

INF / GR / PS / 132

# GTR Head Tests of US Fleet Vehicles



NHTSA Vehicle Research & Test Center

IHRA PSWG Meeting

June 2005

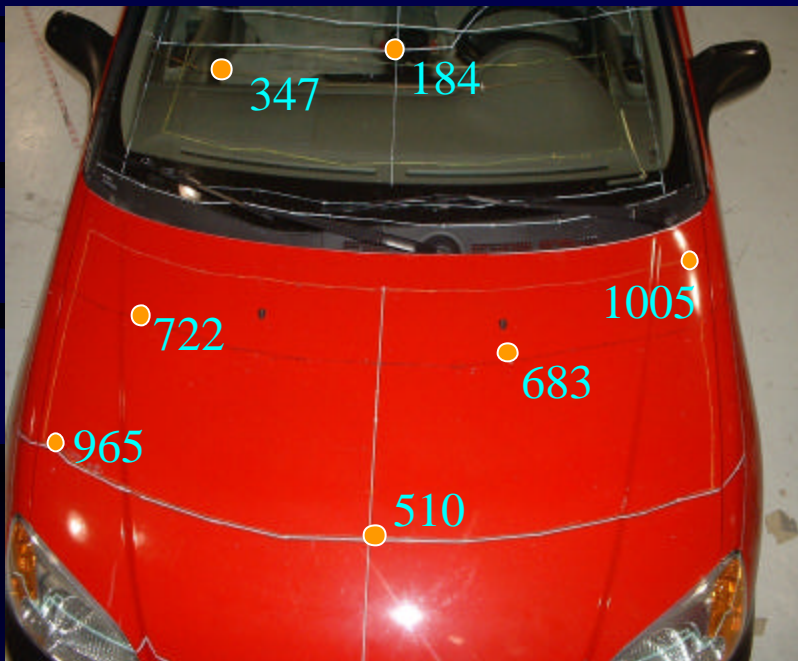
# Overview

- NHTSA needs some information on pedestrian head safety afforded by late model US fleet vehicles
- To address this need, we are testing recent model vehicles using the proposed GTR
- It is hoped that this data can support NHTSA in evaluating GTR as applied to the current US situation

# Test Plan

- Mix of vehicles
  - Pass Cars, SUV, Pickup, Minivan, Full Size Van
- 43 tests; 6 vehicles
  - Child and adult headforms
  - Standard: 50<sup>th</sup> percentile WAD for each headform
  - Vehicle-specific: best (soft) and worst (hard) using engineering judgments
- 32 km/hr impact speed
- Approach angle dictated by vehicle geometry

# 2001 Honda Civic



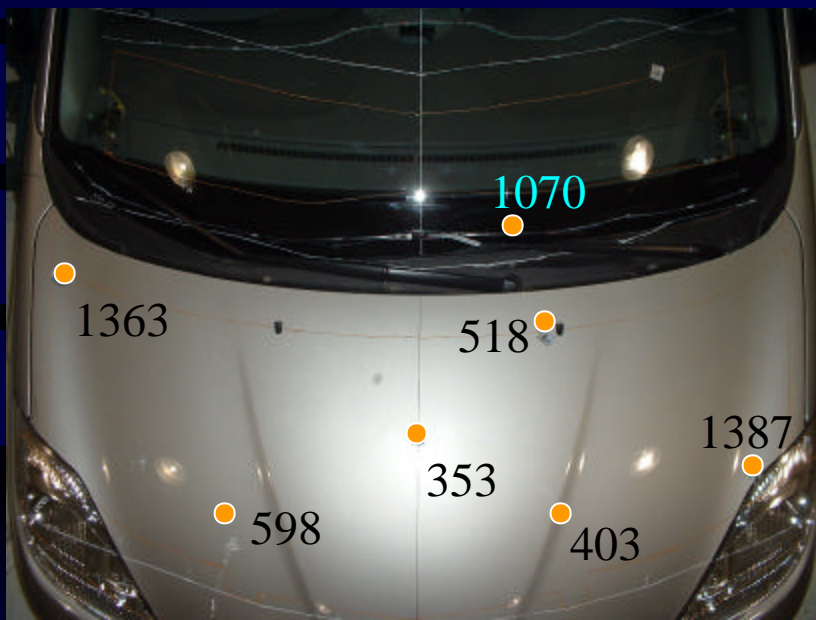
Pt	Head	WAD	Type	HIC
1	C	1345	50 <sup>th</sup> %	722
2	C	1345	50 <sup>th</sup> %	683
3	C	1010	Best	510
4	C	1020	Worst	965
<b>5</b>	<b>C</b>	<b>1460</b>	<b>Worst</b>	<b>1005</b>
6	A	1765	50 <sup>th</sup> %	347
7	A	2100	Best	184

