CALCULATIONS AND VERIFICATIONS - ITEM [1] TYPE I HOOD:

AS-BUILT ROOF STEEL OPEN-WEB JOIST = 18KCS3
JOIST WEIGHT = 11.0 PLF (LISTED)
JOIST SPAN = 26'-4
ALLOWABLE DEFLECTION, Δ = L/360 = 0.8778" OR L/240 = 1.3167"

GROSS MOMENT OF INERTIA, I - 164 IN^4 (LISTED)

DESIGN LIVE LOAD = 20 PSF ROOF
DESIGN DEAD LOAD = 15 PSF (ESTIMATED ALL ATTACHMENTS)

JOIST SPACING = 5'-7⅞" OR 5.635417 +/- FEET
SO, TOTAL EXISTING UNIFORM LOAD ON JOISTS, w = (20+15)X5.635417 + 11.0 = 208.24 PLF

THIS REQUIRES Iw = 88. 50 IN^4 (L/360) OR 59.0 IN^4 (L/240)

IN ADDITION, THE MAXIMUM ADDED-ON POINT LOAD FROM TYPE-I-HOOD TO BE ESTIMATED, Ph = 250# AT THE CENTER OF EACH OF 2 LOADED JOISTS

IN ADDITION, ONE OF 2 JOISTS FOR SUPPORTING THE TYPE-I-HOOD ALSO TO HOLD PART OF ADJACENT MAKE-UP-AIR FAN ON THE ROOF TOP AT THE ESTIMATED LOAD Pm = 480#

PLUS HALF OF 2 EXHAUST FANS ABOVE, Pe = 185#, ASSUMED AT CENTER

SO TOTAL ADDED-ON LOAD IN CONTROL AT P = 250+480+185 = 885#

THEREFORE, THIS REQUIRES (MAXIMUM AT CENTER OF THE SPAN), Ip = 22.86 IN^4 (L/360)

THEREFORE, TOTAL CAPACITY REQUIRES = Iw + Ip = 111.36 IN^4 (UNDER THE Δ = L/360)

THIS NUMBER IS LESS THAN THE JOIST VALUE OF 164 IN^4 BASED UPON GIVEN SPAN TABLE FOR KCS SERIES. SO, THE AS-BUILT OF ROOF STEEL OPEN-WEB JOISTS WILL BE CAPABLE OF HANDLING THE ADDITIONAL TYPE-I-HOOD HANGING LOADS PLUS PARTIAL WEIGHT OF MAKE-UP-AIR FAN FROM ROOF TOP AT SHOWING LOCATIONS AND SCALES.

RECOMMEND THAT THE FIELD MAY ADJUST TO HAVE THE NEW ROOF-TOP EQUIPMENT INSTALLED OUTSIDE MIDDLE ONE-THIRD JOIST SPAN AND ALSO ADD SOME ADDITIONAL STEEL REINFORCING ANGLES TO TRANSFER THE ADDED-ON POINT LOADS AS WIDELY AS POSSIBLE THRU THE CHORDS AND/OR WEBS OF THE JOIST. REFER TO SECTIONS AND DETAILS. OKAY!

CALCULATIONS AND VERIFICATIONS - ITEM [2] MAKE-UP-AIR FAN:

AS-BUILT ROOF STEEL OPEN-WEB JOIST = 18KCS3 ON THE LEFT AND RIGHT
AS-BUILT ROOF STEEL BEAM = W14X22 AT THE CENTER
JOIST WEIGHT = 11.0 PLF (LISTED)
BEAM WEIGHT = 22 PLF
JOIST SPAN = 26'-4
ALLOWABLE DEFLECTION, Δ = L/360 = 0.8778" OR L/240 = 1.3167"

JOIST GROSS MOMENT OF INERTIA, Ij - 164 IN^4 (LISTED)
BEAM MOMENT OF INERTIA, Ib = 199 IN^4

DESIGN LIVE LOAD = 20 PSF ROOF
DESIGN DEAD LOAD = 15 PSF (ESTIMATED ALL ATTACHMENTS)

JOIST/BEAM SPACING = 5'-7⅞" OR 5.66' MAXIMUM
SO, TOTAL EXISTING UNIFORM LOAD ON JOISTS OR BEAM, w = (20+15)X5.66 + 11.0 = 208.24 PLF OR 220.1 PLF, RESPECTIVELY

THIS REQUIRES Iw = 88. 50 OR 93.55 IN^4 (L/360), RESPECTIVELY

THE RIGHT JOIST SUPPORTING MAKE-UP-AIR FUN IS OKAY FROM [1] CHECK.

