



CITY AND COUNTY OF SAN FRANCISCO
 San Francisco Municipal Transportation Agency
 Request for Proposals
 THE PROCUREMENT OF
 30-Foot, 40-FOOT AND 60-FOOT LOW FLOOR
 DIESEL HYBRID COACHES

Proposal Section	Title	Bid Submission Requirements
12	WHOLE LIFE CYCLE COSTS	Describe the Proposer's approach to providing SFMTA the best benefit in whole life cycle costs for the Diesel Hybrid Buses. Include Proposer's experience with whole life cycle costing in the explanation. Projected costs shall be included in a Whole Life Cycle Cost Worksheet provided by the proposer.

A key objective in the design of XcelSior was to reduce the operating and maintenance costs for transit systems. XcelSior can deliver life cycle savings in the areas outlined below:

1. Fuel Economy – XcelSior achieved the best ever fuel economy at Altoona: 5.88 mpg. While this with a 40-foot diesel-electric hybrid, we are confident that these savings can be realized across all propulsion types. The improved fuel economy is a direct result of the reduced vehicle weight: XcelSior weights 10% less than other comparable buses and also had the lowest curb weight at Altoona among similar buses.
2. Longer Tire Life – We anticipate tires on XcelSior buses to last longer due to the reduced vehicle weight and better weight distribution. Recent studies indicate that a 1% reduction in weight can result in a 2% increase in tire mileage.
3. Brake Lining Material – We anticipate brake linings on XcelSior buses to last longer due to the reduced vehicle weight and better weight distribution. Recent studies have documented longer brake material life as a result of weight reduction.
4. Disc Brakes – Transitioning from drum brakes to disc brakes will reduce your life cycle costs as disc brakes are easier and less expensive to maintain and service.
5. New Flyer LED headlights – New Flyer is the only OEM to offer LED headlights. Our LED headlights have a best-in-class 6-year warranty and were designed to last 12 years.

Please refer to the attached Life Cycle Cost Spreadsheets for the 40' and 60' models.



Xcelsior Delivers Life Cycle Savings

A key objective in the design of Xcelsior was to reduce the operating and maintenance costs for transit systems. Xcelsior can deliver life cycle savings in the areas outlined below:

1. **Fuel Economy** – Xcelsior achieved the best ever fuel economy at Altoona: 5.88 mpg. While this with a 40-foot diesel-electric hybrid, we are confident that these savings can be realized across all propulsion types. The improved fuel economy is a direct result of the reduced vehicle weight: Xcelsior weights 10% less than other comparable buses and also had the lowest curb weight at Altoona among similar buses.
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5. **New Flyer LED headlights** – New Flyer is the only OEM to offer LED headlights. Our LED headlights have a best-in-class 6-year warranty and were designed to last 12 years.

We look forward to discussing these savings with you in greater detail.

XDE40 Bus Maintenance Support Cost Model Based on 12 Year Life Cycle

BASE PARAMETERS

Annual Vehicle Miles	50,000	Average Staff Salary per hour	\$ 85.00
Fuel Cost	\$ 3.26	gallon	
Bus Life	12	years	
Annual Mileage	50,000	miles	
Fuel Cost			
Bus MPG	5.383	(mpg)	
Lifetime Fuel Cost	\$ 332,653.06		

Please Note MPG is based on Altoona testing. Many factors such as drivers habits can directly effect fuel economy

