

COMMUTER RAIL

System Planning



System Review Team Meeting

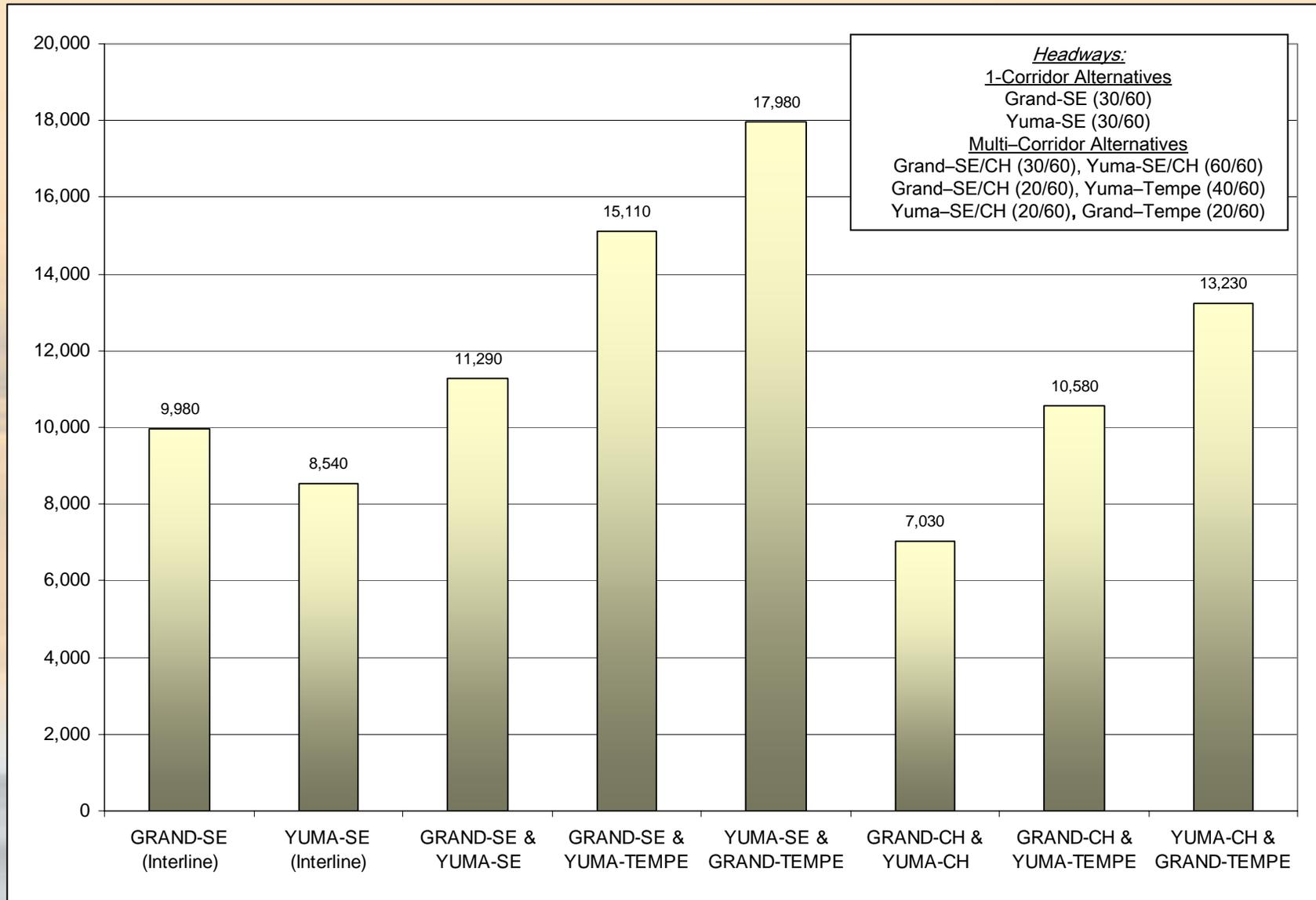
December 1, 2009

Agenda

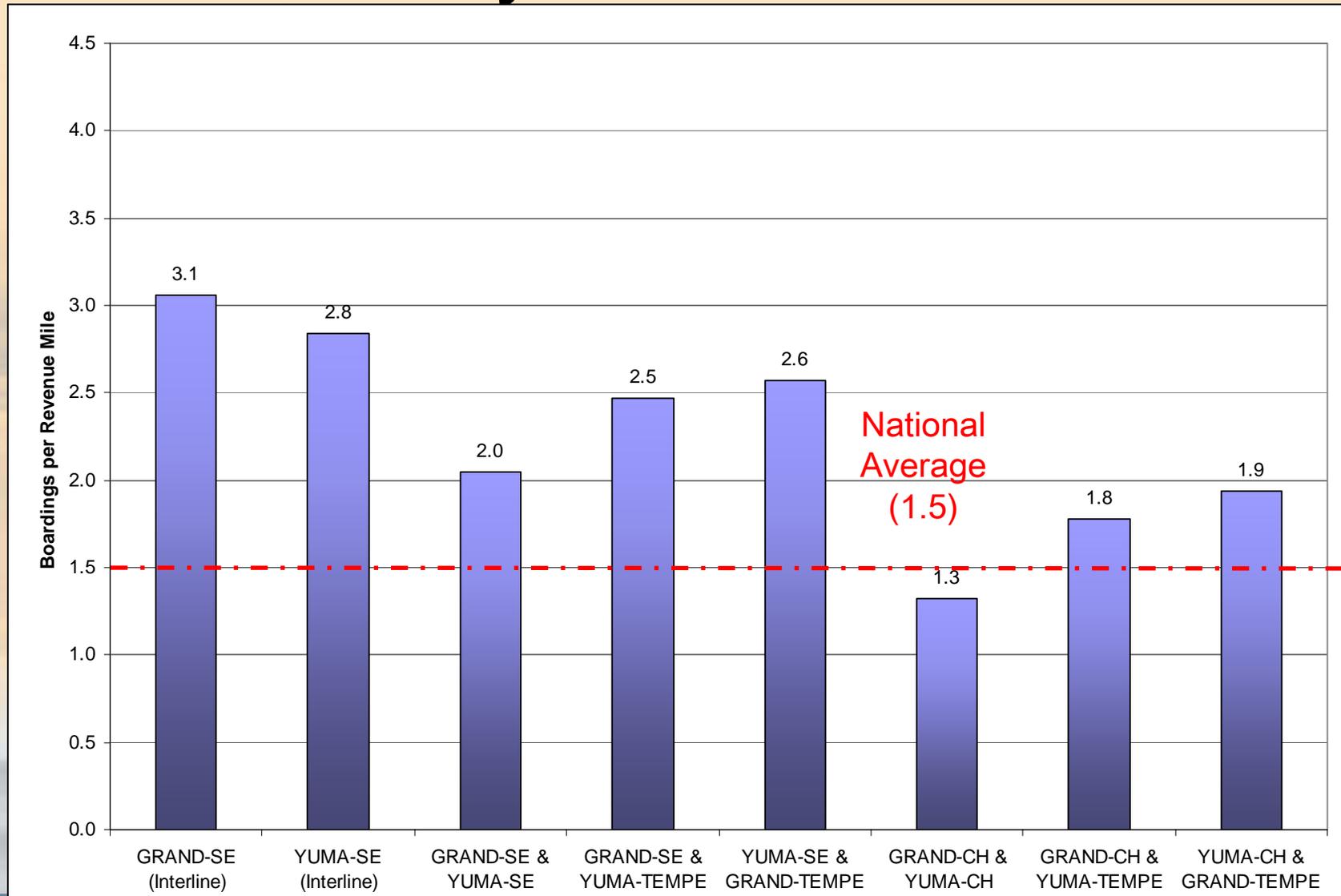
- ⟨ **Introduction**
- ⟨ **Ridership Forecasting Update**
- ⟨ **Evaluation Criteria and Rankings**
- ⟨ **Cost Effectiveness Evaluation**
- ⟨ **Next Steps**

