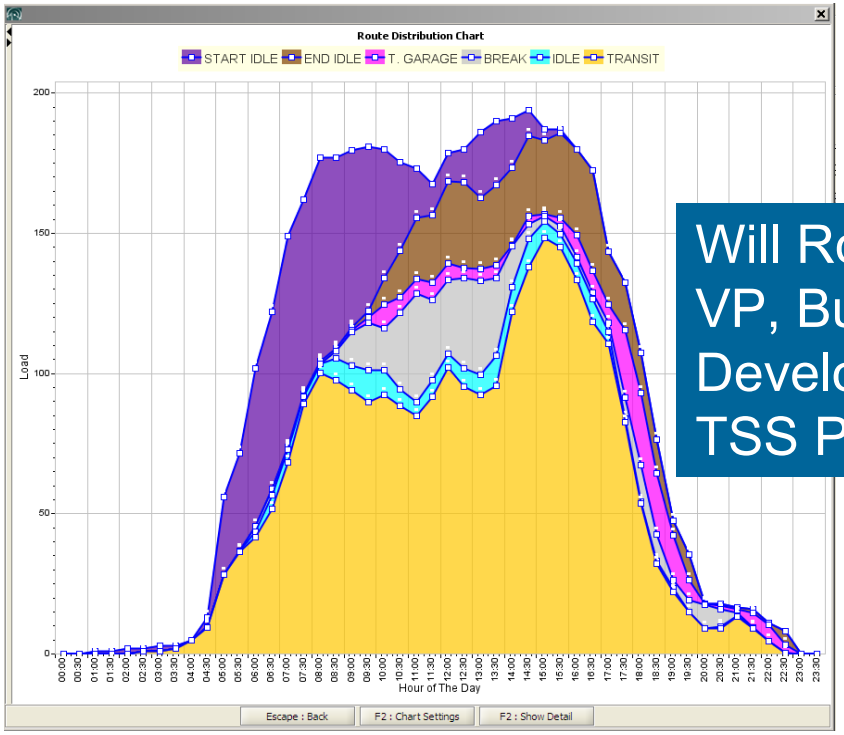
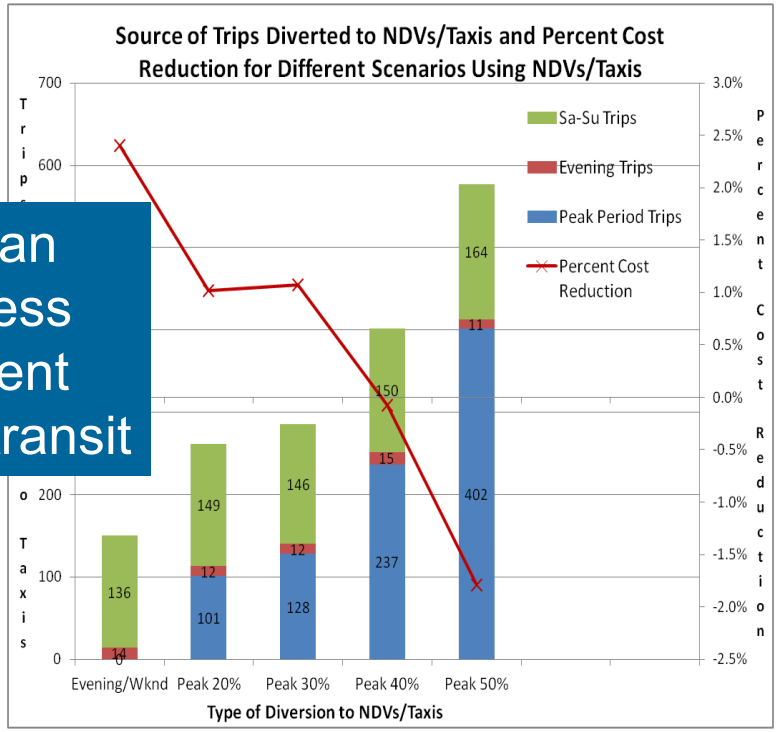
How Analytic Reporting Can Identify and Solve Paratransit Service Shortcomings





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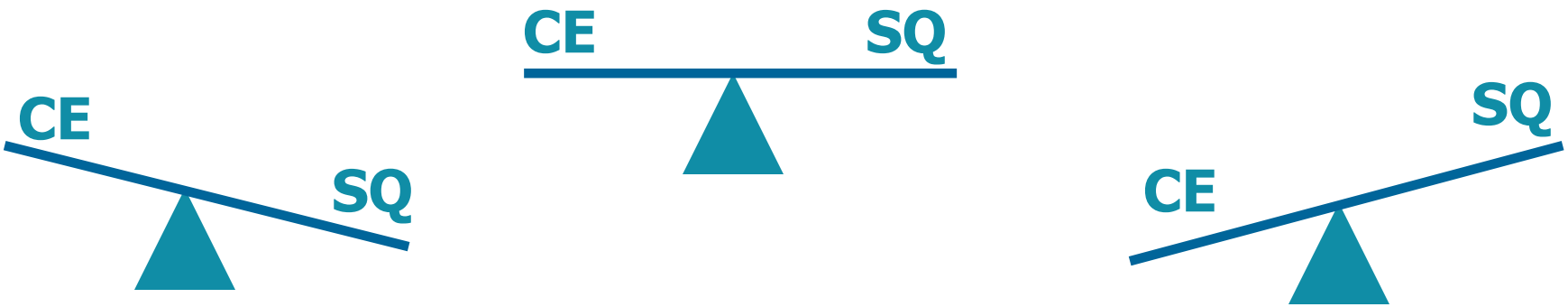
TSS PARATRANSIT
transportation software solutions

Let's Start at the Beginning

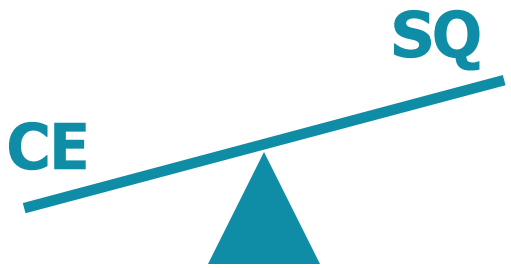
A goal of most paratransit systems: to minimize unit costs while maintaining service standards.



