Thornton Tomasetti

Memorandum

TO	Kathleen Harmon	FROM	Chase Anderson, P.E.
COMPANY	Royal St Andrew Association, Inc.	DATE	March 4, 2022
RE	Limited Structural Analysis – Enclosed Balconies	PROJECT NO	K21168.00
CC		PROJECT NAME	RSA – Balcony Analysis

Thornton Tomasetti Inc. (TT) was engaged by the Royal St. Andrew Association, Inc. (client) to perform a limited structural engineering analysis of the existing enclosed balconies on the condominium building located at 555 S. Gulfstream Avenue in Sarasota, Florida (the subject property). The subject property has balconies for each residential unit located on the south-facing elevation. These were originally designed as open-air balconies with sloped, cantilever slabs. However, after the original construction, the balconies were enclosed with window walls, and the balcony surfaces were leveled with topping slabs. TT was requested to perform a desktop analysis of the existing balcony structures to determine if they are sufficient with the additional superimposed loadings.

TT utilized the following information for our analysis:

- Original structural drawings prepared by William A. Snell, P.E. Consulting Engineers, dated January 1, 1968 (Refer to Appendix B).
- Limited field measurements taken during our site visit on September 20, 2021.

TT analyzed the reinforced concrete structural systems using the following software: SAFE 2016 Version 16.0.2. The following standards were referenced to perform our analysis:

- 2020 Florida Building Code, Existing Building, 7th Edition
- ASCE 7-16
- ACI 318-14

It was determined from our limited structural analysis that the existing reinforced concrete balcony structures are sufficient to safely support the superimposed dead loads created by the topping slabs and enclosing the balcony areas. It is not necessary to perform any repairs and/or modifications to the existing cantilevered balcony slabs. Refer to Appendix A – Structural Analysis for a summary of our analysis assumptions and our calculations.

Limitations and Study Methodology

TT did not perform any destructive examination and/or testing to verify in-situ material conditions, strengths, and densities. It was assumed that the information provide in the existing drawings matches field conditions, and that the information is accurate and thorough. TT did not perform a structural analysis of the entire building, as it would not be feasible given the scale of

the building and the effort necessary to determine the balcony structural capacity. Rather, TT's methodology for this study was to limit the analysis to the two typical balcony geometries that exist in the building (identified in our calculations as Balcony Case 1 and Balcony Case 2). It was assumed that the additional superimposed balcony dead loads are inconsequential to the overall building structural system.

Additional Limitations and Qualifications

TT performed its services in accordance with the standards of professional skill and care ordinarily exercised by other structural engineering firms performing the same services, in the same locale, acting under similar circumstances and conditions ("Standard of Care"). The observations made by TT as referenced in this Letter do not, in any way, replace, negate, or reduce the Client's/Owner's responsibilities to perform standard maintenance for the Building of this age, location, size, and usage, or any specific maintenance protocol previously established for this specific Building.

This Letter shall not be construed to warrant or guarantee the structural stability of the Building and/or any of its components under any circumstances. TT shall not be responsible for latent or hidden defects that may exist, nor shall it be inferred that all defects have been either observed or recorded.

TT's observations and analysis include no specific knowledge of concealed construction or subsurface conditions at the Building. Any comments pertaining to concealed construction or subsurface conditions made by TT are professional opinion of TT based on relevant experience, judgment and current standards of practice, however the actual concealed conditions at the subject property may vary from TT's expectations.

It is expressly understood that TT relied on the accuracy and completeness of all information and documentation provided to it in connection with our scope of services hereunder and no verification services were included in TT's scope of services hereunder.

Please do not hesitate to contact with any comments, questions, or additional information pertaining to this report.

Very truly yours,

THORNTON TOMASETTI, INC.

