FGI Preservation Board Application for HVAC Replacement
December 2024

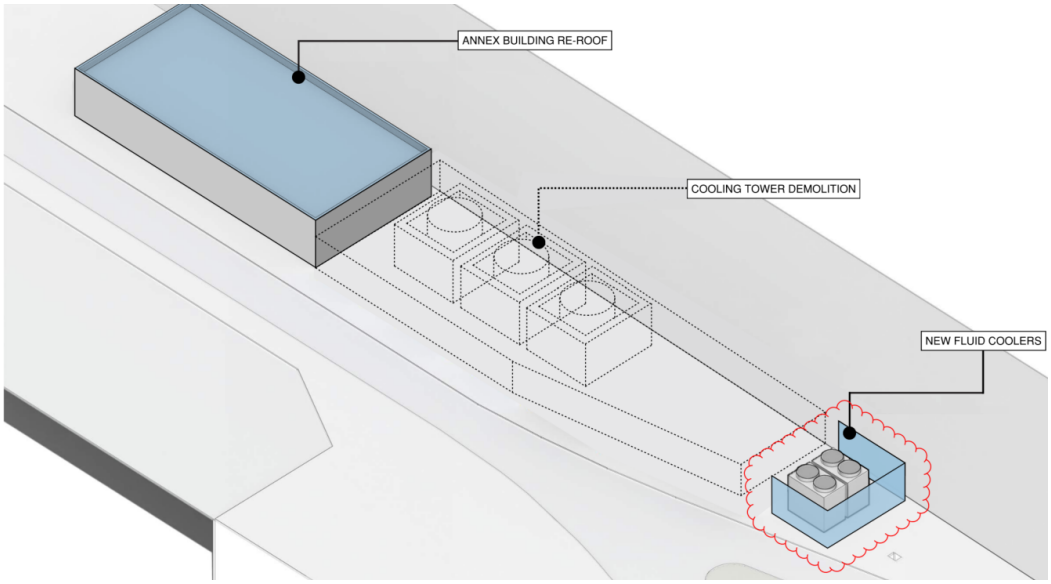
Background

From its opening in 2002, Lumen Field and Event Center has been a world class facility from its stadium turf to theater space and all points in between. As the operator of the venue, First & Goal, Inc. (FGI) committed to the Washington State Public Stadium Authority that the facility would remain world class under its management. As the venue nears its 23rd year of operation, the heating, ventilation and air-conditioning system (HVAC) is nearing the end of its useful life and is ready for replacement. With the approach of the FIFA World Cup, FGI is moving quickly to ensure the facilities are operating at their optimal best.

The Project

The proposed fluid cooler project will install a new, more energy efficient system just south of the existing, decommissioned Kingdome cooling tower structures. The plan is to bring the new system fully online and functional before transitioning over from the 2002 system. This project will require a new foundation, new fluid coolers, mechanical, electrical, plumbing and private utility work, as well as the installation of new screening and access fencing around the structure.

The decommissioned Kingdome cooling towers stand at approximately 40 feet tall. By contrast, the proposed new cooling fluid system is 20 feet tall and will not be visible from the edges of the Lumen Field property lines in Pioneer Square.



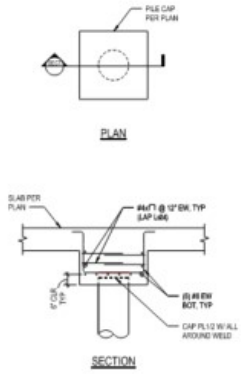
Isometric Plan

View from northern edge of property

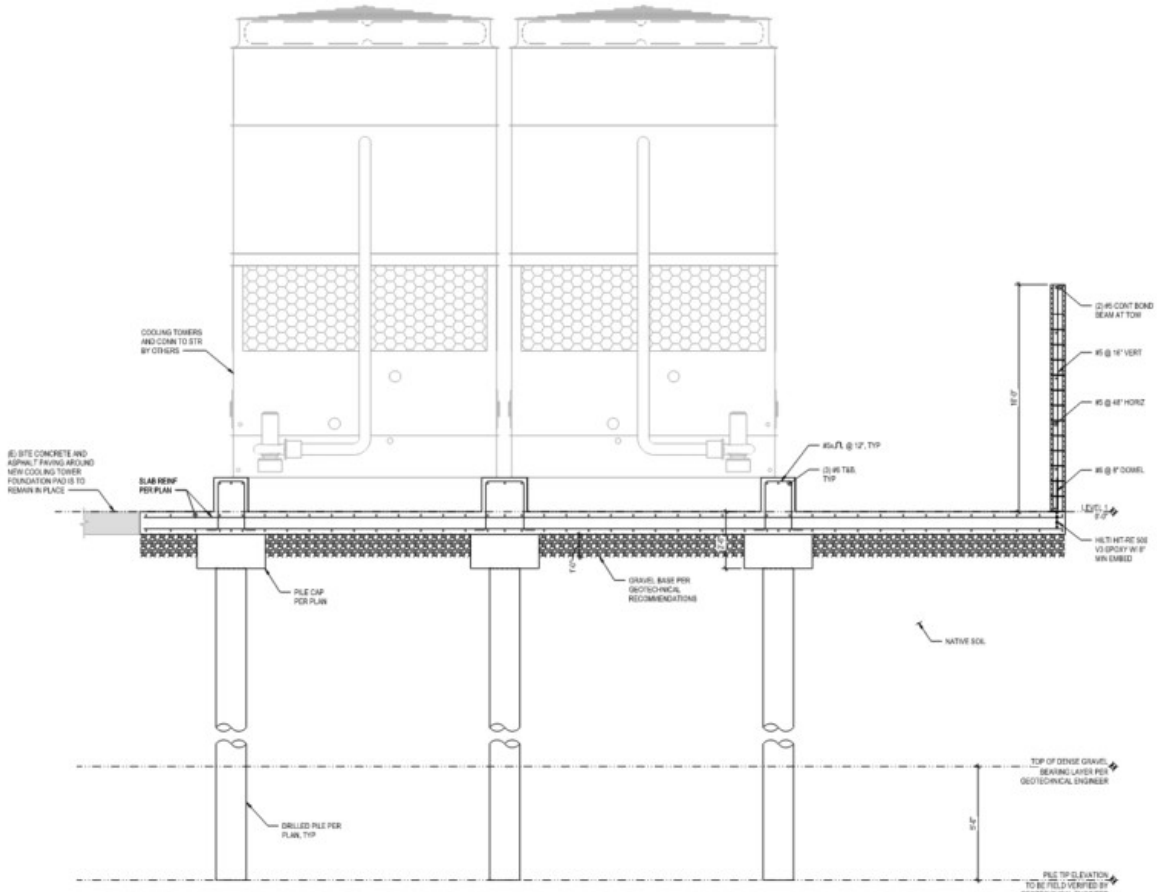
View from northwest edge of property

View from western edge of property


Fluid Coolers
~20' Height
Fluid Coolers fencing
10' Height



17 TYPICAL PILE SECTION



18 NEW COOLING TOWER YARD FOUNDATION SECTION
1/2" = 1'-0"

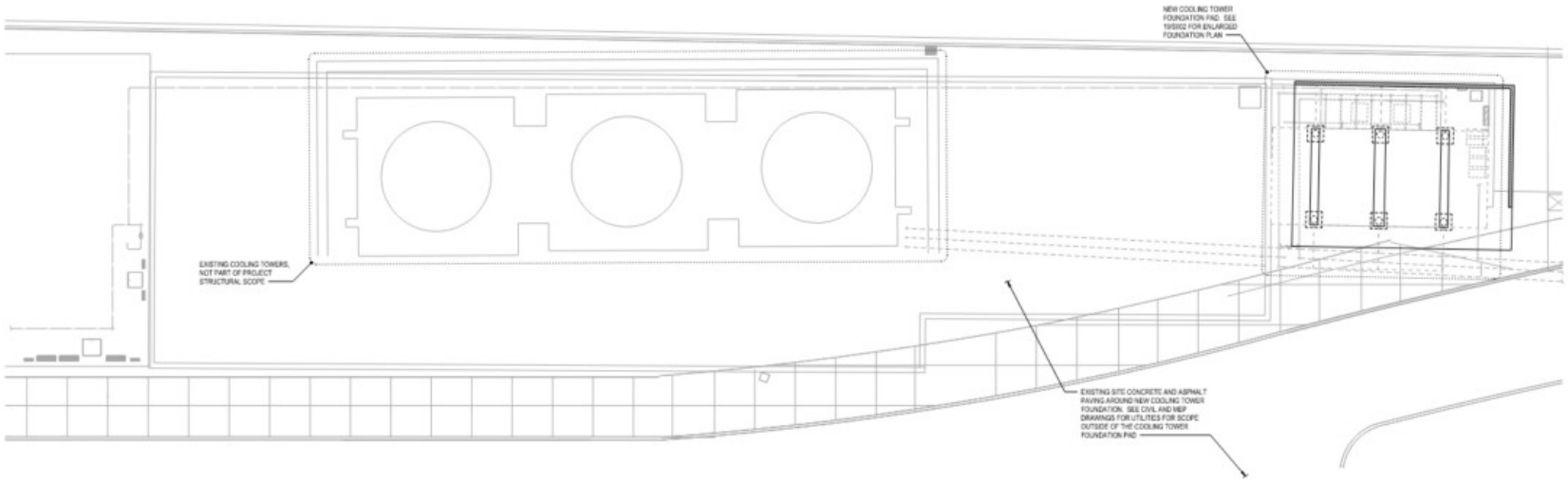
LUMEN FIELD

LUMEN FIELD FLUID COOLER REPLACEMENT

ISSUED FOR PERMIT

COOLING TOWER SECT AND DETAILS

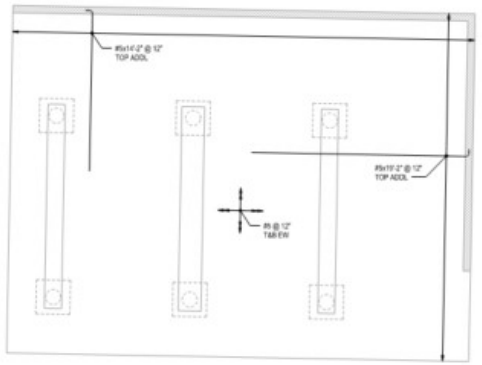
S003



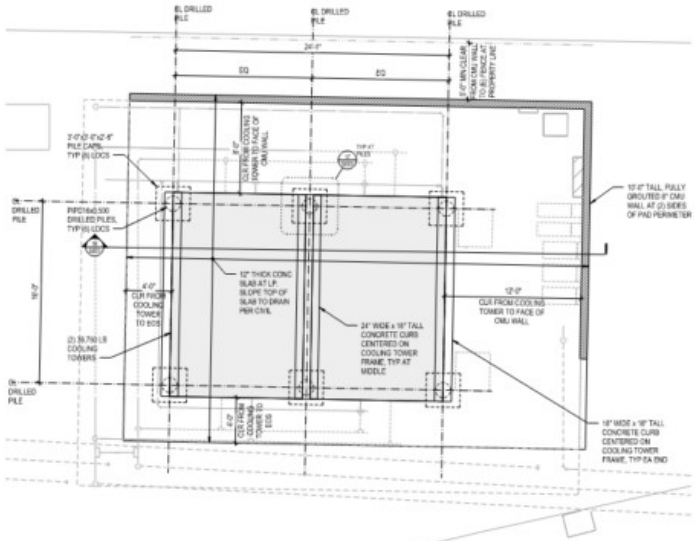
NOTES:

1. PROJECT STRUCTURAL SCOPE OF WORK IS LIMITED TO THE CONCRETE FOUNDATION PAD, DRILLED PILES, AND PERIMETER CMU WALL AT THE NEW COOLING TOWERS. SITE PLAN SHOWN FOR INFORMATION ONLY.
2. REFER TO THE ARCHITECTURAL, CIVIL, AND MEP DRAWINGS FOR DETAILED SITE PLAN INFORMATION.
3. REFER TO THE ARCHITECTURAL AND CIVIL DRAWINGS FOR LOCATION OF COOLING TOWER FOUNDATION PAD RELATIVE TO EXISTING BENCHMARKS.

6 OVERALL EXISTING AND NEW COOLING TOWER YARD SITE PLAN
1/8" = 1'-0"



17 NEW COOLING TOWER YARD REINFORCING PLAN



NOTES:

1. FOUNDATION DESIGN IS BASED ON A PAIR COOLING TOWERS SUPPPLIED BY EVAPCO, INC. THE DESIGN BASIS COOLING TOWERS ARE EVAPCO UNIT ESWM 12-440181X-SP WITH A TOTAL OPERATING WEIGHT ON 77,500 LBS.
2. THE LAYOUT OF THE DRILLED PIER FOUNDATIONS AND CONCRETE CURBS THAT SUPPORT THE COOLING TOWERS IS BASED ON AN OVERALL COMBINED COOLING TOWER FOOTPRINT OF 24'-1 1/8" x 18'-0" x 207-2 1/8" TALL PER THE EVAPCO, INC DRAWINGS DATED 11/25/2024. CONTRACTOR TO VERIFY FINAL COOLING TOWER DIMENSIONS WITH THE MANUFACTURER AND ADJUST LAYOUT OF THE DRILLED PIERS AND THE SUPPORTING CONCRETE CURBS TO FIT THE FINAL COOLING TOWER DIMENSIONS.
3. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS AND UTILITIES PRIOR TO PROCEEDING WITH INSTALLATION OF DRILLED STEEL PIPE PILES. NOTIFY THE OWNER AND DESIGN TEAM OF ANY POTENTIAL CONFLICTS FOR REVIEW.
4. THE REQUIRED CLEARANCES FROM THE EDGE OF THE COOLING TOWER UNITS TO THE EDGE OF SLAB (EOS) AND INSIDE FACE OF CMU WALLS HAVE BEEN DETAILED BASED ON CRITERIA PROVIDED BY THE PROJECT MEP ENGINEERS. VERIFY ALL CLEARANCES WITH THE MEP ENGINEERS AND THE FINAL LAYOUT OF THE COOLING TOWERS AND OTHER MEP EQUIPMENT THAT IS SUPPORTED OFF THE FOUNDATION CONCRETE SLAB AND PERIMETER CMU WALLS. SUBMIT DETAILED CONCRETE LAYOUT DRAWINGS FOR DESIGN TEAM REVIEW.

19 NEW COOLING TOWER YARD FOUNDATION PLAN
1/8" = 1'-0"

LUMEN FIELD

LUMEN FIELD FLUID COOLER REPLACEMENT

ISSUED FOR PERMIT

FOI PROJECT #: 21NM
CA PROJECT #: 400231

COOLING TOWER FOUNDATION PLANS

S002

LUMEN FIELD

LUMEN FIELD FLUID COOLER REPLACEMENT

800 OCCIDENTAL AVE S. SEATTLE, WASHINGTON

DECEMBER 3, 2024
ISSUED FOR PERMIT
project no.: KC-40023

1 SITE PLAN - PROJECT LOCATION
1: 10000

CRAWFORD ARCHITECTS
1801 McGee Street; Suite 200
Kansas City, Missouri, 64108
tel: 816.421.2640

HENDERSON ENGINEERS
8345 Lenexa Dr #300, Lenexa, KS 66214
tel: 913.742.5000

THESE DOCUMENTS ARE INTENDED FOR PERMIT REVIEW OF THE REPLACEMENT OF HVAC FOR THE STADIUM AND EVENT CENTER
NOTE TO CONTRACTORS,
SUB-CONTRACTORS, FABRICATORS & INSTALLERS:
PLEASE READ, REVIEW AND REFER TO ALL DRAWINGS FOR COMPLETE BASIS OF DESIGN.

PARCEL NUMBER: 766620-4876

LEGAL DESCRIPTION: LOTS 5-35, BLK 285 & LOTS 5-35, BLK 325, SEATTLE TIDE LANDS & VAC 3RD AVE S (VO#10552) EXCEPT POR OF LOT 5, BLK 325 LYING N OF ADJUSTED LINE PER LBA# 9806721 & EXCEPT POR OF LOT 5,BLK 285, & VAC 3RD AVE S (VO #10552) LYING N OF THE ADJUSTED LINE PER LBA#9806720

ENGINEER OF RECORD: HENDERSON ENGINEERS
ARCHITECTURAL SUPPORT: CRAWFORD ARCHITECTS

STRUCTURAL PEER REVIEW
MAGNUSSON KLEMENCIC ASSOCIATES
1301 Fifth Avenue, Suite 3200
Seattle, Washington 98101-2699
tel: 206.292.1200

LUMEN FIELD

CLIENT
First & Goal Inc.
800 Occidental Ave S
Seattle, WA 98134
tel: 206-381-7555

CRAWFORD

ARCHITECT
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MEP
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2330005474
WA CORPORATE NO: 1754

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LUMEN FIELD FLUID COOLER REPLACEMENT
800 Occidental Avenue South, Seattle, WA 98134

SEAL:
#9095 REGISTERED ARCHITECT
DAVID MERLE MURPHY
STATE OF WASHINGTON
12/02/2024

No.	Rev.	Date

12/03/2024
ISSUED
FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023
Title:
FLUID COOLER
REPLACEMENT

COVER
sheet no.

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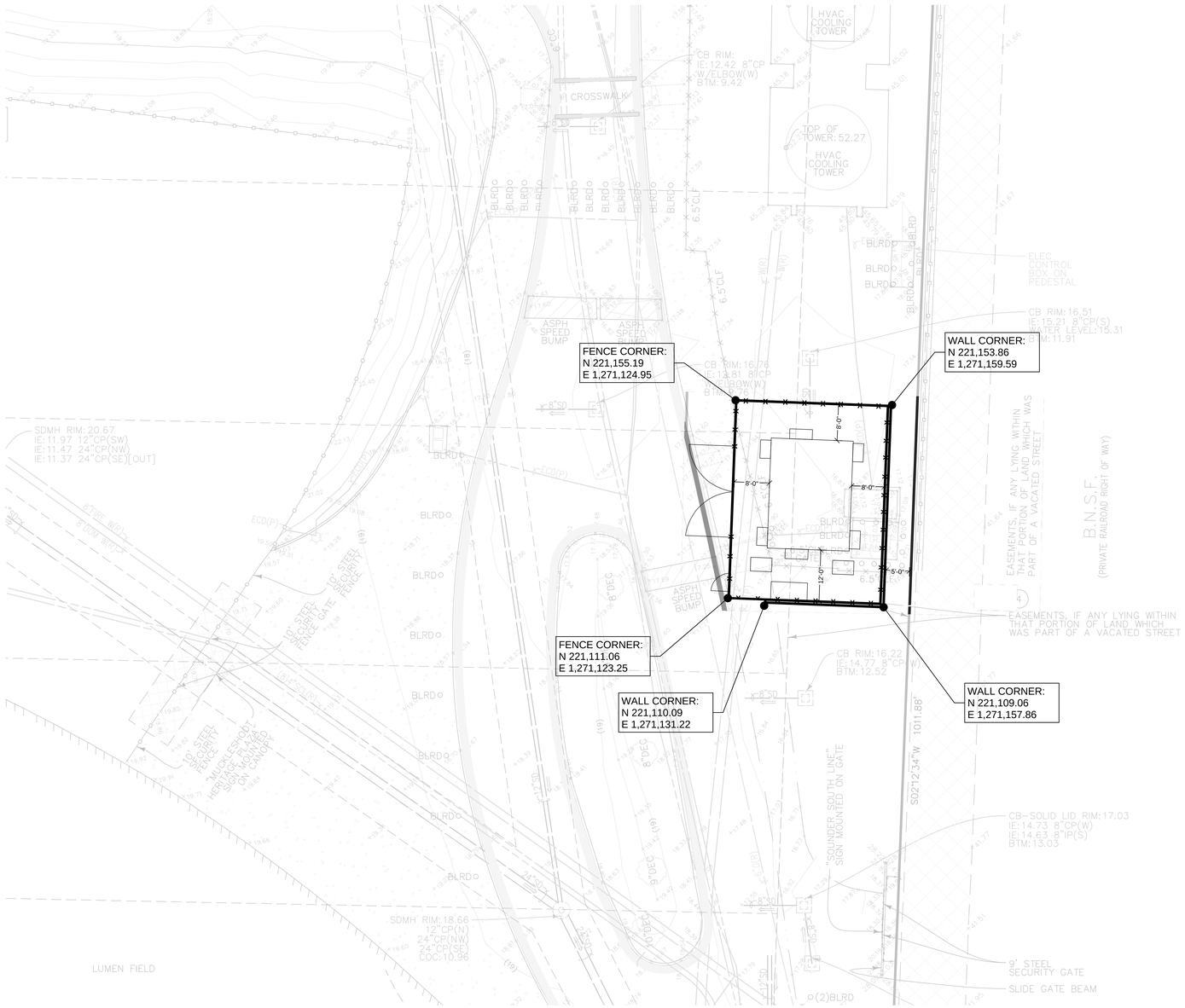
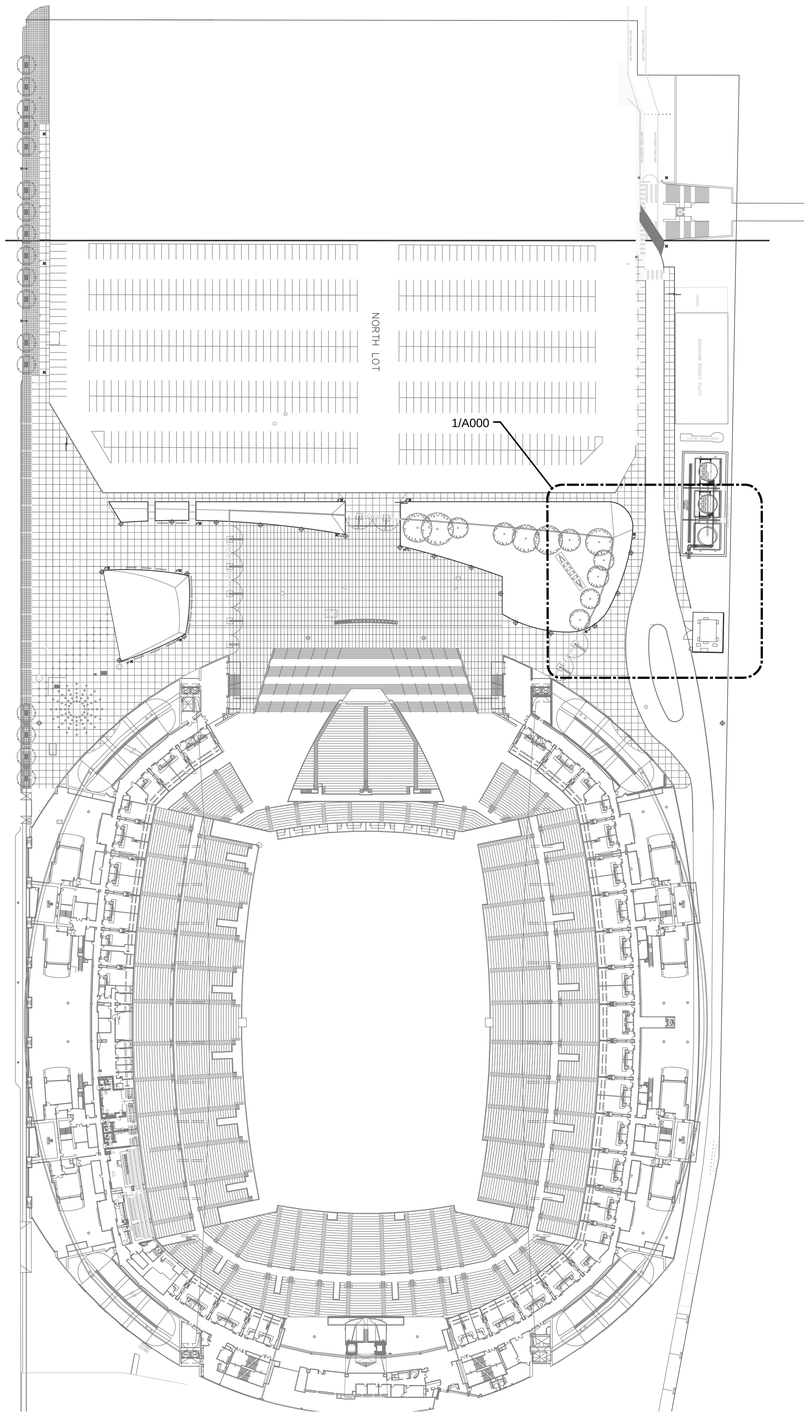


1 SITE REFERENCE PLAN
NOT TO SCALE



2 SITE LOCATION PLAN
NOT TO SCALE

LUMEN FIELD

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First & Goal Inc.
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CRAWFORD

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MEP
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8345 Lenexa Drive, Suite 300
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WA CORPORATE NO: 1754

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1301 Fifth Avenue, Suite 3200
Seattle, Washington 98101-2699
tel: 206.292.1200

LUMEN FIELD FLUID COOLER REPLACEMENT

800 Occidental Avenue South, Seattle, WA 98134

SEAL:
8995 REGISTERED ARCHITECT
DAVID MERLE MURPHY
STATE OF WASHINGTON
12/03/2024

No.	Rev.	Date

12/03/2024
ISSUED
FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023
Title :

SITE PLAN

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sheet no.

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LEGEND

DESCRIPTION	SYMBOL
LIMITS OF WORK	
PROPERTY LINE	
EASEMENT LINE	
CENTERLINE	
GRADE BREAK	GB
MAJOR GRADING ELEVATION CONTOUR	50
MINOR GRADING ELEVATION CONTOUR	49
STORM DRAIN	8" SD
SANITARY SEWER LINE	8" SS
WATER LINE	8" W
COORDINATE POINT	N 1,433,544.34 E 2,454,789.02
MEP EQUIPMENT	

SITE HATCHES

FULL DEPTH CONCRETE PAVEMENT PATCH	
FULL DEPTH ASPHALT PAVEMENT PATCH	
CONCRETE EQUIPMENT SLAB	

ABBREVIATIONS

&	AND
@	AT
Δ, D	DEFLECTION ANGLE
^, DEG	DEGREE
~, DIA	DIAMETER
#	NUMBER
%	PERCENT
f'c	CONCRETE COMPRESSIVE STRENGTH
fy	REINFORCING STEEL YIELD STRENGTH
ABAN	ABANDON (-ED)
AC	ASBESTOS CEMENT, ASPHALT CONCRETE
AD	AREA DRAIN
ADA	AMERICANS WITH DISABILITIES ACT
ADDL	ADDITIONAL
ADJ	ADJACENT, ADJUST (-ED, -MENT, -ABLE)
AGGR	AGGREGATE
ALT	ALTERNATE, ALTERNATIVE
APPD	APPROVED
APPROX	APPROXIMATE (-LY)
ARCH	ARCHITECT (-URAL)
ASPH	ASPHALT
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ATB	ASPHALT TREATED BASE
AVE	AVENUE
BCR	BEGIN CURB RETURN
BFP	BACK FLOW PREVENTER
BLDG	BUILDING
BLK	BLOCK (-ING)
BM	BEAM, BENCH MARK
BMP	BEST MANAGEMENT PRACTICE
BOL	BOLLARD
BOT	BOTTOM
BOW	BOTTOM OF WALL
BSMT	BASEMENT
BTWN	BETWEEN
BVC	BEGIN VERTICAL CURVE
CANT	CANTILEVER
CB	CATCH BASIN
CC	CENTER TO CENTER
CDF	CONTROLLED DENSITY FILL
CFS	CUBIC FEET PER SECOND
CI	CAST IRON
CIP	CAST-IN-PLACE
CJ	CONSTRUCTION JOINT
CL	CENTERLINE
CLR	CLEAR (-ANCE)
CMP	CORRUGATED METAL PIPE
CNR	CORNER
CO	CLEAN OUT
COL	COLUMN
COMB	COMBINATION
COMM	COMMUNICATION
CON	CONCENTRIC
CONC	CONCRETE
COND	CONDUIT, CONDITION
CONN	CONNECT (-ION)
CONST	CONSTRUCTION
CONT	CONTINUATION, CONTINUE, CONTINUOUS
CONTR	CONTRACTOR
COORD	COORDINATE, COORDINATION
CORP	CORPORATION
COS	CITY OF SEATTLE
CP	CONTROL POINT, CENTER POINT
CTB	CEMENT TREATED BASE
CTR	CENTER
CU	CUBIC
CULV	CULVERT
D, Δ	DEFLECTION ANGLE
DB	DUCTBANK
DEG, ^	DEGREE
DEMO	DEMOLISH, DEMOLITION
DEPT	DEPARTMENT
DET	DETAIL
DI	DUCTILE IRON
DIA, ~	DIAMETER
DIAG	DIAGONAL
DICA	DRILLED-IN CONCRETE ANCHOR
DIM	DIMENSION
DIR	DIRECTION
DOM	DOMESTIC
DS	DOWNSPOUT
DWG	DRAWING
DWL	DOWEL
DWY	DRIVEWAY
(E)	EXISTING
E	EAST (-ING)
EA	EACH
ECC	ECCENTRIC
ECR	END CURB RETURN
EG	EXISTING GRADE
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
EMBED	EMBED (-DED, -MENT)
ENGR	ENGINEER
EOR	ENGINEER OF RECORD
EQ	EQUAL
EQUIP	EQUIPMENT
ESMT	EASEMENT
EST	ESTIMATE (-D)
EVC	END VERTICAL CURVE
EW	EACH WAY
EXCAV	EXCAVATION
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR
FD	FOUNDATION DRAIN, FOOTING DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDN	FOUNDATION
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FIN	FINISH (-ED)
FL	FLOOR, FLOWLINE, FLANGE
FM	FORCE MAIN
FT	FOOT, FEET
FTG	FOOTING
G	GAS, GUTTER
GA	GAGE, GAUGE
GAL	GALLON
GALV	GALVANIZE (-D)
GB	GRADE BREAK
GEN	GENERAL
GPM	GALLONS PER MINUTE
GV	GATE VALVE
H	HORIZONTAL
HDPE	HIGH DENSITY POLYETHYLENE
HH	HANDHOLE
HMA	HOT MIX ASPHALT
HORIZ	HORIZONTAL
HP	HIGH POINT
HT	HEIGHT
HTB	HORIZONTAL THRUST BLOCK
HYD	HYDRANT
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCH
INCL	INCLUDE (-D), INCLUDING
INFO	INFORMATION
INT	INTERIOR, INTERSECTION
INV	INVERT
IRR	IRRIGATION
JT	JOINT
LARCH	LANDSCAPE ARCHITECT (-URAL)
LAT	LATERAL
LB	POUND
LF	LINEAR FEET
LOC	LOCATE (-D), LOCATION
LP	LOW POINT
LT	LEFT
LVL	LEVEL
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MFR	MANUFACTURE (-R)
MH	MANHOLE
MIC	MONUMENT IN CASE
MIN	MINIMUM, MINUTE
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
ML	MATCHLINE
MON	MONUMENT
MSE	MECHANICALLY STABILIZED EARTH
MUTCD	MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
N	NORTH (-ING)
NA	NOT APPLICABLE
NE	NORTHEAST
NIC	NOT IN CONTRACT
NOM	NOMINAL
NTS	NOT TO SCALE
NW	NORTHWEST
OC	ON CENTER
OD	OUTSIDE DIAMETER
OPNG	OPENING
OPP	OPPOSITE (HAND)
OPT	OPTION (-AL)
ORIG	ORIGINAL
OWS	OIL/WATER SEPARATOR
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE, PORTLAND CEMENT CONCRETE
PED	PEDESTRIAN
PERF	PERFORATED
PERP	PERPENDICULAR
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
PL	PROPERTY LINE, PLATE
PLUMB	PLUMBING
POLY	POLYETHYLENE
PRC	POINT OF REVERSE CURVATURE
PROP	PROPERTY
PROT	PROTECTION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY, POINT
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
Q	FLOW RATE
R	RADIUS
RCMD	RECOMMEND (-ED)
RCP	REINFORCED CONCRETE PIPE
RED	REDUCER, REDUCING
REF	REFER (-ENCE)
REINF	REINFORCE (-D, -MENT), REINFORCING
REQD	REQUIRED
RET	RETAINING
REV	REVISION
RIM	RIM ELEVATION
RJ	RESTRAINED JOINT
RL	RAIN LEADER
ROW	RIGHT-OF-WAY
RPM	RAISED PAVEMENT MARKER
RT	RIGHT
RW	RECYCLED WATER
S	SLOPE, SOUTH
SCHED	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SE	SOUTHEAST
SECT	SECTION
SHT	SHEET
SIM	SIMILAR
SOG	SLAB ON GRADE
SPC	SPACE
SPEC	SPECIFICATION
SQ	SQUARE
SS	SANITARY SEWER
SSMH	SANITARY SEWER MANHOLE
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STRUC	STRUCTURAL, STRUCTURE
SW	SOUTHWEST
SYM	SYMMETRICAL
TB	THRUST BLOCK
TC	TOP OF CURB
TD	TRENCH DRAIN
TEMP	TEMPORARY
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TOF	TOP OF FOOTING
TOW	TOP OF WALL
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UTIL	UTILITY
V	VERTICAL
VAC	VACUUM
VB	VALVE BOX
VC	VERTICAL CURVE
VDM	VERTICAL DRAINAGE MATERIAL
VERT	VERTICAL
VIF	VERIFY IN FIELD
VOL	VOLUME
VTB	VERTICAL THRUST BLOCK
W	WATER, WEST, WIDTH
W/	WITH
W/O	WITHOUT
WHT	WHITE
WP	WORK POINT
WPJ	WEAKENED PLANE JOINT
WS	WATER SURFACE
WT	WEIGHT
WWF	WELDED WIRE FABRIC
YD	YARD
YEL	YELLOW

GENERAL NOTES

1. EXISTING CONDITIONS SHOWN ARE PER THE PROJECT SITE SURVEY PROVIDED BY BUSH, ROED & HITCHINGS, INC. DATED 9/13/2024. THE CONTRACTOR SHALL VERIFY THE EXISTING CONDITIONS AND NOTIFY THE OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.
2. HORIZONTAL DATUM IS NAD 83/2011 (EPOCH 2010). REFER TO THE PROJECT SITE SURVEY FOR ADDITIONAL INFORMATION.
3. VERTICAL DATUM IS NAVD 88 REFER TO THE PROJECT SITE SURVEY FOR ADDITIONAL INFORMATION.
4. THE CONTRACTOR SHALL COMPLY WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT.
5. WORK SHALL CONFORM TO THE CITY OF SEATTLE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, 2020 EDITION, AND THE CITY OF SEATTLE STANDARD PLANS, 2020 EDITION. STANDARDS. A COPY OF THESE DOCUMENTS SHALL BE ON-SITE DURING CONSTRUCTION.
6. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL DURING CONSTRUCTION.
7. THE LIMITS OF WORK INDICATED ON THE CIVIL DRAWINGS APPLY TO THE CIVIL SITE AND UTILITY WORK. WORK OUTSIDE OF THE LIMITS OF WORK MAY BE REQUIRED BY OTHER DISCIPLINES OR TRADES. UNLESS NOTED OTHERWISE, NO CIVIL-RELATED WORK SHALL BE PERFORMED OUTSIDE THE LIMITS OF WORK WITHOUT PRIOR APPROVAL FROM THE OWNER'S REPRESENTATIVE. ANY WORK ADJACENT TO THE LIMITS OF WORK SHALL BE CARRIED OUT ON THE PROJECT SIDE.
8. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER (1-800-424-5555) A MINIMUM OF THREE DAYS PRIOR TO ANY EXCAVATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE SERVICES OF A PROFESSIONAL UNDERGROUND UTILITY LOCATION SERVICE TO LOCATE AND MAINTAIN MARKINGS THAT INDICATE LOCATIONS OF UNDERGROUND UTILITIES IN THE CONSTRUCTION AREA.

DRAWING LIST

DRAWING NUMBER	DRAWING TITLE
C0.01	GENERAL NOTES, LEGEND, ABBREVIATIONS AND DRAWING LIST
C0.02	NOTES
C0.03	OVERALL KEY PLAN
C3.01	SITE, PAVING, AND GRADING PLAN
C5.01	STORM DRAINAGE PLAN
C6.01	UTILITY PLAN
C8.01	SECTIONS AND DETAILS

LUMEN FIELD

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Seattle, WA 98134
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Crawford Architects CA, Inc.
1801 McGee Street, Suite 200
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2230005474
WA.CORPORATE NO: 1754

MAGNUSSON KLEMENCIC ASSOCIATES

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1301 Fifth Avenue, Suite 3200
Seattle, Washington
98101-2699
tel: 206.292.1200

LUMEN FIELD FLUID COOLER REPLACEMENT

800 Occidental Avenue South, Seattle, WA 98134

SEAL: STEVEN DOUGLAS HALUSCHAK, STATE OF WASHINGTON, 29564, REGISTERED PROFESSIONAL ENGINEER
12/03/2024

No.	Rev.	Date

12/03/2024
ISSUED FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

Title :
GENERAL NOTES, LEGEND, ABBREVIATIONS AND DRAWING LIST

C0.01
sheet no.

