

CONCEPTUAL ACCESS MODIFICATION REPORT

State Project No. 63-703
Relocation of I-91 NB Interchange 29 and
Widening of I-91 NB and State Route 5/15 NB to I-84 EB
Hartford and East Hartford, Connecticut

Submitted to: Connecticut Department of Transportation



And the
U. S. Department of Transportation
Federal Highway Administration



Date: November 4, 2015



CONSULTANTS

Prime Consultant: CME Associates, Inc.
Sub-consultants: H.W. Lochner, Inc.
VN Engineering, Inc.
Freeman Companies

Table of Contents

I.	Introduction	2
II.	Revised Access Description	2
III.	Purpose and Need	3
IV.	Supporting Background Information/Alternatives	3
V.	Areas of Concern (including crash analysis summary)	4
VI.	Communities Served	7
VII.	Adjacent Interchanges	7
VIII.	Design Exceptions	8
IX.	Lane Balance	8
X.	Regional Need	9
XI.	Transportation System Management	9
XII.	Access Connections and Design	12
XIII.	Cost/Benefit Analysis	12
XIV.	Transportation Land Use Plans	13
XV.	Comprehensive Interstate Network Study	13
XVI.	Coordination with Transportation System Improvements	13
XVII.	NEPA Status	14
XVIII.	Highway Capacity Analyses	14
XIX.	FHWA Policy Requirements	20

Appendices

A.	FHWA Policy – August 2009	A1
B.	FHWA/CTDOT Agreement – May 2009	A7
C.	Figures	A53
D.	CTDOT Alternatives Study	A70
E.	Advance Overhead Sign Location Plan	A83
F.	2011 – 2013 SLOSSS	A85
G.	Accident Data	A95
H.	Design Exceptions	A721
I.	NEPA Documents	A724
J.	Capacity Analyses	A744
K.	Preliminary Engineering Plans	A979

Figures

1. Existing Interchange Location Map
2. Study Area
3. Proposed Interchange Location Map
4. 2015 No-Build (Existing) Volumes Map (AM & PM Peak Hour, Average Daily Traffic)
5. 2039 No-Build Volumes Map (AM & PM Peak Hour, Average Daily Traffic)
6. 2039 Build Volumes Map (AM & PM Peak Hour, Average Daily Traffic)
7. 2015 No-Build (Existing) Peak Hour Levels of Service Map (AM & PM Peak Hour)
8. 2039 No-Build Peak Hour Levels of Service Map (AM & PM Peak Hour)
9. 2039 Build Peak Hour Levels of Service Map (AM & PM Peak Hour)

I. Introduction

The Connecticut Department of Transportation (CTDOT) is seeking a change in access along Interstate 91 (I-91) Northbound in the City of Hartford, Connecticut in order to address safety and operational concerns associated with traffic congestion and operational failures at Interchange 29. In accordance with Federal Highway Administration (FHWA) policies as revised and published on August 27, 2009 (see Appendix A) and the May 2009 agreement between FHWA and CTDOT (see Appendix B), this report seeks to address the requirements of the revised document entitled *Policy and Procedures for New or Revised Interstate Access Approval in Connecticut* and to provide the information, documentation and analyses required to secure FHWA approval of the project. The goal of the project is to improve the safety and operation of I-91 Northbound in the vicinity of Interchange 29 by making changes to the off-ramp configuration and geometry.

II. Revised Access Description

Interchange 29 is a partial interchange that provides a connection between I-91 northbound and Connecticut State Route 5/15 northbound, as well as between State Route 5/15 southbound and I-91 southbound. Immediately northeast of the interchange, Route 5/15 crosses the Connecticut River on a large bridge structure named the Charter Oak Bridge (Bridge No. 06000A - Route 5/15 NB over I-91, Reserve Road and rail line). This section of State Route 5/15 provides the freeway-to-freeway connection between I-91 south of the interchange and I-84 to the east. It is a major route for traffic between southern Connecticut and the New York City metropolitan area and eastern Massachusetts and the Boston metropolitan area. Figure 1 in Appendix C depicts the existing interchange location while Figure 2 depicts the area of study for this report.

The project seeks to relocate the current single-lane right-side I-91 northbound off-ramp to State Route 5/15 northbound. The new ramp will be located on the left-side approximately 1,700 feet south of the existing ramp and will be constructed as a two-lane major left diverge from the existing mainline of I-91 northbound. In order to facilitate the movement of traffic in the vicinity of the major diverge, an existing fourth-lane of I-91 northbound will be extended approximately 4,600 feet north from its current lane drop at Interchange 27 – Brainard Road/Airport Road to the new ramp. This widening will necessitate the minor relocation and movement of the gores for the off-ramps at Interchange 27 and 28. There will also be minor ramp gore relocations on State Route 5/15 northbound at the off and on-ramps for Interchange 90 - State Route 2/Main Street (Route 5) – East Hartford and the off-ramp at Interchange 91 – Silver Lane (Figure 3 in Appendix C depicts the ramp's proposed new location and the location of the extended lane. Preliminary engineering plans for the proposed project are included in Appendix K.

The proposed project is scheduled to begin Preliminary Design in October 2015 with Final Design Plans due in November 2017. A Public Information Meeting on the project is tentatively scheduled for January 2016. Construction on the project would begin in 2018 and be completed in 2021.

III. Purpose and Need

The project will address safety concerns associated with traffic congestion and operational failures at existing Interchange 29 on I-91 northbound. Currently a single-lane I-91 northbound off-ramp has a steep vertical grade (+5%) and near capacity traffic volumes (1,790 vehicles in the evening peak hour) that include a significant percentage of heavy vehicles (approximately 11%). In addition, once ramp traffic reaches the top of the vertical grade, traffic must weave across traffic on State Route 5/15 northbound destined for an exit to State Route 2/Main Street on the east end of the bridge in East Hartford. Combined, these factors cause a significant delay in traffic on I-91 northbound, higher than expected crash rates and the queuing of traffic onto the mainline of the highway.

The existing traffic queues extend onto I-91 northbound mainline, taking up the right lane of the three-lane facility. The length of the queue varies, but has been observed to extend approximately 1.4 miles south to the vicinity of the Wethersfield/Hartford town line and the I-91 Bridge over Wethersfield Cove. From visual observations it appears that these queues are not only occurring during normal peak hours of traffic (weekdays 7:00 to 9:00 AM and 4:00 to 6:00 PM) but outside those hours as well. The safety issues are compounded by drivers that routinely cut into the right-lane queue from the center lane, which impedes traffic flow in that and the left lane and further increases congestion on I-91 in this area.

This project begins on I-91 northbound in the vicinity of Wethersfield Cove at approximately the Hartford/Wethersfield town line, extending northerly along I-91 northbound to just past the Charter Oak Bridge overpass. It also extends along State Route 5/15 northbound from Interchange 87 at I-91 Interchange No. 27 in Hartford to approximately 700 feet north of Interchange 91 - Silver Lane just before the Interstate 84 (I-84) Eastbound (EB) merge. The project does not include any work on I-91 Southbound or State Route 5/15 Southbound.

IV. Supporting Background Information/Alternatives

The Department developed and reviewed eight (8) alternatives, plus several variations of those alternatives, for correcting the operational and safety issues relating to I-91 northbound off-ramp at Interchange 29 including a no-build alternative. Four (4) of the alternatives were advanced for closer study. These included options for widening the existing ramp (Alternatives 6C and 6D); replacing the existing ramp with a connection to State Route 5/15 NB further to the south at I-91 Interchange 27 (Alternative 4) and constructing a two-lane major left-diverge ramp to the south of the existing ramp (Alternative 8). A copy of the state's alternatives summary is included in Appendix D.

