TransitX™

A proposal handbook for

Greater Boston South

Ultra-narrow gauge • Ultra-light

Surface Transportation Network

Affordable • Solar Powered • High Capacity

100% Automated • Privately Funded

Economics for Transit X Greater Boston South

Values in boxes are editable.		*Values with asterisk (*) are editable in the table of assumptions at the bottom of the page.*	
Area	1,347	square miles of land area for the region, where a region is a campus, municipality, county, state, country, or other area.	or 3,488.7 square kilometers. Editable. The area is typically known or found on Wikipedia.
People	1,000,000	people who live or work in the 1,347 sq mi region. That is a density of 742 people per sq mi.	The population is typically known or found on Wikipedia for municipalities. In addition to the resident population, add the number of people who work in the region.
Miles traveled anywhere	**8,000M**	miles per year traveled by 1,000,000 people by any surface mode assuming 8,000* miles per person per year.	That is 22 miles per person per day.
% of miles in region	70%	percentage of above passenger miles that occur within the 1,347 sq mi region.	A percentage under 40% represents an area with a high number of commuters — a "bedroom community". A high percentage over 80% represents a self-sufficient area where most travel occurs within that region.
Miles traveled within area	**5,600M**	total miles traveled per year within the region. Multiply 70% regional miles times 8,000M miles traveled.	That is 15.3 miles travelled per person per day within the region across all modes.
Network length	320	mile length of Transit X routes operating within the region. This would cost $1,600.0M and installation would take 320 weeks.	A 320 mile length would place 36% of travelers within 0.75* miles of a Transit X network. This is projected to achieve a 35% mode share.
Convenient Coverage area	**480**	square miles of coverage that is a convenient distance for travelers to get to Transit X. Assumes a 0.75* mile distance on either side of the 320 miles of a Transit X route.	That means that 36% of the region would have convenient access to Transit X.
Mode share	35%	share of miles traveled within area on Transit X. This depends upon the coverage/convenience, cost, speed, comfort, and how it compares to other available transportation options,	People will take Transit X more when it goes to more places. The 320 miles of Transit X is convenient to 36% of travelers in the region (within 0.75* miles of a Highline)
Miles traveled on Transit X	**1,960.0M**	passenger miles traveled on Transit X in a year and 239,726 trips per day. 35% mode share times 5,600M miles within area. Additionally, freight ton miles at 196.0M	That is 15.1 miles per day for people convenient to Transit X, and 15.3 miles per day based on mode share.
Revenue	**$784.0M**	Assumes a passenger fare of $0.30* per mile and freight at $1.00* per ton-mile. Includes freight revenue of $196.0M	This does not include other revenue from sources such as advertising, developer fees, subsidies, carbon-offsets, etc.
System cost (total financed)	**$1,600.0M**	320 miles at $5.0M* per mile. Includes both hard and normal soft costs, but does not include 'Additional soft costs' of $80.0M.	That is $4,490 per person in the coverage area, or $1,600 per person in the entire region.
Additional soft costs*	**$80.0M**	Soft costs that are beyond the normal soft costs such as extensive community engagement process, or environmental studies. Estimated using 10%* of the system cost.	These are costs that are controlled and paid for by the municipality or developer, not by Transit X.
Debt financed	**$960.0M**	Assumes 60%* of the $1,600.0M system cost is financed using green infrastructure bonds or other debt financing.	Vehicle miles traveled is 1,400.0M assuming 1.4* passengers per vehicle.
Equity investment	**$640.0M**	The remaining 40% of the system cost is the equity component financed by investors.	Estimated capacity is at 0% of maximum.
OPEX (O&M costs)	$160.0M	Yearly operations and maintenance costs (OPEX) using an estimate of 10%* of system costs.	Includes management, cleaning, repair, inspections, power, salaries. That is $0.08 per passenger mile ($0.13 when debt service included).
EBITDA Profit	$624.0M	Yearly profit is $784.0M in revenue minus $160,000,000 in expenses.	Operating profit margin is 73% (without debt service)
Debt service	$86.4M	Yearly debt payment calculated as $960.0M financed amount times 4%* interest rate plus the financed amount divided by 20* years.	Average trip length is 22.4 miles. (based on 7%* of network length)
Net income	**$537.6M**	The sum of the yearly expenses of $160.0M O&M and $86.4M debt service.	Breakeven (O&M plus debt service) is 109,589 rides per day, assuming a $6.72 ride for 22.4 miles with roundtrip.
Operating margin	**80%**	Calculated by $624.0M profit divided by $784.0M revenue.	
IRR Internal rate of return	**32%**	The IRR does not include external sociatal benefits such as household savings, less time in traffic, lives saves, increased health, or CO2 removed. A 1.2 year payback period to recoup the original equity investment.	Most transportation systems are not profitable and are heavily subsidized. Given the low capital and operational costs of Transit X, the decision to go with Transit X should be compelling.

* Assumptions

Total miles traveled per year per person across all modes.	8,000	miles. Includes people of all ages including both commuters and non-commuters. Air travel not included.
Distance (in miles) from a Transit X route to be considered conveniently covered.	0.75	miles is a 4 minute walk. Stops would be conveniently placed along the route.
Revenue (fare) per mile	$0.30	
Normal system costs per mile that includes all hard costs (two-way track, 2 stops, and 5 vehicles) as well as typical soft costs for planning, design, and insurance.	$5,000,000	
Additional soft costs' expressed as a percentage of the system cost.	5%	**91%**
Percentage of system cost that is financed with debt.	60%	
O&M per year as a % of system's hard costs	10%	
Length of loan/debt instrument in years.	20	years
Interest rate for debt financing	4%	per year
Build time	1	miles per week
Average trip length as a ratio of the network length	7%	Should be based on how square (ratio of length to width) the area is.
Average number of passengers per vehicle (sharing)	1.4	
During a peak hour, the percentage of passenger miles of an average 24-	15%	
Maximum line capacity	10,000	vehicles per hour
Percentage of max that is practically achievable over region	60%	lower as the network length grows. Bottlenecks in specific areas limit max. Used for max network
Freight ton-miles as a percentage of passenger miles	10%	
Freight revenue per ton-mile	$1.00	
Stops per mile	3	