Planned Maintenance Activities

Ref	Description	Interval (in Miles)	Frequency	# Staff Req'd	Time to Complete (hrs)	Total Man hours	Labour Cost (Can \$)	List Parts or Materials Used (Description)	Material Cost (Can \$)	Qty	Material Cost (Can \$)	Total Cost per task	Total Cost / year
	PM Task 1:												
1	Exterior Check (Pre-Trip)	137	365.00	1	0.01	0.09	\$ 8		\$ -	0	\$ -	\$ 8	2,792
	Operation Check (Pre-Trip)	137	365.00	1	0.01				\$ -	0	\$ -		
	Wheelchair Ramp Inspection	137	365.00	1	0.01				\$ -	0	\$ -		
	Floor Covering Inspection	137	365.00	1	0.01				\$ -	0	\$ -		
	Crankcase Breather Tube Inspection	137	365.00	1	0.01				\$ -	0	\$ -		
	After Treatment Exhaust Piping Inspection	137	365.00	1	0.03				\$ -	0	\$ -		
	Air Intake Piping Inspection	137	365.00	1	0.01				\$ -	0	\$ -		
	PM Task 2:												
	Radiator Cleaning	962	52.00	1	0.02	0.02	\$ 2		\$ -	0	\$ -	\$ 2	88
	PM Task 3:												
	Air Tank Drain	4,167	12.00	1	0.5	0.8	\$ 68		\$ -	0	\$ -	\$ 68	816
	Fire Extinguisher Inspection	4,167	12.00	1	0.05				\$ -	0	\$ -		
	Auxiliary Coolant Heater Inspection	4,167	12.00	1	0.25				\$ -	0	\$ -		
	PM Task 4:												
	Disc Brake Pad Inspection	6,000	8.33	1	0.25	9.55	\$ 812		\$ -	0	\$ -	\$ 812	8,415
	Wheel & Tires Inspection	6,000	8.33	1	0.25				\$ -	0	\$ -		
	Hybrid Transmission Inspection	6,000	8.33	1	0.5				\$ -	0	\$ -		
	Driveshaft Inspection/Lubrication	6,000	8.33	1	0.25				\$ -	0	\$ -		
	Steering System Inspection	6,000	8.33	1	0.75				\$ -	0	\$ -		
	Steering Driveshafts Inspection	6,000	8.33	1	0.5				\$ -	0	\$ -		
	Engine Oil & Filter Change	6,000	8.33	1	0.75				\$ 118.00	1	\$ 118.00		
	Primary Fuel Filter Replacement	6,000	8.33	1	0.2				\$ 35.00	1	\$ 35.00		
	Secondary Fuel Filter Replacement	6,000	8.33	1	0.3				\$ 20.00	1	\$ 20.00		
	Exhaust System Inspection	6,000	8.33	1	0.2				\$ -	0	\$ -		
	Shock Absorber Inspection	6,000	8.33	1	0.2				\$ -	0	\$ -		
	Ride Height Check	6,000	8.33	1	0.5				\$ -	0	\$ -		
	Air Springs Inspection	6,000	8.33	1	0.2				\$ -	0	\$ -		
	Axles & Suspension Inspection	6,000	8.33	1	0.45				\$ -	0	\$ -		
	Air System Functional Test	6,000	8.33	1	0.75				\$ -	0	\$ -		
	Window Emergency Release System Inspection	6,000	8.33	1	0.16				\$ -	0	\$ -		
	Access Doors Lubrication	6,000	8.33	1	0.2				\$ -	0	\$ -		
	Roof Vent/Hatch Inspection	6,000	8.33	1	0.16				\$ -	0	\$ -		
	Splash Guards Inspection	6,000	8.33	1	0.01				\$ -	0	\$ -		
	Windshield Wiper & Washer Inspection	6,000	8.33	1	0.05				\$ -	0	\$ -		
	Passenger Seat Inspection	6,000	8.33	1	0.12				\$ -	0	\$ -		
	Stanchions & Grab Rail Inspection	6,000	8.33	1	0.12				\$ -	0	\$ -		
	Wheelchair Restraint Area Inspection	6,000	8.33	1	0.12				\$ -	0	\$ -		
	Interior Panels Inspection	6,000	8.33	1	0.1				\$ -	0	\$ -		
	Exterior Panels Inspection	6,000	8.33	1	0.1				\$ -	0	\$ -		
	Mirrors Inspection	6,000	8.33	1	0.1				\$ -	0	\$ -		
	Battery System Inspection	6,000	8.33	1	0.1				\$ -	0	\$ -		

