

Preliminary Design Phase

## Design Report

# Extension of Monteith Drive over Farmington River

Town of Farmington, Connecticut

Department of Public Works

Engineering Division

AECOM

Rocky Hill, CT

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### 1. Project Description

This project involves the extension of Monteith Drive across the Farmington River (River) on a new 970 foot long roadway and bridge to provide a connection between Farmington Avenue (Route 4) north of the River and New Britain Avenue to the south. The proposed crossing is located where the River is narrow and the elevation of Farmington Avenue (Route 4) is approximately 30 feet higher than the base flood elevation, making it an ideal place for a new bridge over the River.

### 2. Purpose and Need

The new crossing will provide a critical transportation link between Town facilities that are separated by the River. Motorists, pedestrians and bicyclists will have the opportunity to travel directly between the Town Hall, Town Library and High School that are located on the north side of the River to and from the Police Station, Community Center, Senior Citizen Center and Public Works facility that are located on the south side of the River. The most direct route currently available between the Town facilities on each side of the River is 2.4 miles long on a route that crosses the South Main Street (Route 177) bridge in Unionville. The other option is a route that is 7.5 miles long using the Farmington Avenue (Route 4) bridge crossing in Farmington Village. Both routes require negotiating two very busy and congested 5-legged intersections with Route 4/Route 177/School Street in Unionville and the Route 4/10/Garden Street intersection in Farmington Village. The travel time associated with both routes is seriously impacted by the traffic congestion that typically occurs at each crossing during peak traffic hours and throughout the day.

A new River crossing in Farmington will give motorists, pedestrians and bicyclists another option for getting across the River that bisects the Town. A new crossing will improve travel time and reduce congestion at the crossings that are located in the Town Centers of Farmington Village and Unionville. It will also give Police, Fire and Medical emergency responders another option for crossing the River. Other benefits include improved access to Tunxis Mead Park, the Town Boathouse, School Bus facility and Waste Management truck facility. It will also provide an alternative River crossing when the 78 year old South Main Street (Route 177) Bridge in Unionville is flooded, under repair or when it becomes structurally deficient. A new crossing will allow the opportunity for a circuitous bus route that follows Farmington Avenue (Route 4) through Unionville onto New Britain Avenue and across the new bridge back to Farmington Avenue (Route 4). The new route will be a direct connection between the Senior Housing complex in the center of Unionville and the Senior Center located on New Britain Avenue.

### 3. Background

The Town commissioned the Pert Group in 2014 to conduct a survey among Farmington Residents in order to update their Strategic Plan. The survey revealed traffic flow on main roads is considered a major problem by 72% of residents. As a result, the Town set a Strategic Plan Goal (No. 5) to continue to evaluate the potential and location of an additional River crossing with the State of Connecticut Department of Transportation to alleviate traffic congestion in the Town Centers. A presentation on a new River crossing was given to the Town Council at their September 27, 2016 meeting. It was the consensus of the Council to continue to pursue a new River crossing at the recommended location.

### 4. Evaluation of Existing Traffic Conditions and Performance

At the Town's request, the Capitol Region Council of Governments (CRCOG) prepared an update to the Traffic Modeling work they did for the Town in 2008 (Appendix A). CRCOG performed 2015 and 2040 regional travel demand model runs to evaluate predicted traffic volumes on the existing transportation network under a No Build Scenario and with the new bridge crossing, Build Scenario that extends Monteith Drive over the Farmington River and connects Farmington Avenue (Route 4) to New Britain Avenue.

CRCOG's report makes reference to the Route 4 Corridor Study that was conducted in the late 1990's. In that study, a new roadway and bridge over the River was proposed to connect New Britain Avenue to what is now Bridgewater Road at the existing intersection with Farmington Avenue (Route 4) and Brickyard Road. This crossing is located substantially east of the current proposed crossing (see Appendix A, page 4). In a November 1998 Town-wide referendum, residents defeated that proposed crossing. CRCOG recently stated "given the increased development since the original study and the new location of the envisioned crossing, it appears worthwhile to explore this new proposal."

The following are direct excerpts from CRCOG's report:

2015: No-Build (existing) and Build Traffic Analyses

Table 1 shows estimated traffic under existing conditions (2015 No-Build) and immediately upon completion of the envisioned roadway/bridge (2015 Build). If provided, the new roadway/bridge is estimated to immediately carry approximately 11,200 vehicles per day, which for

comparison purposes is just more than half the traffic volume that Unionville's Route 177 Bridge over the Farmington River currently carries. The table also summarizes the anticipated build scenario changes to traffic in the following three nearby areas: Near the new Bridge, in Unionville Village, and in Farmington Center.

Near the new bridge, traffic as a whole is anticipated to increase moderately (about 11%); however traffic on each individual roadway approach to the new connection is anticipated to vary greatly. For example, traffic along New Britain Avenue is anticipated to increase significantly (by about 75%) east of the new roadway, but experience a significant decrease (over 40%) west of the new roadway. Additionally, traffic volumes on Route 4 east and west of Monteith Drive are anticipated to increase moderately.

In Unionville Village, traffic as a whole is anticipated to decrease moderately (about 15%) along the major roadways. Traffic volumes are anticipated to decrease significantly on New Britain Avenue (over 40%) and along Route 177 near the Farmington River Bridge (almost 30%), with other roadways seeing more modest decreases. None of the major roadways are projected to see traffic volume increase.

In Farmington Center, as a whole, traffic is anticipated to decrease slightly (just over 3%), with north-south roadways seeing modest traffic decreases and Route 4 east-west seeing almost insignificant changes to traffic volumes.

#### 2040: No-Build and Build Traffic Analyses

CRCOG also utilized its travel demand model to project area traffic to the year 2040 for both the existing roadway network (2040 No-Build) scenario and for the envisioned Monteith Drive extension (2040 Build) scenario. The results of these model runs are shown in Table 2, including the estimated change in traffic as compared to existing conditions (2015 No-Build).

If built, traffic on the new roadway/bridge is estimated to carry approximately 14,000 vehicles per day by 2040. Due to traffic being redistributed to the area, future traffic growth is expected to be exacerbated on roadways in the immediate surrounding area. Without changes to the current roadway network, traffic volumes in this area are expected to increase by 18% by 2040, however with the new roadway/bridge traffic volumes are expected to see an increase of 32% over current volumes.

Conversely, the construction of the envisioned new roadway/bridge is expected to help slow the growth of traffic in both Unionville Village and Farmington Center. Without changes to the current roadway network, by 2040 traffic volumes in Unionville Village and Farmington Center are expected to increase by 20% and 11%, respectively. However with a new roadway/bridge, 2040 traffic volumes in Unionville Village and Farmington Center is expected to grow just 3% and 7%, respectively, above current levels.

## 5. Base Plan Information

Town of Farmington GIS mapping was used as base information for this initial phase of design to determine the feasibility of the project location, impact to the right-of-way, Town defined wetland areas and to develop preliminary construction costs. More detailed field survey, wetland field delineation, utility test pits, structure type study, aesthetics and hydraulic study will be performed under a subsequent design phase.

