Appendix K: Scenario Planning Results

GREATER HARTFORD MOBILITY STUDY

CONNECTICUT DEPARTMENT OF TRANSPORTATION

Purpose

The Scenario Planning Results Tech Memo outlines the Key Performance Indicators (KPI) results and regional transportation system performance findings from the GHMS Scenario Planning exercise for both baseline and build scenarios.

Baseline Scenarios

Scenario 1: 2020 Existing Conditions

Scenario 2: Future Year (2050) No-Build Condition – only considers future transportation improvements that are already programmed for implementation and will be completed prior to 2050.

Build Scenarios

Build scenarios were developed based anticipated implementation timeframe for various alternatives as follows:

Scenario 3: 2050 Long-Term Framework – acts as a "big-picture" guide to establish a future transportation vision with major infrastructure initiatives that will be implemented over a longer period (10+ years).

Scenario 4: Early Action Plus Mid-Term Improvements – to determine incremental benefits of projects that can either be implemented quickly (0-4 years implementation timeframe) or within the next 10 years (mid-term).

Scenario 5: Full Build Scenario – an overarching scenario established to include all the identified projects in the GHMS Implementation Plan.

Key Components

The Scenario Planning Results Tech Memo focuses on the following topics:

1. Establishment of Baseline Scenarios
2. Build Scenario Development Process and Definitions
3. Transportation System Benefits (Quantitative KPIs) by Scenario
4. Highlights of Transportation System Performance Improvements
5. Options for Customized Scenario Variations

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Introduction

Several defining events of the current century, such as the COVID-19 pandemic, climate change, economic recessions, an influx of Connected and Automated Vehicle (CAV) technologies, ridesharing, smartphones, and digitalization are affecting demographic trends, travel behavior, land use, and transportation systems. To understand potential impacts of variations in these attributes on the region's transportation system, the GHMS team established a scenario planning tool that is built upon the Capital Region Council of Governments (CRCOG) travel demand model. This tool provides an effective way to understand cumulative benefits and impacts of program(s) of the regional improvements, and how these proposed multimodal improvements would perform as a system to yield both local and regional transportation benefits. The study findings reported in this technical memorandum are based on the outputs from the scenario planning tool for various scenarios of transportation improvements that have been established for the GHMS. The tool has established several Key Performance Indicators (KPIs) – see a separate Scenario Planning Baseline Memo for the detailed definitions of the established KPIs. It should be noted that while auto, transit bus and rail modes are incorporated in the scenario planning tool, active transportation modes (walking and bicycling) are not included as they are not incorporated in the CRCOG's travel demand model. As such, active transportation projects are qualitatively assessed outside of the scenario planning tool. The scenario planning tool will help regional transportation investment and policy decision makers explore future uncertainties and make better informed decisions about transportation funding allocation and investment priority areas.

Baseline Scenarios

The baseline for developing scenario models was established with a beginning year of 2020 (Scenario 1 – 2020 Existing Condition), when the PEL Study began, and an anticipated future outlook year of 2050 (Scenario 2 – 2050 No-Build Condition). Scenario 2 models the infrastructure conditions of Scenario 1 with the addition of projects identified in the CTDOT Capital Plan with construction anticipated to be prior to 2050. Scenario 2 also utilizes adopted demographic projections for anticipated population and employment growth and their locations in the region.

These baseline scenarios are aligned with the CRCOG's travel demand model baseline scenarios as the Scenario Planning Tool (SPT) is built upon the CRCOG's travel demand model. The purpose of establishing these baseline scenarios is to establish a datum for comparing benefits achieved by several transportation improvement scenarios (Build Condition Scenarios) discussed later in the memorandum.

Key findings to be highlighted for the 2050 No-Build baseline scenario are as follows:

- Congestion and travel time deterioration – 2050 is projected to have significant increase in both travel times and congestion. For nearly 10% more miles that are projected to be traveled in the study core compared to the existing conditions, time to travel those miles will be nearly 18% more, which reflects deteriorating congestion. Vehicle miles traveled on freeways in the study core under congested speed range (0-35 mph) will increase by nearly 35% or by 180,000 vehicle miles per day.
- Duration of congestion – Congestion is projected to last longer by over 30 minutes compared to existing conditions. For freight operation, delays are projected to increase by more than 90 minutes compared to the existing conditions.
- Lack of anticipated mode transfer – while the congestion is projected to be more severe and travel times will be longer, mode shift from auto to alternate modes of travel (transit, rail etc.) is not anticipated as the competitiveness of these alternate modes will not improve without significant improvements.

See Appendix K-1 for the detailed KPI (Key Performance Index) findings for the 2020 Existing and 2050 No-Build baseline scenarios.

Build Scenarios Development Process

Based on the anticipated timelines established in the GHMS implementation plan, the tool has been used to establish Future Build condition scenarios to assess for Key Performance Indicators (KPIs) associated with them.

Firstly a 2050 long-term improvements scenario was established to include key longer-term projects that would help in realizing the transportation vision established by the GHMS for the region. This long-term scenario (Scenario 3 - 2050 Long-Term Framework) acts as a framework to guide major infrastructure initiatives including I-84/I-91 interchange relocation with a new Connecticut River crossing, lowered highway option for I-84 Viaduct, a new southern bridge crossing of Connecticut River primarily for local traffic and active transportation modes etc.

Once the framework scenario was established for longer-term transportation improvements, GHMS focused on identifying early action and mid-term projects that will have their independent utility for the region and will act as a step forward towards achieving the long-term improvements envisioned. A scenario with these projects was established (Scenario 4 – Early-Action plus Mid-Term Improvements) to determine immediate benefits that could be achieved over the 2050 baseline scenario.

In the end, an overarching scenario (Scenario 5 – Full Build) was established to include all the identified complimentary projects established through the GHMS detailed screening process. For any competing projects that could not be implemented together as they may either be required same project location or may bring similar benefits, the best project option was selected based on the detailed screening process outcome, public and stakeholder support, and support from the project's sponsor. As an example, the Griffin Corridor has been considered for multiple improvement options such as an active transportation only corridor (trail), a combination of freight rail and trail, a combination of passenger and freight rail, and a combination of bus-rapid transit and trail. However, a combination of freight rail and trail was considered in the implementation program as it received strongest support from the project sponsor, stakeholders, and general public.

As indicated earlier in this memorandum, active transportation (bicycle and pedestrian) projects could not be included in the scenario planning tool as they are not a part of the underlying CRCOG travel demand model. In addition, multiple highway, transit, and rail projects listed in the Table 1 below could not be included in the scenario planning tool due to various limitations of modeling tools and the scale of impacts.

Table 1: Projects Not Included in the Scenario Planning Tool

Mode	Future Improvement Recommendations	Reason(s) for not including in Scenario Planning Tool
Highway	Rev. Moody Overpass Traffic Corridor	Localized operational improvements not affecting regional TDM level assessment
Highway	Trident Mobility Improvements	
Highway	Route 2 Safety and Operational Improvements - Route 15 to Route 3	
Highway	Widen Route 2 over Griswold Street	Localized geometric improvement not affecting regional TDM level assessment
Highway	I-91 Coltsville Curve Realignment	
Highway	Reconfigure Intersection of Albany Avenue and Main Street	
Highway	Develop and Implement Local Complete Streets Plans	Policy improvements that cannot be modeled
Highway	Update Guide Signage on I-84	
Highway	Commuter Parking Policies Assessment	
Highway	Reconfigure Off-Street Parking	
Highway	Route 175 Corridor Study	Planning study recommended – improvements yet to be identified
Highway	Putnam Bridge Replacement	Replacement project not affecting regional TDM level assessment
Rail	286K Freight Rail Capacity Upgrade Study	Facility improvements not affecting rail mode choice and/or ridership for regional TDM level assessment
Rail	Dual-Mode Locomotives and Fleet Upgrades	
Rail	Expand Yard Storage and Maintenance Facilities	
Rail	Infrastructure Hardening to Address Drainage and Flooding Vulnerabilities	
Rail	Electrify the Hartford Line	
Rail	Providence Rail Access through Hartford	Not being considered in GHMS due to long distance interstate nature of the improvement
Rail	Mobility as a Service (MaaS)	Policy improvements that cannot be modeled
Rail	Unified Fare Collection	

Mode	Future Improvement Recommendations	Reason(s) for not including in Scenario Planning Tool
Rail	Strengthen Regional Identity with Branding and Wayfinding	Policy improvements that cannot be modeled
Rail	Rail Station Solar Canopies	
Rail	Implement Rail Station Amenities	
Rail	Knowledge Corridor Rail Service Improvements	Feedback from CT Rail Dept: No opportunities
Rail	Griffin Line – Multimodal Alternatives	Bike/ped improvements not in the CRCOG TDM
Rail	286K Freight Rail Capacity Upgrade Study	Facility improvements not affecting rail mode choice and/or ridership for regional TDM level assessment
Rail	Dual-Mode Locomotives and Fleet Upgrades	
Rail	Expand Yard Storage and Maintenance Facilities	
Rail	Infrastructure Hardening to Address Drainage and Flooding Vulnerabilities	
Rail	Electrify the Hartford Line	
Rail	Providence Rail Access through Hartford	Not being considered in GHMS due to long distance interstate nature of the improvement
Rail	Mobility as a Service (MaaS)	Policy improvements that cannot be modeled
Rail	Unified Fare Collection	
Rail	Strengthen Regional Identity with Branding and Wayfinding	
Rail	Rail Station Solar Canopies	
Rail	Implement Rail Station Amenities	
Rail	Knowledge Corridor Rail Service Improvements	Feedback from CT Rail Dept: No opportunities
Rail	Griffin Line – Multimodal Alternatives	Bike/ped improvements not in the CRCOG TDM
Bus	Provide Transit Priority Infrastructure	Localized geometric improvement (not yet defined) not affecting regional TDM level assessment
Bus	Support Micro-Transit Initiatives	
Bus	Mobility as a Service (MaaS)	Policy improvements that cannot be modeled
Bus	Support For TOD	

Build Scenario Definitions

As discussed earlier, in addition to the baseline Existing Conditions and 2050 No-Build scenarios, three (3) future build scenarios were developed to assess the benefits and impacts the implementation of the Universe of Alternatives would have on the Study Area and Core.

The SPT was developed to only consider projects related to bus, rail, and highway infrastructure; therefore, the projects focusing on bicycle and pedestrian opportunities, as well as bus, rail, and highway amenities – such as shelters, rideshare pickup, and overnight parking – were not considered within the models.

