

Government  
Center

South  
Pointe

Convention  
Center

Downtown  
Core

Bay  
Islands

Entertainment  
District

Beach  
Corridor  
Transit  
Connection  
Study

Policy Executive Committee Meeting  
July 8, 2014



# PURPOSE OF MEETING

# Purpose of Meeting

- ▶ New Miami Beach “Hybrid” Option
- ▶ Off-wire Technology Assessment
- ▶ Financial Analysis Results
- ▶ TIGER Planning Grant Status





# BEACH HYBRID ALIGNMENT OPTION

# Beach Hybrid Alignment Option

Derived from TSC Members

More Frequent Service in South Beach

Circulation on East & West Sides

Duplicative Bus Service Eliminated

Potential Bus O&M Cost Savings



# Beach Hybrid Alignment Option

Capital and O&M Cost Summary					
	2004 LPA	DC	OLA	Hybrid	Extensions
Capital Cost	\$774 M	\$532 M	\$646 M	\$694 M	\$529 M
Annual O&M Cost	\$45 M	\$22 M	\$34 M	\$49 M*	\$28 M

\* 5 Min peak and off-peak headways both segments



# TECHNOLOGY ASSESSMENT



# Vehicle Marketplace

- ▶ 400+ streetcar/tram/LRT systems worldwide, (8,000+ low-floor vehicles)
- ▶ US is only a small portion of the global marketplace for rail transit equipment
- ▶ Streetcar/tram vehicle market has evolved considerably since 2000
- ▶ Power supply technology still developing





# Why Eliminate Overhead Wires?



- ▶ **Aesthetic concerns** - e.g. historic district
- ▶ **Route optimization** - solution to a specific problem (impaired clearance, narrow right-of-way, utility conflict, etc.)
- ▶ **Cost?** (difficult to know with certainty)

*Overhead wire visual impact can be minimized*

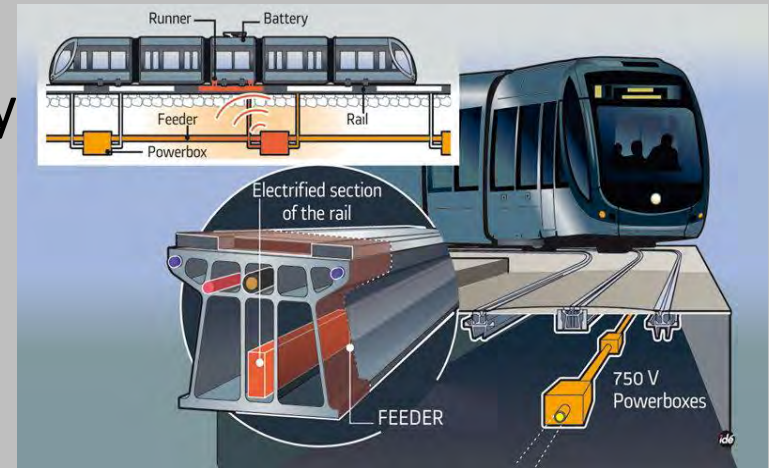


# Speaking the Same Language

Streetcar / LRT Power Supply	Energy Storage System (ESS) Types
<b>Conventional System</b> OCS is primary power source. ESS used for energy savings. ESS can also provide emergency power.	<div data-bbox="1128 305 1441 429"> </div> <div data-bbox="948 462 1663 608"> </div>
<b>Ground-Level Power System</b> GLPS / OCS is primary power source. ESS used as emergency power source in case of GLPS segment outage.	<div data-bbox="948 679 1663 851"> </div>
<b>Off-Wire Capable Vehicle</b> ESS is primary power source in sections without external power. Recharging via regenerative braking and intermittent OCS or GLPS.	<div data-bbox="948 915 1663 1115"> </div>
<b>"Hybrid"</b> (Adds generator) ESS is primary power source.	<div data-bbox="1122 1193 1421 1265"> </div>

# Ground Power Supply

- Power supply replaced overhead wire
- Segmented power supply turns on only when vehicle is over it
- Proprietary infrastructure and vehicle equipment
- Significant underground infrastructure
- Complicates track design
- Typically used for a portion of system (first full system now under construction)
- Continuous vs. blended approach, inductive variant





# State of the Art: Ground Power Supply

## Under Contract:

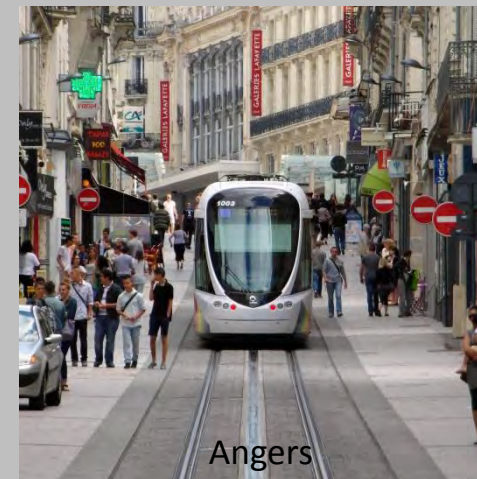
- Beijing, China (5.8 miles) Breda

## Under Construction:

- Dubai, UAE (6.2 miles 2014) Alstom
- Zhuhai, China (5.4 miles 2016) Breda
- Cuenca, Ecuador (portion of 6.5 mile line, 2016) Alstom