# 2004 GMC Savana



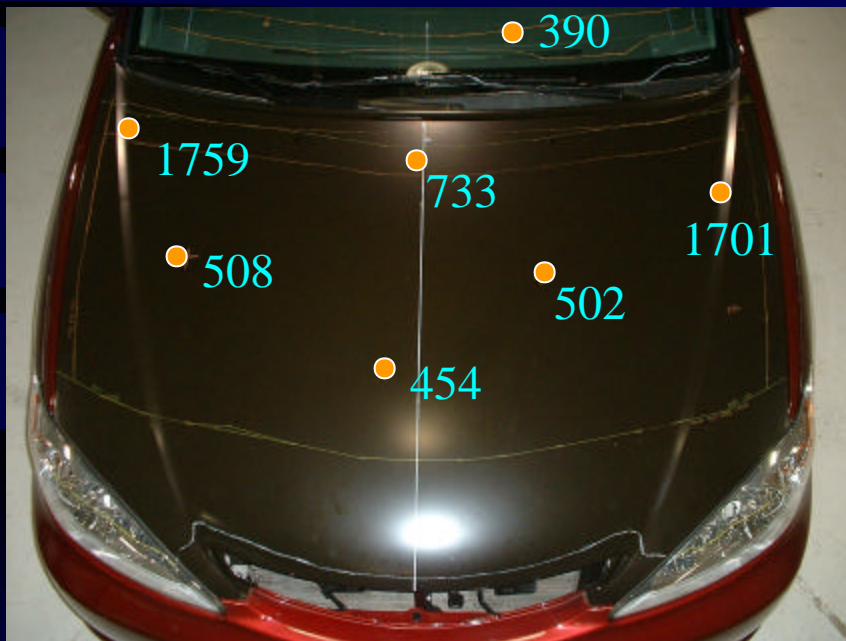
Pt	Head	WAD	Type	HIC
1	C	1380	50 <sup>th</sup> %	582
2	C	1380	50 <sup>th</sup> %	585
3	C	1515	Best	524
4	C	1590	Worst	984
5	A	2035	50 <sup>th</sup> %	348

# 2004 Toyota Sienna



Pt	Head	WAD	Type	HIC
1	C	1215	50th %	598
2	C	1208	50th %	403
<b>3</b>	<b>C</b>	<b>1160</b>	<b>Worst</b>	<b>1387</b>
<b>4</b>	<b>C</b>	<b>1535</b>	<b>Worst</b>	<b>1363</b>
5	C	1535	Medium	518
6	C	1380	Best	353
<b>7</b>	<b>A</b>	<b>1850</b>	<b>50th %</b>	<b>1070</b>

