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Boyds Bear Country

Pigeon Forge, TN

Technical Report 2
Analysis and Comparison of Alternative Floor Systems

Executive Summary:

Boyds Bear Country, located in Pigeon Forge, Tennessee, is designed as a multi-functional space and tourist attraction for Boyds Collections Ltd. The 112,620 square foot building houses three floors of retail space with multiple cashier and information desks, warehouse storage, a loading dock, a full sized restaurant, food court, ice cream parlor, special events areas, and offices.

This report investigates alternative floor systems for the building. A brief summary of each system is as follows:

- **Existing composite slab** – 5½“ composite slab on a typical steel frame. W16x31 joists at 10’ OC frame to W24x62 girders which frame to HSS12x12x5/8” columns.
- **Open-web steel joists** – 5½“ composite slab on a similar steel frame. 22K8 joists at 3’ OC frame to same girders and columns.
- **Two-way concrete slab** – 11” thick slab with 7” deep, 10’ wide drop panel around minimum 15”x15’ cast-in-place column.
- **Pre-cast concrete plank** – 12”x4’ SpanDeck J952 framing to either a steel frame of W30x99 girders and W14x120 columns, or a pre-cast system of 24IT36 268-S girders and a minimum 18”x18” column.
- **Pre-cast double-tees** – 15’ wide, 15DT34, double-tees span 2 typical bays to frame into a 12LB44 168-S pre-cast girder and a minimum of a 18”x18” column per tee.
- **Wood framing** – 5-ply 48” span sheathing covers 7”x20” commercial Parallam joists spaced at 4’ OC which frame to 7”x42” commercial Parallam girders. These are supported by HSS12x12x½“ steel tubes.

All systems are based on a 30’x30’ typical bay, with the exception of the pre-cast double-tees, which spans a 30’x60’ bay. Floor to floor height of the building is 17’-4”, of which 7’ are used within to floor / ceiling assembly, as a result, the system depth was not a consideration in this report.

The original loadings were determined using ASCE 7-95 and ASCE 7-98 and original member selections were chosen using Allowable Stress Design. For the purposes of comparative design, all systems were analyzed with the same superimposed loading and in Allowable Stress Design where possible. In all cases, the requirements as specified by the manufacturer or specific material design guide were followed as applicable.

Comparisons are made at the end of this report, considering factors such as system weight, lateral system changes, and cost. Based on these factors, it can be determined that the pre-cast systems and the wooden framing should all be candidates for further study in application to Boyds Bear Country as a whole.