



Measuring Economic Benefits of Commuter Rail

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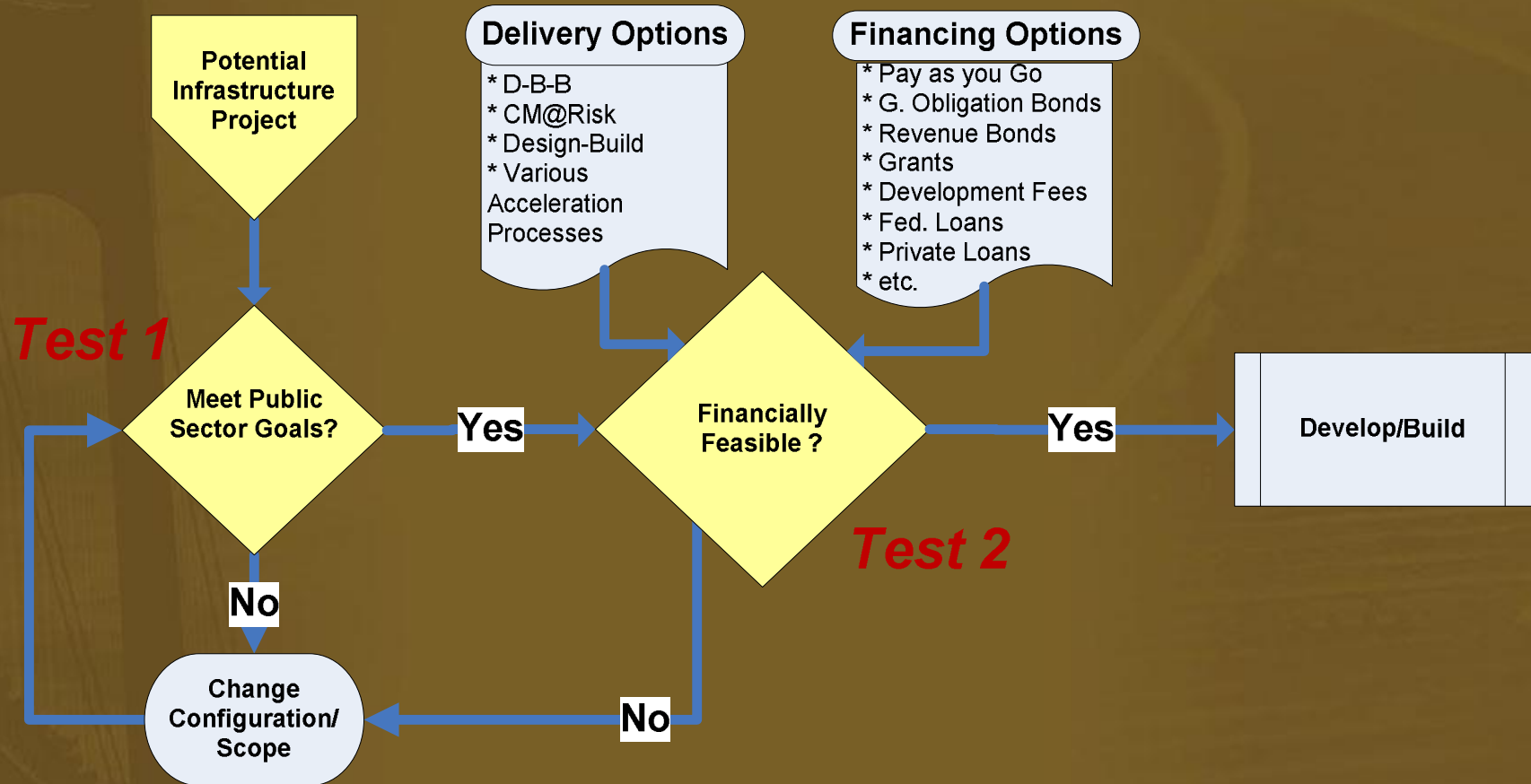
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Presentation Content

- É Why Economic Assessment of Rail Investments
- É Commuter Rail Characteristics
- É Taxonomy of Commuter Rail as a Transit Mode
- É Measuring Commuter Rail Benefits
- É Case Studies



Why Economic Assessment?



Economic Assessment Use

É GAO (2005): Use of Cost-Benefit Analysis in project evaluation ñot Systematicö in US

É More than half of DOTs and transit agencies surveyed use it less than half the time

É Key recommendation for investment decision-making: *Increase use (and utility) of CBA*

É GAO (2008) ñBenefit-cost í a way to identify projects with the greatest net benefits and compare alternatives for individual projectsö.



Transit, In General, Has Two Kinds of Economic Impact

1. Market Impacts

- É Employment and Personal Income
- É Employment and Income Multiplier Effects
- É Business Income
- É Business Multiplier Effects
- É Tax Revenues

2. Non-Market Impacts

- É Access to Employees, Students, and Disadvantaged Groups
- É Affordable Mobility to Economically Disadvantaged Groups
- É Stimulation of Community Development
- É Reduction in Congestion and Delay

Traditional Methodology Covers Market Impacts Only, while New One Covers Both Market and Non-Market Impacts



Analytical Framework

- ó **Affordable Mobility/ Cross Sector Benefits** ó These are the benefits from providing low-cost mobility to transit depend households and budget savings for welfare and social services due to the presence of transit.
- ó **Congestion Management Benefits** ó Congestion management benefits are the savings in vehicle ownership and operating cost, travel time, accidents and environmental emissions.
- ó **Economic Development Benefits** ó Proximity to transit has a positive effect on residential property values and the commercial activities due to the increased availability of travel opportunities.
- ó **Additional Quantifiable Benefits** include: Parking Cost Savings, Infrastructure Cost Savings, Fiscal Impacts, Labor Market Impacts, and Income Impacts.
- ó **Potential financial savings** to existing freight rail on commuter line through cost sharing.



