



Regional Transit Authority Chicago IL.

A Regional Approach to a State of Good Repair

Grace Gallucci

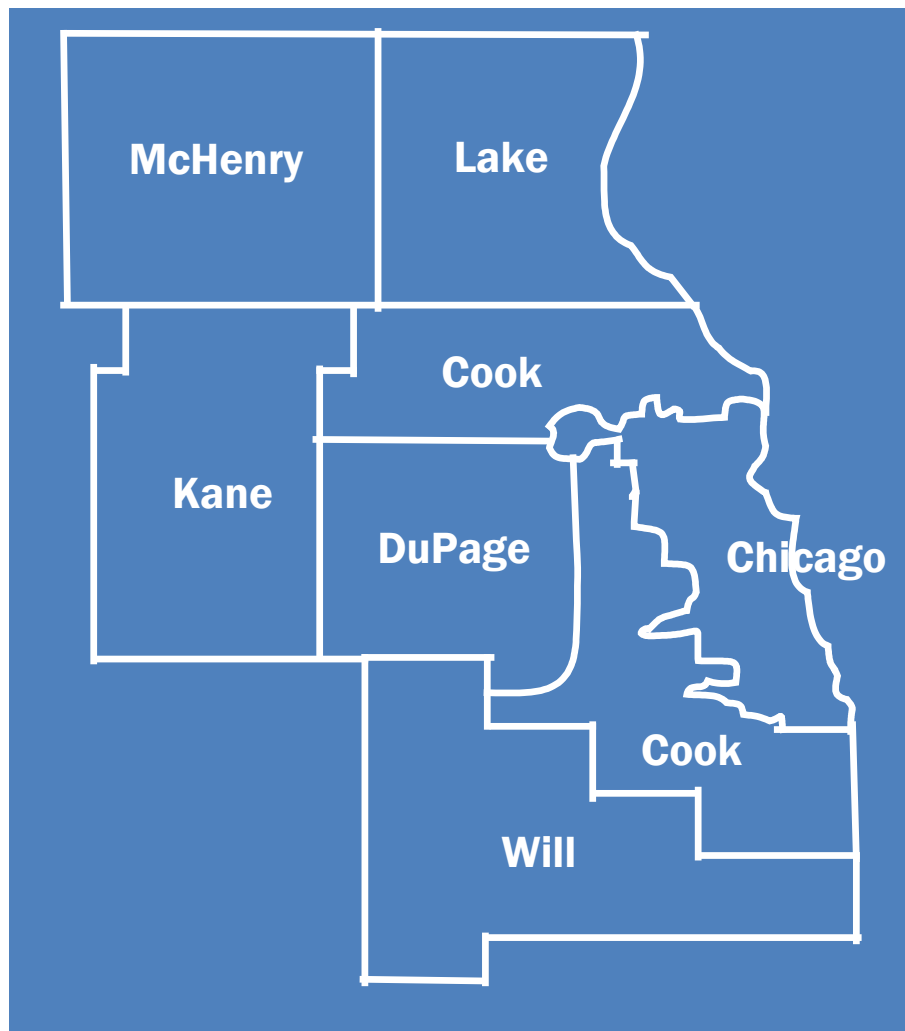
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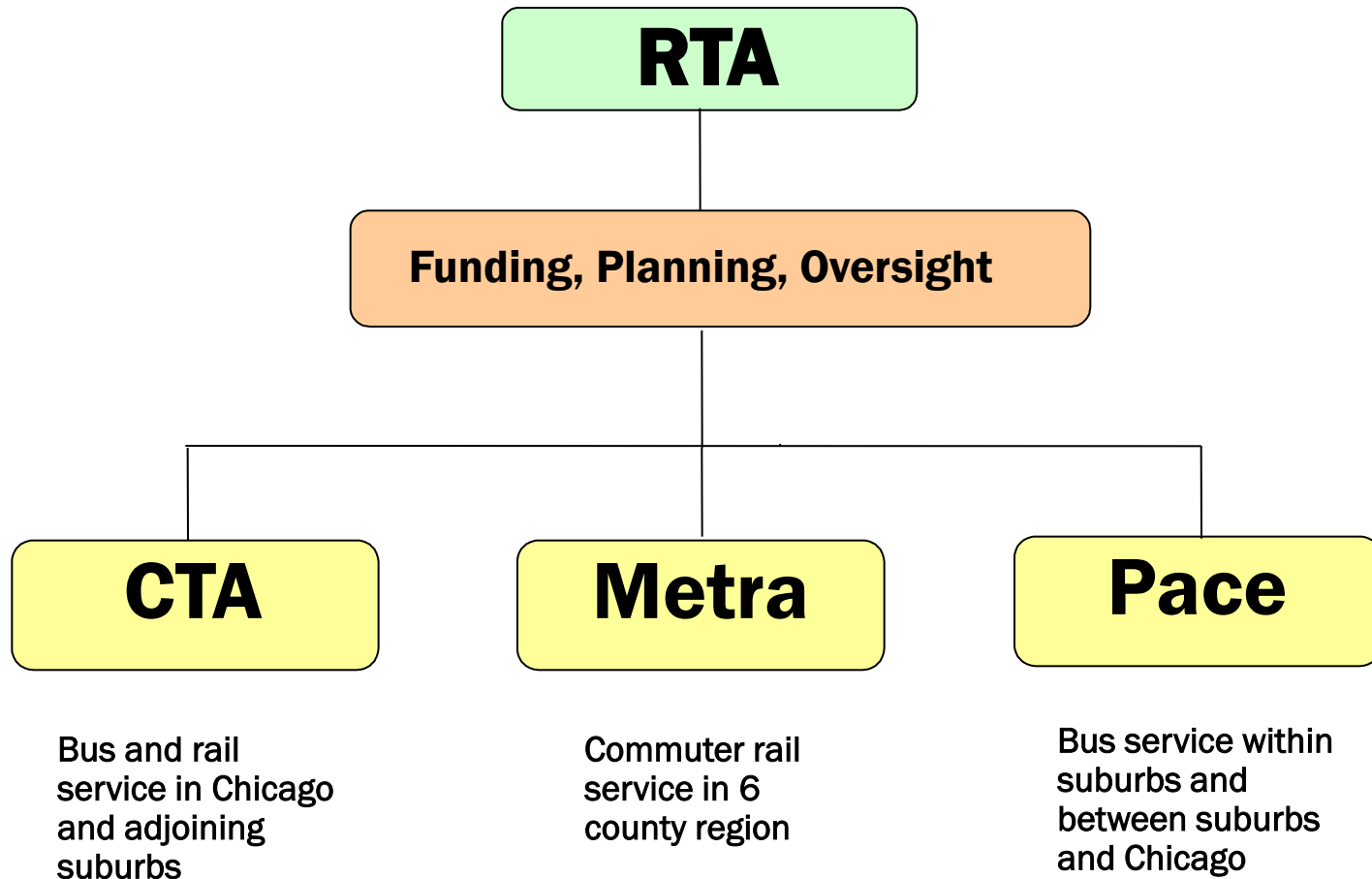
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- **9 million people**
- **3,700 square miles**
- **650 million riders**
- **4,800 bus & rail cars**
- **380 stations**
- **400 routes**
- **7,200 route miles**
- **600 vanpool vehicles**
- **\$30 billion in assets**



Legislative Authority

RTA Act (as amended January 2008)

- Requires criteria for evaluating capital projects
 - Allows RTA to adopt requirements for preparing capital program

OAG Performance Audit

- RTA should establish a set of criteria for funding and prioritizing capital initiatives

MBC Strategic Plan

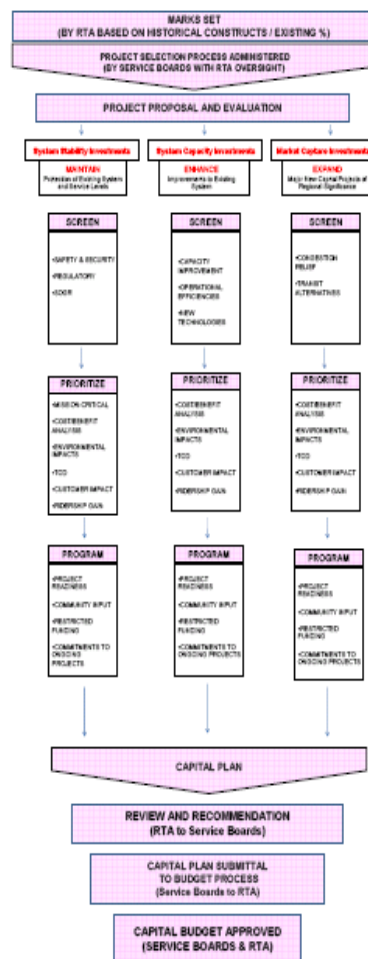
- Identification of 3 categories of capital investment
 - RTA proposed evaluation process
 - Regional coordination with MPO



RTA Capital Plan Development Process

⇒ Phase 1: Capital Plan Development Process adopted by RTA Board in 2008 for use by SBs

⇒ Phase 2: Further refine and improve screening, prioritization and programming of capital projects



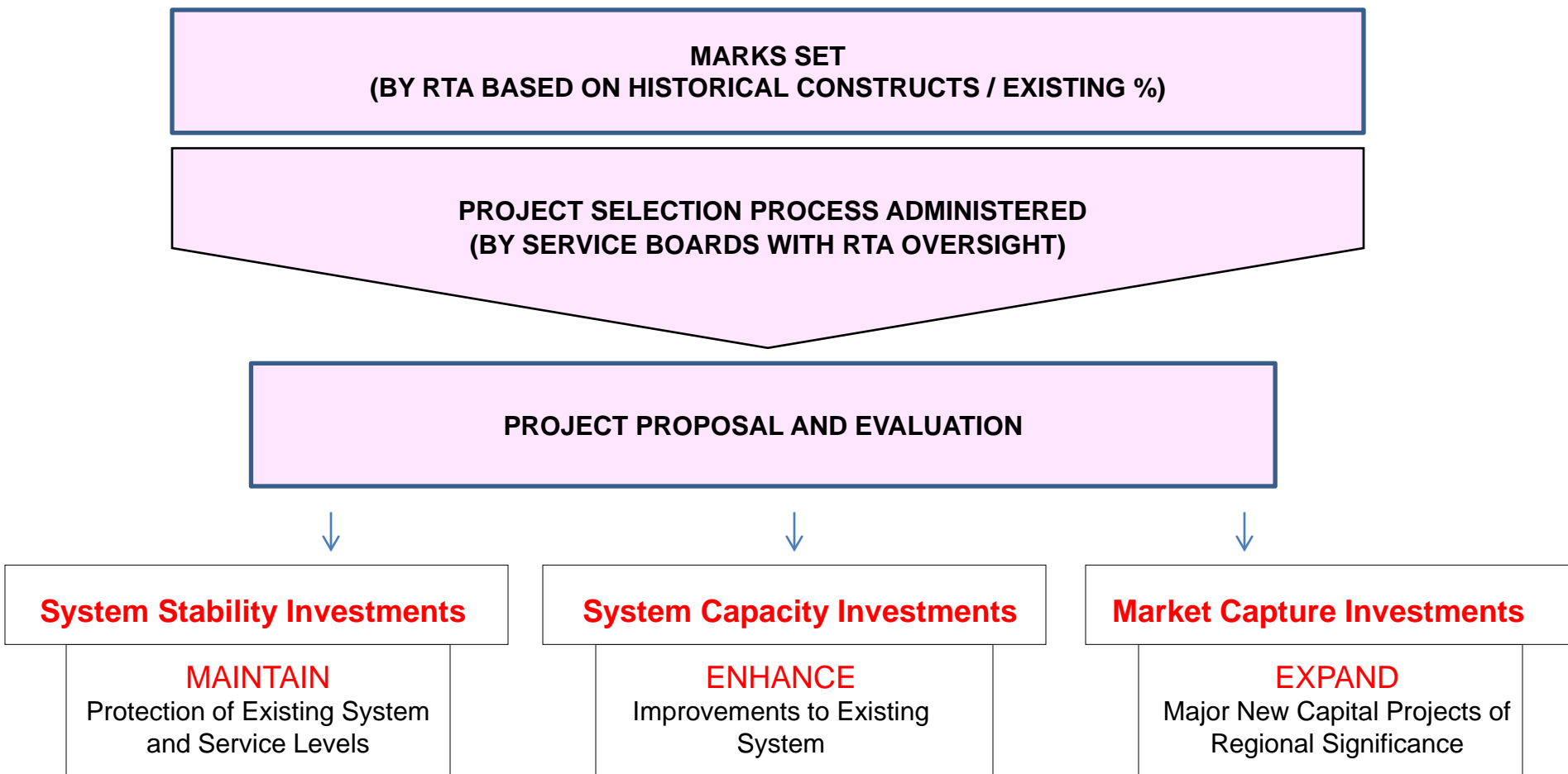
RTA CAPITAL PLAN DEVELOPMENT PROCESS

STEP 1: Marks set. As part of its Budget Call, RTA determines the funding level based on the historical process utilizing existing percentage allocations between the Service Boards.
STEP 2: Project selection process administered. Each Service Board independently administers a uniform process to allocate the assigned level of resources among projects within their agency. RTA oversight ensures consistent management of the process and application of the criteria amongst the Service Boards.
STEP 3: RTA review and recommendation. RTA reviews the proposed capital plan from each agency, provides comment and makes recommendations to the Service Boards regarding the capital plan.
STEP 4: Capital Plan submittal to budget process. The Service Boards submit their final capital plan proposal to RTA as part of the Budget Process. Public hearings are held by RTA and the Service Boards for comment on the capital plan as part of the overall budget.
STEP 5: Capital Budget approved. The Service Boards have their agency capital budgets approved by their respective boards. RTA has the combined budgets approved by its Board.

