Development Services

From Concept to Construction

Phone: 503-823-7300 Email: bds@portlandoregon.gov 1900 SW 4th Ave, Portland, OR 97201
More Contact Info (http://www.portlandoregon.gov//bds/article/519984)

APPEAL SUMMARY

Status: Decision Rendered - Held over from ID 22170 (11/27/19) for additional information

Appeal ID: 22216	**Project Address:** 222 SW Clay St
Hearing Date: 12/11/19	**Appellant Name:** Nancy I Strening
Case No.: M-002	**Appellant Phone:** 5037059768
Appeal Type: Mechanical	**Plans Examiner/Inspector:** Jeff Donnelly, Thomas Ng
Project Type: commercial	**Stories:** 7 **Occupancy:** A-1 **Construction Type:**
Building/Business Name: Keller Auditorium	**Fire Sprinklers:** Yes -
Appeal Involves: Reconsideration of appeal	**LUR or Permit Application No.:**
Plan Submitted Option: pdf [File 1] [File 2] [File 3]	**Proposed use:** Performing Arts

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	OEESC 503.4.1
Requires	The 2014 Oregon Energy Efficiency Specialty Code (OEESC) 503.4.1: Complex HVAC systems economizers.
Proposed Design	The Keller Auditorium is served by a hydronic chilled water system and heating water system. Indoor air-handler units with integral hydronic cooling and heating coils are provided for zoned temperature control. The existing air-handler for the stage currently does not meet the required cooling load. This air-handler serving the stage has been designed to provide mechanical ventilation but not 100% economizer. The unit serves the stage and the backstage rehearsal spaces. The facility needs to increase the cooling for the stage by installing additional indoor air-handler units with hydronic cooling coils (approx. 60 tons cooling) piped to the chill water system.
Reason for alternative	Seven out of the ten existing air-handlers are currently set-up to provide 100-percent outside supply air economizer for cooling when the ambient air is favorable. Due to the structural unknowns of the original building construction, it is impractical to provide new roof mounted equipment, wall intake/relief air louvers / roof hoods. Also installing ductwork down from the roof through the stage equipment is very difficult to do. Finally, ductwork running on the exterior of the building would violate the guidelines of the building Central City Design Overlay zone. The additional cooling operation is not needed year round but just as-needed for events that require unusual stage production load cooling during warmer weather conditions. This cooling load is driven by the electronic equipment for the stage operation.

RECONSIDERATION TEXT:
Seven out of the ten existing air-handlers are currently set-up to provide 100-percent outside supply air economizer for cooling when the ambient air is favorable.

Due to the structural unknowns of the original building construction, it is impractical to provide new roof mounted equipment, wall intake/relief air louvers / roof hoods.

The 7/25/2019 Design drawings (refer specifically to Sheets MS2.09, MS4.01, & MS4.02) call for structural modifications to the roof deck to accommodate the roof-mounted units. Please refer to attached letter dated 10/15/2015 from Metro cPMO Manager to Portland Center'5 for the Performing Arts Director outlining the barriers to determining additional structural capacity of the Keller Auditorium Roof. Although the 2015 letter was in relation to the roof replacement project initiated the following year, the challenge exists for this stage cooling project: It is impractical to determine additional structural capability of the roof, therefore roof-mounted units are not an option.

Also installing ductwork down from the roof through the stage equipment is very difficult to do. Finally, ductwork running on the exterior of the building would violate the guidelines of the building Central City Design Overlay zone.

Refer to sheets MS4.01 & MS4.02 of the 7/25/2019 Keller Auditorium Stage Cooling drawings by MFIA, Inc. Engineers for the location/configuration of the ductwork required by the roof top unit solution. This design configuration would require a lengthy and expensive Type II Land Use review and it is unlikely that Metro would receive approval to place ductwork on the exterior of the building.

The additional cooling operation is not needed year round but just as-needed for events that require unusual stage production load cooling during warmer weather conditions. This cooling load is driven by the electronic equipment for the stage operation.

Therefore given that the roof mounted unit/exterior ductwork solution, which could provide the 100-percent outside supply air, is impractical, and that the stage cooling requirement is as needed and not constant, Metro respectfully requests an exemption from the requirement and permission to instead provide increased cooling for the stage by installing additional indoor air-handler units with hydronic cooling cols (approx. 60 tons cooling) piped to the chill water system.

APPEAL DECISION

Increase in cooling capacity with omission of required economizer: Granted as proposed.

The Administrative Appeal Board finds that the information submitted by the appellant demonstrates that the approved modifications or alternate methods are consistent with the intent of the code; do not lessen health, safety, accessibility, life, fire safety or structural requirements; and that special conditions unique to this project make strict application of those code sections impractical.

Pursuant to City Code Chapter 24.10, you may appeal this decision to the Building Code Board of Appeal within 90 calendar days of the date this decision is published. For information on the appeals process, go to www.portlandoregon.gov/bds/appealsinfo, call (503) 823-7300 or come in to the Development Services Center.

KELLER AUDITORIUM
STAGE COOLING

INDEX OF DRAWINGS

PROJECT DIRECTORY

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ELECTRICAL

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NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
222 SW Clay Portland, OR 97201
COVER SHEET

Issuance
PRICING SET

Date:
JULY 25, 2019

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SHEET
GS0.00

MECHANICAL LEGEND

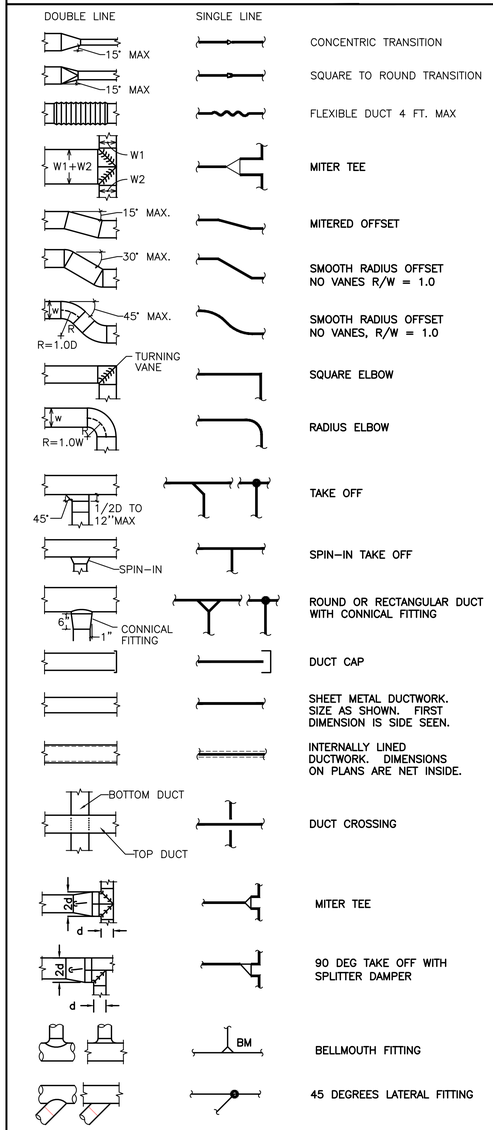
- SUPPLY AIR DIFFUSER
- RETURN AIR GRILLE
- EXHAUST AIR GRILLE
- PERFORATED RETURN AIR PANEL
- DIRECTIONAL AIR FLOW
- MANUAL VOLUME DAMPER
- SUPPLY AIR OR OUTSIDE AIR DUCT UP & DOWN
- RETURN AIR DUCT UP & DOWN
- EXHAUST AIR DUCT UP & DOWN
- SUPPLY AIR OR OUTSIDE AIR DUCT UP & DOWN
- RETURN AIR DUCT UP & DOWN
- EXHAUST AIR DUCT UP & DOWN
- (E) EXISTING
- (N) NEW
- (D) DEMOLISH
- (R) REPLACE
- CONNECT TO EXISTING
- T AC-4 THERMOSTAT OR TEMP. SENSOR
- ? NOTE
- XX / ? EQUIPMENT DESIGNATOR
- BALL VALVE
- GATE VALVE
- CHECK VALVE
- BALANCING VALVE
- THERMOMETER
- DIRECTION OF FLOW
- PUMP
- STRAINER
- PRESSURE GAUGE
- PETE'S PLUG
- VB VACUUM BREAKER
- DOUBLE CHECK ASSEMBLY
- PRESSURE REDUCING VALVE
- UNION
- 2-WAY CONTROL VALVE
- 3-WAY CONTROL VALVE
- CAP
- S SMOKE DETECTOR
- MOTORIZED DAMPER
- FIRE DAMPER
- FIRE / SMOKE DAMPER
- SMOKE DAMPER
- PIPE SLOPE DIRECTION
- CO CO2 SENSOR
- SP DIFFERENTIAL PRESSURE TRANSMITTER
- BDD BACKDRAFT DAMPER
- M MOTORIZED DAMPER

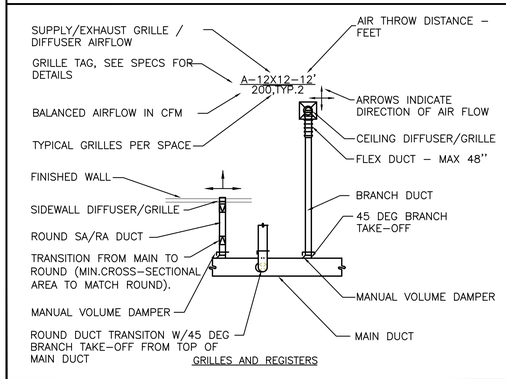
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
B.D.	BOTTOM OF DUCT
BHP	BRAKE HORSEPOWER
BTU	BRITISH THERMAL UNITS
CFM	CUBIC FEET PER MINUTE
CONN.	CONNECTION
CONT.	CONTINUATION
CW	DOMESTIC COLD WATER
DB	DRY BULB
DIA.	DIAMETER
DIST.	DISTRIBUTION
EA	EXHAUST AIR
EDB	ENTERING DRY BULB TEMPERATURE
EWB	ENTERING WET BULB TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
FF	FINISH FLOOR
FIXT.	FIXTURE
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT.	FEET / FOOT
GA.	GAUGE
GPM	GALLONS PER MINUTE
H	HEIGHT
HP	HORSEPOWER
I.D.	INSIDE DIAMETER
IN.	INCHES
L	LENGTH
LBS.	POUNDS
LDB	LEAVING DRY BULB
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MAX.	MAXIMUM
MBH	THOUSANDS OF BTUs PER HOUR
MIN.	MINIMUM
NC	NOISE CRITERIA
N.C.	NORMALLY CLOSED
N.I.M.	NOT IN MECHANICAL
NO.	NUMBER
N.O.	NORMALLY OPEN
OA	OUTSIDE AIR
P	PERSON
PSI	POUNDS PER SQUARE INCH
P/T	PRESSURE / TEMPERATURE
RA	RETURN AIR
RE	RELIEF AIR
RECT.	RECTANGULAR
REQ'D	REQUIRED
SA	SUPPLY AIR
S.P.	STATIC PRESSURE
SQ.	SQUARE
TEMP.	TEMPERATURE
TYP.	TYPICAL
VAV	VARIABLE AIR VOLUME
W	WIDTH
WB	WET BULB
WPD	WATER PRESSURE DROP
ø	DIAMETER

- (E) EXISTING
- (D) DEMOLISH
- NEW WORK
- G (G) NATURAL GAS
- CD (CD) CONDENSATE DRAIN
- RF (RF) TWO OR THREE REFRIGERANT LINES
- HWS EXISTING HOT WATER SUPPLY
- HWR EXISTING HOT WATER RETURN
- HWS NEW HOT WATER SUPPLY
- HWR NEW HOT WATER RETURN

EQUIPMENT MAINTENANCE CLEARANCE AND ACCESS

AIR DISTRIBUTION DETAILS





MECHANICAL GENERAL NOTES

A. THE DRAWINGS ARE DIAGRAMMATIC. PROVIDE ALL MATERIAL (NEW AND UNDAMAGED) AND LABOR FOR A COMPLETE AND OPERABLE SYSTEM. VERIFY ALL BUILDING MEASUREMENTS DIMENSIONS AND EQUIPMENT LOCATIONS BEFORE PROCEEDING WITH ANY OF THE WORK.

