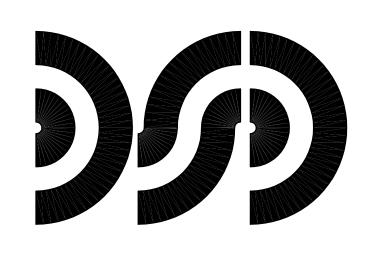
CITY OF ANN ARBOR

LARCOM SECONDARY CHILLER PROJECT

301 E. HURON STREET
ANN ARBOR, MICHIGAN 48104



DICLEMENTE SIEGEL DESIGN INC.

28105 GREENFIELD ROAD
SOUTHFIELD, MICHIGAN 48076-3046
DSD PROJECT No. 13-1310

ENGINEERING AND ARCHITECTURE

GENERAL SHEET INDEX

SHEET DESCRIPTION

G-1 TITLE SHEET

ARCHITECTURAL SHEET INDEX

SHEET DESCRIPTION

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A-3 ROOF FRAMING PLAN & DETAILS

A-4 SECTIONS & PLAN DETAILS

A-5 SPECIFICATIONS
A-6 SPECIFICATIONS

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MECHANICAL SHEET INDEX

SHEET DESCRIPTION

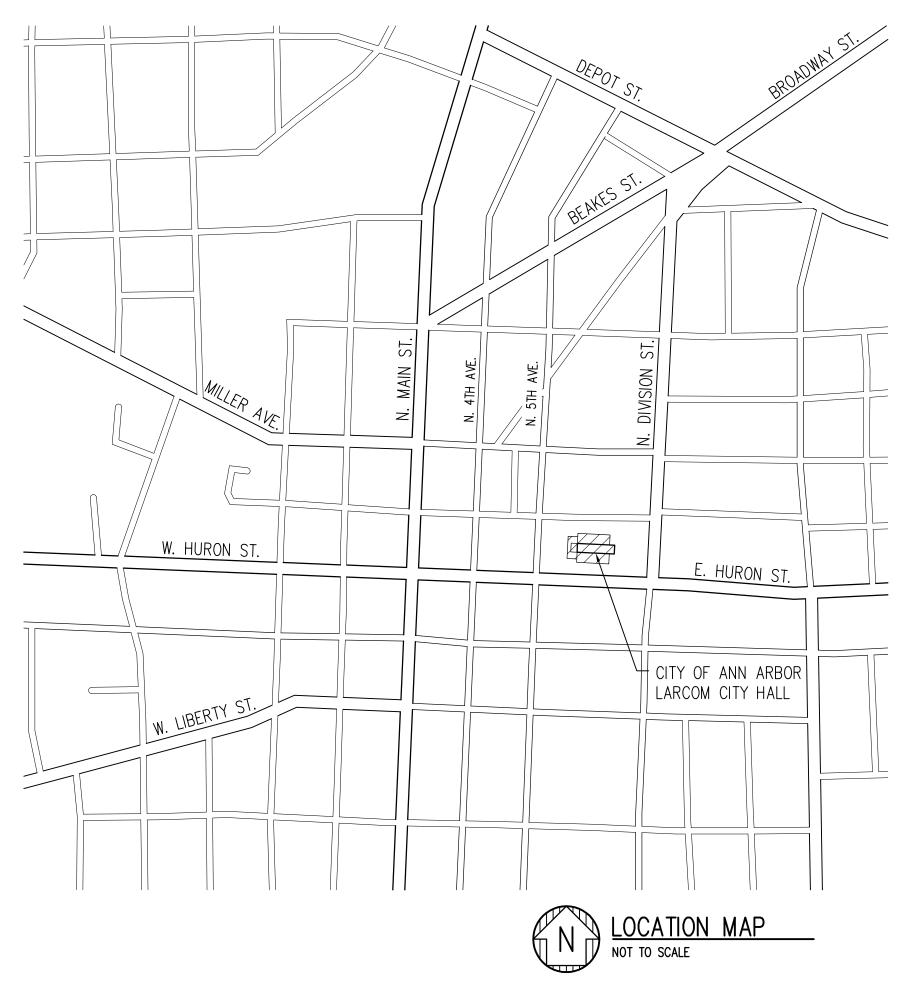
M-1 MECHANICAL GENERAL INFORMATION
M-2 PENTHOUSE FLOOR & ROOF PLANS

ELECTRICAL SHEET INDEX

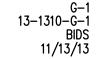
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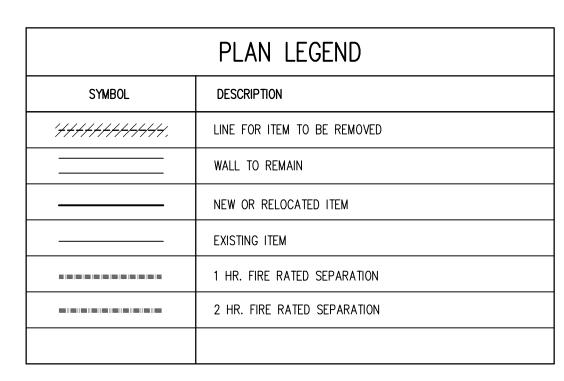
E-1 GENERAL ELECTRICAL INFORMATION

E-2 UPPER AND LOWER PENTHOUSE FLOOR PLANS - ELECTRICAL









GENERAL SYMBOLS		
SYMBOL	DESCRIPTION	
XX	NEW COLUMN NUMBER IDENTIFICATION AND GRID	
<u> </u>	EXISTING COLUMN NUMBER IDENTIFICATION AND GRID	
LX	SECTION IDENTIFIER	
X	DETAIL DESIGNATOR	
4 A-3 2	ELEVATION DESIGNATOR	
•	WORK POINT / ELEVATION ABOVE FINISHED FLOOR OR GRADE	
	MATCH LINE	
	BREAK LINE	
XXX	ROOM NUMBER IDENTIFIER	
XXX	DOOR NUMBER IDENTIFIER	
WINDN	WINDOW NUMBER IDENTIFIER	
AODNOM	ADDENDUM NUMBER IDENTIFIER	
в у До	BULLETIN NUMBER IDENTIFIER	

	ADKEV	IATIONS	
A.F.F.	ABOVE FINISHED FLOOR	N.I.C.	
ALUM.	ALUMINUM	NON. COMB.	
ARCH.	ARCHITECTURAL	N.T.S.	NOT TO SCALE
ASSY.	ASSEMBLY	0.C.	ON CENTER
BD.	BOARD	0.H.	OVERHEAD
B.F.	BARRIER FREE	OPN'G.	OPENING
B.O.S.	BOTTOM OF STEEL	OPP.	OPPOSITE
BOT.	BOTTOM	PL.	PLATE
BRG.	BEARING	P.LAM.	PLASTIC LAMINATE
	CONTROL JOINT	PT.	
C.J.			PAINT
CLG.	CEILING	PTD.	PAINTED
CLR.	CLEAR	PR.	PAIR
CLOS.	CLOSET	R.	RADIUS
C.M.U.	CONCRETE MASONRY UNIT	R.A.	RETURN AIR
C.O.	CLEAN OUT	R.B.	RUBBER BASE
COMM.	COMMUNICATION	REINF.	REINFORCED/REINFORCING
COMP.	COMPACTED	REQ'D.	REQUIRED ´
CONC.	CONCRETE	RM.	ROOM
CONSTR.	CONSTRUCTION	R.O.	ROUGH OPENING
CONT.	CONTINUOUS	S.C.	SOLID CORE
CONTR.	CONTRACTOR	5.0. 9 F	SQUARE FEET
CONTR.		S.F. SHT. SIM.	
	CARPET	SH I.	SHEET
C.T.	CERAMIC TILE	SIM.	SIMILAR
DET.	DETAIL	S.S.	STAINLESS STEEL
DIA.	DIAMETER	ST.	STONE
D.O.	DOOR OPENING	STL.	STEEL
DR.	DOOR	STRUCT.	STRUCTURAL
DWG.	DRAWING	SUSP.	SUSPENDED
E.J.	EXPANSION JOINT	THK.	THICK
ELECT.	ELECTRICAL	THRU	THROUGH
EL. OR ELEV.		T.O.	TOP OF
ENG.	ENGINEER	T.O.C.	TOP OF CURB
		T.O. CONC.	
EQ.	EQUAL		
EQUIP.		T&G	TONGUE AND GROOVE
E.W.C.	ELECTRIC WATER COOLER	T.S.	TUBE STEEL
EX.	EXISTING	T.O.S.	TOP OF STEEL
EXP.	EXPANSION	TYP.	TYPICAL
EXT.	EXTERIOR	UNEXCAV.	UNEXCAVATED
FIN.	FINISH	U.O.N.	UNLESS OTHERWISE NOTE
FL. OR FLR.	FLOOR	V.C.T.	VINYL COMPOSITION TILE
GALV.	GALVANIZED	VERT.	VERTICAL
GA.	GAUGE	VEST.	VESTIBULE
G.C.	GENERAL CONTRACTOR	V.I.F.	VERIFY IN FIELD
GL.	GLASS OR GLAZING	W/	WITH
GYP.	GYPSUM	WD.	WOOD
HDWR.	HARDWARE	W.P.	WORK POINT
H.D.G.	HOT-DIPPED GALVANIZED		
H.M.	HOLLOW METAL		
HORIZ.	HORIZONTAL		
H.P.	HIGH POINT		
HT.	HEIGHT		
INSUL.	INSULATION		
INT.	INTERIOR		
JAN.	JANITOR		
JST.	JOIST		
LAM.	LAMINATE		
LAV.	LAVATORY		
L.P.	LOW POINT		
MANUF.	MANUFACTURER		
MAS.	MASONRY		
MAX.	MAXIMUM		
MECH.	MECHANICAL		
MET. OR MTL.	METAL		
MIN.	MINIMUM		
MTD.	MOUNTED		
M.O.	MASONRY OPENING		

	GENERAL SHEET INDEX		
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A-7	SPECIFICATIONS		

OVERVIEW OF ARCHITECTURAL SCOPE

THIS OVERVIEW OF SCOPE IS INCLUDED TO GIVE THE CONTRACTOR A GENERAL OVERVIEW OF THE PROJECT REQUIREMENTS. THE OVERVIEW IS NOT ALL INCLUSIVE AND IS NOT INTENDED TO, AND SHOULD NOT BE USED TO, ESTABLISH CONTRACT LIMITS OR PRICING INCLUSIONS. THE CONTRACT DOCUMENTS SHALL BE USED TO ESTABLISH CONSTRUCTION CONTRACT SCOPE.

THIS OVERVIEW OF SCOPE INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

ARCHITECTURAL:

1. PROVIDE SHIP LADDER AT THE PENTHOUSE TO THE PENTHOUSE ROOF. PROVIDE ROOF HATCH AT PENTHOUSE ROOF.

PROVIDE STEEL REINFORCING AT PENTHOUSE ROOF.

PROVIDE FLASHING AND OR ROOM MEMBRANE AT ROOF CURBS FOR NEW ROOF TOP UNITS.

PROJECT REQUIREMENTS

PROVIDE ALL NECESSARY PERMITS. ALL WORK SHALL BE INSTALLED TO COMPLY WITH THE OWNER'S STANDARDS, STATE AND LOCAL CODES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING CODES AND THEIR RELATED REFERENCES.

2011 NATIONAL ELECTRICAL CODE AS AMENDED BY THE 2011

MICHIGAN ELECTRICAL COAD RULES, PART 8

NFPA 101 LIFE SAFETY CODE 1997 AND 2006 (AS REFERENCED)

MICHIGAN ENERGY CODE-ASHRAE 90.1-2007 2009 INTERNATIONAL FIRE CODE (AS REFERENCED)

2009 MICHIGAN BUILDING CODE

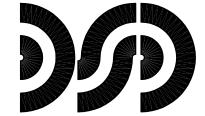
2012 MICHIGAN MECHANICAL CODE

2009 MICHIGAN PLUMBING CODE

2009 INTERNATIONAL FUEL GAS CODE

MANUFACTURER AND MODEL NUMBER LISTED REPRESENTS THE BASIS OF DESIGN FOR THIS PROJECT. THE CONTRACTOR SHALL BEAR ALL ADDITIONAL COSTS ASSOCIATED WITH USING EQUIPMENT AND/OR SYSTEMS BY OTHER APPROVED MANUFACTURERS INCLUDING ADDITIONAL COSTS BY OTHER TRADES.

ALL EQUIPMENT AND/OR SYSTEMS INSTALLED SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. WHERE FIELD OR PROJECT CONDITIONS DO NOT ALLOW ALL MANUFACTURER'S RECOMMENDATIONS TO BE MET, THE INSTALLING CONTRACTOR SHALL SUBMIT IN WRITING TO THE ARCHITECT THE PROPOSED DEVIATION, IN A SKETCH FORM, ACCOMPANIED BY THE MANUFACTURER'S CONCURRENCE.



DiClemente Siegel Design

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CITY OF ANN ARBOR LARCOM SECONDARY CHILLER PROJECT ANN ARBOR, MI

> **ARCHITECTURAL GENERAL** INFORMATION

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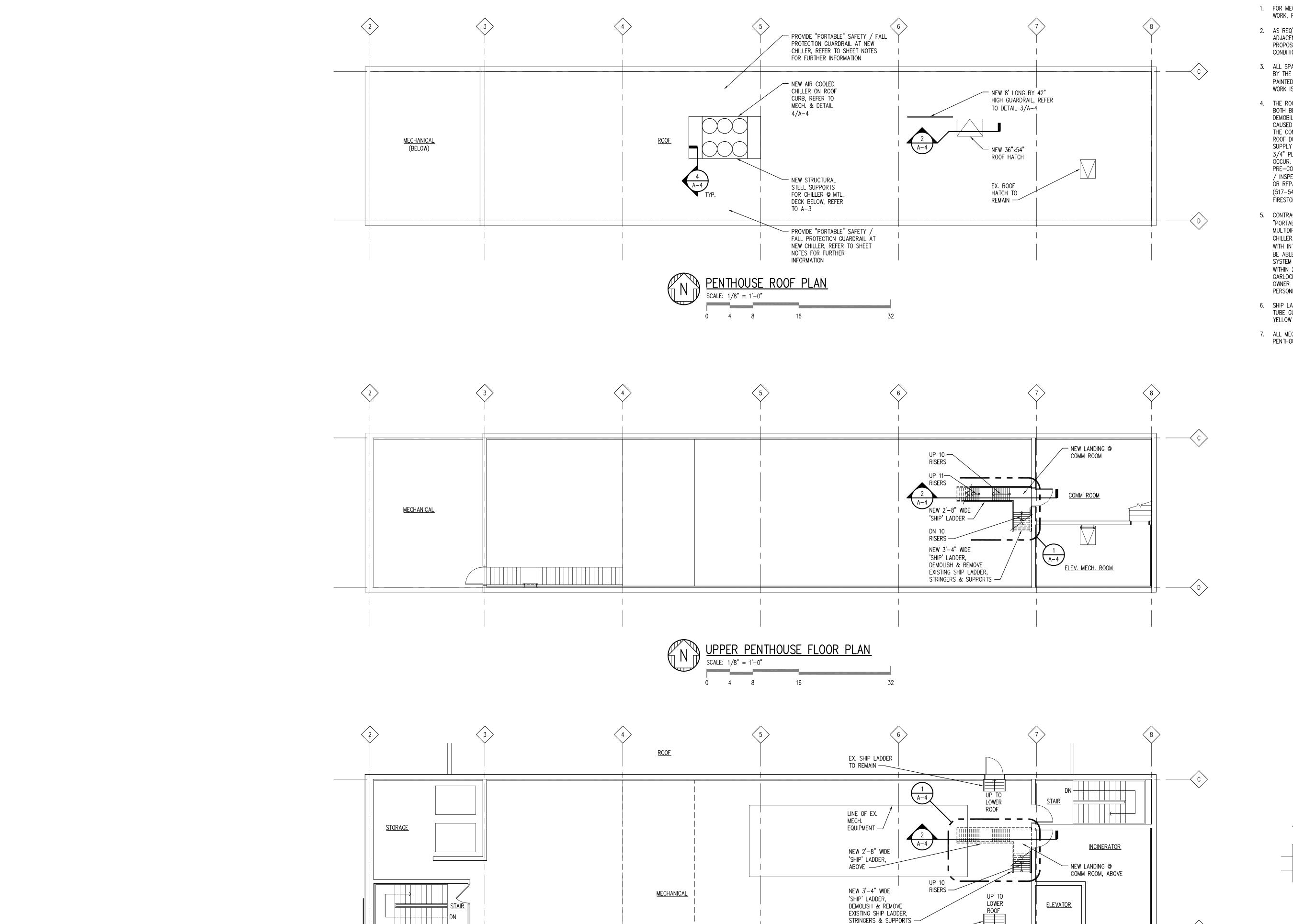
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10/18/13
11/13/13

PROJECT No.	13-1310
ACADFILE:	13-1310-A-1
CHECKED:	GDC
PM / PIC:	JSR/LAT
DRAWN:	CLF
DESIGNER:	CLF

A-1



<u>ROOF</u>



- FOR MECHANICAL AND ELECTRICAL DEMOLITION AND NEW WORK, REFER TO MECHANICAL AND ELECTRICAL DRAWINGS
- AS REQ'D. PATCH, REPAIR AND OR PAINT / REPLACE
 ADJACENT SURFACES TO MATCH ORIGINAL CONDITIONS WHERE
 PROPOSED ARCH. & M.E.P. WORK DISTURBED EXISTING
 CONDITIONS
- 3. ALL SPACES ARE TO BE CLEANED AND ANY DAMAGE CAUSED BY THE CONTRACTOR IS TO BE PATCHED, REPAIRED AND OR PAINTED / REPLACED TO MATCH ORIGINAL CONDITIONS ONCE WORK IS COMPLETED
- 4. THE ROOF IS UNDER WARRANTY AND WILL BE INSPECTED BOTH BEFORE THE CONTRACTOR MOBILIZES AND AFTER DEMOBILIZATION TO CONFIRM THAT THERE ARE NOT DAMAGES CAUSED BY CONSTRUCTION ACTIVITIES OF THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF THE ROOF DURING THEIR CONSTRUCTION ACTIVITIES AND MUST SUPPLY AT A MINIMUM RIGID FOAM BOARD COVERED BY 3/4" PLYWOOD TO PROTECT THE ROOF WHERE WORK IS TO OCCUR. CONTRACTOR TO ARRANGE BOTH PRE—CONSTRUCTION AND POST—CONSTRUCTION CONFERENCES / INSPECTIONS. CONTACT FOR ANY ROOFING PENETRATIONS OR REPAIRS IS CEI, MICHIGAN OUT OF HOWELL, MI (517—548—0039). THE ROOF WAS A PRODUCT OF FIRESTONE ROOFING SYSTEMS (800—830—5612)
- 5. CONTRACTOR TO PROVIDE (3) 10 FOOT (MIN.) SECTIONS OF "PORTABLE" SAFETY / FALL PROTECTION GUARDRAIL W/MULTIDIRECTIONAL BASE FOR EACH POST AT NEW ROOF CHILLER. GUARDRAILS TO BE 42" MIN. HEIGHT AND DESIGNED WITH INTERMEDIATE RAILS SO AS A 21" SPHERE WILL NOT BE ABLE TO PASS THRU THE RAILS / OPENINGS. GUARDRAIL SYSTEM MUST BE ABLE TO WITHSTAND 200 POUND FORCE WITHIN 2" OF THE TOP EDGE. SYSTEM TO MATCH EXISTING GARLOCK EQUIPMENT COMPANY, RAILGUARD 200 #161021. OWNER TO ASSURE GUARDRAIL SYSTEM IS IN PLACE WHEN PERSONNEL ARE WORKING ON ROOF CHILLER
- 6. SHIP LADDER STRINGERS, TREADS, LANDINGS AND STEEL TUBE GUARDRAILS, RAILINGS SHALL BE PAINTED SAFETY YELLOW
- 7. ALL MECHANICAL AND ELECTRICAL PENETRATIONS THRU PENTHOUSE ROOF DECK TO BE 2 HOUR MIN. FIRE STOPPED



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CITY OF ANN ARBOR
LARCOM SECONDARY
CHILLER PROJECT
ANN ARBOR, MI

PENTHOUSE FLOOR & ROOF PLANS

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A-2	
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ACADFILE:	13-1310-A-2
CHECKED:	GDC
PM / PIC:	JSR/LAT
DRAWN:	CLF
DESIGNER:	CLF

LOWER PENTHOUSE FLOOR PLAN

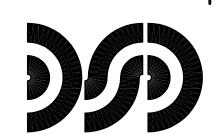
SCALE: 1/8" = 1'-0"

0 4 8 16 32

EX. SHIP LADDER TO REMAIN

SHEET NOTES:

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- 6. SHIP LADDER STRINGERS, TREADS, LANDINGS AND STEEL TUBE GUARDRAILS, RAILINGS SHALL BE PAINTED SAFETY YELLOW



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CITY OF ANN ARBOR LARCOM SECONDARY CHILLER PROJECT ANN ARBOR, MI

> **ROOF FRAMING** PLAN & DETAILS

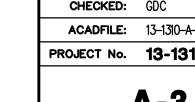
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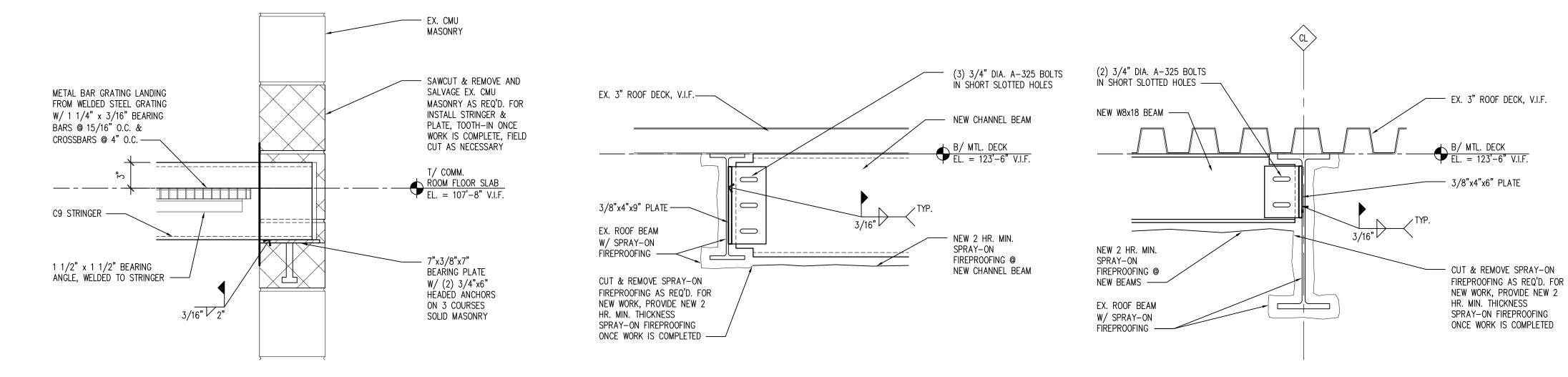
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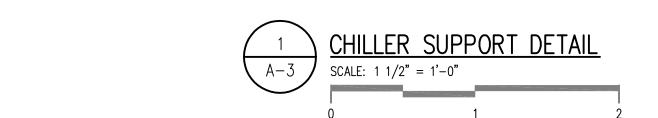
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DRAWN:	CLF
PM / PIC:	JSR/LAT
CHECKED:	GDC
ACADFILE:	13-1 <i>3</i> 10-A-3
PROJECT No.	13-1310

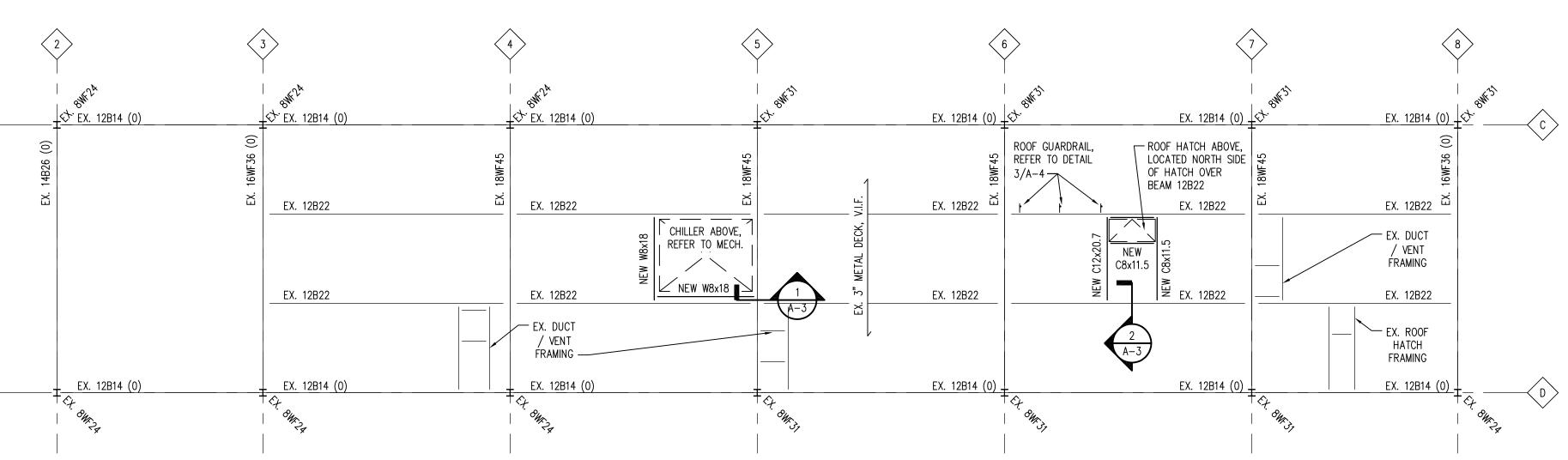


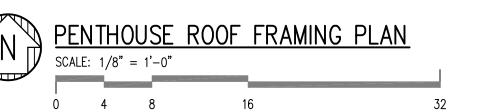


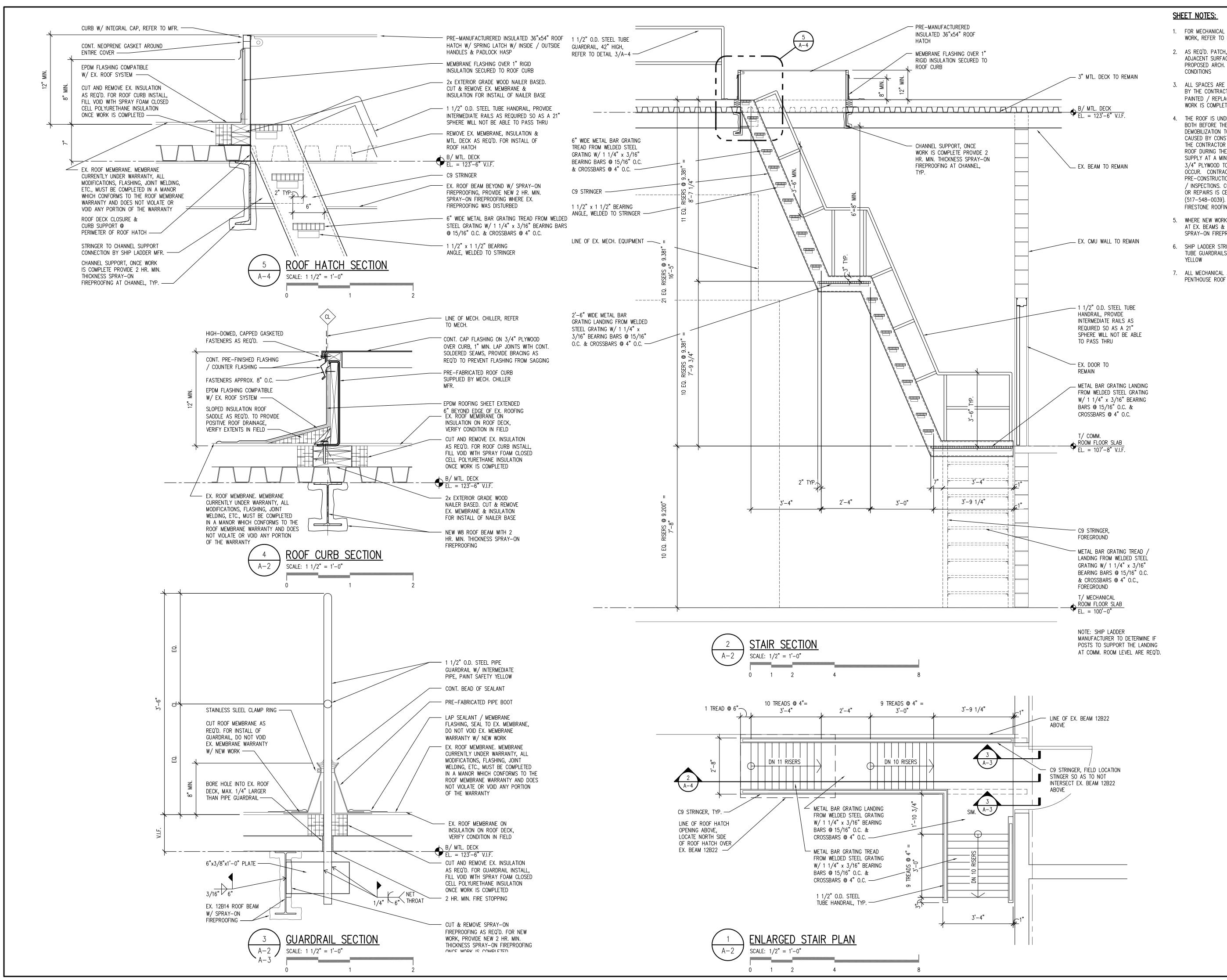




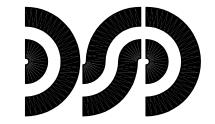








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CITY OF ANN ARBOR
LARCOM SECONDARY
CHILLER PROJECT
ANN ARBOR, MI

SECTIONS & PLAN DETAILS

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PM / PIC:	JSR/LAT
DRAWN:	CLF
DESIGNER:	CLF

A-4

1.1 SUMMARY

- A. SECTION INCLUDES:
- 1. DEMOLITION AND REMOVAL OF SELECTED PORTIONS OF BUILDING OR STRUCTURE.
- 2. DEMOLITION AND REMOVAL OF SELECTED SITE ELEMENTS.
- 3. SALVAGE OF EXISTING ITEMS TO BE REUSED OR RECYCLED.

