



ROAD MOVABLE BARRIERS SYSTEM Segment Analysis

Metro Board Action Item No. 61, June 28, 2018
CEO to report on analysis of the feasibility to
implement movable barrier system in Los Angeles
County where asymmetric traffic flow exists.

NOVEMBER 2018



BOARD ACTION

CEO report on analysis of the feasibility to implement Movable Barrier System in Los Angeles County where asymmetric traffic flow exists.

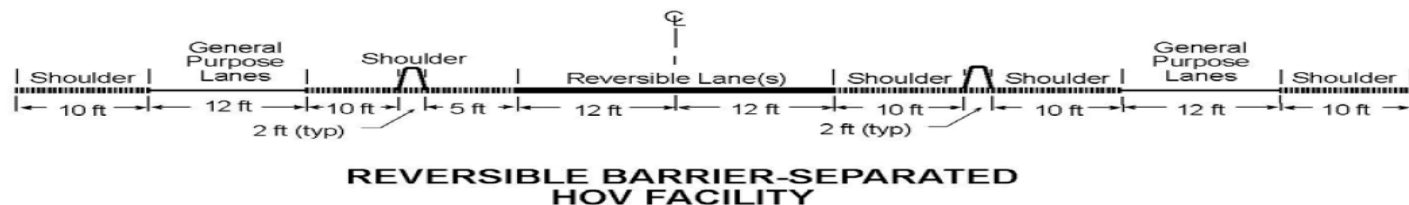
- ▶ **1. Identifying the potential freeway corridor segments such as the I-405 between I-105/LAX to I-710, and others, that have unique directional traffic flows.**
- ▶ 2. Coordination with Caltrans to identify the associated capital costs such as bridge replacement.
- ▶ 3. Coordination with Caltrans to identify the associated operation costs to implement Road Movable Barriers System to create reversible lanes during AM and PM peak hours.

REVERSIBLE HOV LANES MINIMUM REQUIREMENTS

From High-Occupancy Vehicle Guidelines for Planning, Design & Operations.
January 2018.

- ▶ Minimum length for these facilities should be 2 miles
- ▶ This type of operation is feasible only if the existing and forecasted directional traffic split is 65% or more in one direction during the design life of the project
- ▶ Free of right-of-way and physical constraints, such as bridge columns, in retrofitting a reversible flow