Scenario 3: 2050 Long-Term Framework

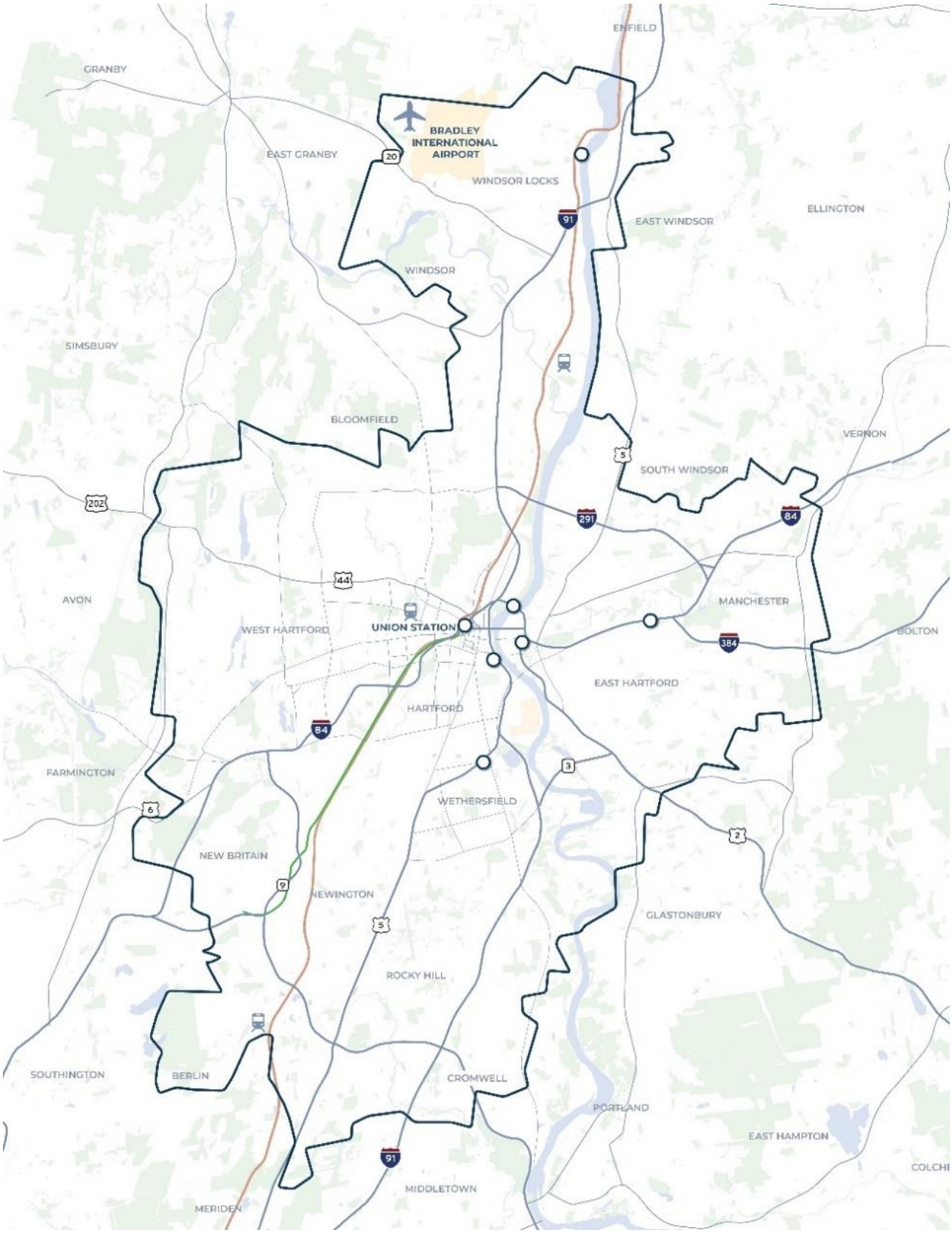
Scenario 3 encompasses all major recommendations and programs identified in the Study that are anticipated to have a development timeframe greater than 10 years, as detailed in Table 2.

Table 2: List of Long-Term Framework Projects

Long-Term Framework Recommendations
Enhance Airport Service along CT*transit* Route #30
Albany Avenue/Route 44 Reconfiguration Study
Connecticut River Rail Bridge
I-91/Route 2 Direct Connection
Mobility Hubs
New Crosstown Routes to Provide Circulation around Hartford
Bulkeley Bridge Conversion
Cap I-91, Hartford
I-84 Lowered Highway, Hartford
I-84/I-91 Interchange Relocation - Northern Alignment
New Connecticut River Bridge at Charter Oak Avenue/East River Drive
Bus Rapid Transit (BRT) Expansion: Connecticut River Crossing
Bus Rapid Transit (BRT) Expansion: North Corridor
Bus Rapid Transit (BRT) Expansion: Northeast Corridor
Bus Rapid Transit (BRT) Expansion: South Corridor

Figure 1 shows general locations of recommendations included in the Long-Term Framework scenario. See Appendix K-2 for the detailed KPI findings for the 2050 Long-Term Framework scenario.

Figure 1: 2050-Long-Term Framework Recommendation Locations



Scenario 4: Early Actions and Mid-Term Improvements

Early actions and mid-term improvements recommendations were identified as projects that would require smaller scale investments and had reduced complexity, which allows them to be completed within a 0-4-year and 5-10-year timeframe, respectively, following initiation. The recommendations identified are in Table 3 below.

Table 3: List of Early Action & Mid-Term Recommendations

List of Early Action & Mid-Term Recommendations
I-91 Northbound Auxiliary Lane - Interchange 21 to 22
Pulaski Circle Improvements
I-91 Southbound Capacity Improvements - Interchange 29 to 25
Improve Evening Service in Transit Priority Areas
Enhance Service Frequency in Transit Priority Areas
Serve Major Employment Centers

Figure 2 shows general locations of recommendations included in the Early Actions Framework, while Figure 3 shows the Mid-Term recommendation locations. See Appendix K-3 for the detailed KPI findings for the Early Actions Plus Mid-Term Improvements scenario.

Figure 2: Early Actions Recommendation Locations

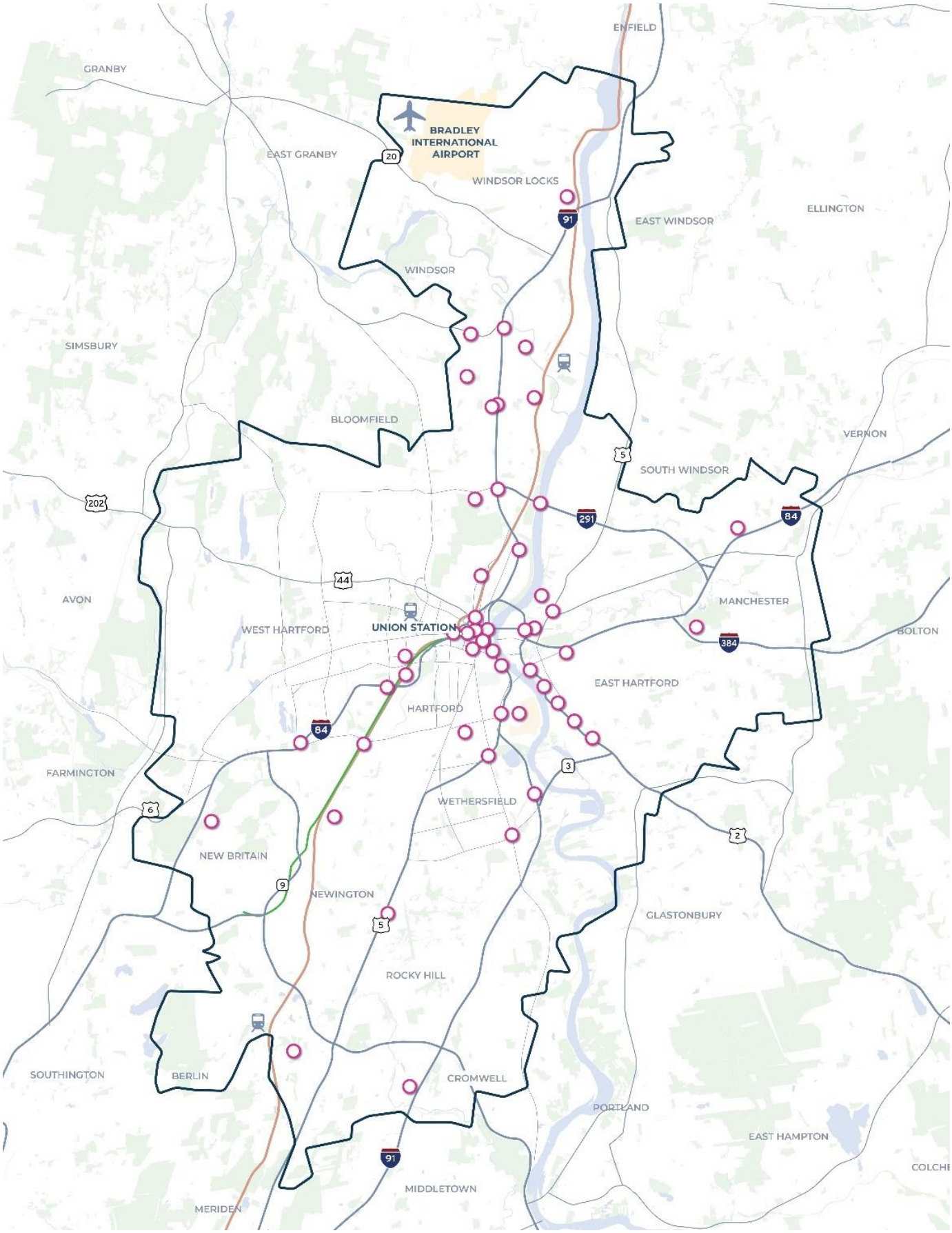


Figure 3: Mid-Term Recommendation Locations

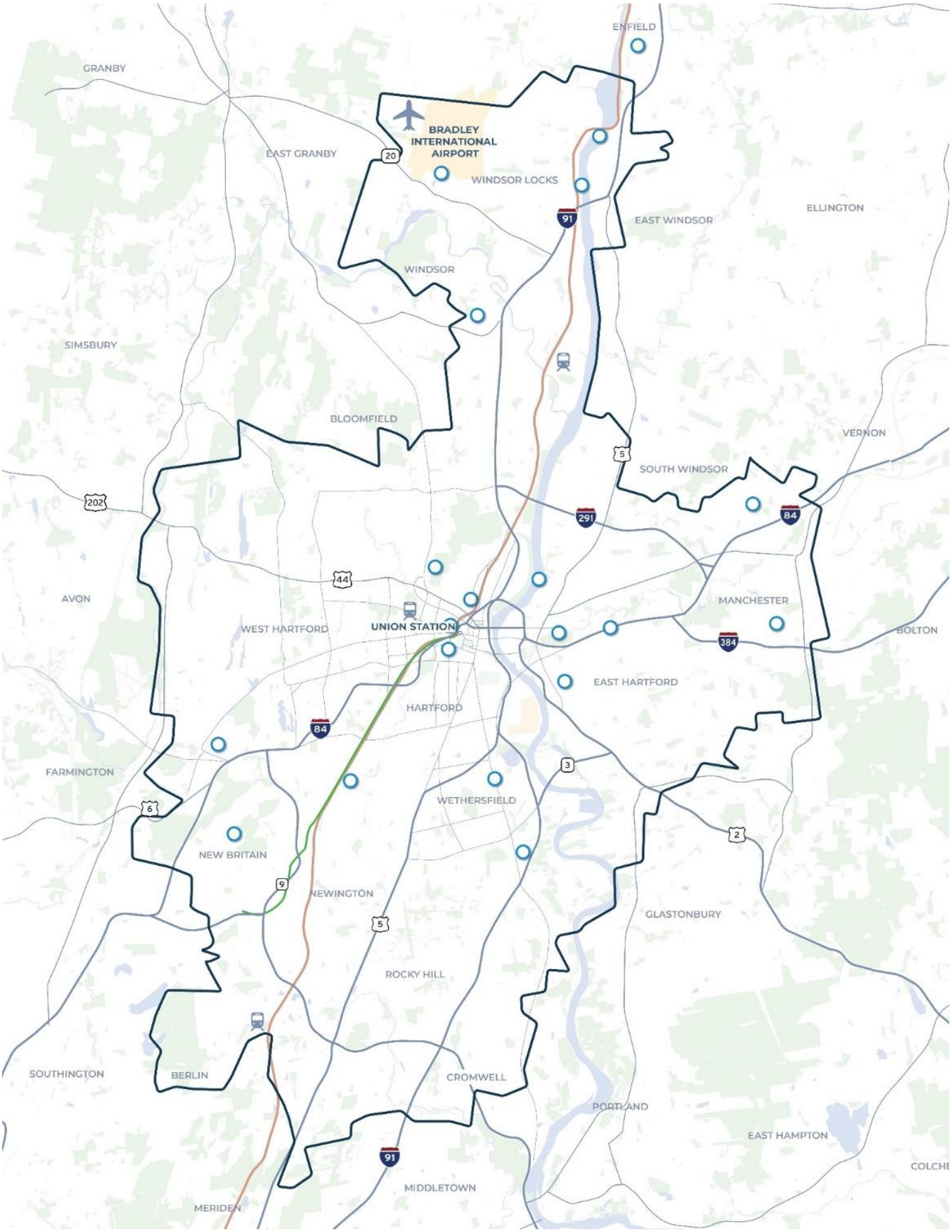
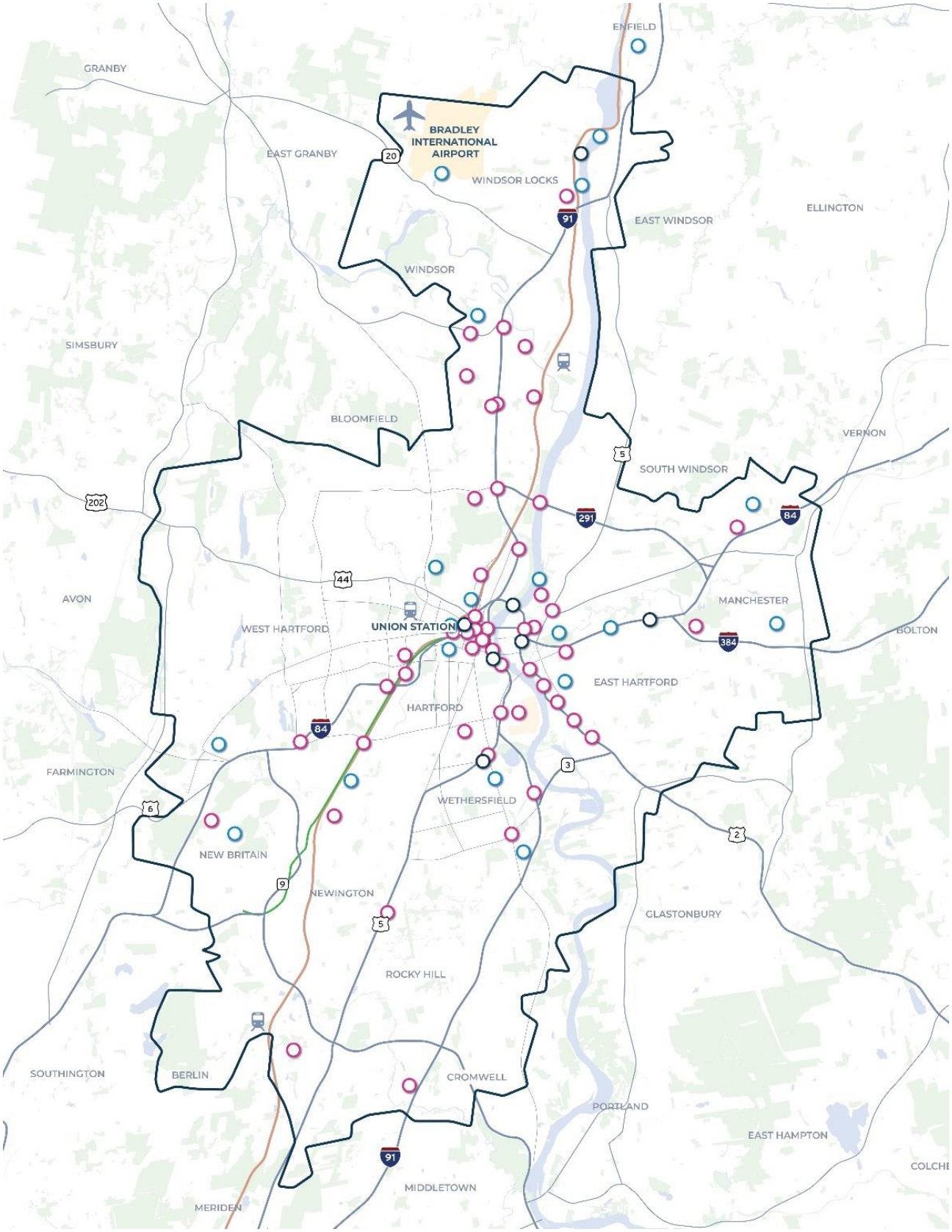