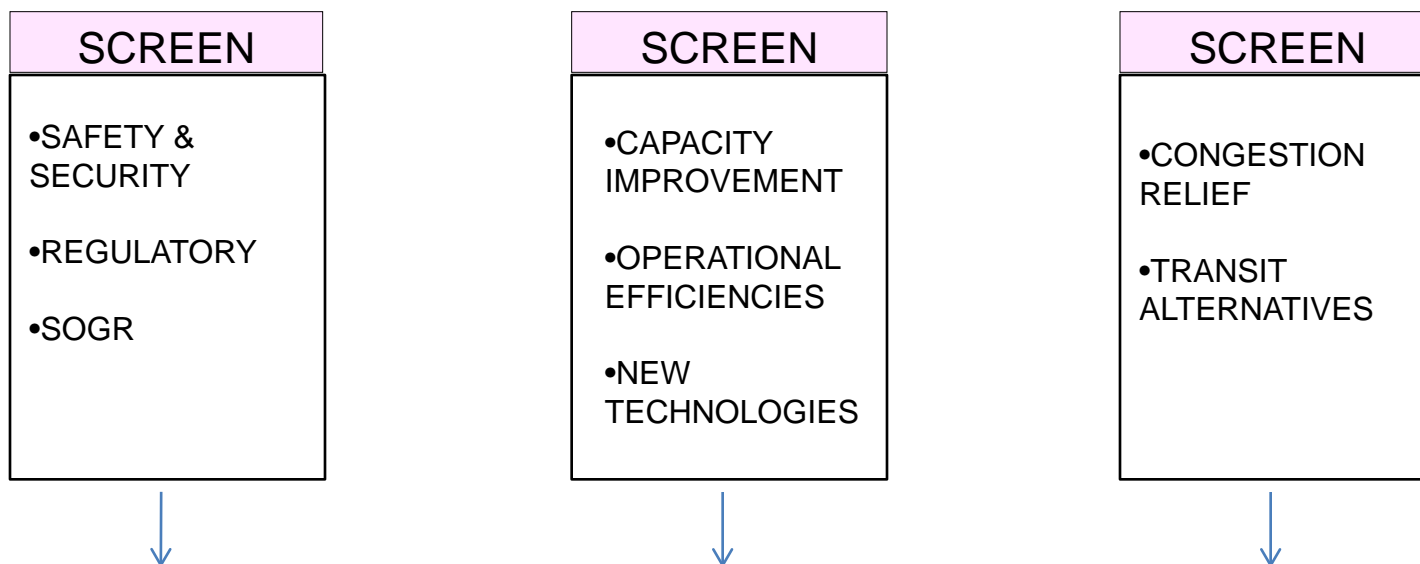
PROJECT SELECTION PROCESS (step 2 above)

SUBSTEP 1: Projects are solicited for consideration from within each agency.
SUBSTEP 2: An initial screening is performed to sort projects into one of three categories of investment: Maintain / Expand / Enhance. Criteria unique to each investment type are used to facilitate the sort.
SUBSTEP 3: Projects are prioritized within each category using another set of criteria that is identical across categories.
SUBSTEP 4: Projects are programmed within each category using still another set of criteria that is also identical across categories.
SUBSTEP 5: Projects are assembled into a five year capital plan by each agency.

RTA Capital Plan Development Process



RTA Capital Plan Development Process



RTA Capital Plan Development Process

PRIORITIZE

- MISSION CRITICAL
- COST/BENEFIT ANALYSIS
- ENVIRONMENTAL IMPACTS
- TOD
- CUSTOMER IMPACT
- RIDERSHIP GAIN



PRIORITIZE

- COST/BENEFIT ANALYSIS
- ENVIRONMENTAL IMPACTS
- TOD
- CUSTOMER IMPACT
- RIDERSHIP GAIN

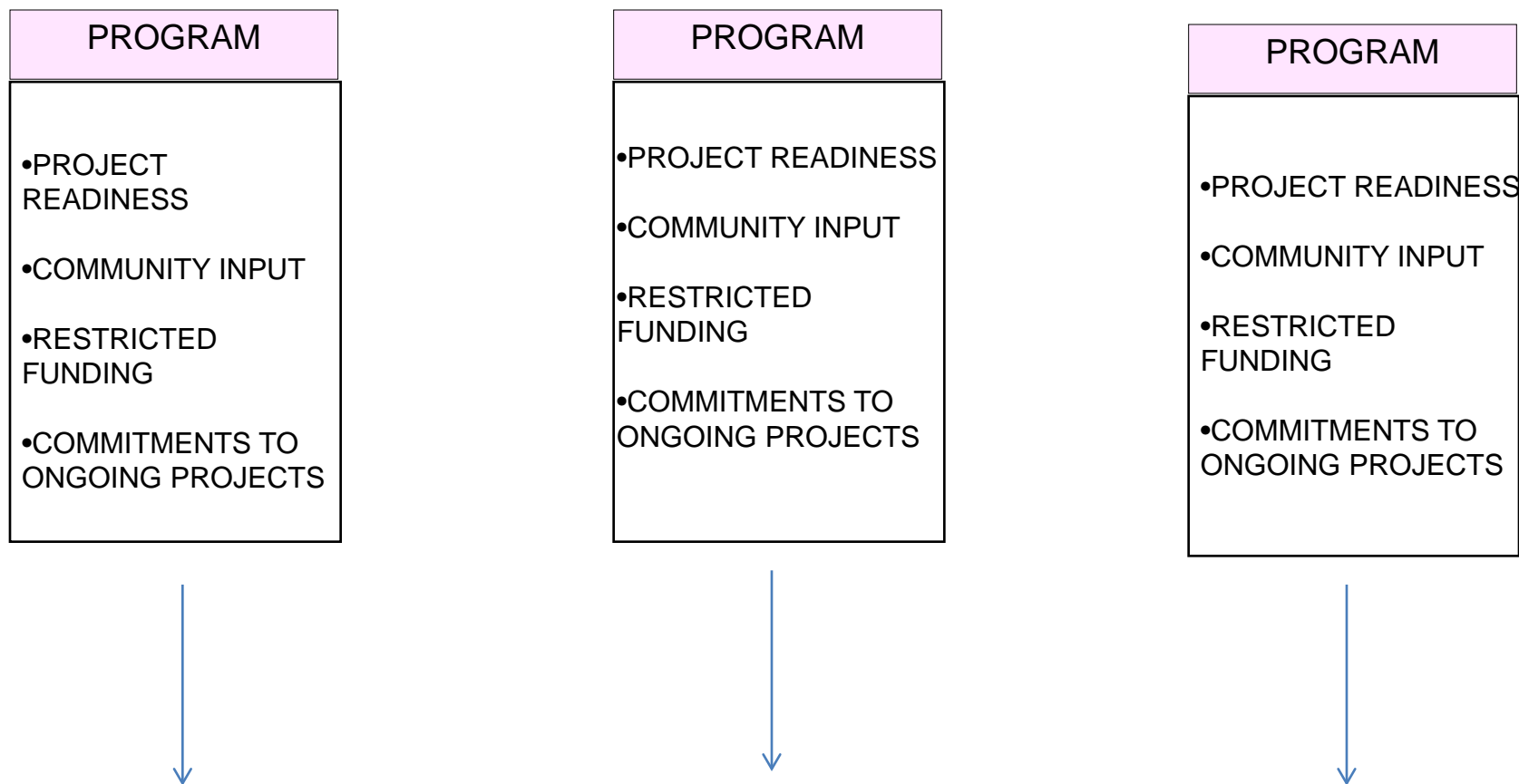


PRIORITIZE

- COST/BENEFIT ANALYSIS
- ENVIRONMENTAL IMPACTS
- TOD
- CUSTOMER IMPACT
- RIDERSHIP GAIN



RTA Capital Plan Development Process



RTA Capital Plan Development Process



```
graph TD; A[CAPITAL PLAN] --> B[REVIEW AND RECOMMENDATION  
(RTA to Service Boards)]; B --> C[CAPITAL PLAN SUBMITTAL  
TO BUDGET PROCESS  
(Service Boards to RTA)]; C --> D[CAPITAL BUDGET APPROVED  
(SERVICE BOARDS & RTA)];
```

CAPITAL PLAN

REVIEW AND RECOMMENDATION
(RTA to Service Boards)

CAPITAL PLAN SUBMITTAL
TO BUDGET PROCESS
(Service Boards to RTA)

CAPITAL BUDGET APPROVED
(SERVICE BOARDS & RTA)

How do you want the regional transit system to be described across the globe?

Compared to:

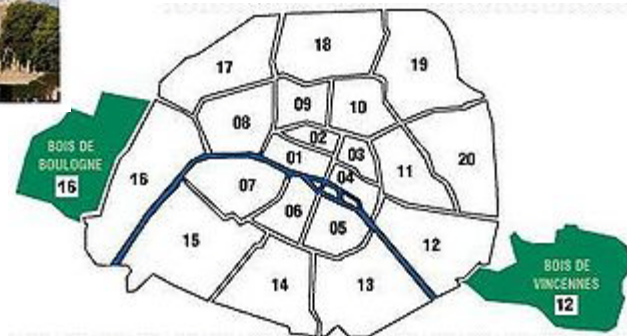
London

Paris

Berlin

Tokyo

Others?



FTA

Third State of Good Repair Roundtable

How do we want to compare with the other largest U.S. transit systems?

New York

Los Angeles

Washington

Boston

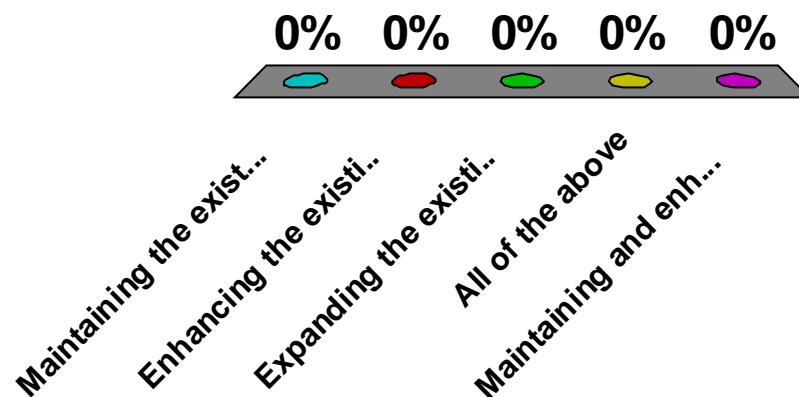
Philadelphia

Others?



Based on the information presented,
should available capital funds be spent on:

1. **Maintaining the existing system**
(replacing or rehabilitating old assets
to achieve a constant state of good
repair)
2. **Enhancing the existing system**
(new stops on existing rail lines,
greater vehicle capacity, etc)
3. **Expanding the existing service**
(creating new rail lines, developing bus
rapid transit, etc)
4. **All of the above**
5. **Maintaining and enhancing the
existing system**



Performance Measures

Service Maintenance / Capital Investment

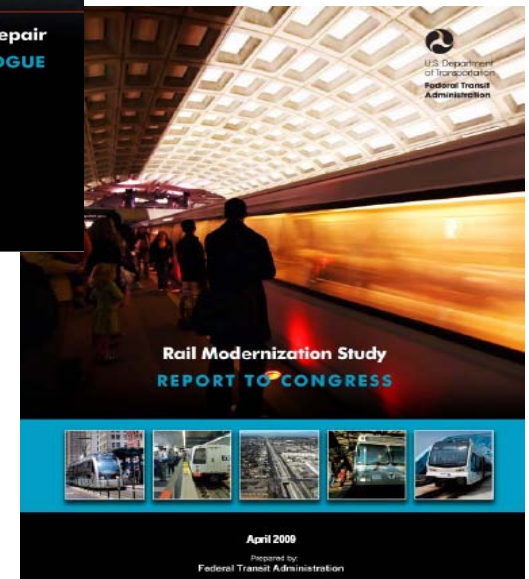
State of Good Repair & Reliability:



- **Capital Program
Maintenance / Enhancement
/ Expansion**
- **Percent of Assets in Good
Condition**
- **Percent of Vehicles Beyond
Useful Life**
- **Miles Between Major
Mechanical Failures**

State of Good Repair

The Ultimate Goal:
Sustainability and
Reliability of Service



Capital Asset Condition

- Improve Decision Making
 - Systems Analysis
 - Market Analysis
- Needs-Based Capital Plan
 - Inventory of assets
 - Rehab/Replace Schedules
 - Maintenance/Life Cycle Costs



Why do we use the information?

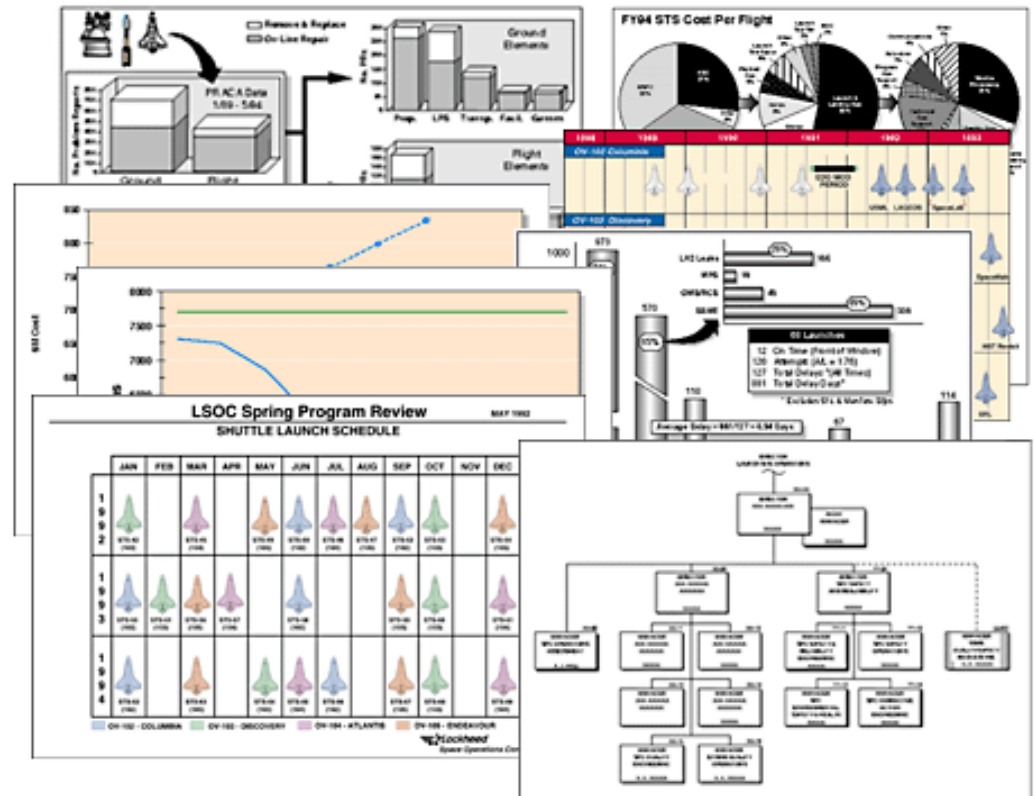
Integrate objective criteria and data to drive decision making in support of achieving the Strategic Plan vision