B. REFER TO THE MECHANICAL SPECIFICATIONS FOR MATERIALS, EQUIPMENT, AND ADDITIONAL CONSTRUCTION INSTRUCTIONS NOT COVERED BY THESE PLANS.

C. ALL INSTALLATIONS SHALL COMPLY WITH APPLICABLE FEDERAL AND STATE CODES INCLUDING, 2014 OREGON STRUCTURAL SPECIALTY CODE (OSSC), 2017 OREGON PLUMBING SPECIALTY CODE (OPSC), 2014 OREGON MECHANICAL SPECIALTY CODE (OMSC), 2014 OREGON FIRE CODE (IFC), 2014 OREGON ENERGY EFFICIENCY SPECIALTY CODE (OEESC), AND NATIONAL FIRE PROTECTION ASSOCIATION (NFPA). WHERE TWO CODES DIFFER THE MORE STRICT OF THE TWO SHALL BE FOLLOWED.

D. OBTAIN ALL NECESSARY PERMITS AND INSPECTIONS REQUIRED BY THE GOVERNING AUTHORITIES HAVING JURISDICTION. SUBMIT ALL CERTIFICATES PRIOR TO ACCEPTANCE.

E. COORDINATE WITH OTHER CRAFTS AS REQUIRED TO COMPLETE WORK IN ACCORDANCE WITH CONSTRUCTION SCHEDULE.

F. PROVIDE OWNER INSTRUCTION BY QUALIFIED PERSONNEL ON EQUIPMENT AND SYSTEMS AT OWNER'S REQUEST.

G. AIR BALANCE DIFFUSERS AND GRILLES TO THE CFM INDICATED ON FLOOR PLANS.

H. PROVIDE DIFFUSER, REGISTERS, AND GRILLES OF SIZE AND TYPE INDICATED.

I. INSULATE SUPPLY AIR, OUTSIDE AIR AND RETURN AIR DUCTWORK OR INTERNALLY LINE SUPPLY AIR AND RETURN AIR DUCTWORK AS SHOWN ON PLANS AND PER MECHANICAL SPECIFICATIONS.

J. ALL DUCTWORK SHALL BE GALVANIZED STEEL, UNLESS OTHERWISE INDICATED, CONFORMING TO LATEST SMACNA, ASHRAE, OMSC, NFPA, AND UL STANDARDS.

K. MANUFACTURERS AND MODEL NUMBERS LISTED IN THE EQUIPMENT SCHEDULES ARE THE BASIS OF DESIGN.

L. CUT WALLS FOR PROPER EQUIPMENT, DUCT OR PIPE INSTALLATION. FILL HOLES WHICH ARE CUT OVERSIZED FOR A TIGHT FIT AROUND OBJECTS PASSING THROUGH. PATCH AND SEAL FINISHES TO MATCH NEW OR EXISTING FINISHES.

M. INSTALL LABELS ON ALL MECHANICAL EQUIPMENT.

N. CONTROLS AND WIRING SHALL MEET ALL ELECTRICAL REQUIREMENTS OF APPLICABLE ELECTRICAL SPECIFICATIONS AND REQUIREMENTS OF OWNER, BUILDING OFFICIALS AND EQUIPMENT SUPPLIERS OF EQUIPMENT INSTALLED ON PROJECT.

O. ALL NEW EQUIPMENT, PIPING, CONDUIT, AND DUCTWORK SHALL BE INSTALLED FOR CURRENT SEISMIC CODE.

P. PROVIDE LOW LEAK AUTOMATIC DAMPERS ON OUTSIDE AIR, EXHAUST AIR AND RELIEF AIR CONTROL DAMPERS WHERE THESE ARE INDICATED.

ACOUSTICAL REQUIREMENTS

1. PROVIDE VIBRATION ISOLATION AND FLEXIBLE DUCT/PIPE CONNECTORS TO THE FOLLOWING EQUIPMENT:
   1.A. ROOF-TOP UNITS
2. SUPPORT PIPE RISERS FROM FLOOR SLAB, ATTACH TO SLAB WITH VIBRATION ISOLATION MOUNTS.
3. SUPPORT OF PIPE AT MID-SPAN SHALL BE ISOLATED FROM STRUCTURE WITH NEOPRENE PADS OR STRIPS.
4. PROVIDE THICK NEOPRENE GASKET BETWEEN THE ROOFTOP EXHAUST FANS THE CURBS TO REDUCE VIBRATION NOISE.
5. INSTALL BUSHINGS AND GROMMETS ON ALL BOLTS OF ROOFTOP MOUNTED FAN DRIVEN EQUIPMENT.
6. PROVIDE DUCT LINING ON THE SUPPLY AND RETURN DUCTWORK OF ROOF-TOP EQUIPMENT AND AIR-HANDLING UNITS.
7. THE AIR-HANDLING UNITS REQUIRE INSTALLATION OF SOUND ATTENUATORS ON THE SUPPLY AND RETURN DUCTWORK.

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
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MECHANICAL LEGEND AND NOTES

Issuance
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Date:
JULY 25, 2019

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MS0.01

DIFFUSER AND REGISTER SCHEDULE

TAG	TYPE	LOCATION - NOTES	MANUFACTURER: MODEL
A	SUPPLY GRILLE - DOUBLE DEFLECTION	SIDEWALL - [1][2]	TITUS 272RL
B	RETURN/EXHAUST GRILLE - SIDEWALL	SIDEWALL -[1][2]	TITUS 33RL

NOTES:

[1] PROVIDE NECK SIZE AS SHOWN ON PLANS.

[2] PROVIDE BLADES PARALLEL TO THE FLOOR/CEILING LINE AT SIDEWALL GRILLES.

[3] PROVIDE SURFACE MOUNT BORDER FOR HARD CEILINGS.

UNIT SOUND POWER (Db)

DESIGN SYMBOL	RADIATED-CASING [1] OCTAVE BAND								UNIT DISCHARGE OCTAVE BAND								UNIT RETURN OCTAVE BAND								BASIS OF DESIGN
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	AAON RNA
RTU-1A	64	67	68	68	68	63	58	55	90	90	93	92	88	86	84	80	93	90	89	83	79	79	76	69	
RTU-1B	64	67	68	68	68	63	58	55	90	90	93	92	88	86	84	80	93	90	89	83	79	79	76	69	

NOTES:

[#]

1 SOUND POWER LEVELS PER AMCA 300 TESTING CRITERIA

7/25/2019 17:21

SOUND ATTENUATOR SCHEDULE

DESIGN SYMBOL	SYSTEM	TYPE	AIRFLOW CFM	FACE VELOCITY FPM	FACE DIMENSIONS WIDTH IN	HEIGHT IN	LENGTH FT[3]	AIR PRESSURE DROP IN W.G.	DYNAMIC INSERTION LOSS (Db) OCTAVE BAND 63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	OPER. WEIGHT LBS	REMARKS NOTES	DESIGN BASIS MODEL#
ES-AS1	RTU-1A SA	ELBOW	7,855	736	48	32	11/6	0.26	18	24	42	54	55	55	53	41	1200	1,2,3,4	PRICE ERM
ES-AR1	RTU-1A RA	ELBOW	7,855	748	42	36	9/9	0.15	22	30	45	55	55	52	43	34	800	1,2,3,4	PRICE ERM
ES-AR2	RTU-1A RA	ELBOW	7,855	748	42	36	5/5	0.08	10	14	16	21	23	23	20	18	200	1,2,3,4	PRICE ERM
ES-BS1	RTU-1B SA	ELBOW	7,855	748	42	36	8/8	0.34	22	31	33	43	43	42	41	44	900	1,2,3,4	PRICE ERM
ES-BR1	RTU-1B RA	ELBOW	7,855	748	42	36	8/8	0.18	23	32	52	55	55	55	48	36	900	1,2,3,4	PRICE ERM
ES-BR2	RTU-1B RA	ELBOW	7,855	873	36	36	5/5	0.09	11	14	16	19	22	24	22	19	400	1,2,3,4	PRICE ERM
NOTES:																			

1 MAXIMUM ALLOWABLE PRESSURE DROP INCLUDING SYSTEM EFFECT.

2 PROVIDE EXTENDED CASING SILENCERS.

3 INDICATED LENGTH FOR ELBOW SILENCERS: INLET SIDE / DISCHARGE SIDE.

4 NOT USED.

UPDATED: 7/25/2019 17:23

ROOF-TOP UNITS SCHEDULE

DESIGN SYMBOL	CONFIG	SERVES	OUTSIDE AIR MIN CFM	OUTSIDE AIR MAX CFM	SUPPLY FAN SA CFM	SUPPLY FAN ESP [5] IN	SUPPLY FAN BHP	SUPPLY FAN HP	RETURN/EXHAUST FAN RA CFM	RETURN/EXHAUST FAN ESP IN	RETURN/EXHAUST FAN BHP	RETURN/EXHAUST FAN HP	DX COOLING [HFC-410A] GROSS CAP. MBH TOT	GROSS CAP. MBH SENS	EAT F DB	EAT F WB	LAT F DB	LAT F WB	FPI/ ROWS	APD IN WG	CONDENSER SECTION MIN EFF IEER	REFRIG CHRG LBS/CRT	COMPRESSOR(S) NO / CIRC'S	COMPRESSOR(S) KW	COMPRESSOR(S) TYPE	AMB TEMP F	GAS HEATING AIRFLOW SA CFM	AIRFLOW OA CFM	HEAT OUTPUT MBH	HEAT INPUT MBH	MIN LAT F DB	AMB F	ENT AIR DB	MIN. AFUE Et	TURN [11] DN	ZONE T'STAT CLG/ HTG	COOLING ECONO- -MIZER	UNIT SMOKE DETECT	UNIT ELECTRICAL DATA POWER VOLT / PHASE/HZ	UNIT FLA	UNIT MCA/MOP	EMERG. POWER	VFD CONTROL	UNIT WEIGHT LBS	INTERLOCK CONTROL WITH	REMARKS NOTES	DESIGN BASIS
RTU-1A	DOWNFLOW	STAGE N	1,645	7,855	7,855	1.90	7.57	15	7,855	1.10	5.48	7.5	298.1	216.5	79.6	62.3	53.9	48.8			11.4/12.4		2.0		SCROLL	95.2	7,825	1,645	263.8	405	92	21	61.3	80%	4.5:1	75/72	YES	YES	208/3/60	175	187/225	NO	YES	4160		1,2,3,4,5,6,7,8,9,10,11,12,13	AAON RNA 025
RTU-1B	DOWNFLOW	STAGE S	1,645	7,855	7,855	1.90	7.57	15	7,855	1.10	5.48	7.5	298.1	216.5	79.6	62.3	53.9	48.8			11.4/12.4		2.0		SCROLL	95.2	7,825	1,645	263.8	405	92	21	61.3	80%	4.5:1	75/72	YES	YES	208/3/60	175	187/225	NO	YES	4160		1,2,3,4,5,6,7,8,9,10,11,12,13	AAON RNA 025

