

PRELIMINARY DESIGN STATEMENT
PROJECT NO. 0017-XXX
STREETSCAPE IMPROVEMENTS ON RIVERSIDE AVE
CITY OF BRISTOL

Project Location:

The Riverside Avenue Streetscape Improvements project is located on a 0.9-mile section of Connecticut State Route 72 (Route 72) between its intersection with Main Street to the west and Memorial Boulevard to the east in the City of Bristol, Connecticut. This portion of Route 72 The railroad is just north of Riverside Avenue and Memorial Boulevard and Veterans' Memorial Park are to the south.



Origin:

The City of Bristol completed a study in 2021 (Streetscape Study and Design Concepts, Riverside Avenue and Divinity Street/Park Street”) which outlined concept-level improvements that would provide an improved pedestrian environment, streetscape improvements, and roadway safety benefits. The aim was to explore potential design strategies that would achieve safety and aesthetic improvements for the important Downtown gateways along CT Route 72.

Existing Conditions:

Riverside Avenue is classified as an Urban Principal Arterial, running in the west-east direction with all cross streets within the project limits (Main Street, Mellen Street, East Street, and Hooker Court) running in the north-south direction. The 2021 ADT on Riverside Avenue was reported to be 8,700 vehicles per day and the posted speed limit is 30 mph.

A typical section of Riverside Avenue consists of two 12-foot travel lanes and 4 to 6-foot painted shoulders. The total roadway pavement width is 32 – 36 feet, except for the westbound approach at Main Street, where there is additional pavement width for turning lanes.

Throughout the corridor there are many areas with wide curb cuts for driveways and paved areas that have little actual or implied separation between the roadway and adjacent parking areas. This gives the appearance of a wide sea of pavement, in many of these areas the adjacent paved area is so wide one cannot identify a driveway at all. The existing sidewalk system on Riverside Avenue is poorly developed on both the north and south sides of the street, with gaps along significant



portions of the corridor. In the areas with sidewalks, most are in disrepair and have no buffer between the sidewalk and roadway. Many are not separated vertically from the roadway. There are numerous utility poles present on both sides of the roadway, there is no formal street landscaping, and there is no pedestrian lighting along Riverside Avenue

Project Purpose & Need:

The purpose of this project is to improve safety, access management, pedestrian accommodations and aesthetic qualities along Riverside Avenue throughout the corridor.

The project is needed because of the deteriorating conditions of existing facilities along Riverside Avenue. There are numerous, overly-wide curb cuts for driveways, a poorly developed and disconnected sidewalk system, stretches with little or no separation between the roadway and parking areas, and no buffer between the sidewalk when it is present and the roadway. All these existing qualities contribute to the user being unable to discern the roadway, driveways, and parking areas from one another which has led to a high frequency of "Fixed Object" type crashes along the corridor. "Fixed Object" type accidents occur when a vehicle leaves the roadway and strikes a fixed object such as a utility pole, tree, wall, etc. Crash data shows there is an unusually high concentration of these types of accidents along Riverside Avenue.

Proposed Improvements:

The proposed improvements include full-depth reconstruction of Riverside Avenue from Main Street to Memorial Boulevard. The existing paved roadway, which varies in width along the project limits, will be standardized to a uniform 30', with 11' travel lanes and 4' shoulders in each direction. Generally, this will be achieved by pulling in the edge of road towards the centerline between two and four feet on both sides of the road. Existing driveway aprons will be consolidated to more standard widths (16' for one-way openings, 24' for two-way openings and 30' for two-way openings with truck access. New commercial concrete driveway aprons will be installed to delineate ingress and egress from adjacent properties and existing curbing will be replaced with new granite stone curbing to better define the roadway edge and provide a more cohesive aesthetic.

Five-foot-wide sidewalks are proposed throughout the corridor on both the north and south sides of the street, each with a 4' wide brick buffer to provide separation between the travel way and the pedestrian space. Additionally, pedestrian lighting will be installed along both sides of the roadway and street trees will be installed where feasible along the corridor.

In addition to the proposed improvements listed above multiple alternatives were developed incorporating a left turn lane for eastbound travel on Riverside Avenue onto Mellen Street.

- Alternative A

Alternative A proposed a 10' left turn lane be evenly divided over the centerline alignment. This layout results in a skewed maneuver for both directions and increases the Right-of-Way impacts to the iDesign Nail and Spa and Disabled Americans Veterans facility to the north and the Gas Man Gas Station to the south. It should be noted this alternative does not propose the brick buffer between the sidewalk and roadway along the Gas Man Gas Station to reduce the number of impacts to the



property. This alternative also requires the relocation of utility poles CL&P 1827 and CL&P 10513.

- Alternative B

Alternative B shifts the location of the left turn lane proposed in Alternative A to be fully to the north of the centerline alignment. Under this alternative a brick buffer is not proposed along the Gas Man Gas Station like Alternative A. This layout results in a normal through movement for westbound travel on Riverside and significantly reduces the right-of-Way impacts to the Gas Man Gas Station. However, the through movement for westbound travel on Riverside is severely skewed to the point where vehicles approaching the Mellen and Riverside intersection will be oriented towards the sidewalk and not the roadway. This alternative also significantly increases the rights-of-way impacts to IDesign Nail and Spa and Disabled Americas Veterans facility. Utility Pole CL&P 10513 will need to be relocated under this alternative.

- Alternative C

To correct the skewed through movement for westbound travel, Alternative C used the existing curbing on the south side of Riverside. The location of the proposed granite stone curbing was laid out to be in the existing curbing's footprint. This allowed all travel lanes and shoulders at the Riverside and Mellen street intersection to shift to the south and help mitigate the skewed through movement. This alternative also helps with potential right-of-way impacts. However, it should be noted that the brick buffer is not proposed along the Gas Man Gas Station or the IDesign Nail and Spa.

Traffic Analysis:

An analysis of the Existing Conditions and No-Build Alternative was conducted for Riverside Avenue to evaluate the need for improvements to current signalization and the implementation of new signalization. Intersections within the project limits were evaluated based off their Level of Service (LOS), which is a qualitative performance measure detailed in the Highway Capacity Manual, 6th Edition. There are 4 intersections along Riverside Avenue, 3 of these intersections are signalized (Main Street, Mellen Street, Memorial Boulevard) and 1 is unsignalized (East Street).

Turning Movement Counts were collected at each intersection within the project limits and used in the existing conditions analysis. The Existing Year (2024) Analysis found that Riverside Avenue, within the project limits, experiences very little congestion. All intersections operate at LOS "C" or better until the Riverside Ave and Memorial Boulevard intersection. This intersection operates at LOS "F" as signal timing favors east-west flow and leads to extended queues and backups along the approach under both AM and PM peak hours.

The No-Build Alternative was analyzed for both the Intermediate Year (2030) and Design Year (2040). Based off the Intermediate Year (2030) Analysis, it is expected Riverside Ave will continue to see very little congestion with all intersection's operation at LOS "C" or better until the Riverside Ave and Memorial Boulevard intersection which operates at LOS "F". The Design Year (2040) Analysis revealed that most of the intersections within the project limits will continue to operate at LOS "C" or better under typical conditions, like the Existing and Intermediate Year Analysis.



Additionally, the Riverside Ave and Memorial Boulevard intersection continues to worsen compared to the Existing and Intermediate Year, as the signal timing splits continue to impact operations.

This analysis and the Manual on Uniform Traffic Control Devices (MUTCD) were used to assess if the current two-way stop-controlled intersection of Riverside Ave and East Street should be signalized. The intersection met all LOS criteria and the provided count data, and forecast indicated minimal demand and delay for left turn operations along Riverside Avenue. Additionally, this intersection does not meet any criteria for signalization based off the warrants provided in the MUTCD. Due to these findings, dedicated left turn lanes along Riverside Avenue at the intersection of Riverside Avenue and Mellen Street are not required. The Traffic Technical Memorandum Existing and No Build Analysis can be found in **Appendix A**.

Safety Analysis:

A safety analysis was performed to calculate the crash rate and frequency for each roadway segment and intersection within the project limits. Crash data from 2017, 2018, 2019, 2022, and 2023 was collected from the Connecticut Crash Data Repository (CTCDR) traffic safety dashboard. Crash data for the years 2020 and 2021 were not used because of the effect the COVID-19 pandemic had on normal traffic patterns.

During the 5-year period there were 153 crashes within the project limits. No crashes resulted in fatalities but 2 had severe injuries. The tables below provide the most common crash types and time of day for when most crashes occurred.

Crash Type	Number of Crashes	Percentage
Front to Rear	64	41.8
Angle	42	27.5
Fixed Object	26	17.0

Time of Day	Number of Crashes	Percentage
Daylight	108	70.6
Dark-Lighted	38	24.8

To analyze the crash data, Riverside Ave was divided into intersections and segments. Intersections are defined as the area within 250 feet of an intersection and segments are the areas between each intersection. Crash rates were calculated for each area based on the data collected from CTCDR traffic safety dashboard. To evaluate the crash rate, critical crash rates were calculated for each segment and intersection following the guidance of the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual 2010. All intersections and segments observed crash rates are below the critical crash rates indicating that crashes are below the expected average levels. However, the most common crash types of Front to Rear, Angle and Fixed Object support the need for improvements along the roadways edge as the high density of driveways and minimal existing streetscape result in sudden stops for turns and the users not being able to determine the edge of road. Crash Data, Crash Rates and Critical Crash Rates can be found in Section 3.3 Safety Analysis of **Appendix A**.



Design Controls:

Riverside Avenue:

- Function Classification: Urban Principal Arterial
- Area Type: Built-up
- National Highway System

Local Roads: Main Street / Mellen Street / East Street

- Function Classification: Urban Local Roads
- Area Type:
 - Built-up: Main Street
 - Intermediate: East Street / Mellen Street

Recorded Usage Data:

Average Daily Traffic (ADT):

Roadway	2021 ADT (vpd)
Riverside Ave	8,700
Main Street	5,600

Posted Speed Limit:

The posted speed limits are as follows:

Roadway	Posted Speed Limit
Riverside Ave	30 m.p.h.
Main Street	25 m.p.h.
Mellen Street	25 m.p.h.
East Street	30 m.p.h.

Design Standards:

The following Design Standards are used:

- CTDOT's Highway Design Manual, 2003 Edition (including Revisions to January 2023) (HDM)

Connection Department of Transportation (CTDOT) Design Standards were used to determine the design criteria for Riverside Avenue. CTDOT has developed criteria for the design of existing roadways under different geometric constraints. More Specifically, Chapter Two (Geometric Design of Existing Highways for 3R Non-Freeway Projects) was used to develop the design criteria for Riverside Avenue.