A. Chase Anderson, P.E.
Associate

ANDREW CHASE ANDERSON
LICENSE
No. 81921
STATE OF FLORIDA
PROFESSIONAL ENGINEER

Andrew C Anderson
Digitally signed by Andrew C Anderson
Date: 2022.03.04 16:35:23 -05'00'

ANALYSIS ASSUMPTIONS

LOADING:

Live Load:

$LL := 40\ psf$

Note: Typical balcony live loading is 100 psf. However, when these were enclosed, they no longer serve as balconies. Appropriate live loading would be as an enclosed residential space per ASCE 7.

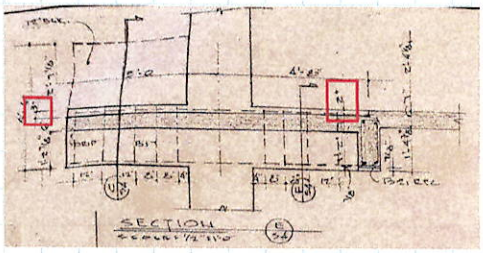
Super Imposed Dead Load from Topping Slab on Enclosed Balconies:

Assumed: The original constructed balcony surface sloped away from 2" to 3" recess at edge. Average topping slab thickness = (2" + 3"/2 - 1" (flooring thickness) = 1.5"
Assume full weight concrete topping slab (conservative)

$SDL_{topoingSlab} := 1.5\ in \cdot 150\ pcf = 18.75\ psf$

Assume ceramic or quarry tile flooring (3/4 in) on 1/2 in mortar bed (conservative)

$SDL_{finishes} := 16\ psf$



Total SDL for plan area

$SDL := SDL_{topoingSlab} + SDL_{finishes} = 34.75\ psf$

SDL for added enclosures: Windows, glass, frame and sash at the perimeters.

$SDL_{windows} := 12\ psf \cdot (8\ ft + 7\ in) = 103\ plf$

MATERIALS STRENGTH:

$f'_c := 3000\ psi$ Specified concrete compressive strength
$f_y := 40000\ psi$ Minimum yield steel stress

Material properties provided in original structural drawings.

LOAD COMBINATIONS:

1.1DL+0.5LL
1.1DL+0.75LL

Based on ACI562-19 Section 5.5.2

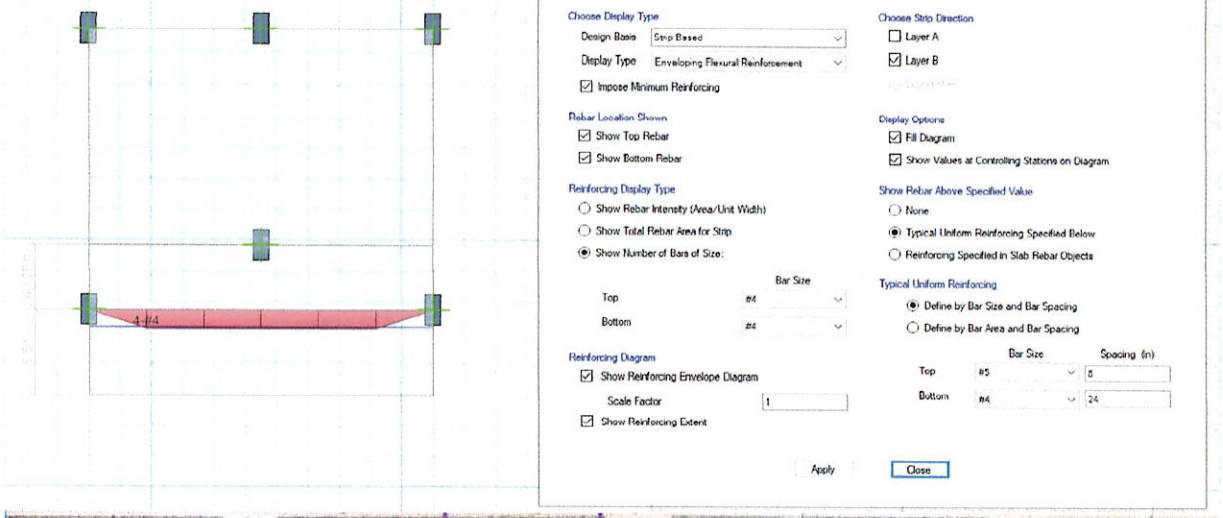
MAXIMUM STRENGTH REDUCTION FACTORS FOR ASSESMENT:

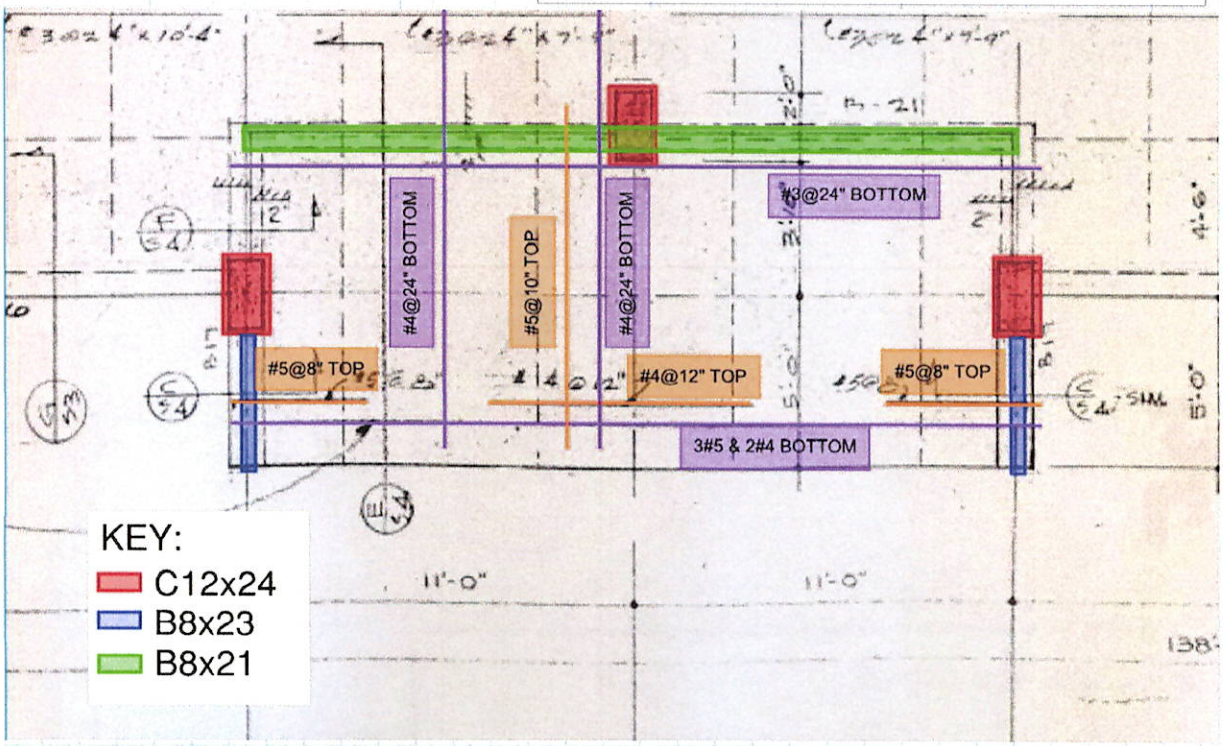
$\phi_{Flexure} := 1.0$

$\phi_{shear} := 0.80$

Based on ACI562-19 Section 5.4.1 Table 5.4.1

V003 - 03/03/2022 Balcony Case 1 **East-West**





East West