Ridership Forecasting Update

2030 Daily CRT Ridership by Model Run



2030 Daily CRT Boardings per Revenue Mile by Model Run



Peer System Comparisons

Comparisons to Other Commuter Rail Systems

System	Start Year	Length (in route miles)	Trains Per Day (Weekday)	Daily Ridership (Weekday)
Altamont Commuter Express (ACE) (San Jose-Stockton, CA)	1998	86	6-8	3,700
Coaster (San Diego-Oceanside, CA)	1995	41	22	6,000
Front Runner (Salt Lake City-Ogden, UT)	2008	44	71	4,100
Metrolink, San Bernardino Line (Los Angeles-San Bernardino, CA)	1992	56	39	11,950
Metrolink, Ventura County Line (Los Angeles-Oxnard/Montalvo, CA)	1992	71	22	4,000
Music City Star (Nashville-Lebanon, TN)	2006	32	11	1,000
New Mexico Rail Runner Express (Santa Fe-Albuquerque-Belen, NM)	2006	93	24	4,500
Souder, North Line (Seattle-Everett, WA.)	2003	35	8	1,500
Souder, South Line (Seattle-Tacoma, WA.)	2000	47	18	11,000
Trinity Railway Express (TRE) (Dallas-Ft. Worth, TX)	1996	34	49	9,800

Base Sensitivity Test Results

Base Sensitivity Test Overview

Model Run	Description
A: Highway Project Removals	<ul style="list-style-type: none">• SR-801: I-10 Reliever (removed)• Loop 303: I-10 to SR 801 (removed as part of the SR-801 project)• SR-802: Williams Gateway (removed)• SR-153: (reverted from freeway back to 6-lane arterial)• I-17: Improvements (removed additional lane capacity between McDowell Rd. and Peoria Ave.)
B: Drive Access and Wait Time Refinements <i>(In Progress)</i>	<ul style="list-style-type: none">• Increased the maximum drive distance to all park-and-ride facilities to 10 miles.
C: Optimized System	<ul style="list-style-type: none">• Used most productive interlined commuter rail scenario from Round 2• Include station modifications on the Grand and Yuma corridors• Refined or added transit routes, stations, and transit connections along each corridor to provide better access to commuter rail• Used 2035 socioeconomic data

