time schedule.

NOTICE TO PROCEED

(a) After receiving and accepting any bonds or evidence of insurance, the Contracting Officer will provide the Contractor a Notice to Proceed. The Contractor must then prosecute the work, commencing and completing performance not later than the time period established in the contract.

(b) It is possible that the Contracting Officer may elect to issue the Notice to Proceed before receipt and acceptance of any bonds or evidence of insurance. Issuance of a Notice to Proceed by the Government before receipt of the required bonds or insurance certificates or policies shall not be a waiver of the requirement to furnish these documents.

WORKING HOURS

All work shall be performed during **Sunday through Thursday from 08:00 am to 04:30 pm**. Other hours, if requested by the Contractor, may be approved by the Contracting Officer's Representative (COR). The Contractor shall give **48 hours in advance** to COR who will consider any deviation from the hours identified above. Changes in work hours, initiated by the Contractor, will not be a cause for a price increase.

(a) The Department of State observes the following days as holidays:

New Year's Day	American	Wednesday	January 1
Coptic Christmas	Egyptian	Tuesday	January 7
Martin Luther King's Birthday	American	Sunday	January 19
Revolution/Police Day*	Egyptian	Saturday	January 25

Washington's Birthday	American	Sunday	February 16
Sham El Nessim	Egyptian	Monday	April 20
Sinai Liberation Day*	Egyptian	Saturday	April 25
Egyptian Labor Day*	Egyptian	Friday	May 1
Memorial Day	American	Sunday	May 24
Eid El Fitr**	Egyptian	Sun/Mon	May 24/25
June 30 Revolution	Egyptian	Tuesday	June 30
Independence Day	American	Sunday	July 5
National Day	Egyptian	Thursday	July 23
Eid Al Adha**	Egyptian	Thurs/Fri/Sat	July 30-Aug 1
Islamic New Year**	Egyptian	Thursday	August 20
Labor Day	American	Sunday	September 6
Armed Forces Day	Egyptian	Tuesday	October 6
Columbus Day	American	Sunday	October 11
Moulid El Nabi**	Egyptian	Thursday	October 29
Veteran's Day	American	Wednesday	November 11
Thanksgiving Day	American	Thursday	November 26
Christmas Day	American	Thursday	December 24

*The Embassy will consider moving the observance date of local holidays falling on weekends or otherwise in the event that the Egyptian Government issues decisions mandating that both the public and private sector change the observance date of a local holiday.

**Dates of Islamic holidays are subject to confirmation from Dar al Ifta, and may vary from the above projected dates.

Any other day designated by Federal law, Executive Order, or Presidential Proclamation.

PRECONSTRUCTION CONFERENCE

NONE

The remainder of this page is intentionally blank.

SECTION F - ADMINISTRATIVE DATA

652.242-70 CONTRACTING OFFICER'S REPRESENTATIVE (COR) (AUG 1999)

(a) The Contracting Officer may designate in writing one or more Government employees, by name or position title, to take action for the Contracting Officer under this contract. Each designee shall be identified as a Contracting Officer's Representative (COR). Such designation(s) shall specify the scope and limitations of the authority so delegated; provided, that the designee shall not change the terms or conditions of the contract, unless the COR is a warranted Contracting Officer and this authority is delegated in the designation.

(b) The COR for this contract is **Facilities Engineer / Eng Veronica Tawfik.**

Payment: The Contractor's attention is directed to Section H, 52.232-5, "Payments Under Fixed-Price Construction Contracts". The following elaborates on the information contained in that clause.

Requests for payment, may be made no more frequently than monthly. Payment requests shall cover the value of labor and materials completed and in place, including a prorated portion of overhead and profit.

After receipt of the Contractor's request for payment, and on the basis of an inspection of the work, the Contracting Officer shall make a determination as to the amount, which is then due. If the Contracting Officer does not approve payment of the full amount applied for, less the retainage allowed by in 52.232-5, the Contracting Officer shall advise the Contractor as to the reasons.

Under the authority of 52.232-27(a), the 14 day period identified in FAR 52.232-27(a)(1)(i)(A) is hereby changed to 30 days.

U.S. Embassy Cairo
Financial Management Office – DBO
8 Kamal El Din Salah Street
Garden City, Cairo, Egypt
CairoDBO@state.gov

The remainder of this page is intentionally blank.

SECTION G - SPECIAL REQUIREMENTS

G.1.0 PERFORMANCE/PAYMENT PROTECTION - The Contractor shall furnish some form of payment protection as described in 52.228-13 in the amount of **10% of the contract price through a check or a bank letter of guarantee**.

G.1.1 The Contractor shall provide the information required by the paragraph above within **ten (10) calendar days after award**. Failure to timely submit the required security may result in rescinding or termination of the contract by the Government. If the contract is terminated, the Contractor will be liable for those costs as described in FAR 52.249-10, Default (Fixed-Price Construction), which is included in this purchase order.

G.1.2 The bonds or alternate performance security shall guarantee the Contractor's execution and completion of the work within the contract time. This security shall also guarantee the correction of any defects after completion, the payment of all wages and other amounts payable by the Contractor under its subcontracts or for labor and materials, and the satisfaction or removal of any liens or encumbrances placed on the work.

G.1.3 The required securities shall remain in effect in the full amount required until final acceptance of the project by the Government. Upon final acceptance, the penal sum of the performance security shall be reduced to 10% of the contract price. The security shall remain in effect for one year after the date of final completion and acceptance, and the Contractor shall pay any premium required for the entire period of coverage.

G.2.0 INSURANCE - The Contractor is required by FAR 52.228-5, "Insurance - Work on a Government Installation" to provide whatever insurance is legally necessary. The Contractor shall at its own expense provide and maintain during the entire performance period the following insurance amounts:

G.2.1 GENERAL LIABILITY (includes premises/operations, collapse hazard, products, completed operations, contractual, independent contractors, broad form property damage, personal injury) :

(1) BODILY INJURY, ON OR OFF THE SITE, IN U.S. DOLLARS	
Per Occurrence	**$ 5,000**
Cumulative	**$ 15,000**
(2) PROPERTY DAMAGE, ON OR OFF THE SITE, IN U.S. DOLLARS	
Per Occurrence	**$ 10,000**
Cumulative	**$ 20,000**

G.2.2 The foregoing types and amounts of insurance are the minimums required. The Contractor shall obtain any other types of insurance required by local law or that are ordinarily or customarily obtained in the location of the work. The limit of such insurance shall be as provided by law or sufficient to meet normal and customary claims.

G.2.3 The Contractor agrees that the Government shall not be responsible for personal injuries or for damages to any property of the Contractor, its officers, agents, servants, and employees, or any other person, arising from and incident to the Contractor's performance of this contract. The Contractor shall hold harmless and indemnify the Government from any and all claims arising therefrom, except in the instance of gross negligence on the part of the Government.

G.2.4 The Contractor shall obtain adequate insurance for damage to, or theft of, materials and equipment in insurance coverage for loose transit to the site or in storage on or off the site.

G.2.5 The general liability policy required of the Contractor shall name "the United States of America, acting by and through the Department of State", as an additional insured with respect to operations performed under this contract.

G.3.0 DOCUMENT DESCRIPTIONS

G.3.1 SUPPLEMENTAL DOCUMENTS: The Contracting Officer shall furnish from time to time such detailed drawings and other information as is considered necessary, in the opinion of the Contracting Officer, to interpret, clarify, supplement, or correct inconsistencies, errors or omissions in the Contract documents, or to describe minor changes in the work not involving an increase in the contract price or extension of the contract time. The Contractor shall comply with the requirements of the supplemental documents, and unless prompt objection is made by the Contractor within 20 days, their issuance shall not provide for any claim for an increase in the Contract price or an extension of contract time.

G.3.1.1. RECORD DOCUMENTS. The Contractor shall maintain at the project site:

(1) a current marked set of Contract drawings and specifications indicating all interpretations and clarification, contract modifications, change orders, or any other departure from the contract requirements approved by the Contracting Officer; and,
(2) a complete set of record shop drawings, product data, samples and other submittals as approved by the Contracting Officer.

G.3.1.2. "As-Built" Documents: After final completion of the work, but before final acceptance thereof, the Contractor shall provide:

(1) a complete set of "as-built" drawings, based upon the record set of drawings, marked to show the details of construction as actually accomplished; and,
(2) record shop drawings and other submittals, in the number and form as required by the specifications.

G.4.0 LAWS AND REGULATIONS - The Contractor shall, without additional expense to the Government, be responsible for complying with all laws, codes, ordinances, and regulations applicable to the performance of the work, including those of the host country, and with the lawful orders of any governmental authority having jurisdiction. Host country authorities may not enter the construction site without the permission of the Contracting Officer. Unless otherwise directed by the Contracting Officer, the Contractor shall comply with the more stringent of the requirements of such laws, regulations and orders and of the contract. In the event of a conflict between the contract and such laws, regulations and orders, the Contractor shall promptly advise the Contracting Officer of the conflict and of the Contractor's proposed course of action for resolution by the Contracting Officer.

G.4.1 The Contractor shall comply with all local labor laws, regulations, customs and practices pertaining to labor, safety, and similar matters, to the extent that such compliance is not inconsistent with the requirements of this contract.

G.4.2 The Contractor shall give written assurance to the Contracting Officer that all subcontractors and others performing work on or for the project have obtained all requisite licenses and permits.

G.4.3 The Contractor shall submit proper documentation and evidence satisfactory to the Contracting Officer of compliance with this clause.

G.5.0 CONSTRUCTION PERSONNEL - The Contractor shall maintain discipline at the site and at all times take all reasonable precautions to prevent any unlawful, riotous, or disorderly conduct by or among those employed at the site. The Contractor shall ensure the preservation of peace and protection of persons and property in the neighborhood of the project against such action. The Contracting Officer may require, in writing that the Contractor remove from the work any employee that the Contracting Officer deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the project is deemed by the Contracting Officer to be contrary to the Government's interests.

G.5.1 If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice, including all relevant information, to the Contracting Officer.

G.5.2 After award, the Contractor has ten calendar days to submit to the Contracting Officer a list of workers and supervisors assigned to this project for the Government to conduct all necessary security checks. It is anticipated that security checks will take **10 calendar days** or

more to perform. For each individual the list shall include:

Full Name
Place and Date of Birth
Current Address
National Identification number
Fingerprint Card
Participation in a personal interview with Embassy security staff

Failure to provide any of the above information may be considered grounds for rejection and/or resubmittal of the application. Once the Government has completed the security screening and approved the applicants a badge will be provided to the individual for access to the site. This badge may be revoked at any time due to the falsification of data, or misconduct on site.

G.5.3 The Contractor shall provide an English speaking supervisor on site at all times. This position is considered as key personnel under this purchase order.

G.6.0 Materials and Equipment - All materials and equipment incorporated into the work shall be new and for the purpose intended, unless otherwise specified. All workmanship shall be of good quality and performed in a skillful manner that will withstand inspection by the Contracting Officer.

G.7.0 SPECIAL WARRANTIES

G.7.1 Any special warranties that may be required under the contract shall be subject to the stipulations set forth in 52.246-21, "Warranty of Construction", as long as they are not in conflict.

G.7.2 The Contractor shall obtain and furnish to the Government all information required to make any subcontractor's, manufacturer's, or supplier's guarantee or warranty legally binding and effective. The Contractor shall submit both the information and the guarantee or warranty to the Government in sufficient time to permit the Government to meet any time limit specified in the guarantee or warranty, but not later than completion and acceptance of all work under this contract.

G.8.0 EQUITABLE ADJUSTMENTS

Any circumstance for which the contract provides an equitable adjustment that causes a change within the meaning of paragraph (a) of the "Changes" clause shall be treated as a change under that clause; provided, that the Contractor gives the Contracting Officer prompt written notice (within 20 days) stating:

(a) the date, circumstances, and applicable contract clause authorizing an equitable adjustment and

(b) that the Contractor regards the event as a changed condition for which an equitable adjustment is allowed under the contract

The Contractor shall provide written notice of a differing site condition within 10 calendar days of occurrence following FAR 52.236-2, Differing Site Conditions.

G.9.0 ZONING APPROVALS AND PERMITS

The Government shall be responsible for:

- obtaining proper zoning or other land use control approval for the project
- obtaining the approval of the Contracting Drawings and Specifications
- paying fees due for the foregoing; and,
- for obtaining and paying for the initial building permits.

The remainder of this page is intentionally blank.

SECTION H - CLAUSES

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es): *http://www.acquisition.gov/far/* or *http://farsite.hill.af.mil/vffara.htm*. Please note these addresses are subject to change.

If the Federal Acquisition Regulation (FAR) is not available at the locations indicated above, use the Department of State Acquisition website at https://www.ecfr.gov/cgi-bin/text-idx?SID=2e978208d0d2aa44fb9502725ecac4e5&mc=true&tpl=/ecfrbrowse/Title48/48chapter6.tplto access links to the FAR. You may also use an internet "search engine" (for example, Google, Yahoo, Excite) to obtain the latest location of the most current FAR.

The following Federal Acquisition Regulation clause(s) is/are incorporated by reference (48 CFR CH. 1):

CLAUSE	TITLE AND DATE
52.202-1	DEFINITIONS (JUN 2020)
52.204-9	PERSONAL IDENTITY VERIFICATION OF CONTRACTOR PERSONNEL (JAN 2011)
52.204-10	REPORTING EXECUTIVE COMPENSATION AND FIRST-TIER SUBCONTRACT AWARDS (OCT 2018)
52.204-13	SYSTEM FOR AWARD MANAGEMENT MAINTENANCE (OCT 2018)
52.204-13 ALT I	SYSTEM FOR AWARD MANAGEMENT MAINTENANCE (OCT 2018)
52.204-18	COMMERCIAL AND GOVERNMENT ENTITY CODE MAINTENANCE (JUL 2016)
52.204-19	INCORPORATION BY REFERENCE OF REPRESENTATIONS AND CERTIFICATIONS (DEC 2014)
52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED OR PROPOSED FOR DEBARMENT (JUN 2020)
52.209-9	UPDATES OF PUBLICLY AVAILABLE INFORMATION REGARDING RESPONSIBILITY MATTERS (JUL 2013)
52.213-4	TERMS AND CONDITIONS-SIMPLIFIED ACQUISITIONS (OTHER THAN COMMERCIAL ITEMS) (JUN 2020)

52.216-7 ALLOWABLE COST AND PAYMENT (JUN 2013)

52.222-1 NOTICE TO THE GOVERNMENT OF LABOR DISPUTES (FEB 1997)

52.222-19 CHILD LABOR – COOPERATION WITH AUTHORITIES AND REMEDIES (JAN 2018)

52.222-50 COMBATING TRAFFICKING IN PERSONS (FEB 2009)

52.223-18 ENCOURAGING CONTRACTOR POLICIES TO BAN TEXT MESSAGING WHILE DRIVING (JUN 2020)

52.225-13 RESTRICTIONS ON CERTAIN FOREIGN PURCHASES (JUNE 2008)

52.225-14 INCONSISTENCY BETWEEN ENGLISH VERSION AND TRANSLATION OF CONTRACT (FEB 2000)

52.225-19 CONTRACTOR PERSONNEL IN A DESIGNATED OPERATIONAL AREA OR SUPPORTING A DIPLOMATIC MISSION OUTSIDE THE UNITED STATES (MAR 2008)

52.228-4 WORKERS' COMPENSATION AND WAR-HAZARD INSURANCE OVERSEAS (APR 1984)

52.228-5 INSURANCE - WORK ON A GOVERNMENT INSTALLATION (JAN 1997)

52.228-11 PLEDGES OF ASSETS (JAN 2012)

52.228-13 ALTERNATIVE PAYMENT PROTECTION (JULY 2000)

52.228-14 IRREVOCABLE LETTER OF CREDIT (NOV 2014)

52.228-15 PERFORMANCE AND PAYMENT BONDS-CONSTRUCTION (JUN 2020)

52.229-6 TAXES - FOREIGN FIXED-PRICE CONTRACTS (FEB 2013)

52.229-7 TAXES- FIXED PRICE CONTRACTS WITH FOREIGN GOVERNMENTS (FEB 2013)

52.232-5 PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS (MAY 2014)

52.232-8 DISCOUNTS FOR PROMPT PAYMENT (FEB 2002)

52.232-11 EXTRAS (APR 1984)

52.232-18 AVAILABILITY OF FUNDS (APR 1984)

52.232-22 LIMITATION OF FUNDS (APR 1984)

52.232-25 PROMPT PAYMENT (JULY 2013)

52.232-27 PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS (MAY 2014)

52.232-33 PAYMENT BY ELECTRONIC FUNDS TRANSFER - SYSTEM FOR AWARD MANAGEMENT (OCT 2018)

52.232-34 PAYMENT BY ELECTRONIC FUNDS TRANSFER – OTHER THAN SYSTEM FOR AWARD MANAGEMENT (JULY 2013)

52.233-1 DISPUTES (MAY 2014) *Alternate I (DEC 1991)*

52.233-3 PROTEST AFTER AWARD (AUG 1996)

52.236-2 DIFFERING SITE CONDITIONS (APR 1984)

52.236-3 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (APR 1984)

52.236-5 MATERIAL AND WORKMANSHIP (APR 1984)

52.236-6 SUPERINTENDENCE BY THE CONTRACTOR (APR 1984)

52.236-7 PERMITS AND RESPONSIBILITIES (NOV 1991)

52.236-8 OTHER CONTRACTS (APR 1984)

52.236-9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS (APR 1984)

52.236-10 OPERATIONS AND STORAGE AREAS (APR 1984)

52.236-11 USE AND POSSESSION PRIOR TO COMPLETION (APR 1984)

52.236-12 CLEANING UP (APR 1984)

52.236-13 ACCIDENT PREVENTION (NOV 1991)

52.236-14 AVAILABILITY AND USE OF UTILITY SERVICES (APR 1984)

52.236-15 SCHEDULES FOR CONSTRUCTION CONTRACTS (APR 1984)

52.236-21 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FEB 1997)

52.236-26 PRECONSTRUCTION CONFERENCE (FEB 1995)

52.242-14 SUSPENSION OF WORK (APR 1984)

52.243-4 CHANGES (JUN 2007)

52.243-5 CHANGES AND CHANGED CONDITIONS (APR 1984)

52.244-6 SUBCONTRACTS FOR COMMERCIAL ITEMS (JUN 2020)

52.245-2 GOVERNMENT PROPERTY INSTALLATION OPERATION SERVICES (APR 2012)

52.245-9 USE AND CHARGES (APR 2012)

52.246-12 INSPECTION OF CONSTRUCTION (AUG 1996)

52.246-17 WARRANTY OF SUPPLIES OF A NONCOMPLEX NATURE (JUN 2003)

52.246-21 WARRANTY OF CONSTRUCTION (MAR 1994)

52.246-26 REPORTING NONCONFORMING ITEMS (DEC 2019)

52.249-2 TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED-PRICE) (APR 2012) *Alternate I (SEPT 1996)*

52.249-10 DEFAULT (FIXED-PRICE CONSTRUCTION) (APR 1984)

52.249-14 EXCUSABLE DELAYS (APR 1984)

I. FAR CLAUSES INCORPORATED IN FULL TEXT

52.204-25 PROHIBITION ON CONTRACTING FOR CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT (AUG 2020)

(a) Definitions. As used in this clause—
Covered foreign country means The People's Republic of China.
Covered telecommunications equipment or services means–
(1) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities);

(2) For the purpose of public safety, security of Government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities);

(3) Telecommunications or video surveillance services provided by such entities or using such equipment; or

(4) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

Critical technology means–

(1) Defense articles or defense services included on the United States Munitions List set forth in the International Traffic in Arms Regulations under subchapter M of chapter I of title 22, Code of Federal Regulations;

(2) Items included on the Commerce Control List set forth in Supplement No. 1 to part 774 of the Export Administration Regulations under subchapter C of chapter VII of title 15, Code of Federal Regulations, and controlled-

(i) Pursuant to multilateral regimes, including for reasons relating to national security, chemical and biological weapons proliferation, nuclear nonproliferation, or missile technology; or

(ii) For reasons relating to regional stability or surreptitious listening;

(3) Specially designed and prepared nuclear equipment, parts and components, materials, software, and technology covered by part 810 of title 10, Code of Federal Regulations (relating to assistance to foreign atomic energy activities);

(4) Nuclear facilities, equipment, and material covered by part 110 of title 10, Code of Federal Regulations (relating to export and import of nuclear equipment and material);

(5) Select agents and toxins covered by part 331 of title 7, Code of Federal Regulations, part 121 of title 9 of such Code, or part 73 of title 42 of such Code; or

(6) Emerging and foundational technologies controlled pursuant to section 1758 of the Export Control Reform Act of 2018 (50 U.S.C. 4817).

Substantial or essential component means any component necessary for the proper function or performance of a piece of equipment, system, or service.

(b) Prohibition. Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. The Contractor is prohibited from providing to the Government any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless an exception at paragraph (c) of this clause applies or the covered

telecommunication equipment or services are covered by a waiver described in Federal Acquisition Regulation 4.2104.

(c) Exceptions. This clause does not prohibit contractors from providing—

(1) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(2) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(d) Reporting requirement.

(1) In the event the Contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the Contractor is notified of such by a subcontractor at any tier or by any other source, the Contractor shall report the information in paragraph (d)(2) of this clause to the Contracting Officer, unless elsewhere in this contract are established procedures for reporting the information; in the case of the Department of Defense, the Contractor shall report to the website at https://dibnet.dod.mil. For indefinite delivery contracts, the Contractor shall report to the Contracting Officer for the indefinite delivery contract and the Contracting Officer(s) for any affected order or, in the case of the Department of Defense, identify both the indefinite delivery contract and any affected orders in the report provided at https://dibnet.dod.mil.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause

(i) Within one business day from the date of such identification or notification: the contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(ii) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: any further available information about mitigation actions undertaken or recommended. In addition, the Contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph (e), in all subcontracts and other contractual instruments, including subcontracts for the acquisition of commercial items.

(End of clause)

II. The following Department of State Acquisition Regulation (DOSAR) clause(s) is/are set forth in full text:

652.204-70 DEPARTMENT OF STATE PERSONAL IDENTIFICATION CARD ISSUANCE PROCEDURES (MAY 2011)

(a) The Contractor shall comply with the Department of State (DOS) Personal Identification Card Issuance Procedures for all employees performing under this contract who require frequent and continuing access to DOS facilities, or information systems. The Contractor shall insert this clause in all subcontracts when the subcontractor's employees will require frequent and continuing access to DOS facilities, or information systems.

(b) The DOS Personal Identification Card Issuance Procedures may be accessed at *http://www.state.gov/m/ds/rls/rpt/c21664.htm* .

(End of clause)

652.229-71 PERSONAL PROPERTY DISPOSITION AT POSTS ABROAD (AUG 1999)

Regulations at 22 CFR Part 136 require that U.S. Government employees and their families do not profit personally from sales or other transactions with persons who are not themselves entitled to exemption from import restrictions, duties, or taxes. Should the Contractor experience importation or tax privileges in a foreign country because of its contractual relationship to the United States Government, the Contractor shall observe the requirements of 22 CFR Part 136 and all policies, rules, and procedures issued by the chief of mission in that foreign country.

(End of clause)

CONTRACTOR IDENTIFICATION (JULY 2008)

Contract performance may require contractor personnel to attend meetings with government personnel and the public, work within government offices, and/or utilize government email.

Contractor personnel must take the following actions to identify themselves as non-federal employees:

1) Use an e-mail signature block that shows name, the office being supported and company affiliation (e.g. "John Smith, Office of Human Resources, ACME Corporation Support Contractor");
2) Clearly identify themselves and their contractor affiliation in meetings;
3) Identify their contractor affiliation in Departmental e-mail and phone listings whenever contractor personnel are included in those listings; and
4) Contractor personnel may not utilize Department of State logos or indicia on business cards.

(End of clause)

652.236-70 ADDITIONAL SAFETY MEASURES (OCT 2017)

In addition to the safety/accident prevention requirements of FAR 52.236-13, Accident Prevention Alternate I, the contractor shall comply with the following additional safety measures.

(a) *High Risk Activities*. If the project contains any of the following high risk activities, the contractor shall follow the section in the latest edition, as of the date of the solicitation, of the U.S. Army Corps of Engineers Safety and Health manual, EM 385-1-1, that corresponds to the high risk activity. Before work may proceed, the contractor must obtain approval from the COR of the written safety plan required by FAR 52.236-13, Accident Prevention Alternate I (see paragraph (f) below), containing specific hazard mitigation and control techniques.

(1) Scaffolding;

(2) Work at heights above 1.8 meters;

(3) Trenching or other excavation greater than one (1) meter in depth;

(4) Earth-moving equipment and other large vehicles;

(5) Cranes and rigging;

(6) Welding or cutting and other hot work;

(7) Partial or total demolition of a structure;

(8) Temporary wiring, use of portable electric tools, or other recognized electrical hazards. Temporary wiring and portable electric tools require the use of a ground fault circuit interrupter (GFCI) in the affected circuits; other electrical hazards may also require the use of a GFCI;

(9) Work in confined spaces (limited exits, potential for oxygen less than 19.5 percent or combustible atmosphere, potential for solid or liquid engulfment, or other hazards considered to be immediately dangerous to life or health such as water tanks, transformer vaults, sewers, cisterns, etc.);

(10) Hazardous materials - a material with a physical or health hazard including but not limited to, flammable, explosive, corrosive, toxic, reactive or unstable, or any operations, which creates any kind of contamination inside an occupied building such as dust from demolition activities, paints, solvents, etc.; or

(11) Hazardous noise levels as required in EM 385-1 Section 5B or local standards if more restrictive.

(b) *Safety and Health Requirements*. The contractor and all subcontractors shall comply with the latest edition of the U.S. Army Corps of Engineers Safety and Health manual EM 385-1-1, or OSHA 29 CFR parts 1910 or 1926 if no EM 385-1-1 requirements are applicable, and the accepted contractor's written safety program.

(c) *Mishap Reporting*. The contractor is required to report **immediately** all mishaps to the COR and the contracting officer. A "mishap" is any event causing injury, disease or illness, death, material loss or property damage, or incident causing environmental contamination. The mishap reporting requirement shall include fires, explosions, hazardous materials contamination, and other similar incidents that may threaten people, property, and equipment.

(d) *Records*. The contractor shall maintain an accurate record on all mishaps incident to work performed under this contract resulting in death, traumatic injury, occupational disease, or damage to or theft of property, materials, supplies, or equipment. The contractor shall report this data in the manner prescribed by the contracting officer.

(e) *Subcontracts*. The contractor shall insert this clause, including this paragraph (e), with appropriate changes in the designation of the parties, in subcontracts.

(f) *Written program*. The plan required by paragraph (f)(1) of the clause entitled "Accident Prevention Alternate I" shall be known as the Site Safety and Health Plan (SSHP) and shall address any activities listed in paragraph (a) of this clause, or as otherwise required by the contracting officer/COR.

(1) The SSHP shall be submitted at least 10 working days prior to commencing any activity at the site.

(2) The plan must address developing activity hazard analyses (AHAs) for specific tasks. The AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk. Work shall not begin until the AHA for the work activity has been accepted by the COR and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives.

(3) The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by EM 385-1-1) shall be identified and included in the AHA. Proof of their competency/qualification shall be submitted to the contracting officer or COR for acceptance prior to the start of that work activity. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

(End of clause)

652.242-73 AUTHORIZATION AND PERFORMANCE (AUG 1999)

(a) The Contractor warrants the following:

(1) That is has obtained authorization to operate and do business in the country or countries in which this contract will be performed;

(2) That is has obtained all necessary licenses and permits required to perform this contract; and,

(3) That it shall comply fully with all laws, decrees, labor standards, and regulations of said country or countries during the performance of this contract.

(b) If the party actually performing the work will be a subcontractor or joint venture partner, then such subcontractor or joint venture partner agrees to the requirements of paragraph (a) of this clause.

(End of clause)

652.243-70 NOTICES (AUG 1999)

Any notice or request relating to this contract given by either party to the other shall be in writing. Said notice or request shall be mailed or delivered by hand to the other party at the address provided in the schedule of the contract. All modifications to the contract must be made in writing by the Contracting Officer.

(End of clause)

The remainder of this page is intentionally blank.

Section I - LIST OF ATTACHMENTS

ATTACHMENT NUMBER	DESCRIPTION OF ATTACHMENT	NUMBER OF PAGES
Attachment 1	Standard Form 25, "Performance and Guaranty Bond	2
Attachment 2	Standard Form 25A, "Payment Bond"	2
Attachment 3	Sample Bank Letter of Guaranty	1
Attachment 4	Breakdown of Price by Divisions of Specifications	2
Attachment 5	Drawings	3
Attachment 6	Specifications	105

The remainder of this page is intentionally blank.

SECTION J - QUOTATION INFORMATION

The Offeror shall include Defense Base Act (DBA) insurance premium costs covering employees. The offeror may obtain DBA insurance directly from any Department of Labor approved providers at the DOL website at *http://www.dol.gov/owcp/dlhwc/lscarrier.htm*

A. QUALIFICATIONS OF OFFERORS

Offerors/quoters must be technically qualified and financially responsible to perform the work described in this solicitation. At a minimum, each Offeror/Quoter must meet the following requirements:

(1) Be able to understand written and spoken English;
(2) Have an established business with a permanent address and telephone listing;
(3) Be able to demonstrate prior construction experience with suitable references;
(4) Have the necessary personnel, equipment and financial resources available to perform the work;
(5) Have all licenses and permits required by local law;
(6) Meet all local insurance requirements;
(7) Have the ability to obtain or to post adequate performance security, such as bonds, irrevocable letters of credit or guarantees issued by a reputable financial institution;
(8) Have no adverse criminal record; and
(9) Have no political or business affiliation which could be considered contrary to the interests of the United States.

B. SUBMISSION OF QUOTATIONS

This solicitation is for the performance of the construction services described in SCOPE OF WORK, and the Attachments which are a part of this request for quotation.

Each quotation must consist of the following:		
VOLUME	TITLE	NUMBER OF COPIES*
I	Standard Form 18 including a completed Attachment 4, "BREAKDOWN OF PROPOSAL PRICE BY DIVISIONS OF SPECIFICATIONS	1
II	Performance schedule in the form of a "bar chart" and Business Management/Technical Proposal	1

Submit the complete quotation to the address indicated. If mailed, on Standard Form 18, or if hand-delivered, use the address set forth below:

CairoContracts@state.gov (preferred)

U.S. Embassy Cairo

ATTN: GSO/Contracting Office

8 Kamal El Din Salah Street

Garden City, Cairo, Egypt

The Offeror/Quoter shall identify and explain/justify any deviations, exceptions, or conditional assumptions taken with respect to any of the instructions or requirements of this request for quotation in the appropriate volume of the offer.

Volume II: Performance schedule and Business Management/Technical Proposal.

(a) Present the performance schedule in the form of a "bar chart" indicating when the various portions of the work will be commenced and completed within the required schedule. This bar chart shall be in sufficient detail to clearly show each segregable portion of work and its planned commencement and completion date.

(b) The Business Management/Technical Proposal shall be in two parts, including the following information:

Proposed Work Information - Provide the following:

(1) A list of the names, addresses and telephone numbers of the owners, partners, and principal officers of the Offeror;

(2) The name and address of the Offeror's field superintendent for this project;

(3) A list of the names, addresses, and telephone numbers of subcontractors and principal materials suppliers to be used on the project, indicating what portions of the work will be performed by them; and,

Experience and Past Performance - List all contracts and subcontracts your company has held over the past three years for the same or similar work. Provide the following information for each contract and subcontract:

(1) Customer's name, address, and telephone numbers of customer's lead contract and technical personnel;

(2) Contract number and type;

(3) Date of the contract award place(s) of performance, and completion dates; Contract dollar value;

(4) Brief description of the work, including responsibilities; and

(5) Any litigation currently in process or occurring within last 5 years.

C. 52.236-27 SITE VISIT (CONSTRUCTION) (FEB 1995)

(a) The clauses at 52.236-2, Differing Site Conditions, and 52.236-3, Site Investigations and Conditions Affecting the Work, will be included in any contract awarded as a result of this solicitation. Accordingly, offerors or quoters are urged and expected to inspect the site where the work will be performed.

(b) A site visit has been scheduled for **September 09, 2020 at 10:00 AM (*Please make sure to be at site at least 30 mins prior to allow time for security check*)**

(c) Participants will meet at **US Embassy Cairo 8 Kamal El Din Salah, Garden City, Cairo - Egypt**.

D. MAGNITUDE OF CONSTRUCTION PROJECT

It is anticipated that the range in price of this contract will be:

Between $25,000.00 and $100,000.00

E. LATE QUOTATIONS. Late quotations shall be handled in accordance with FAR.

F. 52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates the following provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer.

