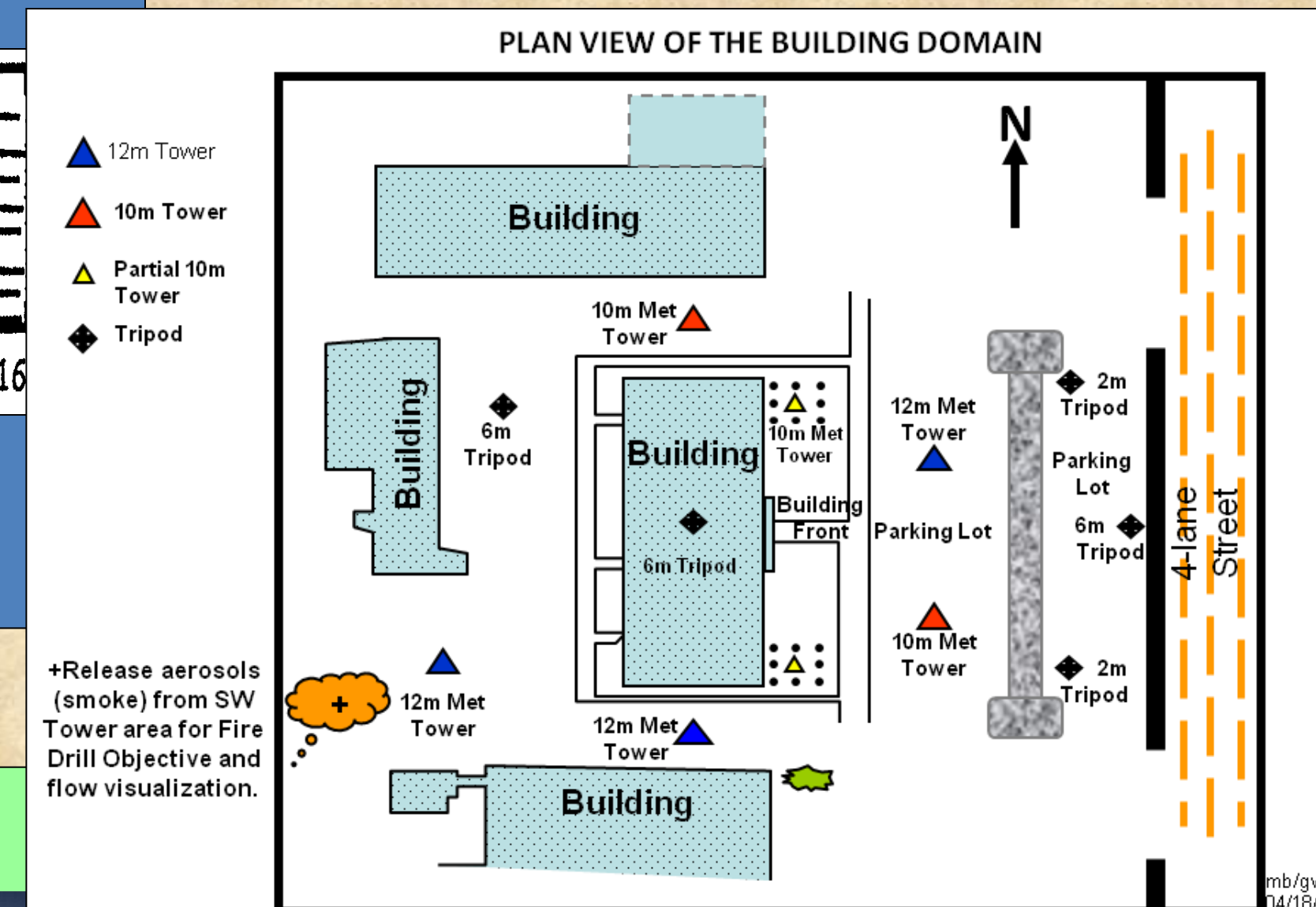
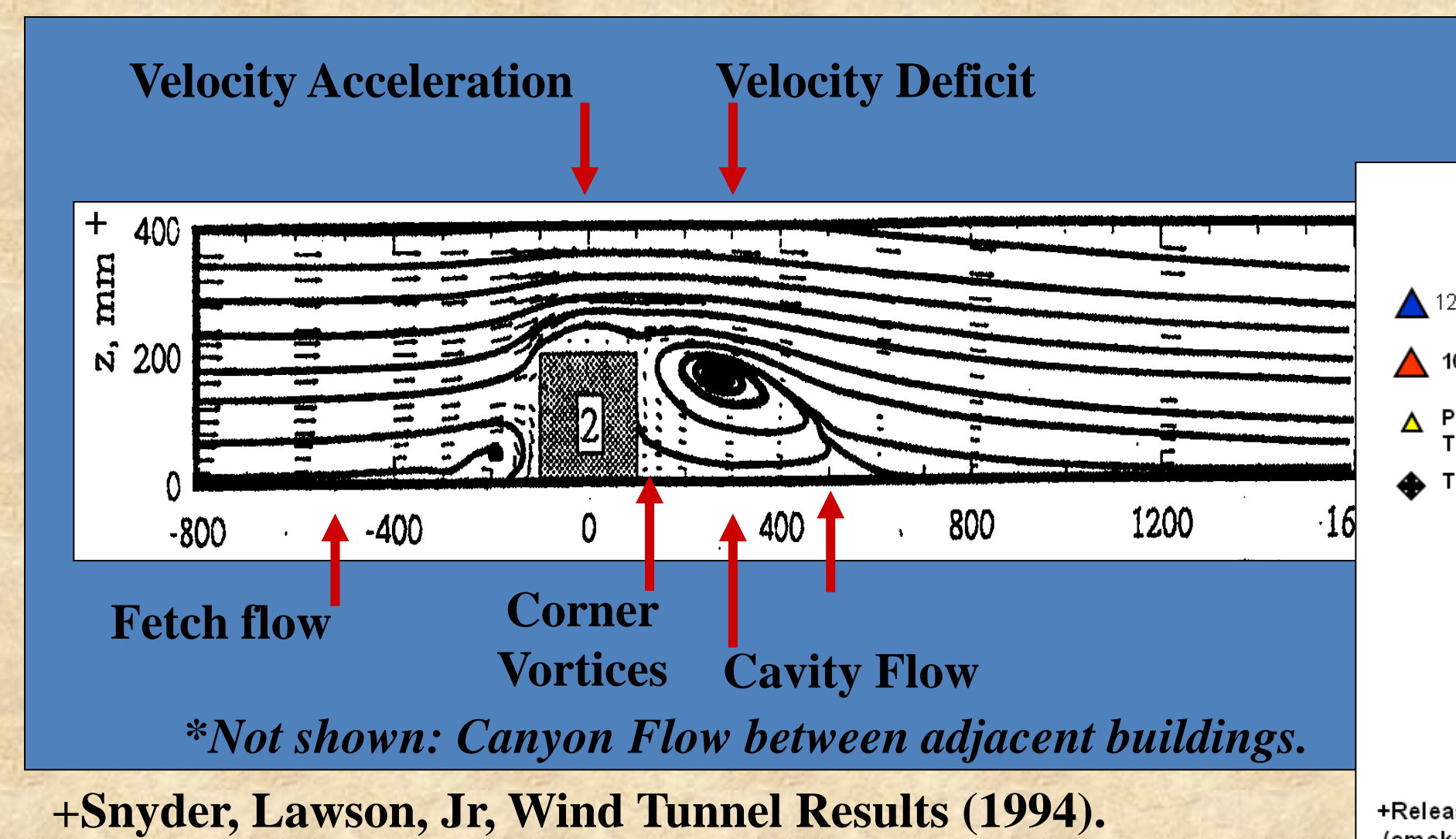