Typical Characteristics of Commuter rail

- “ Typical Design
 - “ Diesel or diesel electric
 - “ Route length: 20 ó 50 miles
 - “ Station spacing: 1 to 4 miles
- “ Typical Operations
 - “ Avg. speed 40 mph (with stops)
 - “ Service: 30 min peak, 60 other
- “ Land Use/Development
 - “ Cost-effective for low densities
 - “ Reliant on park & ride lots
 - “ Moderate economic development potential



Commuter rail vs other transit types

- “ Network Coverage
 - “ Commuter rail is typically 30 to 40 miles in terms of network size; and
 - “ Stations are several miles apart- LRT stations are typically between $\frac{1}{4}$ mile and a mile.
- “ Frequency of Service
 - “ Commuter rail is less frequent than light rail service. Typically, light rail has a peak headway of 2-15 minutes. Commuter rail is often at least 30 minutes of headway during peak hours;
 - “ Frequent Peak Hour trips, sometimes no weekend off peak trips (e.g. MARC and VRE) ; and
 - “ Others have weekend trips (e.g. SEPTA and MBTA).



Commuter Rail vs other Transit Types

“ Lower average cost of construction per passenger mile than heavy rail

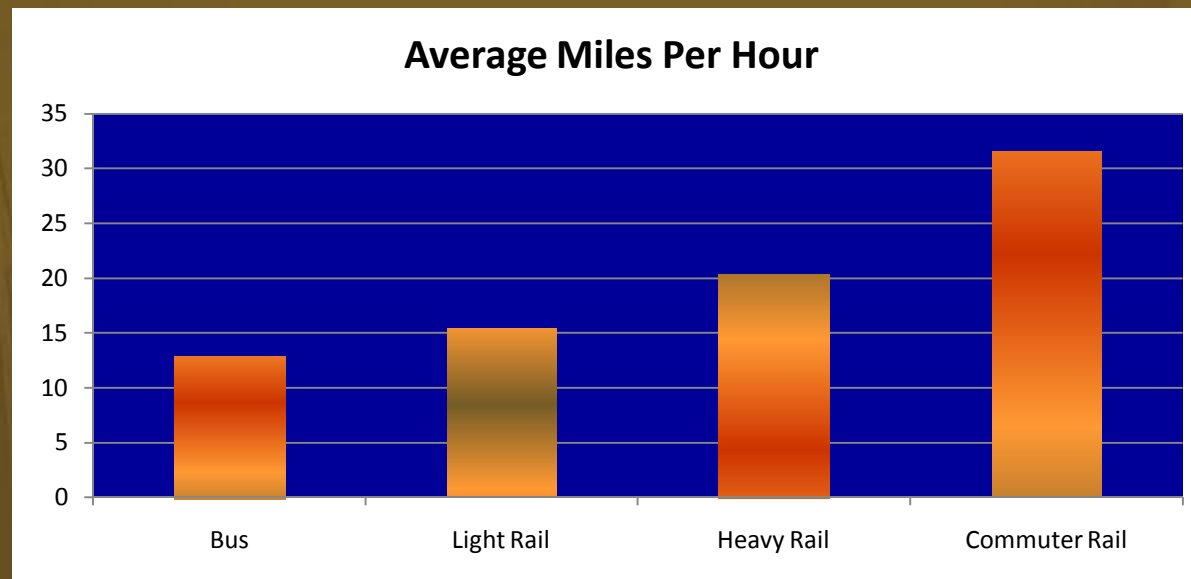
	Miles	Cost for Fixed-Guideway Infrastructure (\$ millions)	Dollars per mile (millions)
Bus Rapid Transit	357.5	3,692.40	10.3
Busway	0.6	48.3	80.5
Light Rail Transit	179.6	19,022.60	105.9
Commuter Rail	177.7	20,493.70	115.3
Heavy Rail Transit	26.3	10,121.00	384.8

Source: FTA: 2010 New Starts Report from 2010 FTA New Starts Report. Excludes projects for upgrades to existing rail routes.



Commuter Rail vs other Transit Types (cont'd)

- ” Speed: Commuter rail trips faster than other transit types, at an average 31.6 mph;



Source: Litman 2010

- ” automobile travel averages about 35 mph overall (NPTS 1999).



Commuter rail vs highway

- “ Cheaper to construct than additional highway capacity, as shown in the March 2007 Financial & Economic Benefits Report for the Austin-San Antonio Commuter Rail Project:
 - “ Construction cost savings for two additional freeway lanes within 112-mile Austin-San Antonio corridor = approximately \$380 million (assuming ROW is available and commuter rail uses existing rail infrastructure)
- “ ASA Commuter Rail Project is cheaper to maintain
 - “ Maintenance cost savings for two additional freeway lanes of 112 miles = \$9.9 million per year or total savings of \$275 million cumulatively through year 2030
- “ Commuter rail will decrease congestion; additional highway capacity does not. Vehicle-miles-traveled increases roughly one-for-one with miles of roads built (Duranton and Turner, 2008).