Also, the full text of a solicitation provision may be accessed electronically at: *http://acquisition.gov/far/index.html/* or *http://farsite.hill.af.mil/vffara.htm*. Please note these addresses are subject to change.

If the Federal Acquisition Regulation (FAR) is not available at the locations indicated above, use the Department of State Acquisition website at *http://www.statebuy.state.gov* to access the link to the FAR, or use of an Internet "search engine" (for example, Google, Yahoo or Excite) is suggested to obtain the latest location of the most current FAR.

The following Federal Acquisition Regulation provisions are incorporated by reference (48 CFR CH. 1):

PROVISION	TITLE AND DATE
52.204-7	SYSTEM FOR AWARD MANAGEMENT (OCT 2018)
52.204-16	COMMERCIAL AND GOVERNMENT ENTITY CODE REPORTING (JUL 2016)
52.214-34	SUBMISSION OF OFFERS IN THE ENGLISH LANGUAGE (APR 1991)
52.215-1	INSTRUCTIONS TO OFFERORS--COMPETITIVE ACQUISITION (JAN 2004)

SECTION K - EVALUATION CRITERIA

Award will be made to the lowest priced, acceptable, responsible quoter. The Government reserves the right to reject quotations that are unreasonably low or high in price.

The Government will determine acceptability by assessing the offeror's compliance with the terms of the RFQ. The Government will determine responsibility by analyzing whether the apparent successful quoter complies with the requirements of FAR 9.1, including:

- ability to comply with the required performance period, taking into consideration all existing commercial and governmental business commitments;
- satisfactory record of integrity and business ethics;
- necessary organization, experience, and skills or the ability to obtain them;
- necessary equipment and facilities or the ability to obtain them; and
- otherwise, qualified and eligible to receive an award under applicable laws and regulations.

K.1.1 General
Meet all the requirements set forth in the other sections of this solicitation.

K.1.2 Basis for Award
The Government intends to make award to the lowest priced offer, provided the offeror submits an acceptable technical proposal, offers a fair and reasonable price, and the offeror is determined to be responsible. Negotiations may be conducted to obtain clarifications or improvements in the offeror's proposal. Evaluations will be conducted in accordance with the procedures set forth below:

(a) **Initial Evaluation** - All proposals received will be evaluated to ensure that each proposal is complete in terms of submission of each required volume. Proposals that are missing a significant amount of the required information may be eliminated from consideration at the Government's discretion.

(b) **Technical Evaluation** - Those proposals remaining after the initial evaluation will be thoroughly reviewed to determine technical acceptability. Technical Acceptability will include a review of each element of the Technical Proposal.

Tab A – Performance Schedule
Tab B – Key Personnel
Tab C – Management Information
Tab D – Past Performance & Construction Experience
Tab E – Preliminary Quality Management Program
Tab F – Performance of Work by Contractor
Tab G – Responsibility Evaluation

Tab H – Safety plan
Tab I – List of sub-contractors
Tab J - Technical submittals for all used materials

(A) Performance Schedule
The Government will evaluate the performance schedule and performance narrative to review the sequence of work and to ensure that performance will be completed on time in accordance with the contract period of performance and that the contractor has demonstrated a clear understanding of the project. The end result of this review will be a determination of technical acceptability or unacceptability.

(B) Key Personnel
The Government will evaluate the key personnel including but not limited to (supervisor engineer – Site resident personnel). The review will include a review of the qualifications of the proposed staff and their range of experience and knowledge. The end result of this review will be a determination of technical acceptability or unacceptability.

(C) Management Information
The Government will evaluate the information Contractor provided, Management Information, including list of names of the owners, partners and principal officers, list of all subcontractors, a comprehensive list of equipment owned, equipment available and equipment projected to be assigned - including subcontractors. Subcontractors shall only be the equipment manufacturers local representative

(D) Past Performance & Construction Experience
The Government will evaluate the design and construction projects, or contracts provided to evaluate both experience and past performance. Experience pertains to the types of work and volume of work previously or currently being performed by the contractor that are comparable to the types of work envisioned by this requirement in terms of size, scope and complexity. Past performance relates to how well a contractor has performed. The Government may contact references to verify experience and past performance. If the Government is aware of contracts that meet the requirements of this solicitation but have not been included in the projects submitted, it may evaluate those contracts in addition to those submitted.

(E) Preliminary Quality Management Program
The Government evaluation team will review the Offeror's Preliminary Quality Management Program as to whether it clearly demonstrates that the offeror has a clear understanding of all project requirements and has an acceptable quality control program. The end result of this review will be a determination of technical acceptability or unacceptability.

(F) Performance of Work by Contractor
The Government will evaluate the amount of design work to be self-performed by the

contractor, the amount of construction work on site proposed to be self-performed by the contractor, and the amount of work proposed to be performed by sub-contractors. The Government will also review the experience of the proposed subcontractors relevant to the works planned to be assigned to them under this contract.

(G) Responsibility Evaluation – Contractor responsibility will be determined by analyzing whether the apparent successful offeror complies with the requirements of FAR 9.1, including:

(1) Adequate financial resources or the ability to obtain them;
(2) Ability to comply with the required performance period, taking into consideration all existing commercial and governmental business commitments;
(3) Satisfactory record of integrity and business ethics;
(4) Necessary organization, experience, and skills or the ability to obtain them;
(5) Necessary equipment and facilities or the ability to obtain them; and
(6) Be otherwise qualified and eligible to receive an award under applicable laws and regulations.

The remainder of this page is intentionally blank.

SECTION L - REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS OR QUOTERS

L.1 52.204-3 TAXPAYER IDENTIFICATION (OCT 1998)

(a) Definitions.

"Common parent", as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

"Taxpayer Identification Number (TIN)", as used in this provision, means the number required by the IRS to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision in order to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325 (d), reporting requirements of 26 USC 6041, 6041A, and 6050M and implementing regulations issued by the Internal Revenue Service (IRS). If the resulting contract is subject to the reporting requirements described in FAR 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments
(c) otherwise due under the contract.

(d) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (3l USC 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(e) Taxpayer Identification Number (TIN).

TIN: _____

☐ TIN has been applied for.
☐ TIN is not required because:
☐ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the U.S. and does not have an office or place of business or a fiscal paying agent in the U.S.;
☐ Offeror is an agency or instrumentality of a foreign government;
☐ Offeror is an agency or instrumentality of the Federal Government.

(e) Type of Organization.
☐ Sole Proprietorship;
☐ Partnership;
☐ Corporate Entity (not tax exempt);

☐ Corporate Entity (tax exempt);
☐ Government Entity (Federal, State or local);
☐ Foreign Government;
☐ International organization per 26 CFR 1.6049-4;
☐ Other _____.

(f) Common Parent.

☐ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this clause.
☐ Name and TIN of common parent:
Name _____
TIN_____

(End of provision)

L.2 FAR 52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (MAR 2020)

(a) (1) The North American Industry Classification System (NAICS) code for this acquisition is_***236118, _236220, _237110, _237310, _237990***.

236118 - Construction Management, residential remodeling
236220 - Construction Management, commercial and institutional building or Warehouse construction
237110 - Construction Management, water and sewage line and related structures
237310 - Construction Management, highway road, street or bridge
237990 - Construction Management, outdoor recreation facility

(2) The small business size standard is **$36.5 Million USD**.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) (1) If the provision at 52.204-7, System for Award Management, is included in this solicitation, paragraph (d) of this provision applies.

(2) If the provision at 52.204-7, System for Award Management, is not included in this solicitation, and the Offeror has an active registration in the System for Award Management (SAM), the Offeror may choose to use paragraph (d) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The Offeror shall indicate which option applies by checking one of the following boxes:

(i) □ Paragraph (d) applies.

(ii) □ Paragraph (d) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(c)

(1) The following representations or certifications in SAM are applicable to this solicitation as indicated:

(i) 52.203-2, Certificate of Independent Price Determination. This provision applies to solicitations when a firm-fixed-price contract or fixed-price contract with economic price adjustment is contemplated, unless–

(A) The acquisition is to be made under the simplified acquisition procedures in part 13;

(B) The solicitation is a request for technical proposals under two-step sealed bidding procedures; or

(C) The solicitation is for utility services for which rates are set by law or regulation.

(ii) 52.203-11, Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions. This provision applies to solicitations expected to exceed $150,000.

(iii) 52.203-18, Prohibition on Contracting with Entities that Require Certain Internal Confidentiality Agreements or Statements-Representation. This provision applies to all solicitations.

(iv) 52.204-3, Taxpayer Identification. This provision applies to solicitations that do not include the provision at 52.204-7, System for Award Management.

(v) 52.204-5, Women-Owned Business (Other Than Small Business). This provision applies to solicitations that-

(A) Are not set aside for small business concerns;

(B) Exceed the simplified acquisition threshold; and

(C) Are for contracts that will be performed in the United States or its outlying areas.

(vi) 52.204-26, Covered Telecommunications Equipment or Services-Representation. This provision applies to all solicitations.

(vii) 52.209-2, Prohibition on Contracting with Inverted Domestic Corporations-Representation.

(viii) 52.209-5, Certification Regarding Responsibility Matters. This provision applies to solicitations where the contract value is expected to exceed the simplified acquisition threshold.

(ix) 52.209-11, Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law. This provision applies to all solicitations.

(x) 52.214-14, Place of Performance-Sealed Bidding. This provision applies to invitations for bids except those in which the place of performance is specified by the Government.

(xi) 52.215-6, Place of Performance. This provision applies to solicitations unless the place of performance is specified by the Government.

(xii) 52.219-1, Small Business Program Representations (Basic, Alternates I, and II). This provision applies to solicitations when the contract will be performed in the United States or its outlying areas.

(A) The basic provision applies when the solicitations are issued by other than DoD, NASA, and the Coast Guard.

(B) The provision with its Alternate I applies to solicitations issued by DoD, NASA, or the Coast Guard.

(C) The provision with its Alternate II applies to solicitations that will result in a multiple-award contract with more than one NAICS code assigned.

(xiii) 52.219-2, Equal Low Bids. This provision applies to solicitations when contracting by sealed bidding and the contract will be performed in the United States or its outlying areas.

(xiv) 52.222-22, Previous Contracts and Compliance Reports. This provision applies to solicitations that include the clause at 52.222-26, Equal Opportunity.

(xv) 52.222-25, Affirmative Action Compliance. This provision applies to solicitations, other than those for construction, when the solicitation includes the clause at 52.222-26, Equal Opportunity.

(xvi) 52.222-38, Compliance with Veterans' Employment Reporting Requirements. This provision applies to solicitations when it is anticipated the contract award will exceed the simplified acquisition threshold and the contract is not for acquisition of commercial items.

(xvii) 52.223-1, Biobased Product Certification. This provision applies to solicitations that require the delivery or specify the use of USDA–designated items; or include the clause at 52.223-2, Affirmative Procurement of Biobased Products Under Service and Construction Contracts.

(xviii) 52.223-4, Recovered Material Certification. This provision applies to solicitations that are for, or specify the use of, EPA–designated items.

(xix) 52.223-22, Public Disclosure of Greenhouse Gas Emissions and Reduction Goals-Representation. This provision applies to solicitations that include the clause at 52.204-7.)

(xx) 52.225-2, Buy American Certificate. This provision applies to solicitations containing the clause at 52.225-1.

(xxi) 52.225-4, Buy American-Free Trade Agreements-Israeli Trade Act Certificate. (Basic, Alternates I, II, and III.) This provision applies to solicitations containing the clause at 52.225-3.

(A) If the acquisition value is less than $25,000, the basic provision applies.

(B) If the acquisition value is $25,000 or more but is less than $50,000, the provision with its Alternate I applies.

(C) If the acquisition value is $50,000 or more but is less than $83,099, the provision with its Alternate II applies.

(D) If the acquisition value is $83,099 or more but is less than $100,000, the provision with its Alternate III applies.

(xxii) 52.225-6, Trade Agreements Certificate. This provision applies to solicitations containing the clause at 52.225-5.

(xxiii) 52.225-20, Prohibition on Conducting Restricted Business Operations in Sudan-Certification. This provision applies to all solicitations.

(xxiv) 52.225-25, Prohibition on Contracting with Entities Engaging in Certain Activities or Transactions Relating to Iran-Representation and Certifications. This provision applies to all solicitations.

(xxv) 52.226-2, Historically Black College or University and Minority Institution Representation. This provision applies to solicitations for research, studies, supplies, or services of the type normally acquired from higher educational institutions.

(2) The following representations or certifications are applicable as indicated by the Contracting Officer:

_X_ (i) 52.204-17, Ownership or Control of Offeror.

__ (ii) 52.204-20, Predecessor of Offeror.

__ (iii) 52.222-18, Certification Regarding Knowledge of Child Labor for Listed End Products.

__ (iv) 52.222-48, Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Certification.

__ (v) 52.222-52, Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services-Certification.

__ (vi) 52.223-9, with its Alternate I, Estimate of Percentage of Recovered Material Content for EPA–Designated Products (Alternate I only).

__ (vii) 52.227-6, Royalty Information.

____ (A) Basic.

____ (B) Alternate I.

__ (viii) 52.227-15, Representation of Limited Rights Data and Restricted Computer Software.

(d) The offeror has completed the annual representations and certifications electronically in SAM website accessed through https://www.sam.gov. After reviewing the SAM information, the offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in paragraph (c) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to

the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below [*offeror to insert changes, identifying change by clause number, title, date*]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR Clause # Title Date Change
_____

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on SAM

(End of provision)

L.3 52.204-24 Representation Regarding Certain Telecommunications and Video Surveillance Services or Equipment (AUG 2020)

The Offeror shall not complete the representation at paragraph (d)(1) of this provision if the Offeror has represented that it "does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument" in the provision at 52.204-26, Covered Telecommunications Equipment or Services—Representation, or in paragraph (v) of the provision at 52.212-3, Offeror Representations and Certifications-Commercial Items.

(a) *Definitions.* As used in this provision—

Backhaul, covered telecommunications equipment or services, critical technology, interconnection arrangements, reasonable inquiry, roaming, and substantial or essential component have the meanings provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) *Prohibition*.

(1) Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. Nothing in the prohibition shall be construed to—

(i)Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii)Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract or extending or renewing a contract with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. This prohibition applies to the use of covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract. Nothing in the prohibition shall be construed to—

(i)Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii)Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(c) *Procedures.* The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(d) *Representation.* The Offeror represents that—

(1)It □ will, □ will not provide covered telecommunications equipment or services to the Government in the performance of any contract, subcontract or other contractual instrument resulting from this solicitation. The Offeror shall provide the additional disclosure information required at paragraph (e)(1) of this section if the Offeror responds "will" in paragraph (d)(1) of this section; and

(2)After conducting a reasonable inquiry, for purposes of this representation, the Offeror represents that—

It □ does, □ does not use covered telecommunications equipment or services, or use any equipment, system, or service that uses covered telecommunications equipment or services. The Offeror shall provide the additional disclosure information required at paragraph (e)(2) of this section if the Offeror responds "does" in paragraph (d)(2) of this section.

(e) *Disclosures.*

(1) Disclosure for the representation in paragraph (d)(1) of this provision. If the Offeror has responded "will" in the representation in paragraph (d)(1) of this provision, the Offeror shall provide the following information as part of the offer:

(i)For covered equipment—

(A)The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the original equipment manufacturer (OEM) or a distributor, if known);

(B)A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C)Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(ii)For covered services—

(A)If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B)If not associated with maintenance, the Product Service Code (PSC) of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(2) Disclosure for the representation in paragraph (d)(2) of this provision. If the Offeror has responded "does" in the representation in paragraph (d)(2) of this provision, the Offeror shall provide the following information as part of the offer:

(i)For covered equipment—

(A)The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known);

(B)A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C)Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(ii)For covered services—

(A)If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B)If not associated with maintenance, the PSC of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(End of provision)

L.4. 52.209-2 PROHIBITION ON CONTRACTING WITH INVERTED DOMESTIC CORPORATIONS REPRESENTATION (NOV 2015)

(a) Definitions. "Inverted domestic corporation" and "subsidiary" have the meaning given in the clause of this contract entitled Prohibition on Contracting with Inverted Domestic Corporations (52.209-10).

(b) Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with either an inverted domestic corporation, or a subsidiary of an inverted domestic corporation, unless the exception at 9.108-2(b) applies or the requirement is waived in accordance with the procedures at 9.108-4.

(c) Representation. The Offeror represents that.

(1) It □ is, □ is not an inverted domestic corporation; and

(2) It □ is, □ is not a subsidiary of an inverted domestic corporation.

(End of provision)

L.5. 52.225-18 PLACE OF MANUFACTURE (SEPT 2006)

(a) *Definitions*. As used in this clause—

" Manufactured end product" means any end product in Federal Supply Classes (FSC) 1000-9999, except—

(1) FSC 5510, Lumber and Related Basic Wood Materials;
(2) Federal Supply Group (FSG) 87, Agricultural Supplies;
(3) FSG 88, Live Animals;
(4) FSG 89, Food and Related Consumables;
(5) FSC 9410, Crude Grades of Plant Materials;
(6) FSC 9430, Miscellaneous Crude Animal Products, Inedible;
(7) FSC 9440, Miscellaneous Crude Agricultural and Forestry Products;
(8) FSC 9610, Ores;
(9) FSC 9620, Minerals, Natural and Synthetic; and
(10) FSC 9630, Additive Metal Materials.

"Place of manufacture" means the place where an end product is assembled out of components, or otherwise made or processed from raw materials into the finished product that is to be provided to the Government. If a product is disassembled and reassembled, the place of reassembly is not the place of manufacture.

(b) For statistical purposes only, the offeror shall indicate whether the place of manufacture of the end products it expects to provide in response to this solicitation is predominantly—

(1) [ ] In the United States (Check this box if the total anticipated price of offered end products manufactured in the United States exceeds the total anticipated price of offered end products manufactured outside the United States); or

(2) [X] Outside the United States.

(End of provision)

L.6 AUTHORIZED CONTRACTOR ADMINISTRATOR

If the offeror does not fill-in the blanks below, the official who signed the offer will be deemed to be the offeror's representative for Contract Administration, which includes all matters pertaining to payments.

Name:
Telephone Number:
Address:

L.7 52.225-20 PROHIBITION ON CONDUCTING RESTRICTED BUSINESS OPERATIONS IN SUDAN – CERTIFICATION (AUG 2009)

(a) *Definitions*. As used in this provision—

"Business operations" means engaging in commerce in any form, including by acquiring, developing, maintaining, owning, selling, possessing, leasing, or operating equipment, facilities, personnel, products, services, personal property, real property, or any other apparatus of business or commerce.

"Marginalized populations of Sudan" means—

(1) Adversely affected groups in regions authorized to receive assistance under section 8(c) of the Darfur Peace and Accountability Act (Pub. L. 109-344) (50 U.S.C. 1701 note); and

(2) Marginalized areas in Northern Sudan described in section 4(9) of such Act.

"Restricted business operations" means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 (Pub. L. 110-174). Restricted business operations do not include business operations that the person conducting the business can demonstrate—

(1) Are conducted under contract directly and exclusively with the regional government of southern Sudan;

(2) Are conducted pursuant to specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;

(3) Consist of providing goods or services to marginalized populations of Sudan;

(4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;

(5) Consist of providing goods or services that are used only to promote health or education; or

(6) Have been voluntarily suspended.

(b) *Certification*. By submission of its offer, the offeror certifies that it does not conduct any restricted business operations in Sudan.

(End of provision)

The remainder of this page is intentionally blank.

ATTACHMENT 1

PERFORMANCE BOND *(See instructions on reverse)*	DATE BOND EXECUTED *(Must be same or later than date of contract)*	OMB Number: **9000-0045** Expiration Date: **6/30/2016**

Public reporting burden for this collection of information is estimated to average 25 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (MVR), Federal Acquisition Policy Division, GSA, Washington, DC 20405

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION ("X" one) ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION
SURETY(IES) (*Name(s) and business address(es)*)	PENAL SUM OF BOND MILLION(S) / THOUSANDS / HUNDRED(S) / CENTS CONTRACT DATE / CONTRACT NO.

OBLIGATION

We, the Principal and Surety (ies), are firmly bound to the Unites States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, where the Sureties are corporations acting as co-sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action against any or all of us. for all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS

The Principal has entered into the contract identified above.

THEREFORE

The above obligation is void if the Principal-

(a)(1) Performs and fulfills all the undertaking, covenants, terms, conditions, and agreements of the contract during the original term of the contract and any extensions thereof that are granted by the Government, with or without notice of the Surety(ies) and during the life of any guaranty required under the contract, and (2) performs and fulfills all the undertakings, covenants, terms conditions, and agreements of any and all duly authorized modifications of the contract that hereafter are made. Notice of those modifications to the Surety(ies) are waived.

(b) Pays to the Government the full amount of the taxes imposed by the Government, if the said contracts is subject to the Miller Act, (40 U.S.C. 270a-270e), which are collected, deducted, or withheld from wages paid by the Principal in carrying out the construction contract with respect to which this bond is furnished.

WITNESS

The Principal and Surety(ies) executed this performance bond and affixed their seals on the above date.

PRINCIPAL

SIGNATURE(S)	1. (Seal)	2. (Seal)	3. (Seal)	Corporate Seal
NAME(S) & TITLE(S) *(Typed)*	1.	2.	3.	

INDIVIDUAL SURETY(IES)

SIGNATURE(S)	1. (Seal)	2. (Seal)
NAME(S) *(Typed)*	1.	2.

CORPORATE SURETY(IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S *(Typed)*	1.	2.		

AUTHORIZED FOR LOCAL REPRODUCTION
Previous edition not usable

STANDARD FORM 25 (REV. 5/1996)
Prescribed by GSA-FAR (48 CFR) 53.228 (b)

CORPORATE SURETY(IES) *(Continued)*

SURETY B	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY C	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY D	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY E	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY F	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY G	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

BOND PREMIUM	RATE PER THOUSAND ($)	TOTAL ($)

INSTRUCTIONS

1. This form is authorized for use in connection with Government contracts. Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., and attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. (a) Corporations executing the bond as sureties must appear on the department of the Treasury's list of approved sureties and must act within the limitation listen therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designated "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual Surety (standard Form 28) for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning their financial capability.

4. Corporation executing the bond shall affix their corporate seals. Individual shall execute the bond opposite the word " Corporate Seal", and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

5. Type the name and title of each person signing this bond in the space provided.

PAYMENT BOND *(See instructions on reverse)*	DATE BOND EXECUTED *(Must be same or later than date of contract)*	OMB No.: **9000-0045**

Public reporting burden for this collection of information is estimate to average 25 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (MVR), Federal Acquisition Policy Division, GSA, Washington, DC 20405

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION *("X" one)* ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION
SURETY(IES) *(Name(s) and business address(es)*	PENAL SUM OF BOND MILLION(S) / THOUSAND(S) / HUNDRED(S) / CENTS CONTRACT DATE / CONTRACT NO.

OBLIGATION:

We, the Principal and Surety(ies), are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us. For all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS:

The above obligation is void if the Principal promptly makes payment to all persons having a direct relationship with the Principal or a subcontractor of the Principal for furnishing labor, material or both in the prosecution of the work provided for in the contract identified above, and any authorized modifications of the contract that subsequently are made. Notice of those modifications to the Surety(ies) are waived.

WITNESS:

The Principal and Surety(ies) executed this payment bond and affixed their seals on the above date.

PRINCIPAL

	1.	2.	3.	
SIGNATURE(S)	(Seal)	(Seal)	(Seal)	Corporate Seal
NAME(S) & TITLE(S) *(Typed)*	1.	2.	3.	

INDIVIDUAL SURETY(IES)

	1.	2.
SIGNATURE(S)	(Seal)	(Seal)
NAME(S) *(Typed)*	1.	2.

CORPORATE SURETY(IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

CORPORATE SURETY(IES) *(Continued)*

SURETY B	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT **$**	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY C	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT **$**	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY D	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT **$**	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY E	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT **$**	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY F	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT **$**	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY G	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT **$**	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

INSTRUCTIONS

1. This form, for the protection of persons supplying labor and material, is used when a payment bond is required under the Act of August 24, 1935, 49 Stat. 793 (40 U.S.C. 270a-270e). Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designated "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual Surety (Standard Form 28) for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning their financial capability.

4. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal", and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

5. Type the name and title of each person signing this bond in the space provided.

ATTACHMENT #3 - SAMPLE LETTER OF BANK GUARANTY

Place _____
Date _____

Contracting Officer
U.S. Embassy, **Cairo**
8 Kamal El Din Salah Garden City
Cairo Egypt

Letter of Guaranty No. _____

SUBJECT: Performance and Guaranty

The Undersigned, acting as the duly authorized representative of the bank, declares that the bank hereby guarantees to make payment to the Contracting Officer by check made payable to the Treasurer of the United States, immediately upon notice, after receipt of a simple written request from the Contracting Officer, immediately and entirely without any need for the Contracting Officer to protest or take any legal action or obtain the prior consent of the Contractor to show any other proof, action, or decision by another authority, up to the sum of **[*amount equal to 20% of the contract price in U.S. dollars during the period ending with the date of final acceptance and 10% of the contract price during contract guaranty period*]**, which represents the deposit required of the Contractor to guarantee fulfillment of his obligations for the satisfactory, complete, and timely performance of the said contract **[*contract number*]** for **[*description of work*]** at **[*location of work*]** in strict compliance with the terms, conditions and specifications of said contract, entered into between the Government and **[*name of contractor*]** of **[*address of contractor*]** on **[*contract date*],** plus legal charges of 10% per annum on the amount called due, calculated on the sixth day following receipt of the Contracting Officer's written request until the date of payment.

The undersigned agrees and consents that said contract may be modified by Change Order or Supplemental Agreement affecting the validity of the guaranty provided, however, that the amount of this guaranty shall remain unchanged.

The undersigned agrees and consents that the Contracting Officer may make repeated partial demands on the guaranty up to the total amount of this guaranty, and the bank will promptly honor each individual demand.

This letter of guaranty shall remain in effect until 3 months after completion of the guaranty period of Contract requirement.

Depository Institution: **[*name*]**
Address:
Representatives:

Location:
State of Inc.:
Corporate Seal:

Certificate of Authority is attached evidencing authority of the signer to bind the bank to this document.

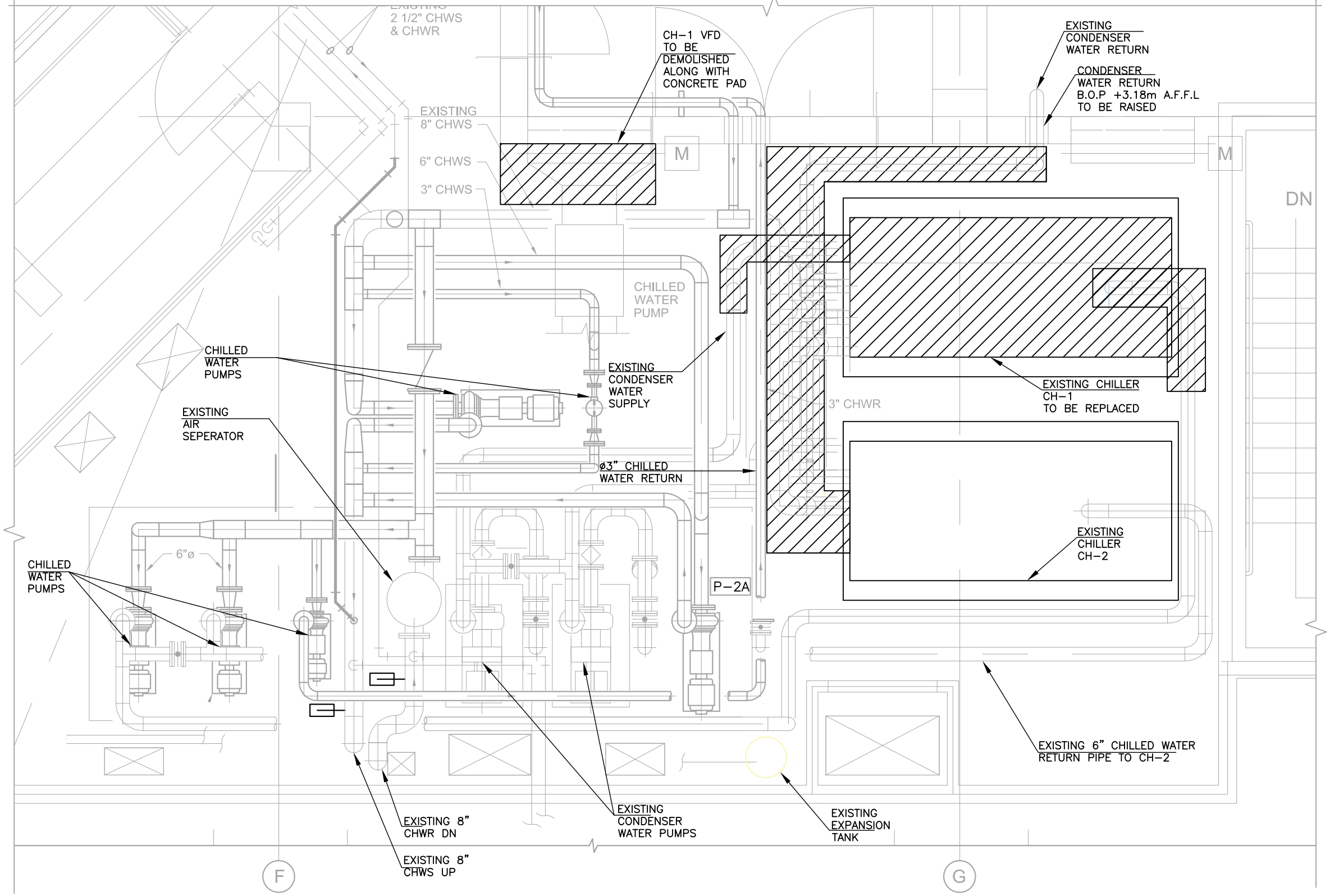
ATTACHMENT - 4

Bill of quantities (BOQ)

PROJECT :Cairo II - 200 TR Chiller installation

Div./Spec. No.	Item				Unit Rates	Total Rates
	No.	Description	Unit	Qty	EGP	EGP
DIVISION 1 GENERAL CONDITIONS						
		Mobilization, Temporary Utilities, compliance with Safety, etc.				
	A	Mobilization	l.s	1		
	B	Delivering the new screw chiller from ESSA compound to Embassy compound	l.s	1		
	C	Delivering old chiller from Embassy compound to ESSA compound	l.s	1		
	D	Telescopic craning and lifting of the new and old chiller to/from Cairo II 6th floor	l.s	1		
	E	Craning and lifting of the new and old chiller from/to ESSA compound		1		
	F	Extend existing concrete pad (2 x 3.6m) to (2 x 4.6m) house the new chiller dimension	l.s	1		
DIVISION 2 SELECTIVE DEMOLITION						
		Selective demolition				
	A	Chiller #1	ea.	1		
	B	VFD for Chiller #1	ea.	1		
	C	Condenser water return main pipe to be replaced and elevated as shown in drawings	l.s	1		
	D	Chilled water return main pipe to be replaced and elevated as shown in drawings	l.s	1		
	E	Chilled water return main pipe to be replaced and re-routed as shown in drawings	l.s	1		
DIVISION 23 HEATING VENTILATING AND AIR CONDITIONING						
230519		**Meters and gages for HVAC piping**				
		Supply and install Meters and gages as per specifications				
	A	Thermometer with its connections as per specifications	ea.	5		
	B	Dial type pressure gage with its attachments and snubbers as per specifications	ea.	5		
230523.12		**Ball valves for HVAC piping**				
		Supply and install ball valves as per specifications				
	A	1/2" Ball valve	ea.	4		
230523.13		**Butterfly Valves for HVAC piping**				
		Supply and install butterfly valves at all the inlets and outlets of the chiller				
	A	6" Flanged Butterfly Valve	ea.	8		
	B	6" Flanged Motorized Butterfly Valve	ea.	3		
230523.14		**Check Valves for HVAC piping**				
		Supply and install check valves at all the inlets of the chiller				
	A	6" Flanged check Valve	ea.	2		
230529		**Hangers and supports for HVAC piping and equipment**				
	A	Supply and install hangers and supports for HVAC piping as per specifications	l.s	1		
	B	Insulation Shields	l.s	1		
230548.13		**Vibration Controls For HVAC**				
		Install GFE vibration isolators below the new chiller				
	A	Install GFE vibration isolators	ea.	4		
230553		**Identification for HVAC piping and equipment**				
		Supplying, installing , identification labels for the chiller, controller, and piping installation height				
	A	Identification labels	l.s	1		