FIGURE 3.1
TYPICAL CROSS SECTIONS
BARRIER-SEPARATED HOV FACILITIES
NOT TO SCALE



HIGH-OCCUPANCY
VEHICLE
GUIDELINES

for Planning, Design
and Operations

January 2018
California State
Transportation Agency

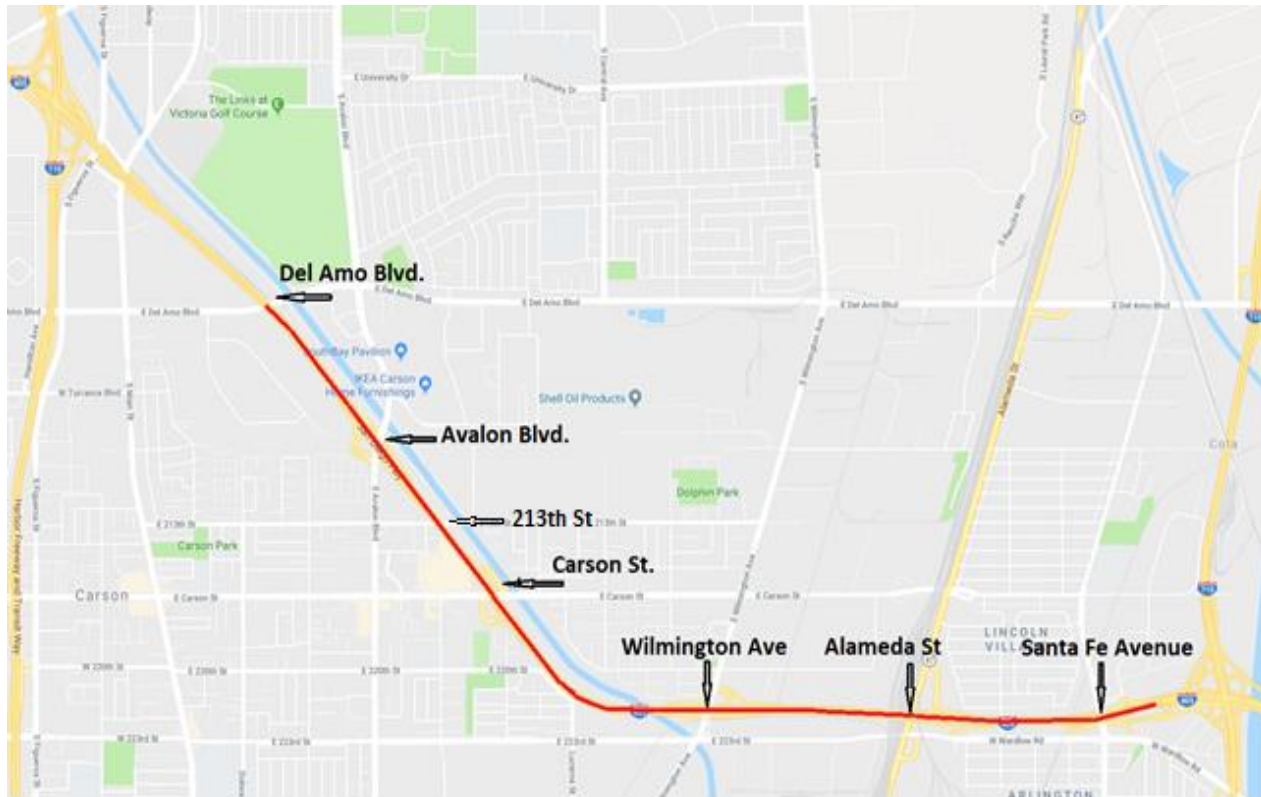


Prepared by:
Department of Transportation
Division of Traffic Operations
web address: <http://onramp/hq/trafops/otr4p4r/hov/hov.html>

High-Occupancy Vehicle Guidelines
For Planning, Design and Operations

SEGMENT LOCATION

ON ROUTE 405 BETWEEN I-710 (PM 7.8)
AND DEL AMO BLVD. (PM 11.8)

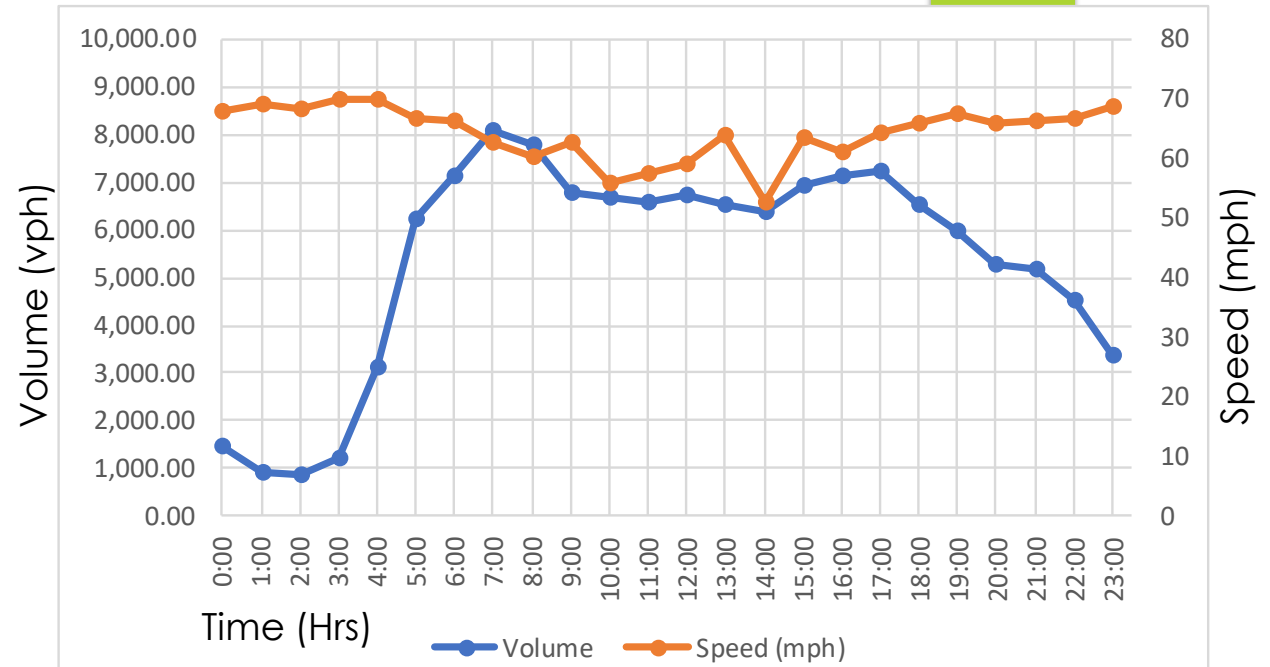


- I-405 is the most congested urban freeway in California, and the site of the top bottlenecks in Los Angeles County.
- There are no major physical constraints located in the median, making it physically feasible for movable barrier system, if 65/35 split tends to exist.
- This segment of I-405 is part of Metro Countywide Express Lanes Tier 1 Projects (5 to 10 Years).
- Caltrans PeMS data are used to measure flow, speed, and occupancy.