## 6. Alternatives Considered

### 6.1 Alternative No. 1 – Recommended Alignment

A preliminary design plan showing the overall proposed concept was prepared and is shown in Appendix B – Alternative 1 Plan Sheet. A rendering of this alternative was also prepared and superimposed on an aerial photograph of the project area (see Appendix B – Alternative 1 Rendering). The Preliminary design plans were based on this alternative and are found in Appendix – I.

#### 6.1.1 Monteith Drive

Under this alternative, Monteith Drive will be reconstructed and widened from Station 41+00 to 47+00, a distance of 600 feet. The new roadway will provide two 12 foot lanes in each direction separated by an 8 foot wide traffic island. In addition, there will be 4 foot shoulders, 3 foot snow shelf areas and 6 foot concrete sidewalks on both sides of the proposed roadway. The realignment will have minimal impact to the Town Hall and Town Library parking lots. The existing Monteith Drive has no shoulder areas, a narrow bituminous sidewalk on one side and provides only one inbound lane to the High School. The new configuration will greatly improve vehicular and pedestrian access to the Town Hall, Town Library and High School.

The lower segment of Monteith Drive will be shifted towards the west to locate the new edge of roadway at about 112 feet away from the nearest corner of the Staples house and about 128 feet from the nearest corner of Farmington Avenue House No. 1535. The upper portion of Monteith Drive will hold the existing offset distance from the Town Library building to the edge of roadway and the widening will occur on the east side of the roadway. The proposed roadway profile grades will closely follow the existing profile grades in order to have minimal impact to the Town Hall and Town Library driveway grades.

#### 6.1.2 Monteith Drive Extension - New Roadway and Bridge

A new roadway will extend Monteith Drive over the River to connect Farmington Avenue (Route 4) with New Britain Avenue. The project limits extend from Station 30+80 to 40+50, a distance of 970 feet. The new roadway and bridge over the River will carry three lanes of traffic, one through lane in each direction and a left turn lane approaching each intersection. There will be 8 foot wide sidewalks and 5 foot wide bicycle lanes on each side of the bridge. For this design report, a steel girder bridge consisting of two, 200 foot long spans located between 26 and 33 feet above the River was considered. This structure will be well above the 500 year flood

elevation. The north span will clear the limits of the River under normal flow conditions. The second span will clear the 500 year floodplain. A centerline pier will be located on the south bank of the River but will be within the 500 year flood plain limits. The roadway segment from the southerly abutment to New Britain Avenue will be built on fill in an area that is above the floodplain. The northerly abutment and centerline pier will be located beyond the edges of the River when it is under normal flow conditions. It is envisioned there will be a segment of the sidewalk on each side of the bridge that will be widened to provide a viewing area of the River. One example of a potential treatment for an overlook area is shown in Appendix C. The next phase of design phase will include a Structure Type Study that will be used to determine the type of structure that will be designed and built. There will also be a process to determine the aesthetic treatments of the bridge. A rendering showing one example of a potential structure type is shown in Appendix D. Aesthetic lighting will be considered along both sides of the bridge and along both sides of all roadways within the project limits. The elevation of Route 4 at the Monteith Drive intersection is 214.9, the elevation of New Britain Avenue at the intersection with the new roadway crossing is 196.4, a difference of 18.5 feet. The profile of the roadway and bridge over the River will follow a 3.4% down grade towards New Britain Avenue to a low point at Station 92+38, than up at a 2.0% grade to the intersection with New Britain Avenue.

### 6.1.3 Farmington Avenue (Route 4)

A segment of Farmington Avenue (Route 4) will require reconstruction and widening to create left turn lanes on each approach to the Monteith Drive intersection. The project limits extend from Station 14+00 to Station 30+50, a distance of 1,650 feet. The roadway will be widened to provide a two lane approach to the intersection. There will be dedicated left turn lanes onto Monteith Drive and onto the new River crossing roadway. There will also be a combination straight/right turn lanes in both directions. The horizontal curve that located near the easterly project limits will be improved by the new alignment. A short retaining wall with a decorative fence on top will be built at the back of the sidewalk on the northerly side of Farmington Avenue (Route 4), west of the Staples House. The wall is needed to minimize impacts to the High School sports practice area and sliding hill if the slope was graded. A retaining wall will also be needed along the south side of Farmington Avenue (Route 4), from the new River crossing roadway and extending about 700 feet to the west. An open rail system will be built along the top of the wall to allow views of the River. The wall is needed to create an area for the new bus stop shelter and to avoid impacts to the parking lot of the former Apricots Restaurant. The proposed profile grades along Farmington Avenue (Route 4) will closely follow the existing profile grades in order to have minimal impact to the driveways that serve several residential properties on the south side of Farmington Avenue (Route 4).

### 6.1.4 New Britain Avenue

New Britain Avenue will be reconstructed from Station 50+00 to Station 60+25, a distance of 1,025 feet. This segment of roadway will be widened to create a two lane approach to a new intersection with the River crossing. The new intersection will have a straight and left

turn lane for eastbound vehicles and a straight and right turn lane for westbound vehicles. There will be essentially no change to the profile grade along New Britain Avenue. It is not anticipated there will be any impacts to the overhead utility lines that run along the south side of New Britain Avenue. The intersection will be controlled by a new traffic control signal that will include an exclusive pedestrian walk phase. A multi-modal trail will be constructed along the north side of New Britain Avenue down to the intersection with Oakridge to provide a connection between the new River crossing and the Farmington multi-modal trail.

#### 6.1.5 Traffic Control

The traffic control signal that is currently located at the intersection of Farmington Avenue and Monteith Drive will be replaced by a new traffic control signal that will include an exclusive pedestrian phase. The intersection of Monteith Drive Extension and New Britain Avenue will also be controlled by a traffic control signal. During the final design phase, traffic volumes will be projected to a 20-year, design year projection. These future volumes will be used to determine traffic signal phasing, lane arrangements and storage length requirements. Signal timings and cycle lengths for these future volumes will also be evaluated during the final design process to verify the proposed lane arrangements that were developed during the preliminary design will remain valid. Consideration will be given to the new Adaptive Traffic Control Signal (ATCS) systems technology. ATCS is a traffic management strategy in which traffic signal timing changes, or adapts, based on actual traffic demand.

#### 6.1.6 Geometric Design Criteria

The geometric design criteria that was used for the Preliminary Design was based on the Connecticut Department of Transportation's (CTDOT) Highway Design Manual. Based on CTDOT Functional Classification Mapping, Farmington Avenue (Route 4) is classified as a Major Collector. Monteith Drive is considered to be classified as a Local Road. The design values used are shown and highlighted on Figure 5C - Two Lane Principal Urban Arterials (New Construction/Major Construction). A copy of Figure 5C is included in Appendix E – Geometric Design Criteria.

