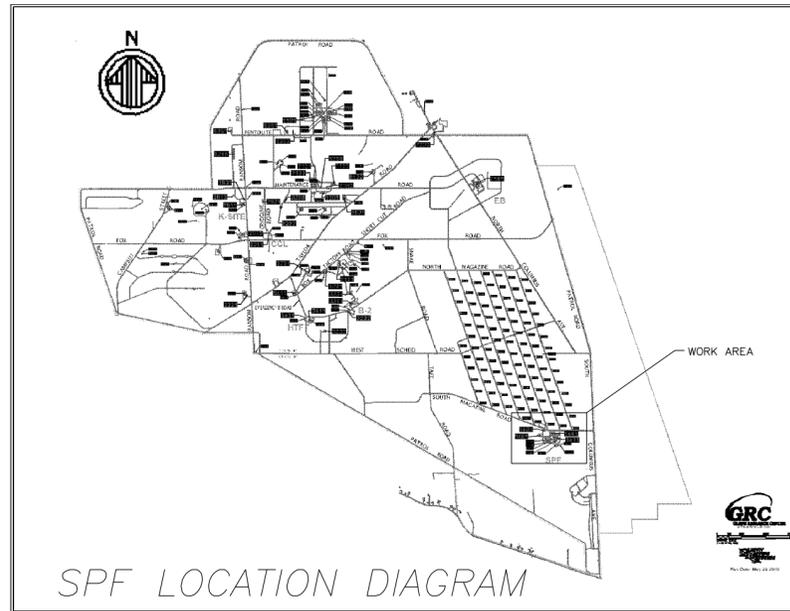




NASA COOLING TOWER REHABILITATION - PHASE II

NASA PLUMBROOK FACILITY
SPACE POWER FACILITY (SPF)
6100 COLUMBUS AVENUE ~ SANDUSKY, OH 44870



ABBREVIATIONS

ABAN	ABANDONED
BC	BURIED CABLE
BLDG	BUILDING
BM	BENCH MARK
BOT	BOTTOM
CB	CATCH BASIN
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CICL	CAST IRON CEMENT LINED
CMP	CORRUGATED METAL PIPE
CND	CONDUIT
CO	CLEAN OUT
COMBA	COMBUSTION AIR
CONC	CONCRETE
CONN	CONNECTION
COP	COPPER
CPTB	CATHODIC PROTECT TEST BOX
CS	CARBON STEEL
CTWR	COOLING TOWER WATER RETURN
CTWS	COOLING TOWER WATER SUPPLY
DG	DEGREES
DI	DUCTILE IRON
DP	DUAL PURGE
DR	DRAIN
DS	DOWNSPOUT
DW	DOMESTIC WATER
EL	ELEVATION
ENTR	ENTRANCE
E/P	EDGE OF PAVEMENT
FD	FLOOR DRAIN
FDN	FOUNDATION
FH	FIRE HYDRANT
FL	FLOOR
FO	FUEL OIL
FOLQ	FOAM LIQUID
FTG	FOOTING
H	LETTER "H" IN HYDRANT
HDPE	HIGH DENSITY POLYETHYLENE
HH	HANDHOLE
HORZ	HORIZONTAL
HPS	HIGH PRESSURE STEAM
IA	INSTRUMENT AIR
INST	INSTRUMENT
INV	INVERT
INW	INDUSTRIAL WASTE SEWER
JB	JUNCTION BOX
LF	LIQUID FUEL
LPS	LOW PRESSURE STEAM
LT	LIGHT
MH	MANHOLE
MON	MONUMENT
NG	NATURAL GAS
NIC	NOT IN CONTRACT
P	POWER
PB	PULL BOX
PC	POINT OF CURVATURE
PERF	PERFORATED
PI	POINT OF INTERSECTION
PP	POLYPROPYLENE
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
RC	REINFORCED CONCRETE
R/W	RIGHT OF WAY
S	STORM
SA	SANITARY
SCGR	STEAM COND GRAVITY RETURN
SCPR	STEAM COND PUMPED RETURN
ST	STEAM
STA	STATION
STL	STEEL
T	TELEPHONE
TRAN	TRANSFORMER
UD	UNDERDRAIN
VAC	VACUUM
VB	VALVE BOX
VC	VITRIFIED CLAY
VERT	VERTICAL
VLV	VALVE
WM	WATER METER

SYMBOLS LEGEND

---	ABAND LINE/STRUCTURE
—	CAPPED LINE
— —	CHECK VALVE
☐	CLEAN OUT
---	CORPORATION LINE
—X—X—	FENCE
—○—	FIRE HYDRANT
— — —	GUARD RAIL
○	IRON PIN
○	LIGHT POLE
●	MANHOLE
●	OPEN GRATE MANHOLE
— —	PIPE DROP
— — —	PIPE RISER
— — —	POINT OF INTERSECTION
—○—	POINT OF TANGENCY
—○—	POINT OF CURVATURE
—○—	POWER POLE
---	PROPERTY LINE
—■—	RECTANGLE CATCH BASIN
— — —	REDUCER
—R/W—	RIGHT OF WAY
—	SIGN
■	SQUARE CATCH BASIN
■	SURVEY MONUMENT
— — —	TRAFFIC SIGNAL
— — —	VALVE

SHEET INDEX

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BID OPTIONS

- OPTION 1 - 2 CELL COOLING TOWER
- OPTION 2 - 3 CELL COOLING TOWER

100% SUBMISSION
FEBRUARY 8, 2012



SYSTEM ID		FACILITY ID		CONTR. CTRL.	
DR.		DES.		XXX.	
CONTRACT NO.		D.ENG.		PROJ. MGR.	
TASK ORDER		TECH LEAD/BR CH		TYP SEQ	
DRAWN		FAC/SYS MGR.		REV SHEET	
APPROVED		RELEASE STATUS		REVISED	

CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD	FAC-SYS MGR	REV DATE
EDMS REVISION	N.NNNNNNNNN	N.NNNNNNNNN	MMDDYYYY
CAD DRAWING - DO NOT REVISE MANUALLY			
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHN H. GLENN RESEARCH CENTER LEWIS FIELD CLEVELAND, OHIO			
NASA COOLING TOWER REHABILITATIONS			
COOLING TOWERS 1&4, 3&6, 5, SPF TITLE SHEET			
SIZE	BLDG/SYS	PROJECT ID	DISC TYP SEQ
PE 1411	- COF14901	- GI 001	
AREA:	GRC - COOLING TOWERS 1 & 4	SHEET	OF
UNITS:	ENGLISH	SOFTWARE: AUTOCAD 2007	REVISION
SCALE:		OFFICIAL DATE: 02/01/2011	

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GENERAL NOTES:

HEREINAFTER, THE TERM "CONTRACTOR" IN THESE DESIGN DRAWINGS SHALL REFER TO THE ENTITIES (I.E. THE CONTRACTOR AND/OR ITS SUBCONTRACTOR(S)) IMPLEMENTING THE PROJECT.

THE CONTRACTOR SHALL COMPLETE ALL ACTIVITIES ASSOCIATED WITH THE PROJECT IN COMPLIANCE WITH APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS AND REQUIREMENTS.

THE CONTRACTOR SHALL EXECUTE ALL CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH THE PROJECT PLAN AND SPECIFICATIONS.

THE CONTRACTOR SHALL SUPPLY ALL EQUIPMENT, MATERIALS, AND LABOR TO PERFORM THE CONTRACT REQUIREMENTS INCLUDING ALL WORKER SAFETY EQUIPMENT.

THE CONTRACTOR SHALL COMPLY WITH NASA PLUM BROOK SITE ACCESS PROTOCOLS.

ACCESS TO NASA PLUM BROOK SHALL BE OFF OF TAYLOR ROAD. ADDITIONAL TIME MAY BE REQUIRED TO GAIN ACCESS. THE CONTRACTOR SHALL BE REQUIRED TO ALLOW FOR DELAYS WITHOUT ADDITIONAL CHARGES TO THE NASA PLUM BROOK FACILITY.

THE CONTRACTOR IS RESPONSIBLE FOR VISITING THE PROJECT SITE AND BECOMING FAMILIAR WITH EXISTING CONDITIONS, CHECKING AND VERIFYING GIVEN DIMENSIONS AND ELEVATIONS AS NECESSARY. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY DISCREPANCIES TO THE NASA QUALITY ASSURANCE TECHNICIAN (QAT).

THE CONTRACTOR SHALL KEEP THE PROJECT SITE, AND ADJACENT PAVEMENT AND SURFACES, CLEAN AT ALL TIMES. THE CONTRACTOR SHALL PROVIDE METAL CONTAINERS FOR WASTE AND SCRAP MATERIALS. THE CONTRACTOR SHALL REMOVE THE CONTAINERS FROM THE PROJECT SITE WHEN FULL AND IS RESPONSIBLE FOR FINAL CLEANING OF THE PROJECT SITE. THE CONTRACTOR SHALL REMOVE ALL TOOLS, SURPLUS MATERIALS, AND DEBRIS FROM THE PROJECT SITE AT THE COMPLETION OF THIS PROJECT.

THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE NASA QAT SO PORTABLE EQUIPMENT AND DEBRIS CAN BE MOVED, ACCESS TO BUILDINGS CAN BE PROVIDED, AND INTERFERENCE WITH OTHER NASA OPERATIONS CAN BE KEPT TO A MINIMUM.

RED-LINED AS-BUILT DRAWINGS SHALL BE SUBMITTED TO THE NASA QAT AT THE COMPLETION OF THE JOB. RED-LINED AS-BUILT DRAWINGS SHALL DOCUMENT EACH AND EVERY DEVIATION FROM THE CONSTRUCTION DRAWINGS. DEVIATIONS INCLUDE CHANGES IN LOCATION, ELEVATION, ALIGNMENTS, MATERIAL, AND CONFIGURATION. LOCATION OF ANY UNCHARTED UTILITY OR UNANTICIPATED CONDITION SHALL BE CAREFULLY AND COMPLETELY DOCUMENTED. RED-LINED AS-BUILT DRAWINGS SHALL BE MAINTAINED ON THE PROJECT SITE AND BE AVAILABLE FOR REVIEW BY THE NASA QAT AND THE SURVEYOR.

NO WORK SHALL TAKE PLACE DURING INCLEMENT WEATHER (INCLUDING, BUT NOT LIMITED TO, EXCESSIVE PRECIPITATION, EXCESSIVE WINDS, APPROACHING INCLEMENT WEATHER, ETC.) AS DETERMINED BY THE COTR.

THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS ON THE SITE PRIOR TO COMMENCING WORK. ALL INQUIRES AND DISCREPANCIES SHOULD BE DIRECTED TO THE NASA COTR.

ALL WORK SHOWN ON THE DRAWINGS SHALL BE BY THE CONTRACTOR UNLESS OTHERWISE NOTED BY THE ABBREVIATION NIC, (NOT IN CONTRACT).

HAZARDOUS MATERIALS INCLUDING ASBESTOS, LEAD-BASED PAINTS, ETC., MAY BE ENCOUNTERED IN THE WORK. IF THE CONTRACTOR ENCOUNTERS MATERIALS WHICH HAVE NOT BEEN REMOVED OR RENDERED HARMLESS, THEY SHALL STOP WORK IN THE AREA AFFECTED AND REPORT TO NASA COTR IN WRITING. THE CONTRACTOR SHALL NOT RESUME WORK UNTIL THE APPROVAL IS GRANTED BY THE CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE (COTR) WITH CONCURRENCE FROM APPROPRIATE SAFETY, HEALTH, ENVIRONMENTAL DIVISION (SHED), AND FACILITIES DIVISION REPRESENTATIVES.

USE ONLY GRAPHIC DIMENSIONS. TO SCALE DWG USE GRAPHIC SCALE.

ALL EXISTING GRADE DIMENSIONS AND ELEVATIONS ARE IN FEET AND ARE APPROXIMATE.

THE CONTRACTOR SHALL INSTALL CONSTRUCTION WARNING SIGNS TO DEMARCAT THE PROJECT SITE A MINIMUM OF FIVE BUSINESS DAYS PRIOR TO INITIATION OF REHABILITATION ACTIVITIES.

THE CONTRACTOR SHALL SUPPLY PORTABLE WATER FOR CONSTRUCTION PURPOSES.

EXISTING UTILITY LOCATIONS, DIMENSIONS, AND ELEVATIONS SHOWN ON THE PLANS AND PROFILES ARE APPROXIMATE.

THE CONTRACTOR SHALL LOCATE AND PROTECT ALL UTILITIES THAT REMAIN DURING CONSTRUCTION. CONSTRUCTION LAYOUT AND STAKING SHALL BE PERFORMED BY A PROFESSIONAL SURVEYOR REGISTERED IN THE STATE OF OHIO.

SHOULD THE CONTRACTOR DISCOVER UTILITIES NOT SHOWN ON THE DRAWINGS, CONSTRUCTION ACTIVITIES SHALL STOP IMMEDIATELY AND THE CONTRACTOR SHALL NOTIFY THE QAT. NASA PERSONNEL SHALL DETERMINE THE DEPOSITION OF THE DISCOVERED UTILITY. THE CONTRACTOR SHALL NOT RESUME WORK UNTIL THE APPROVAL IS GRANTED BY THE NASA COTR.

THE CONTRACTOR SHALL NOTIFY THE NASA CONSTRUCTION MANAGER AT LEAST 48 HOURS PRIOR TO REMOVING, ABANDONING, OR INSTALLING BULKHEADS AS PART OF TAKING ANY EXISTING SEWER OUT OF PERMANENT SERVICE. NOTIFICATION IS NECESSARY TO INSURE THAT NO ACTIVE UTILITY IS TAKEN OUT OF SERVICE.

GENERAL SUMMARY & GENERAL NOTES N.T.S.

GENERAL NOTES, CONT.:

HISTORIC BASE MAP INFORMATION IS PROVIDED BY NASA GRC. MINOR DISCREPANCIES BETWEEN DRAWING AND ACTUAL FIELD CONDITIONS SHALL NOT BE CAUSE FOR ADDITIONAL PAYMENT. IT IS THE CONTRACTOR RESPONSIBILITY TO VERIFY EXISTING CONDITIONS, ELEVATIONS, AND DIMENSIONS PRIOR TO THE START OF CONSTRUCTION AND NOTIFY THE OWNER IF THERE IS A CONFLICT.

UTILITY CLEARANCE SHALL BE COORDINATED THROUGH THE DIGGING, TRENCHING, AND EXCAVATION PERMIT (CHAPTER 35 OF THE NASA PLUM BROOK STATION SAFETY MANUAL). NASA C-927 FORM, DIGGING AND EXCAVATION PERMIT, SHALL BE USED. THE CONTRACTOR SHALL INITIATE THE PERMIT PROCESS A MINIMUM OF 15 BUSINESS DAYS PRIOR TO IMPLEMENTATION. THE CONTRACTOR SHALL COORDINATE ALL WASTE MANAGEMENT ACTIVITIES WITH THE COTR, QAT, AND PLUM BROOK ENVIRONMENTAL OFFICER.

NASA TRAFFIC RULES SHALL BE STRICTLY ADHERED TO. SPEED LIMITS IS LIMITED TO 10 MILES PER HOUR (MPH) WHEN DRIVING THROUGH ANY GATE AND IN PARKING AREAS. THE SPEED LIMIT IS 35 MPH THROUGHOUT THE STATION.

LOCAL TRAFFIC SHALL BE MAINTAINED ON AT LEAST HALF OF THE ROADWAY WIDTH AT ALL TIMES.

NASA ROADS SHALL NOT BE BLOCKED WITHOUT PRIOR APPROVAL AT LEAST 15 DAYS IN ADVANCE.

THE CONTRACTOR SHALL ENSURE THAT LOADED TRUCKS DO NOT EXCEED ALLOWABLE WEIGHTS IN ACCORDANCE WITH DOT REGULATIONS. ALL TRUCKS SHALL BE WEIGHED EMPTY AND FULL AT A TRUCK SCALE, TO BE INDICATED BY THE NASA COTR. ALL LOADS SHALL BE COVERED PRIOR TO LEAVING THE WORK AREA. THE SUB-CONTRACTOR SHALL ALSO NOT ALLOW HAUL TRUCKS TO TRACK SOIL OUT OF THE WORK AREA.

WASTE MANAGEMENT AND ENVIRONMENTAL:

EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO INITIATION OF ANY CONSTRUCTION ACTIVITY THAT MAY CAUSE EROSION OR SEDIMENTATION. EROSION CONTROL MEASURES SHALL BE MAINTAINED, REPAIRED, AND REINSTALLED AS NECESSARY THROUGHOUT THE DURATION OF CONSTRUCTION AND RESTORATION ACTIVITIES.

IF UNEXPECTED MATERIALS ARE DISCOVERED DURING DEMOLITION ACTIVITIES, THE CONTRACTOR SHALL STOP WORK IMMEDIATELY AND NOTIFY THE NASA CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE (COTR). THE CONTRACTOR SHALL NOT RESUME WORK UNTIL APPROVAL IS GRANTED BY THE COTR WITH CONCURRENCE FROM APPROPRIATE SAFETY, HEALTH, ENVIRONMENTAL, AND FACILITIES DEPARTMENT'S REPRESENTATIVES.

DURING INSTANCES OF HIGH WINDS, WHICH RESULT IN VISIBLE DUST, NASA RESERVES THE RIGHT TO REQUIRE ADDITIONAL DUST CONTROL OR TO STOP WORK. THE CONTRACTOR SHALL BE REQUIRED TO ALLOW FOR DELAYS WITHOUT ADDITIONAL CHARGES TO NASA GRC. THE CONTRACTOR SHALL CONTROL DUST AT ALL TIMES.

THE CONTRACTOR IS RESPONSIBLE FOR IMMEDIATELY REMOVING ANY DEMOLITION MATERIAL INCIDENTALLY SPILLED ON THE ROADWAY DURING THE REMOVAL AND TRANSPORTATION ACTIVITIES.

THE CONTRACTOR SHALL COORDINATE ALL WASTE MANAGEMENT ACTIVITIES WITH THE COTR, QAT AND PLUM BROOK ENVIRONMENTAL OFFICER. WASTE HANDLING AND DISPOSAL ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH APPLICABLE STATE AND FEDERAL REGULATIONS FOR WASTE MATERIAL. NASA WM WILL BE GIVEN 1 MONTH'S NOTICE FOR WASTE SHIPPING.

ALL DEMOLITION DEBRIS NOT SCHEDULED FOR RECYCLING SHALL BE DISPOSED AT A LANDFILL APPROVED BY THE PLUM BROOK ENVIRONMENTAL OFFICER.

ALL HAUL TRUCKS TRAVELING ON PUBLIC ROADS SHALL HAVE A BILL OF LADING OR MANIFEST SIGNED BY THE APPROPRIATE NASA PLUM BROOK PERSONNEL. BILLS OF LADING AND MANIFESTS MUST BE COORDINATED WITH WM 1 MONTH PRIOR TO SHIPPING.

IF THE CONTRACTOR STORES FUEL ON SITE, THAT FUEL SHALL BE STORED WITHIN A DOUBLE CONTAINMENT VESSEL MANUFACTURED FOR FUEL STORAGE. PLASTIC LINED STRUCTURES ARE NOT ACCEPTABLE FOR THE DOUBLE CONTAINMENT. FUEL STORAGE SHALL COMPLY WITH CHAPTER 31 OF THE NASA GRC SAFETY MANUAL AND NASA TECHNICAL STANDARD 8719.11.

ALL FLAKING, LOOSE, OR PEELING PAINT IDENTIFIED AS LBP SHALL BE REMOVED PRIOR TO DEMOLITION ACTIVITIES, IN ACCORDANCE WITH SPECIFICATION 02 83 00.98. HOT WORK ON SURFACES IDENTIFIED AS LBP IS PROHIBITED.

WASTE MANAGEMENT AND RECYCLING; ALL MATERIALS LEAVING GOVERNMENT PROPERTY FOR RECYCLING OR DISPOSAL SHALL BE COORDINATED WITH NASA WASTE MANAGEMENT IN ACCORDANCE WITH SPECIFICATION 01 35 43.98 ENVIRONMENTAL PROTECTION PROCEDURES. THE CONTRACTOR MUST OBTAIN THE PROPER MANIFESTS AND PROPERTY PASSES AND MUST HAVE APPROVAL FROM NASA BEFORE ANY MATERIAL LEAVES THE PROPERTY. ALL EMERGENCY AND EXIT LIGHT BATTERIES SHALL BE COLLECTED AND TURNED OVER TO NASA WASTE MANAGEMENT FOR RECYCLING OR DISPOSAL. ALL FLUORESCENT AND INCANDESCENT LIGHT BULBS AND LIGHT BALLASTS SHALL BE PROPERLY PACKAGED AND TURNED OVER TO NASA WM FOR RECYCLING OR DISPOSAL.

THE CONTRACTOR SHALL COMPLETELY CLEAN THE SITE OF ANY DEBRIS, BUILDING MATERIAL, PAINT CHIPS, OR OTHER MATERIALS PRIOR TO START OF STRUCTURAL REHABILITATION AND AFTER ALL CONSTRUCTION IS COMPLETE. ALL MATERIALS ARE TO BE PROPERLY CHARACTERIZED AND DISPOSED OF.

WASTE MANAGEMENT AND ENVIRONMENTAL, CONT.:

THE CONTRACTOR SHALL PROVIDE ALL NECESSARY STORM WATER POLLUTION PREVENTION CONTROL MEASURES TO PREVENT SEDIMENT AND SPILLS FROM ENTERING THE STORM SEWER SYSTEM. THE CONTRACTOR SHALL PROTECT ALL INLET BASINS THAT MAY RECEIVE SEDIMENT OF SPILLS.

THE CONTRACTOR SHALL INSURE THAT NO DIRECT DISCHARGE FROM A CONCRETE TRUCK IS PERMITTED TO DISCHARGE INTO THE STORM SEWER SYSTEM. THE CONTRACTOR SHALL COORDINATE WITH NASA FOR THE DISCHARGE FROM CONCRETE TRUCKS.