1.2 DEFINITIONS

- A. REMOVE: DETACH ITEMS FROM EXISTING CONSTRUCTION AND LEGALLY DISPOSE OF THEM OFF-SITE UNLESS INDICATED TO BE REMOVED AND SALVAGED OR REMOVED AND REINSTALLED.
- B. REMOVE AND SALVAGE: CAREFULLY DETACH FROM EXISTING CONSTRUCTION, IN A MANNER TO PREVENT DAMAGE, AND DELIVER TO
- C. REMOVE AND REINSTALL: DETACH ITEMS FROM EXISTING CONSTRUCTION, PREPARE FOR REUSE, AND REINSTALL WHERE INDICATED.
- D. EXISTING TO REMAIN: EXISTING ITEMS OF CONSTRUCTION THAT ARE NOT TO BE PERMANENTLY REMOVED AND THAT ARE NOT OTHERWISE INDICATED TO BE REMOVED, REMOVED AND SALVAGED, OR REMOVED AND REINSTALLED.
- 1.3 PREINSTALLATION MEETINGS
- A. PREDEMOLITION CONFERENCE: CONDUCT CONFERENCE AT LARCOM CITY HALL, ANN ARBOR, MICHIGAN.

1.4 FIELD CONDITIONS

- A. OWNER WILL OCCUPY PORTIONS OF BUILDING IMMEDIATELY ADJACENT TO SELECTIVE DEMOLITION AREA. CONDUCT SELECTIVE DEMOLITION SO OWNER'S OPERATIONS WILL NOT BE DISRUPTED.
- B. CONDITIONS EXISTING AT TIME OF INSPECTION FOR BIDDING PURPOSE WILL BE MAINTAINED BY OWNER AS FAR AS PRACTICAL. NOTIFY ARCHITECT OF DISCREPANCIES BETWEEN EXISTING CONDITIONS AND DRAWINGS BEFORE PROCEEDING WITH SELECTIVE DEMOLITION.
- C. HAZARDOUS MATERIALS: IT IS NOT EXPECTED THAT HAZARDOUS MATERIALS WILL BE ENCOUNTERED IN THE WORK.
- 1. HAZARDOUS MATERIALS WILL BE REMOVED BY OWNER BEFORE
- START OF THE WORK. 2. IF SUSPECTED HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB: IMMEDIATELY NOTIFY ARCHITECT AND OWNER. HAZARDOUS MATERIALS WILL BE REMOVED BY OWNER UNDER A
- D. STORAGE OR SALE OF REMOVED ITEMS OR MATERIALS ON-SITE IS NOT
- E. UTILITY SERVICE: MAINTAIN EXISTING UTILITIES INDICATED TO REMAIN IN SERVICE AND PROTECT THEM AGAINST DAMAGE DURING SELECTIVE DEMOLITION OPERATIONS.

1.5 WARRANTY

A. EXISTING WARRANTIES: REMOVE, REPLACE, PATCH, AND REPAIR MATERIALS AND SURFACES CUT OR DAMAGED DURING SELECTIVE DEMOLITION, BY METHODS AND WITH MATERIALS SO AS NOT TO VOID EXISTING WARRANTIES.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

SEPARATE CONTRACT.

- A. REGULATORY REQUIREMENTS: COMPLY WITH GOVERNING EPA NOTIFICATION REGULATIONS BEFORE BEGINNING SELECTIVE DEMOLITION. COMPLY WITH HAULING AND DISPOSAL REGULATIONS OF AUTHORITIES
- B. STANDARDS: COMPLY WITH ANSI/ASSE A10.6 AND NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. VERIFY THAT UTILITIES HAVE BEEN DISCONNECTED AND CAPPED BEFORE STARTING SELECTIVE DEMOLITION OPERATIONS.
- B. SURVEY EXISTING CONDITIONS AND CORRELATE WITH REQUIREMENTS INDICATED TO DETERMINE EXTENT OF SELECTIVE DEMOLITION REQUIRED.
- C. WHEN UNANTICIPATED MECHANICAL, ELECTRICAL, OR STRUCTURAL ELEMENTS THAT CONFLICT WITH INTENDED FUNCTION OR DESIGN ARE ENCOUNTERED, INVESTIGATE AND MEASURE THE NATURE AND EXTENT OF CONFLICT. PROMPTLY SUBMIT A WRITTEN REPORT TO ARCHITECT.
- 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS
- A. EXISTING SERVICES/SYSTEMS TO REMAIN: MAINTAIN SERVICES/SYSTEMS INDICATED TO REMAIN AND PROTECT THEM AGAINST DAMAGE.
- 1. COMPLY WITH REQUIREMENTS FOR EXISTING SERVICES/SYSTEMS INTERRUPTIONS SPECIFIED IN SECTION 011000 "SUMMARY."
- B. EXISTING SERVICES/SYSTEMS TO BE REMOVED, RELOCATED, OR ABANDONED: LOCATE, IDENTIFY, DISCONNECT, AND SEAL OR CAP OFF INDICATED UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS SERVING AREAS TO BE SELECTIVELY DEMOLISHED.
- 1. BUILDING MANAGER WILL ARRANGE TO SHUT OFF INDICATED SERVICES/SYSTEMS WHEN REQUESTED BY CONTRACTOR.
- 2. ARRANGE TO SHUT OFF INDICATED UTILITIES WITH UTILITY COMPANIES.
- OR ABANDONED, PROVIDE TEMPORARY SERVICES/SYSTEMS THAT BYPASS AREA OF SELECTIVE DEMOLITION AND THAT MAINTAIN CONTINUITY OF SERVICES/SYSTEMS TO OTHER PARTS OF BUILDING. 4. DISCONNECT, DEMOLISH, AND REMOVE FIRE-SUPPRESSION SYSTEMS PLUMBING, AND HVAC SYSTEMS, EQUIPMENT, AND COMPONENTS

3. IF SERVICES/SYSTEMS ARE REQUIRED TO BE REMOVED, RELOCATED,

- INDICATED TO BE REMOVED. a. PIPING TO BE REMOVED: REMOVE PORTION OF PIPING INDICATED TO BE REMOVED AND CAP OR PLUG REMAINING
- PIPING WITH SAME OR COMPATIBLE PIPING MATERIAL b. PIPING TO BE ABANDONED IN PLACE: DRAIN PIPING AND CAP
- OR PLUG PIPING WITH SAME OR COMPATIBLE PIPING MATERIAL. c. EQUIPMENT TO BE REMOVED: DISCONNECT AND CAP SERVICES AND REMOVE EQUIPMENT.
- d. EQUIPMENT TO BE REMOVED AND REINSTALLED: DISCONNECT AND CAP SERVICES AND REMOVE, CLEAN, AND STORE EQUIPMENT; WHEN APPROPRIATE, REINSTALL, RECONNECT, AND MAKE FOUIPMENT OPERATIONAL
- e. EQUIPMENT TO BE REMOVED AND SALVAGED: DISCONNECT AND CAP SERVICES AND REMOVE EQUIPMENT AND DELIVER TO
- f. DUCTS TO BE REMOVED: REMOVE PORTION OF DUCTS INDICATED TO BE REMOVED AND PLUG REMAINING DUCTS WITH SAME OR COMPATIBLE DUCTWORK MATERIAL
- g. DUCTS TO BE ABANDONED IN PLACE: CAP OR PLUG DUCTS WITH SAME OR COMPATIBLE DUCTWORK MATERIAL. C. REFRIGERANT: REMOVE REFRIGERANT FROM MECHANICAL EQUIPMENT TO

BE SELECTIVELY DEMOLISHED ACCORDING TO 40 CFR 82 AND

REGULATIONS OF AUTHORITIES HAVING JURISDICTION.

- 3.3 PREPARATION
- A. TEMPORARY FACILITIES: PROVIDE TEMPORARY BARRICADES AND OTHER PROTECTION REQUIRED TO PREVENT INJURY TO PEOPLE AND DAMAGE TO ADJACENT BUILDINGS AND FACILITIES TO REMAIN.

B. TEMPORARY SHORING: PROVIDE AND MAINTAIN SHORING, BRACING, AND STRUCTURAL SUPPORTS AS REQUIRED TO PRESERVE STABILITY AND PREVENT MOVEMENT, SETTLEMENT, OR COLLAPSE OF CONSTRUCTION AND FINISHES TO REMAIN, AND TO PREVENT UNEXPECTED OR UNCONTROLLED MOVEMENT OR COLLAPSE OF CONSTRUCTION BEING DEMOLISHED.

3.4 SELECTIVE DEMOLITION, GENERAL

- GENERAL: DEMOLISH AND REMOVE EXISTING CONSTRUCTION ONLY TO THE EXTENT REQUIRED BY NEW CONSTRUCTION AND AS INDICATED. USE METHODS REQUIRED TO COMPLETE THE WORK WITHIN LIMITATIONS OF GOVERNING REGULATIONS AND AS FOLLOWS:
- 1. NEATLY CUT OPENINGS AND HOLES PLUMB, SQUARE, AND TRUE TO DIMENSIONS REQUIRED. USE CUTTING METHODS LEAST LIKELY TO DAMAGE CONSTRUCTION TO REMAIN OR ADJOINING CONSTRUCTION. USE HAND TOOLS OR SMALL POWER TOOLS DESIGNED FOR SAWING OR GRINDING, NOT HAMMERING AND CHOPPING, TO MINIMIZE DISTURBANCE OF ADJACENT SURFACES. TEMPORARILY COVER OPENINGS TO REMAIN.
- 2. CUT OR DRILL FROM THE EXPOSED OR FINISHED SIDE INTO CONCEALED SURFACES TO AVOID MARRING EXISTING FINISHED
- 3. DO NOT USE CUTTING TORCHES UNTIL WORK AREA IS CLEARED OF FLAMMABLE MATERIALS. AT CONCEALED SPACES, SUCH AS DUCT AND PIPE INTERIORS, VERIFY CONDITION AND CONTENTS OF HIDDEN SPACE BEFORE STARTING FLAME-CUTTING OPERATIONS. MAINTAIN PORTABLE FIRE-SUPPRESSION DEVICES DURING FLAME-CUTTING OPERATIONS.
- 4. LOCATE SELECTIVE DEMOLITION EQUIPMENT AND REMOVE DEBRIS AND MATERIALS SO AS NOT TO IMPOSE EXCESSIVE LOADS ON SUPPORTING WALLS, FLOORS, OR FRAMING.
- 5. DISPOSE OF DEMOLISHED ITEMS AND MATERIALS PROMPTLY.
- B. REMOVED AND REINSTALLED ITEMS:
- 1. CLEAN AND REPAIR ITEMS TO FUNCTIONAL CONDITION ADEQUATE FOR INTENDED REUSE.
- 2. PACK OR CRATE ITEMS AFTER CLEANING AND REPAIRING. IDENTIFY CONTENTS OF CONTAINERS.
- 4. REINSTALL ITEMS IN LOCATIONS INDICATED. COMPLY WITH INSTALLATION REQUIREMENTS FOR NEW MATERIALS AND EQUIPMENT. PROVIDE CONNECTIONS, SUPPORTS, AND MISCELLANEOUS

MATERIALS NECESSARY TO MAKE ITEM FUNCTIONAL FOR USE

3. PROTECT ITEMS FROM DAMAGE DURING TRANSPORT AND STORAGE.

C. EXISTING ITEMS TO REMAIN: PROTECT CONSTRUCTION INDICATED TO REMAIN AGAINST DAMAGE AND SOILING DURING SELECTIVE DEMOLITION. WHEN PERMITTED BY ARCHITECT, ITEMS MAY BE REMOVED TO A SUITABLE, PROTECTED STORAGE LOCATION DURING SELECTIVE DEMOLITION AND CLEANED AND REINSTALLED IN THEIR ORIGINAL LOCATIONS AFTER SELECTIVE DEMOLITION OPERATIONS ARE COMPLETE.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. GENERAL: EXCEPT FOR ITEMS OR MATERIALS INDICATED TO BE RECYCLED, REUSED, SALVAGED, REINSTALLED, OR OTHERWISE INDICATED TO REMAIN OWNER'S PROPERTY, REMOVE DEMOLISHED MATERIALS FROM PROJECT SITE AND LEGALLY DISPOSE OF THEM IN AN EPA-APPROVED
- 1. DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON-SITE. B. BURNING: DO NOT BURN DEMOLISHED MATERIALS.
- C. DISPOSAL: TRANSPORT DEMOLISHED MATERIALS OFF OWNER'S PROPERTY AND LEGALLY DISPOSE OF THEM.

3.6 CLEANING

A. CLEAN ADJACENT STRUCTURES AND IMPROVEMENTS OF DUST. DIRT. AND DEBRIS CAUSED BY SELECTIVE DEMOLITION OPERATIONS. RETURN ADJACENT AREAS TO CONDITION EXISTING BEFORE SELECTIVE DEMOLITION OPERATIONS BEGAN.

<u>SECTION 042000 - UNIT MASONRY</u>

1.1 SUMMARY

A. SECTION INCLUDES:

CONCRETE MASONRY UNITS.

1.2 DEFINITIONS

B. CMU(S): CONCRETE MASONRY UNIT(S).

C. REINFORCED MASONRY: MASONRY CONTAINING REINFORCING STEEL IN

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

GROUTED CELLS.

- MASONRY STANDARD: COMPLY WITH TMS 602/ACI 530.1/ASCE 6, EXCEPT AS MODIFIED BY REQUIREMENTS IN THE CONTRACT DOCUMENTS.
- 2.2 CONCRETE MASONRY UNITS
- B. SHAPES: USE EXISTING / SALVAGED UNITS WHERE POSSIBLE. PROVIDE
- 1. PROVIDE SPECIAL SHAPES FOR LINTELS, HEADERS, BONDING, AND OTHER SPECIAL CONDITIONS WHERE REQUIRED.

UNLESS OTHERWISE INDICATED.

AVERAGE NET-AREA COMPRESSIVE STRENGTH OF 2800 PSI. 3. DENSITY CLASSIFICATION: MEDIUM WEIGHT.

2.3 MORTAR AND GROUT MATERIALS

- A. PORTLAND CEMENT: ASTM C 150/C 150M, TYPE I OR II. PROVIDE NATURAL COLOR OR WHITE CEMENT AS REQUIRED TO PRODUCE MORTAR COLOR INDICATED.
- B. HYDRATED LIME: ASTM C 207, TYPE S.
- C. PORTLAND CEMENT-LIME MIX: PACKAGED BLEND OF PORTLAND CEMENT AND HYDRATED LIME CONTAINING NO OTHER INGREDIENTS.
- D. MASONRY CEMENT: ASTM C 91/C 91M.
- MORTAR PIGMENTS: NATURAL AND SYNTHETIC IRON OXIDES AND CHROMIUM OXIDES, COMPOUNDED FOR USE IN MORTAR MIXES AND COMPLYING WITH ASTM C 979/C 979M. USE ONLY PIGMENTS WITH A

RECORD OF SATISFACTORY PERFORMANCE IN MASONRY MORTAR.

- F. AGGREGATE FOR MORTAR: ASTM C 144.
- 1. FOR JOINTS LESS THAN 1/4 INCH THICK, USE AGGREGATE GRADED WITH 100 PERCENT PASSING THE NO. 16 SIEVE.
- 2. WHITE-MORTAR AGGREGATES: NATURAL WHITE SAND OR CRUSHED WHITE STONE.
- 3. COLORED-MORTAR AGGREGATES: NATURAL SAND OR CRUSHED STONE OF COLOR NECESSARY TO PRODUCE REQUIRED MORTAR COLOR.
- G. AGGREGATE FOR GROUT: ASTM C 404.
- H. WATER: POTABLE

2.4 REINFORCEMENT

- WHERE EXISTING MASONRY WAS REMOVED AND REINFORCEMENT WAS REMOVED AND OR CUT PROVIDE NEW REINFORCING TO MATCH EXISTING REINFORCING PROPERTIES. WHERE REINFORCING WAS CUT LAP NEW REINFORCING BY 4INCH MINIMUM.
- UNCOATED-STEEL REINFORCING BARS: ASTM A 615/A 615M OR ASTM A 996/A 996M, GRADE 60.
- K. MASONRY-JOINT REINFORCEMENT, GENERAL: ASTM A 951/A 951M.

2.5 MASONRY-CELL FILL

A. LIGHTWEIGHT—AGGREGATE FILL: ASTM C 331/C 331M.

2.6 MORTAR AND GROUT MIXES

- A. GENERAL: DO NOT USE ADMIXTURES, INCLUDING PIGMENTS, AIR-ENTRAINING AGENTS, ACCELERATORS, RETARDERS, WATER-REPELLENT AGENTS, ANTIFREEZE COMPOUNDS, OR OTHER ADMIXTURES UNLESS OTHERWISE INDICATED.
- DO NOT USE CALCIUM CHLORIDE IN MORTAR OR GROUT.
- 2. USE PORTLAND CEMENT-LIME OR MASONRY CEMENT MORTAR UNLESS OTHERWISE INDICATED. 3. FOR REINFORCED MASONRY, USE PORTLAND CEMENT-LIME OR
- MASONRY CEMENT MORTAR. B. MORTAR FOR UNIT MASONRY: COMPLY WITH ASTM C 270. PROPORTION SPECIFICATION. PROVIDE THE FOLLOWING TYPES OF MORTAR FOR APPLICATIONS STATED UNLESS ANOTHER TYPE IS INDICATED OR NEEDED TO PROVIDE REQUIRED COMPRESSIVE STRENGTH OF MASONRY.
- 4. FOR MASONRY BELOW GRADE OR IN CONTACT WITH EARTH, USE TYPE M.
- 5. FOR REINFORCED MASONRY, USE TYPE N. 6. FOR MORTAR PARGE COATS, USE TYPE N.
- 7. FOR EXTERIOR, ABOVE-GRADE, LOAD-BEARING AND LOAD-BEARING WALLS; FOR INTERIOR NONLOAD-BEARING PARTITIONS; AND FOR OTHER APPLICATIONS WHERE ANOTHER TYPE IS NOT INDICATED, USE TYPE N.
- 8. FOR INTERIOR NONLOAD-BEARING PARTITIONS, TYPE O MAY BE USED INSTEAD OF TYPE N.

- C. GROUT FOR UNIT MASONRY: COMPLY WITH ASTM C 476. 1. USE GROUT OF TYPE INDICATED OR, IF NOT OTHERWISE INDICATED, OF TYPE (FINE OR COARSE) THAT WILL COMPLY WITH TMS 602/ACI 530.1/ASCE 6 FOR DIMENSIONS OF GROUT SPACES AND POUR HEIGHT.
- 2. PROPORTION GROUT IN ACCORDANCE WITH ASTM C 476, PARAGRAPH 4.2.2 FOR SPECIFIED 28-DAY COMPRESSIVE STRENGTH INDICATED, BUT NOT LESS THAN 2000 PSI.
- 3. PROVIDE GROUT WITH A SLUMP OF 10 TO 11 INCHES AS 1. COMPLY WITH REQUIREMENTS IN TMS 602/ACI 530.1/ASCE 6 FOR MEASURED ACCORDING TO ASTM C 143/C 143M.

3.1 INSTALLATION, GENERAL

PART 3 – EXECUTION

- A. USE FULL-SIZE UNITS WITHOUT CUTTING IF POSSIBLE. IF CUTTING I REQUIRED TO PROVIDE A CONTINUOUS PATTERN OR TO FIT ADJOINING CONSTRUCTION, CUT UNITS WITH MOTOR-DRIVEN SAWS; PROVIDE CLEAN, SHARP, UNCHIPPED EDGES. ALLOW UNITS TO DRY BEFORE LAYING UNLESS WETTING OF UNITS IS SPECIFIED. INSTALL CUT UNITS WITH CUT SURFACES AND, WHERE POSSIBLE, CUT EDGES CONCEALED.
- B. SELECT AND ARRANGE UNITS FOR EXPOSED UNIT MASONRY TO PRODUCE A UNIFORM BLEND OF COLORS AND TEXTURES. MIX UNITS FROM SEVERAL PALLETS OR CUBES AS THEY ARE PLACED.

3.2 TOLERANCES

- A. DIMENSIONS AND LOCATIONS OF ELEMENTS:
- 1. FOR DIMENSIONS IN CROSS SECTION OR ELEVATION, DO NOT VARY BY MORE THAN PLUS 1/2 INCH OR MINUS 1/4 INCH.

2. FOR LOCATION OF ELEMENTS IN PLAN, DO NOT VARY FROM THAT

INDICATED BY MORE THAN PLUS OR MINUS 1/2 INCH. 3. FOR LOCATION OF ELEMENTS IN ELEVATION, DO NOT VARY FROM THAT INDICATED BY MORE THAN PLUS OR MINUS 1/4 INCH IN A STORY HEIGHT OR 1/2 INCH TOTAL.

B. LINES AND LEVELS:

- 1. FOR BED JOINTS AND TOP SURFACES OF BEARING WALLS, DO NOT VARY FROM LEVEL BY MORE THAN 1/4 INCH IN 10 FEET, OR 1/2-INCH MAXIMUM.
- 2. FOR CONSPICUOUS HORIZONTAL LINES, SUCH AS LINTELS, SILLS, PARAPETS, AND REVEALS, DO NOT VARY FROM LEVEL BY MORE THAN 1/8 INCH IN 10 FEET, 1/4 INCH IN 20 FEET, OR 1/2-INCH
- 3. FOR VERTICAL LINES AND SURFACES, DO NOT VARY FROM PLUMB BY MORE THAN 1/4 INCH IN 10 FEET, 3/8 INCH IN 20 FEET, OR 1/2-INCH MAXIMUM. 4. FOR CONSPICUOUS VERTICAL LINES, SUCH AS EXTERNAL CORNERS,
- 1/4 INCH IN 20 FEET, OR 1/2-INCH MAXIMUM. 5. FOR LINES AND SURFACES, DO NOT VARY FROM STRAIGHT BY MORE THAN 1/4 INCH IN 10 FEET, 3/8 INCH IN 20 FEET, OR 1/2-INCH MAXIMUM.

DOOR JAMBS, REVEALS, AND EXPANSION AND CONTROL JOINTS, DO

NOT VARY FROM PLUMB BY MORE THAN 1/8 INCH IN 10 FEET,

- IN THREE SUBPARAGRAPHS BELOW TO ALLOW FOR VARIATION IN BRICK SIZE. CONSIDER RESTRICTING TOLERANCES IF TYPE FBX BRICK IS USED.
- 1. FOR BED JOINTS, DO NOT VARY FROM THICKNESS INDICATED BY MORE THAN PLUS OR MINUS 1/8 INCH WITH A MAXIMUM THICKNESS LIMITED TO 1/2 INCH.
- INDICATED BY MORE THAN PLUS 3/8 INCH OR MINUS 1/4 INCH. 3. FOR EXPOSED HEAD JOINTS, DO NOT VARY FROM THICKNESS INDICATED BY MORE THAN PLUS OR MINUS 1/8 INCH.

3.3 MORTAR BEDDING AND JOINTING

- D. LAY CMUS AS FOLLOWS:
- 1. BED FACE SHELLS IN MORTAR AND MAKE HEAD JOINTS OF DEPTH EQUAL TO BED JOINTS.
- COURSE ON FOOTINGS 4. FULLY BED ENTIRE UNITS, INCLUDING AREAS UNDER CELLS, AT
- B. LAY SOLID MASONRY UNITS WITH COMPLETELY FILLED BED AND HEAD JOINTS: BUTTER ENDS WITH SUFFICIENT MORTAR TO FILL HEAD JOINTS
- C. TOOL EXPOSED JOINTS SLIGHTLY CONCAVE WHEN THUMBPRINT HARD, USING A JOINTER LARGER THAN JOINT THICKNESS UNLESS OTHERWISE
- D. CUT JOINTS FLUSH FOR MASONRY WALLS TO RECEIVE PLASTER OR OTHER DIRECT-APPLIED FINISHES (OTHER THAN PAINT) UNLESS OTHERWISE INDICATED.

3.4 MASONRY-CELL FILL

- A. POUR LIGHTWEIGHT-AGGREGATE FILL INTO CAVITIES TO FILL VOID SPACES. MAINTAIN INSPECTION PORTS TO SHOW PRESENCE OF FILL AT EXTREMITIES OF EACH POUR AREA. CLOSE THE PORTS AFTER FILLING HAS BEEN CONFIRMED. LIMIT THE FALL OF FILL TO ONE STORY HIGH,
- A. GENERAL: INSTALL REINFORCEMENT TO MATCH EXISTING CONDITIONS WERE EXISTING REINFORCEMENT WAS REMOVED.
- 3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE
- MASONRY ABUTS OR FACES STRUCTURAL STEEL OR CONCRETE, TO COMPLY WITH THE FOLLOWING:
- 1. PROVIDE ANCHORING TO CONCRETE WHERE EXISTING ANCHORS WERE REMOVED.
- 3. SPACE ANCHORS AS INDICATED, BUT NOT MORE THAN 24 INCHES

- B. TEMPORARY FORMWORK AND SHORES: CONSTRUCT FORMWORK AND
- . CONSTRUCT FORMWORK TO PROVIDE SHAPE, LINE, AND DIMENSIONS OF COMPLETED MASONRY AS INDICATED. MAKE FORMS SUFFICIENTLY TIGHT TO PREVENT LEAKAGE OF MORTAR AND
- 2. DO NOT REMOVE FORMS AND SHORES UNTIL REINFORCED MASONRY MEMBERS HAVE HARDENED SUFFICIENTLY TO CARRY THEIR OWN WEIGHT AND THAT OF OTHER LOADS THAT MAY BE PLACED ON
- B. PLACING REINFORCEMENT: COMPLY WITH REQUIREMENTS IN TMS 602/ACI 530.1/ASCE 6.
- C. GROUTING: DO NOT PLACE GROUT UNTIL ENTIRE HEIGHT OF MASONRY TO BE GROUTED HAS ATTAINED ENOUGH STRENGTH TO RESIST GROUT
- CLEANOUTS AND FOR GROUT PLACEMENT, INCLUDING MINIMUM GROUT SPACE AND MAXIMUM POUR HEIGHT.

2. LIMIT HEIGHT OF VERTICAL GROUT POURS TO NOT MORE THAN 60

- A. IN-PROGRESS CLEANING: CLEAN UNIT MASONRY AS WORK PROGRESSES BY DRY BRUSHING TO REMOVE MORTAR FINS AND SMEARS BEFORE
- B. FINAL CLEANING: AFTER MORTAR IS THOROUGHLY SET AND CURED, CLEAN EXPOSED MASONRY AS FOLLOWS:
- PADDLES AND NONMETALLIC SCRAPE HOES OR CHISELS.