THE CENTER W14X22 BEAM IS UNDER A MAXIMUM ADDED-ON POINT LOAD FROM MAKE-UP-AIR UNIT, P = 960# FROM 2 LOADING POINTS TOGETHER

THEREFORE, THIS REQUIRES (CRITICAL AT CENTER OF THE SPAN), Ip = 24.79 IN^4 (L/360), PLUS Iw = 93.55 IN^4 FROM THE ROOF, A TOTAL I = 118.34 IN^4 , STILL LESS THAN THE BEAM'S 199IN^4, OKAY!

THE LEFT JOIST SUPPORTS PART OF MUA (480#) AND PART OF RTU (245#) AND PART OF ONE CONDENSER (75#). OR A TOTAL p =800# ASSUMED TO BE ACTED AT THE CENTER OF THE JOIST (CRITICAL CONDITION)

SO, THE CAPACITY REQUIRES, Ip =20.66 IN^4 (UNDER Δ = L/360), PLUS Iw = 88.50 IN^4 FROM THE ROOF, A TOTAL I = 109.16 IN^4 , STILL LESS THAN THE BEAM'S 164IN^4, OKAY!

OVERALL, THE NEW MAKE-UP-AIR FUN, PLUS PARTIAL NEW RTU AND CONDENSER AT SHOWING LOCATIONS CAN BE SUPPORTED BY EXISTING AS-BUILT ROOF FRAMING SYSTEM PER THE 2018 IBC BUILDING CODE.

RECOMMEND THAT THE FIELD MAY ADJUST TO HAVE THE NEW ROOF-TOP EQUIPMENT INSTALLED OUTSIDE MIDDLE ONE-THIRD JOIST SPAN AND ALSO ADD SOME ADDITIONAL STEEL REINFORCING ANGLES TO TRANSFER THE ADDED-ON POINT LOADS AS WIDELY AS POSSIBLE THRU THE CHORDS AND/OR WEBS OF THE JOIST. REFER TO SECTIONS AND DETAILS.

CALCULATIONS AND VERIFICATIONS - ITEM [3] ROOT-TOP H.V.A.C. UNIT:

AS-BUILT ROOF STEEL OPEN-WEB JOIST = 18KCS3
AS-BUILT ROOF STEEL BEAM = W16X26 [4] FOR ROOF JOISTS
JOIST WEIGHT = 11.0 PLF (LISTED)
BEAM WEIGHT = 26 PLF
JOIST SPAN = 26'-4"
BEAM SPAN = 22-4" (AT THE SPACE CENTER TO SUPPORT JOISTS)
ALLOWABLE DEFLECTION, Δj = L/360 = 0.8778"; Δb = L/360 = 0.7443"

JOIST GROSS MOMENT OF INERTIA, IJ - 164 IN^4 (LISTED)
BEAM MOMENT OF INERTIA, IB = 301 IN^4

DESIGN LIVE LOAD = 20 PSF ROOF
DESIGN DEAD LOAD = 15 PSF (ESTIMATED ALL ATTACHMENTS)

JOIST SPACING = 5'-6⅞" OR 5.552' MAXIMUM
SO, TOTAL EXISTING UNIFORM LOAD ON JOIST, Wj = 205.32 PLF
AND TOTAL EXISTING UNIFORM LOAD ON GIRDER BEAM, Wb = 460.78 PLF

THIS REQUIRES Iw = 87.27 IN^4 (L/360) FOR JOIST
ALSO, Ib = 101.32 IN^4 PLF FOR GIRDER BEAM

BOTH JOISTS SUPPORTING RUT (245#) EQUALLY OUTSIDE OF 1/3 SPAN BUT USE CRITICAL LOCATION AT THE CENTER OF JOIST, REQUIRES Ip = 6.33 IN^4 (L/360), PLUS Iw = 87.27 IN^4 FROM THE ROOF, A TOTAL I = 93.59 IN^4 , STILL LESS THAN THE BEAM'S 164 IN^4 IN CRITICAL LOCATION, OKAY!