What is the "right" balance of
Cost Efficiency (CE) and Service Quality (SQ)
for your system.

Achieving the Optimal Balance btw Cost Efficiency and Service Quality

- Cost efficiency measured in cost per trip
- Cost efficiency mostly derived from:
  - Competitive service provider rates and incentives
  - Productive schedules; reducing miles thru shared-rides
  - Run structures that mirror demand profile
  - Strategic use of non-dedicated service providers



A truism: The tighter the schedule, the more OTP is reduced.

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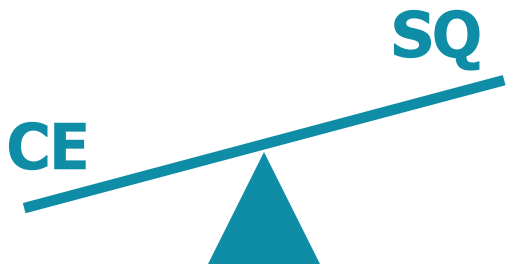

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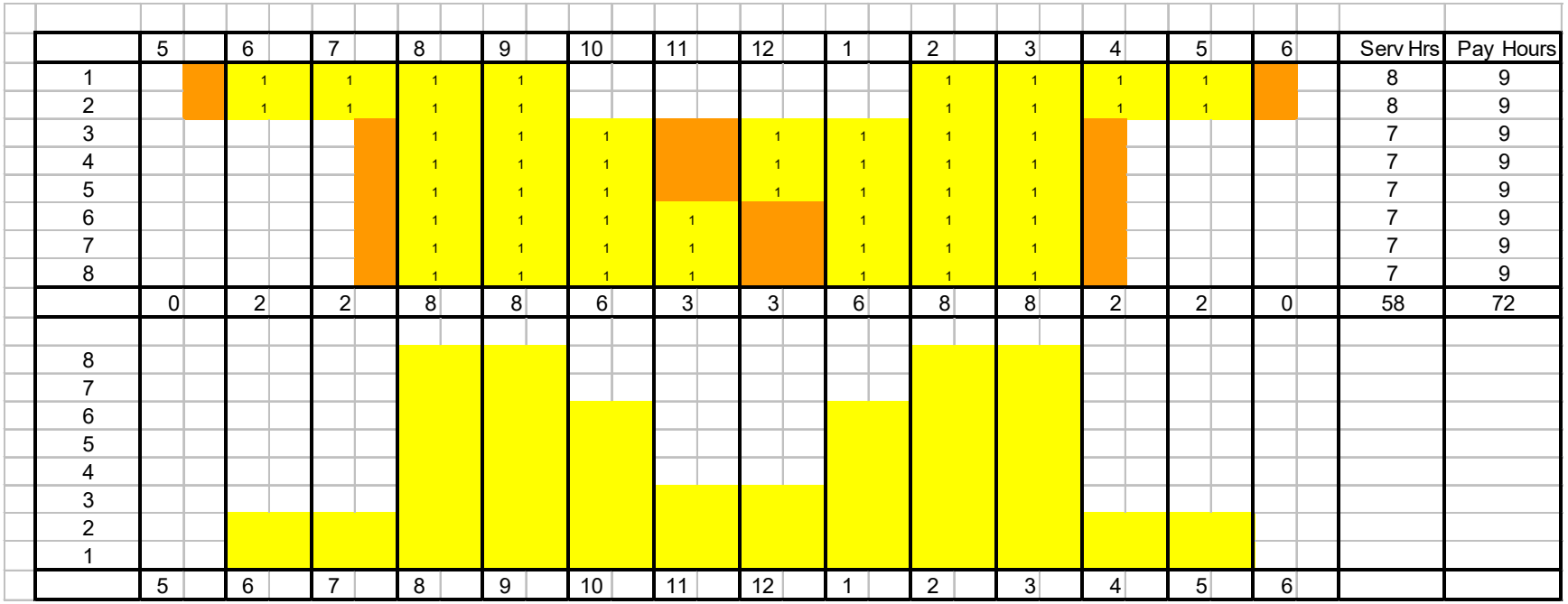
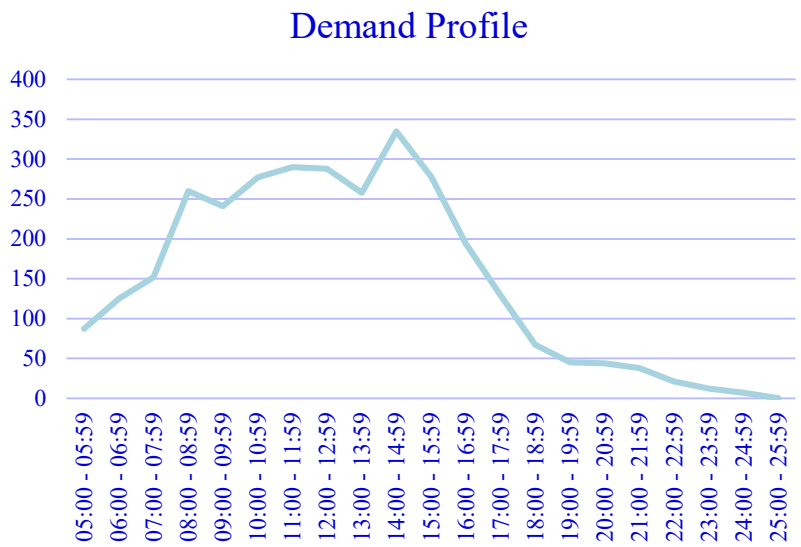
What is a Run Structure?