## Revenue Service:

- Bordeaux (8 mile portion, 2007) Alstom
- Angers (0.9 mile portion, 2011) Alstom
- Reims (1.25 mile portion, 2011) Alstom
- Orleans (1.25 mile portion, 2012) Alstom
- Tours (1.1 mile portion, 2013) Alstom



# Onboard Energy Storage

- ▶ Vehicles use external power supply or on-board energy storage (OESS)
- ▶ Batteries and Super Caps most common energy storage technologies
- ▶ Off-wire “range” dependent on operating conditions and OESS capacity
- ▶ New technology evolving rapidly
- ▶ Energy (battery) storage devices have limited life
- ▶ Weight added to vehicle; increased energy consumption
- ▶ Reduced acceleration rate, reduced AC



# State of the Art: Onboard Energy Storage

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## Planned:

- 2016 Detroit (portions)
- 2017 Ft. Lauderdale (segment)
- ? Washington, DC (portion)
- ? Budapest, Hungary (portion)
- ? Konya, Turkey (1.1 mile segment of 3.2 mile line)



Dallas

## Under Construction:

- 2014 Seattle (one direction of new 2.5 mile line)
- 2014 Dallas (2 vehicles, 1 mile of 1.6 mile line)
- 2014 Kaohsiung, Taiwan (13.7 mile line, charging at stops)
- 2014 Guangzhou, China (4.8 mile line, charging at stops)
- 2015 Nanjing, China (10.6 miles, some overhead)
- 2015 Doha, Qatar (7.2 miles, charging at stops)



# State of the Art: Onboard Energy Storage

## Revenue Service:

- 2007 Nice, France. 0.6 of 5.5 mile line
- 2011 Seville, Spain. 0.4 of 1.4 mile line
- 2011 Zaragoza, Spain. 1.25 of 8 mile line
- 2013 Shenyang, China. Portion of new system





# “Hybrid” (add generator)

- ▶ E.g. hydrogen fuel cells or diesel generator
- ▶ Significantly less progress compared to ground power supply and onboard energy storage
- ▶ Fuel cells still in prototype phase
- ▶ Some notable but limited applications of diesel generators



FEVE Hydrogen tram prototype



Nordhausen; Siemens Combino DUO

# Comparing O&M Costs

## Off-wire O&M savings:

- ▶ Less overhead wire to maintain
- ▶ Reduces conflicts with other users of the right-of-way

## Off-wire O&M added costs:

- ▶ Replacement /disposal of batteries
- ▶ Additional maintenance costs:
  - ▶ Batteries, additional subsystem complexity
  - ▶ Additional maintenance hazards
  - ▶ Current collector (e.g. pantograph) cycles
  - ▶ Proprietary parts issues
  - ▶ “New Technology” unknowns

## Variables:

- ▶ Technology employed
- ▶ Length of off-wire section
- ▶ Duty cycle



South Korean prototype battery tram

# State of the Art (Summary)

Carbuilder	Ground Power Supply			Onboard Energy Storage		
	Prototype	Under Contract	Revenue Service	Prototype	Under Contract	Revenue Service
Alstom *		X	X	X		X
Bombardier *	X					
Brazil- Bom Sinal				In devmt.		
Breda *	X	X				
Brookville *					X	
CAF *					X	X
China- CSR					X	
China- CNR Changchun						X
Hyundai Rotem / KRRI *				X		
Inekon					X	
Kawasaki *				X		
Kinkisharyo *				X		
RTRI Japan				X		
Siemens *				X	X	
Skoda				X	X	
Stadler				X		
United Streetcar *						
Vossloh					X	

\* Have delivered Buy-America compliant vehicles

# Local Issues

- ▶ **Duty Cycle**
  - ▶ Stops per mile (mixed traffic vs. exclusive guideway)
  - ▶ Grades
  - ▶ Climate (HVAC)
- ▶ **Vehicle length and weight**
- ▶ **Exclusive guideway opportunities**
- ▶ **Utility impacts**
- ▶ **Full off-wire; or only partial?**
  - ▶ At 6.75 miles Miami “DC” option would be among the longer off-wire systems
  - ▶ Time under wire is time spent charging
  - ▶ Some wire provides flexibility to optimize the amount of on-board energy storage
  - ▶ Marketplace might still respond with a fully off-wire solution





