

Battery-Electric Bus Charging Infrastructure

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Planning Workshop



Agenda

- About New Flyer / Electric Bus Experience
- Charging Standards
- Charging Infrastructure Project (Example)
- Charging Infrastructure Planning / Roles and Responsibilities
- Takeaways (Summary)



About New Flyer and MCI Electric Buses and Coaches

- New Flyer has manufactured and delivered over 6,400 transit buses powered by electric motors and batteries
- New Flyer is the only manufacturer of all three types of zero-emission buses (ZEBs) – offering transit agencies options and flexibility for implementing ZEBs to meet unique requirements
 - Battery Electric (XE35, XE40 and XE60)
 - Fuel Cell Electric (XHE40 and XHE60)
 - Trolley Electric (XT40 and XT60)
- New Flyer owns MCI. MCI is currently developing an all-electric Coach.
- New Flyer has battery electric buses deployed at the Chicago Transit Authority, WMATA, Winnipeg Transit. Other major projects underway include Los Angeles, New York City, Salt Lake City, Portland, Boston, and Oakland
- New Flyer has no ambitions to design or market proprietary charging equipment. New Flyer firmly supports industry interoperability of charging equipment and invested assets.
- New Flyer will assist transit agencies with charging systems to ensure successful deployments. See contact information to inquire, the last slide of this presentation
- In the future, New Flyer expects RFPs will separate charging equipment from bus procurement



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Charging Standards

- Utilize an established industry process which allows key stakeholders to cooperatively develop standards that support the deployment of battery-electric buses (BEBs) with different types of charging system technologies
- Ensure charging systems conforming to the forthcoming standards are capable of re-charging all types and makes of BEBS. In other words, buses and charging systems are interoperable

Key Stakeholders



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Interoperability Between All OEM Electric Buses and Infrastructure is the Goal!

- Definition 1 – Interoperability is the ability of a system to work with or use the parts or equipment of another system
- Definition 2 – Interoperability is a characteristic of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future, in either implementation or access, without any restrictions

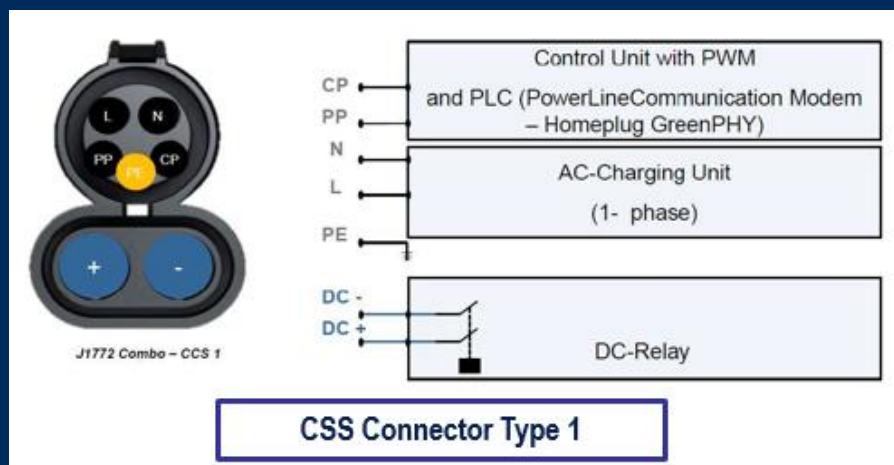
Simply Stated

Charging a bus needs to work as effectively and safely as fueling any type of transit bus with an industry standard gas, diesel, or CNG nozzle