- ⇒ Asset Condition Assessment
- ⇒ Market Analysis
- ⇒ System Analysis
- ⇒ 10 Year Financial Plan
- ⇒ Other

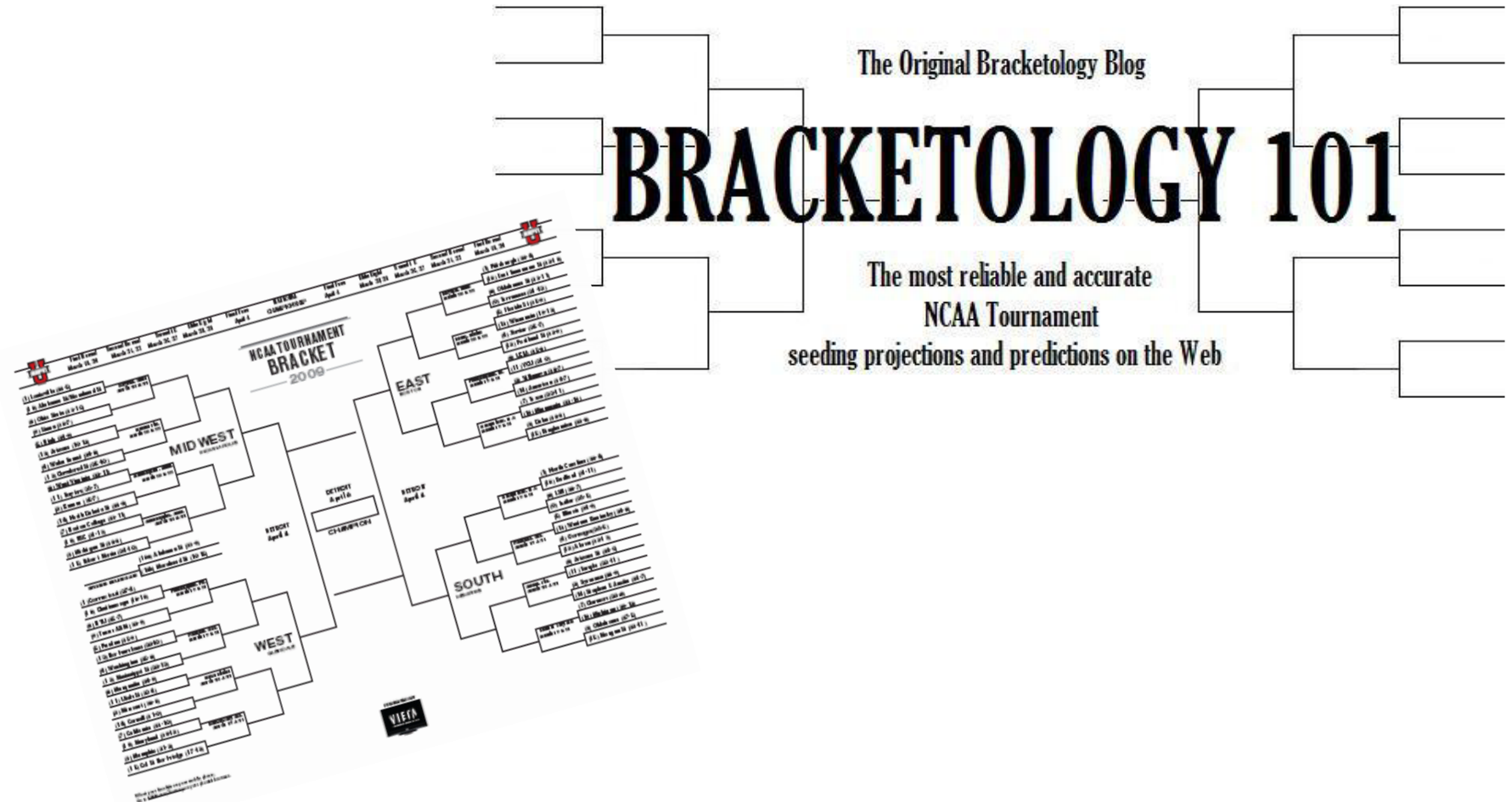


What is a Capital Decision Prioritization Support Tool?

A technology driven resource that will facilitate the development and prioritization of a regional capital program by integrating many data and decision points into a single instrument.



What is a Capital Decision Prioritization Support Tool?



Capital Decision Prioritization Support Tool – Requirements

Provide inherent decision elements in a single collaborative tool to facilitate the optimization of limited resources

- ⇒ develop rating scales and weigh strategies
- ⇒ recognize and balance inconsistencies
- ⇒ perform sensitivity analyses
- ⇒ measure and assess value
- ⇒ present and evaluate scenarios/alternatives
- ⇒ quantify and judge results
- ⇒ formulate reasonable constructible programs



RTA Asset Condition Assessment



Submitted to
Regional Transportation Authority
175 West Jackson Boulevard, Suite 1500
Chicago, IL 60604-2711

REGIONAL TRANSPORTATION AUTHORITY Capital Asset Condition Assessment



prepared by
URS CORPORATION
In association with
Kristine Fallon Associates, Inc.
LTK Engineering Services
Tecma Associates, Inc.
Raul V. Bravo & Associates
ESA Management and Engineering Consultants
Laramore, Douglas, & Popham

August 2010

*This report is confidential and intended solely for the use and
information of the agency to whom it is addressed*



RTA Asset Condition Assessment

1 Record All Assets



- Establish Assessment Team (SBs, RTA and Consultant)
- Collect joint inventory data
- Create tables (87 asset types into 5 asset groups)

Track & Structures

Electrical and Subway

Systems

Facilities

Rolling stock

- Appendix A-2a thru A-4b

CFS1a CTA Stations

LINE	STATION	BRANCH	STATION TYPE	LINES SERVED	PLACED IN SERVICE DATE	RECON-STRUCTION DATE	REPAIRS DATE	Condition Rating
RED	HOWARD	HOWARD	EMB	RED, PUR, YEL	1920	2009		5
	JARVIS	HOWARD	EMB	RED	1920			1
	MORSE	HOWARD	EMB	RED	1920		1990	1
	LOYOLA	HOWARD	EMB	RED	1920	1980		3
	GRANVILLE	HOWARD	EMB	RED	1920	1979		2
	THORNDALE	HOWARD	EMB	RED	1920		1975	1
	BRYN MAWR	HOWARD	EMB	RED	1920		1975	1
	BERWYN	HOWARD	EMB	RED	1920			1
	ARGYLE	HOWARD	EMB	RED	1920			1
	LAWRENCE	HOWARD	EMB	RED	1920			1
	WILSON	HOWARD	EL	RED	1900			1
	SHERIDAN	HOWARD	EL	RED	1900			1
	ADDISON	HOWARD	EL	RED	1900	1994		4
	BELMONT	HOWARD	EL	RED, PUR, YEL	1900	2009		5
	FULLERTON	HOWARD	EL	RED, PUR, YEL	1900	2009		5
	NORTH/CLYBOURN	STATE SUB.	SUB	RED	1943			1
	CLARK/DIVISION	STATE SUB.	SUB	RED	1943			1
	CHICAGO	STATE SUB.	SUB	RED	1943	2002		5
	GRAND	STATE SUB.	SUB	RED	1943	2011		5
	LAKE	STATE SUB.	SUB	RED	1943	2005		5
	WASHINGTON	STATE SUB.	SUB	RED	1943			1
	MONROE	STATE SUB.	SUB	RED	1943		1990	1
	JACKSON	STATE SUB.	SUB	RED	1943	2006		5
	HARRISON	STATE SUB.	SUB	RED	1943			1
	ROOSEVELT	STATE SUB.	SUB	RED	1943	1996		4
	CERMAK-CHINATOWN	DAN RYAN	EMB	RED	1969	2010		5
	SOX-35TH	DAN RYAN	MED	RED	1969	2005		5
	47TH	DAN RYAN	MED	RED	1969		2005	1
	GARFIELD	DAN RYAN	MED	RED	1969		2005	1
	63RD	DAN RYAN	MED	RED	1969		2005	1
	69TH	DAN RYAN	MED	RED	1969	2005		5
	79TH	DAN RYAN	MED	RED	1969	2005		5
	87TH	DAN RYAN	MED	RED	1969		2005	1
	95TH	DAN RYAN	MED	RED	1969		2001	1

RTA Asset Condition Assessment

1 Record All Assets



CFS1a CTA Stations

LINE	STATION	BRANCH	STATION TYPE	LINES SERVED	PLACED IN SERVICE DATE	RECON-STRUCTION DATE	REPAIRS DATE	Condition Rating
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	JARVIS	HOWARD	EMB	RED	1920			1
	MORSE	HOWARD	EMB	RED	1920		1990	1
	LOYOLA	HOWARD	EMB	RED	1920	1980		3
	GRANVILLE	HOWARD	EMB	RED	1920	1979		2
	THORNDALE	HOWARD	EMB	RED	1920		1975	1
	BRYN MAWR	HOWARD	EMB	RED	1920		1975	1
	BERWYN	HOWARD	EMB	RED	1920			1
	ARGYLE	HOWARD	EMB	RED	1920			1
	LAWRENCE	HOWARD	EMB	RED	1920			1
	WILSON	HOWARD	EL	RED	1900			1

RTA Asset Condition Assessment

2 Determine Condition



- Observation Inspection
- Previous Experience
- Research
- **Age**
- Establish Useful Life
- Determine Age
- Ratio of Age to Useful life = Condition Rating
- Record Assumptions
- 1% Sampling

Asset Groups	Asset Sub-Groupings	Asset	Useful Life	Condition Rating Years				
				1	2	3	4	5
CTA TRACK & STRUCTURES (TS)	CTA TRACK STRUCTURES	CTS1 - Track Structures	80	> 80	61 - 80	41 - 60	21 - 40	< 21
		CTS2 - Ties: Pine*	25	> 25	19 - 25	13 - 18	7 - 12	< 7
	CTA TRACK	CTS2 - Ties: Oak/DF Fasteners*	25	> 25	19 - 25	13 - 18	7 - 12	< 7
		CTS2 - Ties: Composite*	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CTS2 - Ties: Concrete Slab*	55	> 55	41 - 55	28 - 41	14 - 27	< 14
		CTS3 - Rail: Ties	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CTS3 - Rail: Curves < than 1500 radius	25	> 25	19 - 25	13 - 18	7 - 12	< 7
		CTS4 - Grade Crossing: Track: High Auto Usage	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CTS4 - Grade Crossing: Track: Low Auto Usage	20	> 20	16 - 20	11 - 15	6 - 10	< 6
		CTS5 - Special Trackwork	40	> 40	31 - 40	21 - 30	11 - 20	< 11
CTA ELECTRICAL & SUBWAY EQUIPMENT (ES)	CTA TRACTION POWER	GES1a - Substations	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		GES1b - Substations Distribution	30	> 30	23 - 30	16 - 23	8 - 15	< 8
		GES2 - ROW Traction Power	40	> 40	31 - 40	21 - 30	11 - 20	< 11
	CTA SUBWAY EQUIPMENT	GES3 - Subway Electrical	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		GES4 - Subway Fans	32	> 32	25 - 32	17 - 24	8 - 16	< 8
		GES5 - Subway Illumination	20	> 20	16 - 20	11 - 15	6 - 10	< 6
CTA SYSTEMS (SCF)	CTA SIGNAL SYSTEMS	GES6 - Subway Pumps	30	> 30	23 - 30	16 - 23	8 - 15	< 8
		CSCF1 - Interlockings	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CSCF2 - Cab Signals	40	> 40	31 - 40	21 - 30	11 - 20	< 11
	CTA FAIR COLLECTION	CSCF3 - Grade Crossing Systems	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CSCF4 - Fare Collection	15	> 15	13 - 15	9 - 12	5 - 8	< 5
	CTA COMMUNICATIONS	CSCF5 - Radio Systems	15	> 15	13 - 15	9 - 12	5 - 8	< 5
		CSCF6 - GPS Bus	15	> 15	13 - 15	9 - 12	5 - 8	< 5
		CSCF7 - CCTV Station	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF8 - Cable Plant	20	> 20	16 - 20	11 - 15	6 - 10	< 6
		CSCF9 - Fiber Optic Systems	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF10a - SCADA Systems Station	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF10b - SCADA Systems Substation	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF11a - Public Address Systems Audio	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
CTA STATIONS, GARAGES, FACILITIES (FS)	CTA STATIONS & PARKING	CSCF11b - Public Address Systems VMS	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		GFSA1 - Stations	40	> 40	31 - 40	21 - 30	11 - 20	< 11
	CTA BUS PASSENGER AND MAINTENANCE FACILITIES	GFSA2 - Station Parking Garages	20	> 20	16 - 20	11 - 15	6 - 10	< 6
		GFSA3 - Bus Passenger Facilities	20	> 20	16 - 20	11 - 15	6 - 10	< 6
		GFSA4 - Maintenance Facilities	70	> 70	54 - 70	36 - 53	18 - 35	< 18
CTA ROLLING STOCK (RS)**	CTA REVENUE VEHICLES	GFSA4 - Yard Facilities	50	> 50	38 - 50	25 - 37	13 - 25	< 13
		CRS1 - Rail Revenue Vehicles	25	> 25	19 - 25	13 - 18	7 - 12	< 7
	CTA NON-REVENUE VEHICLES AND WORK EQUIPMENT	CRS2 - Buses	12	> 12	10 - 12	7 - 9	4 - 6	< 4
		CRS3 - Non-Revenue Vehicles	5	> 5 years	46 - 60 mo	31 - 45 mo	16 - 30 mo	< 15 mo
		CRS4 - Work Equipment	varies					

*CTA ties are replaced based on a scheduled replacement program while Metra ties are replaced as needed.