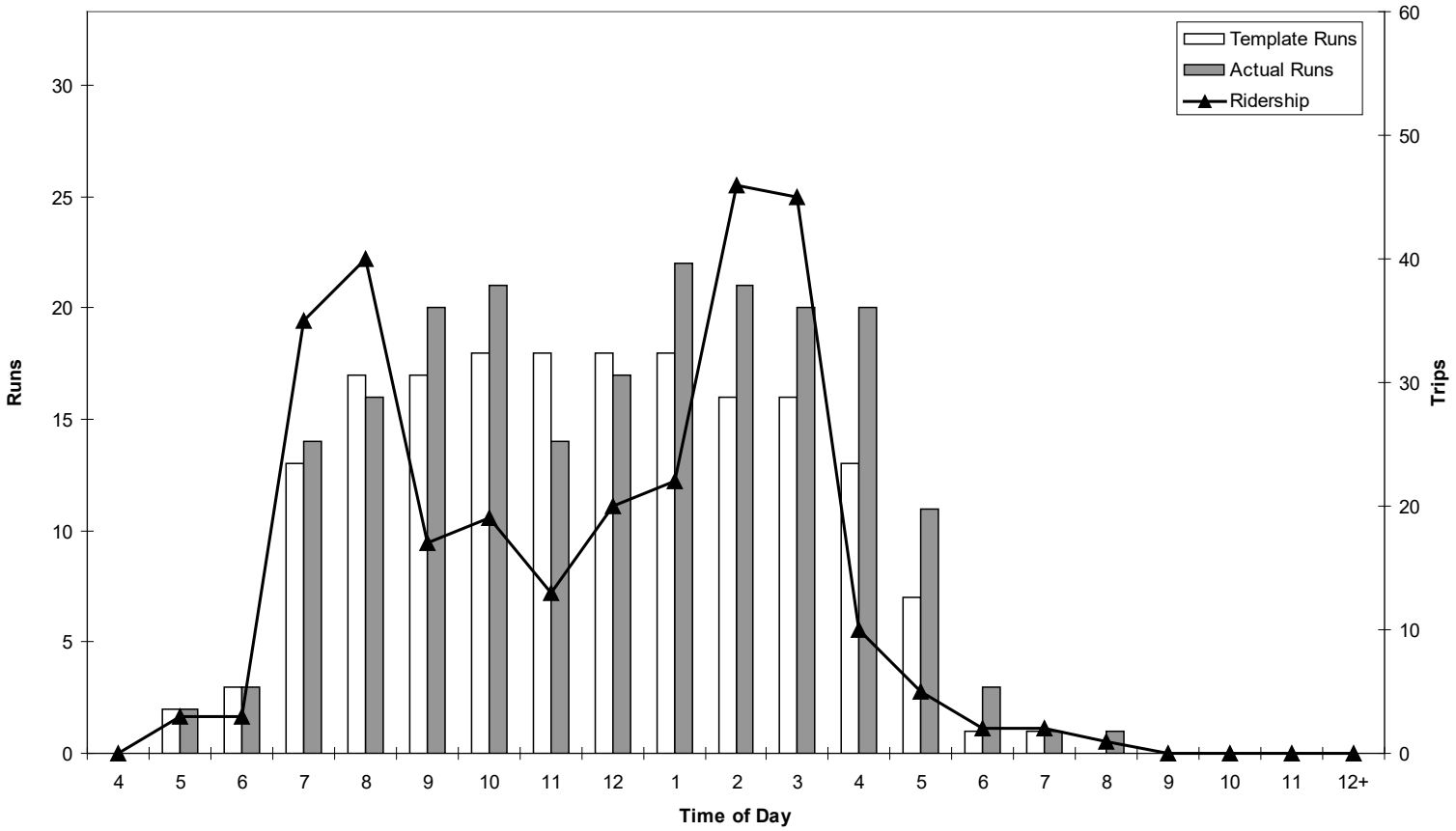


What is a Demand Profile?

- Graph of trips per hour for each hour or half hour of the service day
- Superimpose demand profile on run structure based on current productivity



Run Structure vs. Demand Profile



Case Study #1

Addressing a Suboptimal Run Structure

Case Study #1: The Problem

- OTP really low overall
- OTP really low in afternoon (54-82%)
- Not enough supply of service in the afternoon
- Could existing run start times be shifted to increase supply of service in the afternoon?