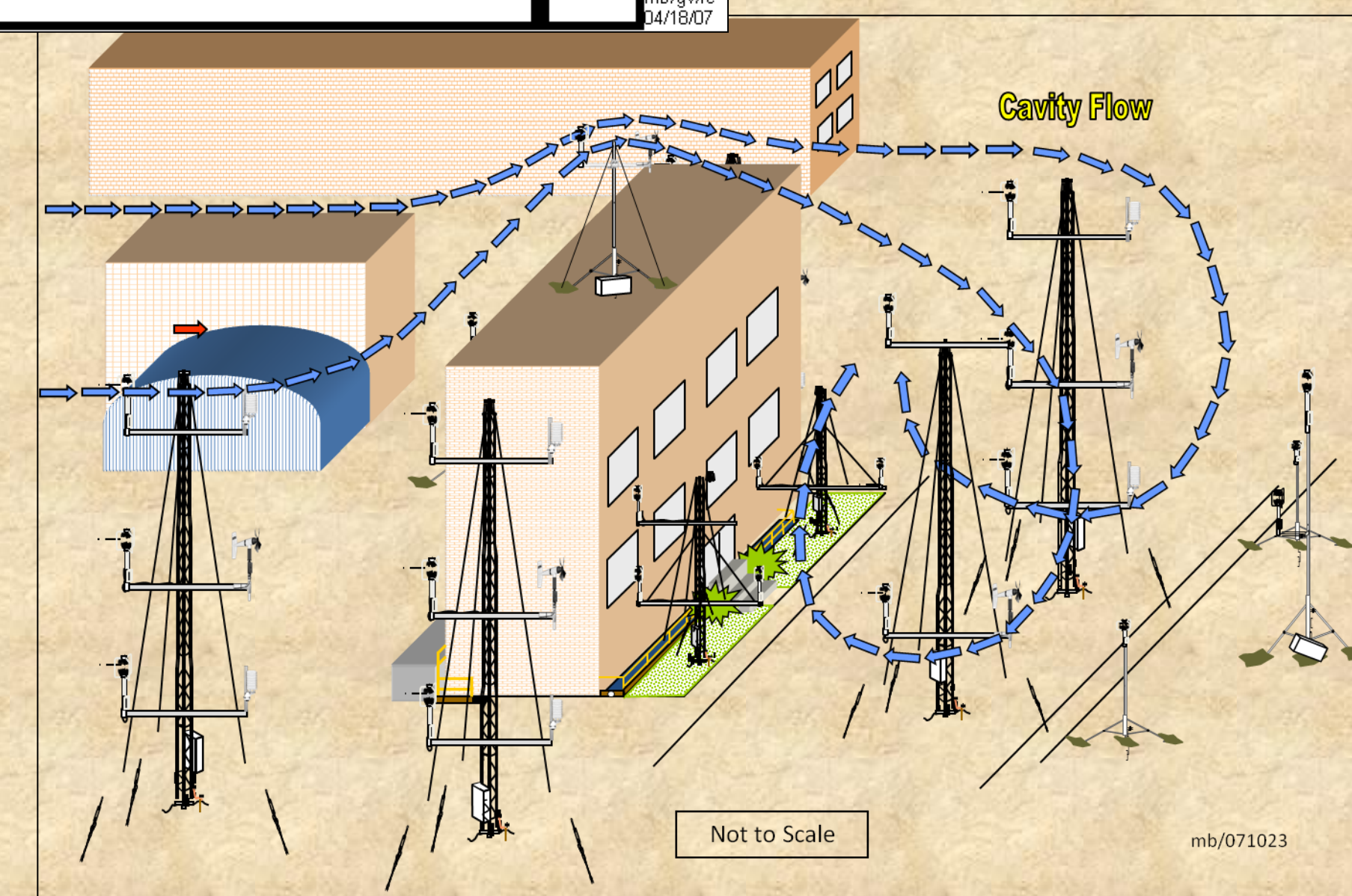
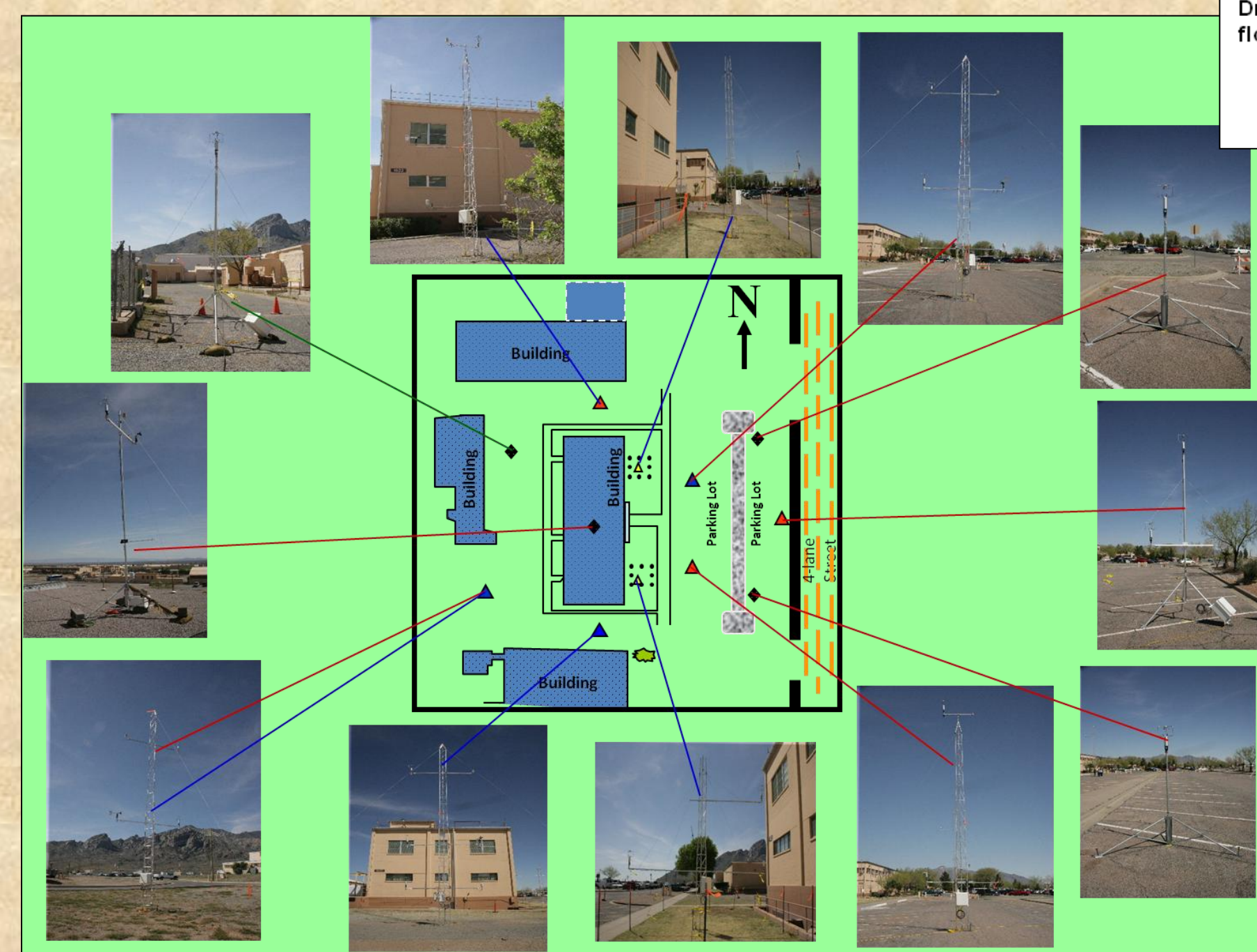