# Conclusions

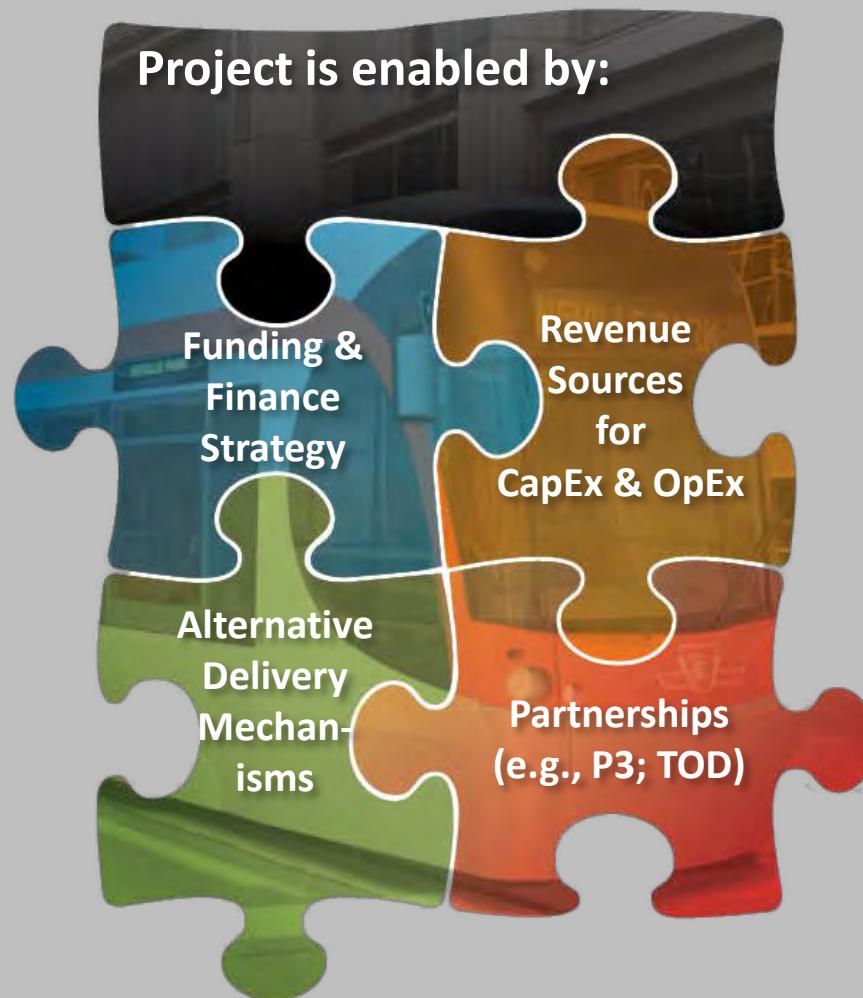
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- ▶ Don't define the solution--define the need and let the marketplace propose solutions
- ▶ Define the *business case* for off-wire; understand cost/benefit
- ▶ Being an early adopter of a new technology has risks
- ▶ Mitigate by using project delivery that shares that risk
- ▶ Ground power supply not a good match to flood-prone areas
- ▶ Stay flexible; partially wired system has important advantages
- ▶ Reduce energy demand; keep vehicles out of mixed traffic
- ▶ Use longer vehicles (~98 ft); more room for OESS, greater future passenger capacity



# FINANCIAL ANALYSIS

# Financial Analysis





# Cost Framework: Initial Estimates of CapEx and Opex

	2004 LPA	DC	OLA	Extensions
Capital Cost	\$774 M	\$532 M	\$646 M	\$529 M
Annual O&M Cost	\$45 M	\$22 M	\$34 M	\$28 M

\$2013 in millions of dollars for total capital cost estimate.  
Source: Gannett Fleming, 2014.

# Funding Questions

1. Should the project be funded with a corridor-specific source?
2. Should Federal New Starts funds be applied?
3. What funding mechanisms are viable for this project?
4. What is the potential for new tolls?
5. What is the potential for value capture?
6. What are the benefits and real opportunities for P3?



# 1. Should the project be funded with a corridor-specific source?

- Probably yes
- No county-wide source available
- Benefits are localized to Miami and Miami Beach travel market and development
- Self-sufficient and viable corridor-specific funding sources are available
- Avoids county-wide prioritization process



## 2. Should Federal New Starts funds be applied?

- If County and Cities commit to local, dedicated funding, then answer is “no”
- Complicated process, competitive, and over-prescribed
- Constrains flexibility in procurement opportunities, especially for P3
- Adds 2+ years to the opening day
- Forego potentially ~\$200M capital dollars
- Viable mix of non-Federal funding sources are available to cover full project costs



### 3. What funding mechanisms are viable for this project?

- Numerous sources identified for capital and O&M costs.
- Several sources could fund project in its entirety.
- Two seem most promising.

