Introduction to VTA Fleet Electrification and Charging Plan

2020

Electrification: the Future of Island Public Transportation

Reliable, Efficient and Clean
2017 – 2025

- Focus on Service Reliability
  - Emissions standards impacting reliability of diesel vehicles
  - Electric buses will improve reliability
  - Lower maintenance and fuel costs
  - Resiliency when the power goes out
- Improved Rider Experience & Community Benefits
  - Zero operating emissions
  - Energy to power buses from locally generated solar
  - Quieter
  - Increased rider comfort and conveniences
  - Rider perceptions essential to successful transit

VTA's Vision
Future of Island Public Transit

- All Electric Transit Vehicles
  - Buses, vans and service vehicles
- Charging Infrastructure
  - Plug-in vehicle chargers at VTA Base
  - In-ground on route inductive charging
- PV Canopies onsite – construction has begun
  - Generate energy for charging buses
  - Installed at VTA Operations Center
  - 467 kWAC/695 kWDC
- Energy Storage Systems
  - Back-up source of power
  - Makes grid connection optional

VTA's Vision – Future of Island Public Transit
Infrastructure Built –VTA Operations Center

12 – 80kW Bus Chargers installed, bases for 14 more are already installed

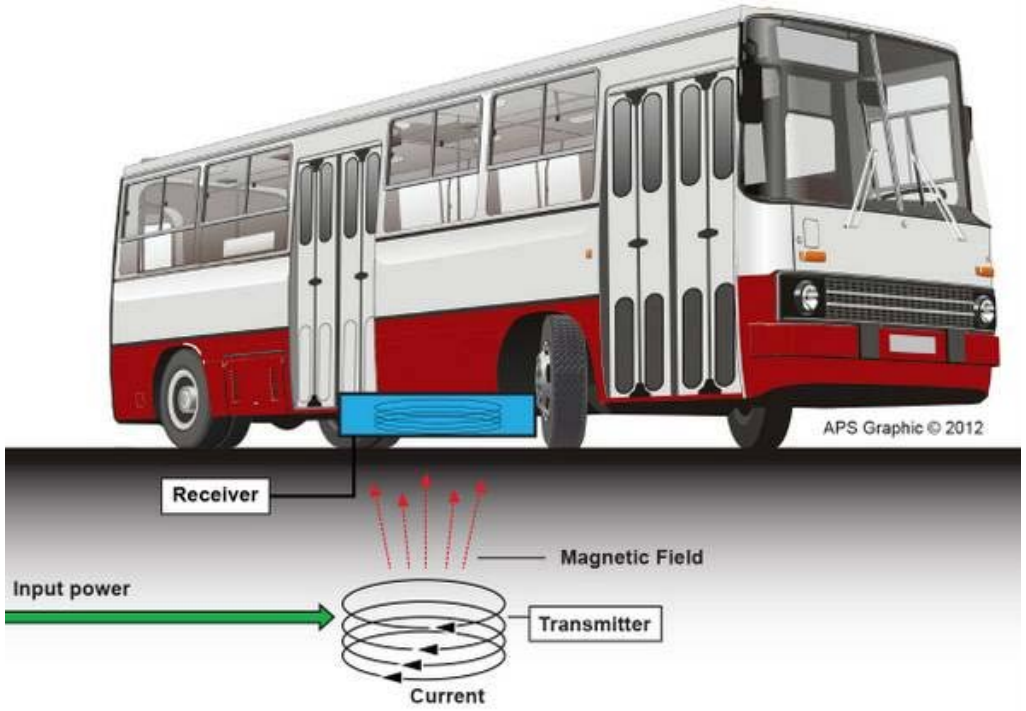
Electrical Switchgear for 32 buses, generator and microgrid

3 Battery Energy Storage Systems (1,440kWh)

VTA's Progress to Date

	Miles Driven	GHG Savings (Lbs.)	Cost Savings	Energy Use (kWh)	Energy Bill	Average kWh/mile	Average of miles/kwh	Average Temperature
2018	69,946	433,126	$6,782	124,320	$28,813	1.77	0.57	60
2019	198,618	1,229,899	$22,564	336,552	$78,051	1.73	0.60	55
2020	175,621	939,944	($3,679)	305,960	$68,605	1.79	0.59	58
Jan	13,542	83,856	$135	26,792	$6,756	2.0	0.51	40
Feb	9,824	60,833	($1,111)	21,520	$6,110	2.2	0.46	39
Mar	12,557	64,782	($1,015)	22,656	$5,389	1.8	0.55	44
Apr	10,059	48,672	($1,989)	23,776	$5,493	2.4	0.42	47
May	17,953	97,994	$817	23,008	$5,437	1.3	0.78	56
Jun	17,395	96,760	$1,441	19,128	$4,618	1.1	0.91	72
Jul	20,905	108,948	$209	35,800	$7,073	1.7	0.58	77
Aug	20,228	106,015	$202	33,600	$6,844	1.7	0.60	78
Sep	16,406	85,097	($125)	28,800	$5,840	2	0.6	69
Oct	18,977	97,719	($1,043)	34,560	$7,653	2	0.5	63
Nov	17,775	89,268	($1,199)	36,320	$7,391	2		52
Grand Total	444,185	2,602,968	$25,667	766,832	$175,468	1.76	0.59	57