Table 4: List of Recommendations for 2050 Full Build Scenario

2050 Full Build Scenario Recommendations
I-91 Northbound Auxiliary Lane - Interchange 21 to 22
Pulaski Circle Improvements
I-91 Southbound Capacity Improvements between Interchange 29 to 25
Regional Freeway Interchange Completion - I-84/Route 4 Connector
I-84/Route 6/Route 4/Route 9 Improvements
Improve Evening Service in Transit Priority Areas
Enhance Service Frequency in Transit Priority Areas
Serve Major Employment Centers
Enhance Airport Service along CT*transit* Route #30
Albany Avenue/Route 44 Reconfiguration Study
Connecticut River Rail Bridge
I-91/Route 2 Direct Connection
Mobility Hubs
New Crosstown Routes to Provide Circulation around Hartford
New Rail Station in Newington
Bulkeley Bridge Conversion
Cap I-91, Hartford
I-84 Lowered Highway, Hartford
I-84/I-91 Interchange Relocation- Northern Alignment
New Connecticut River Bridge at Charter Oak Avenue & East River Drive
Bus Rapid Transit (BRT) Expansion: Connecticut River Crossing
Bus Rapid Transit (BRT) Expansion: North Corridor
Bus Rapid Transit (BRT) Expansion: Northeast Corridor
Bus Rapid Transit (BRT) Expansion: South Corridor

Figure 4 shows general locations of recommendations included in the 2050 Full Build scenario. See Appendix K-4 for the detailed KPI findings for the 2050 Full Build scenario.

Figure 4: 2050 Full Build Scenario Recommendation Locations



Transportation System Performance Improvement Highlights

The future build scenarios showed clear mobility and other benefits as follows:

Improved Mobility:

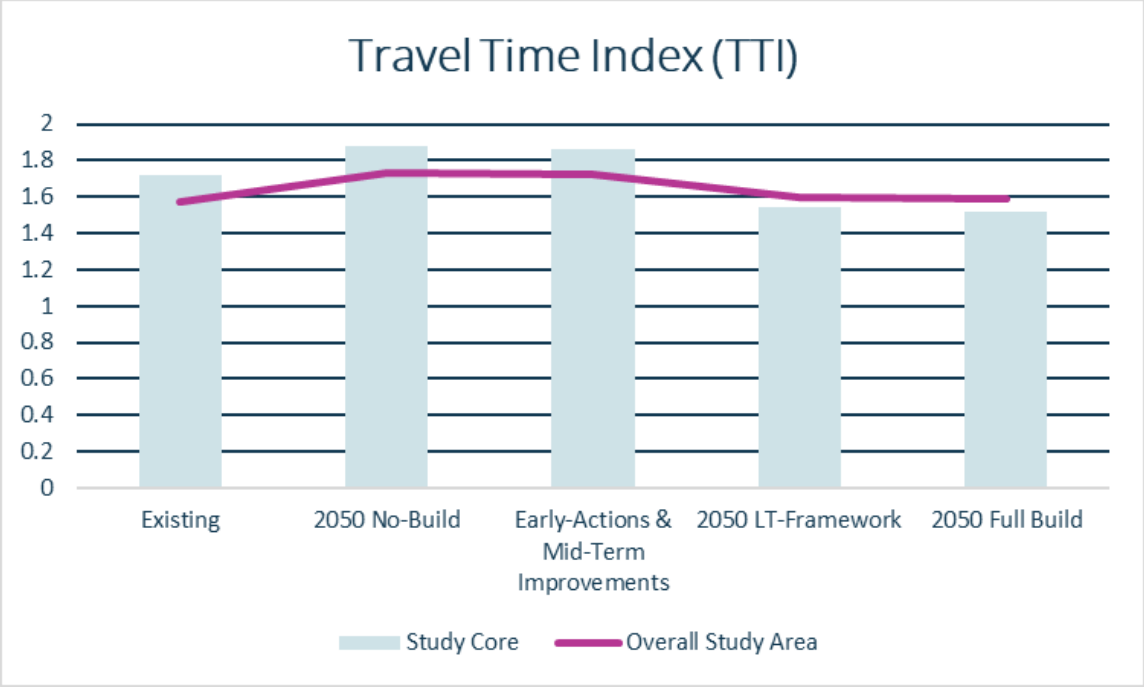
KPI: Travel Time Index – ratio of peak period travel time to free flow travel time

	Existing	2050 No-Build	Early-Actions & Mid-Term Improvements	2050 LT-Framework	2050 Full Build
Study Core	1.72	1.88	1.86	1.54	1.52
Overall Study Area	1.57	1.73	1.72	1.60	1.59

What does this mean?

- Congestion levels would increase with no action (No-Build) and there would be significant impacts on travel times, especially in the study core.
- Travel time within the study core would significantly improve with the proposed improvements both compared to the Existing Condition and 2050 No-Build condition, despite projected future demographic growth and increased VMT.

Figure 5: Travel Time Index



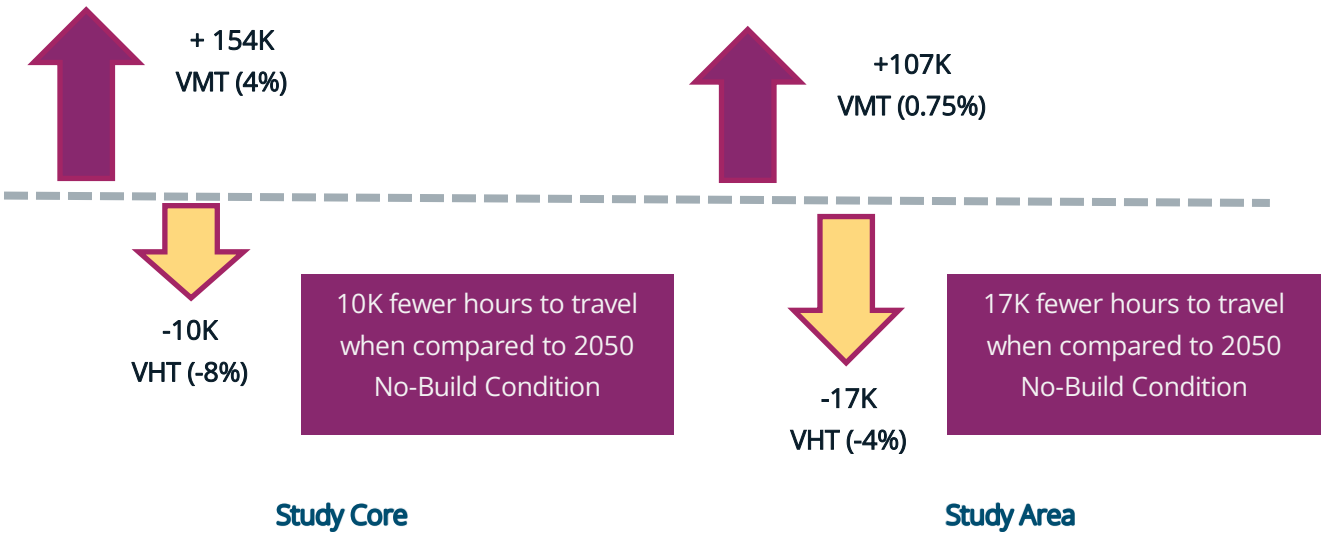
KPI: Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT)

	Existing	2050 No-Build	Early-Actions & Mid-Term Improvements	2050 LT-Framework	2050 Full Build
Study Core – VMT (thousands)	3,301	3,625	3,622	3,783	3,779
Overall Study Area – VMT (thousands)	12,828	14,234	14,259	14,335	14,341
Study Core – VHT (thousands)	104	122	121	112	112
Overall Study Area – VHT (thousands)	364	435	434	420	418

What does this mean?

- 2050 Full Build scenario VHT decreases significantly compared to 2050 No-Build despite minor increase (<1%) in the study area VMT indicating reduced congestion and increased mobility.