2. PROTECT ADJACENT SURFACES FROM CONTACT WITH CLEANER.

- WITH CLEAR WATER. 4. CLEAN BRICK BY BUCKET-AND-BRUSH HAND-CLEANING METHOD
- DESCRIBED IN BIA TECHNICAL NOTES 20. 5. CLEAN MASONRY WITH A PROPRIETARY ACIDIC CLEANER APPLIED ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

3.9 MASONRY WASTE DISPOSAL

- WASTE, INCLUDING EXCESS OR SOIL-CONTAMINATED SAND, WASTE MORTAR. AND BROKEN MASONRY UNITS, BY CRUSHING AND MIXING WITH FILL MATERIAL AS FILL IS PLACED.
- 6. DO NOT DISPOSE OF MASONRY WASTE AS FILL WITHIN 18 INCHES OF FINISHED GRADE. MASONRY WASTE RECYCLING: RETURN BROKEN CMUS NOT USED AS
- END OF SECTION 042000

051200 STRUCTURAL STEEL FRAMIN:

- THE STRUCTURAL STEEL PORTIONS OF THIS STRUCTURE ARE DESIGNED ACCORDING TO THE ALLOWABLE STRESS DESIGN PROVISIONS OF THE 9TH EDITION OF THE AISC MANUAL OF STEEL CONSTRUCTION. THE LOAD AND RESISTANCE FACTOR DESIGN PROVISIONS OF THE 2ND EDITION AISC MANUAL OF STEEL CONSTRUCTION INCLUDING SECTIONS 2204 AND 2211 OF CHAPTER 22 IN THE MICHIGAN BUILDING CODE.
- 2. STEEL DETAILING, FABRICATION AND ERECTION SHALL BE IN ACCORDANCE WITH THE LATEST AISC SPECIFICATIONS FOR "STRUCTURAL STEEL BUILDINGS".
- ALL STRUCTURAL STEEL SHALL CONFORM TO THE LATEST ASTM SPECIFICATIONS ACCORDING TO THE FOLLOWING SERIAL DESIGNATIONS
- BY SHAPE • WIDE FLANGES AND TEES: A992 OR ASTM A572, Fy=50 KSI ANGLES, CHANNELS, BARS AND PLATES: A36
- ROUND HOLLOW STRUCTURAL SHAPES OR PIPES: ASTM A53; GRADE B, Fy=35 KSI 4. ALL WELDED CONNECTIONS SHALL CONFORM TO THE LATEST AWS

CODE, USING E70XX ELECTRODES, WITH WELDING PERFORMED BY

"STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".

TUBES: ASTM A500, GR. B, Fy=46 KSI

QUALIFIED WELDERS.

UNLESS NOTED OTHERWISE.

- 5. BOLTED CONNECTIONS SHALL BE MADE WITH A325-N OR A490-N BOLTS. LOCATIONS OF SLIP CRITICAL CONNECTIONS SHALL BE AS NOTED ON THE DRAWINGS, IF REQUIRED. ALL BOLTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE LATEST AISC SPECIFICATIONS FOR
- 6. THE DESIGN, CONFIGURATION, ERECTION SAFETY AND SEQUENCING OF ALL STRUCTURAL STEEL CONNECTIONS SHALL BE THE RESPONSIBILITY OF THE STRUCTURAL STEEL FABRICATOR. REVIEW AND ACCEPTANCE OF THE SHOP DRAWINGS BY THE ENGINEER SHALL
- 7. CONNECTIONS SHALL BE DESIGNED FOR ONE-HALF THE TOTAL ALLOWABLE UNIFORM LOAD (MIN.) PER AISC BEAM LOAD TABLES,

CONSTITUTE APPROVAL OF THE LOAD CARRYING ADEQUACY ONLY.

- TEMPORARY ERECTION SEATS SHALL BE PROVIDED AS RECOMMENDED ON PAGE 3-59 OF THE LATEST EDITION AISC PUBLICATION "ENGINEERING FOR STEEL CONSTRUCTION".
- 9. THE DESIGN OF STEEL FRAMED STAIRS SHALL BE THE RESPONSIBILITY OF THE STEEL FABRICATOR. PROVIDE COMPLETE ENGINEERED STAIR ASSEMBLIES, CONFORMING TO THE ARCHITECTURA INTENT, UNDER THE SEAL OF AN ENGINEER REGISTERED IN THE STATE OF MICHIGAN, INCLUDING METAL FRAMING, HANGERS, MASONRY BEARING PLATES, COLUMNS, RAILING ASSEMBLIES, AND OTHER COMPONENTS NECESSARY TO SUPPORT THE STAIRS AND LANDINGS INCLUDING ANCHORAGE TO THE SUPPORTING STRUCTURE.
- 10. DRILLED-IN ANCHORS SHALL BE EITHER "UNDERCUT" OR "ADHESIVE" AS INDICATED ON THE DRAWINGS. INSTALLATION OF DRILLED-IN ANCHORS SHALL BE IN COMPLIANCE WITH MANUFACTURER'S LITERATURE AND GUIDELINES. EXPANSION BOLTS SHALL BE "HILTI KWIK BOLT II" OR APPROVED EQUAL. ADHESIVE SHALL BE "HILTI HIT HY-200" OR APPROVED EQUAL.
- 11. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL ANGLES. PLATES, BARS, CLIPS, ETC., ATTACHED TO STRUCTURAL STEEL. VERIFY EXACT SIZE AND LOCATION OF ALL FLOOR AND ROOF OPENINGS WITH CONTRACTOR INVOLVED. IN ADDITION TO L5x3 1/2x5/16 (L.L.V.) PERIMETER CURB SUPPORT FRAMES, PROVIDE L3x3x1/4 FRAMES AT OPENINGS UNDER MECHANICAL UNITS TO SUPPORT METAL DECK. FAILURE TO CONSULT ALL DRAWINGS FOR REQUIRED STEEL SHALL NOT CONSTITUTE A BASIS FOR EXTRAS.

2.2 METALS

- A. METAL SURFACES, GENERAL: PROVIDE MATERIALS WITH SMOOTH, FLAT SURFACES UNLESS OTHERWISE INDICATED, FOR COMPONENTS EXPOSED. TO VIEW IN THE COMPLETED WORK, PROVIDE MATERIALS WITHOUT SEAM MARKS, ROLLER MARKS, ROLLED TRADE NAMES, OR BLEMISHES.
- B. STEEL PLATES, SHAPES, AND BARS: ASTM A 36/A 36M.
- C. ROLLED-STEEL FLOOR PLATE: ASTM A 786/A 786M, ROLLED FROM PLATE COMPLYING WITH ASTM A 36/A 36M OR ASTM A 283/A 283M, GRADE C OR D.
- D. STEEL BARS FOR GRATING TREADS: ASTM A 36/A 36M OR STEEL STRIP, ASTM A 1011/A 1011M OR ASTM A 1018/A 1018M.
- E. WIRE ROD FOR GRATING CROSSBARS: ASTM A 510.
- F. CAST IRON: EITHER GRAY IRON, ASTM A 48/A 48M, OR MALLEABLE IRON, ASTM A 47/A 47M, UNLESS OTHERWISE INDICATED.

2.3 FASTENERS

- A. PROVIDE ZINC-PLATED FASTENERS WITH COATING COMPLYING WITH ASTM B 633 OR ASTM F 1941, CLASS FE/ZN 12 FOR EXTERIOR USE, AND CLASS FE/ZN 5 WHERE BUILT INTO EXTERIOR WALLS. SELECT
- 2.4 MISCELLANEOUS MATERIALS
- A. SHOP PRIMERS: PROVIDE PRIMERS THAT COMPLY WITH SECTION 099123
- B. UNIVERSAL SHOP PRIMER: FAST-CURING, LEAD- AND CHROMATE-FREE. UNIVERSAL MODIFIED-ALKYD PRIMER COMPLYING WITH MPI#79 AND COMPATIBLE WITH TOPCOAT.
- SPECIFIED TO BE USED OVER IT.
- 2.5 FABRICATION, GENERAL A. PROVIDE COMPLETE STAIR ASSEMBLIES, INCLUDING METAL FRAMING, HANGERS, CLIPS, BRACKETS, BEARING PLATES. AND OTHER
- 1. JOIN COMPONENTS BY WELDING UNLESS OTHERWISE INDICATED.
- 2. USE CONNECTIONS THAT MAINTAIN STRUCTURAL VALUE OF JOINED B. WELD CONNECTIONS TO COMPLY WITH THE FOLLOWING:
- OBTAIN FUSION WITHOUT UNDERCUT OR OVERLAP. 3. REMOVE WELDING FLUX IMMEDIATELY. 4. AT EXPOSED CONNECTIONS, FINISH EXPOSED WELDS TO COMPLY

2.6 STEEL-FRAMED STAIRS

- A. NAAMM STAIR STANDARD: COMPLY WITH "RECOMMENDED VOLUNTARY MINIMUM STANDARDS FOR FIXED METAL STAIRS" IN NAAMM AMP 510, "METAL STAIRS MANUAL," INDUSTRIAL CLASS, UNLESS MORE STRINGENT REQUIREMENTS ARE INDICATED.
- a. PROVIDE CLOSURES FOR EXPOSED ENDS OF CHANNEL STRINGERS.
- MISCELLANEOUS FRAMING MEMBERS AS NEEDED TO COMPLY WITH PERFORMANCE REQUIREMENTS.

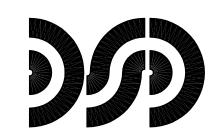
2. CONSTRUCT PLATFORMS OF STEEL CHANNEL HEADERS AND

- C. METAL BAR-GRATING STAIRS: FORM TREADS AND PLATFORMS TO CONFIGURATIONS SHOWN FROM METAL BAR GRATING; FABRICATE TO COMPLY WITH NAAMM MBG 531, "METAL BAR GRATING MANUAL."
- 1. FABRICATE TREADS AND PLATFORMS FROM WELDED STEEL GRATING WITH MEMBERS AND SIZES AS INDICATED ON DRAWINGS.
- 2. SURFACE: PLAIN. 3. FINISH: PAINTED.
- EACH END FOR STRINGER CONNECTIONS. SECURE TREADS TO STRINGERS WITH BOLTS.
- AND TUBE RAILINGS."

2. CONNECT POSTS TO STAIR FRAMING BY DIRECT WELDING UNLESS

- OTHERWISE INDICATED. 2.8 FINISHES
- A. FINISH METAL STAIRS AFTER ASSEMBLY. B. PREPARATION FOR SHOP PRIMING: PREPARE UNCOATED FERROUS-METAL SURFACES TO COMPLY WITH SSPC-SP 6/NACE NO. 3,
- CLEANING." C. APPLY SHOP PRIMER TO UNCOATED SURFACES OF METAL STAIR COMPONENTS, EXCEPT THOSE WITH GALVANIZED FINISHES AND THOSE TO BE EMBEDDED IN CONCRETE OR MASONRY UNLESS OTHERWISE INDICATED. COMPLY WITH SSPC-PA 1, "PAINT APPLICATION
- PART 3 EXECUTION
- 3.1 INSTALLATION A. CUTTING, FITTING, AND PLACEMENT: PERFORM CUTTING, DRILLING, AND FITTING REQUIRED FOR INSTALLING METAL STAIRS. SET UNITS ACCURATELY IN LOCATION, ALIGNMENT, AND ELEVATION, MEASURED
- FROM ESTABLISHED LINES AND LEVELS AND FREE OF RACK. B. FIELD WELDING: COMPLY WITH REQUIREMENTS FOR WELDING IN
- A. TOUCHUP PAINTING: IMMEDIATELY AFTER ERECTION, CLEAN FIELD WELDS, BOLTED CONNECTIONS, AND ABRADED AREAS OF SHOP PAINT, AND PAINT EXPOSED AREAS WITH SAME MATERIAL AS USED FOR SHOP PAINTING TO COMPLY WITH SSPC-PA 1 FOR TOUCHING UP SHOP-PAINTED SURFACES.
- AND ABRADED AREAS AND REPAIR GALVANIZING TO COMPLY WITH ASTM A 780/A 780M.

END OF SECTION 055119



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SPECIFICATIONS

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DATE 11/13/13

DESIGNER: CLF DRAWN: CLF PM / PIC: JSR/LAT CHECKED: GDC **ACADFILE:** 13–1310–A–5 PROJECT No. 13-1310

- SHAPES AS FOLLOWS (WHERE NEW UNITS ARE REQUIRED), WITH EXPOSED SURFACES MATCHING EXPOSED FACES OF ADJACENT UNITS
- 2. UNIT COMPRESSIVE STRENGTH: PROVIDE UNITS WITH MINIMUM

- IF USING TYPE FBS ROUGH BRICK OR TYPE FBA BRICK. REVISE TOLERANCES

 - 2. FOR HEAD AND COLLAR JOINTS, DO NOT VARY FROM THICKNESS

 - 2. BED WEBS IN MORTAR IN ALL COURSES OF PIERS, COLUMNS, AND
 - 3. BED WEBS IN MORTAR IN GROUTED MASONRY, INCLUDING STARTING
 - AND SHOVE INTO PLACE. DO NOT DEEPLY FURROW BED JOINTS OR SLUSH HEAD JOINTS.

STARTING COURSE ON FOOTINGS WHERE CELLS ARE NOT GROUTED.

- BUT NOT MORE THAN 20 FEET. 3.5 MASONRY-JOINT REINFORCEMENT
- A. ANCHOR MASONRY TO STRUCTURAL STEEL AND CONCRETE, WHERE
- 2. ANCHOR MASONRY WITH ANCHORS EMBEDDED IN MASONRY JOINTS AND ATTACHED TO STRUCTURE.

O.C. VERTICALLY AND 36 INCHES O.C. HORIZONTALLY.

- 3.7 REINFORCED UNIT MASONRY INSTALLATION SHORES AS NEEDED TO SUPPORT REINFORCED MASONRY ELEMENTS DURING CONSTRUCTION.
- GROUT BRACE TIE AND SUPPORT FORMS TO MAINTAIN POSITION AND SHAPE DURING CONSTRUCTION AND CURING OF REINFORCED MASONRY.

THEM DURING CONSTRUCTION.

- 3.8 REPAIRING, POINTING, AND CLEANING
- 1. REMOVE LARGE MORTAR PARTICLES BY HAND WITH WOODEN
- REMOVE CLEANERS PROMPTLY BY RINSING SURFACES THOROUGHLY

3. WET WALL SURFACES WITH WATER BEFORE APPLYING CLEANERS:

- C. WASTE DISPOSAL AS FILL MATERIAL: DISPOSE OF CLEAN MASONRY
- FILL TO MANUFACTURER FOR RECYCLING. E. EXCESS MASONRY WASTE: REMOVE EXCESS CLEAN MASONRY WASTE THAT CANNOT BE USED AS FILL, AS DESCRIBED ABOVE OR RECYCLED, AND OTHER MASONRY WASTE, AND LEGALLY DISPOSE OF OFF OWNER'S

- 055119 METAL GRATING STAIR
- A. PRODUCT DATA: FOR METAL GRATING STAIRS. B. SHOP DRAWINGS: INCLUDE PLANS, ELEVATIONS, SECTIONS, DETAILS,

1.2 SUBMITTALS

AND ATTACHMENTS.

PREPARATION.

PART 2 - PRODUCTS 2.1 PERFORMANCE REQUIREMENTS

DESIGN STAIRS AND RAILINGS.

ACT CONCURRENTLY.

LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED: 1. UNIFORM LOAD: 100 LBF/SQ. FT.

A. DELEGATED DESIGN: ENGAGE A QUALIFIED PROFESSIONAL ENGINEER, TO

B. STRUCTURAL PERFORMANCE OF STAIRS: METAL STAIRS SHALL

WITHSTAND THE FFFECTS OF GRAVITY LOADS AND THE FOLLOWING

2. CONCENTRATED LOAD: 300 LBF APPLIED ON AN AREA OF 4 SQ.

3. UNIFORM AND CONCENTRATED LOADS NEED NOT BE ASSUMED TO

A. SECTION INCLUDES INDUSTRIAL-TYPE, STRAIGHT-RUN STAIRS WITH

C. DELEGATED-DESIGN SUBMITTAL: FOR STAIRS, INCLUDING ANALYSIS

DATA SIGNED AND SEALED BY THE QUALIFIED PROFESSIONAL ENGINEER

LICENSED IN STATE OF MICHIGAN RESPONSIBLE FOR THEIR

4. STAIR FRAMING: CAPABLE OF WITHSTANDING STRESSES RESULTING FROM RAILING LOADS IN ADDITION TO LOADS SPECIFIED ABOVE.

- STEEL COMPONENTS HAVE BEEN DESIGNED ACCORDING TO THE PROVISIONS FOR SEISMIC DESIGN CATEGORY B.
- SQUARE OR RECTANGULAR HOLLOW STRUCTURAL SHAPES OR
 - FASTENERS FOR TYPE, GRADE, AND CLASS REQUIRED.
 - "INTERIOR PAINTING."
 - GALVANIZING REPAIR PAINT: HIGH-ZINC-DUST-CONTENT PAINT COMPLYING WITH SSPC-PAINT 20 AND COMPATIBLE WITH PAINTS

 - COMPONENTS NECESSARY TO SUPPORT AND ANCHOR STAIRS AND PLATFORMS ON SUPPORTING STRUCTURE.
 - 1. USE MATERIALS AND METHODS THAT MINIMIZE DISTORTION AND DEVELOP STRENGTH AND CORROSION RESISTANCE OF BASE
 - WITH NOMMA'S "VOLUNTARY JOINT FINISH STANDARDS" FOR TYPE 4 WELDS: GOOD QUALITY, UNIFORM UNDRESSED WELD WITH MINIMAL SPLATTER.

 - B. STAIR FRAMING: 1. FABRICATE STRINGERS OF STEEL CHANNELS.
 - 3. WELD OR BOLT STRINGERS TO HEADERS; WELD OR BOLT FRAMING MEMBERS TO STRINGERS AND HEADERS.

 - 4. FABRICATE GRATING TREADS WITH ROLLED-STEEL FLOOR PLATE NOSING AND WITH STEEL ANGLE OR STEEL PLATE CARRIER AT
 - 2.7 STAIR RAILINGS A. COMPLY WITH APPLICABLE REQUIREMENTS IN SECTION 055213 "PIPE
 - 1. RAILS MAY BE BENT AT CORNERS, RAIL RETURNS, AND WALL RETURNS, INSTEAD OF USING PREFABRICATED FITTINGS.

"COMMERCIAL BLAST CLEANING" OR SSPC-SP 3, "POWER TOOL

access, routing, miscellaneous fittings, final installation an coordination is the contractor's responsit ISSUED FOR

STEEL-GRATING TREADS AND RAILINGS ATTACHED TO METAL GRATING SPECIFICATION NO. 1: SHOP, FIELD, AND MAINTENANCE PAINTING OF STEEL," FOR SHOP PAINTING.

- "FABRICATION, GENERAL" ARTICLE. 3.2 ADJUSTING AND CLEANING
 - GALVANIZED SURFACES: CLEAN FIELD WELDS, BOLTED CONNECTIONS.

1.1 SUMMARY

A. SECTION INCLUDES:

STEEL TUBE RAILINGS.

B. RELATED REQUIREMENTS:

1. SECTION 055119 "METAL GRATING STAIRS" FOR STEEL TUBE RAILINGS ASSOCIATED WITH METAL GRATING STAIRS.

1.2 SUBMITTALS

A. PRODUCT DATA: FOR THE FOLLOWING:

1. MANUFACTURER'S PRODUCT LINES OF MECHANICALLY CONNECTED

B. SHOP DRAWINGS: INCLUDE PLANS, ELEVATIONS, SECTIONS, DETAILS, AND ATTACHMENTS TO OTHER WORK.

C. DELEGATED-DESIGN SUBMITTAL: FOR RAILINGS, INCLUDING ANALYSIS DATA SIGNED AND SEALED BY THE QUALIFIED PROFESSIONAL ENGINEER LICENSED IN STATE OF MICHIGAN RESPONSIBLE FOR THEIR

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS.

A. DELEGATED DESIGN: ENGAGE A QUALIFIED PROFESSIONAL ENGINEER, TO DESIGN RAILINGS, INCLUDING ATTACHMENT TO BUILDING CONSTRUCTION.

B. STRUCTURAL PERFORMANCE: RAILINGS, INCLUDING ATTACHMENT TO BUILDING CONSTRUCTION, SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND THE FOLLOWING LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED:

1. HANDRAILS AND TOP RAILS OF GUARDS:

a. UNIFORM LOAD OF 50 LBF/ FT. APPLIED IN ANY DIRECTION.

b. CONCENTRATED LOAD OF 200 LBF APPLIED IN ANY DIRECTION.

c. UNIFORM AND CONCENTRATED LOADS NEED NOT BE ASSUMED TO ACT CONCURRENTLY.

INFILL OF GUARDS:

a. CONCENTRATED LOAD OF 50 LBF APPLIED HORIZONTALLY ON AN AREA OF 1 SQ. FT.

b. INFILL LOAD AND OTHER LOADS NEED NOT BE ASSUMED TO ACT CONCURRENTLY.

2.2 METALS, GENERAL

A. BRACKETS, FLANGES, AND ANCHORS: CAST OR FORMED METAL OF SAME TYPE OF MATERIAL AND FINISH AS SUPPORTED RAILS UNLESS OTHERWISE INDICATED.

1. PROVIDE TYPE OF BRACKET WITH PREDRILLED HOLE FOR EXPOSED BOLT ANCHORAGE AND THAT PROVIDES 1-1/2-INCH CLEARANCE FROM INSIDE FACE OF HANDRAIL TO FINISHED WALL SURFACE.

2.3 STEEL AND IRON

A. TUBING: ASTM A 500 (COLD FORMED) OR ASTM A 513.

B. PIPE: ASTM A 53/A 53M, TYPE F OR TYPE S, GRADE A, STANDARD WEIGHT (SCHEDULE 40), UNLESS ANOTHER GRADE AND WEIGHT ARE REQUIRED BY STRUCTURAL LOADS.

C. PLATES, SHAPES, AND BARS: ASTM A 36/A 36M.

D. CAST IRON: EITHER GRAY IRON, ASTM A 48/A 48M, OR MALLEABLE IRON, ASTM A 47/A 47M, UNLESS OTHERWISE INDICATED.

2.4 FASTENERS

A. GENERAL: PROVIDE THE FOLLOWING:

UNGALVANIZED-STEEL RAILINGS: PLATED STEEL FASTENERS COMPLYING WITH ASTM B 633 OR ASTM F 1941, CLASS FE/ZN 5 FOR ZINC COATING.

2.5 MISCELLANEOUS MATERIALS

"INTERIOR PAINTING."

A. SHOP PRIMERS: PROVIDE PRIMERS THAT COMPLY WITH SECTION 099123

B. UNIVERSAL SHOP PRIMER: FAST-CURING, LEAD- AND CHROMATE-FREE, UNIVERSAL MODIFIED-ALKYD PRIMER COMPLYING WITH MPI#79 AND COMPATIBLE WITH TOPCOAT.

2.6 FABRICATION

A. CUT, DRILL, AND PUNCH METALS CLEANLY AND ACCURATELY. REMOVE BURRS AND EASE EDGES TO A RADIUS OF APPROXIMATELY 1/32 INCH UNLESS OTHERWISE INDICATED. REMOVE SHARP OR ROUGH AREAS ON EXPOSED SURFACES.

B. FORM WORK TRUE TO LINE AND LEVEL WITH ACCURATE ANGLES AND SURFACES.

C. WELDED CONNECTIONS: COPE COMPONENTS AT CONNECTIONS TO PROVIDE CLOSE FIT. OR USE FITTINGS DESIGNED FOR THIS PURPOSE. WELD ALL AROUND AT CONNECTIONS, INCLUDING AT FITTINGS.

1. USE MATERIALS AND METHODS THAT MINIMIZE DISTORTION AND DEVELOP STRENGTH AND CORROSION RESISTANCE OF BASE

2. OBTAIN FUSION WITHOUT UNDERCUT OR OVERLAP.

REMOVE FLUX IMMEDIATELY.

4. AT EXPOSED CONNECTIONS, FINISH EXPOSED SURFACES SMOOTH AND BLENDED SO NO ROUGHNESS SHOWS AFTER FINISHING AND WELDED SURFACE MATCHES CONTOURS OF ADJOINING SURFACES.

D. NONWELDED CONNECTIONS: CONNECT MEMBERS WITH CONCEALED MECHANICAL FASTENERS AND FITTINGS. FABRICATE MEMBERS AND FITTINGS TO PRODUCE FLUSH, SMOOTH, RIGID, HAIRLINE JOINTS.

E. FORM CHANGES IN DIRECTION BY BENDING.

F. FOR CHANGES IN DIRECTION MADE BY BENDING, USE JIGS TO PRODUCE UNIFORM CURVATURE FOR EACH REPETITIVE CONFIGURATION REQUIRED. MAINTAIN CROSS SECTION OF MEMBER THROUGHOUT ENTIRE BEND WITHOUT BUCKLING, TWISTING, CRACKING, OR OTHERWISE DEFORMING EXPOSED SURFACES OF COMPONENTS.

G. CLOSE EXPOSED ENDS OF RAILING MEMBERS WITH PREFABRICATED END

H. BRACKETS, FLANGES, FITTINGS, AND ANCHORS: PROVIDE WALL BRACKETS, FLANGES, MISCELLANEOUS FITTINGS, AND ANCHORS TO INTERCONNECT RAILING MEMBERS TO OTHER WORK UNLESS OTHERWISE

2.7 STEEL AND IRON FINISHES

A. PREPARATION FOR SHOP PRIMING: PREPARE UNCOATED FERROUS-METAL SURFACES TO COMPLY WITH SSPC-SP 6/NACE NO. 3, "COMMERCIAL BLAST CLEANING" OR SSPC-SP-3, "POWER TOOL CLEANING '

B. PRIMER APPLICATION: APPLY SHOP PRIMER TO PREPARED SURFACES OF RAILINGS UNLESS OTHERWISE INDICATED. COMPLY WITH REQUIREMENTS IN SSPC-PA 1, "SHOP, FIELD, AND MAINTENANCE PAINTING OF STEEL." FOR SHOP PAINTING PRIMER NEED NOT BE APPLIED TO SURFACES TO BE EMBEDDED IN CONCRETE OR MASONRY.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. SET RAILINGS ACCURATELY IN LOCATION, ALIGNMENT, AND ELEVATION:

MEASURED FROM ESTABLISHED LINES AND LEVELS AND FREE OF RACK. 1. DO NOT WELD, CUT, OR ABRADE SURFACES OF RAILING COMPONENTS THAT ARE COATED OR FINISHED AFTER FABRICATION

AND THAT ARE INTENDED FOR FIELD CONNECTION BY MECHANICAL

OR OTHER MEANS WITHOUT FURTHER CUTTING OR FITTING. 2. SET POSTS PLUMB WITHIN A TOLERANCE OF 1/16 INCH IN 3 FEET.

3. ALIGN RAILS SO VARIATIONS FROM LEVEL FOR HORIZONTAL MEMBERS AND VARIATIONS FROM PARALLEL WITH RAKE OF STEPS AND RAMPS FOR SLOPING MEMBERS DO NOT EXCEED 1/4 INCH IN

B. CONTROL OF CORROSION: PREVENT GALVANIC ACTION AND OTHER FORMS OF CORROSION BY INSULATING METALS AND OTHER MATERIALS FROM DIRECT CONTACT WITH INCOMPATIBLE MATERIALS.

1. COAT. WITH A HEAVY COAT OF BITUMINOUS PAINT, CONCEALED SURFACES OF ALUMINUM THAT ARE IN CONTACT WITH GROUT, CONCRETE, MASONRY, WOOD, OR DISSIMILAR METALS.

3.2 ANCHORING POSTS

A. ANCHOR POSTS TO METAL SURFACES WITH OVAL FLANGES, ANGLE TYPE, OR FLOOR TYPE AS REQUIRED BY CONDITIONS, CONNECTED TO POSTS AND TO METAL SUPPORTING MEMBERS.

3.3 ADJUSTING AND CLEANING

A. TOUCHUP PAINTING: IMMEDIATELY AFTER ERECTION, CLEAN FIELD WELDS, BOLTED CONNECTIONS, AND ABRADED AREAS OF SHOP PAINT. AND PAINT EXPOSED AREAS WITH THE SAME MATERIAL AS USED FOR SHOP PAINTING TO COMPLY WITH SSPC-PA 1 REQUIREMENTS FOR TOUCHING UP SHOP-PAINTED SURFACES.

B. GALVANIZED SURFACES: CLEAN FIELD WELDS, BOLTED CONNECTIONS, AND ABRADED AREAS, AND REPAIR GALVANIZING TO COMPLY WITH ASTM A 780/A 780M.