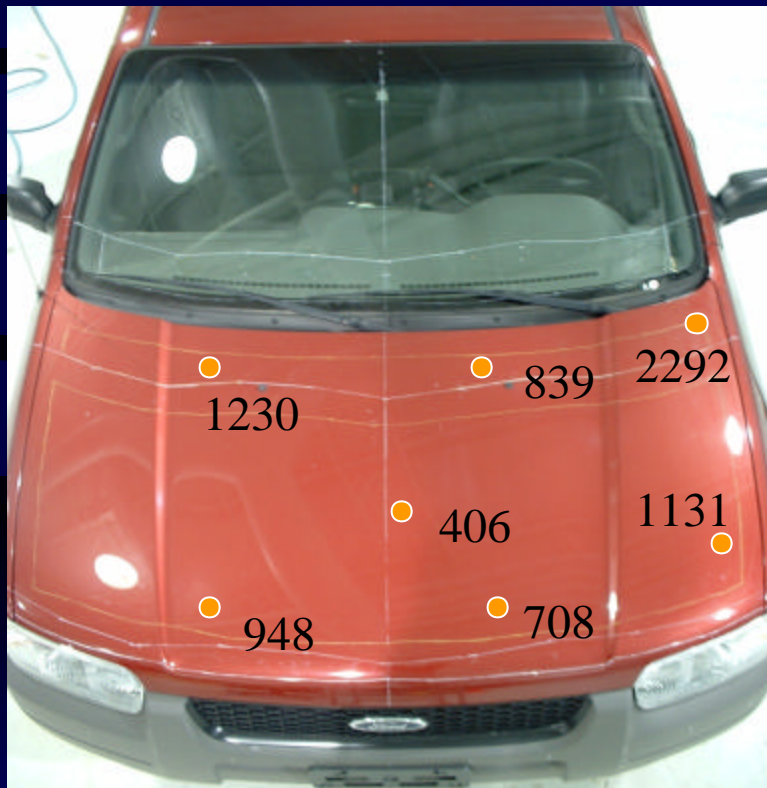
# 2004 Toyota Camry



Pt	Head	WAD	Type	HIC
1	C	1350	50th %	502
2	C	1346	50th %	508
<b>3</b>	<b>C</b>	<b>1476</b>	<b>Worst</b>	<b>1701</b>
4	C	1164	Best	454
5	A	1720	Medium	733
<b>6</b>	<b>A</b>	<b>1715</b>	<b>Worst</b>	<b>1759</b>
7	A	1995	50th %	390



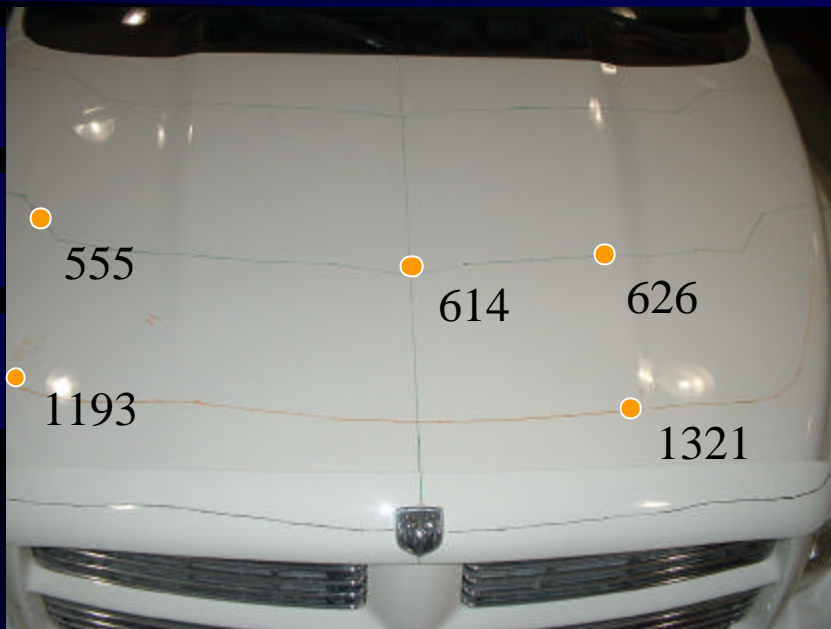
# 2001 Ford Escape



Pt	Head	WAD	Type	HIC
1	C	1090	50th %	708
2	C	1070	50th %	948
<b>3</b>	<b>C</b>	<b>1140</b>	<b>Worst</b>	<b>1131</b>
4	C	1360	Best	406
5	A	1715	50th %	839
<b>6</b>	<b>A</b>	<b>1700</b>	<b>50th %</b>	<b>1230</b>
<b>7</b>	<b>A</b>	<b>1825</b>	<b>50th %</b>	<b>2292</b>