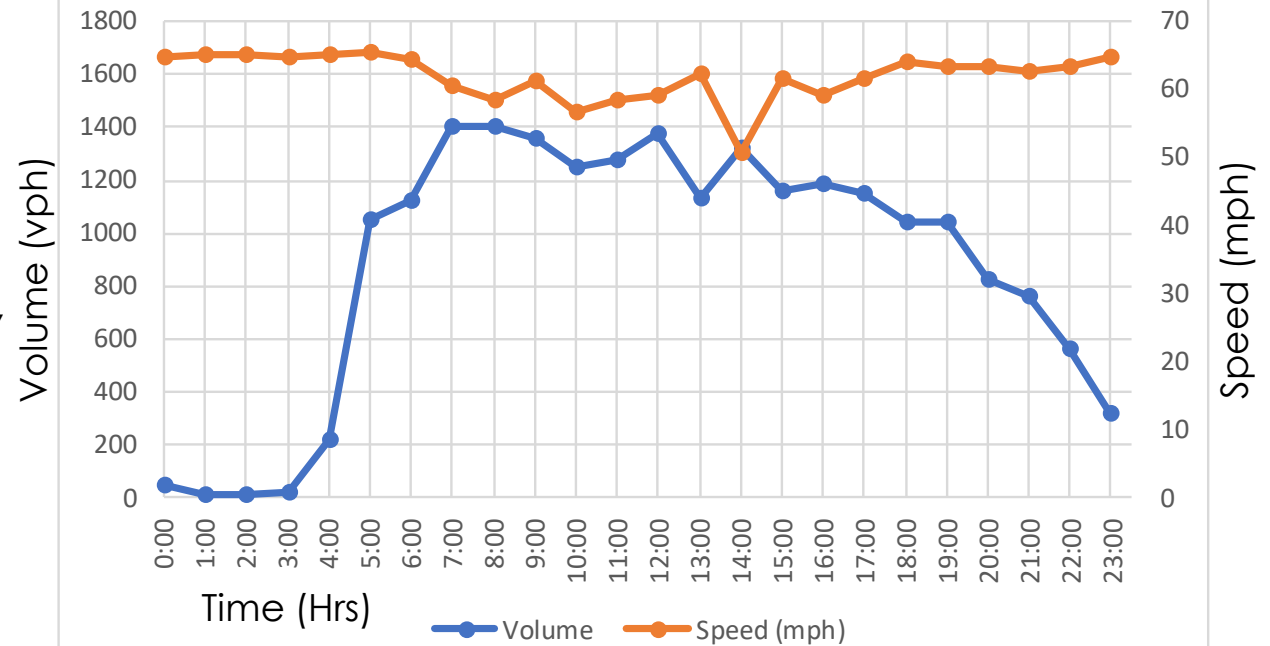
DIRECTIONAL VOLUME AND SPEED COMPARISON I-405 NB

AT AVALON BLVD.

GENERAL PURPOSE (4 LANES)



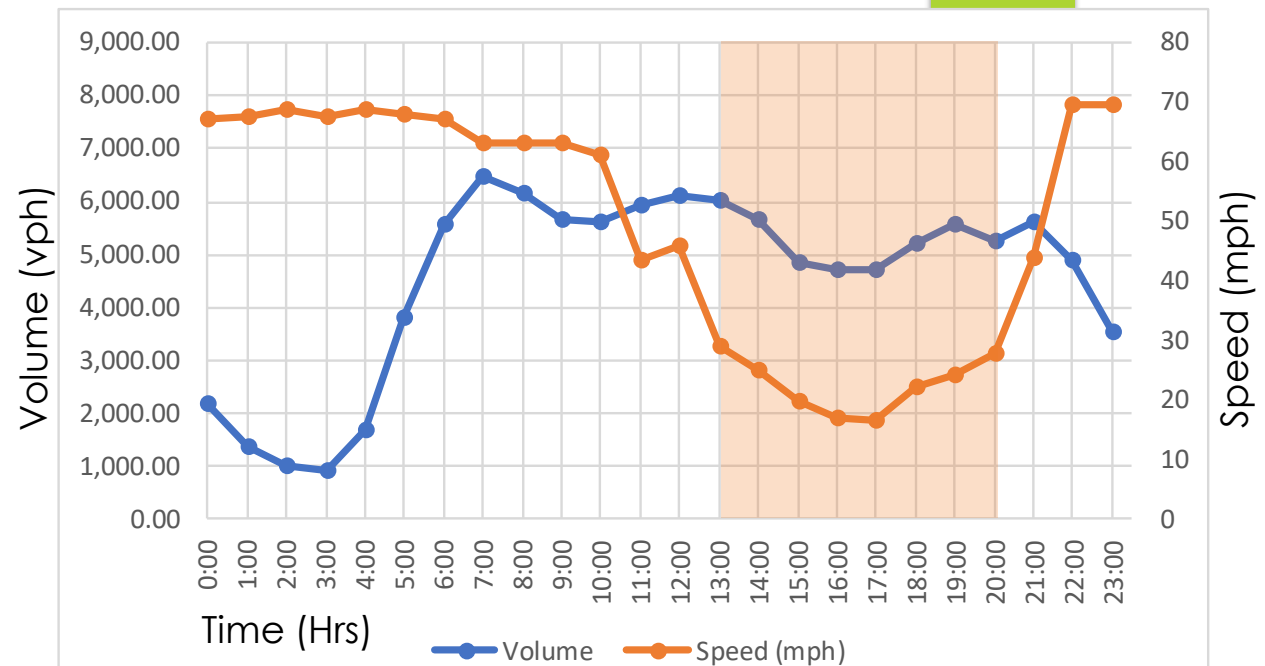
HOV ONLY (1 LANE)