Widening the existing ramp to add a second lane (Alternatives 6C and 6D) was eliminated because of weave issues on the Route 5/15 NB between the widened ramp and the ramps to State Route 2/Main Street immediately east of the Charter Oak Bridge. Replacing the existing ramp with a connection at Interchange 27 (Alternative 4) was eliminated due to the cost of widening multiple bridges on Route 5/15 NB to accommodate the additional traffic and to correct existing horizontal and vertical deficiencies on that section of highway. The cost of Alternative 4 has been estimated at \$380 million.

The geometric and congestion issues associated with the Interchange 29 off-ramp will therefore require the removal and relocation of the existing ramp in the form of a major

diverge. The preferred design for this project is Alternative 8B, which includes a major two-lane left-diverge to State Route 5/15 NB just south of Bridge No. 05922 (I-91 over State Route 5/15) and widening of I-91 NB for approximately 4,300 feet to provide four lanes from the existing lane-drop at Interchange 27 – Brainard Road/Airport Road to the new Interchange 29 – State Route 5/15 northbound ramp. The widening is anticipated to relieve congestion and address safety concerns due to motorists entering the diverge from the center lane of I-91 NB. The widening will require modifications to bridges on I-91 northbound including Bridge No. 00813 (I-91 over Route 15), Bridge No. 03613 (I-91 over a drainage crossing), Bridge No. 01466 (I-91 over the SB entrance ramp to I-91 SB and Route 15 SB), and Bridge No. 00480 (I-91 over Airport Road). The proposed diverge requires the realignment of Route 15 northbound and widening of the southern approach to the Charter Oak Bridge (Bridge No. 06000A, Route 15 NB over I-91, Reserve Road and rail line).

In order to provide a two-lane ramp from I-91 northbound to State Route 5/15 northbound, the Charter Oak Bridge will be restriped to provide four-lanes of travel across the existing bridge structure. One lane will then be dropped at the State Route 2/Main Street (Route 5) – East Hartford exit (Interchange 90) and the remaining three lanes will be continued north to a right-side lane drop just north of the exit at Interchange 91 - Silver Lane.

As part of the preliminary engineering for the project, a study was conducted of signing along I-91 northbound. An evaluation was made of possible locations for large-scale advanced major diverge signing locations. Preliminary locations for ½ mile, 1 mile and 2 mile signs have been identified and are depicted on the plan in Appendix E. Please note that a project justification letter is being submitted to FHWA by CTDOT separately. A more detailed plan for signing along the corridor will be submitted with that letter. A more detailed analysis of locations for these major diverge signs will be conducted during the preliminary design of the project.

V. Areas of Concern

CTDOT collects and analyzes crash information on all state roadways and compiles the data into a list entitled *Suggested List of Surveillance Study Sites (SLOSSS)*¹. The objective of the list is to identify which have the “greatest promise” of crash reduction to give a “broad measure of overall needs of highway safety improvements”. The current list, dated 2011 – 2013, identifies a number of locations within the project area that require attention and safety improvements (see Appendix F). These include I-91 northbound from the Interchange 27 Off-Ramp to Brainard Road (Mile Post 35.59) to the State Route 5/15 underpass (Mile Post 37.50). Sections of State Route 5/15 Northbound from the I-91 Northbound On-Ramp to I-84 Eastbound also appear on the list. Both of these areas correspond to the construction limits of the proposed project.

As noted above in Section III - Purpose and Need, traffic queues in the vicinity of the Interchange 29 off-ramp extend onto I-91 northbound mainline, taking up the right lane of the three-lane facility. The safety issues are compounded by drivers that routinely cut into the right-lane queue from the center lane, impeding traffic flow and increasing congestion on I-91 in this area. As a result, this area experiences higher-than-expected rear-end and side-

¹ “Pursuant to Title 23 United States Code Section 409, this data is not admissible and not discoverable in any federal or state court proceeding, and cannot be considered for any other purpose in any action for damages arising from an occurrence at a location addressed in this report.”

swipe crashes (see discussion below). The proposed project addresses these conditions by providing increased capacity and improved geometrics for traffic on mainline I-91 northbound and State Route 5/15 northbound.

Crash data was compiled from CTDOT's Traffic Accident Viewing System (TAVS) for the three-year period from 2011 to 2013. The data was obtained for I-91 Northbound, I-91 Southbound, State Route 5/15 Northbound, and I-84 Eastbound within the limits of the project. Each of these were further broken down by freeway segments between interchanges. The crash data is summarized by type and severity in Tables V-1 through V-4 in Appendix G while Tables V-5 through V-8 identify the collision contributing factors.

A total of 751 crashes were reported on I-91 Northbound between the Interchange 26 on-ramp and the Interchange 29A off-ramp. Of that, 559 of these were rear-end type crashes; 100 were sideswipe-same direction type crashes and 76 were fixed-object type crashes. The remaining 16 crashes were turning-same direction (4), moving object (6), overturn (4), backing (1) or unknown (1) type crashes. These crashes resulted in 1 fatality and 178 injuries.

I-91 northbound within the project limits was broken down into 5 freeway segments between interchange ramps. The segment with the highest number of crashes is between the Interchange 28 Off-Ramp to Route 5/15 Southbound and the Interchange 29 Off-Ramp to Route 5/15 Northbound with a total of 471 crashes reported. This represents a total of 62.7% of all crashes reported on I-91 northbound within the project limits. Rear-end and sideswipe crashes are the two most common types of crashes on this segment with 397 rear-end crashes and 47 sideswipe-same direction type crashes. The remaining crashes were fixed object (23), overturn (2) and moving object (2) type crashes. A total of 113 injuries and the 1 fatality occurred on this segment. The most common crashes contributing factor is following too closely. Of the 471 crashes reported, 385 crashes were a result of following too closely. The remaining contributing factors were improper lane changes (43), driver losing control (25), speed too fast for conditions (9), animal or foreign object in road (3), defective equipment (2), under the influence (1), improper passing maneuver, unsafe tires (1) and disabled or illegally parked vehicle (1).

A total of 348 crashes were reported on I-91 southbound between the Interchange 29A on-ramp and the Interchange 26 off-ramp. Of that, 155 of these were rear-end type crashes; 93 were fixed-object type crashes and 83 were sideswipe-same direction type crashes. The remaining 17 crashes were turning-same direction (2), moving object (9), overturn (3), turning-intersecting path (1), sideswipe – opposite direction (1) or backing (1) type crashes. These crashes resulted in 3 fatalities and 85 injuries.

Interstate 91 Southbound was broken down into 6 smaller segments between interchange ramps. The segment with the most collisions is between Interchange 29a On-Ramp – Whitehead Hwy to the Interchange 27 Off-Ramp – Airport Road. Of the 348 crashes on I-91 Southbound within the project area, 155 (44.5%) occurred on this section of highway including 61 rear-end crashes, 48 fixed objects crashes, and 35 sideswipe crashes. Of the remaining 11 crashes, there were 4 moving object crashes, 2 turning-same direction crashes, 2 overturn crashes, 1 turning-intersecting path crash, 1 sideswipe – opposite direction crash and 1 backing type crash. These crashes resulted in 2 fatalities and 37 injuries. The most common crash contributing factor were a result of following too closely

(53), followed closely by driver losing control (51) and improper lane changes (21). The remaining crash contributing factors include speed too fast for conditions (10), animal or foreign object in road (4), driver under the influence (3), defective equipment (3), unknown (2), failure to grant right of way, improper passing (1), improper turning (1), unsafe tires (1), violation of traffic control (1) and unsafe backing (1).

