Recent studies of tornado-induced wind loading on low-rise buildings have employed large tornado simulators. Some of the results have shown some similarities between wind load characteristics from tornadoes and conventional, straight-line boundary layer winds such as those observed in hurricanes. Because larger tornado simulators are expensive to design and construct, it would be helpful to know whether or not they are necessary to study tornado wind loads. Can you learn all you need to know for tornado design in a regular wind tunnel? This study investigated the role of various phenomena that are unique to tornadoes: the static pressure drop in the core, the transient nature of the wind during passage of a tornado vortex, the duration of the wind loading, and the vertical profile of the wind velocities. This presentation will show that much but definitely not all of the differences in wind loading between straight-line and tornado winds can be explained by the static pressure of the vortex. Profiles of vertical velocity and static pressure suggest that strong unsteady vertical gusting and strong static pressure fluctuations likely play a role in creating the very large peak pressures observed during slow-moving tornado events. The pressure signals resulting from tornado events will also be shown to be quite different in character from conventional straight-line data and to be worthy of more investigation.

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