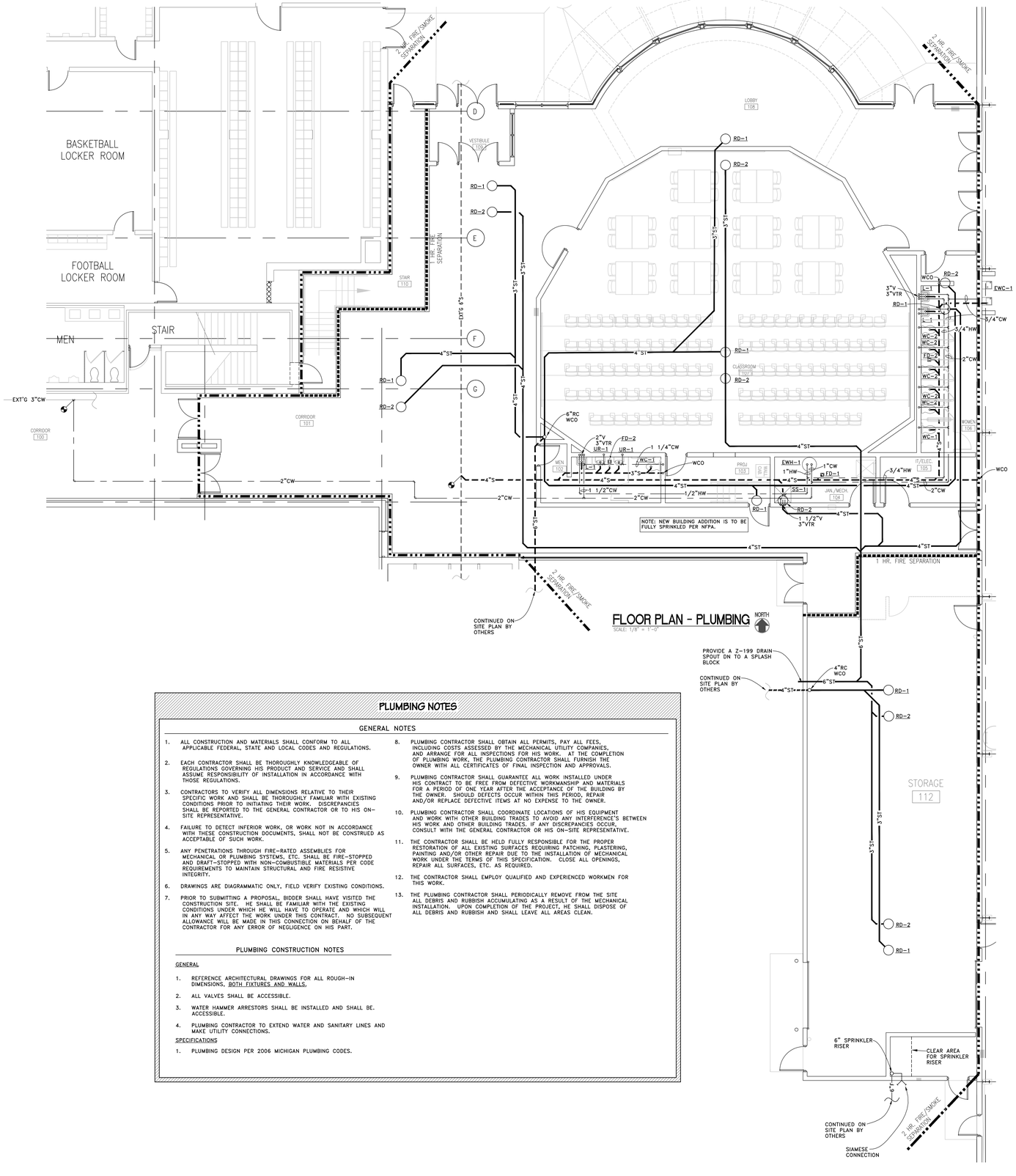


FLOOR PLAN - PLUMBING

SCALE: 1/8" = 1'-0"

NORTH

PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE	MANU.	MODEL	SAN.	HOT	COLD	REMARKS
WC-1	WATER CLOSET	AM. STD.	3461.128	3"	–	1 1/4"	W/ ZURN Z-6001AV-WS1 FLUSH VALVE, W/ OLSONITE #95 SEAT, 17" HIGH
WC-2	WATER CLOSET	AM. STD.	3451.128	3"	–	1 1/4"	W/ ZURN Z-6001AV-WS1 FLUSH VALVE, W/ OLSONITE #95 SEAT, 14" HIGH
UR-1	URINAL	AM. STD.	6501.010	3"	–	3/4"	W/ ZURN Z-6003 FLUSH VALVE
L-1	LAVATORY	AM. STD.	0355.012	1 1/2"	1/2"	1/2"	W/ AM. STD. 1480.115 FAUCET, SEE NOTE #4 & #5
SS-1	SERVICE SINK	FLORESTONE	MR-2424	1 1/2"	1/2"	1/2"	W/ MR-37D, MR-371, & MR-372
EWC-1	ELECTRIC WATER COOLER	ELKAY	EZSTL8LC	1 1/2"	–	1/2"	DUAL HEIGHT, ONE AT ADA THE OTHER AT STANDARD
HB-1	HOSEBIB	WOODFORD	65	–	–	3/4"	FREEZLESS W/ VACUUM BREAKER
FD-1	FLOOD DRAIN	ZURN	ZN-415-5B	3"S	–	–	W/ TYPE 'B' ROUND STRAINER, NICKEL BRONZE TOP, SEE NOTE #6
FD-2	FLOOD DRAIN	ZURN	ZN-415-5S	3"S	–	–	W/ TYPE 'S' SQUARE STRAINER, NICKEL BRONZE TOP, SEE NOTE #6
RD-1	ROOF DRAIN	ZURN	Z103-45-C-MS	4"ST	–	–	COMBINATION DRAIN AND OVER FLOW DRAIN
EWH-1	ELECTRIC WATER HEAATER	AO SMITH	EJC-10	–	3/4"	3/4"	10 GAL., 208V-1ø, 6.0KW

NOTES:

1. SEE ARCHITECTURAL DRAWINGS FOR ALL ROUGH-IN LOCATIONS OF PLUMBING FIXTURES.
2. WC-1 TO CONFORM TO ADA REQUIREMENTS.
3. VERIFY COLOR WITH ARCHITECT BEFORE ORDERING.
4. INSULATE ALL EXPOSED SANITARY AND DOMESTIC HOT AND COLD WATER PIPING TO LAVATORIES.
5. PROVIDE A POWERS 480 MIXING VALVE AT EACH LAV.
6. PROVIDE A 1/2" TRAP PRIMER TO FLOOR DRAIN FROM NEAREST SINK DRAIN.

PLUMBING LEGEND

- S — SANITARY SEWER
- V — SANITARY VENT
- CW — COLD WATER LINE
- HW — HOT WATER LINE
- BALL VALVE
- CONNECT NEW TO EXT'G

PLUMBING NOTES

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES AND REGULATIONS.
2. EACH CONTRACTOR SHALL BE THOROUGHLY KNOWLEDGEABLE OF REGULATIONS GOVERNING HIS PRODUCT AND SERVICE AND SHALL ASSUME RESPONSIBILITY OF INSTALLATION IN ACCORDANCE WITH THOSE REGULATIONS.
3. CONTRACTORS TO VERIFY ALL DIMENSIONS RELATIVE TO THEIR SPECIFIC WORK AND SHALL BE THOROUGHLY FAMILIAR WITH EXISTING CONDITIONS PRIOR TO INITIATING THEIR WORK. DISCREPANCIES SHALL BE REPORTED TO THE GENERAL CONTRACTOR OR TO HIS ON-SITE REPRESENTATIVE.
4. FAILURE TO DETECT INFERIOR WORK, OR WORK NOT IN ACCORDANCE WITH THESE CONSTRUCTION DOCUMENTS, SHALL NOT BE CONSTRUED AS ACCEPTABLE OF SUCH WORK.
5. ANY PENETRATIONS THROUGH FIRE-RATED ASSEMBLIES FOR MECHANICAL OR PLUMBING SYSTEMS, ETC. SHALL BE FIRE-STOPPED AND DRAFT-STOPPED WITH NON-COMBUSTIBLE MATERIALS PER CODE REQUIREMENTS TO MAINTAIN STRUCTURAL AND FIRE RESISTIVE INTEGRITY.
6. DRAWINGS ARE DIAGRAMMATIC ONLY, FIELD VERIFY EXISTING CONDITIONS.
7. PRIOR TO SUBMITTING A PROPOSAL, BIDDER SHALL HAVE VISITED THE CONSTRUCTION SITE. HE SHALL BE FAMILIAR WITH THE EXISTING CONDITIONS UNDER WHICH HE WILL HAVE TO OPERATE AND WHICH WILL IN ANY WAY AFFECT THE WORK UNDER THIS CONTRACT. NO SUBSEQUENT ALLOWANCE WILL BE MADE IN THIS CONNECTION ON BEHALF OF THE CONTRACTOR FOR ANY ERROR OF NEGLIGENCE ON HIS PART.
8. PLUMBING CONTRACTOR SHALL OBTAIN ALL PERMITS, PAY ALL FEES, INCLUDING COSTS ASSESSED BY THE MECHANICAL UTILITY COMPANIES, AND ARRANGE FOR ALL INSPECTIONS FOR HIS WORK. AT THE COMPLETION OF PLUMBING WORK, THE PLUMBING CONTRACTOR SHALL FURNISH THE OWNER WITH ALL CERTIFICATES OF FINAL INSPECTION AND APPROVALS.
9. PLUMBING CONTRACTOR SHALL GUARANTEE ALL WORK INSTALLED UNDER HIS CONTRACT TO BE FREE FROM DEFECTIVE WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR AFTER THE ACCEPTANCE OF THE BUILDING BY THE OWNER. SHOULD DEFECTS OCCUR WITHIN THIS PERIOD, REPAIR AND/OR REPLACE DEFECTIVE ITEMS AT NO EXPENSE TO THE OWNER.
10. PLUMBING CONTRACTOR SHALL COORDINATE LOCATIONS OF HIS EQUIPMENT AND WORK WITH OTHER BUILDING TRADES TO AVOID ANY INTERFERENCE'S BETWEEN HIS WORK AND OTHER BUILDING TRADES. IF ANY DISCREPANCIES OCCUR, CONSULT WITH THE GENERAL CONTRACTOR OR HIS ON-SITE REPRESENTATIVE.
11. THE CONTRACTOR SHALL BE HELD FULLY RESPONSIBLE FOR THE PROPER RESTORATION OF ALL EXISTING SURFACES REQUIRING PATCHING, PLASTERING, PAINTING AND/OR OTHER REPAIR DUE TO THE INSTALLATION OF MECHANICAL WORK UNDER THE TERMS OF THIS SPECIFICATION. CLOSE ALL OPENINGS, REPAIR ALL SURFACES, ETC. AS REQUIRED.
12. THE CONTRACTOR SHALL EMPLOY QUALIFIED AND EXPERIENCED WORKMEN FOR THIS WORK.
13. THE PLUMBING CONTRACTOR SHALL PERIODICALLY REMOVE FROM THE SITE ALL DEBRIS AND RUBBISH ACCUMULATING AS A RESULT OF THE MECHANICAL INSTALLATION. UPON COMPLETION OF THE PROJECT, HE SHALL DISPOSE OF ALL DEBRIS AND RUBBISH AND SHALL LEAVE ALL AREAS CLEAN.