SAFETY:

THE CONTRACTOR RESPONSIBLE FOR IMPLEMENTING CONSTRUCTION ACTIVITIES IS REQUIRED TO PREPARE A SPECIFIC HEALTH AND SAFETY PLAN (HASP) IN ACCORDANCE WITH NASA PLUMBROOK POLICY AND OSHA GUIDELINES. THE SITE SPECIFIC HASP SHALL BE SUBMITTED AT LEAST 45 BUSINESS DAYS PRIOR TO INITIATION OF ANY REHABILITATION-RELATED ACTIVITIES. THE SITE SPECIFIC HASP SHALL BE REVIEWED AND ACCEPTED BY NASA PRIOR TO INITIATION OF ANY REHABILITATION ACTIVITIES. A FALL PROTECTION FORM (C-979) SHALL BE SUBMITTED WITH THE HEALTH AND SAFETY PLAN WHEN WORK IS TO BE PERFORMED ON ANY SURFACE 6 FEET OR MORE ABOVE GRADE. THE CONTRACTOR SHALL HAVE A FULL TIME SITE SAFETY OFFICER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEDERAL, STATE, NASA AND LOCAL HEALTH AND SAFETY REQUIREMENTS FOR THE PROTECTION OF ALL PERSONS (INCLUDING EMPLOYEES) AND PROPERTY. IT IS ALSO THE CONTRACTOR'S RESPONSIBILITY TO INITIATE, MAINTAIN, AND SUPERVISE ALL HEALTH AND SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE PROPOSED WORK. ALL CONTRACTOR EMPLOYEES WORKING ON-SITE MUST ATTEND DAILY HEALTH AND SAFETY TAILGATE MEETINGS PRIOR TO THE START OF THE DAY'S CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL HAVE DAILY DOCUMENTED SITE SAFETY INSPECTIONS.

LOCKOUT/TAGOUT PROCEDURES SHALL FOLLOW NASA POLICY AND COMPLY WITH OSHA REQUIREMENTS.

ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH THE MOST CURRENT EDITION OF THE NATIONAL ELECTRIC CODE AND NASA SAFETY MANUAL, CHAPTER 8.

CUTTING AND WELDING SHALL FOLLOW NASA POLICY AND COMPLY WITH OSHA REQUIREMENTS. NASA POLICY REQUIRES THE CONTRACTOR TO OBTAIN A HOT WORKS PERMIT IN ACCORDANCE WITH CHAPTER 28 OF THE NASA SAFETY MANUAL.

THE CONTRACTOR SHALL PROVIDE TEMPORARY SANITARY FACILITIES AND SHALL CLEAN AND MAINTAIN THESE FACILITIES AND ENCLOSURES. TEMPORARY FACILITIES SHALL BE REMOVED FROM THE SITE AT THE COMPLETION OF WORK. THE CONTRACTOR SHALL PROVIDE REST AREA AND EMERGENCY AID MATERIALS FOR PROJECT WORKERS. CONTRACTOR'S EMPLOYEES MAY SMOKE ONLY WITHIN THE DESIGNATED AREA OF THE CONTRACTOR STAGING AREA.

COOLING TOWER SHUTDOWN:

THE CONTRACTOR SHALL ADHERE TO THE CONSTRUCTION IMPLEMENTATION PLAN, SPECIFICALLY ANY COOLING TOWER OUTAGES SHALL BE COORDINATED WITH THE FACILITY MANAGERS AND SHUT DOWN PERIODS.

DESIGN SPECIFICATIONS:

ALL DIVISIONS OF THE SPECIFICATION BOOK SHALL APPLY TO THE BASE BID. SPECIFIC SPECIFICATIONS RELEVANT TO WORK IN THE BASE BID ARE LISTED IN THE GENERAL SUMMARY TABLE.

NOTIFICATION/PERMIT REQUIREMENTS:

NASA PLUM BROOK AREA CLEARANCES FOR UTILITY DISCONNECTS.

CONFINED SPACE ENTRY PERMIT REQUIRED FOR ALL CONFINED SPACES.

DIGGING AND TRENCHING EXCAVATION PERMIT (NASA C-927).

HOT WORKS PERMIT.

LIST OF REFERENCES:

THE NASA SPF ENVIRONMENTAL MANAGEMENT MANUAL, OCCUPATIONAL HEALTH MANUAL, AND THE SAFETY MANUAL WERE PREPARED BY NASA GRC AND COVER THE PLUM BROOK FACILITY.

LIST OF SUBMITTALS:

- 1. SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)/QUALITY ASSURANCE PLAN (QAP)
2. ENVIRONMENTAL PROTECTION PLAN
3. ENVIRONMENTAL COMPLIANCE PLAN
4. DIRT AND DUST CONTROL PLAN
5. DEMOLITION WORK PLAN
6. IMPLEMENTATION PLAN AND SCHEDULE
7. IDENTIFY ALL DISPOSAL SITES (E.G. C&D, SOLID WASTE, ACM RECYCLABLES, HAZARDOUS WASTE LBP, ETC.) UTILIZING THE "FACILITY AND TRANSPORTER REQUEST FORM"
8. WASTE PROFILES AND DRAFT MANIFESTS

STEEL BOLLARDS

GENERAL: MOUNT ALL BOLLARD SLEEVES FLUSH WITH THE ROADWAY PAVEMENT.

CONCRETE ENCASUREMENT: SLEEVE ENCASEMENT SHALL BE SQUARE AS SHOWN, IN CONCRETE PAVEMENT, BUT MAY BE SQUARE OR ROUND IN FLEXIBLE PAVEMENT. ROUND ENCASEMENT SHOULD BE 1'-0" DIAMETER.

PREFORMED EXPANSION JOINT FILLER: JOINT FILLER IS REQUIRED WHEN BOLLARDS ARE SET IN CONCRETE PAVEMENT. THE JOINT SEAL SHALL CONFORM TO ASTM D 2628. THE NASA COTR WILL APPROVE THE DESIGN OF THE FILLER PRIOR TO INSTALLATION. THE NASA COTR MAY INSPECT THE JOINTS AND REQUEST SAMPLES. IF SAMPLED, PROVIDE A MINIMUM OF 3 FEET WITH ALL MANUFACTURER'S MARKINGS. ENSURE THE MARKINGS ARE EVERY 1 FOOT. IF LUBRICANTS ARE NEEDED, USE LUBRICANTS RECOMMENDED BY THE MANUFACTURER TO INSTALL SEALS.

STEEL PIPE: ASTM A 53 SCHEDULE 40

CONCRETE: USE CLASS 3A CONCRETE AS SPECIFIED IN SPECIFICATIONS SECTION 03 30 00.

REFLECTIVE SHEETING: FURNISH SHEETING ACCORDING TO ASTM D 4956, TYPE IV. THE SHEETING SHALL BE DESIGNED TO RETAIN AT LEAST 80 PERCENT OF THE INITIAL MINIMUM COEFFICIENTS OF RETROREFLECTION FOR THE EFFECTIVE PERFORMANCE LIFE OF 10 YEARS. DURING THE PERFORMANCE LIFE, THE SHEETING SHALL BE DESIGNED TO RETAIN THE MINIMUM SPECIFIC INTENSITY PER UNIT AREA, AND MUST BE FREE FROM WRINKLES, BLISTERS, ALLIGATORING, PEELING, CRACKING, FADING, SHRINKING, DISCOLORING AND DELAMINATION, AND ANY OTHER FAILURE WHICH IN THE OPINION OF NASA RENDERS IT UNSUITABLE FOR USE.

ALL MEASURES OF SPECIFIC INTENSITY PER UNIT AREA SHALL BE MADE IN ACCORDANCE WITH ASTM E 810. MEASUREMENTS SHALL BE TAKEN AT OBSERVATION AND ENTRANCE ANGLES OF 0.2 DEGREES AND -4 DEGREES, RESPECTIVELY. MEASUREMENTS SHALL BE MADE AFTER THE SIGN IS CLEANED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

GALVANIZING: AFTER FABRICATING, HOT-DIP GALVANIZE ALL STEEL PARTS, INCLUDING STEEL PIPE, AS SPECIFIED IN ASTM A 123.

ALUMINUM: ALL STEEL COMPONENTS MAY BE REPLACED BY ALUMINUM COMPONENTS MEETING THE FOLLOWING ASTM SPECIFICATIONS: B 209 (PLATE), B 210 OR B 241 (DRAWN SEAMLESS TUBES & PLATES), B 211 (RODS), AND F 901 (BOLTS).

PERMANENT BOLLARDS: PERMANENT BOLLARDS SHALL BE THE SAME AS REMOVABLE BOLLARDS, EXCEPT THAT THE STEEL PLATES, SLEEVES AND LIFTING HANDLES SHALL BE OMITTED. ENCASE POSTS DIRECTLY IN CONCRETE

MATERIALS: IN ORDER TO ENSURE THAT THE BOLLARD STAYS PLUMB AND IN PLACE, MAKE THE FITTINGS AS TIGHT AS POSSIBLE. HOT-DIP GALVANIZE ANY HARDWARE AND STEEL USED FOR THE BOLLARD. PRESSURE TREAT PER THE FOLLOWING:

GENERAL SUMMARY

Table with columns: DESCRIPTION, TOTAL PRICE, UNIT, SHEET NUMBERS, RELEVANT SPECS. Includes rows for OPTION 1, OPTION 2, and various drawing numbers like PE-1411-COF14901-GI-001.

PIPING:

GRAY IRON PIPE AND FITTINGS WILL NOT BE PERMITTED.

ALL NEW VALVES WITHIN NASA PROPERTY SHALL OPEN BY TURNING COUNTER-CLOCKWISE. VALVES SHALL BE SAME SIZE AS THE WATER PIPE. ALL VALVE BOXES SHALL BE INSTALLED FLUSH WITH GRADE.

THE MAXIMUM TRENCH OPENING SHALL NOT EXCEED 500 LINEAL FEET USING TRADITIONAL EXCAVATION METHODS OR 1000 FEET USING A TRENCHER. WHERE ACCESS TO DRIVES AND PARKING LOTS IS HINDERED OR BLOCKED FOR AN EXTENDED PERIOD OF TIME, THE CONTRACTOR SHALL PROVIDE TEMPORARY ACCESS USING COMPACTED GRAVEL OR OTHER APPROVED METHOD.

INSTALLATION, PRESSURE TESTING AND DISINFECTION PROCEDURES MUST MEET OR EXCEED AWWA STANDARDS C600 AND C651.

PIPE SHALL BE DEFLECTED OR FITTINGS SHALL BE PROVIDED TO MAINTAIN HORIZONTAL ALIGNMENT SHOWN. DEFLECTIONS ARE TO BE IN ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS OR AS NOTED ON THE DETAILED PLANS. IF THE CONTRACTOR CHOOSES TO USE FITTINGS TO OBTAIN THE ALIGNMENT SHOWN, IT SHALL BE DONE AT THE CONTRACTOR'S EXPENSE.

ALL PIPE SHALL BE DUCTILE IRON PIPE SIZE. ALL DUCTILE IRON PIPE SHALL BE CLASS 52 AS CALLED FOR IN THE PLANS AND MATCH OUTER DIMENSIONS.

ABANDONED WATERLINE ENDS SHALL BE PLUGGED, AND BLOCKED (SHORED) AS NECESSARY.

NOTE:

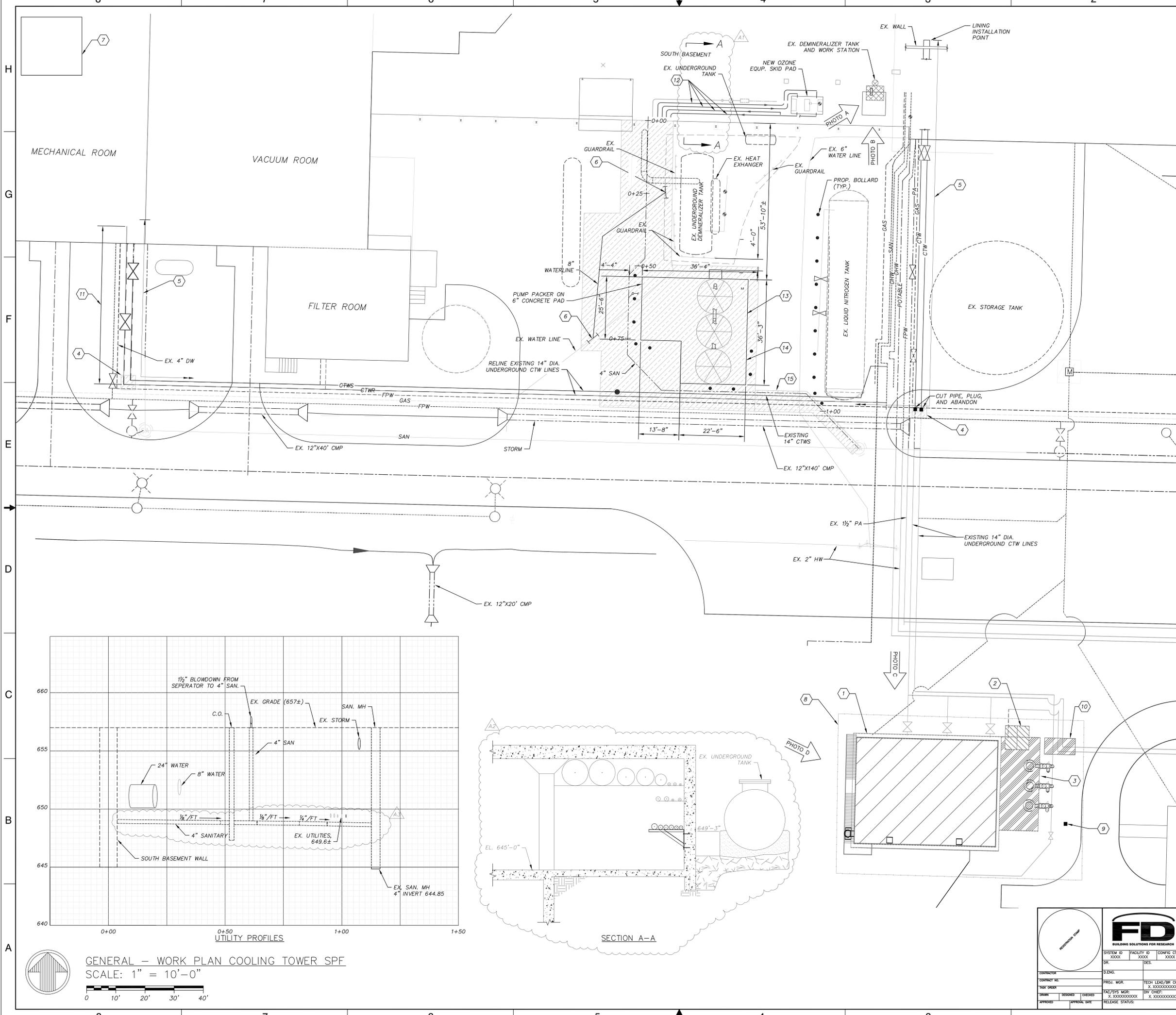
SEE DRAWING PE-1411-COF14901-GI-001 FOR DRAWING INDEX.



NASA COOLING TOWER REHABILITATIONS
GENERAL NOTES
SIZE: BLDG/SYS PROJECT ID: DISC TYP SEQ
PE 1411 - COF14901 - GI 002

Table with columns: CHG, NUM, DESCRIPTION, APP DATE. Includes revision history and drawing information.

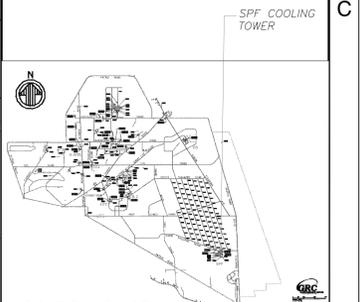
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- NOTES:**
- SEE DRAWING PE-1411-COF14901-GI-001 FOR DRAWING INDEX.
 - SEE DRAWING PE-1411-COF14901-GR-901 FOR THE PHOTOGRAPHS.
 - SEE DRAWING PE-1411-COF14901-MS-101 FOR A PARTIAL ELECTRICAL SITE PLAN.
 - SEE DRAWING PE-1411-COF14901-ES-101 FOR A PARTIAL ELECTRICAL SITE PLAN.

- KEY NOTES:**
- DEMOLISH EXISTING COOLING TOWER (CONCRETE BASIN TO REMAIN)
 - DEMOLISH EXISTING COOLING TOWER CONTROL OUTPOST.
 - DEMOLISH EXISTING COOLING TOWER PUMP PAD AND BACKFILL BASIN TO GRADE
 - LINING INSTALLATION POINT. EXCAVATE AND/OR SHORE AREA TO REMOVE PIPE BENDS TO INSTALL LINING. REATTACH PIPE BENDS AND BACKFILL AFTER WORK IS COMPLETE. INSTALL REPLACEMENT CONCRETE AND PAVING TO MATCH EXISTING CONDITIONS AS NECESSARY.
 - RELINE EXISTING 14" UNDERGROUND COOLING TOWER WATER LINES FROM FLANGE DISCONNECT POINT.
 - CUT, PLUG AND ABANDON EXISTING WATER LINE AND REROUTE AROUND PROPOSED PUMP FOUNDATION PAD AND 4" SANITARY LINE.
 - REMOVE EXISTING ROOF MOUNTED COOLING TOWER (CT-27-2) AND ALL ELECTRICAL CONNECTIONS (SEE PE-1411-COF14901-ES101). AFTER CONSTRUCTION OF THE NEW COOLING TOWER AND PROVIDE METAL GAGE DECKING (1 1/2" WIDE RIB ROOF DECK TYPE 20, FY = 33 KSI OR EQUAL). INSTALL ROOF MEMBRANE AND FORM TO SEAL AND MATCH EXISTING ROOF. SEE GENERAL DETAIL ON SHEET PE-1411-COF14901-CD-701.
 - REMOVE FENCE.
 - CUT AND PLUG 8" MAKE-UP WATER LINE.
 - REMOVE ELECTRICAL CONNECTIONS TO SUMP PUMP AND EXISTING BUTTERFLY VALVE.
 - RELINE EXISTING 14" UNDERGROUND COOLING TOWER WATER LINES TO INSIDE BUILDING ENVELOPE OF MECHANICAL ROOM.
 - INSTALL WATERLINES ON SOUTH BASEMENT USING EXISTING CONCRETE JOISTS FOR NEW BRACKETS. SEE M-401 FOR MECHANICAL PIPING DETAILS.
 - BID OPTIONS 1 - TWO COOLING TOWER CELLS
 - BID OPTIONS 2 - ONE ADDITIONAL COOLING TOWER CELL
 - SLOPE 4" SANITARY AT 1/8" PER FOOT

- LEGEND:**
- TO BE REMOVED
 - LIMITS OF EXCAVATION FOR CONSTRUCTION
 - DEMOLISH COOLING TOWER CONTROL OUTPOST
 - REMOVE DEMINERALIZER AND WORK STATION
 - BACKFILL BASIN TO GRADE WITH GRANULAR BACKFILL



CHG	NUM	DESCRIPTION	APP/DATE
A	3	UTILITY ELEVATIONS ADJUSTED	03/12/12
A	2	SECTION A-A ADDED	03/12/12
A	1	SECTION ARROWS ADDED TO PLAN VIEW	03/12/12

CAD DRAWING - DO NOT REVISE MANUALLY

NASA COOLING TOWER REHABILITATIONS

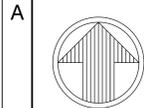
COOLING TOWER SPF GENERAL PLAN

SYSTEM ID: 1411-0000 FACILITY ID: 1411-0000 CONFIG CTRL: 1411-0000

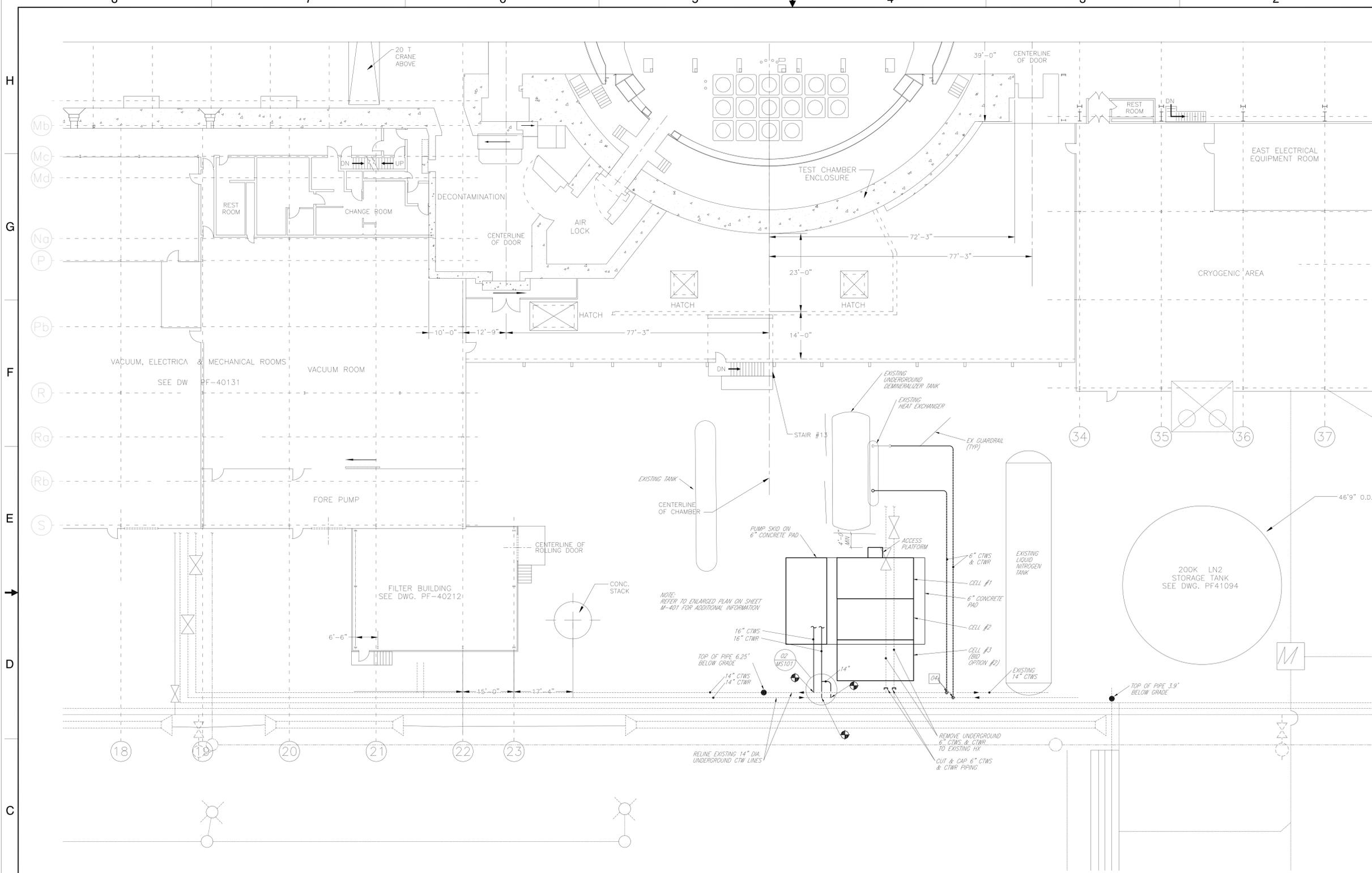
CONTRACTOR: [] D.ENG. [] PROJ. MGR. [] TECH LEAD/BR CH [] TASK ORDER []

SCALE: XXXX PROJECT ID: DISC TYP SEQ: PE 1411 - COF14901 - GI 101 SHEET 01 OF 01

GENERAL - WORK PLAN COOLING TOWER SPF
 SCALE: 1" = 10'-0"



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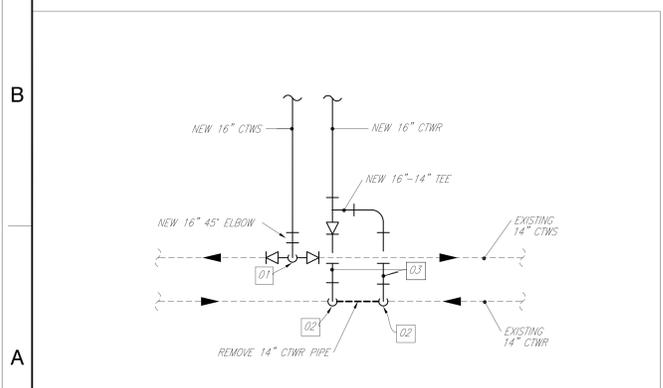


DRAWING NOTES
 A. FOR LIST OF REFERENCE DRAWINGS SEE SHEET COF-14901-M-001.