Div./Spec. No.	Item				Unit Rates	Total Rates
	No.	Description	Unit	Qty	EGP	EGP
230719		**HVAC PIPING INSULATION**				
		Supplying, installing , fitting insulation as shown in the specification				
	A	Insulation, mastics and it's accessories	l.s	1		
	B	ASJ PVC Jacket and sealant	l.s	1		
230800		**Commissioning Of HVAC**				
		Start up and commissioning of the new screw chiller				
	A	Chiller commissioning and start-up (Pre- paid by governement to Carrier) contractor to coordinate with Carrier	ea.	1		
232113		**Hydronic Piping**				
		Supplying installing , new black steel flanged elbows/fittings to connect new screw chiller #2 to existing chilled water and condenser water network				
	A	black steel sch.40 Piping and fittings	l.m	50		
	B	Victaulic connection to the chiller	ea.	4		
232116		**HYDRONIC PIPING SPECIALTIES**				
		Supply and install rubber flexible connection, manual air vents, blowdown valves, automatic flow control valves				
	A	6 inch EPDM rubber flexible connection	ea.	6		
	B	Manual air vent	ea.	6		
	C	Blowdown drain valve	ea.	6		
	D	6 inch Automatic Flow control valve	ea.	2		
236423.11		**Water-Cooled, Rotary Screw Water Chiller (GFE)**				
		Install new GFE water cooled Rotary screw chiller in the location shown on drawings				
	A	Chiller installation	ea.	1		
	B	Conduct 8 hours training at post	l.s	1		
DIVISION 26 ELECTRICAL						
		Disconnect existing power supply to Chiller #2 for the duration of chiller replacement				
		Disconnecting power supply	l.s	1		
		Re-connect existing power supply to Chiller #2 after chiller replacement				
		Reconnecting power supply	l.s	1		
ADD Alternate 1						
DIVISION 26 ELECTRICAL						
		Supply and install new power feeder from the MCC to the new chiller *Note:* *1-Connection to the chiller shall be using liquid tight flexible conduit* *2-Estimated single run is 15m, contractor to verify*				
		Conduit: 4" IMC type UL Listed	l.s	1		
		Cable insulation type: Copper – XLPE/PVC single conductor, 600/1000V				
		Cross section: 4x1C-240 mm2 and 1x1C-70mm2 G	l.s	1		
		Number of run: Two parallel feeders.				
TOTAL						-



CAIRO II – 6TH FLOOR – CHILLER ONE DEMOLITION

SCALE: N.T.S

ATTACHMENT - 5

United States Embassy, Cairo, Egypt

Embassy Compound

GENERAL NOTES:

-Dimensions are not to be scaled from this drawing.
-The contractor shall verify all dimensions on site before Fabrication.
-Any discrepancies, either between written dimensions and site dimensions should be brought to the immediate attention of the COR before executing the works.
-For Materials, colors and special details the Contractor has to submit samples for COR's approval prior construction.
-For all fixed items, built in fixtures and carpentry works, the dimensions have to be checked from site.
- All dimensions shown in drawings are in millimeters

LEGEND AND ABBREVIATIONS

A.F.F.L	ABOVE FINISH FLOOR LEVEL
B.O.P	BOTTOM OF PIPE
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN

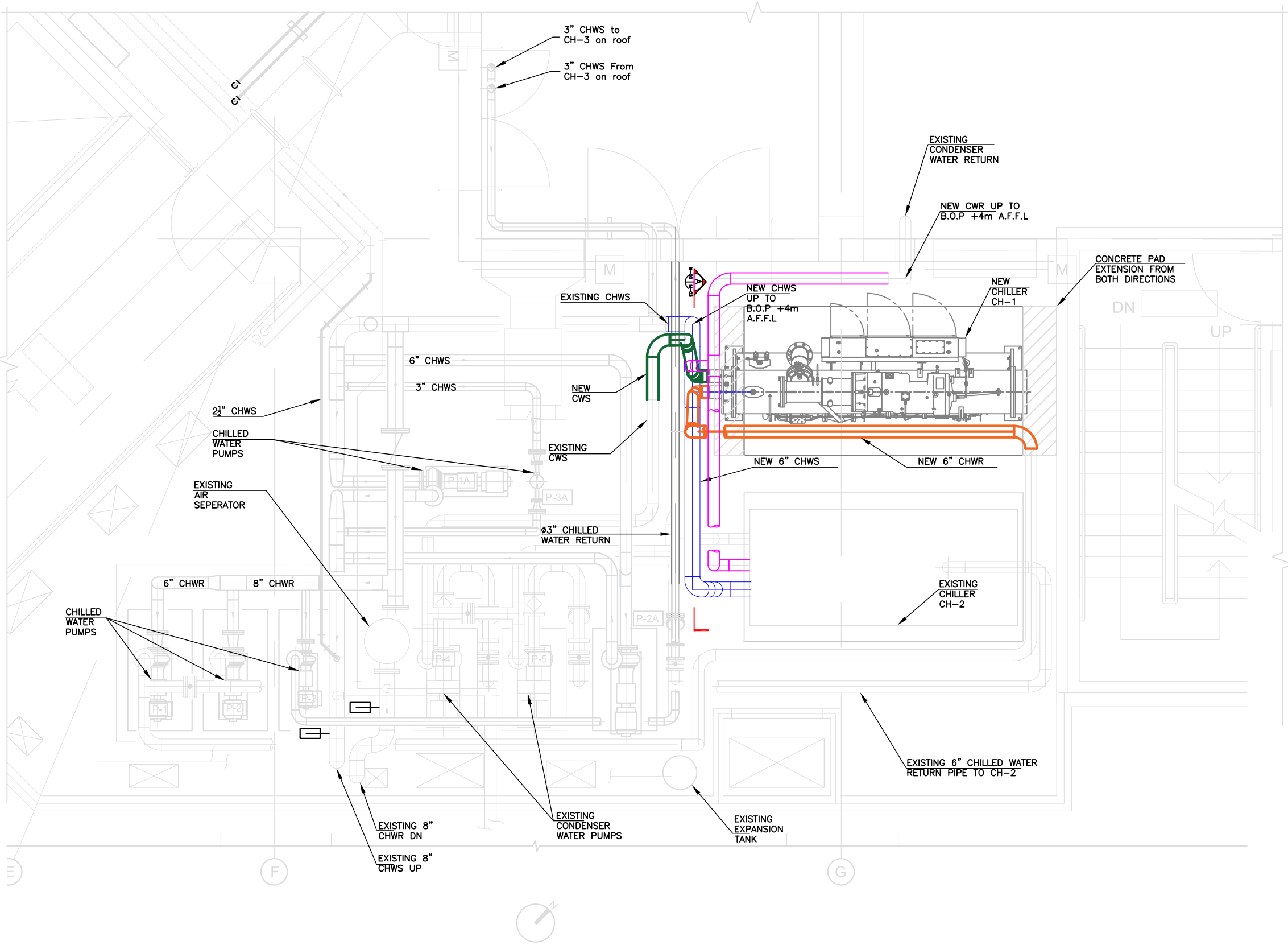
NOTES

1. DEMOLITION IS TO BE DONE IN PHASES.
2. HATCHED PIPES AND EQUIPMENT SHALL BE DEMOLISHED.
3. MINIMUM SYSTEM INTERRUPTION SHALL BE PRACTICED, SUCH THAT ONE CHILLER SHALL BE OPERATIONAL DURING WORKING DAYS THROUGH OUT THE PROJECT DURATION.
4. ALL REMOVED PIPE AND ITS CORRESPONDING PENETRATIONS SHALL BE PERFORMED AND ISOLATED FROM THE MECHANICAL AREA AND ASSURE IT WON'T LEAK TO THE LEVEL UNDERNEATH.
5. THE EXISTING CHILLER CONTROL PANEL IS FED FROM EMBASSY CENTRAL UPS SYSTEM. THE NEW PANEL CONTROLLER SHALL BE POWERED FROM SAME CIRCUIT.
6. THE NEW CHILLER SEISMIC ISOLATIONS SHALL BE VERIFIED TO PROVIDE A NEW PARTS RELEVANT TO THE NEW CHILLER.
7. ANY REMOVED PIPING, CONDUITS, DEVICES DUE TO THE PROJECT RELATIONS, SHALL BE PART OF THE CONTRACTOR RESPONSIBILITIES TO RESTORE THE SYSTEM BACK TO ITS ORIGINAL INSTALLATION.

Drawing Title

Existing/Partial Demolition
Chiller plant
Cairo II - 6th Floor

Date	AUG. 2020
Drawn By	VERONICA TAWFIK
Checked By	HALA KALDAS
Drawing Scale	TO FIT
Classification	SBU
Sheet Number	M-01



CAIRO II – 6TH FLOOR – CHILLER ONE REPLACEMENT

SCALE: N.T.S

United States Embassy, Cairo, Egypt

Embassy Compound

GENERAL NOTES:

-Dimensions are not to be scaled from this drawing.
-The contractor shall verify all dimensions on site before Fabrication.
-Any discrepancies, either between written dimensions and site dimensions should be brought to the immediate attention of the COR before executing the works.
-For Materials, colors and special details the Contractor has to submit samples for COR's approval prior construction.
-For all fixed items, built in fixtures and carpentry works, the dimensions have to be checked from site.
- All dimensions shown in drawings are in millimeters

LEGEND AND ABBREVIATIONS

A.F.F.L	ABOVE FINISH FLOOR LEVEL
B.O.P	BOTTOM OF PIPE
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN

NOTES

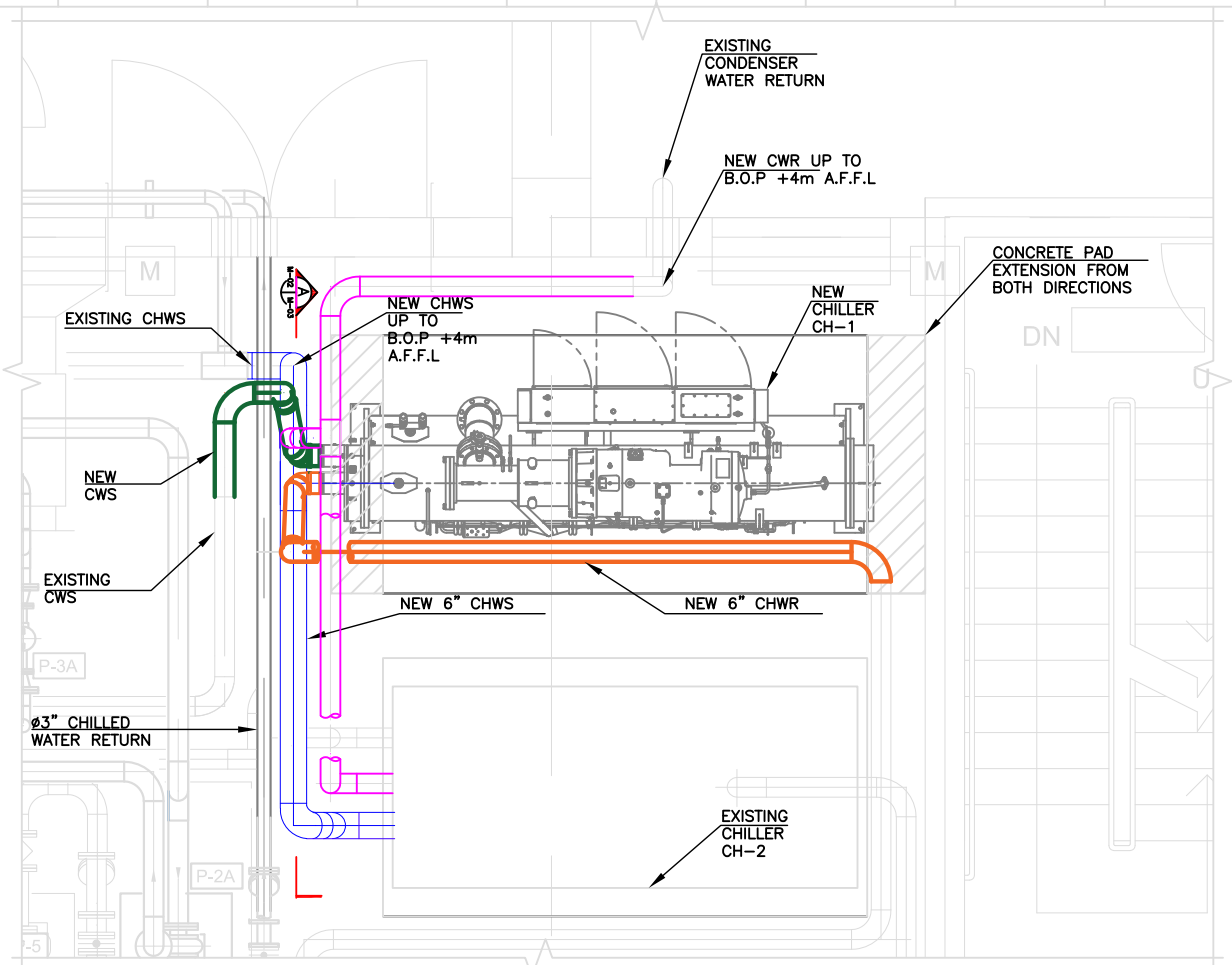
1. DEMOLITION IS TO BE DONE IN PHASES.
2. HATCHED PIPES AND EQUIPMENT SHALL BE DEMOLISHED.
3. MINIMUM SYSTEM INTERRUPTION SHALL BE PRACTICED, SUCH THAT ONE CHILLER SHALL BE OPERATIONAL DURING WORKING DAYS THROUGH OUT THE PROJECT DURATION.
4. ALL REMOVED PIPE AND ITS CORRESPONDING PENETRATIONS SHALL BE PERFORMED AND ISOLATED FROM THE MECHANICAL AREA AND ASSURE IT WON'T LEAK TO THE LEVEL UNDERNEATH.
5. THE EXISTING CHILLER CONTROL PANEL IS FED FROM EMBASSY CENTRAL UPS SYSTEM. THE NEW PANEL CONTROLLER SHALL BE POWERED FROM SAME CIRCUIT.
6. THE NEW CHILLER SEISMIC ISOLATIONS SHALL BE VERIFIED TO PROVIDE A NEW PARTS RELEVANT TO THE NEW CHILLER.
7. ANY REMOVED PIPING, CONDUITS, DEVICES DUE TO THE PROJECT RELATIONS, SHALL BE PART OF THE CONTRACTOR RESPONSIBILITIES TO RESTORE THE SYSTEM BACK TO ITS ORIGINAL INSTALLATION.

Drawing Title

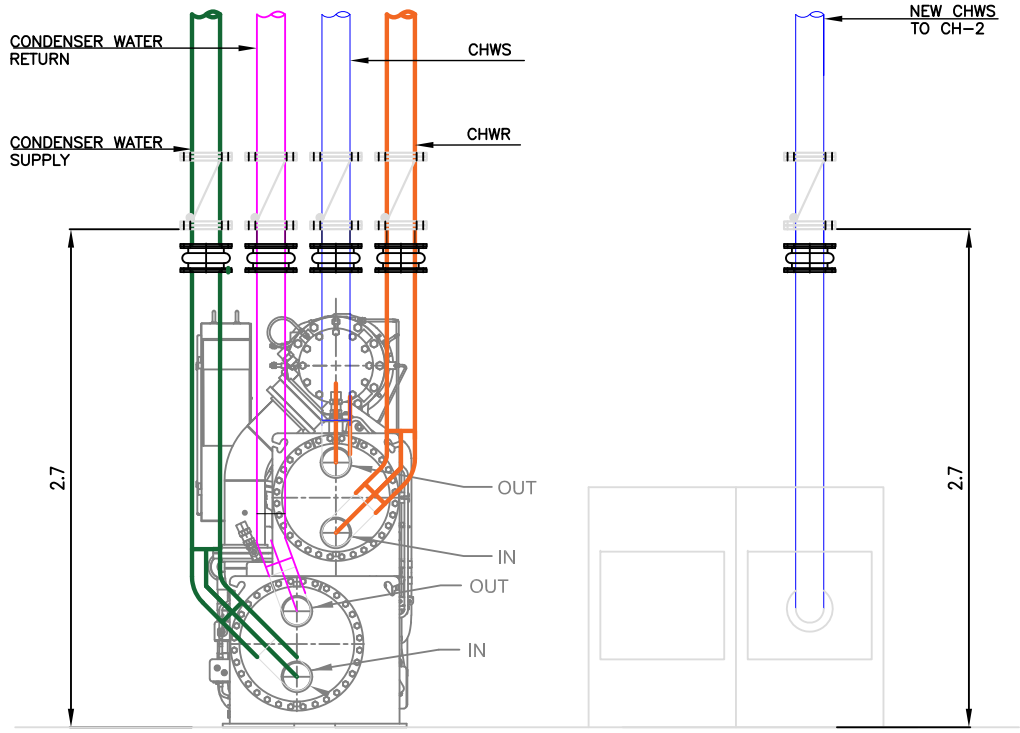
Chiller plant
Chiller 1 replacement
Cairo II - 6th Floor

Date	AUG. 2020
Drawn By	VERONICA TAWFIK
Checked By	HALA KALDAS
Drawing Scale	TO FIT
Classification	SBU
Sheet Number	M-02

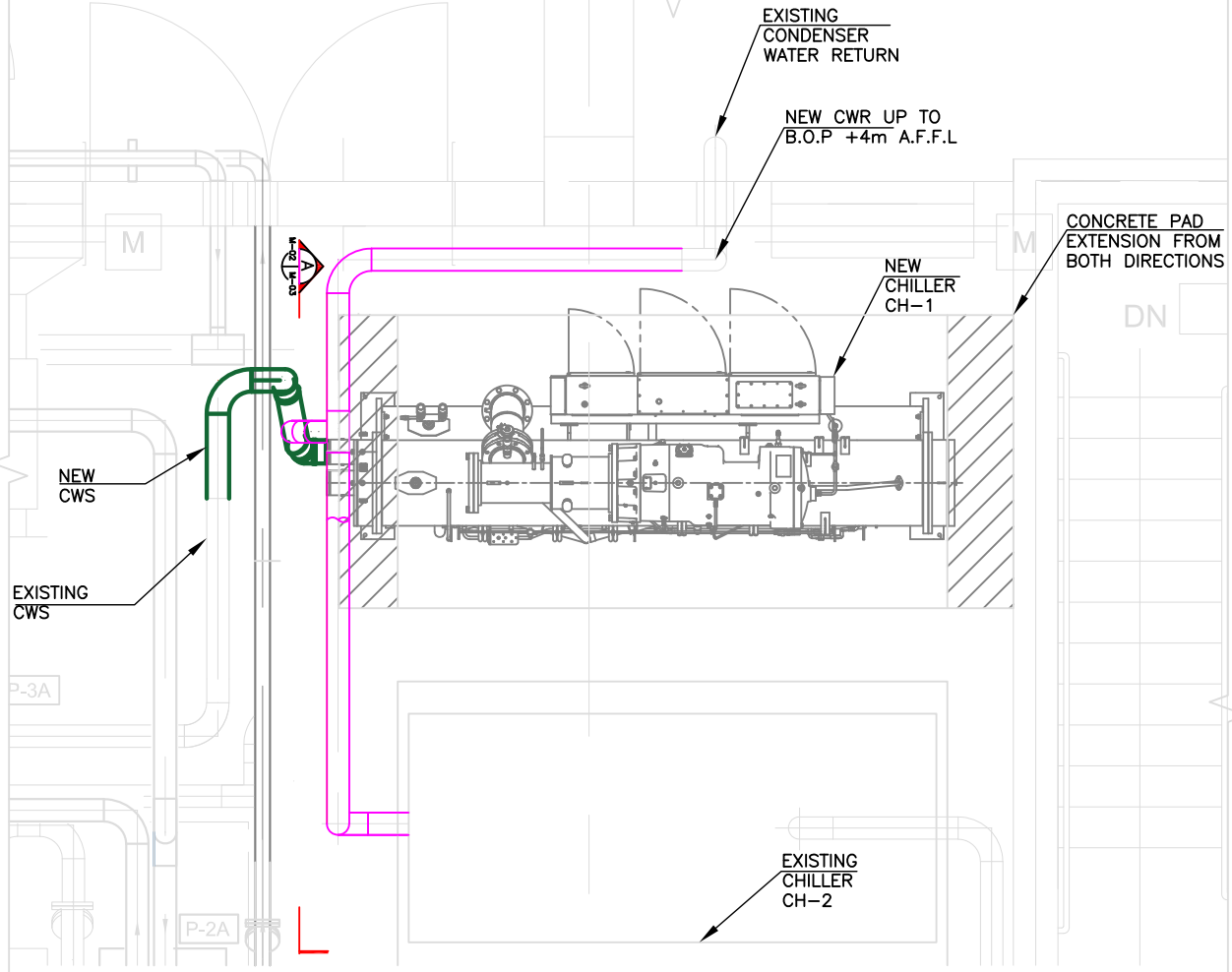
Solicitation 19EG3020Q0021 FAC 7901 Cairo II Chiller Installation



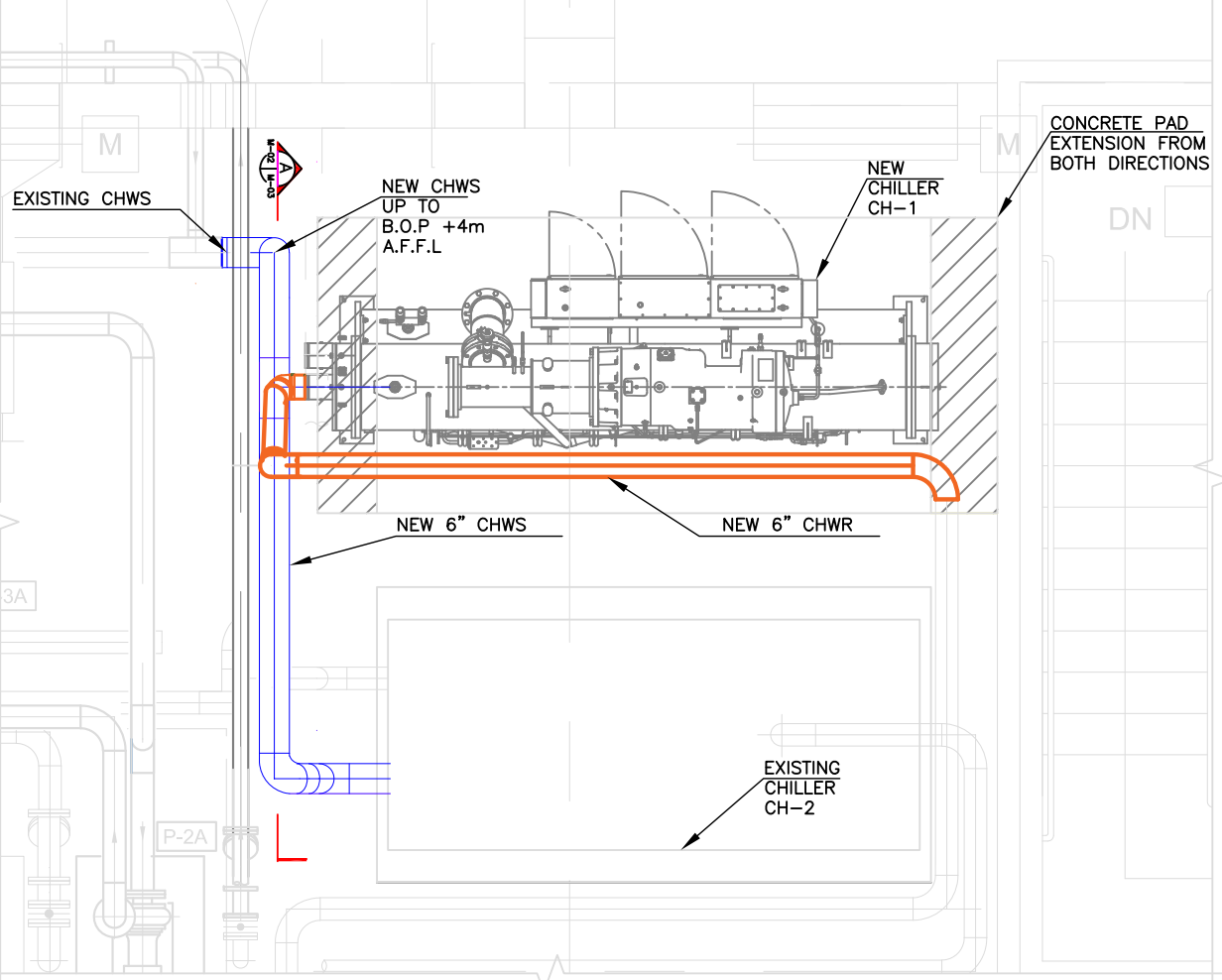
CAIRO II – 6TH FLOOR – CHILLER ONE REPLACEMENT
EXPLODED VIEW
SCALE: N.T.S



A SECTION
M-03 M-02 SCALE: N.T.S



CAIRO II – 6TH FLOOR – CONDENSER PIPING
SCALE: N.T.S



CAIRO II – 6TH FLOOR – COOLER PIPING
SCALE: N.T.S

United States Embassy, Cairo, Egypt

Embassy Compound

GENERAL NOTES:

-Dimensions are not to be scaled from this drawing.
-The contractor shall verify all dimensions on site before Fabrication.
-Any discrepancies, either between written dimensions and site dimensions should be brought to the immediate attention of the COR before executing the works.
-For Materials, colors and special details the Contractor has to submit samples for COR's approval prior construction.
-For all fixed items, built in fixtures and carpentry works, the dimensions have to be checked from site.
- All dimensions shown in drawings are in millimeters

LEGEND AND ABBREVIATIONS

A.F.F.L	ABOVE FINISH FLOOR LEVEL
B.O.P	BOTTOM OF PIPE
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN

NOTES

1. DEMOLITION IS TO BE DONE IN PHASES.
2. HATCHED PIPES AND EQUIPMENT SHALL BE DEMOLISHED.
3. MINIMUM SYSTEM INTERRUPTION SHALL BE PRACTICED, SUCH THAT ONE CHILLER SHALL BE OPERATIONAL DURING WORKING DAYS THROUGH OUT THE PROJECT DURATION.
4. ALL REMOVED PIPE AND ITS CORRESPONDING PENETRATIONS SHALL BE PERFORMED AND ISOLATED FROM THE MECHANICAL AREA AND ASSURE IT WON'T LEAK TO THE LEVEL UNDERNEATH.
5. THE EXISTING CHILLER CONTROL PANEL IS FED FROM EMBASSY CENTRAL UPS SYSTEM. THE NEW PANEL CONTROLLER SHALL BE POWERED FROM SAME CIRCUIT.
6. THE NEW CHILLER SEISMIC ISOLATIONS SHALL BE VERIFIED TO PROVIDE A NEW PARTS RELEVANT TO THE NEW CHILLER.
7. ANY REMOVED PIPING, CONDUITS, DEVICES DUE TO THE PROJECT RELATIONS, SHALL BE PART OF THE CONTRACTOR RESPONSIBILITIES TO RESTORE THE SYSTEM BACK TO ITS ORIGINAL INSTALLATION.

Drawing Title
Chiller plant
Chiller 1 replacement
Cairo II - 6th Floor
Sections and enlarged views

Date	AUG. 2020
Drawn By	VERONICA TAWFIK
Checked By	HALA KALDAS
Drawing Scale	TO FIT
Classification	SBU
Sheet Number	M-03

Solicitation 19EG3020Q0021 FAC 7901 Cairo II Chiller Installation

ATTACHMENT - 6

CHILLER#1

REPLACEMENT
CAIRO II- 6TH FLOOR

Description, Specifications,

And

Work Statement

Date: Aug., 2020

TABLE OF CONTENT

END of Table of Content

011000 SF - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Government Furnished Equipment.
7. Specification and drawing conventions.
8. Codes and Standards.

B. Related Requirements:

1.2 PROJECT INFORMATION

A. Project Identification: **Cairo II - 200 TR Chiller installation.**

1. Project Location: 5 Tawfik Diab Street Garden City, Cairo, Egypt.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:
1. Replacing York Chiller#1 model YTC1C1B25EE located at Cairo 2 building – 6th floor at the US Embassy Compound with the new Carrier GFE chiller model: 23XRVA1A1.

2. The Contractor shall deliver the removed chiller to ESSA Compound at Wadi Degla Club St. Maadi, 09839 Egypt at the disposal area. All documentation shall be signed by the COR prior chiller removal.

3. The contractor shall transport the new chiller to the US Embassy Compound from ESSA Compound and move it to chiller room at the Cairo II – 6th floor.

4. The contractor shall dismantle exiting chiller #1 and the associated variable frequency driver.

5. Modifying the existing condenser water return and chilled water supply main piping such that the main lines will be elevated to allow for future replacement of chiller#2.

6. Connect the new chiller to the existing chilled water and condenser water piping and other Work indicated in the Contract Documents.

7. Supply and install new pipes, valves and flexible connectors as indicated in the drawings.

8. Contractor shall supply and install piping insulation.

9. Cairo II is fully operational facility, at least one of the two chillers shall be operational during the project duration, putting both chillers out of service shall only be allowed during weekend for replacement of main condenser return pipe and chilled water supply pipe.

10. The contractor is responsible for the existing BMS modifications and rearrangement to meet the new installation integration of the system.

11. The removal of the existing VFD unit of the chiller shall be included as part of the scope.

12. The disconnection of the water-cooling system to the VFD shall be isolated and verified not to impact the other VFD unit.

13. The demolition of the old VFD concrete pad shall be part of the contractor responsibilities to clear the maneuvering area.

14. The structural verification of the building shall be the contractor responsibilities to assign a consultant to assure the new chiller fixation center of load is relevant to the existing structure.

15. In case the contractor is planning to use a sub-contractor, the COR shall approve the sub-contractor as part of eth bidding stage. All need certificate shall be part of the bids.

B. Type of Contract: Project will be constructed under one Lump sum contract based on breakdown of prices.

Note: Following the award, contractor shall prepare required materials and take actions as needed for a planned chiller installation by Winter/December 2020.

1.4 ACCESS TO SITE

A. General: Contractor shall comply with all restrictions and regulations of working inside the Embassy Compound to include security, access control, escort policy, and site logistics.

B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

C. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

D. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 WORK RESTRICTIONS

A. Work Restrictions, General:
   1. Work shall be conducted while the facility is in full operation, comply with restrictions on construction operations as scheduled, coordinated and approved by the COR.
   2. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities unless permitted by the COR. Notify the COR not less than three work days in advance of proposed utility interruptions.

C. Restricted Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.

D. Unless otherwise agreed upon in writing, work shall be performed only during the days and hours specified below.
   1. The Contractor shall plan execution of the work based on a 5-day workweek Sunday thru Thursday excluding holidays.
   2. Working hours shall be 8:00 to 16:30.
   3. Holidays - The Contractor shall observe, validate, and plan the work around local national holidays and American Holidays during the construction period.

E. The contractor shall be responsible to cover the fire detectors and AC grills during periods of dusty work and shall not leave the detectors covered during other non-dusty work activities.

F. It is the contractor responsibility to secure their tools and materials inside lockable boxes as located and directed by the project COR.

1.6 GOVERNMENT FURNISHED EQUIPMENT.

A. The New Screw Chiller shall be Government Furnished, Contractor Installed (GFCI). Contractor’s price shall be the cost of installation only. Government Furnished Equipment GFE shall be delivered to the contractor at ESSA compound at Wadi Degla Club St. Maadi, 09839 Egypt.

B. The contractor shall inspect and receive the item and shall be responsible for transferring chiller to the embassy compound, rigging, storing and installing.

C. Factory representative (Carrier) personals shall be involved in all processes of chiller installation, commissioning and start up.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. All work shall be done in accordance with the 2015 International code which includes but is not limited to IBC International Building Code, IMC International Mechanical Code, IPC International Plumbing Code, NEC National Electric Code and industry standard codes for installation and commissioning of chiller plants

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

p

013525 - CONSTRUCTION SAFETY AND OCCUPATIONAL HEALTH

1.1 CODES AND STANDARDS

A. Latest edition, U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual, EM 385-1-1 http://www.usace.army.mil/SafetyandOccupationalHealth/SafetyandHealthRequirementsManual.aspx

B. NFPA Code 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.

C. ANSI A10 Series Standards for Safety Requirements for Construction and Demolition.

D. NFPA Code 51B, Standard for Fire Prevention during Welding, Cutting, and Other Hot Work.

E. NFPA 10, Standard for Portable Fire Extinguishers.

F. NFPA 70, National Electrical Code

G. DOSAR Accident Prevention Clause 652-236-70, included below in full text

1.2 SUBMITTALS

A. The Contractor shall submit the following:

1. A Construction Accident Prevention Plan (CAPP) prior to the beginning of any construction activity at the Project Site.
2. Hazardous Work Permit Requests.
3. Material Safety Data Sheets (MSDS).
4. Accident Investigation Report: A report within 24 hours of each accident or mishap, except as otherwise indicated by requirements or governing regulations.