SITE DEMOLITION NOTES

1. THE CONTRACTOR SHALL PROVIDE, ERECT AND MAINTAIN ALL TEMPORARY BARRIERS AND SECURITY DEVICES AS NECESSARY FOR THE PROTECTION OF THE ADJACENT PUBLIC IMPROVEMENTS WITHIN THE STREET RIGHT-OF-WAYS.
2. THE CONTRACTOR SHALL COORDINATE THE REMOVAL, ABANDONMENT AND/OR CAPPING OF EXISTING UTILITIES WITH THE APPLICABLE UTILITY AGENCY, INCLUDING BUT NOT LIMITED TO:
   A. EXISTING WATER CONNECTIONS (SEATTLE PUBLIC UTILITIES).
   B. EXISTING NATURAL GAS CONNECTIONS (PUGET SOUND ENERGY)
   C. EXISTING TELEPHONE CONNECTIONS (CENTURY LINK).
   D. EXISTING SANITARY SEWER (SEATTLE PUBLIC UTILITIES).
   E. EXISTING POWER CONNECTIONS (SEATTLE CITY LIGHT).
   F. EXISTING FIBER OPTICS (VARIOUS, CONTRACTOR TO VERIFY).
   G. EXISTING STORM DRAINAGE (SEATTLE PUBLIC UTILITIES).
3. EXCAVATION FOR REMOVAL OF UTILITIES SHALL BE IN ACCORDANCE WITH THE PROJECT'S GEOTECHNICAL ENGINEERING REPORT. THE CONTRACTOR SHALL COMPLY WITH THE REPORT RECOMMENDATIONS FOR TEMPORARY CONSTRUCTION SLOPES AND SHALL NOT EXCEED THOSE SLOPES WITHOUT PRIOR APPROVAL OF THE GEOTECHNICAL ENGINEER.
4. CAP OR PLUG UTILITY SERVICES AT THE LIMITS OF EXCAVATION OR AT THE LIMITS OF DEMOLITION, UNLESS NOTED OTHERWISE.
5. ABANDONMENT OF UTILITY PIPELINES 12 INCHES IN DIAMETER AND LARGER AND ALL UTILITIES THAT CROSS A PUBLIC ROADWAY REGARDLESS OF SIZE SHALL BE BY CAPPING OR PLUGGING THE PIPE ENDS AND PUMPING GROUT FILL MATERIAL INTO THE INTERIOR OF THE PIPELINE USING EQUIPMENT AND MONITORING DEVICES SUFFICIENT TO DETERMINE THE EFFECTIVENESS OF THE GROUTING OPERATION AND TO ENSURE THAT THE PIPELINE IS COMPLETELY FILLED WITH GROUT MATERIAL. THE UTILITY TO BE ABANDONED SHALL FIRST BE CLEARED OF DEBRIS AND DEWATERED TO ENSURE PROPER SETTING OF THE GROUT. THE CONTRACTOR SHALL ESTABLISH AND SUBMIT FOR REVIEW THE GROUT MIXES, EQUIPMENT AND METHODS PROPOSED TO BE USED FOR PLACEMENT OF THE GROUT AND MONITORING OF THE GROUTING OPERATION. GROUT SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 100 PSI.
6. ABANDONMENT OF UTILITY PIPELINES SMALLER THAN 12 INCHES IN DIAMETER SHALL REQUIRE CAPPING OR PLUGGING OF THE PIPE ENDS ONLY, UNLESS NOTED OTHERWISE.
7. CLEAR AND GRUB ALL LANDSCAPED AND NON-PAVED AREAS WITHIN THE LIMITS OF WORK, UNLESS NOTED OTHERWISE.
8. REMOVE EXISTING CONCRETE PAVEMENT AND BASE COURSE MATERIAL TO FULL DEPTH.
9. REMOVE EXISTING ASPHALT CONCRETE PAVEMENT AND BASE COURSE MATERIAL TO FULL DEPTH.
10. PROTECT ALL EXISTING STRUCTURES AND FOUNDATIONS TO REMAIN WITHIN THE LIMITS OF WORK DURING CONSTRUCTION UNLESS NOTED OTHERWISE. CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AS REQUIRED IN ORDER TO AVOID IMPACTS TO EXISTING STRUCTURES, FOUNDATIONS AND RETAINING WALLS.
11. PROTECT ALL EXISTING UTILITIES INDICATED TO REMAIN FROM DAMAGE AT ALL TIMES DURING CONSTRUCTION. CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AS REQUIRED TO ENSURE ADEQUATE PROTECTION OF UTILITIES AND APPURTENANCES TO REMAIN. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCEMENT OF DEMOLITION OPERATIONS AND NOTIFY THE OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES.
12. THE CONTRACTOR SHALL VERIFY THAT ALL COMMUNICATIONS WIRES AND CONDUCTORS HAVE BEEN DECOMMISSIONED PRIOR TO REMOVAL OF COMMUNICATIONS CONDUITS AND VAULTS.
13. THE CONTRACTOR SHALL REPLACE PAVEMENT MARKINGS AND/OR SIGNAGE THAT HAS BEEN REMOVED OR DAMAGED FROM CONSTRUCTION ACTIVITIES.
14. PRIOR TO THE START OF ANY SITE DEMOLITION, CONTRACTOR SHALL COORDINATE AND DETERMINE WHICH ITEMS, IF ANY, ARE TO BE SALVAGED WITH THE OWNER'S REPRESENTATIVE AND THE OWNER. ANY SPECIAL SALVAGING PROCEDURES THAT ARE TO BE FOLLOWED WILL BE DETERMINED BY THE OWNER'S REPRESENTATIVE AND THE OWNER.
15. DEMOLITION ASSOCIATED WITH ELECTRICAL LINES AND APPURTENANCES SHALL BE COORDINATED WITH THE ELECTRICAL DRAWINGS. DEMOLITION FOR SPECIFIC ELECTRICAL ITEMS INDICATED ON THE DEMOLITION PLANS SHALL NOT BE CARRIED OUT UNTIL POWER SOURCES TO THE ITEMS INDICATED FOR REMOVAL HAVE BEEN MADE SAFE.
16. REMOVAL OF ELECTRICAL DUCTBANK, CONDUITS AND VAULTS SHALL FOLLOW PULLING OF CABLE AND CONDUCTORS.
17. THE CONTRACTOR SHALL OBTAIN ALL REQUIRED CITY OF SEATTLE DEMOLITION AND STREET USE PERMITS BEFORE COMMENCING DEMOLITION ACTIVITIES.

SITE AND PAVING NOTES

1. DIMENSIONS AND COORDINATES ARE TO FACE OF CURB, FACE OF BUILIDNG, OR FACE OF WALL UNLESS NOTED OTHERWISE.
2. APPLY A BITUMINOUS TACK COAT AT LOCATIONS WHERE ASPHALT PAVEMENT ABUTS ANY BUILDING STRUCTURE, UTILITY APPURTENANCE OR OTHER PAVEMENT TYPE.
3. CONCRETE FOR EXTERIOR SITE FACILITES, INCLUDING BUT NOT LIMITED TO CURBS, SIDEWALKS, PAVING PADS, THRUST BLOCKING, FENCE POST AND BOLLARD FOUNDATIONS, RAMPS, AND UTILITY STRUCTURES SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 033000, "CAST-IN-PLACE CONCRETE" AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS. MAXIMUM WATER/CEMENT RATIO SHALL BE 0.45 AND CONCRETE SHALL HAVE 5 PLUS OR MINUS 0.5 PERCENT AIR ENTRAINMENT. CONCRETE FOR RETAINING WALLS SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 033000, "CAST-IN-PLACE CONCRETE" AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS. MAXIMUM WATER/CEMENT RATIO SHALL BE 0.45 AND CONCRETE SHALL HAVE 5 PLUS OR MINUS 0.5 PERCENT AIR ENTRAINMENT. CONCRETE FOR PAVING SHALL BE IN ACCORDANCE WITH SPECIFICATION 033000, "CAST-IN-PLACE CONCRETE" AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5,000 PSI AT 28 DAYS. MAXIMUM WATER/CEMENT RATIO SHALL BE 0.45 AND CONCRETE SHALL HAVE 5 PLUS OR MINUS 0.5 PERCENT AIR ENTRAINMENT.
4. PROVIDE AN EXPANSION JOINT AT LOCATIONS WHERE CONCRETE WALK OR CONCRETE PAVEMENT ABUT STRUCTURAL FOUNDATION, COLUMN OR WALL, AND FIXED OBJECTS.
5. EXTERIOR CONCRETE PAVEMENT JOINTS SHALL BE WEAKENED PLANE [CONTROL] JOINTS WITH A MAXIMUM SPACING OF X (NOTE TO ENGR: SPACING IS THICKNESS OF CONCRETE IN FEET * 24) FEET ON CENTER. PAVEMENT PANEL LENGTH TO WIDTH RATIO SHALL NOT EXCEED 1.25. AT THE CONTRACTOR'S OPTION, CONTRACTOR MAY SUBSTITUTE CONSTRUCTION JOINTS FOR WEAKENED PLANE [CONTROL] JOINTS. JOINTS SHALL BE COORDINATED WITH LANDSCAPE PLANS.

GRADING NOTES

1. SPOT ELEVATIONS ARE TO TOP OF PAVEMENT, GUTTER ELEVATION OR FINISHED GRADE UNLESS NOTED OTHERWISE.
2. ADJUST UTILITY ACCESS COVERS, FOR UTILITIES TO REMAIN, TO FINISH GRADE.
3. TOP ELEVATION FOR VAULTS SHALL MATCH FINISH GRADE. SLOPE VAULT LIDS AS REQUIRED.
4. SLOPES ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY. CONSTRUCTION SHALL BE BASED ON SPOT ELEVATIONS.

STORM DRAINAGE NOTES

1. A COPY OF THE APPROVED DRAINAGE CONTROL PLANS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
2. UNLESS NOTED OTHERWISE, THE CONTRACTOR MAY USE ANY COMBINATION OF PREFABRICATED FITTINGS (TEES, BENDS AND WYES) AT LOCATIONS WHERE STORM CONNECTION POINTS OF INTERSECTION (PI) OR BENDS ARE INDICATED. PREFABRICATED FITTINGS MAY BE ADJUSTED AS REQUIRED TO MAINTAIN POSITIVE SLOPE AND DRAINAGE. WHERE SPECIFICALLY INDICATED, THE CONTRACTOR SHALL PROVIDE THE FITTINGS AS SHOWN.
3. REQUIRED STORM WATER FACILITIES MUST BE CONSTRUCTED AND IN OPERATION PRIOR TO ANY PAVING UNLESS OTHERWISE APPROVED.
4. INSTALL CATCH BASIN INSERTS UNDER ALL CATCH BASIN AND AREA DRAIN GRATES IMMEDIATELY AFTER INSTALLATION. PROTECTION SHALL BE REMOVED AFTER FINAL PAVING AND/OR LANDSCAPING HAS BEEN ESTABLISHED.
5. STORM DRAIN PIPE DISCHARGING FROM AN AREA DRAIN SHALL BE INSTALLED WITH A MINIMUM SLOPE OF 2 PERCENT UNLESS NOTED OTHERWISE.
6. LENGTHS OF PIPING SHOWN ON STORM DRAIN ARE FROM CENTER OF STRUCTURE, FITTING OR POINT OF INTERSECTION AND ARE SHOWN FOR INFORMATION ONLY. ALL PIPING SHALL BE INSTALLED AT THE LOCATION SHOWN ON THE PLANS AND LOCATED BY COORDINATES OR DIMENSIONS.
7. COORDINATE POINTS AND ELEVATIONS SHOWN FOR ALL CATCH BASINS, CLEANOUTS, AREA DRAINS AND MANHOLES ARE TO THE CENTER OF THE FRAME AND GRATE OR COVER, UNLESS NOTED OTHERWISE.
8. TOP ELEVATION FOR ALL DRAINAGE STRUCTURES WITH SOLID COVERS SHALL MATCH FINISH GRADE UNLESS NOTED OTHERWISE.
9. TRENCHING FOR STORM DRAINS SHALL CONFORM TO CITY OF SEATTLE STANDARD PLAN 284 AND PIPE BEDDING SHALL CONFORM TO CITY OF SEATTLE STANDARD PLAN 285.
10. STORM DRAIN MATERIALS AND CONSTRUCTION SHALL CONFORM TO CITY OF SEATTLE STANDARD SPECIFICATIONS.
11. STORM DRAIN PIPING SHALL BE PVC ASTM D3034, SDR-35, UNLESS NOTED OTHERWISE.

UTILITY NOTES

1. WATER LINES LESS THAN 12 INCHES IN DIAMETER SHALL HAVE A MINIMUM OF 3 FEET OF COVER OVER THE TOP OF PIPE. WATER LINES 12 INCHES OR LARGER IN DIAMETER SHALL HAVE 4 FEET OF COVER OVER THE TOP OF PIPE. MAINTAIN A MINIMUM OF 12 INCHES CLEAR AT CROSSINGS WITH UTILITIES OTHER THAN SANITARY SEWER LINES. WATER LINES SHALL PASS UNDER THE OTHER UTILITY IF THE MINIMUM SPECIFIED COVER CANNOT BE OBTAINED.
2. MAINTAIN A MINIMUM OF 18 INCHES CLEAR BETWEEN CROSSINGS OF WATER LINES AND SANITARY SEWER LINES. WATER LINES SHALL CROSS ABOVE SANITARY SEWER LINES.
3. PROVIDE HORIZONTAL AND VERTICAL BENDS WHERE INDICATED. WHERE A POINT OF INTERSECTION (HORIZONTAL OR VERTICAL) IS SHOWN AND THE DEFLECTION ANGLE IS MORE OR LESS THAN A STANDARD BEND, USE A COMBINATION OF THE STANDARD BEND AND JOINT DEFLECTION OF THE PIPE TO MEET THE ALIGNMENT SHOWN. MAXIMUM JOINT DEFLECTION IS 3 DEGREES OR THE MAXIMUM THAT IS RECOMMENDED BY THE PIPE MANUFACTURER, WHICHEVER IS SMALLER.
4. PROVIDE HORIZONTAL AND VERTICAL THRUST BLOCKING AT ALL HORIZONTAL AND VERTICAL BENDS IN ACCORDANCE WITH THE CITY OF SEATTLE. THE CONTRACTOR MAY PROVIDE RESTRAINED JOINTS IN LIEU OF HORIZONTAL AND/OR VERTICAL THRUST BLOCKING AT LOCATIONS WHERE INSTALLATION OF THE THRUST BLOCKING WILL INTERFERE WITH OTHER CONSTRUCTION. SEE SPECIFICATION FOR REQUIREMENTS.
5. CAPPED WATER LINES OR TEES SHALL HAVE HORIZONTAL THRUST BLOCKING.
6. COORDINATE POINTS AND ELEVATIONS SHOWN FOR ALL MANHOLES ARE TO THE CENTER OF THE MANHOLE, UNLESS NOTED OTHERWISE.
7. THE CONTRACTOR SHALL VERIFY ALL EXISTING AND NEW UTILITY CROSSINGS PRIOR TO WATER AND SANITARY SEWER SYSTEM INSTALLATION.
8. TRENCHING FOR WATER LINES SHALL CONFORM TO CITY OF SEATTLE STANDARD PLAN 284 AND PIPE BEDDING SHALL CONFORM TO CITY OF SEATTLE STANDARD PLAN 285.
9. TRENCHING FOR SANITARY SEWERS SHALL CONFORM TO CITY OF SEATTLE STANDARD PLAN 284 AND PIPE BEDDING SHALL CONFORM TO CITY OF SEATTLE STANDARD PLAN 285.
10. LENGTHS OF PIPING SHOWN ON STORM DRAIN ARE FROM CENTER OF STRUCTURE, FITTING OR POINT OF INTERSECTION AND ARE SHOWN FOR INFORMATION ONLY. ALL PIPING SHALL BE INSTALLED AT THE LOCATION SHOWN ON THE PLANS AND LOCATED BY COORDINATES OR DIMENSIONS.
11. VERIFY LOCATIONS OF LATERAL BUILDING CONNECTIONS WITH THE PLUMBING DRAWINGS PRIOR TO INSTALLATION.
12. UTILITY CROSSINGS SHOWN ON THE UTILITY PROFILES ARE FOR THE CONTRACTOR'S INFORMATION AND REFERENCE. THE CONTRACTOR SHALL VERIFY ALL EXISTING AND NEW UTILITY CROSSINGS PRIOR TO UTILITY SYSTEM INSTALLATION.
13. SANITARY SEWER MATERIALS AND CONSTRUCTION SHALL CONFORM TO CITY OF SEATTLE STANDARD SPECIFICATIONS.
14. WATER MATERIALS AND CONSTRUCTION SHALL CONFORM TO CITY OF SEATTLE STANDARD SPECIFICATIONS.
15. SANITARY SEWER PIPING SHALL BE PVC ASTM D3034, SDR-35, UNLESS NOTED OTHERWISE.
16. WATER LINE PIPING SHALL BE HDPE UNLESS NOTED OTHERWISE.

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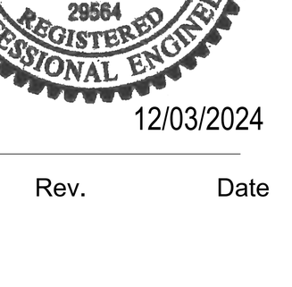

12/03/2024

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FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

Title :
NOTES

C0.02
sheet no.

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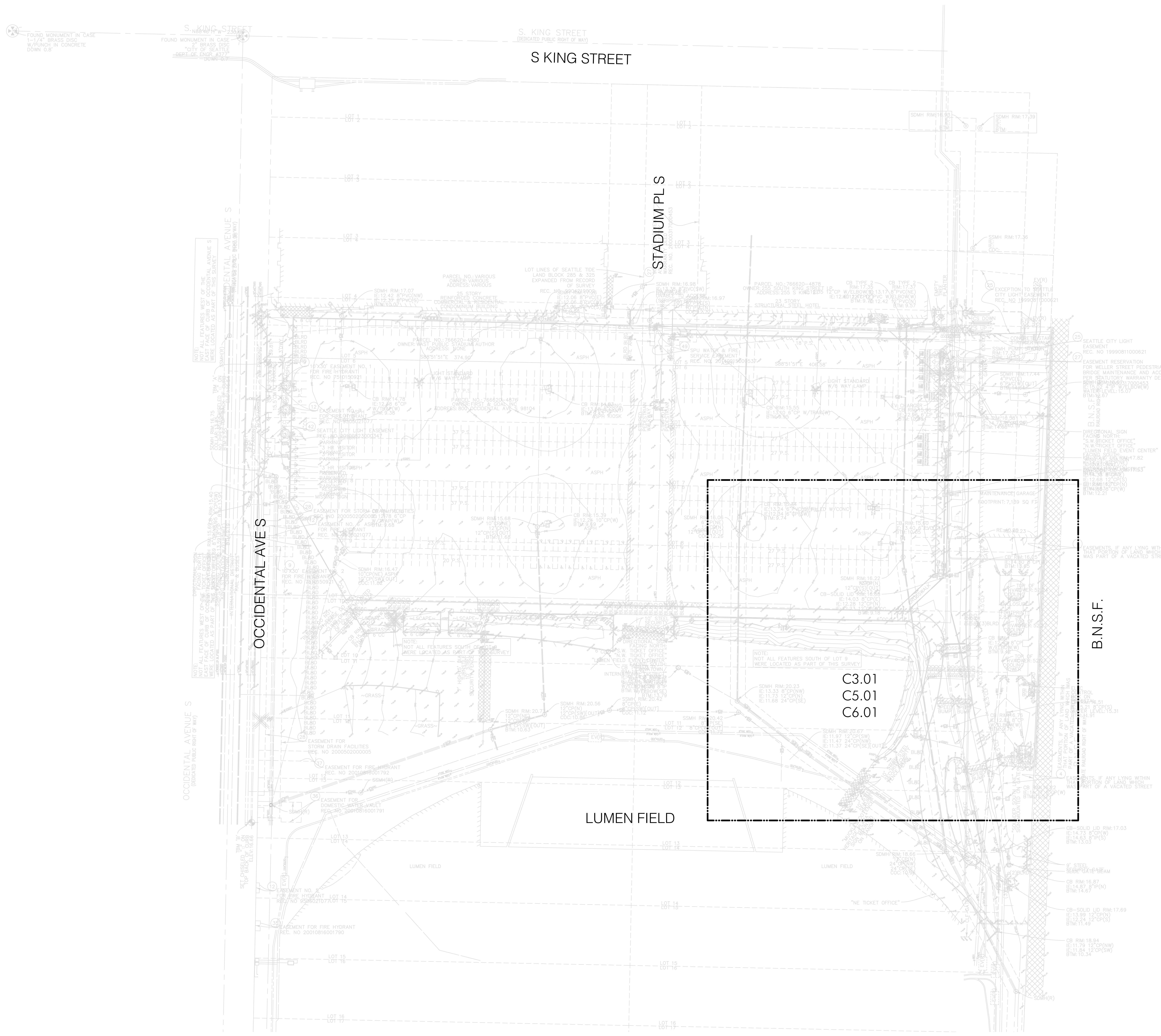

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STEVEN DOUGLAS HALUSCHAK, STATE OF WASHINGTON, 29564, REGISTERED PROFESSIONAL ENGINEER
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Title :
OVERALL
KEY PLAN

40 20 0 40 80
scale 1" = 40' feet

C0.03
sheet no.

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NOTES:

1. SEE SHEET C0.01 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.
2. SEE SHEET C0.02 FOR SITE, PAVING, AND GRADING NOTES.

CONC WALK PATCH, TYP

1 C3.01 | C8.01

REMOVE AND REPLACE CONC CURB, COS STD PLAN 410, TYP

LIMITS OF WORK, TYP

REMOVE AND REPLACE EXISTING FENCE AS DIRECTED BY OWNER

FENCE CNR N 221,155.19 E 1,271,124.95

FENCE, TYP

17.1± MATCH EXIST

CONC SLAB CNR N 221,151.04 E 1,271,128.79 17.2± MATCH EXIST

WALL CNR N 221,153.86 E 1,271,159.59 17.1± MATCH EXIST

17.1± MATCH EXIST

CONC SLAB CNR N 221,149.89 E 1,271,158.77 17.30

CONC SLAB, SEE STRUC

GB, TYP

17.87

17.1± MATCH EXIST

5.0'

PVMT PATCH, TYP

5 C3.01 | C8.01

17.7± MATCH EXIST

16.1'

REMOVE AND REPLACE CONC CURB

REMOVE AND REPLACE CONC CURB

CMU WALL, SEE STRUC

CONC SLAB CNR N 221,109.75 E 1,271,157.22 17.50

FENCE CNR N 221,111.06 E 1,271,123.25

WALL CNR N 221,109.22 E 1,271,157.75 17.1± MATCH EXIST

CONC SLAB CNR N 221,110.91 E 1,271,127.25 17.1± MATCH EXIST

WALL CNR N 221,110.09 E 1,271,131.22 17.0± MATCH EXIST

B.N.S.F.

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10 5 0 10 20
scale 1" = 10' feet

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CA PROJECT #: 40023

Title :

SITE, PAVING, AND GRADING PLAN

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C3.01
sheet no.

NOTES:

1. SEE SHEET C0.01 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.
2. SEE SHEET C0.02 FOR STORM DRAINAGE NOTES.

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CA PROJECT #: 40023

Title:
STORM DRAINAGE PLAN

C5.01
sheet no.

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NOTES:

1. SEE SHEET C0.01 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.
2. SEE SHEET C0.02 FOR UTILITY NOTES.

EXIST ELEC COND CROSSING

2" HPDE W

PI W
N 221,227.11
E 1,271,092.47

3' MIN. TYP

EXIST 6" GAS

2" HPDE W

EXIST ELEC COND CROSSING

PI W
N 221,188.85
E 1,271,097.29

LIMITS OF WORK, TYP

2" HPDE W

45° BEND W
N 221,152.90
E 1,271,104.90

45° BEND W
N 221,149.04
E 1,271,154.74

45° BEND W
N 221,146.97
E 1,271,156.66

CONN TO FLUID COOLER, SEE MECH

CONN SS TO MECH EQUIPMENT
N 221,127.01
E 1,271,150.88

CONN TO FLUID COOLER, SEE MECH

SS CO
N 221,183.32
E 1,270,878.25
IE 6" = 14.20

CONN TO EXIST SSMH
N 221,169.44
E 1,270,868.33
IE 6" = 14.05

6" PVC SS

6" PVC SS

CO, TYP
6
C6.01 C8.01

SS CO
N 221,150.92
E 1,270,954.31
IE 6" = 14.74

6" PVC SS

SS CO
N 221,135.33
E 1,271,042.95
IE 6" = 15.32

SHALLOW ROADWAY TRENCH AND PATCH
7
C6.01 C8.01

45° BEND W
N 221,150.87
E 1,271,107.31

EXIST W CROSSING

2" HPDE W

2" HPDE W

6" PVC SS

6" PVC SS

EXIST ELEC COND CROSSING

EXIST 6" GAS CROSSING

EXIST W CROSSING

6" PVC SS

SS CO
N 221,119.75
E 1,271,131.59
IE 6" = 15.91

SS CO
N 221,119.01
E 1,271,150.58
IE 6" = 16.03

B.N.S.F.

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scale 1" = 10' feet

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Title :
UTILITY PLAN

C6.01
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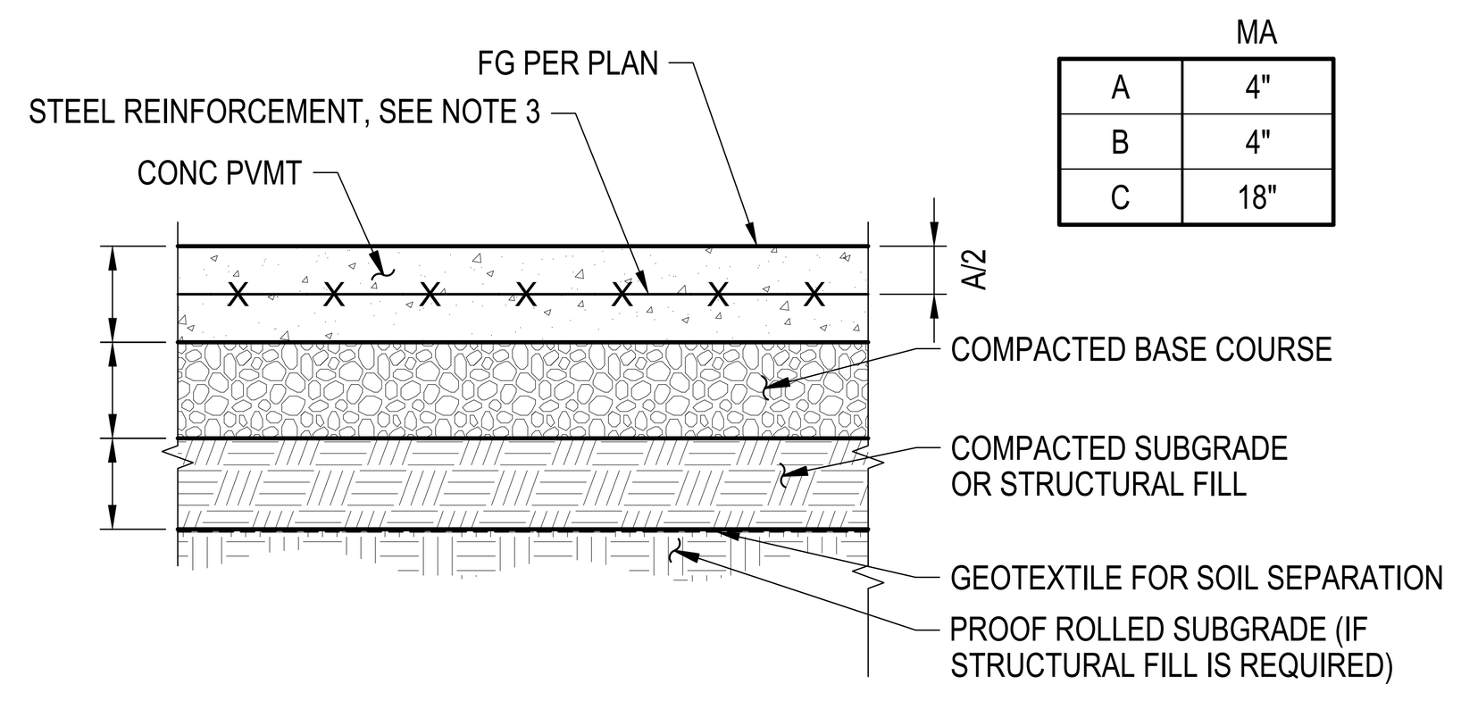
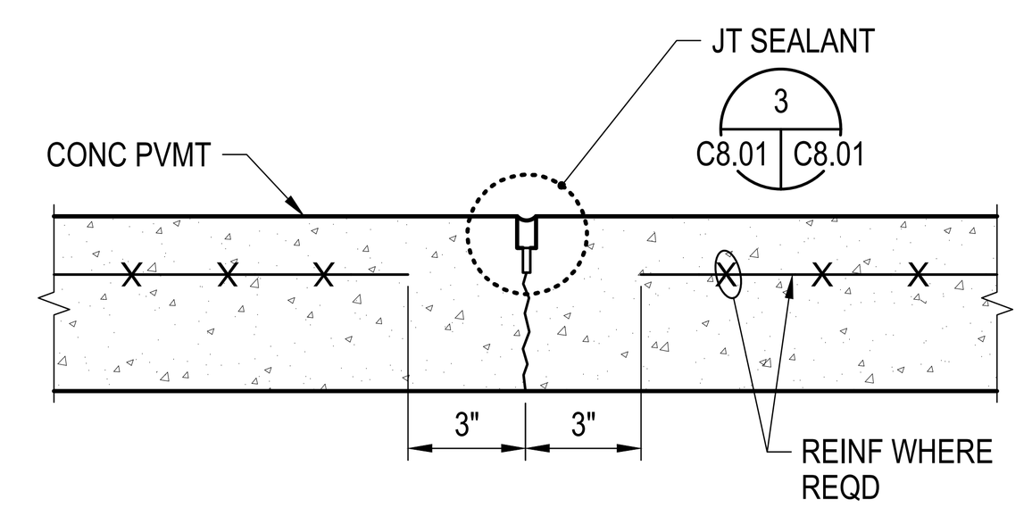


	MA
A	4"
B	4"
C	18"

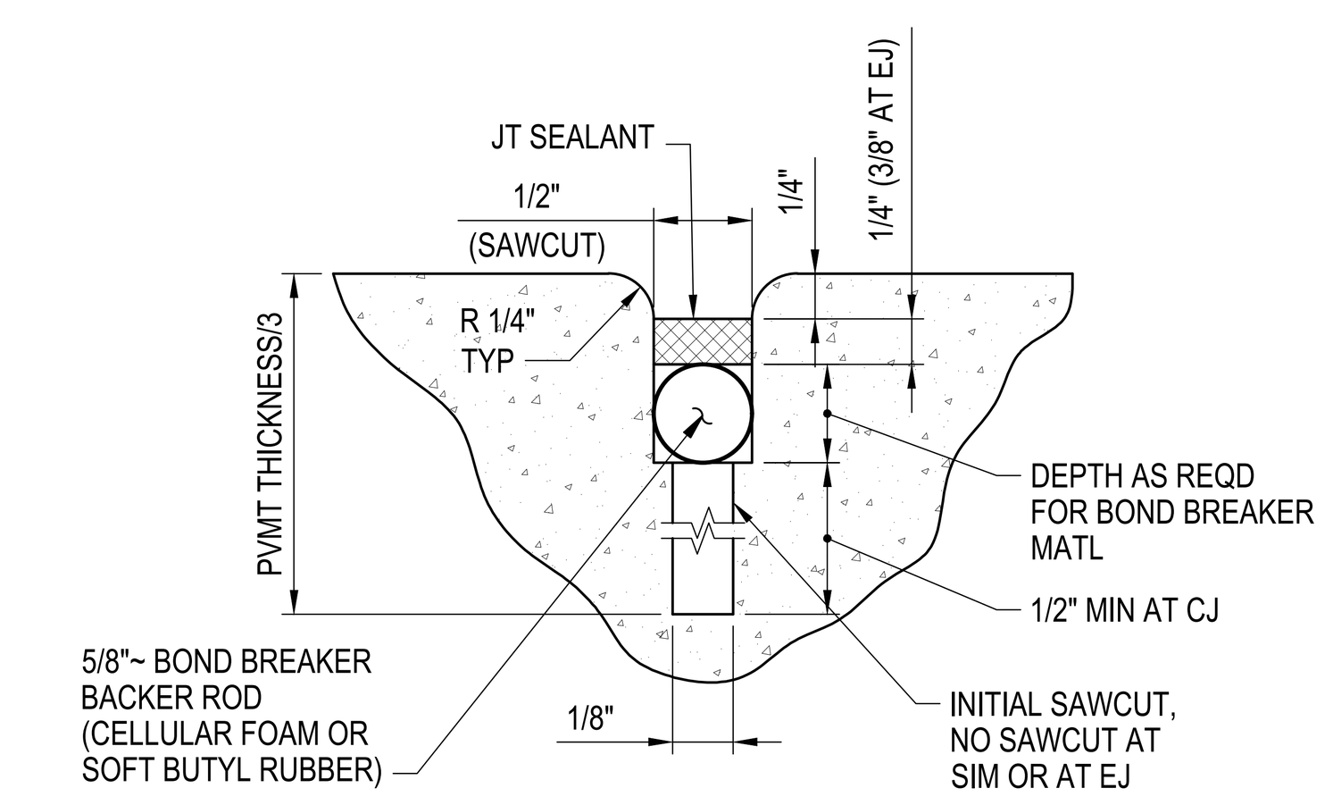
NOTES:

1. PROVIDE EXPANSION JOINT WHEN PAVEMENT ABUTS FIXED OBJECTS, CONCRETE CURBS AND PADS, STRUCTURAL FOUNDATION, AND/OR RIMS.
2. PROVIDE WEAKENED PLANE JOINTS AS FOLLOWS:
   - 8'-0" OC MAXIMUM
   - PANELS SHALL HAVE MAXIMUM LENGTH TO WIDTH RATIO OF 1.25
3. WHERE LENGTH TO WIDTH RATIO IS EXCEEDED OR PANELS ARE NON-RECTANGULAR, AND/OR WHERE INDICATED ON DRAWINGS PROVIDE 6x6 W2.9xW2.9 WELDED WIRE MESH REINFORCEMENT.

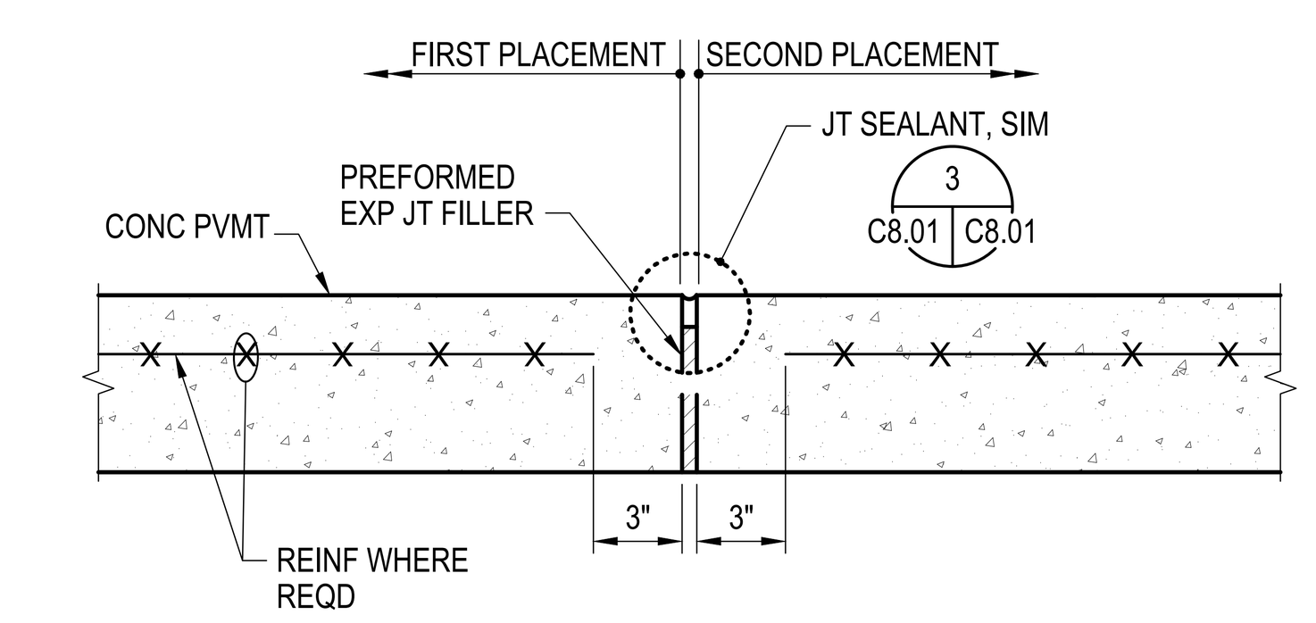
CONCRETE WALK PATCH
NTS — 1 C3.01 | C8.01



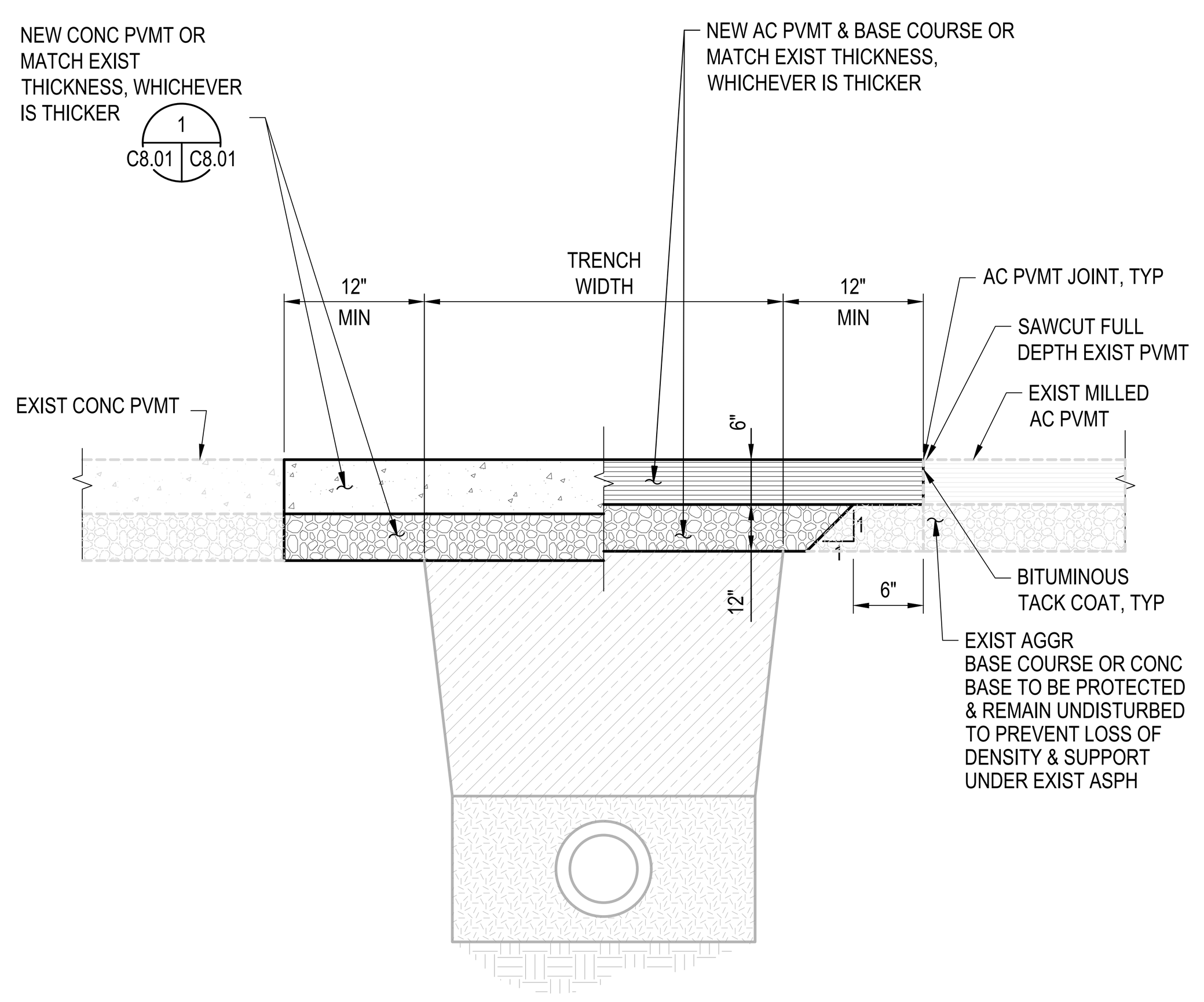
WEAKEND PLAN JOINT (WPJ)
NTS — 2 C3.01 | C8.01



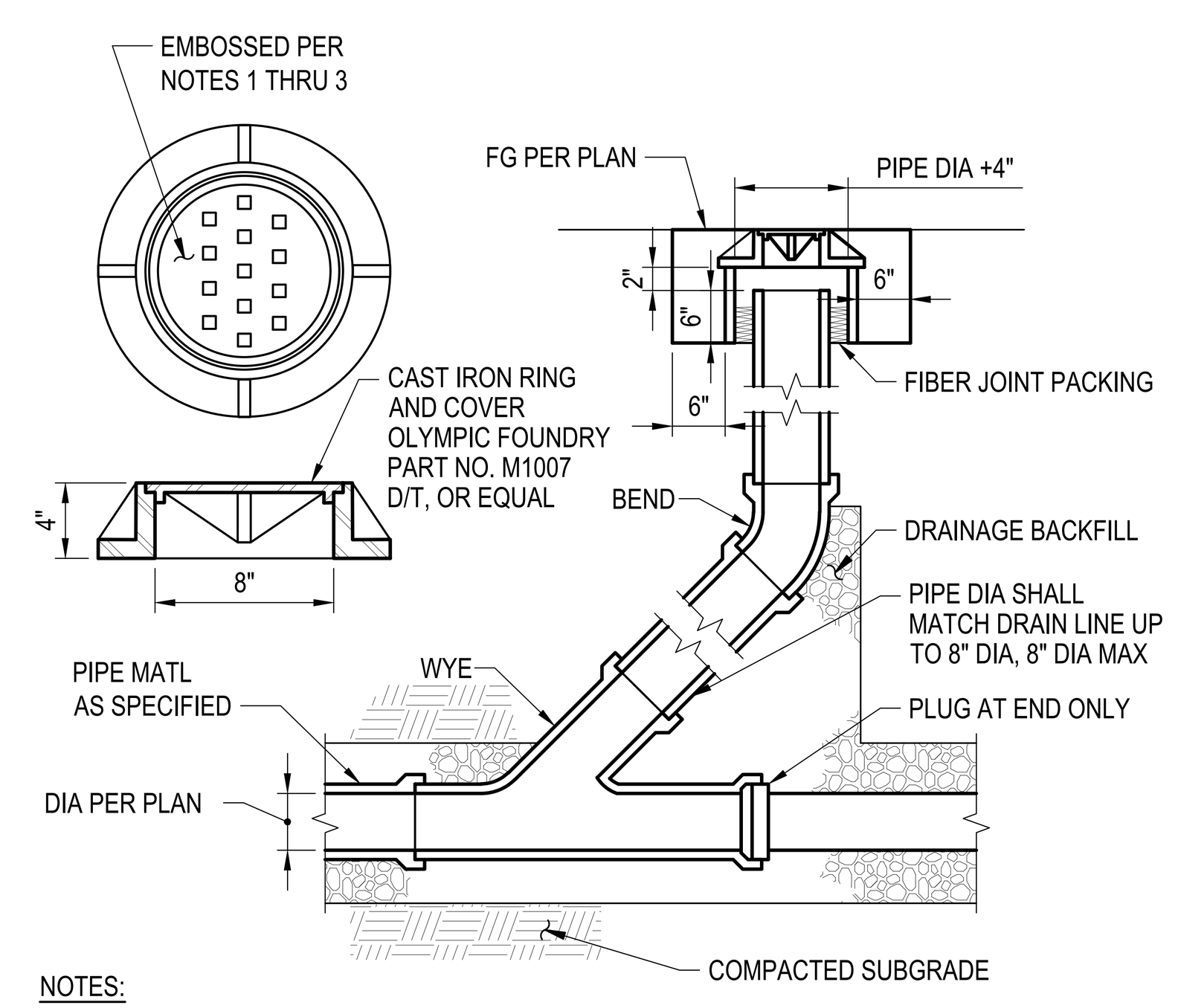
JOINT SEALANT
NTS — 3 C8.01 | C8.01



EXPANSION JOINT (EJ)
NTS — 4 C3.01 | C8.01



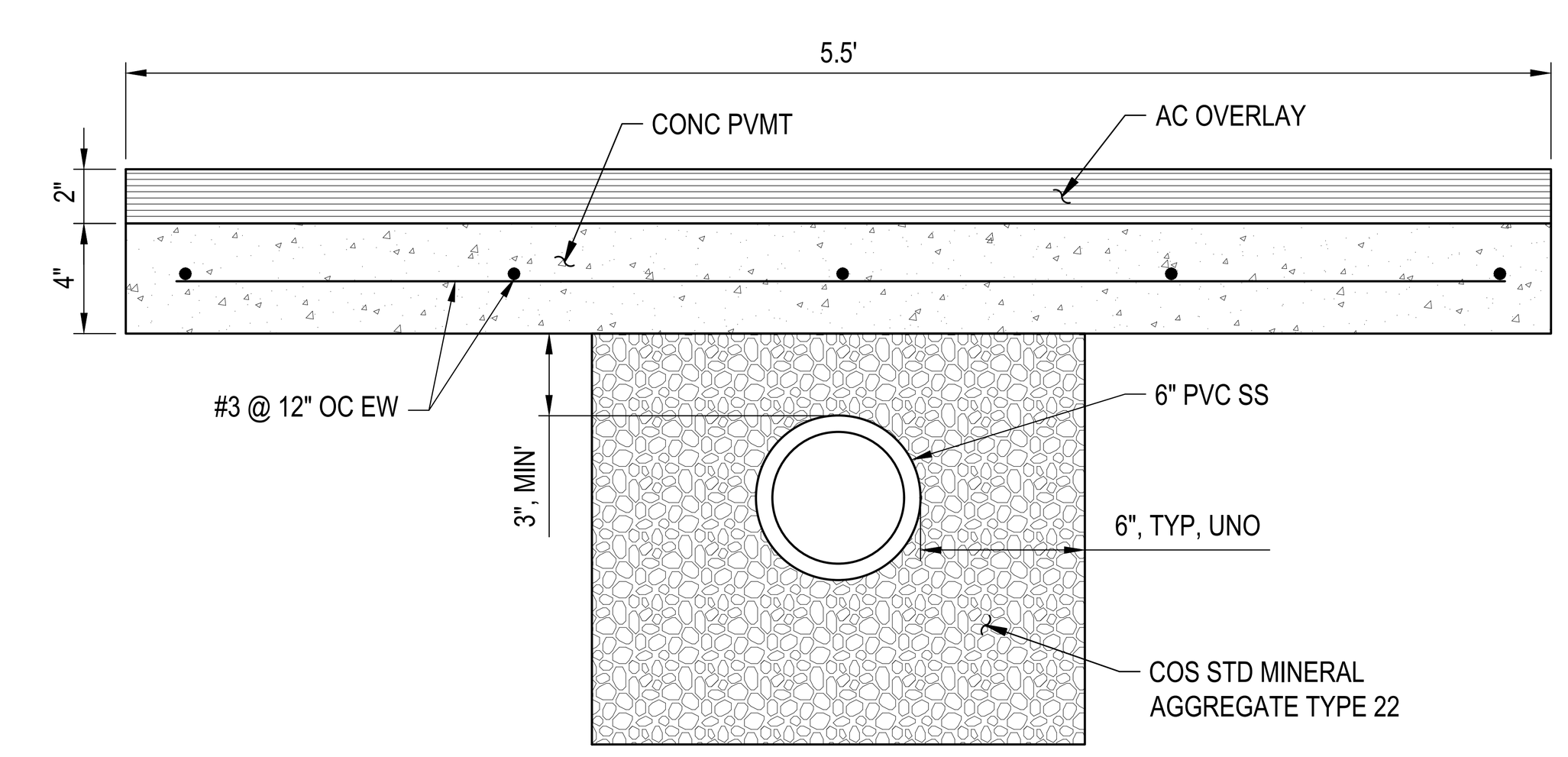
PAVEMENT PATCH
NTS — 5 C3.01 | C8.01



NOTES:

1. STORM DRAIN SHALL HAVE "SD" EMBOSSED ON LID.
2. FOUNDATION DRAIN SHALL HAVE "FD" EMBOSSED ON LID.
3. SANITARY SEWER SHALL HAVE "SS" EMBOSSED ON LID.
4. SEE MECHANICAL/PLUMBING DRAWINGS AND SPECIFICATIONS FOR INTERIOR CLEANOUTS.