Riverside Ave Design Criteria (Urban Principal Arterial/3R Projects)

Design Element		CTDOT Design Criteria		
Design Controls	Area Type		Built-up	
	Design Speed	*	35 MPH	
Cross Section Elements	Travel Lane Width	*	10' - 12'	
	Shoulder Width	Right	*	4' - 8'
		Left	*	4' - 8'
	Typical Cross Slope	Lane	*	1.5% - 2.0%
		Shoulder	*	4% - 6%
	Turn Lanes	Lane Width	*	1' less than TL Width - TL Width
		Shoulder Width	*	1' - 4'
	Parking Lane Width		10' - 11'	
	Sidewalk Width		5' Minimum	
	Bicycle Lane	Width		5'
Cross Slope			2%	
Clear zone	*	14'		
Alignment Elements	Stopping Sight Distance	*	250'	
	Minimum Radius (e=6.0%)	*	375'	
	Maximum Superelevation (e)		4.0%	
	Maximum Grade	*	11%	
	Minimum Grade		0.5%	
	Minimum Vertical Clearance (Arterial over Railroad)		*	Electrified 22'-6"
			All Others 20' - 6"	

Rights-of-Way:

The proposed project requires the right to construct sidewalk, the right to construct driveway, the right to construct retaining wall, and the right to grade be requested for multiple properties along the project corridor. Additionally, a partial take is required at the eastern end of the project limits and Drainage Right of Ways will be requested for the portion of the existing drainage system that are beyond the existing highway line and currently do not have an easement.

Turning Templates:

Turning templates were developed for the turning movements at critical driveways, the Riverside Ave and Mellen Street intersection and the Riverside Ave and East Street intersection. A Passenger Vehicle and a SU-30 were used to evaluate the existing and proposed turning movements at each intersection. In both the existing and proposed condition, passenger vehicles could maneuver every turn at each intersection. However, the SU-30 vehicle was not able to maneuver most of the turns without encroaching into the other lane or hitting the curb. An SU-30



was only able to cleanly maneuver one turn when traveling eastbound on Riverside and turning right onto Mellen Street. However, it should be noted that vehicles bearing non-passenger type registrations are not permitted on Memorial Boulevard. Therefore, it is unlikely an SU-30 vehicle would turn off Riverside Ave and travel south on Mellen Street or East Street as these roads connect to Memorial Boulevard. Additionally, the railroad is just north of Riverside Ave. Therefore, it is unlikely that an SU-30 vehicle would turn from Riverside Ave and travel north on Mellen street and East Street, as East Street dead ends prior to the train tracks and the railroad underpass on Mellen Street only has a clearance of 13'-6".

The driveways of commercial businesses that receive deliveries often and/or have loading docks were determined critical and turning templates into their driveways were analyzed. A WB-40 vehicle was used to review turning maneuvers at 165 Riverside Ave and SU-40 vehicles were used to review the turning maneuvers 180 Riverside Ave and 450 Riverside Ave. Some of these maneuvers did encroach into the other lane, however further coordination with property owners is required to determine the frequency, vehicle type and which entrances are used for their deliveries. Turning Templates for intersections and driveways can be found in **Appendix B**.

Pavement Composition:

- Riverside Avenue (State Route 72) - Full-Depth Reconstruction
 - 2" HMA S0.375
 - 2" HMA S0.5
 - 6" Processed Aggregate
 - 8" Subbase
- Local Roads – Mill and Overlay
 - Fine Milling 2" depth
 - 2" HMA S0.375
- Temporary Pavement
 - 4" HMA S0.5
 - 20" Processed Aggregate Base

Environmental Considerations/Permits:

The Pequabuck River runs along the south side of Riverside Ave at the beginning of the project limits, however there are no anticipated impacts to the regulated areas. The following permits are required:

- The General Permit Stormwater and Dewatering Wastewaters from Construction

Bicycle & Pedestrians:

The pedestrian infrastructure on Riverside Avenue is a poorly developed disconnect system. Several improvements are proposed on Riverside Avenue to improve pedestrian accommodations. Sidewalks are proposed throughout the project limits with a 4' wide brick buffer alongside it to provide separation between the roadway and pedestrian path. Additionally,



pedestrian lighting will be installed within the brick buffer throughout the corridor and as a traffic calming effect it is proposed to reduce travel lanes to 11' wide.

In 2017, the CTDOT and the Statewide Bicycle and Pedestrian Plan Update Steering Committee, developed a bicycle planning network for bicycle travel on state roads in Connecticut. Riverside Avenue was found to be part of the on-road bicycle planning network. However, as the Pequabuck River Trail Project is proposed in the City of Bristol, parallel to Riverside Avenue there is no longer a need for Bicycle improvements on Riverside Ave. As the Pequabuck River Trail Project will provide a safe and comfortable network for bicyclists in the area.

Roadway Borings:

Multiple borings will be completed in the roadway of Riverside Ave within the project limits. The location of the roadway borings is currently being coordinated and will be completed once the locations are agreed to and finalized.

Utilities:

The following companies have utility facilities within the project limits:

- Eversource Energy – Electric Distribution
- Eversource Energy - Gas
- City of Bristol Water and Sewer Department
- Frontier Communications
- Comcast Cable
- Crown Castle

Utility coordination has been initiated by GM2 for the Riverside Ave project and is ongoing. Requests for mapping files have been sent to all utility owners listed in the CTDOT utility coordination guide as having facilities in Bristol, asking to confirm the locations of any facilities within the project limits. To date, 4 utility companies have provided existing mapping. Once preliminary design plans have been reviewed and an alternative has been chosen, additional information such as plans will be sent to the utility owners to review potential impacts to facilities. This will be followed by a utility coordination meeting to identify those impacts and determine options for designing to avoid the impact or relocating the utility.

Maintenance Agreements:

Further coordination with the Department of Transportation will have to establish a Maintenance Agreement that identifies the Town's responsibilities. It is expected the City of Bristol will handle the following:

- Maintenance, operation, and cost of decorative lighting
- Maintenance of decorative paver apron.



115 GLASTONBURY BLVD
GLASTONBURY, CT 06033
860.659.1416

Preliminary Design Statement
Project No. 0017-XXX
September 17, 2024

Schedule:

- Contract Documents: December 2025
- Advertising: January 2026
- Construction: April 1, 2026

Estimated Project Cost:

Alternative 1: \$7.92 Million

Alternative 1C: \$7.85 Million

Both Alternative 1 and 1C include the line item AUP00010 Traffic Signals (LS) as a place holder to account for all proposed work required to install a new traffic signal at the Riverside Avenue and Mellen Street Intersection. See **Appendix C** for the cost estimate breakdowns for each alternative.

Appendix A: Traffic Memorandum Existing and No Build Analysis

Streetscape Improvements on Riverside Avenue | Bristol

Preliminary Design Statement
September 2024

Traffic Technical Memorandum

Existing and No Build Analysis

Streetscape Improvements on
Riverside Avenue & Park Street
Extra Work #1

City of Bristol, Connecticut

Prepared For:
Connecticut Department of Transportation



September 2024

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Appendix A: CTDOT Traffic Memorandum supporting State Project No. 0017-0171 Intersection Improvements on Route 72 at Memorial Boulevard and Blakeslee Street City of Bristol

Appendix B: Existing Year (2024) Intersection Analysis

Appendix C: No-Build Intermediate Year (2030) Intersection Analysis

Appendix D: No-Build Design Year (2040) Intersection Analysis

List of Acronyms

95 th tile	95 th percentile
AADT	Annual Average Daily Traffic
CMF	Crash Modification Factor
CTDOT	Connecticut Department of Transportation
D-Factor	Directional Distribution Factor
DDHV	Directional Design Hourly Volumes
FPID	Financial Project Identification
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HSM	Highway Safety Manual
K-Factor	Ratio of DHV to AADT
KABCO Injury Severity Scale	K – fatal, A – disabling injury, B – serious but non-disabling injury, C – possible injury, and O – property damage only
Ln (ln)	Lane
LOS	Level of Service
mi	Mile(s)
mph	Miles per hour
MUTCD	Manual on Uniform Traffic Control Devices
pc	Passenger Cars
PDO	Property Damage Only
TMC	Turning Movement Count
TWSC	Two-Way Stop Control
vph	Vehicles per hour

1.0 Introduction

1.1 Project Description

The City of Bristol is conducting a Streetscape Improvements project along portions of CT Route 72 (Riverside Avenue and Park Street). Early coordination with the Connecticut Department of Transportation (CTDOT) in January 2023 resulted in an agreement between the City of Bristol and CTDOT for the project scope to include full-depth reconstruction along approximately 0.9 miles of Riverside Avenue from Memorial Boulevard to Main Street, including improvements to the horizontal and vertical alignments of the roadway, drainage improvements, and traffic improvements. The study area is illustrated below in **Figure 1.1**. As the project became partially funded by CTDOT, an increase in project scope was identified, and extra work was tasked to ensure additional design development processes were undertaken to be in conformance with CTDOT policies, procedures, and standard practices. This Traffic Technical Memorandum documents the traffic analysis methodology, existing conditions analysis, future traffic forecasts, and analysis of study alternatives and provides a summary of the results.

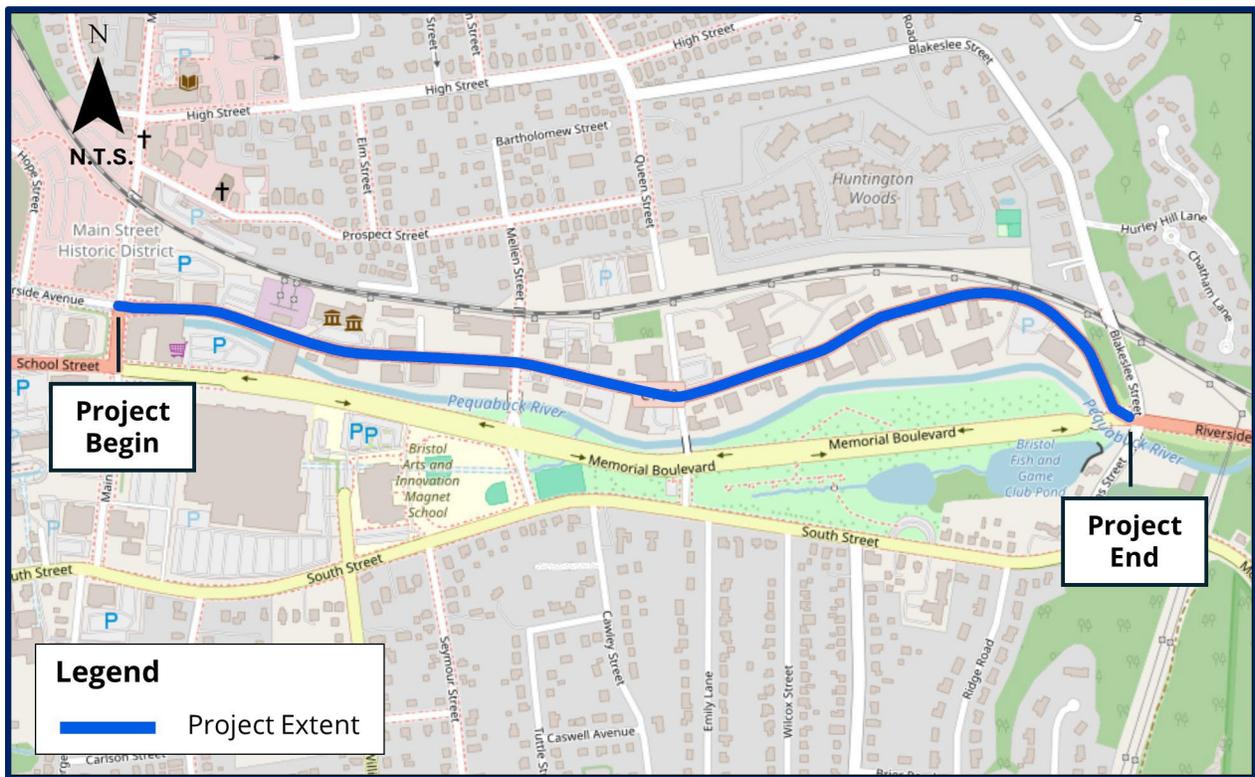


Figure 1.1: Project Location Map

1.2 Purpose and Need

The purpose of this study is to evaluate the options along the Riverside Avenue study segment for their ability to address roadway deficiencies and safety concerns and to evaluate the need for improvements, including updates to current signalization, the inclusion of dedicated left turn lanes at the Mellen Street intersection, and the possible implementation of new signalization at the East Street intersection. Safety concerns along the project corridor stem from a reported 130 crashes in the five years reviewed, 2017, 2018, 2019, 2022, and 2023. Additionally, this project will perform a signal warrant analysis of the intersection of Riverside Avenue and East Street. The intersection currently operates under two-way stop control (TWSC) on East Street.

