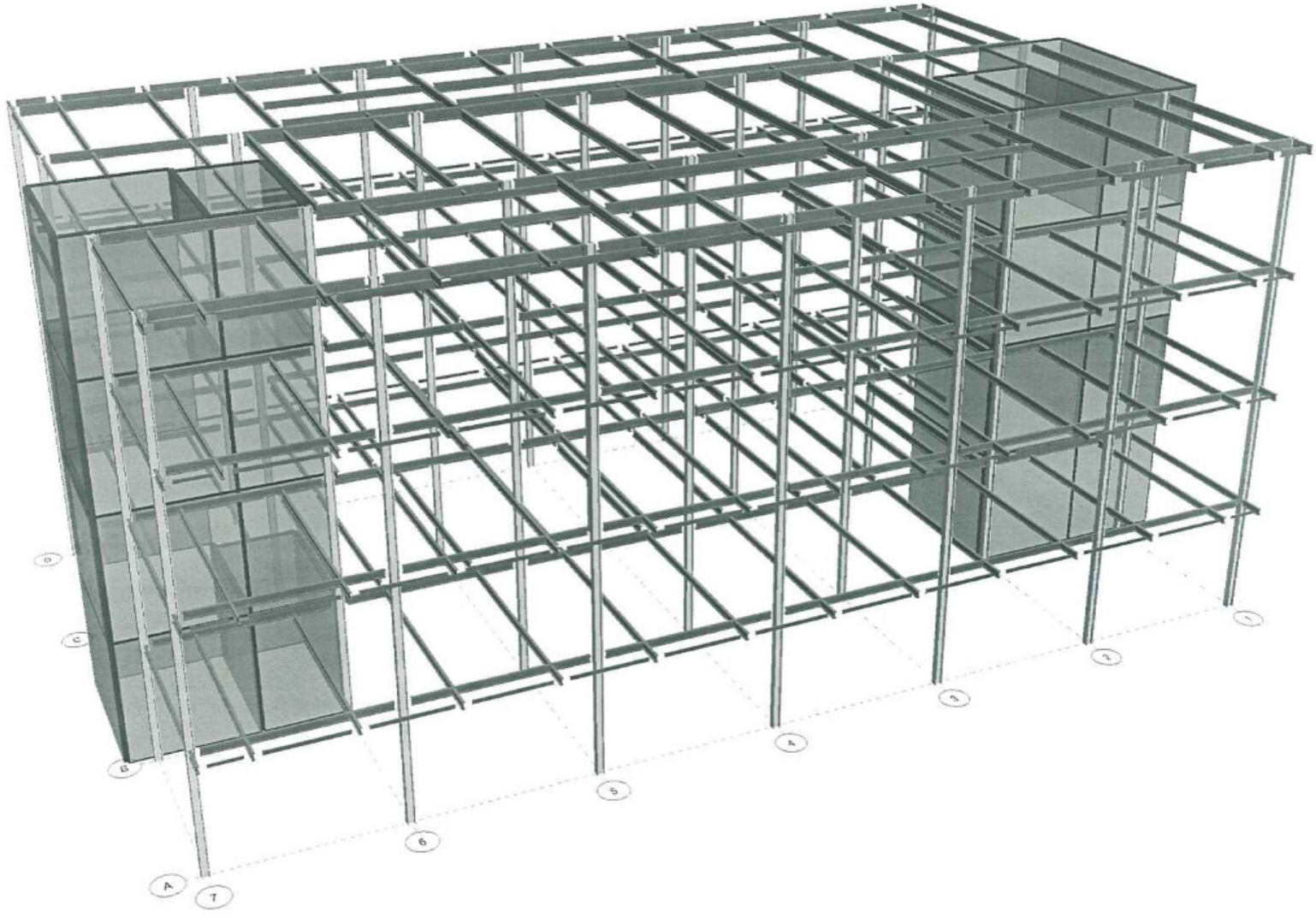


STRUCTURAL ANALYSIS

ROOF FRAME

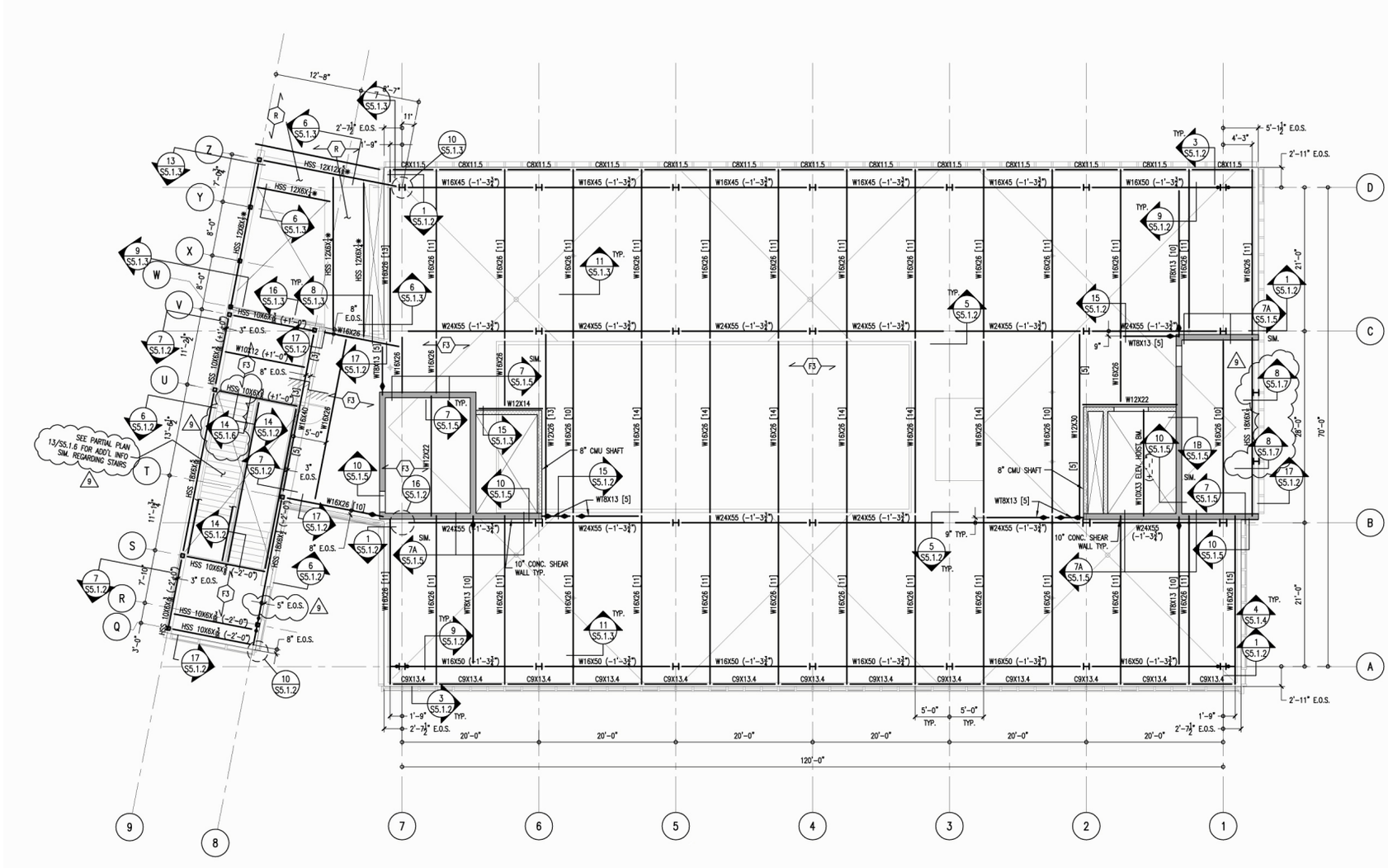
Existing Structure

The existing structure consists of composite beams. They are not typical for 4-story buildings but an assumption of composite action is being used on the roof because of unpredictable future rooftop units. Along all of the bays, the steel is erected using a hung span type of construction. This type of design is more inexpensive than normal framing design. At the perimeter of the building, the ends of the hung spans are cantilevered beams that are braced at the ends with channels. These channels support a very small portion of the roof, but I assume that they most likely brace the curtain wall at the perimeter. Also, there is a large rooftop unit at the center bay of the building.

Redesigned Structure

Almost all of the existing steel is being altered due to the new clerestory to project much more natural light into the fourth floor. There is a big change in the type of deck on the roof that is redesigned. There is the removal of the composite slab on the roof because it is no longer needed. The opening of the new clerestory eliminates future space to be heavily loaded upon. From this we can use Epicore 3.5 x 18 gage decking. This decking has the ability to span 10' with a loading of 15 psf dead load and 30 psf live load. Because of the size opening of the new clerestory, the hung span design has been removed. For the existing roof top unit, a composite slab is still used in that area only. Taking most of the concrete away from the roof will reduce the mass dead load of the structure and also costs. Although the hung span was removed, a cantilevered system is still used to reduce the moment of the roof loading and therefore, "cutting" down costs on beam sizes. An overall change that was considered in design was snow drift. With the new proposed clerestory, the perimeter can drift snow up to 62 psf against the glazing/construction. Another concern was that there can be sliding snow between the high rooftop unit and the sloped side of the clerestory. This area was designed for 51 psf. All other areas that were not mentioned were designed for 30 psf which is considered as the roof live load. The 30 psf approximates a load of snow being 3 feet tall.