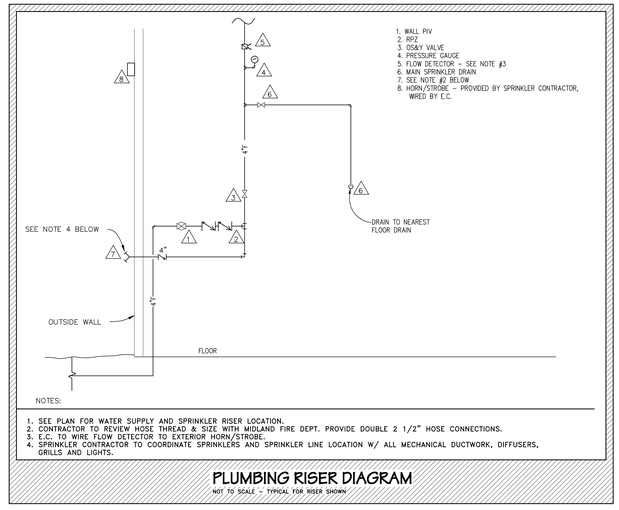
PLUMBING CONSTRUCTION NOTES

GENERAL

1. REFERENCE ARCHITECTURAL DRAWINGS FOR ALL ROUGH-IN DIMENSIONS, BOTH FIXTURES AND WALLS.
2. ALL VALVES SHALL BE ACCESSIBLE.
3. WATER HAMMER ARRESTORS SHALL BE INSTALLED AND SHALL BE ACCESSIBLE.
4. PLUMBING CONTRACTOR TO EXTEND WATER AND SANITARY LINES AND MAKE UTILITY CONNECTIONS.

SPECIFICATIONS

1. PLUMBING DESIGN PER 2006 MICHIGAN PLUMBING CODES.



NOTES:

1. SEE PLAN FOR WATER SUPPLY AND SPRINKLER RISER LOCATION.
2. CONTRACTOR TO REVIEW HOSE THREAD & SIZE WITH MIDLAND FIRE DEPT. PROVIDE DOUBLE 2 1/2" HOSE CONNECTIONS.
3. E.C. TO WIRE FLOW DETECTOR TO EXTERIOR HORN/STROBE.
4. SPRINKLER CONTRACTOR TO COORDINATE SPRINKLERS AND SPRINKLER LINE LOCATION W/ ALL MECHANICAL DUCTWORK, DIFFUSERS, GRILLS AND LIGHTS.

PLUMBING RISER DIAGRAM

NOT TO SCALE - TYPICAL FOR RISER SHOWN

2012 PROJECT FOR:

NORTHWOOD UNIVERSITY - AUDITORIUM AND TURF BUILDING

MIDLAND, MICHIGAN

JOB NUMBER
E 09-237

Apollo Engineering LLC
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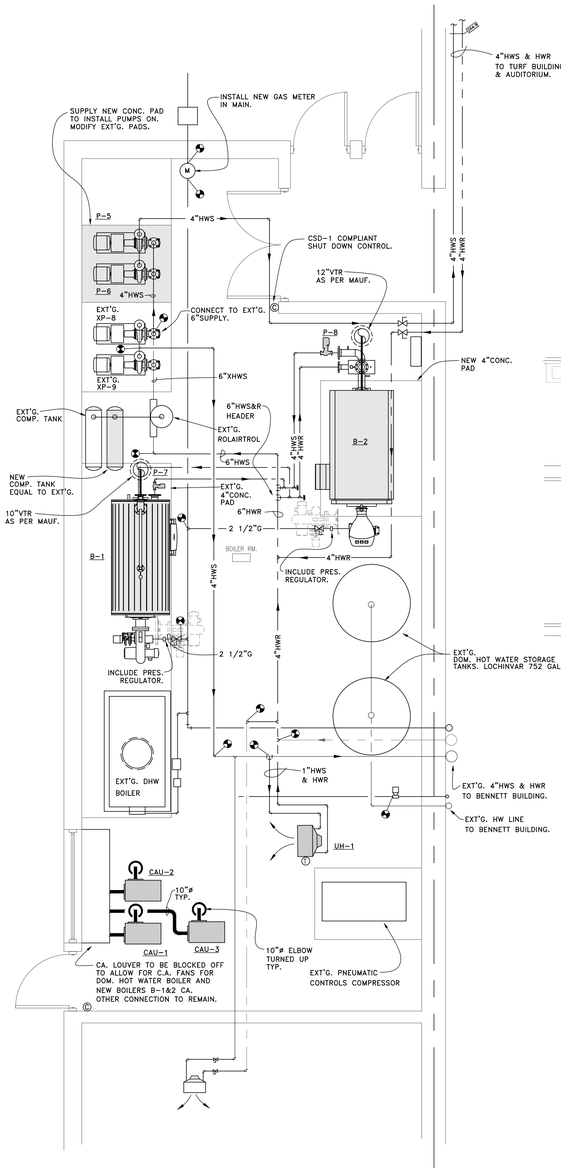
(231) 932-0800 office

PROJECT # 1101-01

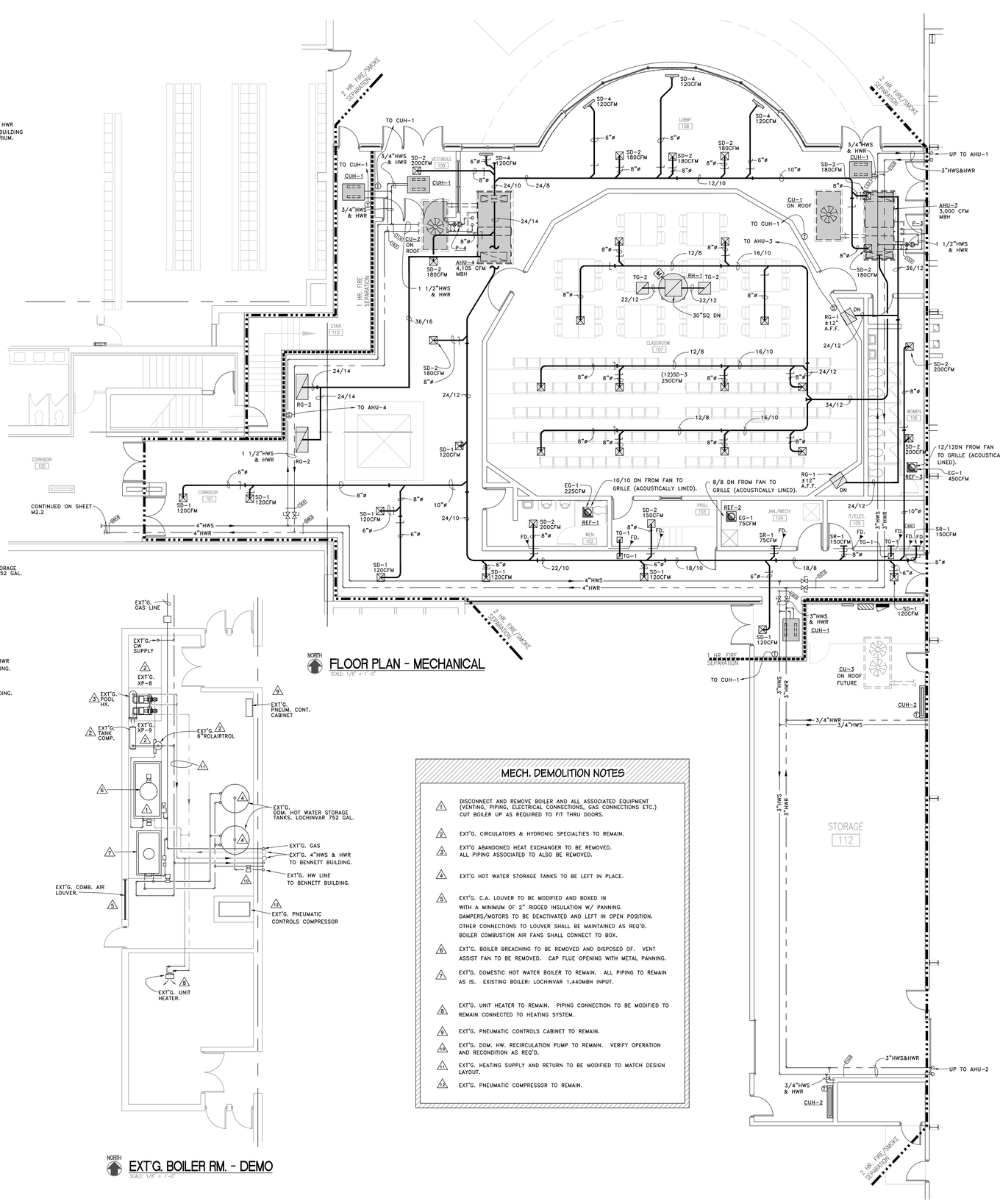
DRAWING
P1.1



NORTH

EXT'G. BOILER RM. - MECHANICAL

SCALE: 1/4" = 1'-0"



NORTH

FLOOR PLAN - MECHANICAL

SCALE: 1/8" = 1'-0"

NORTH

EXT'G. BOILER RM. - DEMO

SCALE: 1/8" = 1'-0"

MECH. DEMOLITION NOTES

1. DISCONNECT AND REMOVE BOILER AND ALL ASSOCIATED EQUIPMENT (VENTING, PIPING, ELECTRICAL CONNECTIONS, GAS CONNECTIONS ETC.) CUT BOILER UP AS REQUIRED TO FIT THRU DOORS.
2. EXT'G. CIRCULATORS & HYDRONIC SPECIALTIES TO REMAIN.
3. EXT'G ABANDONED HEAT EXCHANGER TO BE REMOVED. ALL PIPING ASSOCIATED TO ALSO BE REMOVED.
4. EXT'G HOT WATER STORAGE TANKS TO BE LEFT IN PLACE.
5. EXT'G. C.A. LOUVER TO BE MODIFIED AND BOXED IN WITH A MINIMUM OF 2" RIDGED INSULATION W/ PANNING. DAMPERS/MOTORS TO BE DEACTIVATED AND LEFT IN OPEN POSITION. OTHER CONNECTIONS TO LOUVER SHALL BE MAINTAINED AS REQ'D. BOILER COMBUSTION AIR FANS SHALL CONNECT TO BOX.
6. EXT'G. BOILER BREACHING TO BE REMOVED AND DISPOSED OF. VENT ASSIST FAN TO BE REMOVED. CAP FLUE OPENING WITH METAL PANNING.
7. EXT'G. DOMESTIC HOT WATER BOILER TO REMAIN. ALL PIPING TO REMAIN AS IS. EXISTING BOILER: LOCHINVAR 1,440MBH INPUT.
8. EXT'G. UNIT HEATER TO REMAIN. PIPING CONNECTION TO BE MODIFIED TO REMAIN CONNECTED TO HEATING SYSTEM.
9. EXT'G. PNEUMATIC CONTROLS CABINET TO REMAIN.
10. EXT'G. DOM. HW. RECIRCULATION PUMP TO REMAIN. VERIFY OPERATION AND RECONDITION AS REQ'D.
11. EXT'G. HEATING SUPPLY AND RETURN TO BE MODIFIED TO MATCH DESIGN LAYOUT.
12. EXT'G. PNEUMATIC COMPRESSOR TO REMAIN.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES AND REGULATIONS.
2. PROJECT TO COMPLY WITH CURRENT AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS.
3. EACH CONTRACTOR SHALL BE THOROUGHLY KNOWLEDGEABLE OF REGULATIONS GOVERNING HIS PRODUCT AND SERVICE AND SHALL ASSUME RESPONSIBILITY OF INSTALLATION IN ACCORDANCE WITH THOSE REGULATIONS.
4. CONTRACTORS TO VERIFY ALL DIMENSIONS RELATIVE TO THEIR SPECIFIC WORK AND SHALL BE THOROUGHLY FAMILIAR WITH EXISTING CONDITIONS PRIOR TO INITIATING THEIR WORK. DISCREPANCIES SHALL BE REPORTED TO THE GENERAL CONTRACTOR OR TO HIS ON-SITE REPRESENTATIVE.
5. ANY PENETRATIONS THROUGH FIRE-RATED ASSEMBLIES FOR MECHANICAL OR PLUMBING SYSTEMS, ETC. SHALL BE FIRE-STOPPED AND DRAFT-STOPPED WITH NON-COMBUSTABLE MATERIALS PER CODE REQUIREMENTS TO MAINTAIN STRUCTURAL AND FIRE RESISTIVE INTEGRITY.
6. DRAWINGS ARE DIAGRAMMATIC ONLY, FIELD VERIFY EXISTING CONDITIONS.
7. PRIOR TO SUBMITTING A PROPOSAL, BIDDER SHALL HAVE VISITED THE CONSTRUCTION SITE. HE SHALL BE FAMILIAR WITH THE EXISTING CONDITIONS UNDER WHICH HE WILL HAVE TO OPERATE AND WHICH WILL IN ANY WAY AFFECT THE WORK UNDER THIS CONTRACT. NO SUBSEQUENT ALLOWANCE WILL BE MAKE IN THIS CONNECTION ON BEHALF OF THE CONTRACTOR FOR ANY ERROR OF NEGLIGENCE ON HIS PART.
8. MECHANICAL CONTRACTOR SHALL OBTAIN ALL PERMITS PAY ALL FEES, INCLUDING COSTS ASSESSED BY THE MECHANICAL UTILITIES COMPANIES, AND ARRANGE FOR ALL INSPECTIONS FOR HIS WORK. AT THE COMPLETION OF MECHANICAL WORK, THE MECHANICAL CONTRACTOR SHALL FURNISH THE OWNER WITH ALL CERTIFICATES OF FINAL INSPECTION AND APPROVALS.
9. MECHANICAL CONTRACTOR SHALL COORDINATE LOCATIONS OF HIS EQUIPMENT AND WORK WITH OTHER BUILDING TRADES TO AVOID ANY INTERFERENCES BETWEEN HIS WORK AND THE WORK OF OTHER BUILDING TRADES. IF ANDY DISCREPANCIES OCCUR, CONSULT WITH THE GENERAL CONTRACTOR BEFORE CONTINUING.
10. THE CONTRACTOR SHALL EMPLOY QUALIFIED AND EXPERIENCED WORKMEN FOR THIS WORK.
11. THE MECHANICAL CONTRACTOR SHALL PERIODICALLY REMOVE FROM THE SITE ALL DEBRIS AND RUBBISH ACCUMULATING AS A RESULT OF THE MECHANICAL INSTALLATION. UPON COMPLETION OF THE PROJECT, HE SHALL LEAVE ALL AREAS CLEAN.