1.3 GENERAL

A. The contractor shall have a Full Time dedicated Safety & Health Program Manager on-site when any construction activity is planned, the safety manager shall be able to read, write and speak English fluently.

B. For the duration of construction, the Contractor shall implement and manage a comprehensive safety and health program.

C. The COR, as the Government Contracting Officer's Representative, reserves the right to suspend work when and where the Contractor's safety and health program is operating in an inadequate manner, has severe shortcomings, or is not in compliance with contractual requirements.

D. Acceptance by the COR will not relieve the Contractor of overall responsibility for compliance with the strict interpretation of all safety and health requirements of the Contract.

E. Accident Investigation:

The Contractor shall investigate and prepare a separate accident report for each accident resulting in lost time, disabling or fatal injuries, or damage to vehicles, property, materials, supplies, furniture, fixtures, and equipment.

In each report, the Contractor shall include a statement of Contractor actions taken to prevent recurrence of accident.

F. Hazardous Materials: The Contractor shall test any material encountered suspected to contain hazardous substances and bring to the immediate attention of the COR.

G. Protective Clothing and Equipment: The Contractor shall issue personal protective clothing and equipment as required by EM 385-1-1.

H. Welding Safety Plan: The contractor shall submit a Welding Safety Plan for all welding work to the COR before the start of any welding activities.

I. Safety and Health Training: Tool Box Meetings: The Contractor shall conduct weekly safety meetings. The Contractor shall require attendance by all tradespersons, laborers, foremen, and supervisors at the Project Site, including those of separate contractors. The Contractor shall discuss current construction operations, analyze hazards, and communicate solutions.

J. Rolling Scaffolding: All rolling scaffolding needs to be part of a complete system from a single manufacturer.

K. Ladders: All ladders used on the construction site shall conform to the requirements of EM385-1-1.

L. Signs shall be provided to give adequate warning and caution of hazards. All signs shall be visible at all times when the hazard or problem exists and shall be removed when the hazard or problem no longer exists. All employees shall be informed as to the meaning of the various signs used throughout the workplace and any special precautions that may be required.

M. RIGGING AND LIFTING:

1. The contractor shall supply and install handling and rigging hoist for safe dismantling and handling the existing installed parts that will be replaced.
2. The contractor shall provide suitable tools to include, all beams, beam dollies, chain-falls, straps, and clamps in the cooling towers area for the cooling towers overhaul, in addition to all related equipment needed to complete the rigging, and handling of parts safely without damage to the building or surrounding equipment.
3. Only authorized, trained personnel shall operate crane lift.
4. Before start, the contractor shall provide the calibration certification of the crane and the crane operator license. Out dated license or failure to provide the required documentations will result in operation cancellation with no charge to the US Government.
5. A visual inspection must be made to ensure that horn; lights, brakes, tires, gas supply, hydraulic lines, etc. are in safe working condition. Employees shall not operate an unsafe crane at any time.
6. The loading curve of the counter weight shall be provided to assure safe load capacity of the crane.
7. No person shall stand or walk under the lifting works.
8. When a wire rope bridle is used to connect the work platform to the load line, each bridle leg shall be connected to a master link or shackle in such a manner to ensure that the load is evenly distributed among the bridle legs.
9. The hook connection to the platform rigging shall be of a type that can be closed and locked to eliminate the hook throat opening. Alternately, an alloy anchor type shackle with a bolt, nut, and retaining pin may be used.
10. Wire rope and rigging hardware shall be capable of supporting, without failure, at least five times the maximum intended load. Where rotation-resistant rope is used the slings shall be capable of supporting without failure at least ten times the maximum intended load.
11. All eyes in wire rope slings shall be fabricated with thimbles.
12. Bridles and associated rigging for attaching the platform to the hoist line shall be used only for the platform and the employees and their tools and material necessary for the work and shall not be used for any other purpose when not hoisting personnel.

N. OPERATIONAL CRITERIA:

1. Hoisting of the loads shall be in a slow, controlled, cautious manner with no sudden movements.
2. Load lines shall be capable of supporting, without failure, at least 7 times the maximum intended load, except where rotation resistant rope is used the lines shall be capable of supporting, without failure, at least 10 times the maximum intended load. The required design factor is achieved by taking the current safety factor of 3.5 and applying the 50% de-rating of the crane capacity.
3. The crane shall be uniformly level within 1% of level grade and located on firm footing. Cranes equipped with outriggers shall have them all fully

deployed to load chart criteria following manufacturer's specifications, as far as practical, when hoisting personnel.

4. The total weight of the loads and related rigging shall not exceed 50% of the rated capacity for the radius and configuration of the crane or derrick.
5. Only cranes with power-operated up and down boom hoists and load lines shall be used to support work platforms. The use of machines having live booms is prohibited. Platforms shall be lowered under power and not by the brake.
6. Only cranes with an A2B device that prevents contact between the load block or overhaul ball and the boom tip, or a system that deactivates the hoisting action before damage occurs shall be used.
7. Cranes with variable angle booms shall be equipped with boom angle indicators readily visible to the operator.
8. Cranes with telescoping booms shall be equipped with a device to indicate clearly to the operator, at all times, the boom’s extended length, or an accurate determination of the load radius to be used during the lift shall be made prior to hoisting personnel.
9. The load line of the hoist drum shall have a system or device on the power train, other than the load hoist brake, that regulates the lowering rate of speed of the hoist mechanism (Controlled lowering): free fall is prohibited.

A. LIFT AND INSPECTION:

1. Prior to every trial lift, the crane or derrick operator, signal person, employees to be lifting, and the competent person shall attend a pre-lift meeting to review the applicable parts of this manual, the AHA, and the details of this particular lift.
2. The competent person shall determine that all systems, controls, and safety devices are activated and functioning properly; that no interferences exist; and that all configurations necessary to reach those work locations will allow the operator to remain under the 50% limit of the crane’s rated capacity.
3. Materials and tools to be used during the actual lift may be loaded in the platform (evenly distributed and secured) for the trial lift.
4. A visual inspection of the crane, derrick, rigging, work platform, and the crane or derrick support base shall be conducted by a competent person immediately after the trial lift to determine whether the testing has exposed any defect or produced any adverse effect upon any component or structure.
5. Any defects found during inspections shall be corrected before hoisting.
6. If the load rope goes slack, the hoisting system shall be re-inspected to ensure that all ropes are properly seated on drums and sheaves.

1.4 CONSTRUCTION ACCIDENT PREVENTION PLAN (CAPP)

A. Prior to beginning work at the Project Site, the Contractor shall prepare and submit to the COR, a site-specific CAPP covering all activities for the Contractor and all subcontractors. The CAPP shall contain, at a minimum, the Contractor’s

understanding of:

1. Management and Corporate Commitment: The Contractor shall include a certified statement in the introduction, executed by a senior officer of the construction firm having broad corporate authority, indicating full commitment to the accepted CAPP and the level of authority in assignment of responsibilities at the Project Site.
2. Name, qualifications, and duties of Safety & Health Program Manager.
3. The CAPP shall incorporate the requirements contained in the U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual, EM 385-1-1.
4. Submit the Fall Protection and Prevention Plan with the CAPP, and update every six (6) months
5. Hazardous Work Permits: The procedure for preparation and approval prior to proceeding with work deemed hazardous.
6. Safety and Health Training: The procedures for implementing training and orientation.
7. Location of facilities and procedures for emergency medical situations.
8. .Emergency Plan to include: Escape procedures and routes, method of accounting for employees following emergency evacuation, means of reporting emergencies, and persons to be contacted for information or clarification.
9. Emergency Resources--Establish jointly with the Government, a list of telephone numbers and locations of ambulance, physician, hospital, fire, police and other sources of emergency assistance. The list shall be posted in several locations on the Project site.

1.5 SITE MAINTENANCE, PROTECTION, AND SANITATION

A. The Contractor shall maintain the site facilities in clean, sanitary, and safe operating conditions to the satisfaction of the COR.

B. The COR will conduct periodic site inspections to verify that the Contractor is maintaining good housekeeping practices

C. Fire Protection:
   1. The Contractor shall provide temporary portable fire extinguishers.
   2. The Contractor shall prohibit smoking in the building.
   3. During welding, cutting, and burning, the Contractor shall comply with NFPA 51B in areas of fire-hazard exposure. The Contractor shall provide stand-by fire-protection personnel and adequate supervision of operations.

D. First Aid Medical Facility Requirements:

   1. The Contractor shall provide a first aid kit. A health care professional or competent first aid person shall evaluate and determine the fill contents of each kit.

ACCIDENT PREVENTION CLAUSE (APR 2004) (IN FULL TEST)

(a) General. The contractor shall provide and maintain work environments and procedures which will safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to contractor operations and activities; avoid interruptions of Government operations and delays in project completion dates; and, control costs in the performance of this contract. For these purposes, the contractor shall:

(1) Provide appropriate safety barricades, signs and signal lights;

(2) Comply with the standards issued by any local government authority having jurisdiction over occupational health and safety issues; and,

(3) Ensure that any additional measures the contracting officer determines to be reasonably necessary for this purpose are taken.

(4) For overseas construction projects, the contracting officer shall specify in writing additional requirements regarding safety if the work involves:

(i) Scaffolding.

(ii) Work at heights above two (2) meters.

(iii) Trenching or other excavation greater than one (1) meter in depth.

(iv) Earth moving equipment.

(v) Temporary wiring, use of portable electric tools, or other recognized electrical hazards. Temporary wiring and portable electric tools require the use of a ground fault circuit interrupter (GFCI) in the affected circuits; other electrical hazards may also require the use of a GFCI.

(vi) Work in confined spaces (limited exits, potential for oxygen less that 19.5 percent or combustible atmosphere, potential for solid or liquid engulfment, or other hazards considered to be immediately dangerous to life or health such as water tanks, transformer vaults, sewers, cisterns, etc.);

(vii) Hazardous materials - a material with a physical or health hazard including but not limited to, flammable, explosive, corrosive, toxic, reactive or unstable, or any operations which creates any kind of contamination inside an occupied building such as dust from demolition activities, paints, solvents, etc.; or

(viii) Hazardous noise levels.

(b) Records. The contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this contract resulting in death, traumatic injury, occupational disease, or damage to or theft of property, materials, supplies, or equipment. The contractor shall report this data in the manner prescribed by the contracting officer.

(c) Subcontracts. The contractor shall be responsible for its subcontractor’s compliance with this clause.

(d) Written program. Before commencing work, the contractor shall:

(1) Submit a written plan to the contracting officer for implementing this clause. The plan shall include specific management or technical procedures for effectively controlling hazards associated with the project; and,
(2) Meet with the contracting officer to discuss and develop a mutual understanding relative to administration of the overall safety program.

(e) Notification. The contracting officer shall notify the contractor of any non-compliance with these requirements and the corrective actions required. This notice, when delivered to the contractor or the contractor's representative on site, shall be deemed sufficient notice of the non-compliance and corrective action required. After receiving the notice, the contractor shall immediately take corrective action. If the contractor fails or refuses to promptly take corrective action, the contracting officer may issue an order suspending all or part of the work until satisfactory corrective action has been taken. The contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any suspension of work order issued under this clause.

(End of clause)

END OF SECTION

SECTION 230519 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Liquid-in-glass thermometers.
2. Thermowells
3. Dial-type pressure gages.
4. Gage attachments.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
1. Standard: ASME B40.200.
2. Case: **Cast aluminum**; **9-inch (229-mm)** nominal size unless otherwise indicated.
3. Case Form: **Adjustable angle** or **Straight** unless otherwise indicated.
4. Tube: Glass with magnifying lens and **red** organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in **deg F and deg C**.
6. Window: **plastic**.
7. Stem: **Aluminum** and of length to suit installation.
a. Design for Thermowell Installation: Bare stem.

8. Connector: 1-1/4 inches (32 mm), with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.2 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Steel Piping: **CRES** or **CSA**.
4. Type: Stepped shank unless straight or tapered shank is indicated.
5. External Threads: NPS 1/2, NPS 3/4, or NPS 1, (DN 15, DN 20, or NPS 25,) ASME B1.20.1 pipe threads.
6. Internal Threads: 1/2, 3/4, and 1 inch (13, 19, and 25 mm), with ASME B1.1 screw threads.
7. Bore: Diameter required to match thermometer bulb or stem.
8. Insertion Length: Length required to match thermometer bulb or stem.
9. Lagging Extension: Include on thermowells for insulated piping and tubing.
10. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: **Mixture of graphite and glycerin.**

2.3 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
1. Case: **Sealed** type(s); **cast aluminum or drawn steel**; **6-inch (152-mm)** nominal diameter.
2. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
3. Pressure Connection: Brass, with **NPS 1/4 or NPS 1/2 (DN 8 or DN 15)**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
4. Movement: Mechanical, with link to pressure element and connection to pointer.
5. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **psi and kPa**.
6. Pointer: Dark-colored metal.
7. Window: **plastic**.
8. Ring: **Metal**.
9. Accuracy: **Grade A, plus or minus 1 percent of middle half of** scale range.

2.4 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with **NPS 1/4 or NPS 1/2 (DN 8 or DN 15)**, ASME B1.20.1 pipe threads and **piston** or **porous-metal**-type surge-dampening device. Include extension for use on insulated piping.

B. Siphons: Loop-shaped section of **steel** pipe with **NPS 1/4 or NPS 1/2 (DN 8 or DN 15)** pipe threads.

C. Valves: **Brass ball**, with **NPS 1/4 or NPS 1/2 (DN 8 or DN 15)**, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending **a minimum of 2 inches (51 mm) into** and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

G. Install valve and snubber in piping for each pressure gage for fluids (except steam).

H. Install valve and syphon fitting in piping for each pressure gage for steam.

I. Install thermometers in the following locations:
   1. Two inlets and two outlets of each chiller.

J. Install pressure gages in the following locations:

   1. Discharge of each pressure-reducing valve.
   2. Inlet and outlet of each chiller chilled-water and condenser-water connection.
   3. Suction and discharge of each pump.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at inlets and outlets of each chiller shall be:
   1. Industrial-style, liquid-in-glass type.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: [**0 to 150 deg F (Minus 20 to plus 70 deg C)**] [**0 to 150 deg F and minus 20 to plus 70 deg C**].

B. Scale Range for Condenser-Water Piping: [**0 to 150 deg F (Minus 20 to plus 70 deg C)**] [**0 to 150 deg F and minus 20 to plus 70 deg C**].

3.6 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each pressure-reducing valve shall be:

1. **Sealed**, **direct**-mounted, metal case.

B. Pressure gages at inlet and outlet of each chiller chilled-water and condenser-water connection shall be:

1. **Sealed**, **direct**-mounted, metal case.

C. Pressure gages at suction and discharge of each pump shall be the following:

1. **Sealed**, **direct**-mounted, metal case.

3.7 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: **0 to 200 psi.**

B. Scale Range for Condenser-Water Piping: **0 to 200 psi.**

END OF SECTION 230519

SECTION 230523.12 - BALL VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
3. ASME B31.1 for power piping valves.
4. ASME B31.9 for building services piping valves.

C. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

D. Refer to HVAC valve schedule articles for applications of valves.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:
1. Handlever: For quarter-turn valves smaller than **NPS 4 (DN 100)**.

H. Valves in Insulated Piping:

1. Include 2-inch (50-mm) stem extensions.

2. Extended operating handle of nonthermal-conductive material, and protective sleeves that allow operation of valves without breaking the vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

I. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. One-Piece Bronze Ball Valves with Bronze Trim:
1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 400 psig (2760 kPa).
c. Body Design: One piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE.
g. Stem: Bronze.
h. Ball: Chrome-plated brass.
i. Port: Reduced.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified SWP classes or CWP ratings are unavailable, the same types of valves with higher SWP classes or CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.

3.3 CHILLED-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller: **One** or **Two** piece, **regular** port, **brass or bronze** with B**rass or bronze** trim.

1. Valves may be provided with solder-joint ends instead of threaded ends.

3.4 CONDENSER-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller: **One** piece, **regular** port, **bronze** with **bronze** trim.

1. Valves may be provided with solder-joint ends instead of threaded ends.

END OF SECTION 230523.12

SECTION 230523.13 - BUTTERFLY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Iron, single-flange butterfly valves.
2. Chainwheels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.1 for flanges on iron valves.
2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
3. ASME B31.1 for power piping valves.
4. ASME B31.9 for building services piping valves.

C. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream piping unless otherwise indicated.

E. Valve Actuator Types:

1. Gear Actuator: For valves NPS 6 (DN 150) and larger.
2. Chainwheel: Device for attachment to gear, stem, or other actuator of size and with chain for mounting height, according to "Valve Installation" Article.

F. Valves in Insulated Piping: With 2-inch (50-mm) stem extensions with extended necks.

G. If valves with specified SWP classes or CWP ratings are unavailable, the same types of valves with higher SWP classes or CWP ratings may be substituted.

2.2 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. Iron, Single-Flange Butterfly Valves with Ductile-Iron Disc:

1. Approved manufacturers: Nibco, Crown, Crane or approved equal.
2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: **200 psig (1380 kPa)**.
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: **EPDM**.
f. Stem: One- or two-piece stainless steel.
g. Disc: Nickel-plated or ductile iron.

2.3 CHAINWHEELS

A. Approved manufacturers: Nibco, Crown, Crane or approved equal.

B. Description: Valve actuation assembly with sprocket rim, chain guides, chain**, and attachment brackets for mounting chainwheels directly to hand wheels**.

1. Sprocket Rim with Chain Guides: Ductile iron, of type and size required for valve **Include epoxy coating.**
2. Chain: Hot-dip, galvanized steel, of size required to fit sprocket rim.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install chainwheels on operators for butterfly valves **NPS 4 (DN 100)** and larger and more than **70 inches (1800 mm)** above floor. Extend chains to **60 inches (1520 mm)** above finished floor.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 CHILLED-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Iron, Single-Flange Butterfly Valves, NPS 2-1/2 to NPS 12 (DN 65 to DN 300): 200 CWP, **EPDM** seat, **ductile-iron** disc.

3.4 CONDENSER-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Iron, Single-Flange Butterfly Valves, NPS 2-1/2 to NPS 12 (DN 65 to DN 300): 200 CWP, **EPDM** seat, **ductile-iron** disc.

END OF SECTION 230523.13

SECTION 230523.14 - CHECK VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Iron swing check valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B16.18 for solder joint.
5. ASME B31.1 for power piping valves.
6. ASME B31.9 for building services piping valves.

C. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream piping unless otherwise indicated.

E. Valve Bypass and Drain Connections: MSS SP-45.

2.2 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Approved manufacturers: Nibco, Crown, Crane or approved equal.
2. Description:

a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).

c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Gasket: Asbestos free.
h. Disc Holder: Bronze.
i. Disc: PTFE.
j. Gasket: Asbestos free.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Provide valves that is suitable for vertical and horizontal at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install swing check valves for proper direction of flow in horizontal position with hinge pin level.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified SWP classes or CWP ratings are unavailable, the same types of valves with higher SWP classes or CWP ratings may be substituted.

B. Select valves, except wafer types, with the following end connections:
1. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.
2. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules.
3. For Steel Piping, NPS 5 (DN 125) and Larger: Flanged ends.

3.4 CHILLED-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 (DN 65) and Larger:
1. Iron Swing Check Valves: **Class 125**, **metal** seats.

3.5 CONDENSER-WATER VALVE SCHEDULE

A. Pipe NPS 2-1/2 (DN 65) and Larger:
1. Iron Swing Check Valves: **Class 125**, **metal** seats.

END OF SECTION 230523.14

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to **ASCE/SEI 7**.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following: include Product Data for components:

1. Trapeze pipe hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of **galvanized steel**.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of **galvanized steel**.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: [**ASTM C 552, Type II cellular glass with 100-psig (688-kPa)**] minimum compressive strength and vapor barrier.

B. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

C. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

D. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, **zinc-coated** steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Install lateral bracing with pipe hangers and supports to prevent swaying.

G. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, [**NPS 2-1/2 (DN 65)**] and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

J. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
   b. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.

5. Pipes NPS 8 (DN 200) and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for **trapeze pipe hangers**.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.3 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to [**1-1/2 inches (40 mm)**]

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use galvanized-steel **pipe hangers and supports and metal trapeze pipe hangers** and attachments for general service applications.

F. Use copper-plated pipe hangers and **copper or stainless-steel** attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
3. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
4. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
5. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
6. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
7. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.
8. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
3. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
4. C-Clamps (MSS Type 23): For structural shapes.

5. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

6. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
7. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
2. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Use **powder-actuated fasteners or mechanical-expansion anchors** instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230548.13 - VIBRATION CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Housed-restrained-spring isolators.
   2. Vibration isolation equipment bases.

1.2 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.3 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS **Government Furnished Equipment GFE**

2.1 HOUSED-RESTRAINED-SPRING ISOLATORS

A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing.
   1. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with non-adjustable snubbers to limit vertical movement.
      a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig (3447 kPa).
      b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.2 VIBRATION ISOLATION EQUIPMENT BASES

A. Steel Rails: Factory-fabricated, welded, structural-steel rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide rails.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Rails shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

B. Steel Bases: Factory-fabricated, welded, structural-steel bases and rails.
1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

C. Concrete Inertia Base: Existing, welded, structural-steel bases and rails ready for placement of cast-in-place concrete.
1. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
2. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 VIBRATION CONTROL DEVICE INSTALLATION

A. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

END OF SECTION 230548.13

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Equipment labels (for chiller and controller).
2. Warning signs and labels (for piping installation height).
3. Pipe labels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, **1/16 inch (1.6 mm)** thick, and having predrilled holes for attachment hardware.
2. Letter Color: **White**
3. Background Color: **Black**.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
6. Minimum Letter Size: 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, **1/16 inch (1.6 mm)** thick, and having predrilled holes for attachment hardware.

B. Letter Color: **White**.

C. Background Color: **Red**.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

F. Minimum Letter Size: 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless-steel self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to **partially cover** circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Size letters according to ASME A13.1 for piping and At least 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm) and proportionately larger lettering for greater viewing distances.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulates.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of **25 feet (7.6 m)** in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Pipe Label Color Schedule:

1. Chilled-Water Piping: **White letters on a safety-green background**.
2. Condenser-Water Piping: **White letters on a safety-green background**.

END OF SECTION 230553

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Chilled-water piping, **indoors.**

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Compliance sheet to the specification

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Products shall not contain asbestos, lead, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

D. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White or black to match existing.

2.4 SEALANTS

A. Joint Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
4. Color: White or gray.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 TAPES

A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Width: 2 inches (50 mm).
2. Thickness: 6 mils (0.15 mm).

3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
4. Elongation: 500 percent.
5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

2.6 SECUREMENTS

A. Aluminum Bands: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, **1/2 inch (13 mm)** wide with closed seal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install multiple layers of insulation with longitudinal and end seams staggered.

E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

N. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.3 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
4. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

3.4 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.5 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

B. Color: Final color shall match existing chiller plant colors. Vary first and second coats to allow visual inspection of the completed Work.

C. Do not field paint aluminum or stainless-steel jackets.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Visual fitting inspection.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.7 INDOOR PIPING AND FITTINGS INSULATION SCHEDULE

A. Chilled Water and Condenser Water, above 40 Deg F (5 Deg C): Insulation shall be the following:
1. Flexible Elastomeric: [**2 wraps** x **1 inch (25 mm)**] thick.

END OF SECTION 230719

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes commissioning process requirements for the following HVAC&R systems, assemblies, and equipment:
   1. Cooling generation systems, including chilled-water systems.
   2. Vibration and sound systems, including vibration isolation devices.
   3. Controls and instrumentation, including chiller's unit mounted controllers

B. Contractor shall coordinate with manufacturer to perform the commissioning and start-up of the new chiller under the manufacturer's supervision and presence on site and have the warranty certificate stamped and signed by the manufacturer.

   Note: The US government paid as part of the chiller purchase order the service of Carrier factory representative to attend the start-up procedure provided by the contractor installing the chiller, all commissioning procedure listed in this specification section is included in the chiller installing contractor scope of work.

1.2 DEFINITIONS

A. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For **HVAC&R** Testing Technician.

B. Construction Checklists: For the following:

   1. Vibration controls for HVAC&R equipment.
   2. Instrumentation and control for HVAC&R.
   3. Chillers.

1.4 QUALITY ASSURANCE

A. HVAC&R Testing Technician Qualifications: Technicians to perform HVAC&R construction checklist verification tests, construction checklist verification test demonstrations, commissioning tests, and commissioning test demonstrations shall have the following minimum qualifications:
   1. Minimum **three years'** experience installing, servicing, and operating systems manufactured by approved manufacturer.
   2. One of the following:

a. National Environmental Balancing Bureau (NEBB) Certified Testing, Adjusting, and Balancing Technician.
b. Associated Air Balance Council (AABC) Certified Test and Balance Technician.
c. Owner retains the right to waive NEBB or AABC Certification.

B. Testing Equipment and Instrumentation Quality and Calibration: For test equipment and instrumentation required to perform HVAC&R commissioning work, perform the following:

1. Submit test equipment and instrumentation list. For each equipment or instrument, identify the following:

a. Equipment/instrument identification number.
b. Planned commissioning application or use.
c. Manufacturer, make, model, and serial number.
d. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.

2. Test equipment and instrumentation shall meet the following criteria:

a. Capable of testing and measuring performance within the specified acceptance criteria.
b. Be tested and calibrated at the manufacturer's recommended intervals and maximum within 6 months from the date of use, with current calibration tags permanently affixed to the instrument being used.
c. Be maintained in good repair and operating condition throughout the duration of use on this Project.
d. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

C. Proprietary Test Instrumentation and Tools:

1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the commissioning process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:

a. Submit proprietary instrumentation and tools list. For each instrument or tool, identify the following:

1) Instrument or tool identification number.
2) Equipment schedule designation of equipment for which the instrument or tool is required.
3) Manufacturer, make, model, and serial number.
4) Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

b. Include a separate list of proprietary test instrumentation and tools in the operation and maintenance manuals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 NEW SCREW CHILLER START UP AND COMMISSIONING TESTS

A. Flush new chiller completely with fresh water.

B. Connect the chiller to the system and fill the chiller with treated water from the existing piping network.

C. Test water chemistry and treat as needed.

D. Start up and commissioning of the new screw chiller shall be according to manufacturer’s instructions.

E. Provide technicians, instrumentation, tools, and equipment to complete and document the following:

1. Performance tests.
2. Commissioning tests.
3. Commissioning test demonstrations.

F. Test report shall be submitted after

END OF SECTION 230800

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pipe and fitting materials and joining methods for the following:

1. Steel pipe and fittings.
2. Joining materials.

1.2 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following:
1. Fittings.
2. Joining materials.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
1. Chilled-Water Piping: **150 psig (1034 kPa)** at **73 deg F (22 deg C)**.
2. Condenser-Water Piping: **150 psig (1034 kPa)** at **73 deg F (66 deg C)**.

2.2 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.

B. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

2.3 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness unless otherwise indicated.
   a. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

E. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Chilled-water piping, aboveground, [**NPS 2-1/2 (DN 65) and larger**], shall be:
1. **Schedule 40** steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.

B. Condenser-water piping, aboveground, **NPS 2-1/2 (DN 65) and larger** shall be:
1. **Schedule 40** steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.

3.2 PIPING INSTALLATIONS

A. Install fittings free of sags and bends.

B. Install fittings for changes in direction and branch connections.

C. Install fittings to allow application of insulation.

D. Select system components with pressure rating equal to or greater than system operating pressure.

E. Reduce fitting sizes using eccentric reducer fitting installed with level side up.

F. Install flanges in piping, [**NPS 2-1/2 (DN 65)**] and larger, at final connections of equipment and elsewhere as indicated.

3.3 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.4 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as equipment connections.

3.5 CHEMICAL TREATMENT

A. Apply fresh water and add liquid alkaline compound to remove grease and petroleum products. Drain, clean fittings, and rinse with fresh water.

3.6 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. For the new connection leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic new portion of system is full of water.

4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special-duty valves and specialties for the following:
1. Chilled-water piping.
2. Condenser-water piping.
3. Makeup-water piping.
4. Blowdown-drain piping.
5. Air-vent piping.
6. Safety-valve-inlet and -outlet piping.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Valves: Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
2. Air-control devices.
3. Hydronic specialties.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
1. Chilled-Water Piping: **150 psig (kPa)** at [**200 deg F (93 deg C)**]
2. Condenser-Water Piping: 150 **psig (kPa)** at [**150 deg F (66 deg C)**]
3. Makeup-Water Piping: [**80 psig (552 kPa)**] at [**150 deg F (66 deg C)**]
4. Blowdown-Drain Piping: [**200 deg F (93 deg C)**].
5. Air-Vent Piping: [**200 deg F (93 deg C)**].

6. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 VALVES

A. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Section 230523.11 "Globe Valves for HVAC Piping," Section 230523.12 "Ball Valves for HVAC Piping," Section 230523.13 "Butterfly Valves for HVAC Piping," Section 230523.14 "Check Valves for HVAC Piping," and Section 230523.15 "Gate Valves for HVAC Piping."

B. Automatic Flow-Control Valves:
1. Body: Brass or ferrous metal.
2. Piston and Spring Assembly: **Corrosion resistant**, tamper proof, self-cleaning, and removable.
3. Combination Assemblies: Include bonze or brass-alloy ball valve.
4. Identification Tag: Marked with zone identification, valve number, and flow rate.
5. Size: Same as pipe in which installed.
6. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
7. Minimum CWP Rating: [**175 psig (1207 kPa)**] [**300 psig (2070 kPa)**].
8. Maximum Operating Temperature: [**200 deg F (93 deg C)**] [**250 deg F (121 deg C)**].

2.3 AIR-CONTROL DEVICES

A. Manual Air Vents:
1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/8 (DN 6).
6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 225 deg F (107 deg C).

2.4 HYDRONIC PIPING SPECIALTIES

A. Stainless-Steel Bellow, Flexible Connectors:

1. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
2. End Connections: Threaded or flanged to match equipment connected.
3. Performance: Capable of 3/4-inch (20-mm) misalignment.
4. CWP Rating: 150 psig (1035 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.

B. Install check valves at each pump discharge and elsewhere as required to control flow direction.

3.2 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

END OF SECTION 232116

SECTION 236426.11 - WATER-COOLED, ROTARY-SCREW WATER CHILLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Packaged, water-cooled, single-compressor chillers.

This chiller is to replace York existing chiller model YTC1C1B25EE

Approximate existing chiller Dimensions: 3.7m x 1.65m x 2.2m

1.2 ACTION SUBMITTALS

A. Shop Drawings:
1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Certificates: For certification required in "Quality Assurance" Article.

B. Seismic Qualification Data: Certificates, for chillers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Source quality-control reports.

D. Field Quality-Control Reports: Startup service reports.

E. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For the chiller to include in emergency, operation, and maintenance manuals.

B. Service manual to include the wiring diagram, control connections and Freon piping network.

1.5 QUALITY ASSURANCE

A. AHRI Certification: Certify chiller according to AHRI 550 certification program.

B. AHRI Rating: Rate chiller performance according to requirements in AHRI 550/590.

C. ASHRAE Compliance:

1. ASHRAE 15 for safety code for mechanical refrigeration.
2. ASHRAE 147 for refrigerant leaks, recovery, and handling and storage requirements.

D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1.

E. ASME Compliance: Fabricate and label chiller to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, and include an ASME U-stamp and nameplate certifying compliance.

F. Comply with NFPA 70.

G. Comply with requirements of UL and UL Canada and include label by a qualified testing agency showing compliance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Ship chillers from the factory fully charged with refrigerant.

B. Ship oil-lubricated chiller with a separate full charge of oil.

1. Ship oil in containers separate from chiller.

C. Package chiller for export shipping in totally enclosed bagging.

1.7 WARRANTY

Warranty Period: Warranty shall include parts and labor for one year after date of Substantial Completion or 18 months from shipment in addition to 5 years compressor warranty.

Warranty shall be provided only by the manufacturer’s local representative.

PART 2 - PRODUCTS

Government Furnished Equipment GFE

Carrier model number: 23XRVA1A1

2.1 PACKAGED, WATER-COOLED, SINGLE-COMPRESSOR CHILLERS

A. New Chiller Capacities and Characteristics:
   a. Selection: See attachment number I
   b. Drawings: See attachment number II
   c. Control wiring: See attachment number III
   d. Field wiring: See attachment number IV
   e. Process & Instrumentation: See attachment V
   f. Field Installation Notes: See attachment VI
   g. Product data: https://www.carrier.com/commercial/en/us/products/chillers-components/water-cooled-chillers/23xrv/
   h. Noise Rating: 85 sound power level when measured according to AHRI 575. Provide factory-installed sound treatment if necessary to achieve the performance indicated.