- DRAWING NOTES**
- 01 CUT OUT SECTION OF EXISTING 14" CTWS PIPING AND INSERT 16" TEE AND 16"-14" REDUCERS.
 - 02 CONNECT NEW 14" CTWR TO EXISTING 14" CTWR WITH 90° ELBOW.
 - 03 NEW 14" CTWR 45° ELBOW.
 - 04 PROVIDE NEW 14"-6" TEE & 45° 6" ELBOW (TYP OF 2)

LEGEND

— NEW WORK
 - - - - - EXISTING WORK



GENERAL - WORK PLAN COOLING TOWER SPF
 SCALE: 1" = 10'-0"



CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	EDMS REVISION	TECH LEAD:	FAC-SYS MGR:
		N. NNNNNNNNNN	N. NNNNNNNNNN
		MMDD/YYYY	MMDD/YYYY

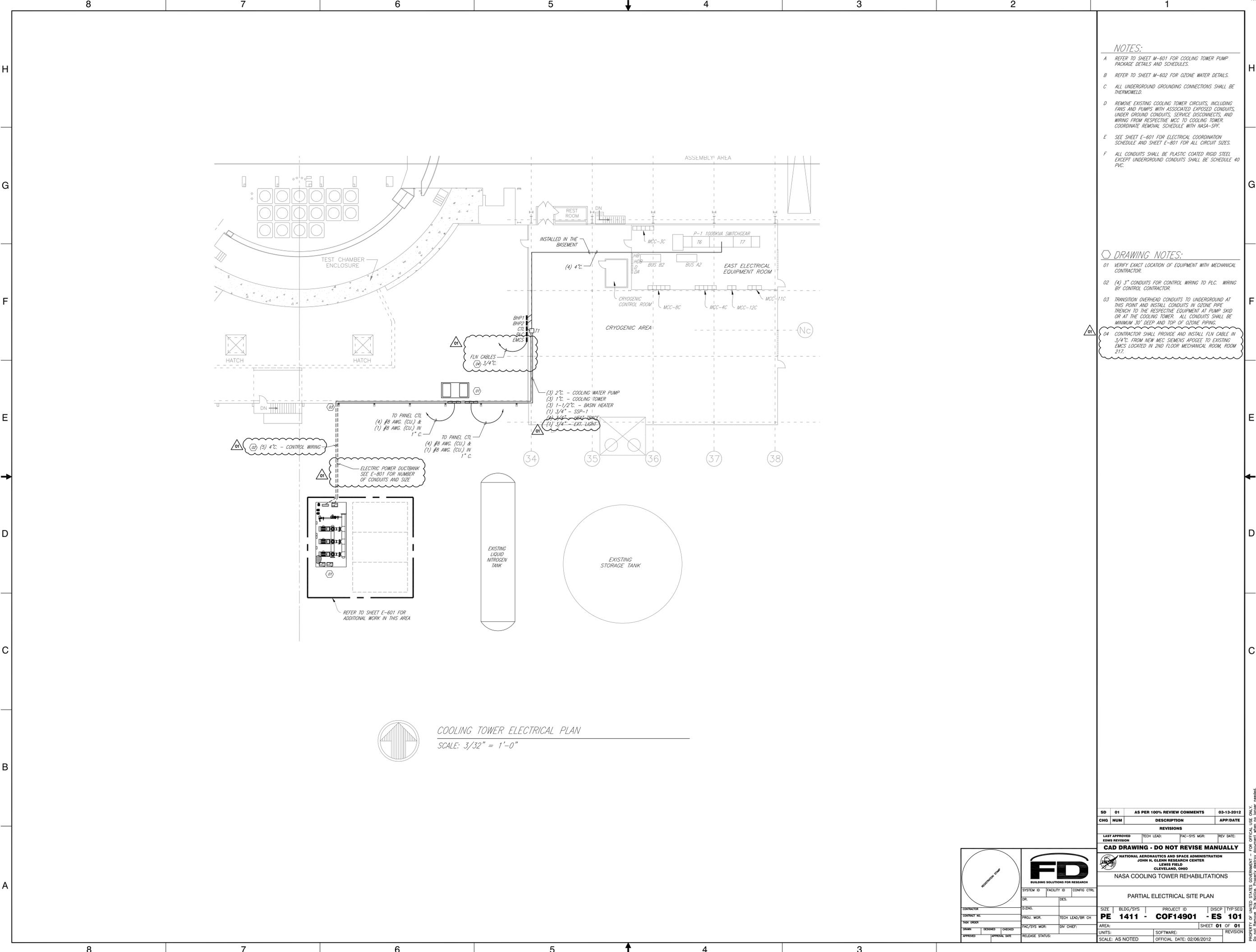
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 JOHN H. GLENN RESEARCH CENTER
 LEWIS FIELD
 CLEVELAND, OHIO

NASA COOLING TOWER REHABILITATIONS
 COOLING TOWER
 SITE PLAN

FD BUILDING SOLUTIONS FOR RESEARCH	
CONTRACTOR:	DR.:
DESIGN:	DES.:
PROJ. MGR.:	TECH LEAD/BR CH.:
FAC/SYS MGR.:	OW CHIEF:
APPROVED:	APPROVAL DATE:
RELEASE STATUS:	

SIZE:	BLDG/SYS:	PROJECT ID:	DISC:	TYP/SEQ:
PE 1411	COF14901	MS 101		
AREA:		SHEET:	01	OF 01
UNITS: ENGLISH	SOFTWARE: AUTOCAD 2008	REVISION:		
SCALE: NTS	OFFICIAL DATE: 02/06/2012			



- NOTES:**
- A REFER TO SHEET M-601 FOR COOLING TOWER PUMP PACKAGE DETAILS AND SCHEDULES.
 - B REFER TO SHEET M-602 FOR OZONE WATER DETAILS.
 - C ALL UNDERGROUND GROUNDING CONNECTIONS SHALL BE THERMOWELDED.
 - D REMOVE EXISTING COOLING TOWER CIRCUITS, INCLUDING FANS AND PUMPS WITH ASSOCIATED EXPOSED CONDUITS, UNDERGROUND CONDUITS, SERVICE DISCONNECTS, AND WIRING FROM RESPECTIVE MCC TO COOLING TOWER. COORDINATE REMOVAL SCHEDULE WITH NASA-SPE.
 - E SEE SHEET E-601 FOR ELECTRICAL COORDINATION SCHEDULE AND SHEET E-601 FOR ALL CIRCUIT SIZES.
 - F ALL CONDUITS SHALL BE PLASTIC COATED RIGID STEEL EXCEPT UNDERGROUND CONDUITS SHALL BE SCHEDULE 40 PVC.

- DRAWING NOTES:**
- 01 VERIFY EXACT LOCATION OF EQUIPMENT WITH MECHANICAL CONTRACTOR.
 - 02 (4) 3" CONDUITS FOR CONTROL WIRING TO PLC. WIRING BY CONTROL CONTRACTOR.
 - 03 TRANSITION OVERHEAD CONDUITS TO UNDERGROUND AT THIS POINT AND INSTALL CONDUITS IN OZONE PIPE TRENCH TO THE RESPECTIVE EQUIPMENT AT PUMP SKID OR AT THE COOLING TOWER. ALL CONDUITS SHALL BE MINIMUM 30" DEEP AND TOP OF OZONE PIPING.
 - 04 CONTRACTOR SHALL PROVIDE AND INSTALL FLN CABLE IN 3/4" FROM NEW MEC SIEMENS APPOGEE TO EXISTING EMCS LOCATED IN 2ND FLOOR MECHANICAL ROOM, ROOM 217.

COOLING TOWER ELECTRICAL PLAN
 SCALE: 3/32" = 1'-0"

SD	01	AS PER 100% REVIEW COMMENTS	03-13-2012
CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD:	FAC-SYS MGR:	REV DATE:
EDMS REVISION			
CAD DRAWING - DO NOT REVISE MANUALLY			
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHN H. GLENN RESEARCH CENTER LEWIS FIELD CLEVELAND, OHIO NASA COOLING TOWER REHABILITATIONS			
PARTIAL ELECTRICAL SITE PLAN			
CONTRACTOR:	DR.	DES.	
CONTRACT NO.:	D.ENG.	DES.	
TASK ORDER:	PROJ. MGR.	TECH LEAD/BR CH	
DRAWN:	FAC/SYS MGR.	DIV CHIEF:	
APPROVED:	APPROVAL DATE:	RELEASE STATUS:	
SIZE:	BLDG/SYS	PROJECT ID	DISCP TYP SEQ
		PE 1411 - COF14901 - ES 101	
AREA:	UNITS:	SOFTWARE:	SHEET 01 OF 01
SCALE: AS NOTED	OFFICIAL DATE: 02/06/2012		REVISION

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NOTE:
SEE DRAWING PE-1411-COF14901-GI-001 FOR DRAWING INDEX.



USE EX. CONCRETE JOINTS FOR NEW WATERLINE SUPPORTS

REMOVE AND CAP SUPPLY HEADER

REMOVE PUMPS, CONDUIT AND STANDS ABOVE GRADE



REMOVE AND CAP FLANGE

REMOVE PIPING AND VALVES

CUT PIPING 6" TO THE WEST OF THE EXISTING SUPPORT

REMOVE TANK, ASSOCIATED PIPING AND WORK BENCH

MECHANICAL REMOVAL
N.T.S.

CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD	FAC-SYS MGR	REV DATE
EDMS REVISION	N.NNNNNNNNN	N.NNNNNNNNN	MMDD/YYYY
CAD DRAWING - DO NOT REVISE MANUALLY			
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NASA COOLING TOWER REHABILITATIONS			
COOLING TOWER SPF MECHANICAL REMOVAL			
CONTRACT NO.	D.ENG.	SIZE	BLDG/SYS
TASK ORDER	PROJ. MGR.	TECH LEAD/BR CH	PROJECT ID
DRAWN	DESIGNED	DIRECTED	DISCIP
APPROVED	APPROVAL DATE	RELEASE STATUS	TYP SEQ
		AREA:	SHEET 01 OF 01
		UNITS: ENGLISH	SOFTWARE: AUTOCAD 2002
		SCALE: XXXX	OFFICIAL DATE: MMDD/YYYY
			REVISION

SYSTEM ID: XXXX FACILITY ID: XXXX CONGR. CTRL: XXXX

DR. DES.

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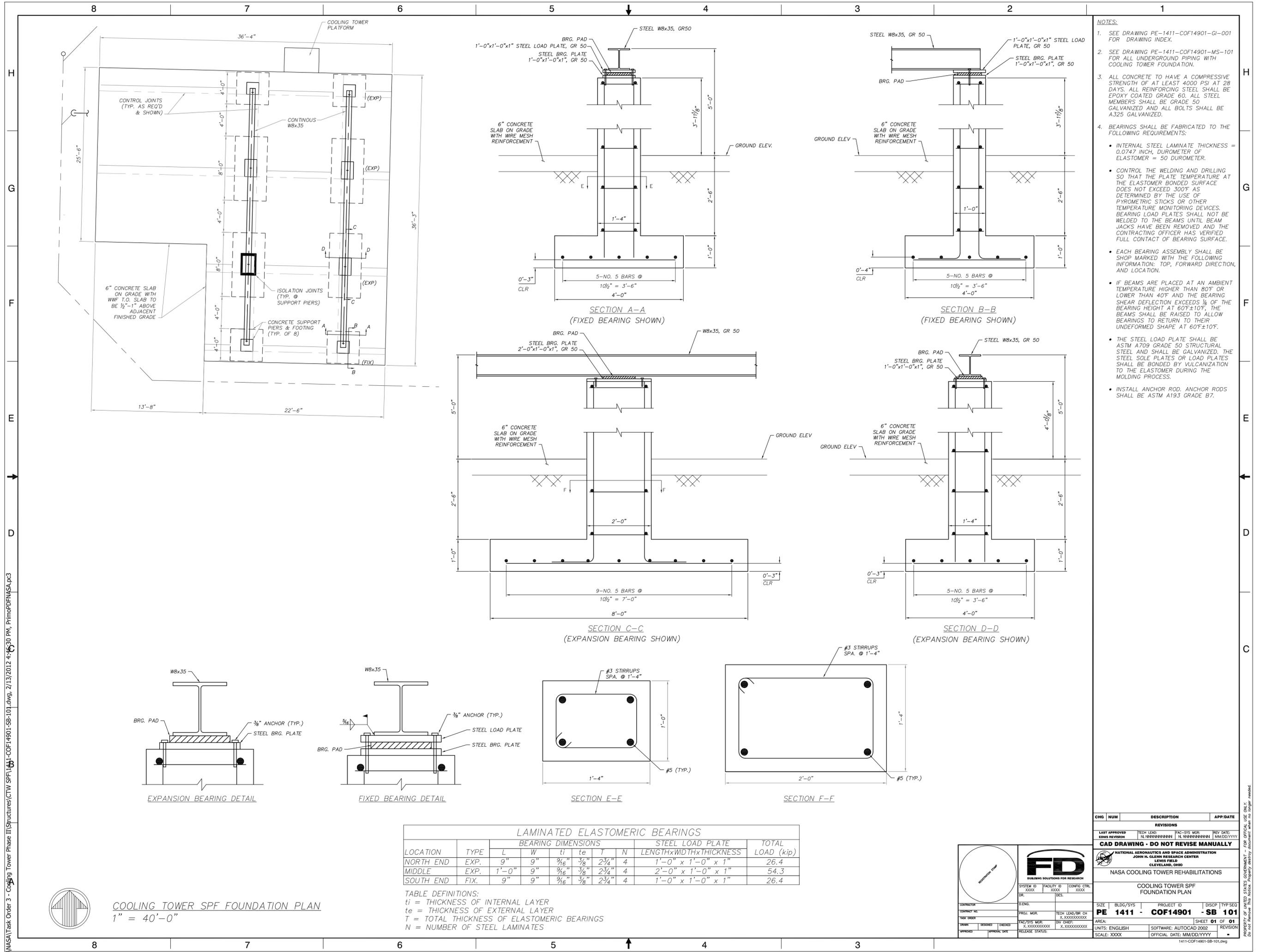
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- NOTES:**
- SEE DRAWING PE-1411-COF14901-GI-001 FOR DRAWING INDEX.
 - SEE DRAWING PE-1411-COF14901-MS-101 FOR ALL UNDERGROUND PIPING WITH COOLING TOWER FOUNDATION.
 - ALL CONCRETE TO HAVE A COMPRESSIVE STRENGTH OF AT LEAST 4000 PSI AT 28 DAYS. ALL REINFORCING STEEL SHALL BE EPOXY COATED GRADE 60. ALL STEEL MEMBERS SHALL BE GRADE 50 GALVANIZED AND ALL BOLTS SHALL BE A325 GALVANIZED.
 - BEARINGS SHALL BE FABRICATED TO THE FOLLOWING REQUIREMENTS:
 - INTERNAL STEEL LAMINATE THICKNESS = 0.0747 INCH, DUROMETER OF ELASTOMER = 50 DUROMETER.
 - CONTROL THE WELDING AND DRILLING SO THAT THE PLATE TEMPERATURE AT THE ELASTOMER BONDED SURFACE DOES NOT EXCEED 300°F AS DETERMINED BY THE USE OF PYROMETRIC STICKS OR OTHER TEMPERATURE MONITORING DEVICES. BEARING LOAD PLATES SHALL NOT BE WELDED TO THE BEAMS UNTIL BEAM JACKS HAVE BEEN REMOVED AND THE CONTRACTING OFFICER HAS VERIFIED FULL CONTACT OF BEARING SURFACE.
 - EACH BEARING ASSEMBLY SHALL BE SHOP MARKED WITH THE FOLLOWING INFORMATION: TOP, FORWARD DIRECTION, AND LOCATION.
 - IF BEAMS ARE PLACED AT AN AMBIENT TEMPERATURE HIGHER THAN 80°F OR LOWER THAN 40°F AND THE BEARING SHEAR DEFLECTION EXCEEDS 1/8 OF THE BEARING HEIGHT AT 60°F±10°F, THE BEAMS SHALL BE RAISED TO ALLOW BEARINGS TO RETURN TO THEIR UNDEFORMED SHAPE AT 60°F±10°F.
 - THE STEEL LOAD PLATE SHALL BE ASTM A709 GRADE 50 STRUCTURAL STEEL AND SHALL BE GALVANIZED. THE STEEL SOLE PLATES OR LOAD PLATES SHALL BE BONDED BY VULCANIZATION TO THE ELASTOMER DURING THE MOLDING PROCESS.
 - INSTALL ANCHOR ROD. ANCHOR RODS SHALL BE ASTM A193 GRADE B7.