MECHANICAL CONSTRUCTION NOTES

GENERAL

1. THE CONTRACTOR SHALL CAREFULLY COORDINATE LOCATIONS OF DUCTS, REGISTERS, DIFFUSERS, AND GRILLES WITH STRUCTURAL FRAMING, ARCH TRADES, ELECTRICAL TRADES AND PLUMBING TRADES.
2. CONTRACTOR SHALL FURNISH COMPLETE AIR BALANCING REPORT TO THE GENERAL CONTRACTOR.
3. CUTTING AND/OR PATCHING THAT MAY BE REQUIRED FOR THE INSTALLATION OF THE MECHANICAL SYSTEM(S) SHALL BE DONE AND/OR REPAIRED BY THE MECHANICAL CONTRACTOR, NO CUTTING OF THE BUILDING STRUCTURAL SYSTEM SHALL BE DONE WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.
4. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND SHALL WORK WITH EXISTING SYSTEMS IN AN "AS FOUND" CONDITION.

SPECIFICATIONS

1. MECHANICAL DESIGN PER 2009 MICHIGAN MECHANICAL CODE.
2. REFERENCE 15000 MECH. SPECS.
3. VENTILATION REQUIREMENTS HAVE BEEN MET BY AN ALTERNATE VENTILATION METHOD TO MAINTAIN THE PROPER LEVELS OF CONTAMINATES BY A COSITRON UNIT.
4. THE SYSTEM DESIGN HAS BE DEVELOPED TO MEET THE CURRENT ENERGY CODE.
5. FIRE DAMPERS: (PROVIDED BY M.C.) INCLUDE FIRE DAMPERS AT ALL WALLS, CEILINGS, OR FLOOR PENETRATIONS AS REQUIRED BY CODE.
   A. 1hr. DAMPERS BASED ON "RUSKIN", MODEL NO. IBD2 W/FUSIBLE LINK (165°F), LEAKAGE CLASS IV. DAMPERS FOR GRILLES, DIFFUSORS, & REGISTERS ARE TO BE EQUAL TO RUSKIN MODEL "CFDR2". VERIFY WITH MANUF.

DUCTWORK

1. SUSPEND ALL DUCTS SECURELY FROM ADJACENT BUILDING MEMBERS. DO NOT SUPPORT DUCTS FROM UNIT DUCT CONNECTORS. DUCT CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND SHALL INCLUDE FLEXIBLE DUCT CONNECTORS.
2. INCLUDE FIRE DAMPERS AT ALL WALL, CEILING OR FLOOR PENETRATIONS AS REQUIRED BY CODE. (SEE ARCH. DRAWINGS FOR FIRE RATED ASSEMBLIES.)
3. RETURN AIR DUCTWORK SHALL BE CONSTRUCTED AS PER SMACNA STANDARDS (LOW PRESSURE) GAUGE GALVANIZED STEEL DUCTWORK.
4. SUPPLY AIR DUCTWORK SHALL BE CONSTRUCTED AS PER SMACNA STANDARDS(LOW PRESSURE) GAUGE GALVANIZED STEEL, WITH INSULATION AS STATED.

NO INSULATION SHALL BE ON EXPOSED SA DUCTING. INSULATED FLEXIBLE DUCT MAY BE USED FOR SHORT AIR DUCT RUNS IN UNEXPOSED AREAS ONLY.

5. EXHAUST AIR DUCTWORK SHALL BE CONSTRUCTED AS PER SMACNA STANDARDS(LOW PRESSURE) GAUGE GALVANIZED STEEL, NO INSULATION SHALL BE REQUIRED. INSULATION AS STATED.
6. ACOUSTICAL DUCT LINER MAY BE INSTALLED AS STATED. DUCTWORK DIMENSIONS INDICATED ARE INSIDE DIMENSIONS REQUIRED FOR AIR FLOW. NO EXTERNAL INSUL. REQ'D. WHERE ACOUSTICAL INSTALLED.
7. INCLUDE MANUAL BALANCING DAMPERS AS REQUIRED FOR A COMPLETE AIR BALANCED SYSTEM.

HEATING AND COOLING EQUIPMENT

1. ALL EQUIPMENT SHALL BE INSTALLED TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2. ALL EQUIPMENT SHALL BE INSTALLED ACCORDING TO APPLICABLE STATE AND LOCAL CODES.
3. BALANCE EXHAUST IN BATHS TO PRODUCE A SLIGHT NEGATIVE PRESSURE IN THE ROOMS. CFMS AS STATED ARE NOMINAL EXHAUST TO BE NO LESS THEN 75CFM.
4. CLASS ROOM 107 SPACE CONDITIONS TO BE CONTROLLED TO 68-72 °F HEATING, 73-75 °F COOLING, HUMIDITY TO BE MAINTAINED TO 40% OR LESS.
5. TURF 111 SPACE CONDITIONS TO BE CONTROLLED TO 63-68 °F HEATING, AS LOW AS AMBIENT COOLING (NO LESS THEN 60°F), HUMIDITY TO BE AMBIENT OR LESS.

2011 PROJECT FOR:

NORTHWOOD UNIVERSITY - AUDITORIUM AND TURF BUILDING

MIDLAND, MICHIGAN

JOB NUMBER

E 09-237

Apollo Engineering LLC
E-Mail : apollo_mi_eng@yahoo.com
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(231) 932-0800 office

PROJECT #1101-40

DRAWING

M1.1

L-1
132"W X 42"H
OUTSIDE AIR INTAKE

RETURN DUCT & L-5
DN WALL TO 15'A.F.F.

AHU-1
30,000 CFM
W/DX FOR FUTURE
DEHUM.

L-3
132"W X 42"H
RELIEF

TO AHU-1

P-1

48/24

5)SR-1
3000CFM
EA.

48/24

5)SR-1
3000CFM
EA.

NOTE:
SUPPLY REGISTERS ARE TO BE
ANGLED TO MAXIMIZE
DISTRIBUTION.

TO
BAS-1,2

3"HWS
& HWR

UP

3"HWS
3"HWR

UP

DF-1
DESTRAT. FAN
W/5'TUBE.

TURF
111

DF-2
DESTRAT. FAN
W/5'TUBE.

3"HWS&HWR

UP TO AHU-2

3"HWS

3"HWR

L-4
132"W X 42"H
RELIEF

3"HWR
3"HWS

5)SR-1
3000CFM
EA.

5)SR-1
3000CFM
EA.

NOTE:
SUPPLY REGISTERS ARE TO BE
ANGLED TO MAXIMIZE
DISTRIBUTION.

48/24

5)SR-1
3000CFM
EA.

48/24

ACOUSTICALLY LINED
DUCT WORK SA & RA.
SHOWN WITH DASHED LINES.

AHU-2
30,000 CFM

TO AHU-2

RETURN DUCT & L-5
DN WALL TO 15'A.F.F.

MECH. SEC.
SHT. M2.1

O.A. INTAKE

L-2
132"W X 42"H
OUTSIDE AIR INTAKE

NORTH

FLOOR PLAN - MECH.

SCALE: 3/32" = 1'-0"

2011 PROJECT FOR:

NORTHWOOD UNIVERSITY - AUDITORIUM AND TURF BUILDING

MIDLAND, MICHIGAN

JOB NUMBER
E 09-237

Apollo
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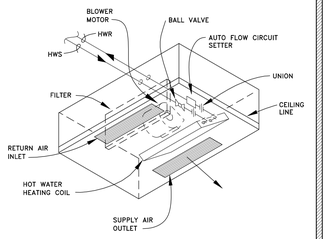
(231) 932-0800 office

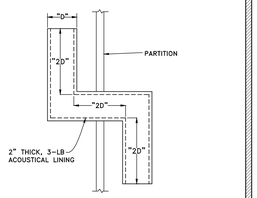
PROJECT# 1101-01

DRAWING
M1.2



CEILING CABINET UNIT HEATER DETAIL

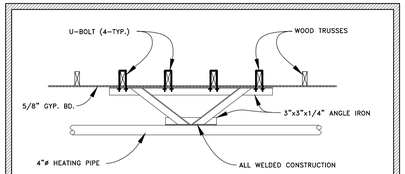
NOT TO SCALE



NOTES:
MAINTAIN 500 FPM MAX. THRU DUCTING TYP.
INSTALL FIRE DAMPERS THRU RATED ASSEMBLIES.

TRANSFER DUCT DETAIL

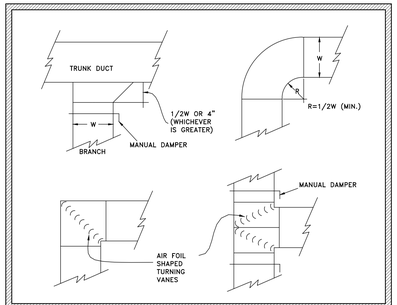
NOT TO SCALE



NOTE: ANGLE IRON SIZES TO VARY WITH PIPE SIZES.
VERIFY BUILDING STRUCTURE WITH STRUCTURAL PLANS FOR PROPER ANCHORING.
ALTERNATE: ANCHOR ANGLE IRON MAY BE SECURED TO ADJACENT MASONARY WALLS.

