



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Norman Bae	Project Number S0201
Project Title Effectiveness of Wing in Ground Effect on High Speed Train Concepts	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to find which high speed train concept produced the most lift and least drag and use that to prove effectiveness of the wing in ground effect.</p> <p>Methods/Materials Constructed four wing in ground effect models (single wing, double wing, lift wing, and x-wing) from balsa wood and styrofoam. A homemade wind tunnel was used to test each design. Using lift and drag balances, I measured how much lift and drag was produced by each model. Dry ice fog was used to visualize the airflow around each model.</p> <p>Results The single wing design produced the most lift of 171 grams and double wing design produced the least drag of 16.5 grams. Further experimentation led to the single wing producing 120 grams of lift at 3.175mm and 87.5 grams of lift at 44.45mm off the ground.</p> <p>Conclusions/Discussion The single wing design performed the best overall while the expected best performance design, lift wing, performed the worst. The lift wing design lift was compromised by large aerodynamic drag. Airflow around the lift wing and x-wing models indicated that in addition to the wing surface area, the body surface area of these models also contributed to the overall lift. Further results of the single wing design proved that more lift was produced closer to the ground due to the wing in ground effect. The test data suggest that it is possible to build a train that travels near the inside surface of a u shaped track using wing in ground effect.</p>	
Summary Statement My project is experimenting with different high speed train designs to see which had the best performance using wing in ground effect.	
Help Received Father helped with preparing the materials for the cardboard wind tunnel.	