Route 15 northbound had a total of 201 crashes occur between Interchange 85 – Silas Deane Highway (Route 99) and I-84 Eastbound in East Hartford. This highway was broken down into 9 smaller segments. The segment with the most crashes (37) is between Interchange 90 On-Ramp – Main St. to Interchange 91 Off-Ramp – Silver Lane. The most common types of crashes for the Route 15 Northbound segment are fixed objects (98), rear-ends (50) and sideswipes (43). The remaining ten (10) crashes were moving object (5), miscellaneous non-crash (3), sideswipe – opposite direction (1) and head-on (1). The four (4) most common contributing factors to crashes on this section of State Route 5/15 are driver lost control (73), following too closely (45), speed too fast for conditions (30) and improper lane change (23).

Sixty-one (61) injuries and 3 fatalities were reported on this segment of State Route 5/15 northbound. One fatality occurred on the segment between Interchange 87 Off-ramp – Brainard Road to Interchange 89 Off-ramp – I-91 Northbound. Another fatality occurred on the segment between Interchange 89 On-ramp – I-91 Northbound to Interchange 90 Off-ramp – Route 2/Main St. The third fatality occurred along the Interchange 91 Off-ramp – Silver Lane to Interstate 84 Eastbound segment.

The Interstate 84 Eastbound segment between Interchange 57 - Route 15 Northbound On-Ramp to Interchange 58 - Roberts St. On-Ramp was the only segment along Interstate 84 Eastbound included in the study. Of the 30 crashes that occurred on this segment over the three year review, 13 were sideswipe crashes which is the most common type of crash on this segment. The most common crash contributing factor was driver lost control. Of the 30 crashes, 7 were a result of driver lost control. Seven (7) injuries were reported along this segment of Interstate 84 Eastbound with no fatalities.

As was noted in Section III – Purpose and Need above, existing traffic queues have been observed to extending onto I-91 northbound mainline approximately 1.4 miles, taking up the right lane of the three-lane facility. The length of the queue varies, but has been observed to not only occur during normal peak hours of traffic (weekdays 7:00 to 9:00 AM and 4:00 to 6:00 PM) but outside those hours as well. The safety issues are further compounded by drivers that routinely cut into the right-lane queue from the center lane, which impedes traffic flow in that and the left lane and further increases congestion on I-91 in this area. The crash data identified above further support these observations.

The proposed project will serve to correct the issues associated with the queues identified above. By providing a new ramp with sufficient capacity to accommodate traffic, queues on the mainline of the highway should be eliminated thus reducing the number of crashes experienced in this area.

VI. Communities Served

The project is located in limits of the City of Hartford and the Town of East Hartford, Connecticut. Hartford is the state's fourth largest city with a 2014 population of 124,705 people. It is the center of the state's largest metropolitan area (the Hartford-West Hartford-East Hartford Metropolitan Statistical Area) with a total population of more than 1.4 million people (2014) and is the 40th largest metropolitan area in the country.

The City of Hartford is Connecticut's state capitol and is the state's largest employment center with nearly 113,000 jobs in more than 3,500 businesses. It is a center of health care and social assistance (25,745 jobs); finance and insurance (23,074 jobs) and government (19,846 jobs). In addition to the State of Connecticut, the largest employers in Hartford include Northeast Utilities (now Eversource), Travelers Indemnity Co., Hartford Financial Services Group, Aetna Inc., and The Hartford. Approximately 87% of the workers in the city commute into Hartford from outside the city limits. The means of travel for these commuters include primarily public bus transit operated by CT Transit or privately owned motor vehicles. Major limited-access highways serving the City of Hartford include I-91, I-84, State Route 5/15 and State Route 2.

The Town of East Hartford is the state's 19th most populated municipality with an estimated 2014 population of 51,294 residents. It has nearly 29,000 jobs in more than 1,200 businesses including the region's largest private employer, the Pratt & Whitney Aircraft division of United Technologies Corp. which has a major engineering and manufacturing facility there. Other major employers in East Hartford include Goodwin College, Fremont Riverview LLC, Clearwater Paper Corp. and DTZ property services company. Approximately 89% of the workers in East Hartford commute into the town from other communities using public transit buses operated by CT Transit or privately owned motor vehicles. Major limited access highways serving East Hartford include I-84, State Route 5/15, State Route 2 and I-384.

VII. Adjacent Interchanges

Interchange 29 is a partial interchange which provides connection from I-91 northbound to Route 5/15 northbound and from Route 5/15 southbound to I-91 southbound. Given the roadway network in the area with multiple highways and ramps converging on or near the Hartford central business district to the north, as well as I-91 northbound and southbound, there is no need for a full interchange at this location. Travelers on I-84 westbound destined for I-91 northbound or downtown Hartford, would continue past Route 5/15 southbound at Interchange 57 to either Interchange 54 – Founders Bridge/Downtown Hartford or Interchange 51 – I-91 Northbound. Traffic on I-91 Southbound destined for I-84 Eastbound would use Interchange 51 – I-84 Eastbound while travelers coming from downtown Hartford would use State Route 2 Eastbound to directly access I-84 Eastbound.

Immediately to the south of Interchange 29 are two closely spaced interchanges, 28 and 27. Interchange 28 provides access to/from State Route 5/15 Southbound while Interchange 27 provides access to local roads (Airport Road, Brainard Road) in Hartford's South Meadows industrial area.

To the north of Interchange 29 are a series of closely spaced interchanges serving the Hartford central business district. Interchange 29A provides access to the Whitehead Highway (State Route 598), a Principle Arterial – Other Expressway which provides access to major downtown streets (Columbus Boulevard, Trumbull Street, Elm Street, Hudson Street) and the State Capitol area. I-91 Interchanges 30, 31, and 32 just north of the Whitehead Highway interchange provide access to/from several downtown streets and to I-84 to the west.

VIII. Design Exceptions

The proposed project has been designed to current CTDOT design standards. It will however, need to be accommodated within tight geometric conditions between two parallel highways (I-91 and State Route 5/15). In order to provide this change, the proposed project will require a number of design exceptions in order to accommodate the selected alternative. Based on the 85th percentile speeds for both highways, a Design Speed of 70 miles-per-hour has been selected for I-91 and State Route 5/15. Horizontal and vertical controls that do not achieve a Design Speed of 70 miles-per-hour will require Design Exceptions. In addition the proposed design will present substandard shoulder widths and minimum vertical clearances that will require Design Exceptions. Table VIII-1 in Appendix H summarizes the anticipated highway design exceptions while Table VIII-2 summarizes the anticipated bridge design exceptions. None of the Design Exceptions are anticipated to significantly impact the safety or operational characteristics of I-91 or State Route 5/15 within the project limits.

IX. Lane Balance

Within the State of Connecticut I-91 is generally a six (6) lane highway with three (3) lanes in each direction. Along its route however, lanes are added and dropped in key areas to accommodate traffic demand as needed.

In the vicinity of Interchange 29, I-91 northbound has three (3) lanes of travel. To the south, between Interchange 25 – State Route 3 in Wethersfield and Interchange 27 – Brainard Road/Airport Road in Hartford, I-91 northbound is 4 lanes with the right lane dropping at the Interchange 27 off-ramp.

Under the proposed project, this fourth right-lane will be extended approximately 4,000 feet to Interchange 29 – Route 5/15 Northbound. The extension of this lane should help achieve improved operational capacity along this section of the highway. Just to the north, approaching downtown Hartford, two operational lanes are added on the left from State Route 5/15, which drop off approximately $\frac{3}{4}$ of a mile north at the Interchange 29A Off-Ramp to the Whitehead Highway (State Road 598). The three lanes on I-91 continue north an additional $\frac{1}{4}$ mile where the left-lane drops to a left-side collector-distributor road for several ramps to/from local streets and for I-84 Westbound. Through this section of the highway, I-91 mainline is two (2) lanes until just north of I-84 where additional lanes of travel are added from I-84 Westbound and I-84 Eastbound.