Gail Vaucher and S.A. "Lou" Luces, Army Research Laboratory, New Mexico

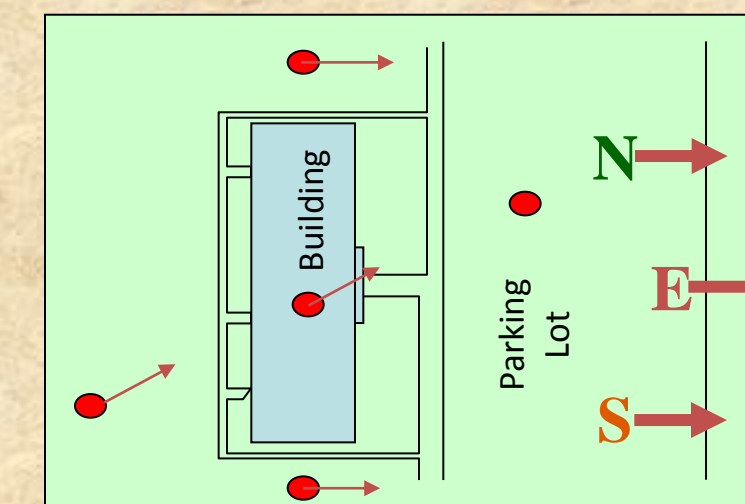
## WSMR 2007 URBAN STUDY (W07US)



- W07US characterizes airflow and stability around urban buildings.
- Cavity Flow and Re-attachment Zone mapped with the data.



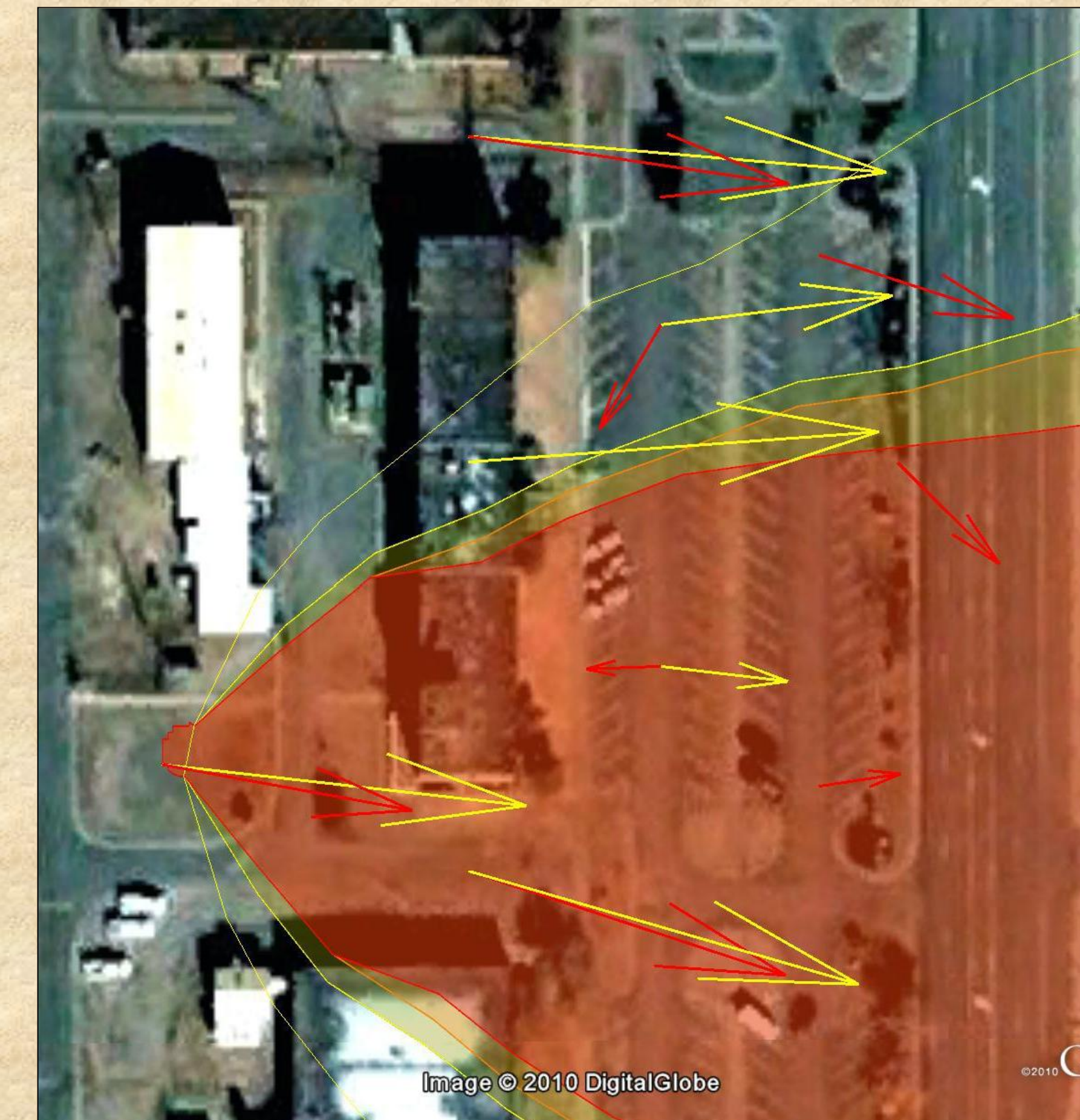
CAVITY FLOW – NORTHEAST and SOUTHEAST



## RELEVANCE TO OPERATIONAL PREDICTION



- Would you evacuate or keep personnel inside the building and why?
- Where would you send the residents of the urban building, and why?
- Where would you place the emergency vehicles and why?