END OF SECTION 055213

075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER <u>(EPDM) ROOFING</u>

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. ADHERED ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING SYSTEM

1.2 DEFINITIONS

A. ROOFING TERMINOLOGY: DEFINITIONS IN ASTM D 1079 AND GLOSSARY OF NRCA'S "THE NRCA ROOFING AND WATERPROOFING MANUAL" APPLY TO WORK OF THIS SECTION.

1.3 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

B. SHOP DRAWINGS: FOR ROOFING SYSTEM, INCLUDE PLANS, ELEVATIONS, SECTIONS, DETAILS, AND ATTACHMENTS TO OTHER WORK.

C. SAMPLE WARRANTIES: FOR MANUFACTURER'S SPECIAL WARRANTIES.

1.4 CLOSEOUT SUBMITTALS

A. MAINTENANCE DATA: FOR ROOFING SYSTEM TO INCLUDE IN MAINTENANCE MANUALS.

1.5 QUALITY ASSURANCE

A. INSTALLER QUALIFICATIONS: A QUALIFIED FIRM THAT IS APPROVED, AUTHORIZED, OR LICENSED BY ROOFING SYSTEM MANUFACTURER TO INSTALL MANUFACTURER'S PRODUCT AND THAT IS ELIGIBLE TO RECEIVE MANUFACTURER'S SPECIAL WARRANTY.

16 WARRANTY

A. SPECIAL WARRANTY: MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF ROOFING SYSTEM THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.

1. WARRANTY PERIOD: FROM DATE OF SUBSTANTIAL COMPLETION WARRANTY DURATION TO EQUAL AND OR EXCEED DURATION OF EXISTING ROOF MEMBRANE. EXISTING ROOF MEMBRANE PRODUCT OF FIRESTONE ROOFING SYSTEMS 800.830.5612 AND WAS INSTALLED BY CEI, MICHIGAN FROM HOWELL, MI 517.548.0039. CONTACT EXISTING ROOF MEMBRANE MANUFACTURER AND INSTALLER FOR EXISTING WARRANTY INFORMATION.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. GENERAL PERFORMANCE: INSTALLED ROOFING AND BASE FLASHINGS SHALL WITHSTAND SPECIFIED UPLIFT PRESSURES, THERMALLY INDUCED MOVFMENT. AND EXPOSURE TO WEATHER WITHOUT FAILURE DUE TO DEFECTIVE MANUFACTURE, FABRICATION, INSTALLATION, OR OTHER DEFECTS IN CONSTRUCTION. ROOFING AND BASE FLASHINGS SHALL REMAIN WATERTIGHT.

1. ACCELERATED WEATHERING: ROOFING SYSTEM SHALL WITHSTAND 2000 HOURS OF EXPOSURE WHEN TESTED ACCORDING TO ASTM G 152, ASTM G 154, OR ASTM G 155.

2. IMPACT RESISTANCE: ROOFING SYSTEM SHALL RESIST IMPACT DAMAGE WHEN TESTED ACCORDING TO ASTM D 3746 OR ASTM D 4272.

B. MATERIAL COMPATIBILITY: ROOFING MATERIALS SHALL BE COMPATIBLE

WITH ONE ANOTHER AND ADJACENT MATERIALS UNDER CONDITIONS OF

SERVICE AND APPLICATION REQUIRED, AS DEMONSTRATED BY ROOFING MANUFACTURER BASED ON TESTING AND FIELD EXPERIENCE. C. FM GLOBAL LISTING: ROOFING, BASE FLASHINGS, AND COMPONENT MATERIALS SHALL COMPLY WITH REQUIREMENTS IN FM GLOBAL 4450. OR FM GLOBAL 4470 AS PART OF A ROOFING SYSTEM, AND SHALL BE LISTED IN FM GLOBAL'S "ROOFNAV" FOR CLASS 1 OR NONCOMBUSTIBLE CONSTRUCTION, AS APPLICABLE. IDENTIFY MATERIALS WITH FM GLOBAL

1. FIRE/WINDSTORM CLASSIFICATION: CLASS 1A-60.

D. EXTERIOR FIRE-TEST EXPOSURE: ASTM E 108 OR UL 790, CLASS A; FOR APPLICATION AND ROOF SLOPES INDICATED; TESTING BY A QUALIFIED TESTING AGENCY. IDENTIFY PRODUCTS WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AGENCY.

2.2 EPDM ROOFING

A. EXISTING ROOF MEMBRANE: EXISTING ROOF MEMBRANE PRODUCT OF FIRESTONE ROOFING SYSTEMS 800.830.5612 AND WAS INSTALLED BY CEI, MICHIGAN FROM HOWELL, MI 517.548.0039. CONTACT EXISTING ROOF MEMBRANE MANUFACTURER AND INSTALLER FOR EXISTING WARRANTY INFORMATION.

B. EPDM: ASTM D 4637, TYPE I, NONREINFORCED, UNIFORM, FLEXIBLE

EPDM SHEET. 1. THICKNESS: TO MATCH EXISTING MEMBRANE THICKNESS.

2. EXPOSED FACE COLOR: TO MATCH EXISTING MEMBRANE THICKNESS. C. SHEET FLASHING: 60-MIL- THICK EPDM, PARTIALLY CURED OR CURED,

D. BONDING ADHESIVE: MANUFACTURER'S STANDARD.

ACCORDING TO APPLICATION.

E. SEAMING MATERIAL: MANUFACTURER'S STANDARD, SYNTHETIC-RUBBER POLYMER PRIMER AND 3-INCH- WIDE MINIMUM, BUTYL SPLICE TAPE WITH RELEASE FILM.

F. LAP SEALANT: MANUFACTURER'S STANDARD, SINGLE-COMPONENT SEALANT, COLORED TO MATCH MEMBRANE ROOFING.

STAINLESS-STEEL OR ALUMINUM BARS, APPROXIMATELY 1 BY 1/8 INCH

G. WATER CUTOFF MASTIC: MANUFACTURER'S STANDARD BUTYL MASTIC SEALANT. H. METAL TERMINATION BARS: MANUFACTURER'S STANDARD, PREDRILLED

THICK; WITH ANCHORS. MISCELLANEOUS ACCESSORIES: PROVIDE POURABLE SEALERS, PREFORMED CONE AND VENT SHEET FLASHINGS, MOLDED PIPE BOOT FLASHINGS, PREFORMED INSIDE AND OUTSIDE CORNER SHEET FLASHINGS. REINFORCED EPDM SECUREMENT STRIPS. T-JOINT COVERS IN-SEAM SEALANTS, TERMINATION REGLETS, COVER STRIPS, AND OTHER ACCESSORIES.

1. PROVIDE WHITE FLASHING ACCESSORIES FOR WHITE EPDM MEMBRANE ROOFING.

J. LIQUID COATING: PRODUCT SPECIFICALLY FORMULATED FOR COATING EPDM MEMBRANE ROOFING, AS FOLLOWS:

 TYPE: ACRYLIC EMULSION COMPLYING WITH ASTM D 6083. 2. TYPE: CHLOROSULFONATED POLYETHYLENE COMPLYING WITH ASTM D 3468.

PART 3 - EXECUTION

COLOR: WHITE

3.1 EXAMINATION

A. EXAMINE SUBSTRATES, AREAS, AND CONDITIONS, WITH INSTALLER PRESENT. FOR COMPLIANCE WITH REQUIREMENTS AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK:

1. VERIFY THAT ROOF OPENINGS AND PENETRATIONS ARE IN PLACE, CURBS ARE SET AND BRACED, AND ROOF-DRAIN BODIES ARE SECURELY CLAMPED IN PLACE. 2. VERIFY THAT WOOD BLOCKING, CURBS, AND NAILERS ARE

TERMINATIONS AND THAT NAILERS MATCH THICKNESSES OF INSULATION.

SECURELY ANCHORED TO ROOF DECK AT PENETRATIONS AND

B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 PREPARATION

A. CLEAN SUBSTRATE OF DUST, DEBRIS, MOISTURE, AND OTHER SUBSTANCES DETRIMENTAL TO ROOFING INSTALLATION ACCORDING TO ROOFING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS. REMOVE SHARP PROJECTIONS.

B. PREVENT MATERIALS FROM ENTERING AND CLOGGING ROOF DRAINS AND CONDUCTORS AND FROM SPILLING OR MIGRATING ONTO SURFACES OF OTHER CONSTRUCTION. REMOVE ROOF-DRAIN PLUGS WHEN NO WORK IS TAKING PLACE OR WHEN RAIN IS FORECAST.

3.3 ROOFING INSTALLATION, GENERAL

A. INSTALL ROOFING SYSTEM ACCORDING TO ROOFING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS.

B. COMPLETE TERMINATIONS AND BASE FLASHINGS AND PROVIDE TEMPORARY SEALS TO PREVENT WATER FROM ENTERING COMPLETED SECTIONS OF ROOFING SYSTEM AT THE FND OF THE WORKDAY OR WHEN RAIN IS FORECAST. REMOVE AND DISCARD TEMPORARY SEALS BEFORE BEGINNING WORK ON ADJOINING ROOFING.

C. INSTALL ROOFING AND AUXILIARY MATERIALS TO TIE IN TO EXISTING ROOFING TO MAINTAIN WEATHERTIGHTNESS OF TRANSITION AND TO NOT VOID WARRANTY FOR EXISTING ROOFING SYSTEM.

3.4 BASE FLASHING INSTALLATION A. INSTALL SHEET FLASHINGS AND PREFORMED FLASHING ACCESSORIES, AND ADHERE TO SUBSTRATES ACCORDING TO ROOFING SYSTEM MANUFACTURER'S WRITTEN INSTRUCTIONS.

B. APPLY BONDING ADHESIVE TO SUBSTRATE AND UNDERSIDE OF SHEET FLASHING AT REQUIRED RATE, AND ALLOW TO PARTIALLY DRY. DO NOT APPLY TO SEAM AREA OF FLASHING.

C. FLASH PENETRATIONS AND FIELD-FORMED INSIDE AND OUTSIDE CORNERS WITH CURED OR UNCURED SHEET FLASHING.

D. CLEAN SPLICE AREAS, APPLY SPLICING CEMENT, AND FIRMLY ROLL SIDE

AND END LAPS OF OVERLAPPING SHEETS TO ENSURE A WATERTIGHT

SEAM INSTALLATION. APPLY LAP SEALANT AND SEAL EXPOSED EDGES OF SHEET FLASHING TERMINATIONS. E. TERMINATE AND SEAL TOP OF SHEET FLASHINGS AND MECHANICALLY ANCHOR TO SUBSTRATE THROUGH TERMINATION BARS.

3.5 FIELD QUALITY CONTROL

A. INSPECTED BY MANUFACTURER'S REPRESENTATIVE FOR WARRANTY.

3.6 PROTECTING AND CLEANING A. PROTECT MEMBRANE ROOFING SYSTEM FROM DAMAGE AND WEAR DURING REMAINDER OF CONSTRUCTION PERIOD. WHEN REMAINING CONSTRUCTION DOES NOT AFFECT OR ENDANGER ROOFING. INSPECT ROOFING FOR DETERIORATION AND DAMAGE, DESCRIBING ITS NATURE AND EXTENT IN A WRITTEN REPORT, WITH COPIES TO ARCHITECT AND

B. CORRECT DEFICIENCIES IN OR REMOVE MEMBRANE ROOFING SYSTEM THAT DOES NOT COMPLY WITH REQUIREMENTS, REPAIR SUBSTRATES, AND REPAIR OR REINSTALL MEMBRANE ROOFING SYSTEM TO A CONDITION FREE OF DAMAGE AND DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION AND ACCORDING TO WARRANTY

REQUIREMENTS. END OF SECTION 075323 076200 - SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES: 1. MANUFACTURED REGLETS WITH COUNTERFLASHING.

1.2 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT. B. SAMPLES: FOR EACH EXPOSED PRODUCT AND FOR EACH COLOR AND

C. PRODUCT CERTIFICATES D. SAMPLE WARRANTY.

TEXTURE SPECIFIED.

1.3 CLOSEOUT SUBMITTALS

A. MAINTENANCE DATA.

1.4 QUALITY ASSURANCE

A. FABRICATOR QUALIFICATIONS: EMPLOYS SKILLED WORKERS WHO CUSTOM FABRICATE SHEFT METAL FLASHING AND TRIM SIMILAR TO THAT REQUIRED FOR THIS PROJECT AND WHOSE PRODUCTS HAVE A RECORD OF SUCCESSFUL IN-SERVICE PERFORMANCE.

WARRANTY

A. SPECIAL WARRANTY ON FINISHES: MANUFACTURER AGREES TO REPAIR FINISH OR REPLACE SHEET METAL FLASHING AND TRIM THAT SHOWS EVIDENCE OF DETERIORATION OF FACTORY-APPLIED FINISHES WITHIN SPECIFIED WARRANTY PERIOD.

1. FINISH WARRANTY PERIOD: 20 YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. GENERAL: SHEET METAL FLASHING AND TRIM ASSEMBLIES SHALL WITHSTAND WIND LOADS, STRUCTURAL MOVEMENT, THERMALLY INDUCED MOVEMENT. AND EXPOSURE TO WEATHER WITHOUT FAILURE DUE TO DEFECTIVE MANUFACTURE, FABRICATION, INSTALLATION, OR OTHER DEFECTS IN CONSTRUCTION. COMPLETED SHEET METAL FLASHING AND TRIM SHALL NOT RATTLE, LEAK, OR LOOSEN, AND SHALL REMAIN WATERTIGHT.

SHEET METAL STANDARD FOR FLASHING AND TRIM: COMPLY WITH NRCA'S "THE NRCA ROOFING MANUAL" AND SMACNA'S "ARCHITECTURAL SHEET METAL MANUAL" REQUIREMENTS FOR DIMENSIONS AND PROFILES SHOWN UNLESS MORE STRINGENT REQUIREMENTS ARE INDICATED.

AMBIENT AND SURFACE TEMPERATURE CHANGES. TEMPERATURE CHANGE: 120 DEG F, AMBIENT; 180 DEG F MATERIAL SURFACES.

THERMAL MOVEMENTS: ALLOW FOR THERMAL MOVEMENTS FROM

2.2 SHEET METALS

A. GENERAL: PROTECT MECHANICAL AND OTHER FINISHES ON EXPOSED SURFACES FROM DAMAGE BY APPLYING STRIPPABLE, TEMPORARY PROTECTIVE FILM BEFORE SHIPPING.

ALUMINUM SHEET: ASTM B 209, ALLOY AS STANDARD WITH MANUFACTURER FOR FINISH REQUIRED, WITH TEMPER AS REQUIRED TO SUIT FORMING OPERATIONS AND PERFORMANCE REQUIRED.

2. FACTORY PRIME COATING: WHERE PAINTING AFTER INSTALLATION IS

REQUIRED. PRETREAT METAL WITH WHITE OR LIGHT-COLORED. FACTORY-APPLIED, BAKED-ON EPOXY PRIMER COAT; MINIMUM DRY FILM THICKNESS OF 0.2 MIL.

C. STAINLESS-STEEL SHEET: ASTM A 240/A 240M, TYPE 304, DEAD SOFT, FULLY ANNEALED; 2D (DULL, COLD ROLLED) FINISH. D. METALLIC-COATED STEEL SHEET: PROVIDE ZINC-COATED (GALVANIZED) STEEL SHEET ACCORDING TO ASTM A 653/A 653M, G90 COATING DESIGNATION: PREPAINTED BY COIL-COATING PROCESS TO COMPLY

WITH ASTM A 755/A 755M.

AS-MILLED FINISH: MILL.

2.3 MISCELLANEOUS MATERIALS A. GENERAL: PROVIDE MATERIALS AND TYPES OF FASTENERS, SOLDER, PROTECTIVE COATINGS, SEALANTS, AND OTHER MISCELLANEOUS ITEMS AS REQUIRED FOR COMPLETE SHEET METAL FLASHING AND TRIM INSTALLATION AND AS RECOMMENDED BY MANUFACTURER OF PRIMARY

SHEET METAL UNLESS OTHERWISE INDICATED.

FASTENERS: WOOD SCREWS, ANNULAR THREADED NAILS, SELF-TAPPING SCREWS, SELF-LOCKING RIVETS AND BOLTS, AND OTHER SUITABLE FASTENERS DESIGNED TO WITHSTAND DESIGN LOADS AND RECOMMENDED BY MANUFACTURER OF PRIMARY SHEET METAL.

1. GENERAL: BLIND FASTENERS OR SELF-DRILLING SCREWS. GASKETED WITH HEX-WASHER HEAD a. EXPOSED FASTENERS: HEADS MATCHING COLOR OF SHEET METAL USING PLASTIC CAPS OR FACTORY-APPLIED COATING.

UNDER HEADS OF EXPOSED FASTENERS BEARING ON WEATHER SIDE OF METAL. b. BLIND FASTENERS: HIGH-STRENGTH ALUMINUM OR STAINLESS-STEEL RIVETS SUITABLE FOR METAL BEING

PROVIDE METAL-BACKED EPDM OR PVC SEALING WASHERS

FASTENED. c. SPIKES AND FERRULES: SAME MATERIAL AS GUTTER; WITH SPIKE WITH FERRULE MATCHING INTERNAL GUTTER WIDTH.

2. FASTENERS FOR ALUMINUM SHEET: ALUMINUM OR SERIES 300

3. FASTENERS FOR STAINLESS-STEEL SHEET: SERIES 300 STAINLESS 4. FASTENERS FOR ZINC-COATED (GALVANIZED) STEEL SHEET:

SERIES 300 STAINLESS STEEL OR HOT-DIP GALVANIZED STEEL

ACCORDING TO ASTM A 153/A 153M OR ASTM F 2329.

STAINLESS STEEL.

1. FOR STAINLESS STEEL: ASTM B 32, GRADE SN60, WITH ACID FLUX OF TYPE RECOMMENDED BY STAINLESS-STEEL SHEET MANUFACTURER.

2. FOR ZINC-COATED (GALVANIZED) STEEL: ASTM B 32, GRADE SN60,

BACKING. PROVIDE PERMANENTLY ELASTIC, NONSAG, NONTOXIC,

60 PERCENT TIN AND 40 PERCENT LEAD WITH MAXIMUM LEAD CONTENT OF 0.2 PERCENT. D. SEALANT TAPE: PRESSURE-SENSITIVE, 100 PERCENT SOLIDS. POLYISOBUTYLENE COMPOUND SEALANT TAPE WITH RELEASE-PAPER

NONSTAINING TAPE 1/2 INCH WIDE AND 1/8 INCH THICK. BUTYL SEALANT: ASTM C 1311, SINGLE-COMPONENT, SOLVENT-RELEASE BUTYL RUBBER SEALANT; POLYISOBUTYLENE PLASTICIZED; HEAVY BODIED FOR HOOKED-TYPE EXPANSION JOINTS WITH LIMITED MOVEMENT.

F. EPOXY SEAM SEALER: TWO-PART, NONCORROSIVE, ALUMINUM

SEAM-CEMENTING COMPOUND. RECOMMENDED BY ALUMINUM

MANUFACTURER FOR EXTERIOR NONMOVING JOINTS, INCLUDING RIVETED

G. BITUMINOUS COATING: COLD-APPLIED ASPHALT EMULSION ACCORDING TO ASTM D 1187.

H. ASPHALT ROOFING CEMENT: ASTM D 4586, ASBESTOS FREE, OF CONSISTENCY REQUIRED FOR APPLICATION.

2.4 MANUFACTURED REGLETS

A. REGLETS: UNITS OF TYPE, MATERIAL, AND PROFILE REQUIRED, FORMED TO PROVIDE SECURE INTERLOCKING OF SEPARATE REGLET AND COUNTERFLASHING PIECES, AND COMPATIBLE WITH FLASHING INDICATED TWITH FACTORY-MITERED AND -WELDED CORNERS AND JUNCTIONS AND WITH INTERLOCKING COUNTERFLASHING ON EXTERIOR FACE, OF SAME METAL AS REGLET

1. MATERIAL: STAINLESS STEEL, 0.019 INCH THICK OR ALUMINUM, 0.024 INCH THICK OR GALVANIZED STEEL, 0.022 INCH THICK. SELECT MATERIAL TO MATCH FLASHING AND OR COUNTERFLASHING

2. FINISH: MILL.

2.5 FABRICATION, GENERAL

EXTENT POSSIBLE.

A. GENERAL: CUSTOM FABRICATE SHEET METAL FLASHING AND TRIM TO COMPLY WITH DETAILS SHOWN AND RECOMMENDATIONS IN CITED SHEET METAL STANDARD THAT APPLY TO DESIGN, DIMENSIONS, GEOMETRY, METAL THICKNESS, AND OTHER CHARACTERISTICS OF ITEM REQUIRED. FABRICATE SHEET METAL FLASHING AND TRIM IN SHOP TO GREATEST

1. OBTAIN FIELD MEASUREMENTS FOR ACCURATE FIT BEFORE SHOP

3. CONCEAL FASTENERS AND EXPANSION PROVISIONS WHERE

2. FORM SHEET METAL FLASHING AND TRIM TO FIT SUBSTRATES WITHOUT EXCESSIVE OIL CANNING, BUCKLING, AND TOOL MARKS; B. ROOF EDGE FLASHING: ANCHOR TO RESIST UPLIFT AND OUTWARD TRUE TO LINE, LEVELS, AND SLOPES; AND WITH EXPOSED EDGES FORCES ACCORDING TO RECOMMENDATIONS IN CITED SHEET METAL FOLDED BACK TO FORM HEMS.

POSSIBLE. DO NOT USE EXPOSED FASTENERS ON FACES EXPOSED B. EXPANSION PROVISIONS: FORM METAL FOR THERMAL EXPANSION OF

EXPOSED FLASHING AND TRIM. D. PIPE OR POST COUNTERFLASHING: INSTALL COUNTERFLASHING 1. FORM EXPANSION JOINTS OF INTERMESHING HOOKED FLANGES, NOT UMBRELLA WITH CLOSE-FITTING COLLAR WITH TOP EDGE FLARED FOR LESS THAN 1 INCH DEEP, FILLED WITH BUTYL SEALANT CONCEALED

2. USE LAPPED EXPANSION JOINTS ONLY WHERE INDICATED ON DRAWINGS. C. SEALANT JOINTS: WHERE MOVABLE. NONEXPANSION-TYPE JOINTS ARE

REQUIRED. FORM METAL TO PROVIDE FOR PROPER INSTALLATION OF ELASTOMERIC SEALANT ACCORDING TO CITED SHEET METAL STANDARD. D. FABRICATE CLEATS AND ATTACHMENT DEVICES FROM SAME MATERIAL AS ACCESSORY BEING ANCHORED OR FROM COMPATIBLE, NONCORROSIVE METAL.

FABRICATE CLEATS AND ATTACHMENT DEVICES OF SIZES AS RECOMMENDED BY CITED SHEET METAL STANDARD FOR APPLICATION, BUT NOT LESS THAN THICKNESS OF METAL BEING SECURED

EDGES TO BE SEAMED, FORM SEAMS, AND SOLDER.

F. SEAMS: FABRICATE NONMOVING SEAMS WITH FLAT-LOCK SEAMS. TIN

G. SEAMS: FABRICATE NONMOVING SEAMS WITH FLAT-LOCK SEAMS. FORM

FLAT-LOCK SEAMS. FORM SEAMS AND SEAL WITH EPOXY SEAM

SEAMS AND SEAL WITH ELASTOMERIC SEALANT UNLESS OTHERWISE RECOMMENDED BY SEALANT MANUFACTURER FOR INTENDED USE. H. SEAMS FOR ALUMINUM: FABRICATE NONMOVING SEAMS WITH

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. FELT UNDERLAYMENT: INSTALL FELT UNDERLAYMENT, WRINKLE FREE, USING ADHESIVE TO MINIMIZE USE OF MECHANICAL FASTENERS UNDER SHEET METAL FLASHING AND TRIM. APPLY IN SHINGLE FASHION TO SHED WATER, WITH LAPPED JOINTS OF NOT LESS THAN 2 INCHES.

B. SYNTHETIC UNDERLAYMENT: INSTALL SYNTHETIC UNDERLAYMENT,

WRINKLE FREE, ACCORDING TO MANUFACTURERS' WRITTEN

INSTRUCTIONS, AND USING ADHESIVE WHERE POSSIBLE TO MINIMIZE USE

OF MECHANICAL FASTENERS UNDER SHEET METAL. C. SELF-ADHERING SHEET UNDERLAYMENT: INSTALL SELF-ADHERING SHEET UNDERLAYMENT. WRINKLE FREE. PRIME SUBSTRATE IF RECOMMENDED BY UNDERLAYMENT MANUFACTURER. COMPLY WITH TEMPERATURE RESTRICTIONS OF UNDERLAYMENT MANUFACTURER FOR INSTALLATION; USE PRIMER FOR INSTALLING UNDERLAYMENT AT LOW TEMPERATURES. APPLY IN SHINGLE FASHION TO SHED WATER, WITH END LAPS OF NOT LESS THAN 6 INCHES STAGGERED 24 INCHES BETWEEN COURSES. OVERLAP SIDE EDGES NOT LESS THAN 3-1/2 INCHES. ROLL LAPS AND EDGES WITH ROLLER. COVER UNDERLAYMENT

WITHIN 14 DAYS.

INTERSECTION.

FLASHING AND TRIM SYSTEM

3.2 INSTALLATION, GENERAL A. GENERAL: ANCHOR SHEET METAL FLASHING AND TRIM AND OTHER COMPONENTS OF THE WORK SECURELY IN PLACE. WITH PROVISIONS FOR THERMAL AND STRUCTURAL MOVEMENT. USE FASTENERS, SOLDER, PROTECTIVE COATINGS, SEPARATORS, SEALANTS, AND OTHER MISCELLANEOUS ITEMS AS REQUIRED TO COMPLETE SHEET METAL

AND SLOPES. PROVIDE UNIFORM, NEAT SEAMS WITH MINIMUM EXPOSURE OF SOLDER, WELDS, AND SEALANT. 2. INSTALL SHEET METAL FLASHING AND TRIM TO FIT SUBSTRATES AND TO RESULT IN WATERTIGHT PERFORMANCE. VERIFY SHAPES AND DIMENSIONS OF SURFACES TO BE COVERED BEFORE

1. INSTALL SHEET METAL FLASHING AND TRIM TRUE TO LINE, LEVELS,

FABRICATING SHEET METAL. 3. SPACE CLEATS NOT MORE THAN 12 INCHES APART. ATTACH EACH CLEAT WITH AT LEAST TWO FASTENERS. BEND TABS OVER

4. INSTALL EXPOSED SHEET METAL FLASHING AND TRIM WITH LIMITED

OIL CANNING, AND FREE OF BUCKLING AND TOOL MARKS. 5. TORCH CUTTING OF SHEET METAL FLASHING AND TRIM IS NOT PERMITTED. B. METAL PROTECTION: WHERE DISSIMILAR METALS CONTACT EACH OTHER, OR WHERE METAL CONTACTS PRESSURE-TREATED WOOD OR OTHER

CORROSIVE SUBSTRATES. PROTECT AGAINST GALVANIC ACTION OR

CORROSION BY PAINTING CONTACT SURFACES WITH BITUMINOUS

COATING OR BY OTHER PERMANENT SEPARATION AS RECOMMENDED BY SHEET METAL MANUFACTURER OR CITED SHEET METAL STANDARD. 1. COAT CONCEALED SIDE OF UNCOATED—ALUMINUM AND STAINLESS-STEEL SHEET METAL FLASHING AND TRIM WITH BITUMINOUS COATING WHERE FLASHING AND TRIM CONTACT WOOD.

2. UNDERLAYMENT: WHERE INSTALLING SHEET METAL FLASHING AND

TRIM DIRECTLY ON CEMENTITIOUS OR WOOD SUBSTRATES, INSTALL

UNDERLAYMENT AND COVER WITH SLIP SHEET. C. EXPANSION PROVISIONS: PROVIDE FOR THERMAL EXPANSION OF EXPOSED FLASHING AND TRIM. SPACE MOVEMENT JOINTS AT MAXIMUM OF 10 FEET WITH NO JOINTS WITHIN 24 INCHES OF CORNER OR

FERROUS METAL, OR CEMENTITIOUS CONSTRUCTION.