#### 6.1.7 Existing and Proposed Pavement Structures

The original pavement structure under Farmington Avenue (Route 4) is reinforced concrete pavement that has trolley tracks embedded along the centerline. Over the years, the roadway has been over-laid with several inches of bituminous concrete. Removal of the original concrete pavement with imbedded trolley tracks that are under the existing bituminous concrete pavement will be factored in the construction cost estimate and schedule.

The proposed pavement structure for Farmington Avenue (Route 4), Monteith Drive and New Britain Avenue consists of 4 inches of Superpave 0.500", placed in two lifts on top of 6 inches of Superpave 1.5", placed in two equal lifts on top of a 10" subbase.

#### 6.1.8 Illumination Recommendations

Ornamental lighting will be located along all sidewalks and on the bridge over the River. It is anticipated overhead utility poles will be used for the roadway lighting, as it is today. If the overhead utility pole line along the north side of Farmington Avenue is relocated as previously mentioned, ornamental luminaire poles will be installed to support the roadway lighting.

#### 6.1.9 Geotechnical

A detailed subsurface exploration program will be conducted during the next phase of design. It will include a soils boring and testing program. Any as-built and soil boring information that may be available from the sanitary sewer project that was constructed along the north side of the River will be considered. Special attention will be given to the areas where the bridge abutments and pier will be located. It is anticipated the bridge abutments and centerline pier will be supported by piles. Based on the rock ledge that is visible along the River during low water flow piles may not be needed if the bridge is supported by spread footings that are founded on stable rock. The subsurface exploration program will confirm the subsurface soil conditions. The foundations will be subjected to scour as such; they will be designed with footings supported on piles, footings founded on rock or deep footings that are located below the maximum estimated scour. This will be confirmed in the subsequent design phases and scour analysis.

#### 6.1.10 ADA Compliance

Provisions will be made at all sidewalk and cross walk locations to ensure all ADA requirements are met.

#### 6.1.11 Pedestrian and Bicycle Accommodation

Sidewalks will be provided on both sides of Monteith Drive and the Extension of Monteith Drive from the High School to New Britain Avenue. They will also be installed along the north side of Farmington Avenue (Route 4) and the north side of New Britain Avenue for the entire length of the project. A Bicycle and Pedestrian Needs Assessment will be prepared in the next phase of design.

#### 6.1.12 Connection to Farmington River Multi-modal Trail

A paved trail will be constructed along the north side of New Britain Avenue all the way to Oakridge where it will connect to the Farmington River Trail, providing a direct connection between the new River crossing and the Town's multi-modal trail system.

#### 6.1.13 Multi-modal Trail

A walking trail will be built starting at the end of the new roadway where it intersects with New Britain Avenue then extend down to and along the River and back to New Britain Avenue, ending at the intersection with Oakridge. It is envisioned this trail will eventually be extended under another project to run along the River and ultimately connect to the Trail System at Tunxis Mead Park. Construction of a multi-modal trail in a regulated floodplain will need to be addressed in the permit process.

#### 6.1.14 Bus Stop and Shelter

The Bus Stop and Shelter that is currently located near House No. 1535 will be relocated to the south side of Farmington Avenue, opposite the Staples House based on the current bus route. If the bus route for busses leaving Unionville is redirected to New Britain Avenue and over the new crossing, the bus stop location will need to be moved to another location along that route.

#### 6.1.15 Rights of Way

This alternative will require two property acquisitions. A parcel where House No. 1541 Farmington Avenue is located will require a property acquisition. A vacant parcel on New Britain Avenue that is currently used for storage of construction equipment and materials will also require an acquisition. A temporary easement from the property owner of the former Apricots Restaurant will be needed to construct the northerly bridge abutment and retaining wall along the south side of Farmington Avenue.

#### 6.1.16 Environmental Analysis and Permitting

The final design phase will include submitting applications for all permits required by federal, state and local regulatory agencies, including local Inland Wetlands and Watercourses agency approval. This project will require a permit from the U.S. Army Corps of Engineers, regardless of the funding source. It is anticipated a Flood Management review at the local level will be needed to comply with the National Flood Insurance Program. This project will have a construction site that disturbs one acre or more which will require a National Pollutant Discharge Elimination System (NPDES) permit under the Federal Clean Water Act. For construction projects with a total disturbed area (regardless of phasing) between one and five acres, the Town must provide a review and written approval of the erosion and sedimentation control measures and certify that the plan follows the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. DEEP Fisheries Division should be contacted early in the design process to discuss any concerns they may have and any requirements that need be addressed.

Following is a list of regulatory approvals which may be required, depending upon the particulars of the project when the design process is advanced beyond the Preliminary Design phase:

- Municipal Inland Wetlands and Watercourses Permit under the Inland Wetlands and Watercourses Act (CGS Sections 22a-36 to 22a-45(a), inclusive), and municipal flood management review
- Water Diversion Permit under the Connecticut Water Diversion Policy Act (CGS Sections 22a-365 to 22a-378(a), inclusive)
- DEEP Certificate of Permission (CGS Section 22a-363b (a))
- U.S. Army Corps of Engineers Permit Application (typically a General Permit concurrence)
- DEEP Section 401 Water Quality Certificate
- DEEP Flood Management Certificate

#### 6.1.17 Hydraulics, Drainage, Scour and Erosion Control

In the next phase of design, a drainage plan will be developed. The existing drainage systems that are along Farmington Avenue (Route 4), Monteith Drive and New Britain Avenue will be analyzed and re-used if they are determined to be adequate or supplemented as needed. The outfalls to the existing systems will be modified to provide the latest required discharge systems. Stormwater management systems will be designed in accordance with the 2004 Connecticut Stormwater Quality Manual, and will incorporate primary treatment measures whenever possible. A determination will be made on how the conceptual drainage design is likely to impact the existing drainage system during the next phase of design. The new roadway and bridge segment will be graded to Sta. 33+00, a low point in the roadway profile that is located about 250 north of New Britain Avenue. The discharge point from a new drainage system will be created in this area which is above the 500 year flood limit. Sedimentation and Erosion Control Plans will be developed in the next phase of design. A scour analysis will also be required, as described in the CTDOT Drainage Manual.

#### 6.1.18 Contaminated and Hazardous Materials

Any potential or suspected contaminated sites will be identified and investigated in the next phase of design. The initial step will be to conduct a screening based on secondary sources. Depending on the results, increasingly evaluations such as a Task 110, 210 or 310 will be conducted to identify and characterize the probability of contamination and corresponding remediation.

#### 6.1.19 Utility Impacts

The northerly abutment will be located to avoid any conflicts with the Sanitary Sewer Trunk-line that follows along the north side of the River. The final design process will need to carefully evaluate and try to avoid any impacts to the 16 inch water main that is located under the bituminous sidewalk along the northerly side of Farmington Avenue, west of the Staples House. In subsequent design phases, test pits will be made to confirm the exact location of the watermain to determine if relocation is required or if the final roadway grade could be set to avoid conflict. The overhead utility pole line carrying electric, telephone and cable provider lines runs along Farmington

Avenue (Route 4) will require relocation. Relocating the overhead utilities will be required in advance of the roadway work. Consideration should be given to relocating the overhead utilities underground within the project limits considering the number of utility poles that have been hit by motor vehicles, particularly on the curve near the former Apricot's Restaurant. The cost of relocating the overhead utilities underground was not included in the current Construction Cost estimate.

