

Pacific Highway SB Border Crossing Options

Preliminary Results

Pacific Highway Southbound: Then and Now

- In 2009, fewer trucks crossed the border during the test period (8:00AM-5:00PM)
 - Fewer used the fast lane
 - “Corrected” Inspection times were faster (e-manifest) than 2006, still lag 2002

	2002	2006	2009
% FAST	NA	35%	23%
Arrivals/Hour	78	65	51
Inspect Time-FAST (Sec)	NA	86	75
Inspect Time-Std (Sec)	57	120	98

Preliminary Results: Performance Measures

- For each scenario, summary data represents 25 separate 14-hour days (7:00 AM-9:00 PM)
 - Mean waiting time (minutes)
 - Average maximum (per day) waiting time (minutes)
 - Average % toll booth utilization
- Results presented for Standard lanes, FAST lane (if applicable), and system-wide (weighted average of Std and FAST)

Alternative FAST Configurations

- Current FAST configuration
- No FAST
- No passenger vehicles in truck lanes
- FAST-Lite
 - No shipper certification
- Congestion Pricing

Preliminary Results: Baseline Scenario

- Baseline scenario has two Standard lanes, one FAST lane
 - Uses corrected inspection times
 - Not much waiting at recession-level traffic volume

	Average Wait	Max Wait (Avg)	Utilization
Standard	8.25	32.79	61%
FAST	1.44	12.63	29%
System	6.71	28.24	50%

Preliminary Results: Uncorrected Times

- The longer waits observed during data collection were due to the longer service times
 - An observer in the booth increased the service times and waits

	Average Wait	Max Wait (Avg)	Utilization
Standard	31.57	71.28	73%
FAST	2.28	15.77	36%
System	24.97	58.76	61%

Preliminary Results: No FAST

- If the FAST booth were open to all traffic:
 - Wait times in the standard lanes drop significantly
 - System-wide average wait time increases slightly
 - FAST enrollees would have slight increase in average wait time (from 1.44 to 1.69 minutes)

	Average Wait	Max Wait (Avg)	Utilization
Standard	1.69	13.02	51%
FAST	0.00	0.00	0%
System	1.69	13.02	51%

Preliminary Results: FAST & No FAST, Busier Day

- The impact on FAST enrollees of opening the FAST lane becomes clear at higher demand levels
 - Arrivals increase by 25%

		Average Wait	Max Wait (Avg)	Utilization
2 Standard, 1 FAST lane	Standard	52.84	97.83	74%
	FAST	2.88	19.02	36%
	System	41.34	79.69	62%
		Average Wait	Max Wait (Avg)	Utilization
3 Standard lanes	Standard	11.09	44.17	65%
	FAST	0.00	0.00	0%
	System	11.09	44.17	65%

Preliminary Results: FAST & No FAST, Busiest Day

- Waits for FAST enrollees increase by a factor of ten at high (2002) demand levels
 - Arrivals increase by 50%

		Average Wait	Max Wait (Avg)	Utilization
2 Standard, 1 FAST lane	Standard	123.09	199.96	76%
	FAST	5.56	26.59	43%
	System	92.26	154.47	65%
		Average Wait	Max Wait (Avg)	Utilization
3 Standard lanes	Standard	58.97	101.21	75%
	FAST	0.00	0.00	0%
	System	58.97	101.21	75%

Preliminary Results: No Passenger Vehicles

- If passenger vehicles were routed to another booth-
 - Wait times in the standard lanes drop noticeably

	Average Wait	Max Wait (Avg)	Utilization
Standard	4.97	23.40	57%
FAST	1.39	12.06	29%
System	4.13	20.74	48%

Preliminary Results: No Passenger Vehicles and Busier Day

- The benefits of removing passenger vehicles from the system hold as the system gets busier
 - Arrivals increase by 25%

		Average Wait	Max Wait (Avg)	Utilization
With passenger vehicles	Standard	52.84	97.83	74%
	FAST	2.88	19.02	36%
	System	41.34	79.69	62%
		Average Wait	Max Wait (Avg)	Utilization
Without passenger vehicles	Standard	31.02	70.84	70%
	FAST	2.73	18.07	36%
	System	24.35	58.41	59%