X. Regional Need

Northeastern United States is the nation's most densely populated region. Located between the country's largest combined statistical metropolitan area, New York City, New York (23.6 million people in 2014) and the sixth largest, Boston, Massachusetts (8.1 million people in 2014), the State of Connecticut and its highways play a significant role in the movement of travelers and goods within the region as well as serving cities within the state itself. The state is served by several major interstate highways including I-95, I-84 and I-91.

Beginning at I-95 in New Haven, Connecticut approximately 37 miles to the south of Interchange 29, I-91 serves as the major north-south limited-access highway route in western New England connecting that city to Hartford, Connecticut; Springfield, Massachusetts; and eastern Vermont before ending at the Canadian border approximately 253 miles to the north.

I-84 begins near Scranton in northeastern Pennsylvania and travels east through New York State and Connecticut before ending at I-90 in Sturbridge, Massachusetts, approximately 42 miles northeast of Hartford and 56 miles west of Boston. I-84 intersects I-91 in downtown Hartford approximately 1.5 miles north of Interchange 29. At the junction of these two highways, a partial interchange connects I-91 to the north to I-84 Eastbound and Westbound; I-84 to the west to I-91 Northbound and Southbound; I-84 to the east to I-91 Northbound; and I-91 to the south to I-84 Westbound. Missing from the interchange are connections between I-84 Westbound and I-91 Southbound and I-91 Northbound and I-84 Eastbound. These connections are made through the use of State Route 5/15 at interchange 29.

I-95 is the country's eastern most interstate highway serving the United States' eastern seaboard from Florida to Maine. It connects many of the seaboard's major cities including Miami, Washington D.C., Baltimore, Philadelphia, New York City and Boston. As a result, it is a very busy and congested highway particularly between New York and Boston.

Together these highways (I-91, I-84 and I-95) form the basis for major interstate highway connections in western New England and serve as important connecting routes for regional traffic. In order to provide an alternative to a portion of the congested I-95 corridor, many travelers between New York City and Boston will use the inland route of I-91/I-84/I-90 to avoid traffic congestion in the vicinity of Providence, Rhode Island. This route includes the use of Interchange 29 on that alternate route. As a result Interchange 29 receives a significant amount of regional traffic including a significant volume of trucks (approximately 11%). This gives Interchange 29 a significant importance in serving the regional needs of traffic in the northeast.

XI. Transportation System Management

FHWA policy as defined in 23 CFR625.2(a) requires the state agencies to consider transportation system management measures prior to developing transportation projects. These include such measures as mass transit, high occupancy vehicle facilities, intelligent transportation system strategies and non-motorized transportation facilities.

CTDOT has developed a comprehensive plan for transportation within the State of Connecticut. The plan, published in 2014, is entitled *Transportation Infrastructure Capital*

Program and includes plans for all forms of transportation in the state including bus, rail, highway, bicycle, pedestrian and related transportation modes and maritime. The plan provides the Department's mission, information on mobility needs and funding; and discusses the department's strategy for meeting those needs.

In February 2015, Connecticut Governor Dannel Malloy announced a 30-year \$100 billion plan for transportation that includes a wide range of projects for CTDOT and the state. Faced with a deteriorating transportation infrastructure, the Governor proposed increased spending on transportation to repair, expand and improve all forms of transportation within the state. The plan, called *Let's Go CT*, is currently being evaluated. In March 2015, the Governor announced the formation of a panel to analyze and recommend options to finance the proposed plan. Governor Malloy has since publicly supported the project several times and the project has the Department's highest priority.

In 2013, CTDOT began a study of measures to reduce traffic congestion in two areas – I-95 between New Haven and the New York State border and I-84 in Hartford. The study is examining conventional congestion relief measures including highway improvements, transit service improvements, managed lanes, express lanes, congestion pricing and electronic tolling. It is anticipated that the final report will be issued in 2015.

In October 2014, CTDOT Commissioner James Redeker signed a new "Complete Streets" policy to promote safe access for all users by providing a comprehensive, integrated and connected multi-modal network of transportation options.

The Hartford metropolitan area is served by network of highways and mass-transit systems designed to move people into, out of and through the region. The city is served by a comprehensive bus network operated by CT Transit, a public transit division of CTDOT. This includes a series of local and intra-city and express buses that provide mass-transit options for commuters and the traveling public. In April 2015, CT Transit began operation of its new *CTfastrak* bus rapid transit system (the first in the state) operating from New Britain to Hartford (paralleling I-84) and limitedly beyond to key destinations in East Hartford and Manchester. In June 2015, Governor Malloy announced plans to expand the *CTfastrak* further east to additional destinations in East Hartford and Manchester along the existing High-Occupancy-Vehicle (HOV) lanes on I-84. The state will build stations, additional parking and possibly some additional exit ramps for the extended service.

CTDOT is in the process of making improvements along the New Haven-Hartford-Springfield rail line in order to begin high-speed and commuter rail service along its corridor. The train line parallels the I-91 corridor and is designed to offer options for rail mass transit for the traveling public north and south of Hartford. The project is funded under the Federal government's High-Speed Intercity Passenger Rail program with construction beginning in 2014. It will add 27 miles of additional double track; 2 miles of new passing sidings; 5 new interlockings, new signaling and control systems, repair and rehabilitation of bridges and culverts; at-grade crossing improvements; four new or improved stations (Wallingford, Meriden, Berlin and Hartford) and new train equipment. Additional improvements including more stations will be implemented on the corridor as ridership increases and funding becomes available. Service on the corridor is expected to begin in late 2016.

CTDOT is also in the process of addressing issues it has on I-84 west of downtown Hartford. The I-84 Hartford project involves reconstructing approximately 4.3 miles of mainline and ramp bridges that currently exist along this corridor. The bridges have reached the end of their service life and despite investing approximately \$58 million over the past 10 years and an additional \$45 million in the next several years, the structures are anticipated to still require replacement in the near future. Currently the project is in the planning phase with a series of alternatives being considered. Design of a selected alternative is anticipated to begin in 2017 with construction starting in 2020 and completed by 2025.

CTDOT operates a system of 38 lane-miles of 2+ passengers per vehicle High-Occupancy-Vehicle (HOV) lanes along I-84 and I-384 east of the Hartford central business district and along I-91 to the north. The I-84 lanes were opened in the 1989 while the I-91 HOV lanes were opened in 1993. The lanes were designed to serve multi-occupant vehicles (autos, commuter vans, buses and motorcycles) in order to improve overall mobility along the corridors and increase the number of commuters using multi-occupant vehicles. The Average Daily Traffic (ADT) volume for the I-84/I-384 HOV lanes were 7,200 vehicles-per-day in 2013 while the ADT for the I-91 HOV lanes were 9,600 vehicles-per-day. During the peak morning traffic period (6:00 to 9:00 AM) in 2010, the I-84/384 westbound HOV lane carried a total of 1,518 vehicles while the I-91 southbound HOV lane carried a total of 1,514 vehicles.

Since 1995, CTDOT has operated an incident management system (IMS) and highway motor patrol (CHAMPS) along highways in and around Hartford. The IMS includes a series of CCTV cameras, traffic vehicle detectors, variable message signs and highway advisory radio stations along major corridors including I-91 and Route 5/15 in the vicinity of the project. The system is monitored/operated from a central operations center at CTDOT Headquarters in Newington, Connecticut. CTDOT also operates a traffic warning system to alert drivers of incidents and advise them of alternate routes of travel. The system has proven to be an invaluable resource in managing the traffic in the greater Hartford region.