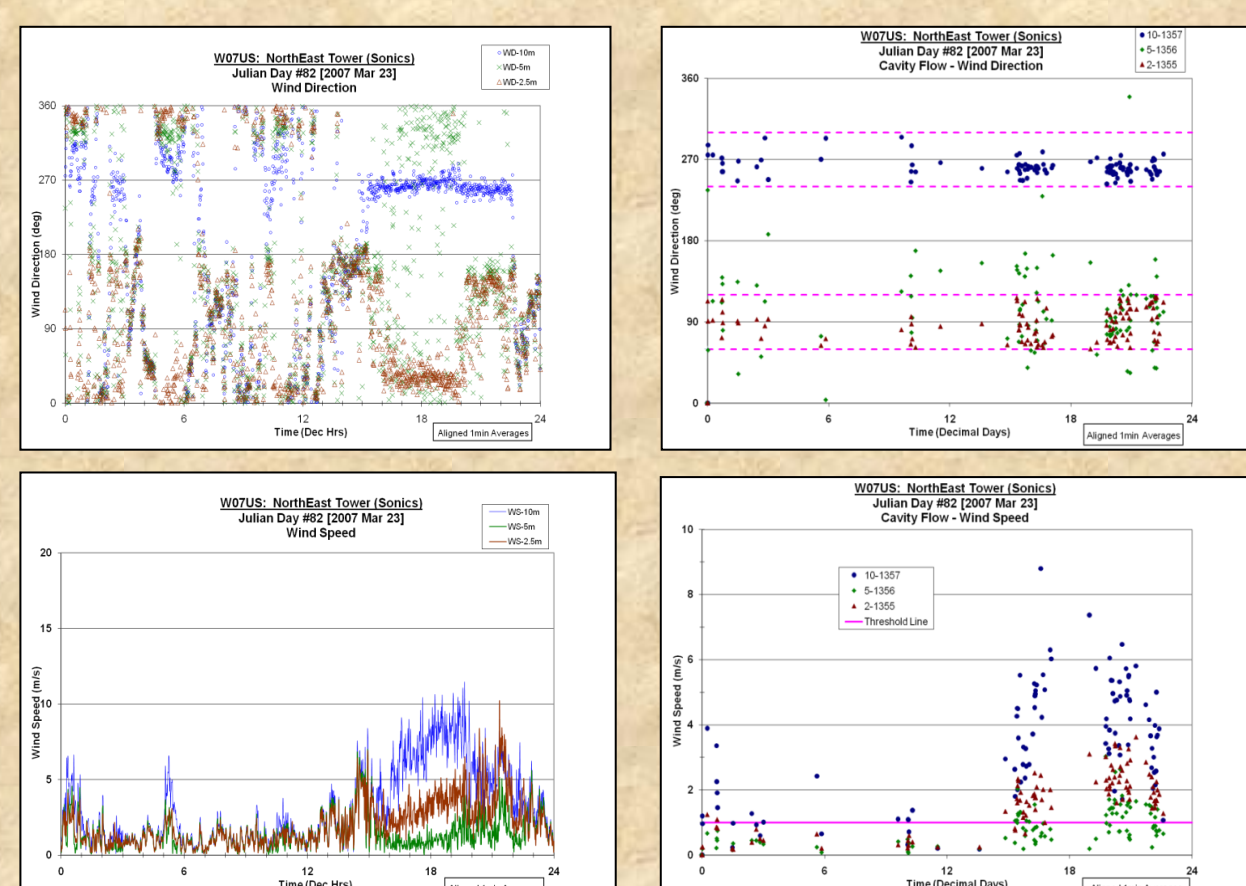
When timely information is not available, people can get hurt.

## LOW AND HIGH VELOCITY CASES RESULT IN FOUR LEESIDE FLOW PATTERNS

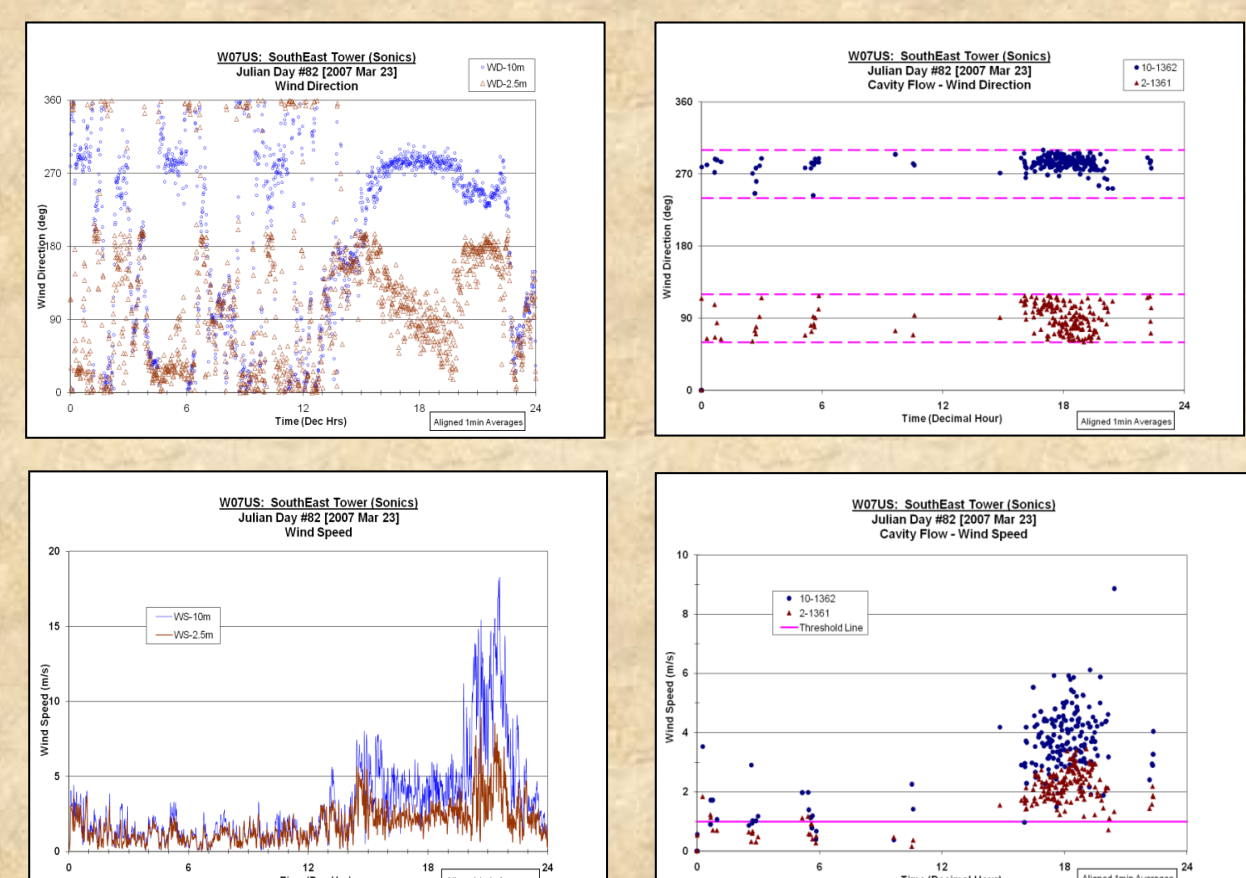
### CAVITY FLOW PATTERNS:

- A leeside flow in which a vertical discontinuity of upper and lower wind directions is observed; this discontinuity can be as great as a 180° (vertical flow reversal).
- Wind Speed profile decreases with height, then increase with height.
- Leeside circulations include clockwise/counterclockwise rotations, center-convergences, rotor-like flows.