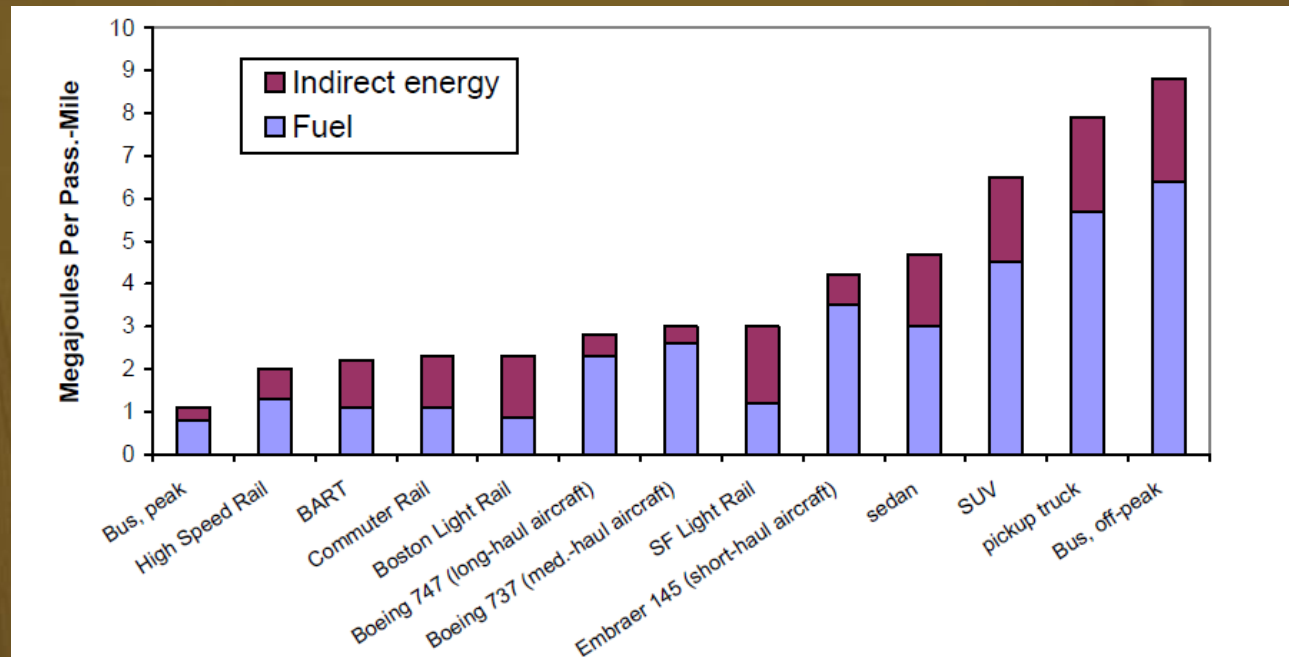
Commuter Rail vs other Transit Types (cont'd)

- “ Average cost of vehicle operation per passenger mile for commuter rail (about \$0.40) is less than light rail at about (about \$0.60) (APTA 2002)
- “ Environmental Savings of Commuter Rail:
 - “ One study compared Caltrain Commuter Rail of San Francisco to 3 other transit types (BART, Muni Light Rail, and Boston's Light Rail Green Line) found that not one network outperformed the other for all CAP categories (Chester 2008).
 - “ However, commuter rail less energy consumption per passenger mile than light rail (Ibid) (see next slide)



Commuter Rail vs other Transit Types (cont'd)

” Lifecycle Energy Consumption



Commuter Rail Economic Development Impacts



Residential Properties

Author	Year of Study	System	City	Distance Measured	Residential Premium
Robert Cervero and Michael Duncan	2002	Coaster	San Diego, CA	0.5 miles	17%
Gruen & Associates	1997	Metra	Chicago, IL	1,000 ft	20%
Armstrong	1994	MBTA Fitchberg Commuter Line	Boston, MA	Within census tracts	6.70%
From Richard Voith, "Transportation, Sorting and House Values," AREUEA Journal, Vol. 117, No. 19	1991	SEPTA	Southern PA	Within census tracts	3.80%
From Richard Voith, "Transportation, Sorting and House Values," AREUEA Journal, Vol. 117, No. 19	1991	PATCO	Camden, NJ	Camden County, NJ	10%

All studies use hedonic price estimation to determine premiums for housing properties within a certain distance of the commuter rail stations



Commercial Properties

- “ Studies that examine the commercial property premiums created by commuter rail find a large impact. Differences between the two studies are again due to ridership.
- “ For Coaster, the differences are due to properties NOT downtown along the commuter line that are not valued

Author	Year of Study	System	City	Distance Measured	Commercial Property Premium
Landis et al	1995	CalTrain	Santa Clara County, CA	0.25 miles	More than 120%
Robert Cervero and Michael Duncan	2002	Coaster	San Diego, CA	0.5 miles	91% in the downtown; -9.9% not downtown



Meta Analysis on Commuter Rail Premium

- “ A consistently higher positive impact on the property value compared to light rail (14% higher) and heavy railway/Metro stations.
- “ An average of 3% higher effect on property value for every 250m closer than the effect of light rail stations.
- “ A larger catchment area ó i.e. a wider service range ó than other transit types.



Case Studies



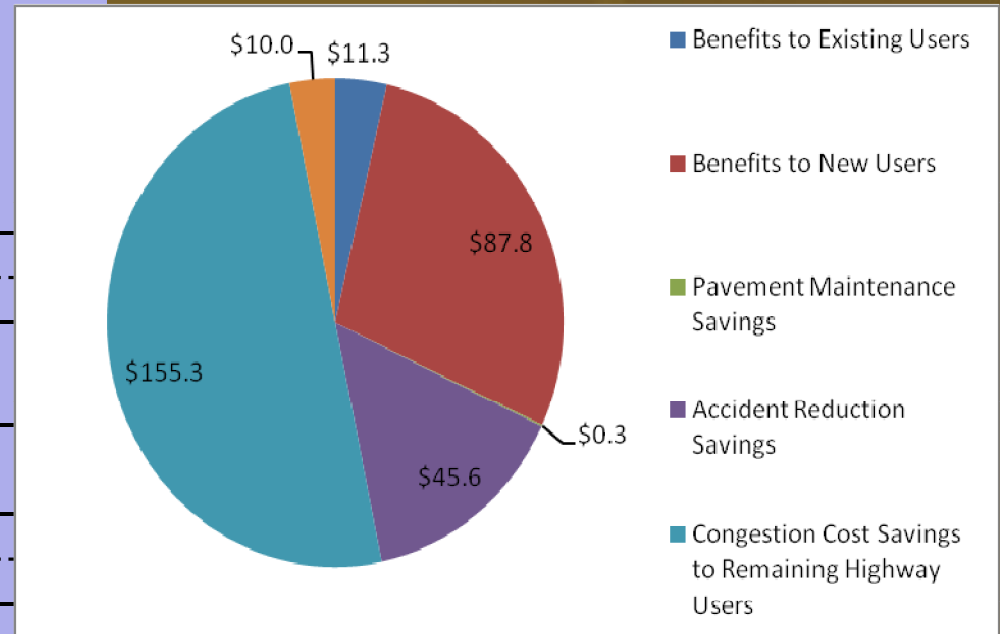
Plaistow Commuter Rail

- “ For Rockingham Planning Commission:
 - “ BCA on completing the expansion of MBTA commuter service to Plaistow, New Hampshire, and building the new layover facility for TIGER II Federal Funding Application in August 2010
- “ Benefits to New Users to be:
 - “ Travel time;
 - “ Vehicle operating costs (i.e., fuel, oil, depreciation, tire wear, maintenance/repair); and
 - “ Rail fare.
 - “ For travelers to Boston and other destinations where parking is relatively more expensive, parking savings will also be achieved; for example, parking at the new Plaistow Station is expected to be \$2 daily, as compared to an average of \$20 in Boston.