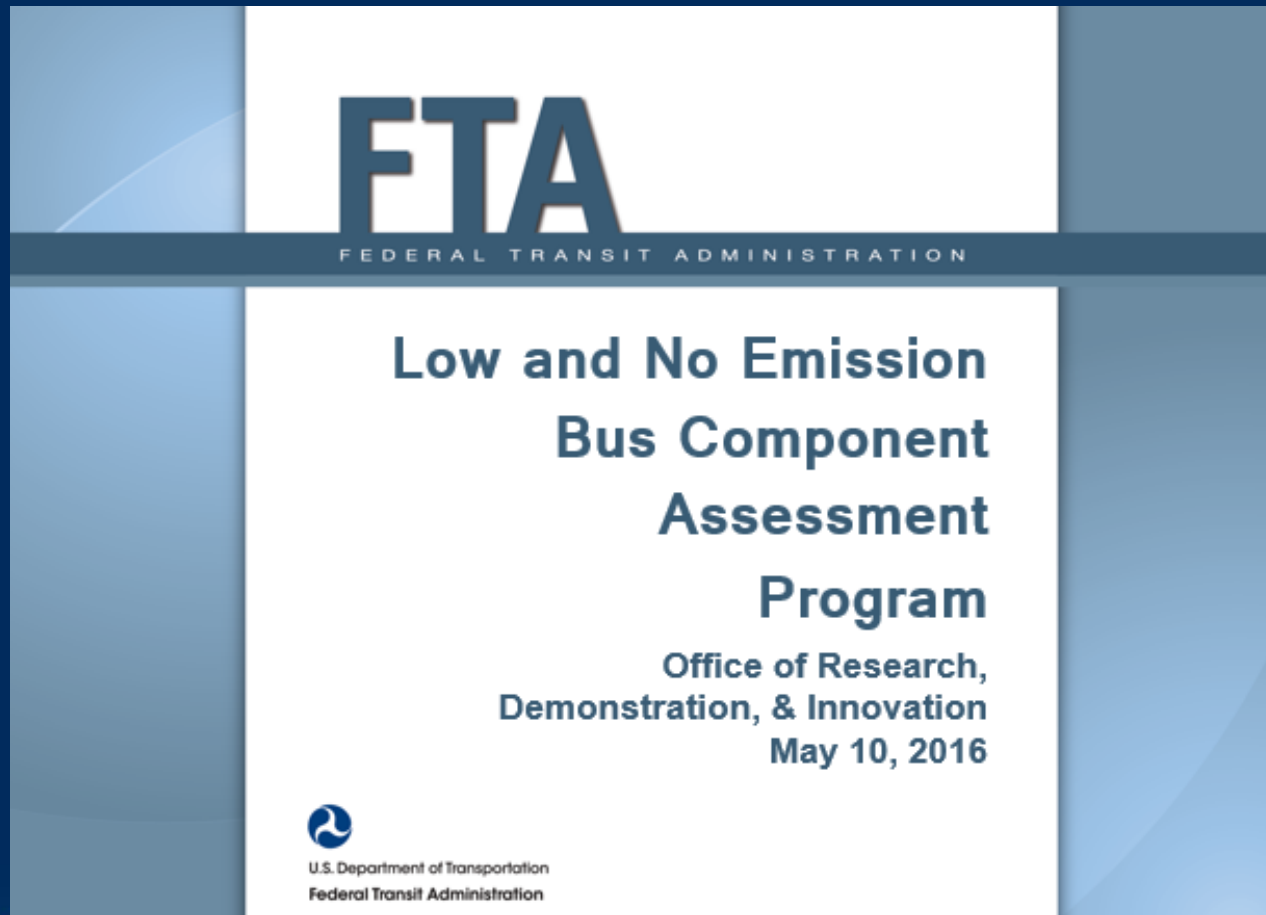


Four Charging Standards Under Development

- (4) Charging Standards Under Development
 - SAE J3105 (Overhead high power)
 - SAE J2954-2 (Wireless high power)
 - SAE J3068 (Plug-In AC)
 - SAE J1772 (Plug-In DC)



Potential Opportunity for the FTA to Validate Interoperability of Chargers



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DRAFT of the Forthcoming Standard Bus Procurement Guideline Update



Battery Charging

DEFAULT

Charging

The bus shall support an SAE-approved charging standard (and/or SAE J1772 DC). Proposers shall include a detailed description of their charging system and specify its compliance with one of the above-listed standards. Proposers shall include a description of the charging infrastructure required to charge the bus on route and/or at the depot.

ALTERNATIVE

The bus must support the upcoming SAE J3068 CCS. This means that the bus must be capable of being charged with both DC EVSE compliant with SAE J3068 and AC EVSE compliant with SAE J3068, such that the Agency may choose to charge the bus with either style EVSE at any given time.