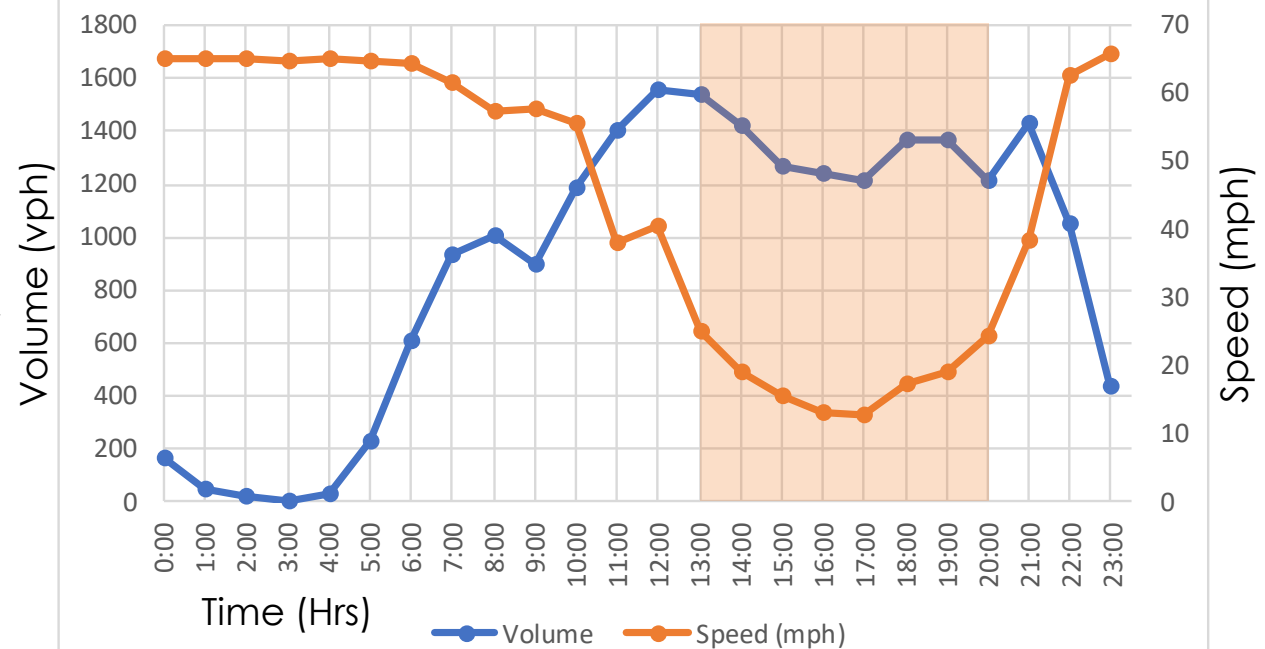
DIRECTIONAL VOLUME AND SPEED COMPARISON I-405 SB

AT AVALON BLVD.

GENERAL PURPOSE (4 LANES)



HOV ONLY (1 LANE)



DIRECTIONAL VOLUME SPLIT AT AVALON BLVD.

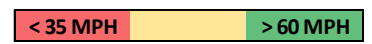
AVALON BLVD (PM 11.32) - DIRECTIONAL LANE CONFIGURATION: 4 GP & 1 HOV