NOTES:

1 PROVIDE 12 IN HIGH CERTIFIED SEISMIC RESTRAINED RAIL WITH SPRING VIBRATION ISOLATION.

2 PROVIDE DEFERED SUBMITAL FOR SPRING RAIL ATTACHEMENT TO STEEL STRUCTURE.

3 PROVIDE DIRTY FILTER GAUGES W/SWITCH.

4 PROVIDE 2 IN MERV13 FILTERS.

5 INCLUDES SA AND RA DUCTWORK AND FILTER LOADING PRESSURE DROP.

6 PROVIDE DRYBULB CONTROL FOR OSA ECONOMIZER.

7 PROVIDE LOW LEAK MODULATING ECONOMIZER.

8 PROVIDE CO2 SENSOR FOR DCV CONTROL.

9 PROVIDE VFD DRIVE FOR EXHAUST FAN AND CONTROL BASED ON SPACE PRESSURE.

10 DISCONNECT SWITCH AND SERVICE RECEPTACLES BY ELECTRICAL.

11 FOUR STAGE HEATING.

12 PROVIDE VFD DRIVE FOR SUPPLY FAN.

13 PROVIDE LOW SOUND ZIEL ABEGG CONDENSER FANS.

14

15

UPDATED: 7/25/2019 17:21

NOT FOR CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
222 SW Clay Portland, OR 97201
MECHANICAL SCHEDULES

Issuance
PRICING SET
Date:
JULY 25, 2019

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SHEET
MS0.02

GENERAL NOTES:

A. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. DO NOT FABRICATE PIPING W/O CONFIRMING SPACE EXISTS, FOR SIZES REQUIRED.

B. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

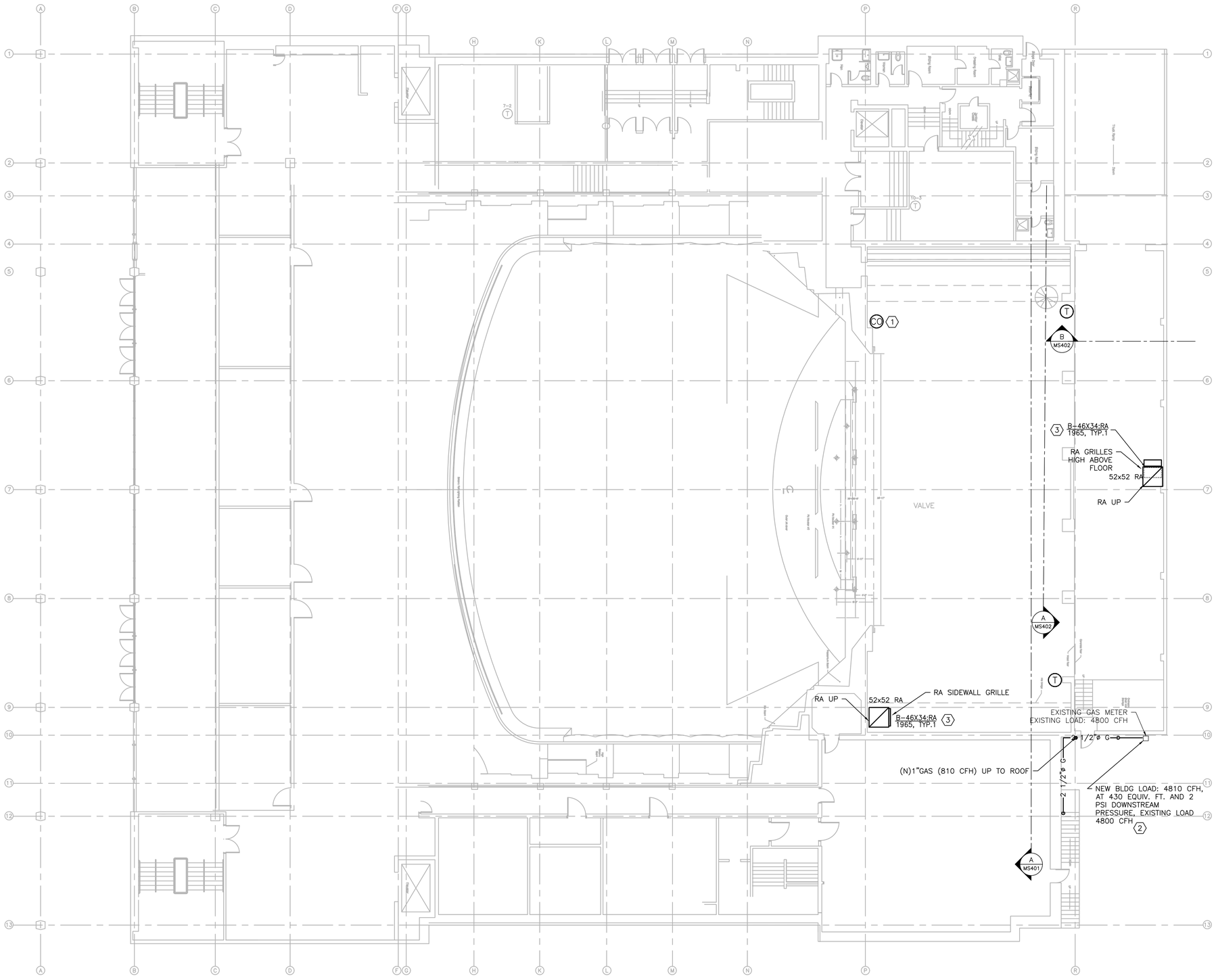
C. MAINTAIN THE REQUIRED NEC CLEARANCES AT ELECTRICAL PANELS AND EQUIPMENT.

D. PROVIDE 1 INCH ACOUSTICAL DUCT LINER ON ENTIRE SUPPLY AND RETURN AIR DUCTWORK SYSTEM.

C. PROVIDE SEISMIC SUPPORT FOR DUCTWORK PER CODE. SEE DETAIL 1/MS6.01.

MECHANICAL NOTES: (X)

1. CO2 SENSOR FOR DCV CONTROL OF OUTSIDE AIR. MOUNT IN SPACE..
2. EXISTING GAS METER SIZE SHALL BE VERIFIED WITH THE GAS SERVICE COMPANY.
3. SEE PERTAINING SECTION DETAIL FOR RA GRILLE INSTALLATION LOCATION.
4. AIR BALANCE EXISTING SUPPLY RETURN AND EXHAUST GRILLES SERVING THE STAGE TO THE INDICATED AIRFLOW.
5.



1 MS2.02 MECHANICAL STAGE/UPPER BASEMENT – NEW WORK
SCALE: 3/32" = 1'-0"

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
222 SW Clay Portland, OR 97201
MECHANICAL UPPER BSMT NEW WORK PLAN

Issuance
PRICING SET
Date:
JULY 25, 2019

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SHEET
MS2.02

GENERAL NOTES:

A. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. DO NOT FABRICATE PIPING W/O CONFIRMING SPACE EXISTS, FOR SIZES REQUIRED.

B. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

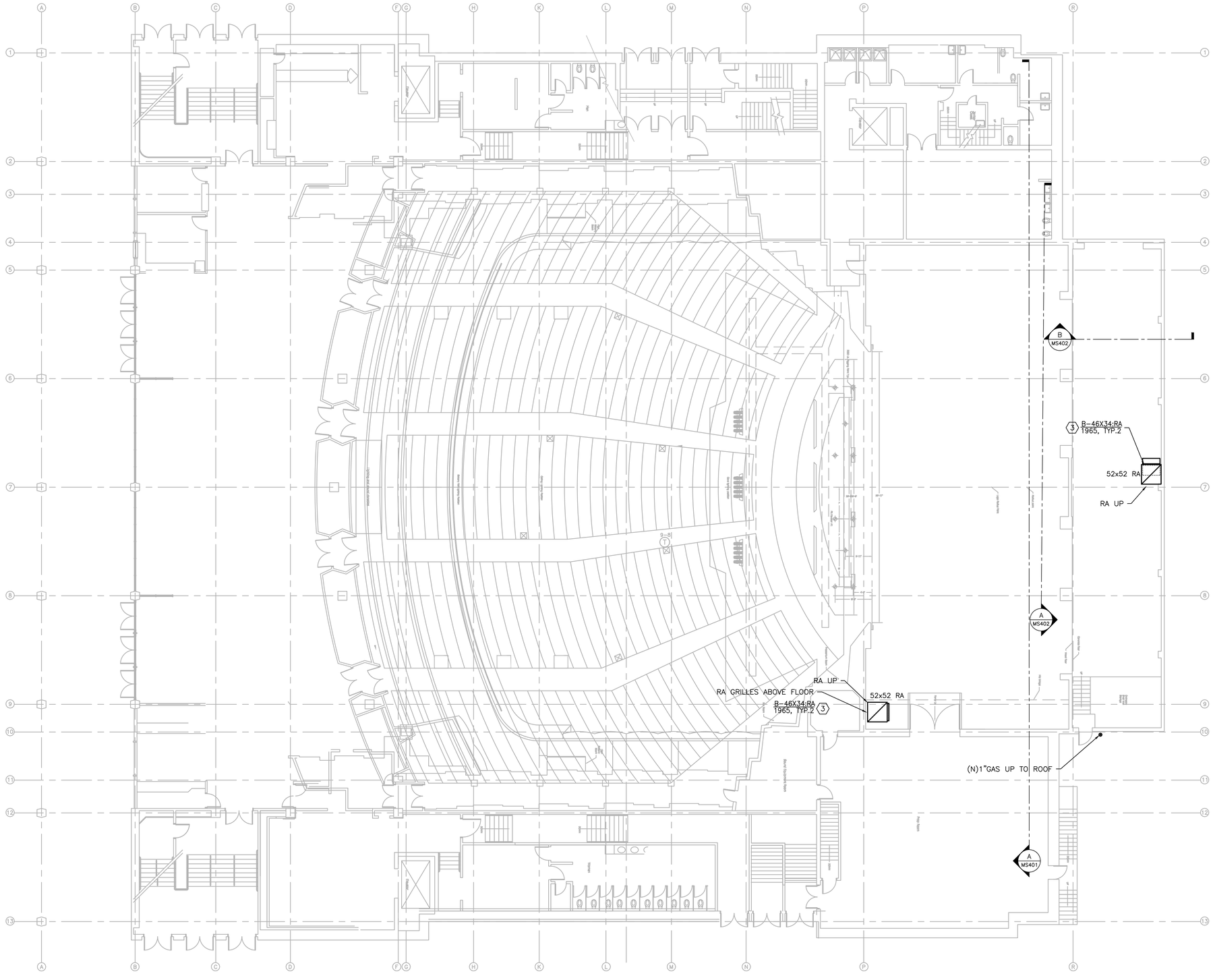
C. MAINTAIN THE REQUIRED NEC CLEARANCES AT ELECTRICAL PANELS AND EQUIPMENT.

D. PROVIDE 1 INCH ACOUSTICAL DUCT LINER ON ENTIRE SUPPLY AND RETURN AIR DUCTWORK SYSTEM.

C. PROVIDE SEISMIC SUPPORT FOR DUCTWORK PER CODE. SEE DETAIL 1/MS6.01.

MECHANICAL NOTES: (X)

1. CO2 SENSOR FOR DCV CONTROL OF OUTSIDE AIR. MOUNT IN SPACE..
2. EXISTING GAS METER SIZE SHALL BE VERIFIED WITH THE GAS SERVICE COMPANY.
3. SEE PERTAINING SECTION DETAIL FOR RA GRILLE INSTALLATION LOCATION.
4. AIR BALANCE EXISTING SUPPLY RETURN AND EXHAUST GRILLES SERVING THE STAGE TO THE INDICATED AIRFLOW.
5.