ALTERNATIVE

The bus must support the upcoming SAE J3068 DC. This means that the bus would be capable of being charged from DC EVSE compliant with SAE J3068.

ALTERNATIVE

The bus must support the upcoming SAE J3068 AC. This means that the bus would be capable of being charged from AC EVSE compliant with SAE J3068.

ALTERNATIVE

The bus must support SAE J1772 DC. This means that the bus would be capable of being charged from DC EVSE compliant with SAE J1772.



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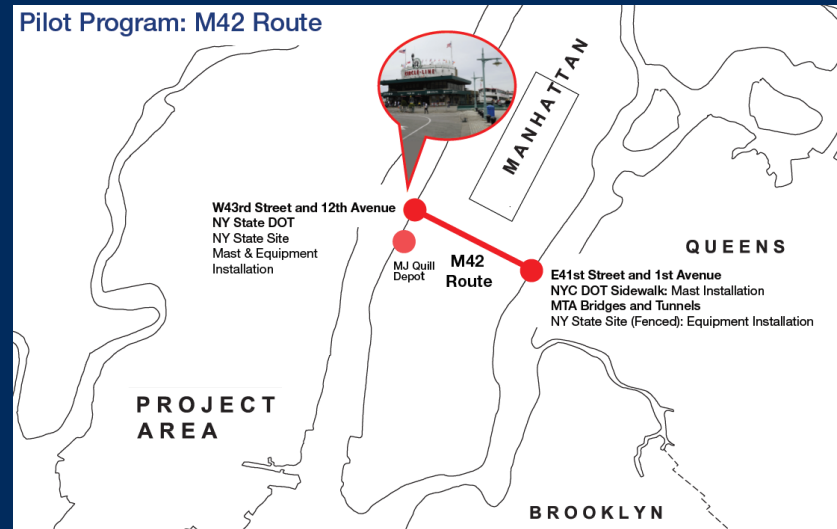


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Infrastructure Requires Significant Planning and Organization



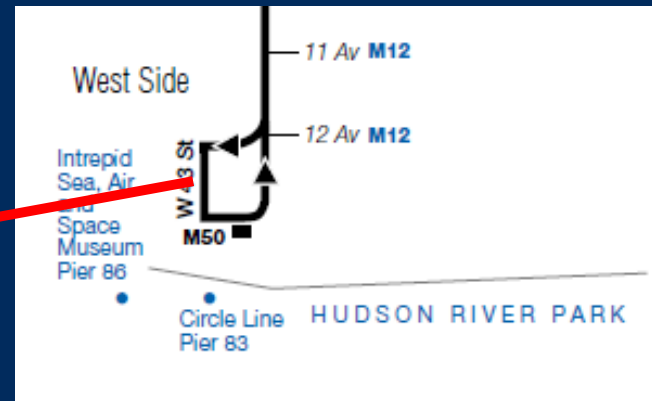
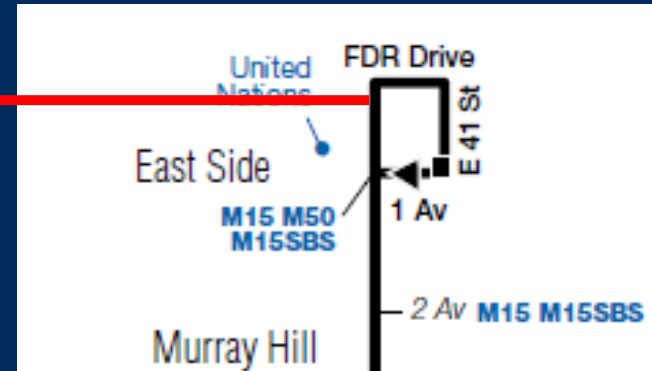
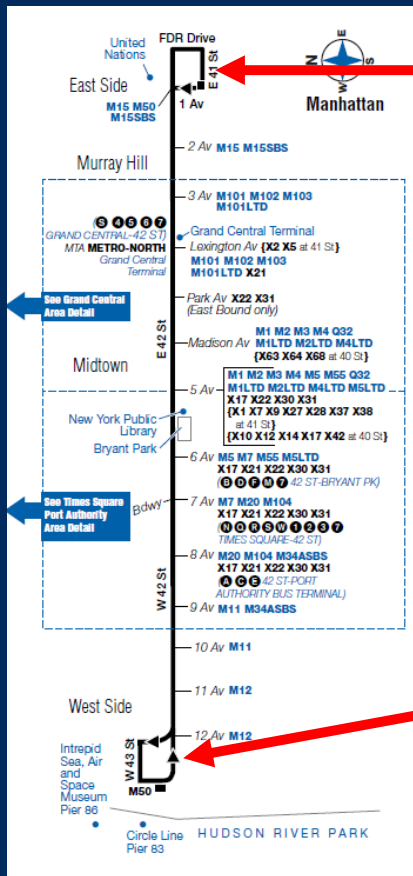
Example
M42 Route – Downtown Manhattan