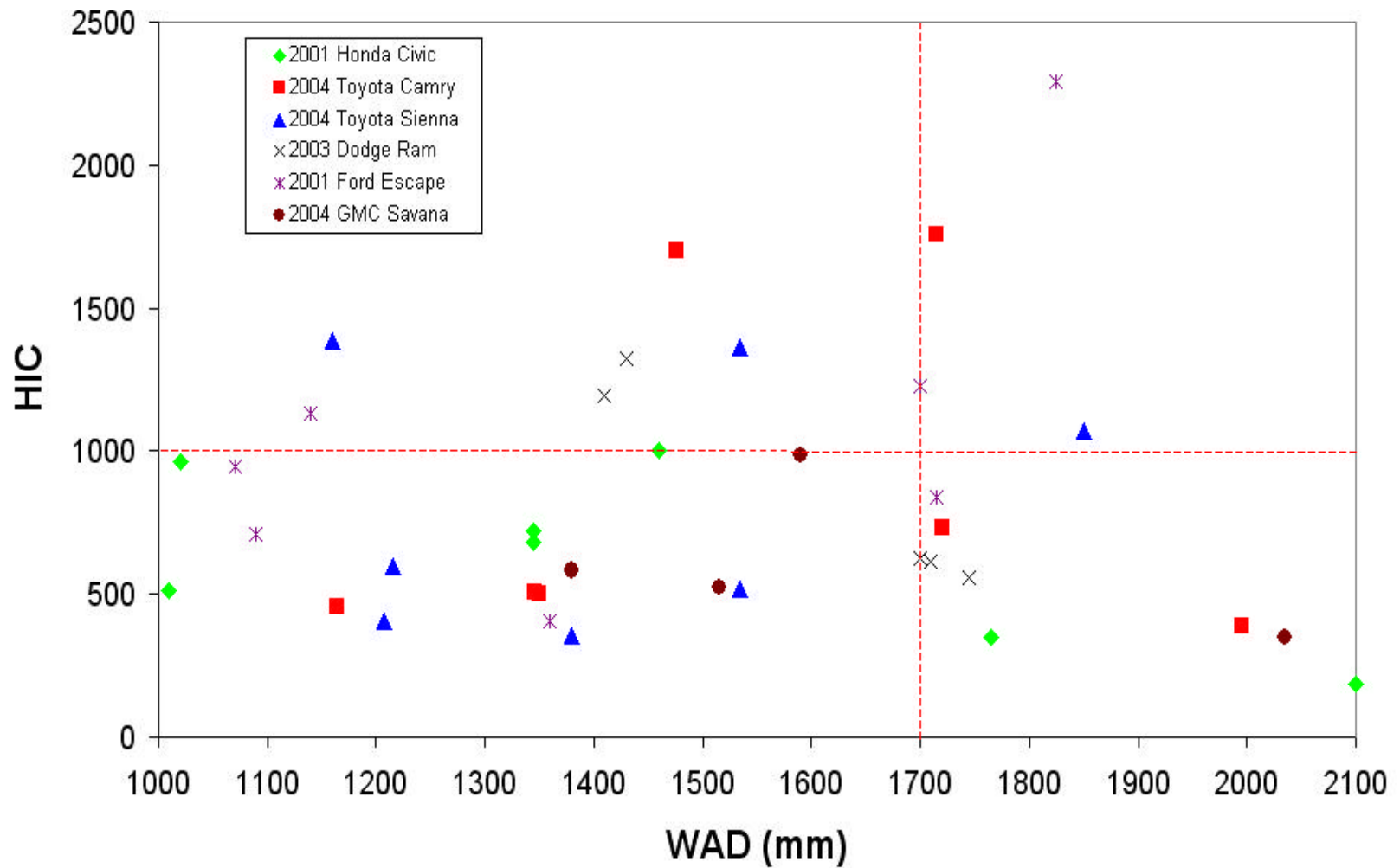


# 2003 Dodge Ram

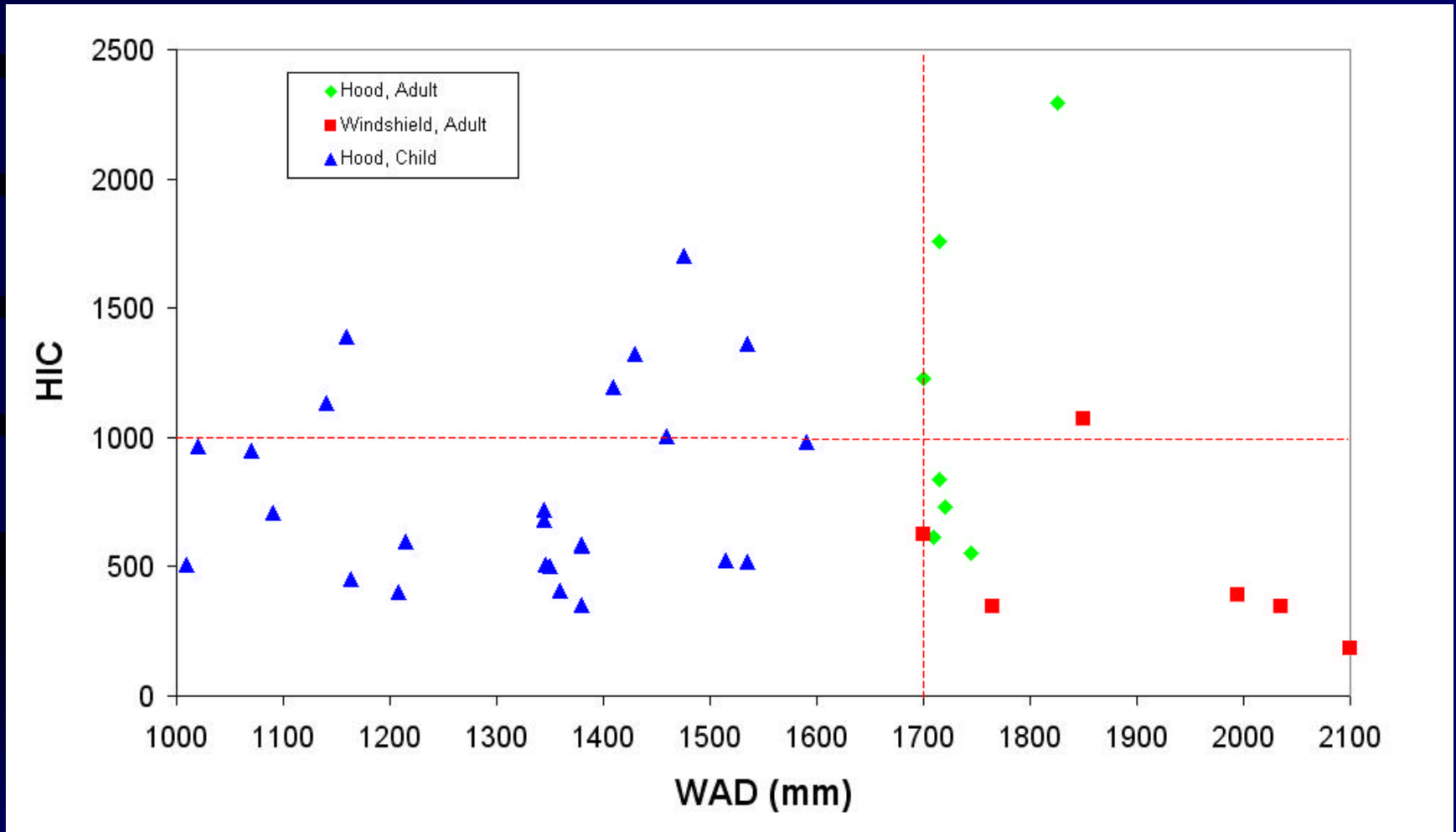


Pt	Head	WAD	Type	HIC
1	C	1430	50th %	1321
2	C	1410	50th %	1193
3	A	1745	50th %	555
4	A	1710	Worst	614
5	A	1700	Best	626

