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

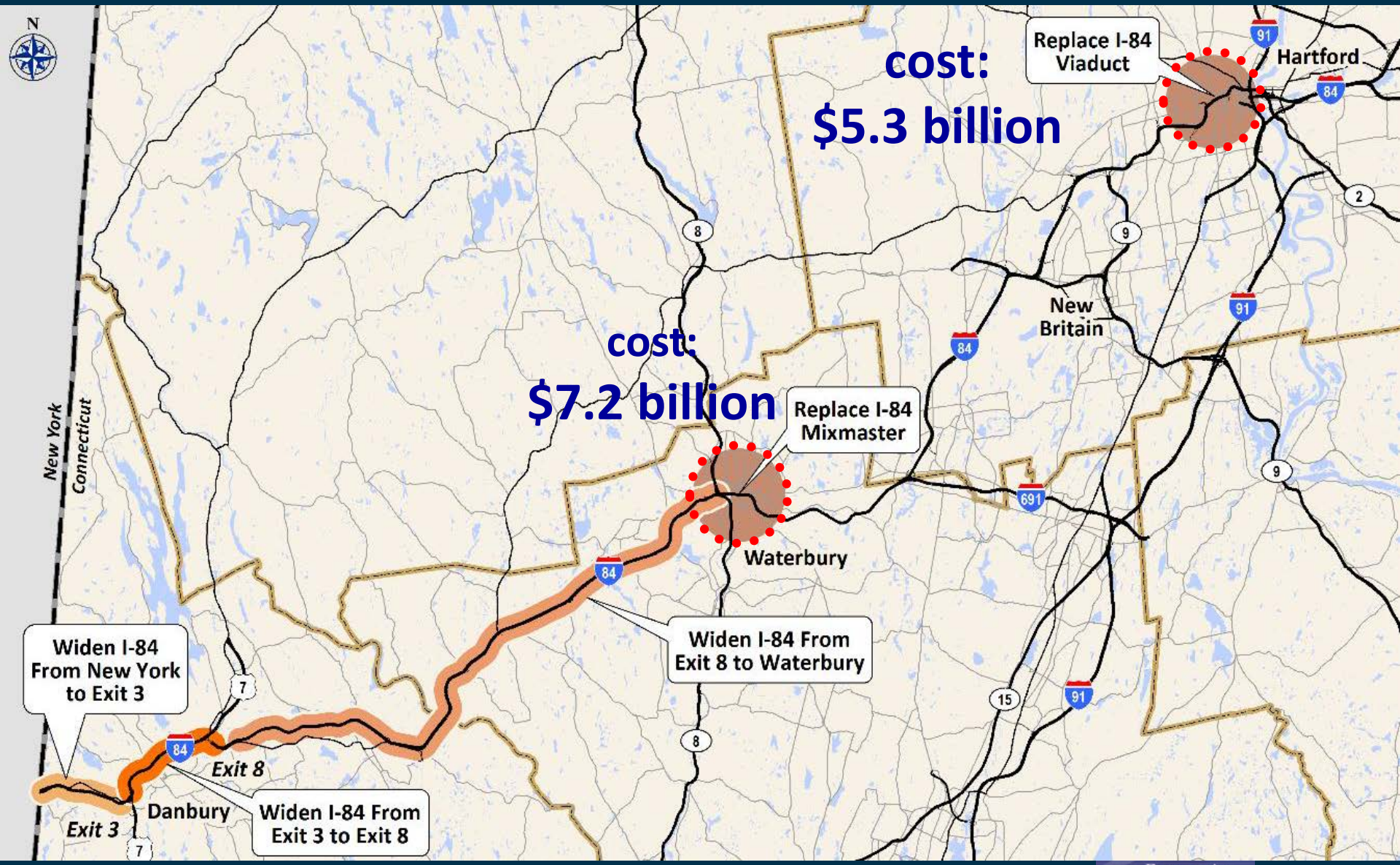
Economic analyses 1 & 2

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

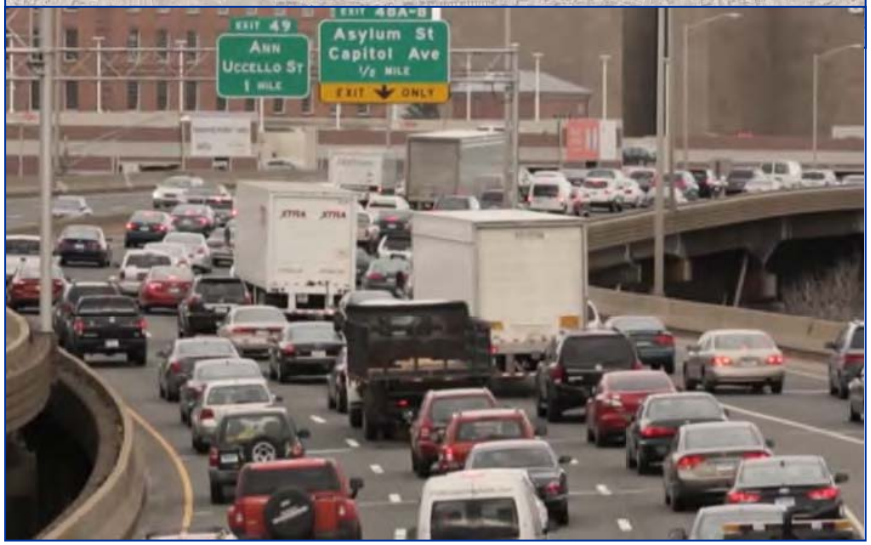
*(assumes **lowered highway** alternative)*

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



- ¾ 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

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
Total Benefits	$0.71 billion	$8.52 billion	$9.22 billion