LAMINATED ELASTOMERIC BEARINGS

LOCATION	TYPE	BEARING DIMENSIONS					STEEL LOAD PLATE LENGTHxWIDTHxTHICKNESS	TOTAL LOAD (kip)
		L	W	ti	te	T		
NORTH END	EXP.	9"	9"	3/16"	3/8"	2 3/4"	1'-0" x 1'-0" x 1"	26.4
MIDDLE	EXP.	1'-0"	9"	3/16"	3/8"	2 3/4"	2'-0" x 1'-0" x 1"	54.3
SOUTH END	FIX.	9"	9"	3/16"	3/8"	2 3/4"	1'-0" x 1'-0" x 1"	26.4

TABLE DEFINITIONS:
 ti = THICKNESS OF INTERNAL LAYER
 te = THICKNESS OF EXTERNAL LAYER
 T = TOTAL THICKNESS OF ELASTOMERIC BEARINGS
 N = NUMBER OF STEEL LAMINATES

COOLING TOWER SPF FOUNDATION PLAN
 1" = 40'-0"

CHG NUM	DESCRIPTION	APP/DATE

REVISIONS

LAST APPROVED	TECH LEAD	FAC-SYS MGR	REV DATE

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 LEWIS FIELD
 CLEVELAND, OHIO

NASA COOLING TOWER REHABILITATIONS

COOLING TOWER SPF FOUNDATION PLAN

SIZE	BLDG/SYS	PROJECT ID	DISCIP	TYP SEQ
PE 1411	COF14901	SB 101		

CONTRACT NO.	PROJ. MGR.	TECH LEAD/BR CH

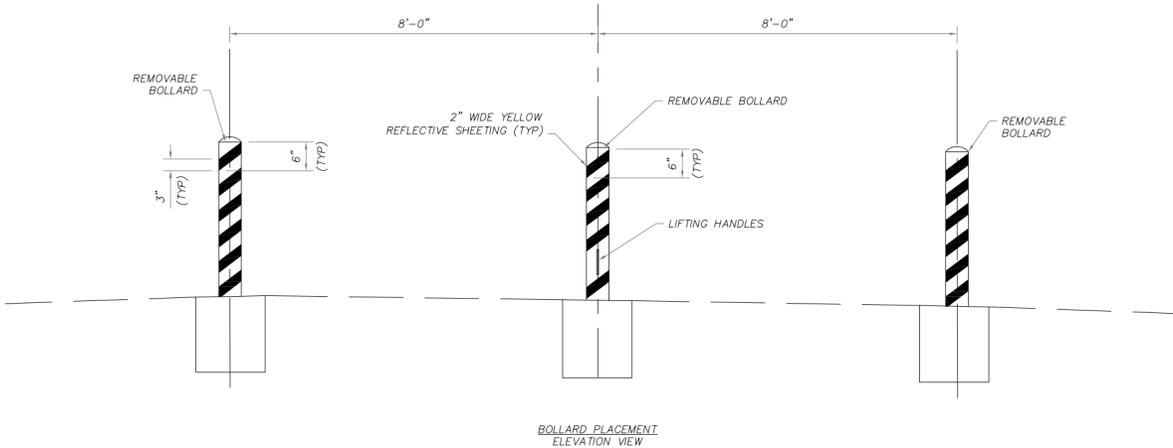
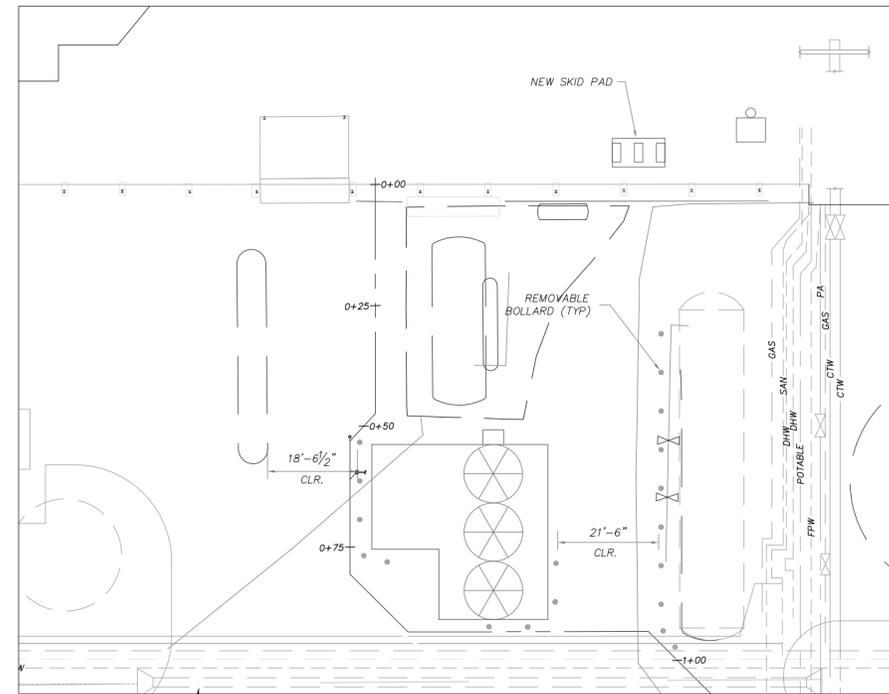
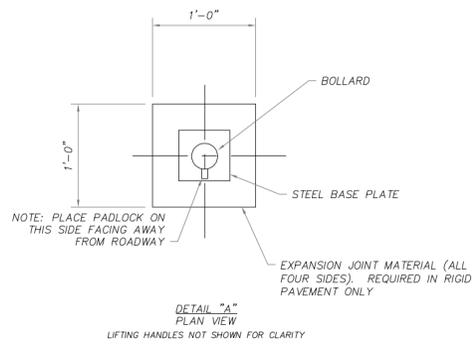
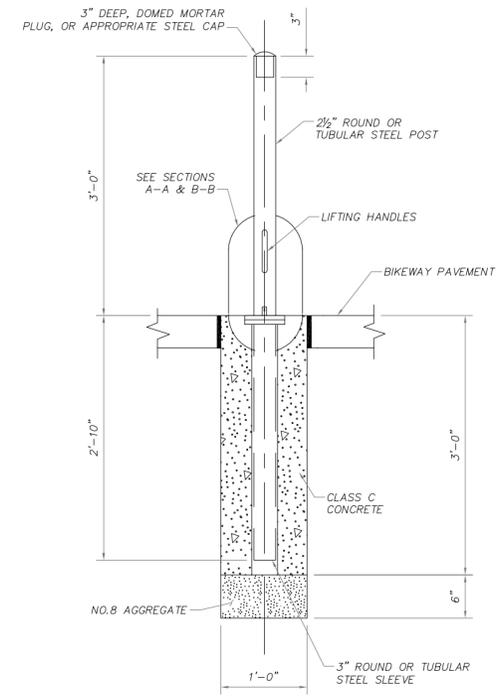
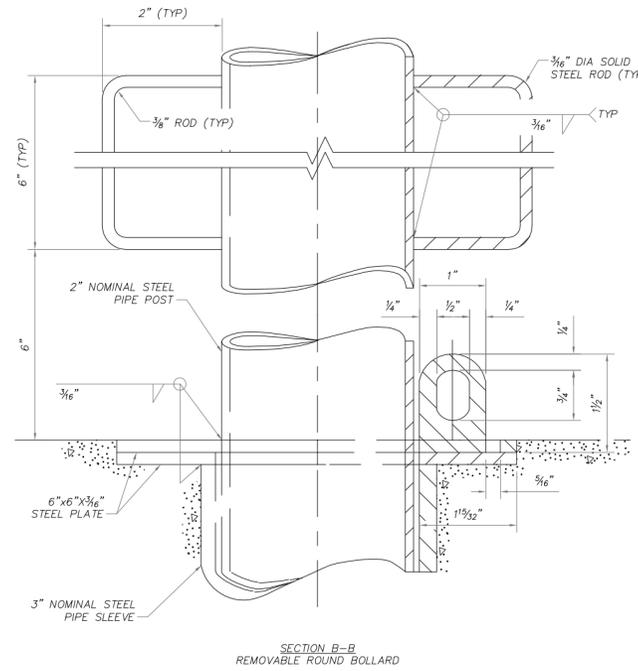
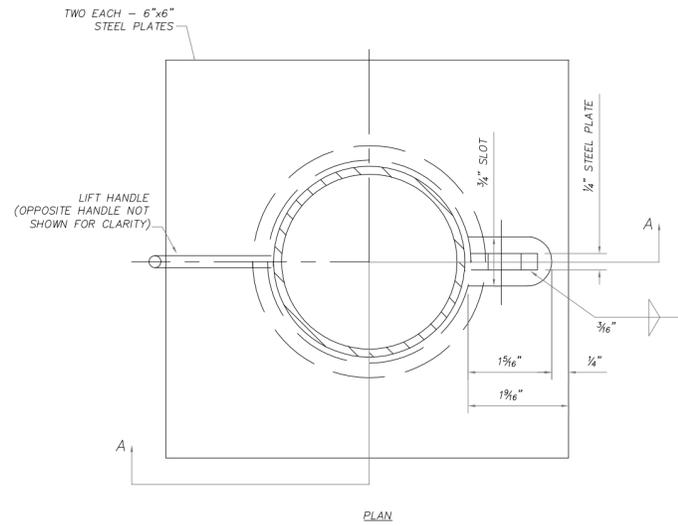
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APPROVED	APPROVAL DATE	RELEASE STATUS

SCALE: XXXX OFFICIAL DATE: MMDD/YYYY

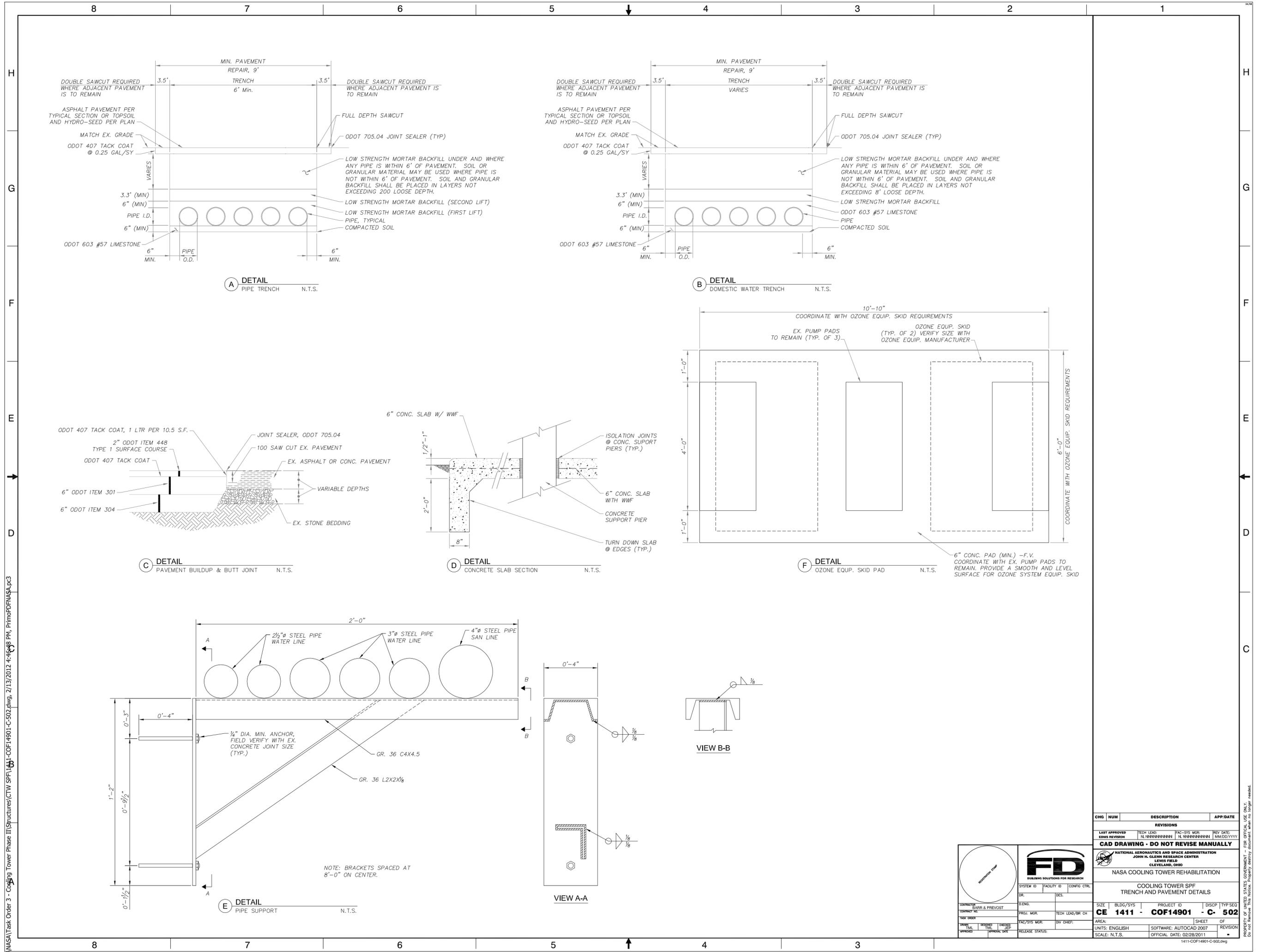
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CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
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EDMS REVISION	N.NNNNNNNNN	N.NNNNNNNNN	MMDDYYYY
CAD DRAWING - DO NOT REVISE MANUALLY			
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHN H. GLENN RESEARCH CENTER LEWIS FIELD CLEVELAND, OHIO			
NASA COOLING TOWER REHABILITATIONS			
COOLING TOWER SPF BOLLARD DETAILS			
SIZE	BLDG/SYS	PROJECT ID	DISC/TYP SEQ
PE 1411	-	COF14901	- C 501
AREA:	SHEET 01 OF 01		REVISION
UNITS: ENGLISH	SOFTWARE: AUTOCAD 2002	REVISION	
SCALE: XXXX	OFFICIAL DATE: MMDD/YYYY	REVISION	

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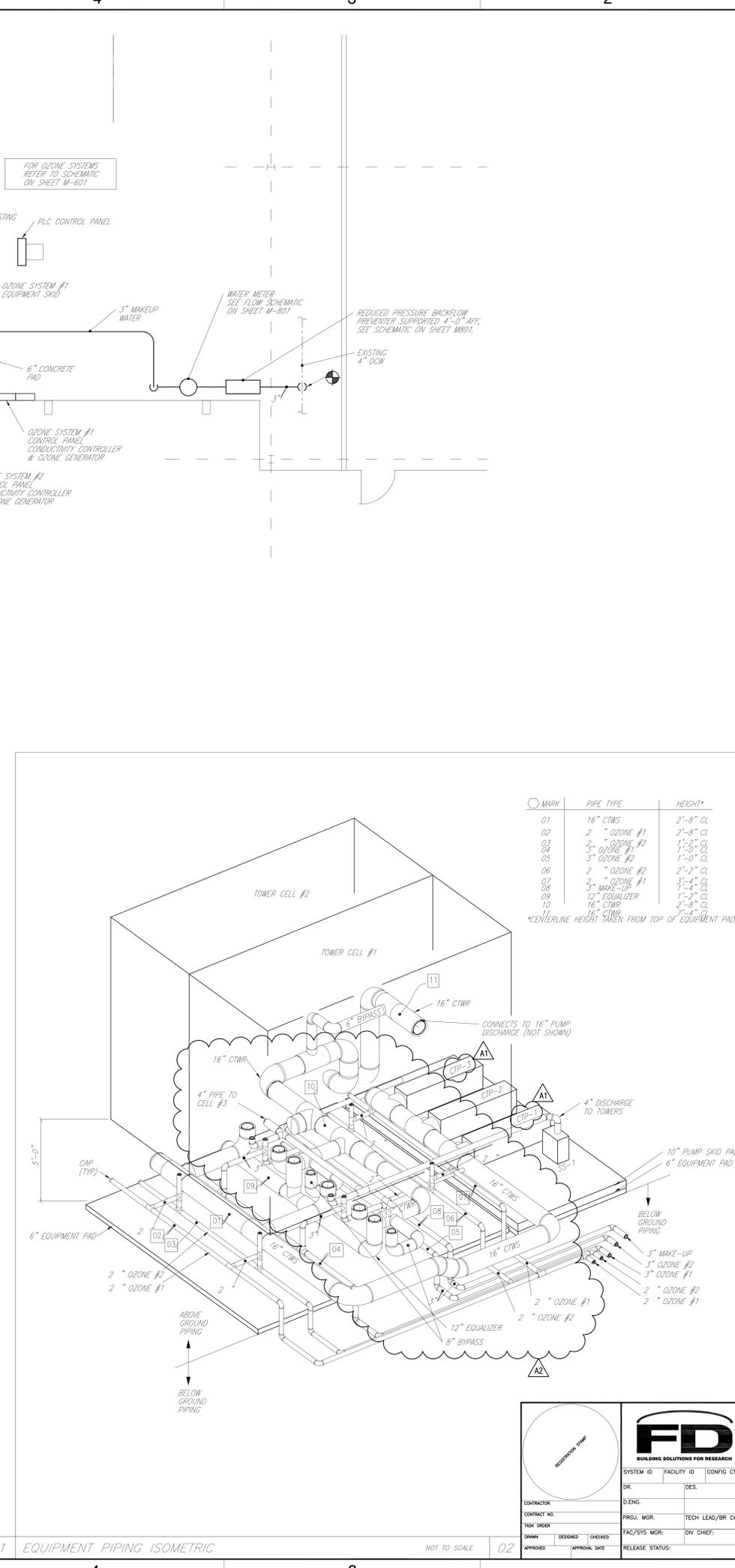
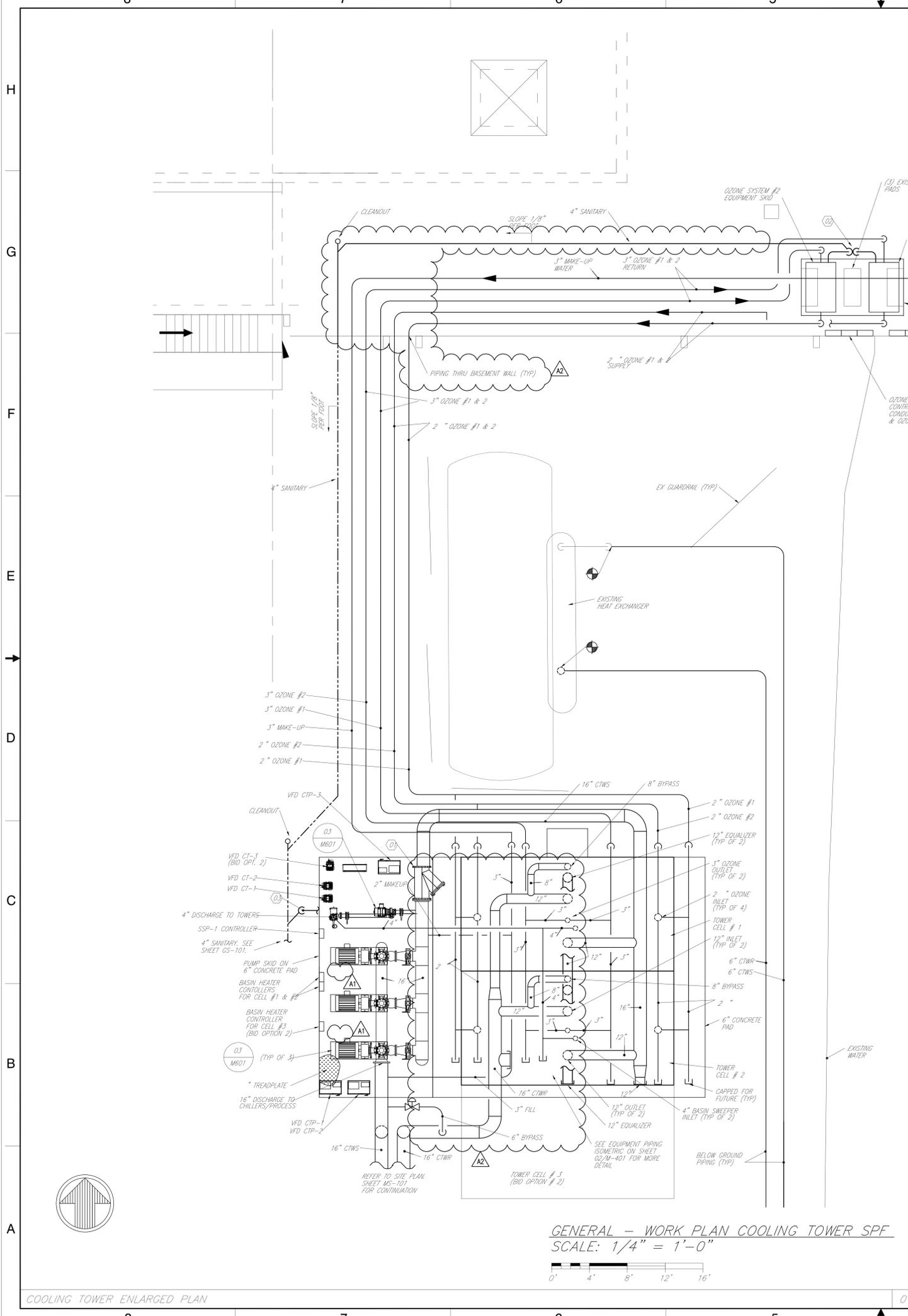


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CHG NUM	DESCRIPTION	APP/DATE
REVISIONS		
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EDMS REVISION	N.N.N.N.N.N.N.N.N.N	N.N.N.N.N.N.N.N.N.N
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NASA COOLING TOWER REHABILITATION		
COOLING TOWER SPF TRENCH AND PAVEMENT DETAILS		
SIZE	BLDG/SYS	PROJECT ID
DISC	TYP SEQ	
CE 1411 - COF14901 - C- 502		
AREA:	SHEET	OF
UNITS: ENGLISH	SOFTWARE: AUTOCAD 2007	REVISION
SCALE: N.T.S.	OFFICIAL DATE: 02/28/2011	

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GENERAL NOTES

- ALL VALVES ARE NOT SHOWN ON THIS DRAWING. REFER TO PIPING SCHEMATIC ON SHEET M-801.
- PROVIDE ELECTRIC HEAT TRACING FOR ALL COOLING TOWER WATER PIPING, MAKEUP WATER PIPING, SEPARATOR SYSTEM PIPING AND OZONE PIPING EXPOSED TO OUTSIDE. THIS INCLUDES VALVES, PUMPS, AND PIPING SPECIALTIES. THE BASIS OF DESIGN IS BRACHEM BTW-CT OR BTW-DR SELF REGULATING HEATING CABLE MANUFACTURED BY TYCO THERMAL CONTROLS. PROVIDE A MINIMUM OF (4) 30 AMP, 277 VOLT, SINGLE PHASE CIRCUITS.
- COOLING TOWER CELL #3 AND VFD FOR CELL #3 FAN WILL BE BID OPTION #2. ALL OTHER WORK IS BID OPTION #1.
- ALL UNDERGROUND PIPING SHALL HAVE A MINIMUM 3 FOOT COVER.
- PIPING AT THE COOLING TOWER SHALL BE SUPPORTED FROM CONCRETE PAD USING MSS TYPE #8 SUPPORTS AND OTHER HANGERS AND SUPPORTS AS REQUIRED.
- REFERENCE DRAWING PE-1411-COF14901-G1001 FOR SHEET INDEX.

DRAWING NOTES

- PROVIDE REQUIRED ACCESS TO MAINTAIN STRAINER.
- OZONE BLOWDOWN PIPING, SEE DETAIL 04/M801.
- 1" SEPARATOR BLOWDOWN TO 4" SANITARY LINE, SEE DETAIL 05/M801.