CLEANOUT
NTS — 6 C6.01 | C8.01



SHALLOW ROADWAY TRENCH AND PATCH
NTS — 7 C6.01 | C8.01

LUMEN FIELD

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First & Goal Inc.
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Seattle, WA 98134

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1301 Fifth Avenue, Suite 3200
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LUMEN FIELD FLUID COOLER REPLACEMENT
800 Occidental Avenue South, Seattle, WA 98134

SEAL:
12/03/2024

No.	Rev.	Date

12/03/2024
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FGI PROJECT #: 21NMR005
CA PROJECT #: 40023
Title :
SECTIONS AND DETAILS

C8.01
sheet no.

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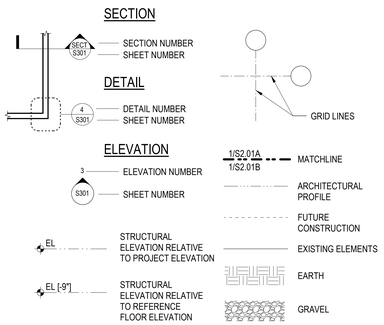
16 ABBREVIATIONS

&	AND	L	ANGLE
@	AT	LAB	LABORATORY
°, DEG	DEGREE	LB, #	POUND
ø, DIA	DIAMETER	LF	LINEAL FOOT
#	NUMBER, POUND	LIN	LINEAL; LINEAR
		LL	LIVE LOAD
AB	ANCHOR BOLT	LLBB	LONG LEGS BACK-TO-BACK
ACI	AMERICAN CONCRETE INSTITUTE	LLH	LONG LEG HORIZONTAL
ADDL	ADDITIONAL	LLV	LONG LEG VERTICAL
ADJ	ADJACENT	LOC	LOCATION; LOCATE
AESS	ARCHITECTURAL EXPOSED STRUCTURAL STEEL	LONGIT	LONGITUDINAL
		LP	LOW POINT
AGGR	AGGREGATE	LSL	LONG SLOTTED (HOLES)
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	LSW	LIGHT GAGE SHEAR WALL
		LTWT	LIGHTWEIGHT
ALT	ALTERNATE	LVL	LEVEL
ALUM	ALUMINUM	LWC	LIGHTWEIGHT CONCRETE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MAS	MASONRY
APA	AMERICAN PLYWOOD ASSOCIATION	MATL	MATERIAL
APPD	APPROVED	MAX	MAXIMUM
APPROX	APPROXIMATE	MB	MACHINE BOLT
AR	ANCHOR RODS	MC	MISCELLANEOUS CHANNEL
ARCH	ARCHITECTURAL; ARCHITECT	MECH	MECHANICAL
ASSY	ASSEMBLY	MEMB	MEMBRANE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	MEP	MECHANICAL/ ELECTRICAL / PLUMBING
AWS	AMERICAN WELDING SOCIETY	MEZZ	MEZZANINE
		MF	MOMENT FRAME
BAL	BALANCE	MFB	MOMENT FRAME BEAM
BD	BOARD	MFC	MOMENT FRAME COLUMN
BF	BRACED FRAME	MFR	MANUFACTURE; MANUFACTURER
BLDG	BUILDING	MFRG	MANUFACTURING
BLK	BLOCK; BLOCKING	MIN	MINIMUM; MINUTE
BM	BEAM	MISC	MISCELLANEOUS
BMU	BRICK MASONRY UNIT	ML	MATCH LINE
BOS	BOTTOM OF STEEL; BOSOM (WELD)	MO	MASONRY OPENING
BOT	BOTTOM	MS	MECHANICAL SPLICE
BRCG	BRACING		
BRG	BEARING	N	NORTH
BRKT	BRACKET	N-S	NORTH-SOUTH
BSMT	BASEMENT	NF	NEAR FACE
BTWN	BETWEEN	NIC	NOT IN CONTRACT
BU	BUILT-UP	NLT	NAIL LAMINATED TIMBER
		NS	NEAR SIDE
c	CAMBER	NTS	NOT TO SCALE
C	STANDARD CHANNEL	NWC	NORMALWEIGHT CONCRETE
CANT	CANTILEVER		
CC	CENTER TO CENTER	OC	ON CENTER
CG	CENTER OF GRAVITY	OD	OUTSIDE DIAMETER
CIP	CAST-IN-PLACE	OPNG	OPENING
CJ	CONSTRUCTION JOINT	OPP	OPPOSITE (HAND)
CJP	COMPLETE JOINT PENETRATION WELD	OPT	OPTION; OPTIONAL
CL	CENTERLINE	OVS	OVERSIZED (HOLES)
CLR	CLEARANCE; CLEAR	OWJ	OPEN WEB JOIST
CLT	CROSS LAMINATED TIMBER		
CMU	CONCRETE MASONRY UNIT	P	PIPE
COL	COLUMN	PC	PRECAST
COMP	COMPRESSION	PCF	POUNDS PER CUBIC FOOT
CONC	CONCRETE	PCP	PRECAST CONCRETE PANEL
CONFIG	CONFIGURATION	PEN	PENETRATION
CONN	CONNECTION; CONNECT	PERP	PERPENDICULAR
CONST	CONSTRUCTION	PH	PENTHOUSE
CONT	CONTINUE; CONTINUOUS	PJP	PARTIAL JOINT PENETRATION WELD
CONTR	CONTRACTOR	PL	PLATE
COORD	COORDINATE; COORDINATION	PLC	PLACE
CORR	CORRUGATED	PLF	POUNDS PER LINEAL FOOT
CTR	CENTER	PLYWD	PLYWOOD
CTSK	COUNTERSINK; COUNTERSUNK	PREFAB	PREFABRICATED
CU	CUBIC	PS	PRESTRESSED
		PSF	POUNDS PER SQUARE FOOT
d	PENNY (NAIL)	PSI	POUNDS PER SQUARE INCH
db	NOMINAL BAR DIAMETER (INCHES)	PT	POST-TENSIONED
DBA	DEFORMED BAR ANCHOR	PV	PHOTOVOLTAICS
DBL	DOUBLE	PVC	POLYVINYL CHLORIDE
DC	DEMAND CRITICAL WELD		
DEG, °	DEGREE	R	RADIUS
DEMO	DEMOLISH; DEMOLITION	RB	RISER BAR
DEPT	DEPARTMENT	RC	REINFORCED CONCRETE
DET	DETAIL	RCMD	RECOMMEND
DIA, ø	DIAMETER	REF	REFERENCE
DIAG	DIAGONAL	REINF	REINFORCE; REINFORCING; REINFORCEMENT
DIAPH	DIAPHRAGM		
DICA	DRILLED-IN CONCRETE ANCHOR	REQD	REQUIRED
DIM	DIMENSION	REQT	REQUIREMENT
DISC	DISCONTINUED; DISCONTINUOUS		
DL	DEAD LOAD	S1S	SURFACED ONE SIDE
DLT	DOWEL LAMINATED TIMBER	S2S	SURFACED TWO SIDES
DN	DOWN	S4S	SURFACED FOUR SIDES
DO	DO OVER; DITTO	S	AMERICAN STANDARD SHAPE; SOUTH
DWG	DRAWING	SB	SPACER BAR; SUPPORT BAR
DWL	DOWEL	SC	SLIP CRITICAL
		SCC	STRUCTURAL CONSULTANT TO THE CONTRACTOR
(E)	EXISTING		
E	EAST	SCHED	SCHEDULE, SCHEDULED
E-W	EAST-WEST	SDQ	SPECIAL DUCTILE QUALITY
EA	EACH	SECT	SECTION
EF	EACH FACE	SEOR	STRUCTURAL ENGINEER OF RECORD
EJ	EXPANSION JOINT	SFRS	SEISMIC FORCE RESISTING SYSTEM
EL	ELEVATION	SHT	SHEET
ELEC	ELECTRICAL	SHTG	SHEATHING
ELEV	ELEVATOR	SIM	SIMILAR
EMBED	EMBEDDED	SLBB	SHORT LEGS BACK-TO- BACK
ENGR	ENGINEER	SOG	SLAB ON GRADE
EQ	EQUAL; EARTHQUAKE	SOSD	SLAB ON STEEL DECK
EQUIP	EQUIPMENT	SP	SPIRAL
ES	EACH SIDE	SPC	SPACE
ETC	ET CETERA	SPCG	SPACING
EW	EACH WAY	SPEC	SPECIFICATION
EXIST	EXISTING	SQ	SQUARE
EXP	EXPANSION	SSL	SHORT SLOTTED (HOLES)
EXT	EXTERIOR	STD	STANDARD
EXTD	EXTEND; EXTENDED	STIFF	STIFFENER
		STIRR	STIRRUP
F	DEGREES FAHRENHEIT	STL	STEEL
FD	FLOOR DRAIN	STR	STRAIGHT
FDN	FOUNDATION	STRUC	STRUCTURAL
FF	FAR FACE	SUPT	SUPPORT
FG	FRICTION GRIP BOLT	SW	SHEAR WALL
FIN	FINISH	SYM	SYMMETRICAL
FL	FLOOR; FLOOR LINE		
FLG	FLANGE	T&B	TOP AND BOTTOM
FOS	FACE OF STUD	T&G	TONGUE AND GROOVE
FP	FIREPROOF; FULL PENETRATION	T&R	TREAD AND RISER
FRMG	FRAMING	TBD	TO BE DETERMINED
FS	FULL SIZE; FAR SIDE	TEMP	TEMPERATURE; TEMPORARY
FT	FOOT; FEET; FINGER TIGHT	THK	THICK; THICKNESS
FTG	FOOTING	THRU	THROUGH
FV	FIELD VERIFY	TOC	TOP OF CURB; TOP OF CONCRETE
		TOF	TOP OF FOOTING
GA	GAGE, GAUGE	TOS	TOP OF STEEL
GALV	GALVANIZED	TOW	TOP OF WALL
GB	GRADE BEAM	TRANS	TRANSVERSE
GFRC	GLASS FIBER REINFORCED CONCRETE	TYP	TYPICAL
GL	GLUED LAMINATED (BEAM)		
GR	GRADE	UB	UNIVERSAL BEAM
GRND	GROUND	UBC	UNIFORM BUILDING CODE
		UC	UNIVERSAL COLUMN
H	HORIZONTAL	UL	UNDERWRITERS' LABORATORY, INC.
HEF	HORIZONTAL EACH FACE	UNO	UNLESS NOTED OTHERWISE
HGR	HANGER	UT	ULTRASONIC TEST
HIF	HORIZONTAL INSIDE FACE		
HOF	HORIZONTAL OUTSIDE FACE	V, VERT	VERTICAL
HORIZ	HORIZONTAL	VEF	VERTICAL EACH FACE
HP	HP SHAPES; HIGH POINT	VG	VERTICAL GRAIN
HS	HIGH STRENGTH	VIF	VERTICAL INSIDE FACE
HSS	HOLLOW STRUCTURAL SECTION	VOF	VERTICAL OUTSIDE FACE
HT	HEIGHT		
		W	WIDE FLANGE; WIDE; WEST
ICC	INTERNATIONAL CODE COUNCIL	W/	WITH
ID	INSIDE DIAMETER	W/O	WITHOUT
IN	INCH	WD	WOOD
INCL	INCLUDE	WF	WIDE FLANGE
INFO	INFORMATION	WH	WEEP HOLE
INSUL	INSULATION	WL	WORK LINE
INT	INTERIOR	WP	WORK POINT
		WPJ	WEAKENED PLANE JOINT
JST	JOIST	WT	WEIGHT; STRUCTURAL TEE CUT FROM W SHAPE
JT	JOINT		
		WWR	WELDED WIRE REINFORCING
K	KIP (1,000 POUNDS)		
KO	KNOCK-OUT	YD	YARD
KSI	KIPS PER SQUARE INCH		

4 MISCELLANEOUS SYMBOLS



5 DRAWING LIST

SHEET NUMBER	SHEET NAME
S000	ABBREVIATIONS, LEGENDS, AND DRAWING LIST
S001	GENERAL NOTES
S002	COOLING TOWER FOUNDATION PLANS
S003	COOLING TOWER SECTION AND DETAILS

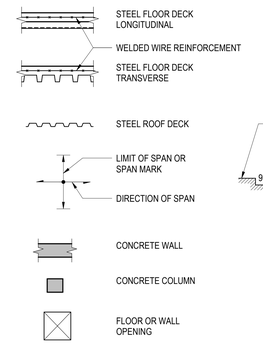
8 REINFORCING BAR DEVELOPMENT LENGTHS AND LAP SPLICES - GRADE 60

ALL CONCRETE STRENGTHS / GRADE 60			
BAR SIZE	Lb	Lc	Lcs
#3	8	12	9
#4	9	15	12
#5	12	19	15
#6	14	23	17
#7	16	27	20
#8	18	30	23
#9	21	34	26
#10	23	39	29
#11	26	43	32
#14	31	-	-
#18	41	-	-

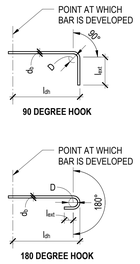
f'c = 4,000 PSI / GRADE 60						
BAR SIZE	Ld	Lt	Lsb	Lsbt	Ldt	Ldh
#3	15	19	19	25	6	6
#4	19	25	25	33	7	6
#5	24	31	31	41	9	8
#6	29	37	37	49	12	10
#7	42	54	54	71	15	13
#8	48	62	62	81	18	15
#9	54	70	70	91	22	18
#10	61	79	79	102	26	22
#11	67	87	87	114	30	26
#14	81	105	-	-	-	66
#18	108	140	-	-	-	102

f'c = 5,000 PSI / GRADE 60						
BAR SIZE	Ld	Lt	Lsb	Lsbt	Ldt	Ldh
#3	13	17	17	22	6	6
#4	17	23	23	29	6	6
#5	22	28	28	36	9	8
#6	26	34	34	44	11	10
#7	38	49	49	63	14	12
#8	43	56	56	72	17	15
#9	48	63	63	81	21	18
#10	54	71	71	92	25	21
#11	60	78	78	102	29	25
#14	72	94	-	-	-	64
#18	96	125	-	-	-	98

10 CONCRETE SYMBOLS



13 TYPICAL STANDARD HOOK GEOMETRY

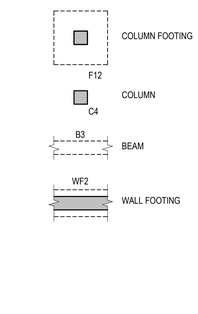


STANDARD HOOK ALL GRADES (D) FINISHED BEND DIAMETER			
BAR SIZE	D	90° HOOKS lext	180° HOOKS lext
#3	2.25	4.5	2.5
#4	3	6	2.5
#5	3.75	7.5	2.5
#6	4.5	9	3
#7	5.25	10.5	3.5
#8	6	12	4
#9	9	13.5	4.5
#10	10.25	15.25	5
#11	11.25	17	5.75
#14	17	20.25	6.75
#18	22.5	27	9

14 STANDARD HOOK GEOMETRY FOR STIRRUPS, TIES, AND HOOPS

STANDARD HOOK FOR STIRRUPS, TIES, AND HOOPS ALL GRADES (D) FINISHED BEND DIAMETER				
BAR SIZE	D	90° HOOKS lext	135° HOOKS lext	180° HOOKS lext
#3	1.5	3	3	2.5
#4	2	3	3	2.5
#5	2.5	3.75	3.75	2.5
#6	4.5	9	4.5	3
#7	5.25	10.5	5.25	3.5
#8	6	12	6	4

15 CONCRETE SCHEDULE MARKS



18 REINFORCING BAR DEVELOPMENT AND SPLICE LENGTH NOTES

NOTES:

1. NOTATIONS:
   - db: NOMINAL BAR DIAMETER (INCHES)
   - Ld: TENSION DEVELOPMENT LENGTH (INCHES) FOR REINFORCEMENT SATISFYING THE FOLLOWING REQUIREMENTS:
     - SLABS AND WALLS: CLEAR SPACING > 2db, AND CONCRETE CLEAR COVER > db
     - BEAMS AND COLUMNS: CLEAR SPACING > db, AND CONCRETE CLEAR COVER > db
   - Lt: DEVELOPMENT LENGTH OF BARS IN THICK CONCRETE = 1.3 X Ld (INCHES)
   - Lb: DEVELOPMENT LENGTH OF BARS OR DOWELS IN COMPRESSION = 19 X db (INCHES)
   - Lc: TIED COLUMN LAP SPLICE IN COMPRESSION = 30 X db (INCHES)
   - Lcs: SPIRAL COLUMN LAP SPLICE IN COMPRESSION = 22.5 X db (INCHES)
   - Lsb: TYPICAL LAP SPLICE LENGTH = 1.3 X Ld (INCHES)
   - Lsbt: LAP SPLICE LENGTH OF HORIZONTAL BARS IN THICK CONCRETE = 1.69 X Ld (INCHES)
   - Ldh: DEVELOPMENT LENGTH IN TENSION OF STANDARD HOOK, WITH SIDE COVER ≥ 2 1/2" AND END COVER ≥ 2" (INCHES)
   - Ldt: DEVELOPMENT LENGTH IN TENSION OF HEADED BAR (INCHES)
   - D: FINISHED BEND DIAMETER (INCHES)
   - lext: STRAIGHT EXTENSION AT THE END OF A HOOK (INCHES)
2. MULTIPLY VALUES IN THE TABLE BY 1.5 IF CLEAR SPACING OR CONCRETE COVER DO NOT MEET THE REQUIREMENTS FOR Ld IN NOTE 1.
3. "HORIZONTAL BARS IN THICK CONCRETE" REFERS TO BARS WITH MORE THAN 12" OF FRESH CONCRETE CAST BELOW. THIS INCLUDES BEAMS, SLABS, FOUNDATIONS, AND WALLS.
4. #14 AND #18 BARS SHALL NOT BE LAP SPLICED. SEE "GENERAL NOTES."
5. MULTIPLY VALUES IN THE TABLE BY 1.33 FOR USE WITH LIGHTWEIGHT AGGREGATE CONCRETE. FOR EPOXY COATED REINFORCEMENT, MULTIPLY VALUES IN THE TABLES BY 1.5 WITH THE EXCEPTION OF Ldh WHICH IS TO BE MULTIPLIED BY 1.2.
6. WHEN BARS OF DIFFERENT SIZES ARE LAP SPLICED IN TENSION, SPLICE LENGTH SHALL BE THE LARGER OF Ld OF LARGER BAR AND Lsb OF SMALLER BAR, OR Lt AND Lsbt FOR BARS IN THICK CONCRETE.
7. FOR HOOKED BARS WITH CENTER-TO-CENTER SPACING LESS THAN 6db, MULTIPLY Ldh VALUES BY 1.6.

20 CONNECTORS

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LUMEN FIELD

LUMEN FIELD FLUID COOLER REPLACEMENT

800 Occidental Avenue South, Seattle, WA 98134

SEAL:

No.	Rev.	Date

12/03/24
ISSUED FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

Title :
ABBREVIATIONS, LEGENDS, AND DRAWING LIST

S000
sheet no.

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DATUM

REFER TO THE CIVIL ENGINEERING DRAWINGS FOR ALL SITE REFERENCE ELEVATION INFORMATION.

BUILDING CODE

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE BUILDING CODE. THE PUBLICATIONS LISTED BELOW ARE THE GOVERNING CODES AND STANDARDS AND ARE REFERENCED BY THEIR BASIC DESIGNATION. IN THE CASE OF CONFLICTING REQUIREMENTS, THE BUILDING CODE SHALL GOVERN.

APPLICABLE CODES AND STANDARDS

BUILDING CODE	INTERNATIONAL BUILDING CODE (IBC), 2018 EDITION (INCLUDING THE CITY OF SEATTLE BUILDING CODE AMENDMENTS)
ACI 318	AMERICAN CONCRETE INSTITUTE, "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE," 2014 EDITION
AISC 360	AMERICAN INSTITUTE OF STEEL CONSTRUCTION, "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS," 2016 EDITION
ASCE 7	AMERICAN SOCIETY OF CIVIL ENGINEERS, "MINIMUM DESIGN LOADS AND ASSOCIATED CRITERIA FOR BUILDINGS AND OTHER STRUCTURES," 2016 EDITION, INCLUDING SUPPLEMENT NO. 1
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM INTERNATIONAL)
AWS A2.4	AMERICAN WELDING SOCIETY, "STANDARD SYMBOLD FOR WELDING, BRAZING, AND NONDESTRUCTIVE EVALUATION," 2012 EDITION
AWS D1.1	AMERICAN WELDING SOCIETY, " STRUCTURAL WELDING CODE - STEEL," 2015 EDITION
ICC	INTERNATIONAL CODE COUNCIL, INTERNATIONAL CODE COUNCIL - EVALUATION SERVICES (ICC-ES)
IAPMO	INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS – UNIFORM EVALUATION SERVICE (IAPMO-UES)

STRUCTURAL DESIGN DATA

BUILDING LOCATION: LATITUDE: 47.5945° N
LONGITUDE: -122.3316° W

LOAD COMBINATIONS: LOAD COMBINATIONS ARE IN ACCORDANCE WITH SECTION 1605 OF THE BUILDING CODE.

LIVE LOADS: LIVE LOADS SHALL BE IN ACCORDANCE WITH THE LOAD DIAGRAMS.

SNOW LOADS: SNOW LOADING AND SNOW DRIFT LOADING SHALL BE IN ACCORDANCE WITH THE BUILDING CODE (SECTION 1608).

GROUND SNOW LOAD: Pg = 20 PSF

IMPORTANCE FACTOR: Is = 1.1

SNOW EXPOSURE FACTOR: Ce = 1.0

THERMAL FACTOR: Ct = 1.2

FLAT-ROOF SNOW LOAD: Pf = 25 PSF (PER SEATTLE BUILDING CODE)

WIND LOADS: WIND PRESSURE SHALL BE IN ACCORDANCE WITH THE BUILDING CODE (SECTION 1609).

BASIC WIND SPEED (3-SECOND GUST): V = 104 MPH

RISK CATEGORY: III

EXPOSURE CATEGORY: C

INTERNAL PRESSURE COEFFICIENT: GCpi = 0.18

SEISMIC LOADS: SEISMIC LOADING SHALL BE IN ACCORDANCE WITH THE BUILDING CODE.

RISK CATEGORY: IV (AT OWNERS OPTION NOT REQUIRED BY CODE)

IMPORTANCE FACTOR: Ie = 1.5

MAPPED SPECTRAL ACCELERATION PARAMETERS: Ss = 1.418, S1 = 0.495

SITE CLASS: E

SITE COEFFICIENTS: Fa = 1.2, Fv = N/A

SEISMIC DESIGN CATEGORY: D

FOUNDATIONS

THE FOUNDATION DESIGN IS BASED ON THE RECOMMENDATIONS CONTAINED IN THE GEOTECHNICAL REPORT ENTITLED "FINAL GEOTECHNICAL REPORT - LUMEN FIELD FLUID COOLERS AND NORTH LOT IMPROVEMENTS, SEATTLE, WASHINGTON" DATED 11/27/2024, PREPARED BY TETRA TECH.

DRILLED STEEL PIPE PILES: ALL PILES SHALL BE 16-INCH DIAMETER x 0.500-INCH THICK STEEL PIPE CONFORMING TO ASTM A53, GRADE B. PILES SHALL BE DRIILLED A MINIMUM OF 5'-0" INTO THE DENSE GRAVEL LAYER BEDROCK OR TO REFUSAL AS DEFINED BY THE GEOTECHNICAL ENGINEER. PILE DRILLING SHALL BE MONITORED BY A QUALIFIED GEOTECHNICAL ENGINEER. THE DRILLING CRITERIA MAY BE MODIFIED TO SUIT THE SITE CONDITIONS ENCOUNTERED WHEN APPROVED BY THE GEOTECHNICAL ENGINEER.

PER THE PROJECT GEOTECHNICAL REPORT, THE PROPOSED DRILLED PILES HAVE AN ALLOWABLE BEARING CAPACITY OF 137.5 KIPS AND AN ALLOWABLE CAPACITY THROUGH SKIN FRICITION OF 37.5 KIPS, RESULTING IN A TOTAL ALLOWABLE CAPACITY OF 175 KIPS. THE ALLOWABLE PILE CAPACITIES IN BEARING AND SKIN FRICTION ARE BASED ON A FACTOR OF SAFETY OF 2.0, THUS THE ULTIMATE CAPACITY IS 350 KIPS.

PER THE GEOTECHNICAL REPORT, THE PROPOSED DRILLED PILES HAVE A LATERAL RESISTENCE OF 15 KIPS PER PILE BASED ON A 1" LATERAL DEFLECTION. THE PILE BENDING MOMENT ASSOCIATED WITH THE 1" LATERAL DEFLECTION IS 1,000 KIP-IN.

OPTIONAL PILES OTHER THAN THOSE INDICATED ON THE DRAWINGS MAY BE PROVIDED. OPTIONAL PILES MUST BE SUPPORTED ON THE SAME SOIL STRATA AS THE PILES SHOWN ON THE DRAWINGS. IF THESE OPTIONAL PILES HAVE A LOWER CAPACITY THAN THOSE SHOWN ON THE DRAWINGS, THE MODIFICATION TO THE PILE CAPS MUST ALSO BE PRESENTED. A 1—MONTH MINIMUM TIME ALLOWANCE MUST BE MADE FOR THE ENGINEER TO REVIEW ALL OPTIONAL PILE AND PILE-CAP DESIGN.

REFER TO THE GEOTECHNICAL REPORT FOR ADDITIONAL DRILLED PILE CRITERIA.

STRUCTURAL SLAB ON GRADE BASE MATERIAL

CONCRETE STRUCTURAL SLAB ON GRADE SHALL BE PLACED ON PREPARED BASE COURSE PER THE GEOTECHNICAL ENGINEER. BASE COURSE SHALL CONSIST OF CRUSHED AGGREGATE COMPACTED TO THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER. REFER TO THE PLANS AND DETAILS FOR OTHER REQUIREMENTS. REFER GEOTECHNICAL ENGINEER FOR VAPOR BARRIER AND UNDER-SLAB DRAINAGE REQUIREMENTS.

STRUCTURAL FILL

ALL FILL PLACED TO SUPPORT SLABS ON GRADE, BEHIND PERMANENT WALLS, AND AROUND ALL DRAINS SHALL CONSIST OF WELL GRADED, GRANULAR MATERIAL PER THE SPECIFICATIONS. SOILS FOR STRUCTURAL FILL SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER. STRUCTURAL FILL SHALL BE PLACED ON SOUND NATIVE MATERIAL. PROOF-ROLL CUT AREAS WHICH PROVIDE SUPPORT FOR PERMANENT STRUCTURES. AREAS WHICH ARE EXCESSIVELY YIELDING, AS DETERMINED BY THE CONTINUOUS OBSERVATION OF THE GEOTECHNICAL ENGINEER, SHALL BE OVEREXCAVATED AND REPLACED WITH STRUCTURAL FILL. STRUCTURAL FILL SHALL BE PLACED PER THE SPECIFICATION.

CONCRETE

MIXING, BATCHING, TRANSPORTING, PLACING, AND CURING OF ALL CONCRETE, AND SELECTION OF CONCRETE MATERIALS, SHALL CONFORM TO ACI 301, "SPECIFICATIONS FOR STRUCTURAL CONCRETE," EXCEPT AS NOTED BELOW. PROPORTIONS OF AGGREGATE TO CEMENTITIOUS PASTE SHALL BE SUCH AS TO PRODUCE A DENSE, WORKABLE MIX THAT CAN BE PLACED WITHOUT SEGREGATION OR EXCESS FREE SURFACE WATER.

MIX DESIGNS LISTED BELOW SHALL BE SUBMITTED TO THE ARCHITECT AND APPROVED PRIOR TO USE. SELECTION OF CONCRETE MIX PROPORTIONS SHALL BE IN ACCORDANCE WITH ACI 301. MIX PROPORTIONS SHALL MEET OR EXCEED THE REQUIREMENTS LISTED BELOW FOR THE LOCATIONS NOTED. THE MORE STRINGENT OF THE REQUIREMENTS LISTED SHALL GOVERN.

PROVIDE ASTM C150 (TYPE I OR TYPE II) OR ASTM C595 (TYPE IL, IS, IP, OR IT) CEMENT UNLESS NOTED OTHERWISE. THE CEMENTITIOUS MATERIAL CONTENT SHALL BE ADEQUATE FOR THE SPECIFIED REQUIREMENTS FOR STRENGTH, WATER-CEMENT RATIO, DURABILITY, AND FINISH ABILITY.

MAXIMUM COMPLEMENTARY CEMENTING MATERIALS (EX. FLY ASH, SLAG, SILICA FUME) AS A PERCENTAGE OF TOTAL WEIGHT OF CEMENTITIOUS MATERIAL SHALL BE 50 PERCENT. FLY ASH SHALL MEET ASTM C618 REQUIREMENTS, AND SHALL NOT EXCEED 30 PERCENT OF TOTAL CEMENTITIOUS MATERIAL. WATER/CEMENT RATIO SHALL BE BASED ON TOTAL CEMENTITIOUS MATERIAL, INCLUDING COMPLEMENTARY CEMENTING MATERIALS. NOMINAL MAXIMUM SIZE OF AGGREGATE SHALL BE AS LISTED BELOW.

ALL CONCRETE USED IN HORIZONTAL SURFACES EXPOSED TO THE WEATHER SHALL CONTAIN AN ACCEPTABLE ADMIXTURE TO PRODUCE AIR-ENTRAINED CONCRETE WITH TOTAL AIR CONTENT AS NOTED IN THE CONCRETE MIX SPECIFICATION TABLE. TOLERANCE FOR AIR CONTENT SHALL BE +/—1.5 PERCENT. AIR CONTENT SHALL BE MEASURED AT THE DISCHARGE OF THE TRUCK. IF CONCRETE IS PUMPED, AIR CONTENT SHALL BE MEASURED AT THE DISCHARGE END OF THE PUMP LINE. TESTS FOR AIR CONTENT SHALL MEET ASTM C172 REQUIREMENTS.

THE CONTRACTOR SHALL DETERMINE SLUMP. EACH CONCRETE MIX SUBMITTED SHALL HAVE THE SLUMP SPECIFIED. SLUMP SHALL BE MEASURED AT THE DISCHARGE OF THE TRUCK. IF CONCRETE IS PUMPED, SLUMP SHALL BE MEASURED AT THE DISCHARGE END OF THE PUMP LINE. SLUMPS SHALL BE WITHIN +1 INCH AND —2 INCHES OF THE SPECIFIED SLUMP.

THE USE OF SUPER PLASTICIZERS AND WATER REDUCERS IS ALLOWED, BUT NOT REQUIRED. ALL ADMIXTURES SHALL BE CHLORIDE-FREE UNLESS OTHERWISE APPROVED BY THE ENGINEER.

CONCRETE MIX SPECIFICATION TABLE

LOCATION	f'c MIN (PSI)	TEST AGE (DAYS)	MAX W/C RATIO	NOMINAL MAX AGG SIZE	AIR CONTENT PERCENT
EXTERIOR EXPOSED SLABS ON GRADE AND CURBS	4,000	28	0.45	1"	4.5

REINFORCING STEEL

ALL REINFORCING SHALL BE NEW BILLET STOCK ASTM A615, GRADE 60, UNLESS NOTED OTHERWISE. BARS SHALL BE SECURELY TIED IN PLACE WITH #16 GAGE MINIMUM ANNEALED BLACK WIRE. BARS SHALL BE SUPPORTED ON CHAIRS IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE. THE CONTRACTOR SHALL COORDINATE REINFORCING STEEL PLACEMENT DETAILS AND PROVIDE TEMPLATES FOR PLACING STEEL IN CONGESTED AREAS AS NECESSARY. SHOP DRAWINGS (INCLUDING PLACING PLANS AND ELEVATIONS) SHALL BE SUBMITTED TO, AND REVIEWED BY, THE ARCHITECT/ENGINEER BEFORE STARTING FABRICATION.

REINFORCING BARS SHALL BE LAP SPLICED FOR TENSION (LSB) UNLESS NOTED OTHERWISE ON THE DRAWINGS. AT THE CONTRACTOR'S OPTION, MECHANICAL COUPLINGS MAY BE USED FOR ANY BAR SIZE, PROVIDED A CURRENT ICC—ES (OR IAPMO-UES EQUIVALENT) REPORT DEMONSTRATES THAT THE PRODUCT CAN ACHIEVE A MINIMUM TENSILE STRENGTH OF 125 PERCENT OF THE SPECIFIED YIELD STRENGTH OF THE BAR. NO REINFORCING BARS SHALL BE SPLICED BY WELDING. SPLICE DEVICES SHALL HAVE A CURRENT ICC-ES (OR IAPMO-UES EQUIVALENT) REPORT THAT SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. HEADED BARS OR TERMINATORS SHALL BE PROVIDED WHERE INDICATED ON THE DRAWINGS OR AT THE CONTRACTOR'S OPTION FOR CONGESTED AREAS OF REINFORCEMENT ANCHORAGE SUBJECT TO THE ENGINEER'S APPROVAL. HEADED BARS OR TERMINATORS SHALL MEET THE REQUIREMENTS OF ACI 318 AND ASTM A970, AND HAVE A CURRENT ICC-ES (OR IAPMO-UES EQUIVALENT) REPORT.

WELDING OR TACK WELDING OF REINFORCING BARS TO OTHER BARS OR TO PLATES, ANGLES, ETC, IS PROHIBITED, EXCEPT WHERE SPECIFICALLY APPROVED BY THE ENGINEER. WHERE WELDING IS APPROVED, IT SHALL BE DONE BY AWS/WABO (WASHINGTON ASSOCIATION OF BUILDING OFFICIALS) CERTIFIED WELDERS. FOR CJP WELDS, MATCHING FILLER METAL STRENGTH SHALL BE USED IN ACCORDANCE WITH AWS D1.4. ALL OTHER WELDS SHALL USE A MINIMUM FILLER METAL TENSILE STRENGTH OF 70KSI UNLESS NOTED OTHERWISE. ALL WELDS SHALL USE LOW HYDROGEN ELECTRODES AND CONFORM TO THE REQUIREMENTS OF AWS D1.4.