Case Study #1: The Guidleines

- Short-term band aids needed until runs re-bid
- Increase the capacity between the hours of 13:00 and 19:00, when OTP is the lowest.
- Minimize number of runs impacted
- Focus: shift runs from oversupply periods
- Cost neutral solutions

- Band Aid #1: Shift runs w/o adjusting run length
- Band Aid #2: Shift runs with length adjustments

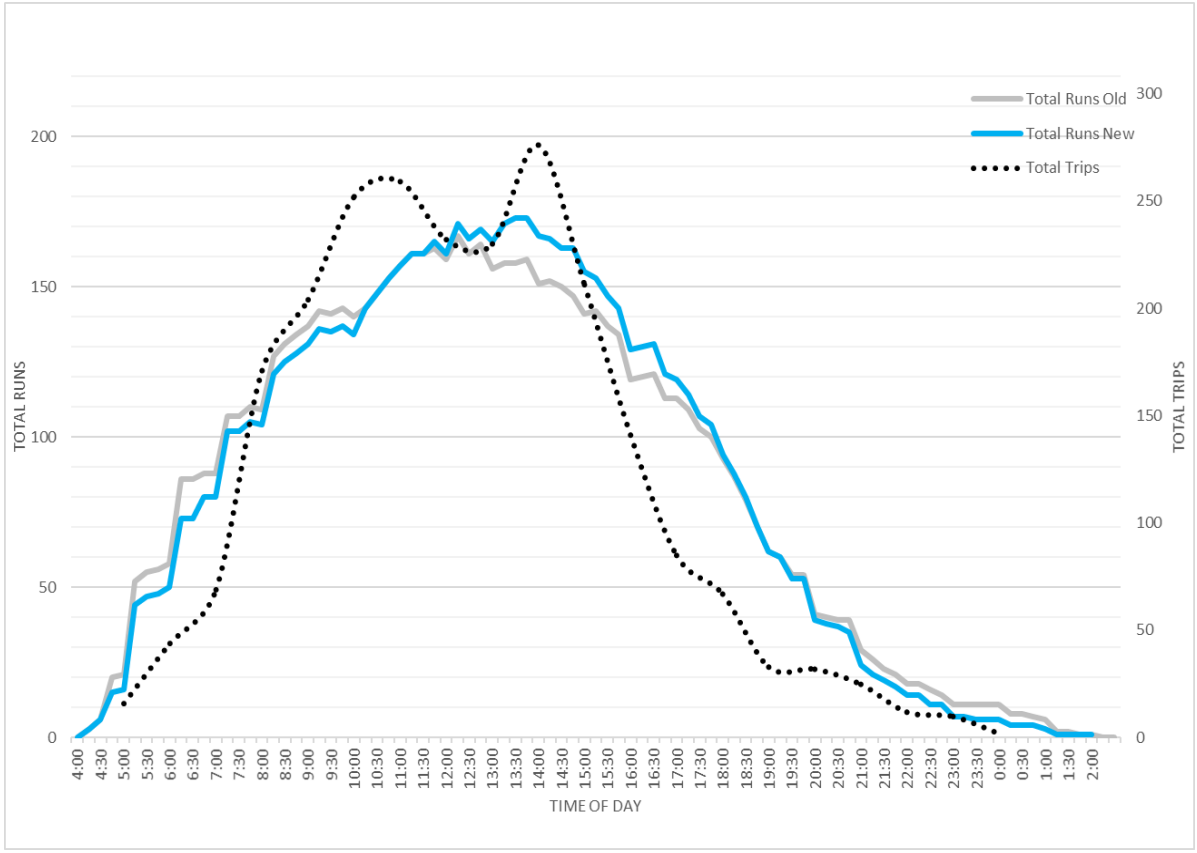
Before OTP – Week of 6/12/17

Trip Type	On-Time Percentage
ADA Paratransit Trips	84.94%
Premium Trips	86.69%

OTP in Afternoon = 54% to 82%

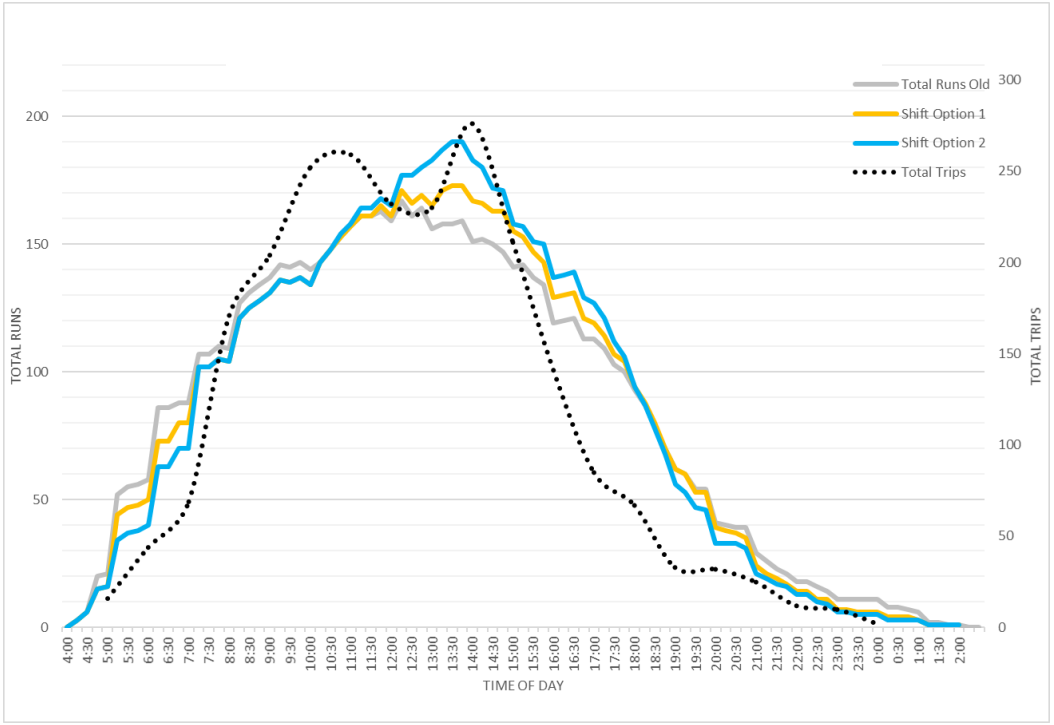
BA #1: Shift Run Start Times Only

- What do we notice?
- Over-supply
  - <9:00 am
  - >3:00 pm
- Under-supply
  - 9:00-noon
  - 1:00-3:00
- BA #1 solution (blue) - addresses problem time