### NORTHEAST TOWER

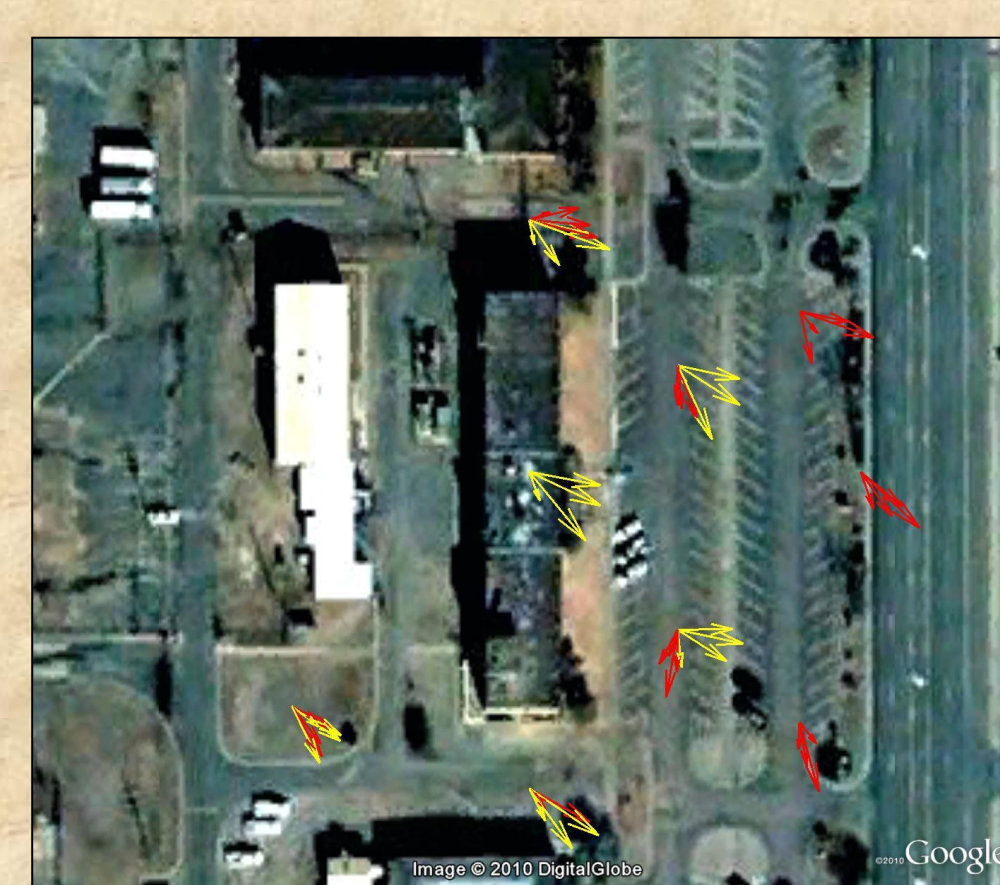


### SOUTHEAST TOWER

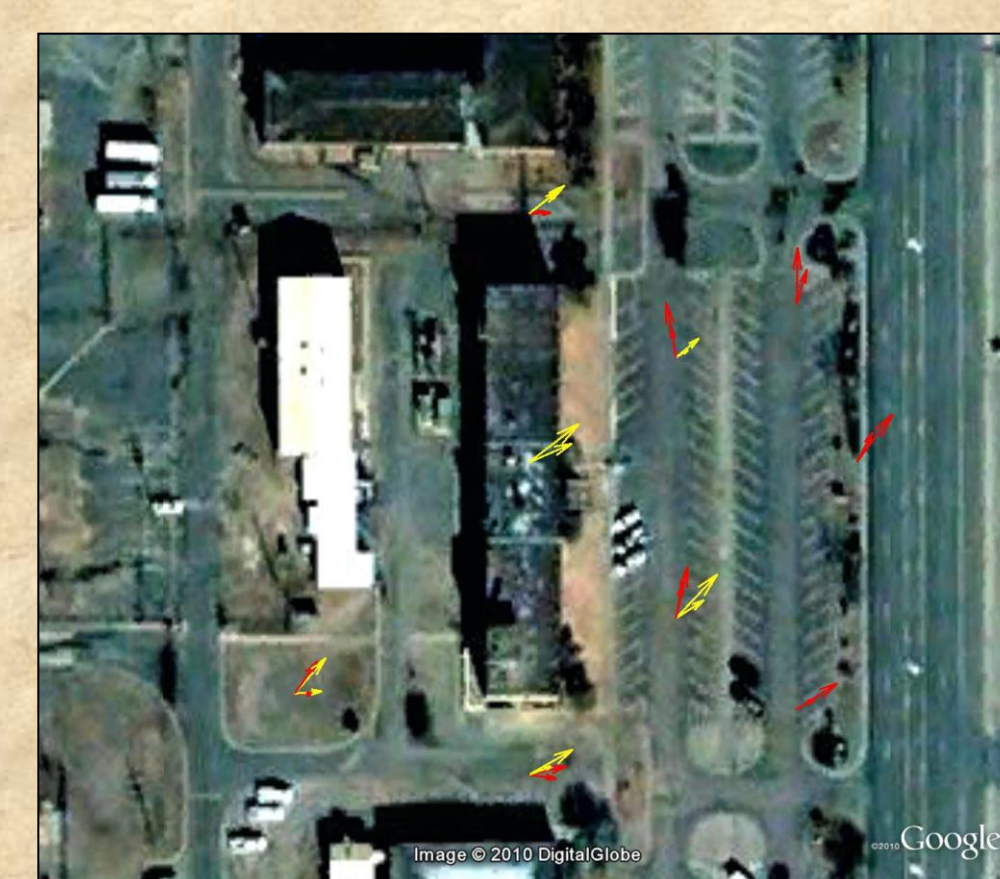


### LOW and HIGH VELOCITY CASES

NW Flow



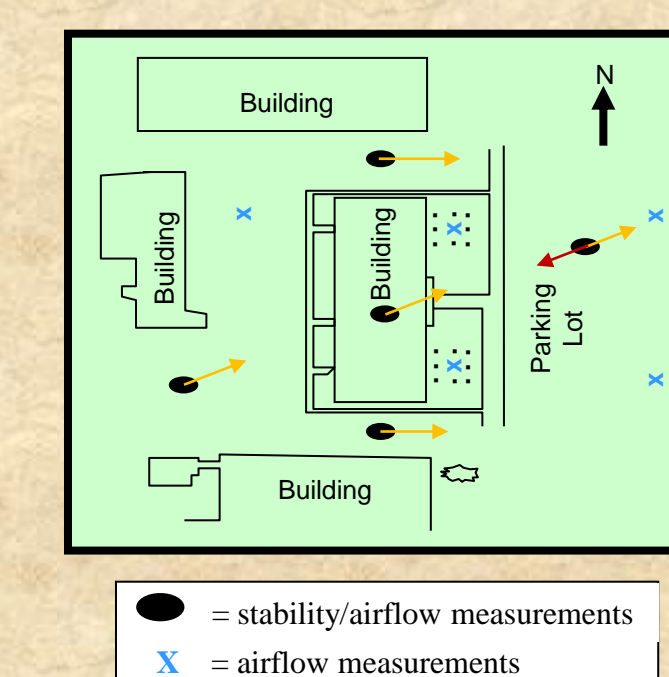
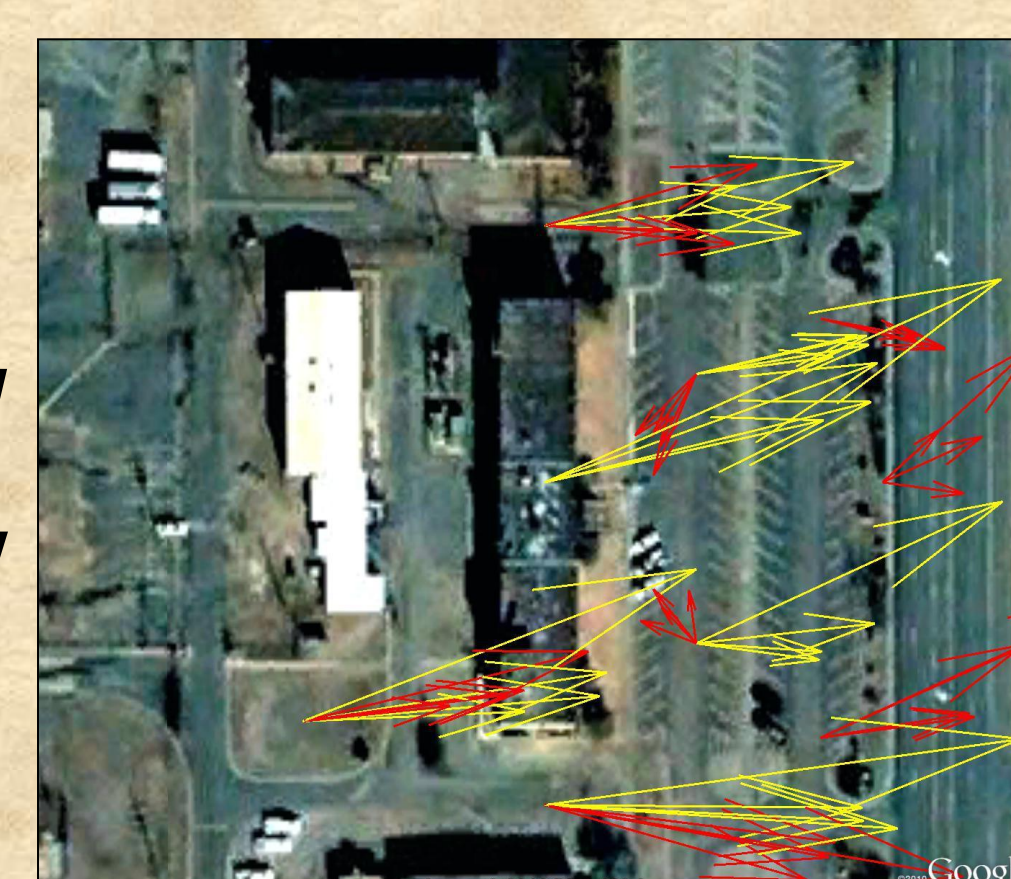
SW Flow