Preliminary Results: No Passenger Vehicles and Busiest Day

- ...and busier
 - Arrivals increase by 50%

		Average Wait	Max Wait (Avg)	Utilization
With passenger vehicles	Standard	123.09	199.96	76%
	FAST	5.56	26.59	43%
	System	92.26	154.47	65%
		Average Wait	Max Wait (Avg)	Utilization
Without passenger vehicles	Standard	99.61	157.96	76%
	FAST	5.49	26.27	42%
	System	75.26	123.89	64%

Preliminary Results: “FAST-Lite”

- If FAST lane open to C-T PAT approved carriers and drivers (shippers not approved)
 - FAST usage jumps to 44% of traffic
 - Wait times in the standard lanes drop noticeably
 - Unrealistic results – FAST trucks would choose standard lanes

	Average Wait	Max Wait (Avg)	Utilization
Standard	1.53	11.01	48%
FAST	17.01	55.97	52%
System	7.91	29.56	49%

Preliminary Results: “FAST-Lite” and Busier Day

- Increasingly unrealistic results with a busier day
 - Arrivals increase by 25%

		Average Wait	Max Wait (Avg)	Utilization
Regular FAST	Standard	52.84	97.83	74%
	FAST	2.88	19.02	36%
	System	41.34	79.69	62%
		Average Wait	Max Wait (Avg)	Utilization
FAST-Lite	Standard	5.93	28.22	59%
	FAST	70.67	127.34	63%
	System	31.95	68.06	60%

Preliminary Results: More FAST Enrollees

- What if FAST enrollment jumps to 30%?
 - Advantage of FAST declines at current low traffic volumes

	Average Wait	Max Wait (Avg)	Utilization
Standard	4.05	20.76	56%
FAST	3.11	17.87	37%
System	3.77	19.90	49%

Preliminary Results: More FAST Enrollees

- Increased traffic volumes restores some of the FAST advantage
 - Arrivals increase by 25%

		Average Wait	Max Wait (Avg)	Utilization
23% FAST	Standard	52.84	97.83	74%
	FAST	2.88	19.02	36%
	System	41.34	79.69	62%
		Average Wait	Max Wait (Avg)	Utilization
30% FAST	Standard	24.26	61.92	69%
	FAST	9.92	38.06	47%
	System	19.93	54.71	62%

Preliminary Results: Tolling Option

- At current volumes, not much advantage for users to pay toll to access FAST lane (3.5% of traffic)
 - \$50/Hour VOTT
 - 98% chance < 30 minute wait

	Average Wait	Max Wait (Avg)	Utilization
Standard	4.48	23.60	58%
FAST	2.31	17.02	34%
System	3.91	21.88	50%

Preliminary Results: Tolling Option

- Heavier traffic volumes make tolling slightly more attractive (4.3%)
 - Arrivals increase by 25%

		Average Wait	Max Wait (Avg)	Utilization
No Tolling Option	Standard	52.84	97.83	74%
	FAST	2.88	19.02	36%
	System	41.34	79.69	62%
		Average Wait	Max Wait (Avg)	Utilization
Tolling Option	Standard	38.18	84.81	71%
	FAST	4.43	23.80	44%
	System	29.00	68.21	62%

Preliminary Results: Tolling Option

- Tolling still attractive option (3.6%) for drivers at 2002 volumes, but less “free” FAST slots
 - Arrivals increase by 50%

		Average Wait	Max Wait (Avg)	Utilization
No Tolling Option	Standard	123.09	199.96	76%
	FAST	5.56	26.59	43%
	System	92.26	154.47	65%
		Average Wait	Max Wait (Avg)	Utilization
Tolling Option	Standard	112.94	184.58	76%
	FAST	7.10	30.10	51%
	System	82.32	139.89	67%

Tentative Conclusions

- Optimal configuration depends on traffic volume and FAST enrollment levels
 - “Recession” traffic – FAST less of a carrot AND less of a traffic management tool
 - Lower FAST levels – more “free” FAST capacity available
- Incremental improvements are possible
 - Rerouting passenger vehicles
- “FAST-Lite” or significantly higher FAST enrollment would require additional FAST capacity

Key Questions-

- Relative importance of objectives
 - FAST enrollment [enhanced security]
 - Less overall waiting
- If waiting time trumps all, open FAST lane to all traffic
- If FAST enrollment is important, need to maintain “service gap” between FAST and Standard
 - Incremental improvements
 - Tolling option