BA #2: Start Times & Adjustments

- Extended some AM shifts from 8 to 10 hours
- More capacity added from noon to 6 pm
- OTP problem in afternoon addressed



Before and After OTP

Trip Type	OTP Week of 6/12/17	OTP Week of 11/6/17
ADA Para Trips	84.94%	90.86%
Premium Trips	86.69%	94.99%

Before and After Productivity

	Trips - Week of 6/12/17	Trips - Week of 9/25/17		Before Productivity	After Productivity	
Monday	2053	2082	(1.4%)	1.434	1.504	(4.9%)
Tuesday	2329	2351	(0.9%)	1.485	1.539	(3.6%)
Wednesday	2384	2455	(3.0%)	1.479	1.537	(3.9%)
Thursday	2429	2435	(0.2%)	1.497	1.567	(4.7%)
Friday	2075	1975	(-4.8%)	1.456	1.534	(5.4%)

Productivity increases = 3.6% to 5.4%

Before and After and After OTP

Trip Type	OTP Week of 6/12/17	OTP Week of 11/6/17	OTP Week of 2/5/18
ADA Para Trips	84.94%	90.86%	94.72%
Premium Trips	86.69%	94.99%	95.17%

Optimization Tools

- Temporal/geographic analysis of accommodated demand, unassigned trips
- Filters to perform analyses of providers, fleets, vehicle types, service areas, days/times, dedicated vs. non-dedicated service providers
- Detail and summary (various subgrouping) of scheduling results
- Individual itinerary assessment

Optimization Tools (continued)

- Provides the ability to:
  - Modify run structure and forecast results
  - Assess impact of seasonal parameters
  - Assess impact of changing scheduling or on-time windows, provider cost, veh. capacity, changes in service zones, transfer points
- As input, any previously recorded scheduling snapshot can be loaded in and analyzed

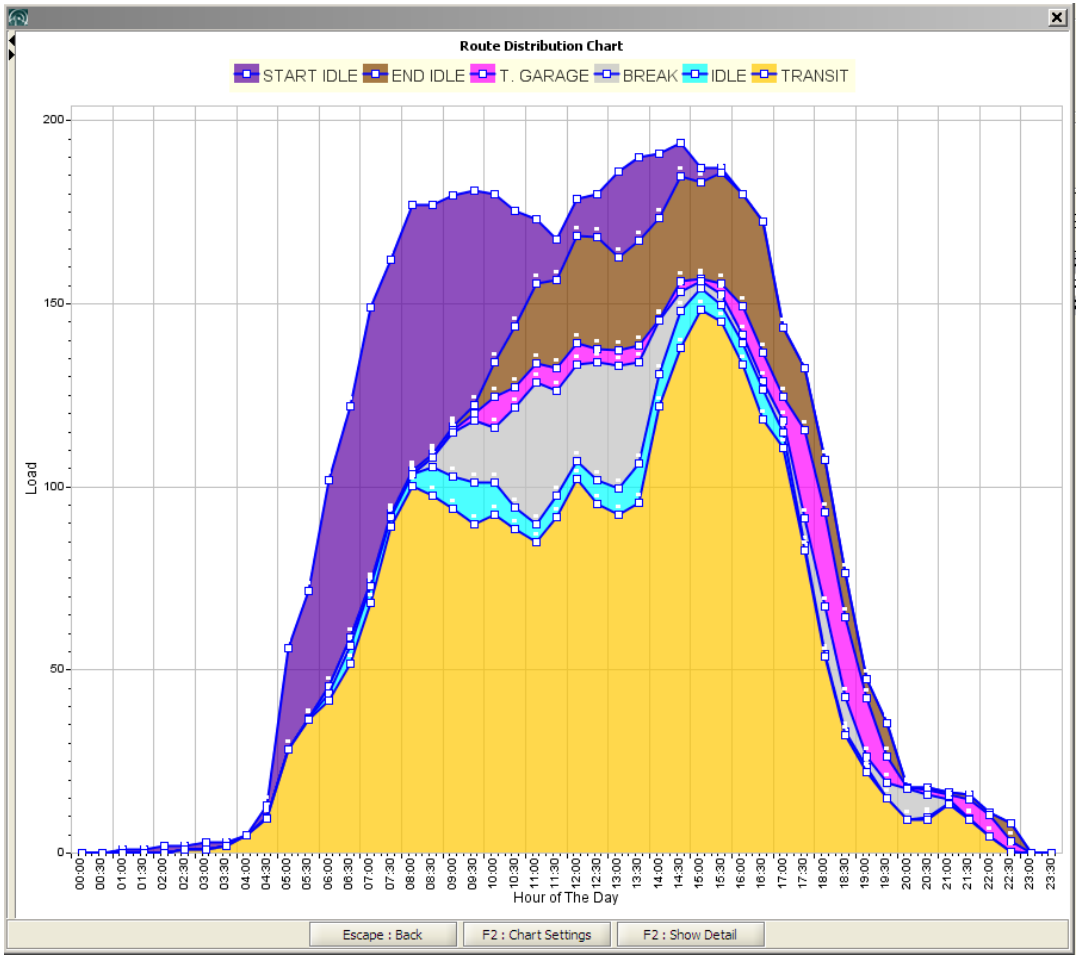
Metrics and More Metrics

- Number of Vehicles (Resources) Available, Used (Needed) and Utilization
- Number of Revenue Vehicle Hours
- Driver Regular Hours – Available, Used
- Driver Overtime Hours – Available, Used
- Idle Time, Dwell Time, Deadhead Time
- Average Productivity – Trips per RVH, Direct Miles per RVH