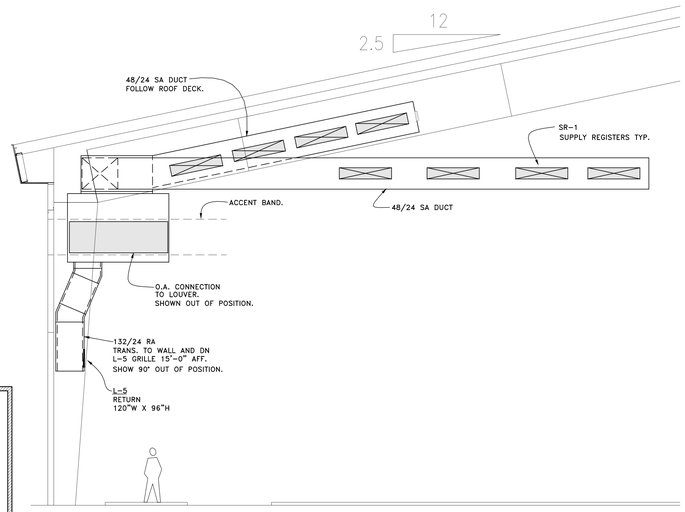
TYPICAL PIPE ANCHOR DETAIL

NOT TO SCALE



ACCEPTABLE DUCT TURNS

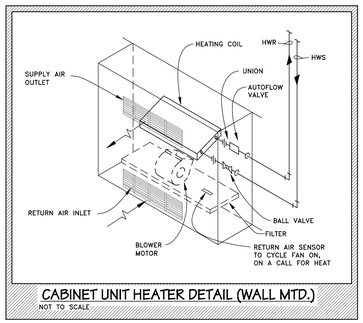
NOT TO SCALE



NORTH

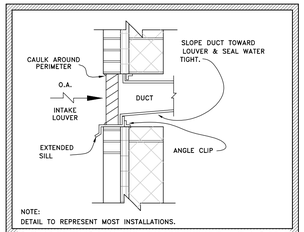
PARTIAL BUILDING SECTION A-A MECH.

SCALE: 1/8" = 1'-0"



CABINET UNIT HEATER DETAIL (WALL MTD.)

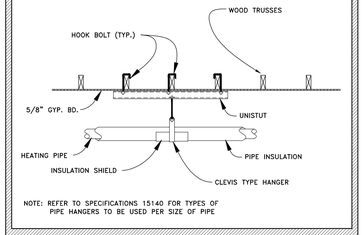
NOT TO SCALE



NOTE:
DETAIL TO REPRESENT MOST INSTALLATIONS.

TYPICAL INTAKE AIR WALL LOUVER DETAIL

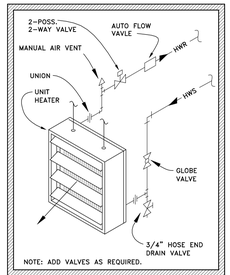
NOT TO SCALE



NOTE: REFER TO SPECIFICATIONS 15140 FOR TYPES OF PIPE HANGERS TO BE USED PER SIZE OF PIPE

TYPICAL PIPE HANGING DETAIL

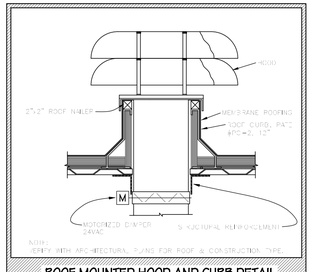
NOT TO SCALE



NOTE: ADD VALVES AS REQUIRED.

UNIT HEATER DETAIL

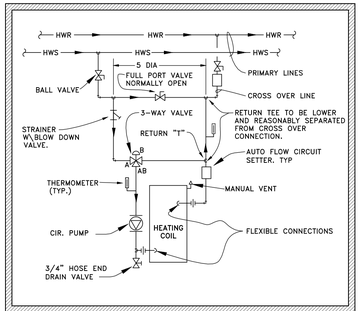
NOT TO SCALE



NOTE:
VERIFY WITH ARCHITECTURAL PLANS FOR ROOF & CONSTRUCTION TYPE.

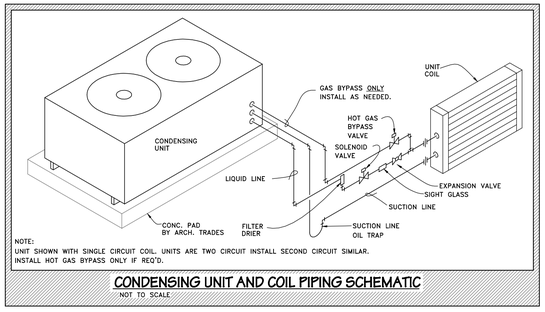
ROOF MOUNTED HOOD AND CURB DETAIL

NOT TO SCALE



HEATING COIL PIPING DETAIL

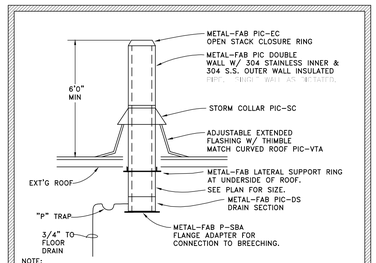
NOT TO SCALE



NOTE:
UNIT SHOWN WITH SINGLE CIRCUIT COIL. UNITS ARE TWO CIRCUIT INSTALL SECOND CIRCUIT SIMILAR.
INSTALL HOT GAS BYPASS ONLY IF REQ'D.

CONDENSING UNIT AND COIL PIPING SCHEMATIC

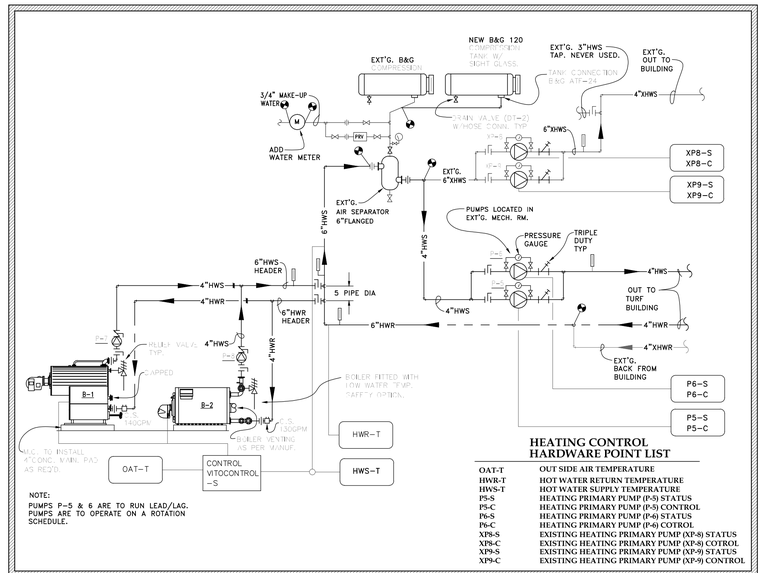
NOT TO SCALE



NOTE:
BOILER VENTING TO FOLLOW VIESSMANN RECOMMENDATIONS AS DIRECTED.

BOILER VENT THRU ROOF DETAIL

NOT TO SCALE



NOTE:
PUMPS P-5 & 6 ARE TO RUN LEAD/LAG.
PUMPS ARE TO OPERATE ON A ROTATION SCHEDULE.

HEATING CONTROL HARDWARE POINT LIST

OAT-T	OUT SIDE AIR TEMPERATURE
HWR-T	HOT WATER RETURN TEMPERATURE
HWS-T	HOT WATER SUPPLY TEMPERATURE
P5-S	HEATING PRIMARY PUMP (P-5) STATUS
P5-C	HEATING PRIMARY PUMP (P-5) CONTROL
P6-S	HEATING PRIMARY PUMP (P-6) STATUS
P6-C	HEATING PRIMARY PUMP (P-6) COTROL
XP8-S	EXISTING HEATING PRIMARY PUMP (XP-8) STATUS
XP8-C	EXISTING HEATING PRIMARY PUMP (XP-8) COTROL
XP9-S	EXISTING HEATING PRIMARY PUMP (XP-9) STATUS
XP9-C	EXISTING HEATING PRIMARY PUMP (XP-9) CONTROL

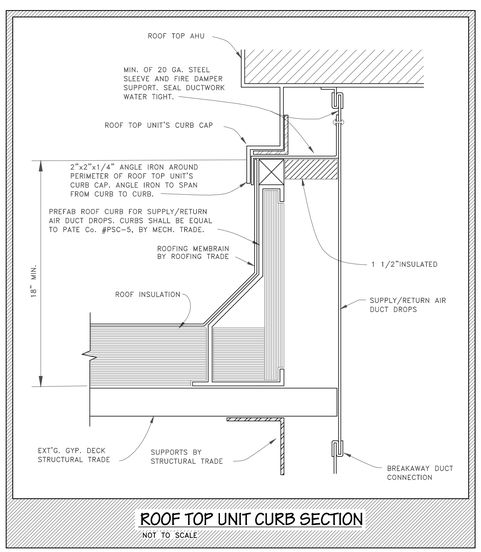
HYDRONIC HEATING PIPING SCHEMATIC

NOT TO SCALE

PIPING/TUBING SIZING EQUIVALENT CHART

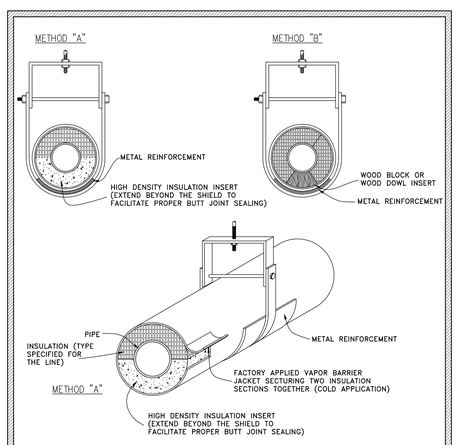
NOMINAL SIZE	COPPER PIPE FLOW RANGE (GPM)	STEEL TUBING FLOW RANGE (GPM)	PEX TUBING FLOW RANGE (GPM)
1/2"	0.5–1.2	0.8–1.8	0.5–1.5
3/4"	2.5–3.5	1.7–4.0	1.6–4.0
1"	3.1–7.5	3.5–7.5	1.6–7.5
1 1/4"	5.5–13.0	7.0–16.0	7.5–13.0
1 1/2"	9.0–21.0	10.0–24.0	11.0–21.0
2"	20.0–45.0	20–47.0	15.0–32.0
2 1/2"	35.0–80.0	33.0–75.0	N/A
3"	65.0–130.0	60.0–140.0	N/A
4"	N/A	120.0–280.0	N/A
5"	N/A	220.0–510.0	N/A
6"	N/A	350.0–840.0	N/A

NOTES:
1. FLOWS ARE GIVEN TO MAINTAIN SIMILAR VELOCITIES IN PIPING/TUBING.
2. REFER TO PIPING FLOW TAGS TO DETERMINE ACCEPTABLE DIAMETERS.
3. HANGER SPACING REQUIREMENTS FOR METAL PIPING AND PLASTIC PIPING SHOULD BE DETERMINED TO ASSURE PROPER INSTALLATION.



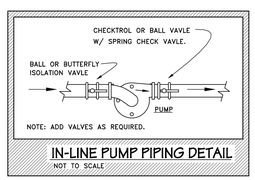
ROOF TOP UNIT CURB SECTION

NOT TO SCALE



PIPE CLEVIS HANGER DETAIL

NOT TO SCALE



NOTE: ADD VALVES AS REQUIRED.