W Flow

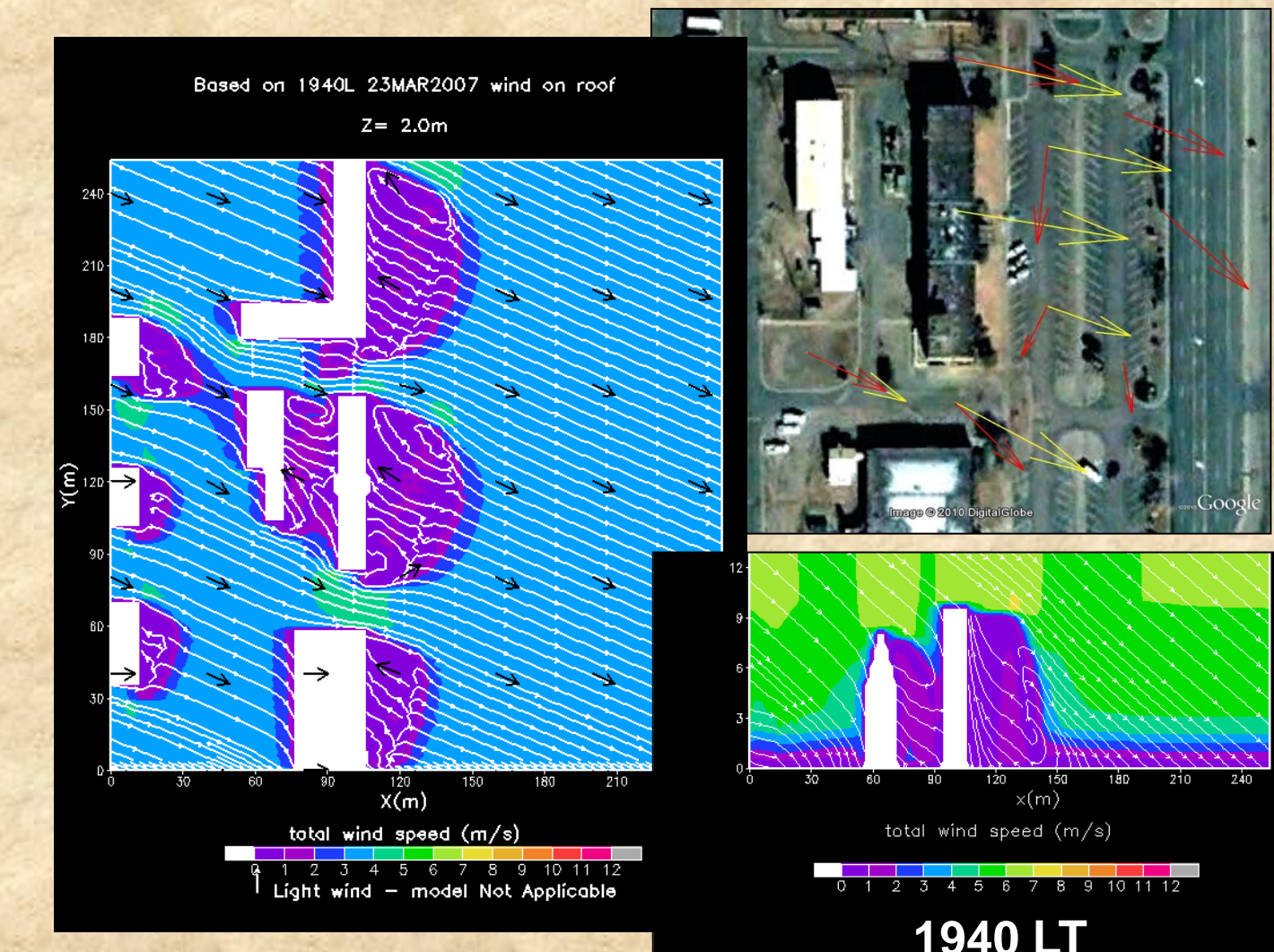


W Flow

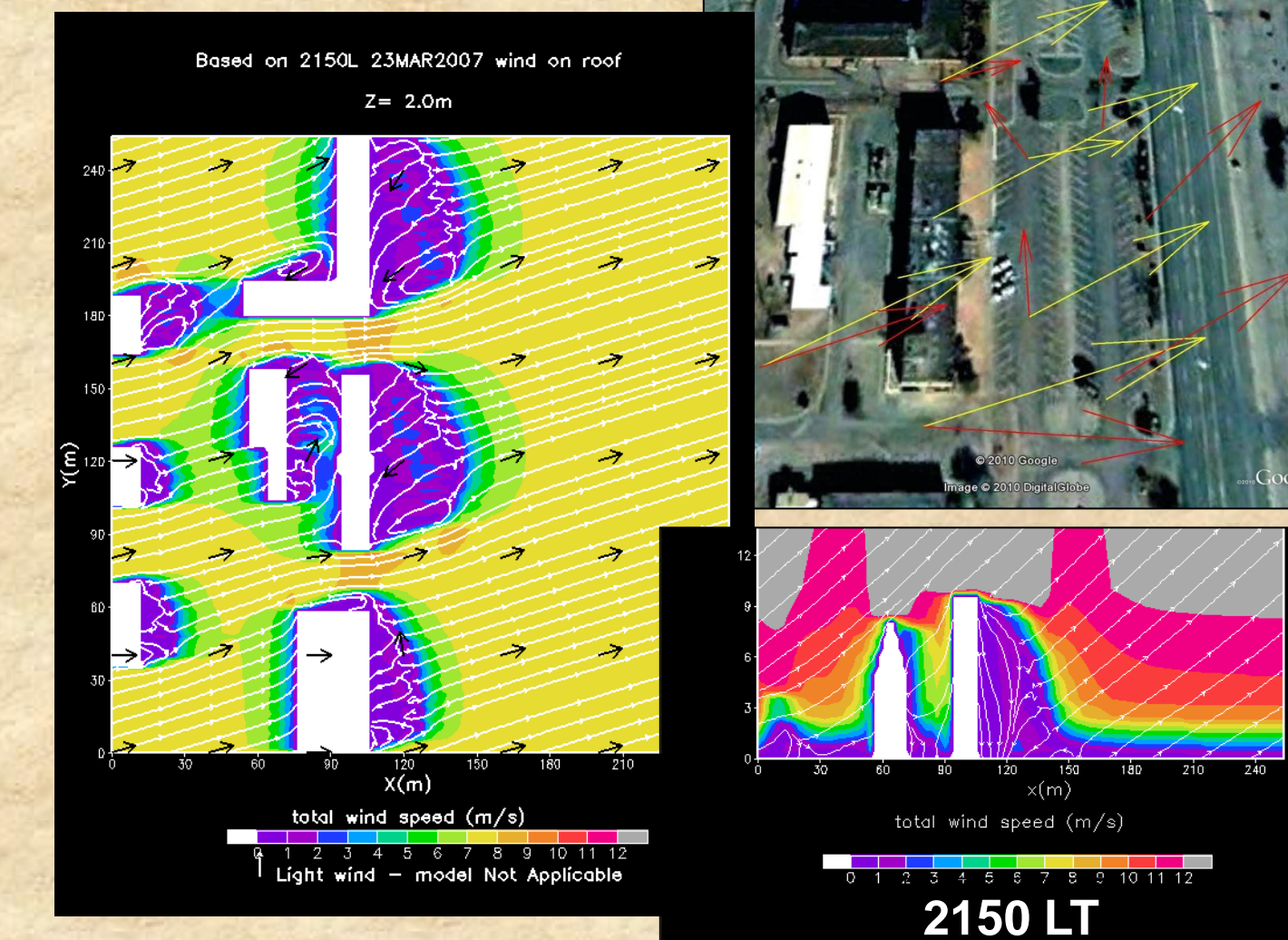


## MODELS DISPLAY LEESIDE FLOW PATTERNS AND APPLICATIONS

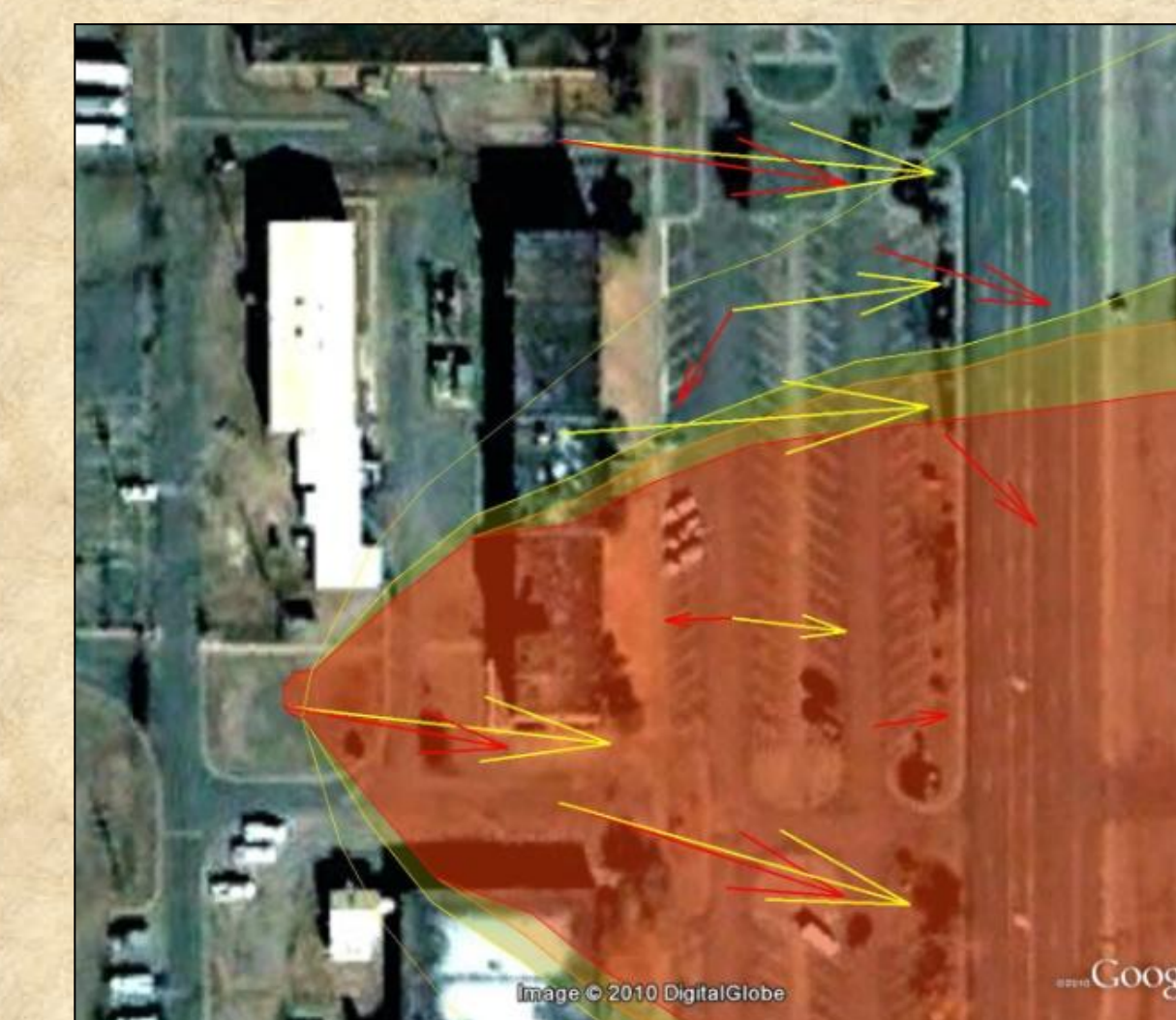