CAST-IN-PLACE CONCRETE COVER OVER REINFORCING STEEL, UNLESS NOTED OTHERWISE, SHALL BE AS FOLLOWS:

1. CONCRETE CAST AGAINST EARTH:

   ALL BAR SIZES: 3 INCHES

2. CONCRETE EXPOSED TO EARTH OR WEATHER:

   #6 BAR OR LARGER: 2 INCHES
   #5 BAR OR SMALLER: 1 1/2 INCHES

3. OTHER CONCRETE:

   SLABS:
   #11 BARS AND SMALLER:
   TOP BARS: 3/4 INCH
   BOTTOM BARS: 1 INCH

   WALLS:
   #11 BARS AND SMALLER: 1 INCH

   BEAMS AND COLUMNS - TIES, STIRRUPS, SPIRALS:
   ALL BAR SIZES: 1-1/2 INCHES

SPECIFIED CONCRETE COVER SHALL BE MAINTAINED TO ALL REINFORCEMENT AT CONCRETE REVEALS AND INSETS. SHOP DRAWINGS SHOWING CONCRETE REVEALS AND OTHER INSETS SHALL BE SUBMITTED FOR REVIEW.

CONSTRUCTION JOINTS

ALL CONSTRUCTION JOINTS IN SLABS, BEAMS, AND WALLS SHALL BE KEYED IN ACCORDANCE WITH THE TYPICAL DETAILS OR, AT THE CONTRACTOR'S OPTION, SHALL BE INTENTIONALLY ROUGHENED IN ACCORDANCE WITH THE FOLLOWING: THE SURFACE OF ROUGHENED JOINTS SHALL BE SAND BLASTED OR ROUGHENED WITH A CHIPPING HAMMER TO EXPOSE THE AGGREGATE EMBEDDED IN THE PREVIOUS POUR. THE EXPOSED AGGREGATE SHALL PROTRUDE A MINIMUM OF 1/4 INCH. ALL SURFACES OF CONSTRUCTION JOINTS SHALL BE CLEANED AND LAITANCE REMOVED. IMMEDIATELY BEFORE NEW CONCRETE IS PLACED, ALL CONSTRUCTION JOINTS SHALL BE WETTED AND STANDING WATER REMOVED. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION JOINT PREPARATION REQUIREMENTS WITH THE COMPLETE CONTRACT DOCUMENTS, INCLUDING WATERSTOPS, WATERPROOFING, ETC., AS REQUIRED.

VERTICAL CONSTRUCTION JOINTS IN WALLS SHALL BE HELD TO A MAXIMUM SPACING OF 40'—0".

ALL CONSTRUCTION JOINTS FOR BEAMS AND SLABS SHALL BE IN ACCORDANCE WITH THE TYPICAL DETAILS.

ALL CONSTRUCTION JOINTS IN SLABS ON STEEL DECK SHALL BE IN ACCORDANCE WITH THE TYPICAL DETAILS. STEEL BEAMS AND GIRDERS HAVE BEEN DESIGNED ASSUMING THE CONSTRUCTION JOINTS ARE LOCATED IN THE MIDDLE THIRD OF THE BEAM, GIRDER, OR SLAB SPAN.

ALL CONSTRUCTION JOINTS IN SLABS, BEAMS, AND WALLS SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER FOR REVIEW BEFORE STARTING CONSTRUCTION. PROVIDE JOINTS AT LOCATIONS SPECIFICALLY NOTED ON THE ARCHITECTURAL OR STRUCTURAL DRAWINGS.

ANCHORAGE TO HARDENED CONCRETE

ANCHORAGE TO HARDENED CONCRETE SHALL INCLUDE MECHANICAL AND ADHESIVE ANCHORS OF SIZE, NUMBER, AND SPACING AS SHOWN ON THE DRAWINGS. HOLES SHALL BE DRILLED AND CLEANED AND ANCHORS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED INSTRUCTIONS AND AN APPROVED ICC—ES (OR IAPMO-UES EQUIVALENT) REPORT. INSPECTION AND TESTING SHALL BE PROVIDED IN ACCORDANCE WITH THE GENERAL NOTES AND THE APPROVED ICC—ES (OR IAPMO-UES EQUIVALENT) REPORT.

WHERE THE ANCHOR TYPE IS SPECIFIED ON THE DRAWINGS, SUBSTITUTION FOR A DIFFERENT TYPE OF ANCHORAGE (INCLUDING SUBSTITUTING FOR CAST-IN-PLACE ANCHORAGE) SHALL NOT BE PERMITTED WITHOUT PRIOR CONSENT OF THE ENGINEER.

ACCEPTABLE ANCHORS SHALL HAVE A CURRENT ICC—ES (OR IAPMO-UES EQUIVALENT) REPORT INDICATING THAT THE ANCHOR IS PERMITTED FOR RESISTING SEISMIC LOADS IN CRACKED CONCRETE. UNLESS NOTED OTHERWISE, ANCHORS SHALL BE ASTM A36 THREADED ROD OR ASTM A615, GRADE 60 REINFORCING STEEL DOWELS.

WHEN EMBEDMENT IS NOTED ON THE DRAWINGS, THE ANCHOR EFFECTIVE EMBEDMENT DEPTH SHALL EQUAL OR EXCEED THE NOTED EMBEDMENT DEPTH. WHERE NO EMBEDMENT IS NOTED ON THE DRAWINGS, THE MINIMUM EFFECTIVE ANCHOR EMBEDMENT DEPTH SHALL BE 6.5 ANCHOR DIAMETERS, MINIMUM DISTANCE TO THE NEAREST CONCRETE EDGE SHALL BE 12 ANCHOR DIAMETERS, AND MINIMUM ANCHOR SPACING SHALL BE 8 ANCHOR DIAMETERS.

HOLES SHALL BE DRILLED WITH ROTARY IMPACT HAMMER OR EQUIVALENT METHOD TO PRODUCE A HOLE WITH A ROUGH INSIDE SURFACE. CORE DRILLING HOLES IS NOT PERMITTED. NO STEEL REINFORCEMENT SHALL BE CUT TO INSTALL ANCHORS. THE ADHESIVE SHALL BE MIXED, APPLIED, AND CURED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS IN THE ICC—ES (OR IAPMO-UES EQUIVALENT) REPORT. ALL PLACEMENT AND CURING SHALL BE CONDUCTED WITH CONCRETE AND AIR TEMPERATURES ABOVE 50 DEGREES FAHRENHEIT. ADHESIVE SHALL BE APPLIED ONLY TO CLEAN, DRY CONCRETE. POSITIVE PROTECTION SHALL BE PROVIDED SO THAT ANCHORS ARE NOT DISTURBED DURING THE CURING PERIOD. STAINLESS STEEL ANCHORS SHALL BE USED AT ALL EXTERIOR LOCATIONS AND WHERE SPECIFICALLY INDICATED ON THE DRAWINGS. DEFECTIVE OR ABANDONED HOLES SHALL BE FILLED WITH NON-SHRINK GROUT OR AN INJECTABLE ADHESIVE MATCHING THE ADJACENT CONCRETE COMPRESSIVE STRENGTH. NOTIFY THE STRUCTURAL ENGINEER OF DEFECTIVE OR ABANDONED HOLES IN WALLS AND COLUMNS. THESE ELEMENTS MAY REQUIRE NON-SHRINK GROUT WITH A COMPRESSIVE MODULUS OF ELASTICITY MATCHING THAT OF THE ADJACENT CONCRETE.

BUILDING TOLERANCES

STANDARD TOLERANCES SHALL BE BASED ON THE REQUIREMENTS OF THE AISC CODE OF STANDARD PRACTICE AND ACI 117, "SPECIFICATIONS FOR TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS".

STRENGTH AND STABILITY DURING CONSTRUCTION

DURING CONSTRUCTION, THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE STRENGTH AND STABILITY OF THE STRUCTURE.

A COMPLETED STRUCTURE IS REQUIRED TO PROVIDE GLOBAL STABILITY, TO PROVIDE LOCAL STABILITY OF INDIVIDUAL STRUCTURAL COMPONENTS (SLABS, DECKS, BEAMS, COLUMNS, WALLS, ETC.), AND TO RESIST IMPOSED LOADS.

THE STRUCTURE WAS ANALYZED AND DESIGNED BY MKA CONSIDERING ITS COMPLETED STATE ONLY. THE DESIGN DID NOT EVALUATE PARTIALLY COMPLETED CONSTRUCTION STAGES.

THE CONTRACTOR SHALL CONSIDER ALL ASPECTS OF CONSTRUCTION SEQUENCING. CONSIDERATIONS SHALL INCLUDE BUT NOT BE LIMITED TO STEEL ERECTION AND CONCRETE PLACEMENT, CRANE REQUIREMENTS, TEMPORARY SHORING, BRACING/STRENGTHENING, BACKFILLING, DE-STRESSING TIEBACKS, TEMPORARY CONSTRUCTION LOADS, SAFETY PROCEDURES, TEMPERATURE CHANGE, AND MOISTURE EFFECTS.

THE CONTRACTOR SHALL EVALUATE THE NEED FOR AND RETAIN AS NECESSARY AN ENGINEER LICENSED TO PERFORM THE WORK IN THE JURISDICTION WHERE THE PROJECT IS LOCATED TO REVIEW ALL STAGES OF CONSTRUCTION SEQUENCING, VALIDATE ALL TEMPORARY CONSTRUCTION LOADS, AND PREPARE A COMPREHENSIVE CONSTRUCTION/ERECTION PLAN TO ADDRESS BOTH STABILITY AND RESISTANCE TO IMPOSED LOADS UNTIL THE STRUCTURE IS COMPLETE.

TEMPORARY SUPPORTS, TEMPORARY CONNECTIONS, AND/OR CONSTRUCTION/ ERECTION AIDS SHALL BE REMOVED BY THE CONTRACTOR AFTER THEY ARE NO LONGER REQUIRED.

MISCELLANEOUS

REFER TO ARCHITECTURAL, MECHANICAL, ELECTRICAL, CIVIL, ELEVATOR, OR OTHER SPECIALTY ENGINEERING DRAWINGS FOR DIMENSIONS NOT SHOWN, INCLUDING BUT NOT LIMITED TO: SIZE AND LOCATION OF CURBS, EQUIPMENT HOUSEKEEPING PADS, WALL AND FLOOR OPENINGS, BLOCKOUTS, FLOOR DEPRESSIONS, SUMPS, DRAINS, ANCHOR BOLTS, EMBEDDED ITEMS, ARCHITECTURAL TREATMENT, ETC. THE CONTRACTOR SHALL VERIFY DIMENSIONS AND RESOLVE DISCREPANCIES OR CONFLICTS PRIOR TO CONSTRUCTION.

WHERE SECTIONS ARE INDICATED ON THE PLAN BY A NUMBER AND A DRAWING NUMBER THUS, 1/S5.01, THE INDICATED SECTION (1) IS SHOWN ON STRUCTURAL DRAWING S5.01.

SHOP DRAWINGS

SHOP DRAWINGS FOR REINFORCING STEEL AND STRUCTURAL STEEL SHALL BE SUBMITTED FOR REVIEW PRIOR TO FABRICATION OF THESE ITEMS.

THE CONTRACTOR SHALL SUBMIT CONCRETE WALL ELEVATION DRAWINGS OF AT LEAST 1/8" = 1'—0" SCALE INDICATING LOCATIONS OF CONNECTION EMBEDMENTS AND WALL OPENINGS FOR REVIEW PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE WITH REINFORCEMENT DRAWINGS.

REFER TO THE ARCHITECTURAL DRAWINGS FOR ALL CONCRETE DIMENSIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DEVELOP DETAILED SLAB EDGE AND CONCRETE OUTLINE DRAWINGS THAT ARE BASED ON THE ARCHITECTURAL, STRUCTURAL, AND MEP DRAWINGS. THE DETAILED EDGE AND OUTLINE DRAWINGS SHALL BE SUBMITTED FOR REVIEW. SUBMITTED DRAWINGS SHALL CONTAIN ALL CONCRETE CURBS, FORM OUTLINES, AND EMBEDDED ITEMS. DIMENSIONS AND OUTLINES DEVELOPED BY THE CONTRACTOR MAY VARY FROM THOSE SHOWN BY THE ARCHITECT AND ENGINEER AS NECESSARY BASED ON THE DEPENDENCY ON ADJACENT MATERIALS THAT ARE DETERMINED BY THE CONTRACTOR AND/OR SUPPLIER (EXTERIOR CLADDING, ELEVATOR EQUIPMENT, FINAL MEP SHAFT SIZES, ETC.). CONCRETE OUTLINES SHALL BE ADJUSTED AS NECESSARY TO ACCOUNT FOR CONSTRUCTION METHODS AND FOR SLAB SHRINKAGE. THE CONCRETE OUTLINE DEVELOPED BY THE CONTRACTOR SHALL NOT MATERIALLY ALTER THE DESIGN INTENT SHOWN IN THE STRUCTURAL DRAWINGS.

DIMENSIONS AND QUANTITIES ARE NOT REVIEWED BY THE ENGINEER OF RECORD; THEREFORE, THEY SHALL BE VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL REVIEW AND STAMP DRAWINGS PRIOR TO REVIEW BY THE ENGINEER OF RECORD. THE CONTRACTOR SHALL REVIEW DRAWINGS FOR CONFORMANCE WITH THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND OPERATIONS OF CONSTRUCTION, AND ALL SAFETY PRECAUTIONS AND PROGRAMS INCIDENTAL THERETO.

SUBMITTALS SHALL BE PROVIDED ELECTRONICALLY WHENEVER POSSIBLE AND WILL BE MARKED AND RETURNED ELECTRONICALLY. WHEN HARD COPY SUBMITTALS ARE REQUIRED, ONE ORIGINAL AND ONE COPY SHALL BE PROVIDED; THE REPRODUCIBLE COPY WILL BE MARKED AND RETURNED.

SHOP DRAWING SUBMITTALS PROCESSED BY THE ENGINEER ARE NOT CHANGE ORDERS. THE PURPOSE OF SHOP DRAWING SUBMITTALS BY THE CONTRACTOR IS TO DEMONSTRATE TO THE ENGINEER THAT THE CONTRACTOR UNDERSTANDS THE DESIGN CONCEPT, BY INDICATING WHICH MATERIAL IS INTENDED TO BE FURNISHED AND INSTALLED, AND BY DETAILING THE INTENDED FABRICATION AND INSTALLATION METHODS. IF DEVIATIONS, DISCREPANCIES, OR CONFLICTS BETWEEN SHOP DRAWINGS SUBMITTALS AND THE CONTRACT DOCUMENTS ARE DISCOVERED EITHER PRIOR TO OR AFTER SHOP DRAWING SUBMITTALS ARE PROCESSED BY THE ENGINEER, THE DESIGN DRAWINGS AND SPECIFICATIONS SHALL CONTROL AND SHALL BE FOLLOWED.

SHOP DRAWINGS FOR DEFERRED SUBMITTALS THAT ARE DEFINED AS DESIGN-BUILD COMPONENTS IN THE CONSTRUCTION DOCUMENTS SHALL BE SEALED AND SIGNED BY AN ENGINEER LICENSED TO PERFORM WORK IN THE JURISDICTION WHERE THE PROJECT IS LOCATED AND SHALL BE APPROVED BY THE COMPONENT DESIGNER PRIOR TO CURSORY REVIEW BY THE ENGINEER OF RECORD FOR LOADS IMPOSED ON THE PRIMARY STRUCTURE. THE COMPONENT DESIGNER IS RESPONSIBLE FOR CODE CONFORMANCE AND ALL NECESSARY CONNECTIONS NOT SPECIFICALLY CALLED OUT ON ARCHITECTURAL OR STRUCTURAL DRAWINGS. SHOP DRAWINGS SHALL INDICATE MAGNITUDE AND DIRECTION OF ALL LOADS IMPOSED ON THE PRIMARY STRUCTURE. DESIGN CALCULATIONS SHALL BE INCLUDED IN THE SUBMITTAL.

SPECIAL INSPECTION

THE FOLLOWING ITEMS REQUIRE SPECIAL INSPECTION AND TESTING PER IBC SECTION 1705. THIS WORK SHALL BE PERFORMED BY A SPECIAL INSPECTOR CERTIFIED BY THE CITY OF SEATTLE TO PERFORM THE TYPES OF INSPECTIONS AND TESTS SPECIFIED. THE FREQUENCY OF INSPECTIONS AND TESTING SHALL BE AS OUTLINED IN THE IBC TABLE ITEMS LISTED BELOW. DEFICIENCIES SHALL BE REPORTED DAILY TO THE CONTRACTOR. SUMMARY REPORTS SHALL BE DISTRIBUTED WEEKLY TO THE OWNER, ARCHITECT, CONTRACTOR, BUILDING OFFICIAL, AND STRUCTURAL ENGINEER. SEE THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR SPECIAL INSPECTION AND TESTING.

ITEM	DESCRIPTION (REFER TO IBC SECTION 1705)	IBC REFERENCE
CONCRETE	CONCRETE THAT IS PART OF THE STRUCTURE.	SECTION 1705.2, TABLE 1705.3, ITEMS 5, 6, 7, 8, 11, 12
ANCHORS POST-INSTALLED IN HARDENED CONCRETE	INSTALLATION OF MECHANICAL AND ADHESIVE ANCHORS.	TABLE 1705.3, ITEM 4
REINFORCING STEEL	A. PLACEMENT OF REINFORCING STEEL. B. SPLICING OF REINFORCING BY WELDING OR THREADED COUPLERS.	TABLE 1705.3, ITEM 1 TABLE 1705.3, ITEM 1, 2
SOILS		SECTION 1705.6, TABLE 1705.6
DEEP FOUNDATIONS		SECTION 1705.7, TABLE 1705.7

STRUCTURAL OBSERVATION

THE ENGINEER OF RECORD SHALL PROVIDE VISUAL OBSERVATION OF THE STRUCTURAL SYSTEM, FOR GENERAL CONFORMANCE TO THE APPROVED PLANS AND SPECIFICATIONS, AT SIGNIFICANT CONSTRUCTION STAGES AND AT THE COMPLETION OF THE STRUCTURAL SYSTEM. STRUCTURAL OBSERVATION DOES NOT INCLUDE OR WAIVE THE RESPONSIBILITY FOR THE INSPECTIONS REQUIRED BY IBC SECTIONS 110, 1705, OR OTHER SECTIONS OF THE INTERNATIONAL BUILDING CODE. STRUCTURAL OBSERVATION REPORTS SHALL BE ISSUED TO THE OWNER, ARCHITECT, CONTRACTOR, AND BUILDING OFFICIAL AT SIGNIFICANT CONSTRUCTION STAGES.

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LUMEN FIELD FLUID COOLER REPLACEMENT

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SEAL:

No.	Rev.	Date

12/03/24
ISSUED FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023
Title :
GENERAL NOTES

S001
sheet no.

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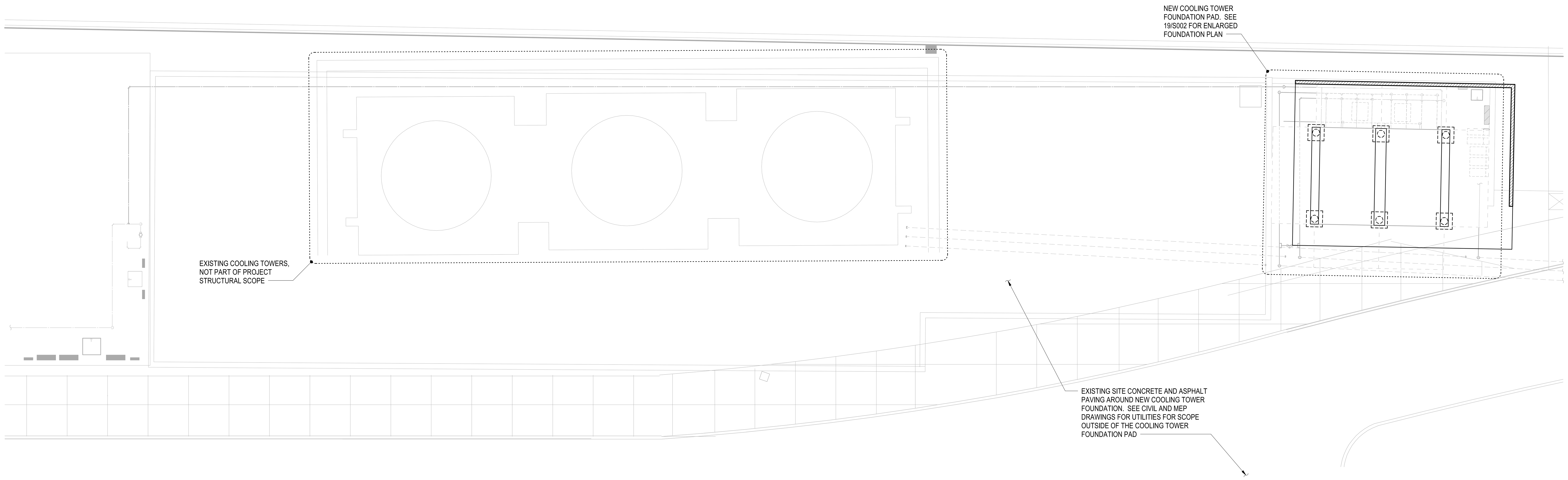
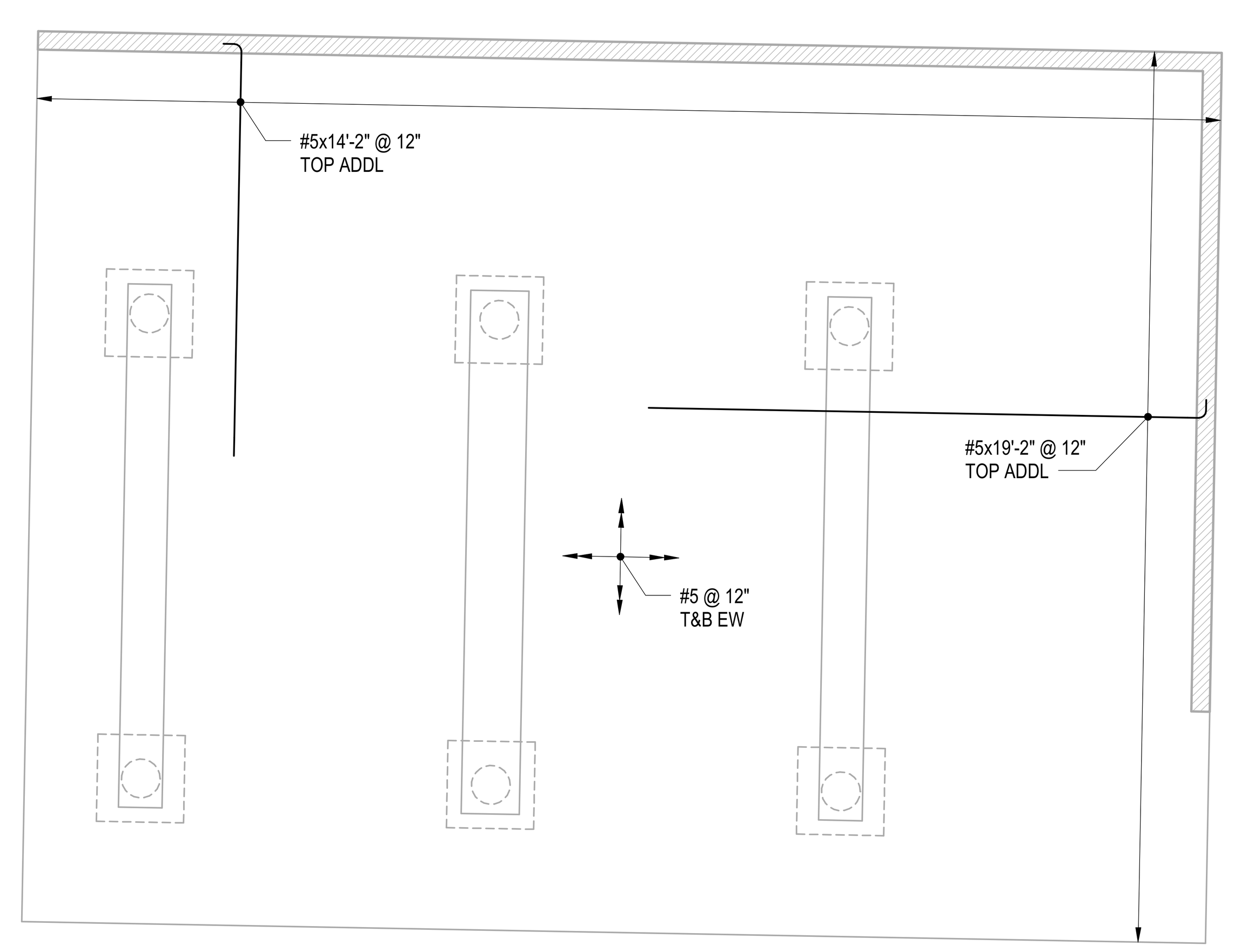


NOTES:

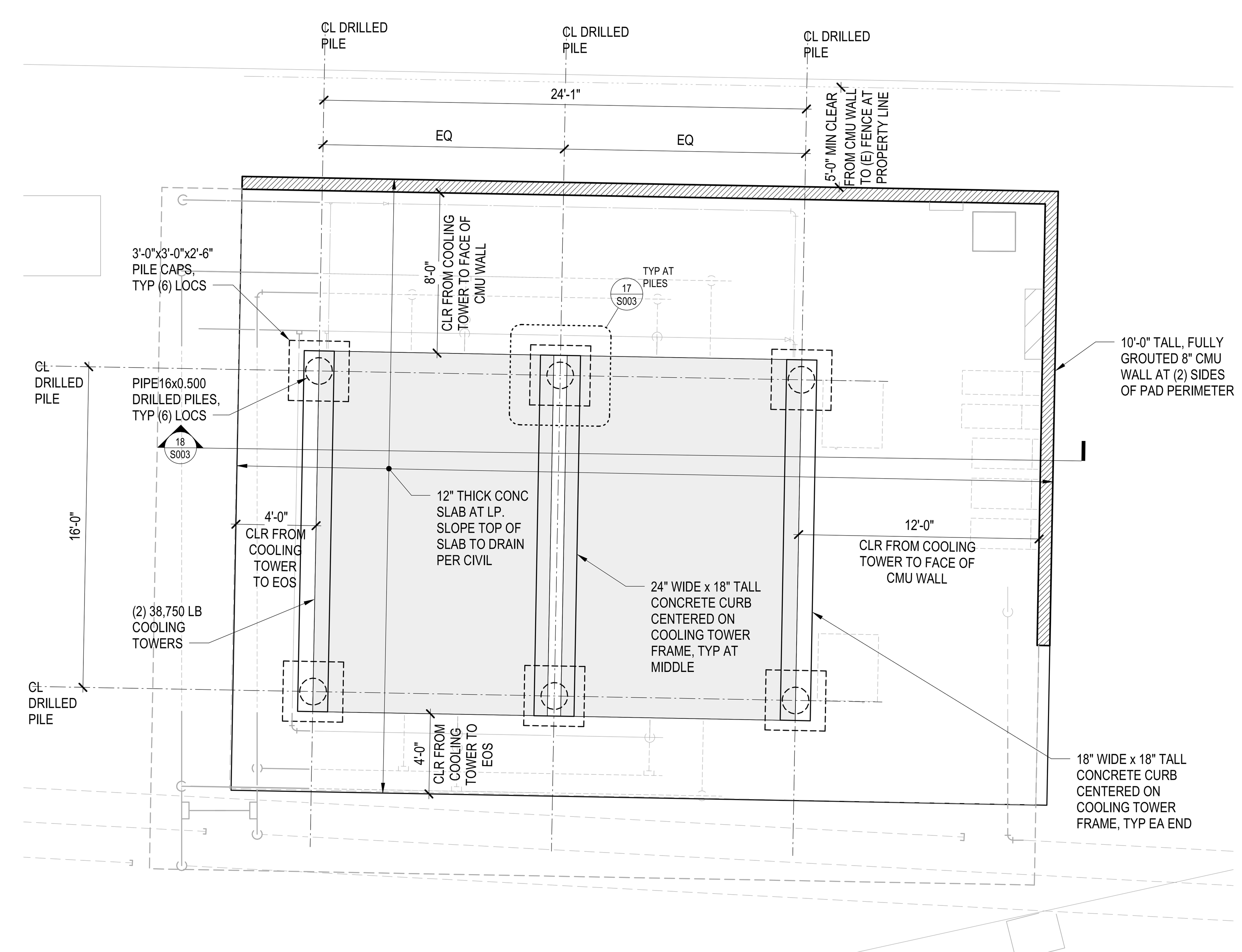
1. PROJECT STRUCTURAL SCOPE OF WORK IS LIMITED TO THE CONCRETE FOUNDATION PAD, DRILLED PILES, AND PERIMETER CMU WALL AT THE NEW COOLING TOWERS. SITE PLAN SHOWN FOR INFORMATION ONLY.
2. REFER TO THE ARCHITECTURAL, CIVIL, AND MEP DRAWINGS FOR DETAILED SITE PLAN INFORMATION.
3. REFER TO THE ARCHITECTURAL AND CIVIL DRAWINGS FOR LOCATION OF COOLING TOWER FOUNDATION PAD RELATIVE TO EXISTING BENCHMARKS.

6 OVERALL EXISTING AND NEW COOLING TOWER YARD SITE PLAN

1/8" = 1'-0"



17 NEW COOLING TOWER YARD REINFORCING PLAN



NOTES:

1. FOUNDATION DESIGN IS BASED ON A PAIR COOLING TOWERS SUPPPLIED BY EVAPCO, INC. THE DESIGN BASIS COOLING TOWERS ARE EVAPCO UNIT ESW4 12-44O18X-SP WITH A TOTAL OPERATING WEIGHT ON 77,500 LBS.
2. THE LAYOUT OF THE DRILLED PIER FOUNDATIONS AND CONCRETE CURBS THAT SUPPORT THE COOLING TOWERS IS BASED ON AN OVERALL COMBINED COOLING TOWER FOOTPRINT OF 24'-1 1/8" x 18'-0" x 20'-2 1/8" TALL PER THE EVAPCO, INC DRAWINGS DATED 11/25/2024. CONTRACTOR TO VERIFY FINAL COOLING TOWER DIMENSIONS WITH THE MANUFACTURER AND ADJUST LAYOUT OF THE DRILLED PIERS AND THE SUPPORTING CONCRETE CURBS TO FIT THE FINAL COOLING TOWER DIMENSIONS.
3. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS AND UTILITIES PRIOR TO PROCEEDING WITH INSTALLATION OF DRILLED STEEL PIPE PILES. NOTIFY THE OWNER AND DESIGN TEAM OF ANY POTENTIAL CONFLICTS FOR REVIEW.
4. THE REQUIRED CLEARANCES FROM THE EDGE OF THE COOLING TOWER UNITS TO THE EDGE OF SLAB (EOS) AND INSIDE FACE OF CMU WALLS HAVE BEEN DETAILED BASED ON CRITERIA PROVIDED BY THE PROJECT MEP ENGINEERS. VERIFY ALL CLEARANCES WITH THE MEP ENGINEERS AND THE FINAL LAYOUT OF THE COOLING TOWERS AND OTHER MEP EQUIPMENT THAT IS SUPPORTED OFF THE FOUNDATION CONCRETE SLAB AND PERIMETER CMU WALLS. SUBMIT DETAILED CONCRETE LAYOUT DRAWINGS FOR DESIGN TEAM REVIEW.

19 NEW COOLING TOWER YARD FOUNDATION PLAN

1/4" = 1'-0"

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COOLING TOWER FOUNDATION PLANS

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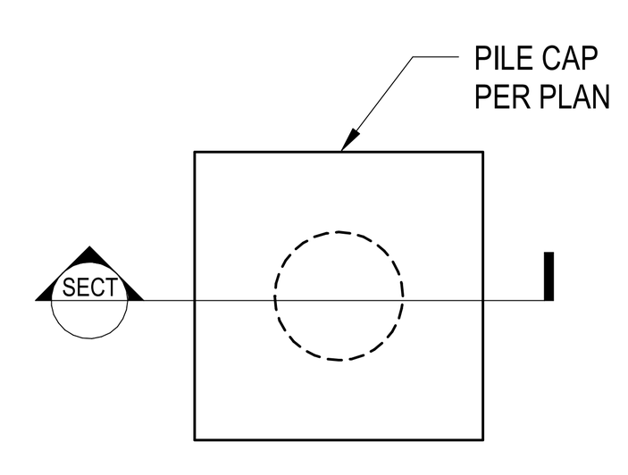
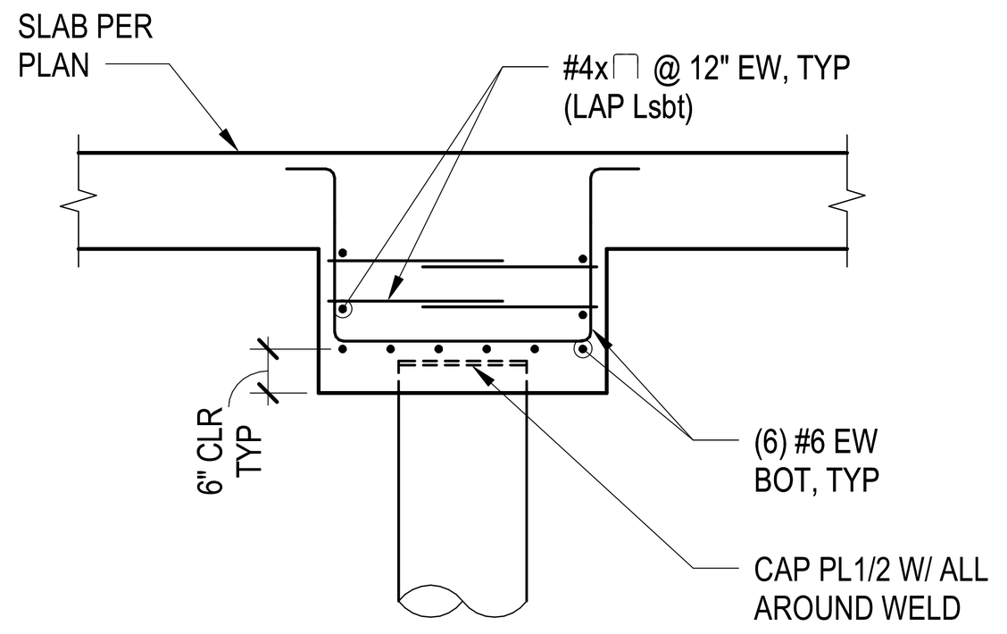
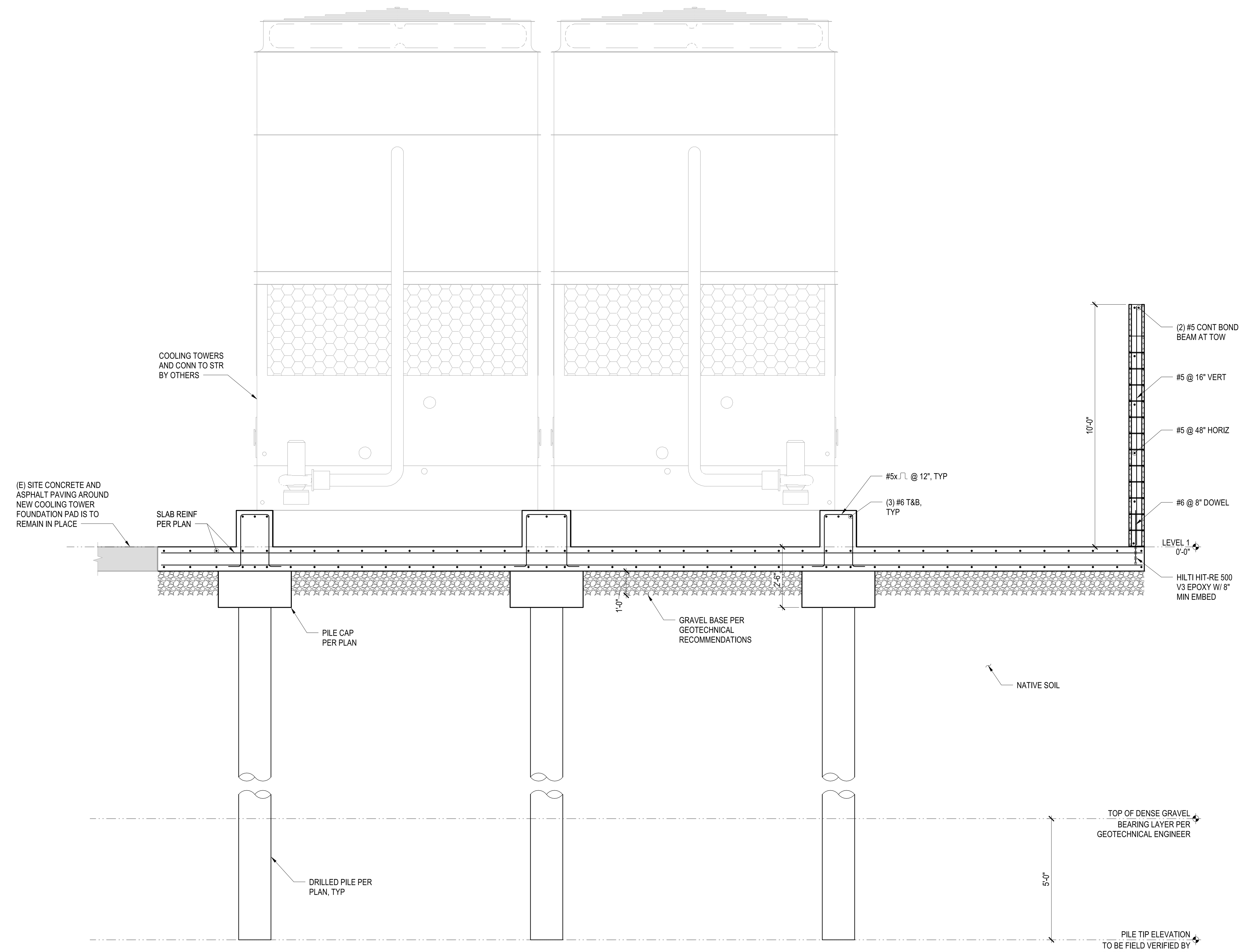


PLAN



SECTION

17 TYPICAL PILE SECTION



18 NEW COOLING TOWER YARD FOUNDATION SECTION
1/2" = 1'-0"

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LUMEN FIELD FLUID COOLER REPLACEMENT

800 Occidental Avenue South, Seattle, WA 98134

SEAL:

No.	Rev.	Date

12/03/24
ISSUED FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

Title :
COOLING TOWER SECTION AND DETAILS

S003
sheet no.