Scenario A Model Run Results Highway Project Removals

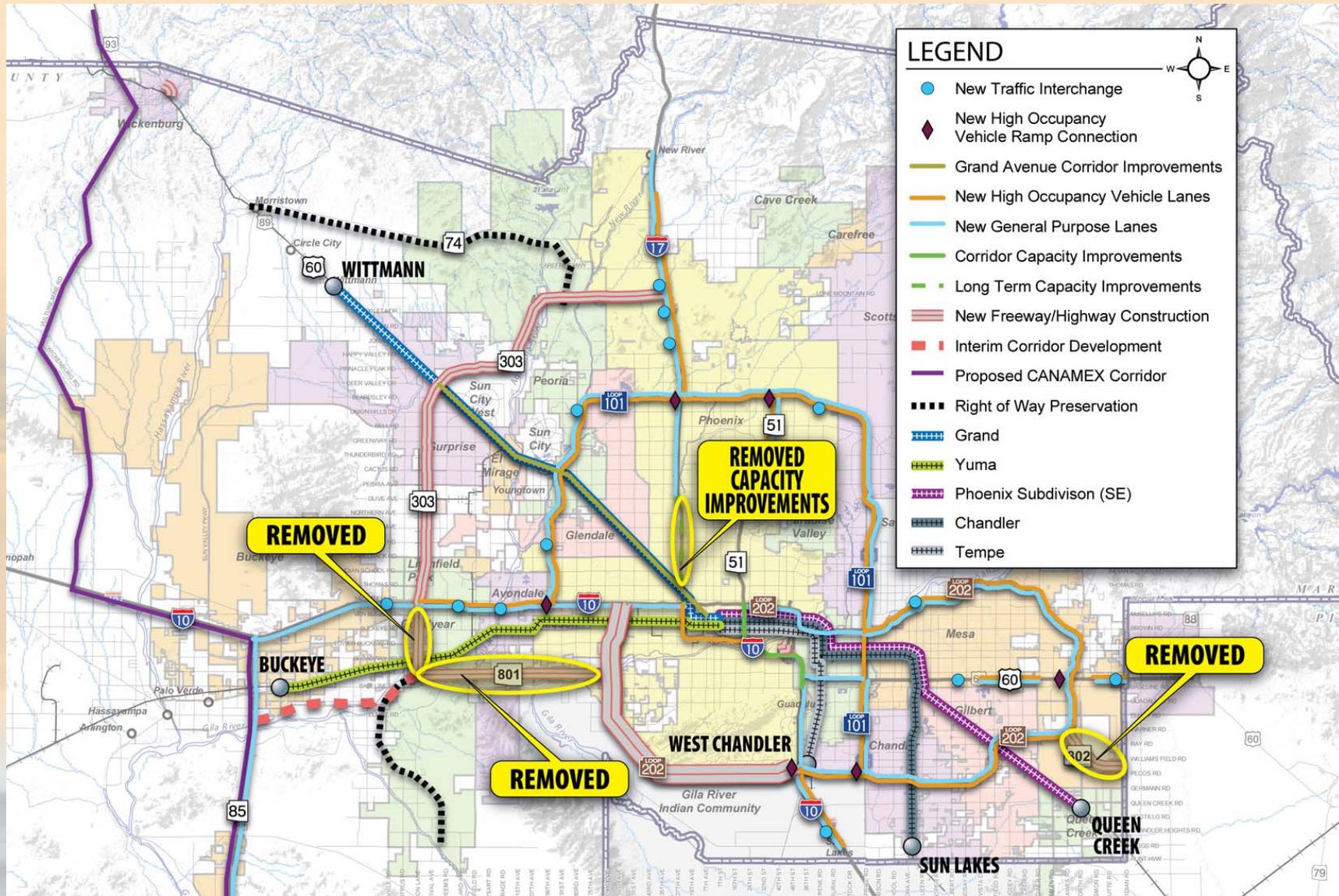
A: Highway Project Removals

Ridership Results

- ➔ **Individual Corridors (compared to GR-YU-SE-TE_2)**
 - ➔ **Grand: +3% (Reverted I-17 back to existing configuration)**
 - ➔ **Yuma: +6% (Removed SR-801)**
 - ➔ **SE: +11% (Removed SR-802)**
 - ➔ **Tempe: No Change**

- ➔ **Chandler: No Change (compared to GR-YU-SE-CH_2)**

A: Highway Project Removals



A: Highway Project Removals

Travel Time Comparison (End to End)

Corridor	Commuter Rail	SOV with Projects (Round 2)	SOV without projects (Scenario 3a)	SOV Difference (3a – Round 2)
Grand	42	66	67	+1 (+2%)
Yuma	47	50	52	+2 (+4%)
SE	46	64	67	+3 (+5%)
Tempe	29	30	30	No Change
Chandler	50	43	43	No Change

Scenario C Model Run Results Optimized System

C: Optimized System

What happens to Grand when we move the State Capitol Station?

- ➔ **State Capitol boardings increase from 210 to 470 (+260 or +124%), probably because of the ease of transfer to/from LRT.**

What is the effect on CRT ridership of additional bus feeder service and 2035 socioeconomic data?

- ➔ **CRT ridership grows by about 10%.**
- ➔ **Difference in projected growth between 2030 and 2035 is the stronger influence in ridership increase.**

What happens to Yuma when we consolidate Goodyear and remove Liberty?

- ➔ **Ridership stays about the same (slight decrease).**

C: Optimized System

Observations

- ➔ **CRT/LRT connections improve ridership.**
- ➔ **The transit feeder system to the CRT lines was already fairly optimized.**
- ➔ **On Yuma, any ridership benefits resulting from the decrease in travel time due to the removal of Liberty and consolidation of two Goodyear stations was offset by the decrease in access, which typically decreases riders.**

Base Sensitivity Test Results Summary

- ◀ **Removing future highway improvements improves commuter rail ridership on lines near the removed corridors. This is likely because travel time increases for auto users make commuter rail more competitive.**
- ◀ **Optimizing transit connections to commuter rail improves ridership.**
- ◀ **Growth from 2030 to 2035 provides about a 10% increase in ridership.**
- ◀ **Consolidating stations in Goodyear and removing the Liberty station did not impact ridership.**

Evaluation Criteria and Rankings

Initial System Alternatives Assessment

- ◀ Study team applied the established evaluation criteria to evaluate each corridor and in combinations.
- ◀ Capital and Operations and Maintenance costs were taken into consideration.