Plaistow Commuter Rail Results

BENEFITS	Millions of 2010\$
Benefits to Existing Users	\$11.30
Benefits to New Users	\$87.80
Pavement Maintenance Savings	\$0.30
Accident Reduction Savings	\$45.60
Congestion Cost Savings to Remaining Highway Users	\$155.30
Environmental Benefits	\$10.00
TOTAL BENEFITS	\$310.40
PV of Total Benefits	\$83.70
COSTS	
Maintenance Costs	\$24.80
Capital Costs	\$29.50
TOTAL COSTS	\$54.20
PV of Total Costs	\$35.60
Net Present Value (NPV)	\$48.10
Benefit-Cost Ratio (BCR)	2.3



Discounted million of dollars at 7% discount rate



PVPC Knowledge Corridor Improvements

- “ For PVPC Pioneer Valley Planning Commission (PVPC), with support from the Vermont Agency of Transportation a BCA was completed for proposed Knowledge Corridor Improvements.
- “ BCA was completed for 3 alternatives:
 1. Realignment: Creating a more direct route reducing trip length by 11 miles;
 2. Enhanced Intercity: Additional rail service and station development in Holyoke; and
 3. Commuter: Commuter level service providing more frequent service, one additional round trip from New Haven, CT, to White River Junction, VT, and eight round trip extensions of the New Haven-Springfield shuttle north to Greenfield with concentrations in the morning and evening commute periods



PVPC Knowledge Corridor Improvements Results

Benefits (\$ Millions)	Realignment	Enhanced Service	Commuter Service
Travel Time Savings - Existing Riders	32.7	32.7	32.7
User Benefits - Induced Riders	16.7	236	289.1
Reduced Emissions	5.9	19	17.8
Reduced Highway Maintenance	32.6	33.8	33.9
Congestion Relief Benefits	152.7	608.5	1,035.1
Freight Shipping Cost Savings	69.2	69.2	69.2
TOTAL BENEFITS	309.8	1,002.2	1,477.8
PV of Total Benefits	121.2	362.1	534.1
Costs			
Capital Costs	47.5	80	275
Annual O&M Cost Change	0	4.9	22
TOTAL COSTS (Cumulative)	47.5	203.4	824.2
PV of Costs	44.4	117.6	431
Net Present Value (NPV)	76.8	244.4	103.1
Benefit-Cost Ratio (BCR)	2.7	3.1	1.2

Discounted million of dollars at 7% discount rate



Baton Rouge to New Orleans Passenger Rail

“ For Southern Rapid Rail Transit Commission, a Benefit Cost Analysis of an Intercity Passenger Rail from Baton Rouge to New Orleans (80 miles)

“ Benefits included:

1. Congestion Management Benefits:

“ Value of Time Savings resulting from reductions in the value of travel time;

“ VOC Savings;

“ Unreliability costs; and

“ Emissions due to the increased efficiency of the passenger rail service. The change in value of travel time includes not only the change in travel time but also the costs associated with comfort and the quality of the time spent in the commute.

2. Operating Cost Reduction Benefits: these are the savings resulting from reductions in the cost of operating existing services (the current commuting option is the LA Swift bus service)

3. Station Area Development Benefits: 8.5% premium is applied to ¼ mile area 4% is applied to the ½ mile corridor. Also, a portion of the development premium is assumed to be capitalized travel benefits and already accounted for in the analysis of user benefits

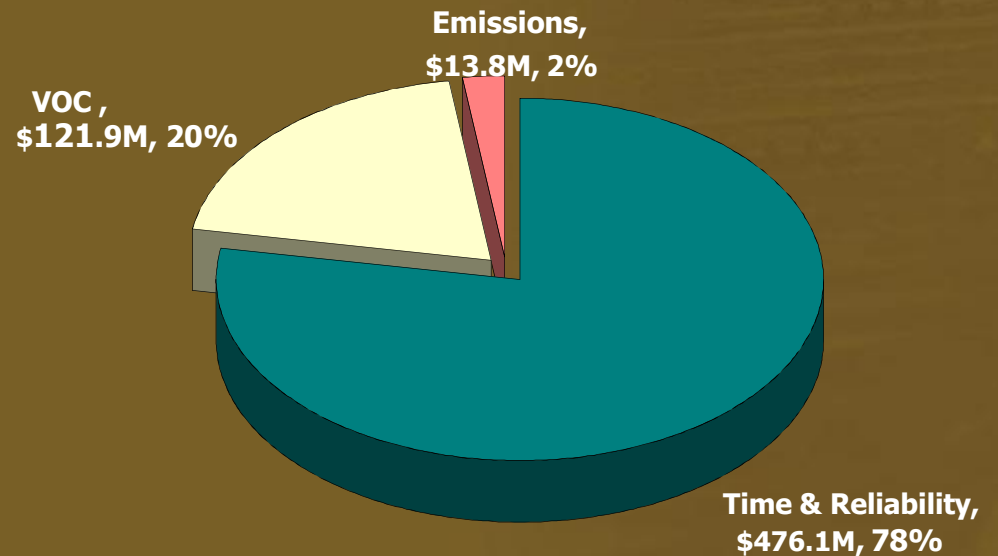


Baton Rouge to New Orleans Passenger Rail Results

“ Station Area Economic Development Value Increases:

Station Area Planning (Millions of US\$) Discounted	1/4 mile		1/2 Mile Donut		Total
	Residential	Commercial	Residential	Commercial	
2008 Total Value	\$86.3	\$280.2	\$245.8	\$840.7	\$1,453.0
2040 Forecasted Value	\$145.1	\$767.9	\$359.7	\$1,030.5	\$2,303.3
Total Forecasted Development	\$58.8	\$487.7	\$114.0	\$189.8	\$850.4
Total Incremental Value Increase	\$9.5	\$45.4	\$10.1	\$30.3	\$95.3
Total Attributable Incremental Value Increase	\$4.7	\$22.7	\$5.1	\$15.1	\$47.6

- “ Benefit Cost Ratio: 1.40
- “ Internal Rate of Return: 4%



Concluding Remarks

- É Commuter Rail as other investment should be assessed based on their incremental economic value.
- É Economic assessment should account for both market and non-market benefits
- É From the literature review, it is clear that gross property value increases due to rail access can often exceed costs.
- É Commuter Rail investments tend to provide a better sustainable option that promotes mobility and accessibility.



References



References

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- “ The Economic Impact of the Proposed New-Haven-Hartford-Springfield Commuter Rail Line, Paul Foster, December 2006
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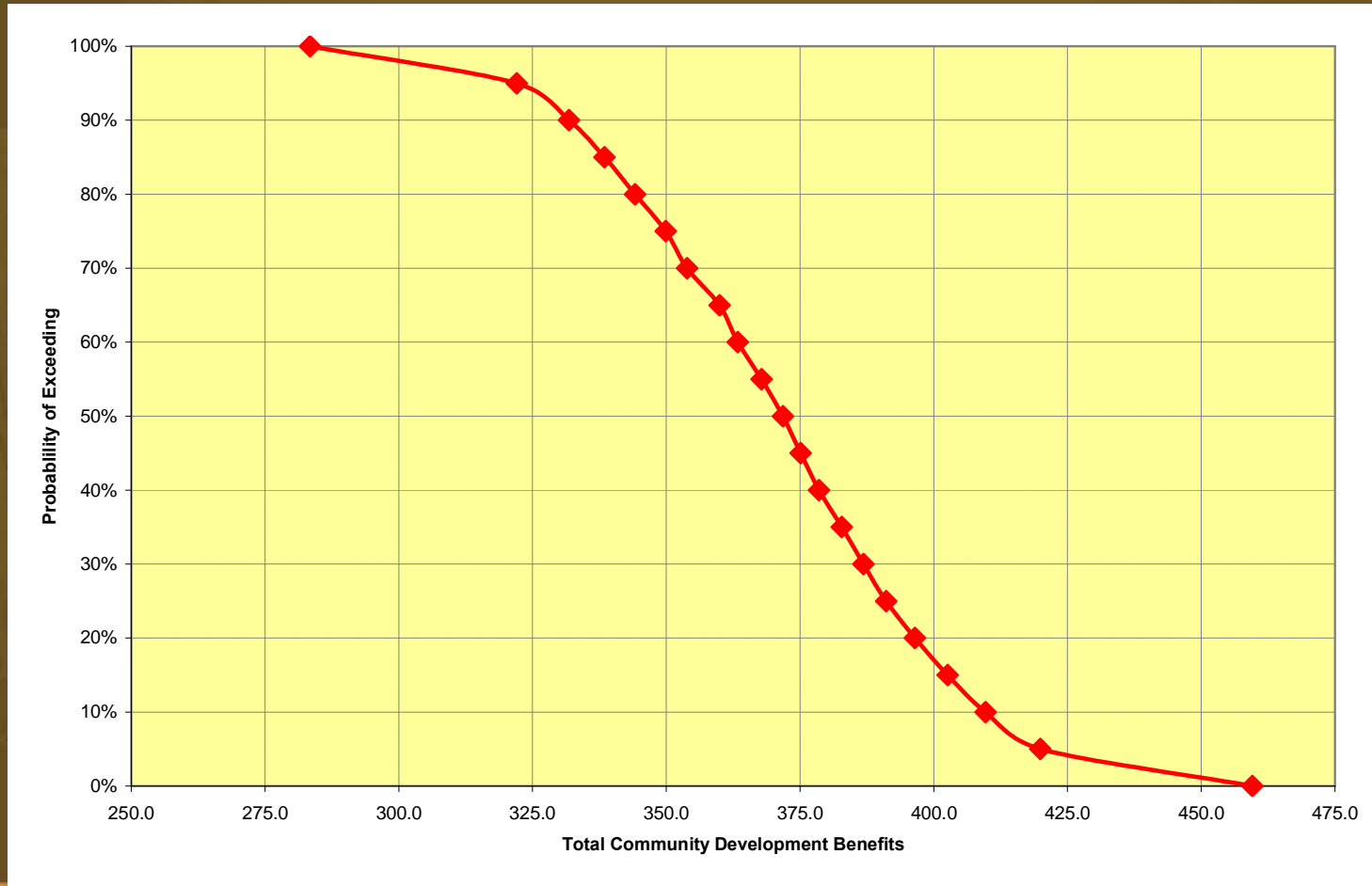
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- " Railway station property value: A Meta analysis, Ghebreegziabiher Debrezion et al, February 2006.
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- " Transportation, Sorting and House Values, Richard Voith, AREUEA Journal, Vol 19., No. 2, 1991.