GENERAL NEW NOTES:

1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
2. PROVIDE SEISMIC RESTRAINTS AS NEEDED FOR THE MECHANICAL SYSTEMS IN THE PROJECT BASED ON THE SEISMIC ANALYSIS REQUIRED BY THE SPECIFICATIONS.
3. EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS.
4. COORDINATE THE INSTALLATION OF THE MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION. INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. ANY MODIFICATIONS REQUIRED DUE TO LACK OF COORDINATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.
5. WHERE SHUTDOWN OF EXISTING SYSTEMS IS REQUIRED DURING NEW WORK, COORDINATE SHUTDOWN TIME AND DURATION WITH THE OWNER TO MINIMIZE DOWNTIME. NOTIFY OWNER THIRTY (30) DAYS PRIOR TO INTERRUPTION OF SERVICE.
6. DURING INSTALLATION OF NEW WORK, AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN. REPAIR DAMAGE CAUSED DURING CONSTRUCTION AT NO EXTRA COST TO THE OWNER.
7. PROVIDE TEMPORARY BARRIERS TO CONTAIN DUST AND DEBRIS RESULTING FROM THE PERFORMANCE OF THE WORK TO THE AREA WHERE WORK IS BEING PERFORMED. PROVIDE BARRIERS TO PROTECT NON CONSTRUCTION RELATED PERSONNEL AS REQUIRED.
8. ALL MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL PLANS SHALL BE PROVIDED BY DIVISION 23 UNLESS OTHERWISE NOTED.
9. NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING ARE SHOWN AT APPROXIMATE LOCATIONS. FIELD MEASURE FINAL DUCTWORK AND PIPING LOCATIONS PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. VERIFY THAT FINAL EQUIPMENT LOCATIONS MEET MANUFACTURER'S RECOMMENDATIONS REGARDING SERVICE CLEARANCE AND PROPER AIRFLOW CLEARANCE AROUND EQUIPMENT.
10. INSTALL PIPING PARALLEL TO BUILDING COLUMN LINES UNLESS OTHERWISE SHOWN OR NOTED.
11. OVERHEAD HANGERS AND SUPPORTS FOR EQUIPMENT, DUCTWORK AND PIPING SHALL BE FASTENED TO BUILDING JOISTS OR BEAMS. DO NOT ATTACH HANGERS AND SUPPORTS TO THE ABOVE FLOOR SLAB OR ROOF EXCEPT WHERE CONCRETE INSERTS IN CONCRETE SLABS ARE ALLOWED BY THE SPECIFICATIONS.
12. COORDINATE LOCATION OF EQUIPMENT SUPPORTS WITH LOCATION OF EQUIPMENT ACCESS PANELS/DOORS TO ENABLE SERVICE OF EQUIPMENT AND/OR FILTER REPLACEMENT.
13. SEAL PENETRATIONS THROUGH THE BUILDING COMPONENTS IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS. FIREPROOF PENETRATIONS THROUGH FIRE RATED COMPONENTS IN ACCORDANCE WITH U.L. REQUIREMENTS.
14. DRAIN, FLUSH, AND REFILL ALL PIPING SYSTEMS NECESSARY TO PERFORM THE WORK. REFERENCE SPECIFICATIONS FOR FLUSHING PERFORMANCE REQUIREMENTS AND SUBMIT FLUSHING PLAN TO ENGINEER FOR REVIEW. PROVIDE CHEMICAL TREATMENT FOR ALL PIPING SYSTEMS AFTER FLUSHING AND REFILLING THE SYSTEM.
15. COORDINATE THE LOCATION AND ELEVATION OF WALL-MOUNTED DEVICES WITH PRESENTATION BOARDS, DISPLAY CABINETS, SHELVES OR OTHER COMPONENTS SHOWN ON THE ARCHITECTURAL DRAWINGS THAT ARE TO BE INSTALLED UNDER OTHER DIVISIONS. CONTRACTOR WILL NOT BE REIMBURSED FOR RELOCATION OF WALL-MOUNTED DEVICES CAUSED BY A LACK OF COORDINATION.
16. FIELD VERIFY THAT THE EXISTING EQUIPMENT INCLUDING ACCESSORIES BEING REUSED FOR THIS PROJECT IS NOT DAMAGED AND IS IN GOOD WORKING ORDER. REPORT ANY DEFICIENCIES TO THE OWNER OR ARCHITECT. SUBMIT TO THE OWNER AND ENGINEER A WRITTEN REPORT DESCRIBING TESTS PERFORMED TO VERIFY OPERATION AND RESULTS OF THE TESTS.
17. CLEAN EXISTING EQUIPMENT AND EQUIPMENT COMPONENTS BEING REUSED FOR THIS PROJECT. CLEAN STRAINERS IN PIPING SYSTEMS PRIOR TO STARTING PUMPS.
18. PROVIDE RISES, DROPS, AND TRANSITIONS NECESSARY TO ROUTE PIPING AS SHOWN. COORDINATE ROUTING WITH ALL OTHER TRADES WORK. EQUIPMENT AND OTHER DEVICES LOCATED ABOVE CEILINGS REQUIRING ROUTINE ACCESS FOR MAINTENANCE SHALL BE MOUNTED WITHIN REACH THRU CEILING ACCESS.
19. ALL MATERIALS LOCATED IN AIR PLENUMS (CEILING PLENUMS, CHASE WALLS, ETC.) SHALL MEET CODE REQUIREMENTS (IMC 602) FOR FLAME SPREAD INDEX OF 25 AND SMOKE-DEVELOPED INDEX OF 50. COORDINATE WITH GC AND OTHER TRADES.
20. PROVIDE FLEXIBLE FLEXIBLE PIPING, AND FLEXIBLE CONDUIT CONNECTIONS TO EQUIPMENT WITH ROTATING COMPONENTS AND THOSE WITH VIBRATION ISOLATION MOUNTS.
21. DETAILS PROVIDED ON THE DETAIL SHEETS APPLY TO THE PROJECT GLOBALLY. SPECIFIC INSTANCES ARE CALLED OUT INDIVIDUALLY ON PLANS, DIAGRAMS, SCHEDULES, ETC. ONLY WHERE ADDITIONAL CLARIFICATION OF APPLICATION IS REQUIRED.
22. ALL NEW EQUIPMENT SHALL BE TESTED AND BALANCED INCLUDING AIR SYSTEMS AND HYDRONIC SYSTEMS. REFER TO SPECIFICATIONS FOR MORE INFORMATION. EXISTING TO REMAIN AIR SYSTEMS DOWNSTREAM OF NEW EQUIPMENT IS NOT REQUIRED TO BE TESTED AND BALANCED UNLESS NOTED OTHERWISE ON PLANS.

GENERAL DEMOLITION NOTES:

1. COORDINATE ALL DEMOLITION WITH WHAT IS SHOWN ON MECHANICAL PLANS. NOTIFY OWNER OF ANY DISCREPANCIES.
2. OWNER RETAINS RIGHTS OF SALVAGE FOR EQUIPMENT AND FIXTURES TO BE REMOVED. COORDINATE WITH OWNER THE EQUIPMENT AND FIXTURES TO BE SALVAGED AND THE LOCATION FOR STORAGE. AVOID DAMAGE TO SALVAGED EQUIPMENT, FIXTURES AND DEVICES DURING DEMOLITION WORK AND DURING TRANSPORT TO OWNER'S DESIGNATED STORAGE LOCATION.
3. REMOVE ITEMS SHOWN HEAVY-LINED DASHED, AND/OR NOTED TO BE REMOVED.
4. AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN FOR NEW INSTALLATION. REPAIR DAMAGE CAUSED DURING WORK AT NO EXTRA COST TO THE OWNER.
5. REMOVE HANGERS AND SUPPORTS WHERE PIPING AND/OR EQUIPMENT ARE REMOVED AND THE EXISTING HANGERS AND SUPPORTS ARE NOT USED FOR THE NEW INSTALLATION.
6. INSPECT EXISTING EQUIPMENT TO REMAIN TO VERIFY THAT EQUIPMENT IS OPERATING PROPERLY. NOTIFY OWNER OF DAMAGED AND/OR MALFUNCTIONING COMPONENTS.
7. WHERE SHUTDOWN OF EXISTING SYSTEMS IS REQUIRED DURING DEMOLITION, COORDINATE SHUTDOWN TIME AND DURATION WITH OWNER TO MINIMIZE DOWNTIME. NOTIFY OWNER SEVEN (7) DAYS PRIOR TO INTERRUPTION OF SERVICE.
8. CEASE WORK AND IMMEDIATELY NOTIFY THE OWNER SHOULD ANY HAZARDOUS MATERIALS BE ENCOUNTERED DURING THE PERFORMANCE OF THE WORK.

MECHANICAL SHEET LIST

MECHANICAL SYMBOLS

THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED. V3.0

STANDARD MOUNTING HEIGHT

THERMOSTATS (USER ADJUSTABLE)	46"
CONTROLS	46"

INSTALL DEVICES AT THE MOUNTING HEIGHTS SHOWN ABOVE UNO IN THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ABOVE OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS ARE AFF OR AFG TO TOP OF THE DEVICE UNO. ALL DEVICES SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.

ANNOTATION

- (1) MECHANICAL PLAN NOTE CALLOUT
- (CU 1) MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)
- CONNECTION POINT OF NEW WORK TO EXISTING
- EXTENT OF DEMOLITION
- (1 / M1) DETAIL REFERENCE. UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER
- (1 / M1) SECTION CUT DESIGNATION
- DEDICATED EQUIPMENT ACCESS TILE
- ACCESS PANEL

ABBREVIATIONS

A/C	AIR CONDITIONING
ACC	AIR COOLED CHILLER
ACCU	AIR COOLED CONDENSING UNIT
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
AWG	AMERICAN WIRE GAUGE
B	BOILER
BAS	BUILDING AUTOMATION SYSTEM
BB	BACKBONE
BD	BACKDRAFT DAMPER
BD	BLOWDOWN
BFC	BELOW FINISHED CEILING
BFF	BELOW FINISHED FLOOR
BFG	BELOW FINISHED GRADE
BFP	BOILER FEED PUMP
BHP	BRAKE HORSEPOWER
BI	BINARY INPUT
BO	BINARY OUTPUT
BOD	BOTTOM OF DUCT
BOS	BOTTOM OF STRUCTURE
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CLG	COOLING
CP	CONDENSATE PUMP
CPT	CONTROL POWER TRANSFORMER
CRAC	COMPUTER ROOM AIR CONDITIONING UNIT
CRU	COMPUTER ROOM UNIT
CT	COOLING TOWER
CV	CONTROL VALVE
CWP	CONDENSER WATER PUMP
CU	CONDENSING UNIT
CHWP	CHILLED WATER PUMP
DB	DECIBELS
DBA	DECIBEL AVERAGE
DDC	DIRECT DIGITAL CONTROL
DI	DIGITAL INPUT
DISC	DISCONNECT
DN	DOWN
DS	DUCT SILENCER
DX	DIRECT EXPANSION
(E)	EXISTING
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
ED	EXHAUST DUCT
EDB	ENTERING DRY BULB
EF	EXHAUST FAN
EFF	EFFICIENCY
EMS	ENERGY MANAGEMENT SYSTEM
ESP	EXTERNAL STATIC PRESSURE
ETR	EXISTING TO REMAIN
EWB	ENTERING WET BULB
EWT	ENTERING WATER TEMPERATURE
FCU	FAN COIL UNIT
FFA	FROM FLOOR ABOVE
FFB	FROM FLOOR BELOW
FF	FINISHED FLOOR
FPI	FINS PER INCH
FPM	FEET PER MINUTE
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
HOA	HAND-OFF-AUTOMATIC
HP	HORSEPOWER
HTG	HEATING
HWP	HEATING WATER PUMP
IN WC	INCHES OF WATER COLUMN
L	LOUVER
LAT	LEAVING AIR TEMPERATURE
LDB	LEAVING DRY BULB
LP	LOW PRESSURE
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MBH	1000 BTU PER HOUR
MD	MOTORIZED DAMPER
MFR	MANUFACTURER
MIN	MINIMUM
N/A	NOT APPLICABLE
N/C	NORMALLY CLOSED
N/O	NORMALLY OPEN
NOM	NOMINAL
NC	NOISE CRITERIA
NF	NON-FUSED
NIC	NOT IN CONTRACT
OA	OUTSIDE AIR
PICV	PRESSURE INDEP. CONTROL VALVE
PROVIDE	FURNISH AND INSTALL
QTY	QUANTITY
RA	RETURN AIR
RC	ROOM CRITERIA
RD	RETURN DUCT
REA	RELIEF AIR
RF	RETURN FAN
RFR	REFRIGERANT
RH	RELATIVE HUMIDITY
RH	ROOF HOOD
RPM	REVOLUTIONS PER MINUTE
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SCP	STEAM CONDENSATE PUMP
SD	SMOKE DUCT DETECTOR
SD	SUPPLY DUCT
SF	SUPPLY FAN
SH	SENSIBLE HEAT CAPACITY
SOW	SCOPE OF WORK
SP	STATIC PRESSURE
ST	STEAM TRAP
STM	STEAM
TBD	TO BE DETERMINED
TC/C	TEMPERATURE CONTROLS CONTRACTOR
TCP	TEMPERATURE CONTROL PANEL
TF	TRANSFER FAN
TFA	TO FLOOR ABOVE
TFB	TO FLOOR BELOW
TH	TOTAL HEAT CAPACITY
TSP	TOTAL STATIC PRESSURE
TT	TEMPERATURE TRANSMITTAL
TYP	TYPICAL
U/F	UNDERFLOOR
U/G	UNDERGROUND
U/S	UNDERSLAB
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
VAV	VARIABLE AIR VOLUME
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW
VRV	VARIABLE REFRIGERANT VOLUME
W/	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER COLUMN
WPD	WATER PRESSURE DROP
XP	EXPLOSION PROOF

HVAC DUCTWORK AND ACCESSORIES

- DUCTWORK/EQUIPMENT TO BE REMOVED OR RELOCATED
- EXISTING DUCTWORK/EQUIPMENT TO REMAIN
- LINEAR SLOT DIFFUSER
- INSULATED FLEXIBLE DUCT (MAX. 5'-0" LONG)
- BRANCH DUCT WITH 45° RECTANGLE-ROUND BRANCH FITTING AND MANUAL VOLUME DAMPER
- ELBOW WITH TURNING VANES
- BRANCH DUCT WITH BELL-MOUTH FITTING & MANUAL VOLUME CONTROL DAMPER
- DUCT UP
- DUCT DOWN
- EA — EXHAUST AIR
- GEA — EXHAUST AIR - GREASE
- OA — OUTSIDE AIR
- REA — RELIEF AIR
- RA — RETURN AIR
- XEA — SPECIAL EXHAUST
- SA — SUPPLY AIR
- EQUIPMENT WITH FLEXIBLE DUCT CONNECTION
- 10" (NECK SIZE) CSD-1 (TYPE) 300 CFM (CFM OF SUPPLY DIFFUSER OR REGISTER)
- 24x24 (NECK SIZE) CEG-1 (TYPE) 800 CFM (CFM OF EXHAUST GRILLE)
- EQUIPMENT ACCESS TILE (IN ACT CEILINGS)
- ACCESS PANEL (IN GYPSUM)
- MANUAL VOLUME DAMPER
- SQUARE TO ROUND TRANSITION
- RD — DUCT MOUNTED SMOKE DETECTOR (SD=SUPPLY/RD=RETURN)
- XX" Ø — ROUND DUCT TAG INDICATING DIAMETER
- XX" x XX" — RECTANGULAR DUCT TAG INDICATING INTERNAL DUCT DIMENSIONS.
- XX" / XX" θ — FLAT OVAL DUCT TAG INDICATING INTERNAL DUCT DIMENSIONS
- (#) — RISER DESIGNATION
- (FD) — FIRE DAMPER
- (FSD) — FIRE SMOKE DAMPER
- (SD) — SMOKE DAMPER
- (VD) — VOLUME DAMPER
- (MD) — MOTORIZED DAMPER
- (BD) — BACKDRAFT DAMPER

ALL DUCT DIMENSIONS SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS. REFER TO DUCTWORK SPECIFICATIONS FOR DUCTWORK INSULATION AND LINER INFORMATION.

HVAC CONTROL DEVICES

- (H) — HUMIDISTAT
- (T) — THERMOSTAT
- CO — CARBON MONOXIDE SENSOR
- CO2 — CARBON DIOXIDE SENSOR
- DP — DIFFERENTIAL PRESSURE SENSOR
- FS — FLOW SWITCH
- HS — HUMIDITY SENSOR
- PS — PULL STATION
- RT — REMOTE TESTING STATION WITH INDICATING LIGHT
- SP — STATIC PRESSURE
- TS — TEMPERATURE SENSOR

PIPING SYMBOLS

- DIRECTION OF FLOW
- CONTROL VALVE
- THREE-WAY CONTROL VALVE
- SHUTOFF VALVE
- CHECK VALVE
- BALANCING VALVE WITH PRESSURE PORTS
- TRIPLE DUTY VALVE WITH PRESSURE PORTS
- STRAINER
- STRAINER WITH BLOWOFF
- RELIEF / SAFETY VALVE
- SOLENOID VALVE
- PRESSURE REDUCING VALVE
- GAS PRESSURE REGULATOR
- THERMOSTATIC MIXING VALVE
- PA — PIPE ANCHOR
- EXPANSION JOINT
- PIPE GUIDE
- PIPING SUPPORT
- F & T TRAP
- BUCKET TRAP
- THERMOSTATIC TRAP
- BACKFLOW PREVENTER
- PRESSURE GAUGE
- THERMOMETER
- PRESSURE AND TEMPERATURE TEST PLUG
- UNION
- FLANGE CONNECTION
- VACUUM RELIEF VALVE
- AV — AUTOMATIC AIR VENT
- MV — MANUAL AIR VENT
- PRESSURE / VACUUM SWITCH
- CLEANOUT
- CAP
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- ELBOW UP WITH SHUT-OFF VALVE (SOV)
- ELBOW DOWN WITH SHUT-OFF VALVE (SOV)
- TEE UP WITH SHUT-OFF VALVE (SOV)
- TEE DOWN WITH SHUT-OFF VALVE (SOV)
- REDUCER
- RECIRCULATION PUMP
- P-TRAP
- GAS COCK
- TOP BEAM CLAMP
- TRAPEZE HANGER
- FLEXIBLE CONNECTION

PIPING LINETYPES

- EXISTING PIPING TO BE REMOVED OR RELOCATED
- EXISTING PIPING TO REMAIN
- D — DRAIN (D)
- SD — SUMP DRAIN (SD)
- SO — SUMP OVERFLOW (SO)
- ACD — AUXILIARY CONDENSATE DRAIN (ACD)
- NPW — NON-POTABLE WATER (NPW)
- G — NATURAL GAS (G)
- G — NATURAL GAS ON ROOF (G)
- MPG — MEDIUM PRESSURE NATURAL GAS (MPG)
- MPG — MEDIUM PRESSURE NATURAL GAS ON ROOF (MGP)
- FOS — FUEL OIL SUPPLY (FOS)
- FOR — FUEL OIL RETURN (FOR)
- FOV — FUEL OIL VENT (FOV)
- LPG — LIQUEFIED PETROLEUM GAS (LPG)
- BFW — BOILER FEED WATER (BFW)
- HPS — HIGH PRESSURE STEAM SUPPLY (HPS)
- HPC — HIGH PRESSURE STEAM CONDENSATE (HPC)
- LPS — LOW PRESSURE STEAM SUPPLY (LPS)
- LPC — LOW PRESSURE STEAM CONDENSATE (LPC)
- CPD — CONDENSATE PUMP DISCHARGE (CPD)
- HWS — HEATING HOT WATER SUPPLY (HWS)
- HWR — HEATING HOT WATER RETURN (HWR)
- CHWS — CHILLED WATER SUPPLY (CHWS)
- CHWR — CHILLED WATER RETURN (CHWR)
- HCS — HOT / CHILLED WATER SUPPLY (HCS)
- HCR — HOT / CHILLED WATER RETURN (HCR)
- CWS — CONDENSER WATER SUPPLY (CWS)
- CWR — CONDENSER WATER RETURN (CWR)
- RL — REFRIGERANT LIQUID (RL)
- RD — REFRIGERANT DISCHARGE (HOT GAS) (RD)
- RS — REFRIGERANT SUCTION (RS)
- RDB — REFRIGERANT DISCHARGE BYPASS (RDB)
- RV — REFRIGERANT VENT (RV)

HATCHING LEGEND

- ENLARGED PLAN
- NOT IN SCOPE (NIS)

LINETYPE LEGEND

THROUGHOUT THE DRAWINGS DIFFERENT LINETYPES ARE USED IN COMBINATION WITH THE SYMBOLS TO INDICATE THE STATUS OF ITEMS AS EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF NEW WORK AND/OR ITEMS WHICH ARE ANTICIPATED TO BE PROVIDED IN THE FUTURE. THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO THE VIEW IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS NOT INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION PHASING, WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC.

EXISTING	NEW
DEMOLISH	FUTURE

COMMISSIONING

PROJECT COMMISSIONING REQUIREMENTS SHALL CONFORM TO SECTION C408 OF 2018 SEATTLE ENERGY CODE. THESE REQUIREMENTS INCLUDE, BUT ARE NOT LIMITED TO A COMMISSIONING PLAN, PRELIMINARY COMMISSIONING REPORT, FINAL COMMISSIONING REPORT, AND ACCEPTABLE AND SUPPORTING DOCUMENTS. IN ADDITION, PROVIDE SYSTEM OPERATIONAL TRAINING, O&M MANUALS, AND RECORD DRAWINGS TO THE OWNER PER THE 2018 SEATTLE ENERGY CODE.

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EXPIRES 6/30/2025

LUMEN FIELD
FLUID COOLER REPLACEMENT

800 Occidental Avenue South, Seattle, WA 98134

SEAL:

12/03/2024

No.	Rev.	Date

12/03/2024
ISSUE FOR PERMIT

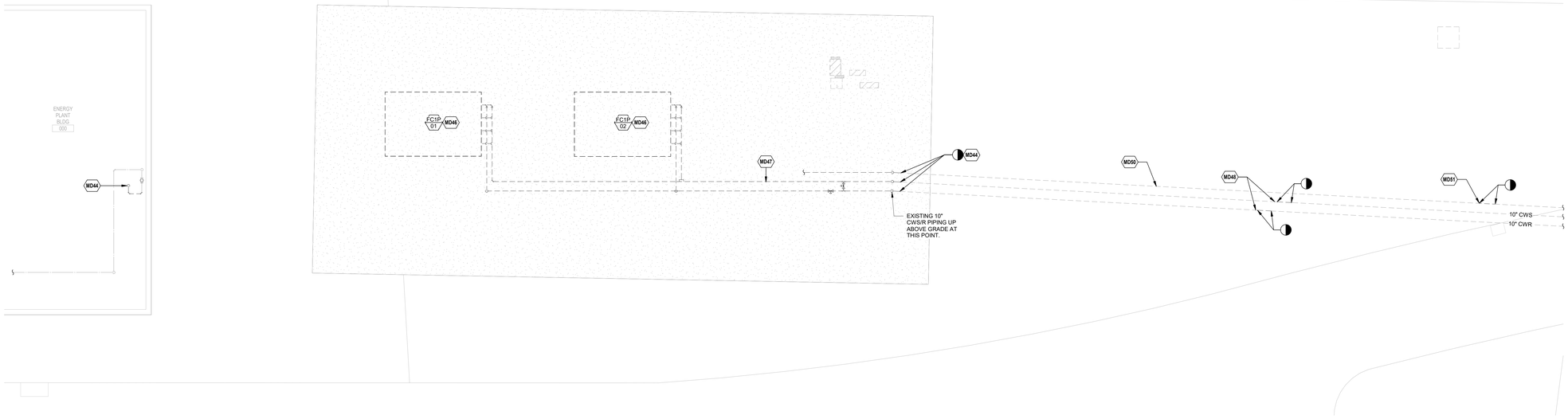
FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

Title
MECHANICAL GENERAL NOTES AND LEGEND

M000
sheet no.

CHRISTOPHER S. CUNNINGHAM
12/3/2024 4:01:04 PM

2 HVAC SITE PLAN - PUMP ROOM - DEMOLITION
1/8" = 1'-0"



1 HVAC SITE PLAN - FLUID COOLER YARD - DEMOLITION
1/8" = 1'-0"

MECHANICAL PLAN NOTES:

MD44 DEMOLISH PIPE TO BELOW SLAB AND CAP. PATCH CONCRETE FLOOR PIPE OPENING TO MATCH EXISTING CONDITIONS.

MD45 DEMOLISH EXISTING CONDENSER WATER PUMPS P1A-01, 02, 03, AND 04. DEMOLISH EXISTING CWS/R PIPING AT EACH PUMP UP TO AND INCLUDING SHUTOFF VALVES.

MD46 DEMOLISH EXISTING CLOSED CIRCUIT COOLING TOWERS FCP-01 AND 02, ASSOCIATED FILTRATION EQUIPMENT, BASIN WATER TREATMENT EQUIPMENT, CONTROLS. CWS/R PIPING, DRAIN PIPING, AND MAKEUP WATER PIPING.

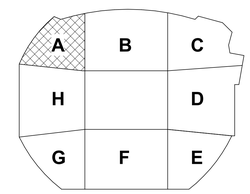
MD47 DEMOLISH ALL ABOVE GRADE CWS/R PIPING TO BELOW GRADE AND CAP. DEMOLISH EXISTING CWS/R PIPE HEAT TRACE AND ASSOCIATED CONTROLS.

MD48 DEMOLISH AND CAP EXISTING 10" CWS/R BELOW GRADE PIPING IN THIS AREA IN PREPARATION FOR NEW PIPE CONNECTIONS.

MD50 EXISTING 1" UNDERGROUND BAS CONTROL CONDUIT AND WIRING. REUSE IF SUITABLE FOR NEW BACNET CONTROLS, OTHERWISE PROVIDE NEW. COORDINATE WITH BAS CONTROLS CONTRACTOR, SIEMENS.

MD51 DEMOLISH AND CAP EXISTING 1" UNDERGROUND BAS CONTROL CONDUIT AND WIRING IN THIS AREA IN PREPARATION FOR NEW WORK.

EXISTING CLOSED-CIRCUIT COOLING TOWERS SHALL REMAIN ACTIVE UNTIL THE NEW TOWERS ARE INSTALLED AND OPERATIONAL. PHASE CONSTRUCTION AND PROVIDE PIPE VALVES AND ACCESSORIES AS REQUIRED AT CONNECTIONS TO EXISTING SYSTEMS AS NEEDED. PHASE REPLACEMENT OF CONDENSER WATER PUMPS AS REQUIRED TO MAINTAIN AT LEAST TWO OPERATIONAL PUMPS AT ALL TIMES.



NORTH **KEY PLAN**

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LUMEN FIELD
FLUID COOLER REPLACEMENT

800 Occidental Avenue South, Seattle, WA 98134

SEAL:

12/03/2024

No.	Rev.	Date

12/03/2024
ISSUE FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

Title
MECHANICAL DEMO PLAN ENLARGED

MD302
sheet no.

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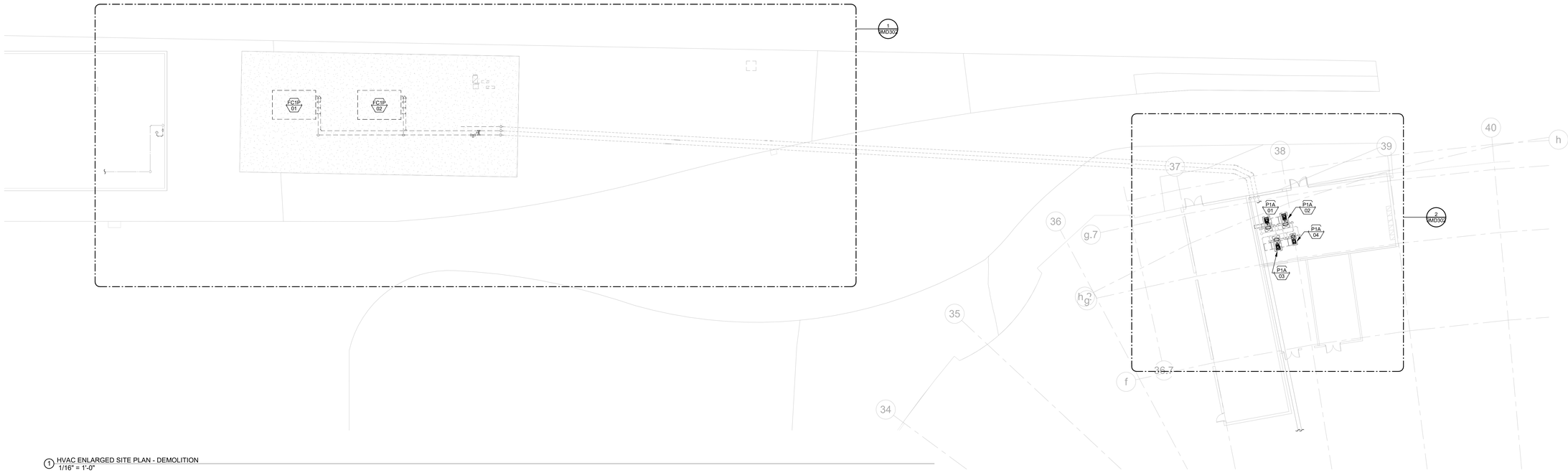
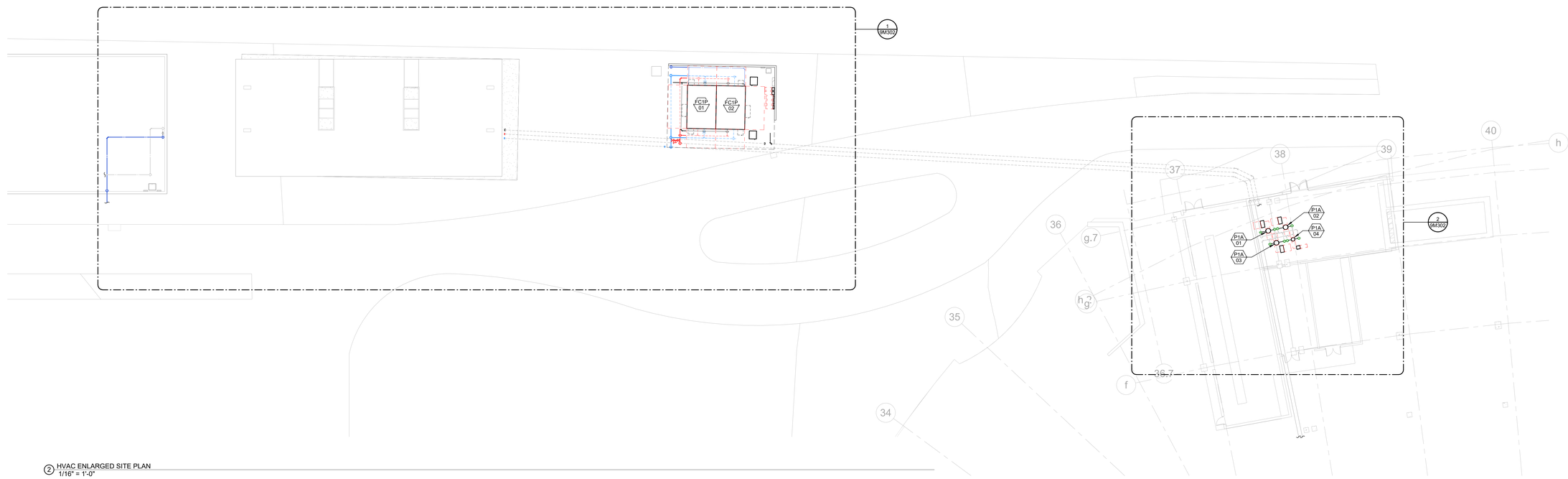


1 HVAC ENLARGED SITE PLAN - DEMOLITION
1/16" = 1'-0"



2 HVAC ENLARGED SITE PLAN
1/16" = 1'-0"

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EXPIRES 6/30/2025

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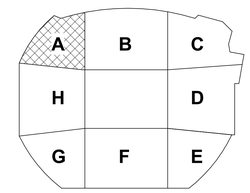
MECHANICAL SITE PLAN



KEY PLAN

M021
sheet no.

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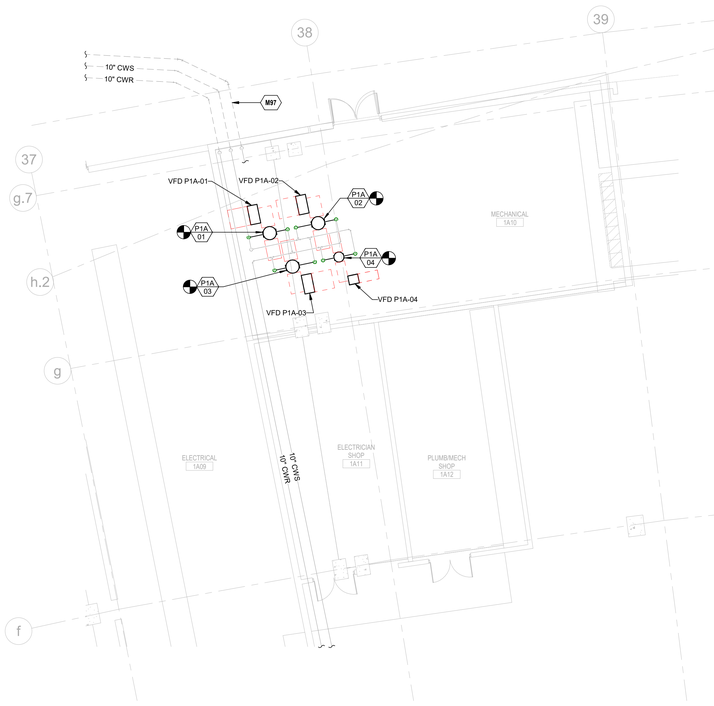
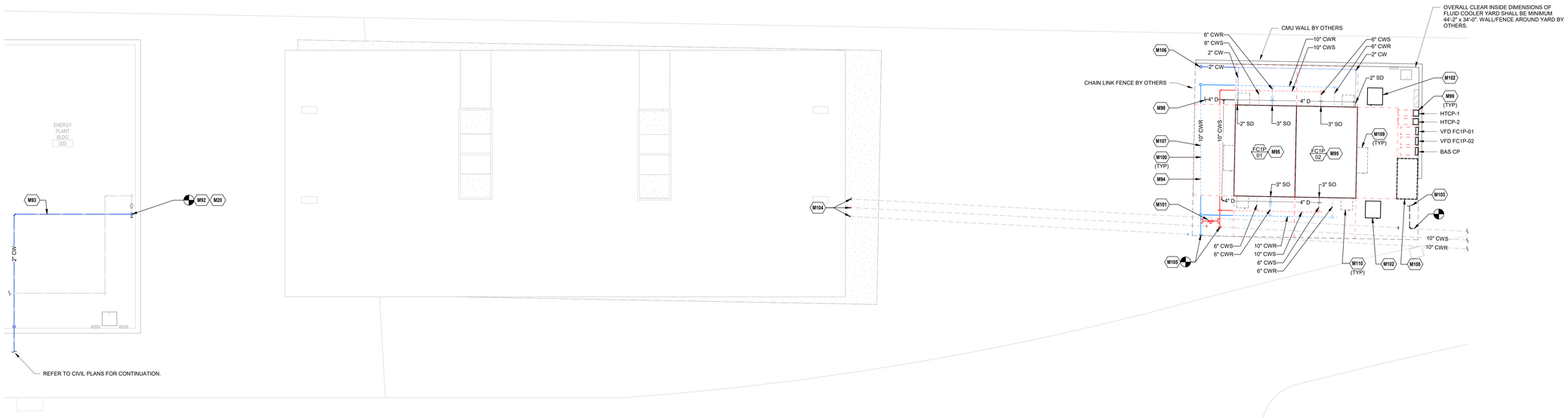


2 HVAC SITE PLAN - PUMP ROOM
1/8" = 1'-0"



1 HVAC SITE PLAN - FLUID COOLER YARD
1/8" = 1'-0"

EXISTING CLOSED-CIRCUIT COOLING TOWERS SHALL REMAIN ACTIVE UNTIL THE NEW TOWERS ARE INSTALLED AND OPERATIONAL. PHASE CONSTRUCTION AND PROVIDE PIPE VALVES AND ACCESSORIES AS REQUIRED AT CONNECTIONS TO EXISTING SYSTEMS AS NEEDED. PHASE REPLACEMENT OF CONDENSER WATER PUMPS AS REQUIRED TO MAINTAIN AT LEAST TWO OPERATIONAL PUMPS AT ALL TIMES.

MECHANICAL PLAN NOTES:

M20 DO NOT ROUTE PIPING ABOVE ELECTRICAL/TELECOM/AV OR OTHER ENERGIZED EQUIPMENT. COORDINATE PIPING WITH ALL TRADES.

M92 CONNECT NEW 2" MAKEUP WATER PIPE TO EXISTING 3" MAKEUP WATER PIPE INSIDE ANNEX BUILDING DOWNSTREAM OF EXISTING TO REMAIN WATER METER AND BACKFLOW PREVENTER.

M93 PROVIDE NEW 2" MAKEUP WATER PIPE ABOVE GRADE TO TOWER MAKEUP WATER CONNECTION.

M94 NEW 10" CWS/R PIPING ABOVE GRADE. HEAT TRACE AND INSULATE WITH ALUMINUM JACKET ALL NEW ABOVE GRADE CWS/R PIPING. PIPE ROUTING SHOWN ON PLAN IS SCHEMATIC FOR CLARITY. INSTALL ACTUAL PIPING TO PROVIDE MAXIMUM WALKING AND SERVICE CLEARANCE AROUND COOLING TOWERS. STACK PIPING VERTICALLY ON RACKS TO MAINTAIN MAXIMUM CLEARANCE BETWEEN PIPING AND TOWERS. PIPE RACKS SHALL BE INSTALLED TIGHT TO COOLING TOWER YARD WALLS/FENCE AND FINAL BRANCH PIPE CONNECTIONS TO TOWERS SHALL BE ROUTED OVERHEAD TO MAINTAIN WALKING CLEARANCE BELOW.

M95 PROVIDE NEW CLOSED-CIRCUIT COOLING TOWERS ON CONCRETE PAD. REFER TO CIVIL PLANS FOR CONCRETE PAD REQUIREMENTS.

M97 EXISTING 1" UNDERGROUND BAS CONTROL CONDUIT AND WIRING. REUSE IF SUITABLE FOR NEW BACNET CONTROLS, OTHERWISE PROVIDE NEW. COORDINATE WITH BAS CONTROLS CONTRACTOR, SIEMENS.

M98 PROVIDE COMBINED COOLING TOWER DRAIN AND OVERFLOW PIPE. TERMINATE AT SANITARY DRAIN. REFER TO CIVIL PLANS FOR SANITARY DRAIN LOCATION.

M99 REFER TO PIPE HEAT TRACE SCHEDULE FOR HEAT TRACE CONTROL PANEL SELECTIONS AND PIPING SERVED.

M100 PROVIDE HEAT TRACE, INSULATION AND ALUMINUM JACKET ON ALL PIPING EXPOSED TO OUTDOOR CONDITIONS.

M101 PROVIDE 10" BYPASS AND CONTROL VALVE WITH A SHUT-OFF VALVE ON EACH SIDE OF THE CONTROL VALVE.

M102 PROVIDE PACKAGED SIDE STREAM TOWER BASIN FILTRATION SYSTEM PUROFLUX MODEL PF-64-040B AT EACH TOWER.

M103 IF SUITABLE FOR NEW BACNET CONTROLS, CONNECT NEW 1" BAS CONDUIT AND WIRING TO EXISTING AND EXTEND TO NEW BAS CONTROL PANEL. OTHERWISE, PROVIDE NEW CONDUIT AND CONTROL WIRING. COORDINATE WITH BAS CONTROLS CONTRACTOR, SIEMENS.

M104 CAP AND ABANDON EXISTING UNDERGROUND PIPING. PATCH AND SEAL CONCRETE FLOOR PIPE OPENING TO MATCH EXISTING CONDITIONS.

M105 CONNECT TO EXISTING 10" CWS/R UNDERGROUND PIPING. NEW UNDERGROUND CWS/R PIPING MATERIAL AND INSTALLATION SHALL MATCH EXISTING CONDITIONS.

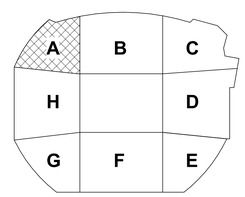
M106 MAKEUP WATER LINE DOWN BELOW GRADE. COORDINATE EXACT LOCATION AND ROUTING WITH CIVIL PLANS.

M107 THE PIPE ROUTING IS SHOWN SCHEMATICALLY FOR CLARITY. INSTALL PIPING TO MAINTAIN WALKING CLEARANCE THROUGHOUT THE COOLING TOWER YARD, INCLUDING ON ALL FOUR SIDES OF THE TOWERS. PIPING AND EQUIPMENT LOCATIONS SHALL ALSO MAINTAIN ALL CODE AND MANUFACTURER REQUIRED EQUIPMENT SERVICE/AIRFLOW CLEARANCES. PROVIDE A PIPE RACK SYSTEM TO ALLOW THE CWS/R PIPE MAINS TO BE STACKED TO PROVIDE AS MUCH CLEARANCE AS POSSIBLE AROUND THE TOWERS. SUBMIT PIPE ROUTING AND COOLING TOWER YARD EQUIPMENT LAYOUT TO ENGINEER AND OWNER FOR REVIEW AND APPROVAL PER SPECIFICATIONS.