THE GIRDER BEAM SUPPORTS HALF OF NEW RTU AT 490# ACTED AT THE CENTER OF THE BEAM (CRITICAL CONDITION)

SO, THE CAPACITY REQUIRES, Ip =9.11 IN^4 (UNDER Δ = L/360), PLUS Ib= 101.32 IN^4 FROM THE ROOF, A TOTAL I = 107.43 IN^4 , STILL LESS THAN THE BEAM'S 301 IN^4, OKAY!

OVERALL, THE NEW RTU, PLUS PARTIAL NEW CONDENSERS' SMALL LOADS AT SHOWING LOCATIONS CAN BE SUPPORTED BY EXISTING AS-BUILT ROOF FRAMING JOIST-BEAM SYSTEM PER THE 2018 IBC BUILDING CODE.

RECOMMEND THAT THE FIELD MAY ADD SOME ADDITIONAL STEEL REINFORCING ANGLES TO CLOSE CUTTING EDGES OF THE METAL DECK AND TRANSFER THE ADDED-ON POINT LOADS AS WIDELY AS POSSIBLE THRU THE CHORDS AND/OR WEBS OF THE JOISTS AND BEAM. REFER TO SECTIONS AND DETAILS.

CALCULATIONS AND VERIFICATIONS - ITEM [5] HOOD EXHAUST FANS:

AS-BUILT ROOF STEEL OPEN-WEB JOIST = 18KCS3
JOIST WEIGHT = 11.0 PLF (LISTED)
JOIST SPAN = 26'-4"
ALLOWABLE DEFLECTION, ΔJ = L/360 = 0.8778"

JOIST GROSS MOMENT OF INERTIA, IJ - 164 IN^4 (LISTED)

DESIGN LIVE LOAD = 20 PSF ROOF
DESIGN DEAD LOAD = 15 PSF (ESTIMATED ALL ATTACHMENTS)

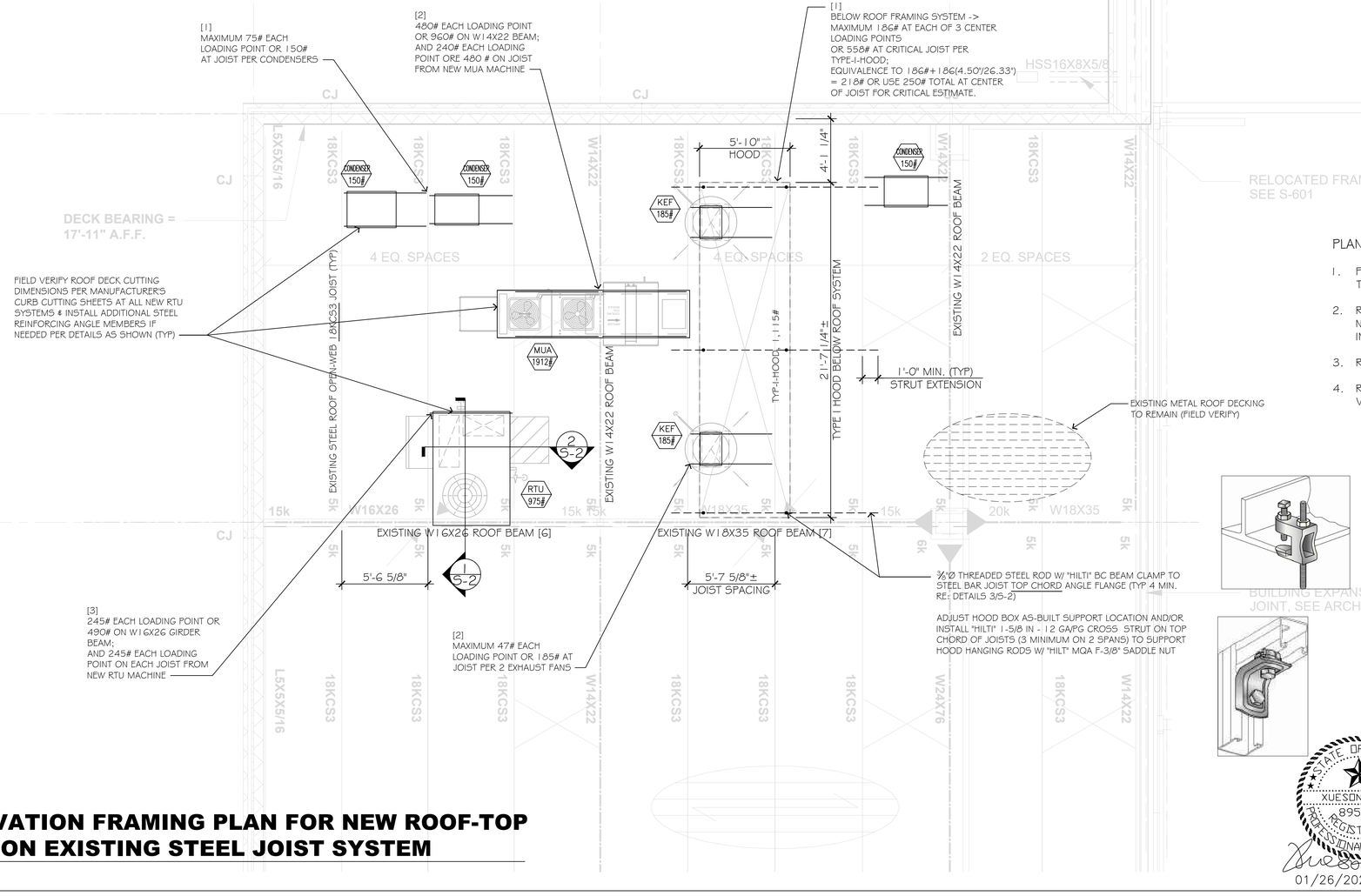
JOIST SPACING = 5'-7⅞" OR 5.66' MAXIMUM
SO, TOTAL EXISTING UNIFORM LOAD ON JOIST, WJ = 208.24 PLF