EXAMPLE Study Outcomes

Economic Development Benefits, \$Millions

“ Risk analysis produces a range of possible outcomes with associated likelihoods



Residential Properties (cont'd)

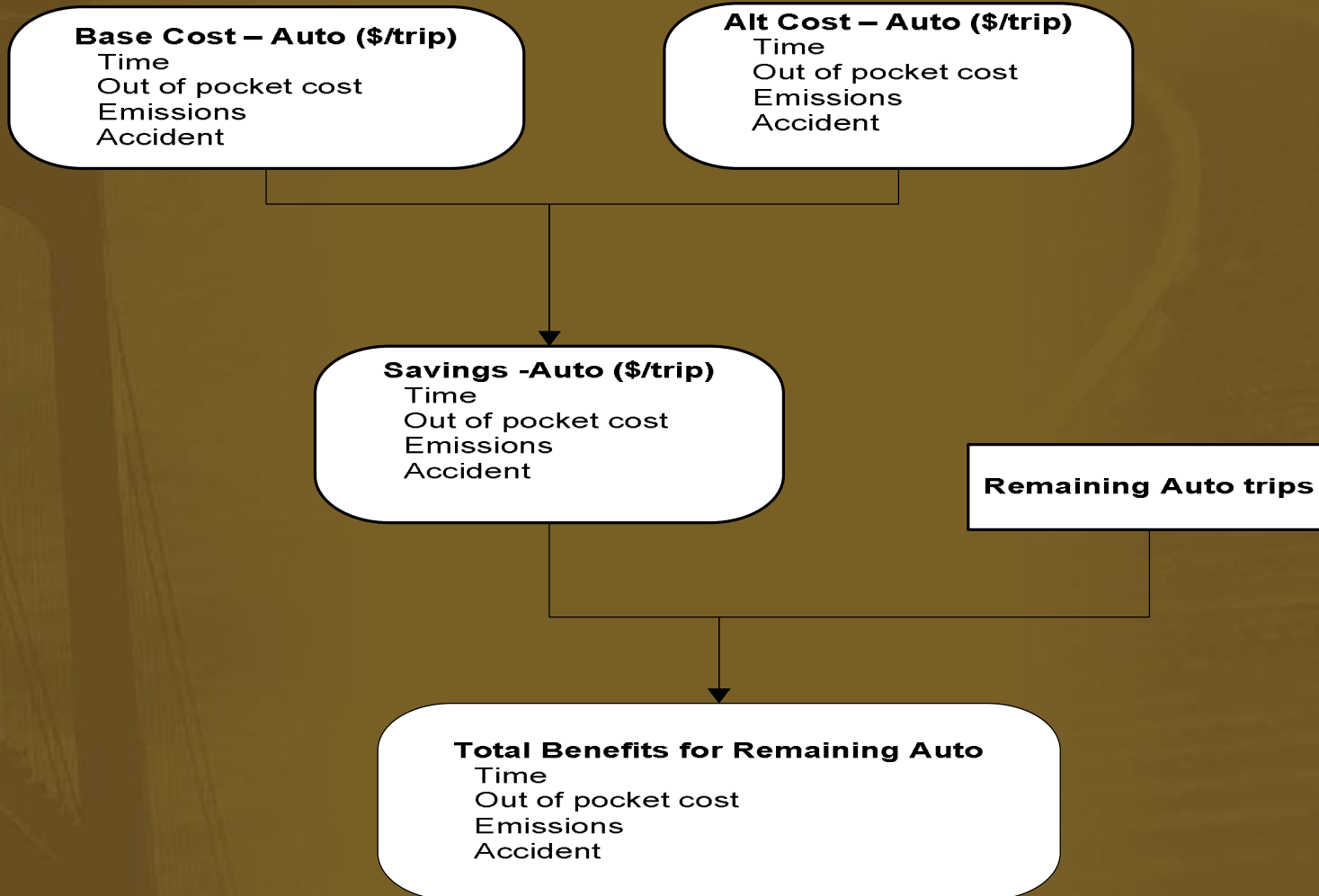
- “ Differences between residential premiums findings are due to:
 - “ Ridership differences (MBTA Fitchburg Line has lowest ridership of all these studied)
 - “ Frequency of service (PATCO is more frequent and has a higher premium than SEPTA)
 - “ Later, Armstrong (1994) showed a decrease in price for single family homes near Boston's Fitchburg commuter rail line that was also a freight train line that creates noise pollution
- “ A range of **3.8% - 20%, with 10% intermediate premium** on median housing values within a 1, 3 and 5 mile corridor is used the 2007 Economic Impact study for Kenosha-Racine-Milwaukee (KRM) Commuter Rail.
- “ At least half of a **6% premium** that is usually applied to commuter rail is considered for housing units near the new stations for a February 2005 Economic Benefits Report on Amtrak's extension of the Downeaster line.