Figure 6: Reduced Congestion and Improved Mobility



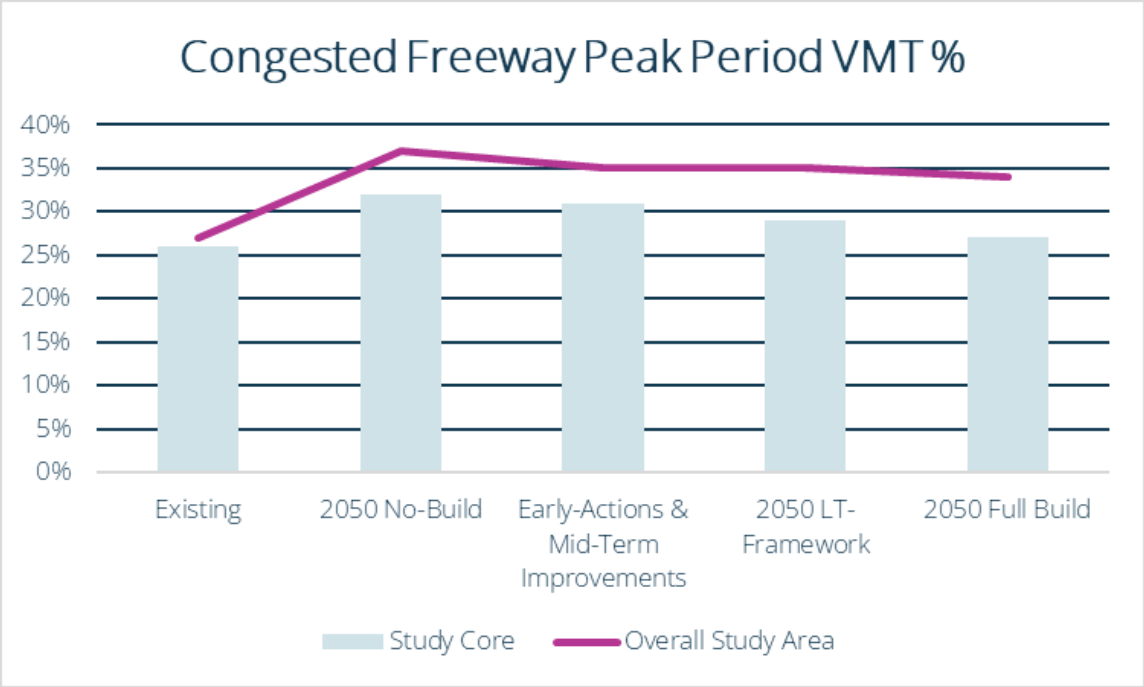
KPI: Peak-Hour Miles Travelled under Congested Conditions (percent of freeway VMT by travel speed (0 to 35 mph) during peak hours.

	Existing	2050 No-Build	Early-Actions & Mid-Term Improvements	2050 LT-Framework	2050 Full Build
Study Core	26%	32%	31%	29%	27%
Overall Study Area	27%	37%	35%	35%	34%

What does this mean?

- The proposed 2050 Full Build improvement program would slightly increase freeway VMT in future compared to the existing conditions in the study core due to longer I-84 alignment but would reduce more than 86,000 vehicle miles traveled under congested condition.
- For the overall study area, while there will be some reduction (2.6%) in VMT under congested conditions compared to the Future No-Build, it is not as significant as study core where most of the improvements are located resulting in significant congestion reduction.

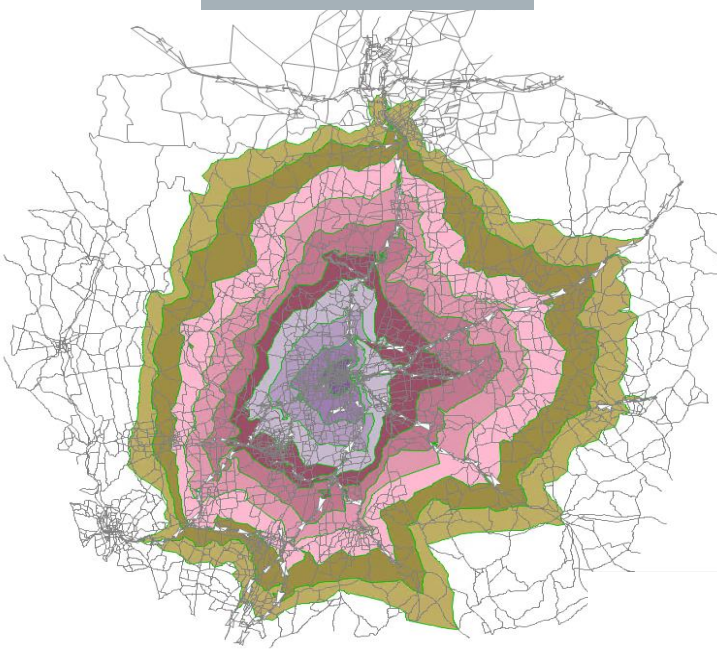
Figure 7: Peak Period VMT under Congested Conditions



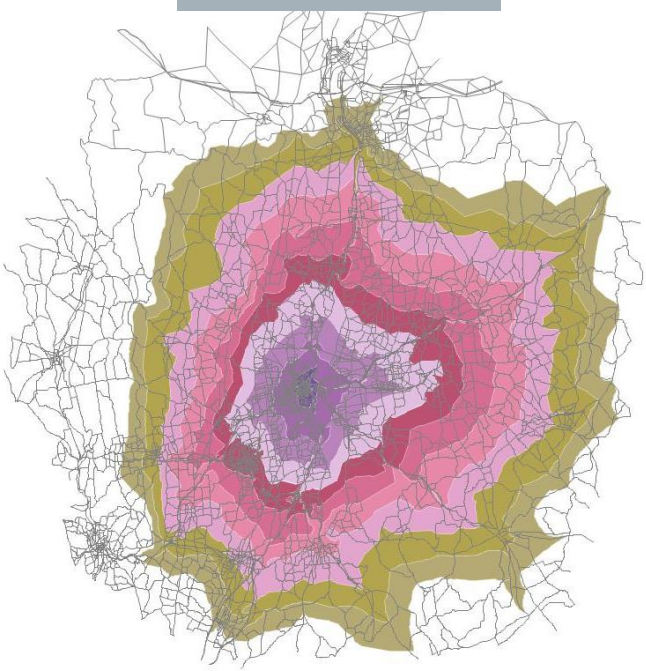
Improved Travel Times:

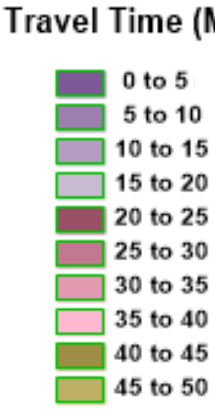
The following travel time isochrones clearly show reduced travel times to the core, with significantly increased population within 15- and 30-minute travel time range from the core.

2050 No-Build
AM Peak



2050 Full-Build
AM Peak





2050 Full-Build Comparison w/2050 No-Build
Nearly 93,000 increased population (34.5% increase) within 15-Min travel isochrone from the center
Nearly 75,000 increased population (10.5% increase) within 30-Min travel isochrone from the center

Improved Truck Freight Operation:

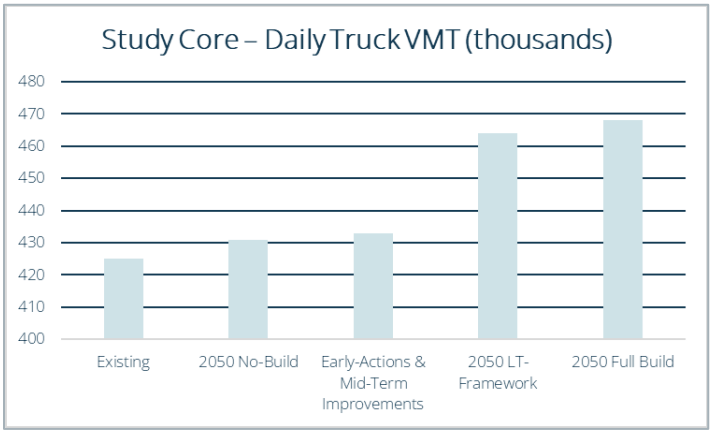
KPI: Total Daily Truck Miles Travelled and average number of truck delay hours on a typical weekday.

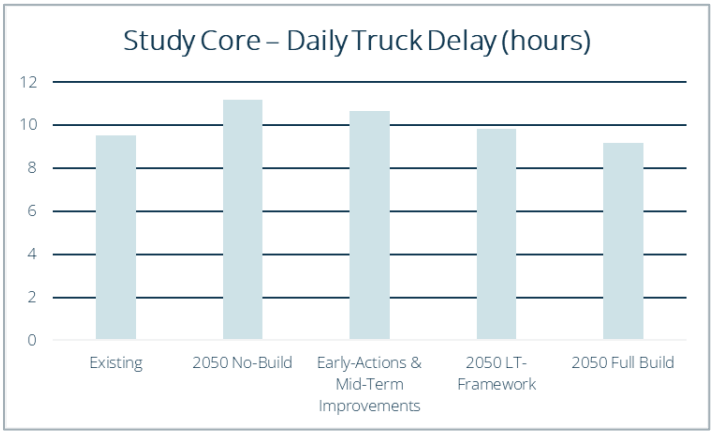
	Existing	2050 No-Build	Early-Actions & Mid-Term Improvements	2050 LT-Framework	2050 Full Build
Study Core – Daily Truck VMT (thousands)	425	431	433	464	468
Study Area – Daily Truck VMT (thousands)	1,403	1,436	1,429	1,475	1,484
Study Core – Daily Truck Delay Hours	9.52	11.18	10.66	9.84	9.18
Study Area – Daily Truck Delay Hours	13.12	14.94	14.97	13.98	13.88

What does this mean?

- While daily truck VMT within the study core and overall study area increases due to longer alignment of I-84, truck delays reduce significantly indicating improved freight mobility and reduced congestion.

Figure 8: Daily Truck Delay in Study Core





Multimodal Options:

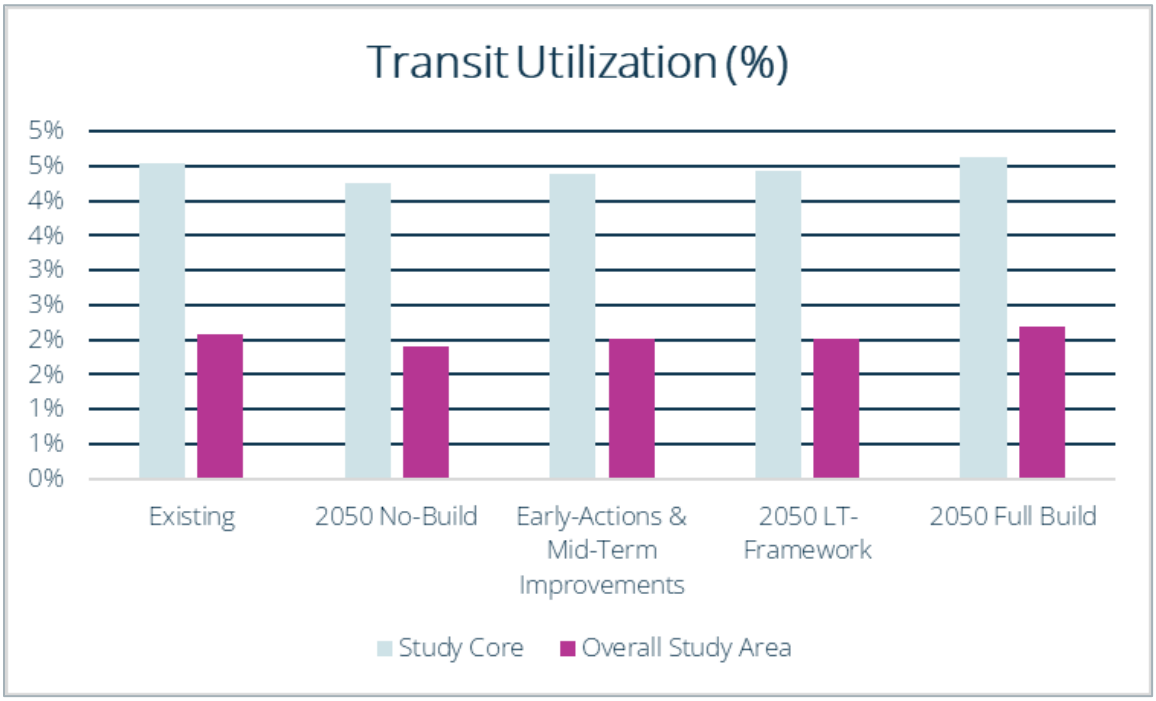
KPI: Transit Utilization – Percentage of daily transit person trips over daily total person trips.

	Existing	2050 No-Build	Early-Actions & Mid-Term Improvements	2050 LT-Framework	2050 Full Build
Study Core	4.55%	4.25%	4.39%	4.43%	4.63%
Overall Study Area	2.08%	1.91%	2.02%	2.02%	2.20%

What does this mean?

- While percentage transit mode share is likely to only slightly increase, transit improvements provide redundant travel options and may help reverse the declining trend of transit utilization.
- Service frequency and evening service enhancements along with expansion of CTfastrak routes would help improve transit utilization compared to the current level of transit service.