| Time | Directional Volume (vph) | | Directional Volume (vph) | | Directional Volume (vph) | | Volume Split (%) | | | | | | Average Speed (mph) | | | |
|-------|--------------------------|--------------------|--------------------------|--------------------|--------------------------|--------------|------------------|-------|-----------|-----------|--------------|--------------|---------------------|-------|--------|--------|
| | SB GP (4 lanes) | NB GP (4 lanes) | SB HOV (1 lane) | NB HOV (1 lane) | SB GP+HOV | NB GP+HOV | SB GP | NB GP | SB HOV | NB HOV | SB GP+HOV | NB GP+HOV | SB GP | NB GP | SB HOV | NB HOV |
| 0:00 | 2192 | 1471 | 160 | 49 | 2352 | 1520 | 60% | 40% | 77% | 23% | 61% | 39% | 67 | 68 | 65 | 65 |
| 1:00 | 1364 | 903 | 50 | 11 | 1414 | 914 | 60% | 40% | 82% | 18% | 61% | 39% | 68 | 69 | 65 | 65 |
| 2:00 | 1023 | 851 | 16 | 7 | 1039 | 858 | 55% | 45% | 70% | 30% | 55% | 45% | 69 | 69 | 65 | 65 |
| 3:00 | 913 | 1223 | 1 | 19 | 914 | 1242 | 43% | 57% | 5% | 95% | 42% | 58% | 68 | 70 | 65 | 65 |
| 4:00 | 1664 | 3114 | 31 | 217 | 1695 | 3331 | 35% | 65% | 13% | 88% | 34% | 66% | 69 | 70 | 65 | 65 |
| 5:00 | 3796 | 6243 | 228 | 1047 | 4024 | 7290 | 38% | 62% | 18% | 82% | 36% | 64% | 68 | 67 | 65 | 66 |
| 6:00 | 5571 | 7128 | 610 | 1119 | 6181 | 8247 | 44% | 56% | 35% | 65% | 43% | 57% | 67 | 67 | 65 | 64 |
| 7:00 | 6454 | 8109 | 932 | 1402 | 7386 | 9511 | 44% | 56% | 40% | 60% | 44% | 56% | 63 | 63 | 62 | 61 |
| 8:00 | 6150 | 7815 | 1006 | 1401 | 7156 | 9216 | 44% | 56% | 42% | 58% | 44% | 56% | 63 | 61 | 58 | 59 |
| 9:00 | 5671 | 6817 | 898 | 1361 | 6569 | 8178 | 45% | 55% | 40% | 60% | 45% | 55% | 63 | 63 | 58 | 61 |
| 10:00 | 5633 | 6713 | 1187 | 1250 | 6820 | 7963 | 46% | 54% | 49% | 51% | 46% | 54% | 61 | 56 | 56 | 57 |
| 11:00 | 5920 | 6586 | 1407 | 1280 | 7327 | 7866 | 47% | 53% | 52% | 48% | 48% | 52% | 44 | 58 | 38 | 59 |
| 12:00 | 6095 | 6723 | 1560 | 1378 | 7655 | 8101 | 48% | 52% | 53% | 47% | 49% | 51% | 46 | 59 | 41 | 59 |
| 13:00 | 6006 | 6557 | 1542 | 1129 | 7548 | 7686 | 48% | 52% | 58% | 42% | 50% | 50% | 29 | 64 | 25 | 62 |
| 14:00 | 5673 | 6394 | 1424 | 1321 | 7097 | 7715 | 47% | 53% | 52% | 48% | 48% | 52% | 25 | 53 | 19 | 51 |
| 15:00 | 4833 | 6924 | 1266 | 1158 | 6099 | 8082 | 41% | 59% | 52% | 48% | 43% | 57% | 20 | 64 | 15 | 62 |
| 16:00 | 4710 | 7133 | 1237 | 1189 | 5947 | 8322 | 40% | 60% | 51% | 49% | 42% | 58% | 17 | 61 | 13 | 59 |
| 17:00 | 4716 | 7224 | 1214 | 1151 | 5930 | 8375 | 39% | 61% | 51% | 49% | 41% | 59% | 17 | 64 | 13 | 62 |
| 18:00 | 5221 | 6535 | 1364 | 1042 | 6585 | 7577 | 44% | 56% | 57% | 43% | 46% | 54% | 22 | 66 | 17 | 64 |
| 19:00 | 5549 | 6013 | 1365 | 1043 | 6914 | 7056 | 48% | 52% | 57% | 43% | 49% | 51% | 24 | 68 | 19 | 63 |
| 20:00 | 5273 | 5308 | 1216 | 822 | 6489 | 6130 | 50% | 50% | 60% | 40% | 51% | 49% | 28 | 66 | 25 | 63 |
| 21:00 | 5594 | 5194 | 1427 | 759 | 7021 | 5953 | 52% | 48% | 65% | 35% | 54% | 46% | 44 | 67 | 38 | 63 |
| 22:00 | 4875 | 4549 | 1051 | 559 | 5926 | 5108 | 52% | 48% | 65% | 35% | 54% | 46% | 70 | 67 | 63 | 63 |
| 23:00 | 3543 | 3399 | 434 | 316 | 3977 | 3715 | 51% | 49% | 58% | 42% | 52% | 48% | 70 | 69 | 66 | 65 |

LOWEST SPEED



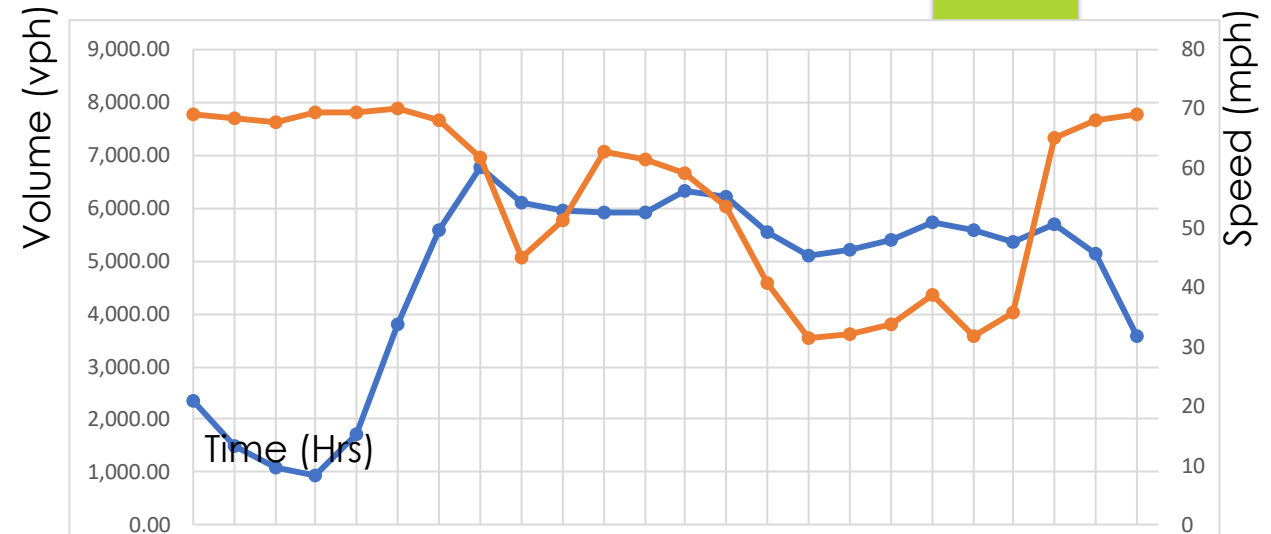
Cells in blue with >65% are when apparent volume split occurs.