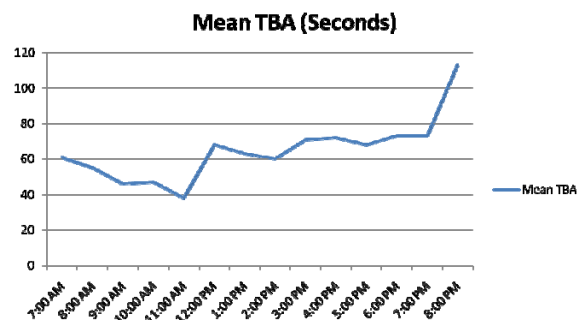
Assumptions Section

Assumptions

- Baseline 2009 Scenario based on data collected on:
 - Wed, 6/17/09, 7:00 AM – 1:00 PM
 - Thur, 6/18/09, 7:00 AM – 1:00 PM
 - Mon, 6/22/09, 1:00 PM – 9:00 PM
 - Tues, 6/23/09, 1:00 PM – 9:00 PM

Assumptions: Arrivals

- Interarrival time distribution –
 - Exponential
 - Mean TBA (Time Between Arrivals) changes each hour



Assumptions: Vehicle Types

- Twelve different vehicle types
 - Proportion based on average over study period
 - Unidentified vehicles (4.2%) assigned proportionately to twelve existing types

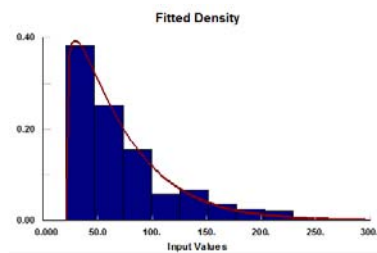
<u>Vehicle Type</u>	<u>Fraction</u>
LightTruck	7.7%
Other	1.3%
PassengerVehicle	4.0%
PickupTruck	2.4%
TractorContainer	4.1%
TractorFlatbed	10.5%
TractorOnly	1.7%
TractorOther	1.6%
TractorTank	8.0%
TractorVan	57.5%
Truck	0.3%
TruckTrailer	0.8%

Assumptions: Service Times

- Service time distribution–
 - Different distributions fitted for five vehicle groups, for FAST and Standard lanes
 - Group 1: Light trucks
 - Group 2: Other, passenger vehicles, pickups
 - Group 3: Tractor container, tractor-other, truck, truck-trailer
 - Group 4: Tractor-flatbed, tractor-only, tractor-tank
 - Group 5: Tractor-van
 - Groupings based upon:
 - Similarity of service time distributions
 - Need for critical number of observations per group for distribution-fitting

Assumptions: Service Times

- Service time distribution–
 - 3-parameter gamma distribution used for FAST and Standard service times
 - “Corrected” service times used in baseline scenario

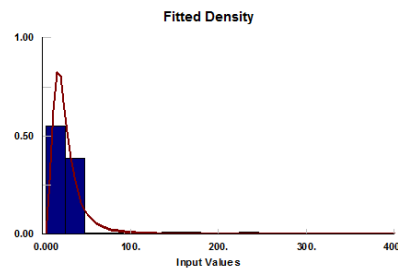


Assumptions: Transition Times

- Transition time distribution–
 - Transition time calculated by subtracting booth departure time from booth arrival time of following vehicle
 - Calculation only performed when vehicle waited in line
 - Distinct transition time distribution calculated for each FAST/Standard – Vehicle group combination

Assumptions: Transition Times

- Transition time distribution–
 - 3-parameter log-logistic distribution used for FAST and Standard transition times
 - Log-logistic distribution reflects long-tailed positive skewness of transition times (generally small, with some very large values)



Assumptions: FAST & Parking

- FAST usage and parking usage probabilities differ by vehicle type
 - Overall FAST usage: 22.5%
 - Overall parking usage: 1.3%

Vehicle Type	FAST %	Parking %
LightTruck	12%	2%
Other	10%	0%
PassengerVehicle	3%	2%
PickupTruck	11%	3%
TractorContainer	34%	0%
TractorFlatbed	15%	1%
TractorOnly	42%	0%
TractorOther	16%	0%
TractorTank	68%	0%
TractorVan	20%	2%
Truck	20%	0%
TruckTrailer	8%	0%