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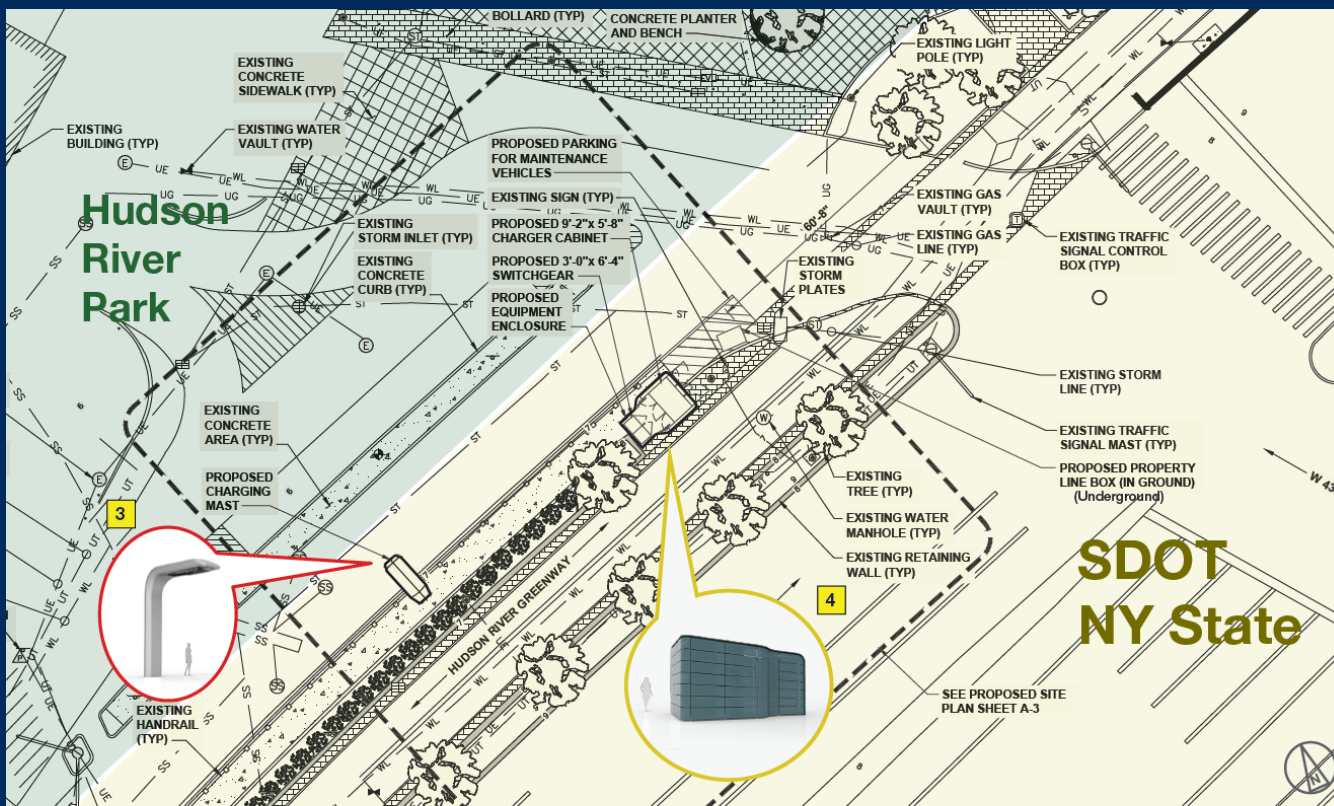
On-Route 300 kW Chargers Allow Buses to Operate Continuously



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Example of Construction Docs for On-Route Charging Infrastructure



All Electric Bus
Pilot Program

NY State Site
W43rd Street and 12th Ave.