**Rolling stock useful life requires regular scheduled rehabs.

RTA Asset Condition Assessment 2 Determine Condition



Table 3-2 Useful Life: CTA Assets								
Asset Groups	Asset Sub-Groupings	Asset	Useful Life	Condition Rating Years				
				1	2	3	4	5
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		CTS3 - Rail: Tangent	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CTS3 - Rail: Curves < than 1500' radius	25	> 25	19 - 25	13 - 18	7 - 12	< 7
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		CES1b - Substations Distribution	30	> 30	23 - 30	16 - 23	8 - 15	< 8
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		CES3 - Subway Electrical	40	> 40	31 - 40	21 - 30	11 - 20	< 11
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		CSCF10b - SCADA Systems Substation	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF11a - Public Address Systems Audio	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF11b - Public Address Systems VMS	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
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		CRS4 - Work Equipment	varies					

*CTA ties are replaced based on a scheduled replacement program while Metra ties are replaced as needed.

**Rolling stock useful life requires regular scheduled rebuilds.

RTA Asset Condition Assessment

3 Determine Asset Costs

- Replacement Costs
- Purchase Price
- Age
- Experience
- Research
- Asset Specific



RTA Asset Condition Assessment

**4 Determine Cost to
Replace All 1's
= BACKLOG**

CTA \$10B

Metra \$3.7B

Pace \$.1B

Region \$13.8B



RTA Asset Condition Assessment**5 Determine Cost to Provide 10 yr.****NORMAL REPLACEMENT**

CTA	\$3.2B
Metra	\$1.7B
Pace	\$1.9B
Region	\$6.8B



RTA Asset Condition Assessment**6 Determine Cost for 10 yr.****CAPITAL MAINTENANCE**

CTA	\$1.7B
Metra	\$1.9B
Pace	\$.2B
Region	\$6.8B



RTA Asset Condition Assessment

7 Add them to Determine:

BACKLOG

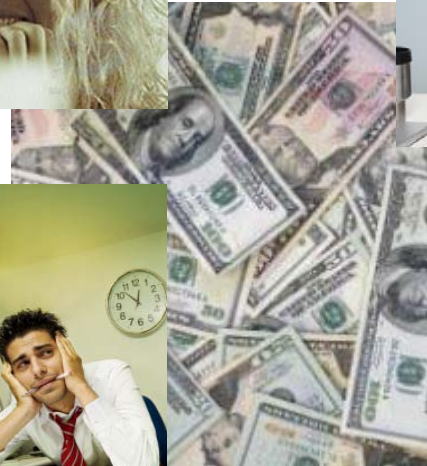
+ 10 yr. NORMAL REPLACEMENT

+ 10 yr. CAPITAL MAINTENANCE

= 10yr. SGR TOTAL NEED

RTA Asset Condition Assessment**7 Add them to Determine:****10yr. SGR TOTAL NEED**

Incl. SC & Cont.

CTA \$14.9B**Metra \$7.4B****Pace \$2.2B****Region \$24.6B**

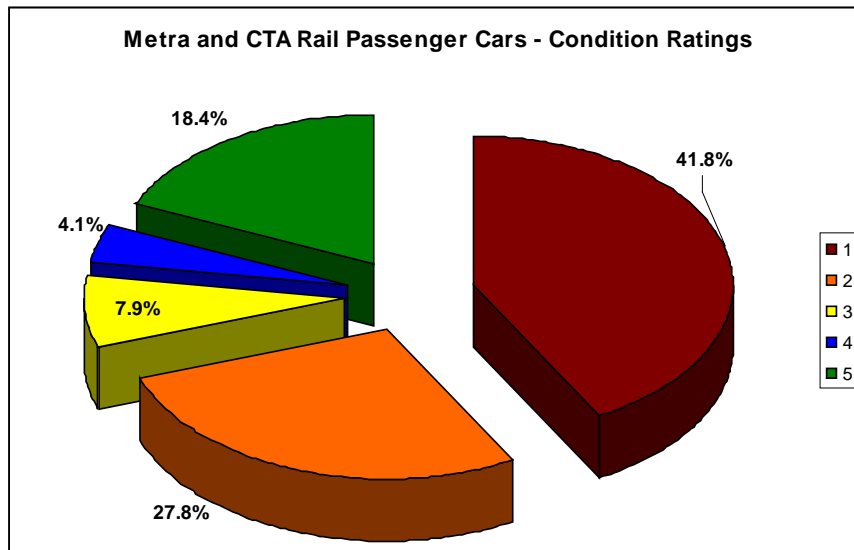
RTA Asset Condition Assessment

- **Regional 10yr. SGR Need.**
\$24.6B
- **Regional Replacement Cost**
\$140B

RTA Asset Condition Assessment

Rail Passenger Cars - \$5.9B

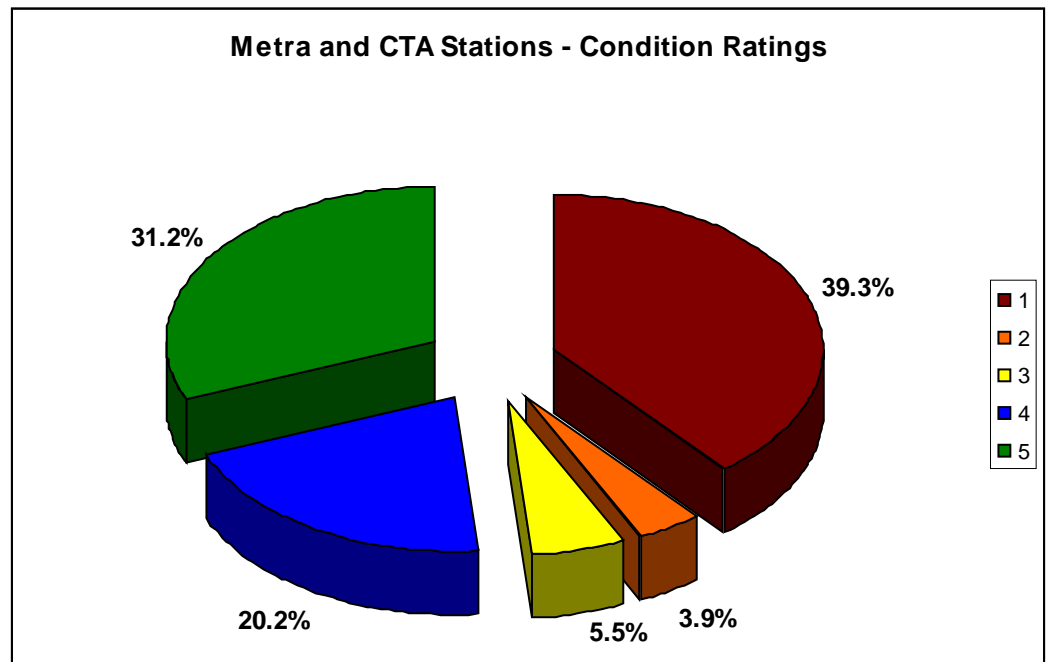
- Average condition rating of 2.3
- 42% are rated 1 (931 of our 2,225 rail cars)



RTA Asset Condition Assessment

Passenger Train Stations - \$5.8B

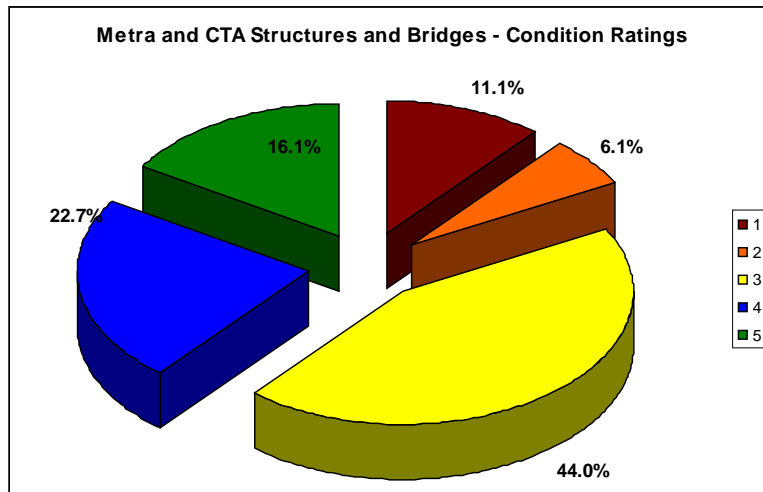
- Average condition rating of 3.0
- 39% are rated 1 (150 of our 382 stations)



RTA Asset Condition Assessment

Rail Bridges and Structures - \$2.9B

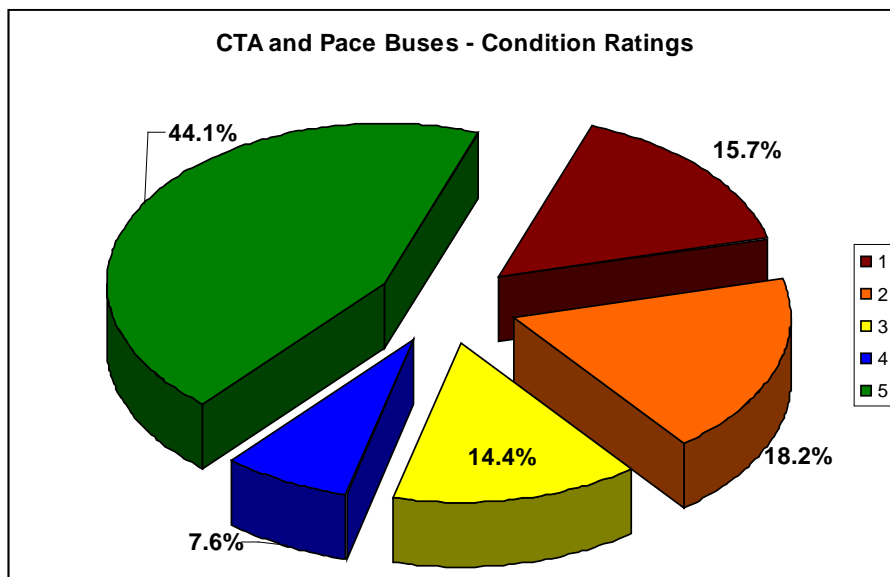
- Average condition rating of 3.3
- 11% are rated 1 (151 of 1,361 rail bridges and structures)



RTA Asset Condition Assessment

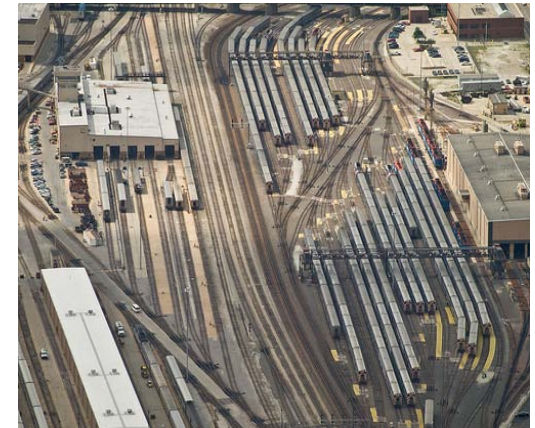
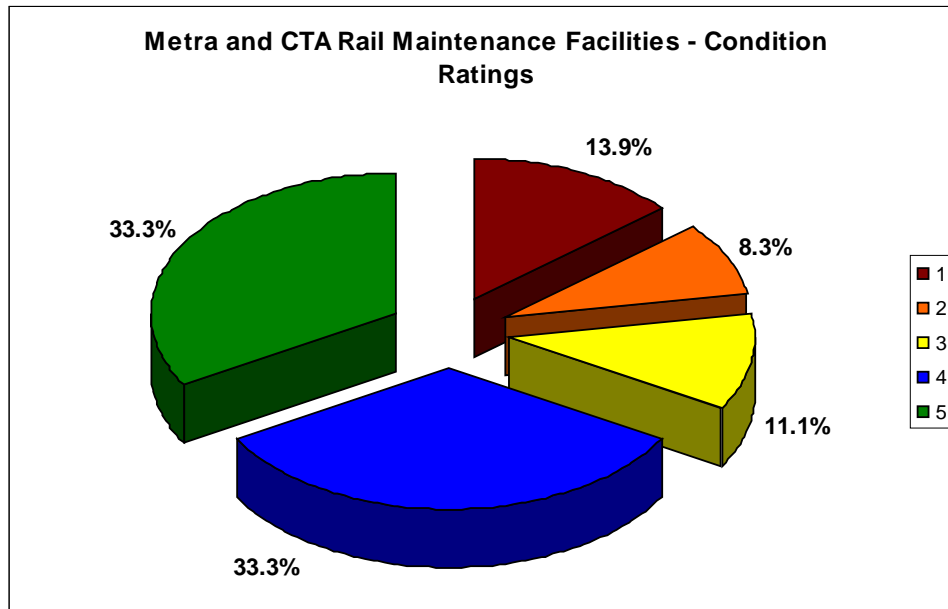
Fixed-Route Passenger Buses - \$2.2B

- Average condition rating of 3.5
- 16% are rated 1 (457 of our 2,918 buses)



RTA Asset Condition Assessment Rail Maintenance Facilities - \$1.0B

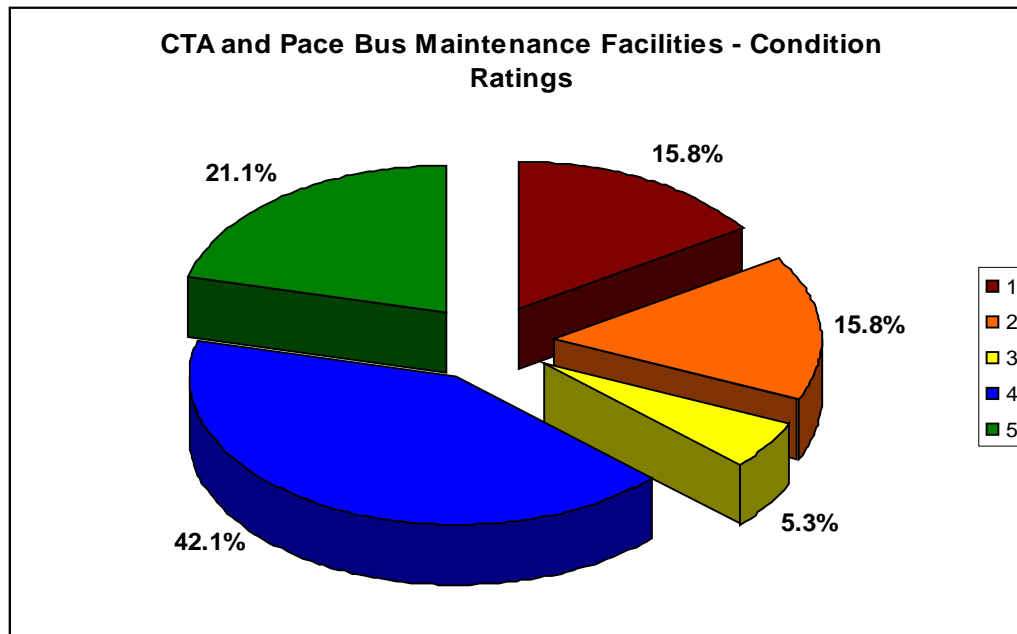
- Average condition rating of 3.6
- 14% are rated 1 (5 of 36 facilities)