Figure 9: Transit Utilization in Study Core vs Study Area



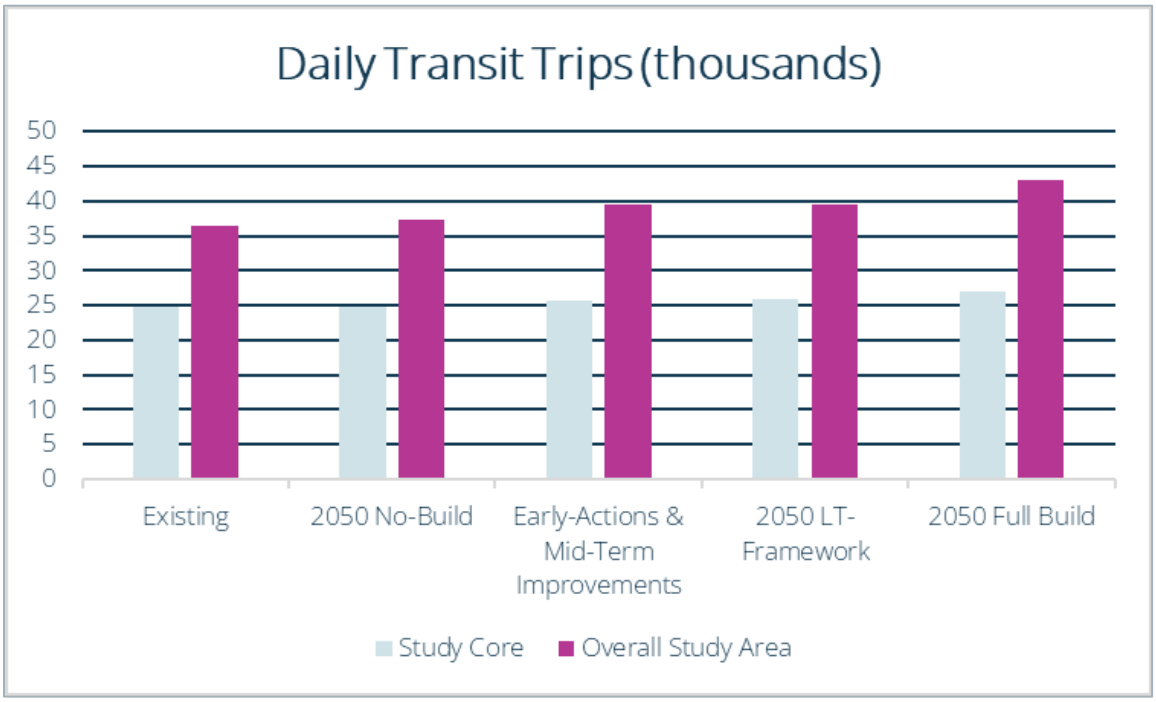
KPI: Transit Utilization – Daily Trips by Transit Mode.

	Existing	2050 No-Build	Early-Actions & Mid-Term Improvements	2050 LT-Framework	2050 Full Build
Study Core	24,990	24,943	25,768	25,997	27,167
Overall Study Area	36,487	37,457	39,504	39,625	43,037

What does this mean?

- With service frequency and service duration improvements as well as FastTrak expansions, daily transit trips show increasing trends in transit ridership.
- It should be noted that the scenario planning tool (based on limitations of a travel demand model) cannot reflect benefits of potential policy changes like TOD, micro-transit, MaaS etc. which would help further boost transit utilization.

Figure 10: Daily Transit Trips in Study Core vs Study Area



Equity Considerations:

KPI: Work Trip Sheds – percent of work trips less than 30 minutes originating from EJ (Environmental Justice) population prevalent TAZs (Traffic Analysis Zones).

	Existing	2050 No-Build	Early-Actions & Mid-Term Improvements	2050 LT-Framework	2050 Full Build
Study Core	94.92%	94.27%	94.45%	94.14%	94.23%
Overall Study Area	92.39%	91.50%	91.61%	91.46%	91.56%

KPI: Commuting costs as a % of income – average annual cost for a work trip per household, as percentage of annual household income.

What does this mean?

- Proposed improvements do not show adverse and/or disproportionate impacts in terms of commute times and cost of commuting in EJ population areas.
- Increased transit options in terms of frequency, evening service and access to employment centers help people who do not have access to personal autos.

	Existing	2050 No-Build	Early-Actions & Mid-Term Improvements	2050 LT-Framework	2050 Full Build
Study Core	5.40%	5.36%	5.36%	5.26%	5.25%
Overall Study Area	5.37%	5.24%	5.24%	5.18%	5.18%

Customized Scenario Testing

The benefit of the scenario planning tool has been in its ability to test impacts of variations in key attributes, such as user behavior, technological advancements, policy changes etc., that influence travel outcomes.

The Covid-19 pandemic has changed the perception about effectiveness of alternate work options, such as telecommuting. More and more people have been gravitating towards hybrid work schedules that combine both working from home and working from employment locations, a post-pandemic "new normal".

The GHMS project team tested a variation scenario that considered how the previously established Scenario 3 (2050 Long-Term Framework) would perform with an assumption that by 2050 there will be 30% telecommuting on a regular basis.

Appendix K-5 shows the detailed KPI findings for comparing the 2050 Long-Term Framework scenario with if the same scenario assumed 30% telecommute for appropriate employment classifications. The results help to understand how the

exact same transportation infrastructure improvements program could yield different system performance outcomes if travel behavior changes significantly.

Another application of the scenario planning tool is to understand independent utility and impacts/benefits of a major stand-alone recommendation in the region. To that effect, the GHMS team tested stand-alone benefits of the City Link East component over the 2020 Existing Conditions if no other improvement is implemented.

Appendix K-6 shows the detailed KPI findings for the City Link East component performance when compared to the 2020 existing conditions. The KPI findings were helpful to understand that the proposed extension of Route 2 to connect with I-91 with a new bridge crossing would not result in more induced travel demand. Instead, it will provide significant operational improvements by rerouting certain travel movements, thereby reducing complex weaving movements and congestion at the current I-84/I-91 interchange location.

Appendix K-1: Baseline Scenario - Key Performance Findings

A. For Overall Study Area

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
MOBILITY			
M1	Congestion		
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.57	1.73
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	26.86%	36.60%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	5.81%	8.69%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	6.47	6.84
M2	Multimodal Options		
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.11	0.11
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	2.08%	1.91%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.94%	16.14%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	5.46%	5.12%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	54.18%	53.80%
SOCIAL			
S1	Travel Convenience		
S1-1	Average Work Trip Time (minutes)	21.0	21.7
S1-2	Average Work Trip Length (miles)	9.51	9.46
S1-3	Average Auto Transportation Costs (dollars)	$9,243	$9,320
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.04%	4.82%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
S2	**Accessibility**		
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	73%	72%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs+retail)	49%	47%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	22%	22%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	44%	45%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	8.69%	7.69%
S3	**Safety**		
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	15,376	17,034
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	774	849
S4	**Equity**		
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	92.39%	91.58%
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	64%	63%
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.37%	5.24%
ENVIRONMENTAL			
N1	**Air Quality**		
N1-1	Total Mobile Emissions in kg/day	76,532	24,194
N2	**GHG Emissions**		
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972
INFRASTRUCTURE			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
I1	Capacity		
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	17,193	16,344
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	39%	37%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A
I2	Land Use Efficiency		
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	-	0.47
I3	Sustainable Urban Infrastructure		
I3-1	Activity Population per acre (activity population per acre of developed land)	8.45	8.89
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	10.37%	10.38%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	20%	20%
	ECONOMIC		
E1	Job Housing Balance		
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	48%	46%
E2	Investment		
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	N/A	$6,832,670
E3	Freight		
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	10.29%	9.49%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	9.15%	8.49%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$19.42	$19.37

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	13.12	14.94
E4	**Economic Development**		
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$11.12	$11.29
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-
E5	**New Metrics**		
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	83	109
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	206	320
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	854,058	1,261,826
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	1,681,528	1,606,486
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	643,978	579,640
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	2,175,413	2,442,652
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	950,747	1,052,887
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	36,487	37,453
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	15,975	16,083
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	7,504	7,337
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	85,896	83,468
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	198,683	206,317
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	116,485	201,028
E5-14	Daily Truck VMT (in vehicle*mile)	1,402,618	1,437,589
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	544,025	560,146

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$716,400,618	$778,852,022
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	84,165	160,250
E5-18	Daily VMT in Highway Network (veh*mile)	12,828,007	14,233,574
E5-19	Daily VHT in Highway Network (veh*hour)	364,142	435,160

B. For Study Core – Hartford and East Hartford

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
MOBILITY			
M1	**Congestion**		
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.88	1.88
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	32.28%	32.28%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	11.21%	11.21%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	5.99	5.99
M2	**Multimodal Options**		
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.21	0.20
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	4.55%	4.25%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.64%	15.76%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	11.88%	11.27%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	61.94%	61.28%
SOCIAL			
S1	**Travel Convenience**		
S1-1	Average Work Trip Time (minutes)	20.4	20.9
S1-2	Average Work Trip Length (miles)	7.72	7.67
S1-3	Average Auto Transportation Costs (dollars)	$8,018	$7,999
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.41%	5.48%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
S2	**Accessibility**		
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	94%	94%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs+retail)	82%	83%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	28%	28%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	51%	53%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	12.04%	11.20%
S3	**Safety**		
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	7,228	8,065
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	445	493
S4	**Equity**		
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	94.92	94.41
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	0.68	0.67
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.40%	5.36%
ENVIRONMENTAL			
N1	**Air Quality**		
N1-1	Total Mobile Emissions in kg/day	76,532	24,194
N2	**GHG Emissions**		
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972
INFRASTRUCTURE			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
I1	Capacity		
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	20,238	19,909
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	27%	25%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A
I2	Land Use Efficiency		
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	0.46	0.48
I3	Sustainable Urban Infrastructure		
I3-1	Activity Population per acre (activity population per acre of developed land)	24.21	19.15
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	9.95%	10.86%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	21%	21%
	ECONOMIC		
E1	Job Housing Balance		
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	50%	48%
E2	Investment		
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	-	TBD
E3	Freight		
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	11.39%	10.55%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	10.26%	9.53%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$17.28	$17.28

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	9.52	11.19
E4	**Economic Development**		
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$8.29	$8.46
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-
E5	New Metrics		
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	29	39
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	82	110
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	249,910	336,015
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	384,854	419,884
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	329,150	285,170
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	583,081	644,697
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	340,531	359,791
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	24,990	24,932
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	11,192	10,936
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	19,619	19,974
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	118,965	121,676
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	223,511	235,786
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	40,318	70,068
E5-14	Daily Truck VMT (in vehicle*mile)	424,668	431,433
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	163,975	167,405

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$179,008,942	$187,710,716
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	57,959	112,433
E5-18	Daily VMT in Highway Network (veh*mile)	3,300,536	3,624,806
E5-19	Daily VHT in Highway Network (veh*hour)	103,706	121,746

Appendix K-2: Scenario 3 (2050 Long-Term Framework) Key Performance Findings

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
MOBILITY				
M1	**Congestion**			
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.57	1.73	1.60
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	26.86%	36.60%	35.34%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	5.81%	8.69%	8.32%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	6.47	6.84	6.70
M2	**Multimodal Options**			
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.11	0.11	0.11
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	2.08%	1.91%	2.02%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.94%	16.14%	16.03%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	5.46%	5.12%	5.49%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	54.18%	53.80%	53.86%
SOCIAL				
S1	**Travel Convenience**			
S1-1	Average Work Trip Time (minutes)	21.0	21.7	21.1
S1-2	Average Work Trip Length (miles)	9.51	9.46	9.49