LESS THAN 1 INCH DEEP, FILLED WITH SEALANT CONCEALED WITHIN 2. USE LAPPED EXPANSION JOINTS ONLY WHERE INDICATED ON

D. FASTENERS: USE FASTENER SIZES THAT PENETRATE WOOD BLOCKING

OR SHEATHING NOT LESS THAN 1-1/4 INCHES FOR NAILS AND NOT

1. FORM EXPANSION JOINTS OF INTERMESHING HOOKED FLANGES, NOT

E. CONCEAL FASTENERS AND EXPANSION PROVISIONS WHERE POSSIBLE IN EXPOSED WORK AND LOCATE TO MINIMIZE POSSIBILITY OF LEAKAGE. COVER AND SEAL FASTENERS AND ANCHORS AS REQUIRED FOR A TIGHT INSTALLATION.

LESS THAN 3/4 INCH FOR WOOD SCREWS.

F. SEAL JOINTS AS REQUIRED FOR WATERTIGHT CONSTRUCTION.

G. SOLDERED JOINTS: CLEAN SURFACES TO BE SOLDERED, REMOVING OILS AND FOREIGN MATTER. PRE-TIN EDGES OF SHEETS WITH SOLDER TO WIDTH OF 1-1/2 INCHES; HOWEVER, REDUCE PRE-TINNING WHERE

PRE-TINNED SURFACE WOULD SHOW IN COMPLETED WORK.

1. DO NOT SOLDER METALLIC-COATED STEEL AND ALUMINUM SHEET. DO NOT USE TORCHES FOR SOLDERING.

3. HEAT SURFACES TO RECEIVE SOLDER, AND FLOW SOLDER INTO JOINT. FILL JOINT COMPLETELY. COMPLETELY REMOVE FLUX AND SPATTER FROM EXPOSED SURFACES.

4. STAINLESS-STEEL SOLDERING: TIN EDGES OF UNCOATED SHEETS.

USING SOLDER FOR STAINLESS STEEL AND ACID FLUX. PROMPTLY

REMOVE ACID FLUX RESIDUE FROM METAL AFTER TINNING AND

SOLDERING. COMPLY WITH SOLDER MANUFACTURER'S RECOMMENDED

METHODS FOR CLEANING AND NEUTRALIZATION. 5. COPPER SOLDERING: TIN EDGES OF UNCOATED SHEETS, USING SOLDER FOR COPPER.

3.3 ROOF FLASHING INSTALLATION

A. GENERAL: INSTALL SHEET METAL FLASHING AND TRIM TO COMPLY WITH PERFORMANCE REQUIREMENTS AND CITED SHEET METAL STANDARD. PROVIDE CONCEALED FASTENERS WHERE POSSIBLE, AND SET UNITS. TRUE TO LINE, LEVELS, AND SLOPES. INSTALL WORK WITH LAPS, JOINTS, AND SEAMS THAT ARE PERMANENTLY WATERTIGHT AND WEATHER RESISTANT.

STANDARD UNLESS OTHERWISE INDICATED, INTERLOCK BOTTOM EDGE OF ROOF EDGE FLASHING WITH CONTINUOUS CLEAT ANCHORED TO SUBSTRATE.

C. COPINGS: ANCHOR TO RESIST UPLIFT AND OUTWARD FORCES ACCORDING TO RECOMMENDATIONS IN CITED SHEET METAL STANDARD UNLESS OTHERWISE INDICATED.

ELASTOMERIC SEALANT, EXTENDING MINIMUM OF 4 INCHES OVER BASE FLASHING. INSTALL STAINLESS-STEEL DRAW BAND AND TIGHTEN. E. COUNTERFLASHING: COORDINATE INSTALLATION OF COUNTERFLASHING WITH INSTALLATION OF BASE FLASHING. INSERT COUNTERFLASHING IN REGIFTS OR RECEIVERS AND FIT TIGHTLY TO BASE FLASHING, EXTEND

COUNTERFLASHING 4 INCHES OVER BASE FLASHING. LAP

COUNTERFLASHING JOINTS MINIMUM OF 4 INCHES. F. ROOF-PENETRATION FLASHING: COORDINATE INSTALLATION OF ROOF-PENETRATION FLASHING WITH INSTALLATION OF ROOFING AND OTHER ITEMS PENETRATING ROOF. SEAL WITH BUTYL SEALANT AND

CLAMP FLASHING TO PIPES THAT PENETRATE ROOF.

3.4 CLEANING AND PROTECTION

A. CLEAN EXPOSED METAL SURFACES OF SUBSTANCES THAT INTERFERE WITH UNIFORM OXIDATION AND WEATHERING.

B. CLEAN AND NEUTRALIZE FLUX MATERIALS. CLEAN OFF EXCESS SOLDER. C. CLEAN OFF EXCESS SEALANTS. D. REMOVE TEMPORARY PROTECTIVE COVERINGS AND STRIPPABLE FILMS

AS SHEET METAL FLASHING AND TRIM ARE INSTALLED UNLESS

OTHERWISE INDICATED IN MANUFACTURER'S WRITTEN INSTALLATION

END OF SECTION 076200

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SPECIFICATIONS

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PROJECT No. 13-1310

PART 1 - GENERAL

1.1 SUMMARY

- A. SECTION INCLUDES:
- ROOF CURBS.
- ROOF HATCHES.
- B. RELATED SECTIONS:
- 1. SECTION 055213 "PIPE AND TUBE RAILINGS" FOR SAFETY RAILING SYSTEMS NOT ATTACHED TO ROOF-HATCH CURBS.
- 2. SECTION 076200 "SHEET METAL FLASHING AND TRIM" FOR SHOP-AND FIELD-FORMED METAL FLASHING, ROOF-DRAINAGE SYSTEMS. ROOF EXPANSION-JOINT COVERS. AND MISCELLANEOUS SHEET METAL TRIM AND ACCESSORIES.

1.2 COORDINATION

- A. COORDINATE LAYOUT AND INSTALLATION OF ROOF ACCESSORIES WITH ROOFING MEMBRANE AND BASE FLASHING AND INTERFACING AND ADJOINING CONSTRUCTION TO PROVIDE A LEAKPROOF, WEATHERTIGHT, SECURE, AND NONCORROSIVE INSTALLATION.
- B. COORDINATE DIMENSIONS WITH ROUGH-IN INFORMATION OR SHOP DRAWINGS OF EQUIPMENT TO BE SUPPORTED.

1.3 SUBMITTALS

- A. PRODUCT DATA: FOR EACH TYPE OF ROOF ACCESSORY.
- 1. INCLUDE CONSTRUCTION DETAILS, MATERIAL DESCRIPTIONS, DIMENSIONS OF INDIVIDUAL COMPONENTS AND PROFILES, AND
- B. SHOP DRAWINGS: FOR ROOF ACCESSORIES.
- 1. INCLUDE PLANS, ELEVATIONS, KEYED DETAILS, AND ATTACHMENTS TO OTHER WORK INDICATE DIMENSIONS LOADINGS AND SPECIAL CONDITIONS. DISTINGUISH BETWEEN PLANT- AND FIELD-ASSEMBLED
- C. COORDINATION DRAWINGS: ROOF PLANS, DRAWN TO SCALE, AND COORDINATING PENETRATIONS AND ROOF-MOUNTED ITEMS. SHOW THE
- 1. SIZE AND LOCATION OF ROOF ACCESSORIES SPECIFIED IN THIS
- 2. METHOD OF ATTACHING ROOF ACCESSORIES TO ROOF OR BUILDING
- STRUCTURE 3. OTHER ROOF-MOUNTED ITEMS INCLUDING MECHANICAL AND ELECTRICAL EQUIPMENT, DUCTWORK, PIPING, AND CONDUIT.
- D. SAMPLE WARRANTIES: FOR MANUFACTURER'S SPECIAL WARRANTIES.

1.4 CLOSEOUT SUBMITTALS

REQUIRED CLEARANCES.

A. OPERATION AND MAINTENANCE DATA: FOR ROOF ACCESSORIES TO INCLUDE IN OPERATION AND MAINTENANCE MANUALS.

1.5 WARRANTY

- A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR FINISHES OR REPLACE ROOF ACCESSORIES THAT SHOW EVIDENCE OF DETERIORATION OF FACTORY-APPLIED FINISHES WITHIN SPECIFIED WARRANTY PERIOD.
- 1. FINISH WARRANTY PERIOD: 20 YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. GENERAL PERFORMANCE: ROOF ACCESSORIES SHALL WITHSTAND EXPOSURE TO WEATHER AND RESIST THERMALLY INDUCED MOVEMENT WITHOUT FAILURE, RATTLING, LEAKING, OR FASTENER DISENGAGEMENT DUE TO DEFECTIVE MANUFACTURE, FABRICATION, INSTALLATION, OR OTHER DEFECTS IN CONSTRUCTION.

2.2 ROOF CURBS

- A. ROOF CURBS: INTERNALLY REINFORCED ROOF-CURB UNITS CAPABLE OF SUPPORTING SUPERIMPOSED LIVE AND DEAD LOADS, INCLUDING FOUIPMENT LOADS AND OTHER CONSTRUCTION INDICATED ON DRAWINGS, BEARING CONTINUOUSLY ON ROOF STRUCTURE, AND CAPABLE OF MEETING PERFORMANCE REQUIREMENTS: WITH WELDED OR MECHANICALLY FASTENED AND SEALED CORNER JOINTS, STRAIGHT SIDES, AND INTEGRALLY FORMED DECK-MOUNTING FLANGE AT PERIMETER BOTTOM.
- B. SIZE: COORDINATE DIMENSIONS WITH ROUGHING-IN INFORMATION OR SHOP DRAWINGS OF EQUIPMENT TO BE SUPPORTED.
- C. SUPPORTED LOAD CAPACITY: SEE MECHANICAL DRAWINGS FOR EQUIPMENT SIZES.
- MATERIAL: ZINC-COATED (GALVANIZED) STEEL SHEET, 0.064 INCH
- FINISH: BAKED ENAMEL OR POWDER COAT. 2. COLOR: AS INDICATED BY MANUFACTURER'S DESIGNATIONS.
- CONSTRUCTION:
- 1. CURB PROFILE: MANUFACTURER'S STANDARD COMPATIBLE WITH
- ROOFING SYSTEM. 2. ON RIBBED OR FLUTED METAL ROOFS, FORM DECK-MOUNTING
- FLANGE AT PERIMETER BOTTOM TO CONFORM TO ROOF PROFILE. 3. FABRICATE CURBS TO MINIMUM HEIGHT OF 12 INCHES ABOVE ROOFING SURFACE UNLESS OTHERWISE INDICATED.
- 4. TOP SURFACE: LEVEL TOP OF CURB, WITH ROOF SLOPE ACCOMMODATED BY USE OF LEVELER FRAME.
- 5. INSULATION: FACTORY INSULATED WITH 1-1/2-INCH THICK GLASS-FIBER BOARD INSULATION.
- 6. LINER: SAME MATERIAL AS CURB, OF MANUFACTURER'S STANDARD THICKNESS AND FINISH.
- 7. NAILER: FACTORY-INSTALLED WOOD NAILER ALONG TOP FLANGE OF CURB, CONTINUOUS AROUND CURB PERIMETER.
- 8. PLATFORM CAP: WHERE PORTION OF ROOF CURB IS NOT COVERED BY EQUIPMENT, PROVIDE WEATHERTIGHT PLATFORM CAP FORMED FROM 3/4-INCH THICK PLYWOOD COVERED WITH METAL SHEET OF SAME TYPE, THICKNESS, AND FINISH AS REQUIRED FOR CURB.
- 9. METAL COUNTERFLASHING: MANUFACTURER'S STANDARD, REMOVABLE, FABRICATED OF SAME METAL AND FINISH AS CURB.

- A. ROOF HATCHES: METAL ROOF-HATCH UNITS WITH LIDS AND INSULATED SINGLE-WALLED CURBS, WELDED OR MECHANICALLY FASTENED AND SEALED CORNER JOINTS. CONTINUOUS LID-TO-CURB COUNTERFLASHING AND WEATHERTIGHT PERIMETER GASKETING, STRAIGHT SIDES, AND INTEGRALLY FORMED DECK-MOUNTING FLANGE AT PERIMETER BOTTOM.
- B. TYPE AND SIZE: SINGLE-LEAF LID, 30 BY 54 INCHES.
- C. LOADS: MINIMUM 40-LBF/SQ. FT. EXTERNAL LIVE LOAD AND 20-LBF/SQ. FT. INTERNAL UPLIFT LOAD.
- D. HATCH MATERIAL: ZINC-COATED (GALVANIZED) STEEL SHEET.
- 1. THICKNESS: MANUFACTURER'S STANDARD THICKNESS FOR HATCH SIZE INDICATED.
- 2. FINISH: BAKED ENAMEL OR POWDER COAT. 3. COLOR: AS INDICATED BY MANUFACTURER'S DESIGNATIONS.

E. CONSTRUCTION:

- 1. INSULATION: CELLULOSIC-FIBER BOARD OR GLASS-FIBER BOARD OR POLYISOCYANURATE BOARD.
- a. R-VALUE: 12.0 ACCORDING TO ASTM C 1363.
- 2. NAILER: FACTORY-INSTALLED WOOD NAILER CONTINUOUS AROUND HATCH PERIMETER.

3. HATCH LID: OPAQUE, INSULATED, AND DOUBLE WALLED, WITH

- MANUFACTURER'S STANDARD METAL LINER OF SAME MATERIAL AND FINISH AS OUTER METAL LID.
- 4. FABRICATE CURBS TO MINIMUM HEIGHT OF 12 INCHES ABOVE ROOFING SURFACE UNLESS OTHERWISE INDICATED.
- F. HARDWARE: SPRING OPERATORS, HOLD-OPEN ARM, STAINLESS-STEEL SPRING LATCH WITH TURN HANDLES, STAINLESS-STEEL BUTT- OR PINTLE-TYPE HINGE SYSTEM, AND PADLOCK HASPS INSIDE AND

2.4 GENERAL FINISH REQUIREMENTS

- A. COMPLY WITH NAAMM'S "METAL FINISHES MANUAL FOR ARCHITECTURAL AND METAL PRODUCTS" FOR RECOMMENDATIONS FOR APPLYING AND DESIGNATING FINISHES.
- B. APPEARANCE OF FINISHED WORK: NOTICEABLE VARIATIONS IN SAME PIECE ARE NOT ACCEPTABLE. VARIATIONS IN APPEARANCE OF ADJOINING COMPONENTS ARE ACCEPTABLE IF THEY ARE WITHIN THE RANGE OF APPROVED SAMPLES AND ARE ASSEMBLED OR INSTALLED TO MINIMIZE CONTRAST.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. EXAMINE SUBSTRATES, AREAS, AND CONDITIONS, WITH INSTALLER PRESENT, TO VERIFY ACTUAL LOCATIONS, DIMENSIONS, AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK.
- B. VERIFY THAT SUBSTRATE IS SOUND, DRY, SMOOTH, CLEAN, SLOPED FOR DRAINAGE, AND SECURELY ANCHORED.
- C. VERIFY DIMENSIONS OF ROOF OPENINGS FOR ROOF ACCESSORIES.
- D. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

BUCKLING, OR TOOL MARKS.

3.2 INSTALLATION

- A. GENERAL: INSTALL ROOF ACCESSORIES ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.
- 1. INSTALL ROOF ACCESSORIES LEVEL; PLUMB; TRUE TO LINE AND FLEVATION: AND WITHOUT WARPING, JOGS IN ALIGNMENT,
- 2. ANCHOR ROOF ACCESSORIES SECURELY IN PLACE SO THEY ARE CAPABLE OF RESISTING INDICATED LOADS.
- 3. USE FASTENERS, SEPARATORS, SEALANTS, AND OTHER MISCELLANEOUS ITEMS AS REQUIRED TO COMPLETE INSTALLATION OF ROOF ACCESSORIES AND FIT THEM TO SUBSTRATES.
- 4. INSTALL ROOF ACCESSORIES TO RESIST EXPOSURE TO WEATHER WITHOUT FAILING, RATTLING, LEAKING, OR LOOSENING OF FASTENERS AND SEALS.
- B. METAL PROTECTION: PROTECT METALS AGAINST GALVANIC ACTION BY SEPARATING DISSIMILAR METALS FROM CONTACT WITH EACH OTHER OR WITH CORROSIVE SUBSTRATES BY PAINTING CONTACT SURFACES WITH BITUMINOUS COATING OR BY OTHER PERMANENT SEPARATION AS RECOMMENDED BY MANUFACTURER.
- 1. COAT CONCEALED SIDE OF STAINLESS-STEEL ROOF ACCESSORIES WITH BITUMINOUS COATING WHERE IN CONTACT WITH WOOD, FERROUS METAL, OR CEMENTITIOUS CONSTRUCTION.
- UNDERLAYMENT: WHERE INSTALLING ROOF ACCESSORIES DIRECTLY ON CEMENTITIOUS OR WOOD SUBSTRATES, INSTALL A COURSE OF UNDERLAYMENT AND COVER WITH MANUFACTURER'S RECOMMENDED 3. BED FLANGES IN THICK COAT OF ASPHALT ROOFING CEMENT
- WHERE REQUIRED BY MANUFACTURERS OF ROOF ACCESSORIES FOR WATERPROOF PERFORMANCE.
- C. ROOF CURB INSTALLATION: INSTALL EACH ROOF CURB SO TOP SURFACE IS LEVEL.

D. ROOF-HATCH INSTALLATION:

- 1. VERIFY THAT ROOF HATCH OPERATES PROPERLY. CLEAN. LUBRICATE, AND ADJUST OPERATING MECHANISM AND HARDWARE.
- 2. ATTACH SAFETY RAILING SYSTEM TO ROOF-HATCH CURB. 3. ATTACH LADDER-ASSIST POST ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

3.3 REPAIR AND CLEANING

- A. GALVANIZED SURFACES: CLEAN FIELD WELDS, BOLTED CONNECTIONS, AND ABRADED AREAS AND REPAIR GALVANIZING ACCORDING TO ASTM A 780/A 780M.
- B. TOUCH UP FACTORY-PRIMED SURFACES WITH COMPATIBLE PRIMER READY FOR FIELD PAINTING ACCORDING TO SECTION 099113 "EXTERIOR
- C. CLEAN EXPOSED SURFACES ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.
- D. CLEAN OFF EXCESS SEALANTS.
- E. REPLACE ROOF ACCESSORIES THAT HAVE BEEN DAMAGED OR THAT CANNOT BE SUCCESSFULLY REPAIRED BY FINISH TOUCHUP OR SIMILAR

END OF SECTION 077200

078100 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY A. SECTION INCLUDES SPRAYED FIRE—RESISTIVE MATERIALS (SFRM).

- 1.2 SUBMITTALS
- A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.
- B. SHOP DRAWINGS: FRAMING PLANS, SCHEDULES, OR BOTH, INDICATING THE FOLLOWING:
- 1. EXTENT OF FIREPROOFING FOR EACH CONSTRUCTION AND FIRE-RESISTANCE RATING.
- 2. APPLICABLE FIRE-RESISTANCE DESIGN DESIGNATIONS OF A QUALIFIED TESTING AND INSPECTING AGENCY ACCEPTABLE TO
- AUTHORITIES HAVING JURISDICTION. 3. MINIMUM FIREPROOFING THICKNESSES NEEDED TO ACHIEVE REQUIRED FIRE-RESISTANCE RATING OF EACH STRUCTURAL
- COMPONENT AND ASSEMBLY. 4. TREATMENT OF FIREPROOFING AFTER APPLICATION.
- C. SAMPLES: FOR EACH EXPOSED PRODUCT AND FOR EACH COLOR AND TEXTURE SPECIFIED, IN MANUFACTURER'S STANDARD DIMENSIONS IN
- D. QUALIFICATION DATA: FOR INSTALLER.
- E. FIELD QUALITY-CONTROL REPORTS.

1.3 QUALITY ASSURANCE

A. INSTALLER QUALIFICATIONS: A FIRM OR INDIVIDUAL CERTIFIED LICENSED, OR OTHERWISE QUALIFIED BY FIREPROOFING MANUFACTURER AS EXPERIENCED AND WITH SUFFICIENT TRAINED STAFF TO INSTAUL MANUFACTURER'S PRODUCTS ACCORDING TO SPECIFIED REQUIREMENTS.

1.4 PRECONSTRUCTION TESTING

- A. PRECONSTRUCTION ADHESION AND COMPATIBILITY TESTING: TEST FOR COMPLIANCE WITH REQUIREMENTS FOR SPECIFIED PERFORMANCE AND
- 1. BOND STRENGTH: TEST FOR COHESIVE AND ADHESIVE STRENGTH ACCORDING TO ASTM E 736. PROVIDE BOND STRENGTH INDICATED IN REFERENCED FIRE-RESISTANCE DESIGN, BUT NOT LESS THAN MINIMUM SPECIFIED IN PART 2.
- 2. DENSITY: TEST FOR DENSITY ACCORDING TO ASTM E 605. PROVIDE DENSITY INDICATED IN REFERENCED FIRE-RESISTANCE DESIGN, BUT NOT LESS THAN MINIMUM SPECIFIED IN PART 2.
- 3. VERIFY THAT MANUFACTURER, THROUGH ITS OWN LABORATORY TESTING OR FIELD EXPERIENCE, ATTESTS THAT PRIMERS OR COATINGS ARE COMPATIBLE WITH FIREPROOFING.
- 4. SCHEDULE SUFFICIENT TIME FOR TESTING AND ANALYZING RESULTS TO PREVENT DELAYING THE WORK. 5. FOR MATERIALS FAILING TESTS, OBTAIN APPLIED-FIREPROOFING

MANUFACTURER'S WRITTEN INSTRUCTIONS FOR CORRECTIVE

MEASURES INCLUDING THE USE OF SPECIALLY FORMULATED BONDING AGENTS OR PRIMERS.

- 1.5 FIELD CONDITIONS A. ENVIRONMENTAL LIMITATIONS: DO NOT APPLY FIREPROOFING WHEN AMBIENT OR SUBSTRATE TEMPERATURE IS 44 DEG F OR LOWER UNLESS TEMPORARY PROTECTION AND HEAT ARE PROVIDED TO MAINTAIN TEMPERATURE AT OR ABOVE THIS LEVEL FOR 24 HOURS BEFORE, DURING, AND FOR 24 HOURS AFTER PRODUCT APPLICATION.
- B. VENTILATION: VENTILATE BUILDING SPACES DURING AND AFTER APPLICATION OF FIREPROOFING, PROVIDING COMPLETE AIR EXCHANGES ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS. USE NATURAL MEANS OR, IF THEY ARE INADEQUATE, FORCED-AIR CIRCULATION UNTIL FIREPROOFING DRIES THOROUGHLY.

PART 2 - PRODUCTS

- 2.1 MATERIALS, GENERAL
- A. ASSEMBLIES: PROVIDE FIREPROOFING, INCLUDING AUXILIARY MATERIALS. ACCORDING TO REQUIREMENTS OF EACH FIRE-RESISTANCE DESIGN AND MANUFACTURER'S WRITTEN INSTRUCTIONS.
- B. SOURCE LIMITATIONS: OBTAIN FIREPROOFING FROM SINGLE SOURCE. C. FIRE-RESISTANCE DESIGN: INDICATED ON DRAWINGS. TESTED ACCORDING TO ASTM E 119 OR UL 263 BY A QUALIFIED TESTING AGENCY. IDENTIFY PRODUCTS WITH APPROPRIATE MARKINGS OF
- APPLICABLE TESTING AGENCY. 1. STEEL MEMBERS ARE TO BE CONSIDERED UNRESTRAINED UNLESS SPECIFICALLY NOTED OTHERWISE.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. SFRM: MANUFACTURER'S STANDARD, FACTORY-MIXED, LIGHTWEIGHT, DRY FORMULATION. COMPLYING WITH INDICATED FIRE-RESISTANCE DESIGN, AND MIXED WITH WATER AT PROJECT SITE TO FORM A SLURRY OR MORTAR BEFORE CONVEYANCE AND APPLICATION OR CONVEYED IN A DRY STATE AND MIXED WITH ATOMIZED WATER AT PLACE OF
- APPLICATION. 1. BOND STRENGTH: MINIMUM 430-LBF/SQ. FT. COHESIVE AND ADHESIVE STRENGTH BASED ON FIELD TESTING ACCORDING TO
- 2. DENSITY: NOT LESS THAN 22 LB/CU. FT. AS SPECIFIED IN THE APPROVED FIRE-RESISTANCE DESIGN, ACCORDING TO ASTM E 605.
- 3. THICKNESS: AS REQUIRED FOR FIRE—RESISTANCE DESIGN INDICATED, MEASURED ACCORDING TO REQUIREMENTS OF FIRE-RESISTANCE DESIGN OR ASTM E 605, WHICHEVER IS THICKER,
- BUT NOT LESS THAN 0.375 INCH.
- 4. COMBUSTION CHARACTERISTICS: ASTM E 136. 5. SURFACE-BURNING CHARACTERISTICS: COMPLY WITH ASTM E 84; TESTING BY A QUALIFIED TESTING AGENCY. IDENTIFY PRODUCTS WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AGENCY.
- a. FLAME-SPREAD INDEX: 10 OR LESS.
- b. SMOKE-DEVELOPED INDEX: 10 OR LESS. 6. COMPRESSIVE STRENGTH: MINIMUM 100 LBF/SQ. IN. ACCORDING TO ASTM E 761.

8. DEFLECTION: NO CRACKING, SPALLING, OR DELAMINATION

- 7. CORROSION RESISTANCE: NO EVIDENCE OF CORROSION ACCORDING TO ASTM E 937
- ACCORDING TO ASTM E 759. 9. EFFECT OF IMPACT ON BONDING: NO CRACKING, SPALLING, OR DELAMINATION ACCORDING TO ASTM E 760.
- 10. AIR EROSION: MAXIMUM WEIGHT LOSS OF [0.025 G/SQ. FT. (0.270 G/SQ. M)] <INSERT VALUE> IN 24 HOURS ACCORDING TO ASTM E 859.

2.3 AUXILIARY MATERIALS

A. GENERAL: PROVIDE AUXILIARY MATERIALS THAT ARE COMPATIBLE WITH FIREPROOFING AND SUBSTRATES AND ARE APPROVED BY UL OR ANOTHER TESTING AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION FOR USE IN FIRE-RESISTANCE DESIGNS INDICATED.

B. SUBSTRATE PRIMERS: PRIMERS APPROVED BY FIREPROOFING MANUFACTURER AND COMPLYING WITH ONE OR BOTH OF THE FOLLOWING REQUIREMENTS:

- 1. PRIMER AND SUBSTRATE ARE IDENTICAL TO THOSE TESTED IN REQUIRED FIRE-RESISTANCE DESIGN BY UL OR ANOTHER TESTING AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
- 2. PRIMER'S BOND STRENGTH IN REQUIRED FIRE-RESISTANCE DESIGN COMPLIES WITH SPECIFIED BOND STRENGTH FOR FIREPROOFING AND WITH REQUIREMENTS IN UL'S "FIRE RESISTANCE DIRECTORY" OR IN THE LISTINGS OF ANOTHER QUALIFIED TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, BASED ON A SERIES OF BOND TESTS ACCORDING TO ASTM E 736.
- BONDING AGENT: PRODUCT APPROVED BY FIREPROOFING MANUFACTURER AND COMPLYING WITH REQUIREMENTS IN UL'S "FIRE RESISTANCE DIRECTORY" OR IN THE LISTINGS OF ANOTHER QUALIFIED TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. EXAMINE SUBSTRATES. AREAS. AND CONDITIONS. WITH INSTALLER PRESENT, FOR COMPLIANCE WITH REQUIREMENTS FOR SUBSTRATES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK AND ACCORDING TO EACH FIRE-RESISTANCE DESIGN. VERIFY COMPLIANCE WITH THE FOLLOWING:
- 1. SUBSTRATES ARE FREE OF DIRT, OIL, GREASE, RELEASE AGENTS, ROLLING COMPOUNDS, MILL SCALE, LOOSE SCALE, INCOMPATIBLE PRIMERS, PAINTS, AND ENCAPSULANTS, OR OTHER FOREIGN SUBSTANCES CAPABLE OF IMPAIRING BOND OF FIREPROOFING WITH SUBSTRATES UNDER CONDITIONS OF NORMAL USE OR FIRE EXPOSURE.
- OBJECTS PENETRATING FIREPROOFING, INCLUDING CLIPS, HANGERS, SUPPORT SLEEVES, AND SIMILAR ITEMS, ARE SECURELY ATTACHED TO SUBSTRATES.