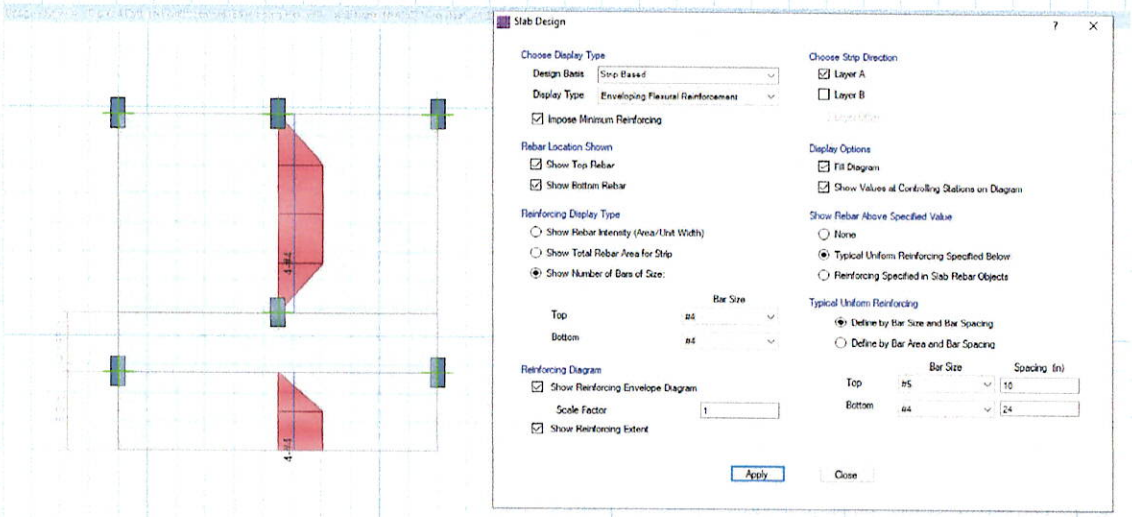
Top reinforcement
#5@8"
Top additional reinforcement
#4@12"

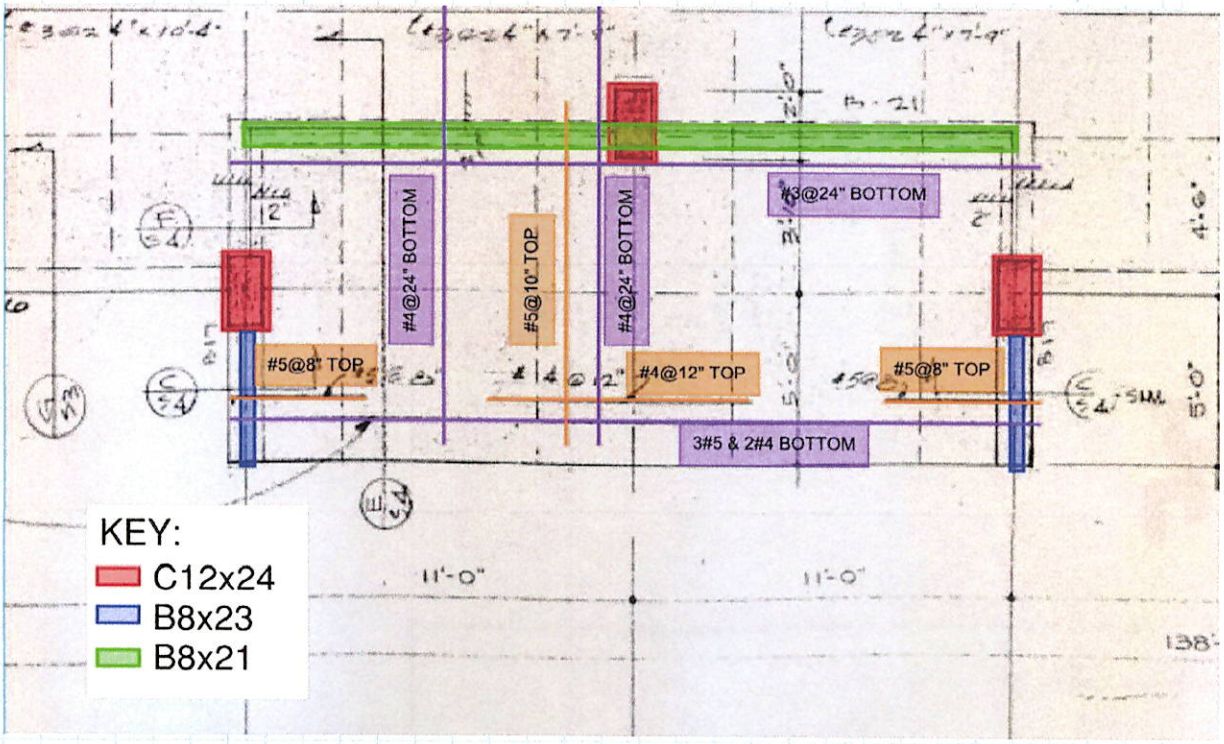
Model required additional rebar is: None
OK!