CTDOT and CRCOG are currently working on a project that involves the development of an Intelligent Transportation System (ITS) strategic deployment plan and an update of the regional ITS architecture for the Hartford metropolitan region. CTDOT is also currently designing a project involving the upgrade of their incident management system in the Hartford metropolitan area.

The Department also has two (2) paving and/or safety improvement projects planned for I-91 and State Route 5/15 that include portions of those highways within the limits of the proposed project. State Project No. 159-0191 provides resurfacing, bridge and safety improvements on I-91 from Wethersfield to Windsor. Construction is scheduled to coincide with the proposed project (State Project 63-703). State Project No. 42-0320 is a pavement preservation project east of the Charter Oak Bridge (State Route 5/15) in East Hartford. Construction on this project has begun. Given that the proposed project is several years from construction and the improvements being made under the project noted above are already underway and needed as soon as possible, it is unlikely that any changes in scope or schedule will be made to it.

As noted previously, CTDOT has accepted the concept of “Complete Streets” and made it a policy to address all forms of transportation including non-motorized travel. This has included developing a network of bicycle and pedestrian travelways around the state. In the vicinity of the proposed project, a pedestrian walkway was built as part of the Charter Oak Bridge in 1991 along the north side of the bridge. The walkway connects a series of trails and walkways along each side of the Connecticut River and into downtown Hartford. On the east side of the river, the walkway connects to a park named Charter Oak Landing, located just north of the Charter Oak Bridge. A direct connection to the park via a stairway is provided from the bridge itself while a ramp connection is provided to Reserve Road near the park entrance just to the west. This connects to a bicycle lane along Reserve Road to the south of the park. On the east side of the bridge the walkway connects to a trail in Great River Park in East Hartford also with a stairway. A ramp connection is also provided further to the east connecting to East River Drive at the State Route 5/15 Interchange 90 on-ramp.

The City of Hartford has a plan for its parks and the pedestrian/bicycle connections between them entitled *Capital City Parks Master Plan*. The 2013 plan identifies parks throughout the city including Charter Oak Landing and makes recommendations for improvements and expansions to the parks themselves and to the connections. For Charter Oak Landing, the plan proposes to extend the park to the south under the Charter Oak Bridge and to extend the existing bicycle lane on Reserve Road to the south of the park, north under I-91 to Wawarme Avenue.

XII. Access Connections and Design

I-91 Interchange 29 is an existing interchange that connects to State Route 5/15, a limited access public highway. The interchange was built as part of the original I-91 expressway when it was constructed in the 1960's. As previously noted, the interchange is a partial interchange, connecting I-91 northbound to Route 5/15 northbound and Route 5/15 southbound to I-91 southbound. Because of the area's roadway network and geometric limitations and a nearby redundancy of connections between major highways, there was limited need for a complete interchange at this location. Access to Route 5/15 southbound from I-91 northbound is accommodated at Interchange 28 to the south. Access between I-91 southbound and Route 5/15 southbound is also accommodated also as part of Interchange 28.

I-84 crosses I-91 approximately 1.5 miles north of Interchange 29. Ramp connections there provide connections from I-84 westbound to I-91 northbound and between I-91 southbound and I-84 eastbound. Between Interchange 29 and I-84 is Hartford's central business district. Approximately $\frac{3}{4}$ mile to the north, State Route 2 provides direct access from I-84 to the east and downtown Hartford, so the need for ramp access to/from Route 5/15 to the east is very limited.

XIII. Cost/Benefit Analysis

The proposed project has been estimated to cost between \$225 and \$275 million based upon preliminary engineering plans. A more detailed cost estimate will be developed as the project progresses through Preliminary Design. Also a Cost/Benefit Analysis will be completed for the project for final FHWA approval of the project.

XIV. Transportation Land Use Plans

The project is located in the City of Hartford and the Town of East Hartford, Connecticut. Hartford is a densely developed mature urban area. The immediate area in the vicinity of the project is primarily a fully developed commercial/industrial zone adjacent to a small regional airport, Brainard Airport. In East Hartford the land surrounding Route 5/15 is a mixture of protected lands and commercial, institutional and residential properties. Given that the State Route 5/15 portion of the project is also within existing right-of-way for the existing highway, no impact to adjacent neighborhoods is anticipated.

Land use planning in the State of Connecticut is primarily the responsibility of each municipality. The City of Hartford's 2010 land use plan entitled *One City, One Plan: Plan of Conservation and Development 2020* does not specifically address improvements to the state-owned expressways within the city limits. The Town of East Hartford's 2014 *Plan of Conservation & Development* also does not specifically address improvements to expressways within the town. The proposed project does not conflict with either plan.

Improvements to major expressways such as I-91 and State Route 5/15 are however addressed in the Capitol Region Council of Governments' 2015 *Capitol Region Transportation Plan* which is the metropolitan planning organization's long-range metropolitan transportation plan. The CRCOG plan specifically identifies and recommends this project as one of six major highway improvement projects within the region to be advanced. The project does not however appear on CRCOG's Transportation Improvement Program (TIP) for FFY 2015 – 2018 dated November 12, 2014. Including the project on the TIP and STIP will occur once the project has received approvals and funding which will likely occur in early 2016.

XV. Comprehensive Interstate Network Study

FHWA policy seeks to demonstrate that all projects are in conformance with transportation network system improvement studies. This is particularly important in areas where the potential exists for multiple new interchanges along the corridor. I-91 Interchange 29 is an existing interchange located in a densely populated, mature area with little potential for significant growth. I-91 has several nearby interchanges that serve roadways and neighborhoods in the area. CTDOT does not anticipate adding or significantly changing interchanges in the vicinity of Interchange 29.

XVI. Coordination with Transportation System Improvements

FHWA policy requires agencies to consider and coordinate activities between major transportation projects and any planned development in the region in order to assure minimal adverse impacts on the traveling public. As has been noted above, there are several key transportation projects being planned, under construction or recently opened in the Hartford area. Those projects are designed to improve transportation in and around the greater Hartford region and the department has considered the impacts of them in relation to this project.

The greater Hartford area is a mature densely populated area with minimal potential for significant growth. There are no anticipated plans for private development in the vicinity of this project that would impact or alter the project as currently planned.

XVII. NEPA Status

National Environmental Policy Act (NEPA) requires environmental review for projects that include Federal funding or Federal actions. The approval of the Access Modification is a Federal Action which requires NEPA review and authorization. NEPA requires the evaluation of the environmental effects of projects and to provide clear reasons of why a project is needed (“Statement of Purpose and Need”), adequate consideration of feasible alternatives, to ensure that impacts are avoided, minimized and mitigated wherever reasonably possible.

During the initial assessment of the project CTDOT suggested that the project might be eligible for a Categorical Exclusion based on 23 CFR 771.117 (c) (22) which provides for projects that are entirely within existing operational right-of-way. At a meeting with FHWA (see Appendix I – NEPA Documents), CTDOT and the project consultant team on July 15, 2015 the project’s applicability for a Categorical Determination was reviewed. At that meeting it was determined that, based on the current design and uncertainty regarding right-of-way requirements, there was no type of Categorical Exclusion that the project was clearly eligible for. The decision was made to prepare an Environmental Assessment (EA) for the project with the goal of obtaining a Finding of No Significant Impact (FONSI) as the resolution of the NEPA processes. The final approval of the Access Modification will require the issuance of the FONSI.

The EA document will be combined with an environmental review document required under the Connecticut Environmental Policy Act (CEPA), an Environmental Impact Evaluation (EIE). The documentation for the project will result in the preparation of a joint EA/EIE document. Public scoping notification has been concluded under the CEPA process with several minor comments being made. A Public Information Meeting for the project has been scheduled for January 2016.