Evaluation Criteria

CATEGORIES	CRITERIA	STAND-ALONE CORRIDORS	INTERLINED CORRIDORS
Primary mode choice	End-to-end travel time savings	X	
	Boardings per revenue mile	X	X
Rider perception	Connections to activity centers	X	
System/Policy compatibility	Land use compatibility	X	
	VMT reduction in corridor	X	
	VHT reduction in corridor	X	
Cost effectiveness	Capital cost per mile	X	X
	Annual O&M cost per rider	X	X
	Annual cost per travel time savings	TBD	TBD
Implementation/ constructability	Ease of implementation/ constructability	X	
	Compatibility with freight railroads	X	X
	Benefit to adjacent or crossing highway infrastructure	X	

Stand-Alone Corridors: Capital Costs

Cost Element	Grand Avenue (36 mi.)	Yuma West (31 mi.)	Southeast (32 mi.)	Tempe (18 mi.)	Chandler (29 mi.)
Guideway/ Track	\$125M	\$55M	\$64M	\$41M	\$54M
Stations	\$53M	\$27M	\$37M	\$43M	\$59M
Vehicles	\$47M	\$47M	\$69M	\$37M	\$66M
Other (Systems, sitework, etc.)	\$300M	\$141M	\$202M	\$170M	\$231M
Prof. Svcs./ Contingency (17% total/ 22% less vehicles)	\$136M	\$63M	\$87M	\$71M	\$95M
TOTALS	\$661M	\$322M	\$459M	\$362M	\$505M
90% cost (lower contingency)	\$595M	\$299M	\$413M	\$325M	\$454M

Stand-Alone Corridors: Capital Costs

Corridor	Length	Capital Costs	Ranking	Cost/ Mile	Ranking	Comments
Grand Avenue	36 mi.	\$595M	Worst performer	\$16.5M	Poor performer	Highest total and per-mile costs due to major infrastructure needs near downtown Phoenix
Yuma West	31 mi.	\$299M	Best performer	\$9.6M	Best performer	Lowest total costs due to corridor length and best per-mile costs due to relatively low infrastructure needs
Southeast	32 mi.	\$413M	Medium performer	\$12.9M	Medium performer	Medium total costs and medium for per-mile cost despite long corridor (high per-mile cost closer to downtown Phoenix)
Tempe	18 mi.	\$325M	Good performer	\$18.1M	Worst Performer	Low total costs due to short corridor but worst per-mile costs due to infrastructures cost closer to downtown Phoenix
Chandler	29 mi.	\$454M	Medium performer	\$15.7M	Medium Performer	Medium total costs and per-mile cost despite long corridor (high per-mile cost closer to downtown Phoenix)

Stand-Alone Corridors: Annual O&M Cost per Rider

Corridor	Length	Boardings/ Mile	Ranking	O&M Cost per Rider	Ranking	Comments
Grand Avenue	36 mi.	1.6	Medium-poor performer	\$13	Medium performer	
Yuma West	31 mi.	1	Worst performer	\$28	Worst performer	
Southeast	32 mi.	4.2	Best performer	\$9	Best performer	Best in both categories; closest in per-rider cost to national average (\$8.70)
Tempe	18 mi.	1.1	Poor performer	\$16	Medium performer	
Chandler	29 mi.	1.6	Medium-poor performer	\$17	Medium performer	

Stand-Alone Corridors: Overall Rankings

Corridor	Length	Total Daily Riders	Ranking	Comments
Grand Avenue	36 mi.	2,830	2	Good travel time savings, moderate ridership, poor land use compatibility, high capital cost, difficult implementation but high benefit to nearby roadways
Yuma West	31 mi.	1,420	5	Poor land use compatibility, low ridership, high O&M costs
Southeast	32 mi.	6,460	1	High ridership, good land use compatibility, medium implementation issues
Tempe	18 mi.	950	3	Lowest ridership but moderate costs
Chandler	29 mi.	2,240	4	Moderate ridership but relatively low cost per rider, medium land use compatibility, medium implementation issues