Bottom reinforcement
Base mesh #4@24"
Bottom additional reinforcement
#3@24" (column strip reinf.)
3#5, and 2#4

Model required additional rebar is: 4#4
Provided in original design, OK!

Balcony Case 1 **North-South**





North South

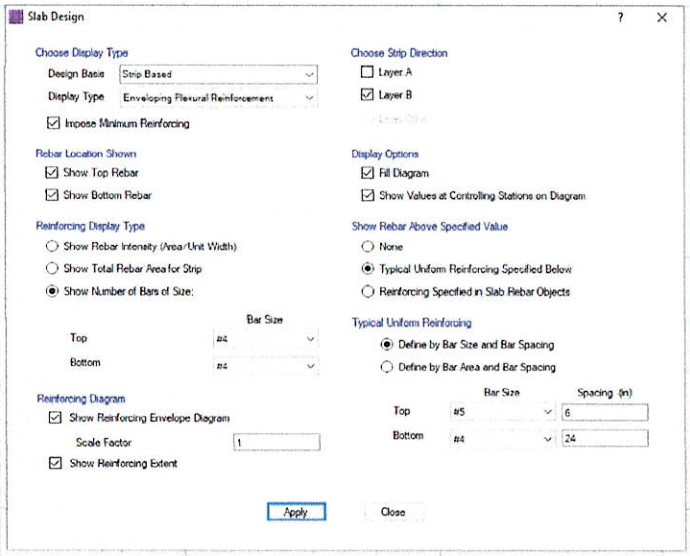
Top reinforcement
#5@10"

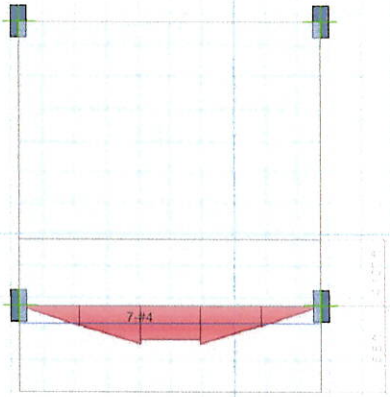
Model required additional rebar is: None
OK!