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Item Description	Quantity	Unit	Rate	Subtotal	Material	Time	Rate	Subtotal	Material	Time	Rate	Subtotal	Material	Time	Rate	Subtotal
Wheelchair Ramp Inspection	6,000		8.33	1	0.3											
Driver's Heater/Defroster Inspection	6,000		8.33	1	0.2											
Floor Heaters Inspection	6,000		8.33	1	0.2											
HVAC Return Air Filter Inspection	6,000		8.33	1	0.5											
Heating Fresh Air Filter Inspection	6,000		8.33	1	0.2											
Radius Rods Inspection	6,000		8.33	1	0.2											
Rear Axle Breather Tube Inspection	6,000		8.33	1	0.06											
Engine Compartment Line Routing Inspection	6,000		8.33	1	0.5											
PM Task 5:																
Air Filter Restriction Indicator Inspection	7,500		6.67	1	0.01											
Air Filter Replacement	7,500		6.67	1	0.16											
Charge Air Cooler & Piping Inspection	7,500		6.67	1	0.05											
PM Task 6:																
Electronic Accelerator Inspection	12,000		4.17	1	0.2											
Driver's Heater/Defroster Inspection	12,000		4.17	1	0.3											
Floor Heaters Inspection	12,000		4.17	1	0.3											
PM Task 7:																
Cooling System Inspection	15,000		3.33	1	0.7											
Cooling System Pressure Test	15,000		3.33	1	0.02											
Coolant Filter Replacement	15,000		3.33	1	0.75											
PM Task 8:																
Engine Mounts Inspection	18,000		2.78	1	0.25											
Power Steering Filter Replacement	18,000		2.78	1	0.25											
PM Task 9:																
Air Dryer Inspection	24,000		2.08	1	0.2											
Brake Treadle Assembly & Brake Valve Inspection	24,000		2.08	1	0.2											
PM Task 10:																
Fuel Tank Inspection	30,000		1.67	1	0.2											
Engine Drive Belt Inspection	30,000		1.67	1	0.1											
PM Task 11:																
Disc Brake Caliper Inspection	36,000		1.39	1	1											
Power Steering Fluid Change	36,000		1.39	1	0.5											
PM Task 12:																
Front End Alignment	48,000		1.04	1	0.75											
Front & Rear Brake Chamber Inspection	48,000		1.04	1	0.2											
PM Task 13:																
Rear Axle Oil Change	54,000		0.93	1	1											
PM Task 14:																
Fuel Tank Inspection	60,000		0.83	1	0.4											
Air Compressor Discharge Line Inspection	60,000		0.83	1	0.1											
Crankcase Breather Element Inspection	60,000		0.83	1	0.7											
PM Task 15:																
Hybrid Transmission Filter Replacement	75,000		0.67	1	0.2											
PM Task 16:																
Front End Alignment	96,000		0.52	1	1.2											
PM Task 17:																
Engine Valve Set Inspection	150,000		0.33	1	1											
Hybrid Transmission Fluid Change	150,000		0.33	1	1.6											
PM Task 18:																
Muffler Particulate Filter Inspection	200,000		0.25	1	4											
Diesel Exhaust Fluid Filter Replacement	200,000		0.25	1	0.5											
DEF Tank Strainer Inspection	200,000		0.25	1	0.5											
PM Task 19:																
Pressure Protection Valve Leak Check	25,000		2.00	1	0.1											
Safety Valve Operating & Leak Check	25,000		2.00	1	0.1											
Spring Brake Control Valve Operating & Leak Check	25,000		2.00	1	0.5											
Double Check Valve Operating & Leak Check	25,000		2.00	1	0.2											
Pressure Reducing Valve Inspection	25,000		2.00	1	0.2											