#### 6.1.20 Construction Staging

Each roadway segment within the project area will be reconstructed following a unique sequence. The fundamental criteria of maintaining one travel lane in each direction will be followed with the exception of off peak traffic hours to complete tie-in work.

##### 6.1.20.1 Monteith Drive

This segment of the project will be reconstructed in stages during the summer months when the High School is not in full session. Initially, one lane in each direction will be maintained along the westerly side of the roadway while the easterly side of the roadway is reconstructed and widened. When completed, traffic will be shifted onto the newly completed half of the roadway and the remaining half completed then opened to provide two lanes in each direction.

##### 6.1.20.2 Monteith Drive Extension - New Roadway and Bridge

This segment of the project involves constructing a new bridge and roadway to connect Farmington Avenue (Route 4) with New Britain Avenue. All of this work will be completed off line to traffic and will not require any specific staging. A plan will be required to address the need to protect the work area that is along the River in the event of flooding. A sewer protection plan will be developed to ensure the sanitary sewer line that is located along the northerly side of the River will not be impacted by any construction activities.

##### 6.1.20.3 Farmington Avenue (Route 4)

The initial phase of construction will involve reconstructing and widening the northerly side of Farmington Avenue (Route 4). When completed, traffic will be shifted to provide one lane in each direction on the northerly side of the roadway while the southerly side is being reconstructed. Work during this stage will include the construction of the northerly bridge abutment and retaining walls that are located at the back of the sidewalk. When completed, traffic will be shifted onto the final alignment. Work will also include reconstructing the intersection with Monteith Drive and installing a new traffic control signal. If it is determined after taking test pits that relocation is required, it will be a major operation that could be the critical path for

completing this stage of construction. During the final design phase, test pits will be made to locate the watermain to determine if relocation is required. Removal of the original concrete pavement and trolley tracks that are under the existing bituminous concrete pavement will also be a factor in the construction schedule.

#### 6.1.20.4 New Britain Avenue

A minimum of one travel lane will be maintained at all times during construction while the segment of New Britain Avenue within the project limits is totally reconstructed. The initial phase of work involves widening and full depth pavement reconstruction along the north side of New Britain Avenue while maintaining two bidirectional travel lanes on the south side. When the north side work is completed, traffic will be shifted on the newly completed area and the south side will be reconstructed. A traffic control signal will be installed at the new intersection during both stages of construction. When the south side work is completed, traffic will be moved onto the final alignment.

#### 6.1.21.5 Construction Cost Estimate Summary

A preliminary construction cost estimate was developed following CTDOT 2017 Cost Estimating Guidelines. The purpose of the estimate is to provide an order of magnitude construction cost estimate for planning purposes. A detailed construction estimate will be prepared based on the Departments guidelines for preparing a final design construction cost estimate when the base survey and final design have been completed. The following is a summary of the Preliminary Construction Cost Estimate for Alternative No. 1.

Bridge	\$10,000,000
Retaining Walls	\$700,000
Roadway Reconstruction	\$6,000,000
Traffic Control Signals	\$425,000
Sidewalks	\$400,000
Sub-total	\$17,500,000
20% Contingency	<u>\$3,500,000</u>
Total	<u>\$21,000,000</u>

#### 6.1.21.6 Construction Schedule

It is expected there will be an advance utility relocation contract that will complete all utility relocations in advance of the start of construction. It is anticipated all work will be completed within two full construction seasons if started early in the construction season. The major component of the project involves constructing a new bridge and roadway over the River can be completed off line from traffic flow, it is expected the work will be completed in two full construction seasons. All other work involving roadway reconstruction of Farmington Avenue (Route 4), New Britain Avenue and Monteith Drive to be constructed in stages will also be completed within the two seasons. Work on Monteith Drive is limited to the summer months when the High School is not in full session. The critical roadway work will be completed within the summer school vacation period.

#### 6.1.21.7 Landscaping

The project will include an extensive landscape component in the next phase of design. The reconstructed Monteith Drive roadway serves as a gateway to the Town Hall, Town Library and High School. The intersection will be landscaped to provide an aesthetically pleasing treatment, deserving of the area. Work will include incorporating the newly installed High School variable message information sign. The sign will be relocated to a prominent location.

### 6.2 Alternative No. 2

This alternative is similar to Alternative No. 1 except the alignment of Monteith Drive is shifted closer to the Staples House and further away from Farmington Avenue House No. 1535. A preliminary design plan of this alternative is shown in Appendix F. All of the other aspects of this alternative are the same except for impacts to the Town Library Parking lot configuration. With the alignment shifted further to the west, adjustments to the parking area behind the Staples house will need to be made. The new edge of roadway under this alternative will be 68 feet away from the nearest corner of the Staples House and 163 feet away from nearest corner of Farmington Avenue House No. 1535. Under Alternative No. 1, the offset dimensions are 112 feet and 126 feet respectively.

This alternative was discounted because it caused an unnecessary impact to the historic Staples House.

### 6.3 Alternative No. 3

This alternative is also similar to Alternative No. 1 except only the lower portion of Monteith Drive will be relocated and reconstructed. A rendering and preliminary design plan of this alternative is shown in Appendix G. The segment from Farmington Avenue (Route 4) to

the Town Hall and Town Library driveways would require relocation. Within that segment, the alignment is shifted in a westerly direction, closer to the Staples House. The portion of Monteith Drive that is beyond the Town Hall and Town Library driveways will remain in the current configuration with only one inbound lane to the High School. This is the same concept that was presented to the Town Council.

This alternative was discounted because its close proximity to the Staples house and it does not address the need to provide a two lane driveway into the High School.

#### 6.4 Alternative No. 4

This alternative relocates Monteith Drive to the west side of the Town Library and the Staples House along an alignment that was the original access road to the High School. Under this alternative (shown in Appendix H), the existing Monteith Drive will be removed, and the area used to expand the parking areas for the Town Hall and Town Library. The new roadway and bridge will follow a curved alignment that connects directly to Town owned property adjacent to the Community Center. The bridge under this alternative follows a curved alignment and is longer than the other alternatives. This alignment eliminates the need to purchase the New Britain Avenue parcel and provides a long distant separation from Farmington Avenue House No. 1535. The rear portion of the former Apricots Restaurant property will need to be acquired. There is a wetland area where the new roadway connects to New Britain Avenue that will be impacted under this alternative. A structure that spans the wetlands will be needed similar to the driveway to the Community Center and Police Station. A retaining wall along the northerly side of New Britain Avenue would be needed to minimize impacts to the wetlands area from the roadway widening that will be needed. A connection between the Town Hall and the relocated Monteith Drive would be needed. The new roadway bisects the Town Library parking lot, creating separate parking areas on each side. The parking spaces that are displaced by the connector roadway would be replaced using the area that is now Monteith Drive. Under this alternative, the field that is currently used by the High School for sports practice and for sledding will be substantially reduced in area. The Town Hall and Library parking lots will be totally reconstructed.