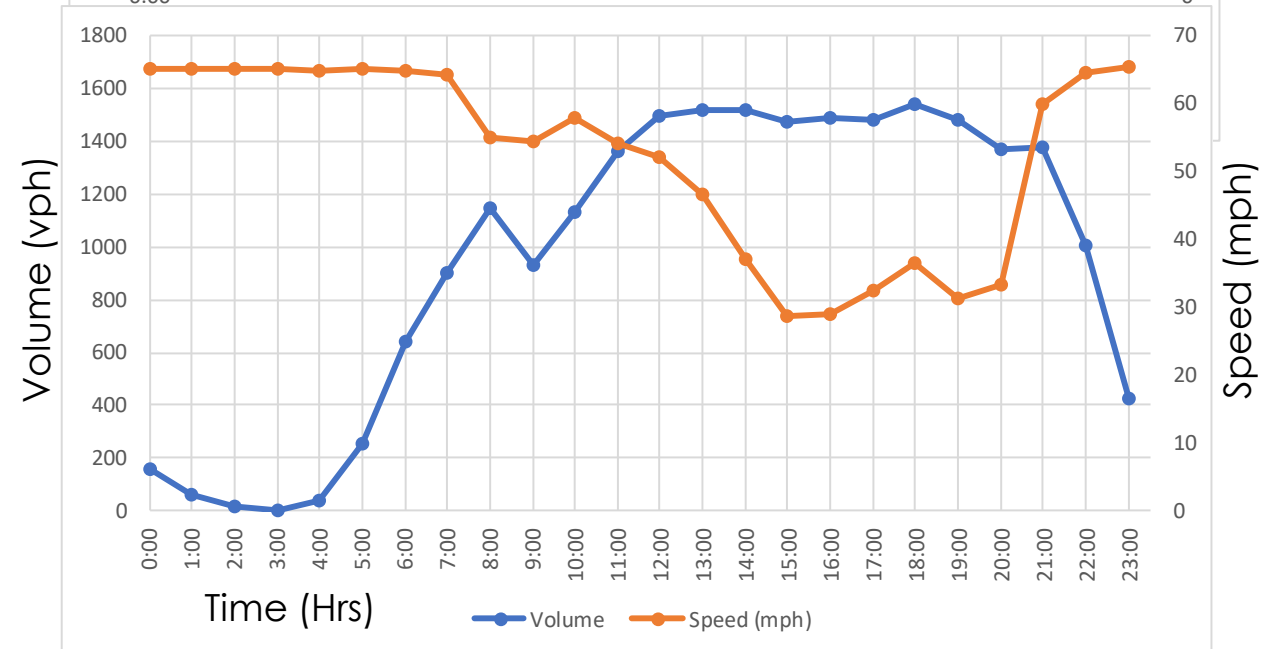
DIRECTIONAL VOLUME AND SPEED COMPARISON I-405 NB

AT SANTA FE AVE.

GENERAL PURPOSE (4 LANES)



HOV ONLY (1 LANE)