# Funding & Financing Landscape

Operating Revenues	Capital Revenues	Financing Mechanism
<p><b>Passenger Fare Revenue</b></p> <p><b>Traditional/Existing Sources</b></p> <ul style="list-style-type: none"> <li>• FHWA CMAQ operating (3 yr limit)</li> <li>• Dept. of Public Works (DPW) <ul style="list-style-type: none"> <li>- 6 cent LOGT</li> <li>- County Gas Tax</li> <li>- 9th cent Gas Tax</li> </ul> </li> <li>• MDT <ul style="list-style-type: none"> <li>- Direct Operating Revs.</li> <li>- Fed/State Grants incl. FDOT Transit</li> <li>- PTP Surtax (operations)</li> </ul> </li> </ul> <p><b>Innovative/New Sources</b></p> <ul style="list-style-type: none"> <li>• Advertising (pillars/kiosks) and marketing; naming rights</li> <li>• Right-of-Way / Air rights</li> <li>• Digital Ecosystem</li> <li>• Station revenues <ul style="list-style-type: none"> <li>- Concessions (travel retail; food; ATMs)</li> </ul> </li> <li>• FL State Energy Program (SEP)</li> </ul>	<p><b>Traditional/Existing Sources</b></p> <ul style="list-style-type: none"> <li>• Federal grants: <ul style="list-style-type: none"> <li>- TIGER (8th or 9th cycle)</li> <li>- FTA New Starts Capital</li> <li>- TA Formula Grants</li> </ul> </li> <li>• Real Property Ad Valorem Tax</li> <li>• Local Option Gas Tax (LOGT)</li> <li>• County Option Sales Tax Surtax</li> <li>• Local Gov Infrastruc Sales Surtax</li> <li>• HEFT/MDX Toll Revenue Share</li> <li>• DDA or County transp fees</li> <li>• FDOT transit funding</li> <li>• PTP Surcharge</li> <li>• County General Funds</li> </ul> <p><b>Innovative/New Sources</b></p> <ul style="list-style-type: none"> <li>• TOD/joint development</li> <li>• Special assessment districts</li> <li>• Tax increment districts (TIFD)</li> <li>• Tourist and Convention Devel.</li> <li>• Parking surcharge</li> <li>• Vehicle Miles Traveled (VMT)</li> <li>• Partner agencies (e.g., CRAs)</li> <li>• Causeway (2) Tolling</li> </ul>	<p><b>Traditional/Existing</b></p> <ul style="list-style-type: none"> <li>• Debt and GO Bonds</li> </ul> <p><b>Alternative Delivery &amp; Innovative Mechanisms</b></p> <ul style="list-style-type: none"> <li>• Florida (FDOT) SIB loans</li> <li>• Tax credit bonds</li> <li>• TIFIA</li> <li>• P3 mechanisms <ul style="list-style-type: none"> <li>- Availability payments</li> <li>- Private activity bonds (PAB)</li> <li>- Private equity</li> </ul> </li> </ul>

## 4. What is the potential for new tolls?


- Projected annual yield of ~\$75 -- \$150 million/year (2014\$) combined on both Causeways.
  - Range assumes \$1 toll and \$2 toll, respectively
- USDOT procedures for Interstates (e.g., I-395) constrains, but could be modified. USDOT considering eliminating the prohibition.





## 5. What is the potential for value capture?

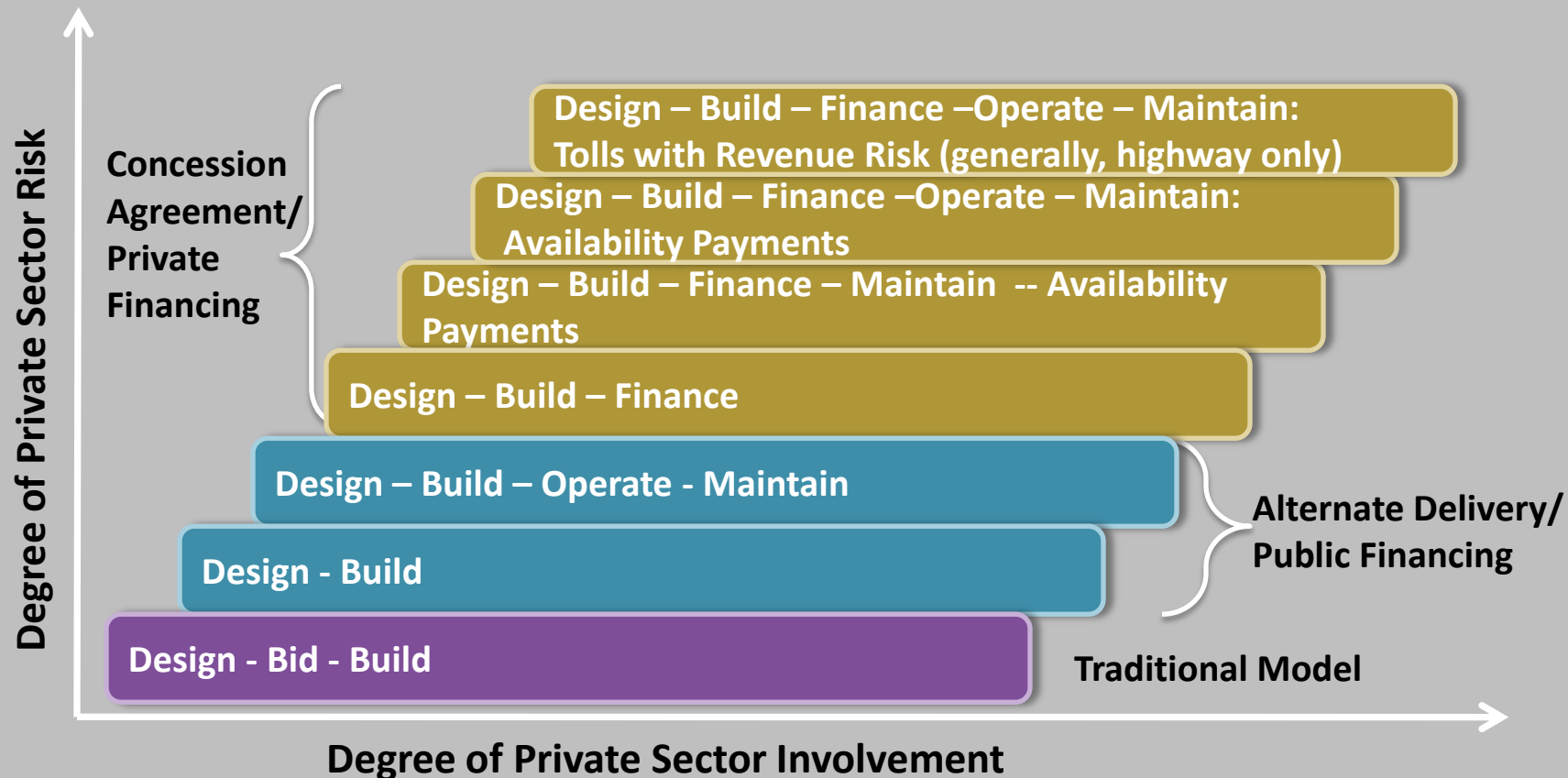
- Tax Increment Financing yield: \$18 million/year
- Special Assessment District yield: \$12 million/year
- 1% local option surtax to the Tourist and Convention Development Tax yield: \$10 million/year
- Total: ~\$40 million/year