This Alternative was discounted because the roadway reconstruction limits on Farmington Avenue (Route 4) are much longer, extending westerly to include the intersection with Highwood Road. The culvert that crosses under near the intersection will likely require replacement. In addition, a bridge over wetlands that are located along New Britain Avenue will be required. Lastly, the bridge over the River will be on a curved alignment, making it more costly than the other alternatives.

### 6.5 Alternative No. 5

This alternative considered a crossing that is in the same location as the Staples House. This alignment provides separation from Farmington Avenue House No. 1535, but requires relocating the Staples House to an area in front of the High School or some other location. This alternative requires partial property acquisitions from the former Apricots property and Farmington Avenue House No. 1541. In addition, a vacant parcel on New Britain Avenue that is currently used to store construction equipment and materials property would also need to be acquired, similar to Alternatives No's. 1, 2 and 3.

The Staples House (also known as the Gridley-Parsons-Staples Homestead) is owned by the Town and is listed on the National Register of Historical Places. It is the only large, 18<sup>th</sup> century house that remains standing in what was known as the Town's Northwestern Division, according to the Farmington Historic Society. The original section of the house is thought to have been built in 1732.

Any impacts to this building will require an Environmental Impact Statement (EIS). An EIS is a document, prepared after careful studies, describing a proposed development or activity, and disclosing the possible, probable, or certain effects of that proposal on the environment. The EIS must evaluate all reasonable alternatives and selection is made in the Record of Decision.

Given the direct impact to the Staples House by this alternative and the extensive EIS process that would be needed to relocate the Staples House, this alternative was not developed beyond the conceptual stage. It will not be further pursued due to the availability of other Alternatives that do not have a direct impact on the Historic Staples House.

### 6.6 Alternative No. 6

This alternative reflects a No Build condition that maintains the current roadway network. As previously stated, without any changes to the current roadway network (shown in Appendix A), by 2040, traffic volumes in Unionville and Farmington Village are expected to increase by 20% and 11% respectively. Traffic volumes are expected to grow on New Britain Avenue (near Route 177), by 40%, further adding to the current peak hour congestion. The No Build analysis did not project the additional time and costs associated with delay from traffic congestion. There is no plan associated with this alternative considering there is no change to current/existing roadway network.

Due to the growing traffic congestion in Unionville and Farmington Town Villages and the numerous advantages of building a new crossing, the No-build Alternative is not a viable alternative.

### 6.7 Preliminary Design Plans

Preliminary Design Plans of Alternative No. 1 were developed to advance the design of the Proposed Bridge Location plan that was presented to the Town Council. The following is a list of the plans sheets that were prepared.

- A. Plans:
  - 1. General Plan
    - a. New Roadway Crossing Location
    - b. Trail Connection
    - c. River Access
    - d. Watercourses, Floodways and Floodplains
    - e. Town Facilities
  - 2. Roadway Plans (Scale: 1" = 40')
    - a. Farmington Avenue/Route 4
    - b. New Roadway
    - c. New Britain Avenue
  - 3. Roadway Profiles
    - a. Farmington Avenue/Route 4
    - b. New Roadway
    - c. New Britain Avenue
  - 4. Typical Roadway Section
    - a. New Roadway
  - 5. Critical Cross Sections
  - 6. Bridge Plan (1"=20')
  - 7. Bridge Elevation
  - 8. Typical Bridge Section
  - 9. Retaining Walls Layout Plan
  - 10. Intersection Plans (1"=20')
    - a. Farmington Avenue/Route 4 at Monteith Drive/New Roadway
    - b. New Britain Avenue at New Roadway

## APPENDIX

Appendix A - CRCOG Regional Travel Demand Model Summary

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Appendix I - Preliminary Design Plans – shown for reference only, see full scale plans for clarification and detail

Appendix J - Alternative 1 - Rendering Display Plan

## APPENDIX - A

### CRCOG Regional Travel Demand Model Summary

**To:** Russ Arnold, Director of Public Works, Farmington  
**From:** Rob Aloise, CRCOG Principal Transportation Engineer  
Jennifer Carrier, CRCOG Director of Transportation Planning  
**Date:** February 17, 2017  
**c:** Ming Zhao, CRCOG Principal Transportation Planner  
**Subject:** Estimated Traffic Impact: Extension of Monteith Drive to New Britain Avenue

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Per Farmington's request, CRCOG has performed 2015 and 2040 regional travel demand model runs for the existing transportation network (No-Build) and with the inclusion of a new roadway network connection involving the extension of Monteith Drive south across Route 4 and the Farmington River and terminating at New Britain Avenue (Build). A summary of the results is provided below and in the Tables 1 and 2 on the following pages.

Please know that we are free to meet with you to discuss these results and strategize regarding any plans going forward. Also, attached for your information is the **DRAFT** index plan from the Route 4 Corridor Study CRCOG performed in the late 90's. As shown in the plan, a roadway/bridge was proposed connecting New Britain Avenue to Route 4 across from Brickyard Road (east of the currently envisioned bridge). Our records show that this roadway/bridge connection was defeated in a November 1998 town-wide referendum. However, given the increased development since the original study and the new location of the envisioned crossing, it appears worthwhile to explore this new proposal.

### **2015: No-Build (existing) and Build Traffic Analyses**

Table 1 shows estimated traffic under existing conditions (2015 No-Build) and immediately upon completion of the envisioned roadway/bridge (2015 Build). If provided, the new roadway/bridge is estimated to immediately carry approximately 11,200 vehicles per day, which for comparison purposes is just more than half the traffic volume that Unionville's Route 177 Bridge over the Farmington River currently carries. The table also summarizes the anticipated build scenario changes to traffic in the following three nearby areas: Near the new Bridge, in Unionville Village, and in Farmington Center.

Near the new bridge, traffic as a whole is anticipated to increase moderately (about 11%), however traffic on each individual roadway approach to the new connection is anticipated to vary greatly. For example, traffic along New Britain Avenue is anticipated to increase significantly (by about 75%) east of the new roadway, but experience a significant decrease (over 40%) west of the new roadway. Additionally, traffic volumes on Route 4 east and west of Monteith Drive are anticipated to increase moderately.

In Unionville Village, traffic as a whole is anticipated to decrease moderately (about 15%) along the major roadways. Traffic volumes are anticipated to decrease significantly on New Britain Avenue (over 40%) and along Route 177 near the Farmington River Bridge (almost 30%), with other roadways seeing more modest decreases. None of the major roadways are projected to see traffic volume increases.

In Farmington Center, as a whole, traffic is anticipated to decrease slightly (just over 3%), with north-south roadways seeing modest traffic decreases, and Route 4 east-west seeing almost insignificant changes to traffic volumes.

