






		Duty Cycle Survey
Hybrid Bus Working Group		
Susan Romeo/Richard Parish		
Date: 7/23/07		Preliminary Results 7/23/07
		
	Yes/No	Comments
Duty Cycle Criteria		
very stop-go with many stops throughout day	yes	<i>exceptions - rural with fewer stops</i>
urban-suburban route	yes	<i>exceptions - rural with fewer stops</i>
average city speed - 35 mph	no	<i>average was 37 mph but that average is squewed higher by one high number; when that number is deleted the average is 32 mph</i>
maximum/ highway speed - 70 mph	no	<i>mstly 65 mph</i>
predominatly low speed city driving rather than higher speed highway driving	no	<i>the majority so far have a lot of high speed driving on highways, freeways</i>
average hours of operation per day - 11 hours/day	yes	<i>11-12 hours per day</i>
average miles per day - 110 miles	no	<i>the majority are over 150 miles per day and as high as 180 miles per day</i>
average idling time - 25%	yes	
terrain - flat with some hills	yes	<i>the exception was rural with lots of hills</i>

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Date: 7/23/07		Hybrid Bu
		
Characteristic	Initial Decision	Date
General		
GVW	Up to 19,500 (Class 5)	3/22/2007
Chassis type	7 year/200,000 mi service life - Altoona tested	3/22/2007
Dimensions		
Length	25-27 feet	3/22/2007
Height	Within base vehicle	KPP survey
Width	Within base vehicle dimensions	KPP survey 7/23/07
Wheelbase	Within base vehicle dimensions	KPP survey 7/23/07
Ground clearance	No reduction in ground clearance due to hybrid drive	KPP survey 7/23/07
Performance		
From KPP- duty cycle surveys		
Max speed	70 mph	KPP survey 7/23/07
Gradeability	≥ 5% @ 40 mph @GVW	KPP survey 7/23/07
Acceleration	≥ base vehicle	KPP survey 7/23/07
Vehicle range	200 min. 300 preferred	6/29/2007
Continuous service	13 hrs	6/29/2007
Transmission		
Type	If transmission is part of the hybrid bus, it is to be an	4/27/2007
Model preference		
Engine		
Fuel Type	Engine/powerplant -diesel or gasoline options. However, the predominant option, probably gasoline, will be used as the proposed baseline with the diesel option offered for an expected up-charge, as with conventional shuttle bus platforms. Must meet current (2007) engine emission standards – local as well as federal without averaging. Bidders to give price on each so group will see cost differential Interest expressed that hybrid engine pass EPA emissions certification Note: no EPA certification process now	3/22/07; additions on 4/27
Size (liters)	Spec to be based on performance standards	
HP		
Fuel Options	Gasoline engine must be E-85 compliant; diesel engine should allow for use of B20; bidders must supply cost information on various fuels – natural gas, diesel gasoline, plug-in option – final fuel choice by individual fleet, not working group	4/27/2007
Brakes		
Type		
Axles (GAWR)		
Turning radius	≤ base vehicle	KPP survey 7/23/07
Approach angles to curb	≥ base vehicle	KPP survey 7/23/07
Front	Turning radius ≤ base vehicle	KPP survey 7/23/07
Back		
Suspension		
Front		
Back		
Steering		
Type		
Seating		
Overall seating capacity	No reduction in passenger capacity due to hybrid drive system	KPP survey 7/23/07
Ambulatory seating capacity		
W/C positions	Minimum 2 positions	
Ambulatory seating with W/C		

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Date: 7/23/2007	
	
 	
	<i>Overall Ranking</i>
Key Performance Parameters	
Preliminary Results - 7-23-07	
Reliability \geq base vehicle	1
\geq 30% better fuel economy vs. base vehicle	2
Serviceability/maintain-ability \geq base vehicle	3
Chassis Durability \geq base vehicle	4
Range \geq 300 mi	5
Lifecycle costs \leq base vehicle	6
Emissions $<$ base vehicle	7
Life in Years \geq base vehicle	8
Interior noise level \leq base vehicle	9
No reduction in passenger capacity due to hybrid drive system	10
Acceleration \geq base vehicle	11
Weight penalty of hybrid drive system components \leq 500 lbs	12
Driver ergonomics \geq base vehicle	13
Gradeability \geq 5% @ 40 mph @ GVW	14
Exterior noise level \leq base vehicle	15
Startability \geq 25% grade	16
Front axle turning radius \leq base vehicle	17
Approach angles to curb \geq base vehicle	18
No reduction in ground clearance due to hybrid drive system components	19
Top Speed \geq base vehicle	20
Stay within base vehicle width dimensions	21
Stay within base vehicle height dimensions	22
Keep existing body supplier	23
Keep existing engine supplier	24