1.3 Study Area

Within the study area, Riverside Avenue consists of three (3) study segments, three (3) signalized intersections, and one (1) unsignalized intersection, as documented in **Table 1.1** and **Table 1.2**, respectively, and as illustrated in **Figure 1.2**.

Table 1.1: Study Roadway Characteristics

ID	Roadway ID	From	To	Length (mi)	Lanes	Speed (mph)
A	Riverside Avenue (CT Route 72)	Main Street	Mellen Street	0.33	2	30 mph
B	Riverside Avenue (CT Route 72)	Mellen Street	East Street	0.14	2	30 mph
C	Riverside Avenue (CT Route 72)	East Street	Memorial Boulevard/Blakeslee Street/Downs Street	0.44	2	30 mph

Table 1.2: Study Intersections

ID	Intersection	Control
1	Riverside Avenue at Main Street	Signalized
2	Riverside Avenue at Mellen Street	Signalized
3	Riverside Avenue at East Street	Unsignalized (TWSC)
4	Riverside Avenue at Memorial Boulevard	Signalized (5 legged)

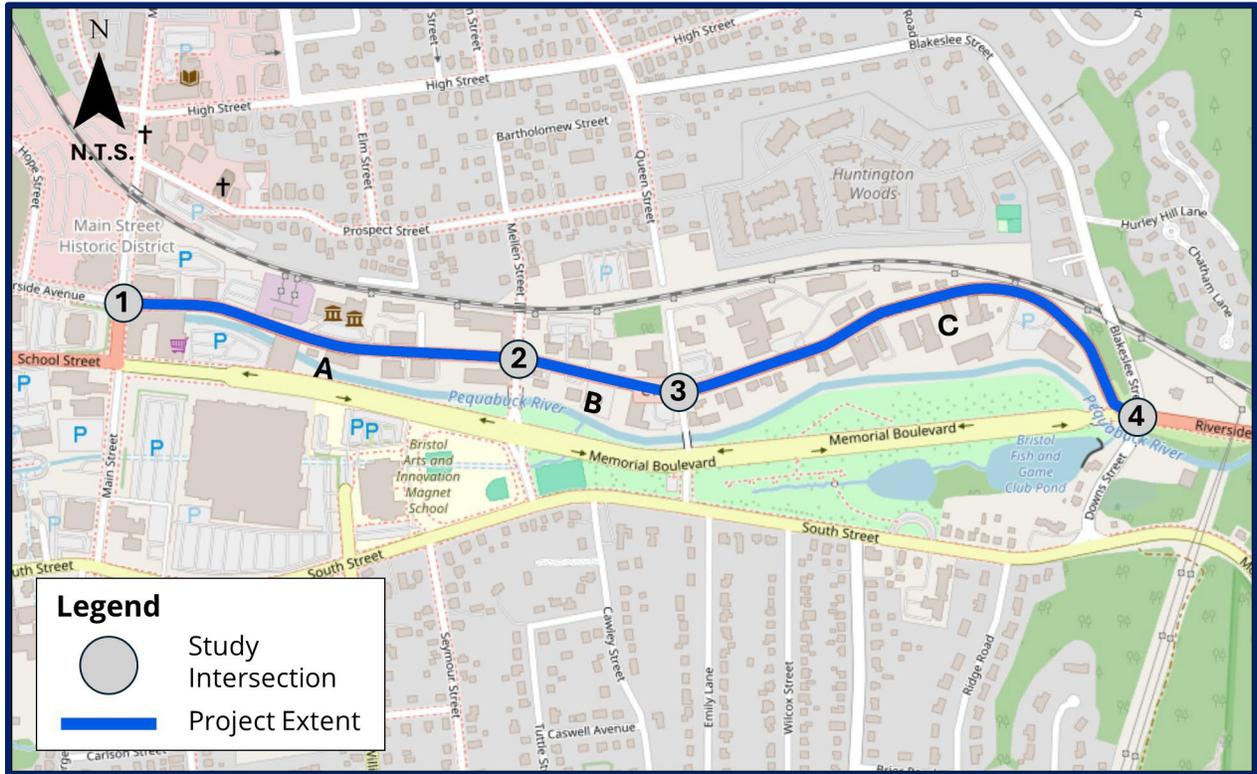


Figure 1.2: Project Study Area Map

2.0 Traffic Analysis Methodology

2.1 Assumptions and Methodology

This chapter summarizes the data and methods used to develop traffic volumes and analyze existing and future traffic conditions associated with the project. Analysis scenarios for the project across its expected lifetime include the selected existing year (2024), intermediate year (2030), and design year (2040).

Analysis of the Existing Conditions and No-Build Alternative was performed across the project lifetime to evaluate the need for improved operational capacity during peak hour normal operations, in line with the project goals. Formally outlined in the *Highway Capacity Manual 6th Edition* (HCM), level of service (LOS) is a qualitative performance measure that utilizes an A-to-F scale, with “A” being the best and “F” being the worst, to relate the motor vehicle traffic service experienced in varying configurations of roadways and intersections. To measure effectiveness, the goal of the study was to achieve and maintain the automobile mode peak hour LOS targets of “D” for the study area.

2.1.1 Methodology

For the purposes of this study, initial forecasting was conducted during the *CTDOT Traffic Memorandum supporting State Project No. 0017-0171 Intersection Improvements on Route 72 at Memorial Boulevard and Blakeslee Street City of Bristol*, dated June 2017. As part of the identified extra work tasks, additional traffic data collection was performed in July 2024, to which project traffic forecasting from the June 2017 Memorandum was applied to develop the intermediate year (2030) and design year (2040) forecasts utilized for this study. The Memorandum is included for reference in **Appendix A**.

2.1.2 Traffic Analysis Tools

As Riverside Avenue is not expected to become oversaturated during the study period, deterministic analysis software utilizing HCM methodologies was appropriate for use. As such, Synchro 12 SimTraffic was used to analyze the controlled intersections along the study corridor.

2.2 Data Collection

Data collection for this extra work study was performed in July 2024. The following data within the study corridor was collected as part of that effort.

2.2.1 Turning Movement Counts

Turning Movement Counts (TMC) were collected at the following locations for the existing year (2024).

- Riverside Avenue at Main Street
- Riverside Avenue at Mellen Street
- Riverside Avenue at East Street
- Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street

2.2.2 Safety Analysis Data Collection

Crash data was collected from the *Connecticut Crash Data Repository (CTCDR)* traffic safety dashboard for five years (2017, 2018, 2019, 2022 and 2023) across intersections and segments within the study area. Crash data for the years 2020 and 2021 were not used in this study because of the COVID-19 pandemic on normal traffic patterns.

2.3 Operational Analysis Measures of Effectiveness

The following section outlines the performance measures of effectiveness (MOE), by control type, used in the study analysis. As previously stated, the LOS target requirements of "D" were used in this study.

2.3.1 Intersections MOE(s)

- Intersection delay (sec/veh)
- Movement delay (sec/veh)
- Intersection (LOS)
- Movement (LOS)
- Back of queue feet/lane (95th percentile)

2.3.2 Highway Segment MOE(s)

- Follower Density (followers/mi/ln) for two-lane highway segments
- Density (pc/mi/ln) for multi-lane highway segments
- Segment LOS

2.4 Safety Analysis

Safety analysis was conducted to calculate the crash rate and crash frequency for each roadway segment and intersection. The crash data was summarized by crash type, severity (property damage only (PDO), injuries, or fatalities), lighting, surface, and weather conditions. The following items are documented in this study:

- Existing crash data
- Calculated crash rates and frequencies

3.0 Existing Conditions Analysis

3.1 Roadway Characteristics

Within the study area, the typical section for Riverside Avenue is a two-way undivided roadway with 11-foot-wide travel lanes in both directions, and 5-foot-wide shoulders along on the north and south side for the entire corridor. The posted speed limit is 30 miles per hour (mph) along the full length of the study area. There are no dedicated bicycle facilities along the roadside. Sidewalks are provided along both the north and south sides from Main Street to Mellen Street, partially between Mellen Street and East Street, and intermittently between East Street and Memorial Boulevard.

3.2 Existing Year (2024) Operational Analysis

3.2.1 Existing Year (2024) Intersection Analysis

All study intersections within the Riverside Avenue study area were analyzed using Highway Capacity Software (HCS) Signalized and Two-Way Stop Control (TWSC) analyses. Summaries of the existing year (2024) intersection analysis results are displayed in **Table 3.1** and operational summaries of each intersection are given in **Table 3.2**. Any observed failures are denoted with red text. The existing year (2024) intersection analysis results can be found in **Appendix B**.

Table 3.1: Existing Year (2024) Intersection Analysis Results

ID: 1		Riverside Avenue at Main Street Signalized (4-Leg)							
Approach	Movement	AM				PM			
		Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	21	8.1	A	31	40	11.5	B	49
	Through	170	4.3	A	77	191	5.5	A	88
	Right	42	2.0	A	77	38	3.2	A	88
	Approach	233	4.2	A		269	6.1	A	
WB	Left	25	10.7	B	43	43	11.8	B	52
	Through	185	6.0	A	84	267	7.6	A	118
	Right	27	4.0	A	27	56	4.7	A	43
	Approach	237	6.3	A		366	7.6	A	
SB	Left	32	29.5	C	55	31	27.2	C	46
	Through	58	22.3	C	83	120	22.7	C	117
	Right	31	9.4	A	83	42	11.3	B	117
	Approach	121	20.9	C		193	20.9	C	
NB	Left	48	28.2	C	66	73	30.6	C	89
	Through	76	22.8	C	95	114	22.2	C	106
	Right	15	4.4	A	34	11	4.9	A	25
	Approach	139	22.7	C		198	24.3	C	

Table 3.1: Existing Year (2024) Intersection Analysis Results (Continued)