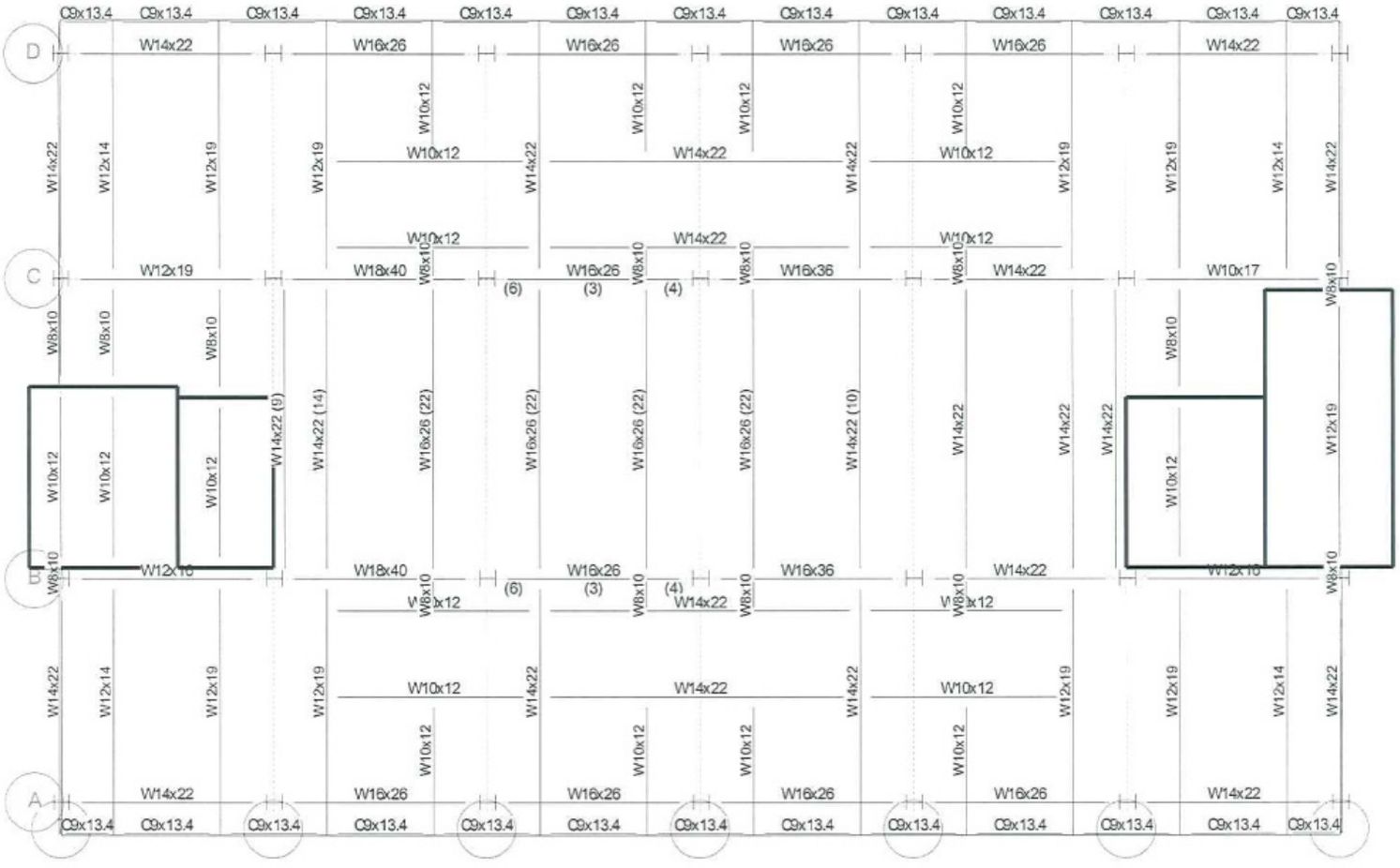
REFER TO APPENDIX E FOR COMPLETE COMPUTER ANALYSIS USING RAM.



EXISTING FRAME

■ STRUCTURAL ANALYSIS

ROOF FRAME



REDESIGNED FRAME