IN-LINE PUMP PIPING DETAIL

NOT TO SCALE

2011 PROJECT FOR:
NORTHWOOD UNIVERSITY - AUDITORIUM AND TURF BUILDING
MIDLAND, MICHIGAN

JOB NUMBER
E 09-237

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PROJECT# 1101-01

DRAWING
M2.1

AIR HANDLING UNIT SCHEDULE

MARK	AREA SERVED	MODEL No. MCQUAY	CFM				HEATING CONDITIONS			HEATING COIL					COOLING COIL CONDITIONS						SA FAN		ELECT	AMPACITY	WEIGHT	REMARKS
			TOTAL	MIN. O.A.	ESP	TSP	MBH	EAT	LAT	GPM	WPD	EWT	LWT	APD	TONS	EDB	EWB	LDB	LWB	APD	H.P.	TYPE/CLASS				
AHU-1	NW TURF BUILDING 111	CAH065GHDC	30,000	5,000	0.75"	2.22"	1,686	48.7	100.1	112.0	10.6'	160	129.9	0.18"	30	81.9	73.3	64.6	62.7	0.4"	25	AF/2	480V, 3#	30.5	7558	MIXING BOX, FILTER SECTION, DX COIL, HW COIL, PLENEUM FAN SECTION SEE NOTES.
AHU-2	SE TURF BUILDING 111	CAH065GHDC	30,000	5,000	0.75"	2.22"	1,686	48.7	100.1	112.0	10.6'	160	129.9	0.18"	N/A	N/A	N/A	N/A	N/A	N/A	25	AF/2	480V, 3#	30.5	6313	MIXING BOX, FILTER SECTION, HW COIL, PLENEUM FAN SECTION. SEE NOTES.
AHU-3	CLASS ROOM 107	OAH008GDAC	3,000	1668	0.6"	3.28"	200.5	30.0	91.1	13.0	1.0'	160	129.4	0.17"	10	82.6	70.3	58.4	56.8	0.45"	5	FC/2	480V, 3#	6.8	2074	MIXING BOX, FILTER SECTION, DX COIL, ACC., HW COIL, FAN SECTION, DA PLEN. SEE NOTES.
AHU-4	LOBBY 108 / CORR.	OAH008GDAC	4,105	750	0.75"	2.38"	184.5	54.7	101.6	11.9	1.6'	160	129	0.35"	10	78.2"	65"	56.1	53.8	0.63"	5	FC/2	480V, 3#	6.8	2079	MIXING BOX, FILTER SECTION, DX COIL, ACC., HW COIL, FAN SECTION, DA PLEN. SEE NOTES.

NOTES:

1. BASED ON MCQUAY. (CARRIER, TRANE, AND YORK MAY BID AS EQUALS). FILTERS BASED ON FARR. REF. SPEC. 15885.
2. SEE PLANS FOR ACCESS DOOR ORIENTATION.
3. UNITS TO BE DOUBLE WALLED, W/2"-1 1/2# SOLID INSULATION WITH RAILS.
4. DUCT MTD. SMOKE DETECTOR FURNISHED AND WIRED BY E.C., INSTALLED IN SUPPLY AND RETURN AIR DUCTS BY M.C. FOR ANY UNIT 16,000 CFM AND OVER AND RA FOR 2000 CFM OR HIGHER.
5. ALL UNITS TO HAVE FACTORY MOUNTED VARIABLE FREQUENCY DRIVES.
6. AHU-1,2,&3 ARE TO BE CONFIGURED TO HAVE COSATRON FIELD INSTALLED. REF. SPEC. 15.886 12" OF SPACE REQUIRED IN UNIT FOR INSTALLATION.
7. AHU-1 COOLING/DEHUMIDIFING SELECTION SHOWN AT 12,000 CFM. COIL TO BE INCLUDED IN BASE BID AND INSTALLED IN UNIT. COIL MAY BE UTILIZED IN FUTURE.

CONDENSING UNIT SCHEDULE

MARK	UNIT SERVED	MODEL No.	NOMINAL CLG. CAP.	# OF COMP.	ELECTRICAL			WEIGHT	REMARKS
					OPERATING	AMPACITY	MOCPD		
CU-1	AHU-3	CC-B-010-3-D-2	10 TONS	2	480V, 3#	22.0	30A	854	SEE NOTES.
CU-2	AHU-4	CC-B-010-3-D-2	10 TONS	2	480V, 3#	22.0	30A	854	SEE NOTES.
CU-3	AHU-1	CC-B-030-3-D-2	30 TONS	2	480V, 3#	65.0	90A	1160	SEE NOTES.

NOTES:

1. BASED ON AAON (YORK, TRANE OR CARRIER MAY BID AS EQUAL).
2. PROVIDE OPTIONAL ANTI-SHORT-CYCLE TIMER AND CONDENSOR COIL GUARD.
3. UNITS ARE TO BE LOW AMBANENT (0 DEG. F).
4. FIELD INSTALL HOT GAS BYPASS AS PER MANUF. RECOMMENDATIONS.
5. UNITS TO HAVE A DIGITAL SCROLL COMPRESSORS.
6. UNITS TO HAVE R-410A REFRIGERANT.
7. PLANS INCLUDE CU-3 30 TON UNIT. MAY BE INSTALLED IN FUTURE TO DEHUMIDIFY OR PROVIDE PASSIVE COOLING.

ROOF EXHAUST FAN SCHEDULE

MARK	MODEL No.	CFM @ E.S.P.	RATED SONES	ELECTRICAL	APPROX. WEIGHT	REMARKS
REF-1	90C15DH	225 @ 0.3"	3.3	120V, 1#, 60W	28	PROVIDE CURB & BACK DRAFT DAMPER
REF-2	70C15HD	75 @ 0.25"	2.5	120V, 1#, 60W	20	PROVIDE CURB & BACK DRAFT DAMPER
REF-3	120C10D	450 @ 0.3"	2.6	120V, 1#, 93W	67	PROVIDE CURB & BACK DRAFT DAMPER

NOTES:

1. BASED ON LOREN COOK. (DISCOVAIR & CARNES MAY BE BID AS EQUAL).
2. UNITS TO BE BALANCED WITH SPEED CONTROLLER.

BOILER SCHEDULE

MARK	MANUFACTURER	MODEL No.	INPUT MBH	OUTPUT MBH	INLET TEMP.	OUTLET TEMP.	FLOW GPM	PD FT/H2O	NAT. GAS TRAIN INLET PRESSURE	ELECTRICAL	
										OPD	VOLTAGE
B-1	VIESSMANN	CT3-57	2160	2094	130°F	160°F	140.0	14.0'	2 PSI	15A	120V CONTROL CIRCUIT
B-2	VIESSMANN	VD2-560	2275	1941	130°F	160°F	130.0	4.0'	2 PSI	15A	120V CONTROL CIRCUIT

NOTES:

1. BASED ON VIESSMANN.
2. UNITS TO BE VENTED AND C.A. AS DIRECTED BY MANUF. UNITS ARE TO BE INTERLOCKED WITH CAU-2 & 3.
3. A CONDENSATE NEUTRALIZER KIT TO BE SUPPLIED FOR BOILER B-1.
4. BOILERS TO BE CONTROLLED BY MANUF. CONTROLS. TO HAVE THE ABILITY TO CONNECT TO BUILDING CONTROLS.
5. BOILERS ARE TO BE ABLE TO PRODUCE 180DEG.F WATER FOR DESIGN DAY CONDITIONS.
6. BOILERS ARE COMPLY WITH ALL REQUIREMENTS OF CSD-1.

DIFFUSER / GRILLE SCHEDULE

MARK	MODEL No.	CFM	SIZE	BALANCING DAMPER	COLOR	REMARKS
SD-1	TDC	100-120	9"x9", 6"ø NECK	YES	WHITE	BORDER TYPE 1, SEE NOTE #4
SD-2	TDC	125-200	9"x9", 8"ø NECK	NO	WHITE	BORDER TYPE 1, SEE NOTE #4
SD-3	TDC	200-250	12"x12", 8"ø NECK	NO	WHITE	BORDER TYPE 1, SEE NOTE #4
SD-4	TBDI-10	120	2'LONG, 6"øNECK, 2) 1" SLOTS	NO	WHITE	FAC. MTD "T" BARS AS REQD., INSUL PLENM.
SR-1	DL	3000	70"x15"	YES	WHITE	BORDER TYPE 1, SEE NOTES AND NOTE #7.
RG-1	33RL	1500	24"x24"	NO	WHITE	BORDER TYPE 1
RG-2	50F	1500-2200	48"X24"	NO	WHITE	BORDER TYPE 1
EG-1	50F	100-450	12"x12"	YES	WHITE	BORDER TYPE 1
TG-1	50F	100-400	14"x14"	NO	WHITE	BORDER TYPE 1
TG-2	50F	1500	22"x22"	NO	WHITE	BORDER TYPE 1

NOTES:

1. BASED ON TITUS. (PRICE OR KRUGER MAY BE BID EQUALS.)
2. REVIEW COLOR W/ARCHITECT BEFORE ORDERING.
3. ALL SUPPLY REGISTERS ON SPIRAL DUCTWORK ARE TO BE PRIMED ONLY FOR FIELD PAINTING BY OTHERS.
4. ALL SUPPLY AIR DIFFUSERS SHALL HAVE A 4-WAY AIR PATTERN UNLESS OTHERWISE INDICATED (SEE PLANS).
5. PROVIDE ALL DUCT COLLARS, TRANSITIONS, CONNECTIONS AND SUPPORTS.
6. PAINT INSIDE OF DUCT BEHIND REGISTERS AND GRILLES FLAT BLACK.
7. INCLUDE SAFETY CHAINS ON SUPPLY REGISTERS.

ROOF RELIEF HOOD

MARK	MODEL No.	CFM @ E.S.P.	ACCESSORIES
RH-1	30TR	3000 @ 0.05"	UNIT TO HAVE INSECT SCREEN, PROVIDE 12" CURB TO FLAT ROOF.

NOTES:

1. BASED ON LOREN COOK. (GREENHECK, OR DISCOVAIR MAY BE BID AS EQUAL).
2. HOOD TO HAVE A CONTROL DAMPER INSTALLED IN DUCTWORK. 24VAC ACTUATOR (MODULATING).

WALL LOUVER SCHEDULE

MARK	MODEL No.	UNIT SERVED	TYPE	CFM	SIZE W x H	REMARKS
L-1	ELF6375DX	AHU-1	INTAKE	5000MIN 15000MAX	132" X 42"	SEE NOTES
L-2	ELF6375DX	AHU-2	INTAKE	5000MIN 15000MAX	132" X 42"	SEE NOTES
L-3	ELF6375DX	AHU-2	RELIEF	5000MIN 15000MAX	132" X 42"	SEE NOTES
L-4	ELF6375DX	AHU-1	RELIEF	5000MIN 15000MAX	132" X 42"	SEE NOTES
L-5	ELF211	AHU-1&2	RETURN	30,000MAX	120" X 96"	SEE NOTES

NOTES:

1. BASED ON RUSKIN. (AMERICAN WARMING & DISCOVAIR MAY BE BID AS EQUAL.)
2. PROVIDE FLANGE, BIRD SCREEN AND BAKED ENAMEL FINISH.
3. REVIEW COLOR W/ARCHITECT BEFORE ORDERING.

DESTRATIFICAION FAN SCHEDULE

MARK	MODEL No.	MAX AIR DISP.	RATED SOUND	ELECTRICAL	APPROX. WEIGHT	REMARKS
DF-1	HVLS-24	360,000 CFM	<55dbA	480V, 3#, 3.2A	487	PROVIDE 5' EXTENSION TUBE.
DF-2	HVLS-24	360,000 CFM	<55dbA	480V, 3#, 3.2A	487	PROVIDE 5' EXTENSION TUBE.

NOTES:

1. BASED ON RITE HITE.
2. UNITS TO BE CONTROLLED BY WALL CONTROLLER CONNECTED TO UNITS BY CAT-5 CABLE.

COMBUSTION AIR UNIT DESCRIPTION

CAU-1
UNIT TO BASED ON TJERNLUND IN-FORCER MODEL PAI-6.
UNIT TO BE SIZED FOR 1,440 MBH INPUT POWER BURNER.
POWER CONNECTION - 120V, 1ø, MAX AMP DRAW 15A.
CONNECT TO LOUVER OVER TO DOOR.
INTERLOCK UNIT TO EXT. DHW BOILER.

CAU-2,3
UNIT TO BASED ON TJERNLUND IN-FORCER MODEL PAI-6.
UNIT TO BE SIZED FOR 2160 MBH INPUT POWER BURNER.
POWER CONNECTION - 120V, 1ø, MAX AMP DRAW 15A.
CONNECT TO EXTISTING LOUVER WHICH IS BOXED IN.
INTERLOCK UNIT TO B-1&2.