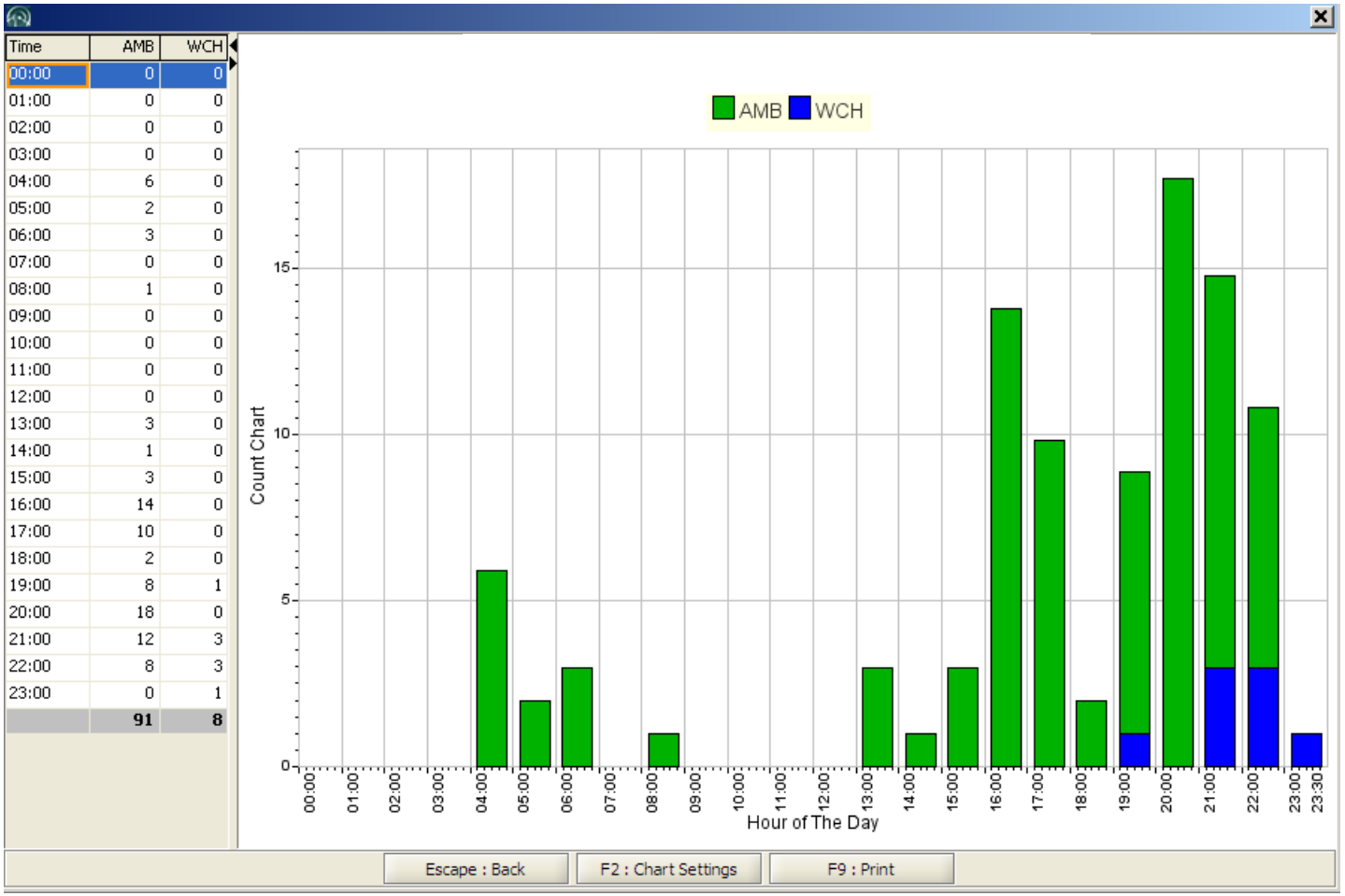
Metrics and More Metrics (cont'd)

- Percentage of Shared Trips
- Average Distance – Total and Direct
- Average Travel Time – Total and Direct
- Average Speed – Total and Direct
- Trips Assigned – Total, amb, w/c
- Trips Unassigned – Total, amb, w/c
- Percentage of On-Time and Late Trips
- Cost per trip, cost per RVM

Active & Inactive Service Supply



Unassigned Trips



Strategies / Simulations

- 1 Adjusted Start Times; Run Lengths Unchanged
- 2 Eliminated Zones and Inter-Zone Transfers
- 3 Scenarios 1+ 2
- 4 Scenario 3 plus 15% cancellations
- 5 Scenario 4; 10% advance + 5 % late/no-shows
- 6 Scenario 5 plus NDSPs

The Results

Scenario	Vehicles	Productivity	Cost Per Trip	Unassigned
Base	645	1.47	$33.96	358
1	645	1.49	$31.61	152
2	645	1.49	$33.63	326
3	645	1.49	$33.46	6
4	603	1.32	$37.91	--
5	572	1.42	$35.17	36
6	653/33	1.43	$34.69	--

