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*Figure 2-30**North face of WTC 2 opposite the zone of impact on the south face, behind WTC 1.*

approximately uniformly loaded with an average utilization ratio (ratio of actual applied stress to ultimate stress) of under 20 percent. This low utilization ratio is due in part to the unusually close spacing of the columns in this building, which resulted in a very small tributary area for each column. It reflects the fact that wind and deflection considerations were dominant factors in the design. Core columns were more heavily loaded with average calculated utilization ratios of 60 percent, which would be anticipated for these columns, which were designed to resist only gravity loads.

A second analysis was conducted to estimate the demands on columns immediately following aircraft impact and before fire effects occurred. Exterior columns were removed from the model to match the damage pattern illustrated in Figure 2-27. Although some core columns were probably damaged by the aircraft impact, the exact extent of this damage is not known and therefore was not considered in the model. As a result, this analysis is thought to underestimate the true stress state in the columns immediately after impact. The analysis indicates that most of the loads initially carried by the damaged exterior columns were transferred by Vierendeel truss action to the remaining exterior columns immediately adjacent to the impact area. If the floors at this level are assumed to remain intact and capable of providing lateral support to the columns, this raised the utilization ratio for the most heavily loaded column immediately adjacent to the damage area to approximately a value of 1.0. At a value of 1.0, columns would lose stiffness and shift load to adjacent columns. Based on this analysis, it appears that the structure had significant remaining margin