In-Route Charging: An Integral Part of the Plan & Beats Waiting Until Battery Technology Improves



Why it's Necessary

- Maintain service operations
- VTA service demands require on-route fast charging Routes are 200 to 300 miles/ day during the peak. During the winter, the electric heaters in the bus are less efficient and the range is reduced considerably.
- Average in December was .49mile/kwh means the stated range of a 30' bus being 150 miles is now down to less than 75
  - Current range on all approved electric buses isn't adequate for VTA transit day, summer or winter
- Cost Savings
  - Maximizes investment in electric vehicles, increases time in service
  - Allows for more flexible management of fuel costs
  - Battery Storage will curb demand charges
- Less Rider Inconvenience
  - Allows buses to stay in service on route longer without having to detour to charge

Overhead Vs. Inductive Charging

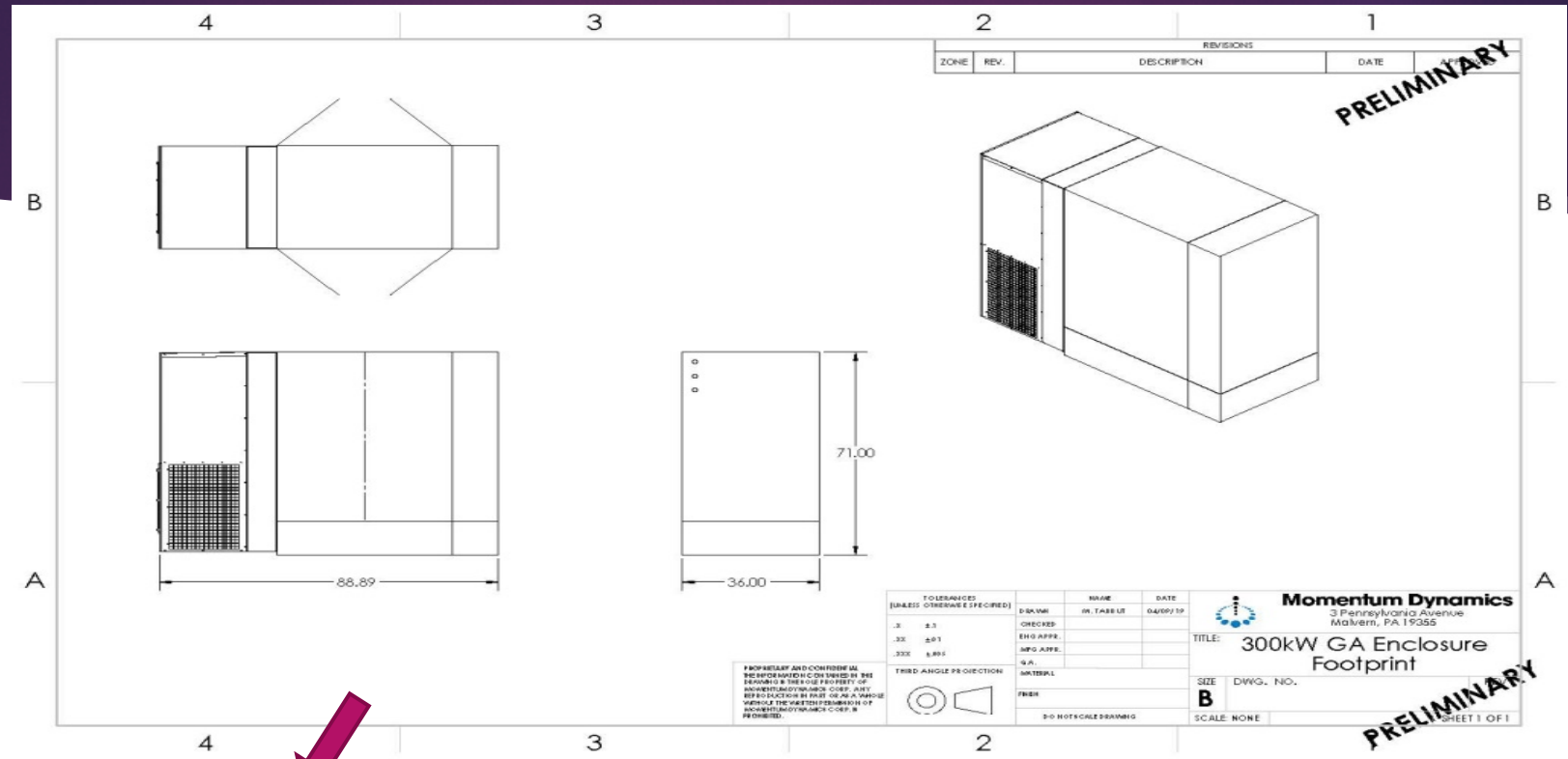
- Inductive chargers allow for in-route charging without the large overhead vehicle chargers
- Allows for them to more easily blend in historical areas
- Charging connectivity is more reliable then overhead