Ref	Description	Interval (in miles)	Frequency	# Staff Req'd	Time to Complete (hrs)	Total Man hours	Labour Cost (Can \$)	List Parts or Materials Used (Description)	Material Cost (Can \$)	Qty	Material Cost per task	Total Cost / year
Major Components:												
1	Engine	250,000	0.20	1	45	45	\$ 3,825	Engine Components	\$17,000.00	1	\$ 20,825	\$ 4,165
2	Hybrid Transmission	250,000	0.20	1	21	21	\$ 1,785	Hybrid Transmission Components	\$34,000.00	1	\$ 35,785	\$ 7,157
3	Underbody Inspection	150,000	0.33	1	3	3	\$ 255	Zinc primer and cora shield/Cora Tube	\$ 300.00	1	\$ 555	\$ 185
4	Tire Replacement (Based on 50,000 miles)	50,000	1.00	1	4	4	\$ 340	Tires	\$ 2,040.00	4	\$ 2,380	\$ 2,380
5	Changing Air Conditioning Compressor	363,000	0.14	1	2	2	\$ 170	Air Conditioning Compressor	\$ 8,700.00	1	\$ 8,870	\$ 1,222
6	Changing Pinion Carrier of Wheel Differential	181,000	0.28	1	3	3	\$ 255	Pinion Carrier	\$ 7,000.00	1	\$ 7,255	\$ 2,004
7	Changing The Air Dryer (Air Brake System)	363,000	0.14	1	1.5	1.5	\$ 128	Air Dryer	\$ 1,700.00	1	\$ 1,828	\$ 252
8	Changing the Alternator	181,000	0.28	1	1	1	\$ 85	Alternator	\$ 3,900.00	1	\$ 3,985	\$ 1,101
9	Changing Door Motor	181,000	0.28	1	1.5	1.5	\$ 128	Door Motor	\$ 350.00	1	\$ 478	\$ 132
10	Replace Steering Box	181,000	0.28	1	4	4	\$ 340	Steering Box	\$ 1,000.00	1	\$ 1,340	\$ 370
11	Changing Rear Destination Sign	363,000	0.14	1	0.5	0.5	\$ 43	Rear Destination Sign	\$ 3,500.00	1	\$ 3,543	\$ 488
12	DPF Cleaning	120,000	0.42	1	8	8	\$ 680	DPF Cleaning	\$ -	1	\$ 680	\$ 283
13	Replace Front & Rear Radius Rods	120,000	0.42	1	8	8	\$ 340	Front and Rear Radius Rods	\$ 1,200.00	4	\$ 1,880	\$ 783
14	Brakes	120,000	0.42	1	4	4	\$ 340	Brake Pads & Discs	\$ 1,200.00	4	\$ 1,540	\$ 642
Total Major Component Replacement/Overhaul Cost												\$ 21,164
TOTAL 12 YEAR LIFE MAINTENANCE COST INCLUDING FUEL												\$ 786,944.09

XDE60 Bus Maintenance Support Cost Model Based on 12 Year Life Cycle

BASE PARAMETERS

Annual Vehicle Miles	50,000	Average Staff Salary per hour	\$ 85.00
Fuel Cost	\$ 3.26	gallon	
Bus Life	12	years	
Annual Mileage	50,000	miles	
Fuel Cost			
Bus MPG	4.95	(mpg)	
Lifetime Fuel Cost	\$ 482,962.96		

Please Note MPG is based on Altoona testing. Many factors such as drivers habits can directly effect fuel economy