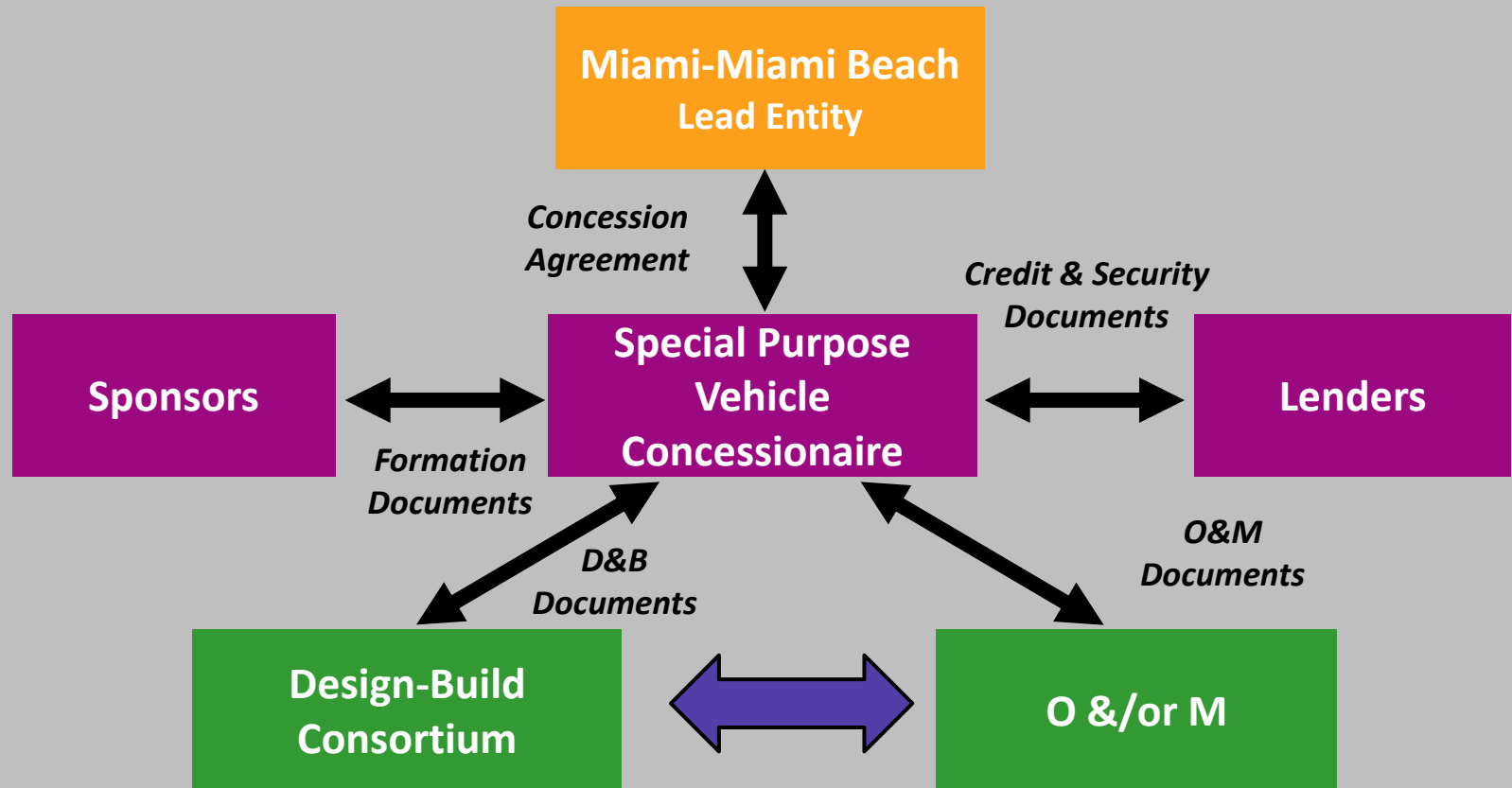
## 6. What are the benefits and real opportunities for P3?