RTA Asset Condition Assessment

Bus Garages - \$.89B

- Average condition rating of 3.4
- 16% are rated 1 (3 of 19 bus garages)



RTA Asset Condition Assessment

Asset Groups	Asset Sub-Groupings	Asset	Useful Life	Condition Rating Years				
				1	2	3	4	5
CTA TRACK & STRUCTURES (TS)	CTA TRACK STRUCTURES	CTS1 - Track Structures	80	> 80	61 - 80	41 - 60	21 - 40	< 21
		CTS2 - Ties: Pine*	25	> 25	19 - 25	13 - 18	7 - 12	< 7
	CTA TRACK	CTS2 - Ties: Oak/DF Fasteners*	25	> 25	19 - 25	13 - 18	7 - 12	< 7
		CTS2 - Ties: Composite*	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CTS2 - Ties: Concrete Slab*	55	> 55	41 - 55	28 - 41	14 - 27	< 14
		CTS3 - Rail: Tangent	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CTS3 - Rail: Curves < than 1500' radius	25	> 25	19 - 25	13 - 18	7 - 12	< 7
		CTS4 - Grade Crossing Track: High Auto Usage	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CTS4 - Grade Crossing Track: Low Auto Usage	20	> 20	16 - 20	11 - 15	6 - 10	< 6
		CTS5 - Special Trackwork	40	> 40	31 - 40	21 - 30	11 - 20	< 11
CTA ELECTRICAL & SUBWAY EQUIPMENT (ES)	CTA TRACTION POWER	CES1a - Substations	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CES1b - Substations Distribution	30	> 30	23 - 30	16 - 23	8 - 15	< 8
		CES2 - ROW Traction Power	40	> 40	31 - 40	21 - 30	11 - 20	< 11
	CTA SUBWAY EQUIPMENT	CES3 - Subway Electrical	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CES4 - Subway Fans	32	> 32	25 - 32	17 - 24	8 - 16	< 8
		CES5 - Subway Illumination	20	> 20	16 - 20	11 - 15	6 - 10	< 6
CTA SYSTEMS (SCF)	CTA SIGNAL SYSTEMS	CES6 - Subway Pumps	30	> 30	23 - 30	16 - 23	8 - 15	< 8
		CSCF1 - Interlockings	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CSCF2 - Cab Signals	40	> 40	31 - 40	21 - 30	11 - 20	< 11
	CTA FARE COLLECTION	CSCF3 - Grade Crossing Systems	40	> 40	31 - 40	21 - 30	11 - 20	< 11
		CSCF4 - Fare Collection	15	> 15	13 - 15	9 - 12	5 - 8	< 5
	CTA COMMUNICATIONS	CSCF5 - Radio Systems	15	> 15	13 - 15	9 - 12	5 - 8	< 5
		CSCF6 - GPS Bus	15	> 15	13 - 15	9 - 12	5 - 8	< 5
		CSCF7 - CCTV Station	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF8 - Cable Plant	20	> 20	16 - 20	11 - 15	6 - 10	< 6
		CSCF9 - Fiber Optic Systems	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF10a - SCADA Systems Station	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF10b - SCADA Systems Substation	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CSCF11a - Public Address Systems Audio	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
CTA STATIONS, GARAGES, FACILITIES (FS)	CTA STATIONS & PARKING	CSCF11b - Public Address Systems VMS	10	> 10	7.5 - 10	5 - 7.5	2.5 - 5	< 2.5
		CFS1a - Stations	40	> 40	31 - 40	21 - 30	11 - 20	< 11
	CTA BUS PASSENGER AND MAINTENANCE FACILITIES	CFS1b - Station Parking Garages	20	> 20	16 - 20	11 - 15	6 - 10	< 6
		CFS2 - Bus Passenger Facilities	20	> 20	16 - 20	11 - 15	6 - 10	< 6
		CFS3 - Maintenance Facilities	70	> 70	54 - 70	36 - 53	18 - 35	< 18
CTA ROLLING STOCK (RS)**	CTA REVENUE VEHICLES	CFS4 - Yard Facilities	50	> 50	38 - 50	25 - 37	13 - 25	< 13
		CRS1 - Rail Revenue Vehicles	25	> 25	19 - 25	13 - 18	7 - 12	< 7
	CTA NON-REVENUE VEHICLES AND WORK EQUIPMENT	CRS2 - Buses	12	> 12	10 - 12	7 - 9	4 - 6	< 4
		CRS3 - Non-Revenue Vehicles	5	> 5 years	46 - 60 mo	31 - 45 mo	16 - 30 mo	< 15 mo.
		CRS4 - Work Equipment	varies					

*CTA ties are replaced based on a scheduled replacement program while Metra ties are replaced as needed.

**Rolling stock useful life requires regular scheduled rehabs.

RTA Asset Condition Assessment

Asset Average Condition Ratings by Service Boards						
Asset Groups	Service Board					
	CTA		Metra		Pace	
	CTA Asset	Average Condition Rating	Metra Asset	Average Condition Rating	Pace Asset	Average Condition Rating
Track and Structures	CTS1 Track Structures	3.21	MTS1 Track Structures	3.30		
	CTS2 Ties	3.69	MTS2 Ties			
	CTS3 Rail	3.08	MTS3 Rail	N/A		
	CTS4 Grade Crossing Rail	4.77	MTS4 Grade Crossing Rail			
	CTS5 Special Trackwork	3.77	MTS5 Special Trackwork			
Electrical and Subway Equipment	CES1a Substations	2.27	MES1 Substations	2.13		
	CES1b Substations Distribution	3.02	MES2 ROW Traction Power	2.39		
	CES2 ROW Traction Power	2.20	MES3 Catenary	2.72		
	CES3 - Subway Electrical Service	1.79				
	CES4 Subway Fans	1.32				
	CES5 Subway Illumination	1.00				
	CES6 Subway Pumps	4.81				
Systems	CSCF1 Interlockings	3.96	MSCF1a Interlockings			
	CSCF1 Cab Signals	3.76	MSCF1b UP Interlockings	3.20		
	CSCF3 Grade Crossing Signals	4.87	MSCF1c BNSF Interlockings			
			MSCF2a Signal Controls	2.68		
			MSCF2b UP Signal Controls	1.43		
			MSCF2c BNSF Signal Controls	1.00		
			MSCF3a Grade Crossing Signals			
			MSCF3b UP Grade Crossing Signals	N/A		
			MSCF3c BNSF Grade Crossing Signals			
	CSCF4 Fare Collection Equipment	N/A	MSCF4 Fare Collection Equipment	1.97	PSCF1 - Pace Fare Collection Equipment	1.00
	CSCF5 Bus and Rail Radio Systems	1.00	MSCF5 Radio Systems	2.90	PSCF2 - Pace Radio Systems	1.59
	CSCF6 GPS On-Board Bus	3.69	MSCF6a CCTV Vending	1.00	PSCF3 - Electric Signal ITS (including B.S. AVL, MDT, TSP)	2.91
	CSCF7 CCTV Station	4.02	MSCF6b CCTV Homeland Security	3.51		
	CSCF8 Cable Plant Fiber	4.43	MSCF7 Telephone Systems	1.36		
	CSCF9 Fiber Optic Systems	4.05	MSCF8 Public Address Systems	N/A		
	CSCF10a SCADA Systems Stations	2.47	MSCF9 Cable Plant	3.00		
	CSCF10b Substation SCADA RTUs	1.71	MSCF10 Fiber Optic Backbone Network	1.00		
	CSCF11a Public Address Systems Audio	2.52	MSCF11 Microwave	2.33		
	CSCF11b Public Address Systems VMS	2.52	MSCF12 Wireless Telephone	5.00		
	CFS1a Stations	2.93	MFS1a Stations	3.04		
	CFS1b Station Parking	2.89	MFS1b Station Parking	2.02		

RTA Asset Condition Assessment

Submitted to
Regional Transportation Authority
175 West Jackson Boulevard, Suite 1500
Chicago, IL 60604-2711

REGIONAL TRANSPORTATION AUTHORITY Capital Asset Condition Assessment

prepared by
URS CORPORATION
In association with
Kristine Fallon Associates, Inc.
LTK Engineering Services
Tecma Associates, Inc.
Raul V. Bravo & Associates
ESA Management and Engineering Consultants
Laramore, Douglas, & Popham

August 2010

*This report is confidential and intended solely for the use and
information of the agency to whom it is addressed*



RTA Asset Condition Assessment

Table i-1 Definitions of Asset Cost Terms	
BACKLOG	The replacement cost for assets characterized by an age greater than their useful life. These assets are still in service and typically have not been replaced within their useful life due to a lack of sufficient funding.
NORMAL REPLACEMENT COSTS	The replacement cost for assets that will reach the end of their useful life during the 10-year program, 2010-2019. These assets are still in service and would be scheduled for replacement during the 10-year program if sufficient funding was available.
CAPITAL MAINTENANCE COSTS	The cost associated with keeping an asset in a state of good repair. Capital maintenance costs are typically significant and anticipated and are associated with keeping the asset in service for the full term of its useful life. Capital maintenance costs are characterized by replacement or rehabilitation of asset components, but not replacement of the entire asset. Examples of typical capital maintenance costs are bus overhauls (CTA, Pace), rail car overhauls (CTA, Metra), structure component replacement such as flange angles, foundations or connection angles (CTA, Metra).
SOFT COSTS	<p>RAIL & BUS INFRASTRUCTURE COMPONENTS: Additional 22.7% of total base cost including miscellaneous costs related to development of passenger services.</p> <p>RAIL AND BUS ROLLING STOCK AND EQUIPMENT: Additional 15% of total base cost including miscellaneous costs related to development of passenger services.</p> <p>The majority of soft costs are expended in the planning, engineering, and project management efforts. These services include in-house agency staff, government related support staff, and the use of consultants for particular tasks. Project start-up and initiation expenses are also included in this cost category. Project financing cost and an "other" expense line item, which includes any reconciliations and unaccountable costs, comprise the full range of project development capital costs. (Federal Transit Administration definition)</p>
CONTINGENCY COSTS	<p>RAIL & BUS INFRASTRUCTURE COMPONENTS: Additional 20% of total base cost including miscellaneous costs related to development of passenger services.</p> <p>RAIL & BUS EQUIPMENT & ROLLING STOCK: Additional 15% of total base cost including miscellaneous costs related to development of passenger services.</p> <p>These costs are budgeted for unforeseen emergencies or design shortfalls typically identified after a project commences. The contingency is included in the budget so the project can proceed with minimal interruption for changes or cost overruns.</p>



RTA Asset Condition Assessment

[illegible]



Third State of Good Repair Roundtable

RTA Asset Condition Assessment

Pace Assets: 10-Year Needs Assessment Components (000's)* CONTINUED																	
Asset Type**	Asset Groups	Asset	Cost Type		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	TOTAL 10-YEAR Replacement & Cap Maint	TOTAL 10-YEAR PROGRAM NEEDS	Asset
			Backlog \$	Normal Replacement \$													
				Capital Maintenance \$													
Bus Infrastructure (BI)	Pace Bus Infrastructure 10-YEAR NEEDS	\$22,054	Normal Replacement \$	\$28,353	\$55,358	\$106,750	\$55,418	\$40,428	\$33,086	\$29,750	\$42,238	\$43,220	\$40,785	\$475,386	\$497,440	Pace Bus Infrastructure 10-YEAR NEEDS	
		Capital Maintenance \$	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0				
	Infrastructure Soft Costs(227%)	\$5,006		\$6,436	\$12,566	\$24,232	\$12,580	\$9,177	\$7,511	\$6,753	\$8,588	\$9,811	\$9,258	\$107,913	\$112,919	Infrastructure Soft Costs(227%)	
	Infrastructure Contingency (20%)	\$4,411		\$5,671	\$11,072	\$21,350	\$11,084	\$8,086	\$6,617	\$5,950	\$8,448	\$8,644	\$8,157	\$85,077	\$95,077	Infrastructure Contingency(20%)	
Bus Equipment and Vehicles (BE)	Pace Bus Equipment 10-YEAR NEEDS	\$64,000	Normal Replacement \$	\$45,330	\$158,390	\$121,250	\$41,995	\$150,680	\$95,500	\$55,030	\$36,615	\$90,850	\$171,070	\$964,710	\$1,188,470	Pace Bus Equipment 10-YEAR NEEDS	
		Capital Maintenance \$	\$28,300	\$14,600	\$14,600	\$15,600	\$15,600	\$14,100	\$14,100	\$14,100	\$15,100	\$159,760					
	Bus Equipment Soft Costs(15%)	\$9,600		\$10,754	\$25,649	\$20,378	\$8,639	\$24,942	\$16,665	\$10,370	\$7,607	\$15,743	\$27,926	\$168,671	\$178,271	Bus Equipment Soft Costs(15%)	
	Bus Equipment Contingency (15%)	\$9,600		\$10,754	\$25,649	\$20,378	\$8,639	\$24,942	\$16,665	\$10,370	\$7,607	\$15,743	\$27,926	\$168,671	\$168,671	Bus Equipment Contingency(15%)	
Total	Pace TOTAL 10-YEAR NEEDS w/o soft costs and contingencies	\$86,054	TOTAL Normal Replacement \$	\$73,683	\$211,748	\$228,000	\$97,413	\$191,108	\$128,586	\$84,780	\$78,933	\$134,070	\$211,855	\$1,440,096	\$1,685,910	Pace TOTAL 10-YEAR NEEDS w/o soft costs and contingencies	
		TOTAL Capital Maintenance \$	\$26,360	\$14,600	\$14,600	\$15,600	\$15,600	\$14,100	\$14,100	\$14,100	\$15,100	\$159,760					
	TOTAL Soft Costs	\$14,606		\$17,190	\$38,215	\$44,610	\$21,219	\$34,119	\$24,176	\$17,123	\$17,195	\$25,553	\$37,184	\$276,583	\$291,189	TOTAL Soft Costs	
	TOTAL Contingency Costs	\$14,011		\$16,424	\$36,720	\$41,728	\$19,723	\$33,028	\$23,282	\$16,320	\$16,055	\$24,387	\$36,083	\$263,748	\$277,759	TOTAL Contingency Costs	
	GRAND TOTAL Pace TOTAL 10-YEAR NEEDS	\$114,671		\$133,657	\$301,283	\$328,937	\$153,955	\$273,855	\$191,644	\$132,322	\$126,203	\$198,110	\$300,221	\$2,140,187	\$2,254,858	GRAND TOTAL Pace TOTAL 10-YEAR NEEDS	
		Backlog \$		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-year Replacement and Cap Maint	GRAND TOTAL		
* Replacement and Capital Maintenance Costs from Pace Suburban Bus and ADA 10-Year Budget																	
** BI= Bus Infrastructure																	
BE= Bus Equipment and Vehicles																	