CABINET UNIT HEATER SCHEDULE

MARK	MODEL No.	CFM	HEATING CONDITIONS			HEATING COIL			ELECTRICAL		LBS	ACCESSORIES
			MBH	EAT	LAT	GPM	WPD	EWT	LWT	VOLTS	H.P.		
CUH-1	RC-1200-04	430	29.7	65	120	2.5	0.6'	160	130	115V, 1#	1/10	135	SEE NOTES
CUH-2	W-1080-06	620	45.0	65	120	3.0	0.6'	160	130	115V, 1#	1/10	164	WALL TRIM, SEE NOTES

NOTES:

1. BASED ON VULCAN (TRANE, STERLING OR YORK MAY BE BID AS AN EQUAL).
2. CABINETS SHALL HAVE BAKED-ON ENAMEL FINISH, WITH COLOR SELECTED BY ARCHITECT.
3. RIGHT HAND/LEFT HAND COIL CONNECTION VARIES.
4. PROVIDE THROW-AWAY FILTERS.
5. UNITS TO HAVE TAMPER RESISTANT ACCESS PANELS.
6. UNITS TO HAVE 2 ROW HIGH CAP. COILS.

CIRCULATING PUMP SCHEDULE

MARK	UNIT SERVED	SERIES - SIZE	IMPLR. DIA	GPM	HEAD	FLANGE SIZE		H.P.	RPM	ELECTRICAL
						INLET	DISC.			
P-1	AHU-1	80-2 1/2"X2 1/2"x7	6.125"	113.0	35'	2 1/2"	2 1/2"	2	1750	480V, 3#
P-2	AHU-2	80-2 1/2"X2 1/2"x7	6.125"	113.0	35'	2 1/2"	2 1/2"	2	1750	480V, 3#
P-3	AHU-3	PL-55	STD	13.0	35'	1 1/2"	1 1/2"	2/5	3250	120V, 1#
P-4	AHU-4	PL-55	STD	11.0	37'	1 1/4"	1 1/4"	2/5	3250	120V, 1#
P-5	TURF BLDG. PRIMARY	1510-2 1/2BB	8.62"	264.9	65'	3"	2 1/2"	7 1/2	1750	480V, 3#
P-6	TURF BLDG. PRIMARY	1510-2 1/2BB	8.62"	264.9	65'	3"	2 1/2"	7 1/2	1750	480V, 3#
P-7	BOILER B-1	80-3X3X7B	6.12"	140.0	32'	3"	3"	2	1750	480V, 3#
P-8	BOILER B-2	80-3X3X7B	6.12"	130.0	32'	3"	3"	2	1750	480V, 3#
XP-8	EXT'G. PRIMARY	1510-2 1/2B	EXT'G.	175.0	65'	3"	2 1/2"	5	1750	480V, 3#
XP-9	EXT'G. PRIMARY	1510-2 1/2B	EXT'G.	175.0	65'	3"	2 1/2"	5	1750	480V, 3#

NOTES:

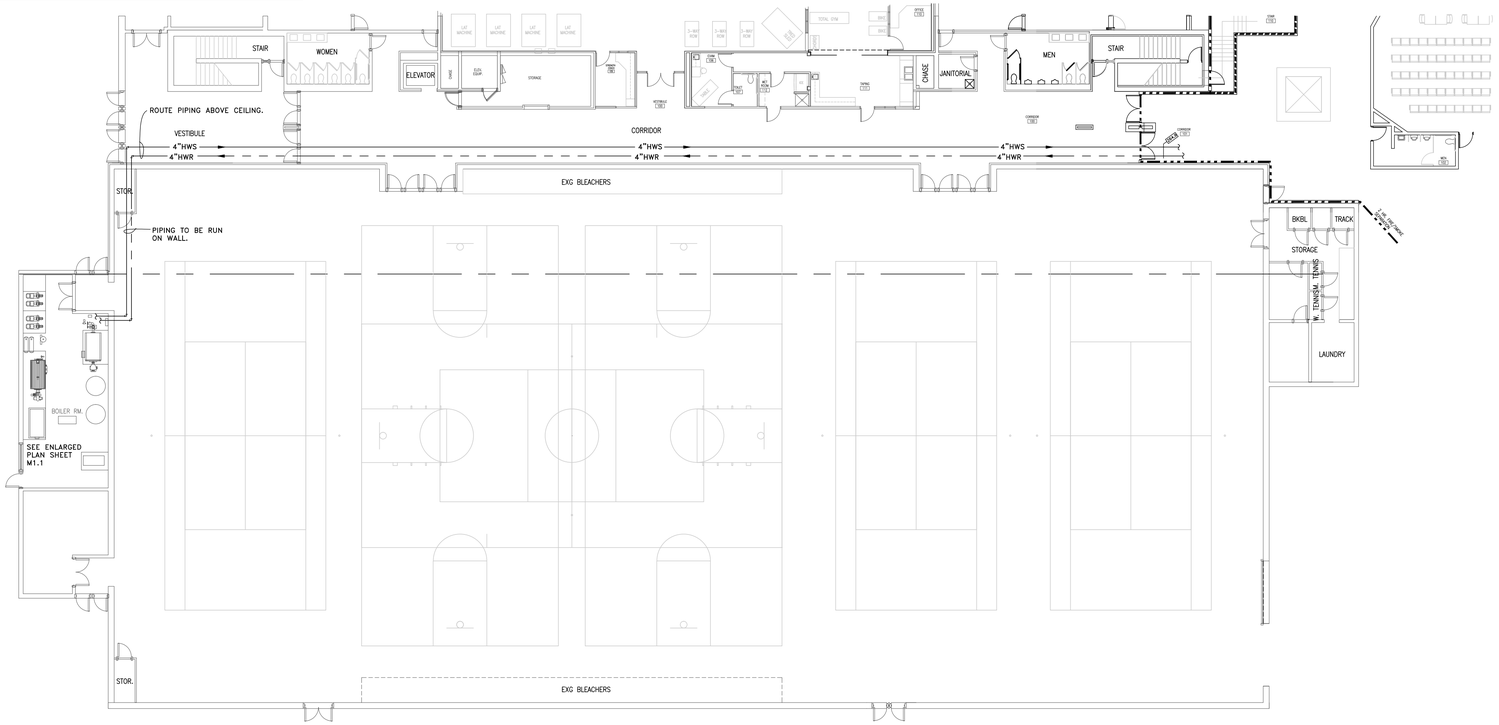
1. BASE BID BELL & GOSSET (TACO MAY BE BID AS VOLUNTARY ALTERNATE ADD/DEDUCT).
2. ALL 3PH MOTORS TO BE VFD RATED.

UNIT HEATER SCHEDULE

MARK	MODEL No.	MBH	GPM	WPD	EAT	EWT	LWT	ELECTRICAL	REMARKS
UH-1	HS-72	47.0	5.0	0.5FT	60	160	130	115V, 1ø, 1/30HP	MOUNTED AT ±8' AFF, W/LOUVER FIN DIFFUSER

NOTES:

1. BASED ON VULCAN.



NORTH
PARTIAL EXT'G. BUILDING PLAN - MECH.
SCALE: 1/16" = 1'-0"

2011 PROJECT FOR:
NORTHWOOD UNIVERSITY - AUDITORIUM AND TURF BUILDING
MIDLAND, MICHIGAN

JOB NUMBER
E 09-237

Apollo Engineering LLC
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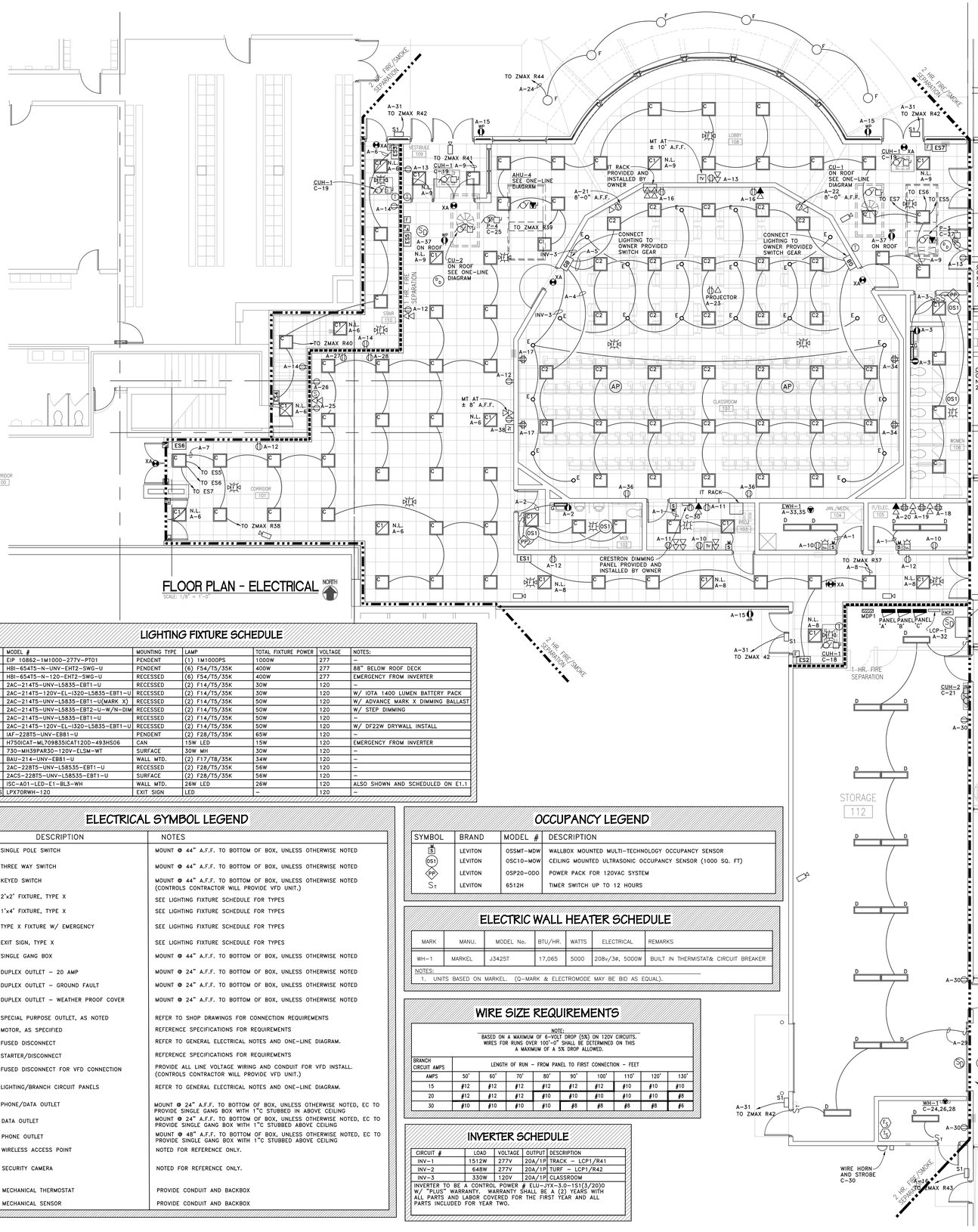
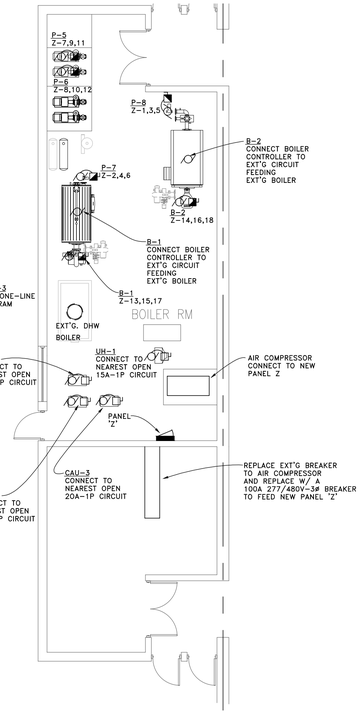
PROJECT # 1101-01