3. SUBSTRATES RECEIVING FIREPROOFING ARE NOT OBSTRUCTED BY

DUCTS, PIPING, EQUIPMENT, OR OTHER SUSPENDED CONSTRUCTION

- THAT WILL INTERFERE WITH FIREPROOFING APPLICATION. B. VERIFY THAT ROOF CONSTRUCTION, INSTALLATION OF ROOF-TOP HVAC EQUIPMENT, AND OTHER RELATED WORK IS COMPLETE BEFORE BEGINNING FIREPROOFING WORK.
- . CONDUCT TESTS ACCORDING TO FIREPROOFING MANUFACTURER'S WRITTEN RECOMMENDATIONS TO VERIFY THAT SUBSTRATES ARE FREE OF SUBSTANCES CAPABLE OF INTERFERING WITH BOND.
- D. PREPARE WRITTEN REPORT, ENDORSED BY INSTALLER, LISTING CONDITIONS DETRIMENTAL TO PERFORMANCE OF THE WORK. . PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS

3.2 PREPARATION

HAVE BEEN CORRECTED.

- A. COVER OTHER WORK SUBJECT TO DAMAGE FROM FALLOUT OR OVERSPRAY OF FIREPROOFING MATERIALS DURING APPLICATION.
- B. CLEAN SUBSTRATES OF SUBSTANCES THAT COULD IMPAIR BOND OF

PRIME SUBSTRATES WHERE INCLUDED IN FIRE-RESISTANCE DESIGN AND

WHERE RECOMMENDED IN WRITING BY FIREPROOFING MANUFACTURER UNLESS COMPATIBLE SHOP PRIMER HAS BEEN APPLIED AND IS IN SATISFACTORY CONDITION TO RECEIVE FIREPROOFING.

- 3.3 APPLICATION A. CONSTRUCT FIREPROOFING ASSEMBLIES THAT ARE IDENTICAL TO FIRE-RESISTANCE DESIGN INDICATED AND PRODUCTS AS SPECIFIED, TESTED, AND SUBSTANTIATED BY TEST REPORTS; FOR THICKNESS, PRIMERS. SEALERS. TOPCOATS, FINISHING, AND OTHER MATERIALS AND
- PROCEDURES AFFECTING FIREPROOFING WORK. B. COMPLY WITH FIREPROOFING MANUFACTURER'S WRITTEN INSTRUCTIONS FOR MIXING MATERIALS, APPLICATION PROCEDURES, AND TYPES OF EQUIPMENT USED TO MIX. CONVEY. AND APPLY FIREPROOFING: AS APPLICABLE TO PARTICULAR CONDITIONS OF INSTALLATION AND AS
- REQUIRED TO ACHIEVE FIRE-RESISTANCE RATINGS INDICATED. C. COORDINATE APPLICATION OF FIREPROOFING WITH OTHER CONSTRUCTION TO MINIMIZE NEED TO CUT OR REMOVE FIREPROOFING.
- SUPPORTS, SLEEVES, AND OTHER ITEMS PENETRATING FIREPROOFING ARE IN PLACE. 2. DEFER INSTALLING DUCTS, PIPING, AND OTHER ITEMS THAT WOULD INTERFERE WITH APPLYING FIREPROOFING UNTIL APPLICATION OF

1. DO NOT BEGIN APPLYING FIREPROOFING UNTIL CLIPS, HANGERS,

FIREPROOFING IS COMPLETED. D. METAL DECKS:

1. DO NOT APPLY FIREPROOFING TO UNDERSIDE OF METAL DECK SUBSTRATES UNTIL CONCRETE TOPPING, IF ANY, HAS BEEN

2. DO NOT APPLY FIREPROOFING TO UNDERSIDE OF METAL ROOF

- DECK UNTIL ROOFING HAS BEEN COMPLETED; PROHIBIT ROOF TRAFFIC DURING APPLICATION AND DRYING OF FIREPROOFING. . INSTALL AUXILIARY MATERIALS AS REQUIRED, AS DETAILED, AND ACCORDING TO FIRE-RESISTANCE DESIGN AND FIREPROOFING MANUFACTURER'S WRITTEN RECOMMENDATIONS FOR CONDITIONS OF EXPOSURE AND INTENDED USE. FOR AUXILIARY MATERIALS, USE
- ATTACHMENT AND ANCHORAGE DEVICES OF TYPE RECOMMENDED IN WRITING BY FIREPROOFING MANUFACTURER. SPRAY APPLY FIREPROOFING TO MAXIMUM EXTENT POSSIBLE. FOLLOWING THE SPRAYING OPERATION IN EACH AREA, COMPLETE THE COVERAGE BY TROWEL APPLICATION OR OTHER PLACEMENT METHOD
- RECOMMENDED IN WRITING BY FIREPROOFING MANUFACTURER. G. EXTEND FIREPROOFING IN FULL THICKNESS OVER ENTIRE AREA OF EACH
- SUBSTRATE TO BE PROTECTED. H. INSTALL BODY OF FIREPROOFING IN A SINGLE COURSE UNLESS OTHERWISE RECOMMENDED IN WRITING BY FIREPROOFING
- DIFFERENTIATE THEM FROM FIREPROOFING OVER WHICH THEY ARE PROVIDE A UNIFORM FINISH COMPLYING WITH DESCRIPTION INDICATED FOR EACH TYPE OF FIREPROOFING MATERIAL AND MATCHING FINISH

WHERE SEALERS ARE USED, APPLY PRODUCTS THAT ARE TINTED TO

APPROVED FOR REQUIRED MOCKUPS. K. CURE FIREPROOFING ACCORDING TO FIREPROOFING MANUFACTURER'S WRITTEN RECOMMENDATIONS.

- 3.4 FIELD QUALITY CONTROL A. SPECIAL INSPECTIONS: ENGAGE A QUALIFIED SPECIAL INSPECTOR TO PERFORM THE FOLLOWING SPECIAL INSPECTIONS:
- B. PERFORM THE TESTS AND INSPECTIONS OF COMPLETED WORK IN SUCCESSIVE STAGES. DO NOT PROCEED WITH APPLICATION OF FIREPROOFING FOR THE NEXT AREA UNTIL TEST RESULTS FOR

1. TEST AND INSPECT AS REQUIRED BY THE IBC, 1704.10.

APPROVED FIRE-RESISTANCE DESIGN. FIREPROOFING WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.

1. REMOVE AND REPLACE FIREPROOFING THAT DOES NOT PASS TESTS

PREVIOUSLY COMPLETED APPLICATIONS OF FIREPROOFING SHOW

COMPLIANCE WITH REQUIREMENTS. TESTED VALUES MUST EQUAL OR

EXCEED VALUES AS SPECIFIED AND AS INDICATED AND REQUIRED FOR

- 2. APPLY ADDITIONAL FIREPROOFING, PER MANUFACTURER'S WRITTEN INSTRUCTIONS, WHERE TEST RESULTS INDICATE INSUFFICIENT THICKNESS, AND RETEST.
- D. PREPARE TEST AND INSPECTION REPORTS.

AND INSPECTIONS. AND RETEST.

- 3.5 CLEANING, PROTECTING, AND REPAIRING
- A. CLEANING: IMMEDIATELY AFTER COMPLETING SPRAYING OPERATIONS IN EACH CONTAINABLE AREA OF PROJECT, REMOVE MATERIAL OVERSPRAY AND FALLOUT FROM SURFACES OF OTHER CONSTRUCTION AND CLEAN EXPOSED SURFACES TO REMOVE EVIDENCE OF SOILING.
- B. PROTECT FIREPROOFING, ACCORDING TO ADVICE OF MANUFACTURER AND INSTALLER, FROM DAMAGE RESULTING FROM CONSTRUCTION OPERATIONS OR OTHER CAUSES, SO FIREPROOFING WILL BE WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION.
- C. AS INSTALLATION OF OTHER CONSTRUCTION PROCEEDS, INSPECT FIREPROOFING AND REPAIR DAMAGED AREAS AND FIREPROOFING
- REMOVED DUE TO WORK OF OTHER TRADES. D. REPAIR FIREPROOFING DAMAGED BY OTHER WORK BEFORE CONCEALING IT WITH OTHER CONSTRUCTION.
- . REPAIR FIREPROOFING BY REAPPLYING IT USING SAME METHOD AS ORIGINAL INSTALLATION OR USING MANUFACTURER'S RECOMMENDED TROWEL-APPLIED PRODUCT.

END OF SECTION 078100

078413 - PENETRATION FIRESTOPPING

PART 1 – GENERAL

- A. SECTION INCLUDES:
- 1. PENETRATIONS IN HORIZONTAL ASSEMBLIES.
- 1.2 SUBMITTALS A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
- B. QUALIFICATION DATA: FOR QUALIFIED INSTALLER. INSTALLER CERTIFICATES: FROM INSTALLER INDICATING PENETRATION FIRESTOPPING HAS BEEN INSTALLED IN COMPLIANCE WITH

REQUIREMENTS AND MANUFACTURER'S WRITTEN RECOMMENDATIONS.

1.3 QUALITY ASSURANCE

A. INSTALLER QUALIFICATIONS: A FIRM THAT HAS BEEN APPROVED BY FM GLOBAL ACCORDING TO FM GLOBAL 4991, "APPROVAL OF FIRESTOP CONTRACTORS," OR BEEN EVALUATED BY UL AND FOUND TO COMPLY WITH ITS "QUALIFIED FIRESTOP CONTRACTOR PROGRAM REQUIREMENTS."

A. COORDINATE CONSTRUCTION OF OPENINGS AND PENETRATING ITEMS TO

ENSURE THAT PENETRATION FIRESTOPPING IS INSTALLED ACCORDING

B. COORDINATE SIZING OF SLEEVES, OPENINGS, CORE-DRILLED HOLES, OR CUT OPENINGS TO ACCOMMODATE PENETRATION FIRESTOPPING.

1.4 COORDINATION

PART 2 - PRODUCTS

TO SPECIFIED REQUIREMENTS.

- 2.1 PENETRATION FIRESTOPPING A. PROVIDE PENETRATION FIRESTOPPING THAT IS PRODUCED AND INSTALLED TO RESIST SPREAD OF FIRE ACCORDING TO REQUIREMENTS INDICATED, RESIST PASSAGE OF SMOKE AND OTHER GASES, AND MAINTAIN ORIGINAL FIRE—RESISTANCE RATING OF CONSTRUCTION PENETRATED. PENETRATION FIRESTOPPING SYSTEMS SHALL BE
- OPENINGS, AND WITH PENETRATING ITEMS IF ANY. PENETRATIONS IN HORIZONTAL ASSEMBLIES: PROVIDE PENETRATION FIRESTOPPING WITH RATINGS DETERMINED PER ASTM E 814 OR UL 1479, BASED ON TESTING AT A POSITIVE PRESSURE DIFFERENTIAL

COMPATIBLE WITH ONE ANOTHER, WITH THE SUBSTRATES FORMING

- OF 0.01-INCH WG. 1. HORIZONTAL ASSEMBLIES INCLUDE METAL DECK / CEILING SYSTEM
- OF ROOF PLANE.
- 2. F-RATING: AT LEAST 2 HOUR. T-RATING: AT LEAST 2 HOUR. C. W-RATING: PROVIDE PENETRATION FIRESTOPPING SHOWING NO

EVIDENCE OF WATER LEAKAGE WHEN TESTED ACCORDING TO UL 1479.

CONTENT WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D

- D. EXPOSED PENETRATION FIRESTOPPING: PROVIDE PRODUCTS WITH FLAME-SPREAD AND SMOKE-DEVELOPED INDEXES OF LESS THAN 25 AND 450, RESPECTIVELY, AS DETERMINED PER ASTM E 84. E. VOC CONTENT: PENETRATION FIRESTOPPING SEALANTS AND SEALANT PRIMERS SHALL COMPLY WITH THE FOLLOWING LIMITS FOR VOC
- (EPA METHOD 24):

2.2 FILL MATERIALS

- 1. SEALANTS: 250 G/L. 2. SEALANT PRIMERS FOR NONPOROUS SUBSTRATES: 250 G/L.
- 3. SEALANT PRIMERS FOR POROUS SUBSTRATES: 775 G/L.
- RADIAL EXTENDED FLANGE ATTACHED TO ONE END OF THE SLEEVE FOR FASTENING TO CONCRETE FORMWORK, AND A NEOPRENE GASKET. B. LATEX SEALANTS: SINGLE-COMPONENT LATEX FORMULATIONS THAT DO

NOT RE-EMULSIFY AFTER CURE DURING EXPOSURE TO MOISTURE.

A. CAST-IN-PLACE FIRESTOP DEVICES: FACTORY-ASSEMBLED DEVICES

FOR USE IN CAST-IN-PLACE CONCRETE FLOORS AND CONSISTING OF

AN OUTER METALLIC SLEEVE LINED WITH AN INTUMESCENT STRIP, A

C. FIRESTOP DEVICES: FACTORY-ASSEMBLED COLLARS FORMED FROM GALVANIZED STEEL AND LINED WITH INTUMESCENT MATERIAL SIZED TO FIT SPECIFIC DIAMETER OF PENETRANT. INTUMESCENT PUTTIES: NONHARDENING DIELECTRIC, WATER-RESISTANT

PUTTIES CONTAINING NO SOLVENTS, INORGANIC FIBERS, OR SILICONE

PILLOWS/BAGS: REUSABLE HEAT-EXPANDING PILLOWS/BAGS CONSISTING OF GLASS-FIBER CLOTH CASES FILLED WITH A COMBINATION OF MINERAL-FIBER. WATER-INSOLUBLE EXPANSION AGENTS, AND FIRE-RETARDANT ADDITIVES. WHERE EXPOSED, COVER OPENINGS WITH STEEL-REINFORCING WIRE MESH TO PROTECT

PILLOWS/BAGS FROM BEING EASILY REMOVED.

ELASTOMERS THAT, WHEN MIXED, EXPAND AND CURE IN PLACE TO PRODUCE A FLEXIBLE, NONSHRINKING FOAM. G. SILICONE SEALANTS: SINGLE-COMPONENT, SILICONE-BASED, NEUTRAL-CURING ELASTOMERIC SEALANTS OF GRADE INDICATED

SILICONE FOAMS: MULTICOMPONENT, SILICONE—BASED LIQUID

1. GRADE: POURABLE (SELF-LEVELING) FORMULATION FOR OPENINGS IN FLOORS AND OTHER HORIZONTAL SURFACES, AND NONSAG FORMULATION FOR OPENINGS IN VERTICAL AND SLOPED SURFACES, UNLESS INDICATED FIRESTOPPING LIMITS USE OF NONSAG GRADE FOR BOTH OPENING CONDITIONS.

- 2.3 MIXING
- A. FOR THOSE PRODUCTS REQUIRING MIXING BEFORE APPLICATION. COMPLY WITH PENETRATION FIRESTOPPING MANUFACTURER'S WRITTEN INSTRUCTIONS FOR ACCURATE PROPORTIONING OF MATERIALS, WATER (IF REQUIRED), TYPE OF MIXING EQUIPMENT, SELECTION OF MIXER SPEEDS, MIXING CONTAINERS, MIXING TIME, AND OTHER ITEMS OR PROCEDURES NEEDED TO PRODUCE PRODUCTS OF UNIFORM QUALITY WITH OPTIMUM PERFORMANCE CHARACTERISTICS FOR APPLICATION

PART 3 - EXECUTION

INDICATED.

3.1 EXAMINATION

- A. EXAMINE SUBSTRATES AND CONDITIONS, WITH INSTALLER PRESENT, FOR COMPLIANCE WITH REQUIREMENTS FOR OPENING CONFIGURATIONS, PENETRATING ITEMS, SUBSTRATES, AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK
- B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 PREPARATION

- A. SURFACE CLEANING: CLEAN OUT OPENINGS IMMEDIATELY BEFORE INSTALLING PENETRATION FIRESTOPPING TO COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND WITH THE FOLLOWING
- 1. REMOVE FROM SURFACES OF OPENING SUBSTRATES AND FROM PENETRATING ITEMS FOREIGN MATERIALS THAT COULD INTERFERE WITH ADHESION OF PENETRATION FIRESTOPPING.
- 2. CLEAN OPENING SUBSTRATES AND PENETRATING ITEMS TO PRODUCE CLEAN, SOUND SURFACES CAPABLE OF DEVELOPING OPTIMUM BOND WITH PENETRATION FIRESTOPPING. REMOVE LOOSE
- PARTICLES REMAINING FROM CLEANING OPERATION.
- A. GENERAL: INSTALL PENETRATION FIRESTOPPING TO COMPLY WITH MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS AND
- PUBLISHED DRAWINGS FOR PRODUCTS AND APPLICATIONS INDICATED. B. INSTALL FORMING MATERIALS AND OTHER ACCESSORIES OF TYPES REQUIRED TO SUPPORT FILL MATERIALS DURING THEIR APPLICATION AND IN THE POSITION NEEDED TO PRODUCE CROSS-SECTIONAL
- 1. AFTER INSTALLING FILL MATERIALS AND ALLOWING THEM TO FULLY CURE, REMOVE COMBUSTIBLE FORMING MATERIALS AND OTHER ACCESSORIES NOT INDICATED AS PERMANENT COMPONENTS OF

SHAPES AND DEPTHS REQUIRED TO ACHIEVE FIRE RATINGS INDICATED.

- C. INSTALL FILL MATERIALS FOR FIRESTOPPING BY PROVEN TECHNIQUES TO PRODUCE THE FOLLOWING RESULTS:
- TO ACHIEVE FIRE-RESISTANCE RATINGS INDICATED. 2. APPLY MATERIALS SO THEY CONTACT AND ADHERE TO SUBSTRATES FORMED BY OPENINGS AND PENETRATING ITEMS.

COMPLETING THE WORK, FINISH TO PRODUCE SMOOTH, UNIFORM

SURFACES THAT ARE FLUSH WITH ADJOINING FINISHES.

FIRESTOPPING.

- A. CLEAN OFF EXCESS FILL MATERIALS ADJACENT TO OPENINGS AS THE WORK PROGRESSES BY METHODS AND WITH CLEANING MATERIALS THAT ARE APPROVED IN WRITING BY PENETRATION FIRESTOPPING MANUFACTURERS AND THAT DO NOT DAMAGE MATERIALS IN WHICH
- OPENINGS OCCUR. B. PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS DURING AND AFTER INSTALLATION THAT ENSURE THAT PENETRATION FIRESTOPPING IS WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION. IF. DESPITE SUCH PROTECTION. DAMAGE OR DETERIORATION OCCURS, IMMEDIATELY CUT OUT AND REMOVE DAMAGED

REQUIREMENTS.

- 3.5 PENETRATION FIRESTOPPING SCHEDULE A. WHERE UL-CLASSIFIED SYSTEMS ARE INDICATED, THEY REFER TO
- B. FIRESTOPPING FOR MISCELLANESOUS ARCHITECTURAL AND STRUCTURAL
- 1. UL-CLASSIFIED SYSTEMS: PROVIDE UL RATED FIRESTOPPING TO REALIZE 2 HOUR MIN RATING. D. FIRESTOPPING FOR MISCELLANEOUS MECHANICAL PENETRANTS:

- 3. REMOVE LAITANCE AND FORM-RELEASE AGENTS FROM CONCRETE. 3.3 INSTALLATION
- 1. FILL VOIDS AND CAVITIES FORMED BY OPENINGS, FORMING

MATERIALS, ACCESSORIES, AND PENETRATING ITEMS AS REQUIRED

3. FOR FILL MATERIALS THAT WILL REMAIN EXPOSED AFTER

- 3.4 CLEANING AND PROTECTION

MATERIALS TO PRODUCE SYSTEMS COMPLYING WITH SPECIFIED

- SYSTEM NUMBERS IN UL'S "FIRE RESISTANCE DIRECTORY" UNDER PRODUCT CATEGORY XHEZ.
- 1. UL-CLASSIFIED SYSTEMS: PROVIDE UL RATED FIRESTOPPING TO REALIZE 2 HOUR MIN RATING. C. FIRESTOPPING FOR MISCELLANEOUS ELECTRICAL PENETRANTS:

1. UL-CLASSIFIED SYSTEMS: PROVIDE UL RATED FIRESTOPPING TO REALIZE 2 HOUR MIN RATING.

END OF SECTION 078413

099123 - INTERIOR PAINTING

PART 1 – GENERAL

1.1 SUMMARY

- A. SECTION INCLUDES SURFACE PREPARATION AND THE APPLICATION OF PAINT SYSTEMS ON INTERIOR SUBSTRATES.
- STEEL.
- 1.2 DEFINITIONS
- A. GLOSS LEVEL 1: NOT MORE THAN 5 UNITS AT 60 DEGREES AND 10 UNITS AT 85 DEGREES, ACCORDING TO ASTM D 523.
- B. GLOSS LEVEL 2: NOT MORE THAN 10 UNITS AT 60 DEGREES AND 10 TO 35 UNITS AT 85 DEGREES, ACCORDING TO ASTM D 523.
- C. GLOSS LEVEL 3: 10 TO 25 UNITS AT 60 DEGREES AND 10 TO 35 UNITS AT 85 DEGREES, ACCORDING TO ASTM D 523.
- D. GLOSS LEVEL 4: 20 TO 35 UNITS AT 60 DEGREES AND NOT LESS THAN 35 UNITS AT 85 DEGREES, ACCORDING TO ASTM D 523.
- E. GLOSS LEVEL 5: 35 TO 70 UNITS AT 60 DEGREES, ACCORDING TO ASTM D 523.
- F. GLOSS LEVEL 6: 70 TO 85 UNITS AT 60 DEGREES, ACCORDING TO
- G. GLOSS LEVEL 7: MORE THAN 85 UNITS AT 60 DEGREES, ACCORDING TO ASTM D 523.

ASTM D 523.

1.3 SUBMITTALS A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT. INCLUDE PREPARATION REQUIREMENTS AND APPLICATION INSTRUCTIONS.

PART 2 - PRODUCTS

B. MATERIAL COMPATIBILITY:

- 2.1 PAINT, GENERAL A. MPI STANDARDS: PROVIDE PRODUCTS THAT COMPLY WITH MPI STANDARDS INDICATED AND THAT ARE LISTED IN ITS "MPI APPROVED PRODUCTS LIST."
- ARE COMPATIBLE WITH ONE ANOTHER AND SUBSTRATES INDICATED. UNDER CONDITIONS OF SERVICE AND APPLICATION AS DEMONSTRATED BY MANUFACTURER, BASED ON TESTING AND FIFI D EXPERIENCE.

1. PROVIDE MATERIALS FOR USE WITHIN EACH PAINT SYSTEM THAT

2. FOR EACH COAT IN A PAINT SYSTEM, PROVIDE PRODUCTS

EXCLUSIVE OF COLORANTS ADDED TO A TINT BASE, WHEN CALCULATED

RECOMMENDED IN WRITING BY MANUFACTURERS OF TOPCOAT FOR USE IN PAINT SYSTEM AND ON SUBSTRATE INDICATED. C. VOC CONTENT: PRODUCTS SHALL COMPLY WITH VOC LIMITS OF AUTHORITIES HAVING JURISDICTION AND, FOR INTERIOR PAINTS AND COATINGS APPLIED AT PROJECT SITE, THE FOLLOWING VOC LIMITS,

ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

2. PRIMERS, SEALERS, AND UNDERCOATERS: 200 G/L.

- 3. ANTICORROSIVE AND ANTIRUST PAINTS APPLIED TO FERROUS
- 2.2 METAL PRIMERS A. PRIMER, ALKYD, ANTI-CORROSIVE, FOR METAL: MPI #79.

A. ALKYD, INTERIOR, GLOSS (GLOSS LEVEL 6): MPI #48.

METALS: 250 G/L.

1. NONFLAT PAINTS AND COATINGS: 150 G/L.

COLOR: SAFETY YELLOW, REFER TO DRAWINGS FOR LOCATIONS.

2.3 SOLVENT-BASED PAINTS

PART 3 - EXECUTION

A. EXAMINE SUBSTRATES AND CONDITIONS, WITH APPLICATOR PRESENT,

C. PROCEED WITH COATING APPLICATION ONLY AFTER UNSATISFACTORY

FOR COMPLIANCE WITH REQUIREMENTS FOR MAXIMUM MOISTURE

CONTENT AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE B. VERIFY SUITABILITY OF SUBSTRATES, INCLUDING SURFACE CONDITIONS

AND COMPATIBILITY WITH EXISTING FINISHES AND PRIMERS.

- CONDITIONS HAVE BEEN CORRECTED. 1. APPLICATION OF COATING INDICATES ACCEPTANCE OF SURFACES
- 3.2 PREPARATION A. COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND

RECOMMENDATIONS IN "MPI MANUAL" APPLICABLE TO SUBSTRATES

1. AFTER COMPLETING PAINTING OPERATIONS, USE WORKERS SKILLED

1. REMOVE INCOMPATIBLE PRIMERS AND REPRIME SUBSTRATE WITH

A. APPLY PAINTS ACCORDING TO MANUFACTURER'S WRITTEN

COMPATIBLE PRIMERS OR APPLY TIE COAT AS REQUIRED TO

PLACE THAT ARE REMOVABLE AND ARE NOT TO BE PAINTED. IF REMOVAL IS IMPRACTICAL OR IMPOSSIBLE BECAUSE OF SIZE OR WEIGHT OF ITEM, PROVIDE SURFACE—APPLIED PROTECTION BEFORE SURFACE PREPARATION AND PAINTING.

B. REMOVE HARDWARE, COVERS, PLATES, AND SIMILAR ITEMS ALREADY IN

IN THE TRADES INVOLVED TO REINSTALL ITEMS THAT WERE REMOVED. REMOVE SURFACE-APPLIED PROTECTION IF ANY. C. CLEAN SUBSTRATES OF SUBSTANCES THAT COULD IMPAIR BOND OF PAINTS, INCLUDING DUST, DIRT, OIL, GREASE, AND INCOMPATIBLE

PRODUCE PAINT SYSTEMS INDICATED. 3.3 APPLICATION

PAINTS AND ENCAPSULANTS.

B. APPLY PAINTS TO PRODUCE SURFACE FILMS WITHOUT CLOUDINESS, SPOTTING, HOLIDAYS, LAPS, BRUSH MARKS, ROLLER TRACKING, RUNS, SAGS, ROPINESS, OR OTHER SURFACE IMPERFECTIONS. CUT IN SHARP LINES AND COLOR BREAKS.

INSTRUCTIONS AND TO RECOMMENDATIONS IN "MPI MANUAL."

CLEANING, REPAIRING, REPLACING, AND REFINISHING, AS APPROVED BY ARCHITECT, AND LEAVE IN AN UNDAMAGED CONDITION. B. AT COMPLETION OF CONSTRUCTION ACTIVITIES OF OTHER TRADES,

A. PROTECT WORK OF OTHER TRADES AGAINST DAMAGE FROM PAINT

APPLICATION. CORRECT DAMAGE TO WORK OF OTHER TRADES BY

TOUCH UP AND RESTORE DAMAGED OR DEFACED PAINTED SURFACES.

3.5 INTERIOR PAINTING SCHEDULE

3.4 CLEANING AND PROTECTION

A. STEEL SUBSTRATES: 1. ALKYD SYSTEM:

a. PRIME COAT: PRIMER, ALKYD, ANTI-CORROSIVE, FOR METAL, b. PRIME COAT: SHOP PRIMER SPECIFIED IN SECTION WHERE

SUBSTRATE IS SPECIFIED.

- c. INTERMEDIATE COAT: ALKYD, INTERIOR, MATCHING TOPCOAT. d. TOPCOAT: ALKYD, INTERIOR, GLOSS (GLOSS LEVEL 6), MPI
- END OF SECTION 099123



Engineering and Architecture

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CITY OF ANN ARBOR

ANN ARBOR, M

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access, routing, miscellaneous fittings, final installation an

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coordination is the contractor's responsib

DATE

11/13/13

DESIGNER: CLF DRAWN: CLF PM / PIC: JSR/LAT CHECKED: GDC **ACADFILE:** 13–1310–A–7 PROJECT No. 13-1310

CHILLER PUMPS SYSTEM POINT LIST			
SYSTEM POINT DESCRIPTION	TYPE	COMMAND	
CHILLER 1 (C-1)	-	ENABLE / DISABLE	
CHILLER 3 (C-3)	-	ENABLE / DISABLE	
CHLR1-ISOLATION VALVES	-	OPEN / CLOSE	
CHLR3-ISOLATION VALVES	-	OPEN / CLOSE	
CHW PUMP 3 VFD	-	CHLR1 OP/ CHLR3 OP	
CHW PUMP 4 VFD	-	CHLR1 OP/ CHLR3 OP	
CWP 1 STATUS	-	ON	
CWP-2 STATUS	-	OFF	
CHWP-3 STATUS	-	OFF	
CHWP-4 STATUS	-	ON	
CW PUMP REQUEST	-	STOP	
CHW PUMP STATUS	-	STOP	
CW PUMP 1	-	STOP	
CW PUMP 2	-	STOP	
CHW PUMP 3	-	STOP	
CHW PUMP 4	-	STOP	

FOR ADDITIONAL POINTS AND PROGRAMMING OF EXISTING CONTROLS, CONTACT AUTOMATIC LOGIC (METRO CONTROL INC. (586) 790-2500).