Combination Corridor Analysis

Combined Corridors: Capital Costs

Cost Element	Grand/SE (68 mi.)	Yuma/SE (63 mi.)	Grand/Yuma/SE (99 mi.)	Grand- SE/Yuma- Tempe (105 mi.)	Yuma- SE/Grand- Tempe (105 mi.)
Guideway/ Track	\$181M	\$110M	\$233M	\$249M	\$251M
Stations	\$86M	\$59M	\$112M	\$125M	\$126M
Vehicles	\$116M	\$115M	\$163M	\$191M	\$191M
Other (Systems, sitework, etc.)	\$476M	\$311M	\$608M	\$667M	\$665M
Prof. Services./ Contingency (17% total/ 22% less vehicles)	\$213M	\$139M	\$273M	\$295M	\$297M
TOTALS	\$1.07B	\$734M	\$1.39B	\$1.52B	\$1.53B
90% cost (lower contingency)	\$965M	\$660M	\$1.25B	\$1.37B	\$1.38B

Combined Corridors: Capital Costs

Corridor	Length	Capital Costs	Ranking	Cost/ Mile	Ranking	Comments
Grand/SE	68 mi.	\$965M	Medium performer	\$14.2M	Worst performer	
Yuma/SE	63 mi.	\$660M	Best performer	\$10.5M	Best performer	Best performer overall since it excludes high infrastructure costs for Grand
Grand-SE / Yuma-SE	99 mi.	\$1.25B	Medium performer	\$12.6M	Medium performer	
Grand-SE / Yuma-Tempe	105 mi.	\$1.37B	Worst performer (tie)	\$13M	Medium Performer	
Yuma-SE / Grand-Tempe	105 mi.	\$1.38B	Worst performer (tie)	\$13.1M	Medium Performer	

Combined Corridors: Annual O&M Cost per Rider

Corridor	Length	Boardings/Mile	Ranking	O&M Cost per Rider	Ranking	Comments
Grand-SE	68 mi.	3.1	Best performer	\$19	Medium performer	
Yuma-SE	63 mi.	2.8	Good performer	\$20	Good performer	
Grand-SE / Yuma-SE	99 mi.	2.0	Worst performer	\$29	Worst performer	Worst in both categories
Grand-SE / Yuma-Tempe	105 mi.	2.2	Medium-low performer	\$23	Medium performer	
Yuma-SE / Grand-Tempe	105 mi.	2.6	Good performer	\$19	Best performer	

Combined Corridors: Overall Rankings

Corridor	Length	Total Daily Riders	Ranking	Comments
Grand-SE	68 mi.	9,980	2	Best boardings per mile but high capital costs and costs per rider
Yuma-SE	63 mi.	8,540	1	Good performer due to high ridership in SE and low costs on Yuma
Grand-SE / Yuma-SE	99 mi.	11,290	5	Worst boardings per mile and high costs per rider
Grand-SE / Yuma-Tempe	105 mi.	15,090	4	Low boardings per mile with moderate costs per rider
Yuma-SE / Grand-Tempe	105mi.	17,940	3	High overall costs but good in costs per rider and boardings per mile

What about substituting Chandler Branch for SE in combinations?

	Length	Capital Cost	Cost/Mile	Daily Riders	Boardings/Mile	O&M Cost/Rider	Comments
Grand-SE / Yuma-SE	99	\$1.25B	\$12.6M	11,290	2.0	\$29	
Grand-Chandler / Yuma-Chandler	96	\$1.30B	\$13.6M	7,030	1.3	\$46	Significantly higher cost per rider
Grand-SE / Yuma-Tempe	105	\$1.37B	\$13.0M	15,100	2.2	\$23	
Grand-Chandler / Yuma-Tempe	102	\$1.41B	\$13.8M	10,580	1.8	\$27	Moderately worse performer
Yuma-SE / Grand-Tempe	105	\$1.37B	\$13.1M	17,960	2.6	\$19	
Yuma-Chandler / Grand-Tempe	102	\$1.42B	\$13.9M	13,230	1.9	\$22	Best performer of CH options but still not better than previous

Observations

- ◁ Southeast Corridor is the best stand-alone performer with high ridership and moderate costs
- ◁ Best interlined combination is Yuma with Southeast (moderate costs, high SE ridership), followed closely by Grand-SE and Yuma-SE/Grand-Tempe combination
- ◁ Substituting Chandler Branch for SE in interlined combinations reduces overall ridership and cost-effectiveness

Next Steps

- ⟨ Complete final round of modeling
- ⟨ Conduct TSUB analyses
- ⟨ Finalize cost estimates and operating concepts
- ⟨ Complete assessment of system alternatives

Questions and Discussion