DRAWING
M2.2



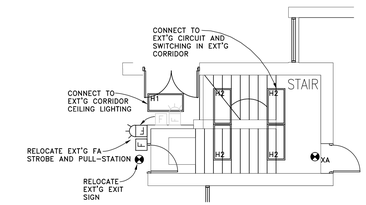
FLOOR PLAN - ELECTRICAL

SCALE: 1/8" = 1'-0"



EXT'G. BOILER RM. - ELECTRICAL

SCALE: 1/8" = 1'-0"



PARTIAL 2ND FLOOR PLAN - ELECTRICAL

SCALE: 1/8" = 1'-0"

PANEL Z

100 AMPS M.C.B. 277/480V-3Ø-4W

CIR NO.	AMP/ POLES	DESCRIPTION	LOAD	LOAD	DESCRIPTION	AMP/ POLES	CIR NO.
1			1000	1000			2
3	15/3	P-8 (EXT'G BOILER RM)	1000	1000	P-7 (EXT'G BOILER RM)	15/3	4
5			1000	1000			6
7			3100	3100			8
9	20/3	P-5 (EXT'G BOILER RM)	3100	3100	P-6 (EXT'G BOILER RM)	20/3	10
11			3100	3100			12
13			500	500			14
15	15/3	B-1 (EXT'G BOILER RM)	500	500	B-2 (EXT'G BOILER RM)	15/3	16
17			500	500			18
19			2100	---	SPARE	20/1	20
21	15/3	EXT'G AIR COMPRESSOR (VERIFY SIZE)	2100	---	SPACE	--	22
23			2100	---	SPACE	--	24
25	20/1	SPARE	---	---	SPACE	--	26
27	--	SPACE	---	---	SPACE	--	28
29	--	SPACE	---	---	SPACE	--	30

CONNECTED LOAD: 33.9KW - 40.8A

PANEL A

100 AMPS M.C.B. 120/208V-3Ø-4W

CIR NO.	AMP/ POLES	DESCRIPTION	LOAD	LOAD	DESCRIPTION	AMP/ POLES	CIR NO.
1	20/1	LIGHTS (PROJ/JC/IT)	400	400	LIGHTS & RECEPTACLES (MEN 102)	20/1	2
3	20/1	LIGHTS & RECEPTACLES (WOMEN'S 106)	800	1300	LIGHTS (CLASSROOM 107)	20/1	4
5	20/1	LIGHTS (CLASSROOM 107)	900	400	LIGHTS (STAIR 110)	20/1	6
7	20/1	LIGHTS (CORRIDOR 101)	1900	600	LIGHTS (CORRIDOR 101)	20/1	8
9	20/1	LIGHTS (LOBBY 108)	1100	600	RECEPTACLES (PROJ/JC)	20/1	10
11	20/1	PROJECTOR (PROJ. 103)	1000	800	RECEPTACLES (CORRIDOR 101)	20/1	12
13	20/1	RECEPTACLES (LOBBY 108)	400	800	RECEPTACLES (STAIR 110)	20/1	14
15	20/1	RECEPTACLES (EXTERIOR)	600	600	RECEPTACLES (CLASSROOM 107)	20/1	16
17	20/1	RECEPTACLES (CLASSROOM 107)	1100	800	RECEPTACLES (IT 105)	20/1	18
19	20/1	RECEPTACLES (IT 105)	800	800	RECEPTACLES (IT 105)	20/1	20
21	20/1	PROJECTOR (CLASSROOM 107)	400	400	PROJECTOR (CLASSROOM 107)	20/1	22
23	20/1	PROJECTOR (CLASSROOM 107)	500	500	LIGHTS (EXTERIOR)	20/1	24
25	20/1	VENDING (LOBBY 108)	1000	1000	VENDING (LOBBY 108)	20/1	26
27	20/1	VENDING (LOBBY 108)	1000	1000	VENDING (LOBBY 108)	20/1	28
29	20/1	LIGHTS (STORAGE 112)	900	400	RECEPTACLES (STORAGE 112)	20/1	30
31	20/1	LIGHTS (EXTERIOR)	200	200	LCP-1 (STORAGE 112)	20/1	32
33	30/2	EWH-1 (JC 104)	3000	800	RECEPTACLES (CLASSROOM 107)	20/1	34
35			3000	400	RECEPTACLES (CLASSROOM 107)	20/1	36
37	20/1	RECEPTACLES (ROOF)	400	200	RECEPTACLES (CORRIDOR 101)	20/1	38
39	20/1	SPARE	---	---	SPARE	20/1	40
41	--	SPACE	---	---	SPACE	--	42

PANEL C

100 AMPS M.C.B. 120/208V-3Ø-4W

CIR NO.	AMP/ POLES	DESCRIPTION	LOAD	LOAD	DESCRIPTION	AMP/ POLES	CIR NO.
1	20/1	RECEPTACLES (TURF 111)	600	600	RECEPTACLES (TURF 111)	20/1	2
3	20/1	RECEPTACLES (TURF 111)	600	400	RECEPTACLES (TURF 111)	20/1	4
5	20/1	RECEPTACLES (TURF 111)	600	400	RECEPTACLES (TURF 111)	20/1	6
7	20/1	RECEPTACLES (TURF 111)	600	600	RECEPTACLES (TURF 111)	20/1	8
9	20/1	RECEPTACLES (TURF 111)	600	600	RECEPTACLES (TURF 111)	20/1	10
11	20/1	RECEPTACLES (TURF 111)	600	500	EWC-1 (TURF 111)	20/1	12
13	20/1	BATTING CAGE (TURF 111)	600	600	BATTING CAGE (TURF 111)	20/1	14
15	20/1	BATTING CAGE (TURF 111)	600	600	BATTING CAGE (TURF 111)	20/1	16
17	20/1	FIELD GOAL (TURF 111)	500	200	CUH-1 (CORRIDOR 101)	20/1	18
19	20/1	CUH-1 (CORRIDOR 101)	600	200	CRESTRON PANEL (PROJ 103)	20/1	20
21	20/1	CUH-2 (STORAGE 112)	200	1000	GARAGE DOOR (TURF 111)	20/1	22
23	20/1	GARAGE DOOR (TURF 111)	1000	1700			24
25	15/1	P-4 (LOBBY 108)	400	1700	WH-1 (STORAGE 112)	15/3	26
27	15/1	P-3 (LOBBY 108)	400	1700			28
29	20/1	RECEPTACLES (EXTERIOR)	600	400	HORN/STROBE (EXTERIOR)	20/1	30
31	--	SPACE	---	---	SPACE	--	32
33	--	SPACE	---	---	SPACE	--	34
35	--	SPACE	---	---	SPACE	--	36
37	--	SPACE	---	---	SPACE	--	38
39	--	SPACE	---	---	SPACE	--	40
41	--	SPACE	---	---	SPACE	--	42

LIGHTING FIXTURE SCHEDULE

TYPE	BRAND	MODEL #	MOUNTING TYPE	LAMP	TOTAL FIXTURE POWER	VOLTAGE	NOTES:
A	SPI	EIP 10862-1M1000-277V-PT01	PENDENT	(1) 1M1000PS	1000W	277	–
B	METALUX	HBI-65475-N-UNV-EHT2-SWG-U	PENDENT	(6) F54/T5/35K	400W	277	88" BELOW ROOF DECK
B1	METALUX	HBI-65475-N-120-EHT2-SWG-U	RECESSED	(6) F54/T5/35K	400W	277	EMERGENCY FROM INVERTER
C	METALUX	2AC-214T5-UNV-L5835-EBT1-U	RECESSED	(2) F14/T5/35K	30W	120	–
C1	METALUX	2AC-214T5-120V-EL-I320-L5835-EBT1-U	RECESSED	(2) F14/T5/35K	30W	120	W/ IOTA 1400 LUMEN BATTERY PACK
C2	METALUX	2AC-214T5-UNV-L5835-EBT1-U(MARK X)	RECESSED	(2) F14/T5/35K	50W	120	W/ ADVANCE MARK X DIMMING BALLAST
C3	METALUX	2AC-214T5-UNV-L5835-EBT2-U-W/N-DIM	RECESSED	(2) F14/T5/35K	50W	120	W/ STEP DIMMING
C4	METALUX	2AC-214T5-UNV-L5835-EBT1-U	RECESSED	(2) F14/T5/35K	50W	120	–
C5	METALUX	2AC-214T5-120V-EL-I320-L5835-EBT1-U	RECESSED	(2) F14/T5/35K	50W	120	W/ DF22W DRYWALL INSTALL
D	METALUX	IAF-228T5-UNV-EBT1-U	PENDENT	(2) F28/T5/35K	65W	120	–
E	HALO	H750ICAT-ML709835ICAT12D0-493HS06	CAN	15W LED	15W	120	EMERGENCY FROM INVERTER
F	LUMIERE	730-WH35PAR30-120V-ELSW-WT	SURFACE	30W MH	30W	120	–
G	METALUX	BAU-214-UNV-EBT1-U	WALL MTD.	(2) F13/T8/35K	34W	120	–
H1	METALUX	2AC-228T5-UNV-L58535-EBT1-U	RECESSED	(2) F28/T5/35K	56W	120	–
H2	METALUX	2ACS-228T5-UNV-L58535-EBT1-U	SURFACE	(2) F28/T5/35K	56W	120	–
S1	MCGRAW	ISC-A01-LED-E1-BL3-WH	WALL MTD.	26W LED	26W	120	ALSO SHOWN AND SCHEDULED ON E1.1
XA	SURELITES	LPX70RWH-120	EXIT SIGN	LED	–	120	–

ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION	NOTES
S	SINGLE POLE SWITCH	MOUNT @ 44" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED
S_3	THREE WAY SWITCH	MOUNT @ 44" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED
S_K	KEYED SWITCH	MOUNT @ 44" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED (CONTROLS CONTRACTOR WILL PROVIDE VFD UNIT.)
X	2'x2' FIXTURE, TYPE X	SEE LIGHTING FIXTURE SCHEDULE FOR TYPES
X	1'x4' FIXTURE, TYPE X	SEE LIGHTING FIXTURE SCHEDULE FOR TYPES
X	TYPE X FIXTURE W/ EMERGENCY	SEE LIGHTING FIXTURE SCHEDULE FOR TYPES
X	EXIT SIGN, TYPE X	SEE LIGHTING FIXTURE SCHEDULE FOR TYPES
GB	SINGLE GANG BOX	MOUNT @ 44" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED
	DUPLEX OUTLET - 20 AMP	MOUNT @ 24" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED
GFI	DUPLEX OUTLET - GROUND FAULT	MOUNT @ 24" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED
WP	DUPLEX OUTLET - WEATHER PROOF COVER	MOUNT @ 24" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED
	SPECIAL PURPOSE OUTLET, AS NOTED	REFER TO SHOP DRAWINGS FOR CONNECTION REQUIREMENTS
	MOTOR, AS SPECIFIED	REFERENCE SPECIFICATIONS FOR REQUIREMENTS
	FUSED DISCONNECT	REFER TO GENERAL ELECTRICAL NOTES AND ONE-LINE DIAGRAM.
	STARTER/DISCONNECT	REFERENCE SPECIFICATIONS FOR REQUIREMENTS
VFD	FUSED DISCONNECT FOR VFD CONNECTION	PROVIDE ALL LINE VOLTAGE WIRING AND CONDUIT FOR VFD INSTALL. (CONTROLS CONTRACTOR WILL PROVIDE VFD UNIT.)
	LIGHTING/BRANCH CIRCUIT PANELS	REFER TO GENERAL ELECTRICAL NOTES AND ONE-LINE DIAGRAM.
TV	PHONE/DATA OUTLET	MOUNT @ 24" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED, EC TO PROVIDE SINGLE GANG BOX WITH 1"C STUBBED IN ABOVE CEILING
	DATA OUTLET	MOUNT @ 24" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED, EC TO PROVIDE SINGLE GANG BOX WITH 1"C STUBBED ABOVE CEILING
	PHONE OUTLET	MOUNT @ 48" A.F.F. TO BOTTOM OF BOX, UNLESS OTHERWISE NOTED, EC TO PROVIDE SINGLE GANG BOX WITH 1"C STUBBED ABOVE CEILING
AP	WIRELESS ACCESS POINT	NOTED FOR REFERENCE ONLY.
	SECURITY CAMERA	NOTED FOR REFERENCE ONLY.
T	MECHANICAL THERMOSTAT	PROVIDE CONDUIT AND BACKBOX
S	MECHANICAL SENSOR	PROVIDE CONDUIT AND BACKBOX

OCCUPANCY LEGEND

SYMBOL	BRAND	MODEL #	DESCRIPTION
B	LEVITON	OSSMT-MDW	WALLBOX MOUNTED MULTI-TECHNOLOGY OCCUPANCY SENSOR
OS1	LEVITON	OSC10-MOW	CEILING MOUNTED ULTRASONIC OCCUPANCY SENSOR (1000 SQ. FT)
PP	LEVITON	OSP20-0DO	POWER PACK FOR 120VAC SYSTEM
S_T	LEVITON	6512H	TIMER SWITCH UP TO 12 HOURS

ELECTRIC WALL HEATER SCHEDULE

MARK	MANU.	MODEL No.	BTU/HR.	WATTS	ELECTRICAL	REMARKS
WH-1	MARKEL	J3425T	17,065	5000	208v/3ø, 5000W	BUILT IN THERMISTAT& CIRCUIT BREAKER

NOTES:
1. UNITS BASED ON MARKEL. (Q-MARK & ELECTROMODE MAY BE BID AS EQUAL).