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S1-3	Average Auto Transportation Costs (dollars)	$9,243	$9,320	$9,319
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.04%	4.82%	5.48%
S2	**Accessibility**			
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	73%	72%	72%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs+retail)	49%	47%	61%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	22%	22%	22%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	44%	45%	45%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	8.69%	7.69%	10.03%
S3	**Safety**			
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	15,376	17,034	12,406
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	774	849	501
S4	**Equity**			
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	92.39%	91.58%	91.46%
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	64%	63%	64%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.37%	5.24%	5.18%
ENVIRONMENTAL				
N1	**Air Quality**			
N1-1	Total Mobile Emissions in kg/day	76,532	24,194	24,189
N2	**GHG Emissions**			
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972	10,982
INFRASTRUCTURE				
I1	**Capacity**			
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	17,193	16,344	16,372
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	39%	37%	39%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A	N/A
I2	**Land Use Efficiency**			
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	-	0.47	0.47
I3	**Sustainable Urban Infrastructure**			
I3-1	Activity Population per acre (activity population per acre of developed land)	8.45	8.89	8.89
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	10.37%	10.38%	10.38%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	20%	20%	20%
ECONOMIC				

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E1	**Job Housing Balance**			
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	48%	46%	47%
E2	**Investment**			
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	N/A	$6,832,670	TBD
E3	**Freight**			
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	10.29%	9.49%	9.66%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	9.15%	8.49%	8.65%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$19.42	$19.37	$19.45
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	13.12	14.94	13.98
E4	**Economic Development**			
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$11.12	$11.29	$11.16
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-	-
E5	**New Metrics**			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	83	109	101
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	206	320	315
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	854,058	1,261,826	1,221,833
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	1,681,528	1,606,486	1,611,486
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	643,978	579,640	623,905
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	2,175,413	2,442,652	2,447,905
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	950,747	1,052,887	1,054,017
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	36,487	37,453	39,625
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	15,975	16,083	17,253
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	7,504	7,337	9,582
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	85,896	83,468	108,894
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	198,683	206,317	229,861
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	116,485	201,028	228,344
E5-14	Daily Truck VMT (in vehicle*mile)	1,402,618	1,437,589	1,474,713
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	544,025	560,146	574,890

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$716,400,618	$778,852,022	$769,674,720
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	84,165	160,250	159,968
E5-18	Daily VMT in Highway Network (veh*mile)	12,828,007	14,233,574	14,334,546
E5-19	Daily VHT in Highway Network (veh*hour)	364,142	435,160	419,900

A. For Overall Study Area

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
MOBILITY				
M1	**Congestion**			
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.57	1.73	1.60
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	26.86%	36.60%	35.34%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	5.81%	8.69%	8.32%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	6.47	6.84	6.70
M2	**Multimodal Options**			
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.11	0.11	0.11
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	2.08%	1.91%	2.02%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.94%	16.14%	16.03%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	5.46%	5.12%	5.49%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	54.18%	53.80%	53.86%
SOCIAL				
S1	**Travel Convenience**			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S1-1	Average Work Trip Time (minutes)	21.0	21.7	21.1
S1-2	Average Work Trip Length (miles)	9.51	9.46	9.49
S1-3	Average Auto Transportation Costs (dollars)	$9,243	$9,320	$9,319
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.04%	4.82%	5.48%
S2	**Accessibility**			
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	73%	72%	72%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs + retail)	49%	47%	61%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	22%	22%	22%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	44%	45%	45%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	8.69%	7.69%	10.03%
S3	**Safety**			
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	15,376	17,034	12,406
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	774	849	501
S4	**Equity**			
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	92.39%	91.58%	91.46%

ID	Indicator		Configuration Scenarios' KPI Results – Study Area	
			Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail and transit)	64%	63%	64%
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.37%	5.24%	5.18%
ENVIRONMENTAL				
N1	**Air Quality**			
N1-1	Total Mobile Emissions in kg/day	76,532	24,194	24,189
N2	**GHG Emissions**			
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972	10,982
INFRASTRUCTURE				
I1	**Capacity**			
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	17,193	16,344	16,372
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	39%	37%	39%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A	N/A
I2	**Land Use Efficiency**			
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	-	0.47	0.47
I3	**Sustainable Urban Infrastructure**			
I3-1	Activity Population per acre (activity population per acre of developed land)	8.45	8.89	8.89
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	10.37%	10.38%	10.38%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	20%	20%	20%
ECONOMIC				
E1	**Job Housing Balance**			
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.	48%	46%	47%
E2	**Investment**			
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	N/A	$6,832,670	TBD
E3	**Freight**			
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	10.29%	9.49%	9.66%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	9.15%	8.49%	8.65%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$19.42	$19.37	$19.45
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	13.12	14.94	13.98
E4	**Economic Development**			
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$11.12	$11.29	$11.16

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-	-
E5	**New Metrics**			
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	83	109	101
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	206	320	315
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	854,058	1,261,826	1,221,833
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	1,681,528	1,606,486	1,611,486
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	643,978	579,640	623,905
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	2,175,413	2,442,652	2,447,905
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	950,747	1,052,887	1,054,017
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	36,487	37,453	39,625
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	15,975	16,083	17,253
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	7,504	7,337	9,582
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	85,896	83,468	108,894
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	198,683	206,317	229,861

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	116,485	201,028	228,344
E5-14	Daily Truck VMT (in vehicle*mile)	1,402,618	1,437,589	1,474,713
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	544,025	560,146	574,890
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$716,400,618	$778,852,022	$769,674,720
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	84,165	160,250	159,968
E5-18	Daily VMT in Highway Network (veh*mile)	12,828,007	14,233,574	14,334,546
E5-19	Daily VHT in Highway Network (veh*hour)	364,142	435,160	419,900

B. For Study Core – Hartford and East Hartford

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
MOBILITY				
M1	**Congestion**			
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.72	1.88	1.54
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	25.93%	32.28%	28.98%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	8.39%	11.21%	10.27%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	5.45	5.99	5.59
M2	**Multimodal Options**			
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.21	0.20	0.21
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	4.55%	4.25%	4.43%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.64%	15.76%	15.54%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	11.88%	11.27%	11.87%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	61.94%	61.28%	61.37%
SOCIAL				
S1	**Travel Convenience**			
S1-1	Average Work Trip Time (minutes)	20.4	20.9	20.0

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S1-2	Average Work Trip Length (miles)	7.72	7.67	7.67
S1-3	Average Auto Transportation Costs (dollars)	$8,018	$7,999	$7,996
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.41%	5.48%	6.44%
S2	**Accessibility**			
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	94%	94%	94%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs + retail)	82%	83%	83%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	28%	28%	66%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	51%	53%	52%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	12.04%	11.20%	13.86%
S3	**Safety**			
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	7,228	8,065	3,479
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	445	493	148
S4	**Equity**			
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	94.92	94.41	94.14
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	0.68	0.67	0.68

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.40%	5.36%	5.26
ENVIRONMENTAL				
N1	**Air Quality**			
N1-1	Total Mobile Emissions in kg/day	76,532	24,194	24,189
N2	**GHG Emissions**			
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972	10,982
INFRASTRUCTURE				
I1	**Capacity**			
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	20,238	19,909	20,030
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	27%	25%	26%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A	N/A
I2	**Land Use Efficiency**			
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	0.46	0.48	0.48
I3	**Sustainable Urban Infrastructure**			
I3-1	Activity Population per acre (activity population per acre of developed land)	24.21	19.15	19.15
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	9.95%	10.86%	10.86%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	21%	21%	21%
ECONOMIC				

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E1	**Job Housing Balance**			
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	50%	48%	51%
E2	**Investment**			
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	-	TBD	TBD
E3	**Freight**			
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	11.39%	10.55%	10.92%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	10.26%	9.53%	9.88%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$17.28	$17.28	$17.28
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	9.52	11.19	9.84
E4	**Economic Development**			
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$8.29	$8.46	$8.24
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-	-
E5	**New Metrics**			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	29	39	36
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	82	110	108
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	249,910	336,015	309,223
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	384,854	419,884	419,657
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	19,619	19,974	25,628
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	118,965	121,676	150,510
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	223,511	235,786	262,427
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	40,318	70,068	83,101
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	424,668	431,433	464,377
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	163,975	167,405	181,656
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	19,619	19,974	25,628
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	118,965	121,676	150,510
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	223,511	235,786	262,427
E5-14	Daily Truck VMT (in vehicle*mile)	40,318	70,068	83,101
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	424,668	431,433	464,377

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$179,008,942	$187,710,716	$182,846,267
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	57,959	112,433	112,063
E5-18	Daily VMT in Highway Network (veh*mile)	3,300,536	3,624,806	3,782,685
E5-19	Daily VHT in Highway Network (veh*hour)	103,706	121,746	111,966

Appendix K-3: Scenario 4 (Early Actions + Mid-Term Recommendations) -Key Performance Findings

A. For Overall Study Area

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
MOBILITY				
M1	**Congestion**			
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.57	1.73	1.72
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	26.86%	36.60%	35.37%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	5.81%	8.69%	8.77%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	6.47	6.84	6.81
M2	**Multimodal Options**			
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.11	0.11	0.12
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	2.08%	1.91%	2.02%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.94%	16.14%	16.11%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	5.46%	5.12%	5.14%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	54.18%	53.80%	53.83%
SOCIAL				
S1	**Travel Convenience**			
S1-1	Average Work Trip Time (minutes)	21.0	21.7	21.7

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S1-2	Average Work Trip Length (miles)	9.51	9.46	9.46
S1-3	Average Auto Transportation Costs (dollars)	$9,243	$9,320	$9,320
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.04%	4.82%	5.22%
S2	**Accessibility**			
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	73%	72%	72%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs + retail)	49%	47%	47%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	22%	22%	22%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	44%	45%	45%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	8.69%	7.69%	7.67%
S3	**Safety**			
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	15,376	17,034	16,891
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	774	849	843
S4	**Equity**			
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	92.39%	91.58%	91.61%
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail and transit)	64%	63%	63%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.37%	5.24%	5.24
ENVIRONMENTAL				
N1	**Air Quality**			
N1-1	Total Mobile Emissions in kg/day	76,532	24,194	24,218
N2	**GHG Emissions**			
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972	10,982
INFRASTRUCTURE				
I1	**Capacity**			
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	17,193	16,344	16,240
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	39%	37%	39%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A	N/A
I2	**Land Use Efficiency**			
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	-	0.47	-
I3	**Sustainable Urban Infrastructure**			
I3-1	Activity Population per acre (activity population per acre of developed land)	8.45	8.89	8.89
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	10.37%	10.38%	10.38%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	20%	20%	20%
ECONOMIC				

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E1	**Job Housing Balance**			
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	48%	46%	46%
E2	**Investment**			
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	N/A	$6,832,670	TBD
E3	**Freight**			
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	10.29%	9.49%	9.50%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	9.15%	8.49%	8.50%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$19.42	$19.37	$19.38
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	13.12	14.94	15.03
E4	**Economic Development**			
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$11.12	$11.29	$11.29
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-	-
E5	**New Metrics**			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	83	109	104
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	206	320	319
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	854,058	1,261,826	1,087,171
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	1,681,528	1,606,486	1,469,718
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	643,978	579,640	516,643
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	2,175,413	2,442,652	2,425,042
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	950,747	1,052,887	1,053,506
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	36,487	37,453	39,504
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	15,975	16,083	16,125
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	7,504	7,337	7,048
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	85,896	83,468	83,342
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	198,683	206,317	206,943
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	116,485	201,028	192,655
E5-14	Daily Truck VMT (in vehicle*mile)	1,402,618	1,437,589	1,429,334
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	544,025	560,146	557,218

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$716,400,618	$778,852,022	$779,030,696
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	84,165	160,250	160,301
E5-18	Daily VMT in Highway Network (veh*mile)	12,828,007	14,233,574	14,258,726
E5-19	Daily VHT in Highway Network (veh*hour)	364,142	435,160	434,257

B. For Study Core – Hartford and East Hartford

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
MOBILITY				
M1	**Congestion**			
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.72	1.88	1.86
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	25.93%	32.28%	31.24%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	8.39%	11.21%	10.78%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	5.45	5.99	5.86
M2	**Multimodal Options**			
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.21	0.20	0.22
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	4.55%	4.25%	4.39%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.64%	15.76%	15.73%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	11.88%	11.27%	11.30%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	61.94%	61.28%	61.33%
SOCIAL				
S1	**Travel Convenience**			
S1-1	Average Work Trip Time (minutes)	20.4	20.9	20.9