XVIII. Highway Capacity Analyses

Traffic volumes for the project corridor within the project limits were developed by the CTDOT – Bureau of Policy & Planning, Office of Policy & Strategic Planning. Included were volumes for the morning peak hour of traffic, evening peak hour of traffic and average daily traffic (ADT) under the 2015 No-Build (existing) traffic condition; the 2039 No-Build traffic condition; and the 2039 Build traffic conditions. These volumes are depicted in Figures 4 (2015 No-Build), 5 (2039 No-Build) and 6 (2039 Build) in Appendix C.

Analysis of the volumes were conducted using methodology outlined in the *2010 Highway Capacity Manual* developed by the Transportation Research Board (TRB) and replicated in computer software entitled *Highway Capacity Software 2010 (HCS 2010)*, Release 6.65. These analyses provide an operating condition, or Level-of-Service (LOS), using a grading scale similar to that used in most schools with LOS A being the highest LOS (a generally free-flow traffic condition) while LOS F is the lowest (a fully saturated traffic flow condition). In Connecticut, LOS D is commonly considered to be an “acceptable” LOS

while LOS C or better is considered to be “desirable”. LOS E is considered to be “undesirable”. Analyses were conducted for each freeway segment, ramp junction and weave area along the corridor within the project limits. The criteria for each LOS is based on density of traffic in terms of passenger cars per mile per lane (pc/mi/ln). The tables below identify the parameters of that criteria for each LOS.

Table XVIII - 1 LOS Criteria for Freeway Segments*		
LOS	Density (pc/mi/ln)	Comments
A	≤ 11	Free-flow speed operations with unimpeded maneuvers
B	> 11-18	Reasonably free-flow speed operations with slightly restricted maneuvers
C	> 18-26	Speeds near free-flow speeds with noticeably restricted maneuvers
D	> 26-35	Speeds begin to decline with seriously limited ability to maneuver
E	> 35-45	Operation at capacity with little room to maneuver
F	>45	Demand exceeds capacity with breakdown or unstable flow

Table XVIII - 2 LOS Criteria for Ramp Merge/Diverge*		
LOS	Density (pc/mi/ln)	Comments
A	≤ 10	Unrestricted operations
B	> 10-20	Merging & diverging maneuvers noticeable
C	> 20-28	Influence area speeds begin to decline
D	> 28-35	Influence area turbulence becomes intrusive
E	> 35	Turbulence felt by virtually all drivers
F	Demand exceeds capacity	Ramp & freeway queues form

Table XVIII - 3 LOS Criteria for Weaving Segments*		
LOS	Density (pc/mi/ln)	
	Freeway Weaves	Multilane or CD Weaves
A	0-10	0-12
B	> 10-20	> 12-24
C	> 20-28	> 24-32
D	> 28-35	> 32-36
E	> 35	> 36
F	Demand exceeds capacity	Demand exceeds capacity

* 2010 Highway Capacity Manual

2015 No-Build (Existing) Analyses

The results of the analyses for I-91 under the 2015 No-Build (or existing) traffic condition are consistent with the peak hour directional flow of traffic with high congestion northbound in the AM peak hour (toward Hartford) and southbound in the PM peak hour (leaving Hartford). The results for I-91 Northbound during the AM peak hour indicate that 1 of the 5 segments operate at LOS F, 1 operates at LOS E and 2 operate at a LOS of D. The 5th segment operates at LOS D. These segments are as follows:

- Interchange 26 On-Ramp – Old Wethersfield to Interchange 27 Off-Ramp – Brainard Road operates at LOS D
- Interchange 27 Off-Ramp – Brainard Road to Interchange 28 Off-Ramp – State Route 5/15 Southbound operates at LOS F
- Interchange 28 Off-Ramp – State Route 5/15 Southbound to Interchange 29 Off-Ramp – State Route 5/15 Northbound operates at LOS E

- Interchange 29 Off-Ramp – State Route 5/15 Northbound to Interchange 29 On-Ramp – State Route 5/15 Northbound operates at LOS of D
- Interchange 29 On-Ramp – State Route 5/15 Northbound to Interchange 29a Off-Ramp – Whitehead Highway operates at LOS C

Of the 3 ramps analyzed on I-91 northbound, all resulted in a LOS F. These ramps are as follows:

- I-91 Northbound Interchange 27 Off-Ramp to Brainard Road
- I-91 Northbound Interchange 28 Off-Ramp to State Route 5/15 Southbound
- I-91 Northbound Interchange 29 Off-Ramp to State Route 5/15 Northbound

During the PM peak hour, all of the I-91 northbound segments and ramps were found to operate at LOS D or better except for the ramp from I-91 Northbound at Interchange 29 to State Route 5/15 Northbound which operates at LOS F.

The results for I-91 Southbound for the PM peak hour indicate that 2 of the 6 segments operate at LOS F, 1 operates at LOS E and the remaining 3 operate at a LOS D. These segments are as follows:

- Interchange 29a On-Ramp – Whitehead Highway to Interchange 27 Off-Ramp – Airport Road operates at LOS D
- Interchange 27 Off-Ramp – Airport Road to Interchange 27 On-Ramp – State Route 5/15 Southbound operates at LOS D
- Interchange 27 On-Ramp – State Route 5/15 Southbound to Interchange 28 Off-Ramp – State Route 5/15 Southbound operates at LOS D
- Interchange 28 Off-Ramp – State Route 5/15 Southbound to Interchange 28 On-Ramp – State Route 5/15 Southbound Airport Road operates at LOS E
- Interchange 28 On-Ramp – State Route 5/15 Southbound Airport Road to Interchange 27 On-Ramp – State Route 5/15 Northbound operates at LOS F
- Interchange 27 On-Ramp – State Route 5/15 Northbound to Interchange 26 Off-Ramp – Old Wethersfield operates at LOS F

Of the 4 southbound ramps analyzed, 3 operate at a LOS F and one (Interchange 86 On-Ramp from I-91 Southbound/Airport Road) operates at LOS C during the PM peak hour. The ramps operating at LOS F are as follows:

- I-91 Southbound Interchange 28 Off-Ramp to Route 5/15 Southbound
- I-91 Southbound Interchange 28 On-Ramp from Route 5/15 Southbound, Airport Road
- I-91 Southbound Interchange 27 On-Ramp from Route 5/15 Northbound

The AM peak results for I-91 Southbound indicate that all of the segments and ramps operate at LOS D or better.

The results for State Route 5/15 Northbound during the AM peak indicated that all 9 freeway segments analyzed operates at LOS D or better which is considered to be acceptable.

The PM peak hour results indicate that only 1 of the 9 freeway segments operate at an unacceptable LOS (LOS E) while the remaining 8 operate at acceptable LOS (LOS D or better). The segments that operates at LOS of E during the PM peak hour between the Interchange 90 Off-Ramp – State Route 2/Main Street to Interchange 90 On-Ramp – Main Street.

Of the 3 ramps analyzed during the AM peak hour, the ramp from State Route 5/15 Northbound Interchange 86 Off-Ramp to I-91 Southbound operates at LOS E. The other ramps operate at acceptable LOS (D or better).

During the PM peak hour only the State Route 5/15 Northbound Interchange 87 On-Ramp from Brainard Road operates below a satisfactory LOS with a LOS of F. The other ramps operate at acceptable LOS (D or better).

