



Case Study

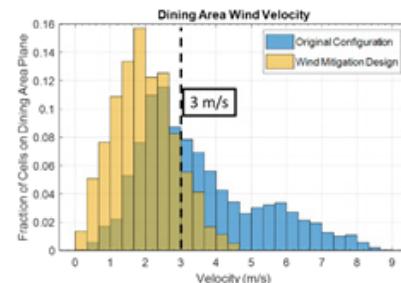
Hospital Campus Wind Mitigation CFD Analysis Study

OVERVIEW

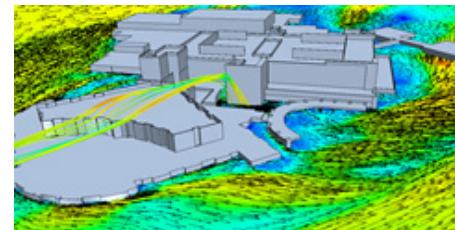
ATA used computational fluid dynamics (CFD) simulations to analyze the high-velocity winds and several mitigating structure designs at the Yuma Regional Medical Center (YRMC), with the goal of reducing airflow velocities experienced in an outdoor dining area. The analysis showed that high wind velocities in the dining area resulted from a combination of flow impingement on the elevator shaft above and a driving vortex tube that was generated off the northeastern corner of the elevator shaft. ATA collaborated with the architecture firm ARCHSOL to reach a design consisting of a ledge and an arrangement of alternating sails, which was proven to sufficiently reduce dining area winds below the 3 m/s threshold deemed acceptable (based on literature research) for the comfort of YRMC staff while also providing an aesthetically pleasing sun-shade solution.

TASKS PERFORMED & KEY OUTCOMES

- Created a CFD model that accurately represents the winds experienced in the Yuma locale, with an adequate description of the atmospheric boundary layer as it interacts with the YRMC.
- Generated an appropriately resolved CFD mesh to resolve important flow features in high-fidelity CFD simulations.
- Performed CFD analyses to determine the source of the high-velocity airflow causing discomfort in the YRMC outdoor dining area.
- Conducted trade studies considering multiple wind-mitigation barrier designs to reduce the flow velocities in the dining area to acceptable levels



Velocity reduction in dining area



CFD streamlines mapping the SSE wind pathway into the dining area