Chiller's full documents will be handed to the awarded contractor

2.2 SOURCE QUALITY CONTROL

A. Perform functional tests of chillers before shipping.

B. Factory performance test water-cooled chillers, before shipping, according to AHRI 550/590.

   1. Test the following conditions:

      a. Design conditions indicated.
      b. Reduction in capacity from design to minimum load in steps of 25 with condenser fluid at design conditions.
      c. Reduction in capacity from design to minimum load in steps of 25 with varying entering condenser-fluid temperature from design to minimum conditions in [**5 deg F (3 deg C)**] increments.
      d. 10 point(s) of varying part-load performance to be selected by Owner at time of test.

C. Factory sound test water-cooled chillers, before shipping, according to AHRI 575.

   1. Test the following conditions:

      a. Design conditions indicated.
      b. Chiller operating at calculated worst-case sound condition.

c. At five point(s) of varying part-load performance to be selected by Owner at time of test.

D. For chillers located indoors, rate sound power level according to AHRI 575.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine chillers before installation. Reject chillers that are damaged.

B. Examine roughing-in for equipment support, anchor-bolt sizes and locations, piping, and electrical connections to verify actual locations, sizes, and other conditions affecting chiller performance, maintenance, and operations before equipment installation.

1. Final chiller locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CHILLER INSTALLATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.
1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

B. Maintain manufacturer's recommended clearances for service and maintenance.

C. Install separate devices furnished by manufacturer and not factory installed.

3.3 CONNECTIONS.

A. Comply with requirements for piping specified in Section 232113 "Hydronic Piping," Section 232116 "Hydronic Piping Specialties," Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to chiller to allow service and maintenance.

C. Evaporator Fluid Connections: Connect to evaporator inlet with shutoff valve, strainer, flexible connector, thermometer, and plugged tee with pressure gage. Connect to evaporator outlet with shutoff valve, balancing valve, flexible connector, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter (optional), and drain connection with valve. Make connections to chiller with a flange.

D. Condenser Fluid Connections: Connect to condenser inlet with shutoff valve, strainer, flexible connector, thermometer, and plugged tee with pressure gage. Connect to condenser outlet with shutoff valve, balancing valve, flexible connector, flow switch, thermometer, plugged tee with

shutoff valve and pressure gage, flow meter (optional) and drain connection with valve. Make connections to chiller with a flange.

E. Connect each chiller drain connection with a union and drainpipe, and extend pipe, full size of connection, to floor drain. Provide a shutoff valve at each connection.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup and commissioning service.

1. Complete installation and startup check according to manufacturer's written instructions.
2. Verify that refrigerant charge is sufficient, and chiller has been leak tested.
3. Verify that pumps are installed and functional.
4. Verify that thermometers and gages are installed.
5. Operate chiller for run-in period.
6. Check bearing lubrication and oil levels.
7. For chillers installed indoors, verify that refrigerant pressure relief device is vented outdoors.
8. Verify proper motor rotation.
9. Verify static deflection of vibration isolators, including deflection during chiller startup and shutdown.
10. Verify and record performance of fluid flow and low-temperature interlocks for evaporator and condenser.
11. Verify and record performance of chiller protection devices.
12. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

B. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assembly, installation, and connection.

C. Prepare test and inspection startup reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel for at least 8 hours to adjust, operate, and maintain chillers demonstration shall include a pre-test and post training test to confirm knowledge transfer.

END OF SECTION 236426.11

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for [Type PVC].

C. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for [armored cable, Type PVC/PVC and XLPE/PVC with ground wire.

2.2 CONNECTORS

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for all feeders. Solid for 4 mm2 and smaller; stranded for 6mm2 and larger.

B. Branch Circuits: Copper. Solid for 4mm2 and smaller; stranded for 6mm2 and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: PVC/PVC or XLPE/PVC multiconductor cable.

B. Feeders Concealed in Ceilings, Walls, and Partitions: PVC/PVC.

C. Branch Circuits Concealed in Ceilings, Walls, and Partitions: PVC insulated.

D. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: PVC/PVC or XLPE/PVC.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material [and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors].

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least [6 inches (150 mm)] of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors 50mm2 and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

    a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

B. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Furse, ERCO or approved equal.

2.2 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Conductor: 16 mm2, stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
6. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for 10mm2 and smaller, and stranded conductors for 16 mm2 and larger unless otherwise indicated.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the distribution panel to equipment grounding bar terminal on busway.

C. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, and coordinated with each other, using input from installers of the items involved:

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.

1. Wheatland, Allied, B-LINE, HILTI. Or approved equal.
2. Material: Pre-galvanized steel.
3. Channel Width: [1-5/8 inches (41.25 mm)].
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
7. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, or stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Boxes, enclosures, and cabinets.

1.2 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. IMC: Comply with ANSI C80.6 and UL 1242.

C. EMT: Comply with ANSI C80.3 and UL 797.

D. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.

2. Fittings for EMT:

   a. Material: Steel.
   b. Type: Compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

F. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

F. Device Box Dimensions: 100 mm square by 60 mm deep.

G. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, [Type 1] [Type 3R] with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

H. Cabinets:

1. NEMA 250, [Type 1] [Type 3R] galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: schedule-40-PVC.
2. Concealed Conduit, Aboveground: IMC (outdoor), EMT (indoor).
3. Underground Conduit: RNC, schedule-40-PVC in direct buried or concrete encased.
4. Boxes and Enclosures, Aboveground: NEMA 250, IP55.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: [EMT] [ENT] [or] [RNC].
2. Exposed, Not Subject to Severe Physical Damage: [EMT] [RNC identified for such use].
3. Exposed and Subject to Severe Physical Damage: [GRC] [IMC]. Raceway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Gymnasiums.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT or RNC, schedule-40-PVC].
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.

C. Minimum Raceway Size: [3/4-inch (21-mm) trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Keep raceways at least 6 inches (150 mm) away from parallel runs of hot-water pipes. Install horizontal raceway runs above water piping.

B. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

C. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

D. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

E. Support conduit within 12 inches (300 mm) of enclosures to which attached.

F. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

G. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35-mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

H. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

I. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

J. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

K. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

L. Locate boxes so that cover or plate will not span different building finishes.

M. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

N. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

O. Set metal floor boxes level and flush with finished floor surface.

P. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Identification of power and control cables.
2. Identification for conductors.
3. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

B. Comply with ANSI Z535.4 for safety signs and labels.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and service type.

B. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2.3 LABELS

A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

2.4 TAPES AND STENCILS:

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Underground-Line Warning Tape

1. Tape:

a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
b. Printing on tape shall be permanent and shall not be damaged by burial operations.
c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:
a. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE”.
b. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE.

2.5 Signs

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches (180 by 250 mm).

2.6 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use industry standard colors for ungrounded service conductors.

a. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for direct-buried cables and cables in raceways.

D. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

END OF SECTION 260553

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonfusible switches.
2. Molded-case circuit breakers (MCCBs).
3. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 NONFUSIBLE SWITCHES

A. GE, ABB brand or approved equal.

B. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Single Throw, **600**-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Six Pole, Single Throw, **600**-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Type HD, Heavy Duty, Double Throw, 6**00**-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

F. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Suitable for number, size, and conductor material.

2.2 MOLDED-CASE CIRCUIT BREAKERS

A. ABB, Schneider Electric brand or approved equal.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

F. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; **integrally mounted, self-powered** type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Auxiliary Contacts: **One SPDT switch** with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
7. Alarm Switch: One **NO** contact that operates only when circuit breaker has tripped.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, **Type 1**.
2. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.2 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816

AquaEdge Chiller Performance Outputs

Project Name: US Embassy 24.07.19 08/25/2019
Sales Office: Miraco Carrier 08:48 PM

Tag Name: Selection1

Rated with AHRI Standard 550/590 (I-P)

Chiller
- Chiller Model **23XRVA1A1NPJR390-**
- Starter / VFD ..... **VFD - Unit Mounted (STD Tier)**
- Refrigerant Type **R-134a**
- Isolation Valve ..... **Installed**
- Automatic Hot Gas Bypass ..... **Installed**
- Operation Type ..... **Cooling**

Cooler
- Size **A1**
- Waterbox Type ..... **Nozzle-in-Head, 150 psi**
- Passes **2**
- Nozzle Arrangement ..... **C (Nozzles on Drive End)**
- Tubing ..... **Super E3 (SUPE3), .025 in, Copper**
- Fluid Type ..... **Fresh Water**
- Fouling Factor(hr-sqft-F)/BTU **0.000250**

Compressor
- Size ..... **P (FL Opt.)**
- Economizer ..... **No**

Weights
- Total Rigging Weight ..... **13885** lb
- Total Operating Weight ..... **14673** lb
- Refrigerant Weight ..... **820** lb

Condenser
- Size **A1**
- Waterbox Type ..... **Nozzle-in-Head, 150 psi**
- Passes **2**
- Nozzle Arrangement ..... **R (Nozzles on Drive End)**
- Tubing ..... **Spike Fin III (SPK3), .025 in, Copper**
- Fluid Type ..... **Fresh Water**
- Fouling Factor(hr-sqft-F)/BTU **0.000250**

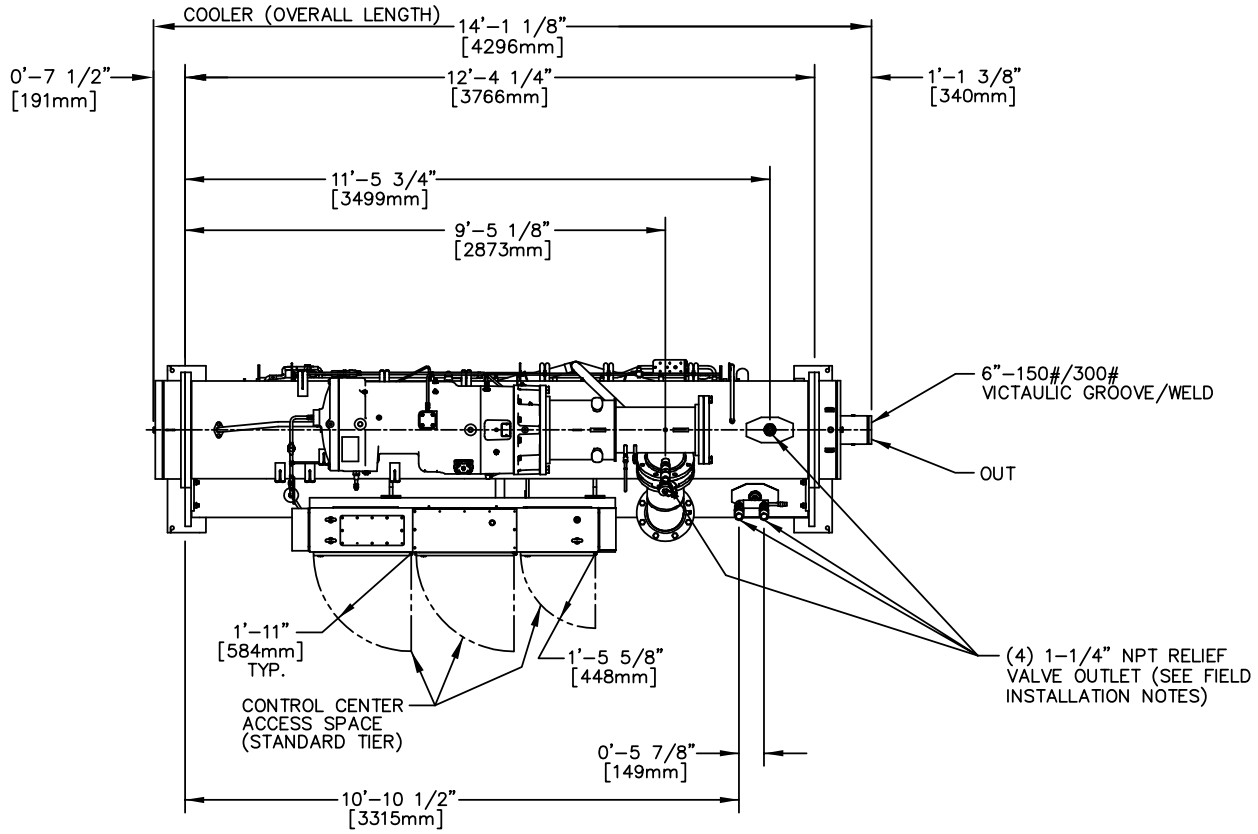
Motor
- Size ..... **J9 (P comp)**
- Line Voltage/Hertz (VFD Line Side) **400-3-50**

Output Type	Full Load (I-P)
Percent Load	100.00
Chiller Capacity	200.0 tonR
Chiller Input kW	133.9 kW
Chiller Efficiency	0.6694 kW/tonR
Chiller COPR	5.254 kW/kW
Cooler	
Entering Temp.	54.70 F
Leaving Temp.	44.00 F
Flow Rate	448.1 gpm
Pressure Drop	15.9 ft H2O
Condenser	
Leaving Temp.	100.00 F
Entering Temp.	90.00 F
Flow Rate	573.9 gpm
Pressure Drop	16.2 ft H2O
Motor	
Motor Rated Load Amps	252.9
Chiller Rated Line Amps	229
Chiller Inrush Amps	229
Max Fuse/CB Amps	500
Min Circuit Ampacity	287

Messages:

This unit complies with the efficiency requirements of ASHRAE Standard 90.1.

(1) Certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Certified units may be found in the AHRI Directory at www.ahridirectory.org.



SUCTION END

PLAN VIEW

DISCHARGE END

NOTE: CONDENSER WATER BOXES NOT SHOWN FOR CLARITY.
SEE FRONT, REAR, SUCTION END AND DISCHARGE END VIEWS
FOR DIMENSIONAL INFORMATION.

HEAT EXCHANGERS 23XRA1–A6						MACHINE OPTIONS		
COOLER					CONDENSER			
PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END		ISOLATION VALVE	HOT GAS BYPASS	ECONOMIZER
2	C	150/300 PSIG	232 LBS. [105 KG.]	333 LBS. [151 KG.]		✓	✓	--

NOTES:
1. TOLERANCES ON NOZZLE LOCATIONS AND OVERALL DIMENSIONS ARE ± 1" [25mm].
2. CARRIER DOES NOT RECOMMEND PRE–FAB WATER PIPING.
3. FOR VICTAULIC GROOVE DETAIL SEE DRAWING 19XR14VG.
4. ✓ DENOTES APPLICABLE CONDITIONS
5. IF HINGED WATERBOXES ARE INCLUDED, THE HINGES ARE NOT SHOWN ON THIS DRAWING AND MAY CHANGE THE MACHINE OVERALL LENGTH AND WIDTH. PLEASE CONSULT THE HINGED WATERBOX DRAWING FOR MORE DETAILS.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390–

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R–134a

NOTES:

COMP'R: TP
COOLER: 23XRA1–A6
COND'R: 23XRA1–A6
MACHINE ASSEMBLY
PLAN VIEW

DATE: 25/08/2019

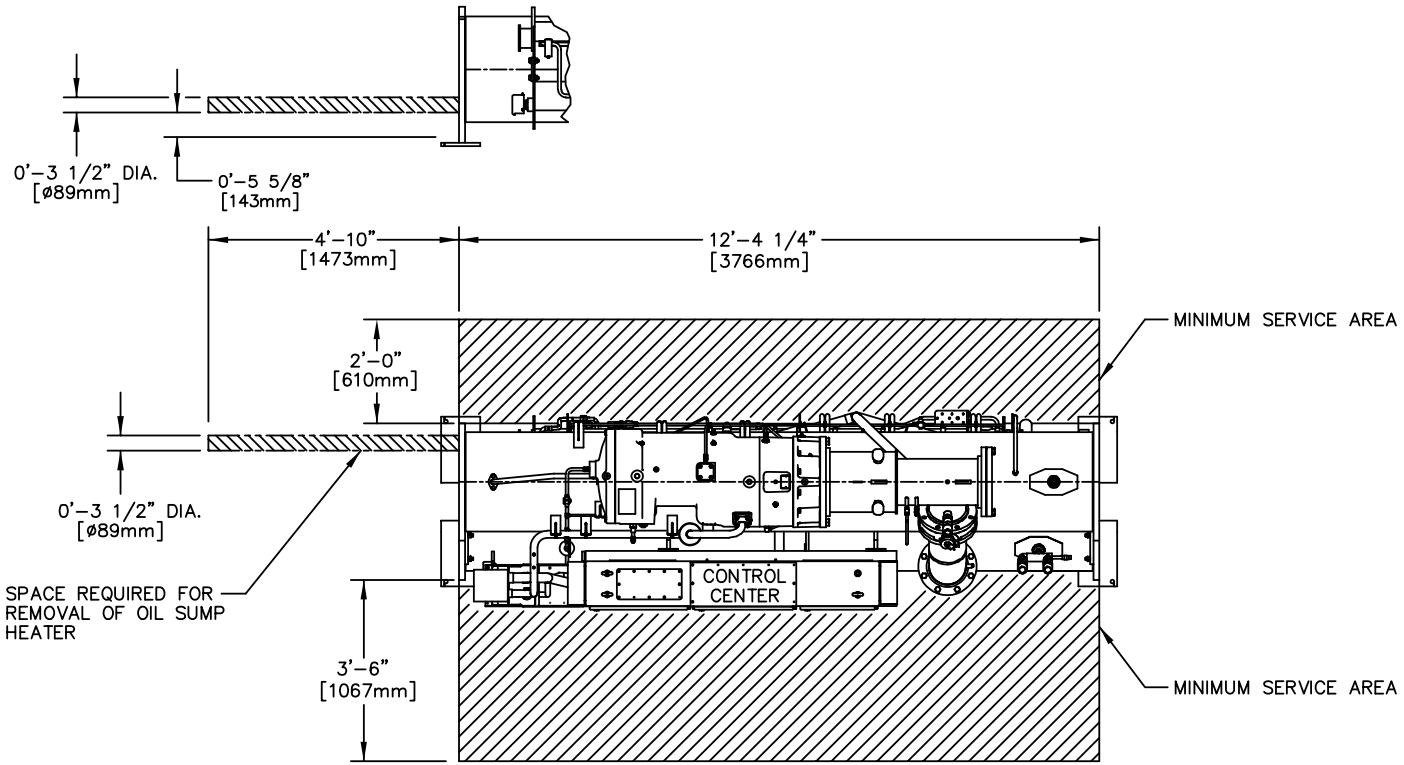
REVISION: ---

CARRIER DWG # 23XRA1TP–P
REV. D SHT 01 OF 01
DATE: 6/20/2017
SUPERSEDES DWG. DATED: 5/5/2017

23XRTP–12

SHT 1 OF 24

Attachment II



SUCTION END

PLAN VIEW

DISCHARGE END

SERVICE CLEARANCE AREA

NOTES:

1. TOLERANCES ON NOZZLE LOCATIONS AND OVERALL DIMENSIONS ARE ± 1" [25mm].
2. CARRIER DOES NOT RECOMMEND PRE–FAB WATER PIPING.

5. IF HINGED WATERBOXES ARE INCLUDED, THE HINGES ARE NOT SHOWN ON THIS DRAWING AND MAY CHANGE THE MACHINE OVERALL LENGTH AND WIDTH. PLEASE CONSULT THE HINGED WATERBOX DRAWING FOR MORE DETAILS.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME:
US Embassy 24.07.19

BUYER:
_____

SALES ENG.:
Khaled Yacout

MODEL NO.:
23XRVA1A1NPJR390–

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS:
400/3/50

JOBSITE LOCATION:

SALES OFFICE:
Miraco Carrier

REFRIGERANT NO.:
R–134a

NOTES:

COMP'R: TP
COOLER: 23XRA1–A6
COND'R: 23XRA1–A6
MACHINE ASSEMBLY
PLAN VIEW

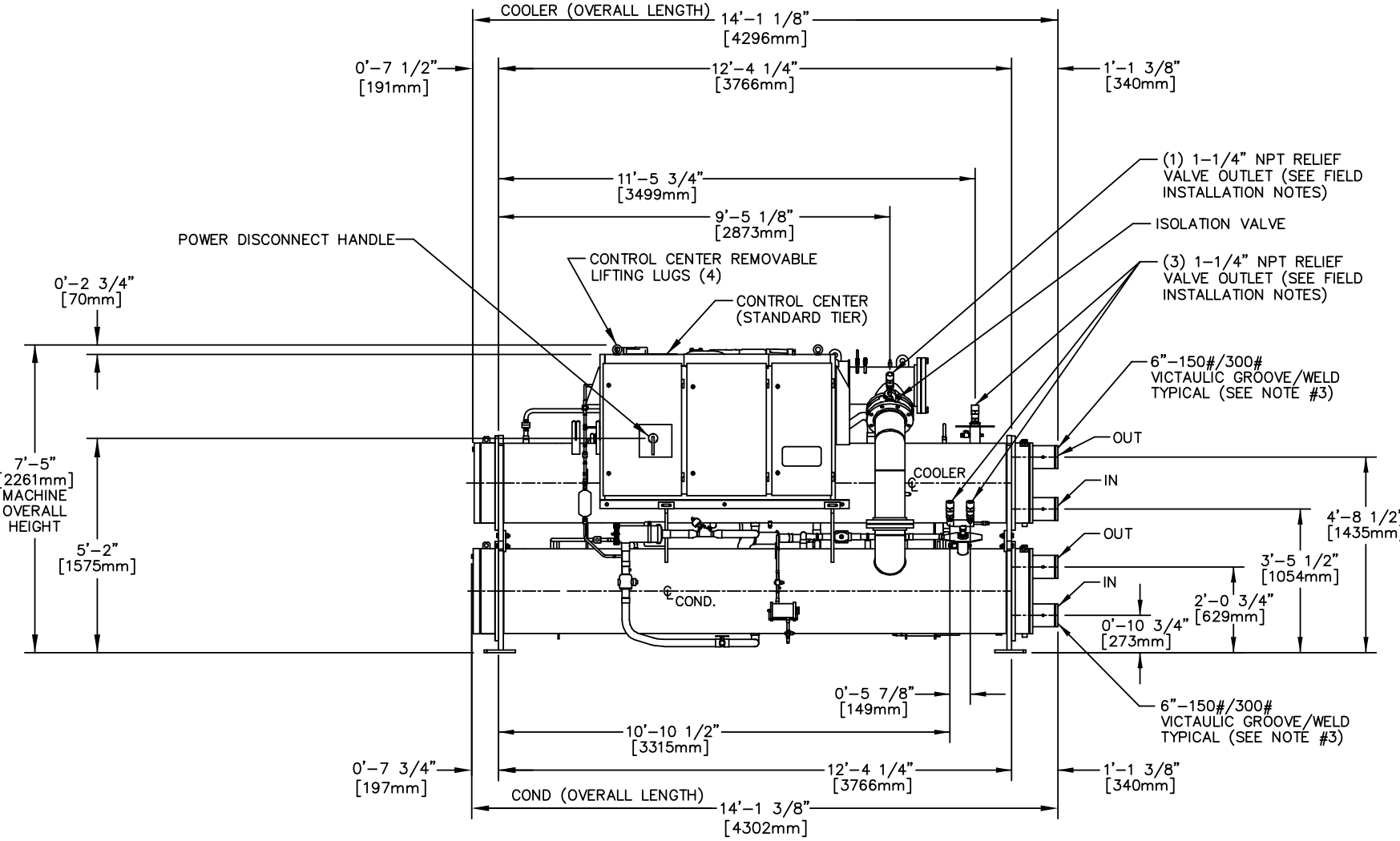
DATE: 25/08/2019

REVISION: ———

CARRIER DWG # 23XRA1TP–P
REV. D SHT 01 OF 01
DATE: 6/20/2017
SUPERSEDES DWG. DATED:
5/5/2017

23XRTP–12

SHT 2 OF 24



SUCTION END FRONT VIEW DISCHARGE END

HEAT EXCHANGERS 23XRA1-A6										MACHINE OPTIONS		
COOLER					CONDENSER							
PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END	PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END	ISOLATION VALVE	HOT GAS BYPASS	ECONOMIZER
2	C	150/300 PSIG	232 LBS. [105 KG.]	333 LBS. [151 KG.]	2	R	150/300 PSIG	265 LBS. [120 KG.]	406 LBS. [184 KG.]	✓	✓	--

NOTES:
1. TOLERANCES ON NOZZLE LOCATIONS AND OVERALL DIMENSIONS ARE ± 1" [25mm].
2. CARRIER DOES NOT RECOMMEND PRE-FAB WATER PIPING.
3. FOR VICTAULIC GROOVE DETAIL SEE DRAWING 19XR14VG.
4. ✓ DENOTES APPLICABLE CONDITIONS
5. IF HINGED WATERBOXES ARE INCLUDED, THE HINGES ARE NOT SHOWN ON THIS DRAWING AND MAY CHANGE THE MACHINE OVERALL LENGTH AND WIDTH. PLEASE CONSULT THE HINGED WATERBOX DRAWING FOR MORE DETAILS.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

COMP'R: TP
COOLER: 23XRA1-A6
COND'R: 23XRA1-A6
MACHINE ASSEMBLY FRONT VIEW

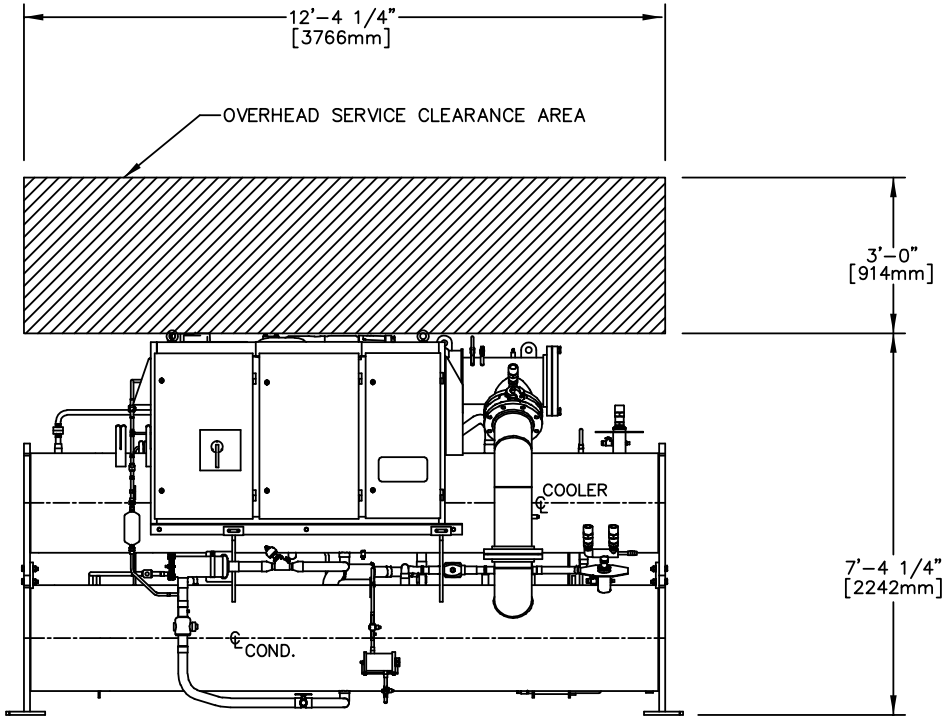
DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRA1TP-F
REV. D SHT 01 OF 01
DATE: 6/20/2017
SUPERSEDES DWG. DATED: 5/5/2017

23XRTP-12

SHT 3 OF 24



SUCTION END | FRONT VIEW | DISCHARGE END

OVERHEAD SERVICE CLEARANCE AREA
WITH STANDARD TIER VFD

NOTES:
1. TOLERANCES ON NOZZLE LOCATIONS AND OVERALL DIMENSIONS ARE ± 1" [25mm].
2. CARRIER DOES NOT RECOMMEND PRE–FAB WATER PIPING.

5. IF HINGED WATERBOXES ARE INCLUDED, THE HINGES ARE NOT SHOWN ON THIS DRAWING AND MAY CHANGE THE MACHINE OVERALL LENGTH AND WIDTH. PLEASE CONSULT THE HINGED WATERBOX DRAWING FOR MORE DETAILS.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME:
US Embassy 24.07.19

BUYER:
———————

SALES ENG.:
Khaled Yacout

MODEL NO.:
23XRVA1A1NPJR390–

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS:
400/3/50

JOBSITE LOCATION:

SALES OFFICE:
Miraco Carrier

REFRIGERANT NO.:
R–134a

NOTES:

COMP'R: TP
COOLER: 23XRA1–A6
COND'R: 23XRA1–A6
MACHINE ASSEMBLY
FRONT VIEW

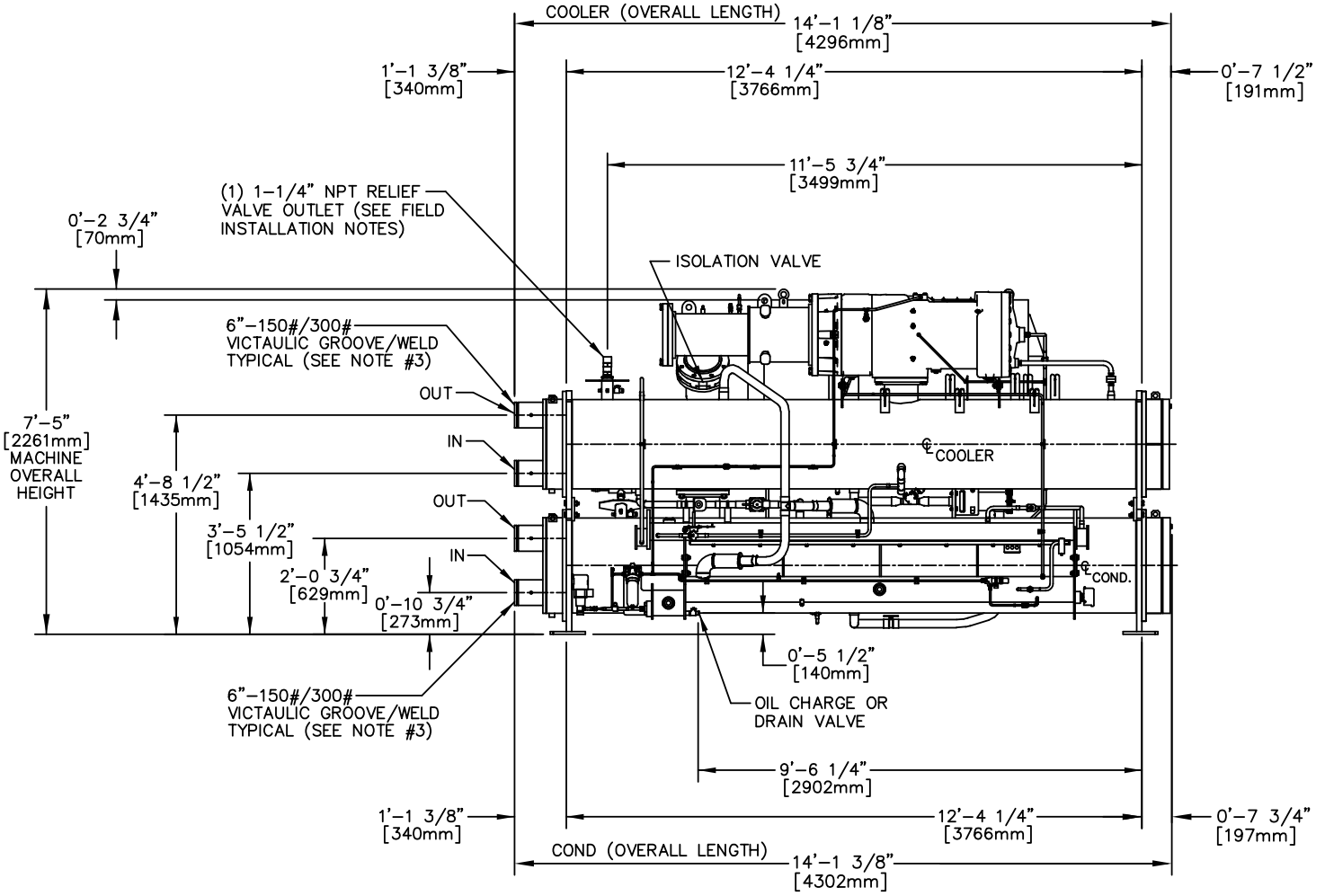
DATE: 25/08/2019

REVISION: ———

CARRIER DWG # 23XRA1TP–F
REV. D SHT 01 OF 01
DATE: 6/20/2017
SUPERSEDES DWG. DATED:
5/5/2017

23XRTP–12

SHT 4 OF 24



DISCHARGE END REAR VIEW SUCTION END

HEAT EXCHANGERS 23XRA1-A6										MACHINE OPTIONS		
COOLER					CONDENSER							
PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END	PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END	ISOLATION VALVE	HOT GAS BYPASS	ECONOMIZER
2	C	150/300 PSIG	232 LBS. [105 KG.]	333 LBS. [151 KG.]	2	R	150/300 PSIG	265 LBS. [120 KG.]	406 LBS. [184 KG.]	✓	✓	--

