

# Economic Analysis Reports:

1. I-84 Viaduct in Hartford
2. I-84/Rt8 Mixmaster in Waterbury
3. New Haven Rail Line



## Briefing for Transportation Finance Panel

Nov 23, 2015

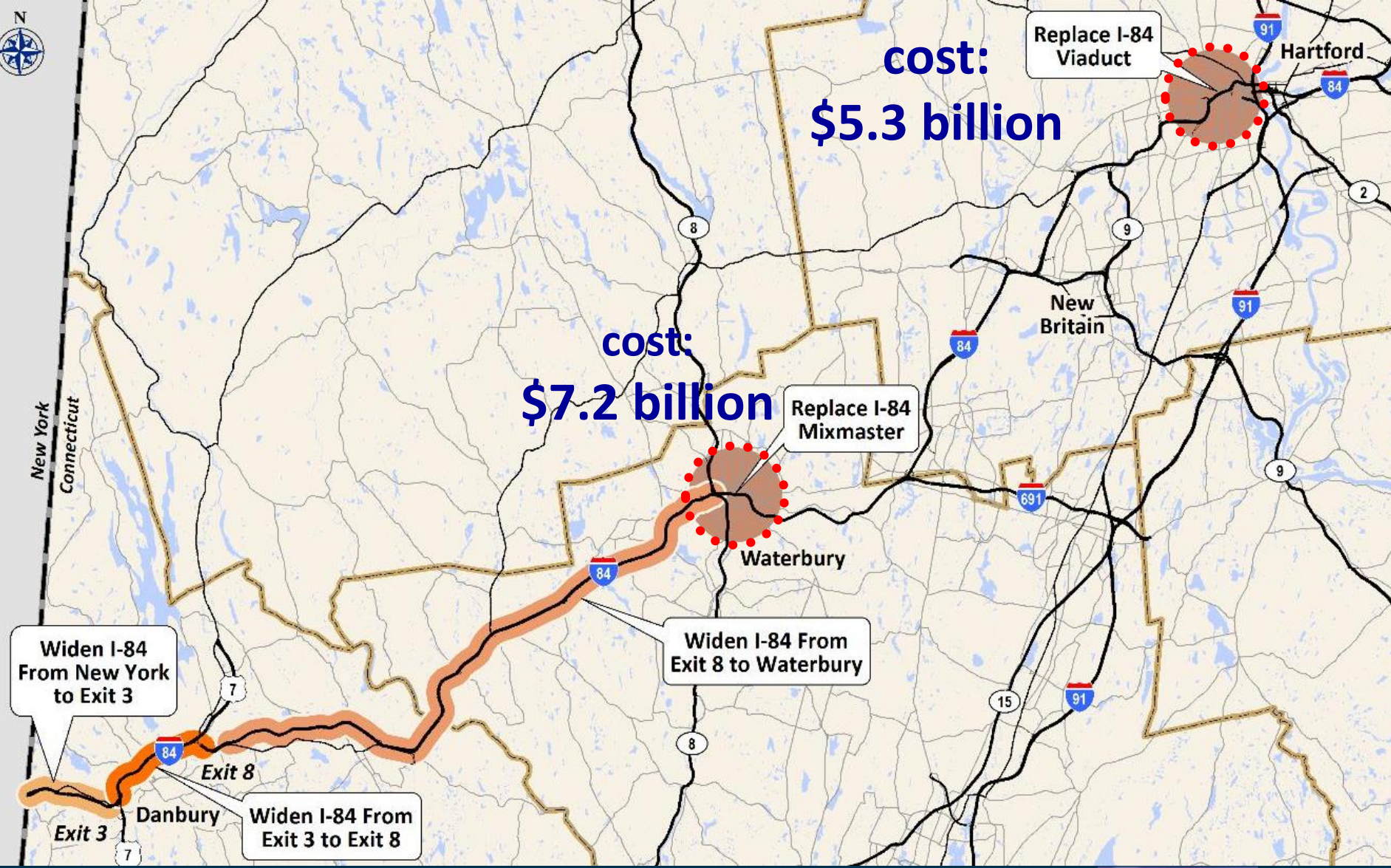
# Economic analyses 1 & 2

1. I-84 Viaduct in Hartford
2. I-84/Rt8 Mixmaster in Waterbury

Both projects are 'must do' projects near the end of their life expectancy. Both are too important to let deteriorate to unsafe & unusable conditions.