There were also 3 weave segments analyzed on State Route 5/15 Northbound. During both the AM and PM peak hour 2 of the 3 operate at LOS F while the other (Main Street On-Ramp to Silver Lane Off-Ramp) operates at a LOS B during the AM peak hour and LOS C during the PM peak hour. The 2 segments that operate at a LOS F are:

- Brainard Road On-Ramp to I-91 Northbound Off-Ramp
- I-91 Northbound On-Ramp to State Route 2/Main Street Off-Ramp

The results for I-84 are also consistent with directional flow volumes, high congestion westbound (toward Hartford) in the AM peak hour and eastbound (away from Hartford) in the PM peak hour. The results indicate that for I-84 Westbound, the segment from Roberts Street On-Ramp to Main Street On-Ramp operates at a LOS E during the AM peak and at a LOS C in the PM peak hour. The results for eastbound indicate that the segment from Int. 57 - State Route 15 Northbound On-Ramp to Int. 58 - Roberts Street On-Ramp operates at a LOS B during the AM peak and at a LOS E during the PM peak.

Figure 7 in Appendix C depicts the analysis results for the 2015 No-Build (Existing) traffic conditions within the project limits. A summary of the results are also included in Table XVIII-4 (I-91 NB & SB), Table XVIII-5 (State Route 5/15 NB & SB) and Table XVIII-6 (I-84 EB & WB) in Appendix J. Copies of the 2015 No-Build (Existing) analyses are also included in Appendix J.

2039 No-Build Traffic Analyses

The results for the I-91 2039 No-Build analyses show continued deterioration of the operation of highways within the project area as traffic grows in the future. The analyses results continue to be consistent with the directional flow volumes: high congestion northbound in the AM peak hour (toward Hartford) and southbound in the PM peak hour (leaving Hartford).

The results for I-91 Northbound during the AM peak hour indicate that 2 of the 5 segments will operate at a LOS F and 2 at a LOS E. The 5th segment operates at a LOS of D. These segments are as follows:

- Interchange 26 On-Ramp – Old Wethersfield to Interchange 27 Off-Ramp – Brainard Road operates at LOS E
- Interchange 27 Off-Ramp – Brainard Road to Interchange 28 Off-Ramp – State Route 5/15 Southbound operates at LOS F
- Interchange 28 Off-Ramp – State Route 5/15 Southbound to Interchange 29 Off-Ramp – State Route 5/15 Northbound operates at LOS F
- Interchange 29 Off-Ramp – State Route 5/15 Northbound to Interchange 29 On-Ramp – State Route 5/15 Northbound operates at LOS of E
- Interchange 29 On-Ramp – State Route 5/15 Northbound to Interchange 29a Off-Ramp – Whitehead Highway operates at LOS D

Of the 3 ramps analyzed, all 3 resulted in a LOS F during the AM peak hour. These ramps are as follows:

- I-91 Northbound Interchange 27 Off-Ramp to Brainard Road
- I-91 Northbound Interchange 28 Off-Ramp to State Route 5/15 Southbound
- I-91 Northbound Interchange 29 Off-Ramp to State Route 5/15 Northbound

During the 2039 No-Build PM peak hour all of the freeway segments operate at LOS D or better. One of the ramps, the ramp from Interstate 91 Northbound at Interchange 29 to State Route 5/15 Northbound operates at LOS F while the other 2 are anticipated to operate at LOS D or better.

The results for I-91 Southbound under the 2039 No-Build traffic condition for the PM peak hour indicate that 3 of the 6 freeway segments operate at LOS E and the remaining 3 segments operate at a LOS F. These segments are as follows:

- Interchange 29a On-Ramp – Whitehead Highway to Interchange 27 Off-Ramp – Airport Road operates at LOS E
- Interchange 27 Off-Ramp – Airport Road to Interchange 27 On-Ramp – State Route 5/15 Southbound operates at LOS E
- Int. 27 On-Ramp – State Route 5/15 Southbound to Int. 28 Off-Ramp – State Route 5/15 Southbound operates at LOS E
- Interchange 28 Off-Ramp – State Route 5/15 Southbound to Interchange 28 On-Ramp – State Route 5/15 Southbound Airport Road operates at LOS F
- Interchange 28 On-Ramp – State Route 5/15 Southbound Airport Road to Interchange 27 On-Ramp – State Route 5/15 Northbound operates at LOS F
- Interchange 27 On-Ramp – State Route 5/15 Northbound to Interchange 26 Off-Ramp – Old Wethersfield operates at LOS F

Of the 4 southbound ramps analyzed, 3 operate at a LOS F during the PM peak hour and one, I-91 Southbound Off-Ramp to Airport Road, operates at LOS D. The ramps with a LOS of F are as follows:

- I-91 Southbound Interchange 28 Off-Ramp to Route 5/15 Southbound
- I-91 Southbound Interchange 28 On-Ramp from Route 5/15 Southbound, Airport Road
- I-91 Southbound Interchange 27 On-Ramp from Route 5/15 Northbound

The AM peak results for I-91 Southbound indicate that all of the segments and ramps operate at LOS D or better except for the freeway segment from Interchange 27 On-Ramp from Route 5/15 NB to Interchange 26 Off-Ramp to Old Wethersfield. This segment operates at LOS E during the AM peak hour under 2039 No-Build traffic condition.

The results for State Route 5/15 Northbound during the 2039 No-Build AM peak indicated that, of the 6 freeway segments analyzed, 2 operate at unacceptable LOS (LOS E or worse). These 2 segments are:

- Interchange 85 – Silas Deane Highway On-Ramp to Interchange 86 Off-Ramp – I-91 Southbound operates at LOS F
- Interchange 86 Off-Ramp – I-91 Southbound to Interchange 87 Off-Ramp - Brainard Road operates at LOS E

The remaining freeway segments operate at LOS D or better.

During the 2039 No-Build PM peak hour, the results indicate that 3 of the 6 freeway segments operate at an unacceptable LOS (LOS E or F) while the remaining operate at acceptable LOS (LOS D or better). The 3 segments that operate at LOS of E or F during the PM peak hour are:

- Interchange 89 Off-Ramp – I-91 Northbound to Interchange 89 On-Ramp – I-91 Northbound (LOS E)
- Interchange 90 Off-Ramp – State Route 2/Main Street to Interchange 90 On-Ramp – Main Street (LOS F)
- Interchange 90 On-Ramp – Main Street to Interchange 91 Off-Ramp – Silver Lane to I-84 Eastbound (LOS F)

All 3 ramps analyzed during the 2039 No-Build AM and 2 of the ramps during the PM peak hours operate at unacceptable LOS (LOS E or F). During the PM peak hour only the State Route 5/15 Northbound Int. 87 Off-Ramp to Brainard Road operates at acceptable LOS (D or better).

There were also 3 weave segments analyzed on State Route 5/15 Northbound. During both the AM and PM peak hours 2 of them operate at LOS F while the other (Main Street On-Ramp to Silver Lane Off-Ramp) operates at a LOS B during the AM peak hour and LOS F during the PM peak hour. The 2 segments that operate at a LOS F are:

- Brainard Road On-Ramp to Interstate 91 Northbound Off-Ramp
- I-91 Northbound On-Ramp to State Route 2/Main Street Off-Ramp

The results for I-84 continue to be consistent with directional flow volumes, high congestion westbound (toward Hartford) in the AM peak hour and eastbound (away from Hartford) in the PM peak hour. The results indicate that for I-84 Westbound, the segment from Roberts Street On-Ramp to Route 15 Off-Ramp operates at a LOS F during the AM peak and at a LOS D in the PM peak hour. The results for eastbound indicate that the segment from Interchange 57 - Route 15 Northbound On-Ramp to Interchange 58 - Roberts Street On-Ramp operates at a LOS C during the AM peak and at a LOS F during the PM peak.