- Expedited and efficient project delivery:
  - Saves time and money
  - Allocates risks to parties best able to manage
- Miami-Dade region is national leader in successful P3 projects.
- National best practices in P3 streetcar systems demonstrate effectiveness. (e.g., Portland Streetcar; Denver RTD Eagle Project).

# Alternate Delivery Mechanisms: Project Implementation Techniques

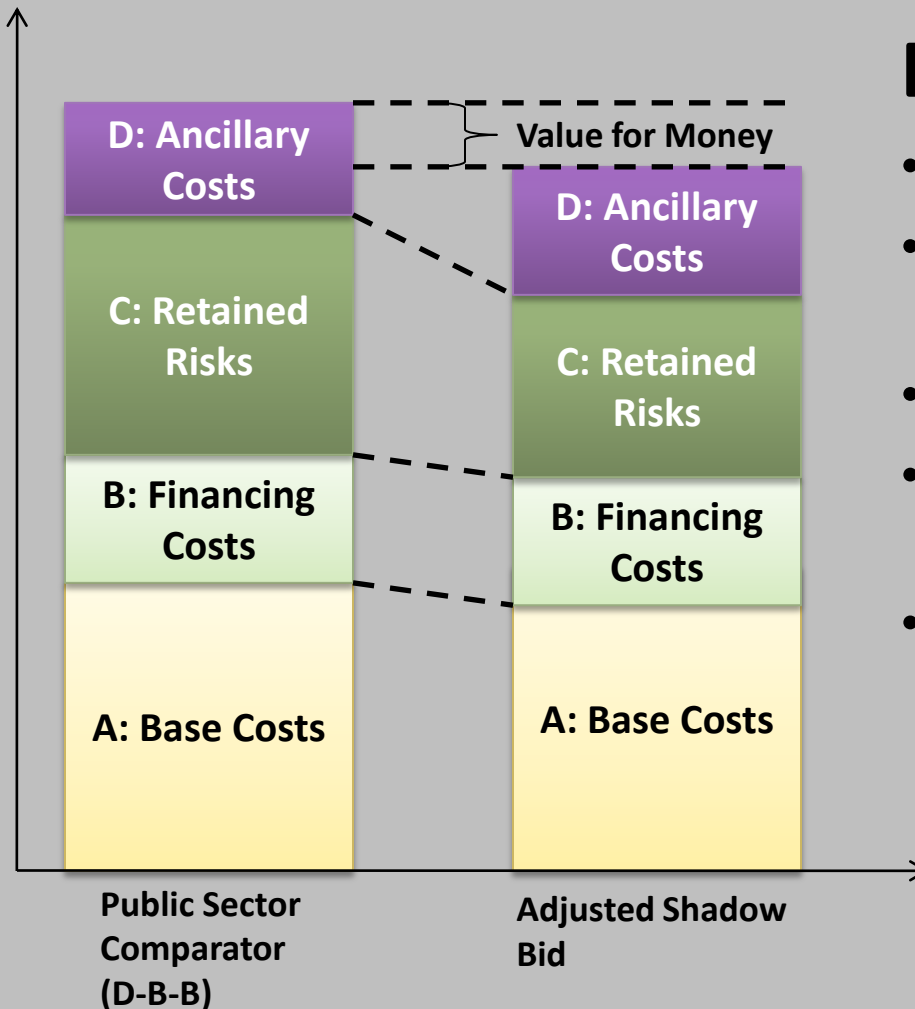


# Typical P3 Business Model



Single point responsibility for project implementation  
Need for coordination with Operator during design and commissioning