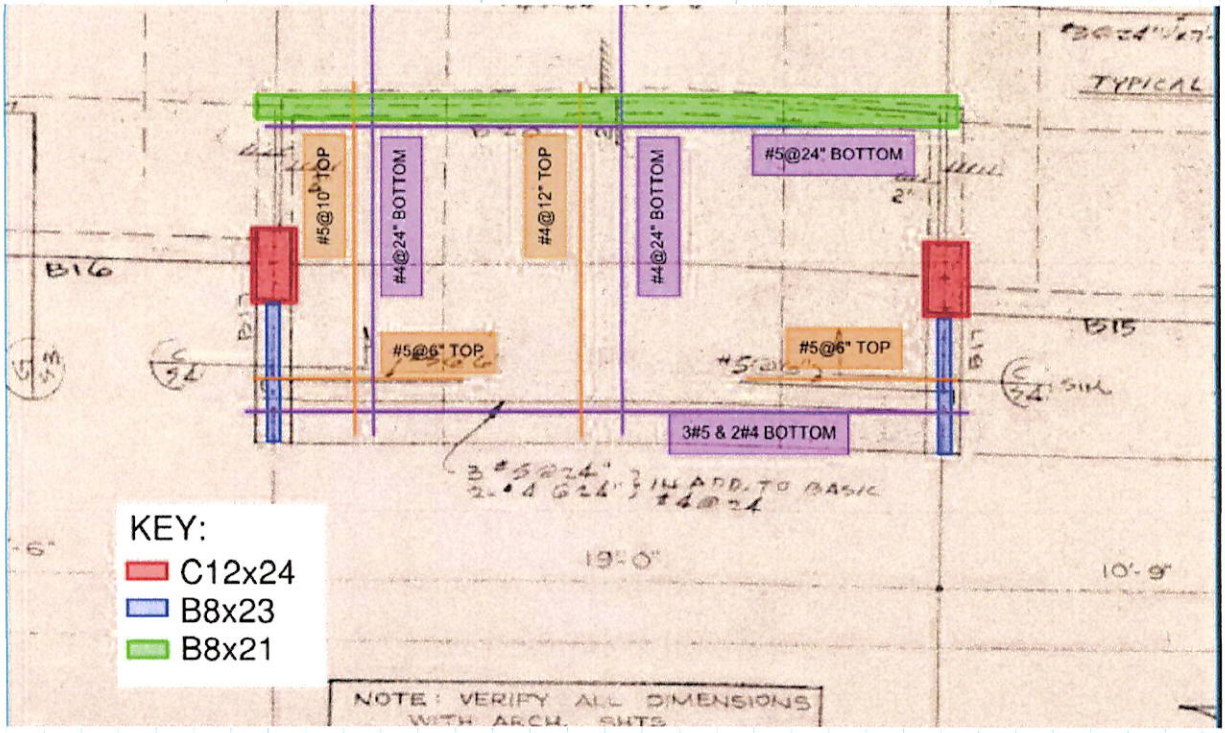
Bottom Base mesh #4@24"
Additional Bottom bars #5@24"

Model required additional rebar is: 4#4
Provided in original design, OK!

Balcony Case 2 **East-West**







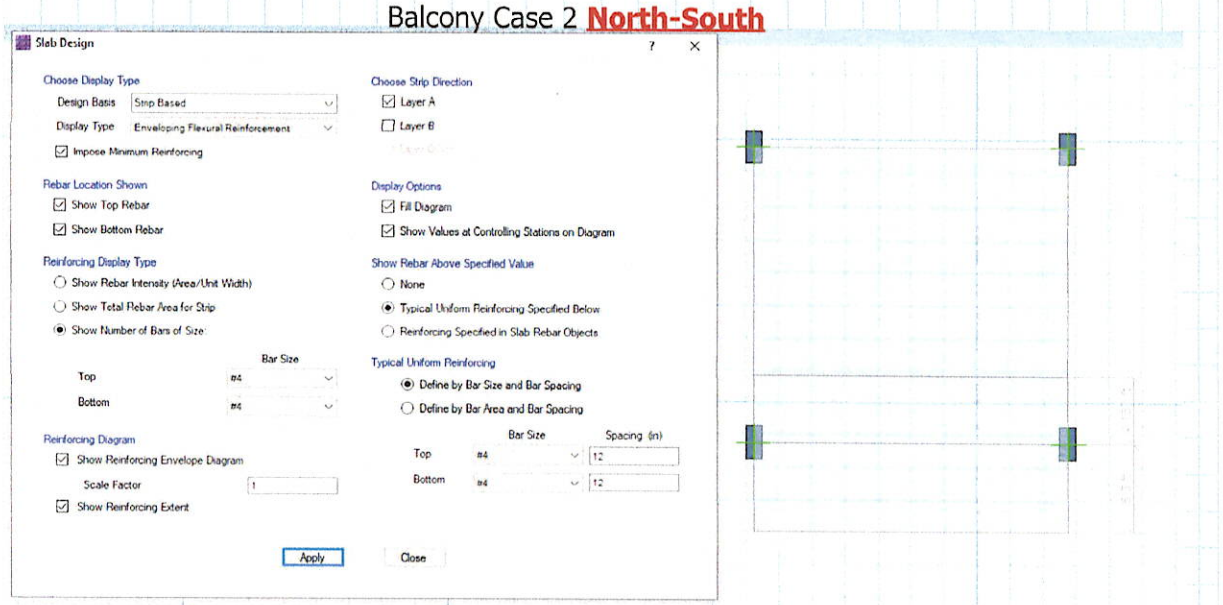
East West
Top reinforcement
#5@6"