ID: 2 Riverside Avenue at Mellen Street Signalized (4-Leg)									
Approach	Movement	AM				PM			
		Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	6	6.1	A	69	12	8.8	A	79
	Through	206	3.9	A	69	214	4.5	A	79
	Right	5	3.4	A	69	9	4.1	A	79
	Approach	217	3.9	A		235	4.7	A	
WB	Left	1	3.8	A	87	7	6.8	A	150
	Through	225	3.6	A	87	335	6.0	A	150
	Right	20	2.6	A	87	73	4.1	A	150
	Approach	246	3.5	A		415	5.7	A	
SB	Left	32	20.6	C	82	41	25.5	C	96
	Through	35	21.4	C	82	40	22.7	C	96
	Right	9	7.3	A	82	17	11.0	B	96
	Approach	76	19.4	B		98	21.8	C	
NB	Left	2	14.9	B	51	14	26.6	C	66
	Through	22	19.9	B	51	30	22.0	C	66
	Right	5	5.2	A	51	9	7.8	A	66
	Approach	29	17.0	B		53	20.8	C	
ID: 3 Riverside Avenue at East Street Unsignalized – Two-Way Stop Control (North-South)									
Approach	Movement	AM				PM			
		Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	1	4.7	A	5	2	6.0	A	6
	Through	230	1.2	A	5	256	1.1	A	6
	Right	11	0.9	A	5	5	0.6	A	6
	Approach	242	1.2	A		263	1.1	A	
WB	Left	1	3.6	A	0	2	4.8	A	8
	Through	231	2.5	A	0	388	3.1	A	8
	Right	1	2.9	A	0	1	1.8	A	8
	Approach	233	2.5	A		391	3.1	A	
SB	Left	2	6.6	A	19	1	4.1	A	29
	Through	1	6.7	A	19	2	8.2	A	29
	Right	1	3.5	A	19	8	3.7	A	29
	Approach	4	5.9	A		11	4.6	A	
NB	Left	14	6.6	A	37	19	9.0	A	46
	Through	1	6.7	A	37	1	9.3	A	46
	Right	1	3.0	A	37	5	6.1	A	46
	Approach	16	6.4	A		25	8.4	A	

Table 3.1: Existing Year (2024) Intersection Analysis Results (Continued)

ID: 4		Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street Signalized (5-Leg)							
		Approach	Movement	AM			PM		
Volume (vph)	Delay (s)			LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Sharp Left	1	0.0	A	11	1	52.0	D	8
	Slight Left	2	26.7	C	11	2	81.3	F	8
	Through	338	13.2	B	171	305	12.5	B	161
	Right	1	11.4	B	171	1	2.6	A	161
	Approach	342	13.2	B		309	13.0	B	
WB	Left	17	19.3	B	24	72	21.8	C	64
	Through	240	11.8	B	125	481	15.1	B	249
	Slight Right	230	14.0	B	183	382	20.4	C	346
	Sharp Right	127	9.6	A	183	175	16.7	B	346
	Approach	614	12.4	B		1110	17.6	B	
SB	Left	173	76.8	E	287	180	126.7	F	405
	Through	3	113.8	F	287	1	207.5	F	405
	Slight Right	1	49.4	D	287	4	158.0	F	405
	Sharp Right	1	111.4	F	287	2	93.0	F	405
	Approach	178	77.5	E		187	127.4	F	
NB	Sharp Left	2	29.6	C	30	1	0.0	A	23
	Slight Left	1	44.7	D	30	5	33.0	C	23
	Through	18	39.8	D	30	8	36.3	D	23
	Right	1	11.1	B	30	3	7.8	A	23
	Approach	22	37.8	D		17	28.2	C	
SE	Sharp Left	1	47.9	D	239	1	0.0	A	397
	Slight Left	229	52.9	D	239	258	91.4	F	397
	Through	1	0.0	A	239	1	0.2	A	397
	Right	1	80.3	F	239	1	105.9	F	397
	Approach	232	52.8	D		261	90.8	F	

Table 3.2: Existing Year (2024) Intersection Analysis Summary

ID: 1	Riverside Avenue at Main Street Signalized (4-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at or above LOS "C".
PM	<ul style="list-style-type: none"> All approaches operate at or above LOS "C".
ID: 2	Riverside Avenue at Mellen Street Signalized (4-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at LOS "B".
PM	<ul style="list-style-type: none"> All approaches operate at LOS "C".
ID: 3	Riverside Avenue at East Street Unsignalized - Two-Way Stop Control (North-South)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at LOS "A".
PM	<ul style="list-style-type: none"> All approaches operate at LOS "A".
ID: 4	Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street Signalized (5-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> The SB approaches operate at LOS "F". This is driven by intersection timing splits.
PM	<ul style="list-style-type: none"> The SB and SEB approaches operate at LOS "F". This is driven by intersection timing splits.

3.2.2 Existing Year (2024) Operational Analysis Summary

Based on the existing year (2024) analysis, Riverside Avenue within the study area experiences very little congestion with all study intersection approaches operating at LOS "C" or better until approaching the intersection of Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street. Under typical operating conditions, the most significant delay experienced within the study area is present as drivers approach SB at the Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street intersection. Signal timing splits favor east-west flow and lead to extended queues and backups along the approach under both the AM and PM peak hours.

3.3 Safety Analysis

3.3.1 Historical Crash Data (2017 to 2019; 2022 to 2023)

Historical crash data within the study area was obtained from CTCDR for the five-year period from 2017 to 2019; 2022 to 2023. The collected data includes crashes coded to locations within the study area along Riverside Avenue. The collected data includes crash frequency, type, severity, lighting conditions, and pavement surface conditions.

3.3.2 Crash Analysis

The five-year historical crash data (2017 to 2019; 2022 to 2023) was reviewed and is summarized by type, severity, lighting conditions, and pavement surface conditions in **Table 3.3**. Segment and intersection crash rates are depicted in **Figure 3.1**.

During the five-year (2017 to 2019; 2022 to 2023) analysis period, a total of 153 crashes were observed, resulting in two severe injury crashes and no fatal crashes. The most common crash types were 'Front to Rear' (64 crashes, 41.8 percent), 'Angle' (42 crashes, 27.5 percent), and 'Hit Fixed Object' (26 crashes, 17.0 percent). The most crashes (108 crashes, 70.6 percent) occurred during 'Daylight', with second most crashes (38 crashes, 24.8 percent) occurred during the 'Dark -Lighted' condition. When examining weather impacts on crashes, most crashes occurred during 'Dry' (121 crashes, 79.1 percent) and 'Wet' (20 crashes, 13.1 percent) conditions. There were two pedestrian collisions, and no bike collisions observed during the analysis period.

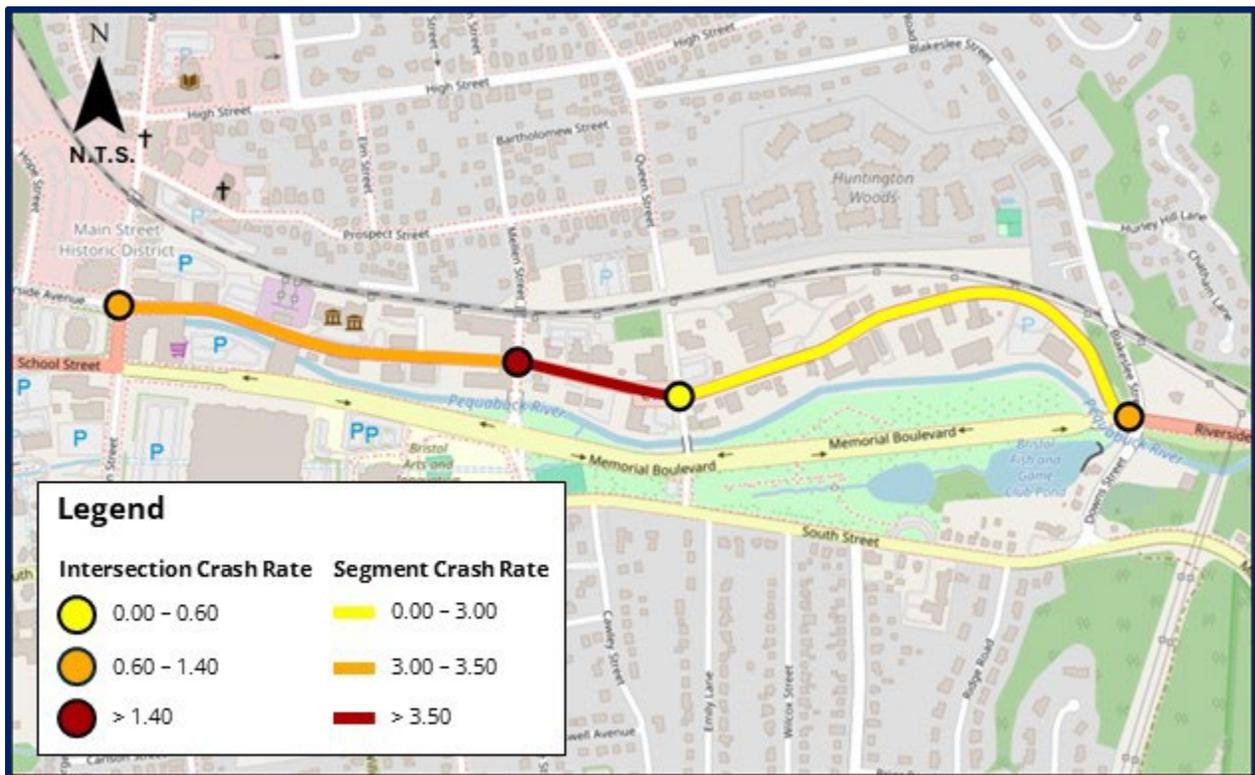


Figure 3.1: Segment and Intersection Crash Rates

Table 3.3: Crash Data (2017 to 2019; 2022 to 2023) Summary

Category	2017	2018	2019	2022	2023	Total	Mean	Percentage
Type								
Angle	8	15	8	7	4	42	8.4	27.5%
Animal	0	0	1	1	0	2	0.4	1.3%
Front to Front	0	0	0	2	1	3	0.6	2.0%
Front to Rear	11	17	12	10	14	64	12.8	41.8%
Hit Fixed Object	11	6	2	6	1	26	5.2	17.0%
Not Applicable	0	0	0	0	0	0	0	0.0%
Other	0	0	0	0	0	0	0	0.0%
Pedestrian	1	0	0	1	0	2	0.4	1.3%
Sideswipe, opposite direction	0	1	0	0	0	1	0.2	0.7%
Sideswipe, same direction	4	4	2	1	2	13	2.6	8.5%
Total	35	43	25	28	22	153	30.6	100.0%
Severity								
Fatality (K)	0	0	0	0	0	0	0.0	0.0%
Serious Injury (A)	2	0	0	0	0	2	0.4	1.3%
Minor Injury (B)	2	8	1	3	0	14	2.8	9.2%
Possible Injury (C)	6	9	3	5	5	28	5.6	18.3%
No Apparent Injury (O)	25	26	21	20	17	109	21.8	71.2%
Total	35	43	25	28	22	153	30.6	100.0%
Lighting Condition								
Dark-Lighted	12	11	5	8	2	38	7.6	24.8%
Dark-Not Lighted	2	3	0	0	0	5	1	3.3%
Daylight	20	28	20	20	20	108	21.6	70.6%
Dusk	0	1	0	0	0	1	0.2	0.7%
Unknown	1	0	0	0	0	1	0.2	0.7%
Total	35	43	25	28	22	153	30.6	100.0%
Surface Condition								
Dry	24	30	21	26	20	121	24.2	79.1%
Ice / Frost	0	1	0	0	0	1	0.2	0.7%
Slush	1	1	1	0	0	3	0.6	2.0%
Snow	3	3	0	1	0	7	1.4	4.6%
Unknown	1	0	0	0	0	1	0.2	0.7%
Wet	6	8	3	1	2	20	4	13.1%
Total	35	43	25	28	22	153	30.6	100.0%

3.3.3 Segment Crash Analysis

The segment crash rates along the Riverside Avenue study area are shown in **Table 3.4**. The segment crash rates exclude crashes that occurred within 250 feet of study area intersections. To evaluate the observed crash rates in the absence of statewide average crash rates, a critical crash rate was calculated for each study location following the guidance of the American Association of State Highway and Transportation Officials (AASHTO) *Highway Safety Manual 2010* (HSM), Chapter 4. Any observed crash rates above the calculated critical rates are denoted in the table with red text. Based on the analysis no segments crash rate exceeds the critical rates.