*Purpose of Analyses:* intended to measure value of the facilities & the economic impacts of disinvestment.

# I-84: Hartford Viaduct & Waterbury Mixmaster



# Full Replacement vs. Deterioration & Closure

*same comparative analysis for both Viaduct & Mixmaster*

## Deterioration & Closure

(**worst case** or '**disinvestment**')

### Assumptions:

- Minor capital projects & increased O&M keep Viaduct **open for another decade.**
- **Viaduct closed in 2026.**
- From 2026-2050, no traffic is allowed to use the Viaduct.
- Traffic forced to alternate highways & local streets.
- More congestion, more wasted time, longer travel distances.

## Full Replacement

(assumes **lowered highway** alternative)

### Assumptions:

- Larger capital project keeps the current facilities open until 2030.
- New facility opens in 2030.
- **Compared to the “worst case” or closure scenario the facility remains open for full study period. No diversions or detours**
- New facility designed to reduce congestion & accidents

# I-84 Viaduct in Hartford

# I-84 Viaduct in Hartford



- $\frac{3}{4}$  mile elevated highway
- built in 1965 (*50-yr design life*)
- large traffic volume (175,000 daily)
- highly congested
- ***must*** reconstruct or replace

## **1960s design:**

- ✓ resulted in operational & accident problems  
(*acc. rate = 4X state average*)
- ✓ divided & disrupted the city, neighborhoods, & street grid

## Hartford Viaduct:

# Benefit/Cost Analysis:

comparing  
user & societal benefits  
to project costs

# Benefit/Cost Analysis: Long-term Costs & Benefits

## Hartford Viaduct:

Replacement Vs. Closure	“Present Value” (1) of Benefits & Costs
A. Project Benefits (2)	\$9.2 Billion
B. Project Costs	\$3.4 Billion
C. Net Benefits	\$5.8 Billion
D. Benefit/Cost Ratio	2.68

1. Future costs & benefits are discounted to present value
2. Benefits are primarily ‘user’ benefits like travel time savings, lower accident costs, & improved travel time reliability.



# BCA: Personal vs Business Travel Benefits Only *(in \$2015)*

## Hartford Viaduct:

Trip Purpose	Vehicle Operating Costs	Travel Time & Other Costs	Present Value Total
Personal & Commute	\$0.51 billion	\$6.06 billion	\$6.56 billion
Business & Freight	\$0.20 billion	\$2.46 billion	\$2.65 billion
<b>Total Benefits</b>	<b>\$0.71 billion</b>	<b>\$8.52 billion</b>	<b>\$9.22 billion</b>

(1) All future benefits discounted to present value or current

**About 28% of benefits go to business & industry.**

## Hartford Viaduct:

# Economic Impact Analysis:

Measuring the impact of the project  
on economic growth in CT

# Economic Impact Analysis (EIA)

## Long-Term Economic Growth

*Cumulative increase from 2020 - 2050*

### Hartford Viaduct:

Type of impact on CT economy Contribution to:	Cumulative impact of replacement vs closure
<b>Business Sales (Output)</b>	<b>\$10.2 Billion</b>
<b>Gross State Product</b>	<b>\$6.1 Billion</b>
<b>Wage Income</b>	<b>\$4.2 Billion</b>

Values in each column are not additive. GSP & Wages are components of Business Sales

# EIA: Short-Term Construction Impacts

## Hartford Viaduct:

Type of impact on CT economy Contribution to:	Cumulative impact from <u>construction</u>
Business Sales (Output)	\$7.3 Billion
Gross State Product	\$4.1 Billion
Wage Income	\$3.1 Billion