THIS REQUIRES IW = 88.50 IN^4 (L/360) FOR JOIST

BOTH JOISTS ARE OKAY PER THE [1] CHECKING TO SUPPORT PARTS OF HOOD, EXHAUST FANS, AND MAKE-UP-AIR FAN.

CALCULATIONS AND VERIFICATIONS - ITEM [6] CONDENSERS:

BY OBSERVATION, THE AS-BUILT ROOF JOIST 18KCS3 CAN SUPPORT ALL 3 SMALL CONDENSER (15# EACH) THRU THE AS-BUILT ROOF FRAMING SYSTEM.



1 ROOF RENOVATION FRAMING PLAN FOR NEW ROOF-TOP EQUIPMENT ON EXISTING STEEL JOIST SYSTEM

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

PLAN NOTES:

1. FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITION OF THE SPACE/BUILDING PRIOR TO ANY NEW CONSTRUCTION.
2. REFER TO ARCHITECTURAL PLANS, SECTIONS, DETAILS, AND NOTES/SPECIFICATIONS FOR THE PROJECT AND BUILDING INFORMATION.
3. REFER TO STRUCTURAL GENERAL NOTES FOR MATERIALS.
4. REFER TO TENANT FINISH-OUT MECHANICAL DRAWINGS TO VERIFY ALL ROOF-TOP AND KITCHEN EQUIPMENT DATA.

STATE OF TEXAS
XUESONG BAI
89538
REGISTERED PROFESSIONAL ENGINEER
01/26/2022

REVIEW/PERIMET SET 01/26/2022

B C PROJECT NO.: 2022-B008-01

B C STRUCTURAL ENGINEERS LLC
FIRM REGISTRATION# F-10942

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REVISIONS:

1	PLAN REVIEW COMMENTS	12/01/2021
2	PANDA EXPRESS REVISIONS	01/03/2022
3	ADDENDUM 1	06/06/2022

ISSUE DATE:

1	35% SUBMITTAL	02/12/2021
2	95% SUBMITTAL	04/23/2021
3	100% SUBMITTAL	01/28/2022
4	BID SET	04/25/2022

DRAWN BY:

PANDA PROJECT #:

ARCH PROJECT #:

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PANDA EXPRESS
NAS JAX FOOD COURT
SPACE 101
NAS JACKSONVILLE, FL

FRAMING RENOVATION PLAN

S-1

BID SET (2022/04/25)