Table 3.4: Segment Crash Rates

ID	Segment	Length (mi)	Crashes	Crash Rate*	Critical Crash Rate**
A	Riverside Avenue between Main Street and Mellen Street	0.33	14	3.32	6.86
B	Riverside Avenue between Mellen Street and East Street	0.14	7	3.59	9.04
C	Riverside Avenue between East Street and Memorial Boulevard/Blakeslee Street/Downs Street	0.44	20	2.85	5.91

*Crash Rate = number of crashes per million vehicle miles traveled

**Critical Crash rate based on Highway Safety Manual 2010 (HSM), Chapter 4

3.3.4 Intersection Crash Analysis

The intersection crash rates along the Riverside Avenue study area are shown in **Table 3.5**. The intersection crash rates include crashes that occurred within 250 feet of study area intersections. Any observed crash rates above the calculated critical rates, are denoted in the table with red text. None of the study intersections are above the critical rates.

Table 3.5: Intersection Crash Rates

ID	Intersection	Intersection Legs	Crashes	Crash Rate*	Critical Crash Rate**
1	Riverside Avenue at Main Street	4	29	1.40	2.33
2	Riverside Avenue at Mellen Street	4	24	1.48	2.49
3	Riverside Avenue at East Street	4	5	0.60	2.59
4	Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street	5	54	1.41	2.04

*Crash Rate = number of crashes per million entering vehicles

**Critical Crash rate based on Highway Safety Manual 2010 (HSM), Chapter 4

3.4 Multi-modal Accommodations

3.4.1 Pedestrian and Bicycle

Riverside Avenue has no dedicated bicycle accommodations in the study area on or adjacent to the roadside. Sidewalks are provided along both the north and south sides from Main Street to Mellen Street, partially between Mellen Street and East Street, and intermittently between East Street and Memorial Boulevard.

3.4.2 Urban Area Public Transit

The study area has no current public transit or school bus stop operations. Upon a review of the CT Transit Route Plans, CT Transit did not set any public transit options in the study area.

4.0 No-Build Alternative Analysis

4.1 No-Build Alternative Description

The No-Build Alternative condition for this study represents the same condition found under the existing conditions. There are currently no planned improvements along the corridor outside of improvements being assessed as part of this study. The intermediate year (2030) and design year (2040) forecast volumes were developed using growth rates developed from the existing and forecast volumes found in the traffic forecasting memorandum dated June 2017 and found in **Appendix A**. Growth rates on each study intersection approach ranged from 0.2 percent to 1.5 percent.

4.2 No-Build Alternative Intermediate Year (2030) Operational Analysis

4.2.1 No-Build Alternative Intermediate Year (2030) Intersection Analysis

All study intersections within the Riverside Avenue study area were analyzed using HCS Signalized and TWSC analyses. The summary of the No-Build Alternative Intermediate year (2030) intersection analysis results are displayed in **Table 4.1** and operational summaries of each intersection are given in **Table 4.2**. Any observed failures will be denoted with red text. The No-Build Alternative intermediate year (2030) intersection analysis results can be found in **Appendix C**.

Table 4.1: No-Build Alternative Intermediate Year (2030) Intersection Analysis Results

ID: 1		Riverside Avenue at Main Street Signalized (4-Leg)							
Approach	Movement	AM				PM			
		Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	23	6.6	A	32	44	10.1	B	52
	Through	181	4.4	A	87	205	6.1	A	111
	Right	47	2.4	A	87	43	3.8	A	111
	Approach	251	4.2	A		292	6.4	A	
WB	Left	27	9.9	A	46	47	12.5	B	58
	Through	196	6.2	A	91	285	8.5	A	129
	Right	28	4.2	A	32	59	4.9	A	46
	Approach	251	6.4	A		391	8.4	A	
SB	Left	33	28.4	C	59	33	26.9	C	54
	Through	63	22.2	C	79	130	22.3	C	124
	Right	34	8.4	A	79	46	11.3	B	124
	Approach	130	20.2	C		209	20.6	C	
NB	Left	54	28.4	C	69	81	28.7	C	95
	Through	82	23.4	C	90	123	21.5	C	108
	Right	15	4.5	A	33	12	4.8	A	32
	Approach	151	23.3	C		216	23.3	C	

Table 4.1: No-Build Alternative Intermediate Year (2030) Intersection Analysis Results (Continued)

ID: 2		Riverside Avenue at Mellen Street Signalized (4-Leg)							
Approach	Movement	AM				PM			
		Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	7	5.7	A	75	13	9.7	A	96
	Through	219	3.9	A	75	228	5.1	A	96
	Right	5	2.6	A	75	9	3.5	A	96
	Approach	231	3.9	A		250	5.3	A	
WB	Left	1	0.0	A	87	7	7.1	A	157
	Through	238	3.4	A	87	358	6.0	A	157
	Right	21	2.2	A	87	76	4.1	A	157
	Approach	260	3.3	A		441	5.7	A	
SB	Left	33	21.8	C	79	43	23.2	C	95
	Through	36	22.4	C	79	41	26.0	C	95
	Right	10	9.4	A	79	18	9.8	A	95
	Approach	79	20.5	C		102	22.0	C	
NB	Left	2	35.2	D	50	15	25.3	C	65
	Through	23	19.3	B	50	30	22.1	C	65
	Right	5	5.0	A	50	9	10.5	B	65
	Approach	30	18.0	B		54	21.1	C	

ID: 3		Riverside Avenue at East Street Unsignalized – Two-Way Stop Control (North-South)							
Approach	Movement	AM				PM			
		Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	1	3.3	A	3	2	1.8	A	2
	Through	243	1.1	A	3	272	1.3	A	2
	Right	12	0.9	A	3	5	1.0	A	2
	Approach	256	1.1	A		279	1.3	A	
WB	Left	1	0.0	A	0	2	5.0	A	7
	Through	245	2.5	A	0	413	3.2	A	7
	Right	1	3.2	A	0	1	3.0	A	7
	Approach	247	2.5	A		416	3.2	A	
SB	Left	2	6.2	A	17	1	5.9	A	31
	Through	1	5.1	A	17	2	8.6	A	31
	Right	1	3.2	A	17	8	4.9	A	31
	Approach	4	5.2	A		11	5.7	A	
NB	Left	14	6.6	A	38	19	9.0	A	43
	Through	1	5.4	A	38	1	7.9	A	43
	Right	1	3.2	A	38	5	3.2	A	43
	Approach	16	6.3	A		25	7.8	A	

Table 4.1: No-Build Alternative Intermediate Year (2030) Intersection Analysis Results (Continued)

ID: 4		Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street Signalized (5-Leg)							
		AM				PM			
Approach	Movement	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Sharp Left	1	14.4	B	9	1	44.1	D	13
	Slight Left	2	23.2	C	9	2	87.4	F	13
	Through	361	13.2	B	191	325	12.6	B	176
	Right	1	10.4	B	191	1	8.1	A	176
	Approach		365	13.3	B		329	13.1	B
WB	Left	17	24.8	C	29	73	21.2	C	68
	Through	256	13.1	B	140	513	15.7	B	264
	Slight Right	244	14.4	B	199	407	21.8	C	351
	Sharp Right	132	10.0	A	199	181	18.7	B	351
	Approach		649	13.3	B		1174	18.6	B
SB	Left	179	101.4	F	373	186	192.4	F	630
	Through	3	133.1	F	373	1	203.4	F	630
	Slight Right	1	52.0	D	373	4	189.0	F	630
	Sharp Right	1	149.7	F	373	2	165.3	F	630
	Approach		184	101.9	F		193	192.1	F
NB	Sharp Left	2	31.3	C	22	1	37.6	D	26
	Slight Left	1	18.6	B	22	5	32.8	C	26
	Through	18	34.1	C	22	8	41.3	D	26
	Right	1	5.1	A	22	3	9.4	A	26
	Approach		22	31.8	C		17	33.0	C
SE	Sharp Left	1	15.2	B	282	1	108.2	F	772
	Slight Left	242	60.1	E	282	273	192.3	F	772
	Through	2	1.6	A	282	2	0.4	A	772
	Right	1	48.9	D	282	1	418.3	F	772
	Approach		246	59.4	E		277	191.4	F

Table 4.2: No-Build Alternative Intermediate Year (2030) Intersection Analysis Summary

ID: 1	Riverside Avenue at Main Street Signalized (4-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at or above LOS "C".
PM	<ul style="list-style-type: none"> All approaches operate at or above LOS "C".
ID: 2	Riverside Avenue at Mellen Street Signalized (4-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at LOS "C".
PM	<ul style="list-style-type: none"> All approaches operate at LOS "C".
ID: 3	Riverside Avenue at East Street Unsignalized - Two-Way Stop Control (North-South)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at LOS "A".
PM	<ul style="list-style-type: none"> All approaches operate at LOS "A".
ID: 4	Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street Signalized (5-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> The SB approach operates at LOS "F" and SEB operates at LOS "E". This is driven by intersection timing splits.
PM	<ul style="list-style-type: none"> The SB and SEB approaches operate at LOS "F". This is driven by intersection timing splits.

4.2.2 No-Build Alternative Intermediate Year (2030) Operational Analysis Summary

Based on the No-Build Alternative intermediate year (2030) analysis, Riverside Avenue within the study area is expected to continue to experience very little congestion with the majority of intersections operating at LOS "C" or better during typical operations. Delays increased as density along Riverside Avenue increased, impacting capacity along Riverside Avenue. Challenges continue along the SB and SEB approaches at Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street as the signal timing splits continue to impact operations.

4.3 No-Build Alternative Design Year (2040) Operational Analysis

4.3.1 No-Build Alternative Design Year (2040) Intersection Analysis

All study intersections within the Riverside Avenue study area were analyzed using HCS Two-Way Stop Control Analysis. The summary of the No-Build Alternative design year (2040) intersection analysis results are displayed in **Table 4.3** and operational summaries of each intersection are found in **Table 4.4**. Any observed failures will be denoted with red text. The No-Build Alternative design year (2040) intersection analysis results can be found in **Appendix D**.

