

Description of Upgrade (compared to not using, standard equipment...)	Aero Drag Savings @ 30 mph (in gmf)	Time Saved in 40K TT @ 20 mph (sec's)	Time Saved in 40K TT @ 25 mph (sec's)	Cost	Avg. Cost/Second	Equivalent Watts based on FTP = 250 watts	Avg. Cost/Watt
Caffeine (8 events/yr, effect varies, too much is negative)	N/A	40	32	\$24	\$0.67	8	\$3.00
Carbohydrate Drink (8 events/yr)	N/A	30	24	\$24	\$0.89	6	\$4.00
Premium Clincher Tires vs. Touring	N/A	60	48	\$100	\$1.85	12	\$8.33
12 Weeks of Specific Training (based on technique + power gain)	N/A	120	96	\$210	\$1.94	24	\$8.75
Latex vs. Butyl Tubes (note: need to fill every ride)	30	21	19	\$40	\$1.99	4	\$9.44
Clip-on Aerobars (3% less area if well positioned)	110	78	70	\$150	\$2.03	16	\$9.66
Shoe/Cleat/Pedal Fit	N/A	20	16	\$40	\$2.22	4	\$10
Aerojacket Rear Wheel Cover	60	42	38	\$100	\$2.49	8	\$12
Aero Helmet	80	56	51	\$150	\$2.80	11	\$13
Bontrager Aero Water Bottle (difficult to use during a TT)	25	18	16	\$70	\$4.18	4	\$20
Tight Fit Smooth Clothing (skin suit)	50	35	32	\$150	\$4.47	7	\$21
Aluminum TT Frameset (7% less area if properly positioned)	240	169	152	\$1,500	\$9.32	34	\$44
Aero Wheels (30 mm aluminum)	60	42	38	\$600	\$15	8	\$71
Carbon TT Frameset (-3 lbs, 8% less area if properly positioned)	280	198	178	\$3,500	\$19	40	\$89
Aero Wheels (60 mm carbon)	90	64	57	\$1,500	\$25	13	\$118

Bike fitting/positioning to balance power production, comfort, handling and aerodynamics is absolutely critical to performance. The body provides 70% of the system drag, 30% the bike.

As a rough rule of thumb, an 0.005 m² reduction in CDA = 0.5 seconds/kilometer = 0.1 lbs difference in drag at 30 mph = 5 W.

Estimates based on flat to slightly rolling terrain. Also assume a relatively non-specific trained athlete.

By: Jeff Melcher

Update on: 11/1/10

Distance vs. Speed = Time to Complete

MPH	10 Mile Time	12.4 Mile Time	24.8 Mile Time	56 Mile Time
18	33.3	41.3	82.7	186.7
19	31.6	39.2	78.3	176.8
20	30.0	37.2	74.4	168.0
21	28.6	35.4	70.9	160.0
22	27.3	33.8	67.6	152.7
23	26.1	32.3	64.7	146.1
24	25.0	31.0	62.0	140.0
25	24.0	29.8	59.5	134.4
26	23.1	28.6	57.2	129.2
27	22.2	27.6	55.1	124.4

Notes: Time is in minutes. Distances are given in miles with 12.4 miles = 20K, 24.8 = 40K.

Example: If speed is increased in a 24.8 mile TT from 20 to 22 MPH, it would take 6.8 min's less to complete (6 min's 48 sec's).