# Benefit of P3: Value for Money



## Drivers of Savings:

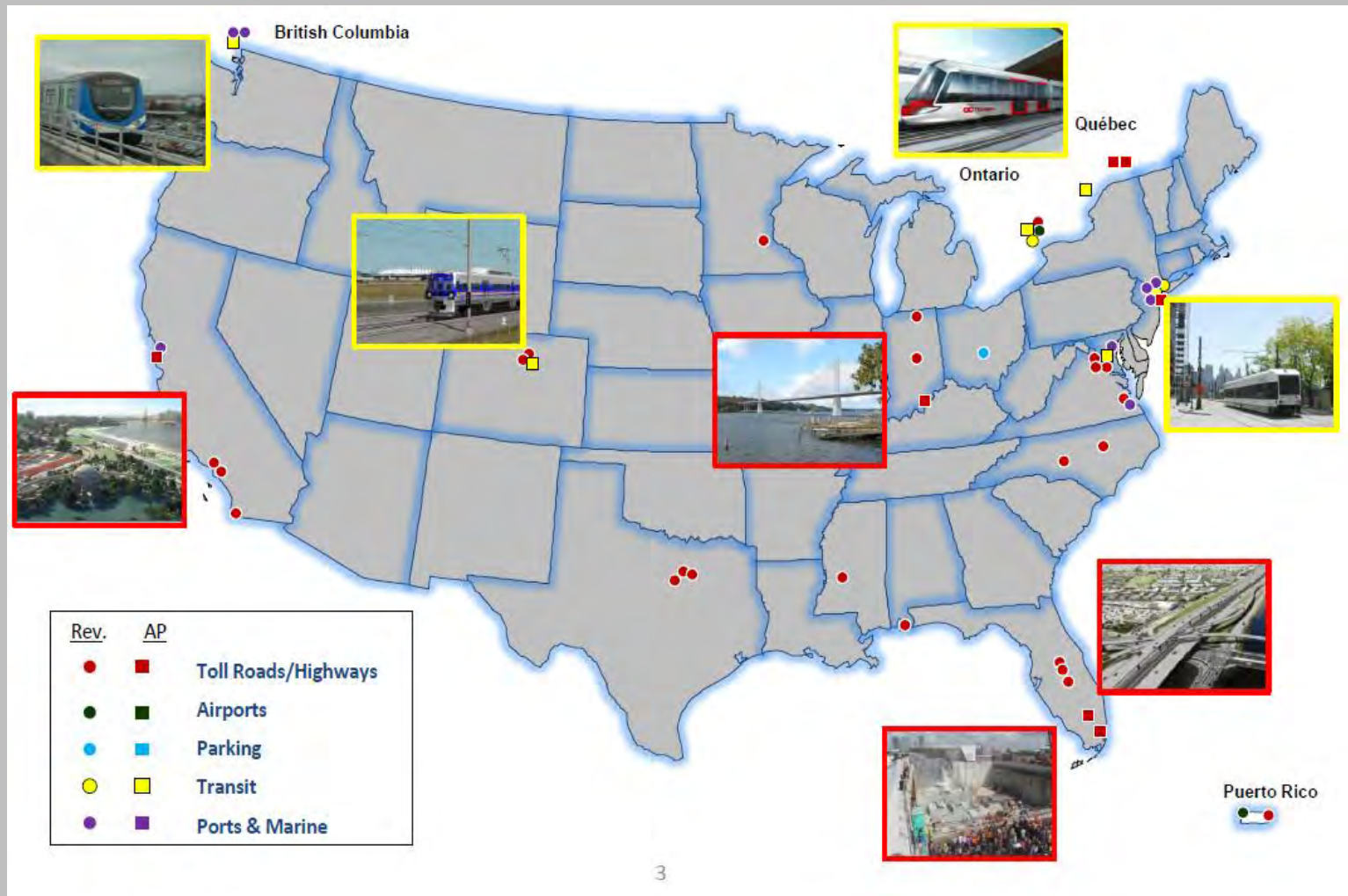
- Optimal allocation of risks
- Innovation: design and construction efficiencies
- Focus on life cycle costs
- Integrated planning and design
- Single point responsibility for management and control

# Alternative Project Delivery

## Typical Risk Allocations

Risk	Design Bid Build	Design Build	DBFOM
Change in Scope	Public	Public	Public
NEPA Approvals	Public	Public	Public
Permits	Public	Shared	Private
Right of Way	Public	Public	Shared
Utilities	Public	Shared	Shared
Design	Public	Private	Private
Ground Conditions	Public	Public	Private
Hazmat	Public	Public	Shared
Construction	Private	Private	Private
QA / QC	Public	Shared	Private
Security	Public	Public	Shared
Final Acceptance	Public	Private	Private
O&M	Public	Public	Private
Financing	Public	Public	Private
Force Majeure	Public	Shared	Shared