NOTES:
1. TOLERANCES ON NOZZLE LOCATIONS AND OVERALL DIMENSIONS ARE ± 1" [25mm].
2. CARRIER DOES NOT RECOMMEND PRE-FAB WATER PIPING.
3. FOR VICTAULIC GROOVE DETAIL SEE DRAWING 19XR14VG.
4. ✓ DENOTES APPLICABLE CONDITIONS
5. IF HINGED WATERBOXES ARE INCLUDED, THE HINGES ARE NOT SHOWN ON THIS DRAWING AND MAY CHANGE THE MACHINE OVERALL LENGTH AND WIDTH. PLEASE CONSULT THE HINGED WATERBOX DRAWING FOR MORE DETAILS.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

COMP'R: TP
COOLER: 23XRA1-A6
COND'R: 23XRA1-A6
MACHINE ASSEMBLY
REAR VIEW

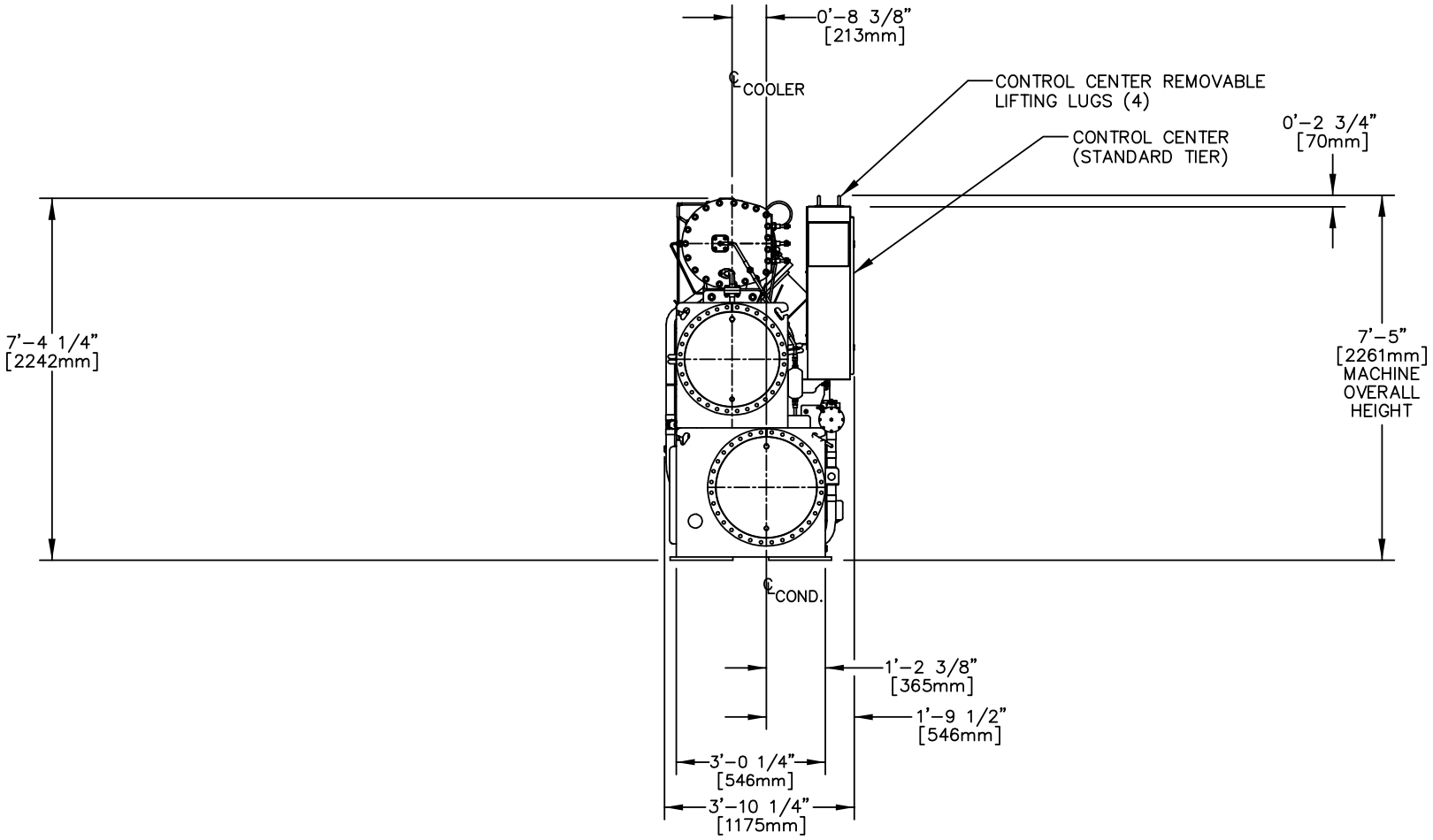
DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRA1TP-R
REV. D SHT 01 OF 01
DATE: 6/20/2017
SUPERSEDES DWG. DATED: 5/5/2017

23XRTP-12

SHT 5 OF 24



SUCTION END VIEW

HEAT EXCHANGERS 23XRA1-A6										MACHINE OPTIONS		
COOLER					CONDENSER							
PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END	PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END	ISOLATION VALVE	HOT GAS BYPASS	ECONOMIZER
2	C	150/300 PSIG	232 LBS. [105 KG.]	333 LBS. [151 KG.]	2	R	150/300 PSIG	265 LBS. [120 KG.]	406 LBS. [184 KG.]	✓	✓	--

NOTES:
1. TOLERANCES ON NOZZLE LOCATIONS AND OVERALL DIMENSIONS ARE ± 1" [25mm].
2. CARRIER DOES NOT RECOMMEND PRE-FAB WATER PIPING.
3. FOR VICTAULIC GROOVE DETAIL SEE DRAWING 19XR14VG.
4. ✓ DENOTES APPLICABLE CONDITIONS
5. IF HINGED WATERBOXES ARE INCLUDED, THE HINGES ARE NOT SHOWN ON THIS DRAWING AND MAY CHANGE THE MACHINE OVERALL LENGTH AND WIDTH. PLEASE CONSULT THE HINGED WATERBOX DRAWING FOR MORE DETAILS.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

COMP'R: TP
COOLER: 23XRA1-A6
COND'R: 23XRA1-A6
MACHINE ASSEMBLY
SUCTION END VIEW

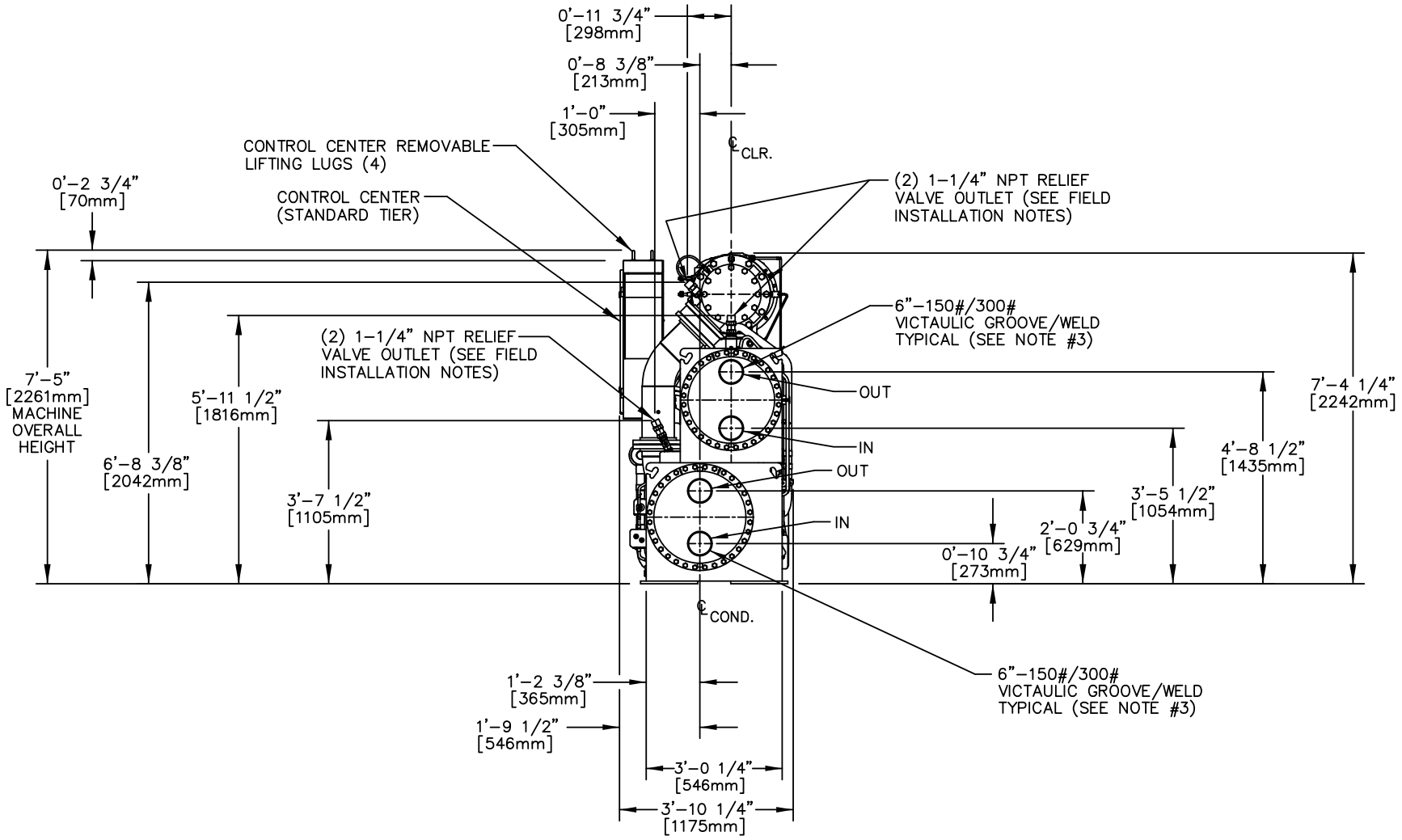
DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRA1TP-D
REV. D SHT 01 OF 01
DATE: 6/20/2017
SUPERSEDES DWG. DATED: 5/5/2017

23XRTP-12

SHT 6 OF 24



DISCHARGE END VIEW

HEAT EXCHANGERS 23XRA1-A6										MACHINE OPTIONS		
COOLER					CONDENSER							
PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END	PASS	NOZZLE CODE	PRESSURE	W/B COVER WT. DISCHARGE END	W/B COVER WT. SUCTION END	ISOLATION VALVE	HOT GAS BYPASS	ECONOMIZER
2	C	150/300 PSIG	232 LBS. [105 KG.]	333 LBS. [151 KG.]	2	R	150/300 PSIG	265 LBS. [120 KG.]	406 LBS. [184 KG.]	✓	✓	--

NOTES:

1. TOLERANCES ON NOZZLE LOCATIONS AND OVERALL DIMENSIONS ARE ± 1" [25mm].
2. CARRIER DOES NOT RECOMMEND PRE-FAB WATER PIPING.
3. FOR VICTAULIC GROOVE DETAIL SEE DRAWING 19XR14VG.
4. ✓ DENOTES APPLICABLE CONDITIONS
5. IF HINGED WATERBOXES ARE INCLUDED, THE HINGES ARE NOT SHOWN ON THIS DRAWING AND MAY CHANGE THE MACHINE OVERALL LENGTH AND WIDTH. PLEASE CONSULT THE HINGED WATERBOX DRAWING FOR MORE DETAILS.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

COMP'R: TP
COOLER: 23XRA1-A6
COND'R: 23XRA1-A6
MACHINE ASSEMBLY
DISCHARGE END VIEW

DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRA1TP-C
REV. D SHT 01 OF 01
DATE: 6/20/2017
SUPERSEDES DWG. DATED: 5/5/2017

23XRTP-12

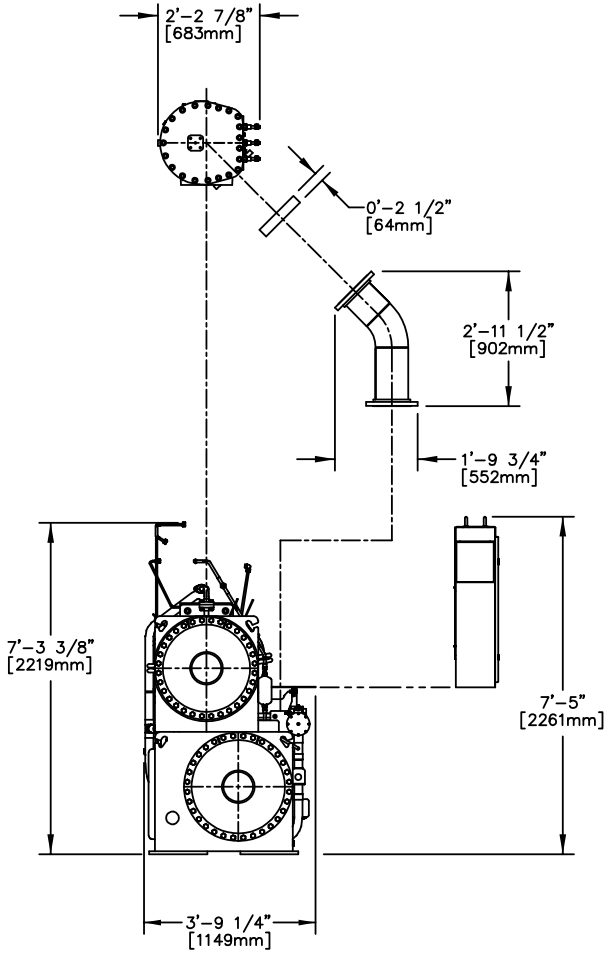
SHT 7 OF 24

COMPRESSOR: NTP

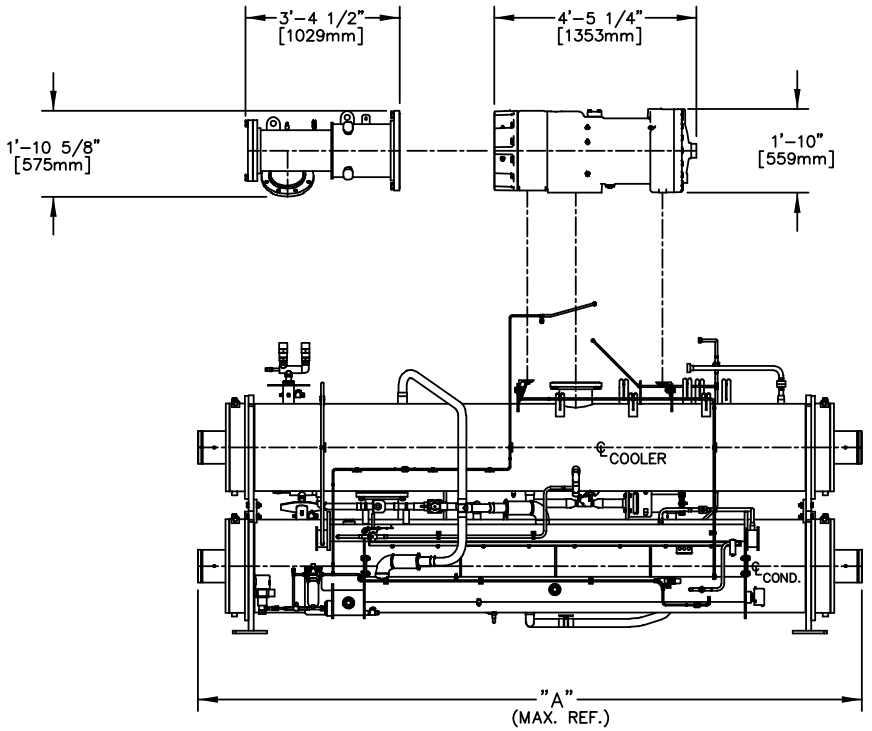
✓ INDICATES, CHECK BOX FOR APPLICABLE CONDITION

COOLER OR COND.	NOZZLE LOCATION	DIMENSION "A" 150 PSI WATERBOX A1–A6	✓	150 PSI WATERBOX B1–B6	✓	300 PSI WATERBOX A1–A6	✓	300 PSI WATERBOX B1–B6	✓
1 PASS	BOTH ENDS	14'–7 1/2" [4458mm]		16'–4" [4978mm]		14'–7 1/2" [4458mm]		16'–4" [4978mm]	
2 PASS	DISCHARGE END	13'–11 5/8" [4258mm]		15'–8 1/8" [4778mm]		13'–11 5/8" [4258mm]		15'–8 1/8" [4778mm]	
	SUCTION END	13'–11 5/8" [4258mm]		15'–8 1/8" [4778mm]		13'–11 5/8" [4258mm]		15'–8 1/8" [4778mm]	
3 PASS	BOTH ENDS	14'–7 1/2" [4458mm]		16'–4" [4978mm]		14'–7 1/2" [4458mm]		16'–4" [4978mm]	

DIMENSIONS REFLECT FLANGED NOZZLES

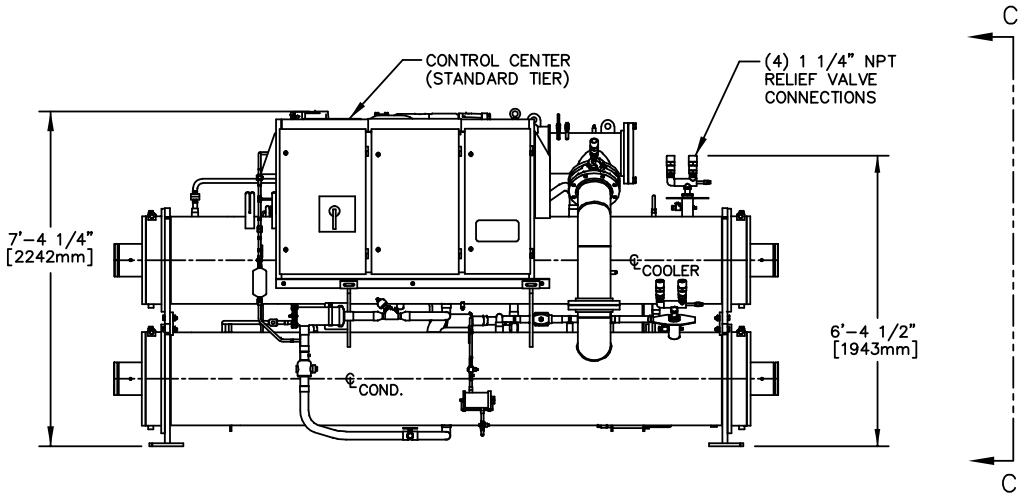


DISCHARGE END



DISCHARGE END SUCTION END

VIEW "C–C"
(REAR VIEW)



SUCTION END FRONT VIEW DISCHARGE END

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: ----------

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390–

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R–134a

NOTES:

COOLER: 23XRA1–A6 23XRB1–B6
COND'R: 23XRA1–A6 23XRB1–B6
MACHINE ASSEMBLY COMPONENT DIS–ASSEMBLY NIH STYLE WATERBOX (WITHOUT ECONOMIZER)

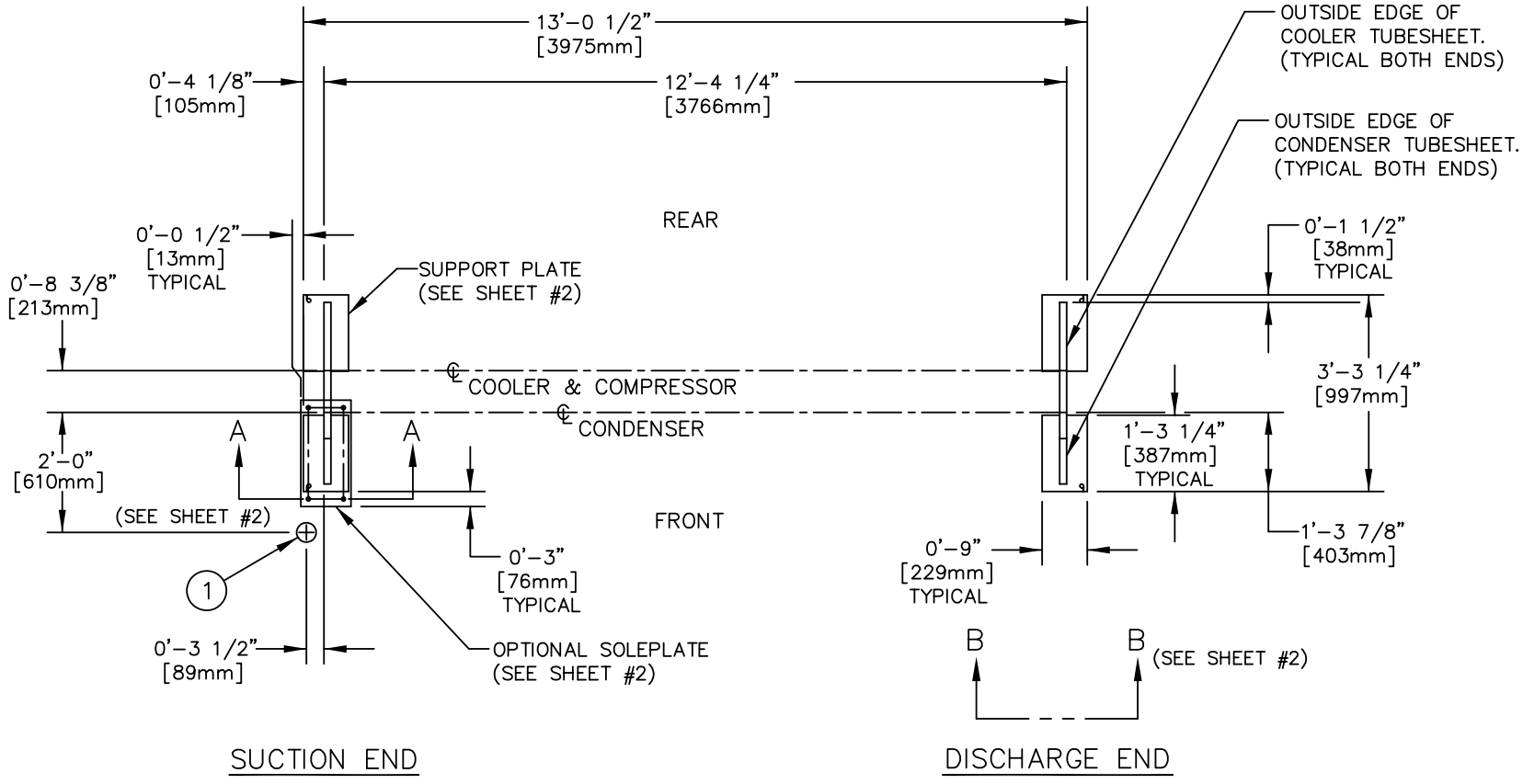
DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRTP51
REV. – SHT 01 OF 01
DATE: 4/17/2014
SUPERSEDES DWG. DATED: –

23XR

SHT 8 OF 24



PLAN VIEW OF CONTACT SURFACE

NOTES:

1. USE GROUT AND PACKAGE COMPONENTS AS SHOWN ON SHEET #2 TO ESTABLISH THE LEVEL BASE LINE.
2. IF CHILLER IS SET ON A CONCRETE PAD, iT IS SUGGESTED THAT THE PAD BE EXTENDED AT LEAST 4'-0" [1219mm] BEYOND THE WIDTH OF THE MACHINE ON THE CONTOL CENTER SIDE.
3. CONDUIT LOCATIONS ARE APPROXIMATE.

CONDUIT LEGEND:

(1) — MAIN POWER

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

COOLER: 23XRA1-A6
COND"R: 23XRA1-A6
CONTACT SURFACE AND CONDUIT LOCATIONS

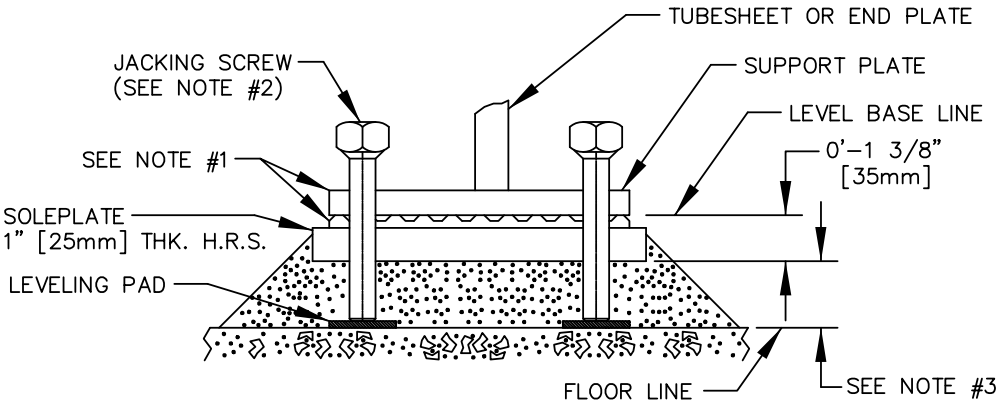
DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRTPA121
REV. - SHT 01 OF 02
DATE: 4/17/2014
SUPERSEDES DWG. DATED: -

23XRA1

SHT 9 OF 24

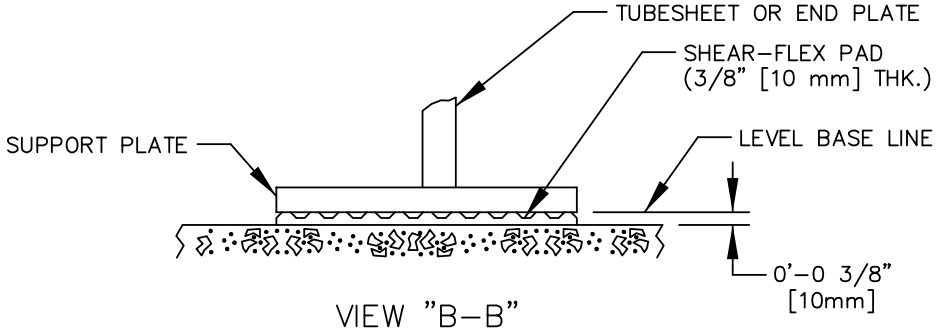


SECTION "A-A"

ISOLATION WITH SOLEPLATE PACKAGE (OPTIONAL)
(FROM SHEET #1)
SCALE: NONE

NOTES:

1. OPTIONAL SOLEPLATE PACKAGE INCLUDES 4 SOLEPLATES, 16 JACKING SCREWS AND 16 LEVELING PADS. REQUIRES ISOLATION PACKAGE ALSO.
2. JACKING SCREWS TO BE REMOVED AFTER GROUT HAS SET.
3. THICKNESS OF GROUT WILL VARY, DEPENDING ON THE AMOUNT NECESSARY TO LEVEL CHILLER. USE ONLY PRE-MIXED NON-SHRINKING GROUT, CEILCOTE 748 OR CHEMREX EMBECO 636 PLUS, 0'-1 1/2" [38mm] TO 0'-2 1/4" [57mm] THICK.

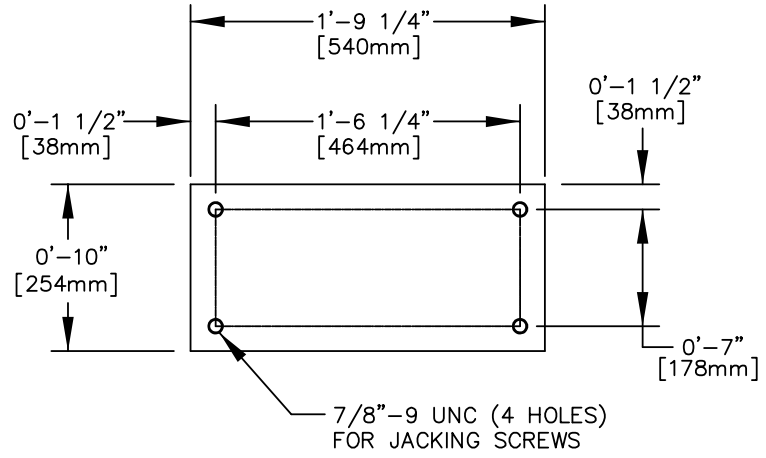


VIEW "B-B"

ISOLATION WITH ISOLATION PACKAGE ONLY (STANDARD)
(FROM SHEET #1)
SCALE: NONE

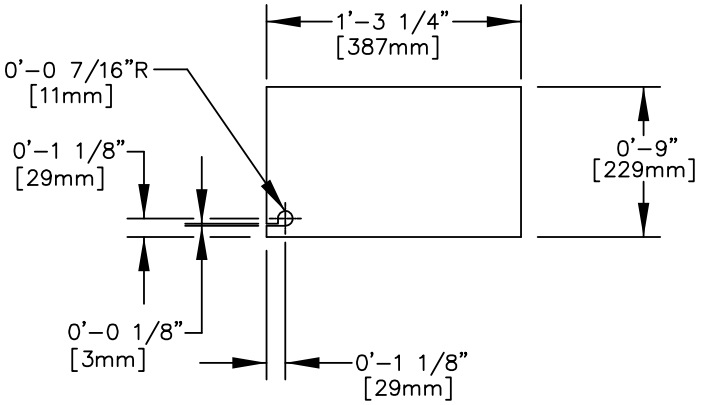
NOTE:

1. ISOLATION PACKAGE INCLUDES 4 SHEAR-FLEX ISOLATION PADS



SOLEPLATE DETAIL

SOLEPLATE: 1" THICK
SCALE: 1:1



SUPPORT PLATE DETAIL

SUPPORT PLATE: 3/4" THICK
SCALE: 1:1

✓ INDICATES; CHECK BOX FOR APPLICABLE CONDITION.