RTA Asset Condition Assessment

10-year Capital Program Needs Summary (in billions)

Program Needs	CTA	Metra	Pace	Total RTA
Backlog	\$10.0	\$3.7	\$.1	\$13.8
Normal Replacement	\$3.2	\$1.7	\$1.9	\$6.9
Capital Maintenance	\$1.8	\$2.0	\$.2	\$3.9
Total	\$15.0	\$7.4	\$2.3	\$24.6 (\$17 B Shortfall)
% of Total	60.90%	29.94%	9.16%	100.00%

RTA Asset Condition Assessment

**Multiple Asset
Management Systems**

WITH FTA

ASSET CONDITION ASSESSMENT - URS

ASSESSMENT CONTINUATION - BAH/URS

DECISION TOOL PROJECT - BAH



PARTNERSHIP



US Transit
Properties



RTA Asset Condition Assessment



RTA Asset Condition Assessment



RTA Asset Condition Assessment



RTA Asset Condition Assessment



RTA Asset Condition Assessment



RTA Asset Condition Assessment



RTA Asset Condition Assessment



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PARTNERSHIP



US Transit
Properties

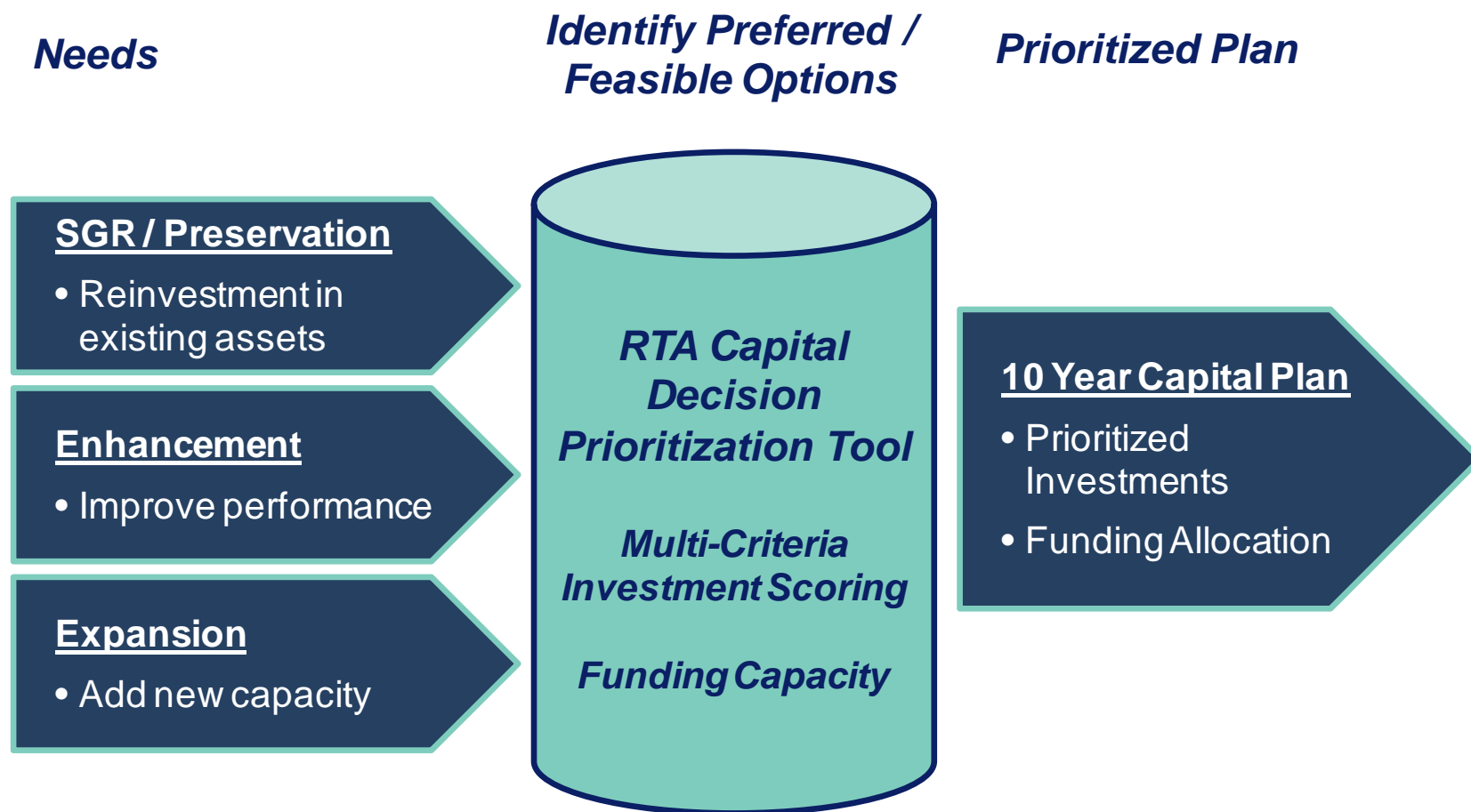


RTA Capital Prioritization Decision Support Tool

- Tool to prioritize regional capital needs:
 - Preservation / SGR
 - Expansion
 - Enhancement
- Support scenario analysis
 - How do changes in priorities and funding impact investment selection?
- Yield a needs based capital plan
- Developed jointly with service boards:
 - CTA, Metra and Pace
- Approach to be shared with TERM Lite

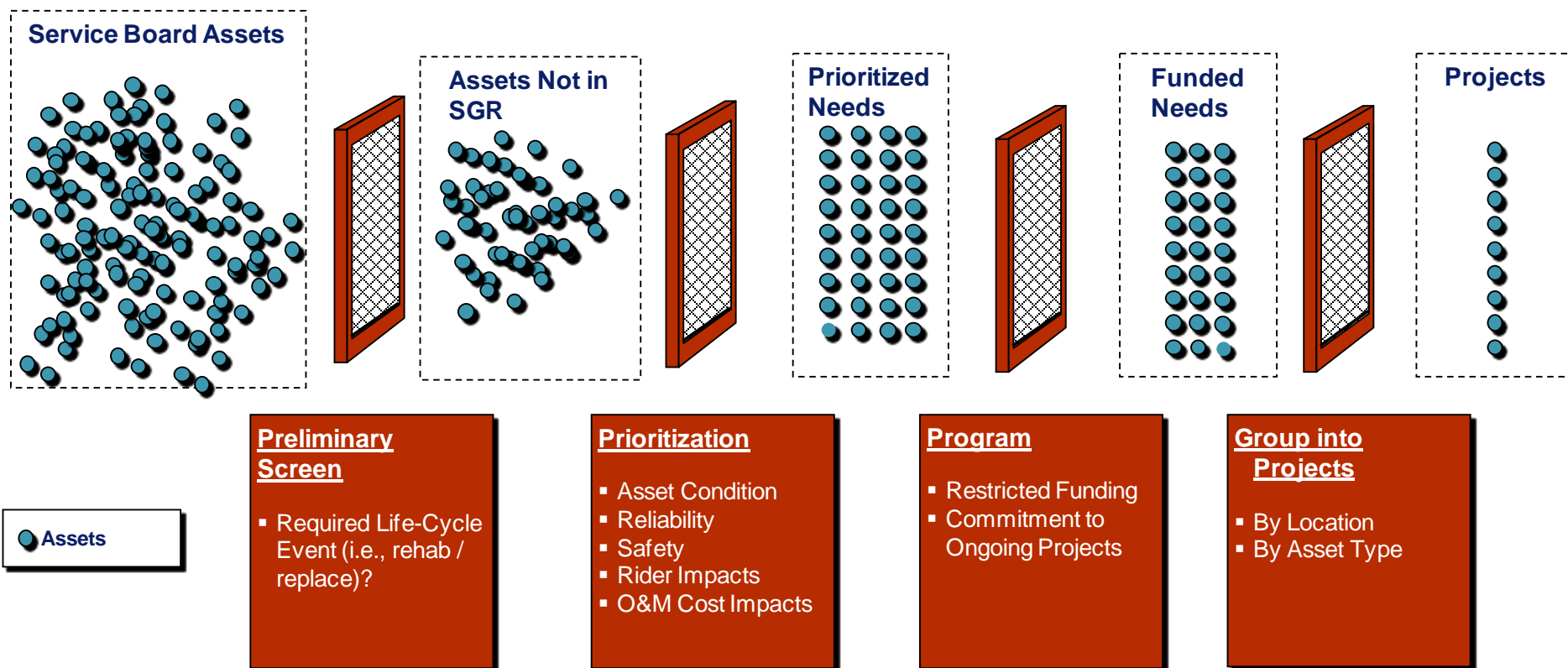


Prioritization Tool: Conceptual Model



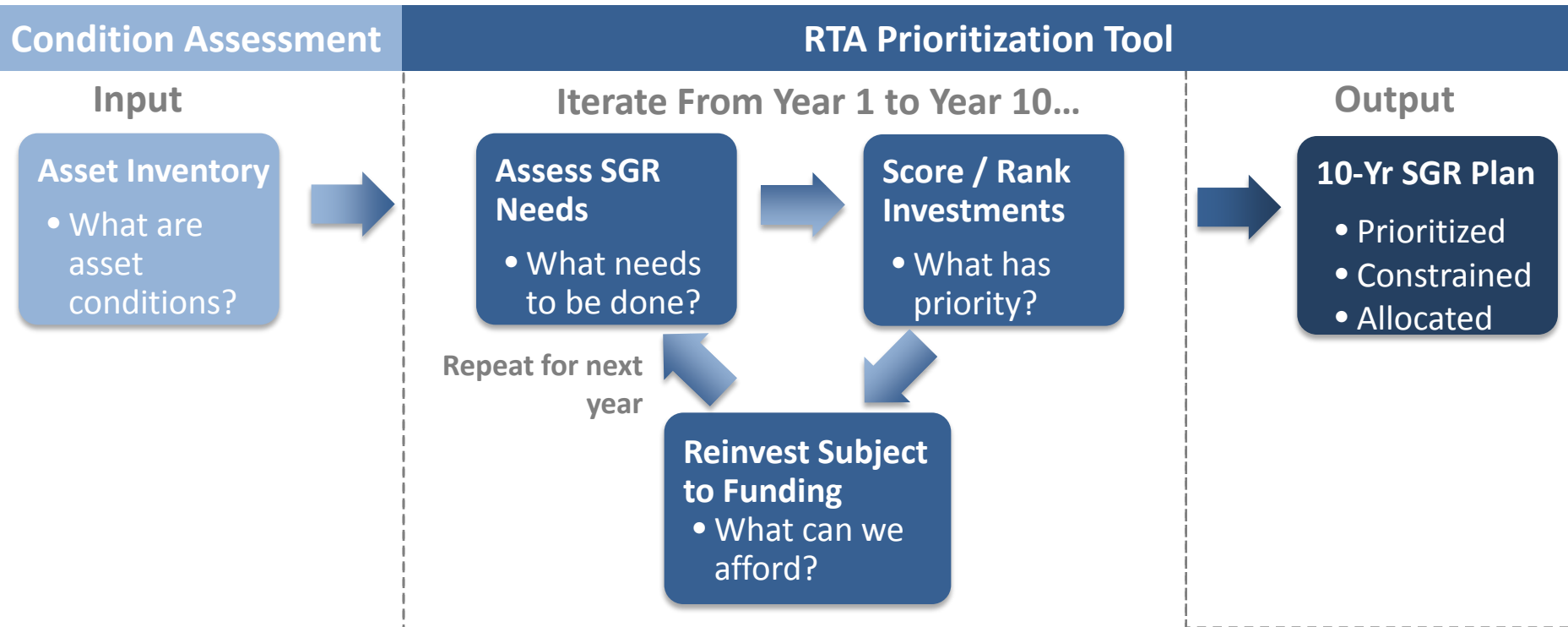
Initial Development Focused on Preservation

Annual Investment Prioritization Process (Repeated Iteratively to Generate 10-Year Plan)