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S1-2	Average Work Trip Length (miles)	7.72	7.67	7.67
S1-3	Average Auto Transportation Costs (dollars)	$8,018	$7,999	$7,999
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.41%	5.48%	6.85%
S2	**Accessibility**			
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	94%	94%	94%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs + retail)	82%	83%	83%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	28%	28%	27%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	51%	53%	53%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	12.04%	11.20%	11.17%
S3	**Safety**			
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	7,228	8,065	8,018
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	445	493	491
S4	**Equity**			
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	94.92	94.41	94.45
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail and transit)	0.68	0.67	0.67

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.40%	5.36%	5.36%
ENVIRONMENTAL				
N1	**Air Quality**			
N1-1	Total Mobile Emissions in kg/day	76,532	24,194	24,218
N2	**GHG Emissions**			
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972	10,982
INFRASTRUCTURE				
I1	**Capacity**			
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	20,238	19,909	19,751
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	27%	25%	26%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A	N/A
I2	**Land Use Efficiency**			
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	0.46	0.48	0.48
I3	**Sustainable Urban Infrastructure**			
I3-1	Activity Population per acre (activity population per acre of developed land)	24.21	19.15	19.15
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	9.95%	10.86%	10.86%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	21%	21%	21%
ECONOMIC				

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E1	**Job Housing Balance**			
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	50%	48%	48%
E2	**Investment**			
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	-	TBD	TBD
E3	**Freight**			
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	11.39%	10.55%	10.59%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	10.26%	9.53%	9.58%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$17.28	$17.28	$17.30
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	9.52	11.19	10.66
E4	**Economic Development**			
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$8.29	$8.46	$8.45
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-	-
E5	**New Metrics**			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	29	39	38
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	82	110	105
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	249,910	336,015	171,565
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	384,854	419,884	289,488
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	329,150	285,170	218,673
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	583,081	644,697	643,356
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	340,531	359,791	360,065
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	24,990	24,932	25,768
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	11,192	10,936	10,962
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	19,619	19,974	19,393
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	118,965	121,676	121,342
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	223,511	235,786	236,939
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	40,318	70,068	56,092
E5-14	Daily Truck VMT (in vehicle*mile)	424,668	431,433	433,488
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	163,975	167,405	168,058

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$179,008,942	$187,710,716	$187,667,602
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	57,959	112,433	112,480
E5-18	Daily VMT in Highway Network (veh*mile)	3,300,536	3,624,806	3,621,688
E5-19	Daily VHT in Highway Network (veh*hour)	103,706	121,746	121,393

Appendix K-4: Scenario 5 (2050 Full Build) - Key Performance Findings

A. For Overall Study Area

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
MOBILITY				
M1	**Congestion**			
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.72	1.88	1.52
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	25.93%	32.28%	27.02%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	8.39%	11.21%	10.27%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	5.45	5.99	5.48
M2	**Multimodal Options**			
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.21	0.20	0.24
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	4.55%	4.25%	4.63%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.64%	15.76%	15.52%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	11.88%	11.27%	12.35%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	61.94%	61.28%	61.46%
SOCIAL				
S1	**Travel Convenience**			
S1-1	Average Work Trip Time (minutes)	20.4	20.9	20.1

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S1-2	Average Work Trip Length (miles)	7.72	7.67	7.68
S1-3	Average Auto Transportation Costs (dollars)	$8,018	$7,999	$7,996
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.41%	5.48%	6.37%
S2	**Accessibility**			
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	94%	94%	94%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs + retail)	82%	83%	83%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	28%	28%	66%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	51%	53%	53%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	12.04%	11.20%	13.96%
S3	**Safety**			
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	7,228	8,065	3,460
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	445	493	144
S4	**Equity**			
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	94.92	94.41	94.23
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail and transit)	0.68	0.67	0.69

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.40%	5.36%	5.25%
ENVIRONMENTAL				
N1	**Air Quality**			
N1-1	Total Mobile Emissions in kg/day	76,532	24,194	24,236
N2	**GHG Emissions**			
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972	10,994
INFRASTRUCTURE				
I1	**Capacity**			
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	20,238	19,909	20,099
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	27%	25%	27%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A	N/A
I2	**Land Use Efficiency**			
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	0.46	0.48	0.48
I3	**Sustainable Urban Infrastructure**			
I3-1	Activity Population per acre (activity population per acre of developed land)	24.21	19.15	19.15
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	9.95%	10.86%	10.86%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	21%	21%	21%
ECONOMIC				

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E1	**Job Housing Balance**			
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	50%	48%	51%
E2	**Investment**			
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	-	TBD	TBD
E3	**Freight**			
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	11.39%	10.55%	11.01%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	10.26%	9.53%	9.96%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$17.28	$17.28	$17.30
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	9.52	11.19	9.18
E4	**Economic Development**			
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$8.29	$8.46	$8.23
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-	-
E5	**New Metrics**			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	29	39	35
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	82	110	108
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	249,910	336,015	289,280
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	384,854	419,884	426,675
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	329,150	285,170	354,616
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	583,081	644,697	658,815
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	340,531	359,791	360,816
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	24,990	24,932	27,167
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	11,192	10,936	11,985
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	19,619	19,974	21,874
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	118,965	121,676	151,639
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	223,511	235,786	274,663
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	40,318	70,068	82,477
E5-14	Daily Truck VMT (in vehicle*mile)	424,668	431,433	467,644
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	163,975	167,405	182,932

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$179,008,942	$187,710,716	$182,795,741
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	57,959	112,433	112,166
E5-18	Daily VMT in Highway Network (veh*mile)	3,300,536	3,624,806	3,778,744
E5-19	Daily VHT in Highway Network (veh*hour)	103,706	121,746	111,503

B. For Study Core – Hartford and East Hartford

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
MOBILITY				
M1	**Congestion**			
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.72	1.88	1.52
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	25.93%	32.28%	27.02%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	8.39%	11.21%	10.27%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	5.45	5.99	5.48
M2	**Multimodal Options**			
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.21	0.20	0.24
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	4.55%	4.25%	4.63%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.64%	15.76%	15.52%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	11.88%	11.27%	12.35%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	61.94%	61.28%	61.46%
SOCIAL				
S1	**Travel Convenience**			
S1-1	Average Work Trip Time (minutes)	20.4	20.9	20.1

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S1-2	Average Work Trip Length (miles)	7.72	7.67	7.68
S1-3	Average Auto Transportation Costs (dollars)	$8,018	$7,999	$7,996
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.41%	5.48%	6.37%
S2	**Accessibility**			
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	94%	94%	94%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs + retail)	82%	83%	83%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	28%	28%	66%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	51%	53%	53%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	12.04%	11.20%	13.96%
S3	**Safety**			
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	7,228	8,065	3,460
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	445	493	144
S4	**Equity**			
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	94.92	94.41	94.23
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	0.68	0.67	0.69

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.40%	5.36%	5.25%
ENVIRONMENTAL				
N1	**Air Quality**			
N1-1	Total Mobile Emissions in kg/day	76,532	24,194	24,236
N2	**GHG Emissions**			
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	10,972	10,994
INFRASTRUCTURE				
I1	**Capacity**			
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	20,238	19,909	20,099
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	27%	25%	27%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A	N/A
I2	**Land Use Efficiency**			
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	0.46	0.48	0.48
I3	**Sustainable Urban Infrastructure**			
I3-1	Activity Population per acre (activity population per acre of developed land)	24.21	19.15	19.15
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	9.95%	10.86%	10.86%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	21%	21%	21%
ECONOMIC				

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E1	**Job Housing Balance**			
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	50%	48%	51%
E2	**Investment**			
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	-	TBD	TBD
E3	**Freight**			
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	11.39%	10.55%	11.01%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	10.26%	9.53%	9.96%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$17.28	$17.28	$17.30
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	9.52	11.19	9.18
E4	**Economic Development**			
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$8.29	$8.46	$8.23
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-	-
E5	**New Metrics**			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	29	39	35
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	82	110	108
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	249,910	336,015	289,280
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	384,854	419,884	426,675
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	329,150	285,170	354,616
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	583,081	644,697	658,815
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	340,531	359,791	360,816
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	24,990	24,932	27,167
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	11,192	10,936	11,985
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	19,619	19,974	21,874
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	118,965	121,676	151,639
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	223,511	235,786	274,663
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	40,318	70,068	82,477
E5-14	Daily Truck VMT (in vehicle*mile)	424,668	431,433	467,644
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	163,975	167,405	182,932

ID	Indicator	Configuration Scenarios' KPI Results – Study Area		
		Scenario 1 - Existing (2020)	Scenario 2 - Future No-Build Condition (2050)	Scenario 3 – 2050 Long-Term Framework
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$179,008,942	$187,710,716	$182,795,741
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	57,959	112,433	112,166
E5-18	Daily VMT in Highway Network (veh*mile)	3,300,536	3,624,806	3,778,744
E5-19	Daily VHT in Highway Network (veh*hour)	103,706	121,746	111,503

Appendix K-5: 2050 Long-Term Framework with 30% Telecommute Variation – Key Performance Findings

A. For Overall Study Area

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
MOBILITY			
M1	**Congestion**		
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.60	1.47
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	35.34%	26.49%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	8.32%	5.10%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	6.70	1.81
M2	**Multimodal Options**		
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.11	0.11
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	2.02%	1.94%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	16.03%	17.24%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	5.49%	6.25%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	53.86%	55.61%
SOCIAL			
S1	**Travel Convenience**		
S1-1	Average Work Trip Time (minutes)	21.1	19.84
S1-2	Average Work Trip Length (miles)	9.49	10.80
S1-3	Average Auto Transportation Costs (dollars)	$9,319	$10,967.05
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	5.48%	4.98%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
S2	**Accessibility**		
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	72%	72%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs+retail)	61%	61%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	22%	22%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	45%	45%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	10.03%	10.49%
S3	**Safety**		
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	12,406	TBD
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	501	TBD
S4	**Equity**		
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	91.46%	91.46%
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	64%	64%
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.18%	5.23%
ENVIRONMENTAL			
N1	**Air Quality**		
N1-1	Total Mobile Emissions in kg/day	24,189	22,293
N2	**GHG Emissions**		
N2-1	GHG Emissions (light-duty vehicles) in kg/day	10,982	10,155
INFRASTRUCTURE			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
I1	Capacity		
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	16,372	16,367
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	39%	36%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A
I2	Land Use Efficiency		
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	0.47	-
I3	Sustainable Urban Infrastructure		
I3-1	Activity Population per acre (activity population per acre of developed land)	8.89	8.89
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	10.38%	10.38%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	20%	20%
ECONOMIC			
E1	Job Housing Balance		
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	47%	47%
E2	Investment		
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	TBD	TBD
E3	Freight		
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	9.66%	11.02%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	8.65%	10.18%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$19.45	$19.43

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	13.98	12.46
E4	**Economic Development**		
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$11.16	$10.72
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-
E5	New Metrics		
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	101	52
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	315	198
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	1,221,833	831,560
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	1,611,486	1,606,254
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	623,905	701,886
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	2,447,905	2,390,001
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	1,054,017	1,035,900
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	39,625	36,134
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	17,253	13,736
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	9,582	9,582
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	108,894	108,894
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	229,861	229,861
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	228,344	191,432
E5-14	Daily Truck VMT (in vehicle*mile)	1,474,713	1,526,970
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	574,890	597,289

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$769,674,720	TBD
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	159,968	89,026