ISOLATION PACKAGE	✓
ISOLATION PACKAGE ONLY STANDARD (SEE VIEW "B-B")	
SOLEPLATE PACKAGE OPTIONAL (SEE VIEW "A-A")	

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19
BUYER: ----------
SALES ENG.: Khaled Yacout
MODEL NO.: 23XRVA1A1NPJR390-
JOB NO.:
P.O. NO.:
PREPARED BY:
ELECTRICAL CHARACTERISTICS: 400/3/50
JOBSITE LOCATION:
SALES OFFICE: Miraco Carrier
REFRIGERANT NO.: R-134a
NOTES:

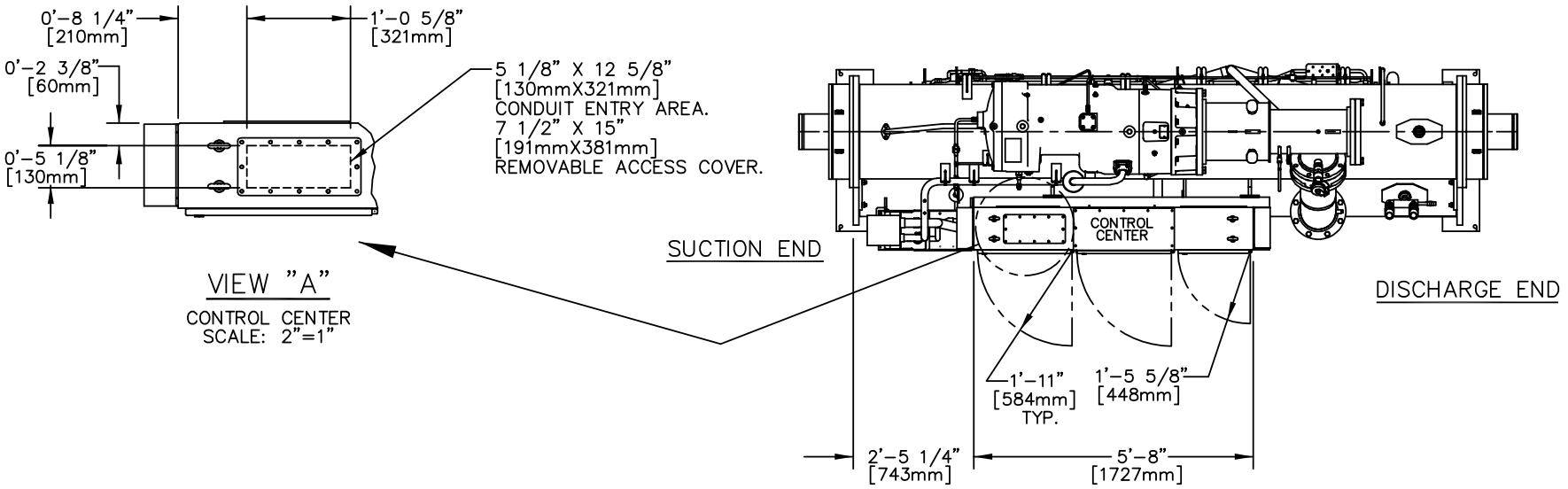
COOLER: 23XRA1-A6
COND'R: 23XRA1-A6
CONTACT SURFACE AND CONDUIT LOCATIONS

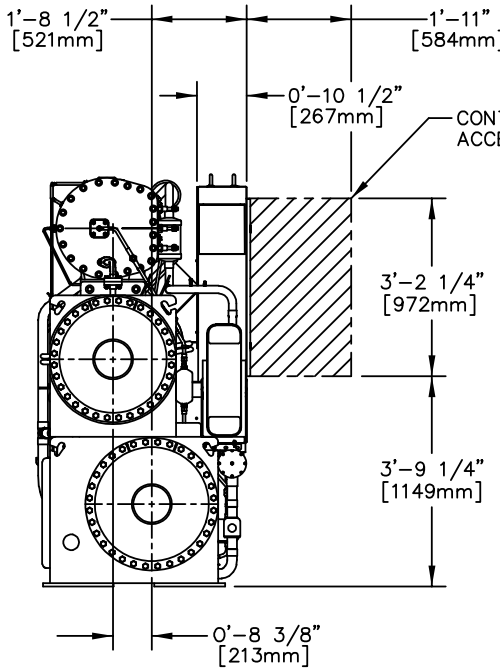
DATE: 25/08/2019
REVISION: ----

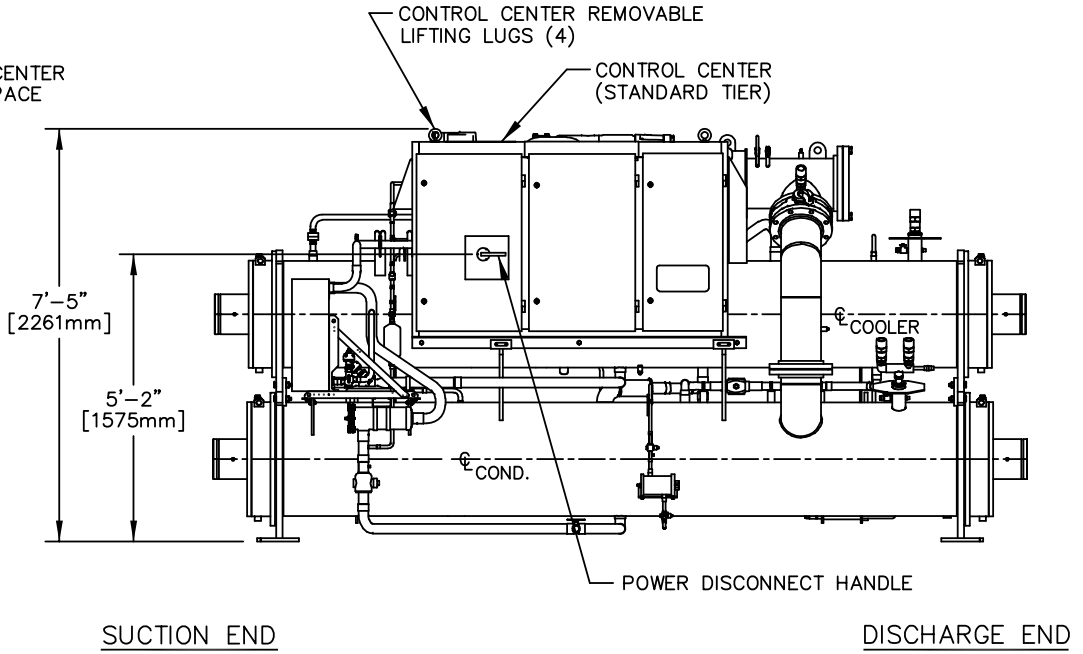
CARRIER DWG # 23XRTPA122
REV. - SHT 02 OF 02
DATE: 4/17/2014
SUPERSEDES DWG. DATED: -

23XRA1

SHT 10 OF 24







Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

COMP'R: TP
COOLER: 23XRA1-A6
23XRB1-B6
COND'R: 23XRA1-A6
23XRB1-B6
CONTROL CENTER (STANDARD TIER)

DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRTP41
REV. - SHT 01 OF 01
DATE: 4/17/2014
SUPERSEDES DWG. DATED: -

23XR

SHT 11 OF 24

Carrier — A United Technologies Company — P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19 | BUYER: _____ | SALES ENG.: Khaled Yacout | MODEL NO.: 23XRVA1A1NPJR390- | JOB NO.: | P.O. NO.: | PREPARED BY: | ELECTRICAL CHARACTERISTICS: 400/3/50 | JOBSITE LOCATION: | SALES OFFICE: Miraco Carrier | REFRIGERANT NO.: R-134a | NOTES:

23XR Standard Tier CONTROL WIRING DIAGRAM (230,335,445 FRAME VFD)

DATE: 25/08/2019

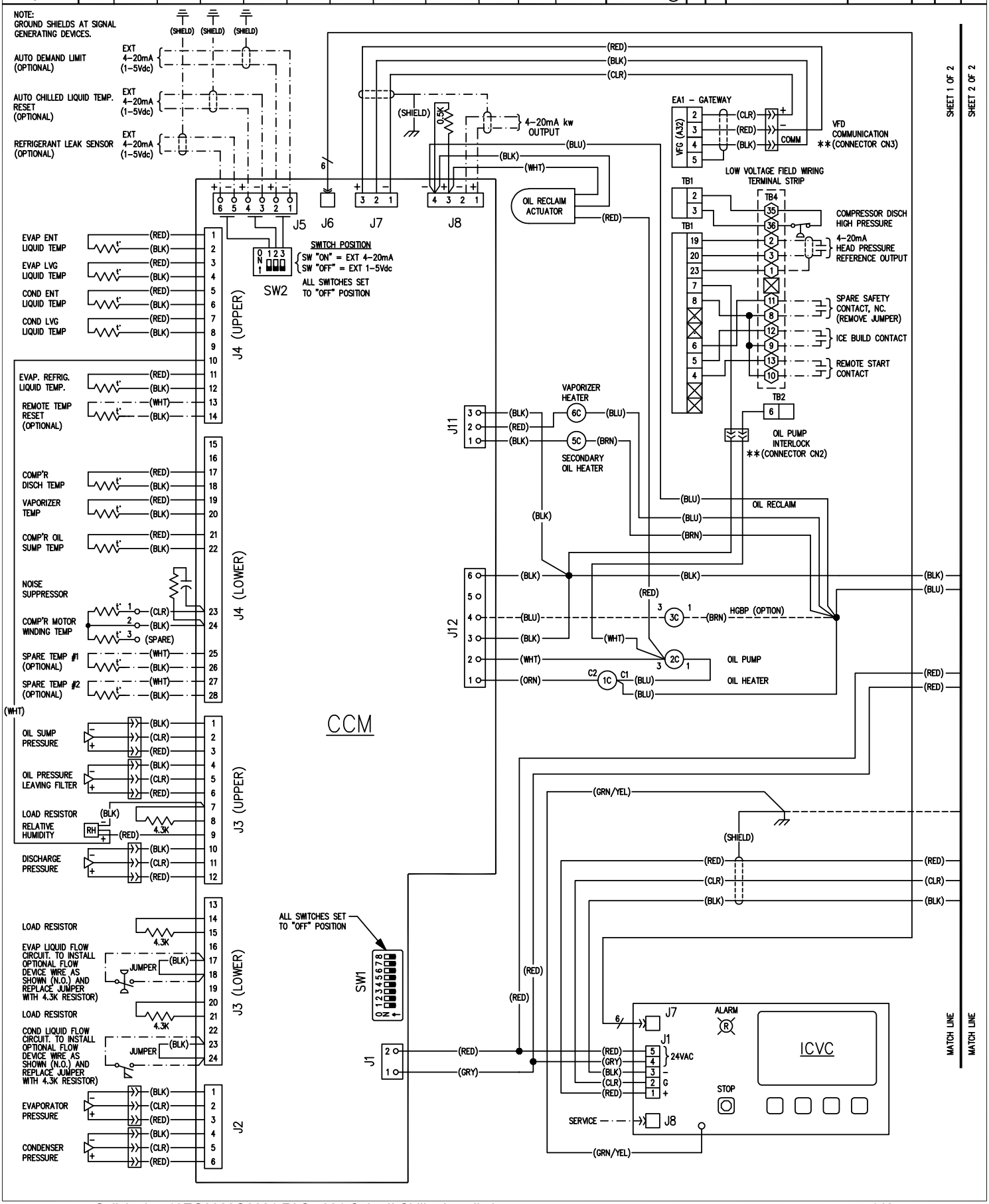
REVISION: ———

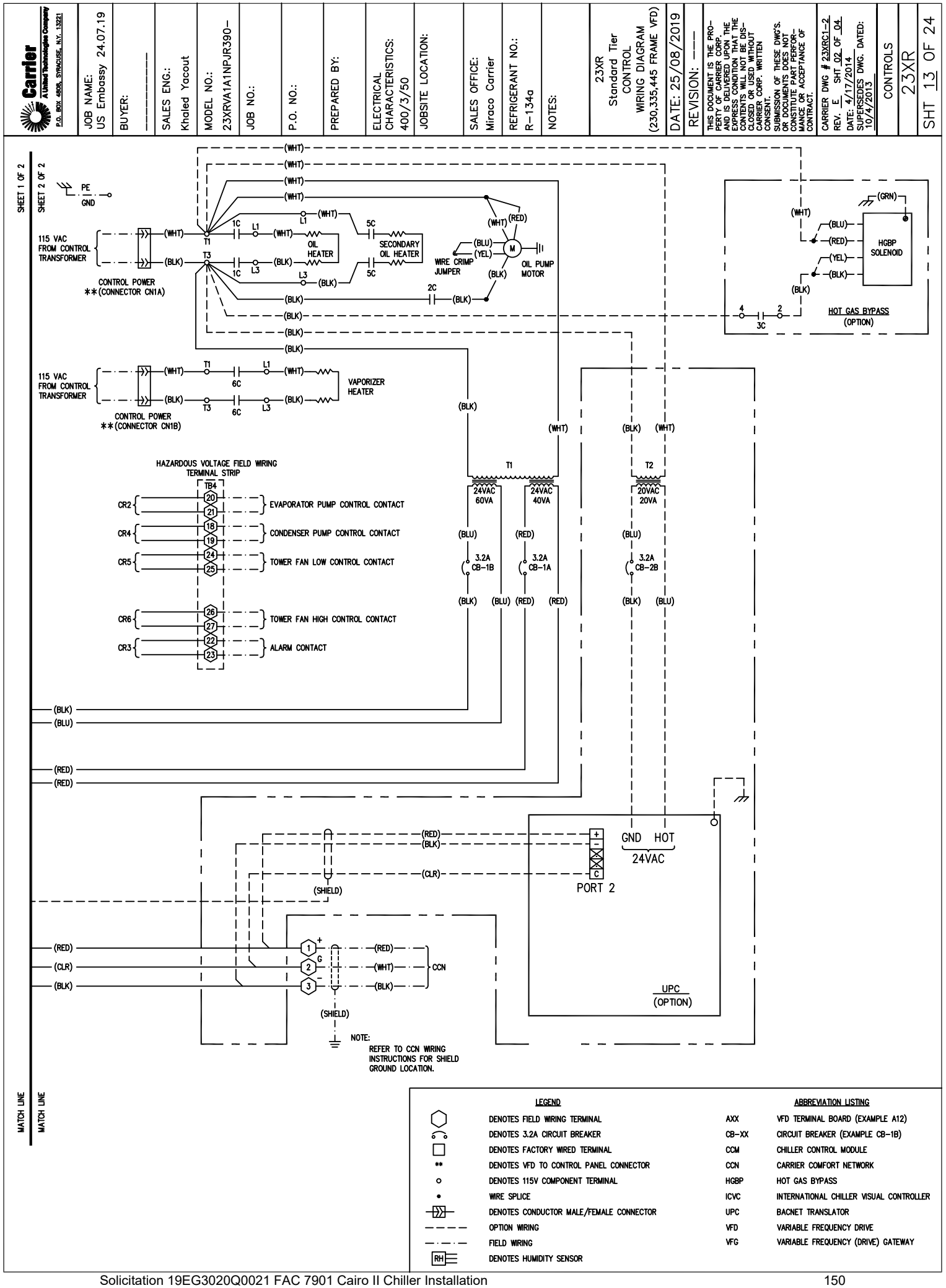
CARRIER DWG # 23XRC1-1 | REV. E SHT 01 OF 04 | DATE: 4/17/2014 | SUPERSEDES DWG. DATED: 10/4/2013

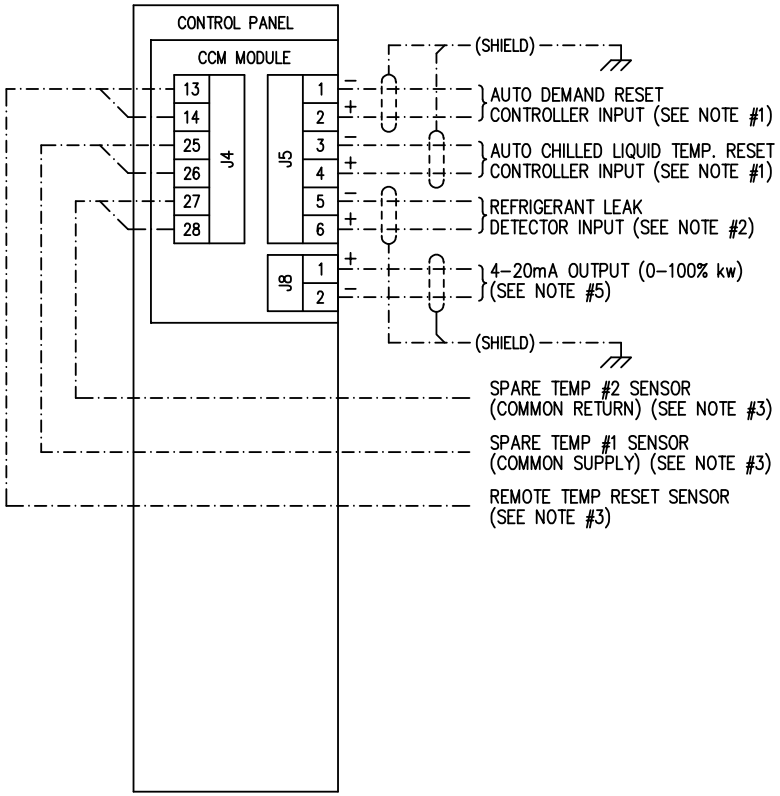
CONTROLS

23XR

SHT 12 OF 24



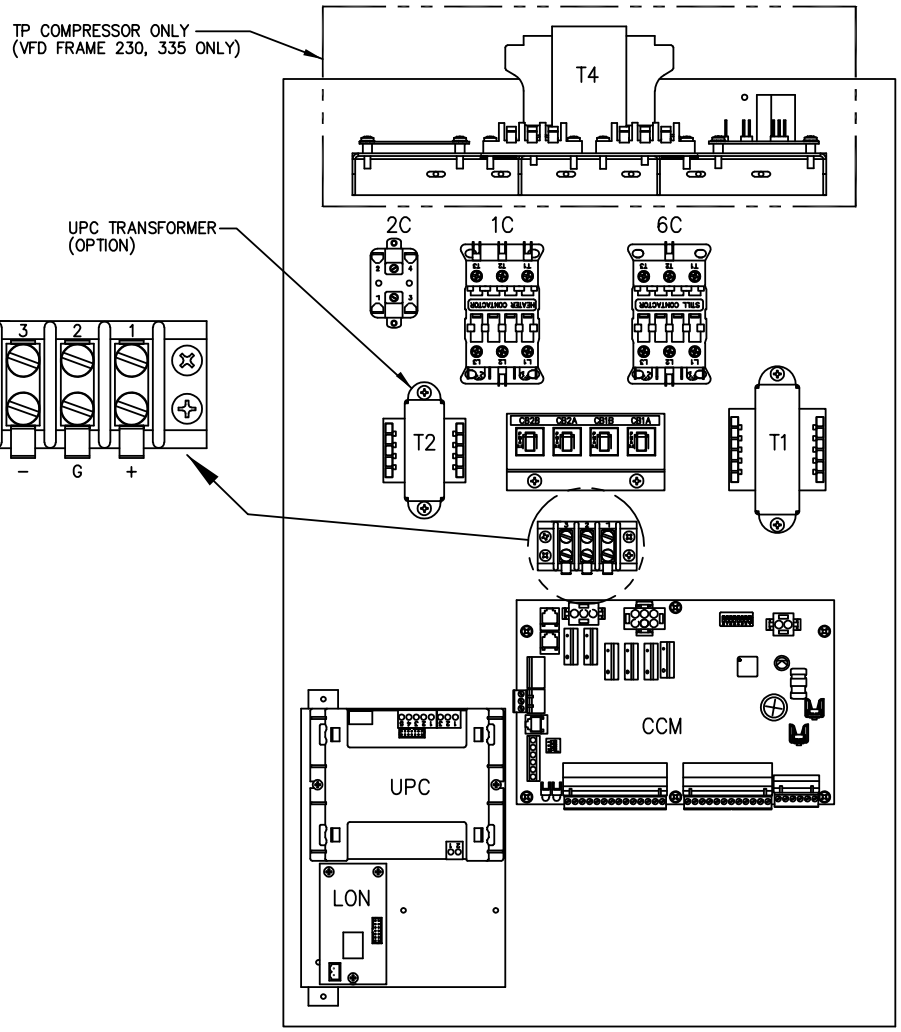

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221
JOB NAME: US Embassy 24.07.19
BUYER: _____
SALES ENG.: Khaled Yacout
MODEL NO.: 23XRVA1A1NPJR390-
JOB NO.:
P.O. NO.:
PREPARED BY:
ELECTRICAL CHARACTERISTICS: 400/3/50
JOBSITE LOCATION:
SALES OFFICE: Miraco Carrier
REFRIGERANT NO.: R-134a
NOTES:
23XR Standard Tier CONTROL WIRING DIAGRAM (230,335,445 FRAME VFD)
DATE: 25/08/2019
REVISION: ---
THIS DOCUMENT IS THE PROPERTY OF CARRIER CORP. AND IS LOANED FOR THE EXPRESS CONDITION THAT THE CONTENTS WILL NOT BE DISCLOSED OR USED WITHOUT CARRIER CORP. WRITTEN CONSENT. SUBMISSION OF THESE DWG'S. OR DOCUMENTS DOES NOT CONSTITUTE PART PERFORMANCE OR ACCEPTANCE OF CONTRACT.
CARRIER DWG # 23XRC1-2
REV. E SHT 02 OF 04
DATE: 4/17/2014
SUPERSEDES DWG. DATED: 10/4/2013
CONTROLS
23XR
SHT 13 OF 24
SHEET 1 OF 2
SHEET 2 OF 2
MATCH LINE
MATCH LINE
PE
GND
115 VAC FROM CONTROL TRANSFORMER
CONTROL POWER
**(CONNECTOR CN1A)
OIL HEATER
SECONDARY OIL HEATER
WIRE CRIMP JUMPER
OIL PUMP MOTOR
HGBP SOLENOID
HOT GAS BYPASS (OPTION)
115 VAC FROM CONTROL TRANSFORMER
CONTROL POWER
**(CONNECTOR CN1B)
VAPORIZER HEATER
HAZARDOUS VOLTAGE FIELD WIRING TERMINAL STRIP
TB4
CR2 EVAPORATOR PUMP CONTROL CONTACT
CR4 CONDENSER PUMP CONTROL CONTACT
CR5 TOWER FAN LOW CONTROL CONTACT
CR6 TOWER FAN HIGH CONTROL CONTACT
CR3 ALARM CONTACT
T1
24VAC 60VA
24VAC 40VA
T2
20VAC 20VA
3.2A CB-1B
3.2A CB-1A
3.2A CB-2B
GND HOT
24VAC
PORT 2
UPC (OPTION)
CCN
(SHIELD)
NOTE:
REFER TO CCN WIRING INSTRUCTIONS FOR SHIELD GROUND LOCATION.
LEGEND
DENOTES FIELD WIRING TERMINAL
DENOTES 3.2A CIRCUIT BREAKER
DENOTES FACTORY WIRED TERMINAL
DENOTES VFD TO CONTROL PANEL CONNECTOR
DENOTES 115V COMPONENT TERMINAL
WIRE SPLICE
DENOTES CONDUCTOR MALE/FEMALE CONNECTOR
OPTION WIRING
FIELD WIRING
DENOTES HUMIDITY SENSOR
ABBREVIATION LISTING
AXX VFD TERMINAL BOARD (EXAMPLE A12)
CB-XX CIRCUIT BREAKER (EXAMPLE CB-1B)
CCM CHILLER CONTROL MODULE
CCN CARRIER COMFORT NETWORK
HGBP HOT GAS BYPASS
ICVC INTERNATIONAL CHILLER VISUAL CONTROLLER
UPC BACNET TRANSLATOR
VFD VARIABLE FREQUENCY DRIVE
VFG VARIABLE FREQUENCY (DRIVE) GATEWAY



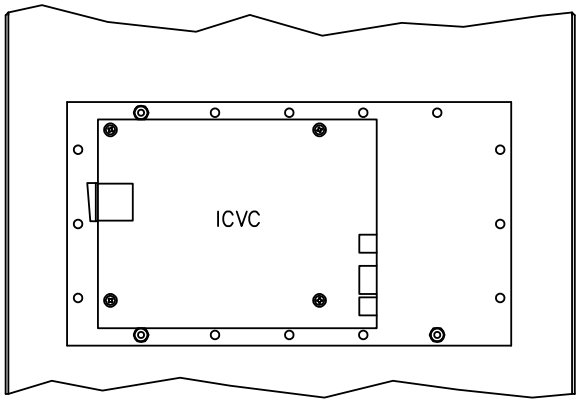
CONTROL PANEL OPTIONAL WIRING

NOTES:

1. THIS FEATURE IS STANDARD IN THE 23XR CONTROLS, BUT REQUIRES A CONTROLLER WITH A NON-GROUNDED 4-20mA OR 1-5Vdc OUTPUT SIGNAL, NOT BY CARRIER.
2. THIS FEATURE IS STANDARD IN THE 23XR CONTROLS, BUT REQUIRES AN EXTERNAL CONTROLLER WITH A NON-GROUNDED 4-20mA OUTPUT SIGNAL, NOT BY CARRIER.
3. THIS FEATURE IS STANDARD IN THE 23XR CONTROLS, BUT REQUIRES A SENSOR PACKAGE OPTION, BY CARRIER. (ITEM #3 SEE OPTION LISTING)
4. PINS SHOWN FOR REFERENCE ONLY. ACTUAL PIN LAYOUT NOT SHOWN.
5. THIS FEATURE IS STANDARD IN THE 23XR CONTROLS. CONTROLLERS MONITORING THIS SIGNAL MUST HAVE A NON-GROUNDED INPUT WITH A MAXIMUM IMPEDANCE OF 500 OHMS.



CONTROL PANEL COMPONENT LAYOUT



INSIDE PANEL DOOR

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

23XR
Standard Tier
CONTROL
WIRING DIAGRAM
(230,335,445 FRAME VFD)

DATE: 25/08/2019

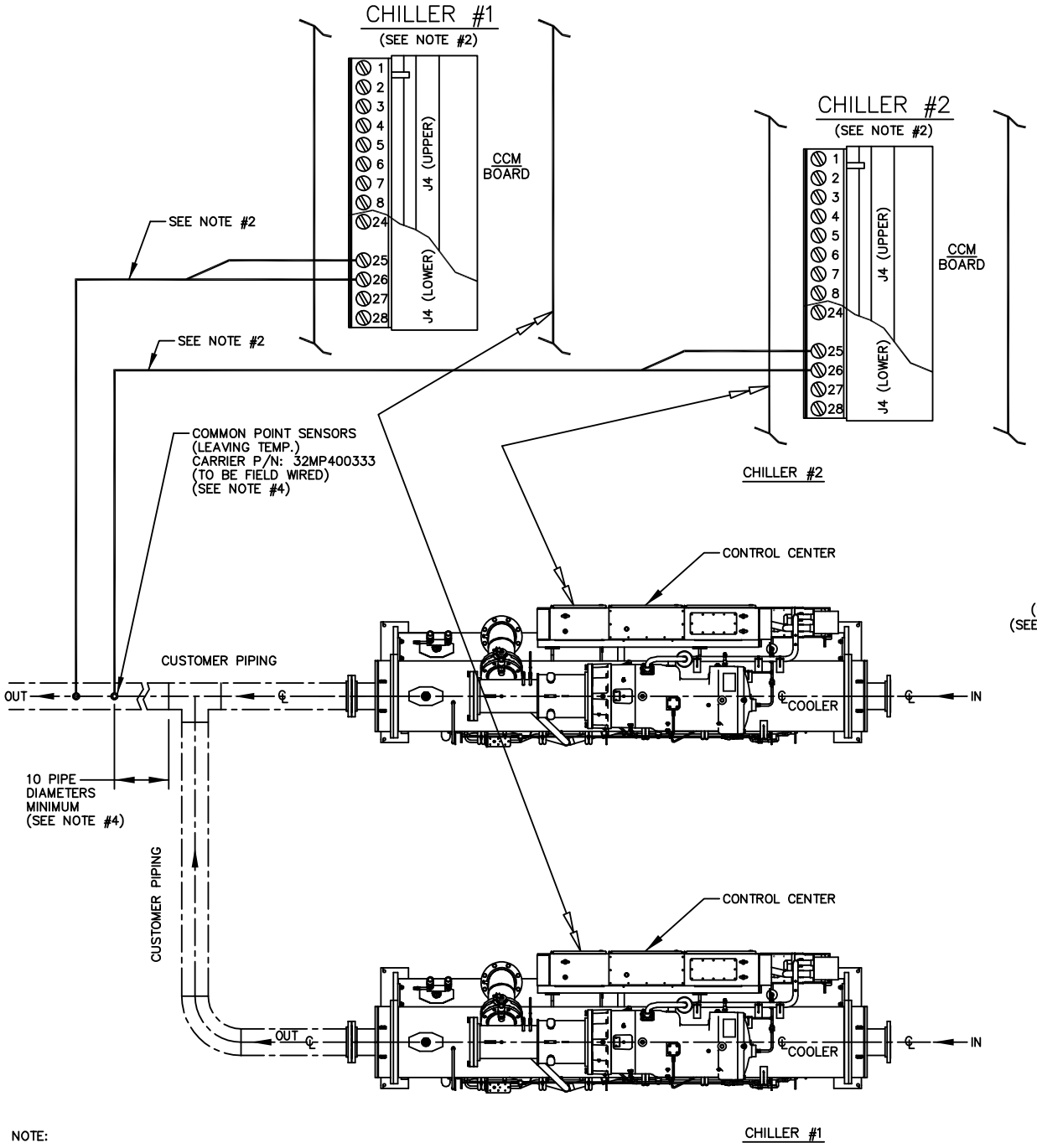
REVISION: ---

CARRIER DWG # 23XRC1-3
REV. E SHT 03 OF 04
DATE: 4/17/2014
SUPERSEDES DWG. DATED: 10/4/2013

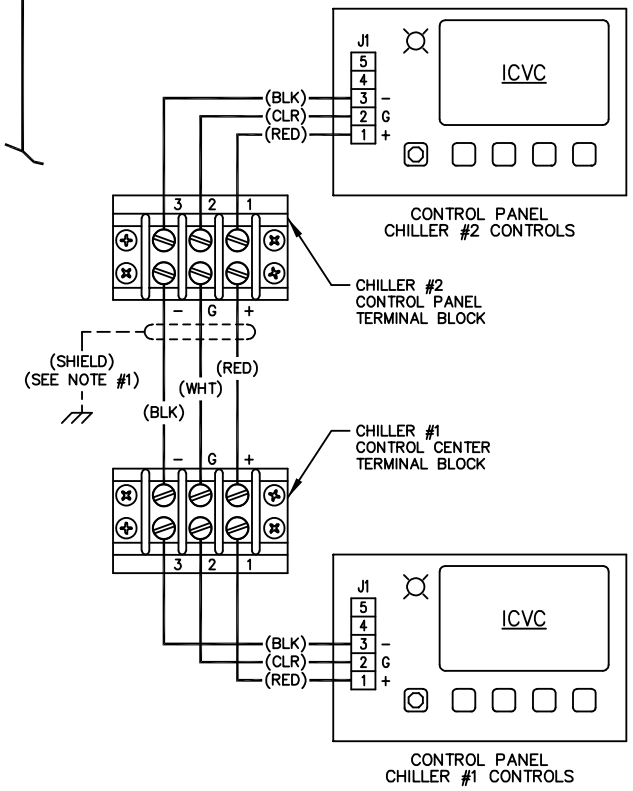
CONTROLS

23XR

SHT 14 OF 24



PLAN VIEW



NOTE:

1. GROUND SHIELD AT ONE END ONLY.
2. COMMON POINT SENSORS ARE REQUIRED IF THE COOLERS ON PARALLEL FLOW MACHINES ARE SUPPLIED BY A SINGLE (COMMON) CHILLED WATER PUMP.
3. IF COMMON CHILLED WATER TEMPERATURE SENSORS ARE INSTALLED, SET COMMON SENSOR OPTION TO ENABLE.
4. INSTALL COMMON POINT SENSORS A MINIMUM OF 10 PIPE DIAMETERS DOWN STREAM OF TEE.