# North America P3 Projects

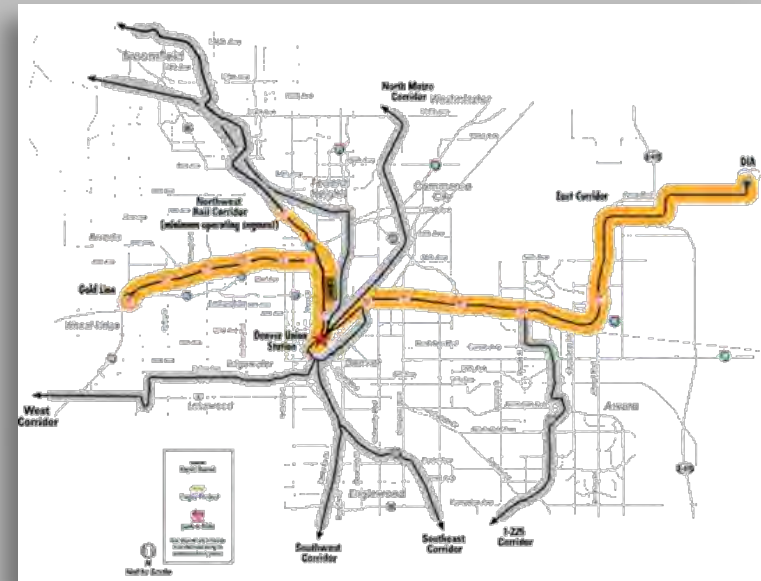




# Denver RTD Eagle P3 Project

## Project Description

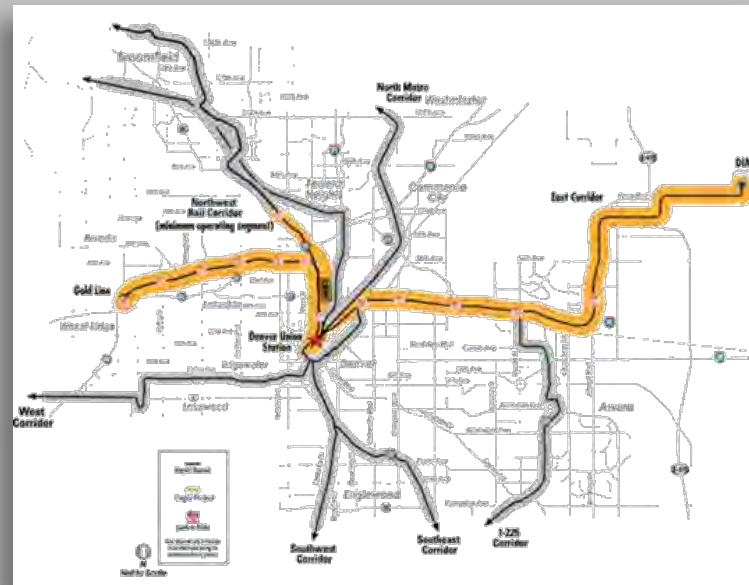
- Gold Line Corridor: 11.2-mile rail transit corridor from Denver Union Station to the vicinity of Ward Road
- East Corridor: 22.8-mile commuter rail transit between Denver Union Station and Denver International Airport
- North Metro Corridor: 18-mile rail link between Denver Union Station and 162nd Ave
- Maintenance Facility



# Denver RTD Eagle P3 Project

## Concessionaire – Denver Transit Partners

- Macquarie (90%) - sold to Uberior and John Laing
- Fluor (10%)
- Design Build Contractors:
  - Fluor – 50% of the EPC & 33% of the O&M
  - Balfour Beatty - 50% of EPC and 33% of O&M
  - HYUNDAI -Rotem (USA) – rail vehicles
  - Ames Construction
  - HDR – engineering



# Denver RTD Eagle P3 Project

## Financial Details

- 46 year concession reduced by mutual agreement to 34 years
- Lifecycle cost reduced by \$817.5m (2010\$) by 12 yr reduction in term of concession
- Total Investment: \$1.6bn (Phase 1)
- FTA New Starts Grant: \$1.0bn
- Private Equity: \$ 50.4m
  - Superior: \$ 24.5m (45%)
  - Laing: \$ 24.5m (45%)
  - Fluor: \$ 5.4m (10%)
- PABs: \$398m
- RTD Bridge Financing: \$142m (includes \$44m of service payments for early completion)

# Denver RTD Eagle P3 Project

## Benefits of P3

- Cost Savings - \$300 million less than the RTD cost estimate
- Faster delivery – delivery scheduled 11 months in advance of RTD's deadline
- Transfer of certain construction risks and O&M risks from RTD to P3 concessionaire



# Alternative Project Delivery: Benefits for this Project

- Risk sharing (or transfer)
- Accelerated project delivery (time) and cost certainty
- Contractor/engineer innovation
- Life-cycle cost efficiencies
- Increased leverage of existing revenue streams
- Negotiation, partnership, collaboration



# Conclusions and Next Steps

- Need dedicated, available and stable funding source(s), not just a portion of revenues.
  - Several funding options are promising; some with lead time or enabling legislation
- Add project into transit project development programming (TDP and TIP).
- Prioritize transportation investment utilizing latent capacity in existing funding sources and new local revenues.
- Checklist of “readiness” steps for P3.

# DID WE ADDRESS ALL QUESTIONS?

- ✓ Is a partially wired system acceptable?
- ✓ Should the project be funded with corridor-specific funding sources?
- ✓ Should we pursue Federal New Starts funding?
- ✓ Should we further explore tolling the two Causeways?
- ✓ Should we further explore value capture funding mechanisms?
- ✓ Should we further explore a P3 arrangement?
- ✓ Should we amend the LRTP to include this project?
- ✓ Should the Miami Beach Hybrid Option be considered in the first phase, or a later phase?



# TIGER PLANNING GRANT STATUS





# Tiger Grant Summary

- Notice of Funding Availability (NOFA) announced February 25<sup>th</sup>, 2014
- \$35M available for planning projects
- TIGER grant submitted on April 26<sup>th</sup>, 2014
- Requested \$1.5M (50% of anticipated project cost)
- Expect response by September/October 2014

# Options for Funding Next Phase

	Option 1	Option 2	Option 3
• TIGER	\$ 1,500,000	\$ 0	0
• FDOT	\$ 750,000	\$ 1,500,000	?
• MDT	\$ 250,000	\$ 500,000	?
• Miami	\$ 250,000	\$ 500,000	?
• Miami	<u>\$ 250,000</u>	<u>\$ 500,000</u>	<u>?</u>
Beach			
	\$ 3,000,000	\$ 3,000,000	



# Next PEC Meeting Date

DATE: October 2, 2014, 2:00 pm

TIME: 2:00 pm – 3:00 PM

LOCATION: TBD

## AGENDA:

- Maintenance Facility Locations
- Tiger Planning Grant Update
- Implementation Plan/Next Steps