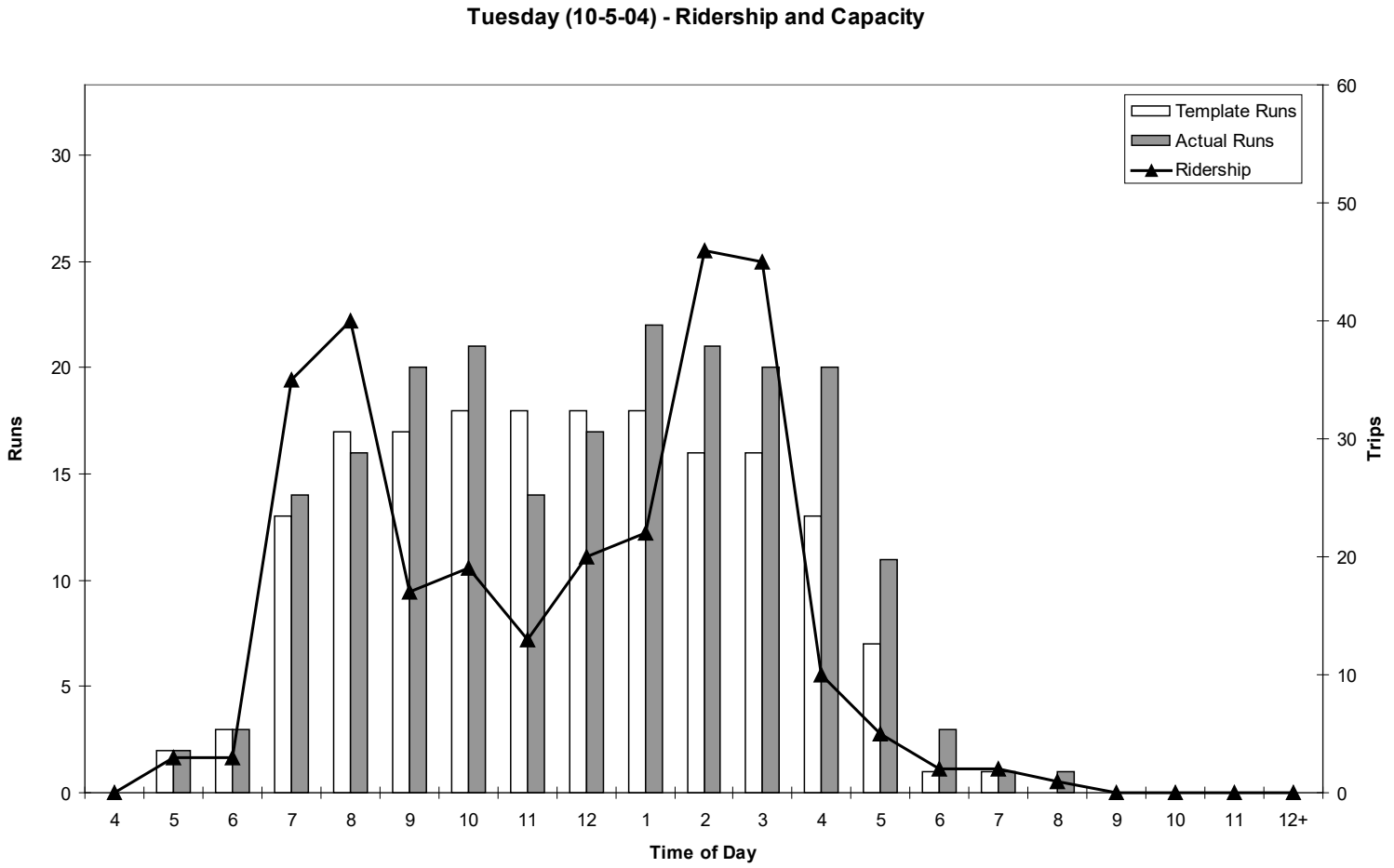
Scheduling Tests
1 Adjusted Start Times
2 Eliminated Zones/Transfers
3 Scenarios 1+ 2

Scheduling Tests and Simulations
4 Scenario 3 plus 15% cancellations
5 Scenario 4; 10% adv + 5% lates/NS
6 Scenario 5 plus NDSPs

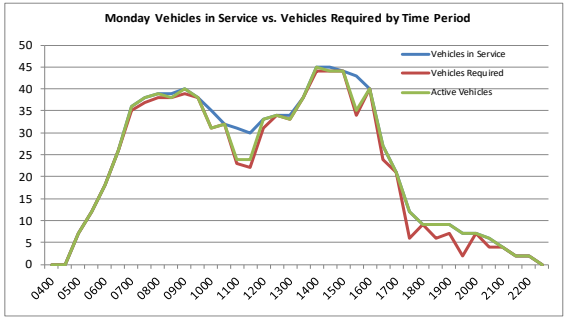
Case Study #2

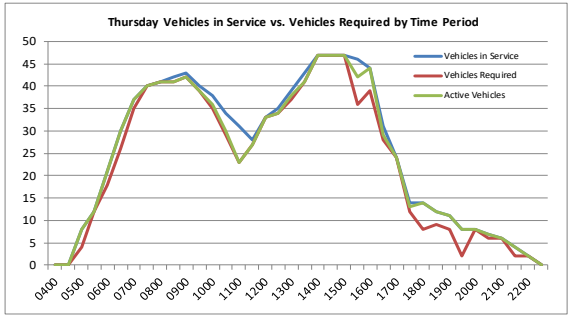
Addressing a Suboptimal Service Mix

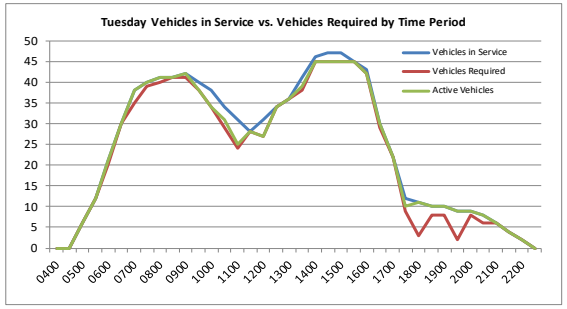
Case Study #2:
Run Structure vs. Demand Profile - October 2004