B. For Study Core – Hartford and East Hartford

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
MOBILITY			
M1	**Congestion**		
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.54	1.40
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	28.98%	25.79%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	10.27%	6.89%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	5.59	0.83
M2	**Multimodal Options**		
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.21	0.21
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	4.43%	4.23%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.54%	16.66%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	11.87%	13.01%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	61.37%	62.66%
SOCIAL			
S1	**Travel Convenience**		
S1-1	Average Work Trip Time (minutes)	20.0	18.89
S1-2	Average Work Trip Length (miles)	7.67	9.31
S1-3	Average Auto Transportation Costs (dollars)	$7,996	$9,721
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	6.44%	5.68%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
S2	**Accessibility**		
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	94%	94%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs+retail)	83%	83%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	66%	66%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	52%	52%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	13.86%	13.97%
S3	**Safety**		
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	3,479	TBD
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	148	TBD
S4	**Equity**		
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	94.14	59.12
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	0.68	TBD
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.26	3.12
ENVIRONMENTAL			
N1	**Air Quality**		
N1-1	Total Mobile Emissions in kg/day	24,189	22,298
N2	**GHG Emissions**		
N2-1	GHG Emissions (light-duty vehicles) in kg/day	10,982	10,155
INFRASTRUCTURE			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
I1	Capacity		
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	20,030	20,013
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	26%	24%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A
I2	Land Use Efficiency		
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	0.48	-
I3	Sustainable Urban Infrastructure		
I3-1	Activity Population per acre (activity population per acre of developed land)	19.15	19.15
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	10.86%	10.86%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	21%	21%
ECONOMIC			
E1	Job Housing Balance		
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	51%	51%
E2	Investment		
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	TBD	TBD
E3	Freight		
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	10.92%	12.45%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	9.88%	11.62%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$17.28	$17.27

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	9.84	8.21
E4	**Economic Development**		
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$8.24	$7.09
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-
E5	New Metrics		
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	36	19
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	108	75
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	309,223	250,007
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	419,657	342,951
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	337,999	376,503
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	660,365	642,563
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	360,295	351,908
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	25,997	23,782
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	11,519	9,309
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	25,628	25,628
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	150,510	150,510
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	262,427	262,427
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	83,101	67,598
E5-14	Daily Truck VMT (in vehicle*mile)	464,377	480,262
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	181,656	188,647

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$182,846,267	TBD
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	112,063	TBD

Appendix K-6: City Link East-Key Performance Findings

A. For Overall Study Area

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
MOBILITY			
M1	**Congestion**		
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.57	1.52
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	26.86%	23.26%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	5.81%	5.18%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	6.47	6.27
M2	**Multimodal Options**		
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.11	0.11
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	2.08%	2.05%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.94%	16.21%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	5.46%	5.66%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	54.18%	54.76%
SOCIAL			
S1	**Travel Convenience**		
S1-1	Average Work Trip Time (minutes)	21.0	20.5
S1-2	Average Work Trip Length (miles)	9.51	9.52
S1-3	Average Auto Transportation Costs (dollars)	$9,243	$9,241
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.04%	3.13%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
S2	**Accessibility**		
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	73%	73%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs+retail)	49%	47%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	22%	22%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	44%	45%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	8.69%	9.39%
S3	**Safety**		
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	15,376	14,867
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	774	749
S4	**Equity**		
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	92.39%	92.94%
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	64%	63%
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.37%	4.77%
ENVIRONMENTAL			
N1	**Air Quality**		
N1-1	Total Mobile Emissions in kg/day	76,532	74,413
N2	**GHG Emissions**		
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	15,704
INFRASTRUCTURE			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
I1	Capacity		
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	17,193	17,296
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	39%	38%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A
I2	Land Use Efficiency		
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	-	-
I3	Sustainable Urban Infrastructure		
I3-1	Activity Population per acre (activity population per acre of developed land)	8.45	8.45
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	10.37%	10.37%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	20%	20%
	ECONOMIC		
E1	Job Housing Balance		
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	48%	50%
E2	Investment		
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	N/A	TBD
E3	Freight		
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	10.29%	10.80%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	9.15%	9.72%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$19.42	$19.44

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	13.12	12.60
E4	**Economic Development**		
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	-
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$11.12	$9.85
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	-
E5	New Metrics		
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	83	69
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	206	187
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	854,058	716,136
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	1,681,528	1,609,863
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	643,978	753,455
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	2,175,413	2,149,738
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	950,747	944,835
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	36,487	35,425
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	15,975	14,906
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	7,504	7,792
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	85,896	92,788
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	198,683	204,331
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	116,485	117,769
E5-14	Daily Truck VMT (in vehicle*mile)	1,402,618	1,431,776
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	544,025	556,701

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$716,400,618	$634,552,059
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	84,165	TBD
E5-18	Daily VMT in Highway Network (veh*mile)	12,828,007	12,470,072
E5-19	Daily VHT in Highway Network (veh*hour)	364,142	343,896

B. For Study Core – Hartford and East Hartford

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
MOBILITY			
M1	**Congestion**		
M1-1	Travel Time Index (the ratio of the peak-period travel time ("rush hour") to free-flow travel time (when traffic flows at the speed limit)	1.72	1.64
M1-2	Freeway Peak-Hour Speed 0-35mph (percentage of freeway VMT by travel speed 0 to 35 mph)	25.93%	26.89%
M1-3	Reduction in System Reliability (percentage of lane miles with a LOS D, E or F during peak periods)	8.39%	7.86%
M1-4	Duration of Congestion (the average number of hours during a typical weekday in which road sections are congested.	5.45	5.10
M2	**Multimodal Options**		
M2-1	Transit Facility Coverage (number of transit stops per 1000 Population (per capita))	0.21	0.21
M2-2	Transit Utilization (Percentage of daily transit person trips/daily total person trips)	4.55%	4.49%
M2-3	Ridesharing/Carpooling Utilization (percent of VMT in ride sharing trips) over total VMT during a typical weekday)	15.64%	15.72%
M2-4	Transit Commute Share (number of transit commute trips over total commute trips during a typical weekday)	11.88%	12.20%
M2-5	Non-SOV Person-Trips (the percentage of non-single occupied vehicle person trips (HOVs, transit, walk and bike) during a typical weekday)	61.94%	62.36%
SOCIAL			
S1	**Travel Convenience**		
S1-1	Average Work Trip Time (minutes)	20.4	19.80
S1-2	Average Work Trip Length (miles)	7.72	7.72
S1-3	Average Auto Transportation Costs (dollars)	$8,018	$8,015
S1-4	Percent HOV VMT (Percent of person-miles travelled in HOV lanes in the study area)	3.41%	3.55%

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
S2	**Accessibility**		
S2-1	Walk Access to Transit (the percentage of jobs within 10-minute walk to transit.)	94%	94%
S2-2	Walk Access to Essential Destinations (the percentage of households within 10-minute walk to essential destinations (jobs+retail)	82%	82%
S2-3	Proximity to Multimodal Hub (Percentage of population within multimodal hub radius)	28%	28%
S2-4	Access to Major Thoroughfare (the percentage of population within 0.5-mile distance from highways)	51%	52%
S2-5	Percent Jobs Within Accessible Transit Shed (average number of jobs that can be reached by a 15-minute transit ride)	12.04%	12.75%
S3	**Safety**		
S3-1	Fatal & Injury Crashes (motorized) (the total number of fatal and injury crashes in an incident involving motorized vehicles)	7,228	7,173
S3-2	Fatal & Injury Crashes (non-motorized) (the total number of ped and bike fatal and injury crashes)	445	443
S4	**Equity**		
S4-1	Work Trip Sheds (peak) (Percent of work trips with travel time less than 30 minutes over all work trips within EJ TAZs)	94.92	95.23
S4-2	EJ Population with Walk Access to Destinations (Percentage of EJ population within 0.5 mile /10 min walkable access to office, retail, and transit)	68%	0.68%
S4-3	Commuting Costs as a % of Income (the average annual costs for a work trip per household, as percentage of annual household income)	5.40%	4.85%
ENVIRONMENTAL			
N1	**Air Quality**		
N1-1	Total Mobile Emissions in kg/day	76,532	74,413
N2	**GHG Emissions**		
N2-1	GHG Emissions (light-duty vehicles) in kg/day	16,180	15,704
INFRASTRUCTURE			

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
I1	Capacity		
I1-1	Roadway Capacity per 1,000 Capita (vehicles per hour per 1000 people)	20,238	20,540
I1-2	Usage Rate of Public Transit (the rate of daily transit trips over daily transit capacity)	27%	26%
I1-3	Miles of Bike Lanes per 1,000 Population (the total length of bike network in miles per 1,000 population)	N/A	N/A
I2	Land Use Efficiency		
I2-1	Land Use Diversity within TOD Areas (the extent of land use mix within the study area, ranging from maximally mixed or heterogeneous to maximally homogeneous)	0.46	0.46
I3	Sustainable Urban Infrastructure		
I3-1	Activity Population per acre (activity population per acre of developed land)	24.21	24.21
I3-2	% of Local Trips (the percentage of trips beginning and ending in the same local geographic unit)	9.95%	9.95%
I3-3	Road and Parking Areas (the percentage of area covered by roads and parking)	21%	21%
ECONOMIC			
E1	Job Housing Balance		
E1-1	Job Accessibility (the average percentage of jobs that are accessible within 30 minutes' drive or transit time from any TAZ in the study area.)	50%	52%
E2	Investment		
E2-1	Infrastructure Cost (the estimated cost for constructing new transportation projects)	N/A	TBD
E3	Freight		
E3-1	Truck VMT (Daily - the percentage of truck vehicle mile traveled out of total vehicle mile traveled.)	11.39%	12.02%
E3-2	Truck VMT (Peak Hour - the percentage of truck vehicle mile traveled out of total vehicle mile traveled during peak periods)	10.26%	10.95%
E3-3	Average Costs per Truck Trip (the average cost of a truck trip in dollars starting or ending in a TAZ within the study area during peak periods)	$17.28	$17.30

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
E3-4	Daily Truck Hours of Delay (the average truck delay in Hours on a typical weekend)	9.52	9.26
E4	**Economic Development**		
E4-1	Creation of New Jobs (the number of direct jobs generated from new investments in highway projects. Direct jobs are occupations that work directly on the project.)	-	TBD
E4-2	Average Work Trip Costs per Person (the average costs of commuting in dollars by all modes (auto, TNC and transit) during AM peak periods in a typical weekday)	$8.29	$7.41
E4-3	New Revenue Sources (annual traffic revenues owing to VMT based fees and cordon-line congestion pricing (wherever enabled).)	-	TBD
E5	New Metrics		
E5-1	Failing LOS_AM (Lane-Miles, with a LOS D, E or F during AM peak periods)	29	29
E5-2	Failing LOS_PM (Lane-Miles, with a LOS D, E or F during PM peak periods)	82	75
E5-3	Daily VMT by Speed 1 (daily VMT in veh*mile for speed from 0 to 35 mph)	249,910	250,650
E5-4	Daily VMT by Speed 2 (daily VMT in veh*mile for speed from 35 to 55 mph)	384,854	291,176
E5-5	Daily VMT by Speed 3 (daily VMT in veh*mile for speed above 55 mph)	329,150	390,430
E5-6	Daily VMT from HOV (daily VMT in person*mile on HOV lanes in the study area)	583,081	575,543
E5-7	Daily Non-SOV Trips (daily number of ride-sharing trips, HOVs, transit, walk and bike, not in single occupied vehicles)	340,531	337,649
E5-8	Daily Transit Trips (Number of daily transit person trips in the study area)	24,990	24,291
E5-9	Commute Trips by Transit Mode (Average daily number of commute trips using transit in the study area)	11,192	10,481
E5-10	Number of Regional Jobs Accessible in 15 minutes of Transit Time (Number of jobs)	19,619	20,143
E5-11	Number of Regional Jobs Accessible in 30 minutes of Transit Time (Number of jobs)	118,965	125,929
E5-12	Number of Regional Jobs Accessible in 45 minutes of Transit Time (Number of jobs)	223,511	229,325
E5-13	HOV_Lane_VMT_A (total VMT in veh*mile on all HOV lanes in the study area)	40,318	41,660
E5-14	Daily Truck VMT (in vehicle*mile)	424,668	440,400
E5-15	Peak Period Truck VMT (in vehicle*mile, during AM and PM peak periods)	163,975	170,890

ID	Indicator	Configuration Scenarios' KPI Results – Study Area	
		Scenario 3 – Long-Term Framework (2050)	Scenario 3A – Long-Term Framework w/30% Telecommute
E5-16	Annual Commute Costs (total annual commute cost in dollars for all workers in the study area)	$179,008,942	$160,067,011
E5-17	Daily Commute Trips within 30 Minutes in EJ Zone (number of trips)	57,959	TBD
E5-18	Daily VMT in Highway Network (veh*mile)	3,300,536	3,247,680
E5-19	Daily VHT in Highway Network (veh*hour)	103,706	96,965