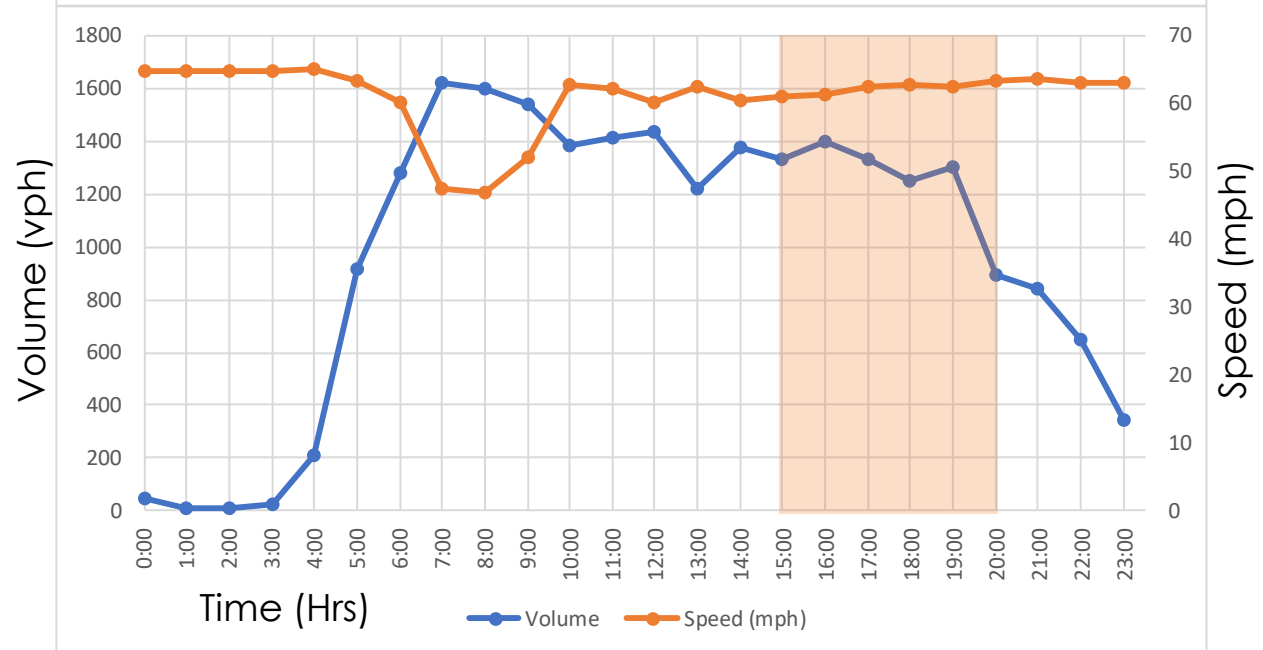
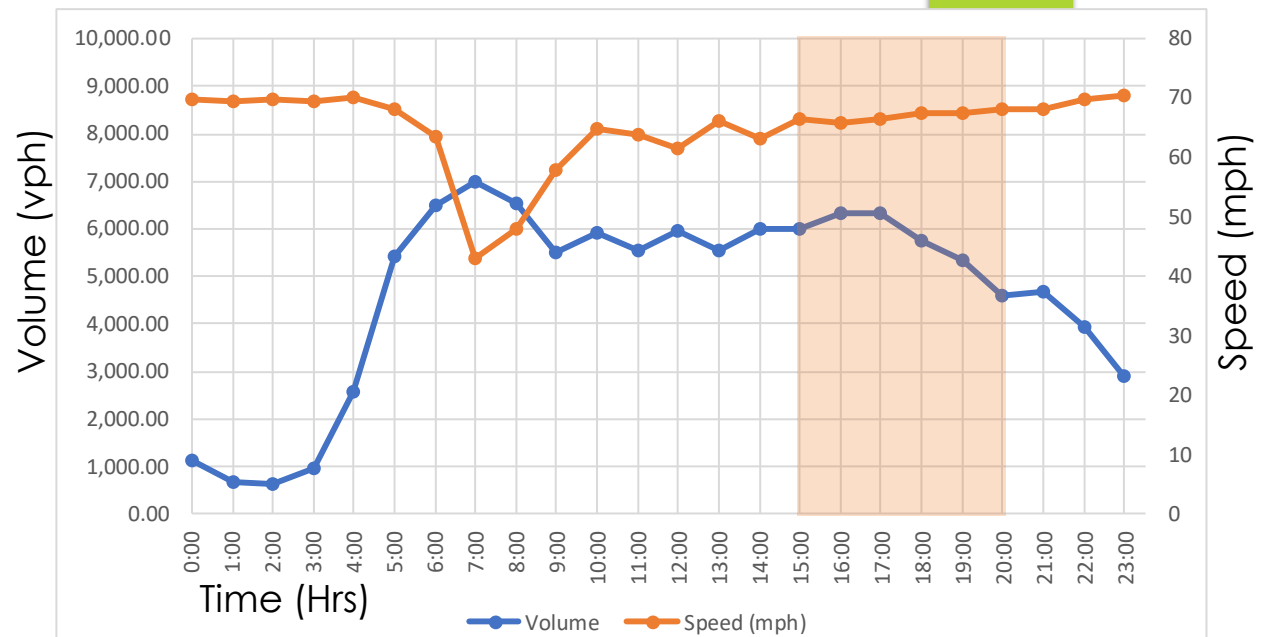


DIRECTIONAL VOLUME AND SPEED COMPARISON I-405 SB

AT SANTA FE AVE.

GENERAL PURPOSE (4 LANES)

HOV ONLY (1 LANE)

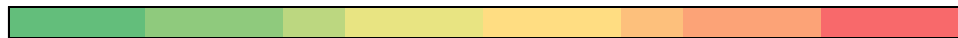


DIRECTIONAL VOLUME SPLIT AT SANTA FE AVE.