1 MS2.03 MECHANICAL ORCHESTRA LEVEL – NEW WORK
SCALE: 3/32" = 1'-0"

ORCHESTRA/CHORUS
83.12'

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
222 SW Clay Portland, OR 97201
MECHANICAL ORCHESTRA NEW WORK PLAN

Issuance
PRICING SET

Date:
JULY 25, 2019

MFIA INC.
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SHEET
MS2.03

GENERAL NOTES:

A. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. DO NOT FABRICATE PIPING W/O CONFIRMING SPACE EXISTS, FOR SIZES REQUIRED.

B. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

C. MAINTAIN THE REQUIRED NEC CLEARANCES AT ELECTRICAL PANELS AND EQUIPMENT.

D. PROVIDE 1 INCH ACOUSTICAL DUCT LINER ON ENTIRE SUPPLY AND RETURN AIR DUCTWORK SYSTEM.

C. PROVIDE SEISMIC SUPPORT FOR DUCTWORK PER CODE. SEE DETAIL 1/MS6.01.

MECHANICAL NOTES: (X)

1. CO2 SENSOR FOR DCV CONTROL OF OUTSIDE AIR. MOUNT IN SPACE..
2. EXISTING GAS METER SIZE SHALL BE VERIFIED WITH THE GAS SERVICE COMPANY.
3. SEE PERTAINING SECTION DETAIL FOR RA GRILLE INSTALLATION LOCATION.
4. AIR BALANCE EXISTING SUPPLY RETURN AND EXHAUST GRILLES SERVING THE STAGE TO THE INDICATED AIRFLOW.
5.

B MS402

B-46X34:RA 1965, TYP.1 (3)

52x52 RA

RA UP

A MS402

RA GRILLES OVERHEAD

B-34X46:RA 1965, TYP.1 (3)

RA UP

42x42 RA

(4) (E):SA 450,TYP.2

(N)1"GAS UP TO ROOF

A MS401

(4) (E):RA 900

1 MS2.04 MECHANICAL INTERMEDIATE LEVEL 1 – NEW WORK

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

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796

Drawn By: MG

Chkd By: SWM

DSGN By: MG

KELLER AUDITORIUM

STAGE COOLING

222 SW Clay Portland, OR 97201

MECHANICAL INTERM. LEV. 1 NEW WORK PLAN

Issuance

PRICING SET

Date:
JULY 25, 2019

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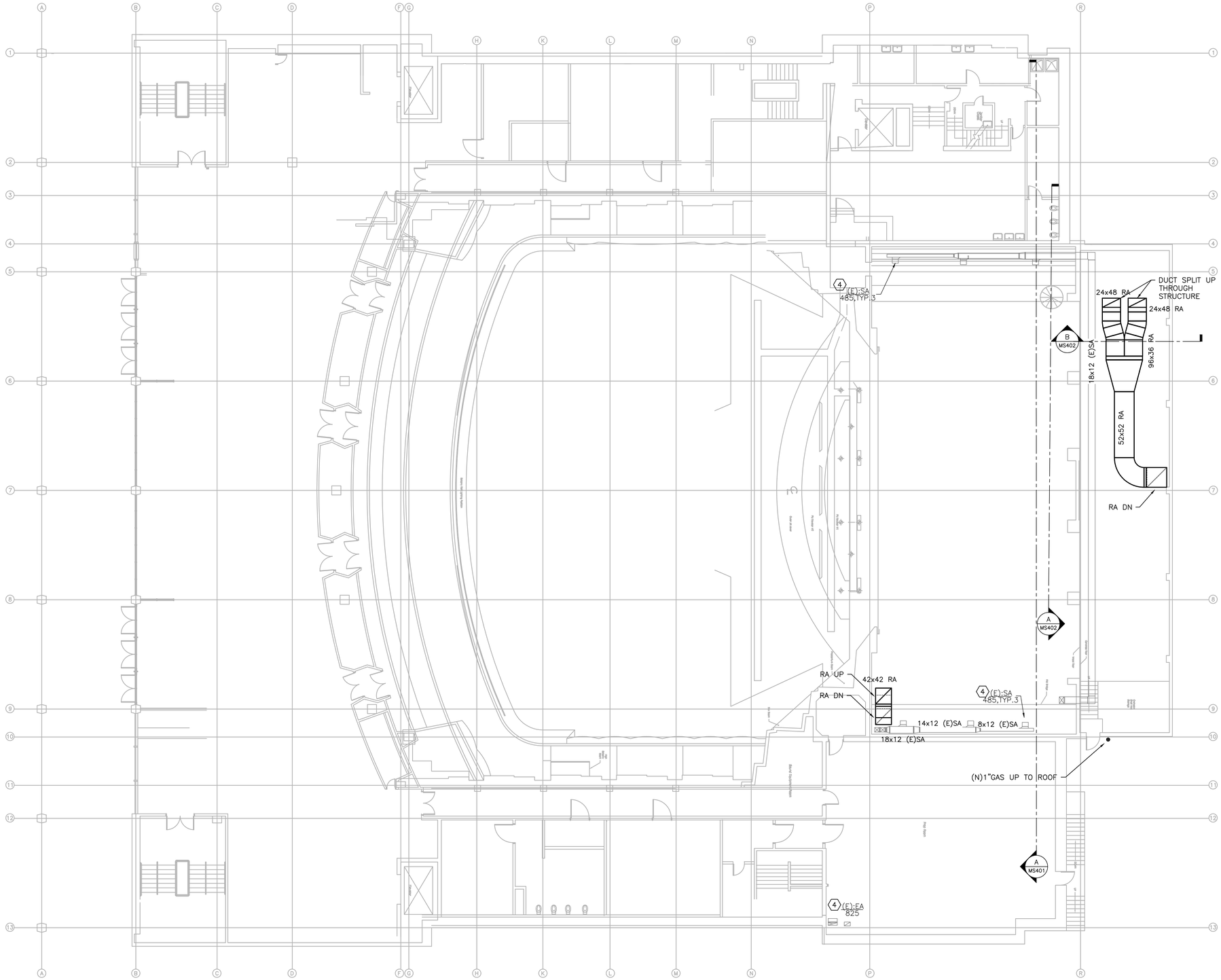
MS2.04



1 MS2.05 MECHANICAL FIRST BALCONY LEVEL – NEW WORK
SCALE: 3/32" = 1'-0"

GENERAL NOTES:

A. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. DO NOT FABRICATE PIPING W/O CONFIRMING SPACE EXISTS, FOR SIZES REQUIRED.

B. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

C. MAINTAIN THE REQUIRED NEC CLEARANCES AT ELECTRICAL PANELS AND EQUIPMENT.

D. PROVIDE 1 INCH ACOUSTICAL DUCT LINER ON ENTIRE SUPPLY AND RETURN AIR DUCTWORK SYSTEM.

C. PROVIDE SEISMIC SUPPORT FOR DUCTWORK PER CODE. SEE DETAIL 1/MS6.01.

MECHANICAL NOTES: (X)

1. CO2 SENSOR FOR DCV CONTROL OF OUTSIDE AIR. MOUNT IN SPACE..
2. EXISTING GAS METER SIZE SHALL BE VERIFIED WITH THE GAS SERVICE COMPANY.
3. SEE PERTAINING SECTION DETAIL FOR RA GRILLE INSTALLATION LOCATION.
4. AIR BALANCE EXISTING SUPPLY RETURN AND EXHAUST GRILLES SERVING THE STAGE TO THE INDICATED AIRFLOW.
5.

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

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STAGE COOLING
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MECHANICAL 1ST BALCONY NEW WORK PLAN

Issuance
PRICING SET

Date:
JULY 25, 2019

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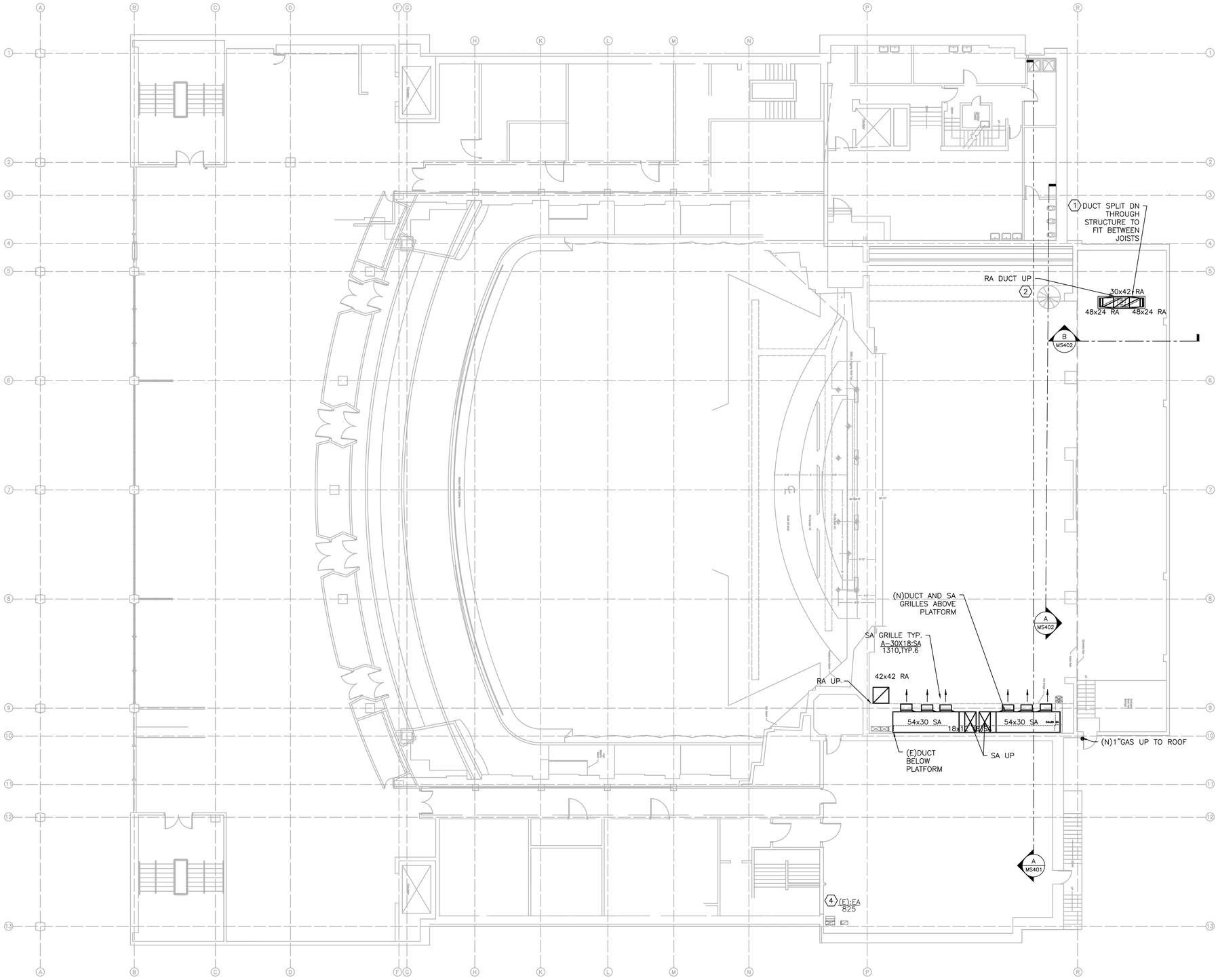
SHEET
MS2.05



GENERAL NOTES:

A. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. DO NOT FABRICATE PIPING W/O CONFIRMING SPACE EXISTS, FOR SIZES REQUIRED.

B. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

C. PROVIDE SEISMIC/WIND SUPPORT FOR EXTERIOR DUCTWORK PER CODE.

D. PROVIDE DOUBLE WALL INSULATION WITH 1 INCH ACOUSTICAL DUCT LINER ON SUPPLY AND RETURN AIR EXTERIOR DUCTWORK. CONSTRUCT TOP OF DUCTWORK TO PREVENT WATER ACCUMULATION.

E. PROVIDE AIR AND WATER TIGHT CONSTRUCTION AT BUILDING ENVELOPE DUCTWORK/PIPING PENETRATIONS.

D. PROVIDE 1 INCH ACOUSTICAL DUCT LINER ON ENTIRE SUPPLY AND RETURN AIR INTERIOR DUCTWORK.

C. PROVIDE SEISMIC SUPPORT FOR INTERIOR DUCTWORK PER CODE. SEE DETAIL 1/MS6.01.

MECHANICAL NOTES: (X)

1. PROVIDE ROOF CURB AT ROOF PENETRATION.
2. SUPPORT EXTERIOR DUCT FROM BLDG. STRUCTURE.
3. SEE PERTAINING SECTION DETAIL FOR RA GRILLE INSTALLATION LOCATION.
4. AIR BALANCE EXISTING SUPPLY RETURN AND EXHAUST GRILLES SERVING THE STAGE.
5.

1 / MS2.06 MECHANICAL INTERMEDIATE LEVEL 2 – NEW WORK
SCALE: 3/32" = 1'-0"

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

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STAGE COOLING
222 SW Clay Portland, OR 97201

MECH.INTERM. LEVEL 2 NEW WORK PLAN

Issuance
PRICING SET

Date:
JULY 25, 2019

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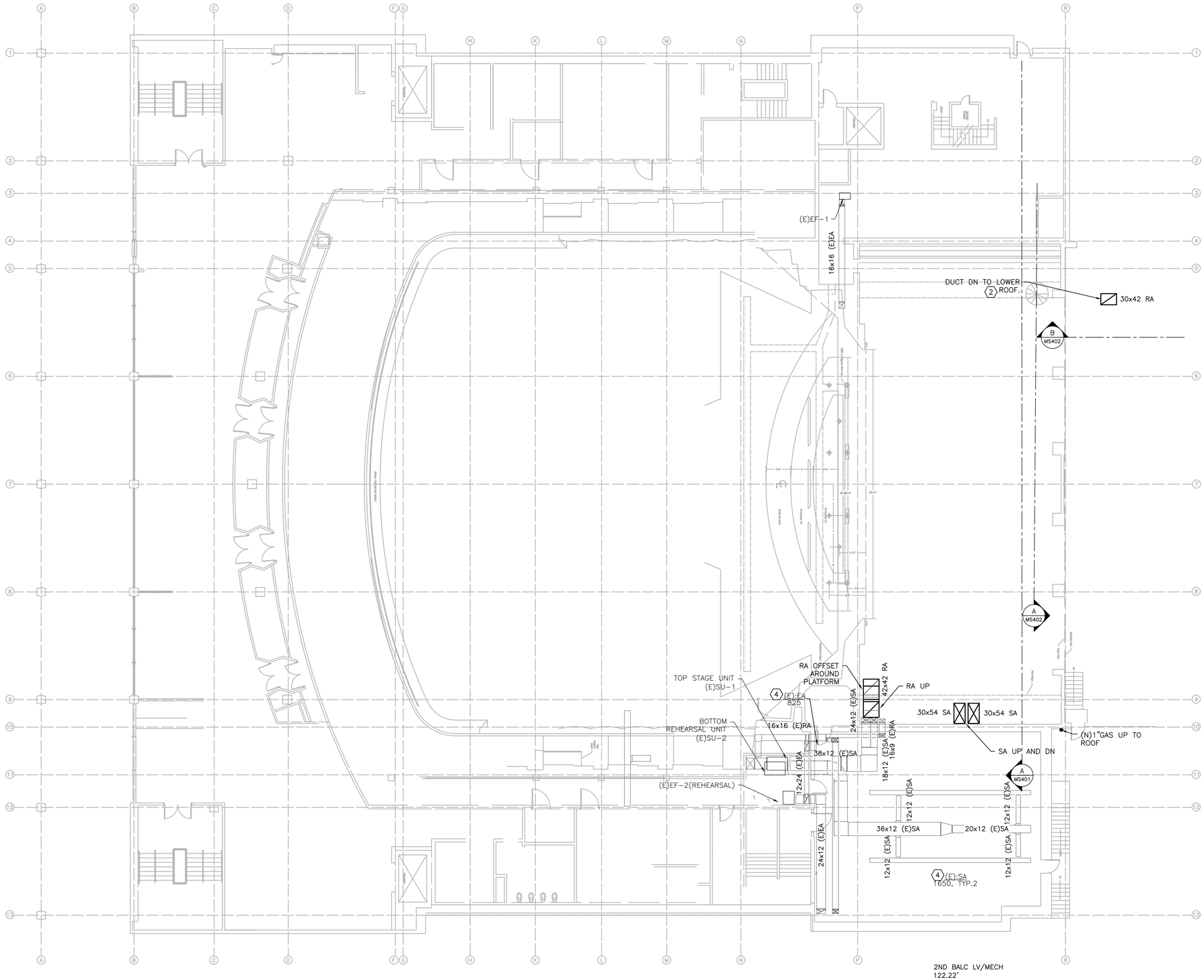
SHEET
MS2.06



1 MS2.07 MECHANICAL SECOND BALCONY LEVEL – NEW WORK
SCALE: 3/32" = 1'-0"

GENERAL NOTES:

A. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. DO NOT FABRICATE PIPING W/O CONFIRMING SPACE EXISTS, FOR SIZES REQUIRED.

B. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

C. PROVIDE SEISMIC/WIND SUPPORT FOR EXTERIOR DUCTWORK PER CODE.

D. PROVIDE DOUBLE WALL INSULATION WITH 1 INCH ACOUSTICAL DUCT LINER ON SUPPLY AND RETURN AIR EXTERIOR DUCTWORK. CONSTRUCT TOP OF DUCTWORK TO PREVENT WATER ACCUMULATION.

E. PROVIDE AIR AND WATER TIGHT CONSTRUCTION AT BUILDING ENVELOPE DUCTWORK/PIPING PENETRATIONS.

D. PROVIDE 1 INCH ACOUSTICAL DUCT LINER ON ENTIRE SUPPLY AND RETURN AIR INTERIOR DUCTWORK.

C. PROVIDE SEISMIC SUPPORT FOR INTERIOR DUCTWORK PER CODE. SEE DETAIL 1/MS6.01.

MECHANICAL NOTES: (X)

1. PROVIDE ROOF CURB AT ROOF PENETRATION.
2. SUPPORT EXTERIOR DUCT FROM BLDG. STRUCTURE.
3. SEE PERTAINING SECTION DETAIL FOR RA GRILLE INSTALLATION LOCATION.
4. AIR BALANCE EXISTING SUPPLY RETURN AND EXHAUST GRILLES SERVING THE STAGE.
5.

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

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MECHANICAL 2ND BALCONY NEW WORK PLAN

Issuance
PRICING SET

Date:
JULY 25, 2019

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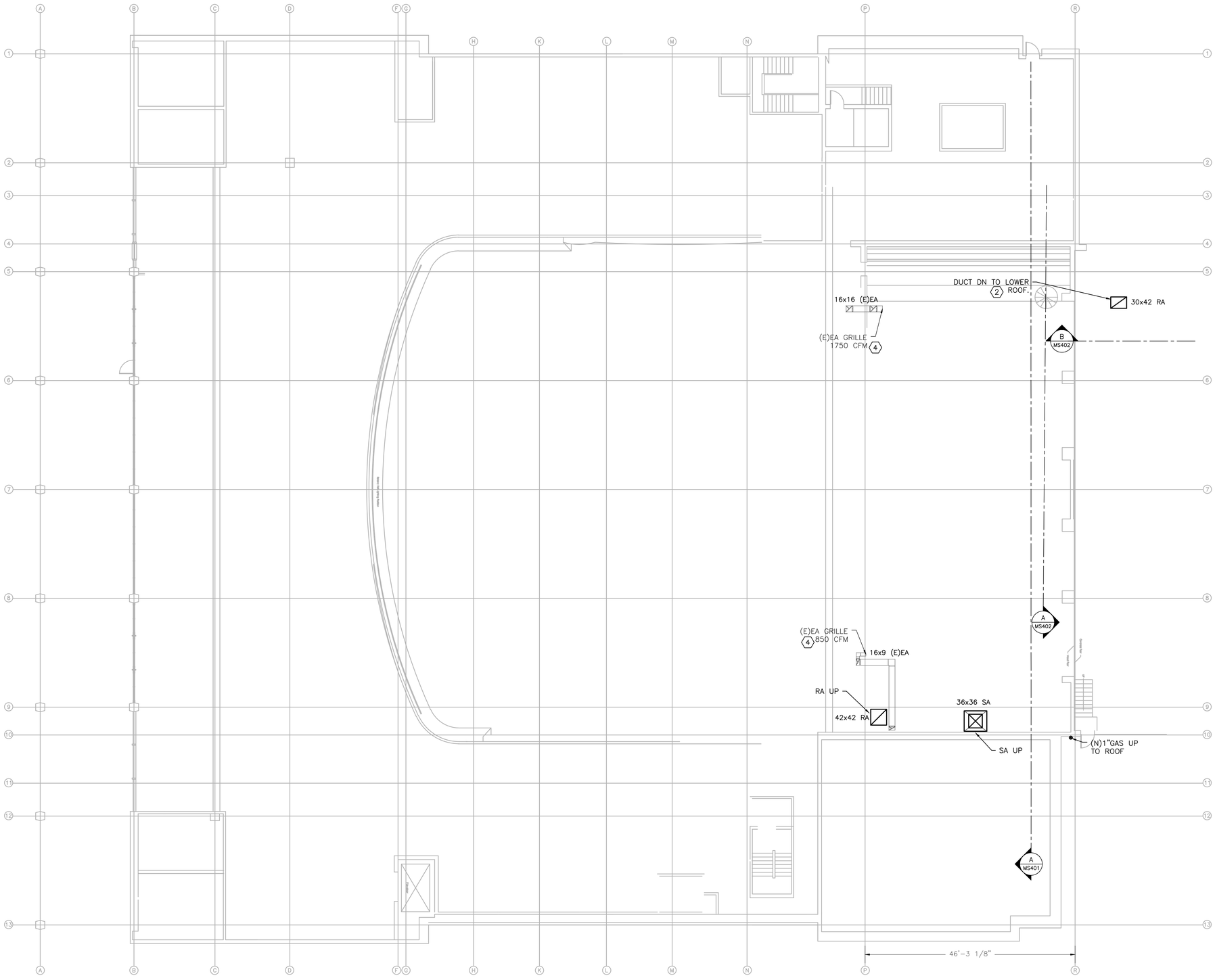
SHEET
MS2.07



1 MS2.08 MECHANICAL ATTIC LEVEL PLAN – NEW WORK
SCALE: 3/32" = 1'-0"

GENERAL NOTES:

A. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. DO NOT FABRICATE PIPING W/O CONFIRMING SPACE EXISTS, FOR SIZES REQUIRED.

B. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

C. PROVIDE SEISMIC/WIND SUPPORT FOR EXTERIOR DUCTWORK PER CODE.

D. PROVIDE DOUBLE WALL INSULATION WITH 1 INCH ACOUSTICAL DUCT LINER ON SUPPLY AND RETURN AIR EXTERIOR DUCTWORK. CONSTRUCT TOP OF DUCTWORK TO PREVENT WATER ACCUMULATION.

E. PROVIDE AIR AND WATER TIGHT CONSTRUCTION AT BUILDING ENVELOPE DUCTWORK/PIPING PENETRATIONS.

D. PROVIDE 1 INCH ACOUSTICAL DUCT LINER ON ENTIRE SUPPLY AND RETURN AIR INTERIOR DUCTWORK.

C. PROVIDE SEISMIC SUPPORT FOR INTERIOR DUCTWORK PER CODE. SEE DETAIL 1/MS6.01.

MECHANICAL NOTES: (X)

1. PROVIDE ROOF CURB AT ROOF PENETRATION.
2. SUPPORT EXTERIOR DUCT FROM BLDG. STRUCTURE.
3. SEE PERTAINING SECTION DETAIL FOR RA GRILLE INSTALLATION LOCATION.
4. AIR BALANCE EXISTING SUPPLY RETURN AND EXHAUST GRILLES SERVING THE STAGE.
5.

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
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MECHANICAL ATTIC NEW WORK PLAN

Issuance
PRICING SET
Date:
JULY 25, 2019

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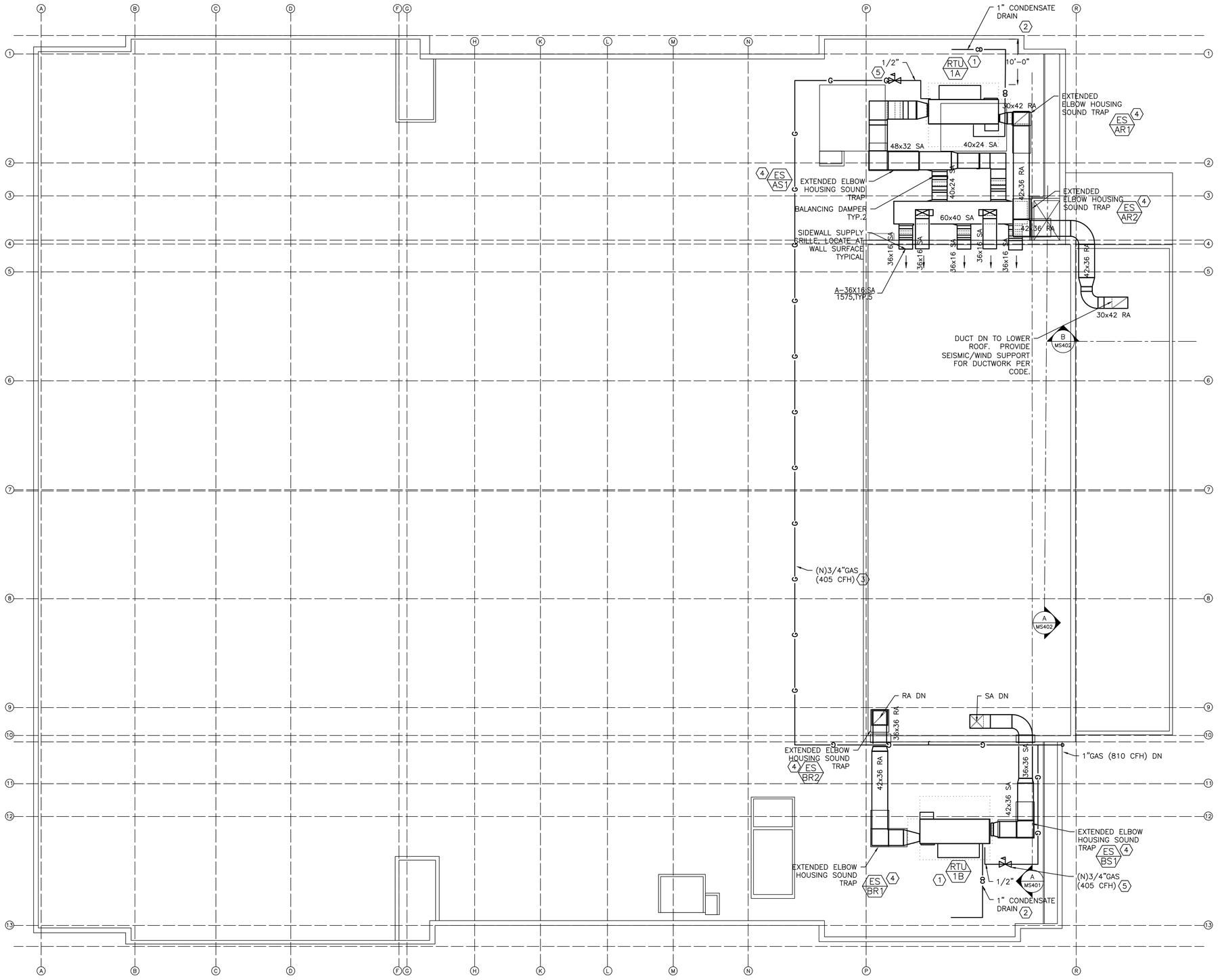
MS2.08



1 MECHANICAL ROOF PLAN – NEW WORK
MS2.09 SCALE: 3/32" = 1'-0"

GENERAL NOTES:

A. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. DO NOT FABRICATE PIPING W/O CONFIRMING SPACE EXISTS, FOR SIZES REQUIRED.

B. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

C. PROVIDE SEISMIC/WIND SUPPORT FOR EXTERIOR DUCTWORK PER CODE.

D. PROVIDE DOUBLE WALL INSULATION WITH 1 INCH ACOUSTICAL DUCT LINER ON SUPPLY AND RETURN AIR EXTERIOR DUCTWORK. CONSTRUCT TOP OF DUCTWORK TO PREVENT WATER ACCUMULATION.

E. PROVIDE AIR AND WATER TIGHT CONSTRUCTION AT BUILDING ENVELOPE DUCTWORK/PIPING PENETRATIONS.

MECHANICAL NOTES: (X)

1. ROOF-TOP UNIT. INSTALL ON SEISMIC/VIBRATION RESTRAINED SUPPORT. SEE STRUCTURAL FOR ELEVATED ROOF STRUCTURE SUPPORT. SEE STRUCTURAL FOR FRAME DESIGN. PROVIDE FLEXIBLE CONNECTORS AT DUCT CONNECTIONS. SEE DETAIL 6/MS6.01
2. PROVIDE TRAPPED CONDENSATE DRAIN WITH CLEAN-OUT AT UNIT PER MANUFACTURER'S REQUIREMENTS. ROUTE ABOVE ROOF TO ROOF DRAIN LOCATION AND DAYLIGHT. SEE DETAIL 3/MS6.01.
3. GAS PIPE ABOVE ROOF. ROUTE 3 INCHES ABOVE ROOF SURFACE AND SECURE PIPING PER CODE.
4. DUCT SILENCER. PROVIDE SEISMIC/WIND SUPPORT PER CODE. SEE SCHEDULE FOR WEIGHT.
5. PROVIDE GAS PRESSURE REGULATOR FOR THE INDICATED LOAD AND 14 IN WC DOWNSTREAM PRESSURE. PROVIDE REGULATOR APPROVED FOR OUTDOOR INSTALLATION. SEE DETAIL 5/MS6.01.

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
222 SW Clay Portland, OR 97201

MECHANICAL ATTIC NEW WORK PLAN

Issuance
PRICING SET

Date:
JULY 25, 2019

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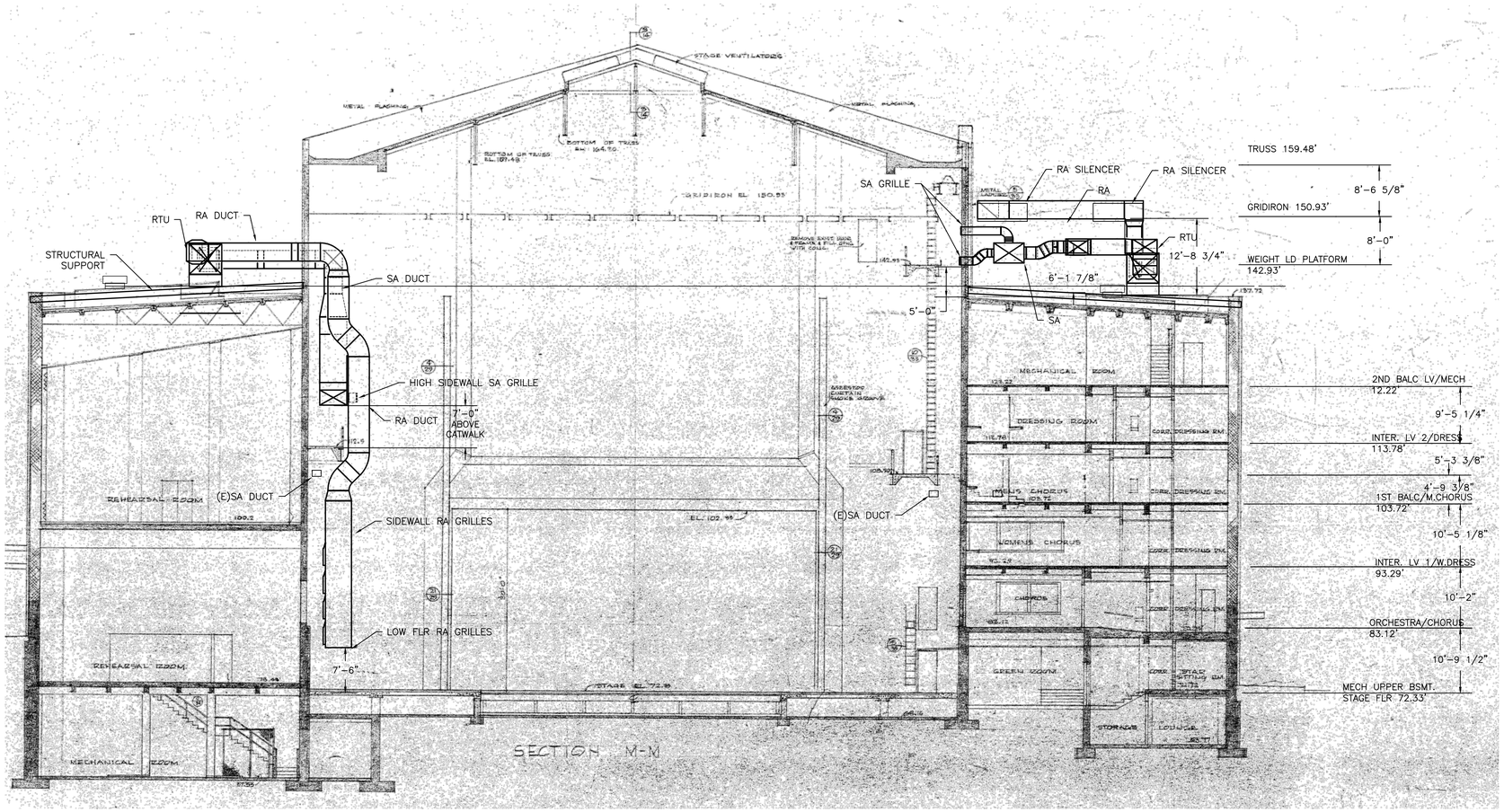
SHEET
MS2.09