### NW Fetch



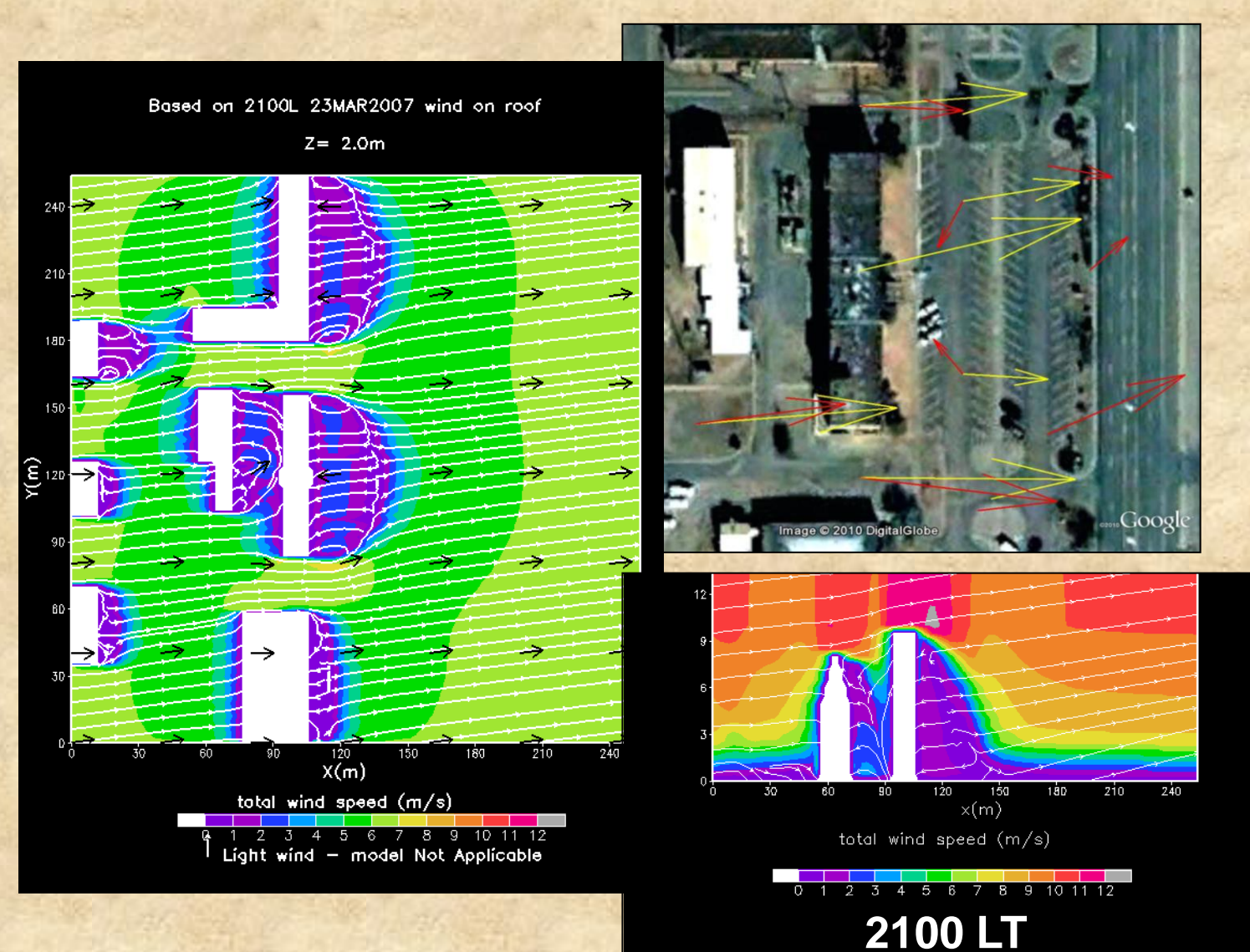
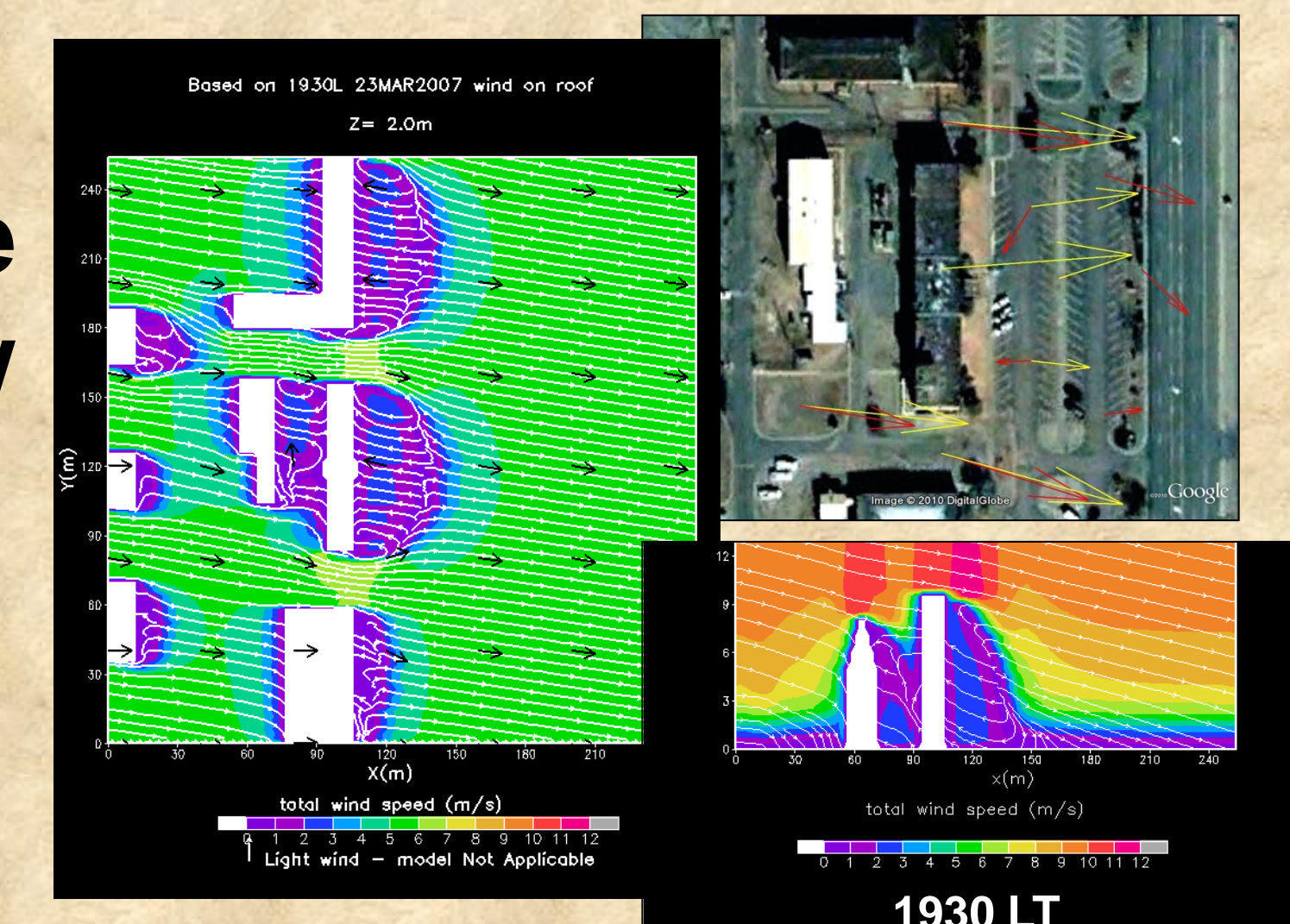
### SW Fetch



### W Fetch with Leeside Convergence and Cavity Flow



### W Fetch with Leeside Convergence



### WIND FIELD MODEL

ARL-3DWF(v1) (Three-Dimensional Wind Field Model)  
Diagnostic model.

### PLUME MODEL

NOAA/EPA-ALOHA (Areal Location of Hazardous Atmospheres)  
Dispersion Model.