Commuter Rail Congestion Management Benefits

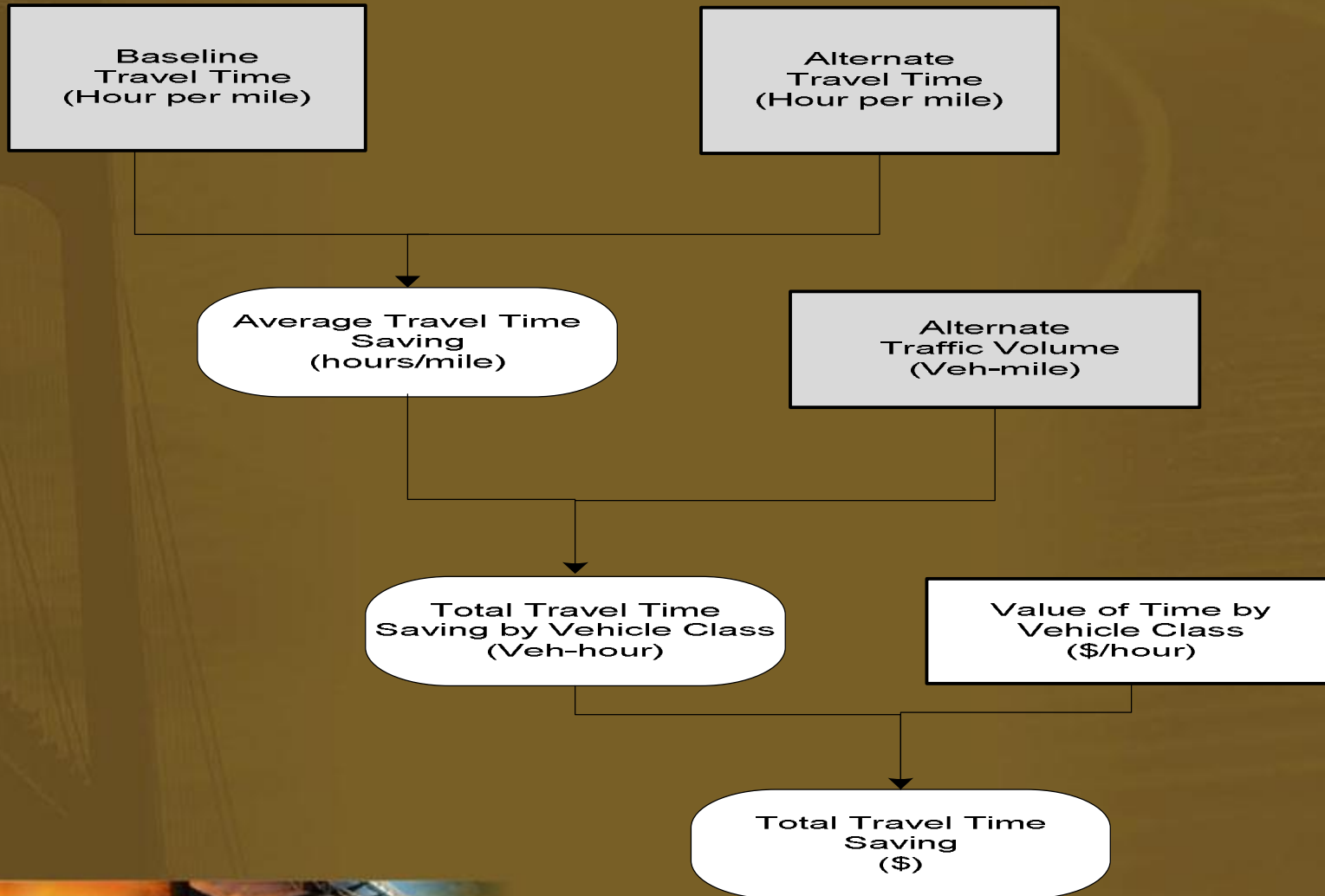


Congestion Management Benefits

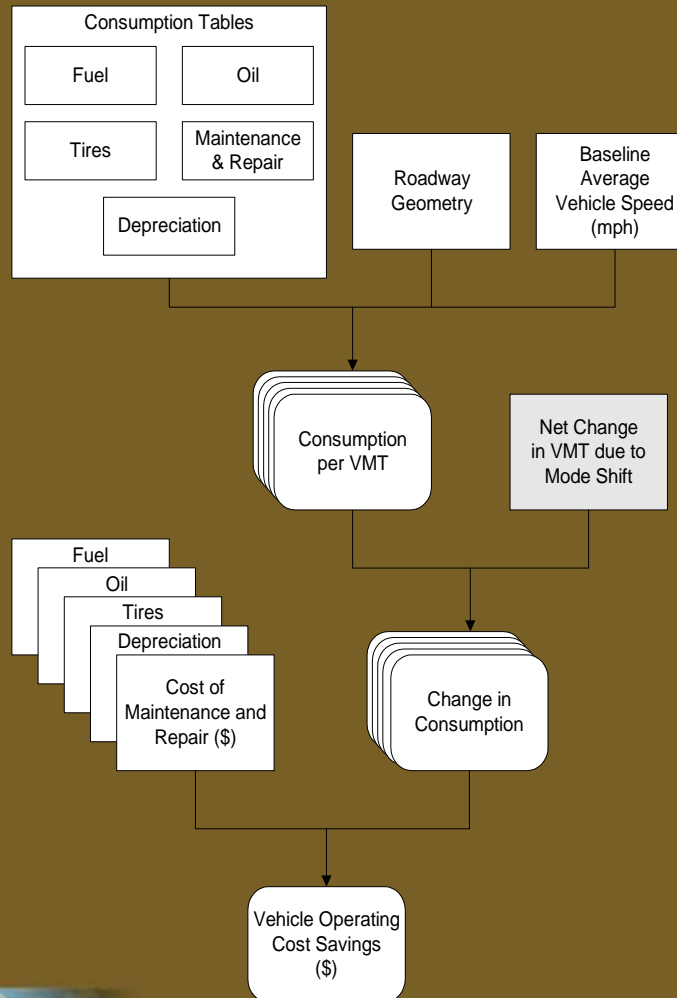


Congestion Management

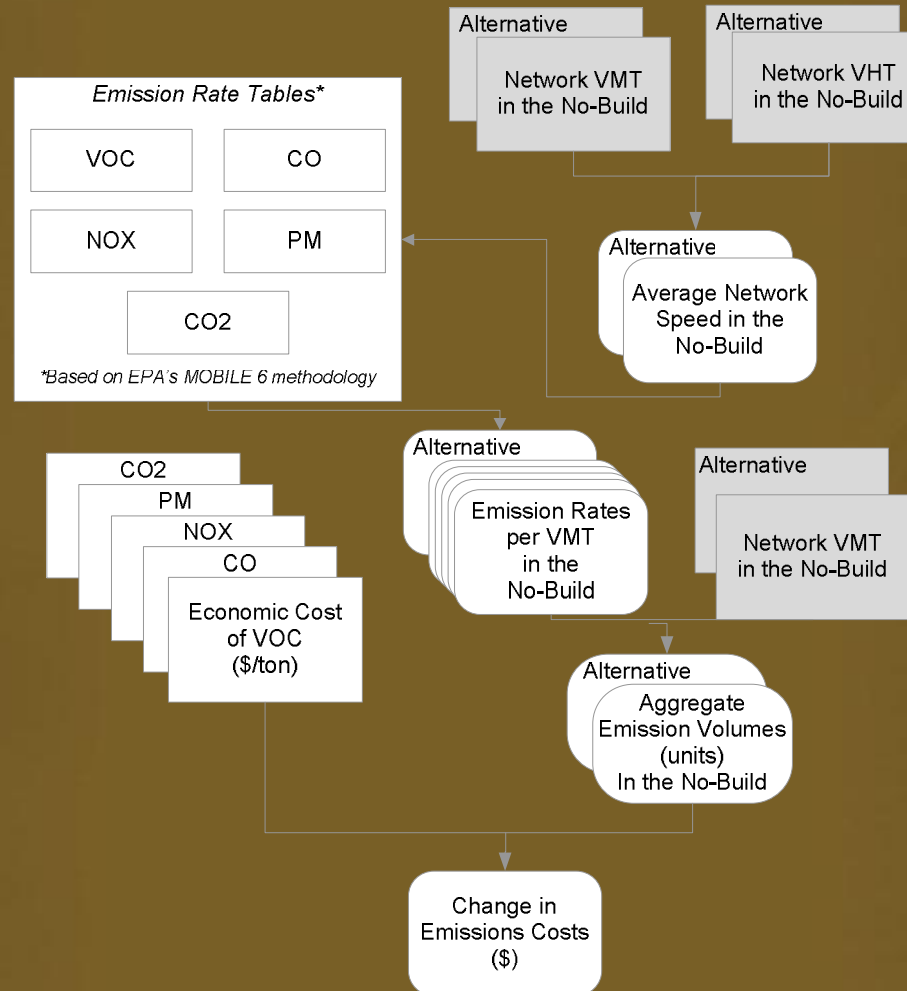
Benefits: Travel Time Savings



Congestion Management Benefits: VOC Savings

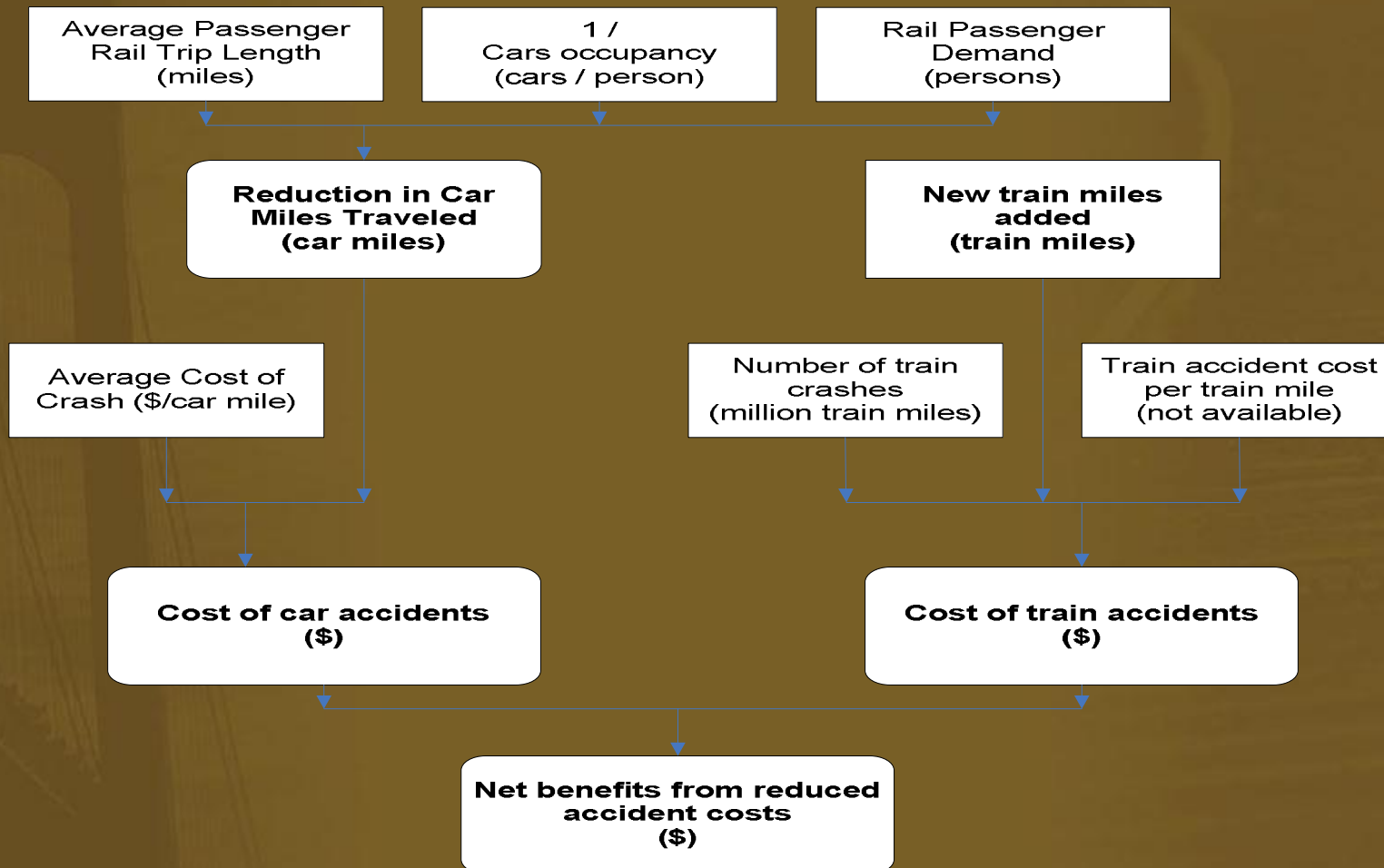


Congestion Management Benefits: Emission Cost Savings



Congestion Management

Benefits: Accident Cost Savings



Proposed Stakeholder Workshop

Attendance Needs

- É Project Sponsors
- É Local Developers
- É Community Leaders
- É OASIS Representation

*8-12 knowledgeable stakeholders
who understand local
conditions*

*½ Day review project section by
section*

Workshop Evaluation Category

- É Current Market Strength
- É Expected Improvement in
Accessibility
- É Residential Desirability
- É Commercial Desirability
- É Supportive Zoning
- É Available Land for
Development or
Redevelopment
- É Major Attractions
- É Public Sector Investment /
Support
- É Private Sector Investment /
Support