Also a Needs Analysis Forecasting Tool

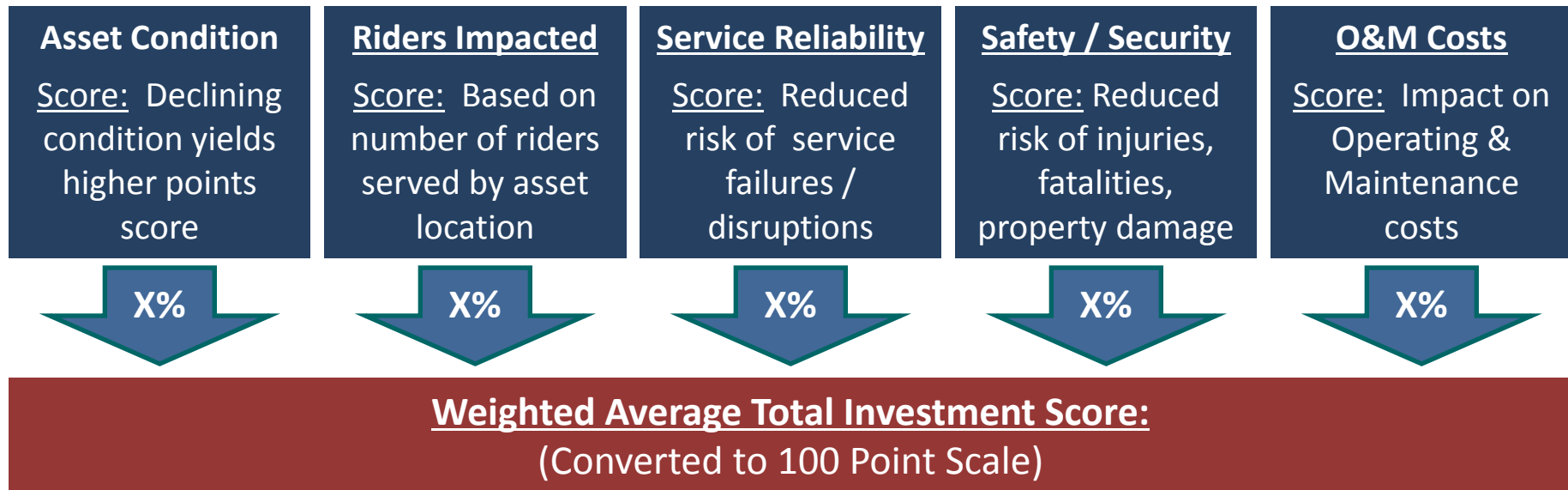
- Not “just” a prioritization tool...
- Both *projects* and *prioritizes* 10 year needs



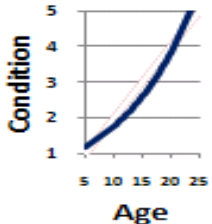
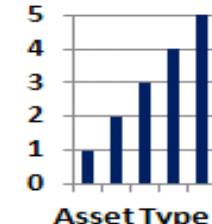
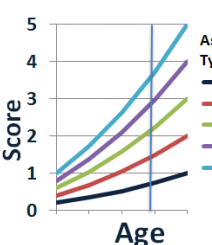
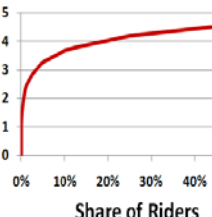
Multi-Criteria Prioritization

- All assets scored on five criteria
 - Each criteria scored on 1 to 5 scale
 - Scores weighted, summed, & converted to 100 point scale

Multi-Criteria Decision Analysis (MCDA) Based Approach



Approaches to Criteria Scoring

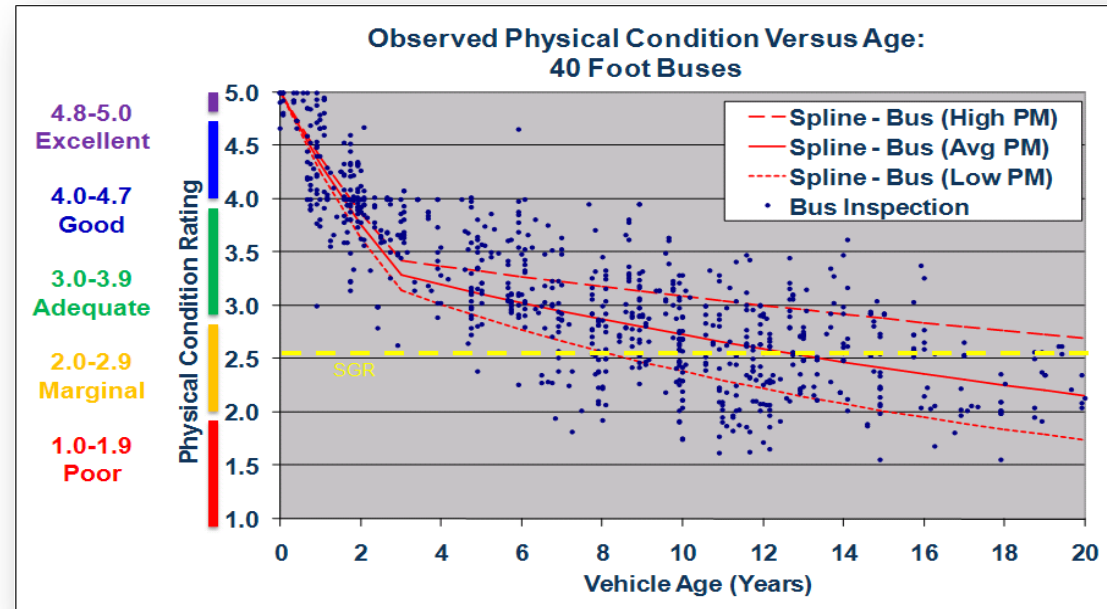
Criterion	Approach	Dynamic or Static?	Illustration
Condition	<ul style="list-style-type: none"> Decay curve based condition estimate <ul style="list-style-type: none"> Age based 1 to 5 scale 	<ul style="list-style-type: none"> Dynamic 	
O&M Cost Impact	<ul style="list-style-type: none"> Fixed score by asset type 	<ul style="list-style-type: none"> Static 	
Reliability and Safety	<ul style="list-style-type: none"> Combination of: <ul style="list-style-type: none"> Fixed score by asset type Dynamic score by asset age 	<ul style="list-style-type: none"> Mixed 	
Riders Impacted	<ul style="list-style-type: none"> Logarithmic score based on share of total agency riders impacted <ul style="list-style-type: none"> Scale ensures all assets obtain score 	<ul style="list-style-type: none"> NA 	

Condition Score

- Condition estimated using FTA decay curves
 - Estimate driven by asset age
- Ratings “inverted” for scoring

FTA Condition Ratings and RTA Prioritization SGR Scores

Condition	FTA Rating	RTA SGR Score	Description
Excellent	5	1	▶ New asset
Good	4	2	▶ Minimal signs of wear
Adequate	3	3	▶ Asset has reached its mid-life
Marginal	2	4	▶ Asset reaching or just past its useful life
Poor	1	5	▶ Asset past its useful life / in need of immediate repair or replacement



Static Scoring

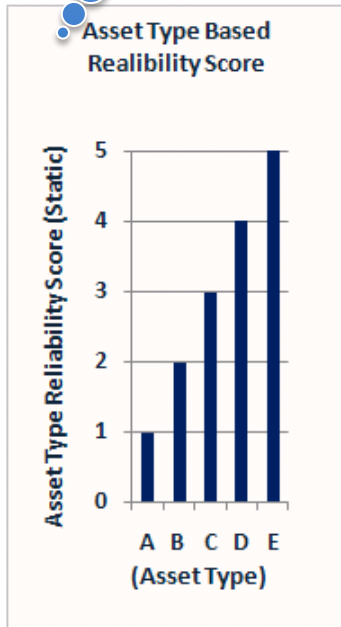
- Static scoring assigned by asset type for:
 - Reliability
 - Safety
 - O&M Costs

Consolidated Criteria Scoring (static)			Reliability	Safety	O&M Cost
Asset Group	Sub Group	Elements	Regional	Regional Avg.	Regional Avg.
Track and Structures	Structures	At-Grade	4	4	3
		Grade Crossing	3	4	3
		Retained Cut / Elevated Fill	4	4	3
		Elevated Structures	4	4	3
		Subway Tunnels	4	4	3
	Trackwork	Ties	5	4	4
		Rail	5	4	4
		Special Trackwork	5	4	4
	Electrical Power / Subway Equipment	Traction Power			
		Substations: Equipment	4	4	4
		Substations: Building	3	2	3
		Substations: Distribution Cable	4	4	3
		ROW Traction Power: 3rd Rail / Catenary	5	3	4
	Subway Equipment	Subway: Electrical	4	4	4
		Subway: Fans	2	4	3
		Subway: Illumination	2	4	4
		Subway: Pumps	4	4	3
Systems	Signals	Interlockings	5	5	4
		Wayside Signals	4	5	4
		Grade Crossing Signals	4	5	4
		Cab Signals	4	5	4
		Central Control	3	5	3
	Fare Collection	Central Revenue Collection	1	1	2
		In-Station: TVM, fare gates	2	2	3
		On-Vehicle	3	1	2
	Communications	Voice: Radio Systems	4	4	2
		Voice: Telephone	2	3	2
		Data Network	4	4	2
		SCADA	5	4	2
		Station: PA / Audio	3	3	2
		Station: VMS	3	2	2
		Station: CCTV	2	2	4
	ITS	GPS / AVL / CAD / APC	4	4	2

Dynamic Scoring

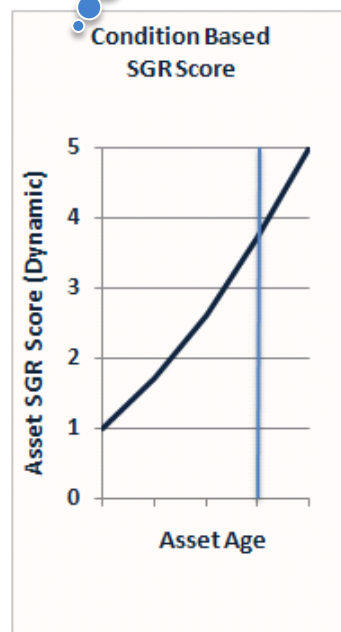
- Reliability and safety have both static and dynamic scoring components

Contribution to reliability varies by asset type...



Static

...reliability also driven by asset condition...

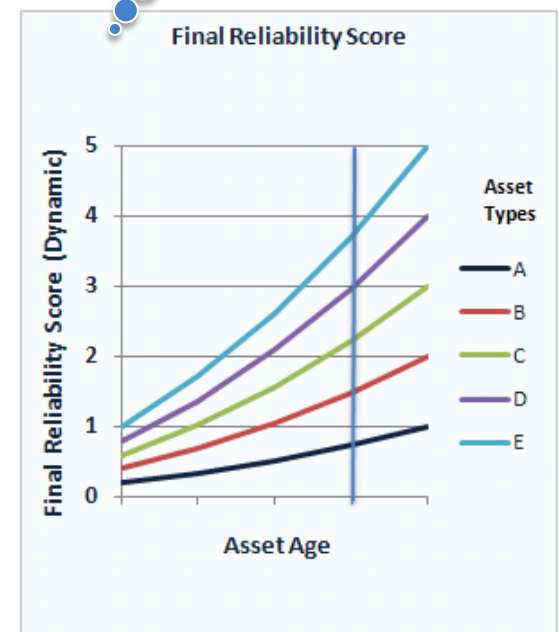


Dynamic

Adjustment Factor

5

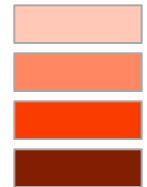
reflects both type and condition



Mixed

- Dynamic scoring – for condition, safety and reliability – drive up prioritization scores over the 10-year analysis period for non-SGR assets not replaced due to financial constraints

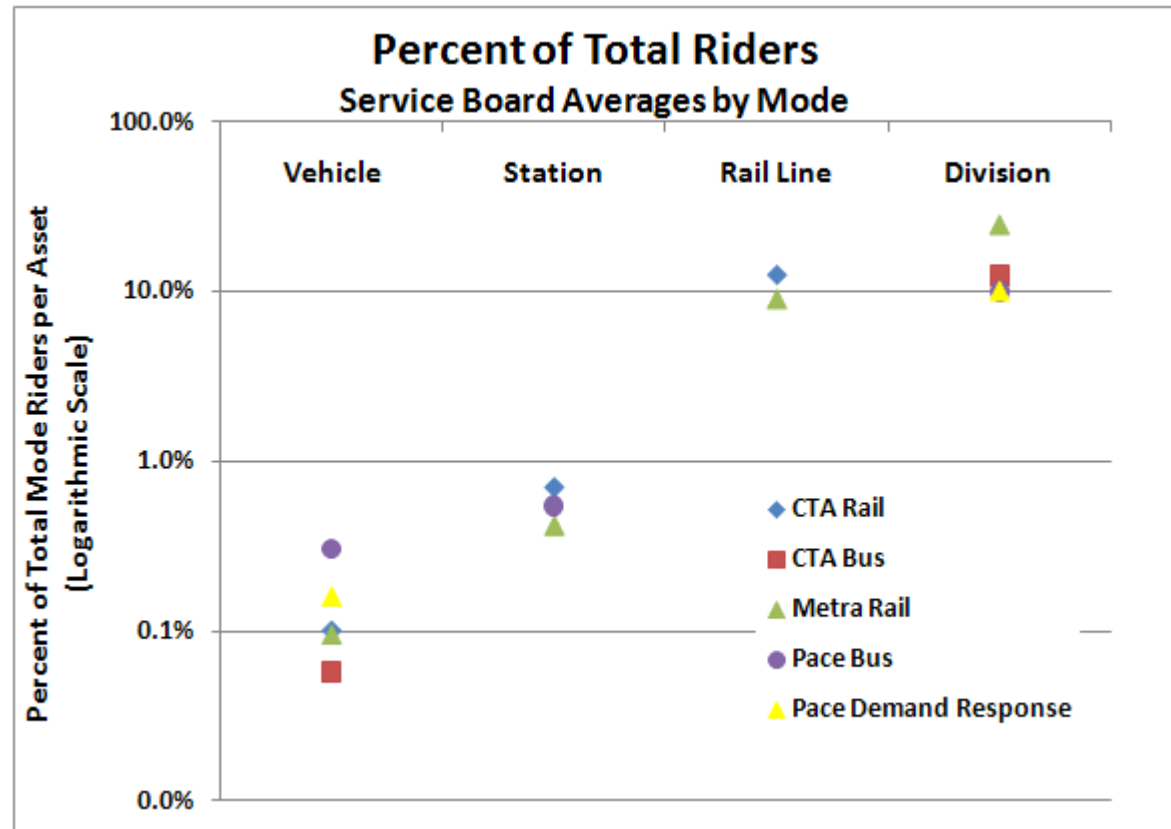
Increasing Scores for Assets Not in SGR



Year 5...