# EIA: Short & Long-Term Job Impacts

## Hartford Viaduct:

Type of Job	Number of Jobs
<b><u>Construction Jobs</u></b> <i>(for duration of construction )</i>	<b>4,300 – 7,500 jobs</b> <i>each construction year</i>
<b><u>Permanent Jobs</u></b> <i>(for each year during the 30-year analysis period thru 2050)</i>	<b>2,200 – 3,400 jobs</b> <i>each year</i>

# I-84 Mixmaster in Waterbury

# *I-84 Mixmaster in Waterbury*

major interchange of I-84 & Route 8

## **Built in 1960s:**

- CT's only 'double-decked' highway
- 130,000+ vehicles daily
- must reconstruct or replace
- about \$7 billion to replace

## Waterbury Mixmaster:

# Benefit/Cost Analysis:

comparing  
user & societal benefits  
to project costs



# BCA: Long-term Costs & Benefits

## *Waterbury Mixmaster*

### Waterbury Mixmaster:

Replacement versus Closure	“Present Value” (1) of Benefits & Costs
A. Project Benefits (2)	\$8.2 Billion
B. Project Costs	\$4.7 Billion
C. Net Benefits	\$3.5 Billion
D. Benefit/Cost Ratio	1.75

1. Future costs & benefits are discounted to present value
2. Benefits are primarily ‘user’ benefits like travel time savings, lower accident costs, & improved travel time reliability.

# BCA: Personal vs Business Travel Benefits Only *(in \$2015)*

## Waterbury Mixmaster:

Trip Purpose	Vehicle Operating Costs	Travel Time & Other Costs	Total
Personal & Commute	\$0.20 billion	\$5.52 billion	<b>\$5.71</b> billion
Business & Freight	\$0.10 billion	\$2.40 billion	<b>\$2.50</b> billion
<b>Total Benefits</b>	<b>\$0.31</b> billion	<b>\$7.92</b> billion	<b>\$8.22</b> billion

(1) All future benefits discounted to present value or current

About 30% of benefits go to business & industry.

## Waterbury Mixmaster:

# Economic Impact Analysis:

Measuring the impact of the project  
on economic growth in CT

# EIA: Long-Term Economic Growth

*Cumulative increase from 2020 - 2050*

## Waterbury Mixmaster:

Type of impact on CT economy Contribution to:	Cumulative impact of replacement vs closure
<b>Business Sales (Output)</b>	<b>\$8.8 Billion</b>
<b>Gross State Product</b>	<b>\$5.1 Billion</b>
<b>Wage Income</b>	<b>\$3.6 Billion</b>

Values in each column are not additive. GSP & Wages are components of Business Sales

# EIA: Short-Term Construction Impacts

## Waterbury Mixmaster:

Type of impact on CT economy Contribution to:	Cumulative impact from <u>construction</u>
<b>Business Sales (Output)</b>	<b>\$10.4 Billion</b>
<b>Gross State Product</b>	<b>\$5.8 Billion</b>
<b>Wage Income</b>	<b>\$4.5 Billion</b>

Values in each column are not additive. GSP & Wages are components of Business Sales

# EIA: Short & Long-Term Job Impacts

## Waterbury Mixmaster:

Type of Job	Number of Jobs
<b><u>Construction Jobs</u></b> <i>(for duration of construction )</i>	<b>6,100 – 11,000 jobs</b> <i>each construction year</i>
<b><u>Permanent Jobs</u></b> <i>(for each year during the 30-year analysis period thru 2050)</i>	<b>2,100 – 2,800 jobs</b> <i>each year</i>

# Hartford Viaduct & Waterbury Mixmaster Side-by-Side Comparison

Economic analyses demonstrate positive economic returns for both of these 'must do' projects.

- **Replacing** these critical but aging structures **is essential to CT's economy**
- Yields large **benefits to users** who depend on I-84
- **Supports economic growth** and avoids economic losses that would result from letting them deteriorate to unsafe & unusable condition.