**Table 1: Estimated 2015 Traffic Volumes**

<b>Location</b>	<b>2015 No-Build (Existing) Estimated Daily Traffic</b>	<b>2015 Build (new bridge) Estimated Daily Traffic</b>	<b>Daily Traffic Difference</b>	<b>Percent Difference</b>
<b>Monteith Dr. ext. to New Britain Ave (NEW BRIDGE)</b>		<b>11,200</b>		
<b><u>Near the New Bridge</u></b>				
Rt. 4 (Farmington Ave) - West of New Bridge	16,300	17,500	1,200	7% ±
Rt. 4 (Farmington Ave) - East of New Bridge	16,100	17,900	1,800	11% ±
New Britain Ave - West of New Bridge	5,500	3,200	-2,300	-42% ±
New Britain Ave - East of New Bridge	5,600	9,800	4,200	75% ±
<b>Average</b>	<b>10,875</b>	<b>12,100</b>	<b>1,225</b>	<b>11% ±</b>
<b><u>Unionville Village</u></b>				
New Britain Ave - East of Rt. 177	5,500	3,200	-2,300	-42% ±
Rt. 177 over Farmington River	20,500	14,500	-6,000	-29% ±
Rt. 177 North of Rt. 4	9,800	9,800	0	0% ±
Rt. 4 (Farmington Ave) - East of Rt. 177	20,600	18,400	-2,200	-11% ±
Rt. 4 (Farmington Ave) - West of Rt. 177	12,100	12,100	0	0% ±
<b>Average</b>	<b>13,700</b>	<b>11,600</b>	<b>-2,100</b>	<b>-15%</b>
<b><u>Farmington Center</u></b>				
Rt. 10 - North of Farmington Ave	8,400	8,100	-300	-4% ±
Rt. 4 - East of Mountain Spring Rd	33,400	33,200	-200	-1% ±
Main St (Rt 10), Garden St, & High St (combined)	25,000	22,700	-2,300	-9% ±
Farmington Ave - West of Garden St	27,500	26,900	-600	-2% ±
<b>Average</b>	<b>23,575</b>	<b>22,725</b>	<b>-850</b>	<b>-4% ±</b>

*Note: All figures are for internal planning purposes only. Although the 2015 No-Build model has been calibrated to existing ADT's in various locations near the envisioned bridge and in Unionville, all shown daily traffic volumes are model estimates and should not be confused with actual ADT counts.*

### **2040: No-Build and Build Traffic Analyses**

CRCOG also utilized its travel demand model to project area traffic to the year 2040 for both the existing roadway network (2040 No-Build) scenario and for the envisioned Monteith Drive extension (2040 Build) scenario. The results of these model runs are shown in Table 2, including the estimated change in traffic as compared to existing conditions (2015 No-Build).

If built, traffic on the new roadway/bridge is estimated to carry approximately 14,000 vehicles per day by 2040. Due to traffic being redistributed to the area, future traffic growth is expected to be exacerbated on roadways in the immediate surrounding area. Without changes to the current

roadway network, traffic volumes in this area are expected to increase by 18% by 2040, however with the new roadway/bridge traffic volumes are expected to see an increase of 32% over current volumes.

Conversely, the construction of the envisioned new roadway/bridge is expected to help slow the growth of traffic in both Unionville Village and Farmington Center. Without changes to the current roadway network, by 2040 traffic volumes in Unionville Village and Farmington Center are expected to increase by 20% and 11%, respectively. However with a new roadway/bridge, 2040 traffic volumes in Unionville Village and Farmington Center are expected to grow just 3% and 7%, respectively, above current levels.

**Table 2: Projected 2040 Traffic Volumes**

Location	2015 No-Build (Existing)	2040 No-Build		2040 Build (new bridge)	
	Estimated Daily Traffic	Estimated Daily Traffic	% Increase over Base Condition	Estimated Daily Traffic	% Increase over Base Condition
<b>Monteith Dr. ext. to New Britain Ave (NEW BRIDGE)</b>				<b>14,000</b>	
<b><u>Near the New Bridge</u></b>					
Rt 4 (Farmington Ave) - West of New Bridge	16,300	18,600	14% ±	20,400	25% ±
Rt 4 (Farmington Ave) - East of New Bridge	16,100	18,000	12% ±	19,600	22% ±
New Britain Ave - West of New Bridge	5,500	7,000	27% ±	4,800	-13% ±
New Britain Ave - East of New Bridge	5,600	7,600	36% ±	12,800	129% ±
<b>Average</b>	<b>10,875</b>	<b>12,800</b>	<b>18% ±</b>	<b>14,400</b>	<b>32% ±</b>
<b><u>Unionville Village</u></b>					
New Britain Ave - East of Rt 177	5,500	7,700	40% ±	4,900	-11% ±
Rt 177 over Farmington River	20,500	24,500	20% ±	18,400	-10% ±
Rt 177 North of Rte 4	9,800	12,000	22% ±	12,300	26% ±
Rt 4 (Farmington Ave) - East of Rt 177	20,600	24,200	17% ±	21,100	2% ±
Rt 4 (Farmington Ave) - West of Rt 177	12,100	13,600	12% ±	13,800	14% ±
<b>Average</b>	<b>13,700</b>	<b>16,400</b>	<b>20% ±</b>	<b>14,100</b>	<b>3% ±</b>
<b><u>Farmington Center</u></b>					
Rt 10 - North of Farmington Ave	8,400	9,400	12% ±	9,200	10% ±
Rt 4 - East of Mountain Spring Rd	33,400	34,700	4% ±	34,600	4% ±
Main St (Rt 10), Garden St, & High St (combined)	25,000	29,800	19% ±	27,400	10% ±
Farmington Ave - West of Garden St	27,500	30,700	12% ±	29,900	9% ±
<b>Average</b>	<b>23,575</b>	<b>26,150</b>	<b>11% ±</b>	<b>25,275</b>	<b>7% ±</b>

*Note: All figures are for internal planning purposes only. Although the 2015 No-Build model has been calibrated to existing ADT's in various locations near the envisioned bridge and in Unionville, all shown daily traffic volumes are model estimates and should not be confused with actual ADT counts.*

# Route 4 Corridor Study

## Farmington Village Improvements:

- Reconstruct Route 4 so that:
  - Eastbound (uphill) thru traffic has two continuous lanes from Garden Street to I-84
  - Westbound (downhill) thru traffic is limited to a single lane. There is no net increase in the total amount of pavement on Route 4
- Signalize the Route 4/High Street intersection to:
  - Improve pedestrian safety
  - Improve ability to make left turns
- Extend I-84 incident management system to Route 4/Route 10 intersection

## Interstate 84 Improvements:

- Construct "missing ramps" to and from the west on I-84 at Route 6 to provide a "back door" to the Health Center neighborhood
- Support Hartford West MIS initiatives to:
  - Improve transit service to Hartford with stations near the Route 9 "stack" and Finemann Road
  - Remove morning bottleneck between Route 6 and Route 4 by providing a third travel lane on I-84
  - Encourage westbound I-84 traffic to use Route 6 rather than I-84 by reconstructing exit ramps and revising signage