1 MECHANICAL SECTION LOOKING WEST
MS4.01 SCALE: 3/32" = 1'-0"

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
222 SW Clay Portland, OR 97201
MECHANICAL SECTIONS

Issuance
PRICING SET

Date:
JULY 25, 2019

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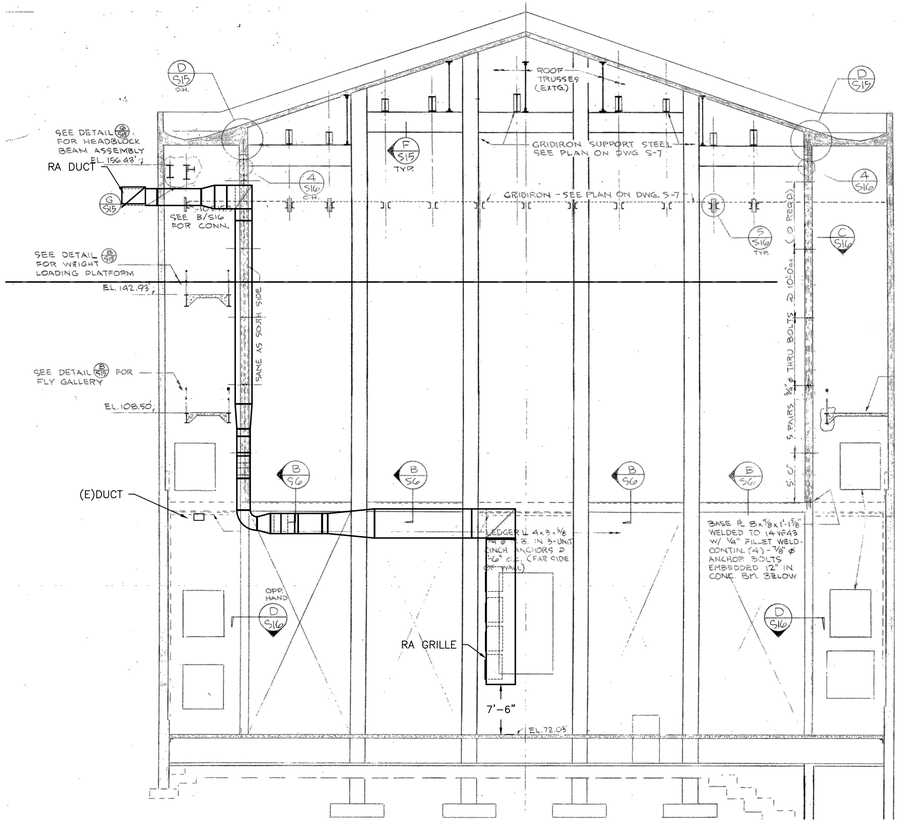
SHEET
MS4.01



1 MS4.02 MECHANICAL BACKSTAGE SECTION LOOKING EAST
SCALE: 3/32" = 1'-0"

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
222 SW Clay Portland, OR 97201
MECHANICAL SECTIONS

Issuance
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Date:
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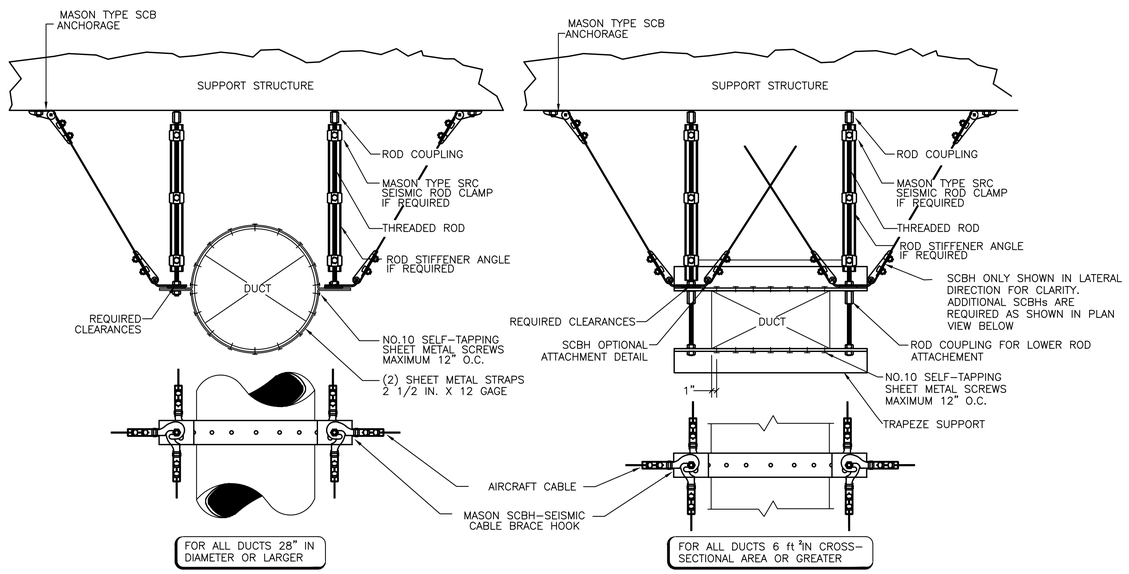
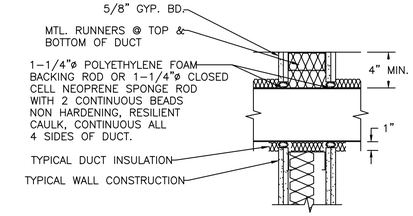
SHEET
MS4.02

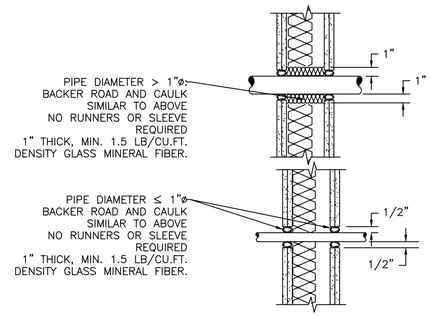


NOTE: MATERIALS BASED ON MASON INDUSTRIES. SIZE MATERIALS BASED ON APPLICATION & MANUFACTURER REQUIREMENT.

1 MS6.01 SEISMIC DUCT SUPPORT
SCALE: DETAIL



DUCT PENETRATION OF DRYWALL CONSTRUCTION
PROVIDE MINIMUM 5" SEPARATION BETWEEN ADJACENT PENETRATIONS

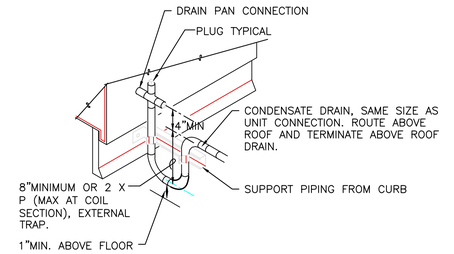


PIPE/CONDUIT PENETRATION DRYWALL CONSTRUCTION TO BE APPLIED TO WALLS WITH STC ≥ 49 SEE ARCHITECTURAL DRAWINGS FOR ACOUSTICALLY IMPORTANT WALLS (WALL TYPES). SEAL PENETRATIONS IN THOSE WALLS PER THESE DETAILS

NOTES:

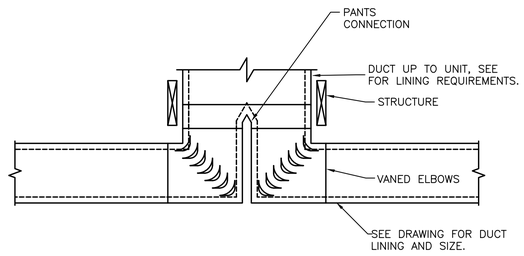
1. **PROVIDE ADDITIONAL WEATHER/AIR TIGHT CONSTRUCTION MEASURES WHERE PENETRATIONS OCCUR AT BUILDING ENVELOPE.**

2 MS6.01 ACOUSTICAL MECHANICAL PENETRATION
SCALE: DETAIL

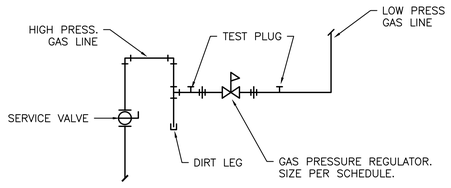


NOTE: PROVIDE TRAP FOR ALL CONDENSATE DRAINS ON UNIT.

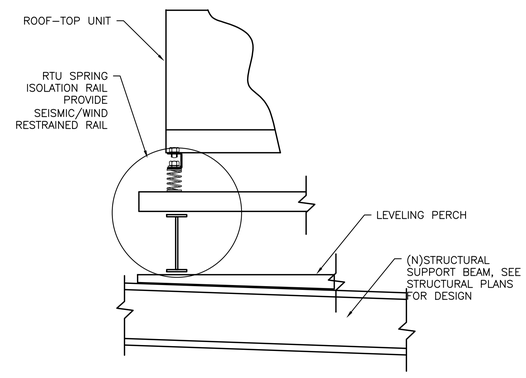
3 MS6.01 COOLING COIL CONDENSATE DRAIN PIPING
SCALE: DETAIL



4 MS6.01 DUCT DROPS
SCALE: DETAIL



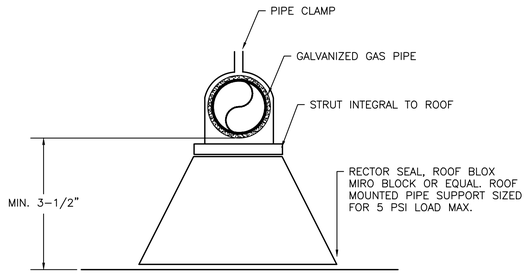
5 MS6.01 GPRV PIPING DETAIL
NO SCALE



NOTES:

1. **PROVIDE DEFERRED SUBMITTAL FOR THE ROOF-TOP UNIT'S SPRING RAIL ANCHORAGE TO THE STRUCTURAL SUPPORT.**
2. **THE ROOF-TOP UNIT SUPPORT SUBMITTAL SHALL PROVIDE FOR A SEISMIC/WIND/VIBRATION ISOLATION UNIT INSTALLATION TO MEET CODE REQUIREMENTS.**
3. **SEE SCHEDULE FOR UNIT WEIGHT.**

6 MS6.01 ROOF-TOP UNIT SUPPORT DETAIL
SCALE:DETAIL



7 MS6.01 ROOF MOUNTED GAS PIPE
SCALE: DETAIL

NOT-FOR-CONSTRUCTION

Proj No: MFIA 9796
Drawn By: MG
Chkd By: SWM
DSGN By: MG

KELLER AUDITORIUM
STAGE COOLING
222 SW Clay Portland, OR 97201
MECHANICAL DETAILS

Issuance
PRICING SET
Date:
JULY 25, 2019

MFIA INC.
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SHEET
M6.01

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Portland, OR 97232-2736
www.oregonmetro.gov

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October 15, 2015

Jason Blackwell
Portland' 5 Center for the Arts
1111 SW Broadway
Portland, OR 97205

Dear Jason:

Carleton Hart and their team for roof, Professional Roof Consultants, and for structural, KPFF, to perform were hired to perform an evaluation of existing conditions and to identify re-roof options at Keller Auditorium. These options were to include calculations allowing for either a green roof or a solar PV installation.