M108 PROPOSED LOCATION OF WATER TREATMENT EQUIPMENT. COORDINATE LOCATION AND SIZE WITH WATER TREATMENT PROVIDER.

M109 MANUFACTURER PROVIDED COOLING TOWER ACCESS LADDER. REFER TO COOLING TOWER SPECIFICATIONS FOR MORE INFORMATION.

M110 MANUFACTURER PROVIDED COOLING TOWER RECIRCULATION SPRAY PUMP. REFER TO COOLING TOWER SPECIFICATIONS FOR MORE INFORMATION.



KEY PLAN

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PIPE HEAT TRACE SCHEDULE

MARK	MANUFACTURER	MODEL#	APPLICATION	PIPING SERVED	TOTAL LENGTH (FT)	NUMBER OF CIRCUITS	LENGTH PER CIRCUIT (FT)	PIPE HEAT LOSS (W/FT)	TEMP. SETTING (°F)		ELECTRICAL					NOTES
									ON	OFF	CONTROLLER	VOLTS	TOTAL LOAD (W)	MOCP (A)	PHASE	
HT-1	RAYCHEM	5XL2-CR	FREEZE PROTECTION	MAKEUP WATER - COOLING TOWER YARD	60	1	60	5.7	40	55	C910-485	208	537	30	1	ALL
HT-2	RAYCHEM	5XL2-CR	FREEZE PROTECTION	CONDENSER WATER SUPPLY AND RETURN	250	1	325	5.7	40	55	C910-485	208	2907	30	1	ALL

NOTES:

A. POLYOLEFIN OUTER JACKET.
B. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
C. REFER TO HEAT TRACE CONTROL PANEL SCHEDULE FOR ADDITIONAL INFORMATION.
D. COORDINATE WITH ELECTRICAL CONTRACTOR TO PROVIDE WIRING FROM CONTROL PANEL TO JUNCTION BOX ADJACENT TO THE BEGINNING OF THE HEAT TRACE SYSTEM.
E. PRIOR TO BID COORDINATE WITH MANUFACTURER TO DETERMINE REQUIRED COMPONENTS TO COMPLETE THE SYSTEM.

HEAT TRACE CONTROL PANEL SCHEDULE

MARK	MANUFACTURER	MODEL#	DEVICE SERVED	QUANTITY	ELECTRICAL DATA				NOTES
					MOCP (A)	VOLTS (V)	PHASE	EMS POWER	
HTCP-1	RAYCHEM	C910-485	HT-1	1	30	208	1	YES	ALL
HTCP-2	RAYCHEM	C910-485	HT-2	1	30	208	1	YES	ALL

NOTES:

A. NEMA 4X FRP ENCLOSURE WITH GROUND FAULT CIRCUIT PROTECTION.
B. LED DISPLAY AND KEYPAD INTERFACE.
C. ALARM LIGHTS FOR HIGH AND LOW TEMPERATURE, CURRENT AND GROUND FAULT.
D. DRY ALARM CONTACTS FOR INTERLOCK WITH BUILDING MANAGEMENT SYSTEM.
E. PROVIDE WITH # RTD4AL REMOTE TEMPERATURE DEVICE AND # RTD-200 STAINLESS STEEL CABLE, LENGTH AS REQUIRED. MOUNT REMOTE TEMPERATURE SENSING DEVICE ON PIPE UNDER INSULATION. REFER TO PLANS FOR LOCATION(S).
F. COORDINATE INSTALLATION WITH ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL PROVIDE WIRING FROM CONTROL PANEL TO JUNCTION BOX WHERE HEAT TAPE SYSTEM BEGINS.
G. REFER TO SPECIFICATIONS FOR MORE INFORMATION.

CLOSED CIRCUIT COOLING TOWER SCHEDULE

MARK	MANUFACTURER	MODEL	CAP (MBH)	FLOW (GPM)	EAT (°F WB)	EWT (°F)	LWT (°F)	FAN HP	WPD (PSI)	V/PH	DISC TYPE	STARTER	VFD (Y/N)	WEIGHT (LBS)	NOTES
FC1P 01	BAC	PFI-2418H-6D1ES-R2	8765.0	1349	67.0	95.0	82.0	60	20.45	480 V / 3PH	VFD	VFD	Yes	44425	ALL
FC1P 02	BAC	PFI-2418H-6D1ES-R2	8765.0	1349	67.0	95.0	82.0	60	20.45	480 V / 3PH	VFD	VFD	Yes	44425	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

A. PROVIDE 14 KW, 480V/3PH ELECTRIC BASIN HEATER WITH DISCONNECT SWITCH FOR EACH CELL.
B. VARIABLE FREQUENCY DRIVE FURNISHED BY DIVISION 23 CONTRACTOR, INSTALLED BY DIVISION 26 CONTRACTOR.
C. PROVIDE SIDE OUTLET SUMP.
D. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
E. PROVIDE ELECTRIC FLOAT SWITCH AND SOLENOID MAKEUP VALVE.
F. PROVIDE WITH BAC WHISPER QUITE FAN.
G. PROVIDE WITH 5.0 HP RECIRCULATION SPRAY PUMP WITH DISCONNECT SWITCH FOR EACH CELL.

PUMP SCHEDULE

MARK	SERVICE	MANUFACTURER	MODEL	SIZE	MOUNTING	MIN FLOW (GPM)	DESIGN		MAX WORKING PRESS (PSIG)	MAX PEI RATING	MAX BHP	NOM HP	RPM	VFD (Y/N)	V/PH	DISC TYPE	STARTER TYPE	WEIGHT (LBS)	NOTES
							(GPM)	(FT HD)											
P1A 01	CONDENSER WATER	GRUNDFOS	CR 255-2	8x8	VERTICAL INLINE	405	1350	385	220	1	158	200	3580	Yes	480 V / 3PH	VFD	VFD	3000	ALL
P1A 02	CONDENSER WATER	GRUNDFOS	CR 255-2	8x8	VERTICAL INLINE	405	1350	385	220	1	158	200	3580	Yes	480 V / 3PH	VFD	VFD	3000	ALL
P1A 03	CONDENSER WATER	GRUNDFOS	CR 255-2	8x8	VERTICAL INLINE	405	1350	385	220	1	158	200	3580	Yes	480 V / 3PH	VFD	VFD	3000	ALL
P1A 04	CONDENSER WATER	GRUNDFOS	CR 125-4-2	6x6	VERTICAL INLINE	180	600	385	220	0.93	80	100	3546	Yes	480 V / 3PH	VFD	VFD	1700	ALL

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NOTES:

A. EXTEND EXISTING CONCRETE HOUSEKEEPING PAD AS REQUIRED FOR NEW PUMP INSTALLATION.
B. SUPPORT PUMP FROM FLOOR WITH VERTICAL SUPPORTS INDEPENDENT FROM PIPING.
C. VFD FURNISHED BY DIVISION 23 CONTRACTOR.
D. PUMP MOTOR SHALL BE NON-OVERLOADING THROUGHOUT THE FULL RANGE OF THE PUMP CURVE.
E. PUMP SHALL MEET OR BE MORE EFFICIENT THAN THE SCHEDULED DEPARTMENT OF ENERGY (DOE) PUMP ENERGY INDEX (PEI) RATING.

VARIABLE FREQUENCY DRIVES (VFD'S)

MARK	SERVING EQUIPMENT	NUMBER OF MOTORS	HP OF EACH MOTOR ON THE DRIVE	PULSE WIDTH MODULATED PULSE TYPE	MANUFACTURER	MODEL	V/PH	ENCLOSURE	MOUNTING LOCATION	INTERNAL INPUT OVERCURRENT PROTECTION DEVICE	BYPASS	MINIMUM SHORT-CIRCUIT CURRENT RATING (SCCR)	MINIMUM OUTPUT RATING (AMPS)	NOTES
VFD FC1P-01	FC1P-01	1	60	6	ABB	ACH580	480 V / 3PH	NEMA 3R	COOLING TOWER YARD	DISCONNECT SWITCH	NO	100,000	77.0	ALL
VFD FC1P-02	FC1P-02	1	60	6	ABB	ACH580	480 V / 3PH	NEMA 3R	COOLING TOWER YARD	DISCONNECT SWITCH	NO	100,000	77.0	ALL
VFD P1A-01	P1A-04	1	200	6	ABB	ACH580	480 V / 3PH	NEMA 1	PUMP ROOM	DISCONNECT SWITCH	NO	100,000	240.0	ALL
VFD P1A-02	P1A-02	1	200	6	ABB	ACH580	480 V / 3PH	NEMA 1	PUMP ROOM	DISCONNECT SWITCH	NO	100,000	240.0	ALL
VFD P1A-03	P1A-03	1	200	6	ABB	ACH580	480 V / 3PH	NEMA 1	PUMP ROOM	DISCONNECT SWITCH	NO	100,000	240.0	ALL
VFD P1A-04	P1A-01	1	100	6	ABB	ACH580	480 V / 3PH	NEMA 1	PUMP ROOM	DISCONNECT SWITCH	NO	100,000	124.0	ALL

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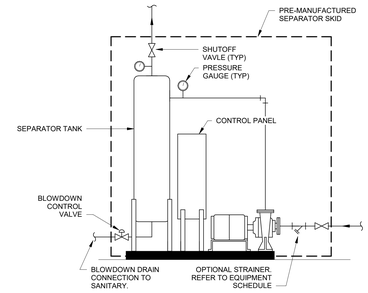
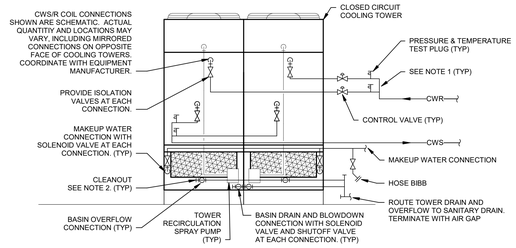
GENERAL NOTES APPLICABLE TO ALL ITEMS:
1. DRIVE AMPS SHALL BE RATED PER NATIONAL ELECTRICAL CODE TABLE 430.250

SCHEDULE NOTES:
A. PROVIDE FITLERS AS REQUIRED BY THE MANUFACTURER.
B. PROVIDE SURGE SUPPRESSION ON THE INPUT OF THE DRIVE.
C. PROVIDE ANTI-SINGLE PHASING PROTECTION.
D. VFD'S MOUNTED OUTDOORS SHALL BE RATED FOR 105°F AMBIENT TEMPERATURE MINIMUM. VFD'S MOUNTED INDOORS SHALL BE RATED FOR 90°F TEMPERATURE MINIMUM.

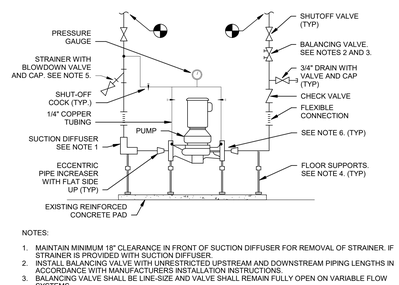


2 COOLING TOWER PARTICLE SEPARATOR DETAIL
NTS



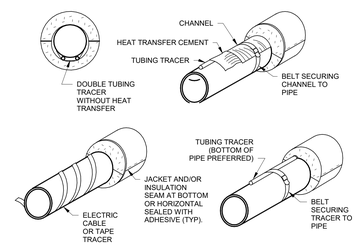
NOTES:
1. THE PIPE ROUTING IS SHOWN SCHEMATICALLY FOR CLARITY. INSTALL PIPING TO MAINTAIN WALKING CLEARANCE THROUGHOUT THE COOLING TOWER YARD INCLUDING ON ALL FOUR SIDES OF THE TOWERS. PIPING AND EQUIPMENT LOCATIONS SHALL ALSO MAINTAIN ALL CODE AND MANUFACTURER REQUIRED EQUIPMENT SERVICE/AIRFLOW CLEARANCES. PROVIDE A PIPE RACK SYSTEM TO ALLOW THE CWS/R PIPE MAINS TO BE STACKED TO PROVIDE AS MUCH CLEARANCE AS POSSIBLE AROUND THE TOWERS. SUBMIT PIPE ROUTING AND COOLING TOWER YARD EQUIPMENT LAYOUT TO ENGINEER AND OWNER FOR REVIEW AND APPROVAL PER SPECIFICATIONS.
2. PROVIDE CLEANOUTS IN TOWER DRAIN AND OVERFLOW PIPING AT THE END OF EACH PIPE RUN AND AT EACH CHANGE IN DIRECTION FOR THE ENTIRE RUN FROM BASIN CONNECTIONS TO SANITARY DRAIN TERMINATION.

1 CLOSED CIRCUIT COOLING TOWER PIPING DETAIL
NTS



NOTES:
1. MAINTAIN MINIMUM 18" CLEARANCE IN FRONT OF SUCTION DIFFUSER FOR REMOVAL OF STRAINER. IF STRAINER IS PROVIDED WITH SUCTION DIFFUSER.
2. INSTALL BALANCING VALVE WITH UNRESTRICTED UPSTREAM AND DOWNSTREAM PIPING LENGTHS IN ACCORDANCE WITH MANUFACTURERS INSTALLATION INSTRUCTIONS.
3. BALANCING VALVE SHALL BE LINE-SIZE AND VALVE SHALL REMAIN FULLY OPEN ON VARIABLE FLOW SYSTEMS.
4. SUPPORT PUMP, SUCTION DIFFUSER AND ELBOW FROM FLOOR. PROVIDE VIBRATION ISOLATION PER SPECIFICATIONS.
5. PROVIDE STRAINER ONLY IF NOT PROVIDED IN SUCTION DIFFUSER.
6. PIPING AND ALL PIPE COMPONENTS DOWNSTREAM OF PUMPS SHALL BE RATED FOR HIGH WORKING PRESSURE (CLASS 250 FOR CAST IRON AND CLASS 300 FOR STEEL). REFER TO SPECFICATIONS FOR MORE INFORMATION.

4 FLOOR MOUNTED IN-LINE PUMP DETAIL
NTS



NOTES:
1. TUBING TRACER BELTED OR WIRED TO PIPE EVERY 3' MINIMUM AND BOTH SIDES OF ALL FITTINGS
2. SECURE ELECTRIC CABLE OR TAPE TRACER TO PIPE PER MANUFACTURER'S INSTRUCTIONS
3. PROVIDE INSULATION AND JACKETING FOR INDOOR OR OUTDOOR APPLICATIONS AS SPECIFIED

3 HEAT-TRACED PIPING DETAIL
NTS

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M700
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12/3/2024 4:01:35 PM

MECHANICAL SYMBOLS (v2.12)

NOTE: THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS, ABBREVIATIONS, ETC. ARE NECESSARILY USED ON THE DRAWINGS.

CONTROLS SYMBOLS AND NOMENCLATURE

- FLUE DAMPER (BOILERS)
- BOILER (CONTROL PANEL)
- COOLING TOWER
- CONDENSING UNIT
- FLUID COOLER
- WATER-COOLED CHILLER (CONDENSER, EVAPORATOR, CONTROL PANEL)
- AIR-COOLED CHILLER (AIR-COOLED)
- GENERIC HEAT EXCHANGER (HX)
- SHELL AND TUBE HEAT EXCHANGER (HEAT EXCHANGER)
- BASIN HEATER (BHTR)
- GROUND HEAT EXCHANGER
- HEAT RECOVERY WHEEL

- HTG — HOT GAS REHEAT COIL
- CC — COOLING COIL
- FURNACE
- HTG — HEATING COIL
- DAMPER - GENERIC BLADE TYPE
- DAMPER - OPPOSED BLADE TYPE
- DAMPER - PARALLEL BLADE TYPE
- FLEXIBLE SENSING ELEMENT
- AIRFLOW STATION
- PUMP
- FAN
- HUMIDIFIER
- AIR FILTER
- 3-WAY CONTROL VALVE
- 2-WAY CONTROL VALVE
- AIR BYPASS DAMPER
- AFS — AIRFLOW MEASURING STATION
- DX — DIRECT EXPANSION COOLING UNIT CONTROLLER
- GAS — FURNACE BURNER CONTROLLER
- SCR — SILICON-CONTROLLED RECTIFIER ELECTRIC HEATER CONTROL (MODULATING)
- ELEC — ELECTRIC HEATER CONTROLLER (ON/OFF)
- ECM — ELECTRONIC COMMUTATED MOTOR
- VFD — VARIABLE FREQUENCY DRIVE
- STARTER — MOTOR STARTER
- LTC — LOW LIMIT TEMPERATURE CONTROLLER (FREEZESTAT)
- EMERGENCY PUSH BUTTON

- (#) RISER DESIGNATION
- (FD) FIRE DAMPER
- (YD) FIRE SMOKE DAMPER
- (SD) SMOKE DAMPER
- SD (SD=SUPPLY / RD=RETURN) SMOKE DETECTOR
- (MD) MOTORIZED DAMPER
- (BD) BACKDRAFT DAMPER
- (VD) VOLUME DAMPER
- (H) HUMIDISTAT
- (T) THERMOSTAT

- BTU — BTU METER
- CO — CARBON MONOXIDE SENSOR
- CO2 — CARBON DIOXIDE SENSOR
- CP — CONTROL PANEL
- CT — CURRENT CIRCUIT RELAY
- DP — DIFFERENTIAL PRESSURE SENSOR
- EM — ELECTRIC METER
- FM — FLOW METER; FUEL METER
- FS — FLOW SWITCH
- HS — HUMIDITY SENSOR
- P — PRESSURE SENSOR
- PA — POLLUTANT ALARM
- PS — PULL STATION
- R — RELAY
- RL — REFRIGERANT LEAK SENSOR
- S — SENSOR - GENERIC
- SP — STATIC PRESSURE PORT
- SW — SWITCH
- TS — TEMPERATURE SENSOR
- WM — WATER METER

POINT TYPE

AI	ANALOG INPUT (MODULATING)
AO	ANALOG OUTPUT (MODULATING)
AV	ANALOG VALUE (VIRTUAL)
BI	BINARY INPUT (ON/OFF, OPEN/CLOSED, ETC)
BO	BINARY OUTPUT (ON/OFF, OPEN/CLOSED, ETC)
BV	BINARY VALUE (VIRTUAL)
COM	COMMUNICATION LINK
MI	MULTI-STATE INPUT
MO	MULTI-STATE OUTPUT
MV	MULTI-STATE VALUE (VIRTUAL)

ABBREVIATIONS

-X	GENERIC INDICATOR OF PLAN MARK NUMBER OR QTY
<>	NOT EQUAL TO
BAS	BUILDING AUTOMATION SYSTEM
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CMD	COMMAND
CP	CONTROL PANEL
CV	CONTROL VALVE
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
DCW	DOMESTIC COLD WATER
DDC	DIRECT DIGITAL CONTROL
E/C	ELECTRICAL CONTRACTOR
EOA	ECONOMIZER OUTSIDE AIR
EQ	EQUALIZER
E/M	EQUIPMENT MANUFACTURER
FA/C	FIRE ALARM CONTRACTOR
F/P	FAIL IN POSITION
G	NATURAL GAS
HWS	HEATING WATER SUPPLY
HWR	HEATING WATER RETURN
HPWS	HEAT PUMP WATER SUPPLY
HPWR	HEAT PUMP WATER RETURN
LPS	LOW PRESSURE STEAM SUPPLY
LPC	LOW PRESSURE STEAM CONDENSATE
M/C	MECHANICAL CONTRACTOR
MIN	MINIMUM; MINUTES
MOA	MINIMUM OUTSIDE AIR
NC	NORMALLY CLOSED
N/A	NOT IN AUTO (IN HAND)
NO	NORMALLY OPEN
PID	PROPORTIONAL INTEGRAL DERIVATIVE
RA	RETURN AIR
REA	RELIEF/EXHAUST AIR
RH	RELATIVE HUMIDITY
SA	SUPPLY AIR
SCHED	AS SCHEDULED ON DRAWINGS
SPEC	SPECIFIED
SPT	SETPOINT
TBD	TO BE DETERMINED
T/C	TEMPERATURE CONTROLS CONTRACTOR

WIRING TYPES

———	POWER WIRING
– – –	SYSTEM CONTROL WIRING
—·—	BUILDING AUTOMATION WIRING

POINTS LIST - AUXILARY SYSTEMS

POINT ID	DESCRIPTION	POINT TYPE	DEFAULT SETPOINT	SETPOINT RESET RANGE	FAIL POSITION	STATUS ALARM	ALARM RANGE	NOTES
HEAT TRACE CONTROLLER								
HT-COMM-X	HEAT TRACE CONTROLLER COMMUNICATION	COM						U

ALL POINTS SHOWN SHALL BE PROVIDED BY BAS CONTRACTOR UNLESS NOTED OTHERWISE. SUFFIX "-X" INDICATES MULTIPLE SENSORS PROVIDED.

NOTES:

U. FULLY INTEGRATE HEAT TRACE CONTROL PANELS INTO THE BAS INCLUDING ALL AVAILABLE HARDWARE AND SOFTWARE POINTS. REFER TO MECHANICAL, AND ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR HEAT TRACE CONTROLLER INFORMATION, LOCATIONS, AND QUANTITIES.

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FLUID COOLER REPLACEMENT

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SEAL:

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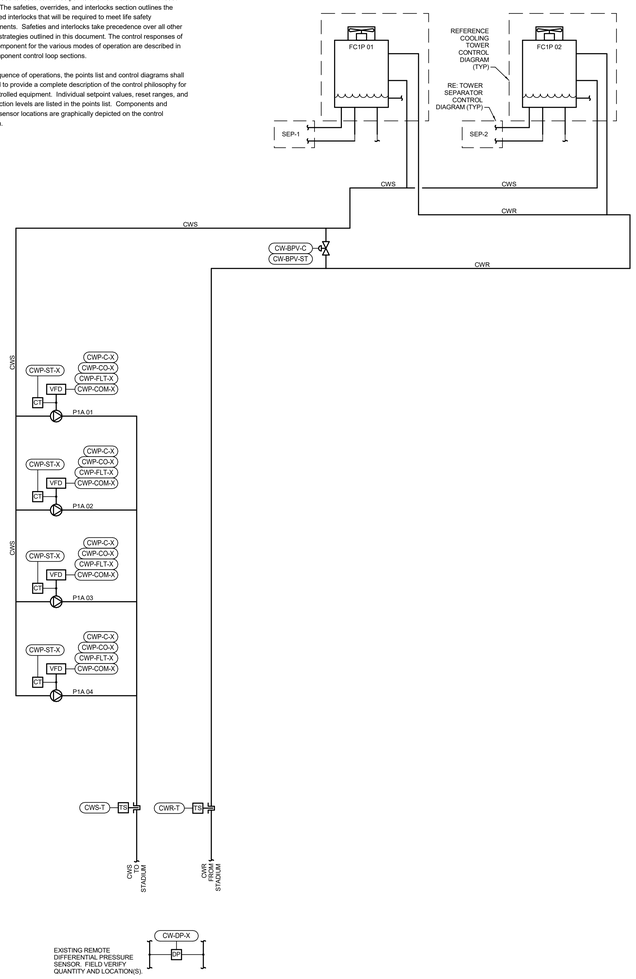
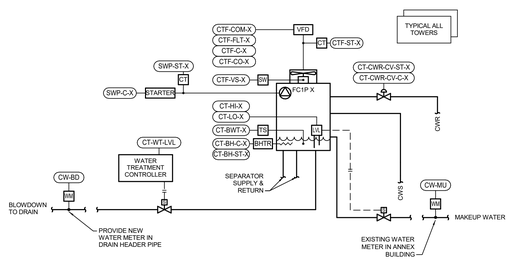
SEQUENCE OF OPERATIONS
GENERAL ORGANIZATION

This sequence of operations is organized into the following main categories: operating modes, control setpoint resets, safeties, overrides and interlocks, and component control loops. The operating modes describe the criteria that either enable or disable the various modes of operation. If a mode of operation is not listed within a component control loop section then that mode of operation has no direct influence on the operation of the component. The control setpoint reset section describes the logic and reference variables that will be used to reset control setpoints to a new value within its reset range. The safeties, overrides, and interlocks section outlines the hardwired interlocks that will be required to meet life safety requirements. Safeties and interlocks take precedence over all other control strategies outlined in this document. The control responses of each component for the various modes of operation are described in the component control loop sections.

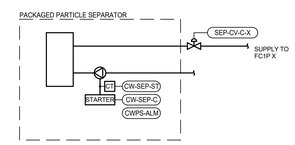
The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram.



CONDENSER WATER PLANT CONTROL DIAGRAM



CLOSED CIRCUIT COOLING TOWER CONTROL DIAGRAM



CONDENSER WATER PARTICLE SEPARATOR CONTROL DIAGRAM

POINTS LIST - CONDENSER WATER PLANT

POINT ID	DESCRIPTION	POINT TYPE	DEFAULT SETPOINT	SET POINT RESET RANGE	FAIL POSITION	STATUS ALARM	ALARM RANGE	NOTES
GLOBAL VALUES								
OAT	OUTSIDE AIR DRY BULB TEMPERATURE	AV						B
OAWB	OUTSIDE AIR WET BULB TEMPERATURE	AV						B
PSD	PLANT LOSS OF POWER START DELAY	AV	TBD					E, F
CONDENSER WATER LOOP								
CWR-T	CONDENSER WATER RETURN TEMPERATURE	AI						A
CWS-T	CONDENSER WATER SUPPLY TEMPERATURE	AI	SCHED	65-90 F		X	CWS-MIN-T > CWS-T > 93F	A, E
CWS-MIN-T	CONDENSER WATER MINIMUM OPERATING TEMPERATURE	BV	60 F					E, F
CW-BPV-C	CONDENSER WATER BYPASS VALVE COMMAND	BO			NO			A
CW-BPV-ST	CONDENSER WATER BYPASS VALVE STATUS	BI				X	CW-BPV-ST <> CW-BPV-C	
CW-DP-X	CONDENSER WATER DIFFERENTIAL PRESSURE	AI	TBD	TBD		X	CW-DP +/- 5 PSIG OF SPT	A, E, H
CONDENSER WATER PUMP (TYPICAL ALL CWP)								
CWP-C-X	CONDENSER PUMP COMMAND	BO						
CWP-CO-X	CONDENSER PUMP CONTROL OUTPUT	AO	TBD	MIN. - 60 Hz		X	CWP-CO < MINIMUM	E, F
CWP-COM-X	CONDENSER PUMP VFD COMMUNICATION	COM						
CWP-FLT-X	CONDENSER PUMP VFD FAULT	BI				X	COMMON ALARM	
CWP-ST-X	CONDENSER PUMP STATUS	BI				X	CWP-ST <> CWP-C	
COOLING TOWER SENSORS AND VALVES (TYPICAL ALL CT)								
CT-COM-X	COOLING TOWER CONTROL PANEL COMMUNICATION	COM						
CT-BH-C-X	COOLING TOWER BASIN HEATER COMMAND	BO						
CT-BH-ST-X	COOLING TOWER BASIN HEATER STATUS	BI				X	CT-BH-ST <> CT-BH-C	
CT-BWT-X	COOLING TOWER BASIN WATER TEMPERATURE	AI	40 F			X	CT-BWT < 38	E
CT-HI-X	COOLING TOWER BASIN HIGH WATER LEVEL ALARM	BI				X	ON ACTIVATION	F
CT-LO-X	COOLING TOWER BASIN LOW WATER LEVEL ALARM	BI				X	ON ACTIVATION	F
CT-CWR-CV-C-X	TOWER CONDENSER WATER RETURN VALVE COMMAND	BO			NO			A
CT-CWR-CV-ST-X	TOWER CONDENSER WATER RETURN VALVE STATUS	BI				X	CT-CWR-CV-ST <> CT-CWR-CV-C	
COOLING TOWER SPRAY WATER PUMP (TYPICAL ALL SWP)								
SWP-C-X	SPRAY WATER PUMP COMMAND	BO						
SWP-ST-X	SPRAY WATER PUMP STATUS	BI				X	SWP-ST <> SWP-C	
COOLING TOWER FAN (TYPICAL ALL CTF)								
CTF-C-X	COOLING TOWER FAN COMMAND (START/STOP)	BO						
CTF-CO-X	COOLING TOWER FAN CONTROL OUTPUT - SPEED	AO		MIN.- 60 Hz		X	CTF-CO < MINIMUM	F
CTF-COM-X	COOLING TOWER FAN VFD COMMUNICATION	COM						
CTF-FLT-X	COOLING TOWER FAN VFD FAULT	BI				X	COMMON ALARM	
CTF-ST-X	COOLING TOWER FAN STATUS	BI				X	CTF-ST <> CTF-C	
CTF-VS-X	COOLING TOWER VIBRATION SWITCH STATUS	BI				X	ON ACTIVATION	A
CONDENSER WATER TREATMENT								
CW-BD	CONDENSER WATER BLOWDOWN WATER METER	AI						B
CW-MU	CONDENSER WATER MAKEUP WATER METER	AI						B
CW-WT-LVL	WATER TREATMENT CHEMICAL LIQUID LOW LEVEL	BI				X	ON ACTIVATION	F
CONDENSER WATER SEPARATOR (TYPICAL ALL SEPARATORS)								
CWPS-ALM	SEPARATOR SYSTEM ALARM	BI				X	COMMON ALARM	
CW-SEP-C	SEPARATOR PUMP COMMAND	BO						
CW-SEP-ST	SEPARATOR PUMP STATUS	BI				X	SEP-P-ST <> SEP-P-C	
SEP-CV-C-X	SEPARATOR CONTROL VALVE COMMAND	BO			NO			

ALL POINTS SHOWN SHALL BE PROVIDED BY BAS CONTRACTOR UNLESS NOTED OTHERWISE.

NOTES:
A. BAS CONTRACTOR SHALL PROVIDE DEVICE.
B DISPLAY VALUE WITH CENTRAL PLANT GRAPHIC AT BAS FRONT END.
E. POINT SHALL BE ADJUSTABLE.
F. DETERMINE SETPOINT IN FIELD.
H. POINT IS EXISTING TO REMAIN. FIELD VERIFY EXISTING SETPOINT AND QUANTITY OF POINTS. TEST AND BALANCE CONTRACTOR SHALL DETERMINE IF SETPOINT NEEDS TO BE ADJUSTED.

CONDENSER PLANT LOAD STAGING CONTROL MATRIX

PLANT LOAD STAGE	TOWER CELL ENABLE STATUS		TOWER CONDENSER WATER ISOLATION VALVE STATUS		TOWER CELL SPRAY PUMP		TOWER CELL FAN		CONDENSER WATER BYPASS
	LEAD	LAG	LEAD	LAG	LEAD	LAG	LEAD	LAG	VALVE
0	OFF	OFF	CLOSED	CLOSED	OFF	OFF	OFF	OFF	OPEN
1	ON	ON	OPEN	OPEN	OFF	OFF	OFF	OFF	CLOSED
2	ON	ON	OPEN	OPEN	OFF	OFF	MODULATING	OFF	CLOSED
3	ON	ON	OPEN	OPEN	OFF	OFF	MODULATING	MODULATING	CLOSED
4	ON	ON	OPEN	OPEN	ON	OFF	MODULATING	MODULATING	CLOSED
5	ON	ON	OPEN	OPEN	ON	ON	MODULATING	MODULATING	CLOSED

SEQUENCE OF OPERATIONS
WSHP LOOP CENTRAL CONDENSER WATER PLANT

GENERAL DESCRIPTION
The condenser water plant described by this sequence of operations consist(s) of closed circuit cooling towers and variable speed condenser water pumps that provide condenser water to distributed water-source heat pumps.

OPERATING MODES
CONDENSER WATER PLANT DISABLED MODE:
The condenser water plant shall be in disabled mode when
There is no call from the enable modes as defined below;
Or- when the operator has manually disabled the condenser water plant at the operator's workstation.

CONDENSER WATER PLANT ENABLED MODE:
Manual Enable Mode Option: The condenser water plant is in manual enable mode when the operator manually places the plant in enable mode at the operator work station.
Scheduled Start Mode Option: In the scheduled start mode, the system shall be manually enabled by the building operator or by time of day schedule.

COOLING TOWER BYPASS MODE:
The cooling tower shall be in bypass mode when:
The condenser water supply temperature (CWS-T) falls more than 2 F (adj.) below minimum setpoint and the tower fan is off.

COOLING TOWER FREEZE PROTECTION MODE:
The cooling tower shall be in freeze protection mode when:
The outside air temperature is less than 32 F (adj.)

LOSS OF POWER RESTART DELAY MODE:
The plant shall be in loss of power mode upon restoration of power after an unexpected loss of power. The plant shall remain in this mode for the duration as defined by the plant start delay (PSD) setpoint. Once the plant start delay duration has elapsed, the plant shall return to its previous mode prior to loss of power.

CONDENSER PUMP FAILURE MODE:
A pump shall be in failure mode when:
The pump is given a start signal;
And- The pump status indicates it is off.

CONTROL SETPOINT RESETS
CONDENSER WATER SUPPLY RESET:
Reset based on Outside Air Dry Bulb: The condenser water supply temperature setpoint shall linearly reset based on the following schedule:

(OADB)	(CWS-T)
< 65 F	80 F
> 65 F & < 72 F	65 F
> 72 F	72 F

SAFETIES, OVERRIDES AND INTERLOCKS
COOLING TOWER FAN VIBRATION SAFETY SWITCH:
The factory furnished contractor installed vibration switch (CTF-VS-X) wired through the fan motor controller shall stop cooling tower fan when excessive vibration is detected. An alarm signal shall be annunciated on activation of the vibration switch and the lag cooling tower mode shall be activated.

COOLING TOWER FAN(S) INTERLOCK:
Cooling tower fan(s) shall not be allowed to start (CTF-C-X) until the condenser water pump(s) has proven flow.

BASIN HEATER(S) INTERLOCK:
Basin heater(s) shall be enabled subject to a hardwired interlock when the tower spray water pumps are off.

CONTROL LOOPS
COOLING TOWER ISOLATION VALVES (CT-CWR-CV)
The cooling tower isolation valve shall be provided by the BAS contractor and controlled through the BAS.
When in condenser water plant disabled mode:
The valve shall be closed.
When in condenser water plant enabled mode:
The valve(s) shall be open or closed as defined in the Condenser Plant Load Staging Control Matrix.
When in cooling tower bypass mode:
The condenser water return isolation valve (CT-CWR-CV) shall be closed.
When in cooling tower freeze protection mode:
The condenser water return isolation valve (CT-CWR-CV) shall be open.

COOLING TOWER BYPASS VALVE (CT-BPV)
The valve shall be provided by the BAS controls contractor and controlled by the BAS.
When in condenser water plant disabled mode:
The valve shall be open.
When in condenser water plant enabled mode:
The valve shall be closed.
When in cooling tower bypass mode:
The valve shall be open.
When in cooling tower freeze protection mode:
The valve shall be closed.

CONDENSER WATER- PUMP CONTROL (P1A 01 – P1A X)
The pump(s) shall be controlled by the BAS. Pumps P1A 01, P1A 02 and P1A 03 shall be operated as primary load pumps. P1A 04 shall be operated as low load pump.
When in condenser water plant disabled mode:
The pump shall be off.
When in condenser water plant enabled mode:
The pumps shall energize subject to a lead/lag sequence. Sequence shall be based on equal run time.

A pump that is energized shall start on low speed and ramp up to maintain the condenser water differential pressure set point as measured by the differential pressure sensor(s) (CW-DP-X). Initial differential setpoint shall be existing to remain, field verify. The most critical DP sensor shall govern pump speed. Multiple operating pumps shall ramp together to meet setpoint.

Pump capacity staging algorithm: Low load Pump P1A 04 shall be enabled first and ramped to 95% speed. When it reaches 95%, start the lead primary load pump and stop Pump P1A 04.

Primary load pumps shall energize on and off based on pump capacity. If the operating pump(s) is at or above 95% of maximum speed for a period of 10 minutes (adj.), the BAS shall energize the next lag pump.

When staging on a lag pump:
1. Ramp the operating pumps down to minimum speed.
2. Turn the lag pump on.
3. Ramp the operating pumps together to meet setpoint.

If multiple pumps are operating and their speed is less than 40% of maximum speed for a period of 10 minutes (adj.), de-energize the lag pump. When staging off a lag pump:
1. Ramp the operating pumps down to minimum speed.
2. Turn the lag pump off.
3. Ramp the remaining operating pumps together to meet setpoint.
When the lead primary load pump reduces to minimum speed, start low load pump P1A 04 and stop the lead primary load pump.
When in pump failure mode:
The next lag pump shall start.

COOLING TOWER CONTROL (FC1P 01 – FC1P 02)
When in condenser water plant disabled mode:
The cooling tower(s) shall be off.
When in condenser water plant enabled mode:
Each tower shall be on or off as described in the Condenser Plant Load Staging Control Matrix.
Interlocks shall have proven the associated equipment is on in the following order prior to turning a cooling tower on:
- The cooling tower isolation valve(s) have proven status (CT-CWR-CT-ST);
The condenser water pump is on (CWP-ST-X).
Cooling towers shall operate according to a lead/lag sequence. Sequence shall be based on equal run time.

COOLING TOWER SPRAY PUMP (SWP-1 – SWP-1-X)
When in condenser water plant disabled mode:
The pumps shall be off.
When in condenser water plant enabled mode:
The pump(s) shall be on or off as defined in the Condenser Plant Load Staging Control Matrix.
When in cooling tower bypass mode:
Upon entering bypass mode, the pumps shall be off.
When in cooling tower freeze protection mode:
The pumps shall be off.

COOLING TOWER FAN (CTF-1 – CTF-1-X)
When in condenser water plant disabled mode:
The fans shall be off.
When in condenser water plant enabled mode:
The fan(s) shall be on or off as defined in the Condenser Plant Load Staging Control Matrix.

A fan that is on shall start on low speed and ramp up to maintain the condenser water supply temperature setpoint (CWS-T). The minimum fan speed setting shall be determined during system startup. If the condenser water supply temperature continues to rise when the fan is at full speed, additional fan cells shall stage on.

When the load requires a water spray pump to start, modulate the fans to maintain setpoint. As the load reduces, turn the water spray pumps off in a lead/lag sequence when the tower fans are at minimum speed and the condenser water supply temperature is below setpoint.
When in cooling tower bypass mode:
Upon entering bypass mode, the fans shall be off.
When in cooling tower freeze protection mode:
The fans shall be off.

WATER LEVEL CONTROL
The cooling tower makeup valve(s) shall maintain sump water level subject to individual basin water level sensors. Upon sensing a drop in water level in a basin, the makeup valve for that tower shall automatically open. The makeup valve shall slowly close when water level is met.
A separate level sensor provided by the BAS contractor shall monitor the basin water level (CT-LVL-X).

COOLING TOWER BASIN HEATER CONTROL
The local basin heater shall operate subject to the factory furnished basin heater controller that energizes stages of electric heat to maintain the basin water temperature setpoint of 40 F (adj).

CONDENSER WATER TREATMENT BLOWDOWN CONTROL
The water treatment system controller shall operate the blow-down solenoid valve in response to the conductivity sensor analog output provided by the water treatment system. The conductivity set point and dead band shall be adjustable as determined by the water treatment installer.
The BAS shall sense chemical treatment liquid level and shall alarm upon low liquid level (CW-WT-LVL).

CONDENSER WATER MAKE UP AND BLOWDOWN METER
The BAS shall monitor the difference between the makeup water meter (CW-MU) and the blow-down water meter (CW-BD) flow rates and record the monthly totals.

COOLING TOWER CENTRIFUGAL SEPARATOR PUMP (SEP-P)
The BAS shall provide remote monitoring of pump status (SEP-P-ST) from the cooling tower centrifugal separator system. The separator system shall operate according to its on-board controls.