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Stakeholders for Infrastructure Can Be Considerable - Example

	STAKEHOLDERS
1	Transit Agency
2	Park Trust
3	Bridges & Tunnels
4	State Department of Transportation
5	City Department of Transportation
6	Public Design Committee
7	City Community Board
8	Bus OEM
9	Charging Equipment Supplier
10	Engineering and Construction Firm
11	Utility Provider
12	Industrial Designer (Charging Equipment Enclosure)



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- Charging Infrastructure Planning / Roles and Responsibilities



Infrastructure Roles and Responsibilities Example (1 of 2)

Infrastructure - Roles & Responsibilities Matrix						
Major Task No.	Primary Task Description	Transit Agency	Utility Company	Bus OEM	Charger Equipment Supplier	Engineering and Construction Firm
1	Overall Project Scope of Work	ACCom	TI	TI		
2	Charger Site Location(s) Confirmations	A	TI	TI		
3	Charging Infrastructure Design Concept	A	TI	DR	TI	E
4	Design-Build Engineering			AR	TI	E
5	Charger Equipment	TI		A	RC	
6	Project Schedule	TI	TI	A	TI	R
7	Land Survey, Underground Utility, Geosystem surveying / mapping for infrastructure underground and aerial construction (If Required)	AR		TI	TI	TI
8	Bridges & Tunnels Approval Management (If Required)	A		TI	TI	
8	City Department of Transportation Approval Management (If Required)	A		TI	TI	
9	Public Design Committee Approval Management (If Required)	A		TI	TI	
10	Community Board Approval Management	A		TI	TI	
11	Overall Project Management	TI	TI	A	TI	R
12	Utility Service Coordination	TI	A	TI	TI	TI
13	Project Permits	AR	TI	TI	TI	TI

Legend	
A	Approve
C	Construct
Com	Commission
D	Design
E	Engineering
R	Responsible
S	Service
TI	Technical Input



Infrastructure Roles and Responsibilities Example (2 of 2)

Infrastructure - Roles & Responsibilities Matrix						
Major Task No.	Primary Task Description	Transit Agency	Utility Company	Bus OEM	Charger Equipment Supplier	Engineering and Construction Firm
14	Overall Daily Project Execution & Site Construction Management	AR		TI	TI	R
15	Utility Service with Transformer Installation(s) in favorable location(s)	AR	R	TI	TI	TI
16	Charger Enclosure Infrastructure Civil Work	ARC		TI	TI	TI
17	Charger Mast (On-Route Only) Infrastructure Civil Work	ARC		TI	TI	TI
18	Charger Pantograph (On-Route Only) Mechanical Work	ARC		TI	TI	TI
19	Charger Enclosure Mounting on Pad	ARC		TI	TI	TI
20	Charger Mast / Pantograph (On-Route Only) Mounting on Pad	ARC		TI	TI	TI
21	Charger Mast (On-Route Only) Infrastructure Civil Work	ARC		TI	TI	TI
22	Power Supplies and Communications Interconnection of the Charger Enclosure or Pantograph (On-Route)	ARC		A	R	TI
23	Power-On of Charger System (Depot or On-route)	ARC		A	R	TI
24	Testing of Charger System (Depot or On-route)	TI		TI	R	TI
25	Commissioning of Charger System (Depot or On-route)	A		TI	Com	TI
26	Development of As-Built Charger System Drawings	AR		TI	TI	TI
27	Submittal of Charger System Final Drawings	AR		TI	TI	TI
28	Close Project	A		R		

Legend	
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Takeaways (Summary)

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 - SAE J1772 (Plug-In DC)
- Charging Standards Stakeholders are organized - making good progress
- Deploying Electric Bus Charging Infrastructure is complex – Plan Early!
- Develop Infrastructure Roles and Responsibilities Matrix – Organize Early!



Contact Information

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