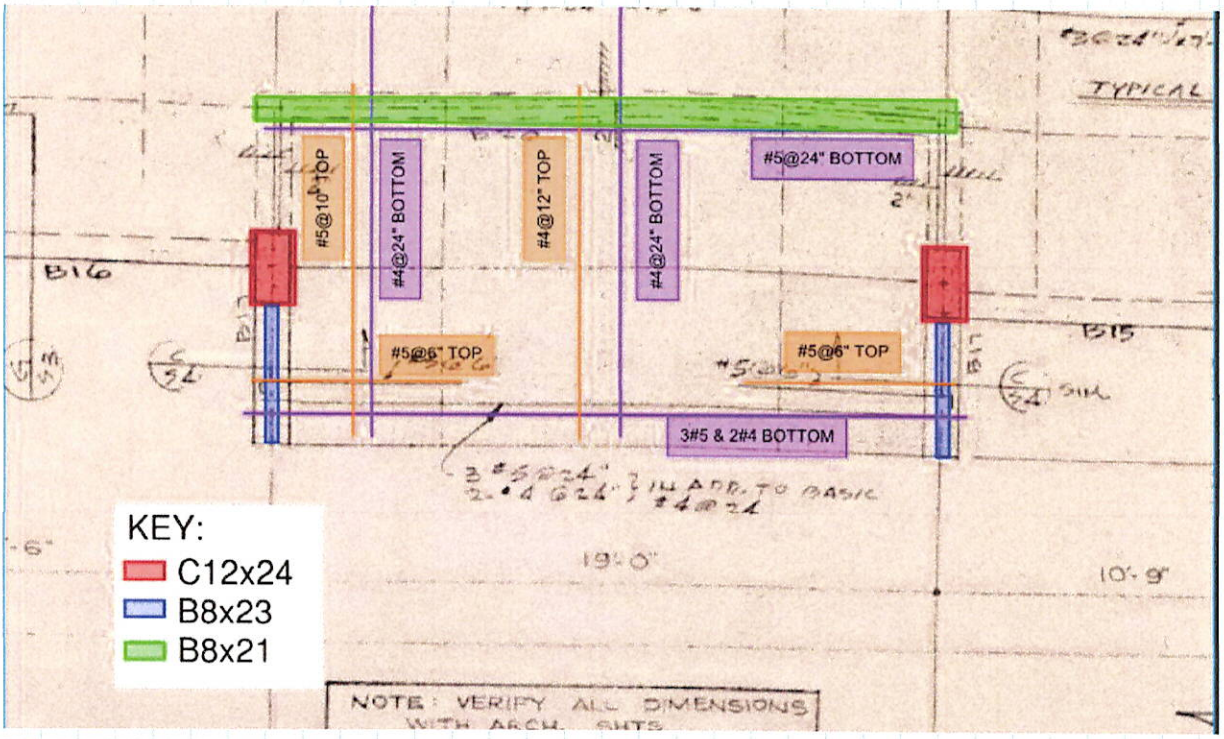
Model required additional rebar is: None
OK!

Base mesh #4@24"
Bottom additional reinforcement
#5@24"
3#5@24"
2#4@24"

Model required additional rebar is: 7#4
Provided in original design, OK!

Balcony Case 2 **North-South**





North South

Top reinforcement
#4@12" (middle strip reinf.)
#5@10" (column strip reinf.)

Model required additional rebar is: None
OK!

Base mesh #4@24"
Bottom additional reinforcement is #4@24"

Model required additional rebar is: None
OK!