## Brickyard Road Extension:

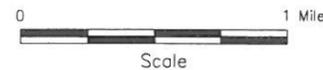
- Construct 2-lane bridge across Farmington River
- Several options exist for connecting the new bridge to New Britain Avenue.
- Provide pedestrian/bicycle connection to Tunxis Mead Park

## Transit Improvements:

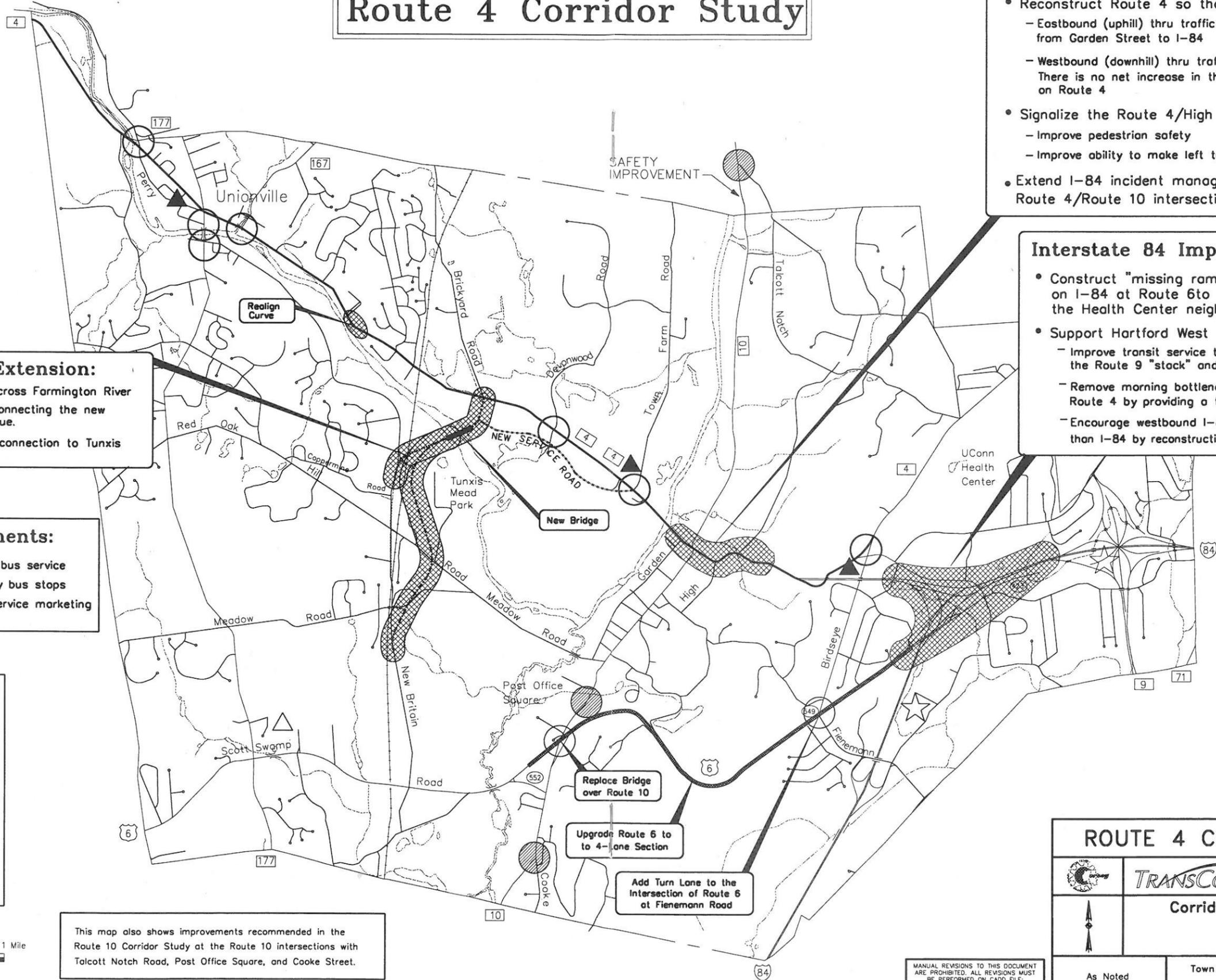
- Increase Unionville Express bus service
- Provide bus shelters at key bus stops
- Increase transit/ridshare service marketing

## Legends:

- Intersection Improvement or New Signal
- ..... New Two-lane Roadway
- - - - - New Service Roadway
- ▨ Roadway Segment Improvement
- △ New Park-N-Ride Lot
- ▲ Improve Park-N-Ride Facilities / Services
- ☆ Future Transit Station
- Proposed Improvements to Route 10



This map also shows improvements recommended in the Route 10 Corridor Study at the Route 10 intersections with Talcott Notch Road, Post Office Square, and Cooke Street.



<b>ROUTE 4 CORRIDOR STUDY</b>		
	<b>TRANS</b> SCORE	<b>PURCELL</b> Fitzgerald & Halliday, Inc. Mary Means & Associates
▲	<b>Corridor Management and Improvement Index Plan</b>	
As Noted	Town of Farmington State Project No. 51-242	October, 1998

MANUAL REVISIONS TO THIS DOCUMENT ARE PROHIBITED. ALL REVISIONS MUST BE PERFORMED ON CADD FILE.  
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## APPENDIX - B

### Alternative 1

1. Plan Sheet
2. Rendering



## APPENDIX – C

### Rendering of Potential River Overlook

## APPENDIX - D

### Rendering of Potential Bridge Type

# APPENDIX - E

## Geometric Design Criteria

Figure 5C (Continued)

**TWO-LANE PRINCIPAL URBAN ARTERIALS**  
**(New Construction/Major Construction)**

Design Element		*	Manual Section	Design Values (Based on Design Speed)						
				55 mph	50 mph	45 mph	40 mph	35 mph	30 mph	
Alignment Elements	Stopping Sight Distance		x	7-1.0	495'	<del>425'</del>	360'	<del>305'</del>	250'	200'
	Decision Sight Distance	Maneuver		7-2.0	U: 1135' SU: 980'	U: 1030' SU: 890'	U: 930' SU: 800'	U: 825' SU: 715'	U: 720' SU: 625'	U: 620' SU: 535'
		Stop			1030'	910'	800'	690'	590'	490'
	Minimum Radius		x	8-2.02/ 8-3.02	1065' (e = 6%)	840' (e = 6%)	665' (e = 4%)	490' (e = 4%)	345' (e = 4%)	230' (e = 4%)
	Superelevation	e <sub>max</sub>		8-2.02/ 8-3.02	6.0%	6.0%	4.0%	4.0%	4.0%	4.0%
		Rate	x		See Figure 8-2A			See Figure 8-3C		
	Horizontal Sight Distance			8-2.04	See Section 8-2.04					
	Maximum Grade		x	9-2.03	6%	7%	<del>7%</del>	<del>8%</del>	8%	9%
	Minimum Grade			9-2.03	0.5%					
	Vertical Curvature (K-Value)	Crest		9-3.02	114	<del>84</del>	<del>61</del>	<del>44</del>	29	19
		Sag		9-3.03	115	<del>96</del>	79	64	49	37
	Minimum Vertical Clearance: Arterial Under ...	New Highway Bridge	x	9-4.0	16'-3"					
		Existing Highway Bridge	x		14'-3"					
		Pedestrian Bridge	x		17'-6"					
Overhead Sign		x	18'-0"							
Minimum Vertical Clearance (Arterial over Railroad)		x	9-4.0	Electrified: 22'-6" All Others: 20'-6"						

\* Controlling design criteria (see Section 6-6.0).

