Final Recommendation

The perimeter diagrid structural system of the University of Cincinnati Athletic Center was redesigned using three distinct approaches; changing its material, modifying its geometry, and removing it altogether. Changing the material did not produce any additional benefits over the original steel wide flange system. Modifying the geometry made the system more structurally efficient, but other factors decreased its effectiveness. However, removing the diagrid and replacing it with a perimeter truss and braced frame system led to significant advantages, both structurally and architecturally.

The proposed perimeter truss satisfies the three main issues presented in the problem statement.

1) Structurally, it is more efficient than the diagrid, reducing steel weight and material costs.
2) Its connections are fewer and less complex than the diagrid, reducing labor costs and erection time.
3) It opens up the façade to support a curtain wall and glazing system, creating more desirable views of the surrounding landscape.

Because these three issues were fully resolved and because daylighting and construction management studies worked out additional details of façade design and erection, the perimeter truss and braced frame system performs as well or better than the diagrid system for most considerations. Not only does it satisfy the design parameters of the Athletic Center, it also an innovative structural solution which makes a unique architectural statement. The perimeter truss and braced frame system is recommended as a sound engineering alternative to the original perimeter diagrid lateral design.