Summary Findings:
1. Based on roofing material core sampling, the weight of the existing roofing material was determined to be 4.53 psf.

2. Under the Oregon Structural Specialty Code, additional weight may be added to a structure so long as the addition does not exceed 5% of the existing total roof load, including allowed snow load. For the Keller roof, this would enable a maximum additional load of no more than 3.97 psf over current conditions without triggering structural upgrades. This represents a total maximum roofing material load of 8.5 psf for the Keller once the existing roofing materials are removed.

3. Options for a green roof were considered. The lightest green roof option that is known to be available is a Red Cinder Ecoroof design used by the City of Portland. This lightest green roof option is stated by the City to weigh 10.5 psf.

4. In order to conduct a full structural analysis of the Keller roof to determine if additional loading would be allowed, the original 1917 drawings of the roof structure are necessary. The only copy of these drawings that has been able to be located is on City of Portland planning department microfiche and is of very poor quality and unusable for the calculations.

5. As an alternative to basing the analysis on the original drawings, KPFF has advised a direct structural study could be undertaken. To accomplish this, KPFF would need to expose measure and document approximately 200 locations on the roof's steel trusses. However, the entire roof truss system is coated in asbestos bearing fireproofing, which would have to be removed to conduct the analysis.

[1] City of Portland Red Cinder Ecoroof Design Guide, table 03.1, page 10

6. Kelsay Environmental, an AHERA certified asbestos abatement designer, was consulted about designing a program to remove the insulation from the 200 locations required by KPFF. Kelsay states that to perform only a spot-removal in 200 locations would be nearly impossible without disturbing the rest of the asbestos that would not be removed for the study. Kelsay recommended a complete abatement throughout the entire attic. The effort is roughly estimated to cost $3 million, and would take approximately 10 weeks to complete, during which time the building would have to be shut down.

7. Four roof options ranging from 3.3 psf to 8.5 psf. were proposed by the Carlton Hart team. The 3.3 psf option was recommended as it provides the most surplus capacity for future needs.

Summary Recommendation:
At this time, it is not possible to determine if the Keller Auditorium roof can sustain any load increase greater than the OSSC allowed 5% without a significant and expensive effort. Asbestos abatement alone could run more than double the budget for the roof replacement itself, and does not include the cost of re-fireproofing the structural steel, nor the estimated loss in revenues due to the need to shutdown the facility while that work proceeds.

Even if a complete abatement were to take place and KPFF were to determine a design for structural upgrades, we have no way to know how expensive that construction work would be, nor how long it would take.

At this time, it is our recommendation that you proceed with roofing using the lightest material option proposed 3.3 psf. This will still allow about 5 psf of surplus capacity for possible future sustainability or energy projects.

Sincerely,

April Siebenaler, Manager
Construction Project Management Office

July 30, 2015

Mr. Scott Palmer
Carleton Hart Architecture
322 NW 8th Ave.
Portland, OR 97209

RE: Keller Auditorium—Reroof Options
222 SW Clay St.
Portland, OR 97201

Dear Scott:

As requested, we have reviewed the reroofing options provided in Professional Roof Consultants, Inc. report dated April 8, 2015 and the effects on the existing roof structure. The report states that the existing roofing weighs 4.53 pounds per square foot (psf) and the roofing systems being considered weigh 4.15, 3.3, 7.75, and 8.5 psf respectively.

The Oregon Structural Specialty Code (OSSC) requires that any building alteration limit the increase in forces on any structural element to 5% more than it was originally designed for. When calculating the increase, the weight of the whole roof system may be used. Therefore, the baseline weight of the existing roof is the combined weight of the roofing, concrete slab steel force, walkways, and ceiling.

When the four reroofing options are compared to this baseline, the worst case increase of 3.97 psf over the existing roof weight does not increase the total force on the roof structure by more than 5% which meets the requirements of the OSSC. The two heavier roof options effectively use up all of the 5% increase allowed by code and will not allow for any additional weight to be added in the future. The lighter two roofs will allow for around 4 psf of additional weight to be added in the future without triggering an upgrade of the structure.

Therefore, all four reroofing options are structurally acceptable.

If you have any questions or need further information, please call me.

Sincerely,

Erik Kabusreiter, S.E.
Associate

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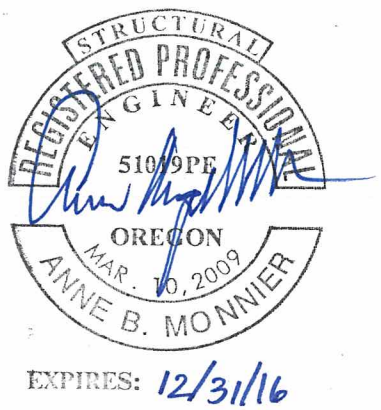

EXPIRES: 12/31/16

Site Visit Report No.: 001

Project Name:	**Keller Auditorium Reroof**	Owner:	Metro
Location:	Portland, OR	Client:	Carlton Hart Architecture
Job No.:	213137	Contractor:	Professional Roof Consultants
Site Visit Date:	March 11, 2015	Weather:	Overcast
Present at Site:	Steve McBride – Professional Roof Consultants Andrew Matthews, Jon Eisner, Scott Palmer – Carlton Hart Architecture April Siebenaler – Metro Edward Williams, Jim Bell, Jason Blackwell – Portland 5 Erik Kabusreiter, Don Stack – KPFF		

Those present walked Keller Auditorium to review portions of the existing roof structure and discuss next steps. The existing roof structure is a concrete slab spanning between steel beams. The steel beams are supported from large trusses which span across the auditorium below. There are catwalks that hang above the ceiling and below the roof which allow for access to portions of the interstitial space between the roof and ceiling. The existing steel beams are either partially or fully encased in concrete. The steel trusses which support the beams are encased in spray applied fireproofing. The following was noted:

1. The owner stated that their goal is to determine the load carrying capacity of the roof framing and if the roof can carry additional weight. We understand that the additional weight being considered is a heavier roofing system, future ecoroof, and/or a P/V array.

2. KPFF noted to the team that the building code allows two engineering methods to add weight to a building. The first is to increase forces on the structure by less than 5% from the time of original construction. This means that if the building was originally designed for roofing weighing 20 pounds per square foot, new roofing can weigh 5% more than that amount; 21 pounds per square foot. As can be seen from this example, the 5% method does not allow for substantially more weight on the roof.

3. The second method is to analyze the existing roof structure and determine if it was designed with any additional load carrying capacity. This is a fairly intensive analysis and requires a detailed understanding of the buildings, geometry, framing member sizes, connections, and material properties. Unfortunately, the structural drawings from the original construction are not available so none of this information is reliably known. The lack of original information requires an extensive investigation and testing program to determine the information listed above.

4. The catwalks above the ceiling only allow access to approximately one fourth of the roof area as shown in Figure 1 below. The remainder of the roof area is not easily accessible. Without additional access, the investigation and therefore our analysis on the roof capacity will be incomplete for the majority of the roof.

5. The existing roof trusses are covered in fireproofing and therefore the exact member sizes and geometry cannot be determined without removal fireproofing. It is understood from the owner that the fireproofing contains asbestos and will need to be removed by a contractor who specializes in this type of work. We estimate that on the portion of the roof accessible from the catwalk system will require approximately 200 locations of fireproofing removal. The fireproofing will need to be replaced after the documentation of the framing is complete.

The purpose of this visit was to evaluate the existing roof framing at a conceptual level and gain a better understanding of the owner's goals and next steps. This report is based on a visual observation of construction readily accessible to view.

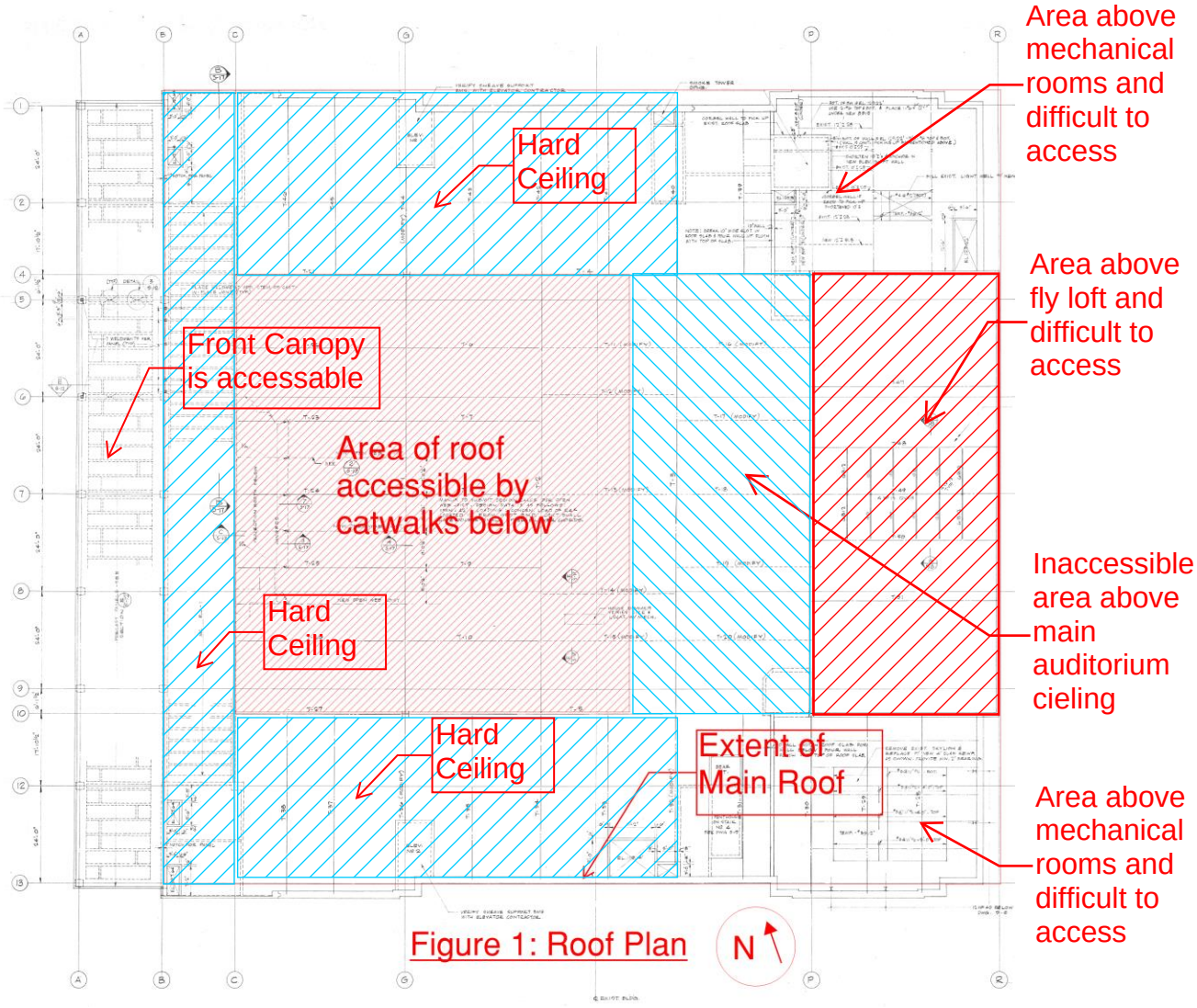

Figure 1: Roof Plan

Respectfully submitted,

Erik Kabusreiter, S.E.