	S'	YMBOL LEGEND				
TWO LINE SYMBOLS	SCHEMATIC SYMBOLS	DESCRIPTION				
		EXISTING TO REMAIN				
	/////////////////////////////////////	EXISTING TO BE REMOVED				
		NEW WORK				
•	•	NEW CONNECTION TO EXISTING				
		PIPING ELBOW				
		PIPING ELBOW UP				
		PIPING ELBOW DOWN				
		PIPING TEE				
		PIPING TEE UP				
		PIPING TEE DOWN				
		DIELECTRIC UNION OR FLANGE CONNECTION				
—×—	\longrightarrow	ISOLATION VALVE				
	─ ₩	GATE VALVE				
		CHECK VALVE				
		BUTTERFLY VALVE				
M—	M	MOTORIZED DEVICE				
<u> </u>	<u> </u>	SOLENOID VALVE				
—	<u> —</u> Б—	BALL VALVE				
	—×—	GLOBE VALVE				
&	— № — — 1	LUBRICATED PLUG VALVE				
<u></u> ———	─ ♦	BALANCE VALVE				
		CONTROL VALVE - 2 WAY				
	——————————————————————————————————————	CONTROL VALVE - 3 WAY				
	—	BACKWATER VALVE				
		STRAINER				
	<u> </u>	THERMOMETER				
<u> </u>	<u> </u>	PRESSURE GAUGE WITH BALL VALVE				
		CIRCUIT SETTER				
		FLOW METER				
		PIPE ANCHOR				
<u> </u>	=	PIPE GUIDE				
-		FLOW ARROW				
		CONCENTRIC REDUCER (PIPE OR DUCT)				
		FOOENTRIC DEDUCED (DIDE OD DUCT)				

ECCENTRIC REDUCER (PIPE OR DUCT)

GPM MAX. PRESS. DROP (FT.)

163

14.7

FLUID

35% PROPYLENE

GLYCOL

0.0001

95

EVAPORATOR

E.W.T. L.W.T. NO. OF F F PASSES

45

55

SYSTEM SERVED

HVAC

MARK

C-3

LOCATION

PENTHOUSE ROOF

CAPACITY (TONS)

SYMBOL	DESCRIPTION
ABV	ABOVE
A.F.F.	ABOVE FINISHED FLOOR
A.H.U.	AIR HANDLING UNIT
B.O.D.	BOTTOM OF DUCT
B.O.P.	BOTTOM OF PIPE
CHWP	CHILLED WATER PUMP
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
DN	DOWN
EXH.	EXHAUST
F.D.	FLOOR DRAIN
FLR.	FLOOR
I.E.	INVERT ELEVATION
M.B.H.	THOUSAND BTU/HR (BRITISH THERMAL UNITS PER HOUR)
N.I.C.	NOT IN CONTRACT
P.R.V.	PRESSURE REDUCING VALVE
P.T.	PLUGGED TEE
R.A.	RETURN AIR
R.A.F.	RETURN AIR FAN
S.A.	SUPPLY AIR
SAN	SANITARY PIPE
TYP.	TYPICAL
V	VENT
V.T.R.	VENT THROUGH ROOF

PIPING LEGEND

CHILLED WATER RETURN

CHILLED WATER SUPPLY

DESCRIPTION

SYMBOL

------ CHWR ------

----- CHWS -----

		MECHANICAL SHEET INDEX
	SHEET	DESCRIPTION
	M-1	MECHANICAL GENERAL INFORMATION
	M-2	PENTHOUSE FLOOR & ROOF PLANS
-		

OVERVIEW OF MECHANICAL SCOPE

THIS OVERVIEW OF SCOPE IS INCLUDED TO GIVE THE CONTRACTOR A GENERAL OVERVIEW OF THE PROJECT REQUIREMENTS. THE OVERVIEW IS NOT ALL INCLUSIVE AND IS NOT INTENDED TO, AND SHOULD NOT BE USED TO, ESTABLISH CONTRACT LIMITS OR PRICING INCLUSIONS. THE CONTRACT DOCUMENTS SHALL BE USED TO ESTABLISH CONSTRUCTION CONTRACT SCOPE.

THIS OVERVIEW OF SCOPE INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

MECHANICAL:

- 1. PROVIDE AIR COOLED CHILLER AS SCHEDULED AND SHOWN ON
- THE DRAWINGS. 2. PROVIDE CHILLED WATER PIPING AND CONNECT TO EXISTING AS
- SHOWN ON DRAWINGS. 3. REPLACE MOTORS ON EXISTING CHILLED WATER PUMPS.
- 4. REMOVE EXISTING MEZZANINE PUMP.

PROJECT REQUIREMENTS

PROVIDE ALL NECESSARY PERMITS. ALL WORK SHALL BE INSTALLED TO COMPLY WITH THE OWNER'S STANDARDS, STATE AND LOCAL CODES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING CODES AND THEIR RELATED REFERENCES.

2009 MICHIGAN BUILDING CODE

2012 MICHIGAN MECHANICAL CODE

OTHER TRADES.

2009 MICHIGAN PLUMBING CODE

2009 INTERNATIONAL FIRE CODE (AS REFERENCED)

2009 INTERNATIONAL FUEL GAS CODE

NFPA 101 LIFE SAFETY CODE 1997 AND 2006 (AS REFERENCED) MICHIGAN ENERGY CODE-ASHRAE 90.1-2007

TRANE

CGAM070F2

2011 NATIONAL ELECTRICAL CODE AS AMENDED BY THE

2011 MICHIGAN ELECTRICAL CODE RULES, PART 8. 2009 MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS

MANUFACTURER AND MODEL NUMBER LISTED REPRESENTS THE BASIS OF DESIGN FOR THIS PROJECT. THE MECHANICAL CONTRACTOR SHALL BEAR ALL ADDITIONAL COST ASSOCIATED WITH USING EQUIPMENT BY OTHER APPROVED MANUFACTURERS INCLUDING ADDITIONAL COSTS BY

ALL EQUIPMENT INSTALLED SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. WHERE FIELD OR PROJECT CONDITIONS DO NOT ALLOW ALL MANUFACTURER'S RECOMMENDATIONS TO BE MET, THE INSTALLING CONTRACTOR SHALL SUBMIT IN WRITING TO THE ENGINEER THE PROPOSED DEVIATION, IN A SKETCH FORM, ACCOMPANIED BY THE MANUFACTURER'S CONCURRENCE.

INSULATION, SEVEN BLADE CONDENSER FANS WITH

TOTALLY ENCLOSED AIR OVER MOTORS.

* - ITEMS INDICATED AS SUPPLIER SHALL BE PROVIDED

WITH THE ITEM/ EQUIPMENT OR BY THE CONTRACTOR

PURCHASING THE ITEM/EQUIPMENT

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CITY OF ANN ARBOR LARCOM SECONDARY CHILLER PROJECT ANN ARBOR, MI

> **MECHANICAL GENERAL INFORMATION**

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PROJECT No.	13-1310
ACADFILE:	13-1310-M-1
CHECKED:	GDC
PM / PIC:	JSR/LAT
DRAWN:	RJF
DESIGNER:	SDM

M-1

	AIR COOLED CHILLER SCHEDULE														
	CC	NDENSER				COI	MPRESSOR			UNIT POWER)	DAGIO OF DEGICAL			
FOULING	AMBIENT	NO. OF	HP	NO	STEPS	TVDE	DEEDIOEDANIT	NUMBER OF INDEPENDENT		ONIT TOWER		BASIS OF DESIGN MODEL NUMBER	REMARKS		
FACTOR	° F	FANS	EACH	NO.	UNLOADING %	TYPE	REFRIGERANT	REFRIGERANT CIRCUITS	KW	VOLTAGE	PHASE	MODEL NOMBER			
												TDANE	WITH DISCONNECT, ENHANCED CHILLER ACOUSTICAL		

	ARCHITECTURAL - MECHANICAL - ELECTRICAL COORDINATION SCHEDULE										
MADIC	LOCATION UD LONG			1404	ELECTRICAL		DISCONNECT		STARTER		DEMARKO
MARK	LOCATION	HP	KW	MCA	VOLTAGE	PHASE	FURN.	INST.	FURN.	INST.	REMARKS
C-3	PENTHOUSE ROOF	-	_	148A	460	3	S	S	S	S	_
CP-3 MOTOR	PENTHOUSE	15			460	3	М	E	М	E	VFD — PROVIDED BY MECHANICAL, INSTALLED BY ELECTRICAL
CP-4 MOTOR	PENTHOUSE	15			460	3	М	E	М	E	VFD — PROVIDED BY MECHANICAL, INSTALLED BY ELECTRICAL

80.8

460

<u>LEGEND</u>

= CHILLER

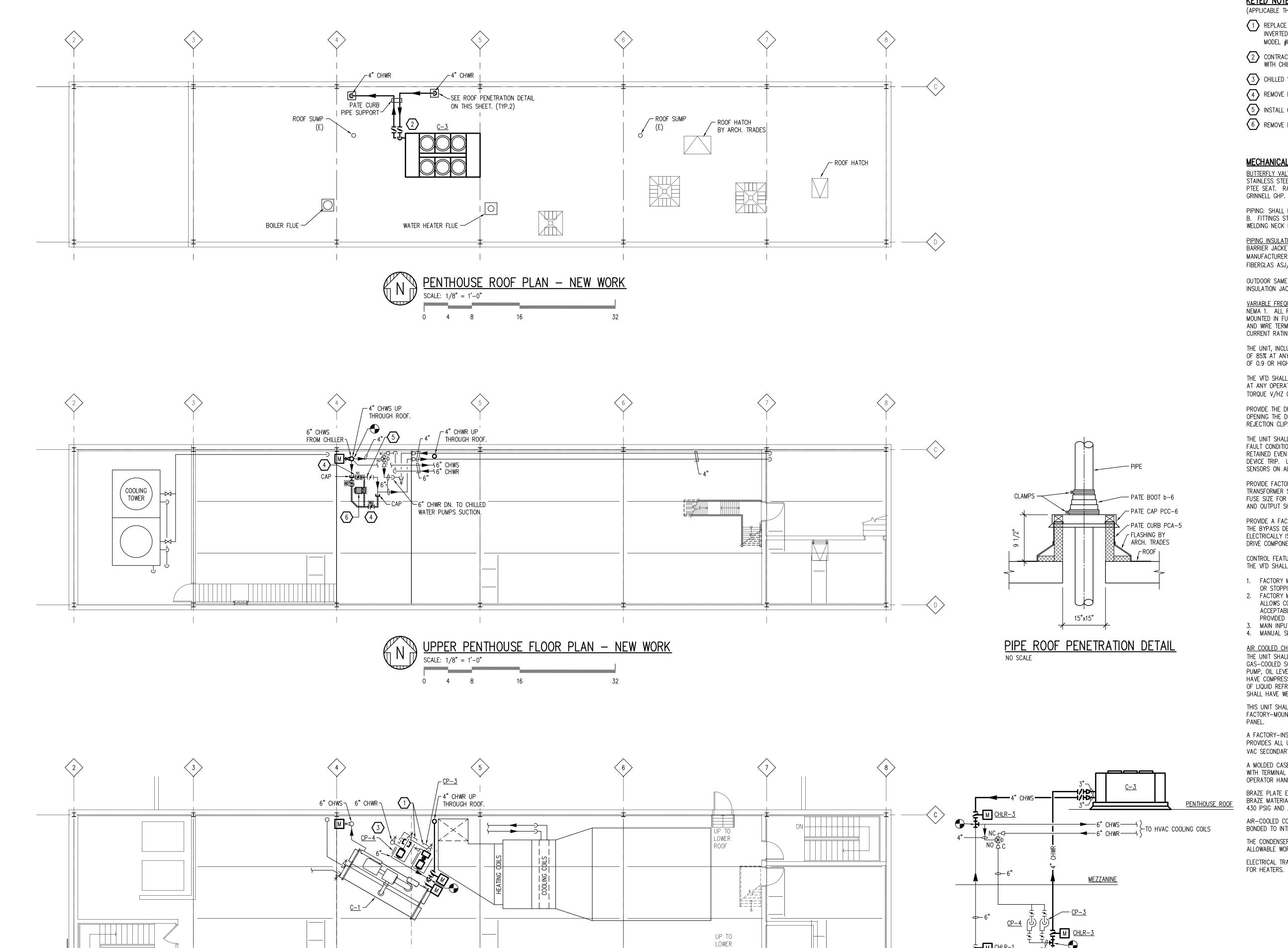
= CHILLED WATER PUMP

S = SUPPLIER (MANUFACTURER)*M = MECHANICAL

6 | 1.5 | 4 | 25-50-75-100 | SCROLL |

E = ELECTRICAL

VFD = VARIABLE FREQUENCY DRIVE



ROOF

LOWER PENTHOUSE FLOOR PLAN - NEW WORK

EVAPORATOR

CHILLED WATER PIPING DIAGRAM

KEYED NOTES:

(APPLICABLE THIS SHEET ONLY)

1) REPLACE EXISTING PUMP CP-3 AND CP-4 MOTORS WITH 15HP, 1,750 RPM WEG INVERTED DUTY RATED (ODP NEMA MOTOR WITH AEGIS BEARING PROTECTION RING, MODEL #015180T3E254T-G) OR EQUIVALENT.

2 CONTRACTOR TO INSTALL FLOW SWITCH AND CHWS TEMPERATURE SENSOR FURNISHED WITH CHILLER.

(3) CHILLED WATER SYSTEM TO HAVE 35% PROPYLENE GLYCOL.

4 REMOVE PIPING AND VALVES, RETURN VALVES TO OWNER.

5 INSTALL 6" SPOOL PIECE IN PLACE OF REMOVED VALVE.

6 REMOVE EXISTING PUMP.

MECHANICAL SPECIFICATIONS:

BUTTERFLY VALVE: FULL LUG, HIGH PERFORMANCE TYPE, CARBON STEEL BODY, 316 STAINLESS STEEL DISC, STAINLESS STEEL SHAFT AND BEARING, TEFLON STEM PACKING, PTEE SEAT. RATED FOR 150 PSI, 450 DEGREES F. MANUFACTURER: DEZURIK BHP;

PIPING: SHALL BE BLACK STEEL, SCHEDULE 40, ASTM A 53, ERW OR SEAMLESS GRADE B. FITTINGS STANDARD WEIGHT, BUTT WELDED, BLACK STEEL, ASTM A 234. JOINT WELDING NECK FORGED STEEL FLANGE AT VALVES AND EQUIPMENT, ASTM A 181, 150#.

PIPING INSULATION: INDOOR SHALL BE FIBERGLASS WITH FACTORY-APPLIED VAPOR BARRIER JACKET WITH SELF-SEALING LAPS, 1" THICK, ASTM C547, CLASS 1. MANUFACTURER: JOHNSON-MANVILLE MICRO-LOK 650 AP-T; OWENS/CORNING FIBERGLAS ASJ/SSLII.

OUTDOOR SAME AS ABOVE EXCEPT 1-1/2" THICK AND WITH PVC WATERPROOF INSULATION JACKETING. MANUFACTURER: ZESTON: CEECO: PROTO.

<u>VARIABLE FREQUENCY DRIVE CP-3 AND CP-4</u>: VFD SHALL HAVE ENCLOSURES RATED NEMA 1. ALL RELAYS SHALL BE PLUG-IN STYLE BASE. ALL FUSES SHALL BE MOUNTED IN FUSE BLOCKS WITH INSULATED COVERS. COVERS SHALL SHIELD FUSE ENDS AND WIRE TERMINATIONS. THE VFD SHALL BE MARKED WITH ITS SHORT CIRCUIT CURRENT RATING IN COMPLIANCE WITH UL.

THE UNIT, INCLUDING ALL SPECIFIED ACCESSORIES, SHALL HAVE A MINIMUM EFFICIENCY OF 85% AT ANY SPEED FROM 50 TO 100%. THE UNIT SHALL HAVE A POWER FACTOR OF 0.9 OR HIGHER WHEN OPERATING AT ANY SPEED FROM 50 TO 100%.

THE VFD SHALL BE VARIABLE TORQUE TYPE AND SHALL PROVIDE FULL MOTOR TORQUE AT ANY OPERATING SPEED FROM 40% TO 100%. THE VFD SHALL PROVIDE VARIABLE TORQUE V/HZ CONTROL WHEN OPERATING AT SPEEDS LESS THAN 100%.

PROVIDE THE DRIVE WITH A MAIN INPUT DISCONNECT SWITCH, ACCESSIBLE WITHOUT OPENING THE DRIVE CABINET, EQUIPPED WITH CURRENT LIMITING FUSES AND FUSE REJECTION CLIPS, OR CIRCUIT BREAKERS.

THE UNIT SHALL INCLUDE SELF-DIAGNOSTICS WITH A DIGITAL DISPLAY THAT IDENTIFIES FAULT CONDITIONS AND SIMPLIFIES TROUBLE SHOOTING. FAULT INDICATION SHALL BE RETAINED EVEN AFTER A POWER OUTAGE OR AN INPUT OVER-CURRENT PROTECTIVE DEVICE TRIP. UNIT SHALL BE UL, CSA OR ETL LABELED. VFD SHALL INCLUDE CURRENT SENSORS ON ALL THREE OUTPUT PHASES TO ACCURATELY MEASURE MOTOR CURRENT.

PROVIDE FACTORY MOUNTED AND WIRED 115V, 1 PHASE, AND 60 HZ CONTROL POWER TRANSFORMER SIZED FOR HANDLING AN ADDITIONAL 30 VA INDUCTIVE LOAD. LIMIT FUSE SIZE FOR THE CONTROL TRANSFORMER TO 3 AMPS MAXIMUM. THE VFD INPUT AND OUTPUT SHALL BE RATED AT 480V, 3 PHASE.

PROVIDE A FACTORY MOUNTED AND WIRED MANUAL BYPASS DEVICE AS SCHEDULED. THE BYPASS DEVICE SHALL ALLOW THE LOAD TO RUN ACROSS—THE—LINE WHILE ELECTRICALLY ISOLATING THE VFD SO THAT MAINTENANCE CAN BE PERFORMED ON THE DRIVE COMPONENTS.

CONTROL FEATURES: THE VFD SHALL BE PROVIDED WITH THE FOLLOWING CONTROL FEATURES:

- 1. FACTORY MOUNTED AND WIRED HAND-OFF-AUTO SELECTOR SWITCH THAT STARTING OR STOPPING OF THE DRIVE.
- 2. FACTORY MOUNTED AND WIRED LOCAL SPEED CONTROL SWITCH THAT ALLOWS CONTROL OF THE DRIVE SPEED. KEY PAD BUTTONS ARE ALSO ACCEPTABLE PROVIDED THAT PERMANENTLY LABELED, DEDICATED BUTTONS ARE PROVIDED FOR THE LOCAL SPEED CONTROL FUNCTIONS.
- 3. MAIN INPUT DISCONNECT SWITCH. 4. MANUAL SPEED POTENTIOMETER OR KEYPAD CONTROL, FOR LOCAL SPEED CONTROL.

AIR COOLED CHILLER

PENTHOUSE FINISHED FLOOR

THE UNIT SHALL HAVE HERMETIC, DIRECT-DRIVE, 3600 RPM 60 HZ SUCTION GAS-COOLED SCROLL COMPRESSORS. THE COMPRESSOR INCLUDES: CENTRIFUGAL OIL PUMP, OIL LEVEL SIGHT GLASS AND OIL CHARGING VALVE. EACH COMPRESSOR WILL HAVE COMPRESSOR HEATERS INSTALLED AND PROPERLY SIZED TO MINIMIZE THE AMOUNT OF LIQUID REFRIGERANT PRESENT IN THE OIL SUMP DURING OFF CYCLES. COMPRESSORS SHALL HAVE WEATHERPROOF ENCLOSURE TO REDUCE COMPRESSOR SOUND LEVEL.

THIS UNIT SHALL HAVE AN ACROSS-THE-LINE CONFIGURATION STARTER, FACTORY-MOUNTED, AND FULLY PRE-WIRED TO THE COMPRESSOR MOTOR AND CONTROL

A FACTORY-INSTALLED, FACTORY-WIRED 120 VA CONTROL POWER TRANSFORMER PROVIDES ALL UNIT CONTROL POWER (120 VAC SECONDARY) AND MODULE POWER (24 VAC SECONDARY).

A MOLDED CASE HIGH INTERRUPTING CAPACITY CIRCUIT BREAKER, FACTORY PRE-WIRED WITH TERMINAL BLOCK POWER CONNECTIONS AND EQUIPPED WITH A LOCKABLE EXTERNAL

OPERATOR HANDLE TO DISCONNECT THE CHILLER FROM MAIN POWER. BRAZE PLATE EVAPORATOR TO BE MADE OF STAINLESS STEEL WITH COPPER AS THE BRAZE MATERIAL, DESIGNED TO WITHSTAND A REFRIGERANT SIDE WORKING PRESSURE OF

AIR-COOLED CONDENSER COILS TO HAVE LANCED ALUMINUM FINS MECHANICALLY BONDED TO INTERNALLY-FINNED COPPER TUBING.

THE CONDENSER COIL TO BE AN INTEGRAL SUBCOOLING CIRCUIT. THE MAXIMUM

ALLOWABLE WORKING PRESSURE OF THE CONDENSER IS 650 PSIG. ELECTRICAL TRADES WILL PROVIDE THREE PHASE POWER FOR MOTORS AND 120V POWER

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DESIGNER:	SDM

M-2

430 PSIG AND A WATERSIDE WORKING PRESSURE OF 150 PSIG.

PENTHOUSE FLOOR & ROOF PLANS

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CITY OF ANN ARBOR

ANN ARBOR, MI

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CHILLER PROJECT

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	ARCHITECTURAL - MECHANICAL - ELECTRICAL COORDINATION SCHEDULE										
MARK LOCATION		HP	KW	MCA	ELECTRICAL		DISCONNECT		STA	RTER	REMARKS
MAIN	LOCATION	III	NW	MICA	VOLTAGE	PHASE	FURN.	INST.	FURN.	INST.	ILMAINCS
C-3	PENTHOUSE ROOF	_	_	148A	460	3	S	S	S	S	_
CP-3 MOTOR	PENTHOUSE	15			460	3	М	E	М	E	VFD — PROVIDED BY MECHANICAL, INSTALLED BY ELECTRICAL
CP-4 MOTOR	PENTHOUSE	15			460	3	М	E	М	E	VFD — PROVIDED BY MECHANICAL, INSTALLED BY ELECTRICAL
	LEGEND										

<u>LEGEND</u>

= CHILLER

= CHILLED WATER PUMP

SYMBOL	DESCRIPTION				
	FLUORESCENT SUSPENDED LIGHT FIXTURE				
Ø	THREE PHASE MOTOR				
	CONTROL PANEL BY MECHANICAL TRADES				
7///2	DISTRIBUTION PANEL				
라	DISCONNECT SWITCH				
	COMBINATION MAGNETIC MOTOR STARTER				
+	DUPLEX RECEPTACLE OUTLET				
[VFD]-	VARIABLE FREQUENCY DRIVE				
E	EXISTING EQUIPMENT / DEVICE				
GFI	GROUND FAULT INTERRUPTER				
WP	WEATHERPROOF				
	EXISTING TO REMAIN				
<u>'////</u> EXISTING TO BE REMOVED					
	NEW				

SYMBOL LIST

SHEET	DESCRIPTION	
E-1	GENERAL ELECTRICAL INFORMATION	
E-2	UPPER AND LOWER PENTHOUSE FLOOR PLANS — ELECTRICAL	

ELECTRICAL SHEET INDEX

OVERVIEW OF ELECTRICAL SCOPE

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THIS OVERVIEW OF SCOPE INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

<u>ELECTRICAL:</u>

- 1. DISCONNECT AND REMOVE EXISTING CONDUCTORS FEEDING ABANDONED 400A.3P. COMBINATION STARTER.
- 2. PROVIDE POWER TO NEW CHILLER C-3 ON ROOF.
- 3. PROVIDE NEW WEATHER PROOF, GFI RECEPTACLE ON NEW CHILLER C-3.
- DISCONNECT AND REMOVE EXISTING STARTERS SERVING EXISTING CP-3 AND EXISTING CP-4, INSTALL NEW VFDS, AND MAKE FINAL CONNECTIONS TO NEW CP-3 AND NEW CP-4 AS SHOWN ON PLAN.
- 5. RELOCATE ONE LIGHT FIXTURE.
- 6. DISCONNECT AND REMOVE STARTER AND CIRCUITRY TO EXISTING 1 1/2HP MOTOR ON UPPER PENTHOUSE.

PROJECT REQUIREMENTS

PROVIDE ALL NECESSARY PERMITS. ALL WORK SHALL BE INSTALLED TO COMPLY WITH THE OWNER'S STANDARDS, STATE AND LOCAL CODES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING CODES AND THEIR RELATED REFERENCES.

2011 NATIONAL ELECTRICAL CODE AS AMENDED BY THE 2011 MICHIGAN ELECTRICAL CODE RULES, PART 8.

NFPA 101 LIFE SAFETY CODE 1997 AND 2006 (AS REFERENCED)

MICHIGAN ENERGY CODE-ASHRAE 90.1-2007

2009 INTERNATIONAL FIRE CODE (AS REFERENCED)

2009 MICHIGAN BUILDING CODE

2009 MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS

2012 MICHIGAN MECHANICAL CODE

2009 MICHIGAN PLUMBING CODE 2009 INTERNATIONAL FUEL GAS CODE

MANUFACTURER AND MODEL NUMBER LISTED REPRESENTS THE BASIS OF DESIGN FOR THIS PROJECT. THE ELECTRICAL CONTRACTOR SHALL BEAR ALL ADDITIONAL COST ASSOCIATED WITH USING EQUIPMENT BY OTHER APPROVED MANUFACTURERS INCLUDING ADDITIONAL COSTS BY OTHER TRADES.

ALL EQUIPMENT INSTALLED SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. WHERE FIELD OR PROJECT CONDITIONS DO NOT ALLOW ALL MANUFACTURER'S RECOMMENDATIONS TO BE MET, THE INSTALLING CONTRACTOR SHALL SUBMIT IN WRITING TO THE ENGINEER THE PROPOSED DEVIATION, IN A SKETCH FORM, ACCOMPANIED BY THE MANUFACTURER'S CONCURRENCE.

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CITY OF ANN ARBOR LARCOM SECONDARY CHILLER PROJECT

ANN ARBOR, MI

GENERAL ELECTRICAI INFORMATION

contractor as shop drawings. Final dimensions, equipmen access, routing, miscellaneous fittings, final installation and coordination is the contractor's responsit

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DESIGNER:	TBR
DRAWN:	MEP
PM / PIC:	JSR/LAT
CHECKED:	GDC
ACADFILE:	13-1310-E-1

PROJECT No. 13-1310

E-1

ELECTRICAL SPECIFICATION

CUTTING AND PATCHING

NO CUTTING OR BURNING OF HOLES THROUGH BEAMS OR OTHER STRUCTURAL MEMBERS SHALL BE DONE WITHOUT THE SPECIFIC PERMISSION OF THE ARCHITECT.

ALL MEASUREMENTS NECESSARY FOR THE PROPER INSTALLATION OF MATERIALS OR APPARATUS SHALL BE TAKEN IN THE FIELD. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR THE CORRECT FIT OF WORK INSTALLED.

* - ITEMS INDICATED AS SUPPLIER SHALL BE PROVIDED

WITH THE ITEM/ EQUIPMENT OR BY THE CONTRACTOR

PURCHASING THE ITEM/EQUIPMENT

ALL OPENINGS IN WALLS, ROOF, CEILINGS, OR FLOORS MADE BY THE CONTRACTOR SHALL BE NEATLY PATCHED.

<u>TESTS AND ADJUSTMENTS</u>

ALL ELECTRICAL CIRCUITS SHALL BE TESTED AS SOON AS CONDUCTORS ARE INSTALLED, AND FINAL TESTS SHALL BE MADE IN THE PRESENCE OF THE ENGINEER, WHEN ALL WORK IS COMPLETE, IF REQUIRED. IF CIRCUITS ARE NOT PROPERLY CONTROLLED AND INSULATED, MAKE NECESSARY CHANGES AND REPAIRS.