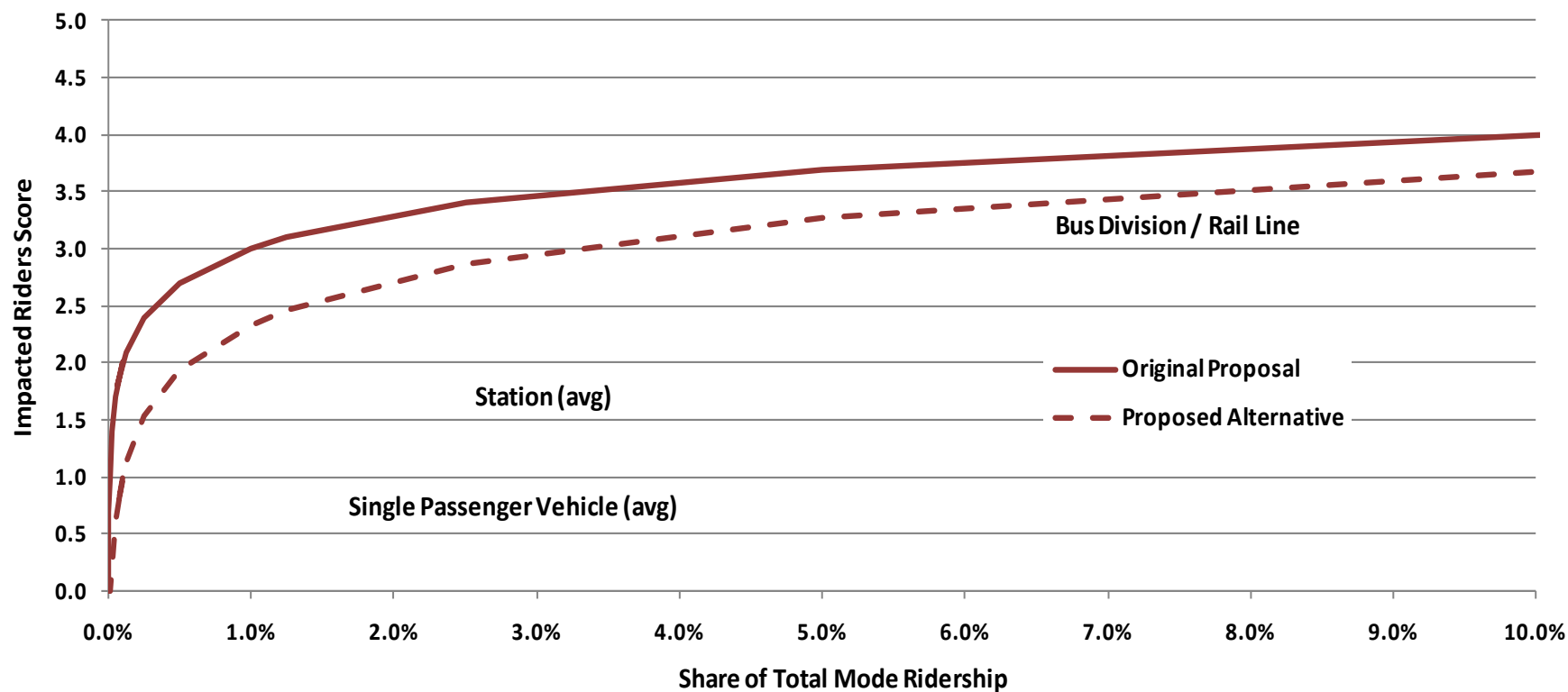
Riders Impacted Scoring

- Goal: Investments benefiting more riders score higher
- Challenges:
 - Assets can serve very different numbers of riders
 - Share of total riders served tends to align by “orders of ten%”
 - Suggests scoring on logarithmic scale
 - Ensures all asset types obtain a score

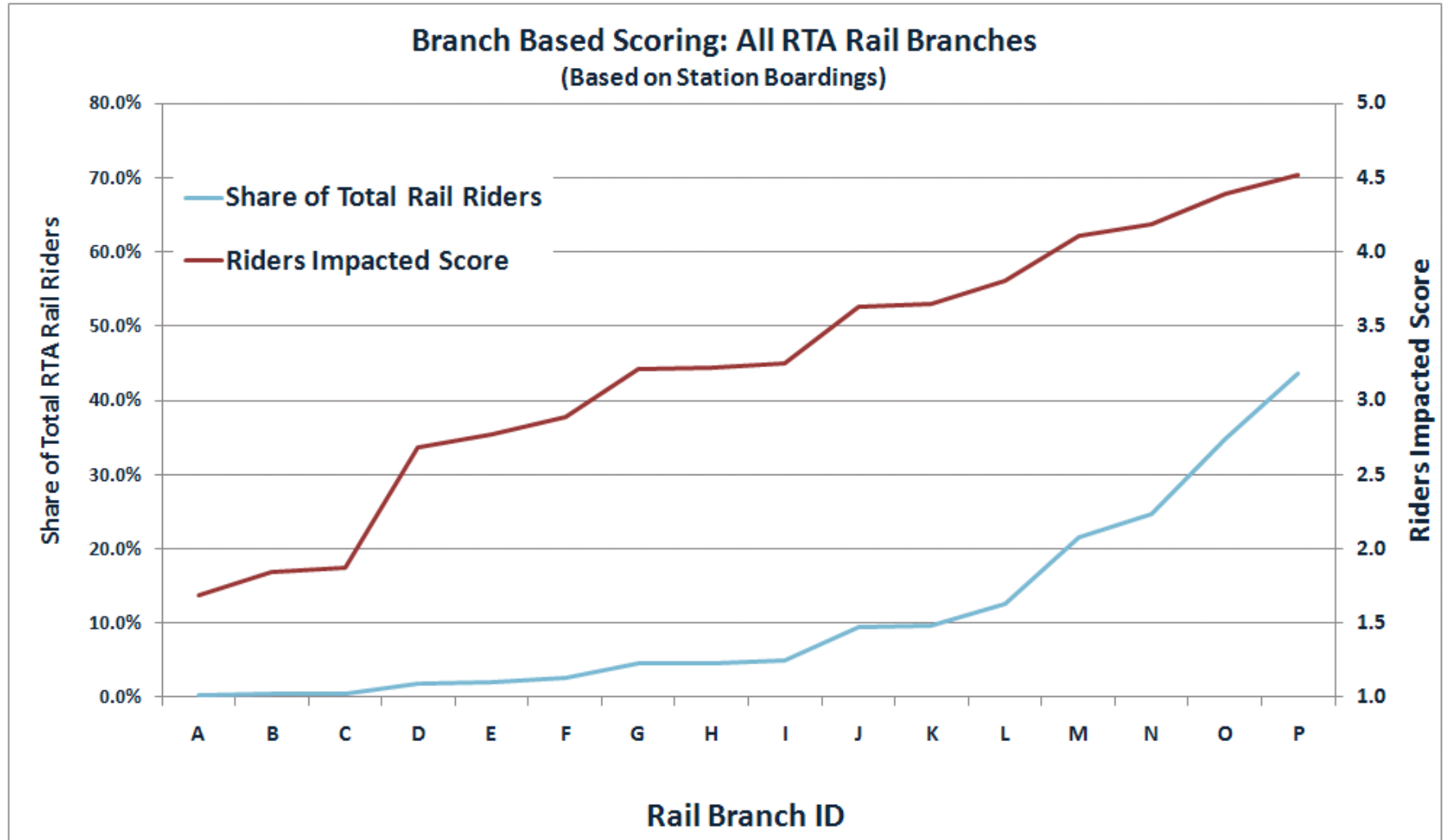


Riders Impacted: Logarithmic Scoring Function

Impacted Riders Scoring (Logarithmic)



Riders Impacted: Branch Scoring Example



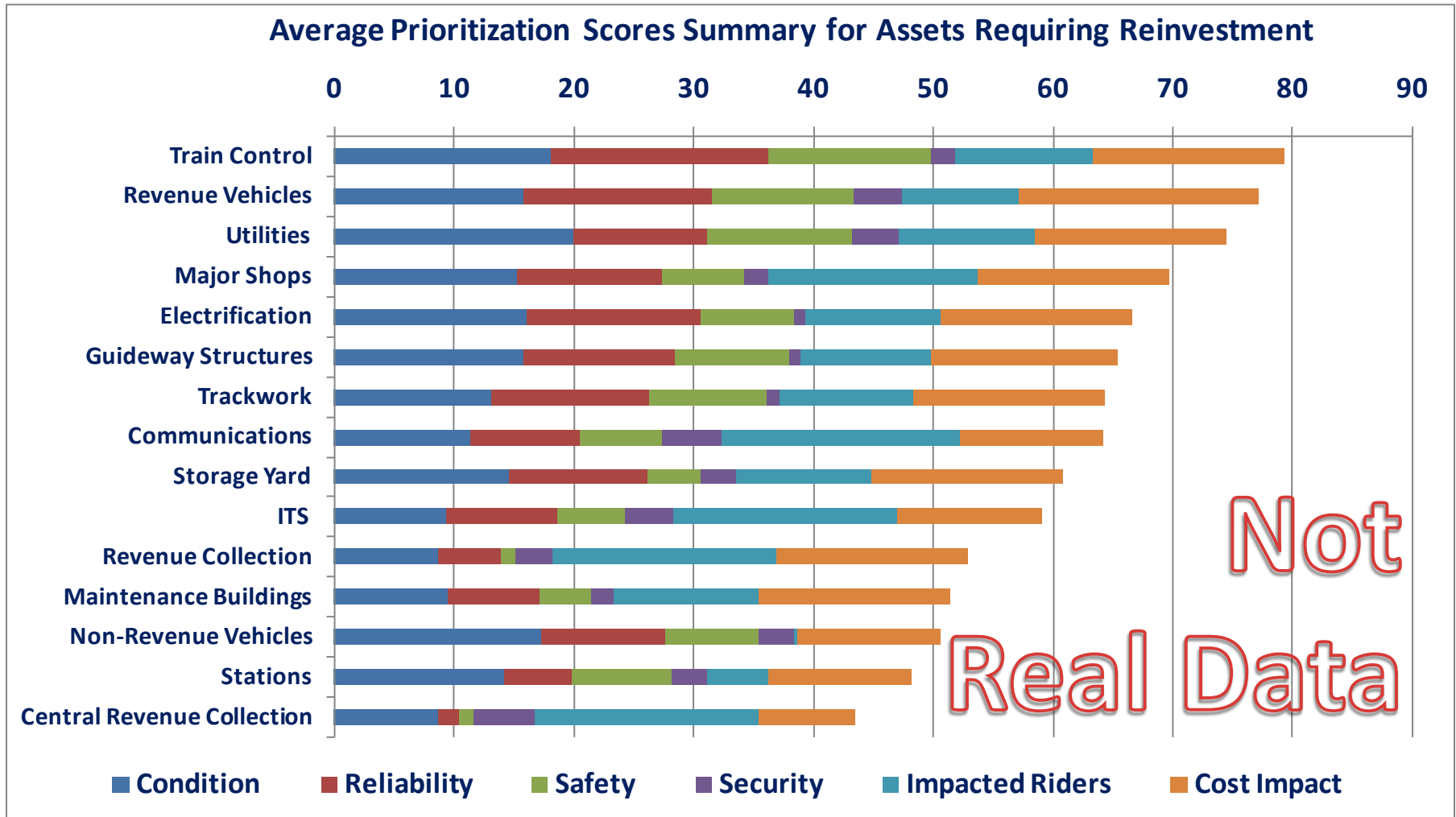
Total Asset Prioritization Score

Total Asset Score Calculation

Criteria	Score (1 to 5)		Criteria Weight		Convert to Base 100		Base 100 Score
SGR / Condition	3.75	x	20%	x	20	=	15.00
Reliability	2.62	x	20%	x	20	=	10.48
Safety	3.11	x	20%	x	20	=	12.44
Riders Impacted	4	x	20%	x	20	=	16.00
O&M Cost Impact	1	x	20%	x	20	=	4.00
Total			100%			=	57.92

 User input

Summary Prioritization: Example



Detailed Prioritization: Sample

Asset Data				Prioritization Score						
Category	Sub-Category	Element	Location ID	Conditon (20%) (FTA Decay Curve Based Score based on Asset Type and Age)	Reliability (20%) (Condition x Static Reliability Score)	Safety & Security (20%) (Condition x Static Safety Score)	Security (5%) (Static Security Score Only)	Impacted Riders (20%) (Logarithmic Score based on Share of Total SB Riderhip)	O&M Cost Impact (20%) (Static Reliability Score Only)	Total Score (100%) (weighted sum of scores in coulmnns J to O times 20)
Facilities	Major Shops	Bus	67983	3.06	2.45	1.84	2	4.36	4	63.00
Facilities	Storage Yard	Rail	96550	3.79	3.04	1.52	3	3.00	4	62.89
Guideway	Trackwork	Direct Fixation	69362	3.79	3.79	3.79	1	1.05	4	62.84
Systems	Electrification	Substations	83117	3.14	2.51	1.88	1	4.36	4	62.66
Guideway	Guideway	Elevated Struct	95422	3.82	3.05	3.05	1	2.04	4	61.77
Facilities	Storage Yard	Bus	69631	3.35	2.68	1.34	3	3.62	4	61.66
Guideway	Trackwork	Ties	34853	3.60	3.60	3.60	1	1.05	4	60.80
Guideway	Trackwork	Direct Fixation	14253	2.88	2.88	2.88	1	2.99	4	60.63
Systems	Electrification	Contact Rail	83655	3.38	3.38	2.03	1	2.56	4	60.42
Systems	Train Control	Interlockings	88773	2.80	2.80	2.80	2	2.61	4	59.27
Guideway	Trackwork	Embedded	44226	2.89	2.89	2.89	1	2.61	4	59.25
Systems	Train Control	Roadway Crossi	25409	2.47	2.47	2.47	2	3.49	4	59.13
Systems	ITS	GPS	98564	2.33	2.33	1.87	4	4.68	3	59.00
Systems	Utilities	Fan Plants	68472	3.03	1.82	2.43	4	2.99	4	58.66

Next Steps: RTA Prioritization Tool...

- Beta application for 2012 Budget
- Ongoing development...
 - Scoring and criteria weight calibration
 - Asset to project mapping
 - User training
- Prioritization of enhancement and expansion investments

Questions?

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