CHG NUM	DESCRIPTION	APP/DATE
A 2	GENERAL REVISIONS BASED ON NASA REVIEW COMMENTS	03/26/2012
A 1	CHANGED PUMP IDENTIFICATION	03/13/2012

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LAST APPROVED: TECH LEAD: N. NNNNNNNNNN | FAC-SYS MGR: N. NNNNNNNNNN | REV DATE: MMSDDYYYYY

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JOHN H. GLENN RESEARCH CENTER
LEWIS FIELD
CLEVELAND, OHIO

NASA COOLING TOWER REHABILITATIONS

CONTRACTOR: **FD BUILDING SOLUTIONS FOR RESEARCH**

SYSTEM ID: _____ FACILITY ID: _____ CONFIG CTRL: _____

DR: _____ DES: _____

CONTRACTOR: _____ D.ENG: _____ PROJECT ID: _____ DISC: _____ TYP: _____

CONTRACT NO: _____ PROJ. MGR: _____ TECH LEAD/BR CH: _____

TASK ORDER: _____ FAC/SYS MGR: _____ DIV CHIEF: _____

SCALE: **PE 1411 - COF14901 - M- 401**

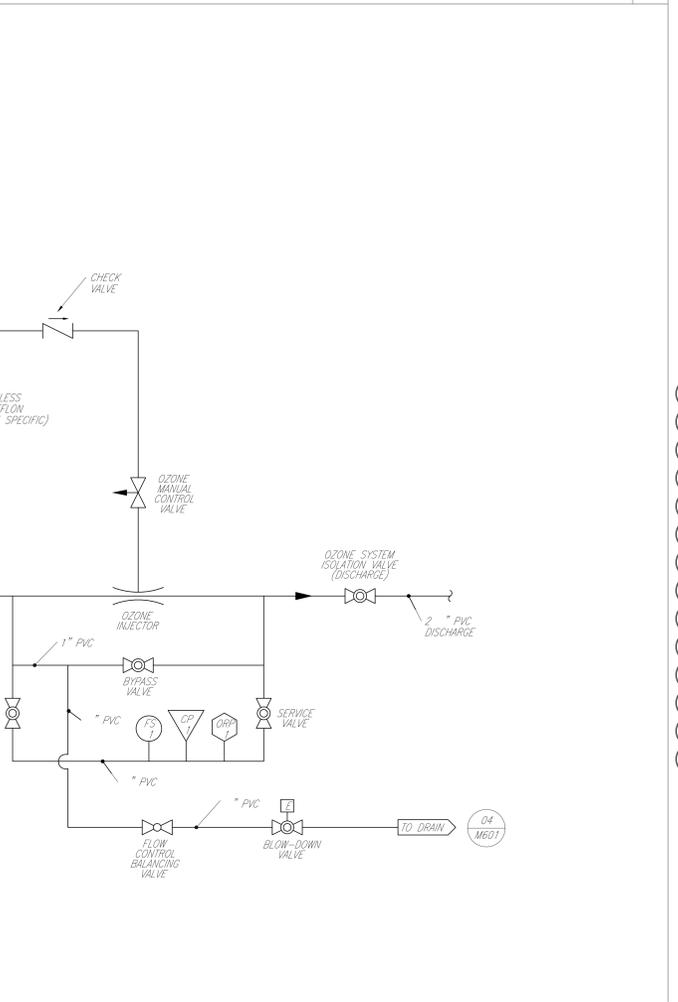
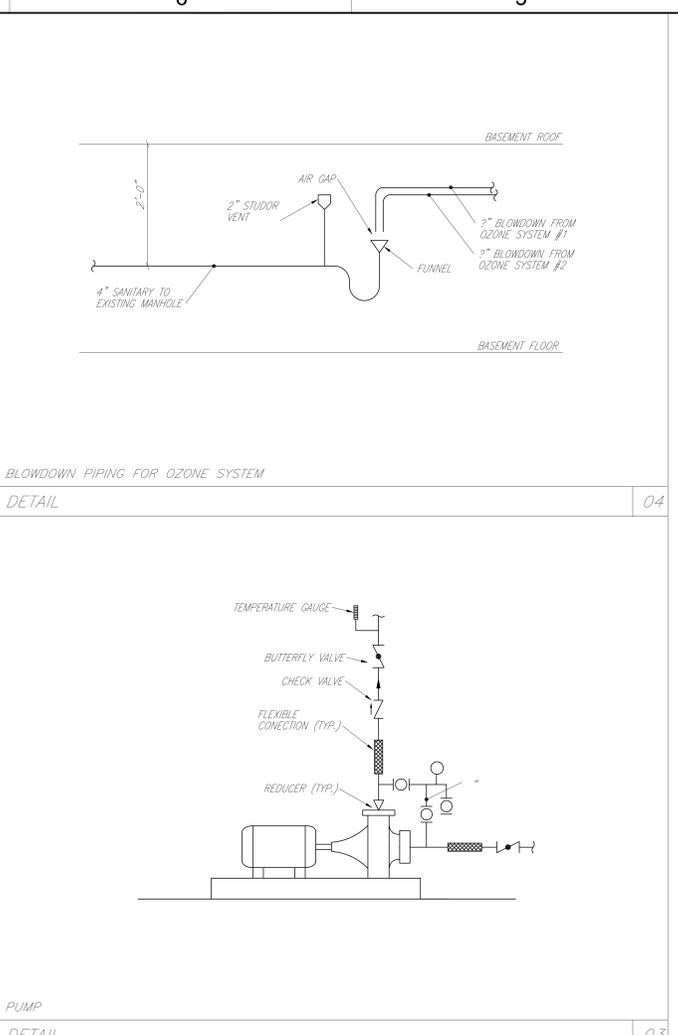
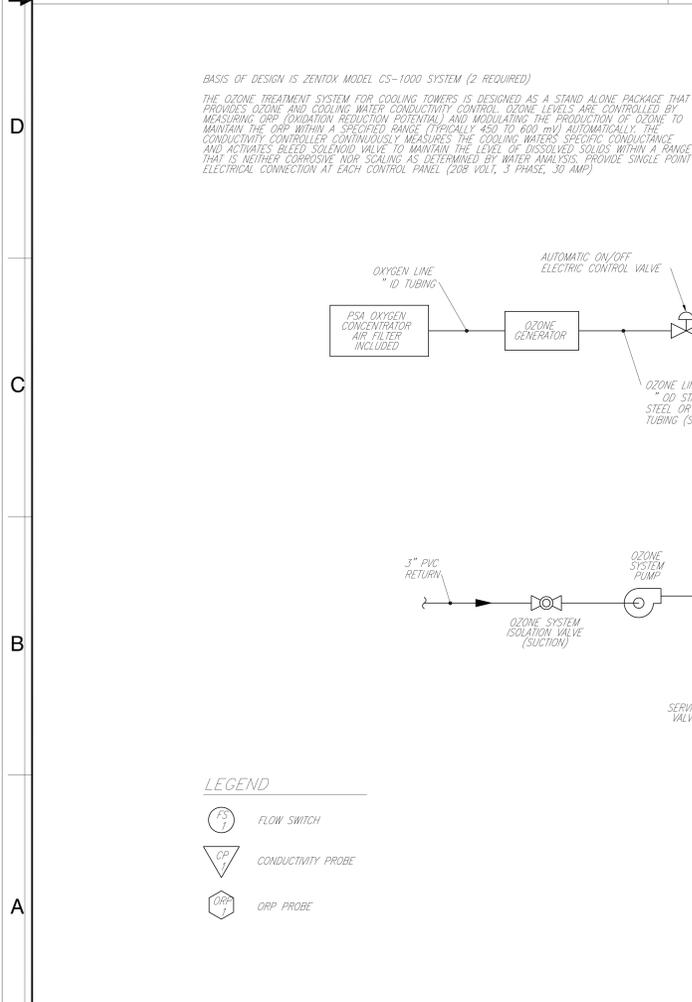
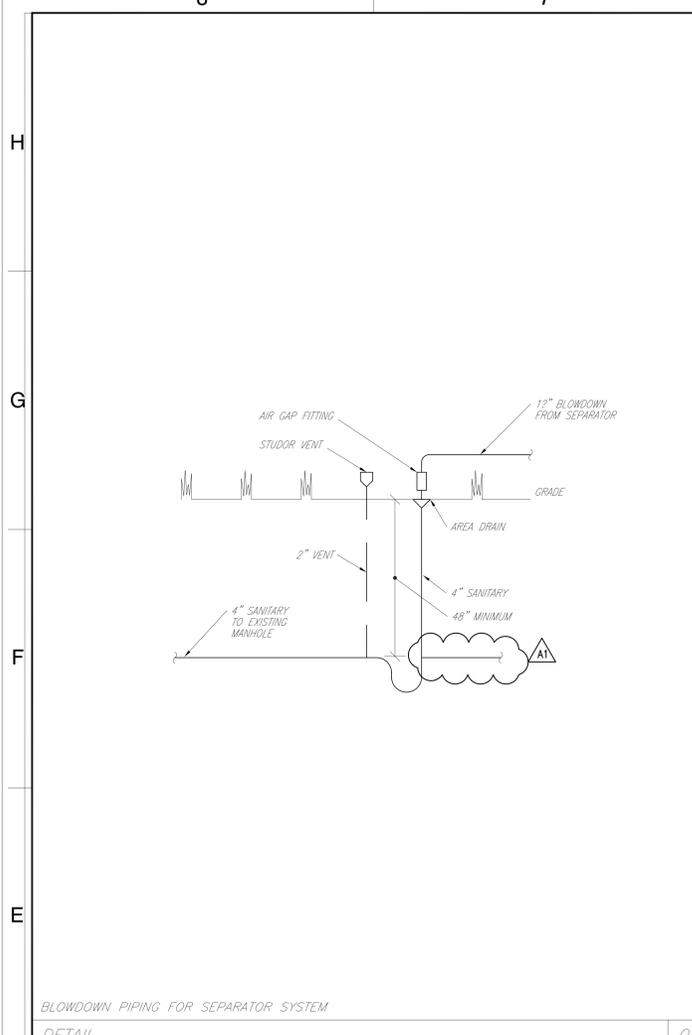
UNITS: ENGLISH | SHEET **01** OF **01**

SCALE: NTS | SOFTWARE: AUTOCAD 2008 | REVISION: _____

OFFICIAL DATE: 02/06/2012

01 EQUIPMENT PIPING ISOMETRIC | NOT TO SCALE | 02

0101-COF14901-M-401.DWG



PIPING MATERIAL SCHEDULE

SERVICE	SIZE	PIPE	FITTINGS	JOINTS	REMARKS
MAKEUP WATER SEPARATOR SYSTEM PIPE	4" AND SMALLER	SCHEDULE 40 PVC ASTM D 1785	SOCKET TYPE PVC FITTINGS	SOLVENT WELDED	
COOLING TOWER PIPE	4" AND LARGER	SCH. 40 BLACK CARBON STEEL, TYPE S, GR. E	SCH. 40 BLACK CARBON STEEL, GR. WPB, ASTM A234	BUTT WELDED	UNLESS NOTED OTHERWISE
OZONE PIPE	3" AND SMALLER	SCHEDULE 80 PVC ASTM D 1785	SOCKET TYPE PVC FITTINGS	SOLVENT WELDED	UNLESS NOTED OTHERWISE
SANITARY UNDERGROUND	ALL SIZES	PVC-SDR26	SOCKET TYPE	SOLVENT WELDED	UNLESS NOTED OTHERWISE

PUMP SCHEDULE

MARK	BASIS OF DESIGN	LOCATION	TYPE	PUMP EFFICIENCY	CAPACITY		MOTOR DATA				REMARKS
					(GPM)	(FT WG)	HP	VOLTS	PHASE	HZ	
CTP-1	AURORA 360 6x8x15	PUMP SKID	END SUCTION	83	2375	175	150	460	3	60	PROVIDE VFD ①
CTP-2	AURORA 360 6x8x15	PUMP SKID	END SUCTION	83	2375	175	150	460	3	60	PROVIDE VFD ①
CTP-3	AURORA 360 6x8x15	PUMP SKID	END SUCTION	83	2375	175	150	460	3	60	PROVIDE VFD ①
SSP-1	AURORA 3401	PUMP SKID	END SUCTION	70	300	85	10	460	3	60	②

COOLING TOWER SCHEDULE

MARK	LOCATION	MANUFACTURER & MODEL NO.	FLOW (GPM)	EWT (°F)	LWT (°F)	MOTOR DATA				REMARKS
						VOLTS	PHASE	HZ	MIN HP	
CT-1	OUTSIDE	BAC 3985C-FM-2	4750	102.3	85	460	3	60	40	AMBIENT WET BULB = 75°F ○○○③

PIPING SYSTEM TEST CRITERIA LIST

SYSTEM	EACH PIPING SYSTEM SHALL BE TESTED ACCORDING TO THE FOLLOWING SCHEDULES				DESIGN STANDARD	INSPECTION REQ'D FOR WELDED OR BRAZED PIPE OR TUBING ②	REMARKS
	SYSTEM WORKING PRESSURE PSIG	MAXIMUM ALLOWABLE WORKING PRESSURE PSIG	TEST PRESSURE PSIG ①	WORKING TEMP ③			
SEWER							
SANITARY / SAN	0	3	5 (A)	80		③	
WATER							
COOLING TOWER	90	90	135	95	B31.3	VISUAL ①	
OZONE	25	30	45	80	B31.3	VISUAL ①	
SEPARATOR SYSTEM	40	50	75	80	B31.3	VISUAL ①	
POTABLE COLD	80	80	120	80	B31.9	VISUAL ①	

- ① TESTING SHALL BE HYDROSTATIC
- ② A WELD REQUEST FORM (NASA C-4025) MUST BE COMPLETED FOR ALL WELDED PIPE ON ALL SYSTEMS AND FORWARDED TO COTR PRIOR TO WELDING. COTR SHALL SUBMIT REQUEST FORM TO PRESSURE SYSTEMS OFFICE.
- ③ UNDERGROUND PIPE SHALL BE TESTED BEFORE & AFTER IT IS PUT IN TRENCH.

CONTROL VALVE SCHEDULE

MARK	LOCATION	SERVICE	TYPE	WATER FLOW (GPM)	APPROX CV	REMARKS
FCV-1	CT CELL #1 INLET	COOLING TOWER WATER	2-WAY 2 POSITION	2375	5000	
FCV-2	CT CELL #1 OUTLET	COOLING TOWER WATER	2-WAY 2 POSITION	2375	5000	
FCV-3	CT CELL #2 INLET	COOLING TOWER WATER	2-WAY 2 POSITION	2375	5000	
FCV-4	CT CELL #2 OUTLET	COOLING TOWER WATER	2-WAY 2 POSITION	2375	5000	
FCV-5	BASIN CLEANER CELL #1	BASIN CLEANER	2-WAY 2 POSITION	300	600	
FCV-6	BASIN CLEANER CELL #2	BASIN CLEANER	2-WAY 2 POSITION	300	600	
FCV-7	BYPASS LINE	BYPASS #1	2-WAY MODULATING	900	200	
TCV-1	BYPASS LINE	CT CELL #1	2-WAY MODULATING	1200	750	
TCV-2	BYPASS LINE	CT CELL #2	2-WAY MODULATING	1200	750	
TCV-3	BYPASS LINE	CT CELL #3	2-WAY MODULATING	1200	750	
FCV-8	CT CELL #3 INLET	COOLING TOWER WATER	2-WAY 2 POSITION	2375	5000	
FCV-9	CT CELL #3 OUTLET	COOLING TOWER WATER	2-WAY 2 POSITION	2375	5000	
FCV-10	BASIN CLEANER CELL #3	BASIN CLEANER	2-WAY 2 POSITION	300	600	

SEPARATOR SCHEDULE

MARK	LOCATION	BASIS OF DESIGN	FLOW (GPM)	PRESSURE DROP (PSI)	EFFICIENCY	REMARKS
SS-1	PUMP SKID	PURAFLEX PF 01-03D	289	10	98% ON 74 MICRONS	

GENERAL NOTES

A. FT FLOW METER SHALL BE ROSEMOUNT 0700 SERIES WITH RF CONNECTION OR SIMILAR.

B. REFERENCE DRAWING PE-1411-COF14901-G-001 FOR SHEET INDEX.

GENERAL REVISIONS BASED ON NASA REVIEW COMMENTS

CHG	NUM	DESCRIPTION	APP/DATE
A	1		03/26/2012

REVISIONS

LAST APPROVED	TECH LEAD	FAC-SYS MGR	REV DATE
EDMS	REVISION	N. NNNNNNNNNN	N. NNNNNNNNNN

CAD DRAWING - DO NOT REVISE MANUALLY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN H. GLENN RESEARCH CENTER
LEWIS FIELD
CLEVELAND, OHIO

NASA COOLING TOWER REHABILITATIONS

HVAC DETAILS & SCHEDULES

CONTRACTOR: **FD** BUILDING SOLUTIONS FOR RESEARCH

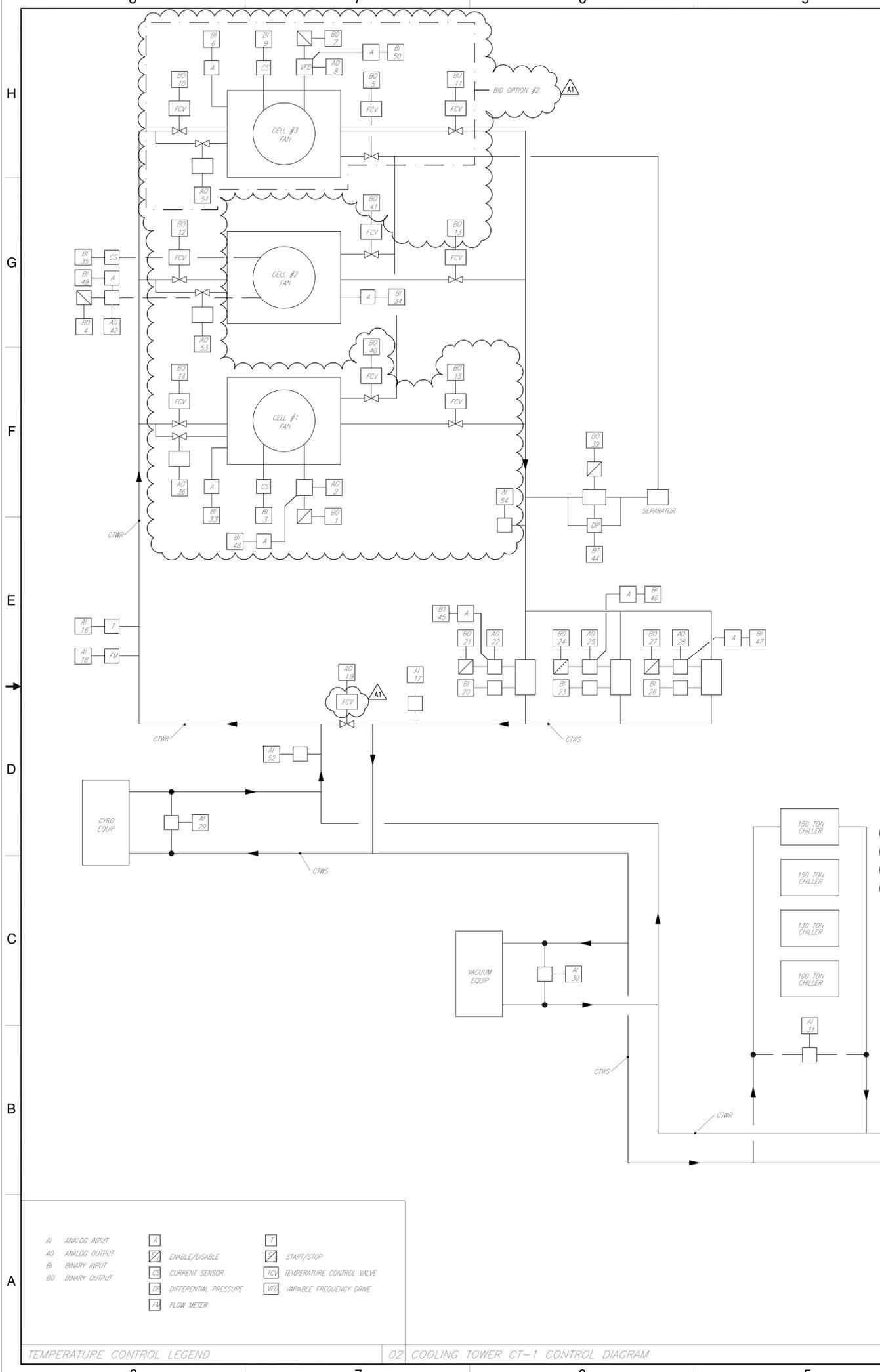
SYSTEM ID: _____ FACILITY ID: _____ CONFIG CTRL: _____
DR: _____ DES: _____

CONTRACTOR: _____ D.ENG: _____
CONTRACT NO: _____ PROJ. MGR: _____ TECH LEAD/BR CH: _____
TASK ORDER: _____ FAC/SYS MGR: _____ DIV CHIEF: _____
DRAWN: _____ DESIGNED: _____ CHECKED: _____ APPROVED: _____
APPROVAL DATE: _____ RELEASE STATUS: _____

SIZE: BLDG/SYS PROJECT ID: DISC TYP SEQ
PE 1411 - COF14901 - M- 601

AREA: _____ SHEET **01** OF **01**
UNITS: ENGLISH SOFTWARE: AUTOCAD 2008 REVISION
SCALE: NTS OFFICIAL DATE: 02/06/2012

0010-COF14901-M-601.DWG



CELL #1 FAN START/STOP	
CELL #1 FAN SPEED CONTROL	
CELL #1 FAN STATUS	
CELL #2 FAN START/STOP	
CELL #3 SS VALVE	
TOWER CELL #3 ALARM	
CELL #3 FAN START/STOP	
CELL #3 FAN SPEED CONTROL	
CELL #3 FAN STATUS	
CELL #3 CTWR VALVE	
CELL #3 CTWS VALVE	
CELL #2 CTWR VALVE	
CELL #2 CTWS VALVE	
CELL #1 CTWR VALVE	
CELL #1 CTWS VALVE	
CTWR TEMPERATURE	
CTWS TEMPERATURE	
CTW FLOW (GPM)	
BYPASS VALVE #1	
CTP-1 STATUS	
CTP-1 START/STOP	
CTP-1 SPEED CONTROL	
CTP-2 STATUS	
CTP-2 START/STOP	
CTP-2 SPEED CONTROL	
CTP-3 STATUS	
CTP-3 START/STOP	
CTP-3 SPEED CONTROL	
DP SENSOR FOR CRYO EQUIP	
DP SENSOR FOR VACUUM EQUIP	
DP SENSOR FOR CHILLERS	
DP SENSOR FOR VIBRO ACOUSTIC EQUIP	
TOWER CELL #1 ALARM	
TOWER CELL #2 ALARM	
CELL #2 FAN STATUS	
BYPASS VALVE FOR CELL #1	
ENABLE/DISABLE OZONE SYSTEM #1	
ENABLE/DISABLE OZONE SYSTEM #2	
SSP-1 PUMP START/STOP	
CELL #1 SS VALVE	
CELL #2 SS VALVE	
CELL #2 FAN SPEED CONTROL	
MAKEUP WATER METER	
44 SSP-1 PUMP STATUS	
45 CTP-1 VFD ALARM	
46 CTP-2 VFD ALARM	
47 CTP-3 VFD ALARM	
48 CELL #1 FAN VFD ALARM	
49 CELL #2 FAN VFD ALARM	
50 CELL #3 FAN VFD ALARM	
51 BYPASS VALVE FOR CELL #3	
52 CTWR TEMP	
53 BYPASS VALVE FOR CELL #2	
54 CTWS TEMP	

SEQUENCE OF OPERATION
COOLING TOWER WATER SYSTEM

The cooling tower water system includes cooling tower CT-1 with two cells and cooling tower pumps CTP-1, CTP-2 and CTP-3. Each cell will have a cooling tower fan. The third cooling tower cell will be bid option #2. Ozone water treatment system and Separator & Basin Cleaner system are also included.