Figure 8 in Appendix C depicts the analysis results for the 2039 No-Build traffic conditions within the project limits. A summary of the results are also included in Table XVIII-7 (I-91 NB & SB), Table XVIII-8 (State Route 5/15 NB & SB) and Table XVIII-9 (I-84 EB & WB) in Appendix J. Copies of the 2039 No-Build analyses are also included in Appendix J.

2039 Build Traffic Analyses

The results for the I-91 Design Year 2039 Build analyses show significant improvement in operating conditions in the vicinity of the relocated I-91 Northbound Off-Ramp at Interchange 29 – State Route 5/15 NB. During the AM peak hour of traffic the freeway segments from Interchange 27 Off-Ramp – Brainard Road to Interchange 28 Off-Ramp – State Route 5/15 Southbound improves from LOS F to LOS E and the segment from Interchange 28 Off-Ramp – State Route 5/15 Southbound to Interchange 29 Off-Ramp – State Route 5/15 Northbound improve from LOS F to LOS E. During the PM peak hour all of the freeway segments on I-91 Northbound operate at acceptable LOS (LOS D or better).

Of the 3 ramps analyzed on I-91 Northbound during the 2039 Build AM peak hour, the I-91 Northbound Int. 28 Off-Ramp to State Route 5/15 Southbound improves from LOS F to LOS D and the I-91 Northbound Interchange 29 Off-Ramp to State Route 5/15 Northbound improves from LOS F to LOS B. During the PM peak hour, all of the ramps operate at desirable LOS (LOS C or better).

The results for State Route 5/15 Northbound during the 2039 No-Build AM peak indicated that with the proposed improvements the operations improves to acceptable LOS (LOS D or better) at the following locations:

- Interchange 89 Off-Ramp – I-91 Northbound to Interchange 89 On-Ramp – I-91 Northbound
- Interchange 90 Off-Ramp – State Route 2/Main Street to Interchange 90 On-Ramp – Main Street
- Interchange 91 Off-Ramp – Silver Lane to I-84 Eastbound

The weave conditions on State Route 5/15 Northbound between Interchange 89 On-Ramp – I-91 Northbound and Interchange 90 Off-Ramp – State Route 2/Main Street improves to LOS B during the AM peak hour. The weave between Interchange 90 On-Ramp – Main Street and the Interchange 91 Off-Ramp – Silver Lane improves to an acceptable LOS (LOS D or better). Other freeway segments, ramps and weaves on I-91, Route 5/15 and I-84 remain unchanged from the 2039 No-Build traffic conditions.

Figure 9 in Appendix C depicts the analysis results for the 2039 Build traffic conditions within the project limits. A summary of the results are also included in Table XVIII-10 (I-91 NB & SB), Table XVIII-11 (State Route 5/15 NB & SB) and Table XVIII-12 (I-84 EB & WB) in Appendix J. Copies of the 2039 Build analyses are also included in Appendix J.

XIX. FHWA Policy Requirements

On August 27, 2009, FHWA published a revised policy statement regarding requests for new or modified access to interstate highways. The new policy outlined eight (8) policy

requirements that need to be addressed in all interstate highway modification applications. In August 2010 FHWA issued a document entitled *Interstate System Access Informational Guide* which further outlined and defined the information and methods for analyzing interstate highway access and modification requests including further definition of the eight (8) Policy Requirements. Each of the policy points have been addressed in previous sections of this document. Those Policy Requirements and how they are addressed in this document are as follows:

Policy Requirement 1: *The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).*

Response: As it was noted in Section II – Revised Access Description, the proposed project involves relocating and reconfiguring an existing exit ramp at Interchange 29 on I-91 Northbound in Hartford, Connecticut. The current single-lane ramp fails operationally (see Section XVIII – Highway Capacity Analyses) and has a long history of significant crash issues (see Section V – Areas of Concern). The interchange serves as a freeway-to-freeway connection between I-91 and Route 5/15 and serves as the major connecting route between I-91 south of the interchange and I-84 to the west. The issues associated with this interchange cannot be resolved adequately with improvements to local roads, access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage.

Policy Requirement 2: *The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).*

Response: As discussed in Section XI – Transportation System Management of this report, transportation system management measures have been implemented along the corridor and in the region but are not anticipated to reasonably improve the issues experienced in the project area. The use of additional Transportation System improvement measures are unlikely to reasonably improve the issues identified to occur within the project area. Because Interchange 29 is a freeway-to-freeway connection, use of ramp metering cannot be utilized to solve the issues. Limited right-of-way in the vicinity of the project limits the ability of adding HOV facilities on the I-91 corridor. Mass transit improvements in the corridor are being constructed but they are unlikely to improve on the traffic conditions at the interchange since those facilities are not anticipated to significantly decrease traffic on the Interchange 29 ramp. A number of alternative geometric revisions have been considered by CTDOT but none of the other alternatives were found to be a reasonable solution to the issues (see Section IV – Supporting Background Information/Alternatives).

Policy Requirement 3: *An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified*

ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

Response: An analysis of the proposed project indicates it will have a significant positive impact on the operations and therefore the safety of I-91 within the project study area under the Design Year 2039 traffic conditions. The analysis includes freeway segments, ramps and weave areas within the project limits as well as those sections of highway and interchanges immediately north and south of the project area. Section XVIII – Highway Capacity Analyses includes a description of the impacts of the project showing that they safely and efficiently collect, distribute and accommodate traffic on the interstate facility and its ramps. The section of I-91 Northbound in the vicinity of Interchange 29 improves from LOS F to LOS C. This should mean the elimination of vehicles queuing on the mainline highway from the exit ramp and thus significantly improve the safety of that section of the highway. The analyses also indicate that there should be no significant change to operations, and therefore the safety, of the highway sections and interchanges to the north and south of the project area. As noted in Section IV – Supporting Background Information/Alternatives, a preliminary advanced signing plan has been prepared for the proposed project. That plan is included in Appendix E.

Policy Requirement 4: *The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).*

Response: The proposed project ramp connects I-91 to State Route 5/15 which is a public road. While Interchange 29 is a partial interchange by numbering, together with Interchange 28 to the south it provides full access between I-91 and State Route 5/15. The proposed project has been designed to meet current CTDOT design standards. Because of some geometric constraints it will require several design exceptions as has been noted in Section VIII – Design Exceptions. These exceptions should not however, impede or limit traffic operations and safety of the proposed interchange ramp.

Policy Requirement 5: *The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the*

adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.

Response: As noted in Section XIV – Transportation Land Use Plans, the proposed project is identified in the Capitol Region Council of Governments’ 2015 *Capitol Region Transportation Plan* as a top transportation improvement project for the region. The project does not however appear on the *Metropolitan Transportation Improvement Program (TIP)* or the *Statewide Transportation Improvement Program (STIP)*. It is CTDOT policy to not include them on these programs until the project has received full Federal approval and funding.

Policy Requirement 6: In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).

Response: As noted in Section XVI – Coordination with Transportation System Improvements, the project is located in a mature urban area with limited potential for future new growth or the need for multiple new interchanges in the vicinity of the project site.

Policy Requirement 7: *When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).*

Response: The project is not being proposed due to new, expanded or substantial change in current or planned future development or land use. As discussed in Section III – Purpose and Need, the project is being proposed to address safety and operational concerns on I-91 Northbound associated with Interchange 29.

Policy Requirement 8: *The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).*

Response: Section XVII – NEPA Status discusses the status of the environmental review and approval process for the project.

As can be seen in the outline above, this report covers all pertinent portions of the eight (8) policy requirements of FHWA. The project has been planned to address much needed safety and operational issues on I-91 Northbound in the vicinity of Interchange 29 and should go a long way to significantly improve operational and safety conditions faced by the traveling public.