Table 4.3: No-Build Alternative Design Year (2040) Intersection Analysis Results

ID: 1		Riverside Avenue at Main Street Signalized (4-Leg)							
		Approach	Movement	AM			PM		
Volume (vph)	Delay (s)			LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	27	8.4	A	37	50	13.9	B	55
	Through	200	4.9	A	87	227	7.2	A	120
	Right	56	2.5	A	87	51	4.7	A	120
	Approach	283	4.8	A		328	7.8	A	
WB	Left	29	11.1	B	45	52	15.6	B	78
	Through	216	7.4	A	113	316	11.0	B	176
	Right	30	3.9	A	30	64	5.5	A	52
	Approach	275	7.4	A		432	10.7	B	
SB	Left	35	26.7	C	53	34	28.3	C	52
	Through	70	22.1	C	91	146	22.1	C	141
	Right	39	8.6	A	91	51	11.7	B	141
	Approach	144	19.6	B		231	20.7	C	
NB	Left	63	28.4	C	77	95	30.6	C	104
	Through	92	21.2	C	86	138	21.1	C	114
	Right	17	5.0	A	35	13	5.0	A	29
	Approach	172	22.2	C		246	23.9	C	

Table 4.3: No-Build Alternative Design Year (2040) Intersection Analysis Results (Continued)

ID: 2		Riverside Avenue at Mellen Street Signalized (4-Leg)							
Approach	Movement	AM				PM			
		Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	8	6.9	A	78	14	13.4	B	115
	Through	239	4.1	A	78	251	6.1	A	115
	Right	6	2.9	A	78	10	4.9	A	115
	Approach	253	4.2	A		275	6.4	A	
WB	Left	1	3.0	A	101	7	6.8	A	163
	Through	261	4.0	A	101	397	6.3	A	163
	Right	22	3.1	A	101	80	4.5	A	163
	Approach	284	3.9	A		484	6.0	A	
SB	Left	34	22.4	C	86	45	24.0	C	97
	Through	37	22.3	C	86	42	22.9	C	97
	Right	11	8.3	A	86	21	11.0	B	97
	Approach	82	20.5	C		108	21.0	C	
NB	Left	2	35.0	C	51	16	25.4	C	63
	Through	23	21.6	C	51	31	23.2	C	63
	Right	5	5.3	A	51	9	7.2	A	63
	Approach	30	19.8	B		56	21.3	C	

ID: 3		Riverside Avenue at East Street Unsignalized – Two-Way Stop Control (North-South)							
Approach	Movement	AM				PM			
		Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Left	1	3.5	A	2	2	4.6	A	13
	Through	266	1.3	A	2	296	1.4	A	13
	Right	12	0.8	A	2	6	1.4	A	13
	Approach	279	1.3	A		304	1.4	A	
WB	Left	1	0.0	A	0	2	1.3	A	0
	Through	268	2.7	A	0	455	3.5	A	0
	Right	1	1.0	A	0	1	0.3	A	0
	Approach	270	2.7	A		458	3.5	A	
SB	Left	2	6.5	A	21	1	5.5	A	31
	Through	1	7.1	A	21	2	10.9	B	31
	Right	1	2.4	A	21	8	3.7	A	31
	Approach	4	5.6	A		11	5.2	A	
NB	Left	14	6.9	A	35	20	8.1	A	44
	Through	0	0.0	A	35	1	5.6	A	44
	Right	1	2.4	A	35	4	4.3	A	44
	Approach	15	6.6	A		25	7.4	A	

Table 4.3: No-Build Alternative Design Year (2040) Intersection Analysis Results (Continued)

ID: 4		Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street Signalized (5-Leg)							
		AM				PM			
Approach	Movement	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)	Volume (vph)	Delay (s)	LOS	Queue (ft) (95%tile)
EB	Sharp Left	1	0.0	A	13	1	85.8	F	10
	Slight Left	3	34.1	C	13	2	189.7	F	10
	Through	398	13.6	B	202	359	13.0	B	190
	Right	1	7.8	A	202	1	8.1	A	190
	Approach		403	13.7	B		363	14.2	B
WB	Left	17	21.2	C	28	75	24.2	C	77
	Through	282	11.7	B	148	566	17.2	B	304
	Slight Right	267	15.3	B	207	448	28.5	C	464
	Sharp Right	140	11.1	B	207	193	26.7	C	464
	Approach		706	13.2	B		1282	23.0	C
SB	Left	190	96.0	F	312	198	187.6	F	586
	Through	3	107.0	F	312	1	169.4	F	586
	Slight Right	1	75.2	E	312	5	226.9	F	586
	Sharp Right	1	101.9	F	312	3	171.2	F	586
	Approach		195	96.1	F		207	188.2	F
NB	Sharp Left	2	48.4	D	25	1	0.0	A	23
	Slight Left	1	19.1	B	25	6	34.2	C	23
	Through	19	35.6	D	25	8	41.2	D	23
	Right	1	11.3	B	25	3	11.5	B	23
	Approach		23	34.9	C		18	31.6	C
SE	Sharp Left	1	71.4	E	421	1	167.6	F	1129
	Slight Left	264	97.3	F	421	298	305.2	F	1129
	Through	2	0.9	A	421	1	27.1	C	1129
	Right	1	198.3	F	421	1	193.3	F	1129
	Approach		268	96.9	F		301	303.4	F

Table 4.4: No-Build Alternative Design Year (2040) Intersection Analysis Summary

ID: 1	Riverside Avenue at Main Street Signalized (4-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at or above LOS "C".
PM	<ul style="list-style-type: none"> All approaches operate at or above LOS "C".
ID: 2	Riverside Avenue at Mellen Street Signalized (4-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at LOS "C".
PM	<ul style="list-style-type: none"> All approaches operate at LOS "C".
ID: 3	Riverside Avenue at East Street Unsignalized - Two-Way Stop Control (North-South)
Period	Observations
AM	<ul style="list-style-type: none"> All approaches operate at LOS "A".
PM	<ul style="list-style-type: none"> All approaches operate at LOS "A".
ID: 4	Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street Signalized (5-Leg)
Period	Observations
AM	<ul style="list-style-type: none"> The SB and SEB approaches operate at LOS "F". This is driven by intersection timing splits.
PM	<ul style="list-style-type: none"> The SB and SEB approaches operate at LOS "F". This is driven by intersection timing splits.

4.3.2 No-Build Alternative Design Year (2040) Operational Analysis Summary

Based on the No-Build Alternative design year (2040) analysis, Riverside Avenue within the study area continues to experience a similar trend as under the intermediate year (2030) analysis with most intersections operating at LOS "C" or better under typical operations. The issues along the SB and SEB approaches at Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street continue to worsen as the signal timing splits continue to impact operations.

5.0 Summary of Analysis Results

This analysis considers the existing year (2024) and No-Build scenario under the intermediate year (2030) and design year (2040) to identify existing and future operational and safety challenges along the corridor. It involves assessing existing conditions, historical crash analysis, traffic forecasting, and a No-Build scenario operational analysis. The No-Build Alternative is effectively unchanged from the existing condition as there are no planned improvements along the corridor outside of ones that would be developed as part of this analysis.

5.1 Summary of Traffic Analysis Results

Under existing year (2024) conditions, Riverside Avenue experiences minimal congestion, operating at or above LOS "C" or better for all intersection approaches within the study area except for the SB and SEB approaches at Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street intersection. The delay here is caused by intersection signal timings that favor east-west travel and cause delays along Riverside Avenue.

The No-Build analysis continued to show that the Riverside Avenue study corridor experienced little congestion with most intersections operating at LOS "C" or better in both the AM and PM peak period. The intersection of Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street continued to show operational break down as demand increases due to the existing signal timing.

Based upon the scope of work, this analysis was to assess the possible signalization of the currently unsignalized two-way (north-south) stop controlled intersection of Riverside Avenue and East Street. Based on a review of the Warrants provided in the Manual on Uniform Traffic Control Devices (MUTCD), the intersection does not meet any criteria for signalization. This recommendation is also supported by both the operational and safety analysis that do not indicate any reason to signalize the intersection.

Additionally, the intersection of Riverside Avenue at Mellen Street met all LOS criteria and the provided count data and forecast indicated minimal demand and delay for left turn operations along Riverside Avenue. Due to these findings, dedicated left turn lanes along Riverside Avenue at the intersection at Riverside Avenue and Mellen Street are not required.

5.2 Summary of Safety Analysis Results

Based on the historical crash patterns, all segments and intersections have crash rates below the critical crash rate indicating that while crashes do occur, they are below the expected average levels and do not require mitigation at this time. There were also no fatalities recorded along the corridor during the observed historical analysis period (2017 to 2019; 2022 to 2023).

With the density of driveways and, in many cases, extremely wide or poorly defined curb cuts, it's logical that front to rear (41.8 percent) and angle (27.5 percent) lead all crash types as sudden stops for turns can heavily drive these crash types. Additionally, the poorly defined roadway edge, minimal existing streetscaping along the corridor, and many utility poles close to the travel way, it's not surprising that the third highest type of crash is 'hit fixed object' at 17.0 percent of crashes. This indicates a need for improvement along the roadway edge.

5.3 Conclusion

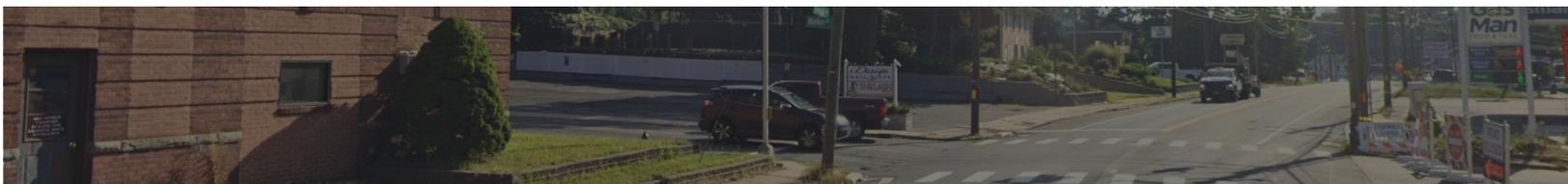
Based on the results of this analysis, the proposed streetscape improvements, new curbing, and reduction in curb cut widths where feasible, would provide safety benefits to the corridor by providing better delineation between the roadway and the side of the road which could affect the three most common types of crashes, while not impacting existing operations. The two recommendations of this analysis would be to collect updated traffic count information and assess the retiming of the intersection at Riverside Avenue at Memorial Boulevard/Blakeslee Street/Downs Street to mitigate the noted operational issues and provide for better streetscaping and separation of the roadway from the side of road through the corridor.