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ELECTRICAL SYMBOLS

THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED. V4.00

STANDARD MOUNTING HEIGHTS

AUDIBLE APPLIANCE (CENTERLINE)	84"
ALARM (TOP OF DEVICE)	46"
ANNUNCIATOR PANEL (TOP OF DISPLAY)	60"
CONTROLS (TOP OF DEVICE)	46"
DATA WALL OUTLET	SAME AS ADJACENT DEVICE, UNO
EXIT SIGN (WALL MOUNTED)	92"
FIRE ALARM ANNUNCIATOR PANEL (TOP OF DISPLAY)	60"
FIRE ALARM BELL (EXTERIOR) (CENTERLINE)	120"
FIRE ALARM CONTROL PANEL/UNIT (TOP OF DISPLAY)	60"
INTERCOM (TOP OF DEVICE)	46"
PULL STATION (HANDLE)	46"
RECEPTACLE	16"
RECEPTACLE (ABOVE COUNTER)	+6" ABOVE BACKSPLASH/COUNTER, 40" MAX
RECEPTACLE (CLOCK) (CENTERLINE)	84"
RECEPTACLE (EQUIPMENT ROOMS) (TOP OF DEVICE)	46"
RECEPTACLE (EXTERIOR)	24"
RECEPTACLE (GARAGES)	24"
REMOTE INDICATING LIGHT (EQUIPMENT ROOMS) (TOP OF DEVICE)	46"
REMOTE INDICATING LIGHT (FINISHED AREAS)	CEILING
SAFETY SWITCH (TOP OF DEVICE)	46"
STARTER (TOP OF DEVICE)	46"
SWITCH (TOP OF DEVICE)	46"
TELEPHONE WALL OUTLET (TOP OF DEVICE)	46"
TELECOMMUNICATIONS BACKBOARD	6"
TELEVISION OUTLET	REFER TO DRAWINGS
VISIBLE APPLIANCE (CENTERLINE)	84"

INSTALL DEVICES/OUTLET BOXES AT THE MOUNTING HEIGHTS SHOWN ABOVE UNO IN THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ABOVE, OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS, ARE AFF OR AFG TO BOTTOM, UNO. ALL DEVICES SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.

ABBREVIATIONS

AF	AMPERE FUSE SIZE	MFR	MANUFACTURER
AFC	ABOVE FINISHED CEILING	MIN	MINIMUM
AFF	ABOVE FINISHED FLOOR	MLO	MAIN LUGS ONLY
AFG	ABOVE FINISHED GRADE	MLV	MAGNETIC LOW-VOLTAGE
AHJ	AUTHORITY HAVING JURISDICTION	MOCP	MAXIMUM OVERCURRENT PROTECTION
AHU	AIR HANDLING UNIT	MTD	MOUNTED
AIC	AMPERE INTERRUPTING CAPACITY	N/A	NOT APPLICABLE
AS	AMPERE SWITCH SIZE	NIC	NOT IN CONTRACT
AT	AMPERE TRIP SETTING	NIS	NOT IN SCOPE
ATS	AUTOMATIC TRANSFER SWITCH	NF	NON-FUSED
AV	AUDIO VISUAL	NL	NIGHT LIGHT (24HR ON)
BAS	BUILDING AUTOMATION SYSTEM	NRTL	NATIONALLY RECOGNIZED TESTING LABORATORY
BKR	BREAKER	NTS	NOT TO SCALE
C	CONDUIT	OS	OCCUPANCY SENSOR
CAT	CATEGORY	P	POLE
CATV	CABLE TELEVISION SYSTEM	PART	PARTIAL CIRCUIT
CCTV	CLOSED CIRCUIT TELEVISION	PH/Ø	PHASE
CD	CANDELA	PNL	PANEL
CKT	CIRCUIT	PNLBD	PANELBOARD
CODE	APPLICABLE CODE ADOPTED BY JURISDICTION	PROVIDE	FURNISH AND INSTALL
CT	CURRENT TRANSFORMER	PT	POTENTIAL TRANSFORMER
CTR	CENTER	QTY	QUANTITY
CTRL	CONTROL/CONTROLLED	R/REL	RELOCATE
CVD	CUMULATIVE VOLTAGE DROP	RCPT	RECEPTACLE
D/DEMO	DEMOLITION	RLA	RUNNING LOAD AMPS
DPDT	DOUBLE-POLE, DOUBLE-THROW	RTU	ROOFTOP UNIT
DPST	DOUBLE-POLE, SINGLE-THROW	SCCR	SHORT-CIRCUIT CURRENT RATING
E/ETR/EX	EXISTING TO REMAIN	SD	SMOKE DUCT DETECTOR
EC	ELECTRICAL CONTRACTOR	SF	SQUARE FEET
EF	EXHAUST FAN	SPDT	SINGLE-POLE, DOUBLE-THROW
EM	EMERGENCY	SPST	SINGLE-POLE, SINGLE-THROW
EMS	ENERGY MANAGEMENT SYSTEM	SSBJ	SUPPLY-SIDE BONDING JUMPER
ELV	ELECTRONIC LOW-VOLTAGE	ST	SHUNT TRIP
EWC	ELECTRIC WATER COOLER	SWBD	SWITCHBOARD
F	FUTURE	SWGR	SWITCHGEAR
FAAP	FIRE ALARM ANNUNCIATOR PANEL	TBB	TELECOMMUNICATIONS BONDING BACKBONE
FACP	FIRE ALARM CONTROL PANEL	TBD	TO BE DETERMINED
FCA	FAULT CURRENT AMPS AVAILABLE	TGB	TELECOMMUNICATIONS GROUND BUS BAR
FCU	FAN COIL UNIT	TL	TWISTLOCK
FF	FINISHED FLOOR	TMGB	TELECOMMUNICATIONS MAIN GROUND BUS BAR
FLA	FULL LOAD AMPS	TX/XFMR	TRANSFORMER
FLR	FLOOR	TYP	TYPICAL
GC	GENERAL CONTRACTOR	U/F	UNDERFLOOR
GEC	GROUNDING ELECTRODE CONDUCTOR	U/G	UNDERGROUND
GES	GROUNDING ELECTRODE SYSTEM	U/S	UNDERSLAB
GFR	GROUND FAULT RELAY	UH	UNIT HEATER
G	GROUND	UNO	UNLESS NOTED OTHERWISE
IG	ISOLATED GROUND	UPS	UNINTERRUPTIBLE POWER SUPPLY
ISC	SHORT CIRCUIT CURRENT	VD	VOLTAGE DROP
JB/J-BOX	JUNCTION BOX	VFD	VARIABLE FREQUENCY DRIVE
LF	LINEAR FEET	VS	VACANCY SENSOR
LRA	LOCKED ROTOR AMPS	W	WIRE
LTG/LTS	LIGHTING/LIGHTS	W/	WITH
MAU	MAKE-UP AIR UNIT	WP	WEATHER PROOF
MAX	MAXIMUM	WR	WEATHER RESISTANT
MCA	MINIMUM CIRCUIT AMPACITY	WT	WATERTIGHT
MCB	MAIN CIRCUIT BREAKER	XP	EXPLOSION PROOF
MCC	MOTOR CONTROL CENTER		

LINETYPE LEGEND

THROUGHOUT THE DRAWINGS DIFFERENT LINETYPES ARE USED IN COMBINATION WITH THE SYMBOLS TO INDICATE THE STATUS OF ITEMS AS EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF NEW WORK AND/OR ITEMS WHICH ARE ANTICIPATED TO BE PROVIDED IN THE FUTURE. THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO THE VIEW IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS NOT INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION PHASING, WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC.

EXISTING	ARTICLE 700 OR LIFE SAFETY*
DEMOLISH	ARTICLE 701 OR CRITICAL / EQUIPMENT BRANCH*
NEW	
FUTURE	ARTICLE 702 OR OPTIONAL*

* APPLIES TO COLOR PLOTS ONLY

ANNOTATION

- MECHANICAL OR FIRE PROTECTION PLAN NOTE CALLOUT
- PLUMBING PLAN NOTE CALLOUT
- ELECTRICAL OR FIRE ALARM PLAN NOTE CALLOUT
- TECHNOLOGY PLAN NOTE CALLOUT
- PLUMBING EQUIPMENT DESIGNATION. (CONTRACTOR FURNISHED AND INSTALLED, UNO). REFER TO PLUMBING FIXTURE OR EQUIPMENT SCHEDULES
- EQUIPMENT DESIGNATION (OWNER FURNISHED, CONTRACTOR INSTALLED, UNO)
- MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED, UNO)
- CONNECTION POINT OF NEW WORK TO EXISTING
- DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER
- SECTION CUT DESIGNATION
- DEDICATED EQUIPMENT ACCESS TILE
- ACCESS PANEL

CIRCUITING & WIRING

- HOMERUN TO PANELBOARD. INFORMATION AT ARROWS ARE CIRCUIT NUMBERS AND PANELBOARD FOR ILLUMINATION. REFER TO PANELBOARD SCHEDULES FOR BRANCH CIRCUIT CONDUCTOR SIZES.
- INDICATES RELAY NUMBER
- CIRCUIT CONTINUATION OR PARTIAL CIRCUIT
- CONDUIT CONCEALED
- CONDUIT CONCEALED (EMERGENCY)
- CONDUIT IN/UNDER FLOOR/GROUND CONSTRUCTION
- EXPOSED CONDUIT
- EXPOSED CONDUIT (EMERGENCY)
- FLEXIBLE CONDUIT
- LOW VOLTAGE CABLE (NOT ROUTED IN CONDUIT)
- CONDUIT TURNING DOWN
- CONDUIT TURNING UP
- CONNECTION POINT OR EQUIPMENT TERMINATION
- EQUIPMENT TERMINATION

CONDUCTOR TICK MARK LEGEND

WHERE TICK MARKS ARE SHOWN, THE FOLLOWING SHALL GOVERN:

- SWITCHED HOT (PHASE) CONDUCTORS (SHOWN TRAILING NEUTRAL)
- NEUTRAL (GROUNDED) CONDUCTOR
- UNSWITCHED HOT (PHASE) CONDUCTORS (SHOWN LEADING NEUTRAL)

NOTE: HASH MARKS INDICATE QUANTITY OF CONDUCTORS

- EQUIPMENT GROUNDING CONDUCTOR IN CONDUIT (GREEN INSULATION OR BARE)
- ISOLATED GROUNDING CONDUCTOR IN CONDUIT (GREEN INSULATION WITH YELLOW TRACER)

BRANCH CIRCUIT CONDUCTOR TABLE

WHERE TICK MARKS ARE NOT SHOWN, THE FOLLOWING SHALL GOVERN:

# OF POLES	HOT (PHASE)*	NEUTRAL (GROUNDED)**	GROUNDING***
1P	(1)	(1) UNO	(1)
2P	(2)	(1) UNO	(1)
3P	(3)	(1) UNO	(1)

* PROVIDE ADDITIONAL CONDUCTORS THROUGH ENTIRE CIRCUIT (SWITCHED, UNSWITCHED/EM, ETC.) AS INDICATED THROUGHOUT CONSTRUCTION DOCUMENTS AND AS REQUIRED FOR A COMPLETE AND WORKING SYSTEM.

** REFER TO SPECIFICATIONS FOR LIMITATIONS ON SHARING NEUTRAL (GROUNDED) CONDUCTORS. DO NOT CIRCUIT AS A MULTI-WIRE BRANCH CIRCUIT, UNO.

*** PROVIDE ADDITIONAL ISOLATED GROUNDING CONDUCTORS WHERE INDICATED.

REFER TO SPECIFICATIONS, PLANS, NOTES, WIRING AND CONTROL DIAGRAMS FOR ADDITIONAL CIRCUITING REQUIREMENTS.

HATCHING LEGEND

- ENLARGED PLAN
- NOT IN SCOPE (NIS)

LIGHTING

- LIGHT FIXTURE
- a = LOWER CASE LETTER IS SWITCH IDENTIFIER
- A = UPPER CASE LETTER INDICATES LIGHT FIXTURE TYPE
- [OS] = INTEGRAL OCCUPANCY SENSOR
- = WALL MOUNT
- = ARROW INDICATED AIMING DIRECTION
- LIGHT FIXTURE CIRCUITED AS A NIGHT LIGHT (NL)
- EMERGENCY LIGHT FIXTURE WITH EMERGENCY LIGHTING BATTERY PACK OR CONNECTED TO EMERGENCY SOURCE
- NIGHT LIGHT/EMERGENCY LIGHT FIXTURE WITH EMERGENCY BATTERY PACK OR CONNECTED TO EMERGENCY SOURCE
- LIGHT FIXTURE WITH DUAL BALLASTS CIRCUITED SEPARATELY (SHADING IMPLIES EMERGENCY LIGHT FIXTURE)
- LIGHTING TRACK (# INDICATES RELAY NUMBER)
- MIRROR LIGHTS
- EXTERIOR PARKING LOT LIGHT FIXTURE
- EXTERIOR PEDESTRIAN POST TOP LIGHT FIXTURE
- EXTERIOR LIT BOLLARD LIGHT
- EXIT SIGN - CEILING / WALL MOUNTED, ARROWS AS INDICATED, FACE HATCHED
- EMERGENCY LIGHTING UNIT EQUIPMENT WITH BATTERY PACK - CEILING/WALL MOUNTED
- AFEA (AREA FOR EVACUATION ASSISTANCE) SIGN - CEILING/WALL MOUNTED, ARROWS AS INDICATED

REFER TO LIGHT FIXTURE SCHEDULE FOR MORE INFORMATION

POWER EQUIPMENT

- ELECTRICAL PANELBOARD (SURFACE OR FLUSH MOUNT)
- ELECTRICAL CABINET (SURFACE OR FLUSH MOUNT), TYPE AS NOTED
- PLYWOOD TERMINAL BOARD FOR TELEPHONE SYSTEM, UNO. SIZE AS NOTED
- ELECTRICAL EQUIPMENT ON HOUSEKEEPING PAD
- TRANSFORMER
- DISCONNECT SWITCH: 200/3/150/3R = AMPERES/POLE/FUSE/NEMA ENCLOSURE RATING; CB = CIRCUIT BREAKER (200/3CB); FM = FACTORY FURNISHED AND MOUNTED; NF = NON-FUSED; OL = SIZE INDICATED ON ONE-LINE DIAGRAM; NO VALUE FOR NEMA ENCLOSURE = NEMA 1
- COMBINATION DISCONNECT (SAFETY) SWITCH AND MOTOR STARTER: 30/3/15/1/3R = AMPERES/POLE/FUSE/NEMA STARTER SIZE/NEMA ENCLOSURE RATING; CB= CIRCUIT BREAKER (30/3/CB/1); FM = FACTORY FURNISHED AND MOUNTED; NF= NON-FUSED; NO VALUE FOR NEMA ENCLOSURE = NEMA 1
- MAGNETIC MOTOR STARTER, NEMA SIZE AS NOTED. 3-POLE, UNO
- VARIABLE FREQUENCY DRIVE
- INDICATING LIGHT
- EMERGENCY POWER OFF BUTTON
- STOP-START PUSH BUTTON CONTROL STATION
- HAND-OFF-AUTO PUSH BUTTON CONTROL STATION
- MUSHROOM-TYPE PUSH BUTTON
- OVERHEAD PADDLE FAN

SIGNALING

- SIGNALING BELL
- SIGNALING BUZZER
- LV TRANSFORMER

BOXES, LIGHTING CONTROL & WIRING DEVICES

SWITCH LETTER DESIGNATIONS AS FOLLOWS:
BLANK = SINGLE POLE
2 = TWO POLE
3 = THREE-WAY
4 = FOUR-WAY
D = DIMMER
F = FAN SPEED CONTROL
FH = FRACTIONAL HORSEPOWER MANUAL CONTROLLER
IH = INTEGRAL HORSEPOWER MANUAL CONTROLLER
K = KEYED
LVB = LOW VOLTAGE / DIGITAL
M = MANUAL MOTOR STARTER DISCONNECT
OS# = OCCUPANCY SENSOR
P = SPST PILOT LIGHT
WP = WEATHER PROOF
30/3/3R = AMPERES/POLES/NEMA ENCLOSURE RATING
= REFER TO LIGHTING CONTROL DEVICE SCHEDULE

- AUTOMATIC LOAD CONTROL RELAY
- BRANCH CIRCUIT TRANSFER SWITCH
- CEILING / WALL MOUNTED OCCUPANCY SENSOR (# INDICATES TYPE PER SCHEDULE)
- CORNER 90 DEGREE SENSING
- ONE-DIRECTION SENSING, CEILING/WALL MOUNT
- CEILING MOUNT, TWO-DIRECTION SENSING
- CEILING MOUNT, FOUR-DIRECTION SENSING
- CONTACTOR (SIZE, COIL VOLTAGE AND NUMBER OF POLES AS INDICATED)
- TRACK-MOUNTED CURRENT LIMITER (## INDICATES AMPERAGE)
- DAYLIGHT SENSOR (# INDICATES TYPE PER SCHEDULE)
- LIGHTING CONTROLS PROCESSOR AND/OR EQUIPMENT
- POWER PACK (# INDICATES TYPE PER SCHEDULE)
- PHOTOELECTRIC SWITCH
- ROOM CONTROLLER (# INDICATES TYPE PER SCHEDULE)
- TIME SWITCH
- SIMPLEX RECEPTACLE - NEMA 5-20R, UNO
- DUPLEX RECEPTACLE - NEMA 5-20R, UNO
- DOUBLE DUPLEX RECEPTACLE - NEMA 5-20R, UNO
- SPECIAL RECEPTACLE - NEMA TYPE AS NOTED
- TWIST-LOCK TYPE RECEPTACLE
- BLANK FACE GFCI FEED THROUGH DEVICE
- GFCI TYPE RECEPTACLE*
- ISOLATED GROUND TYPE RECEPTACLE*
- GFCI WITH ISOLATED GROUND TYPE RECEPTACLE*
- EMERGENCY RECEPTACLE*
- RECEPTACLE INSTALLED ABOVE COUNTER OR BACKSPLASH*
- RECEPTACLE INSTALLED IN CEILING*
- RECEPTACLE INSTALLED IN FLOOR*
- RECEPTACLE INSTALLED VIA DROP CORD*
- RECEPTACLE INSTALLED IN HORIZONTAL ORIENTATION*

ADDITIONAL RECEPTACLE LETTER DESIGNATIONS AS FOLLOWS:
C = AUTOMATICALLY CONTROLLED
CH = CLOCK HANGER TYPE
G=RCPT PROTECTED BY GFCI CIRCUIT BREAKER OR UPSTREAM GFCI DEVICE
S = MANUALLY SWITCHED
SP / TVSS = SURGE PROTECTION
TR = TAMPER RESISTANT
TV = TELEVISION
USB = USB/DUPLEX
WP = WEATHER PROOF COVER
WR = WEATHER RESISTANT

- MULTI-OUTLET ASSEMBLY
- TELEPHONE OUTLET
- DATA OUTLET
- MULTI-SERVICE OUTLET; TELEPHONE AND DATA
- ABOVE COUNTER, TYP
- WALL, TYP
- FLOOR, TYP
- MULTI-SERVICE POWER POLE WITH TELEPHONE, DATA AND POWER OUTLETS A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS
- MULTI-SERVICE FLOOR BOX WITH TELEPHONE, DATA AND POWER OUTLETS A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS
- POKE THROUGH, A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS
- THERMOSTAT
- CEILING/FLOOR MOUNT JUNCTION/OUTLET BOX
- WALL MOUNT JUNCTION/OUTLET BOX

* SYMBOL DEMONSTRATED WITH DUPLEX RECEPTACLE, WHEN USED IN COMBINATION WITH OTHER DEVICES MEANING IS SIMILAR FOR THOSE DEVICE TYPES.

REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR MORE INFORMATION.

ELECTRICAL ONE-LINE & RISER DIAGRAM

- SWITCH (RATING AND POLES AS INDICATED)
- DRAWOUT CIRCUIT BREAKER (RATINGS, POLES, TRIP SIZE AND BREAKER TYPE AS INDICATED)
- FUSED SWITCH (RATING, POLES, FUSE SIZE AND TYPE AS INDICATED)
- COMBINATION FUSED SWITCH/STARTER (RATING, POLES, FUSE SIZE, FUSE TYPE, NEMA STARTER SIZE, NEMA ENCLOSURE TYPE AS INDICATED)
- CIRCUIT BREAKER (RATING, POLES, TRIP SIZE AND BREAKER TYPE AS INDICATED)
- COMBINATION CIRCUIT BREAKER/STARTER (RATING, POLES, TRIP SIZE, BREAKER TYPE, NEMA STARTER SIZE, NEMA ENCLOSURE TYPE AS INDICATED)
- PANELBOARD, SINGLE OR MULTI-SECTION (REFER TO SCHEDULES)
- ISOLATED POWER PANELBOARD W/ INTEGRAL TRANSFORMER (REFER TO SCHEDULES)
- TRANSFORMER (TYPE AND RATINGS AS INDICATED)
- SHIELDED TRANSFORMER (TYPE AND RATINGS AS INDICATED)
- TRANSFER SWITCH (RATINGS AS INDICATED) ATS = AUTOMATIC TRANSFER SWITCH; MTS = MANUAL TRANSFER SWITCH; NTS = NON-AUTOMATIC TRANSFER SWITCH
- TRANSFER SWITCH WITH BYPASS (RATINGS AS INDICATED)
- GENERATOR (RATINGS AS INDICATED)
- INDICATES CONNECTION TO GROUNDING ELECTRODE SYSTEM IF GENERATOR IS CONNECTED AS A SEPARATELY DERIVED SOURCE
- SWITCHGEAR, SWITCHBOARD AND/OR DISTRIBUTION PANELBOARD (TYPE, RATING, DEVICES AND ACCESSORIES AS INDICATED)
- AMMETER SWITCH
- VOLTMETER SWITCH
- AMMETER (RANGE AS SPECIFIED OR REQUIRED)
- VOLTMETER (RANGE AS SPECIFIED OR REQUIRED)
- COMBINATION DIGITAL VOLT METER/AMMETER
- UTILITY METER (AS REQUIRED BY UTILITY)
- WATT-HOUR METER, "D" DENOTES DEMAND REGISTER, "15" DENOTES MINUTES OF DEMAND INTERVAL
- CURRENT TRANSFORMER RATING AS SPECIFIED OR REQUIRED
- POTENTIAL TRANSFORMER RATING AS SPECIFIED OR REQUIRED
- CIRCUIT/EQUIPMENT IDENTIFICATION (REFER TO SCHEDULE)
- ENERGY-REDUCING MAINTENANCE SWITCH
- GROUND FAULT RELAY
- PHASE FAILURE RELAY
- PHASE ROTATION MONITOR
- RELAY
- KIRK-KEY INTERLOCK (# INDICATES KEY PAIR)
- SHUNT TRIP
- SURGE-PROTECTIVE DEVICE
- VARIABLE FREQUENCY DEVICE
- GROUND CONNECTION
- GROUND CONNECTION WITH TEST WELL
- GROUND ROD
- LIGHTNING ARRESTER
- CAPACITOR
- CONTACT (OPEN OR CLOSED)
- HEATER
- MOTOR
- BLOCK LOAD KW OR KVA
- ×F# ×FP# FAULT POINT REFERENCED IN SHORT CIRCUIT CURRENT AND VOLTAGE DROP SPREADSHEET

ELECTRICAL DEMOLITION GENERAL NOTES:

1. COORDINATE DEMOLITION AND REMOVAL OF EXISTING ELECTRICAL EQUIPMENT WITH ARCHITECTURAL PHASING DRAWING AND OWNER TO ALLOW NECESSARY SYSTEMS TO REMAIN OPERATIONAL DURING CONSTRUCTION. (NOTE: NOT ALL EXISTING/DEMOLISHED EQUIPMENT, DEVICES OR RACEWAYS WILL BE SHOWN ON THE DRAWINGS). COORDINATE ELECTRICAL REQUIREMENTS FOR REMODELED/RENOVATED SPACES WITH THE OWNER.
2. AVOID DAMAGING FACILITIES, INCLUDING EQUIPMENT, LIGHT FIXTURES AND DEVICES THAT ARE EXISTING TO REMAIN, NEW OR REUSED. REPAIR ALL DAMAGE CAUSED DURING WORK AT NO EXTRA COST TO THE OWNER.
3. DISPOSE OF ALL ELECTRICAL EQUIPMENT AND DEVICES SHOWN TO BE REMOVED, UNLESS NOTED OTHERWISE. COORDINATE WITH THE OWNER THE ITEMS TO BE SALVAGED, AND THE LOCATION FOR STORAGE. AVOID DAMAGING SALVAGED ITEMS DURING DEMOLITION WORK AND DURING TRANSPORT TO OWNER'S DESIGNATED STORAGE LOCATION.
4. WHERE ALTERATION OF ELECTRICAL EQUIPMENT, RACEWAYS OR WIRING DEVICES AFFECTS EXISTING SURFACES/FINISHES: REPAIR/PAINT AFFECTED SURFACE TO MATCH EXISTING ADJACENT SURFACE IN ACCORDANCE WITH OWNER REQUIREMENTS. MAINTAIN FIRE RATING OF ALL FLOORS/WALLS/CEILINGS THAT ARE RATED.
5. WHERE DEMOLITION WORK INTERRUPTS ELECTRICAL CONTINUITY OF CIRCUITS THAT ARE TO REMAIN IN USE, PROVIDE NECESSARY DEVICES AND RELATED CIRCUITRY TO MAINTAIN ELECTRICAL CONTINUITY IN ACCORDANCE WITH OWNER REQUIREMENTS. RECIRCUIT REUSED ELECTRICAL EQUIPMENT, WIRING DEVICES PREVIOUSLY POWERED FROM DEMOLISHED EQUIPMENT TO NEW OR TEMPORARY EQUIPMENT AS NEEDED.
6. COORDINATE DISCONNECTION OF POWER TO EQUIPMENT BEING DEMOLISHED/REMOVED/RELOCATED WITH OTHER TRADES PRIOR TO START OF WORK. ALL ELECTRICAL EQUIPMENT, RACEWAYS, WIRING DEVICES AND RELATED CIRCUITRY NOT BEING REUSED SHALL BE REMOVED IN ALL ACCESSIBLE AREAS AND IN FLOORS/WALLS/CEILINGS THAT ARE TO BE REMOVED, UNLESS NOTED OTHERWISE. AS ALLOWED BY OWNER, UNUSED ELECTRICAL EQUIPMENT, RACEWAYS AND RELATED CIRCUITRY THAT ARE INACCESSIBLE MAY BE ABANDONED IN PLACE AND SHALL BE PERMANENTLY DISCONNECTED FROM ALL POWER SOURCES, INSULATED FROM CONTACT WITH OTHER LIVE ELECTRICAL WIRING/DEVICES, AND IDENTIFIED AT THE TERMINATIONS AS NO LONGER BEING IN SERVICE.
7. LOW VOLTAGE CABLES/WIRING NOT BEING REUSED SHALL BE REMOVED UNLESS IDENTIFIED FOR FUTURE USE. COORDINATE REQUIREMENTS WITH OWNER. CARE SHOULD BE TAKEN DURING THE REMOVAL PROCESS TO PROTECT THE EXISTING REUSED CABLES/WIRING FROM DAMAGE.

APPLICABLE ELECTRICAL CODES:

NOTE: PROJECT IS DESIGNED IN COMPLIANCE WITH THE FOLLOWING CODES. THIS IS NOT AN EXHAUSTIVE LIST. PROJECT SHALL COMPLY WITH ALL APPLICABLE CODES, STANDARDS AND LOCAL REQUIREMENTS. REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

ELECTRICAL CODE: **2020 SEATTLE ELECTRICAL CODE**
BUILDING CODE: **2018 SEATTLE BUILDING CODE**
ENERGY CODE: **2018 SEATTLE ENERGY CODE**

ELECTRICAL GENERAL NOTES:

1. EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND SITE VISITS AND MAY NOT REFLECT ACTUAL "AS-BUILT" CONDITIONS. VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BID. COORDINATE NEW AND DEMOLITION WORK WITH ALL OTHER TRADES AND EXISTING CONDITIONS.
2. NOTIFY ARCHITECT, ENGINEER AND OWNER, AS APPLICABLE, IF ANY DANGEROUS CONDITIONS EXIST ON JOB SITE BEFORE ANY DEMOLITION OR REMODEL WORK BEGINS.
3. COORDINATE ANY NECESSARY POWER OUTAGES WITH THE OWNER AND MAKE EVERY ATTEMPT TO SCHEDULE DURING NON-BUSINESS OR OFF-PEAK BUSINESS HOURS TO MINIMIZE DISRUPTION TO BUSINESS OPERATIONS. REQUESTS FOR ELECTRICAL SHUTDOWNS OF THE OWNER'S EQUIPMENT SHALL BE BROUGHT IN WRITING TO THE ATTENTION OF THE OWNER AT LEAST 7 DAYS IN ADVANCE. SHUTDOWNS SHALL NOT BE PERFORMED WITHOUT WRITTEN APPROVAL FROM THE OWNER.
4. FOR AREAS AND EQUIPMENT WITHIN THE SCOPE OF THIS REMODEL: EXISTING ELECTRICAL EQUIPMENT AND CIRCUITRY MAY BE REUSED IF IN GOOD CONDITION AND NEW DESIGN REQUIREMENTS CAN BE MET; OTHERWISE REPLACE.
5. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS. AS APPLICABLE, REVIEW THE OWNER CRITERIA, GENERAL NOTES, OTHER TRADE DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMITTING BID.
6. ALL WORK SHALL CONFORM TO ALL LOCAL CODES AND ORDINANCES AS WELL AS APPLICABLE INDUSTRY STANDARDS. ALL EQUIPMENT SHALL BEAR LABELS FOR THE USE INTENDED BY AN ANSI ACCEPTED NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL), SUCH AS UL OR ETL. THE FINAL ELECTRICAL INSTALLATION OF THE FACILITY OCCUPIED BY OWNER SHALL BE FREE FROM ELECTRICAL DEFECTS TO THE SATISFACTION OF THE AHJ, OWNER, ARCHITECT AND ENGINEER.
7. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC/SCHEMATIC IN NATURE AND REPRESENT THE GENERAL SCOPE OF WORK. IT IS NOT WITHIN THE SCOPE OF THE ELECTRICAL DRAWINGS TO SHOW ALL NECESSARY RACEWAY ROUTING, BENDS, OFFSETS, PULL BOXES AND OBSTRUCTIONS. CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF EQUIPMENT AND WIRING DEVICES WITH OTHER TRADES PRIOR TO INSTALLATION AND INSTALL ALL WORK TO CONFORM TO THE OWNER REQUIREMENTS.
8. PROVIDE LABEL AT EACH EQUIPMENT DISCONNECT WITH THE RESPECTIVE "PNLBD-CKT#" DESIGNATION. COORDINATE LABEL REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.

ELECTRICAL SHEET LIST - FLUID COOLER

SHEET # ON SHEET	Sheet Name	Sheet Order
E000	ELECTRICAL GENERAL NOTES AND LEGEND	1
ED021	ELECTRICAL DEMOLITION SITE PLAN	2
ED302	ELECTRICAL ENLARGED DEMOLITION PLANS	3
E021	ELECTRICAL SITE PLAN	4
E302	ELECTRICAL ENLARGED PLANS	5
E500	ELECTRICAL SCHEDULES	6
E800	ELECTRICAL ONE-LINE DIAGRAMS	7

Grand total: 7

COMMISSIONING

PROJECT COMMISSIONING REQUIREMENTS SHALL CONFORM TO SECTION C408 OF 2018 SEATTLE ENERGY CODE. THESE REQUIREMENTS INCLUDE, BUT ARE NOT LIMITED TO A COMMISSIONING PLAN, PRELIMINARY COMMISSIONING REPORT, FINAL COMMISSIONING REPORT, AND ACCEPTABLE AND SUPPORTING DOCUMENTS. IN ADDITION, PROVIDE SYSTEM OPERATIONAL TRAINING, O&M MANUALS, AND RECORD DRAWINGS TO THE OWNER PER THE 2018 SEATTLE ENERGY CODE.

PROJECT CLOSE OUT

PROJECT CLOSE OUT DOCUMENTATION REQUIREMENTS SHALL CONFORM TO THE 2018 SEATTLE ENERGY CODE. THESE REQUIREMENTS INCLUDE, BUT ARE NOT LIMITED TO A SEC LIGHTING COMPLIANCE FORMS AND CALCUATIONS THAT DOCUMENT ALL INTERIOR AND EXTERIOR LIGHTING AREAS, LIGHT POWER ALLOWANCES AND INSTALLED DENSITIES.

LUMEN FIELD

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CRAWFORD

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BRETT J. MILES
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22822
REGISTERED PROFESSIONAL ENGINEER
12/03/2024

No.	Rev.	Date

12/03/2024
ISSUE FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

Title
ELECTRICAL GENERAL NOTES AND LEGEND

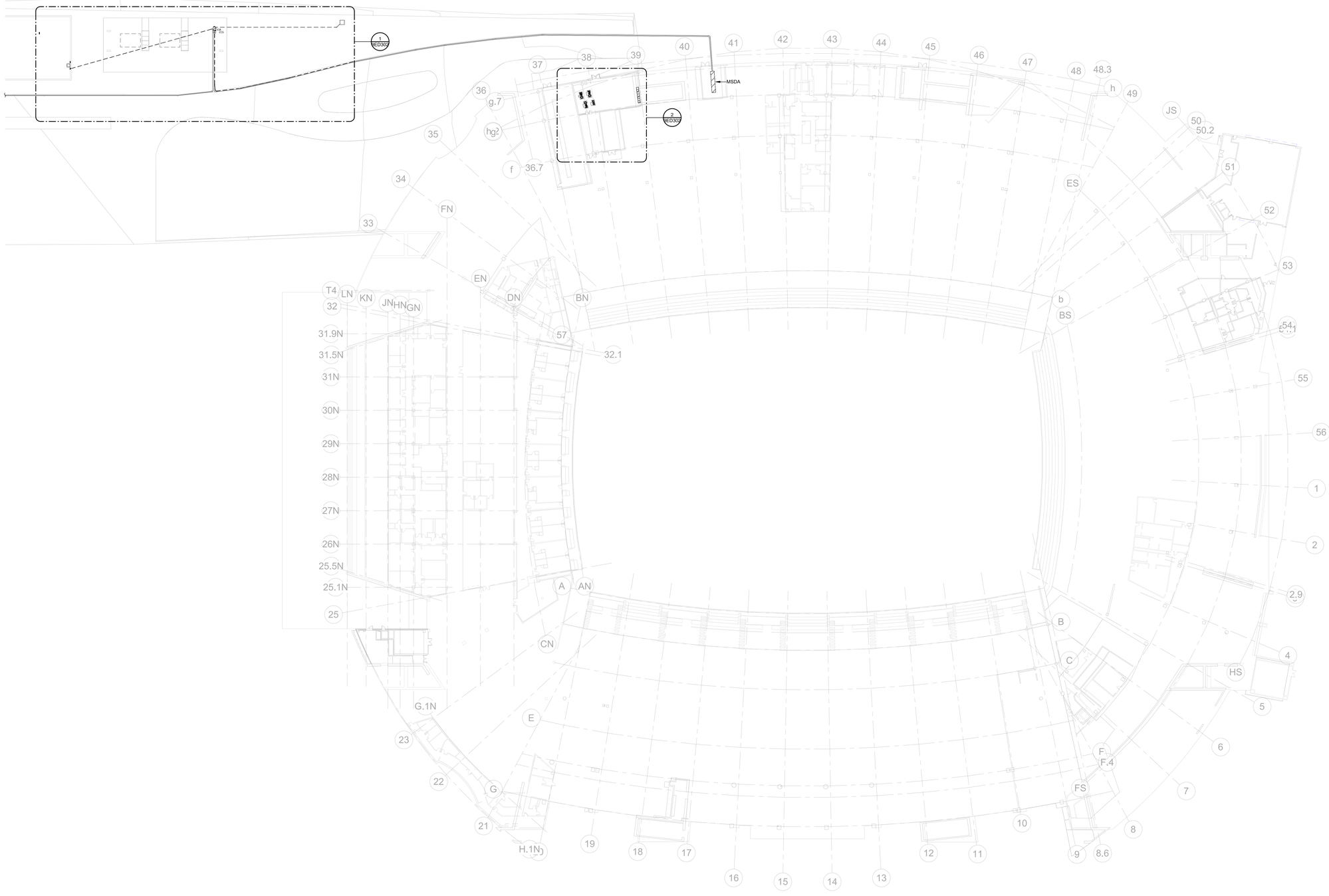
E000
sheet no.

BRETT J. MILES
12/3/2024 5:00:28 PM

ELECTRICAL GENERAL NOTES:

1. REFER TO SHEET E000 FOR ADDITIONAL GENERAL NOTES.
2. NOTIFY ARCHITECT AND ENGINEER OF ANY DISCREPANCIES OF EXISTING CIRCUITRY OR DISCONNECT SIZES INDICATED.

☐ **ELECTRICAL PLAN NOTES:**



1 ELECTRICAL DEMOLITION SITE PLAN
1/32" = 1'-0"

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No.	Rev.	Date

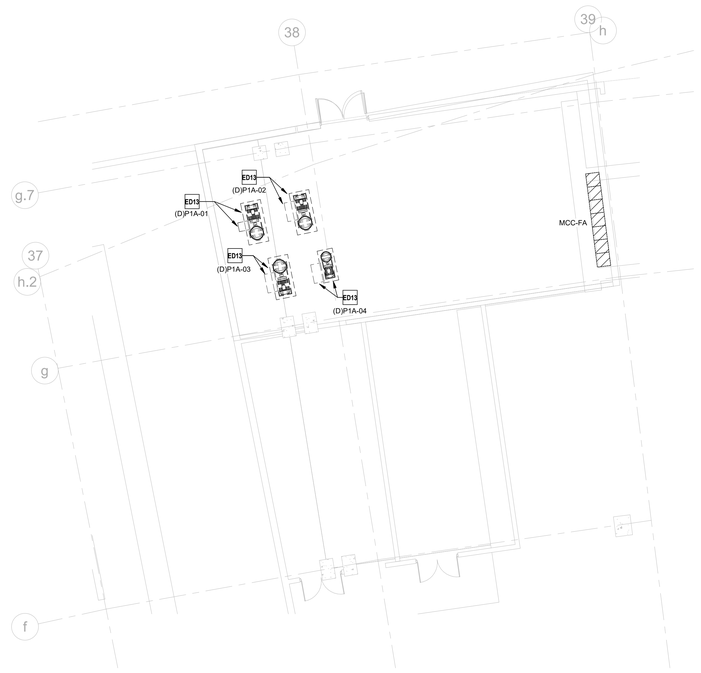
12/03/2024
ISSUE FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

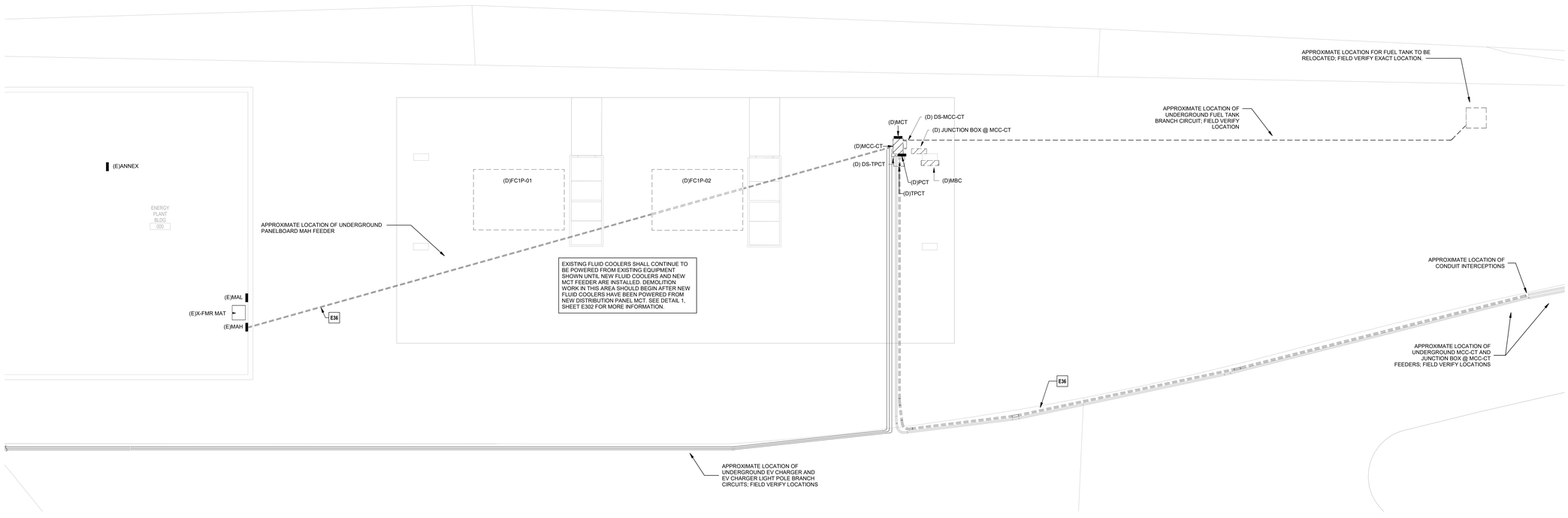
Title
ELECTRICAL DEMOLITION SITE PLAN

ED021
sheet no.