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

About 28% of benefits go to business & industry.

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
Business Sales (Output)	**$10.2 Billion**
Gross State Product	**$6.1 Billion**
Wage Income	**$4.2 Billion**

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 *construction*
Business Sales (Output)	$7.3 Billion
Gross State Product	$4.1 Billion
Wage Income	$3.1 Billion

EIA: Short & Long-Term Job Impacts

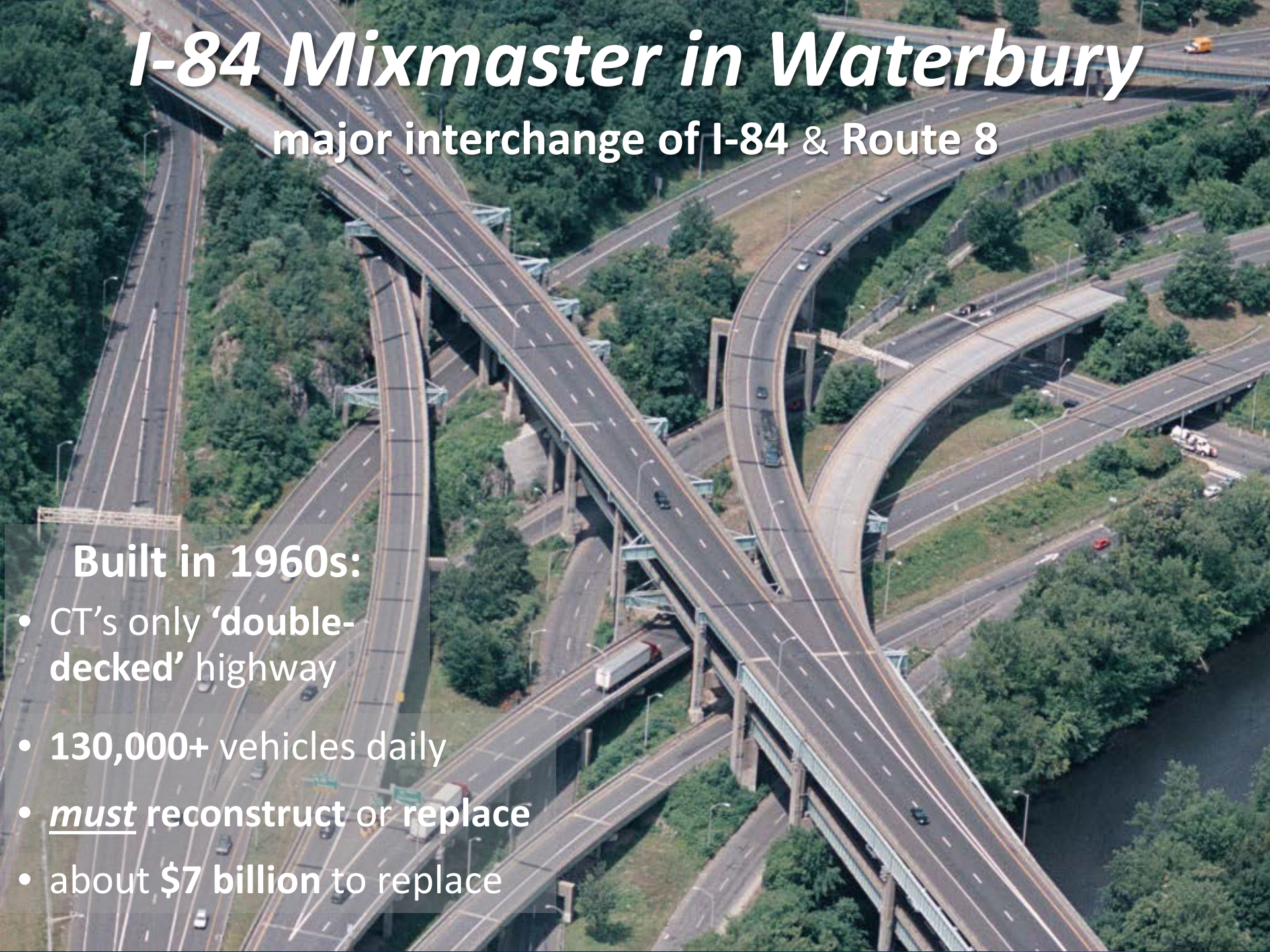
Hartford Viaduct:

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

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

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	**$5.71** billion
Business & Freight	**$0.10** billion	**$2.40** billion	**$2.50** billion
Total Benefits	**$0.31** billion	**$7.92** billion	**$8.22** billion

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

About 30% of benefits go to business & industry.

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
Business Sales (Output)	**$8.8** Billion
Gross State Product	**$5.1** Billion
Wage Income	**$3.6** Billion

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 *construction*
Business Sales (Output)	**$10.4** Billion
Gross State Product	**$5.8** Billion
Wage Income	**$4.5** Billion

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
Construction Jobs *(for duration of construction)*	**6,100 – 11,000 jobs** *each construction year*
Permanent Jobs *(for each year during the 30-year analysis period thru 2050)*	**2,100 – 2,800 jobs** *each year*

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[2]	**$9.2** Billion	**$8.2** Billion
Benefit/Cost Ratio	**2.68**	**1.75**

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)	**$10.2** Billion	**$8.8** Billion	**$19.0** 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 (MNRR) 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

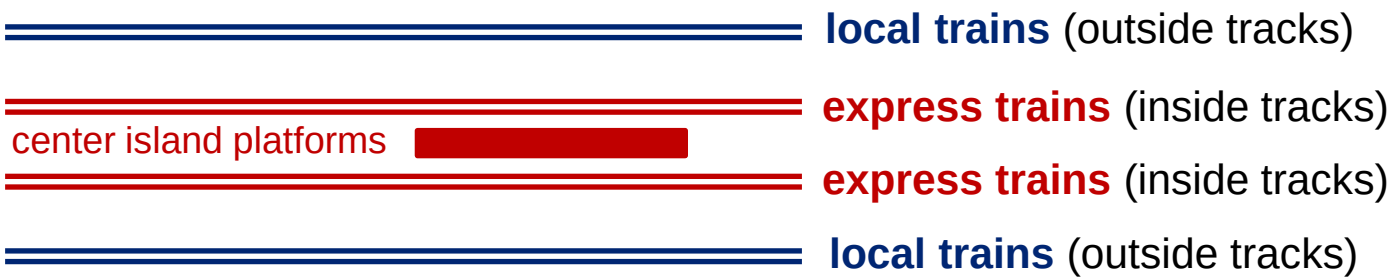
Goals:

- **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 *Existing Service Levels*	**Build Case** *2+2 Service Improvement*
Rail	Current rail service configuration, with future growth assumptions	Restored 4-track capability ***plus*** Reconfiguration for **2+2 service**
Highway	Current capital program minor capacity improvements with future traffic growth assumptions	Current capital program, same as baseline, but expect to see *congestion relief* 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.

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)*	$9.7 Billion
B. Project Costs	$3.9 Billion
C. Net Benefits	$5.8 Billion
D. Benefit/Cost Ratio	2.51

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
Total Benefits	**$1.10** billion	**$8.63** billion	**$9.71** billion

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

About 35% of benefits go highway users.

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)	$6.2 Billion
Additional Gross State Product	$3.9 Billion
Additional Wage Income	$2.8 Billion

Economic Impact Analysis (EIA)

Short-Term or "Construction" Impacts

Type of impact on CT economy	Cumulative impact from *construction*
Additional Business Sales (Output)	$9.1 Billion
Additional Gross State Product	$6.3 Billion
Additional Wage Income	$4.9 Billion

EIA: Short & Long-Term Job Impacts

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

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