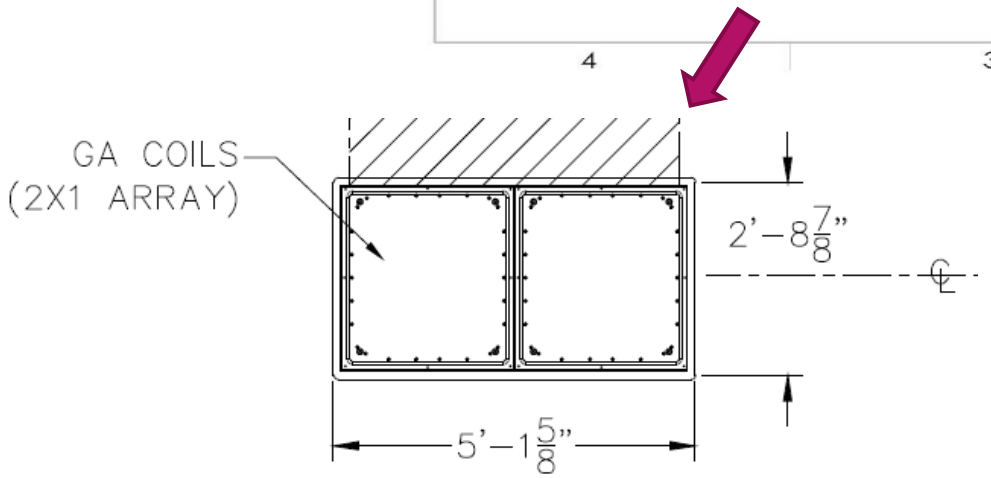
Overhead chargers, also known as conductive charging does not fit into the charm of the Vineyard

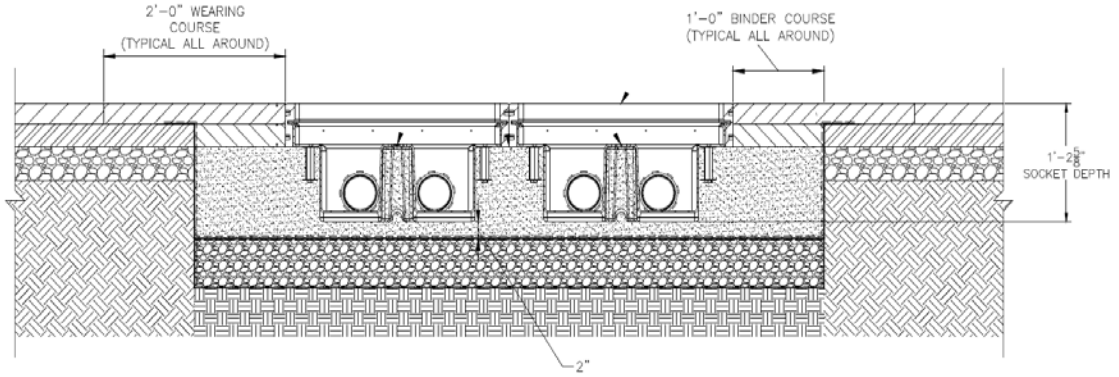
Inductive chargers, also known as in ground charging fits better into the Vineyard landscape

Inductive Equipment – Electrical Cabinets & Inground Pads

- Within 75’ of bus stop
  - One Inductive Cabinet
  - Two sets of pads
  - Switchgear?







Additional Tidbits

Transit operations on will remain the same
Emissions from inductive charging are less than:
- Home and business electronic security systems
- Induction cooktops
- Transformers on the electrical grid

Chargers are compliant with International Commission on Non-Ionizing Radiation (ICNIRP)
- ICNIRP emissions levels are exceeded ONLY within 18” of the pads

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