1. The cooling tower pumps CTP-1, CTP-2 and CTP-3 and cooling tower fans CTF-1 and CTF-2 shall be controlled from H-0-A switches on the VFD panel. With the switch in the "H" position, the pumps shall start. With the switch in the "A" position, the pumps shall operate in response to system controls.

2. The operator will program the lead/lag sequence for two cooling tower pumps and the corresponding cooling tower cells. The third pump is a standby pump, and will be used if there is a problem with the lead or lag pump.

3. The control system operator shall enable the cooling tower water system. When the system is enabled, the isolation control valves for the lead cooling tower cell are opened and the lead CTP is started. If water flow is not verified, an alarm shall be initiated, and the standby pump shall be automatically started. When water flow is verified from the flow meter, the control system shall modulate cooling tower bypass valve #1 to maintain cooling tower water supply (CTWS) temperature above 60 degrees F (adjustable). The lead cooling tower fan shall start and modulate fan speed to maintain CTWS temperature below 85 degrees F (adjustable). If the fan fails to start, an alarm shall be initiated, and the isolation valves for the lag tower shall open, the isolation valves for the lead tower shall close, the lead tower fan shall shut off and the lag tower fan shall start. If the fan speed is at minimum flow and the CTWS temperature remains 3 degrees F (adjustable) below setpoint for a continuous time period of 15 minutes (adjustable), the lower fan shall shut off and the bypass valve shall modulate to maintain CTWS temperature at setpoint. When the CTWS temperature remains 2 degrees F (adjustable) above setpoint for a continuous time period of 15 minutes (adjustable), the control system shall enable the cooling tower fan and shall disable cell #1 bypass valve. If the CTWS temperature rises above 85 degrees F, cooling tower fan speed shall increase. When the operating tower fan has been operating at 80% speed (adjustable) or greater for a continuous time period of 15 minutes (adjustable), the control system shall enable the lag cooling tower cell. Both fans shall modulate at the same speed to maintain CTWS temperature below 85 degrees F. When the operating cooling tower fans have been running at 35% (adjustable) or less for a continuous time period of 15 minutes (adjustable), the control system shall disable the lag cooling tower cell by stopping its fan and closing its isolation valves.

4. A differential pressure sensor is provided in four locations in the building; the Cryogenic area, the Vacuum Equipment area, the Vibroacoustic area and the HVAC chillers. The differential pressure at design flow in each area should be maintained by the pumping system. The design flows are as follows; Cryogenic area is 1500 gpm, Vacuum Equipment area is 1558 gpm, Vibroacoustic area is 400 gpm and the HVAC chillers is 1290 gpm. The system controller shall modulate the lead CTP speed with an analog signal out to variable frequency drive based on maintaining the required differential pressure in all areas. The lead pump speed shall be increased if one or more required differential pressures cannot be maintained. When the system flow rises above 1900 gpm, the isolation control valves for the lag cooling tower cell shall open and the lag pump shall start, and both pumps shall modulate at the same speed to satisfy the differential pressure demand. When flow falls to 1700 gpm (adjustable), as determined by the CTWR flow meter, the lag pump shall shut off and the isolation control valves for the lag cooling tower cell shall close. When flow falls below 900 gpm (adjustable), bypass valve #1 shall modulate open to maintain a minimum flow of 900 gpm.

5. Ozone water treatment systems: Ozone system #1 shall be enabled whenever the lead pump (CTP-1 or CTP-2) is started, or the standby pump (CTP-3) is started in its place. When the pump is stopped, ozone system #1 will be disabled. Ozone system #2 shall be enabled whenever the lag pump (CTP-2 or CTP-1) is started, or the standby pump (CTP-3) is started in its place. When the pump is stopped, ozone system #2 will be disabled. If one of the tower cells is out of operation for more than 48 hours (adjustable), the ozone system serving that tower cell shall be enabled and shall operate until the oxidation reduction potential (ORP) is between 450 and 600 mV (adjustable), or for an 8 hour period (adjustable).

6. The cooling tower separator and basin sweeper system: Each tower cell shall have a sweeper control valve which shall be opened or closed by the control system. In addition, the control system shall monitor and control the separator pump SSP-1 which shall serve all of the tower cells. The separator and basin sweeper system shall be enabled and disabled by manual command from the control system operator, or by an automatic time schedule as entered by the control system operator. When the system is enabled, the pump will start after the sweeper control valve at the specific cell is opened. If the separator pump does not start after a 45 second delay (adjustable) after the initial start, or if the pump stops during normal operation, an alarm shall be registered at the control system. The pump shall be shut off and the sweeper control valve shall be closed. The control system operator must manually reset the "alarm" point.

7. Alarms:
- A. Cooling tower general alarm for cell #1
 - B. Cooling tower general alarm for cell #2
 - C. Cooling tower general alarm for cell #3
 - D. VFD general alarm for cell #3 fan
 - E. VFD general alarm for cell #2 fan
 - F. VFD general alarm for cell #1 fan
 - G. No flow through pump CTP-1. Shall be verified by current sensor within 45 seconds.
 - H. No flow through pump CTP-2. Shall be verified by current sensor within 45 seconds.
 - I. No flow through pump CTP-3. Shall be verified by current sensor within 45 seconds.
 - J. No flow through pump SSP-1
 - K. VFD general alarm for CTP-1
 - L. VFD general alarm for CTP-2
 - M. VFD general alarm for CTP-3

GENERAL NOTES

- A. VFD, COOLING TOWER CONTROL, PLC AND EMCS (SIEMENS APOSEE) MUST BE COMMUNICATED BY MODBUS RTU.
- B. COOLING TOWER PLC - PROVIDE MODBUS RTU MODULE TO COMMUNICATE WITH (2) 150 TON, (1) 130 TON, & (1) 100 TON CHILLERS & (2) OZONE SYSTEMS AND CRYO EQUIPMENT.
- C. REFERENCE DRAWING PE-1411-COF14901 G-001 FOR DRAWING INDEX.

TEMPERATURE CONTROL LEGEND

AI	ANALOG INPUT	A	START/STOP
AO	ANALOG OUTPUT	CS	CURRENT SENSOR
BI	BINARY INPUT	DF	DIFFERENTIAL PRESSURE
BO	BINARY OUTPUT	FM	FLOW METER
		EN	ENABLE/DISABLE
		TCV	TEMPERATURE CONTROL VALVE
		VFD	VARIABLE FREQUENCY DRIVE

02 COOLING TOWER CT-1 CONTROL DIAGRAM

NOT TO SCALE

CONTRACTOR: **FD**
BUILDING SOLUTIONS FOR RESEARCH

SYSTEM ID: _____ FACILITY ID: _____ CONFIG CTRL: _____
DR: _____ DES: _____

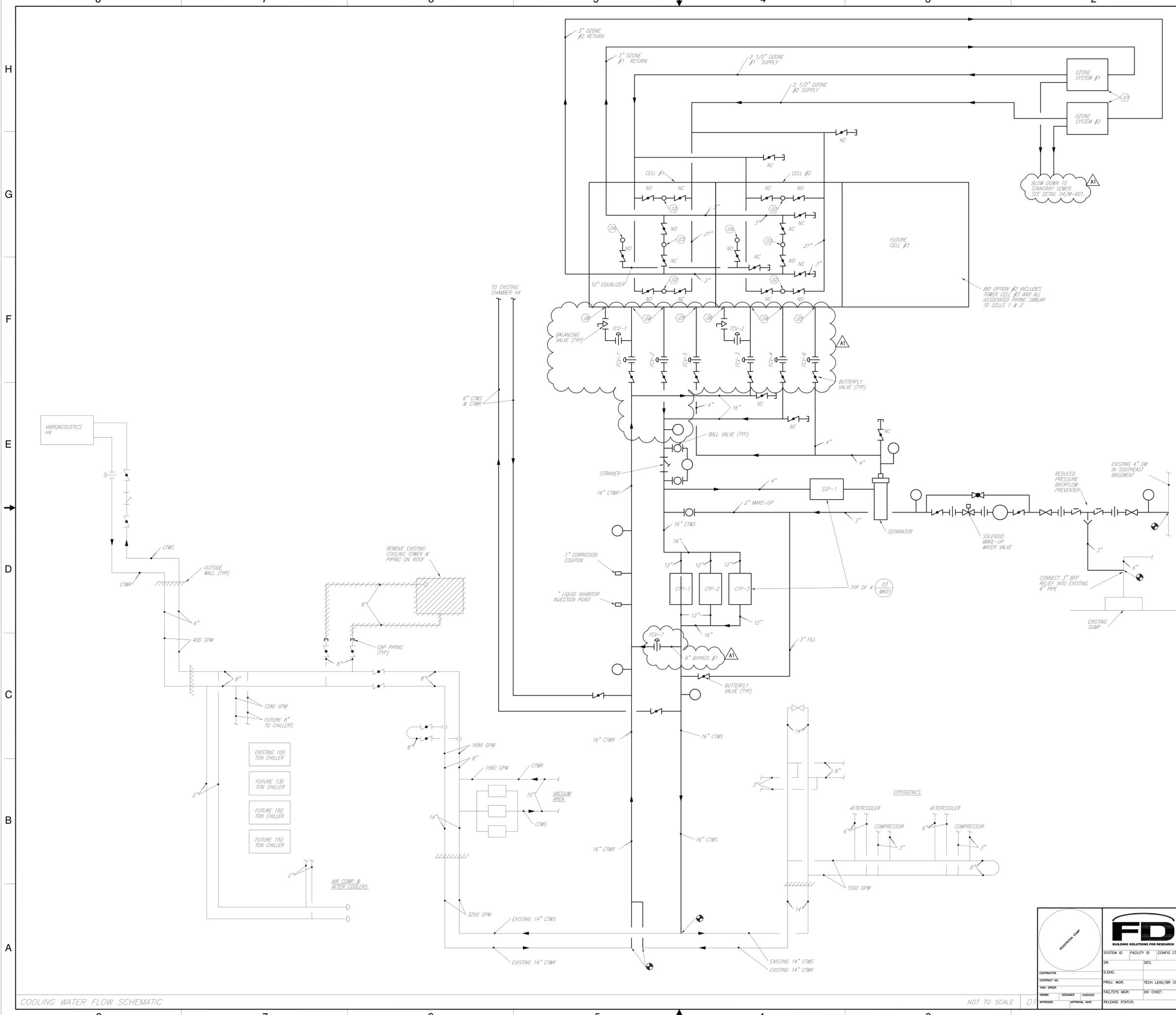
D.ENG: _____ PROJ. MGR: _____ TECH LEAD/BR CH: _____
FAC/SYS MGR: _____ DIV CHIEF: _____

SIZE: BLDG/SYS PROJECT ID: DISC TYP SEQ
PE 1411 - COF14901 - M- 701

AREA: _____ SHEET **01** OF **01**
UNITS: ENGLISH SOFTWARE: AUTOCAD 2008 REVISION
SCALE: NTS OFFICIAL DATE: 02/06/2012

GENERAL REVISIONS BASED ON NASA REVIEW COMMENTS			03/26/2012
CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD:	FAC/SYS MGR:	REV DATE:
EDMS REVISION	N. NNNNNNNNNN	N. NNNNNNNNNN	MMDD/YYYY
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHN H. GLENN RESEARCH CENTER LEWIS FIELD CLEVELAND, OHIO			
NASA COOLING TOWER REHABILITATIONS			
HVAC CONTROLS			

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- DRAWING NOTES**
- 01 SEE OZONE SCHEMATIC ON SHEET M-601.
 - 02 CONNECT 2 1/2" OZONE PIPE TO BOTTOM OF TOWER NEAR BOTH ENDS OF EACH CELL.
 - 03 CONNECT 3" OZONE PIPE TO BOTTOM OF TOWER NEAR THE MIDDLE OF EACH CELL.
 - 04 CONNECT 12" PIPE TO BOTTOM OF TOWER.
 - 05 CONNECT 4" PIPE TO BASIN SWEEPER SYSTEM.
 - 06 REFERENCE DRAWING PE-1411-COF14901-G001 FOR SHEET INDEX.
 - 07 CONNECT 8" BYPASS TO BOTTOM OF CT CELL.

- LEGEND**
- NEW WORK
 - - - EXISTING WORK

CHG	NUM	DESCRIPTION	APP/DATE
GENERAL REVISIONS BASED ON NASA REVIEW COMMENTS			
A	1		03/26/2012
REVISIONS			
LAST APPROVED	TECH LEAD:	FAC-SYS MGR:	REV DATE:
EDMS REVISION	N. NNNNNNNNNN	N. NNNNNNNNNN	MMDD/YYYY
CAD DRAWING - DO NOT REVISE MANUALLY			
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHN H. GLENN RESEARCH CENTER LEWIS FIELD CLEVELAND, OHIO NASA COOLING TOWER REHABILITATIONS			
FD BUILDING SOLUTIONS FOR RESEARCH			
CONTRACTOR:		PROJECT ID:	DISC TYP/SEQ
CONTRACT NO.:		PE 1411 - COF14901 - M- 801	
TASK ORDER:		AREA:	SHEET 01 OF 01
APPROVED:	DESIGNED:	FAC/SYS MGR:	DIV CHIEF:
APPROVAL DATE:	APPROVAL DATE:	RELEASE STATUS:	REVISION
SCALE: NTS		SOFTWARE: AUTOCAD 2008	REVISION
		OFFICIAL DATE: 02/06/2012	

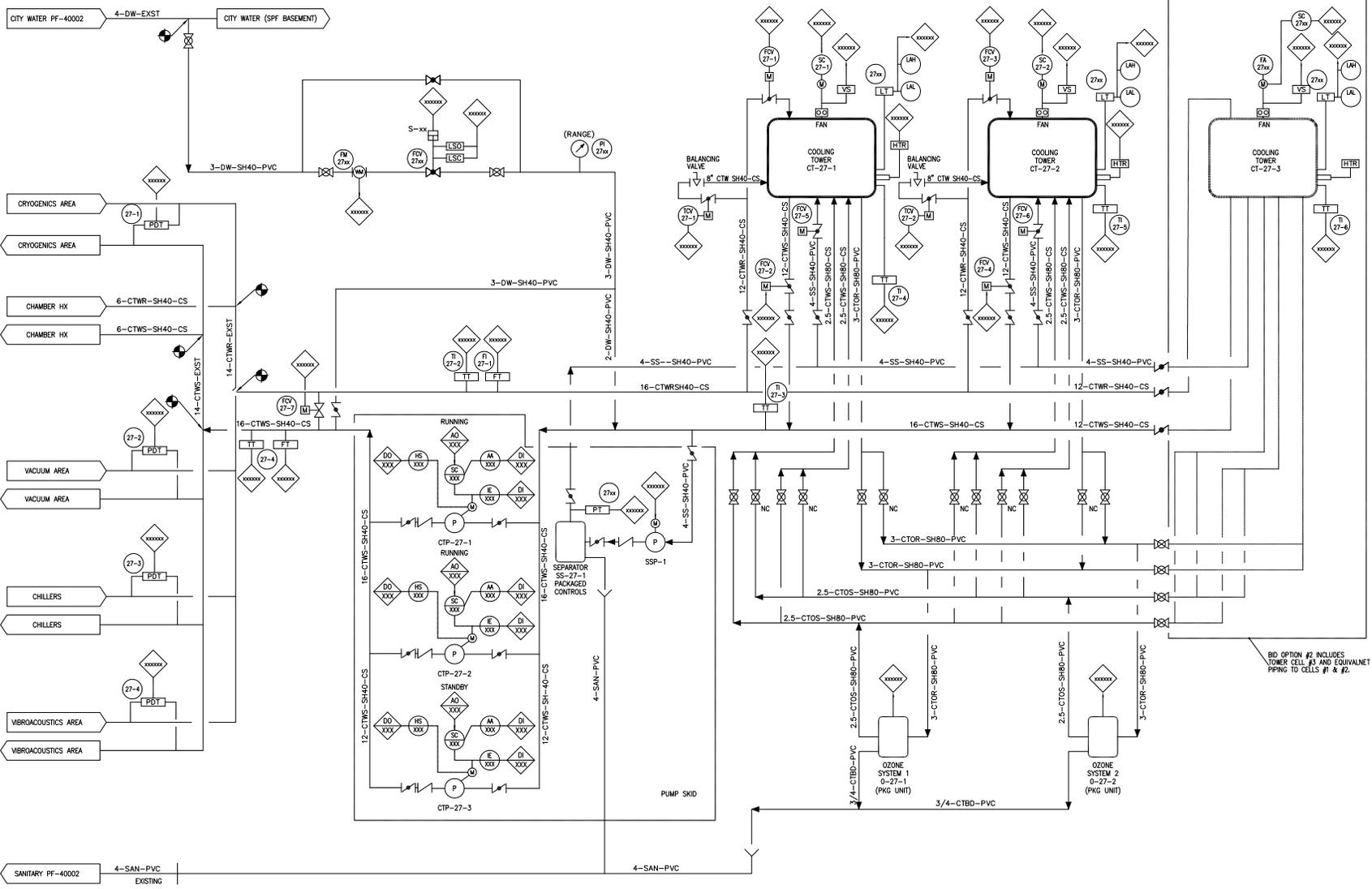
COOLING WATER FLOW SCHEMATIC

NOT TO SCALE

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GENERAL NOTES
 A. REFERENCE DRAWING PE-1411-COF14901-M-001 FOR SHEET INDEX.

LEGEND
 (HS XXX) LOCAL START/STOP
 (M XXX) LOCAL ALARM
 (E XXX) CURRENT SENSOR
 (SC XXX) VFD (SPEED CONTROL)



BID OPTION #2 INCLUDES TOWER CELL #5 AND EQUIVALENT PIPING TO CELLS #1 & #2.