# BCA: Benefits to Users vs Cost

Large benefits to users & good B/C ratios

Replacement versus Closure	“Present Value” (1)	
	Viaduct	Mixmaster
Project Benefits <sup>2</sup>	<b>\$9.2</b> Billion	<b>\$8.2</b> Billion
Benefit/Cost Ratio	<b>2.68</b>	<b>1.75</b>



# EIA: Impacts to CT's Economy

## Potential Losses to CT's Economy

if structures are allowed to deteriorate (*versus being replaced*)

Contribution to:	Viaduct	Mixmaster	Combined Impact
Business Sales (Output)	<b>\$10.2</b> Billion	<b>\$8.8</b> Billion	<b>\$19.0</b> Billion

Combined economic impact of **\$19 billion**

# New Haven Line

Economic analysis of  
more frequent & faster service

# New Haven Rail Line



Serves a critical economic function

- links CT directly **to NYC**
- reliable & convenient rail service **within CT** in **severely congested highway** corridor.
- 80,000 daily riders



Ownership & operation

- NHL commuter service operates **75 miles** from New Haven to NYC
- CT owns **49 miles** (New Haven to NY)
- Metro North (MNRN) operates NHL for CT

# New Haven Rail Line (NHL)

## Infrastructure Preservation

Most of the line is **4 tracks** (*but frequent repairs limit use to 2-3*)

- **Rail preservation program** in Let's Go CT will restore the NHL infrastructure to a good state of repair (full use of 4 tracks)
- preservation costs **not included** in this service expansion analysis

## Service Improvement Proposal

Let's Go CT includes **\$2 billion** for 'improved' service on NHL

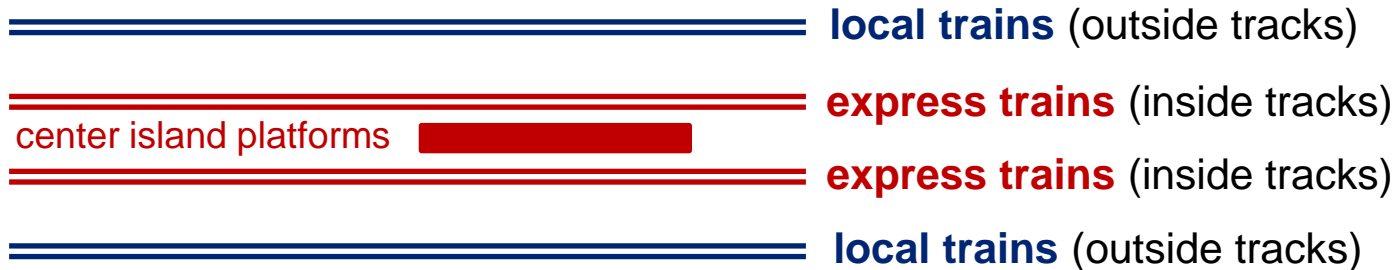
Goals:

- **more frequent service**
- **faster service** (especially express trains)

# New Haven Rail Line (NHL)

## Improved Service Concept

(2+2 track configuration)



- Use full 4-track capacity
- Express trains travel unimpeded by locals, but stop only at major stations
  - ✓ Reduced travel times
  - ✓ More frequent service
- Local trains stop at all or most stations
  - ✓ Greatly increased frequency of service

# New Haven Line:

*Improved* service vs. *Existing* service levels

	Base Case <i>Existing Service Levels</i>	Build Case <i>2+2 Service Improvement</i>
<b>Rail</b>	<u>Current rail service</u> configuration, with future growth assumptions	<u>Restored</u> 4-track capability <i>plus</i> <u>Reconfiguration</u> for <b>2+2</b> service
<b>Highway</b>	<u>Current capital program</u> minor capacity improvements with future traffic growth assumptions	<u>Current capital program</u> , same as baseline, but expect to see <i>congestion relief</i> from diversion to faster & more frequent rail