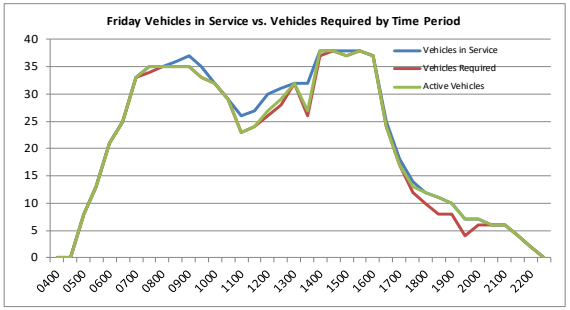


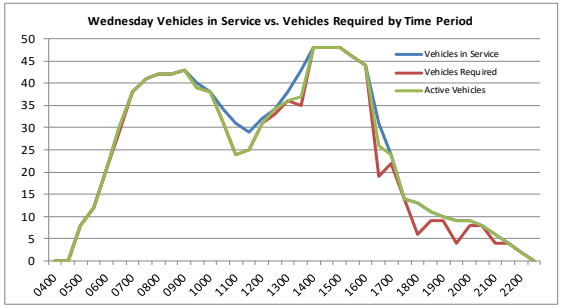
Case Study #2:
Run Structure vs. Demand Profile – May 2012









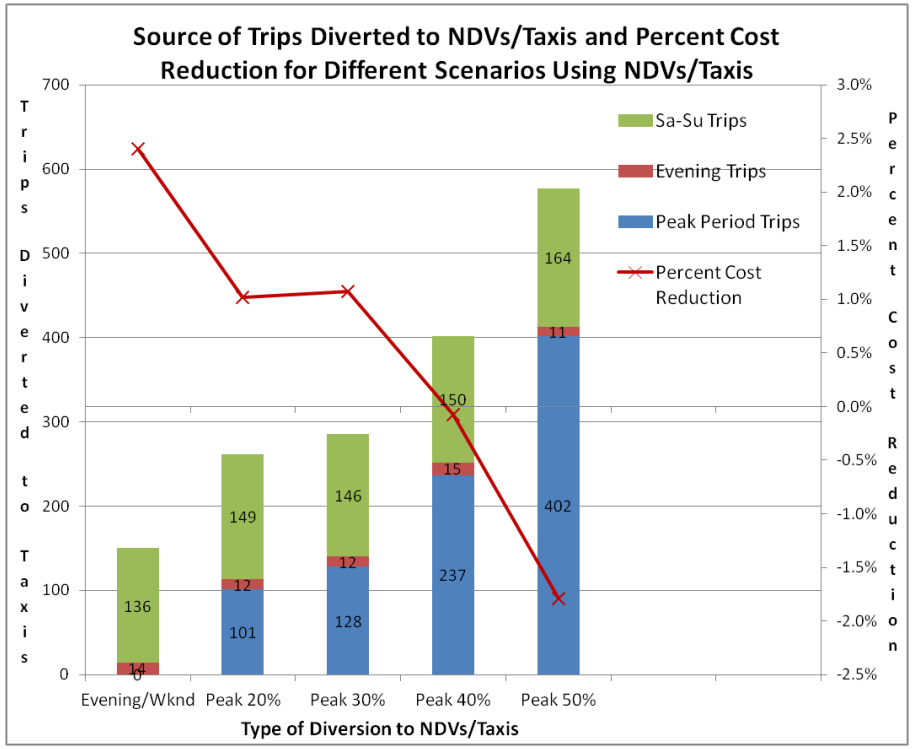


Case Study #2:
Run Structure Optimization Test – May 2012

	Weekly Total Vehicle Hours	Weekly Driver Hours	Max Vehicles in Service
Existing	2704	2887	52
Optimized	2674	2850	51
Difference	-1.1%	-1.3%	-1.9%

Case Study #2: Service Mix Analysis - May 2012

- Diverting peak period trips had diminishing returns. Why?
- Because weekday dedicated run structures were close to optimal
- Diverting trips to NDSPs during low-demand times (evenings and weekends) produced the most savings



Alternative Services

- Predicting ridership needed to reduce overall cost
- Predicting subsidy per trip needed to reduce overall cost
- At what point do the savings from diverted trips exceed the additional subsidy paid out for new trips generated

The Bet: What's the Break Even Point?

ASSUMPTIONS	
Transit Agency	**Taxi Subsidy Program**
Cost/trip: **$37** Less Fare: **$4** Subsidy: **$33**	If Base Fare: **$2.50** If Subsidy: **$11.00**
Taxi subsidy must be below $33	*Customer can make a 5.5 mile trip for $2.50; pays over-age for longer trips*

OUTCOMES	
Cost **Reduced** if:	Cost **Increased** if:
Less than 2 new trips are generated for each diverted ADA trip	**More than 2** new trips are generated for each diverted ADA trip

Example: Transit Agency has $100,000 to invest on taxi subsidy pilot program

$100,000 = 9,090 trips (based on $11/trip subsidy) or max of 25 trips/day

If 3,030 are diverted and 6,060 are new, **Transit Agency breaks even.**
If 6,060 are diverted and 3,030 are new, **Transit Agency saves $100,000.**
If 4,545 are diverted and 4,545 are new, **Transit Agency saves $50,000.**

Thank you!

Questions?