Appendices



Appendix A

CTDOT Traffic Memorandum supporting State Project No. 0017-0171 Intersection Improvements on Route 72 at Memorial Boulevard and Blakeslee Street City of Bristol



subject: State Project No. 0017-0171
Intersection Improvements on Route 72
At Memorial Blvd. and Blakeslee Street
City of Bristol

Memorandum

date: November 13, 2017

to: Michael S. Cherpak
Transportation Project Manager
Bureau of Engineering and Construction

from: Colleen A. Kissane
Trans. Assistant Planning Director
Bureau of Policy and Planning

Colleen A. Kissane

Date: 2017.11.09
15:49:33 -05'00'

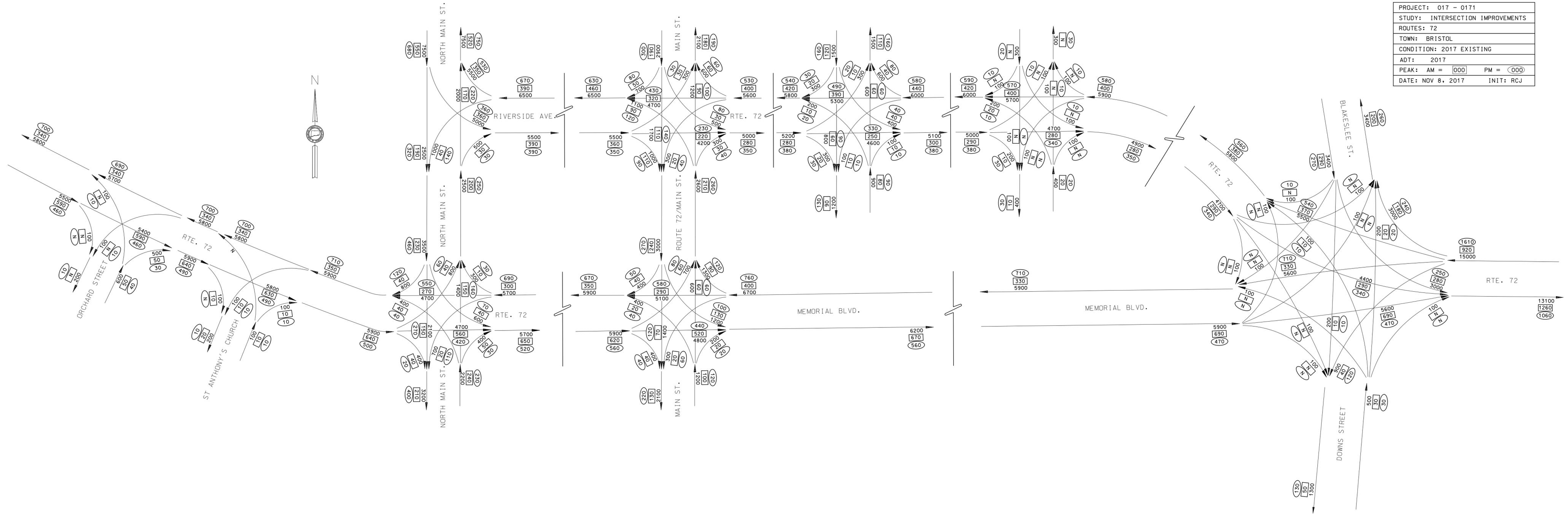
Attached are the 2019 construction year and 2040 design year volumes requested for the above mentioned project. The no-build volumes and the 2017 existing volumes have also been included. The percentage of trucks is approximately 2% on Memorial Boulevard and 5% on Route 72.

If you have any questions or need additional information regarding this request, please contact Mr. Richard C. Jacobson, Transportation Planner 2 at extension 2035.

Rick C. Jacobson/RCJ

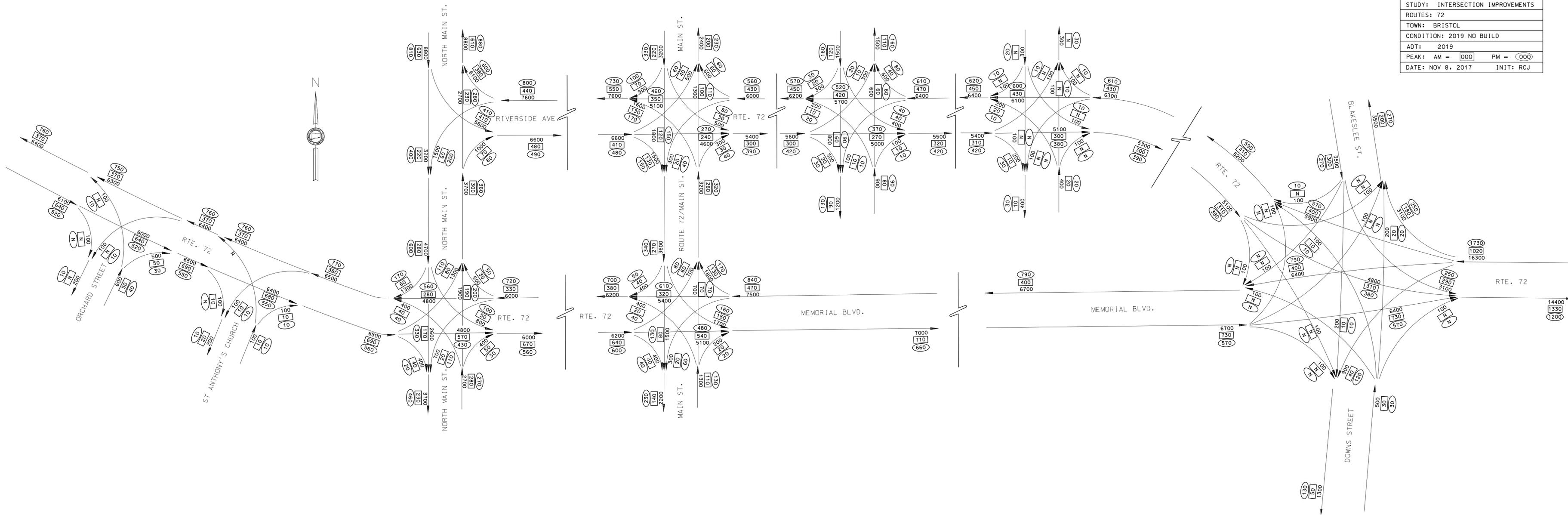
cc: Mark F. Carlino - Colleen A. Kissane
Gary J. Sojka - Rick C. Jacobson

PROJECT:	017 - 0171
STUDY:	INTERSECTION IMPROVEMENTS
ROUTES:	72
TOWN:	BRISTOL
CONDITION:	2017 EXISTING
ADT:	2017
PEAK:	AM = 000 PM = 000
DATE:	NOV 8, 2017 INIT: RCJ

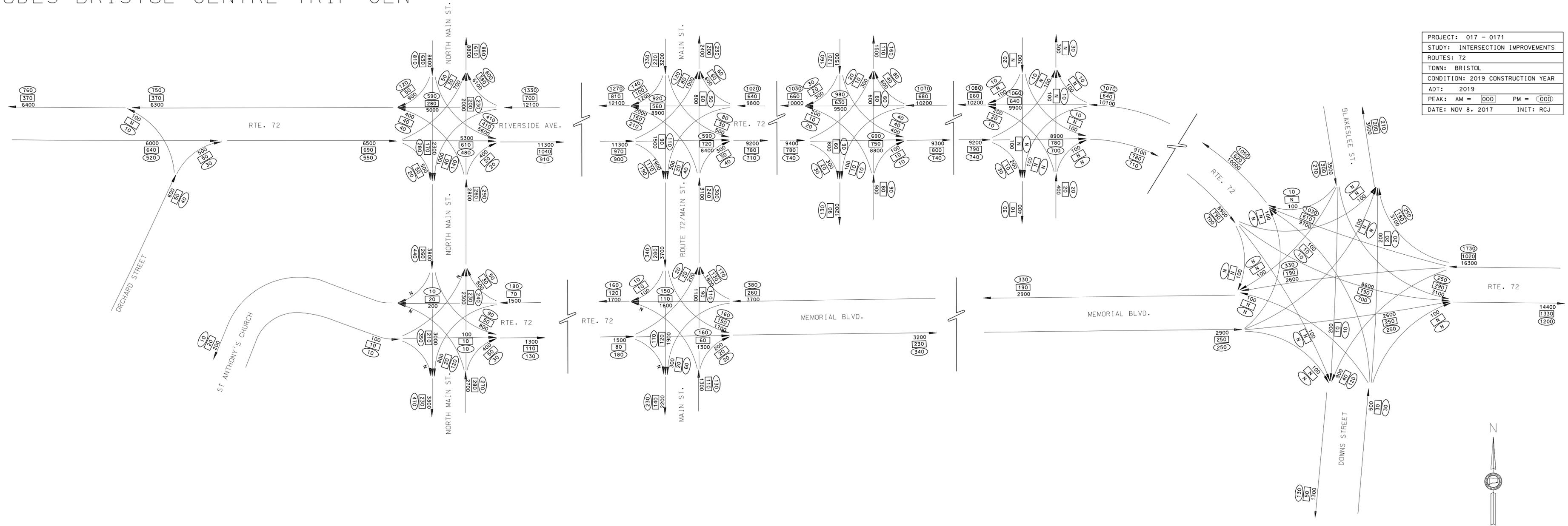


*INCLUDES BRISTOL CENTRE TRIP GEN

PROJECT:	017 - 0171
STUDY:	INTERSECTION IMPROVEMENTS
ROUTES:	72
TOWN:	BRISTOL
CONDITION:	2019 NO BUILD
ADT:	2019
PEAK:	AM = 000 PM = 000
DATE:	NOV 8, 2017 INIT: RCJ



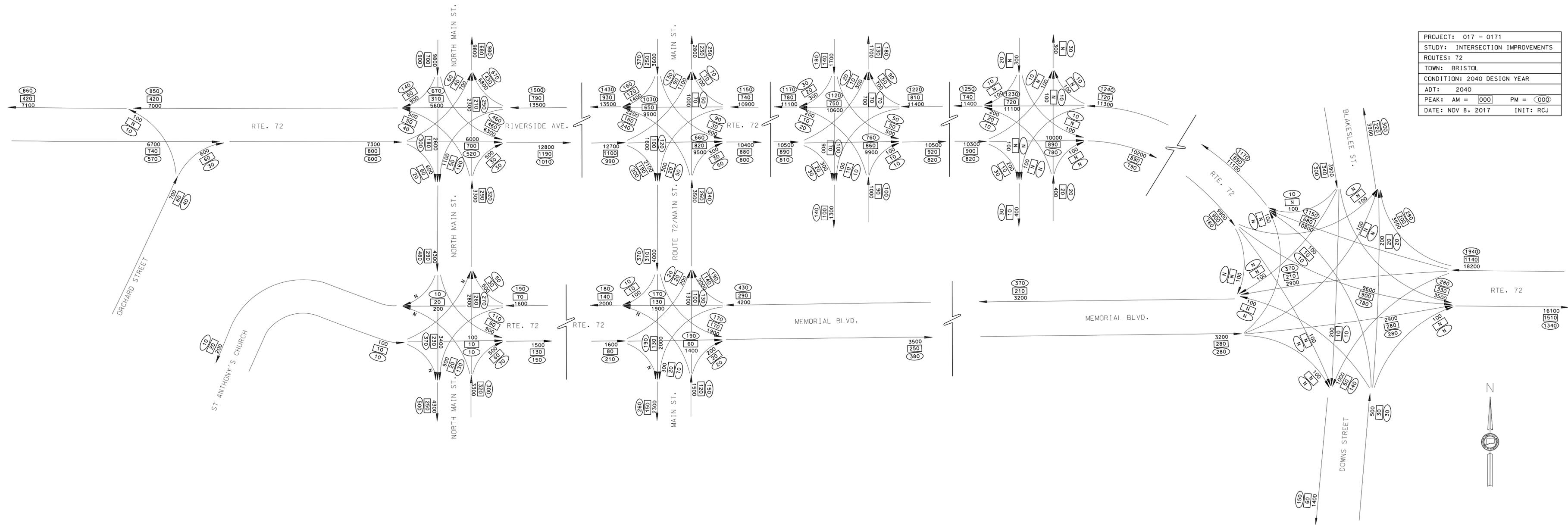
*INCLUDES BRISTOL CENTRE TRIP GEN



PROJECT:	017 - 0171
STUDY:	INTERSECTION IMPROVEMENTS
ROUTES:	72
TOWN:	BRISTOL
CONDITION:	2019 CONSTRUCTION YEAR
ADT:	2019
PEAK:	AM = 000 PM = 000
DATE:	NOV 8, 2017
INIT:	RCJ