PIPING COMPONENT SYMBOLS		ACTUATOR SYMBOLS		PRIMARY CONTROL ELEMENT SYMBOLS		ITEM DESIGNATIONS		INSTRUMENT LETTER DESIGNATIONS FOR		INSTRUMENT SYMBOLS	
Butterfly Valve	Pressure Regulator	Pressure Gauge	Heat Exchanger	EP	ELEC-PNEU DOOR	LOCALLY MOUNTED	B-BURNER	L-LEVEL	U-UNCLASSIFIED	IC - CLOSED	GENERAL
Check Valve	Relief Valve	Loader	Reducer	EH	ELEC-HOOR DOOR	CONTROL ROOM LOCATED	E-EMERGENCY	P-PRESSURE	V-VELOCITY	IO - OPEN	DATA COLLECTOR FACILITY
Gate Valve	Relief Valve	Flange	Union	LI	LIFT INDICATOR	ALIN CONTROL ROOM LOCATED	F-FLOW	S-SURGE	X-SPEED	PRIM LOGIC CONTROLLER	FROM PROCESS CONTROLLER
Plug Valve	Rupture Disc	Strainer	Union	LLS	LIQ LEVEL SWITCH	SUCCESSING LETTERS	H-HIGH	T-TEMPERATURE	Z-POSITION	INTERLOCK	
Ball Valve	Vacuum Pump Down Valve	Flange	Union	LLT	LIQ LEVEL SWITCH		L-ALARM	I-INDICATE	R-RECORD		
Globe Valve	Expansion Joint	Flange	Union	LS	LIMIT SWITCH		C-CONTROL	L-LOW	S-SIGNAL/SONG		
3-Way Valve	Needle Valve	Flange	Union	LSO	LIMIT SWITCH OPEN		D-DIFFERENTIAL	P-PERMISSIVE	T-TRANSMITTER		
		Flange	Union	TC	THERMOCOUPLE		G-CALCULATION	Y-CATALOG			

GENERAL REVISIONS BASED ON NASA REVIEW COMMENTS

REV	DATE	DESCRIPTION
A	03/06/2013	DISSEMINATION
B		APP-DATA

REVISIONS

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 JOHN H. GLENN RESEARCH CENTER
 LEWIS FIELD & PLAIN BROOK STATIONS, OHIO

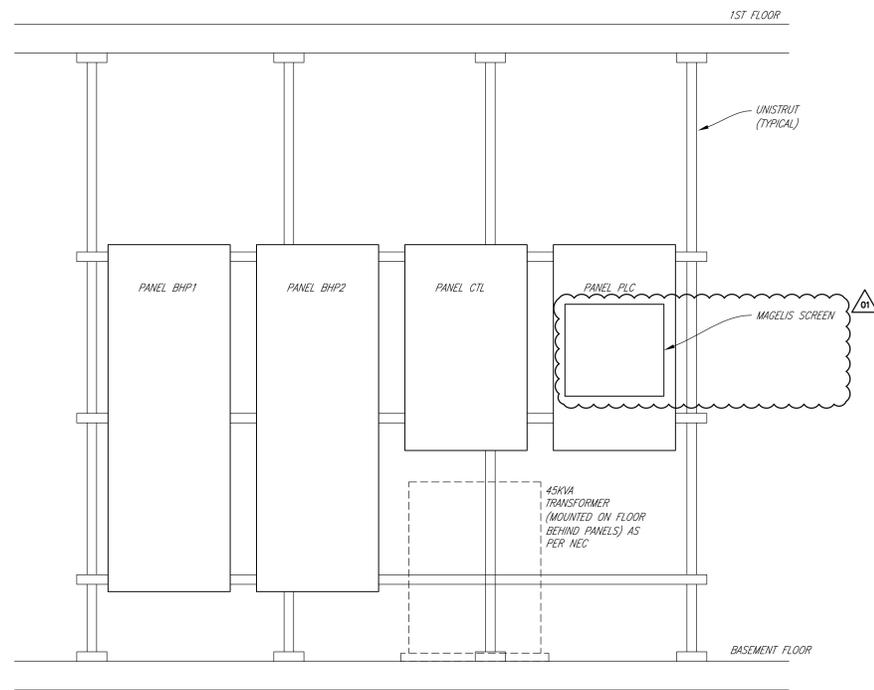
REPAIR OF COOLING TOWERS
 SPACE POWER FACILITY
 COOLING TOWER WATER
 P&ID

DATE: 03/06/2013
 PROJECT ID: PE 1411 - COF14901 - M 802
 SHEET 01 OF 01
 UNITS: ENGLISH
 SOFTWARE: AUTOCAD 2009
 REVISION: 1
 SCALE: NONE
 OFFICIAL DATE:

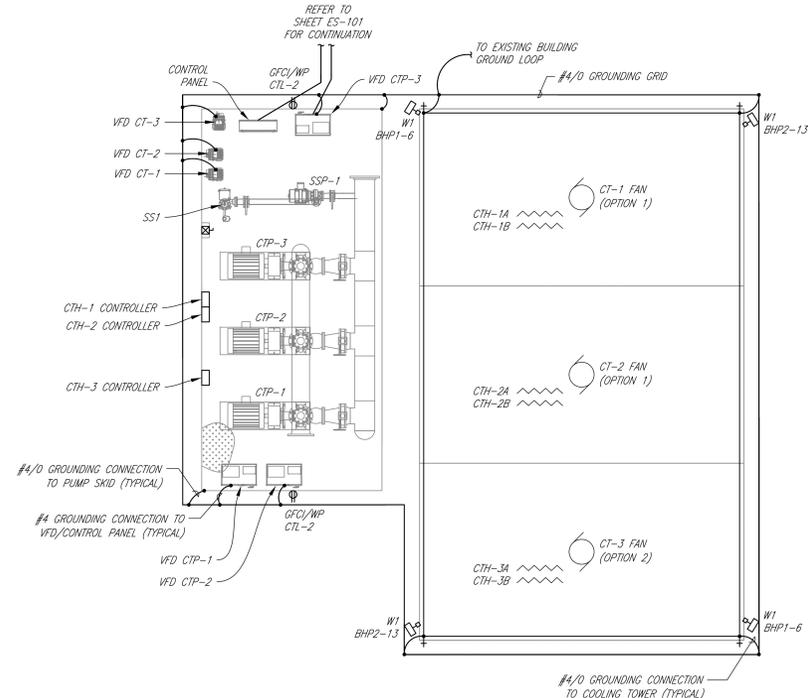
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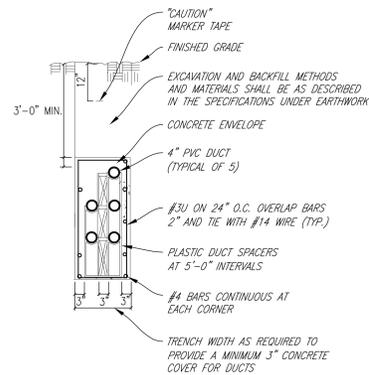
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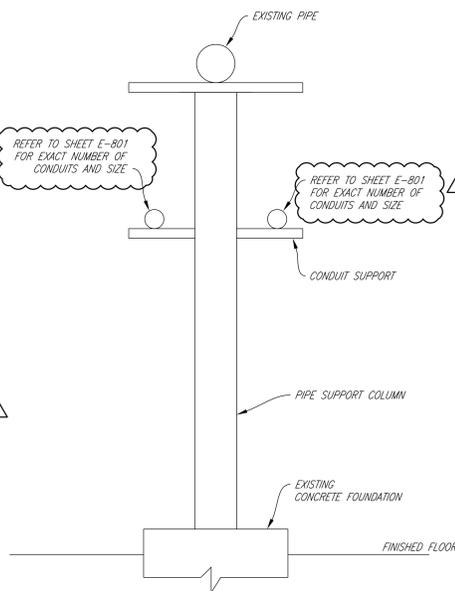
ELECTRICAL PANEL MOUNTING DETAIL
SCALE: NOT TO SCALE



COOLING TOWER AND PUMP SKID - GROUNDING AND LIGHTNING PROTECTION
SCALE: 1/4" = 1'-0"



ELECTRICAL DUCTBANK DETAIL
SCALE: NOT TO SCALE



EXISTING ELECTRICAL CONDUIT SUPPORT DETAIL
SCALE: NOT TO SCALE

POWER SYMBOLS

- PULL BOX
- TRANSFORMER
- ELECTRICAL PANEL

LIGHTING SYMBOLS

- EXTERIOR MOUNTED LIGHT FIXTURE

MISCELLANEOUS SYMBOLS

- DRAWING NOTE
- ⓘ FEEDER SCHEDULE NOTE
- UNDERGROUND CONDUIT

SINGLE LINE DIAGRAM SYMBOLS

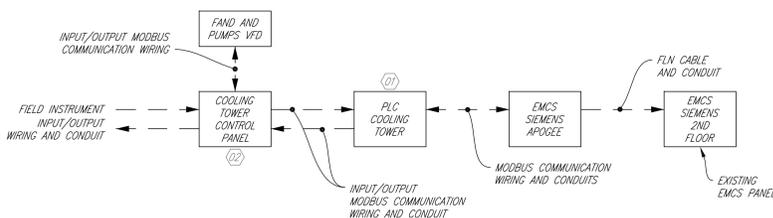
- ⌋ CIRCUIT BREAKER
- ⊞ TRANSFORMER

LIGHTNING PROTECTION SYMBOLS

- ⚡ AIR TERMINAL
- ⚡ GROUNDING CONNECTION
- ⚡ GROUNDING GRID
- ⚡ GROUNDING CONDUCTOR

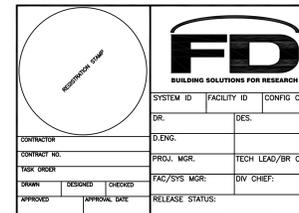
DETAIL CODED NOTES

- 01 VFD, COOLING TOWER CONTROL PLC AND EMCS (SIEMENS APOGEE) MUST BE COMMUNICATED BY MODBUS RTU.
- 02 COOLING TOWER PLC- PROVIDE MODBUS RTU MODULE TO COMMUNICATE WITH (2) 150 TON, (1) 130 TON, & (1) 100 TON CHILLERS & (2) OZONE SYSTEMS AND CYRO EQUIPMENT.



COMMUNICATION DIAGRAM
SCALE: NOT TO SCALE

SD	01	AS PER 100% REVIEW COMMENTS	03-13-2012
CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD:	FAC-SYS MGR:	REV DATE:
EDMS REVISION:			
CAD DRAWING - DO NOT REVISE MANUALLY			
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHN H. GLENN RESEARCH CENTER LEWIS FIELD CLEVELAND, OHIO			
NASA COOLING TOWER REHABILITATIONS			
PUMP SKID ELECTRICAL LAYOUT, DETAILS, AND ELECTRICAL SYMBOLS			
CONTRACTOR:	D.ENG.	PROJECT ID	DISC
CONTRACT NO.:	PROJ. MGR.	TECH LEAD/BR CH	TYP SEQ
TASK ORDER:	FAC/SYS MGR.	DIV CHIEF:	
DRAWN:	DESIGNED:	CHECKED:	APPROVED:
DATE:	DATE:	DATE:	DATE:
RELEASE STATUS:			
SIZE	BLDG/SYS	PROJECT ID	DISC
PE 1411	-	COF14901	- E 201
AREA:	UNITS:	SOFTWARE:	SHEET 01 OF 01
SCALE: AS NOTED	OFFICIAL DATE: 02/06/2012		REVISION



PANEL: BHP1
 LOCATION: RM
 MOUNTING: SURFACE OR RECESSED
 FEED: TOP OR BOTTOM
 NEMA: 1 OR 3R

277/480V, 3PH 4W
 600 AMP MLO
 35,000 AIC (MINIMUM)
 GROUND BAR
 NEUTRAL BAR

CKT	DESCRIPTION	#	BKR	PL	LOAD IN KVA PER PHASE			PL	BKR	#	DESCRIPTION	CKT
					A	B	C					
1	HEAT TRACE											2
3	BASIN HEATER - 2A/2B	125	3		10.00	3.10		1	30		HEAT TRACE	4
5	HEAT TRACE										HEAT TRACE	6
7	EXTERIOR LIGHTING										EXTERIOR LIGHTING	8
9	COOLING TOWER - 1	100	3		14.41	5.82		1	20		EXTERIOR LIGHTING	10
11	SSP-1										SSP-1	12
13	SPARE										SPARE	14
15	COOLING WATER PUMP - 1	250	3		49.88	0.00		1	20		SPARE	16
17	SPARE										SPARE	18
19	SPARE										SPARE	20
21	SPARE										SPARE	22
23	SPARE										SPARE	24
TOTAL PER PHASE:					83.21	83.21						KVA
TOTAL CONNECTED LOAD:					246.64							AMPS
FEEDER DEMAND LOAD:					160.36							AMPS

PROVIDE SWITCHING DUTY CIRCUIT BREAKERS FOR LIGHTING CIRCUITS CONTROLLED FROM BREAKER
 PROVIDE HACR CIRCUIT BREAKERS FOR HVAC AND REFRIGERATION EQUIPMENT

ABBREVIATIONS:
 # (GF) = GROUND FAULT INTERRUPTER, (ST) = SHUNT TRIP, (LO) = LOCKOUT, (IG) = ISOLATED GROUND

PANEL: BHP2
 LOCATION: RM
 MOUNTING: SURFACE OR RECESSED
 FEED: TOP OR BOTTOM
 NEMA: 1 OR 3R

277/480V, 3PH 4W
 600 AMP MLO
 35,000 AIC (MINIMUM)
 GROUND BAR
 NEUTRAL BAR

CKT	DESCRIPTION	#	BKR	PL	LOAD IN KVA PER PHASE			PL	BKR	#	DESCRIPTION	CKT
					A	B	C					
1	HEAT TRACE										HEAT TRACE	2
3	BASIN HEATER - 1A/1B	125	3		10.00	10.00		3	125		BASIN HEATER - 3A/3B	4
5	HEAT TRACE										HEAT TRACE	6
7	EXTERIOR LIGHTING										EXTERIOR LIGHTING	8
9	TRANSFORMER T1	70	3		2.59	1.90		1	30		HEAT TRACE	10
11	VIA PANEL CTL										HEAT TRACE	12
13	EXTERIOR LIGHTING										EXTERIOR LIGHTING	14
15	COOLING TOWER - 2	100	3		14.41	14.41		3	100		COOLING TOWER - 2	16
17	SPARE										SPARE	18
19	COOLING TOWER - 3	100	3		14.41	49.88		3	250		COOLING TOWER - 2	20
21	SPARE										SPARE	22
23	COOLING WATER PUMP - 3	250	3		49.88	0.00		1	20		SPARE	24
25	SPARE										SPARE	26
27	SPARE										SPARE	28
29	SPARE										SPARE	30
31	SPARE										SPARE	32
33	SPARE										SPARE	34
35	SPARE										SPARE	36
TOTAL PER PHASE:					153.18	154.68						KVA
TOTAL CONNECTED LOAD:					459.04							AMPS
FEEDER DEMAND LOAD:					298.42							AMPS

PROVIDE SWITCHING DUTY CIRCUIT BREAKERS FOR LIGHTING CIRCUITS CONTROLLED FROM BREAKER
 PROVIDE HACR CIRCUIT BREAKERS FOR HVAC AND REFRIGERATION EQUIPMENT

ABBREVIATIONS:
 # (GF) = GROUND FAULT INTERRUPTER, (ST) = SHUNT TRIP, (LO) = LOCKOUT, (IG) = ISOLATED GROUND

PANEL: CTL
 LOCATION: CRYOGENIC AREA
 MOUNTING: SURFACE
 FEED: BOTTOM
 NEMA: 1

120/208V, 3PH, 4W
 150 AMP MCB
 22,000 AIC (MINIMUM)
 GROUND BAR
 NEUTRAL BAR

CKT	DESCRIPTION	#	BKR	PL	LOAD IN KVA PER PHASE			PL	BKR	#	DESCRIPTION	CKT	
					A	B	C						
1	MODICON PLC	(1)	20	1	0.25	0.36		1	20	(1)	RECEPTACLES	2	
3	OZONE SYSTEM 1 CONTROL PANEL	(1)	30	3		1.67	1.67		3	30	OZONE SYSTEM 2 CONTROL PANEL	4	
5	HEAT TRACE										HEAT TRACE	6	
7	HEAT TRACE										HEAT TRACE	8	
9	CT-1 FAN VIBRATION SWITCH	(1)	20	1	1.67	1.67		1	20	(1)	CT-2 FAN VIBRATION SWITCH	10	
11	CT-1 WATER LVL CNTRL	(1)	20	1		0.10	0.10		1	20	(1)	CT-2 WATER LVL CNTRL	12
13	CT-3 FAN VIBRATION SWITCH	(1)	20	1		0.10	0.10		1	20	(2)	CT-3 WATER LVL CNTRL	14
15	SPARE										SPARE	16	
17	SPARE										SPARE	18	
19	SPARE										SPARE	20	
21	SPARE										SPARE	22	
23	SPARE										SPARE	24	
TOTAL PER PHASE:					4.14	3.53						KVA	
TOTAL CONNECTED LOAD:					11.21							AMPS	
FEEDER DEMAND LOAD:					7.77							AMPS	

PROVIDE SWITCHING DUTY CIRCUIT BREAKERS FOR LIGHTING CIRCUITS CONTROLLED FROM BREAKER
 PROVIDE HACR CIRCUIT BREAKERS FOR HVAC AND REFRIGERATION EQUIPMENT

ABBREVIATIONS:
 # (1) = BID OPTION 1, (2) BID OPTION 2

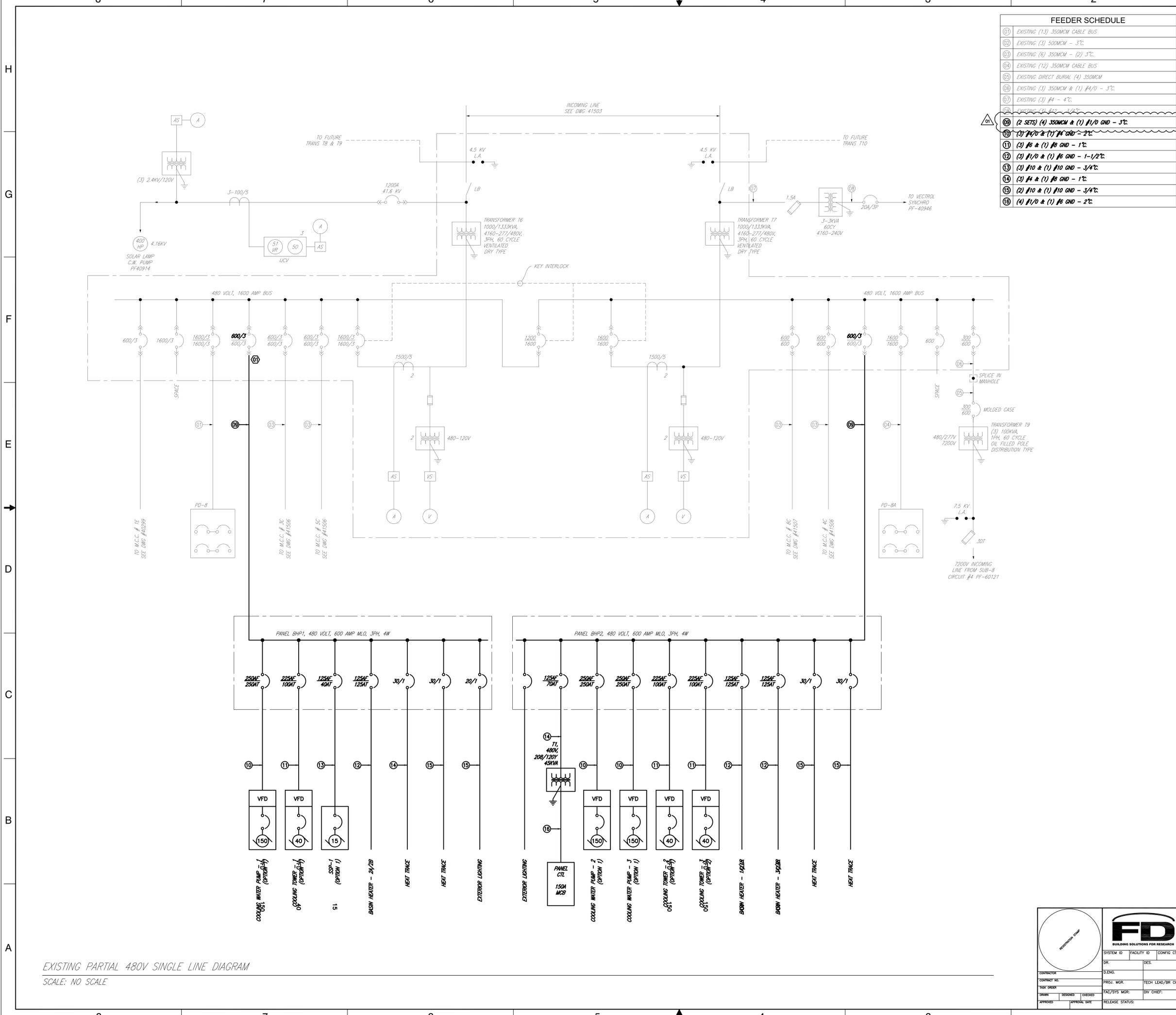
ELECTRICAL PANEL SCHEDULES
 SCALE: NO SCALE