# By Vehicle Model

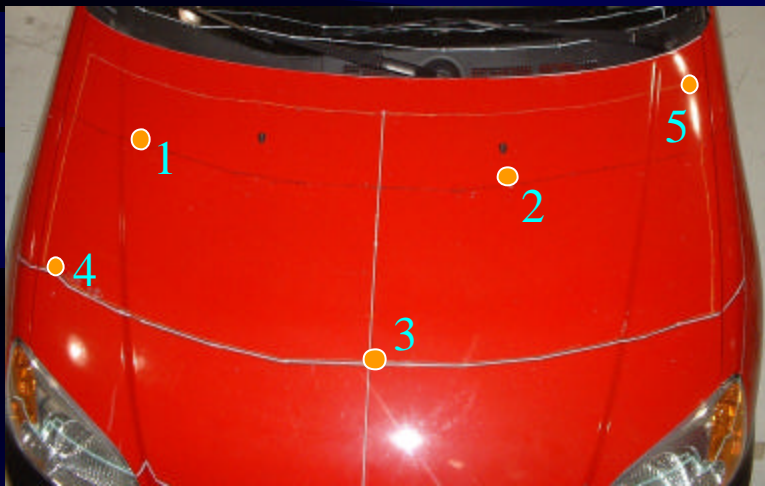


# By Head Type & Impacted Structure



# Benefit Study: Honda Civic Hood

- Identified equivalent impact areas based on:
  - Similar underhood components
  - Similar WAD