Planned Maintenance Activities

Ref	Description	Interval (in Miles)	Frequency	# Staff Reqd	Time to Complete (hrs)	Total Man hours	Labour Cost (Can \$)	List Parts or Materials Used (Description)	Material Cost (Can \$)	Qty	Material Cost (Can \$)	Total Cost per task	Total Cost / year
	PM Task 1:												
1	Exterior Check (Pre-Trip)	137	365.00	1	0.01	0.09	\$ 8		\$ -	0	\$ -	\$ 8	2,792
	Operation Check (Pre-Trip)	137	365.00	1	0.01				\$ -	0	\$ -		
	Wheelchair Ramp Inspection	137	365.00	1	0.01				\$ -	0	\$ -		
	Floor Covering Inspection	137	365.00	1	0.01				\$ -	0	\$ -		
	Crankcase Breather Tube Inspection	137	365.00	1	0.01				\$ -	0	\$ -		
	After Treatment Exhaust Piping Inspection	137	365.00	1	0.03				\$ -	0	\$ -		
	Air Intake Piping Inspection	137	365.00	1	0.01				\$ -	0	\$ -		
	PM Task 2:												
	Radiator Cleaning	962	52.00	1	0.02	0.02	\$ 2		\$ -	0	\$ -	\$ 2	88
	PM Task 3:												
	Air Tank Drain	4,167	12.00	1	0.5	1.55	\$ 132		\$ -	0	\$ -	\$ 132	1,701
	Artic Joint Cleaning	4,167	12.00	1	0.5				\$ -	0	\$ -		
	Artic Joint Cover Plate Lubrication	4,167	12.00	1	0.25			Multi-Purpose Grease	\$ 10.00	1	\$ 10.00		
	Fire Extinguisher Inspection	4,167	12.00	1	0.05				\$ -	0	\$ -		
	Auxiliary Coolant Heater Inspection	4,167	12.00	1	0.25				\$ -	0	\$ -		
	PM Task 4:												
	Disc Brake Pad Inspection	6,000	8.33	1	0.25	9.55	\$ 812		\$ -	0	\$ -	\$ 812	8,581
	Wheel & Tires Inspection	6,000	8.33	1	0.25				\$ -	0	\$ -		
	Transmission Inspection	6,000	8.33	1	0.5				\$ -	0	\$ -		
	Driveshaft Inspection/Lubrication	6,000	8.33	1	0.25			Multi-Purpose Grease	\$ 10.00	1	\$ 10.00		
	Steering Driveshafts Inspection	6,000	8.33	1	0.75				\$ -	0	\$ -		
	Steering Driveshafts Inspection	6,000	8.33	1	0.5				\$ -	0	\$ -		
	Engine Oil & Filter Change	6,000	8.33	1	0.75			Engine Oil & Filter	\$ 118.00	1	\$ 118.00		
	Primary Fuel Filter Replacement	6,000	8.33	1	0.2			Primary Fuel Filter	\$ 35.00	1	\$ 35.00		
	Secondary Fuel Filter Replacement	6,000	8.33	1	0.3			Secondary Fuel Filter	\$ 20.00	1	\$ 20.00		
	Exhaust System Inspection	6,000	8.33	1	0.2				\$ -	0	\$ -		
	Shock Absorber Inspection	6,000	8.33	1	0.2				\$ -	0	\$ -		
	Ride Height Check	6,000	8.33	1	0.5				\$ -	0	\$ -		
	Air Springs Inspection	6,000	8.33	1	0.2				\$ -	0	\$ -		
	Axles & Suspension Inspection	6,000	8.33	1	0.45				\$ -	0	\$ -		
	Air System Functional Test	6,000	8.33	1	0.75				\$ -	0	\$ -		
	Window Emergency Release System Inspection	6,000	8.33	1	0.16				\$ -	0	\$ -		
	Access Doors Lubrication	6,000	8.33	1	0.2				\$ -	0	\$ -		
	Roof Vent/Hatch Inspection	6,000	8.33	1	0.16				\$ -	0	\$ -		
	Splash Guards Inspection	6,000	8.33	1	0.01				\$ -	0	\$ -		
	Windshield Wiper & Washer Inspection	6,000	8.33	1	0.05				\$ -	0	\$ -		
	Passenger Seat Inspection	6,000	8.33	1	0.12				\$ -	0	\$ -		
	Stanchions & Grab Rail Inspection	6,000	8.33	1	0.12				\$ -	0	\$ -		
	Wheelchair Restraint Area Inspection	6,000	8.33	1	0.12				\$ -	0	\$ -		
	Interior Panels Inspection	6,000	8.33	1	0.1				\$ -	0	\$ -		
	Exterior Panels Inspection	6,000	8.33	1	0.1				\$ -	0	\$ -		