U: Urban

SU: Suburban

**Figure 5C**

**TWO-LANE PRINCIPAL URBAN ARTERIALS  
(New Construction/Major Construction)**

Design Element		*	Manual Section	Design Values (by Type of Area)			
				Suburban	Intermediate	Built-up	
Design Controls	Design Forecast Year		6-3.02	20 Years	20 Years	20 Years	
	Design Speed	x	6-2.02	45 mph – 55 mph	35 mph – 50 mph	30 mph – 45 mph	
	Access Control		6-4.02	Partial/Control by Regulation	Control by Regulation	Control by Regulation	
	Level of Service		6-3.0	B – D	B – <del>D</del>	B – D	
	On-Street Parking		10-1.04	None	None	Sometimes	
Cross Section Elements	Travel Lane Width	x	10-1.01	12'	11' – 12'	11' – 12'	
	Shoulder Width	x	10-1.02	4' – 8'	4' – 8'	4' – 8'	
	Cross Slope	Travel Lane	x	10-1.01	1.5% – 2.0%	1.5% – 2.0%	1.5% – 2.0%
		Shoulder	x		4% – 6%	4% – 6%	4% – 6%
	Turn Lanes	Lane Width	x	10-1.03	11' – 12'	11' – 12'	11' – 12'
		Shoulder Width	x		2' – 4'	2' – 4'	2' – 4'
	Parking Lane Width		10-1.04	N/A	N/A	10' – 11'	
	Sidewalk Width		10-2.01	5' Minimum	5' Minimum	5' Minimum	
	Bicycle Lane	Width		15-4.0	5'	<del>5'</del>	5'
		Cross Slope			2%	<del>2%</del>	2%
	Bridge Width/Cross Slope	x	10-4.01	Curb-to-Curb: Meet Approach Roadway Width and Cross Slope Sidewalk Width: 5'-6"			
	Underpass Width		10-4.02	Meet Approach Roadway Width Plus Clear Zones			
	Right-of-Way Width		10-5.0	Project-by-Project Basis			
	Roadside Clear Zones	x	13-2.0	S [redacted] 0			
Fill/Cut Slopes		10-2.02	S [redacted] 1				

\* Controlling design criteria (see Section 6-6.0).

**Figure 2-3I  
LOCAL URBAN STREETS  
(3R Projects)**

Design Element		*	Manual Section	Design Values (By Type of Area)			
				Suburban	Intermediate	Built-up	
Design Controls	Design Forecast Year		2-4.02	Current – 10 years	Current – 10 years	Current – 10 years	
	Design Speed	x	2-4.01	See Section 2-4.01	See Section 2-4.01	See Section 2-4.01	
	Access Control		6-4.0	Control by Regulation	Control by Regulation	Control by Regulation	
	Level of Service		6-3.0	C – D	C – D	C – D	
	On-Street Parking		10-1.04	Sometimes	Sometimes	Sometimes	
Cross Section Elements	Travel Lane Width	x	2-7.01	10' – 11'	10' – 11'	9' – 11'	
	Shoulder Width	x	2-7.01	2' – 4'	2' – 4'	2' – 4'	
	Cross Slope	Travel Lane	x	10-1.01	1.5 – 2.0% (1.5-3.0% with curbing)	1.5 – 2.0% (1.5-3.0% with curbing)	1.5 – 2.0% (1.5-3.0% with curbing)
		Shoulder (W < 4')	x	10-1.02	Same as Adjacent Travel Lane		
		Shoulder (W ≥ 4')	x		4% – 6%	4% – 6%	4% – 6%
	Turn Lanes	Lane Width	x	10-1.03	1' Less than Travel Lane Width (9' Min.) — Same as Travel Lane		
		Shoulder Width	x		1' – 4'	1' – 4'	1' – 4'
	Parking Lane Width			10-1.04	7' – 10'	7' – 11'	7' – 11'
	Sidewalk Width			10-2.01	5' Minimum	5' Minimum	5' Minimum
	Bicycle Lane	Width		15-4.0	5'	5'	5'
		Cross Slope			2%	2%	2%
	Bridge Width/Cross Slope	x	2-7.02	See Figure 2-7B for Width; Meet Roadway Cross Slope Sidewalk Width: 5'-6"			
	Underpass Width			10-4.02	Meet Approach Roadway Width Plus Clear Zones		
	Right-of-Way Width			10-5.0	Project-by-Project Basis		
Roadside Clear Zones	x	2-9.01	See Section 2-9.01				
Fill/Cut Slopes			10-2.02	Existing — See Figure 5I			

\* Controlling design criteria (see Section 6-6.0).

**Figure 2-3I (Continued)**  
**LOCAL URBAN STREETS**  
**(3R Projects)**

Design Element		*	Manual Section	Design Values (Based on Design Speed)			
				30 mph	25 mph	20 mph	
Alignment Elements	Stopping Sight Distance	x	7-1.0	200'	155'	115'	
	Decision Sight Distance	Maneuver	7-2.0	U: 620' SU: 535'	N/A	N/A	
		Stop		490'	N/A	N/A	
	Minimum Radius (e = 4%)	x	2-5.02	230'	145'	80'	
	Superelevation	e <sub>max</sub>	x	2-5.02	4.0%	4.0%	4.0%
		Rate			See Figure 8-3C		
	Horizontal Sight Distance		8-2.04	See Section 8-2.04			
	Maximum Grade	x	2-6.01	12%	13%	13%	
	Minimum Grade		9-2.03	0.5%			
	Vertical Curvature (K-Value)	Crest		2-6.02	See Section 2-6.02		
		Sag		2-6.03	37	26	17
	Minimum Vertical Clearance: Local Street Under ...	New Highway Bridge	x	9-4.0	14'-6"		
		Existing Highway Bridge	x		14'-3"		
Minimum Vertical Clearance (Local Street over Railroad)	x	9-4.0	Electrified: 22'-6" All Others: 20'-6"				

\* Controlling design criteria (see Section 6-6.0).

U: Urban

SU: Suburban

# APPENDIX – F

## Alternative 2

### Plan Sheet

# APPENDIX – G

Alternative 3

Plan Sheet

Rendering

# APPENDIX – H

Alternative 4

Plan Sheet

## APPENDIX – I

### Preliminary Design Plans

Note: Plan set is shown for reference only; see larger scale plans for clarification and detail

## APPENDIX - J

### Alternative 1 - Rendering Display Plan