BRETT J. MILES
12/3/2024 5:01:17 PM



2 ELECTRICAL ENLARGED DEMOLITION PLAN - PUMP ROOM
1/8" = 1'-0"



1 ELECTRICAL ENLARGED DEMOLITION SITE PLAN - FLUID COOLER YARD
1/8" = 1'-0"

ELECTRICAL GENERAL NOTES:

1. REFER TO SHEET E000 FOR ADDITIONAL GENERAL NOTES.
2. NOTIFY ARCHITECT AND ENGINEER OF ANY DISCREPANCIES OF EXISTING CIRCUITRY OR DISCONNECT SIZES INDICATED.

ELECTRICAL PLAN NOTES:

E36 REMOVE WIRES AND ABANDON UNDERGROUND CONDUITS AFTER NEW EQUIPMENT HAS BEEN POWERED.

ED13 EXISTING EQUIPMENT TO BE REPLACED. REMOVE EXISTING WIRING DEVICES, EXPOSED RACEWAY, CIRCUITRY AND RELATED ACCESSORIES NOT BEING REUSED BACK TO SOURCE. PANELBOARD OR NEAREST REMAINING DEVICE AND UPDATE CIRCUIT DIRECTORY ACCORDINGLY. MAINTAIN EXISTING ELECTRICAL INSTALLATIONS THAT ARE USED FOR TEMPORARY PURPOSES. REFER TO DETAIL 2, SHEET E302 AND SHEET E800 FOR NEW ELECTRICAL EQUIPMENT INFORMATION.

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ELECTRICAL ENLARGED DEMOLITION PLANS

ED302
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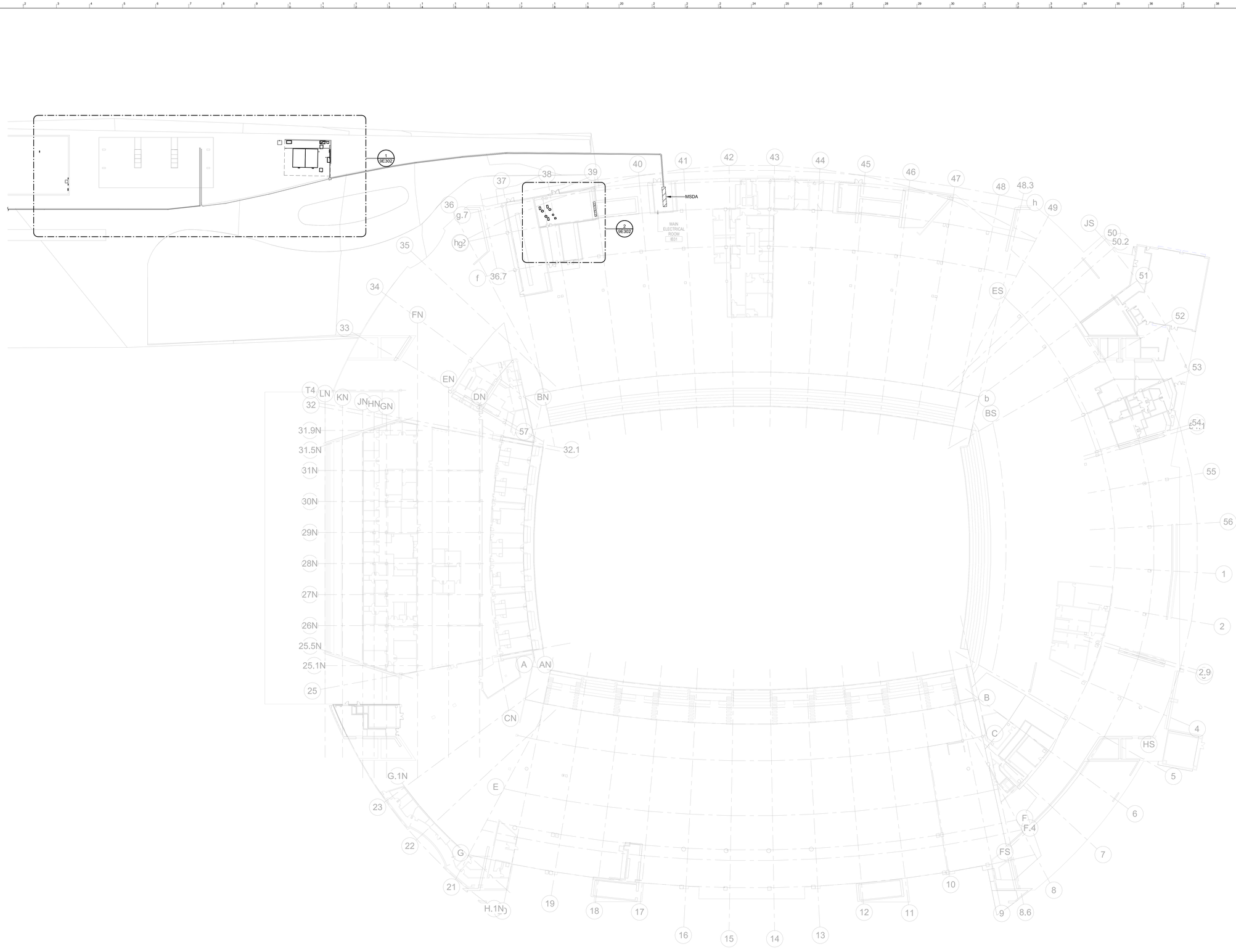

1 ELECTRICAL SITE PLAN
1/32" = 1'-0"

ELECTRICAL GENERAL NOTES:

1. REFER TO SHEET E000 FOR ADDITIONAL GENERAL NOTES.
2. NOTIFY ARCHITECT AND ENGINEER OF ANY DISCREPANCIES OF EXISTING CIRCUITRY OR DISCONNECT SIZES INDICATED.

☐ **ELECTRICAL PLAN NOTES:**

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ELECTRICAL SITE PLAN

E021
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2 ELECTRICAL ENLARGED PLAN - PUMP ROOM
1/8" = 1'-0"

1 ELECTRICAL ENLARGED SITE PLAN - FLUID COOLER YARD
1/8" = 1'-0"

ELECTRICAL GENERAL NOTES:

1. REFER TO SHEET E000 FOR ADDITIONAL GENERAL NOTES.
2. NOTIFY ARCHITECT AND ENGINEER OF ANY DISCREPANCIES OF EXISTING CIRCUITRY OR DISCONNECT SIZES INDICATED.

ELECTRICAL PLAN NOTES:

EC1 PROVIDE WALL PACK FOR PATHWAY LIGHTING AROUND FLUID COOLERS. COORDINATE LOCATIONS WITH FLUID COOLER EQUIPMENT AND PIPING TO PROVIDE AN AVERAGE OF 1 FOOTCANDLE ON GROUND AROUND FLUID COOLERS.

EC2 REFER TO ONE-LINE DIAGRAM FOR FEEDER AND CIRCUITRY INFORMATION.

EC3 PROVIDE (1) 2" SPARE CONDUIT WITH PULLSTRING UNDERGROUND FROM MCT FOR FUTURE PREFAB BUILDING. STUB UP AND CAP BY NORTH WALL OF FLUID COOLER ENCLOSURE.

EC4 CAP EXISTING BRANCH CIRCUIT FOR FUTURE USE.

EC5 CAP EXISTING FEEDER AT PANELBOARD FOR FUTURE USE.

EC7 PROVIDE PULLBOX FLUSH WITH GRADE FOR INTERCEPTION OF EXISTING 5" CONDUITS. INTERCEPT AND EXTEND ONE 5" CONDUIT UNDERGROUND FROM PULL BOX TO PANELBOARD MCT. OVERSIZED BOX TO ALLOW ADEQUATE SPACE FOR FUTURE CONDUIT ROUTING THRU PUILL BOX. COORDINATE PULL BOX WITH EXISTING UTILITIES.

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ELECTRICAL ENLARGED PLANS

E302
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LIGHT FIXTURE SCHEDULE

TYPE	MANUFACTURER	SERIES / MODEL	APPROVED ALTERNATES	SOURCE QTY	SOURCE TYPE	SOURCE CRI	SOURCE CCT	LUMENS	DIMMING TYPE	VOLTAGE	INPUT WATTS	INPUT VA	DESCRIPTION	NOTES
W1	LSI INDUSTRIES	XGBWM3 FT LED 28 350 NW UE GPT SPECIFY WITH MOTION SENSOR	-	1	LED	70	4000	2787	NON-DIM	UNV	34	36	LED WALL SCONCE WITH FORWARD THROW DISTRIBUTION AND FACTORY GRAPHITE FINISH. WET LOCATION LISTED. MOTION SENSOR. MOUNTED AT 8' AFG.	
W2	LSI INDUSTRIES	XGBWM3 WT LED 28 350 NW UE GPT SPECIFY WITH MOTION SENSOR	-	1	LED	70	4000	2792	NON-DIM	UNV	34	36	LED WALL SCONCE WITH WIDE THROW DISTRIBUTION AND FACTORY GRAPHITE FINISH. WET LOCATION LISTED. MOTION SENSOR. MOUNTED AT 8' AFG.	
W2E	LSI INDUSTRIES	XGBWM3 WT LED 28 350 NW UE GPT CWBB SPECIFY WITH MOTION SENSOR	-	1	LED	70	4000	2792	NON-DIM	UNV	34	36	SAME AS TYPE W2 EXCEPT WITH A 90 MINUTE EMERGENCY, COLD BATTERY/DRIVER WITH THE CAPABILITY OF PROVIDING AT LEAST 800 LUMENS AT THE INITIATION OF EMERGENCY MODE. UL 924 LISTED.	

GENERAL NOTES:

A. REFER TO LIGHT FIXTURE SCHEDULE GENERAL NOTES AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

NOTES:

1. NOT USED.

FAULT CURRENT GENERAL NOTE (UTILITY VALUE):

THE MAXIMUM AVAILABLE 3-PHASE SYMMETRICAL FAULT CURRENT VALUE AT THE UTILITY TRANSFORMER SECONDARY/POINT OF SERVICE IS 55,000A BASED ON PRELIMINARY INFORMATION PROVIDED BY THE UTILITY. CONTRACTOR SHALL VERIFY ACTUAL AVAILABLE FAULT CURRENT VALUE WITH UTILITY PRIOR TO BEGINNING CONSTRUCTION. NOTIFY ENGINEER IF ACTUAL VALUE EXCEEDS DESIGN VALUE.

LIGHT FIXTURE GENERAL NOTES:

1. ALL LIGHT FIXTURES AND RELATED COMPONENTS SHALL BE PROVIDED BY THE CONTRACTOR, UNLESS NOTED OTHERWISE.

LIGHT CONTROL SEQUENCE OF OPERATIONS:

A. GENERAL REQUIREMENTS
   a. Emergency Lighting: Emergency egress lighting is powered from emergency battery ballasts and drivers integral to fixtures designated as emergency. Upon loss of power, all lights designated as emergency shall turn on at full emergency battery back-up output.

B. EXTERIOR
   a. Motion Sensor: Integral motion sensor shall turn on light fixture when motion is detected. After no motion has been detected for 20 minutes, light fixture shall turn off.

PANELBOARD: PCT (NEW)
BUS AMPS: 100A
MAIN SIZE/TYPE: 100A MCB
VOLTS/PHASE: 208Y/120V, 3PH, 4W
SECTION: 1

FED FROM: TPCT
AIC RATING: CONTRACTOR TO VERIFY & NOTIFY EOR
MOUNTING: SURFACE, NEMA 3R
SERVES: FLUID COOLER YARD
LOCATION: FLUID COOLER YARD

LINE-SIDE LUGS: MECHANICAL
EQUIPMENT GROUND BUS

CKT NO.	DESCRIPTION	VOLTAMPS/PHASE A	VOLTAMPS/PHASE B	VOLTAMPS/PHASE C	WIRE NO.	BKR AMP	P	P	BKR AMP	WIRE NO.	VOLTAMPS/PHASE A	VOLTAMPS/PHASE B	VOLTAMPS/PHASE C	DESCRIPTION	CKT NO.
1	FLUID COOLER YARD RCPT	360			12	20	1	1	20					SPARE	2
3	BAS CONTROL PANEL		500		12	20	1	1	20					SPARE	4
5	SPARE					20	1	2	20	12			800	FUEL PUMPS	6
7	FLUID COOLER LTG	108			12	20	1				800				8
9	SPARE					20	1	1	20					SPARE	10
11	HEAT TRACE CONTROL PANEL HTCP-1 MAKEUP WATER			269	10	30	2	1	20					SPARE	12
13	HTCP-1 MAKEUP WATER	269						1	20					SPARE	14
15	HEAT TRACE CONTROL PANEL HTCP-2 CONDENSER WATER		1,454		10	30	2	1	20					SPARE	16
17	HTCP-2 CONDENSER WATER			1,454				1	20					SPARE	18
19	SPARE				20	1	1	20						SPARE	20
21	SPARE				20	1	1	20						SPARE	22
23	SPARE				20	1	1	20						SPARE	24
SUBTOTAL		737	1,954	1,722							800		800	SUBTOTAL	

TOTAL PHASE A - VA	1,537	LOAD	CONN. VA	DF	LOAD	CONN. VA	DF	
AMPS	13	COOLING [C]		0	REFRIG [F]		1.00	
TOTAL PHASE B - VA	1,954	HEATING [H]	3,444	1.00	SIGNAGE [S]		1.25	
AMPS	16	LIGHTING [L]	108	1.25	KITCHEN [K]		1.00	
TOTAL PHASE C - VA	2,522	RECEPTACLES [R]	360	1.0/.5	EXISTING [E]		1.00	
AMPS	21	MOTORS [M]		1.00	LRG MOTOR		1.25	TOTAL DEMAND
TOTAL PNLBD - VA	6,012	SUPP HEAT [U]		1.00	SHOW WND(W)		1.25	6,039 VA
AMPS	17	MISC EQUIP [Z]	2,100	1.00	LTG TRACK		1.00	17 A

PANELBOARD NOTES

PANELBOARD LEGEND

ABBREVIATIONS

AF	ARC FAULT CIRCUIT INTERRUPTER.
C#	CIRCUIT VIA CONTACTOR #.
CL	CIRCUIT VIA CURRENT LIMITING DEVICE.
D	DISCONNECT CIRCUITRY FOR REMOVED LOAD, UPDATE CIRCUIT DIRECTORY TO SPARE AND TURN OFF.
EM	EMERGENCY LIGHTING HANDLE-ON CLAMP.
EX	EXISTING.
F	FUTURE LOAD; NOTE AS SPARE AND TURN OFF.
FA	RED/HANDLE-ON CLAMP.
GF	GROUND-FAULT CIRCUIT INTERRUPTER TYPE CIRCUIT BREAKER (5 mA).
GFEP	GROUND FAULT EQUIPMENT PROTECTION BREAKER (30 mA).
HT	PROVIDE HANDLE-TIE FOR MULTI-WIRE BRANCH CIRCUIT PER CODE.
IG	ISOLATED GROUND CIRCUIT.
INT	INTERCEPT AND EXTEND CONDUIT AND WIRING TO NEW PANELBOARD LOCATION.
L#	LIGHTING CONTROL SCHEME NUMBER.
LCK	HANDLE PADLOCKABLE-OFF DEVICE.
LO	HANDLE-ON CLAMP.
N	PROVIDE NEW CIRCUIT BREAKER.
OL	REFER TO ELECTRICAL ONE-LINE/RISER DIAGRAM.
PS	POWER-SWITCHING CIRCUIT BREAKER.
PSE	EMERGENCY POWER-SWITCHING CIRCUIT BREAKER.
R	REUSE EXISTING CIRCUIT BREAKER FOR NEW/REVISED LOAD.
RP	CIRCUIT VIA RELAY PANEL.
ST	SHUNT TRIP CIRCUIT BREAKER.
V	VERIFY EXISTING LOAD AND UPDATE DIRECTORY, IF UNUSED, NOTE AS SPARE AND TURN OFF.
VD	BRANCH CIRCUITRY HAS BEEN UPSIZED TO REDUCE VOLTAGE DROP. ADJUST GROUND WIRE SIZE PER CODE. PROVIDE LUG ADAPTORS IF REQUIRED.
Z	CORRECT/REPAIR EXISTING HAZARD TO MAKE CODE COMPLIANT INSTALLATION.

NOT ALL ABBREVIATIONS ARE USED.

Short-Circuit and Voltage Drop Calculations

Version 2.10

Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance

The following calculations are based on the "Point-by-Point" method where:

ISC (2) = ISC(1) x M(1) — M= 1/(1+f)

ISC (1) = short circuit current at fault point 1

ISC (2) = short circuit current at fault point 2

Feeder: f (3Ø) = 1.732 x L x Isc / C x E — XFMR: f (3Ø) = IPsca/a Vp x 1.73 x %Z / 100,000 x KVA — IS(sca)= Vp x M x IP(sca) / Vs

Feeder: f (1Ø)= 2 x L x Isc / C x E — XFMR: f (1Ø)= IPsca/a Vp x %Z / 100,000 x KVA

VOLTAGE DROP (3Ø):
%VD = ((R x cos(arccos(pf)) + X x sin(arccos(pf))) x L/# x I x 1.73) / E

VOLTAGE DROP (1Ø):
%VD = ((R x cos(arccos(pf)) + X x sin(arccos(pf))) x 2 x L/# x I) / E

E = Line to line volts
IP = Primary short circuit current
Vp = Primary voltage
IS= Secondary short circuit current
Vs= Secondary voltage
L = Length of circuit
C = "C" Factor from Bussman table where "C" = 1 / impedance per linear foot

%VD CUM = Cumulative Voltage Drop from Fault Point 1 to Fault Point #
R = resistance in ohms per LF
X = reactances in ohms per LF

Feeder Types: NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer

System Voltage: 480Y/277V - 3 phase

Date of Calculations: 10/08/2024

Fault Point (F#)	Bus/Feeder Description	Source (Fault Point)	Phase	Source Isc (amps)	Feeder: Conduit Type/ TX	Feeder: Material	Feeder: Quantity of Parallel Sets and Bus/ Phase & Neutral Size	Conductor 'C' Value	Busway 'C' Value	L-L Voltage (E)	Circuit Length (L)	Load Power Factor (pf)	Circuit Load (Amperage)	Conductor: Resistance (R)	Conductor: Reactance (X)	Conductor: Arccos (pf) (Radians)	Transformer: Type	Transformer: Degree Rise	Transformer: kVA	Transformer: New Xfmr Z	Transformer: Existing Xfmr Z	Transformer: Secondary Voltage	Transformer: Tap Setting	f	M	Fault Current (amps)	Voltage Drop (%VD)	Cumulative Voltage Drop (%VD)	Fault Point (F#)
1	Utility Service Point			55,000 at the Service Entrance Switch																									1
	Motor Contribution			1,600 The connected full load motor amps (includes compressors) on the system																				Source Isc + 6X Motor Contribution =		64,600			
2	MCT	1	3	64,600	NM	AL	2 Set(s) of 500 kcmil	21391	--	480	401	0.9	320	0.000043	0.000039	0.451027								2.185	0.31	20,283	-1.29%	-1.29%	2
3	TPCT PRI	2	3	20,283	M	CU	1 Set(s) of 4 AWG	3806	--	480	.5	0.9	64	0.000310	0.000060	0.451027								0.096	0.91	18,504	-0.04%	-1.32%	3
4	TPCT SEC	3	3	18,504	TX	CU	1			480							DOE	150	30	2.44		208		12.512	0.07	3,160		-1.32%	4
5	PCT	4	3	3,160	M	CU	1 Set(s) of 3 AWG	4774	--	208	5	0.9	80	0.000250	0.000059	0.451027								0.028	0.97	3,076	-0.08%	-1.41%	5
6	FUEL TANK	5	1	3,076	M	CU	1 Set(s) of 12 AWG	617	--	208	61	0.8	16	0.002000	0.000068	0.643501								2.924	0.25	784	-1.54%	-2.95%	6
7	FC1P-02	2	3	20,283	M	CU	1 Set(s) of 1/0 AWG	8925	--	480	45	0.8	120	0.000120	0.000055	0.643501								0.369	0.73	14,816	-0.25%	-1.54%	7
8	FC1P-01	2	3	20,283	M	CU	1 Set(s) of 1/0 AWG	8925	--	480	57	0.8	120	0.000120	0.000055	0.643501								0.467	0.68	13,822	-0.32%	-1.61%	8
9	FC1P-02 FILTRATION PUMP	2	3	20,283	M	CU	1 Set(s) of 12 AWG	617	--	480	47	0.8	16	0.002000	0.000068	0.643501								5.575	0.15	3,085	-0.45%	-1.73%	9
10	FC1P-01 FILTRATION PUMP	2	3	20,283	M	CU	1 Set(s) of 12 AWG	617	--	480	56	0.8	16	0.002000	0.000068	0.643501								6.643	0.13	2,654	-0.53%	-1.82%	10
11	MCC-FA	1	3	64,600	M	AL	4 Set(s) of 350 kcmil	15484	--	480	92	0.9	800	0.000063	0.000050	0.451027								0.346	0.74	47,985	-0.52%	-0.52%	11
12	P1A-04	11	3	47,985	M	CU	1 Set(s) of 2/0 AWG	10755	--	480	58	0.8	140	0.000100	0.000054	0.643501								0.934	0.52	24,814	-0.33%	-0.85%	12
13	P1A-01	11	3	47,985	M	CU	2 Set(s) of 3/0 AWG	12844	--	480	63	0.8	320	0.000079	0.000052	0.643501								0.425	0.70	33,682	-0.34%	-0.86%	13
14	P1A-02	11	3	47,985	M	CU	2 Set(s) of 3/0 AWG	12844	--	480	56	0.8	320	0.000079	0.000052	0.643501								0.377	0.73	34,836	-0.31%	-0.83%	14
15	P1A-03	11	3	47,985	M	CU	2 3/0 AWG	12844	--	480	66	0.8	320	0.000079	0.000052	0.643501								0.445	0.69	33,210	-0.36%	-0.88%	15

Voltage Drop Calculations

Panel	Circuit	Description	Length	Voltage	Phase	Load (VA)	Wire Size	% VD	Panel VD %	Cumul. VD %
PCT	1	FLUID COOLER YARD RCPT	61	120	1	360	12	-0.56	-1.78	-2.34
PCT	3	BAS CONTROL PANEL	29	120	1	500	12	-0.37	-1.78	-2.15
PCT	6	FUEL PUMPS	61	208	1	1600	12	-0.83	-1.78	-2.61
PCT	11	HEAT TRACE CONTROL PANEL HTCP-1 MAKEUP WATER	21	208	1	538	10	-0.06	-1.78	-1.84
PCT	15	HEAT TRACE CONTROL PANEL HTCP-2 CONDENSER WATER	22	208	1	2907	10	-0.33	-1.78	-2.11

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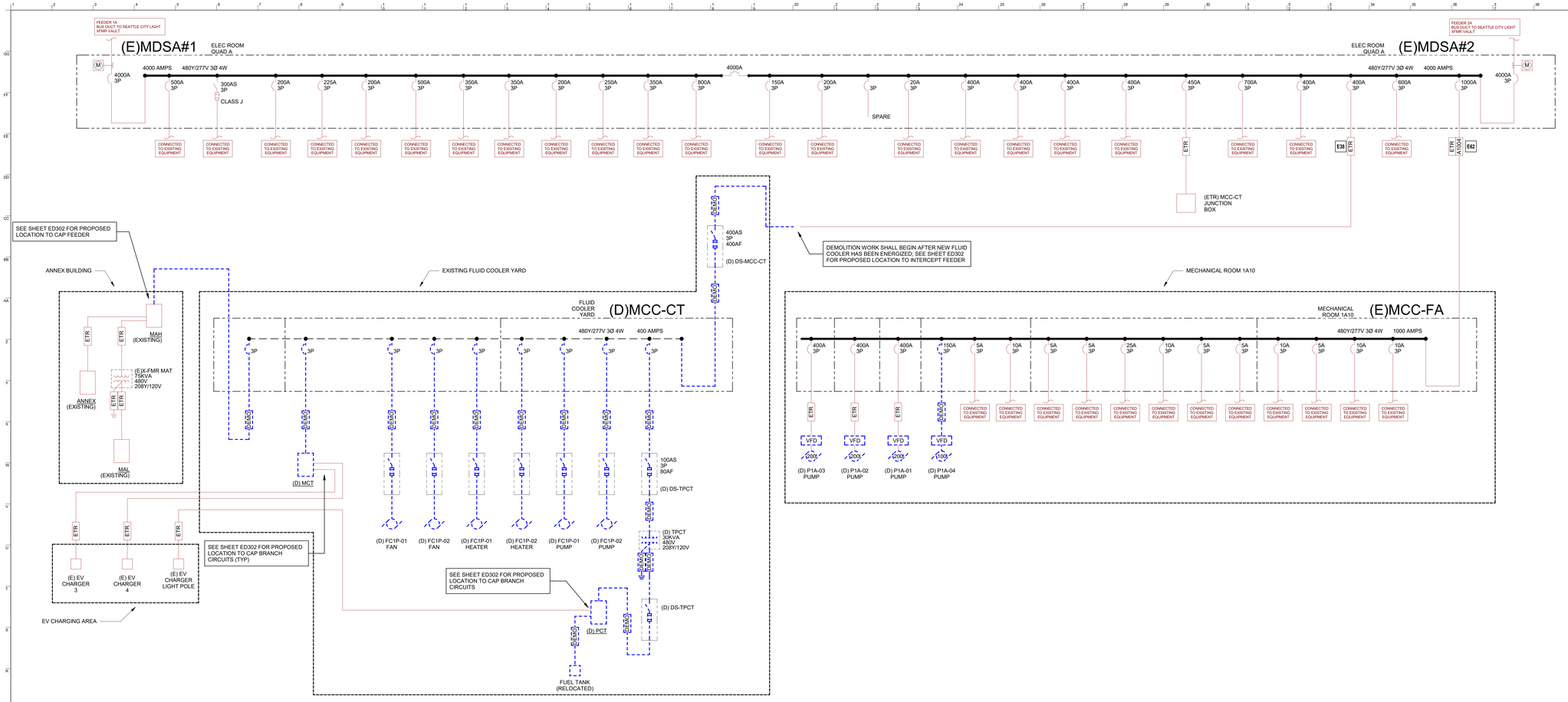
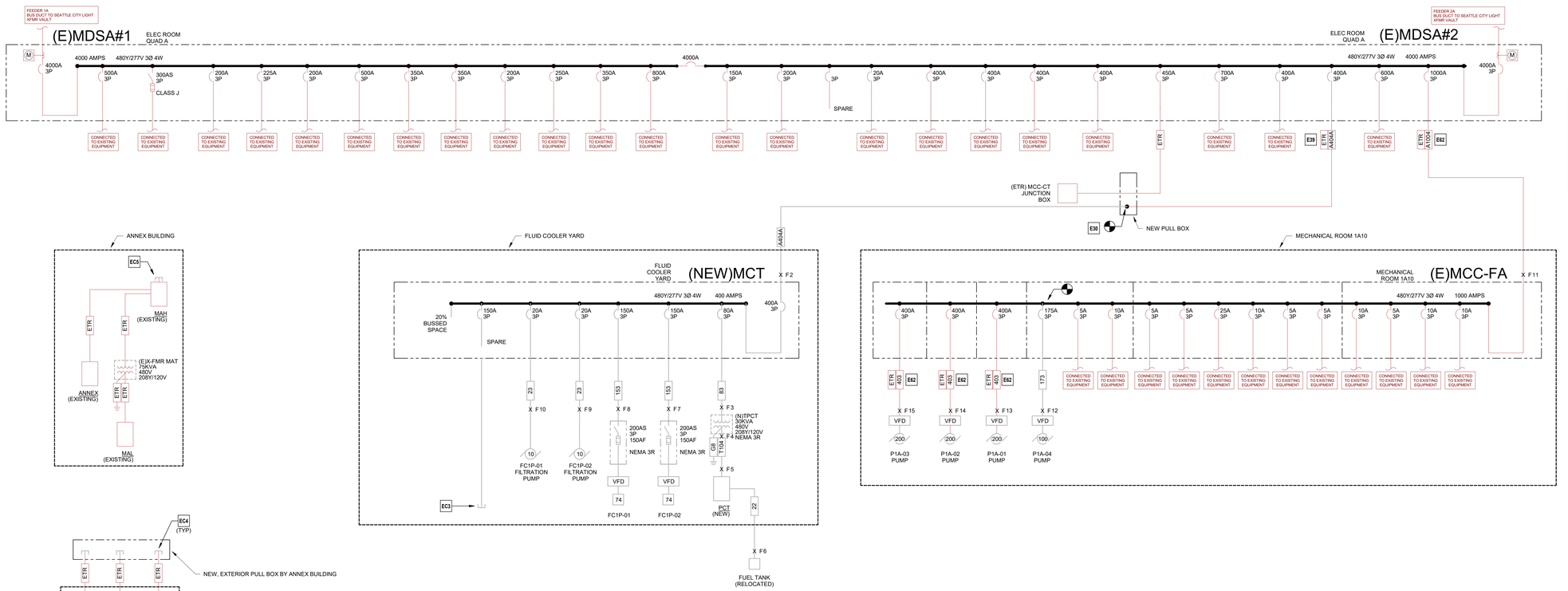


1 ELECTRICAL ONE-LINE DIAGRAM - DEMO
NTS



2 ELECTRICAL ONE-LINE DIAGRAM - NEW
NTS

ONE-LINE DIAGRAM GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AN ARC-FLASH STUDY FOR NEW PANELBOARDS AND TRANSFORMER. PROVIDE ALL NECESSARY AS-BUILT INFORMATION REQUIRED FOR COMPLETION OF THE STUDY TO THE ENGINEER DOING TO THE STUDY. PROVIDE SUBMITTALS INDICATED WITHIN THE SPECIFICATIONS TO OWNER AND ARCHITECT/ENGINEER TO CONFIRM STUDY HAS BEEN COMPLETED. ARC FLASH PROTECTION MARKING SHALL BE PROVIDED FOR ALL ELECTRICAL EQUIPMENT AS REQUIRED BY THE LATEST ADOPTED VERSION OF THE SEATTLE ELECTRICAL CODE. THE FLASH PROTECTION MARKING SHALL BE AN IDENTIFICATION PLATE OR LABEL MEETING APPLICABLE ANSI STANDARDS OR A TYPE APPROVED BY THE AHJ. THE LABEL MAY BE FIELD OR FACTORY INSTALLED AND SHALL INCLUDE ALL OF THE REQUIRED INFORMATION. CONTRACTOR SHALL INCLUDE THE COST FOR THIS WORK IN THEIR BID. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE AIC RATING OF ANY NEW OVER-CURRENT PROTECTION DEVICE (CIRCUIT BREAKER AND/OR FUSE) MEETS OR EXCEEDS THE EXISTING AIC RATING OF THE EXISTING SWITCHBOARD. NOTIFY THE OWNER AND THE ENGINEER IF THE EXISTING EQUIPMENT DOES NOT COMPLY WITH THIS REQUIREMENT.
3. ALL NEW CONDUIT SHALL BE ROUTED ABOVE GROUND UNLESS NOTED OTHERWISE.
4. PROVIDE A PERMANENT LABEL ON FRONT OF EQUIPMENT ENCLOSURE; REFER TO SPECIFICATIONS FOR LABEL REQUIREMENTS. LABEL SHALL READ AS FOLLOWS (INCLUDE RESPECTIVE NAMES IN BLANKS):

   SERVICE EQUIPMENT LABEL:

   EXAMPLE:
   208Y/120V, 60HZ
   800A
   SCCR = 65,000A
   MAX AVAILABLE FAULT CURRENT = 58,815A
   CALCULATED: 01/01/2018

   PANELBOARD/SWITCHBOARD LABEL:
   LINE 1: PANELBOARD " _____ " SUPPLIED BY UPSTREAM
   LINE 2: PANELBOARD/SWITCHBOARD " _____"
   LINE 3: LOCATED IN " _____ "
   LINE 4: PANELBOARD " _____ " SUPPLIES DOWNSTREAM
   LINE 5: PANELBOARD(S) " _____"

   TRANSFORMERS LABEL:
   LINE 1: TRANSFORMER " _____ " SUPPLIED BY UPSTREAM
   LINE 2: PANELBOARD/SWITCHBOARD " _____"
   LINE 3: LOCATED IN " _____ "
   LINE 4: TRANSFORMER " _____ " SUPPLIES DOWNSTREAM
   LINE 5: PANELBOARD(S) " _____"

ONE-LINE DIAGRAM SUPPLEMENTAL SPECIFICATIONS:

1. PROVIDE TYPED FINAL CIRCUIT DIRECTORY FOR ALL PANELBOARDS TO REFLECT ACTUAL AS-BUILT CONDITIONS. COORDINATE FINAL ROOM NAMES, NUMBERS AND DESCRIPTIONS WITH OWNER PRIOR TO COMPLETION. CIRCUIT DESCRIPTIONS SHALL BE PER CODE AND SHALL BE DISTINGUISHABLE FROM ALL OTHERS.

☐ ONE-LINE DIAGRAM NOTES:

E30 INTERCEPT EXISTING 5" CONDUIT IN NEW PULL BOX AND EXTEND UNDERGROUND TO NEW PANELBOARD MCT.
E38 EXISTING 5" CONDUIT. REMOVE WIRES IN CONDUIT.
E39 PROVIDE NEW WIRES IN EXISTING 5" CONDUIT. SEE FEEDER SCHEDULE ON THIS SHEET.
E62 EXISTING FEEDER IS BASED ON AS BUILT DRAWINGS. CONFIRM EXISTING FEEDER IS GREATER THAN OR EQUAL TO SIZE SHOWN. REPORT ANY DISCREPANCIES TO ENGINEER.
EC3 PROVIDE (1) 2" SPARE CONDUIT WITH PULLSTRING UNDERGROUND FROM MCT FOR FUTURE PREFAB BUILDING. STUB UP AND CAP BY NORTH WALL OF FLUID COOLER ENCLOSURE.
EC4 CAP EXISTING BRANCH CIRCUIT FOR FUTURE USE.
EC5 CAP EXISTING FEEDER AT PANELBOARD FOR FUTURE USE.

FEEDER SCHEDULE:

SIZES ARE BASED ON COPPER (CU) THHN/THWN-2 INSULATION, UNO. NUMBER DESIGNATIONS PRECEDED BY "A" INDICATE THAT THE SIZE IS BASED ON ALUMINUM (AL) WIRE. AL CONDUCTOR SIZES ARE BASED ON XHHW-2 INSULATION, UNO. ALL CONDUCTOR SIZES ARE BASED ON 75 DEG C RATED TERMINATIONS, UNO. CONDUIT SIZES SHOWN ARE APPROPRIATE FOR SCHEDULE 40 PVC, EMT, GRS, IMC AND RMC; ADJUST SIZE AS NEEDED FOR OTHER RACEWAY TYPES. FOR ANY OTHER CONDITIONS MODIFY SIZES PER CODE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

FEEDER TAG	FEEDER DESCRIPTION
22	(2)#12, (1)#12 G, 1/2" C
23	(3)#12, (1)#12 G, 1/2" C
83	(3)#4, (1)#8 G, 1" C
153	(3)#1/0, (1)#6 G, 1-1/2" C
173	(3)#2/0, (1)#6 G, 1-1/2" C
403	(2) 2" C, EACH W/ (3)#3/0, (1)#3 G
A404A	(8)-500 kcmil, (1)#1 G, (1) 5" C
A1004	(4) 3" C, EACH W/ (4)-350 kcmil, (1)#4/0 G
DEMO	DEMOLISH
ETR	EXISTING TO REMAIN
G8	#8 COPPER GROUND, 3/4" C
T104	(4)#3, (1)#8 SSBJ, 1-1/4" C

MDSA #1 PEAK METER READINGS
PHASE A: 982.4A @ 480V, 3-PHASE (7/12/2024)
PHASE B: 895.8A @ 480V, 3-PHASE (7/12/2024)
PHASE C: 877.8A @ 480V, 3-PHASE (7/12/2024)

MDSA #2 PEAK METER READINGS
PHASE A: 863.8A @ 480V, 3-PHASE (7/12/2024)
PHASE B: 814.2A @ 480V, 3-PHASE (7/12/2024)
PHASE C: 832.7A @ 480V, 3-PHASE (7/12/2024)

EXISTING MCC-CT DEMAND LOAD TO BE REMOVED: 199,239 VA (240A @ 480V,3-PHASE)
MCT DEMAND LOAD TO REPLACE EXISTING: 211,224 VA (254A @ 480V,3-PHASE)
TOTAL LOAD ADDED TO MDSA: 11,985 VA (14A @ 480V,3-PHASE)

MCC-FA LOADS TO BE REMOVED MATCHES LOADS TO REPLACE EXISTING

PNLBD MCT LOADSUM — 480Y/277V, 3PH

LOAD DESCRIPTION	Connected KVA	Demand FACTOR	Demand KVA
HVAC - SUMMER	0.00	0%	0.00
HVAC - WINTER	39.44	100%	39.44
RECEPTACLES	0.36	100%,50%	0.36
MOTOR LOADS	102.43	100%	102.43
LARGEST MOTOR LOAD (50HP)	54.04	125%	67.55
MISCELLANEOUS EQUIPMENT	2.10	100%	2.10
EXTERIOR LIGHTING	0.11	125%	0.14
TOTAL LOAD	198.49	KVA	212.02
TOTAL AMPACITY	238.74	AMPS	255.03
OVERCURRENT DEVICE AMPACITY	400	AMPS	400.00
SPARE CAPACITY		AMPS	145

MOTOR CONTROL CENTER MCC-FA LOADSUM — 480Y/277V, 3PH

LOAD DESCRIPTION	Connected KVA	Demand FACTOR	Demand KVA
EXISTING DESIGN CONNECTED LOAD	41.40	100%	41.40
MOTOR LOADS	502.16	100%	502.16
LARGEST MOTOR LOAD (200HP)	199.53	125%	249.42
TOTAL LOAD	743.09	KVA	792.97
TOTAL AMPACITY	893.80	AMPS	953.80
OVERCURRENT DEVICE AMPACITY	1000	AMPS	1000.00
SPARE CAPACITY		AMPS	46

MCC-FA LOADSUM

EXISTING LOAD TO BE REMOVED: 701,688 VA (845A @ 480V,3-PHASE)

LOAD TO REPLACE EXISTING: 701,688 VA (845A @ 480V,3-PHASE)

LUMEN FIELD

CLIENT
First & Goal Inc.
800 Occidental Ave S
Seattle, WA 98134
tel: 206-381-7555

CRAWFORD
ARCHITECT
Crawford Architects CA, Inc.
1801 McGee Street, Suite 200
Kansas City, MO 64108
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2230005474
WA. CORPORATE NO: 1754
EXPIRES 6/30/2025

LUMEN FIELD
FLUID COOLER REPLACEMENT
800 Occidental Avenue South, Seattle, WA 98134

SEAL:
BRETT J. MILES
STATE OF WASHINGTON
21922
REGISTERED PROFESSIONAL ENGINEER
12/03/2024

No.	Rev.	Date

12/03/2024
ISSUE FOR PERMIT

FGI PROJECT #: 21NMR005
CA PROJECT #: 40023

Title
ELECTRICAL ONE-LINE DIAGRAMS

E800
sheet no.

BRETT J MILES
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