SANTA FE AVE (PM 8.02) - DIRECTIONAL LANE CONFIGURATION: 4 GP & 1 HOV

| Time | Directional Volume (vph) | | Directional Volume (vph) | | Directional Volume (vph) | | Volume Split (%) | | | | | | Average Speed (mph) | | | |
|-------|--------------------------|--------------------|--------------------------|--------------------|--------------------------|--------------|------------------|-------|-----------|-----------|--------------|--------------|---------------------|-------|--------|--------|
| | SB GP (4 lanes) | NB GP (4 lanes) | SB HOV (1 lane) | NB HOV (1 lane) | SB GP+HOV | NB GP+HOV | SB GP | NB GP | SB HOV | NB HOV | SB GP+HOV | NB GP+HOV | SB GP | NB GP | SB HOV | NB HOV |
| 0:00 | 2344 | 1132 | 160 | 46 | 2504 | 1178 | 67% | 33% | 78% | 22% | 68% | 32% | 65 | 70 | 65 | 65 |
| 1:00 | 1478 | 652 | 59 | 11 | 1537 | 663 | 69% | 31% | 84% | 16% | 70% | 30% | 65 | 69 | 65 | 65 |
| 2:00 | 1094 | 630 | 13 | 6 | 1107 | 636 | 63% | 37% | 68% | 32% | 64% | 36% | 65 | 70 | 65 | 65 |
| 3:00 | 928 | 953 | 4 | 24 | 932 | 977 | 49% | 51% | 14% | 86% | 49% | 51% | 65 | 69 | 65 | 65 |
| 4:00 | 1729 | 2580 | 35 | 211 | 1764 | 2791 | 40% | 60% | 14% | 86% | 39% | 61% | 65 | 70 | 65 | 65 |
| 5:00 | 3798 | 5436 | 254 | 916 | 4052 | 6352 | 41% | 59% | 22% | 78% | 39% | 61% | 65 | 68 | 65 | 64 |
| 6:00 | 5593 | 6480 | 643 | 1283 | 6236 | 7763 | 46% | 54% | 33% | 67% | 45% | 55% | 65 | 64 | 65 | 60 |
| 7:00 | 6774 | 6992 | 905 | 1626 | 7679 | 8618 | 49% | 51% | 36% | 64% | 47% | 53% | 64 | 43 | 64 | 48 |
| 8:00 | 6120 | 6534 | 1145 | 1603 | 7265 | 8137 | 48% | 52% | 42% | 58% | 47% | 53% | 55 | 48 | 55 | 47 |
| 9:00 | 5969 | 5521 | 929 | 1540 | 6898 | 7061 | 52% | 48% | 38% | 62% | 49% | 51% | 54 | 58 | 54 | 52 |
| 10:00 | 5916 | 5935 | 1130 | 1384 | 7046 | 7319 | 50% | 50% | 45% | 55% | 49% | 51% | 58 | 65 | 58 | 63 |
| 11:00 | 5920 | 5545 | 1364 | 1415 | 7284 | 6960 | 52% | 48% | 49% | 51% | 51% | 49% | 54 | 64 | 54 | 62 |
| 12:00 | 6328 | 5967 | 1499 | 1435 | 7827 | 7402 | 51% | 49% | 51% | 49% | 51% | 49% | 52 | 61 | 52 | 60 |
| 13:00 | 6210 | 5549 | 1522 | 1222 | 7732 | 6771 | 53% | 47% | 55% | 45% | 53% | 47% | 47 | 66 | 47 | 63 |
| 14:00 | 5566 | 5979 | 1517 | 1377 | 7083 | 7356 | 48% | 52% | 52% | 48% | 49% | 51% | 37 | 63 | 37 | 61 |
| 15:00 | 5109 | 5999 | 1474 | 1333 | 6583 | 7332 | 46% | 54% | 53% | 47% | 47% | 53% | 29 | 67 | 29 | 61 |
| 16:00 | 5211 | 6319 | 1491 | 1402 | 6702 | 7721 | 45% | 55% | 52% | 48% | 46% | 54% | 29 | 66 | 29 | 61 |
| 17:00 | 5390 | 6345 | 1485 | 1332 | 6875 | 7677 | 46% | 54% | 53% | 47% | 47% | 53% | 33 | 67 | 33 | 62 |
| 18:00 | 5721 | 5748 | 1543 | 1251 | 7264 | 6999 | 50% | 50% | 55% | 45% | 51% | 49% | 37 | 68 | 37 | 63 |
| 19:00 | 5599 | 5324 | 1481 | 1300 | 7080 | 6624 | 51% | 49% | 53% | 47% | 52% | 48% | 31 | 68 | 31 | 63 |
| 20:00 | 5379 | 4580 | 1372 | 891 | 6751 | 5471 | 54% | 46% | 61% | 39% | 55% | 45% | 33 | 68 | 33 | 63 |
| 21:00 | 5694 | 4668 | 1377 | 844 | 7071 | 5512 | 55% | 45% | 62% | 38% | 56% | 44% | 60 | 68 | 60 | 64 |
| 22:00 | 5123 | 3937 | 1005 | 645 | 6128 | 4582 | 57% | 43% | 61% | 39% | 57% | 43% | 65 | 70 | 65 | 63 |
| 23:00 | 3567 | 2918 | 424 | 347 | 3991 | 3265 | 55% | 45% | 55% | 45% | 55% | 45% | 65 | 70 | 65 | 63 |

LOWEST SPEED



Lowest Volume

Highest Volume

Cells in red with >65% are when apparent volume split occurs.



< 35 MPH

> 60 MPH

SUMMARY OF FINDINGS & CONCLUSION

- ▶ Noticeable asymmetric traffic flow patterns (approx. 65/35 split) were observed only during off-peak hours in segment of the I-405 between Del Amo Blvd. and I-710.
- ▶ **During those hours, speeds are moderately high and minimal congestion is present, thus implementing Movable Barrier System will not be a viable investment.**
- ▶ Upon evaluation of other routes, the following locations exhibit similar conditions and movable barrier **will not be a viable investment**:
 - ▶ **Route 60** from Crossroad Parkway to Barford POC (Approx. 3.9 miles): Approximately 50/50 volume percentage split throughout the day.
 - ▶ **I-10** from Rio Hondo to I-605 (Approx. 2.8 miles): 65/35 volume split only occurs when vehicles are traveling at free-flow speed.
 - ▶ **Route 14** from I-5 to Newhall Avenue (Approx. 4.2 miles): 65/35 volume split occurs when vehicles are traveling at free-flow speed during 7:00PM to 1:00AM.
- ▶ Detailed traffic modeling and analysis needed to further assess other scenarios & alternatives.