WIRE SIZE REQUIREMENTS

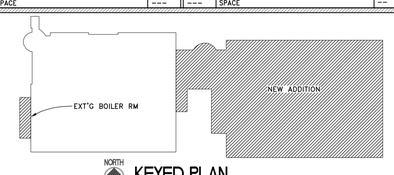
NOTE:
BASED ON A MAXIMUM OF 6-VOLT DROP (5%) ON 120V CIRCUITS.
WIRES FOR RUNS OVER 100'-0" SHALL BE DETERMINED ON THIS A MAXIMUM OF A 5% DROP ALLOWED.

BRANCH CIRCUIT AMPS	LENGTH OF RUN - FROM PANEL TO FIRST CONNECTION - FEET								
AMPS	50'	60'	70'	80'	90'	100'	110'	120'	130'
15	#12	#12	#12	#12	#12	#12	#10	#10	#10
20	#12	#12	#12	#10	#10	#10	#10	#10	#8
30	#10	#10	#10	#10	#8	#8	#8	#8	#6

INVERTER SCHEDULE

CIRCUIT #	LOAD	VOLTAGE	OUTPUT	DESCRIPTION
INV-1	1512W	277V	20A/1P	TRACK - LCP1/R41
INV-2	648W	277V	20A/1P	TURF - LCP1/R42
INV-3	330W	120V	20A/1P	CLASSROOM

INVERTER TO BE A CONTROL POWER # ELU-JYX-3.0-1S1(3/20)0 W/ "PLUS" WARRANTY. WARRANTY SHALL BE A (2) YEARS WITH ALL PARTS AND LABOR COVERED FOR THE FIRST YEAR AND ALL PARTS INCLUDED FOR YEAR TWO.



KEYED PLAN

N.T.S.

ELECTRICAL NOTES

1. PRIOR TO SUBMITTING A PROPOSAL, BIDDER SHALL HAVE VISITED THE CONSTRUCTION SITE. HE SHALL BE FAMILIAR WITH THE EXISTING CONDITIONS UNDER WHICH HE WILL HAVE TO OPERATE AND WHICH WILL IN ANY WAY AFFECT THE WORK UNDER THIS CONTRACT, NO SUBSEQUENT ALLOWANCE WILL BE MADE IN THIS CONNECTION ON BEHALF OF THE CONTRACTOR FOR ANY ERROR OR NEGLIGENCE ON HIS
2. ELECTRICAL WORK SHALL COMPLY WITH THE LATEST ENFORCEABLE EDITION OF THE N.E.C., LOCAL AND STATE CODES, ORDINANCES, REGULATIONS, INCLUDING THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA), AND ADA GUIDELINES WITH THE LOCAL CODE AUTHORITIES HAVING JURISDICTION.
3. ELECTRICAL CONTRACTOR SHALL OBTAIN ALL PERMITS, PAY ALL FEES, INCLUDING COSTS ASSESSED BY THE ELECTRIC UTILITY COMPANIES, AND ARRANGE FOR ALL INSPECTIONS FOR HIS WORK. AT THE COMPLETION OF ELECTRICAL WORK, THE ELECTRICAL CONTRACTOR SHALL FURNISH THE OWNER WITH ALL CERTIFICATES OF FINAL INSPECTION AND APPROVALS.
4. ELECTRICAL MATERIALS SHALL BE NEW, AND BEAR THE "UL" LABEL
5. BRANCH CIRCUIT WIRE FOR LIGHTING, RECEPTACLE AND SMALL POWER SHALL BE COPPER, RATED 75 DEGREES C, MINIMUM SIZE #12 AWG, AND BE TYPE "THHN", AND BE INSTALLED IN EMT, UNLESS OTHERWISE NOTED OR REQUIRED BY CODE. FEEDERS AND SECONDARY SERVICE CONDUCTORS SHALL BE STRANDED COPPER WITH 600 VOLT INSULATION, RATED 90 DEGREES C, TYPE "THHN", AND BE INSTALLED IN EMT OR PVC CONDUIT, MINIMUM SIZE 1/2" UNLESS OTHERWISE NOTED OR REQUIRED BY CODE. ALL WIRE AND CABLE SHALL BE NEW AND SHALL BE DELIVERED TO PROJECT IN UNBROKEN AND UNDAMAGED CARTONS AND REELS.
6. FUSES SHALL BE "UL" LISTED, DUAL AS MANUFACTURED BY BUSMAN CO., OR APPROVED EQUAL (200,000 ERIC).
7. PLATES FOR SWITCHES AND RECEPTACLES SHALL BE BRUSHED STAINLESS STEEL.
8. FLUORESCENT FIXTURE BALLAST VOLTAGE RATING SHALL BE AS NOTED, NON, HIGH POWER FACTOR, ENERGY SAVING, CLASS P, "A" SOUND RATED. HIGH DISCHARGE (HID) BALLAST SHALL BE NON, HIGH POWER FACTOR, CONSTANT WATTAGE AUTO TRANSFORMER TYPE, WITH STARTING CURRENT NOT EXCEEDING THE OPERATING CURRENT.
9. PANEL BOARDS SHALL BE RATED 120/240V, 1 PHASE, 4W, AS NOTED WITH PLUG TYPE BRANCH CIRCUIT BREAKERS RATED A MINIMUM 10,000 A.I.C. PANEL BOARDS SHALL BE SIMILAR TO SQUARE D, TYPE QO AND I-LINE, OR EQUAL BY WESTINGHOUSE/ CHALLENGER, E.T.A.., OR GENERAL ELECTRIC.
10. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT ELECTRIC UTILITY COMPANIES SERVICE POINTS AND PRIMARY SERVICE CONDUIT, ROUTING, AND SIZE WITH UTILITY COMPANY SERVICE PLANNERS PRIOR TO BEGINNING WORK.
11. ELECTRICAL CONTRACTOR SHALL GUARANTEE ALL WORK INSTALLED UNDER HIS CONTRACT TO BE FREE FROM DEFECTIVE WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR AFTER THE ACCEPTANCE OF THE BUILDING BY THE OWNER. SHOULD DEFECTS OCCUR WITHIN THIS PERIOD, REPAIR AND/OR REPLACE DEFECTIVE ITEMS AT NO EXPENSE
12. ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATIONS OF HIS EQUIPMENT AND WORK WITH OTHER BUILDING TRADES TO AVOID ANY INTERFERENCE'S BETWEEN HIS WORK AND THE WORK OF OTHER BUILDING TRADES. IF ANY DISCREPANCIES OCCUR, CONSULT WITH THE ARCHITECT AND/OR OWNER BEFORE CONTINUING.
13. LAMPS - ALL LAMPS SHALL BE CLASSIFIED "ENERGY SAVING", AND BE PROVIDED BY E.C. (LIGHTOLIER MAY BE BID AS AN EQUAL.)
14. THE CONTRACTOR SHALL BE HELD FULLY RESPONSIBLE FOR THE PROPER RESTORATION OF ALL EXISTING SURFACES REQUIRING PATCHING, PLASTERING, PAINTING AND/OR OTHER REPAIR DUE TO THE INSTALLATION OF ELECTRICAL WORK UNDER THE TERMS OF THIS SPECIFICATION. CLOSE ALL OPENINGS, REPAIR ALL SURFACES.
15. THE ELECTRICAL CONTRACTOR SHALL PERIODICALLY REMOVE FROM THE SITE ALL DEBRIS AND RUBBISH ACCUMULATING AS A RESULT OF THE ELECTRICAL INSTALLATION. UPON COMPLETION OF THE PROJECT, HE SHALL DISPOSE OF ALL DEBRIS AND RUBBISH AND SHALL LEAVE ALL AREAS CLEAN. THE INTERIORS OF ALL CABINETS, PULL AND BOXES, AND EQUIPMENT ENCLOSURES SHALL BE FREE OF ANY DEBRIS.
16. UNDERGROUND CONDUIT TO BE SCHEDULE 40 PVC.
17. ELECTRICAL JOINTS WILL BE PERMITTED ONLY IN JUNCTION AND OUTLET BOXES. ALL JOINTS SHALL BE FIRMLY BONDED TOGETHER AND TAPED OR SHALL BE MADE WITH MECHANICAL CONNECTORS.

2011 PROJECT FOR:
NORTHWOOD UNIVERSITY - AUDITORIUM AND TURF BUILDING
MIDLAND, MICHIGAN

JOB NUMBER
E 09-237

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PROJECT# 1101-50

DRAWING
E1.2

PROVIDE AND CONNECT DUCT SMOKE DETECTOR IN RETURN AND SUPPLY DUCTWORK

A-31 TO ZMAX R42

MT. RECEPTACLES AND DATA DROP AT ± 27' A.F.F. FOR FILMING PLATFORM – VERIFY EXACT LOCATION W/ OWNER

2 HR FIRE/SMOKE SEPARATION

AHU-1 SEE ONE-LINE DIAGRAM

P-1 FED FROM AHU-1 CIRCUIT

NOTE: ADJUST LIGHTING AS REQ'D TO COORDINATE W/ DUCTWORK (TYPICAL)

TO LIGHT FIXTURES SEE RELAY PANEL DETAIL

TO BATTING CAGES

TO FIELD GOAL

MT. RECEPTACLES AND DATA DROP AT ± 27' A.F.F. FOR FILMING PLATFORM – VERIFY EXACT LOCATION W/ OWNER

MOUNT FIXTURES AT ± 84" BELOW ROOF DECK

NOTE:
THE LIGHTING FOR THE TURF BUILDING IS TO PRODUCE AN AVERAGE OF 50FC WITH JUST THE TYPE 'A' LIGHTS ON AND 75FC WITH ALL LIGHTS (TYPES 'A' & 'B') ON.

NOTE: ADJUST LIGHTING AS REQ'D TO COORDINATE W/ DUCTWORK (TYPICAL)

P-2 FED FROM AHU-2 CIRCUIT

AHU-2 SEE ONE-LINE DIAGRAM

PROVIDE AND CONNECT DUCT SMOKE DETECTOR IN RETURN AND SUPPLY DUCTWORK

600A DISCONNECT

FLOOR PLAN - ELECTRICAL

SCALE: 3/32" = 1'-0"

NORTH

2011 PROJECT FOR:

NORTHWOOD UNIVERSITY - AUDITORIUM AND TURF BUILDING

MIDLAND, MICHIGAN

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DRAWING E1.3