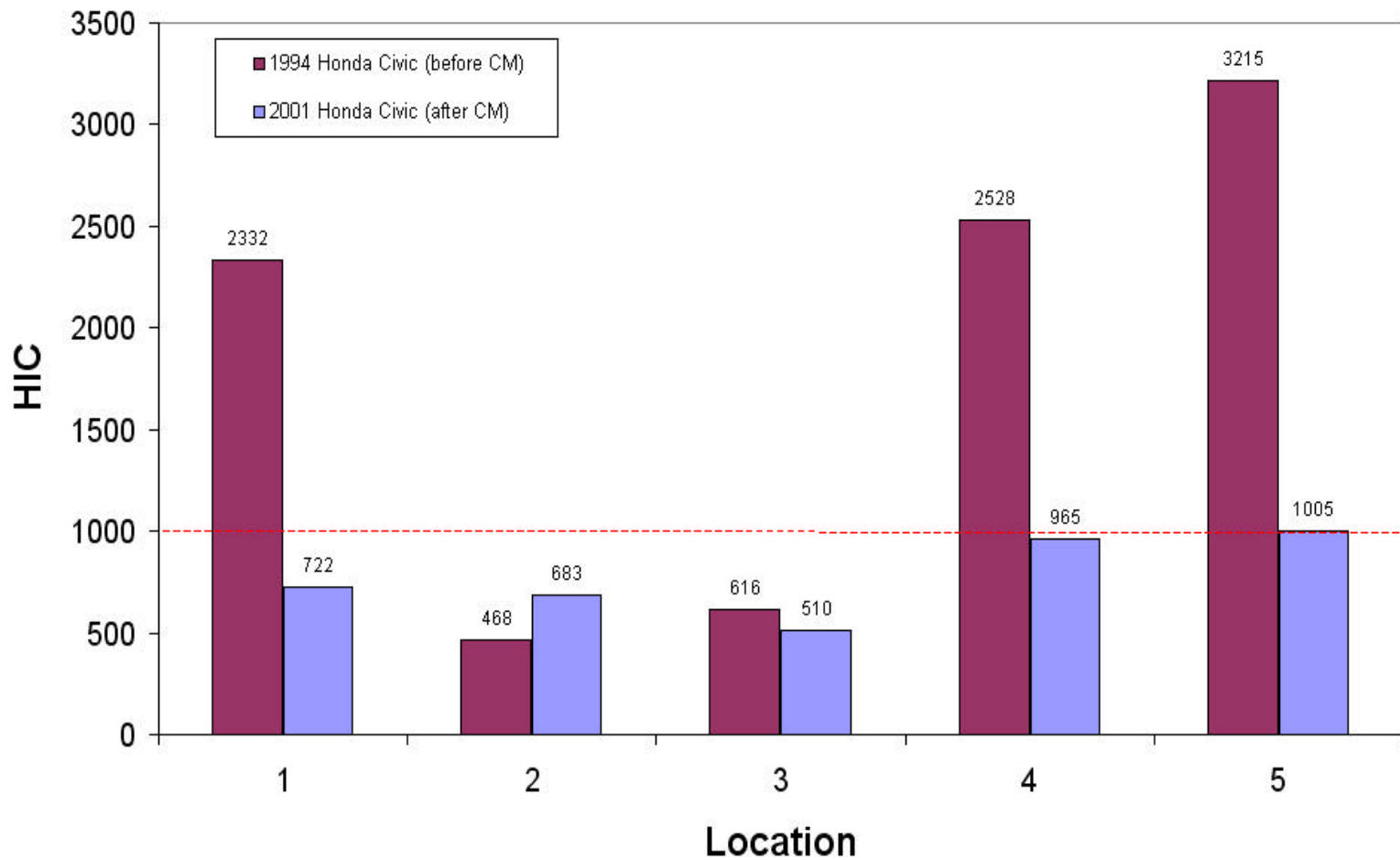


2001 Model (With Countermeasures)



1994 Model (Baseline)

# HIC Reductions



# GTR Procedural Observations

- Side reference lines often encompass parts of the vehicle outside the hood edge
- Offset of 82.5 mm sometimes unnecessary, especially between child and adult zones on larger vehicles
- Adult test zone is often very small
- No limit on tests per structure noted in GTR

# Summary

- Only one of six vehicles had 100% pass rate
- Known countermeasures were found to significantly reduce HIC in the Civic
  - Feasibility for other vehicles undetermined
- Observations for proposed GTR:
  - $HIC < 1000$  everywhere will be difficult to meet