MECHANICAL/ELECTRICAL COORDINATION SCHEDULE
 SEE MECHANICAL AND/OR ARCHITECTURAL PLANS FOR EXACT EQUIPMENT LOCATIONS

NAME/DESIGN	LOCATION	LOAD	UNIT	VOLT	PHASE	LOCATION	CONTROLLER			INTERLOCK	DISCONNECT AT EQUIP.			POWER CONNECTION			REMARKS						
							FB	IB	TYPE		SIZE	COVER	#	ANY	LOCAT	FB		IB	TYPE	SIZE	WIRE	GND	CONDUIT
COOLING TOWER - 1	CT-1	40.0	HP	480	3	PS	MC	MC	VFD	---	HIP	DIV-23	PACK	---	---	---	---	---	---	---	BHP1	100/3	BID OPTION - 1
COOLING TOWER - 2	CT-2	40.0	HP	480	3	PS	MC	MC	VFD	---	HIP	DIV-23	PACK	---	---	---	---	---	---	---	BHP2	100/3	BID OPTION - 1
COOLING TOWER - 3	CT-3	40.0	HP	480	3	PS	MC	MC	VFD	---	HIP	DIV-23	PACK	---	---	---	---	---	---	---	BHP2	100/3	BID OPTION - 2
BASIN HEATER - 1A	CT-1	15.0	KW	208	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	BID OPTION - 2
BASIN HEATER - 1B	CT-1	15.0	KW	208	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NOTE-5
BASIN HEATER - 2A	CT-2	15.0	KW	208	3	PS	MC	MC	COM	NEMA-2S	S/S/SS/P	DIV-23	PACK	---	---	---	---	---	---	---	BHP1	125/3	BID OPTION - 1
BASIN HEATER - 2B	CT-2	15.0	KW	208	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NOTE-5
BASIN HEATER - 3A	CT-3	15.0	KW	208	3	PS	MC	MC	COM	NEMA-2S	S/S/SS/P	DIV-23	PACK	---	---	---	---	---	---	---	BHP2	125/3	BID OPTION - 2
BASIN HEATER - 3B	CT-3	15.0	KW	208	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NOTE-5
SSP-1	BASIN SWEEPER	15.0	HP	480	3	PS	MC	MC	COM	NEMA-2S	S/S/SS/P	DIV-23	PACK	---	---	---	---	---	---	---	---	---	BID OPTION - 1
COOLING WATER PUMP-1	PS	150.0	HP	480	3	PS	MC	MC	VFD	---	HIP	DIV-23	PACK	---	---	---	---	---	---	---	---	---	BID OPTION - 1
COOLING WATER PUMP-2	PS	150.0	HP	480	3	PS	MC	MC	VFD	---	HIP	DIV-23	PACK	---	---	---	---	---	---	---	---	---	BID OPTION - 1
COOLING WATER PUMP-3	PS	150.0	HP	480	3	PS	MC	MC	VFD	---	HIP	DIV-23	PACK	---	---	---	---	---	---	---	---	---	BID OPTION - 1
MODICON PLC	SOUTH BASEMENT	250.0	W	120	1	---	---	---	---	---	---	DIV-23	---	---	---	---	---	---	---	---	---	---	BID OPTION - 1
HEAT TRACE	16" PIPE	3.1	KW	277	1	NU	MC	MC	---	---	---	DIV-23	NU	EC	EC	HR/WP	30/2	2#10	#10	1"	BHP1	40/3	NOTE-1
HEAT TRACE	16" PIPE	3.1	KW	277	1	NU	MC	MC	---	---	---	DIV-23	NU	EC	EC	HR/WP	30/2	2#10	#10	1"	BHP1	30/1	NOTE-1
HEAT TRACE	12" PIPE	1.9	KW	277	1	NU	MC	MC	---	---	---	DIV-23	NU	EC	EC	HR/WP	30/2	2#10	#10	1"	BHP2	30/1	NOTE-1
HEAT TRACE	MISC.	3.5	KW	277	1	NU	MC	MC	---	---	---	DIV-23	NU	EC	EC	HR/WP	30/2	2#10	#10	1"	BHP2	30/1	NOTE-2
CT-1 FAN VIBRATION SWITCH	CT-1	100.0	W	120	1	---	---	---	---	---	---	DIV-23	NU	EC	EC	HR/WP	20/1	2#10	#10	1"	CTL	20/1	BID OPTION - 1
CT-2 FAN VIBRATION SWITCH	CT-2	100.0	W	120	1	---	---	---	---	---	---	DIV-23	NU	EC	EC	HR/WP	20/1	2#10	#10	1"	CTL	20/1	BID OPTION - 1
CT-3 FAN VIBRATION SWITCH	CT-3	100.0	W	120	1	---	---	---	---	---	---	DIV-23	NU	EC	EC	HR/WP	20/1	2#10	#10	1"	CTL	20/1	BID OPTION - 2
CT-1 WATER LEVEL CONTROL	CT-1	100.0	W	120	1	---	---	---	---	---	---	DIV-23	NU	EC	EC	HR/WP	20/1	2#10	#10	1"	CTL	20/1	BID OPTION - 1
CT-2 WATER LEVEL CONTROL	CT-2	100.0	W	120	1	---	---	---	---	---	---	DIV-23	NU	EC	EC	HR/WP	20/1	2#10	#10	1"	CTL	20/1	BID OPTION - 1
CT-3 WATER LEVEL CONTROL	CT-3	100.0	W	120	1	---	---	---	---	---	---	DIV-23	NU	EC	EC	HR/WP	20/1	2#10	#10	1"	CTL	20/1	BID OPTION - 2
OZONE SYSTEM #1 CONTROL PANEL	SOUTH BASEMENT	5.0	KW	208	3	NU	MC	MC	---	---	---	DIV-23	PACK	---	---	---	---	---	---	---	---	---	BID OPTION - 1
OZONE #1 CIRCULATING PUMP	SOUTH BASEMENT	5.0	HP	208	3	PACK	---	---	---	---	---	DIV-23	PACK	---	---	---	---	---	---	---	---	---	NOTE-3
OZONE #1 GENERATOR	SOUTH BASEMENT	---	---	120	1	PACK	---	---	---	---	---	DIV-23	PACK	---	---	---	---	---	---	---	---	---	NOTE-4
OZONE SYSTEM #2 CONTROL PANEL	SOUTH BASEMENT	5.0	KW	208	3	NU	MC	MC	---	---	---	DIV-23	PACK	---	---	---	---	---	---	---	---	---	BID OPTION - 1
OZONE #2 CIRCULATING PUMP	SOUTH BASEMENT	5.0	HP	208	3	PACK	---	---	---	---	---	DIV-23	PACK	---	---	---	---	---	---	---	---	---	NOTE-3
OZONE #2 GENERATOR	SOUTH BASEMENT	---	---	120	1	PACK	---	---	---	---	---	DIV-23	PACK	---	---	---	---	---	---	---	---	---	NOTE-4

ABBREVIATIONS

BI	BUILT IN
CC	CONTROL CONTRACTOR
CCOMB	COMBINATION STARTER WITH DISCONNECT
DDC	DIRECT DIGITAL CONTROL SYSTEM BY HC
EC	ELECTRICAL CONTRACTOR
EL RM	ELECTRICAL ROOM
EXP	EXPLOSION PROOF
F	FUSED
FB	FURNISHED BY
HC	HVAC CONTRACTOR
HR	HUMAN INTERFACE PANEL
HR	HORSEPOWER RATED TOGGLE SWITCH
IB	



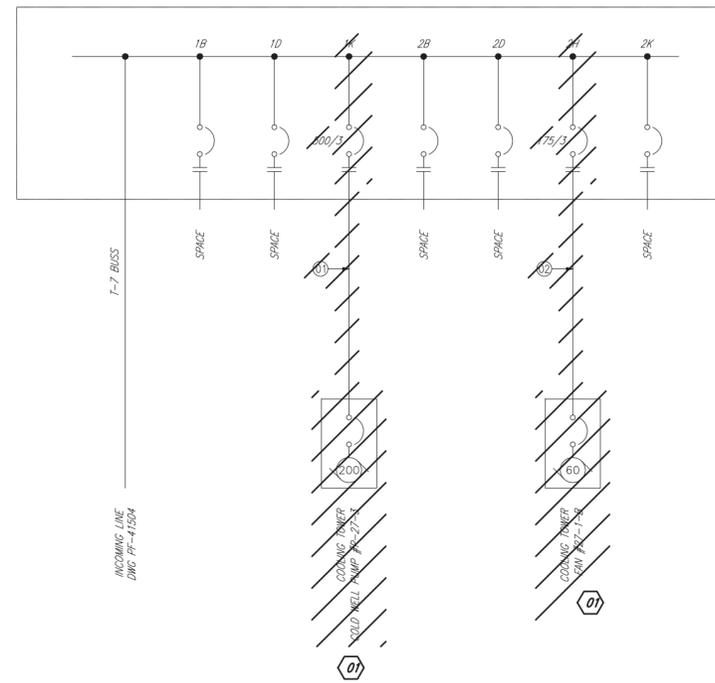
FEEDER SCHEDULE	
01	EXISTING (13) 350MCM CABLE BUS
02	EXISTING (3) 500MCM - 3"
03	EXISTING (6) 350MCM - (2) 3"
04	EXISTING (12) 350MCM CABLE BUS
05	EXISTING DIRECT BURIAL (4) 350MCM
06	EXISTING (3) 350MCM & (1) #4/0 - 3"
07	EXISTING (3) #4 - 4"
08	EXISTING (1) #2 - 2 1/2"
09	(2 SETS) (4) 350MCM & (1) #1/0 GND - 3"
10	(3) #4/0 & (1) #4 GND - 2"
11	(3) #6 & (1) #6 GND - 1"
12	(3) #1/0 & (1) #6 GND - 1-1/2"
13	(3) #10 & (1) #10 GND - 3/4"
14	(3) #4 & (1) #6 GND - 1"
15	(2) #10 & (1) #10 GND - 3/4"
16	(4) #1/0 & (1) #6 GND - 2"

DRAWING NOTES:
 01 REMOVE EXISTING FEEDER TO MCC-11C AND CHANGE BREAKER SETTING FROM 400 AMPERE TRIP TO 600 AMPERE TRIP.

EXISTING PARTIAL 480V SINGLE LINE DIAGRAM
 SCALE: NO SCALE

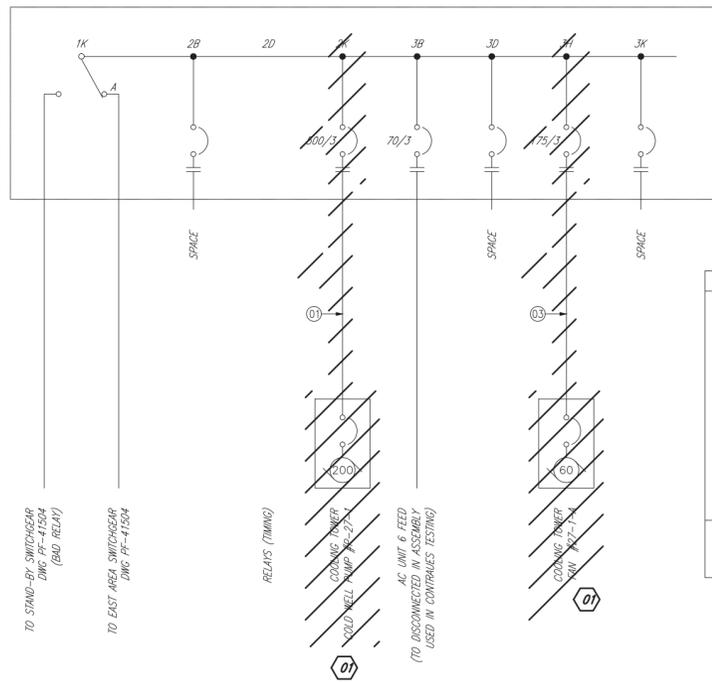
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CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD:	FAC-SYS MGR:	REV DATE:
EDMS REVISION			
CAD DRAWING - DO NOT REVISE MANUALLY			
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION JOHN H. GLENN RESEARCH CENTER LEWIS FIELD CLEVELAND, OHIO			
NASA COOLING TOWER REHABILITATIONS			
ELECTRICAL SINGLE LINE DIAGRAM			
CONTRACTOR:	D.ENG.	SIZE	BLDG/SYS
CONTRACT NO.:	PROJ. MGR.	PROJECT ID	DISC#
TASK ORDER	FAC/SYS MGR.	TECH LEAD/BR CH	PE 1411 - COF14901 - E 801
DRAWN	DESIGNED	CHECKED	UNITS:
APPROVED	APPROVAL DATE	RELEASE STATUS:	SOFTWARE:
SCALE: AS NOTED		OFFICIAL DATE: 02/06/2012	
		SHEET 01 OF 01	

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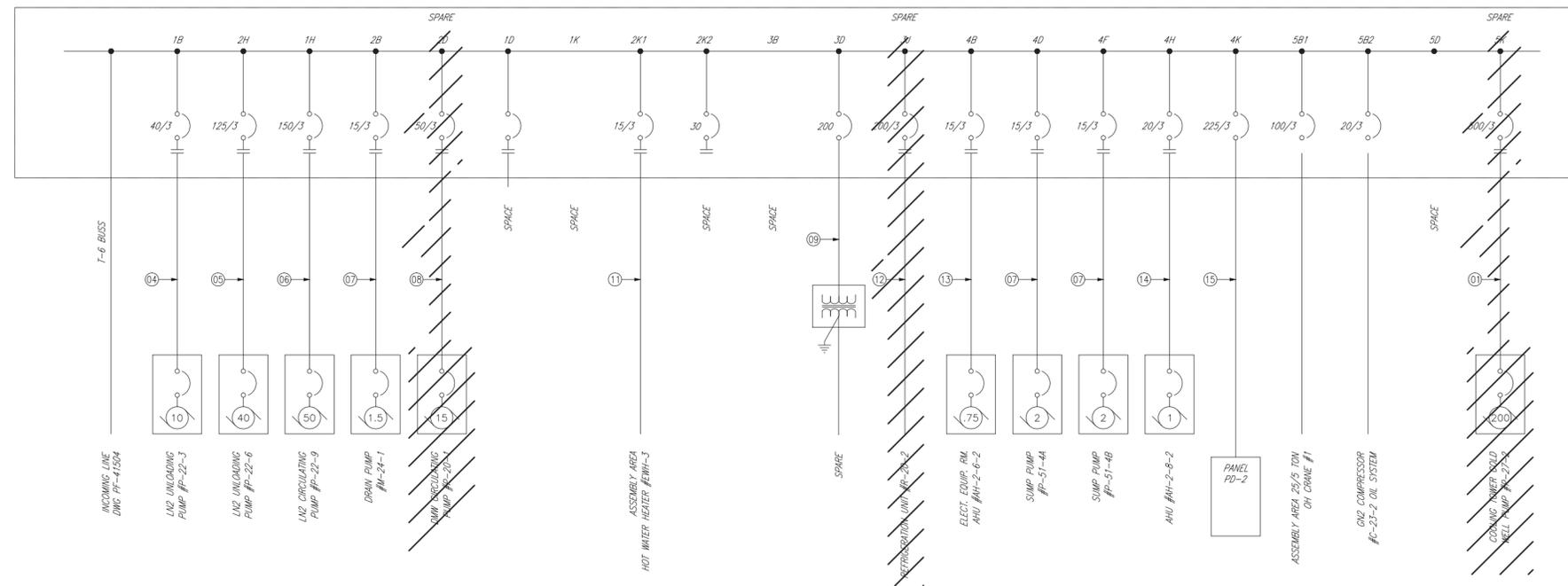
EXISTING PARTIAL MCC #12C (PF-41522) SINGLE LINE DIAGRAM
SCALE: NO SCALE

1B	2B
1D	2D
1K	2H
	2K



EXISTING PARTIAL MCC #11C (PF-40894) SINGLE LINE DIAGRAM
SCALE: NO SCALE

1K	2B	3B
	2D	3D
	2K	3H
		3K



EXISTING PARTIAL MCC #3C (PF-41522) SINGLE LINE DIAGRAM
SCALE: NO SCALE

1B	2B	3B	4B	5B1	5B2
1D	2D	3D	4D	5D	
1H	2H	3J	4F	5K	
			4H		
1K	2K1	2K2	3K	4K	

FEEDER SCHEDULE

01	EXISTING (3) 350KCMIL - 3°C.
02	EXISTING (3) #1 - 2°C.
03	EXISTING (3) #1 - 1-1/2°C.
04	EXISTING (3) #12 & (3) #14 - 1°C. & (2) #12 FOR HEATER
05	EXISTING (3) #6 & (6) #14 - 1°C.
06	EXISTING (3) #2 - 1-1/4°C.
07	EXISTING (3) #12 & (2) #14 - 1°C.
08	EXISTING (3) #8 & (3) #14 - 1-1/4°C.
09	EXISTING
10	NOT USED
11	EXISTING (3) #12 - 3/4°C.
12	EXISTING (3) #4/0 - 2-1/2°C.
13	EXISTING (3) #12 & (3) #14 - 1°C.
14	EXISTING (3) #12 & (2) #14 - 3/4°C.
15	EXISTING (3) 250KCMIL - 2-1/2°C.

DRAWING NOTES:
01 REMOVE EXISTING COOLING TOWER CIRCUITS, INCLUDING FANS AND PUMPS, WITH ASSOCIATED EXPOSED CONDUITS, UNDER GROUND CONDUITS, SERVICE DISCONNECTS, AND WIRING FROM RESPECTIVE MCC TO COOLING TOWER WHEN PROPOSED COOLING TOWER HAS BEEN INSTALLED AND HAS BEEN IN OPERATION FOR AT LEAST 30 DAYS.



CONTRACTOR:	DR.	DES.
CONTRACT NO.:	DLENL.	DES.
TASK ORDER:	PROJ. MGR.	TECH LEAD/BR CH
APPROVED:	DESIGNED:	CHECKED:
APPROVAL DATE:	RELEASE STATUS:	

CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD:	FAC-SYS MGR:	REV DATE:
EDMS REVISION			

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JOHN H. GLENN RESEARCH CENTER
LEWIS FIELD
CLEVELAND, OHIO

NASA COOLING TOWER REHABILITATIONS

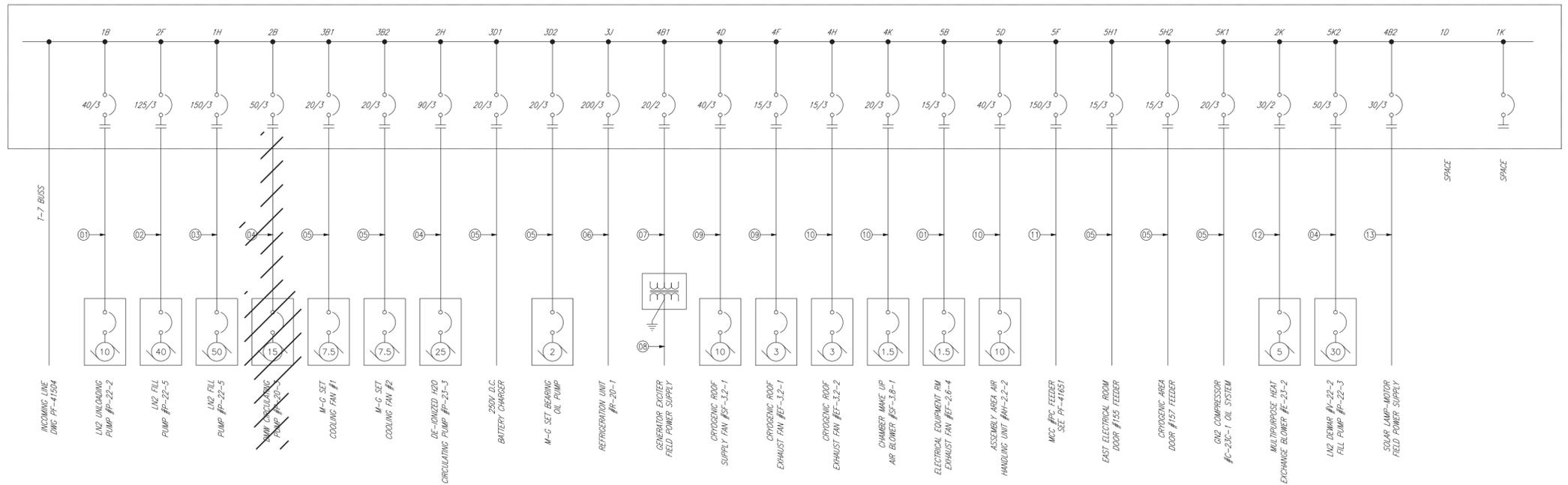
ELECTRICAL SINGLE LINE DIAGRAM

SYSTEM ID	FACILITY ID	CONFIG CTRL.
DR.	DES.	
CONTRACTOR	DLENL.	DES.
CONTRACT NO.	PROJ. MGR.	TECH LEAD/BR CH
TASK ORDER	FAC/SYS MGR.	DRY CHIEF:
APPROVED	DESIGNED	CHECKED
APPROVAL DATE	RELEASE STATUS	

SIZE	BLDG/SYS	PROJECT ID	DISC	TYP	SEQ
PE 1411	-	COF14901	-	E	802
AREA:	UNITS:	SCALE:	AS NOTED	OFFICIAL DATE:	02/06/2012
SHEET	01	OF	01	REVISION	

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FEEDER SCHEDULE	
01	EXISTING (3) #12 & (3) #14 - 1°C.
02	EXISTING (3) #6 & (6) #14 - 1°C.
03	EXISTING (3) #2 - 1-1/4°C.
04	EXISTING (3) #8 & (3) #14 - 1-1/4°C.
05	EXISTING (3) #12 - 3/4°C.
06	EXISTING (3) #4/0 - 2-1/2°C.
07	EXISTING (2) #12 - 3/4°C.
08	EXISTING (2) #16
09	EXISTING (3) #12 & (2) #14 - 3/4°C.
10	EXISTING (3) #12 & (5) #14 - 1°C.
11	EXISTING (3) #1/0 - 2°C.
12	EXISTING (3) #8, (2) #14 & (16) #16 - 2°C.
13	EXISTING (3) #10 - 3/4°C.



1B	2B	3B1	3B2	4B1	4B2	5B
1D	2F	3D1	3D2	4D	5D	
1H		3J		4F	5F	
	2H			4H	5H1	5H2
1K	2K	3K		4K	5K1	5K2

EXISTING MCC #4C (PF-41522) SINGLE LINE DIAGRAM
SCALE: NO SCALE



CHG	NUM	DESCRIPTION	APP/DATE
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NASA COOLING TOWER REHABILITATIONS			
ELECTRICAL SINGLE LINE DIAGRAM			
CONTRACTOR	DR.	DES.	
CONTRACT NO.	PROJ. MGR.	TECH LEAD/BR CH	
TASK ORDER	FAC/SYS MGR:	DRY CHIEF:	
APPROVED	DESIGNED	CHECKED	RELEASE STATUS:
DATE	DATE	DATE	
SIZE	BLDG/SYS	PROJECT ID	DISC#
PE 1411		COF14901	E 803
AREA:	UNITS:	SOFTWARE:	SHEET 01 OF 01
SCALE: AS NOTED	OFFICIAL DATE: 02/06/2012	REVISION	

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NOTE:
SEE DRAWING PE-1411-COF14901-GI-001 FOR
DRAWING INDEX.



PHOTOGRAPH A
EXISTING DEMINERALIZER TANK AND WORK STATION
(TO BE REMOVED)



PHOTOGRAPH B
EXISTING DEMINERALIZER TANK AND WORK STATION
(TO BE REMOVED)



PHOTOGRAPH C
EXISTING COOLING TOWER ELEVATION
(TO BE REMOVED)



PHOTOGRAPH D
EXISTING COOLING TOWER ELEVATION
(TO BE REMOVED)



PHOTOGRAPH E
EXISTING BUTTERFLY VALVE PIT
(TO BE FILLED WITH GRANULAR BACKFILL)



PHOTOGRAPH F
EXISTING BUTTERFLY VALVE PIT
(TO BE FILLED WITH GRANULAR BACKFILL)

GENERAL PHOTOGRAPHS
N.T.S.

CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD	FAC-SYS MGR	REV DATE
EDMS REVISION	N.NNNNNNNNN	N.NNNNNNNNN	MMDD/YYYY
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NASA COOLING TOWER REHABILITATIONS			
COOLING TOWER SPF GENERAL PHOTOGRAPHS			
SIZE	BLDG/SYS	PROJECT ID	DISC TYP SEQ
PE 1411	-	COF14901	- GR 901
AREA:	UNITS: ENGLISH	SOFTWARE: AUTOCAD 2002	SHEET 01 OF 01
APPROVED	DESIGNED	DRAWN	REVISION
APPROVAL DATE	RELEASE STATUS	OFF SHEET	REVISION
SCALE: XXXX		OFFICIAL DATE: MMDD/YYYY	

FD

BUILDING SOLUTIONS FOR RESEARCH

SYSTEM ID: XXXX FACILITY ID: XXXX CONTR. CTRL: XXXX
DR. DES.