CHILLER #2/LEAD LAG CONTROL	
LEAD LAG CONFIGURATION (LEAD=1) – (LAG=2)	PER JOB
LOAD BALANCE OPTION	PER JOB
COMMON SENSOR OPTION	DISABLE/ENABLE (SEE NOTE #3)
LAG % CAPACITY	PER JOB
LAG ADDRESS	* PER JOB
LAG START TIMER	PER JOB
LAG STOP TIMER	PER JOB
PRESTART FAULT TIMER	PER JOB
* ADDRESS OF CHILLER #1	

CHILLER #1/LEAD LAG CONTROL	
LEAD LAG CONFIGURATION (LEAD=1) – (LAG=2)	PER JOB
LOAD BALANCE OPTION	PER JOB
COMMON SENSOR OPTION	DISABLE/ENABLE (SEE NOTE #3)
LAG % CAPACITY	PER JOB
LAG ADDRESS	* PER JOB
LAG START TIMER	PER JOB
LAG STOP TIMER	PER JOB
PRESTART FAULT TIMER	PER JOB
* ADDRESS OF CHILLER #2	

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390–

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R–134a

NOTES:

COMP'R.: 23XRTP
LEAVING WATER/BRINE
PARALLEL LEAD LAG
CONTROL

DATE:25/08/2019

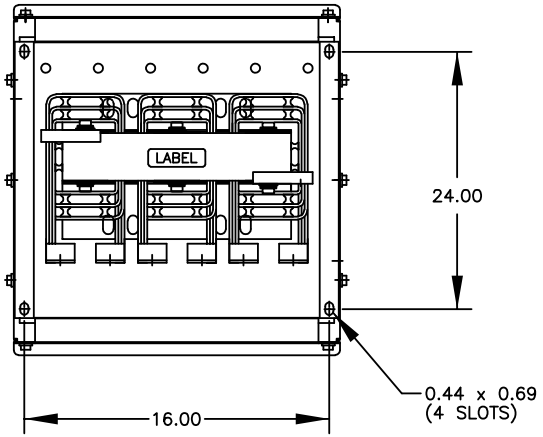
REVISION: ---

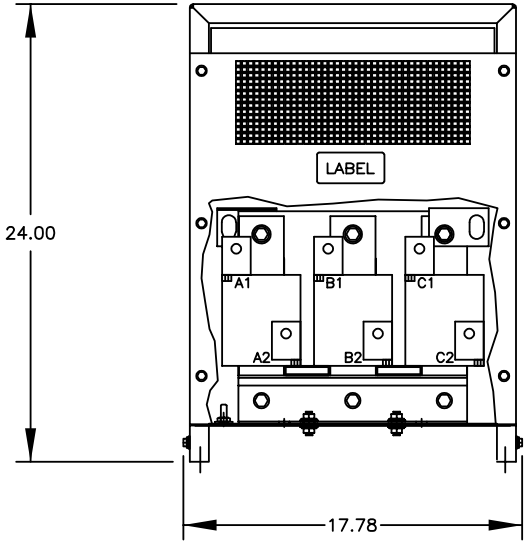
CARRIER DWG # 23XRTPLL1–1
REV. – SHT 01 OF 02
DATE: 10–30–2014
SUPERSEDES DWG. DATED: –

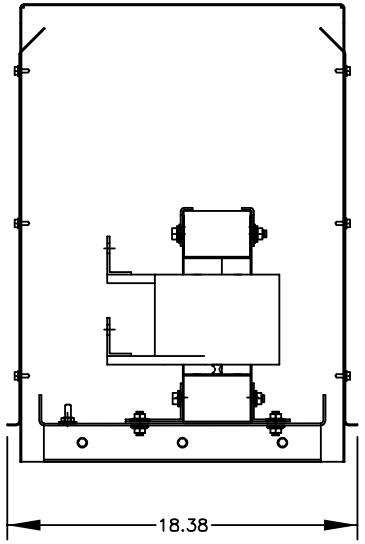
23XRTP

SHT 15 OF 24

FUNDAMENTAL AMPS	INDUCTANCE	LOSSES	WEIGHT
250	0.150 mH	219 Watts	137 Lbs
320	0.125 mH	351 Watts	197 Lbs
400	0.105 mH	293 Watts	203 Lbs







THE COMPONENT, PART OR ASSEMBLY DESCRIBED IN THIS DOCUMENT MUST COMPLY WITH THE EU(EUROPEAN UNION) DIRECTIVE RoHS

CONTAINS <0.1 % OF ANY SVHC BY WEIGHT PER REACH REGULATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES [MM]

TOLERANCES ARE:

ANGLES: ± 1°
1 PLACE .X: ± .1 [2.5]
2 PLACE .XX: ± .03 [0.76]
3 PLACE .XXX: ± .010 [0.254]

MTE
AN SL POWER ELECTRONICS COMPANY

N83 W13330 Leon Road
Menomonee Falls, WI 53051 USA
800.455-4683
262.253.8200

MATERIAL

DRAWN JS	08/09/12
CHECKED JH	08/10/12
APPROVED JH	08/10/12

DESCRIPTION

3 PHASE REACTOR WITH ENCLOSURE

SIZE	DWG No.	REV
A	CD RL-25013B14 CD RL-32013B14 CD RL-40013B14	00

SCALE | SHEET 1 OF 1

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

ROCKWELL
LINE REACTOR
OUTLINE
(480V)
CHILLER RLA RANGE:
0-400

DATE: 25/08/2019

REVISION: ----

CARRIER DWG# RW-LR-400
REV. A SHT 01 OF 01
DATE: 6/16/2017
SUPERSEDES DWG. DATED: 9-5-2012

CONTROLS / PIC II

19XR & 23XR

SHT 24 OF 24

Attachment IV

Carrier A United Technologies Company P.O. BOX 4808, SYRACUSE, N.Y. 13221	JOB NAME: US Embassy 24.07.19	BUYER: ————	SALES ENG.: Khaled Yacout	MODEL NO.: 23XRVA1A1NPJR390–	JOB NO.:	P.O. NO.:	PREPARED BY:	ELECTRICAL CHARACTERISTICS: 400/3/50	JOBSITE LOCATION:	SALES OFFICE: Miraco Carrier	REFRIGERANT NO.: R–134a	NOTES:	23XR (LOW VOLTAGE MOTOR) Standard Tier FIELD WIRING DIAGRAM PIC III CONTROLS WITH UNIT MOUNTED VFD (230–605 FRAME VFD)	DATE: 25/08/2019	REVISION: ———	THIS DOCUMENT IS THE PROPERTY OF CARRIER CORP. AND IS DELIVERED UPON THE EXPRESS CONDITION THAT THE CONTENTS WILL NOT BE DISCLOSED OR USED WITHOUT CARRIER CORP. WRITTEN CONSENT. SUBMISSION OF THESE DWG'S. OR DOCUMENTS DOES NOT CONSTITUTE PART PERFORMANCE OR ACCEPTANCE OF CONTRACT.	CARRIER DWG # 23XRFW11 REV. F SHT 01 OF 04 DATE: 6/16/2017 SUPERSEDES DWG. DATED: 10–30–2014	CONTROLS / PIC III	23XR	SHT 17 OF 24

UNIT MOUNTED VARIABLE FREQUENCY DRIVE – BILL OF MATERIAL

ITEM		DESCRIPTION			BY CARRIER YES	BY CARRIER NO
		UNIT MOUNTED STD TIER VFD MODEL R0230		CHECK ONE		
		UNIT MOUNTED STD TIER VFD MODEL R0269	NOTE: R0269 AVAILABLE FOR 575V ONLY			
		UNIT MOUNTED STD TIER VFD MODEL R0335				
		UNIT MOUNTED STD TIER VFD MODEL R0445				
		UNIT MOUNTED STD TIER VFD MODEL E0389	NOTE: E0389 AVAILABLE FOR 575V ONLY			
		UNIT MOUNTED STD TIER VFD MODEL E0469	NOTE: E0469 AVAILABLE FOR 575V ONLY			
		UNIT MOUNTED STD TIER VFD MODEL E0485				
		UNIT MOUNTED STD TIER VFD MODEL E0550				
		UNIT MOUNTED STD TIER VFD MODEL E0605				
		VFD W/65KAIC CIRCUIT BREAKER (STD)		CHECK ONE		
		VFD W/100KAIC CIRCUIT BREAKER (OPTIONAL)				
1		INCLUDES: (1) N.O. CHILLED WATER PUMP CONTACT OUTPUT (1) N.O. CONDENSER WATER PUMP CONTACT OUTPUT (1) N.O. TOWER FAN LOW / #1 CONTACT OUTPUT (1) N.O. TOWER FAN HIGH / #2 CONTACT OUTPUT (1) N.O. ALARM CONTACT OUTPUT (1) 4–20mA HEAD PRESSURE REFERENCE OUTPUT (1) N.C. SPARE SAFETY (DRY) CONTACT INPUT (1) N.O. REMOTE START (DRY) CONTACT INPUT				
	PROTECTION	UNDER / OVER VOLTAGE PROTECTION (LOAD SIDE)			✓	
	PROTECTION	PHASE LOSS / IMBALANCE / REVERSAL PROTECTION (LOAD SIDE)			✓	
	PROTECTION	OVER CURRENT PROTECTION (LOAD SIDE)			✓	
	PROTECTION	PHASE TO GROUND FAULT PROTECTION (LOAD SIDE)			✓	
	METERING	3 PHASE AMPS (CHILLER DISPLAY LOAD SIDE)			✓	
	METERING	4–20mA KW TRANSDUCER OUTPUT FROM CHILLER CONTROL MODULE (CCM)			✓	
	METERING	KW HOURS / DEMAND KW			✓	
	METERING	KW METERING (CHILLER DISPLAY LOAD SIDE)			✓	
	ANCILLARY	CONTROL POWER TRANSFORMER			✓	
	ANCILLARY	CONTROLS AND OIL HEATER DISCONNECT			✓	
		3 PHASE ANALOG VOLTS / AMPS METER PACKAGE	(OPTION) 389–605 EATON CH72 ONLY			
		CE – MARKING	(OPTION)			
		VOLTS / AMPS METER PACKAGE	(OPTION) 230–445 RA PF755 ONLY			
2		SYSTEM FEEDER (SHORT CIRCUIT, GROUND FAULT & PROTECTION)				✓
A		EVAPORATOR LIQUID PUMP STARTER DISCONNECT				✓
B		EVAPORATOR LIQUID PUMP MOTOR STARTER				✓
C		CONDENSER LIQUID PUMP STARTER DISCONNECT				✓
D		CONDENSER LIQUID PUMP MOTOR STARTER				✓
E		COOLING TOWER FAN STARTER DISCONNECT (LOW FAN/#1)				✓
F		COOLING TOWER FAN STARTER (LOW FAN/#1)				✓
G		COOLING TOWER FAN STARTER DISCONNECT (HIGH FAN/#2)				✓
H		COOLING TOWER FAN STARTER (HIGH FAN/#2)				✓
J		SPARE SAFETY DEVICES [N.C.] SEE NOTE 3.1				✓
K		REMOTE START / STOP DEVICE [N.O.] SEE NOTE 3.1				✓
L		REMOTE ALARM SEE NOTE 3.3				✓
M		REMOTE ANNUNCIATOR SEE NOTE 3.3				✓
N		LINE SIDE LUG ADAPTERS SEE NOTE 2.3				✓
P		ICE BUILD START / TERMINATE DEVICE SEE NOTE 3.1				✓

NOTES:

I GENERAL

1.0 VARIABLE FRQUENCY DRIVE (VFD) SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH CARRIER ENGINEERING REQUIREMENT Z-417.

1.1 ALL FIELD-SUPPLIED CONDUCTORS, DEVICES AND THE FIELD-INSTALLATION WIRING, TERMINATION OF CONDUCTORS AND DEVICES, MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES AND JOB SPECIFICATIONS.

1.2 THE ROUTING OF FIELD-INSTALLED CONDUIT AND CONDUCTORS AND THE LOCATION OF FIELD-INSTALLED DEVICES, MUST NOT INTERFERE WITH EQUIPMENT ACCESS OR THE READING, ADJUSTING OR SERVICING OF ANY COMPONENT.

1.3 EQUIPMENT INSTALLATION AND ALL STARTING AND CONTROL DEVICES, MUST COMPLY WITH DETAILS IN EQUIPMENT SUBMITTAL DRAWINGS AND LITERATURE.

1.4 CONTACTS AND SWITCHES ARE SHOWN IN THE POSITION THEY WOULD ASSUME WITH THE CIRCUIT DE-ENERGIZED AND THE CHILLER SHUTDOWN.

1.5 WARNING – DO NOT USE ALUMINUM CONDUCTORS. CONTRACTOR / INSTALLER ASSUMES ALL LIABILITY RESULTING FROM THE USE OF ALUMINUM CONDUCTORS WITHIN THE VFD ENCLOSURE.

II POWER WIRING TO VFD

2.0 PROVIDE A MEANS OF DISCONNECTING BRANCH FEEDER POWER TO VFD. PROVIDE SHORT CIRCUIT PROTECTION AND INTERRUPT CAPACITY FOR BRANCH FEEDER IN COMPLIANCE WITH ALL APPLICABLE CODES.

2.1 IF METAL CONDUIT IS USED FOR THE POWER WIRES, THE LAST 4 FEET OR GREATER SHOULD BE FLEXIBLE TO AVOID TRANSMITTING UNIT VIBRATION INTO THE POWER LINES AND TO AID IN SERVICEABILITY.

2.2 LINE SIDE POWER CONDUCTOR RATING MUST MEET VFD NAMEPLATE VOLTAGE AND CHILLER MINIMUM CIRCUIT AMPACITY.

2.3 LUG ADAPTERS MAY BE REQUIRED IF INSTALLATION CONDITIONS DICTATE THAT CONDUCTORS BE SIZED BEYOND THE MINIMUM AMPACITY REQUIRED. CIRCUIT BREAKER LUGS WILL ACCOMMODATE THE QUANTITY (#) AND SIZE CABLES (PER PHASE) AS FOLLOWS:

		STANDARD LUG CAPACITY (PER PHASE)		OPTIONAL LUG CAPACITY (FIELD SUPPLIED PER PHASE)	
AMPACITY RANGE	VFD TYPE	MAXIMUM NUMBER OF CONDUCTORS	CONDUCTOR RANGE	MAXIMUM NUMBER OF CONDUCTORS	CONDUCTOR RANGE
230-300	STD TIER (RA PF755)	2	3/0-250MCM	1	250-500MCM
301-445	STD TIER (RA PF755)	3	2/0-400MCM	2	250-500MCM
389-605	STD TIER (EATON CH72)	4	4/0-500MCM	3	500-750MCM

IF LARGER LUGS ARE REQUIRED, THEY CAN BE FIELD SUPPLIED FROM THE MANUFACTURER OF THE CIRCUIT BREAKER. OPTIONAL LUGS ARE FIELD INSTALLED. FOR LARGER LUGS AND CABLE REDUCERS REFER TO PPS HH83RZ015 AND PPS HH87LZ500.

2.4 COMPRESSOR MOTOR AND CONTROLS MUST BE GROUNDED BY USING EQUIPMENT GROUNDING LUG PROVIDED INSIDE UNIT MOUNTED VFD ENCLOSURE.

III CONTROL WIRING

3.0 FIELD SUPPLIED CONTROL CONDUCTORS TO BE AT LEAST 18 AWG OR LARGER.

3.1 ICE BUILD START/TERMINATE DEVICE CONTACTS, REMOTE START/STOP DEVICE CONTACTS AND SPARE SAFETY DEVICE CONTACTS, (DEVICES NOT SUPPLIED BY CARRIER), MUST HAVE 24VAC RATING. MAX CURRENT IS 60mA, NOMINAL CURRENT IS 10mA. SWITCHES WITH GOLD PLATED BIFURCATED CONTACTS ARE RECOMMENDED.

3.2 REMOVE JUMPER WIRE BETWEEN TB1-19 AND TB1-20 BEFORE CONNECTING AUXILLIARY SAFETIES BETWEEN THESE TERMINALS.

3.3 EACH INTEGRATED CONTACT OUTPUT CAN CONTROL LOADS (VA) FOR EVAPORATOR PUMP,CONDENSER PUMP, TOWER FAN LOW, TOWER FAN HIGH AND ALARM ANNUNCIATOR DEVICES RATED 5 AMPS AT 115VAC AND UP TO 3 AMPS AT 277VAC.

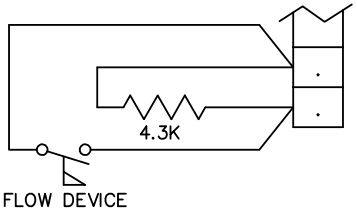
WARNING:
CONTROL WIRING REQUIRED FOR CARRIER TO START PUMPS AND TOWER FAN MOTORS AND ESTABLISH FLOWS MUST BE PROVIDED TO ASSURE MACHINE PROTECTION. IF PRIMARY PUMP, TOWER FAN AND FLOW CONTROL IS BY OTHER MEANS, ALSO PROVIDE A PARALLEL MEANS FOR CONTROL BY CARRIER. FAILURE TO DO SO COULD RESULT IN MACHINE FREEZE-UP OR OVER-PRESSURE.

DO NOT USE CONTROL TRANSFORMERS IN THE CONTROL CENTER AS THE POWER SOURCE FOR EXTERNAL OR FIELD SUPPLIED CONTACTOR COILS, ACTUATOR MOTORS OR ANY OTHER LOADS.

3.4 DO NOT ROUTE CONTROL WIRING CARRYING 30V OR LESS WITHIN A CONDUIT OR TRAY WHICH HAS WIRES CARRYING 50V OR HIGHER OR ALONG SIDE WIRES CARRYING 50V OR HIGHER.

3.5 SPARE 4-20mA OUTPUT SIGNAL IS DESIGNED FOR CONTROLLERS WITH A NON-GROUNDED 4-20mA INPUT SIGNAL AND A MAXIMUM INPUT IMPEDANCE OF 500 OHMS.

3.6 FLOW DEVICES TO CONFIRM EVAPORATOR OR CONDENSER PUMP FLOW ARE NOT REQUIRED. HOWEVER; IF FLOW DEVICES ARE USED, WIRE AS SHOWN ON DRAWING 23XRC1-1 (J3 LOWER). REMOVE JUMPER INSTALLED AT THESE TERMINALS AND WIRE IN A 4.3 K RESISTOR IN ITS PLACE.



THE FLOW DEVICE AND RESISTOR MUST BE INSTALLED IN PARALLEL AT THESE TERMINALS SUCH THAT THE RESISTOR PROVIDES A SIGNAL WHEN THE FLOW DEVICE IS OPEN.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: ----------

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

23XR
(LOW VOLTAGE MOTOR)
Standard Tier
FIELD WIRING DIAGRAM
PIC III CONTROLS WITH UNIT MOUNTED VFD
(230-605 FRAME VFD)

DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRFW12
REV. F SHT 02 OF 04
DATE: 6/16/2017
SUPERSEDES DWG. DATED: 10-30-2014

CONTROLS / PIC III

23XR

SHT 18 OF 24

SHT 3 OF 4
SHT 4 OF 4

BRANCH DISCONNECT

L3
L2
L1

-VOLTS
3-PHASE

(2) SEE NOTE 2.0

CHILLER CONTROL CENTER ENCLOSURE

SEE NOTE 2.4

(N) SEE NOTE 2.3

(ST) SHUNT TRIP CIRCUIT BREAKER

POWER INPUT SECTION
(LEFT DOOR)

CONTROL PANEL SECTION
(RIGHT DOOR)

(1)

TB4 (230-445)

EVAP PUMP	20
	21
COND PUMP	18
	19
TOWER FAN LOW	24
	25
TOWER FAN HIGH	26
	27
ALARM	22
	23

TB2 (389-605)

EVAP PUMP	1
	2
COND PUMP	3
	4
TOWER FAN LOW	5
	6
TOWER FAN HIGH	7
	8
ALARM	9
	10

(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)

TB4 (230-445)

HIGH PRESS SW	35
	36
4-20mA PRESS REF	2
	3
SPARE SAFETY	8
	11
ICE BUILD	9
	12
REMOTE START	10
	13

4-20mA HEAD PRESSURE REFERENCE OUTPUT

TB1 (389-605)

HIGH PRESS SW	15
	16
4-20mA PRESS REF	17
	18
SPARE SAFETY	19
	20
ICE BUILD	21
	22
REMOTE START	23
	24

COMP'R. DISCH. HIGH PRESSURE (FACTORY WIRED)

+
-

SPARE SAFETY CONTACT(S)
(J) SEE NOTE 3.1
SEE NOTE 3.2

(P) SEE NOTE 3.1
ICE BUILD CONTACT

(K) SEE NOTE 3.1
REMOTE START/STOP CONTACT

REMOTE START/STOP CONTACT

CUSTOMER SUPPLIED REMOTE ANNUNCIATOR DEVICE (OPTIONAL)

V-1PH-50/60HZ

(M) SEE NOTE 3.3

CUSTOMER SUPPLIED REMOTE ALARM (OPTIONAL)
(L) SEE NOTE 3.3

LEGEND:
- REQUIRED POWER WIRING
- REQUIRED CONTROL WIRING
- FIELD WIRING (LOW VOLTAGE)
- FIELD WIRING (EXTRA LOW VOLTAGE)

MATCH LINE
MATCH LINE

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R-134a

NOTES:

23XR
(LOW VOLTAGE MOTOR)
Standard Tier
FIELD WIRING DIAGRAM
PIC III CONTROLS WITH
UNIT MOUNTED VFD
(230-605 FRAME VFD)

DATE: 25/08/2019

REVISION: ----

CARRIER DWG # 23XREW14
REV. F SHT 04 OF 04
DATE: 6/16/2017
SUPERSEDES DWG. DATED: 10-30-2017

CONTROLS / PIC III

23XR

SHT 20 OF 24

SHT 3 OF 4

SHT 4 OF 4

-VOLTS
3-PHASE

A
B
OPTIONAL
HAND-OFF-AUTO-SW.
SEE NOTE 3.3
(1)
(2)
HAND AUTO
OFF
M1
OL'S
CONTROL OUTPUT TO FLOW CONTROL DEVICES; SPEED, VALVE(S) ETC. IF REQUIRED TO ESTABLISH FLOW
EVAPORATOR LIQUID PUMP MOTOR
(NOT BY CARRIER)

C
D
OPTIONAL
HAND-OFF-AUTO-SW.
SEE NOTE 3.3
(3)
(4)
HAND AUTO
OFF
M2
OL'S
CONTROL OUTPUT TO FLOW CONTROL DEVICES; SPEED, VALVE(S) ETC. IF REQUIRED TO ESTABLISH FLOW
CONDENSER LIQUID PUMP MOTOR
(NOT BY CARRIER)

G
H
OPTIONAL
HAND-OFF-AUTO-SW.
SEE NOTE 3.3
(7)
(8)
HAND AUTO
OFF
M4
OL'S
CONTROL OUTPUT TO FLOW CONTROL DEVICES; SPEED, VALVE(S) ETC. IF REQUIRED TO ESTABLISH FLOW
PRIMARY COOLING TOWER FAN MOTOR HIGH/#2
(NOT BY CARRIER)

-VOLTS
3-PHASE

E
F
OPTIONAL
HAND-OFF-AUTO-SW.
SEE NOTE 3.3
(5)
(6)
HAND AUTO
OFF
M3
OL'S
CONTROL OUTPUT TO FLOW CONTROL DEVICES; SPEED, VALVE(S) ETC. IF REQUIRED TO ESTABLISH FLOW
OPTIONAL COOLING TOWER FAN MOTOR LO/#1
(NOT BY CARRIER)

MATCH LINE

MATCH LINE

4-20 mA OUTPUT REFERENCE TO SIGNAL CONTROLLER FOR DEVICE CHOICE(S)
(NOT BY CARRIER)
EXAMPLES: - TOWER BYPASS VALVE
- TOWER SPEED CONTROL
- CONDENSER PUMP SPEED CONTROL

(SEE NOTE 3.5)

LEGEND	
SYMBOL	DESCRIPTION
TYPE LOCATION	MACHINE MOUNTED INSTRUMENT
TYPE LOCATION	ALARM
TYPE LOCATION	ALERT & ALARM
	MAJOR WATER OR REFRIGERANT PIPING (STEEL PIPE)
	MINOR WATER OR REFRIGERANT PIPING (COPPER TUBING)
	OIL PIPING
	SCHRADER VALVE
	VALVE
	RELIEF VALVE
	OIL PUMP
S	SOLENOID VALVE
	STRAINER
	OIL FILTER
	BUTTERFLY ISOLATION VALVE
	CONTROL VALVE

LEGEND	
SYMBOL	DESCRIPTION
COMP	COMPRESSOR
COND	CONDENSER
DSCG	COMPRESSOR DISCHARGE
ECW	ENTERING CONDENSER WATER
EEW	ENTERING EVAPORATOR WATER (CHILLED WATER)
ES	EVAPORATOR REFRIGERANT LIQUID TEMPERATURE
EVAP	EVAPORATOR
EXV	EXPANSION VALVE
FCV	FLOW CONTROL VALVE
HC	HEATER CONTROL
LCV	LEVEL CONTROL VALVE
LCW	LEAVING CONDENSER WATER
LEW	LEAVING EVAPORATOR WATER
LS	LEVEL SWITCH
MTR	MOTOR
ORT	OIL RECLAIM TEMPERATURE
OST	OIL SUMP TEMPERATURE
PCV	PRESSURE CONTROL VALVE
PI	PRESSURE INDICATOR
PS	POSITION SENSOR
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
PSV	PRESSURE SAFETY VALVE
PT	PRESSURE TRANSMITTER
TCV	TEMPERATURE CONTROL VALVE
TE	TEMPERATURE ELEMENT
TI	TEMPERATURE INDICATOR
TSH	TEMPERATURE SWITCH HIGH
TSL	TEMPERATURE SWITCH LOW
TW	TEMPERATURE WELL
VFD	VARIABLE FREQUENCY DRIVE
XG	SIGHTGLASS
XE	HEATER
XO	ORIFICE

NOTE:

1. THIS SHEET IS A GENERAL LEGEND SHEET FOR ALL FLOW PIPING AND INSTRUMENTATION DIAGRAMS. IT IS USED TO AID IN IDENTIFICATION OF THE ITEMS SHOWN ON THE SHEET THAT FOLLOWS.

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: _____

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390–

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R–134a

NOTES:

23XR
REFRIGERATION MACHINE
PIPING AND
INSTRUMENTATION
DIAGRAM
(TP COMPRESSOR)

DATE: 25/08/2019

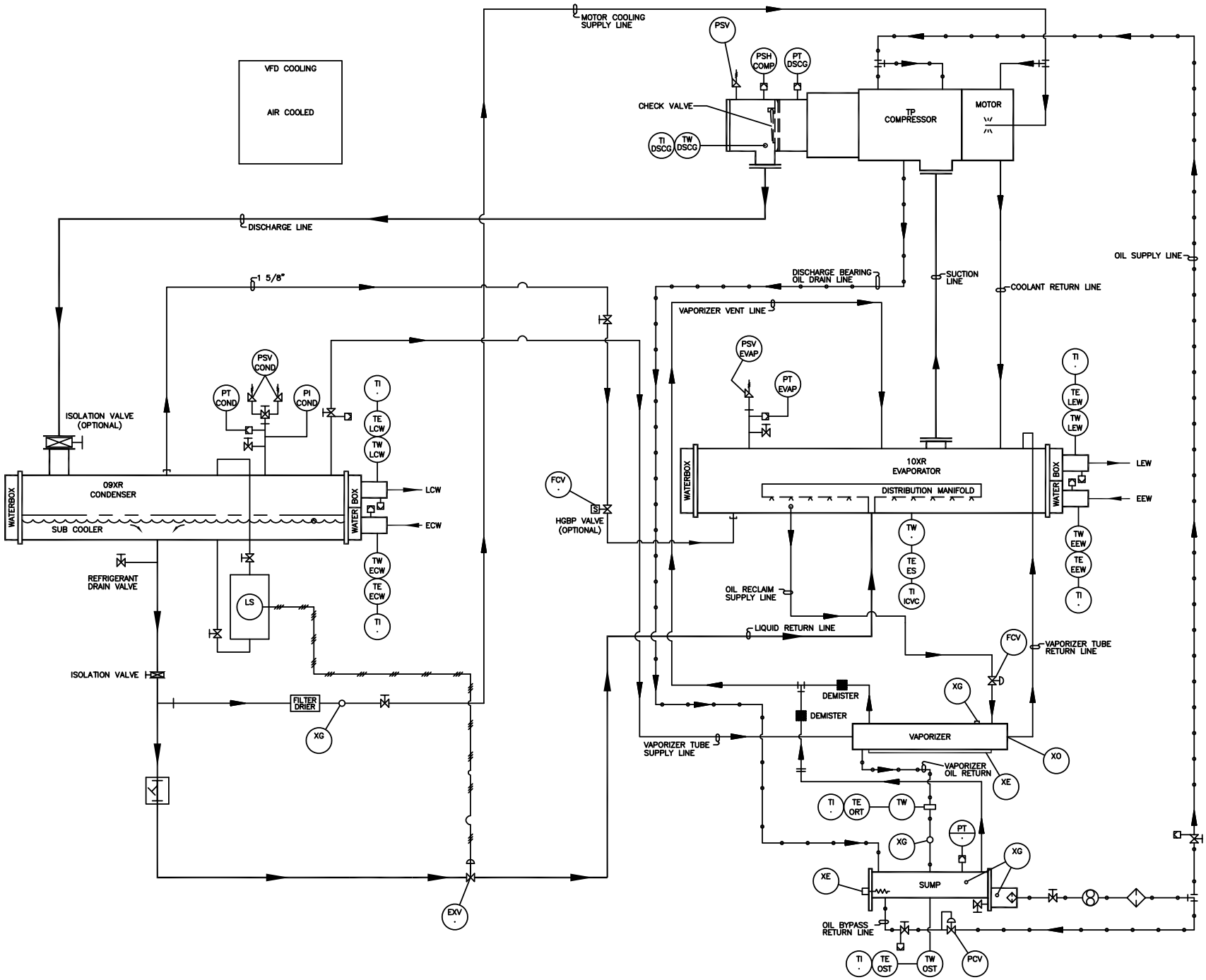
REVISION: ———

CARRIER DWG # 23XRTP–PID–1
REV. – SHT 01 OF 02
DATE: 4/17/2014
SUPERSEDES DWG. DATED: –

23XR

SHT 21 OF 24

Attachment V



Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME:
US Embassy 24.07.19

BUYER:
_____

SALES ENG.:
Khaled Yacout

MODEL NO.:
23XRVA1A1NPJR390-

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS:
400/3/50

JOBSITE LOCATION:

SALES OFFICE:
Miraco Carrier

REFRIGERANT NO.:
R-134a

NOTES:

23XR
REFRIGERATION MACHINE
PIPING AND
INSTRUMENTATION
DIAGRAM
(TP COMPRESSOR)

DATE: 25/08/2019

REVISION: ---

CARRIER DWG # 23XRTP-PID-2
REV. - SHT 02 OF 02
DATE: 4/17/2014
SUPERSEDES DWG. DATED:
-

23XR

SHT 22 OF 24

FIELD INSTALLATION NOTES

1. CARRIER DOES NOT RECOMMEND PRE–FAB WATER PIPING.

2. FIELD–INSTALLED PIPING MUST BE ARRANGED AND SUPPORTED TO AVOID STRESS ON THE EQUIPMENT AND TRANSMISSION OF VIBRATIONS FROM THE EQUIPMENT AS WELL AS TO PREVENT INTERFERENCE WITH ROUTINE ACCESS FOR THE READING ADJUSTING AND SERVICING OF THE EQUIPMENT. PROVISIONS SHALL BE MADE FOR ADJUSTMENT IN EACH PLANE OF THE PIPING AND FOR PERIODIC AND MAJOR SERVICING OF THE EQUIPMENT.

3. RELIEF VALVES ON COOLER AND CONDENSER MUST BE VENTED TO THE OUTDOORS AS THE DISCHARGING OF REFRIGERANTS IN CLOSED SPACES MAY DISPLACE OXYGEN AND CAUSE ASPHYXIATION. ALL FIELD SUPPLIED REFRIGERANT RELIEF PIPING AND DEVICES MUST BE IN ACCORDANCE WITH ANSI/ASHRAE STANDARD 15.

   DUAL PRESSURE RELIEF VALVES ARE MOUNTED ON THE THREE–WAY VALVES IN SOME LOCATIONS TO ALLOW TESTING AND REPAIR WITHOUT TRANSFERRING THE REFRIGERANT CHARGE. THREE–WAY VALVE SHAFTS SHOULD BE TURNED EITHER FULLY CLOCKWISE OR FULLY COUNTERCLOCKWISE SO ONLY ONE RELIEF VALVE IS EXPOSED TO REFRIGERANT PRESSURE AT A TIME.

   THE FLOW AREA OF DISCHARGE PIPING ROUTED FROM MORE THAN ONE RELIEF VALVE, OR MORE THAN ONE HEAT EXCHANGER, MUST BE GREATER THAN THE SUM OF THE OUTLET AREAS OF ALL RELIEF VALVES THAT ARE EXPECTED TO DISCHARGE SIMULTANEOUSLY. ALL RELIEF VALVES WITHIN A MACHINERY ROOM THAT ARE EXPOSED TO REFRIGERANT MAY DISCHARGE SIMULTANEOUSLY IN THE EVENT OF A FIRE. DISCHARGE PIPING SHOULD LEAD TO THE POINT OF FINAL RELEASE AS DIRECTLY AS POSSIBLE WITH CONSIDERATION OF PRESSURE DROP IN ALL SECTIONS DOWNSTREAM OF THE RELIEF VALVES.

4. SERVICE ACCESS SHOULD BE PROVIDED PER STANDARDS ANSI/ASHRAE 15 AND ANSI/NFPA 70 (NEC) AND LOCAL SAFETY CODES. UNOBSTRUCTED SPACE ADEQUATE FOR INSPECTION, SERVICING AND RIGGING OF ALL MAJOR COMPONENTS OF THE CHILLER IS REQUIRED. SHADED SERVICE AREAS ARE SHOWN ON THE CERTIFIED MACHINE ASSEMBLY DRAWING PLAN VIEW AND FRONT VIEW. SEE MACHINE ASSEMBLY COMPONENT DIS–ASSEMBLY DRAWWING FOR COMPONENT REMOVAL. SPACE FOR RIGGING EQUIPMENT AND COMPRESSOR REMOVAL IS NOT SHOWN.

5. THE INSTALLATION OF CHILLED WATER AND COOLING TOWER WATER STRAINERS SHOULD BE CONSIDERED TO PREVENT DEBRIS FROM COLLECTING IN THE WATERBOXES AND DEGRADING PERFORMANCE.

6. FLEXIBLE CONDUIT SHOULD BE USED FOR THE LAST FEW FEET TO THE CONTROL CENTER FOR VIBRATION ISOLATION OF POWER WIRING AND CONTROL WIRING.

Attachment VI

Carrier
A United Technologies Company
P.O. BOX 4808, SYRACUSE, N.Y. 13221

JOB NAME: US Embassy 24.07.19

BUYER: ——————

SALES ENG.: Khaled Yacout

MODEL NO.: 23XRVA1A1NPJR390–

JOB NO.:

P.O. NO.:

PREPARED BY:

ELECTRICAL CHARACTERISTICS: 400/3/50

JOBSITE LOCATION:

SALES OFFICE: Miraco Carrier

REFRIGERANT NO.: R–134a

NOTES:

FIELD INSTALLATION NOTES

DATE: 25/08/2019

REVISION: ——

CARRIER DWG # 23XRNOTE
REV. A SHT 01 OF 01
DATE: 5/5/2006
SUPERSEDES DWG. DATED: 8/12/2005

23XR

SHT 23 OF 24

160

Solicitation 19EG3020Q0021 FAC 7901 Cairo II Chiller Installation