

April 15, 2009

Cydney McGlothlin  
UF Facilities Planning and Construction  
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REF: Structural Analysis for New Building at the Sun Terrace Roof Deck

Dear Cydney:

BASE Consultants, P.A. was hired to evaluate the structural integrity of the Communicore Roof Plaza for a proposed new 4,150sqft building. The new building will be a new stand alone building near the existing Sun Terrace Building. The anticipated tenants of the building will be a book store and Starbucks. The existing structural drawings were used for the analysis of the existing structure. A summary of the framing capacity and recommendations are detailed in this report.

#### Existing Conditions

The existing roof plaza is comprised of structural steel non-composite beams and a concrete slab on metal deck. The existing roofing system is comprised of multiple concrete layers. Previous reports on the layered roofing system were provided to BASE Consultants by UF. Core samples were taken and analyzed in a November 3, 1975 report. Based on this report, the following concrete thicknesses and weights were used in our analysis:

- 12psf wearing surface
- 4" average thickness of normal weight concrete = 48psf
- 5" maximum thickness of vermiculite concrete (80pcf) = 33psf
- 3" normal weight concrete on 3" metal deck = 57psf

The total average weight of the structure used in our analysis is 150psf. The middle layers of vermiculite and concrete vary in thickness to create the roof slopes. The 1975 report listed the average weight as 135psf. We believe the 150psf value is appropriate to account for high points in the roof slope. The steel strength of the beams used in analysis is 36ksi.

#### Analysis of Floor Framing

The existing beams of the roof plaza were analyzed to determine their capacity. The actual layout of the new building is yet to be determined. The general area analyzed to receive the new building was between existing gridlines 6.5 to 12 and N to J. It was given by the University to anticipate a load of 240psf for the book store. Due to the building being a mixed use, the structure was analyzed for a live load of both 240psf and 100psf. A 6psf allowance for ceiling/mechanical was used in the analysis. The beams were checked for an interior condition as well as to receive exterior cladding load from the new building. A 15psf glass cladding weight was used.

The follow is a summary of the analysis for a live load of 100psf:

- W21x44 (25'-8" span) Interior - OK
- W21x44 (25'-8" span) Perimeter Wall - OK

- W21x62 (32'-0" span) Interior - OK
- W21x62 (32'-0" span) Perimeter Wall - OK Within 3%
- W21x44 (29'-0" span) Interior - OK Within 4.5%
- W21x44 (29'-0" span) Perimeter Wall - Over Capacity
- W14x22 (17'-2" span) Interior - OK
- W14x22 (17'-2" span) Perimeter Wall - Over Capacity
- W21x62 (Girder @ Grid 10)- OK
- W21x62 (Girder @ Grid 8.5)- 6.8% Over Capacity

It is industry standard to allow a 5% overstress in design. Most of the beams are ok for the 100psf live load but most have no additional capacity left. It is anticipated that the new roof structure will be supported by extending the existing columns up. Due to the configuration of the new building it is possible that there will be areas in which a post column will be required. A few beams were analyzed for the load of a post column. This additional post load exceeded the capacity of the beams.

The beams were checked for the 240psf live load. In all cases the load greatly exceeded the capacity of the beams. The existing column design was checked for the 240psf load. The live load used in the calculation for the basement level and the ground floor was 60psf. This load accounts for a dry lab occupation. It was confirmed by the University that there are no wet labs below the area of the new building. The columns have adequate capacity to support the new imposed loads. Live load reduction was not used in the column calculation.

The one structural component that could not be verified is the beam connections. The existing beam connections are currently covered up by fireproofing and are not detailed on the existing drawings. It is our recommendation that the connections be spot checked. One connection for each beam size should be checked.

#### Guidelines for New Framing

The existing structural floor framing will need to be strengthened to support the area the book store will occupy. Possible solutions for retrofitting the floor would be to remove some of the existing concrete topping and build it back up with a lighter weight system. This would reduce some of the dead load on the system. The steel beams can also be supplemented with additional steel to increase their section modulus and capacity. The beam connections are also anticipated to need supplemental support and retrofit to support the load of the book store. Any new steel would need to be fireproofed to match the existing.

The new exterior wall may require a low steel beam supported by the columns in a few areas with the lower live load. Transferring the weight of the wall directly to the columns could help reduce retrofit for the beams listed above as over capacity with the perimeter wall.

Sincerely,

BASE Consultants, P.A.



Wendy Bonnett, P.E.  
Vice President