# Types of 'Users' & 'User Benefits'

## 1. "Existing" Rail & Bus Users:

- Travel time savings for existing rail and bus users
- Reliability improvements for existing rail users

## 2. "New" Rail Users: *(many diverted from highways)*

- Travel time savings

## 3. Highway Users:

- Travel time, reliability, & vehicle operating cost
  - benefits to drivers who remain on the road & do not divert to rail
- Safety, logistics, and environmental benefits

# Highway User Benefits

## Highway impacts:

- Improved rail service will attract some drivers out of their cars & into trains
- Diversion of drivers to rail is expected to **reduce highway delays** by:
  - about **5 million hours** annually.



## New Haven Line Service Improvements:

# Benefit/Cost Analysis:

comparing  
user & societal benefits  
to project costs

# Benefit/Cost Analysis: Long-term Costs & Benefits

## *New Haven Line 2+2 Service Improvements*

Service Improvements versus existing service	“Present Value” (1) of Benefits & Costs
A. Project Benefits (2)	<b>\$9.7 Billion</b>
B. Project Costs	<b>\$3.9 Billion</b>
C. Net Benefits	<b>\$5.8 Billion</b>
D. Benefit/Cost Ratio	<b>2.51</b>

1. Future costs & benefits are discounted to present value
2. Benefits are primarily ‘**user**’ **benefits** like travel time savings, lower accident costs, & improved travel time reliability.

# BCA: by type of user

## Benefits Only *(in \$2015)*

### New Haven Line:

Trip Purpose	Vehicle Operating Costs	Travel Time & Other Costs	Total Benefits (1)
'Existing' Rail Users	-----	\$5.37 billion	\$5.37 billion
'New' Rail Users	-----	\$0.95 billion	\$0.95 billion
Highway Users	\$1.10 billion	\$2.29 billion	\$3.39 billion
<b>Total Benefits</b>	<b>\$1.10 billion</b>	<b>\$8.63 billion</b>	<b>\$9.71 billion</b>

(1) All future benefits discounted to present value or current

About 35% of benefits go highway users.

## New Haven Line Service Improvements:

# Economic Impact Analysis:

Measuring the impact of the project  
on economic growth in CT

# Economic Impact Analysis (EIA)

## Long-Term Economic Growth

*Cumulative increase from 2020 - 2040*

Type of impact on CT economy	Cumulative impact from new 2+2 service
Additional Business Sales (Output)	<b>\$6.2 Billion</b>
Additional Gross State Product	<b>\$3.9 Billion</b>
Additional Wage Income	<b>\$2.8 Billion</b>

# Economic Impact Analysis (EIA)

## Short-Term or “Construction” Impacts

Type of impact on CT economy	Cumulative impact from <u>construction</u>
Additional Business Sales (Output)	<b>\$9.1 Billion</b>
Additional Gross State Product	<b>\$6.3 Billion</b>
Additional Wage Income	<b>\$4.9 Billion</b>

# EIA: Short & Long-Term Job Impacts

Type of Job	Number of Jobs
<b><u>Construction Jobs</u></b> <i>(for duration of construction )</i>	<b>2,300 – 5,900 jobs</b> <i>each construction year</i>
<b><u>Permanent Jobs</u></b> <i>(for each year during the 25-year analysis period thru 2040)</i>	<b>1,700 – 3,100 jobs</b> <i>each year</i>

# SUMMARY & CONCLUSIONS

- New Haven Rail Line *serves a critical economic function*
- Investing the New Haven Line is a **good economic strategy** as well as a **sound transportation policy**
- Reconfiguring tracks & services to operate on **2 express & 2 local tracks** *yields a strong economic return*

\$2 billion state investment:

- Returns **\$2.50 for every \$1.00 invested** (B/C ratio = 2.51)
  - Over **\$9 billion** in benefits to **highway users** as well as **rail users**
- **Grows CT economy by \$6.2 billion** in business sales & output