"AS-BUILT" CONDUIT DRAWINGS

AT COMPLETION, THE CONTRACTOR SHALL FURNISH TO THE OWNER ONE (1) COMPLETE SET OF CONTRACT MYLAR SEPIAS, NEATLY MARKED AND DIMENSIONED WHERE REQUIRED TO SHOW ALL VARIATIONS BETWEEN ACTUAL CONSTRUCTION AS BUILT AND WORK AS INDICATED ON THE PRINTED DRAWINGS, INCLUDING ALL CHANGES IN LOCATIONS, SIZES, ETC. EACH SHEET CERTIFIED AS BUILT BY THE CONTRACTOR, AND TURNED OVER TO THE OWNER IN GOOD CONDITION.

GUARANTEE AND WARRANTY

CONTRACTOR SHALL GUARANTEE ALL WORK INSTALLED BY HIM OR HIS SUBCONTRACTORS TO BE FREE FROM DEFECT IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FOLLOWING THE DATE OF FINAL ACCEPTANCE OF THE WORK, UNLESS A LONGER PERIOD IS STIPULATED UNDER SPECIFIC HEADINGS, AND HE SHALL REPAIR OR REPLACE AT NO ADDITIONAL COST TO THE OWNER, ANY MATERIAL OR EQUIPMENT DEVELOPING DEFECTS AND SHALL ALSO MAKE GOOD ANY DAMAGE CAUSED BY SUCH DEFECTS OR THE CORRECTION OF DEFECTS.

REPAIRS OR REPLACEMENTS SHALL BEAR ADDITIONAL TWELVE (12) MONTHS GUARANTEE, AS ORIGINALLY CALLED FOR, DATED FROM THE FINAL ACCEPTANCE OF THE REPAIR OR REPLACEMENT. THIS REQUIREMENT SHALL BE BINDING EVEN THOUGH IT WILL EXCEED PRODUCT GUARANTEES NORMALLY FURNISHED BY SOME MANUFACTURER'S.

CONTRACTOR SHALL SUBMIT HIS OWN AND EACH EQUIPMENT MANUFACTURER'S WRITTEN CERTIFICATES, WARRANTING THAT EACH ITEM OF EQUIPMENT FURNISHED COMPLIES WITH ALL REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. NOTE THAT GUARANTEE SHALL RUN FROM DATE OF FINAL ACCEPTANCE OF THE WORK, NOT FROM DATE OF INSTALLATION OF A DEVICE OR PIECE OF EQUIPMENT.

STENCILING AND PAINTING

ALL PANELS, DISCONNECT SWITCHES, ETC. SHALL HAVE THE NAME OF THE PANEL OR EQUIPMENT CONTROLLED ON FRONT COVER IN ONE INCH LETTERS ON ENGRAVED BAKELITE NAMEPLATE.

PAINT ALL IRON WORK AND OTHER MISCELLANEOUS IRON TWO COATS OF AN APPROVED OIL BASE PAINT. COLOR OF PAINT SHALL BE SELECTED SUCH THAT IT BLENDS WITH SURROUNDINGS.

<u>Wiring Devices</u>

RECEPTACLE PLATES SHALL BE .040 STAINLESS STEEL, 97,000 SERIES AS MANUFACTURED BY PASS AND SEYMOUR, HUBBELL, LEVITON, BRYANT, EAGLE OR ARROW— HART AND HEGEMAN. COLOR TO BE AS SELECTED BY ARCHITECT. PROVIDE TYPED TAG ON BACK OF EACH SWITCH AND RECEPTACLE PLATE, IDENTIFYING PANEL AND CIRCUIT NUMBER.

ABSOLUTELY NO DESPARD SWITCHES SHALL BE USED UNLESS OTHERWISE SPECIFIED OR UNLESS NECESSARY DUE TO BUILDING CONSTRUCTION, AND THEN ONLY IF SPECIFICALLY APPROVED BY THE ARCHITECT.

WEATHERPROOF DUPLEX RECEPTACLES SHALL BE FLUSH WALL MOUNTED, 20 AMPERE, 125 VOLT, SPECIFICATION GRADE AS MANUFACTURED BY HUBBELL CATALOG NO. GF-5362 RECEPTACLE WITH GROUND FAULT PROTECTION (COLOR TO BE AS SELECTED BY ARCHITECT) AND INTERMATIC CATALOG NO. WP1030MC GRAY DIE CAST METAL MOUNTING BASE WITH GRAY DIE CAST METAL WEATHERPROOF HINGED COVER WITH OPENING FOR (2) CORDS, OR EQUAL AS MANUFACTURED BY PASS AND SEYMOUR, BRYANT, EAGLE OR ARROW-HART & HEGEMAN.

CONDUITS AND FITTINGS

CONDUIT IN MASONRY PARTITIONS, EXPOSED AND CONDUIT LARGER THAN 2" SHALL BE HOT- DIP GALVANIZED, RIGID HEAVYWALL TYPE, UNLESS OTHERWISE NOTED.

CONDUIT 2" AND SMALLER WHICH IS CONCEALED IN DRYWALL PARTITIONS, ABOVE ACCESSIBLE CEILINGS AND WHERE EXPOSED ABOVE 48" AFF, SHALL BE ELECTRICAL METALLIC TUBING.

CONDUIT SHALL BE DELIVERED TO THE SITE IN STANDARD 10 FOOT LENGTHS, EACH LENGTH BEARING THE UL LABEL. HOT-DIP GALVANIZED CONDUIT SHALL BE SO LABELED.

MINIMUM SIZE OF CONDUIT SHALL BE 1/2", UNLESS OTHERWISE NOTED.

ALL CONDUIT SHALL BE SECURELY FASTENED IN PLACE WITH APPROVED CLAMPS AND CAREFULLY REAMED BEFORE INSTALLING.

CONDUITS SHALL NOT BE INSTALLED WITHIN 3" OF HOT WATER LINES.

CONDUITS IN MECHANICAL EQUIPMENT SPACES AND UNFINISHED AREAS MAY BE RUN EXPOSED. ALL OTHER CONDUIT SHALL BE CONCEALED, UNLESS OTHERWISE NOTED. EXPOSED CONDUIT SHALL BE INSTALLED PARALLEL, OR AT RIGHT ANGLES TO ADJACENT BUILDING LINES AND SHALL BE SUPPORTED AT INTERVALS NOT EXCEEDING EIGHT FEET.

GROUPS OF CONDUITS, WHERE SUSPENDED, SHALL BE SUPPORTED ON TRAPEZE TYPE HANGERS, USING 3/8" ROD AND CHANNEL IRON OR UNISTRUT. INDIVIDUAL CONDUITS NOT SUPPORTED ON PIPE STRAPS SHALL BE PROVIDED WITH CONDUIT CLAMPS OR RING HANGERS SUSPENDED ON RODS. PERFORATED IRON STRAPS OR SOFT IRON WIRE FOR PIPE SUPPORTS SHALL NOT BE USED.

NO BEAMS OR OTHER STRUCTURAL MEMBERS SHALL BE DRILLED, BURNED, OR CUT WITHOUT WRITTEN APPROVAL OF THE ARCHITECT.

CONNECTORS AND COUPLINGS FOR ELECTRICAL METALLIC TUBING SHALL BE OF THE SET- SCREW TYPE AS MANUFACTURED BY T & B, MIDWEST, OR ELECTRIC TUBE PRODUCTS CO.

ALL WIRING SHALL BE ENCLOSED IN A METAL RACEWAY, UNLESS OTHERWISE NOTED. EXPOSED CONDUIT SHALL BE IN STRAIGHT LINES PARALLEL WITH, OR AT RIGHT ANGLES TO COLUMN LINES OR BEAMS AND SEPARATED BY AT LEAST 3" FROM WATER LINES.

ALL WALL AND FLOOR PENETRATIONS SHALL BE FIRE RATED TO MAINTAIN RATING OF SURFACE PENETRATED, OR 1 HOUR RATING MINIMUM. SEALING SHALL BE WITH 3M #CP25 FIRE PUTTY OR EQUAL BY

INSTALLATION OF CABLES

BEFORE CONDUCTORS ARE INSERTED IN CONDUIT RUNS, THE CONDUITS SHALL BE SWABBED OR THE EQUIVALENT TO INSURE THEIR DRYNESS AND FREEDOM FROM FOREIGN MATTER DETRIMENTAL TO THE CONDUCTOR INSULATION. ALL WIRING SHALL BE INSTALLED BEFORE FINISHES ARE APPLIED TO WALL AND CEILING SURFACES.

WIRE AND CABLES

ALL WIRE AND CABLE SHALL CONFORM TO THE LATEST REQUIREMENTS OF THE CURRENT EDITION OF THE NEC AND SHALL MEET ALL ASTM SPECIFICATIONS. WIRE AND CABLE SHALL BE NEW; SHALL HAVE SIZE, GRADE OF INSULATION, VOLTAGE AND MANUFACTURER'S NAME PERMANENTLY MARKED ON OUTER COVERING AT REGULAR INTERVALS; SHALL BE DELIVERED IN COMPLETE COILS OR REELS WITH IDENTIFYING SIZE AND INSULATION TAGS.

WIRE AND CABLE SHALL BE SUITABLY PROTECTED FROM WEATHER AND DAMAGE DURING STORAGE AND HANDLING AND SHALL BE IN FIRST-CLASS CONDITION WHEN INSTALLED.

ALL WIRING SHALL BE THHN, THWN, XHHW OR TYPE THW UNLESS A HIGHER TEMPERATURE WIRE IS REQUIRED.

ALL CONDUCTORS SHALL BE ANNEALED, SOFT-DRAWN COPPER UNLESS OTHERWISE NOTED.

CONDUIT AND WIRE SIZES ARE BASED ON THW CONDUCTORS.

VERIFY C-1 WIRING REQUIREMENTS WITH UNIT MANUFACTURER.

WIRE AND CABLE SHALL BE AS MANUFACTURED BY GENERAL ELECTRIC, GENERAL CABLE, OKONITE OR ANACONDA.

MINIMUM SIZE WIRE SHALL BE #12 AWG UNLESS OTHERWISE NOTED. ALL CONDUCTORS SHALL BE COLOR CODED. ALL WIRING SHALL BE INSTALLED IN CONDUIT.

PROVIDE A SEPARATE NEUTRAL CONDUCTOR FOR EACH CIRCUIT OR MULTI-WIRE BRANCH CIRCUIT. PROVIDE A GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH CONDUIT. WHERE CIRCUITS FROM DIFFERENT SOURCES ARE INSTALLED IN THE SAME CONDUIT, SEPARATE EQUIPMENT GROUNDING CONDUCTORS

WIRE CONNECTIONS

SHALL BE PROVIDED FOR EACH SOURCE.

SPLICES IN CONDUCTORS NO. 8 AND SMALLER SHALL BE MADE BY PREINSULATED "SCOTCH- LOCK" OR IDEAL "WING-NUT" SPRING TENSION CONNECTORS, INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. SPLICES OF NO. 6 CONDUCTORS AND LARGER SHALL BE MADE WITH SOLDERLESS, COMPRESSION TYPE CONNECTORS, U.L. LABELED AND COMPRESSED WITH APPROVED TOOLS.

ALL SPLICES SHALL BE INSULATED WITH AN APPROVED VINYL PLASTIC ALL WEATHER TAPE TO A THICKNESS FOULVALENT OF THE CONDUCTOR INSULATION.

<u>GROUNDING</u> ALL CABINETS, CONDUIT SYSTEMS, ETC., SHALL BE THOROUGHLY GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE.

PROVIDE A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH CONDUIT. WHERE CIRCUITS FROM DIFFERENT SOURCES ARE INSTALLED IN THE SAME CONDUIT, SEPARATE EQUIPMENT GROUNDING CONDUCTORS SHALL BE PROVIDED FOR EACH SOURCE.

FIRESTOPPING

CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL MATERIAL REQUIRED FOR FIRE STOPPING ELECTRICAL PENETRATIONS THRU FIRE RATED FLOORS, CEILINGS, ROOF AND WALLS, PER SECTION 01047 "FIRESTOPPING".

<u>FUSES</u>

ALL FUSES SHALL BE DUAL ELEMENT. CURRENT LIMITING CARTRIDGE TYPE AND SHALL HAVE A MINIMUM SHORT-CIRCUIT RATING OF 200,000 RMS AMPS. FUSES SHALL BE BUSSMAN "LOW PEAK".

IN ADDITION OF FUSES BLOWN DURING CONSTRUCTION AND TESTING, A COMPLETE SET OF SPARE FUSES SHALL BE PROVIDED FOR EACH DIFFERENT AMP SIZE OF FUSES ON PROJECT.

FUSES FOR ALL CIRCUITS AND OTHER EQUIPMENT SHALL BE SELECTED IN RATINGS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, TO PROVIDE A COORDINATED SYSTEM OF OVER-CURRENT PROTECTION. THUS IN CASE OF A FAULT OR HARMFUL OVERLOAD, ONLY THE FUSES NEAREST THE FAULT OR OVERLOADED EQUIPMENT SHALL OPEN.

HANGERS SHALL INCLUDE ALL MISCELLANEOUS STEEL AND SHALL BE FASTENED TO STEEL, CONCRETE OR MASONRY, NOT TO PIPING.

HANGERS AND SUPPORTS EXPOSED TO PUBLIC VIEW MUST BE UNIFORMLY SPACED AND NEATLY INSTALLED, WITH NO EXCESS MATERIAL BEYOND WHAT IS REQUIRED FOR THE SUPPORT FUNCTION.

ALL OUTLET BOXES, PULL BOXES AND JUNCTION BOXES SHALL BE RIGIDLY SECURED IN PLACE IN AN

NO OUTLETS SHALL BE PLACED BEHIND MECHANICAL PIPES OR HEATING EQUIPMENT OR ENCLOSURES. CHECK DRAWINGS OF OTHER TRADES FOR DOOR SWINGS AND SIZES AND LOCATIONS OF EQUIPMENT AND

ALL SURFACE MOUNTED OUTLET BOXES SHALL BE CROUSE-HINDS FS SERIES OR EQUAL BY KILLARK OR APPLETON. WITH THREADED HUBS AS REQUIRED.

DISCONNECT SWITCHES

PROVIDE AND INSTALL ALL REQUIRED FUSIBLE OR NON-FUSIBLE DISCONNECT SWITCHES SHOWN ON THE DRAWINGS. ALL INDOOR SWITCHES SHALL BE HEAVY DUTY TYPE IN A NEMA I ENCLOSURE, OUTDOOR SWITCHES SHALL BE NEMA 3R.

SWITCHES SHALL BE QUICK-MAKE, QUICK-BREAK WITH A MECHANICAL DUAL COVER INTERLOCK. DISCONNECT SWITCHES SHALL BE SQUARE D, WESTINGHOUSE, GTE SYLVANIA, SIEMENS, CUTLER HAMMER OR GENERAL ELECTRIC.

PROVIDE AS-BUILT DRAWINGS INDICATING CIRCUIT AND PANEL IDENTIFICATIONS.

BE DONE.

SCHEDULE OF WORK

THE CONTRACTOR SHALL EXPEDITE HIS WORK IN ORDER TO CONFORM TO THE DATES OUTLINED IN THE GENERAL CONTRACTOR'S PROGRESS SCHEDULE AND WHERE NECESSARY SHALL WORK OVERTIME AT HIS OWN EXPENSE SO THAT ALL WORK MAY BE COMPLETED WITHIN THE TIME OUTLINED.

COORDINATE ALL WORK WITH THAT OF OTHER TRADES. PERFORM WORK IN A PHASED MANNER AS REQUIRED TO ACCOMMODATE THE PROJECT CONSTRUCTION SCHEDULE. COORDINATE ALL WORK AND THE SEQUENCE OF INSTALLATION WITH THE GENERAL CONTRACTOR.

S = SUPPLIER (MANUFACTURER)*

VFD = VARIABLE FREQUENCY DRIVE

THE CURRENT EDITION OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, A.I.A. DOC.

A201, AND THE SUPPLEMENTARY GENERAL CONDITIONS ARE A PART OF THE CONTRACT FOR THIS WORK.

THE CONTRACTOR SHALL PROVIDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS, OR METHODS MENTIONED,

EQUIPMENT, AND ALL INCIDENTALS NECESSARY REQUIRED FOR THE COMPLETION AND OPERATION OF ALL

LISTED OR SCHEDULED ON THE DRAWINGS AND IN THESE SPECIFICATIONS, INCLUDING ALL LABOR, MATERIALS,

THE INSTALLATION SHALL BE MADE SO THAT ALL COMPONENT PARTS FUNCTION TOGETHER AS A WORKABLE

INSTALLATION IS COMPLETE, ALL EQUIPMENT SHALL BE OPERATIVE AND IN PROPER ADJUSTMENT. ALL WORK

SHALL BE EXECUTED IN CONFORMITY WITH THE BEST PRACTICE SO AS TO CONTRIBUTE TO EFFICIENCY OF

TO ACCOMPLISH THESE RESULTS, THE CONTRACTOR SHALL CONSULT THE ARCHITECTS AND ENGINEER'S

PLANS COVERING THE VARIOUS OTHER TRADES, THE FIELD LAYOUTS OF THE CONTRACTORS FOR THESE

THE CONTRACTOR SHALL VISIT THE SITE AND SHALL FAMILIARIZE HIMSELF WITH CONDITIONS WHICH WILL

CONSIDERATION AND EVALUATION OF THESE CONDITIONS IN THE PREPARATION OF HIS PROPOSAL. NO

INTERRUPT OR DISTURB OPERATION OF EXISTING SERVICES THAT ARE TO REMAIN. RELOCATE EXISTING

CONCLUSIVE EVIDENCE THAT THIS CONTRACTOR HAS VISITED THE SITE AND HAS GIVEN PROPER

AFFECT THE WORK HE IS TO PERFORM. THE SUBMISSION OF A PROPOSAL BY THIS CONTRACTOR SHALL BE

ALLOWANCE SHALL SUBSEQUENTLY BE MADE IN HIS BEHALF FOR EXTRA EXPENSE INCURRED DUE TO FAILURE

WHERE ACTIVE GAS, ELECTRIC, OR OTHER SERVICES ARE ENCOUNTERED DURING THE PERFORMANCE OF THIS

CONTRACT, THE CONTRACTOR SHALL PROTECT, BRACE AND SUPPORT THEM AS REQUIRED. DO NOT PREVENT,

THE CONTRACTOR SHALL TAKE OUT ALL PERMITS AND ARRANGE FOR ALL NECESSARY INSPECTIONS AND

UPON COMPLETION OF THE WORK, THEY SHALL FURNISH TO THE OWNER ALL CERTIFICATES OF INSPECTION

ALL WORK SHALL BE PERFORMED OR INSTALLED IN STRICT ACCORDANCE WITH ALL APPLICABLE RULES.

REGULATIONS AND CODES OF LOCAL, STATE AND FEDERAL GOVERN- MENTS, OR OTHER AUTHORITIES HAVING

ALL ELECTRICAL WORK AND EQUIPMENT SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ISSUE OF

THE NATIONAL ELECTRICAL CODE, AND SHALL BEAR THE LABEL OF LISTING WITH THE UNDERWRITERS'

ALL ELECTRICAL WORK SHALL BE INSTALLED TO BE READILY ACCESSIBLE FOR OPERATING, SERVICING,

ELECTRICAL DISTRIBUTION SYSTEM SHALL BE DESIGNED TO WITHSTAND AND SAFELY INTERRUPT AN

AVAILABLE SHORT CIRCUIT CURRENT THAT THE CONTRACTOR HAS VERIFIED WITH THE LOCAL UTILITY

COMPLETE SHOP DRAWINGS FOR ALL ELECTRICAL MANUFACTURED ITEMS SHALL BE SUBMITTED TO THE

SHOP DRAWINGS TO THE ARCHITECT FOR APPROVAL BEFORE INSTALLATION OF ALL OF THE FOLLOWING

ARCHITECT AND ENGINEER FOR APPROVAL BEFORE FABRICATION OF THE ITEMS. DRAWINGS SHALL INDICATE

THE CONTRACTOR SHALL THOROUGHLY CHECK ALL SHOP DRAWINGS AS REGARDS TO MEASUREMENTS. SIZES

ENGINEER'S DRAWINGS AND SPECIFICATIONS. DRAWINGS FOUND TO BE INACCURATE OR OTHERWISE IN ERROR

THE CHECKING AND APPROVING OF SHOP DRAWINGS BY THE ENGINEER SHALL BE CONSTRUED AS ASSISTING

DRAWINGS NOT APPROVED MUST BE CORRECTED AND RETURNED FOR FINAL APPROVAL. NO SHOP DRAWINGS

SUBMITTED WILL BE RETAINED BY THE ENGINEER. CONTRACTOR SHALL SUBMIT AS MANY MORE COPIES AS HE DESIRES TO BE RETURNED. THE CONTRACTOR SHALL FURNISH TO THE FIELD, PRINTS OF CHECKED AND

AFTER SHOP DRAWINGS HAVE BEEN SUBMITTED TO THE ENGINEER AND RETURNED TO THE CONTRACTOR

FOR ANY EXTRA ELECTRICAL WORK WHICH MAY BE PROPOSED, THIS CONTRACTOR SHALL FURNISH TO THE

GENERAL CONTRACTOR AN ITEMIZED BREAKDOWN OF THE ESTIMATED COST OF THE MATERIALS AND LABOR

REQUIRED TO COMPLETE THIS WORK. THE CONTRACTOR SHALL PROCEED ONLY AFTER RECEIVING A WRITTEN

ORDER FROM THE GENERAL CONTRACTOR ESTABLISHING THE AGREED PRICE AND DESCRIBING THE WORK TO

APPROVED, THE CONTRACTOR WILL NOT BE ALLOWED TO RESUBMIT SHOP DRAWINGS OF ANOTHER

SHALL BE USED ON THE WORK UNLESS APPROVED BY THE ENGINEER. ONE COPY OF ALL DRAWINGS

RESPONSIBILITY FOR ERRORS OR OMISSIONS WHICH MAY EXIST THEREON. WHERE ERRORS OR OMISSIONS

OF EQUIPMENT, MATERIALS AND DETAILS TO SATISFY HIMSELF THAT THEY CONFORM TO THE INTENT OF

ARE TO BE RETURNED TO THE SUB- CONTRACTORS FOR CORRECTION BEFORE SUBMITTING SAME TO THE

THE CONTRACTOR AND THE ENGINEER'S ACTION DOES NOT RELIEVE THE CONTRACTOR FROM THE

ARE DISCOVERED LATER, THEY MUST ACCORDINGLY BE MADE GOOD BY THE CONTRACTOR.

APPROVED SHOP DRAWINGS AS REQUIRED BY THE CONSTRUCTION OPERATIONS.

MANUFACTURER FOR THIS SAME ITEM WITHOUT THE ENGINEER'S CONSENT.

NAME OF PROJECT AND NAME OF CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL SUBMIT EQUIPMENT

ALL MATERIALS, PRODUCTS AND EQUIPMENT, INCLUDING COMPONENTS THEREOF, SHALL BE NEW.

LAWFUL JURISDICTION, AND EACH CONTRACTOR AND SUBCONTRACTOR SHALL BE RESPONSIBLE FOR SUCH

SHALL PAY ALL FEES AND EXPENSES IN CONNECTION THEREWITH AS A PART OF THEIR WORK UNDER THEIR

TRADES AND THEIR SHOP DRAWINGS. HE SHALL COORDINATE HIS WORK ACCORDINGLY.

SYSTEM; IT SHALL BE COMPLETE WITH ALL ACCESSORIES NECESSARY FOR PROPER OPERATION. WHEN THE

CONTRACTOR SHALL CONSULT THEM AND THE GENERAL REQUIREMENTS, DIV. 1, FOR INSTRUCTIONS

M = MECHANICAL

E = ELECTRICAL

OPERATION, MINIMUM MAINTENANCE, ACCESSIBILITY AND SIGHTLINESS.

OR NEGLECT ON HIS PART TO MAKE THIS VISIT AND EXAMINATION.

AND APPROVAL WHICH ARE CUSTOMARY FOR THE CLASSES OF WORK INVOLVED.

PERTAINING TO WORK UNDER THIS SECTION.

WORK INCLUDED

LOCAL CONDITIONS

SERVICES IF REQUIRED.

PERMITS AND INSPECTIONS

RULES, CODES AND STANDARDS

MAINTAINING AND REPAIRING.

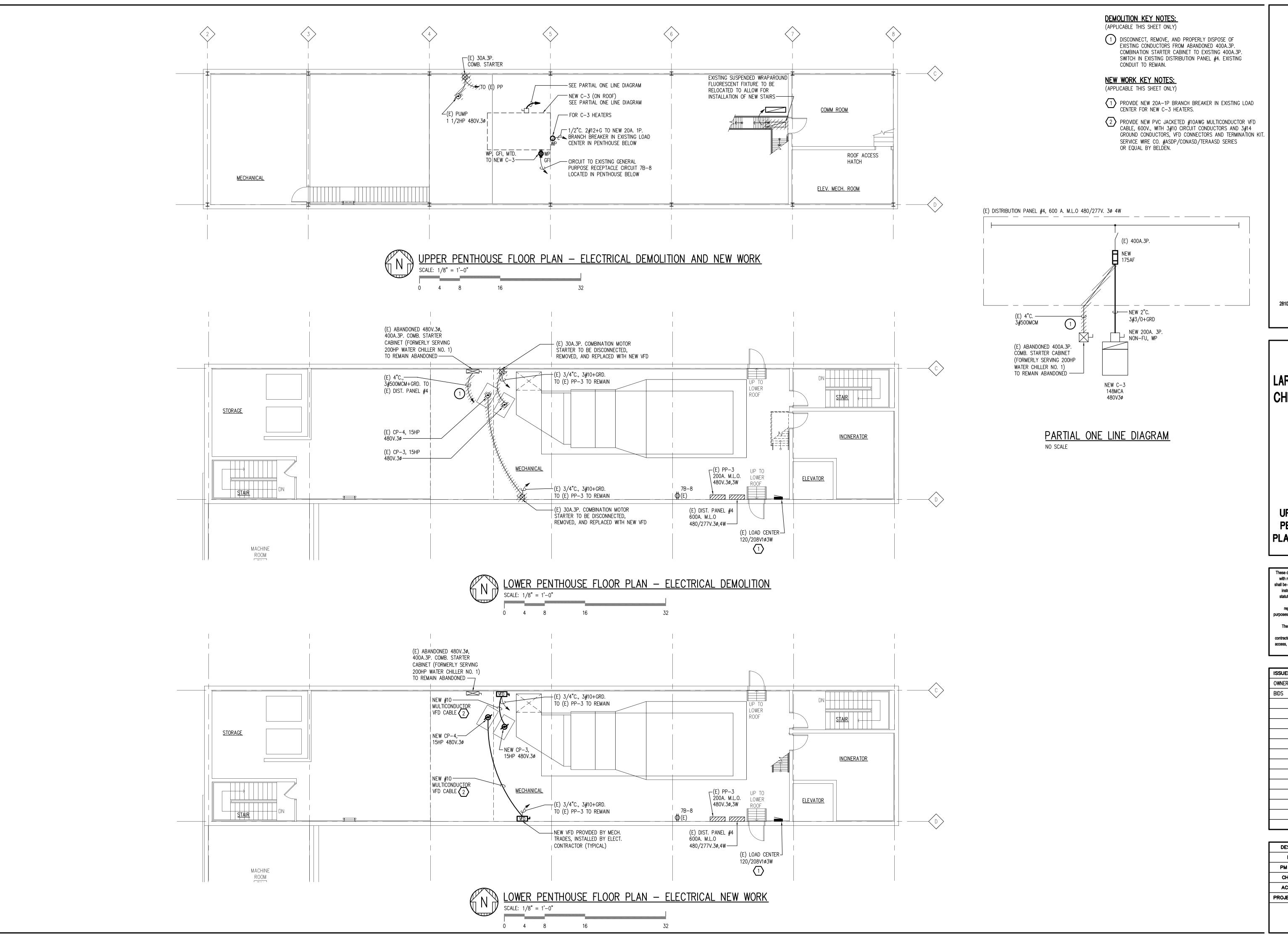
SHOP DRAWINGS

ELECTRICAL EQUIPMENT:

A. WIRING DEVICES

FNGINFFR.

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CITY OF ANN ARBOR
LARCOM SECONDARY
CHILLER PROJECT
ANN ARBOR, MI

UPPER AND LOWER
PENTHOUSE FLOOR
PLANS - ELECTRICAL

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ISSUED FOR	DATE
OWNER REVIEW	10/18/13
BIDS	11/13/13

PROJECT No.	13-1310
ACADFILE:	13-1310-E-2
CHECKED:	GDC
PM / PIC:	JSR/LAT
DRAWN:	MEP
DESIGNER:	TBR

E-2