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Ref	Description	Interval (in miles)	Frequency	# Staff Reqd	Time to Complete (hrs)	Total Man hours	Labour Cost (Can \$)	List Parts or Materials Used (Description)	Material Cost (Can \$)	Qty	Material Cost (Can \$)	Total Cost per task	Total Cost / year
Major Components:													
1	Engine	250,000	0.20	1	45	45	\$ 3,825	Engine Components	\$27,000.00	1	\$ 27,000	\$ 30,825	\$ 6,165
2	Transmission	250,000	0.20	1	21	21	\$ 1,785	Hybrid Components	\$34,000.00	1	\$ 34,000	\$ 35,785	\$ 7,157
3	Underbody Inspection	150,000	0.33	1	3	3	\$ 255	Zinc primer and cora shield/Cora Tube	\$ 300.00	1	\$ 300	\$ 555	\$ 185
4	Tire Replacement (Based on 50,000 miles)	50,000	1.00	1	4	4	\$ 340	Tires	\$ 2,040.00	4	\$ 2,040	\$ 2,380	\$ 2,380
5	Artic Joint Wrist Joint Replacement	240,000	0.21	1	3	3	\$ 255	Artic Joint Wrist Joints	\$ 2,000.00	2	\$ 2,000	\$ 2,255	\$ 470
6	Changing Air Conditioning Compressor	363,000	0.14	1	2	2	\$ 170	Air Conditioning Compressor	\$10,000.00	1	\$ 10,000	\$ 10,170	\$ 1,401
7	Changing Pinion Carrier of Wheel	181,000	0.28	1	3	3	\$ 255	Pinion Carrier	\$ 8,500.00	1	\$ 8,500	\$ 8,755	\$ 2,419
8	Changing The Air Dryer (Air Brake System)	363,000	0.14	1	1.5	1.5	\$ 128	Air Dryer	\$ 1,700.00	1	\$ 1,700	\$ 1,828	\$ 252
9	Changing the Alternator	181,000	0.28	1	1	1	\$ 85	Alternator	\$ 3,900.00	1	\$ 3,900	\$ 3,985	\$ 1,101
10	Changing Door Motor	181,000	0.28	1	1.5	1.5	\$ 128	Door Motor	\$ 350.00	1	\$ 350	\$ 478	\$ 132
11	Replace Steering Box	181,000	0.28	1	4	4	\$ 340	Steering Box	\$ 1,000.00	1	\$ 1,000	\$ 1,340	\$ 370
12	Changing Rear Destination Sign	363,000	0.14	1	0.5	0.5	\$ 43	Rear Destination Sign	\$ 3,500.00	1	\$ 3,500	\$ 3,543	\$ 488
13	DPF Cleaning	120,000	0.42	1	8	8	\$ 680	DPF Cleaning	\$ -	1	\$ -	\$ 680	\$ 283
14	Replace Front & Rear Radius Rods	120,000	0.42	1	8	8	\$ 680	Front and Rear Radius Rods	\$ 1,200.00	4	\$ 1,200	\$ 1,880	\$ 783
15	Brakes	120,000	0.42	1	4	4	\$ 340	Brake Pads & Discs	\$ 1,200.00	4	\$ 1,200	\$ 1,540	\$ 642
Total Major Component Replacement/Overhaul Cost												\$	24,227
TOTAL 12 YEAR LIFE MAINTENANCE COST EXCLUDING FUEL												\$	992,327.76