

Dean & Associates, Inc.

ENGINEERING & CONSTRUCTION SERVICES

15 Forge Valley Drive, Unit 1
Mills River, NC 28759

March 16, 2015

To: David McNeill
Transylvania County, North Carolina
101 South Broad Street
Brevard, NC 28712

Re: Structural investigation of Transylvania County Courthouse building, Dean & Associates, Inc. Project No. 15036.

Dear David:

Dean & Associates, Inc. (Dean) has been retained to inspect specific structural systems inside the Transylvania County Courthouse building and to issue a report including recommendations. Specifically, our inspection was limited to the Civil Division Offices room and the Jury room above.

BACKGROUND INFORMATION

The area we inspected in the Courthouse building was part of an addition to the original Courthouse. The original Courthouse was constructed around 1890 and the addition was constructed around 1920. Most of the original walls are multiple wythe brick assemblies with reinforced concrete floors. Recently, a piece of concrete fell from the bottom of a floor/ceiling assembly above the Civil Division Offices room. The concrete fell approximately two (2) feet to a suspended ceiling tile. As a result of the fallen concrete, the reinforcing steel in the concrete slab is now exposed. The concrete slab supports the Jury room and the Judges Chambers room above. At the time the piece of concrete fell, the jury room above was occupied by approximately 15 people.

OBSERVATIONS AND FINDINGS

Our inspection revealed the following:

1. The Civil Division Offices room measures approximately 18' x 32'.
2. The floor/ceiling assembly above the Civil Division Offices room consists of two steel beams that span approximately 18'. The beams are spaced approximately 11' apart.
3. The steel beams have section properties similar to an S10X25.4.
4. The concrete slab is approximately 4" thick. The slab is reinforced using No. 6 bars spaced at 9" on center in the stress direction. The slab is reinforced using No. 6 bars spaced at 12" on center in the temperature/shrinkage direction. The exposed reinforcement is located in the middle 1/3 of the slab span near the bottom of the slab with approximately 1/2" of concrete cover.

Phone (828) 890-4606 Fax (828) 890-4610
Email – john@deangroupcarolina.com

5. A layer of plaster approximately ½" thick is attached to the underside of the concrete slab.
6. A Terrazzo floor system bears directly on the slab. The Terrazzo system consists of approximately 1½" of sandy concrete with approximately 3" of the Terrazzo finished floor.

ANALYSIS AND RESULTS

We analyzed the floor/ceiling assembly based on our findings. We made the following assumptions in our analysis:

1. Concrete density – 145 pounds per cubic foot (PCF).
2. Sandy concrete density – 110 PCF.
3. Concrete compressive strength – 2000 pounds per square inch (PSI).
4. Concrete modulus of elasticity – 2549 kips per square inch (KSI)
5. Terrazzo density – 145 PCF.
6. Plaster density – 125 PCF.
7. Steel beam yield strength F_y – 30,000 (PSI).
8. Steel beam moment of inertia – 123 in⁴.
9. Floor live load – 50 pounds per square foot (PSF).

Using generally accepted engineering practice, we determined that the bending stress on the steel beams is approximately 80% overstressed. Also the concrete slab has not been designed and constructed to support the applied dead and live loads.

Both the steel beam and the concrete slab are vulnerable and could fail resulting in serious injury to or death of the occupants of the Civil Division Offices room, the Jury room and the Judges Chambers room. It is our opinion that the steel beams are the most vulnerable. The reason that the steel beams have not failed prior to this time is most likely due to two reasons. One, F_y is a factor of safety in bending established by the American Institute of Steel Construction (AISC) and two, the Jury room floor and/or the Judges Chambers room floor have probably never been exposed to a live load of 50 PSF.

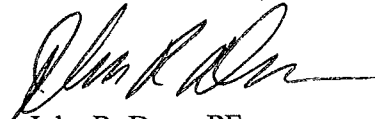
RECOMMENDATIONS

To protect the employees of Transylvania County and the public, we recommend the following:

1. Discontinue the use of the Jury room, the Judges Chambers room and the Civil Division Offices room immediately.
2. Inspect and analyze the remainder of the court house building for structural integrity and life safety of the building occupants.
3. Evaluate the feasibility of repairing/reinforcing the court house building compared with total replacement of the building.
4. If repair/reinforcement of the building is opted for, design and install structural reinforcements to the court house building to ensure structural adequacy.

We appreciate this opportunity to be of service to you and look forward to continue working with you on this project.

Very truly yours,
Dean & Associates, Inc.


John R. Dean, PE