*INCLUDES BRISTOL CENTRE TRIP GEN

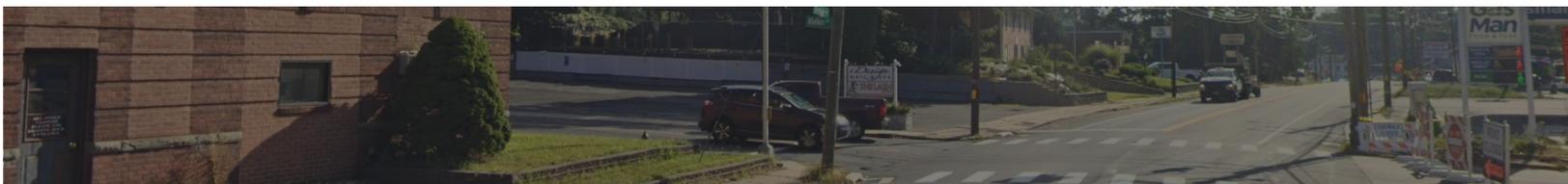


PROJECT:	017 - 0171
STUDY:	INTERSECTION IMPROVEMENTS
ROUTES:	72
TOWN:	BRISTOL
CONDITION:	2040 DESIGN YEAR
ADT:	2040
PEAK:	AM = 000 PM = 000
DATE:	NOV 8, 2017 INIT: RCJ



Appendix B

Existing Year (2024) Intersection Analysis



Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	90	90	90	90	90	90
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	3	3	3	3	3	3
Vehs Entered	2594	2649	2680	2708	2665	2660
Vehs Exited	2535	2606	2644	2645	2604	2607
Starting Vehs	0	0	0	0	0	0
Ending Vehs	59	43	36	63	61	49
Travel Distance (mi)	1641	1665	1714	1730	1714	1693
Travel Time (hr)	78.7	79.7	82.0	90.1	82.6	82.6
Total Delay (hr)	20.9	21.4	21.6	29.4	22.2	23.1
Total Stops	2156	2073	2160	2328	2190	2182
Fuel Used (gal)	57.3	58.1	59.9	62.1	60.0	59.5

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	433	418	448	458	450	442
Vehs Exited	392	363	390	406	392	388
Starting Vehs	0	0	0	0	0	0
Ending Vehs	41	55	58	52	58	52
Travel Distance (mi)	257	260	287	274	274	270
Travel Time (hr)	11.8	12.4	14.3	12.8	13.6	13.0
Total Delay (hr)	2.8	3.3	4.2	3.2	4.0	3.5
Total Stops	306	318	354	345	352	333
Fuel Used (gal)	8.8	8.8	10.1	9.4	9.6	9.3

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1694	1813	1787	1812	1774	1779
Vehs Exited	1667	1825	1798	1794	1780	1776
Starting Vehs	41	55	58	52	58	52
Ending Vehs	68	43	47	70	52	54
Travel Distance (mi)	1081	1146	1141	1163	1144	1135
Travel Time (hr)	52.3	55.3	53.8	60.9	55.2	55.5
Total Delay (hr)	14.1	15.2	13.6	20.0	14.9	15.6
Total Stops	1442	1417	1426	1584	1470	1468
Fuel Used (gal)	37.7	40.3	39.7	42.0	40.2	40.0

Interval #2 Information Ending

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	467	418	445	438	441	442
Vehs Exited	476	418	456	445	432	444
Starting Vehs	68	43	47	70	52	54
Ending Vehs	59	43	36	63	61	49
Travel Distance (mi)	304	259	287	292	296	288
Travel Time (hr)	14.6	12.0	13.8	16.4	13.8	14.1
Total Delay (hr)	3.9	2.9	3.8	6.1	3.3	4.0
Total Stops	408	338	380	399	368	376
Fuel Used (gal)	10.8	9.0	10.0	10.8	10.2	10.2

1: Main Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.4	0.3	0.2	0.0	0.0	0.1	3.5	0.3	3.6	3.6	0.2	0.3
Total Delay (hr)	0.1	0.3	0.0	0.1	0.5	0.0	0.5	0.8	0.0	0.4	0.6	0.1
Total Del/Veh (s)	8.1	4.3	2.0	10.7	6.0	4.0	28.2	22.8	4.4	29.5	22.3	9.4
Travel Dist (mi)	5.7	48.6	12.6	12.2	90.4	11.8	12.1	22.1	4.5	10.4	20.0	10.8
Travel Time (hr)	0.3	2.0	0.5	0.5	3.5	0.5	1.0	1.5	0.2	0.8	1.3	0.5
Avg Speed (mph)	21	25	25	23	26	25	13	15	23	13	16	20
Vehicles Entered	29	250	65	37	279	36	65	119	24	49	93	50
Vehicles Exited	29	248	64	37	277	36	65	118	24	48	92	50
Hourly Exit Rate	19	165	43	25	185	24	43	79	16	32	61	33
Input Volume	21	170	42	25	185	27	48	76	15	32	58	31
% of Volume	92	97	102	99	100	89	90	104	107	100	106	108
Density (ft/veh)												
Occupancy (veh)	0	1	0	0	2	0	1	1	0	1	1	0

1: Main Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.2
Denied Del/Veh (s)	0.7
Total Delay (hr)	3.4
Total Del/Veh (s)	11.2
Travel Dist (mi)	261.3
Travel Time (hr)	12.6
Avg Speed (mph)	21
Vehicles Entered	1096
Vehicles Exited	1088
Hourly Exit Rate	725
Input Volume	730
% of Volume	99
Density (ft/veh)	1492
Occupancy (veh)	8

2: Mellen Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1
Total Delay (hr)	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.2	0.0	0.3	0.3	0.0
Total Del/Veh (s)	6.1	3.9	3.4	3.8	3.6	2.6	14.9	19.9	5.2	20.6	21.4	7.3
Travel Dist (mi)	2.8	101.2	2.2	0.1	46.0	3.6	0.6	8.4	1.8	10.1	11.6	3.4
Travel Time (hr)	0.1	3.8	0.1	0.0	1.9	0.2	0.0	0.5	0.1	0.6	0.7	0.2
Avg Speed (mph)	25	27	25	20	24	23	17	17	23	16	16	22
Vehicles Entered	8	306	7	1	333	26	3	36	8	49	56	16
Vehicles Exited	8	304	7	1	332	26	3	36	8	49	55	16
Hourly Exit Rate	5	203	5	1	221	17	2	24	5	33	37	11
Input Volume	6	206	5	1	225	20	2	22	5	32	35	9
% of Volume	89	98	93	67	98	87	100	109	107	102	105	119
Density (ft/veh)												
Occupancy (veh)	0	3	0	0	1	0	0	0	0	0	0	0

2: Mellen Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	1.6
Total Del/Veh (s)	6.7
Travel Dist (mi)	191.7
Travel Time (hr)	8.2
Avg Speed (mph)	23
Vehicles Entered	849
Vehicles Exited	845
Hourly Exit Rate	563
Input Volume	568
% of Volume	99
Density (ft/veh)	883
Occupancy (veh)	5

3: East Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.7	1.2	0.9	3.6	2.5	2.9	6.6	6.7	3.0	6.6	6.7	3.5
Travel Dist (mi)	0.2	46.6	2.5	0.3	149.6	1.3	4.0	0.6	0.7	0.7	0.4	0.5
Travel Time (hr)	0.0	1.7	0.1	0.0	5.8	0.1	0.2	0.0	0.0	0.0	0.0	0.0
Avg Speed (mph)	22	27	24	25	26	25	23	23	25	22	24	24
Vehicles Entered	1	338	18	1	344	3	18	3	3	3	2	2
Vehicles Exited	1	337	18	1	340	3	18	3	3	3	2	2
Hourly Exit Rate	1	225	12	1	227	2	12	2	2	2	1	1
Input Volume	1	230	11	1	231	1	14	1	1	2	1	1
% of Volume	67	98	109	67	98	200	86	200	200	100	133	133
Density (ft/veh)												
Occupancy (veh)	0	1	0	0	4	0	0	0	0	0	0	0

3: East Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	0.4
Total Del/Veh (s)	2.0
Travel Dist (mi)	207.4
Travel Time (hr)	8.0
Avg Speed (mph)	26
Vehicles Entered	736
Vehicles Exited	731
Hourly Exit Rate	487
Input Volume	495
% of Volume	98
Density (ft/veh)	1031
Occupancy (veh)	5

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)		0.1	0.3	0.1	2.9	0.3	0.3	0.2	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.0	1.8	0.0	0.1	1.2	1.3	0.5	0.0	0.0	0.3	0.0
Total Del/Veh (s)		26.7	13.2	11.4	19.3	11.8	14.0	9.6	29.6	44.7	39.8	11.1
Travel Dist (mi)	0.1	0.5	75.2	0.3	4.5	74.8	73.5	40.7	0.8	0.3	5.6	0.5
Travel Time (hr)	0.0	0.0	4.4	0.0	0.3	3.7	4.1	2.0	0.1	0.0	0.5	0.0
Avg Speed (mph)	6	11	17	17	16	20	18	20	13	14	12	19
Vehicles Entered	0	4	499	2	21	353	347	192	4	1	25	3
Vehicles Exited	0	4	497	2	21	349	345	192	4	1	25	2
Hourly Exit Rate	0	3	331	1	14	233	230	128	3	1	17	1
Input Volume	1	2	338	1	17	240	230	127	2	1	18	1
% of Volume	0	133	98	133	82	97	100	101	133	67	93	133
Density (ft/veh)												
Occupancy (veh)	0	0	3	0	0	2	3	1	0	0	0	0

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	SBL	SBT	SBR	SBR2	SEL2	SEL	SET	SER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.2	0.4	0.1	0.8	0.0	0.0	0.0	0.0	0.2
Total Delay (hr)	5.4	0.1	0.0	0.0	0.0	5.0	0.0	0.0	16.0
Total Del/Veh (s)	76.8	113.8	49.4	111.4	47.9	52.9	0.0	80.3	28.0
Travel Dist (mi)	50.7	0.9	0.3	0.3	0.3	146.4	0.4	0.5	476.8
Travel Time (hr)	7.3	0.2	0.0	0.0	0.0	10.1	0.0	0.0	32.8
Avg Speed (mph)	7	6	8	7	14	15	28	12	15
Vehicles Entered	255	4	2	1	1	338	2	1	2055
Vehicles Exited	249	4	2	1	1	329	2	1	2031
Hourly Exit Rate	166	3	1	1	1	219	1	1	1354
Input Volume	173	3	1	1	1	229	1	1	1388
% of Volume	96	89	133	67	67	96	133	67	98
Density (ft/veh)									433
Occupancy (veh)	5	0	0	0	0	7	0	0	22

Total Network Performance

Denied Delay (hr)	0.4
Denied Del/Veh (s)	0.5
Total Delay (hr)	22.7
Total Del/Veh (s)	30.8
Travel Dist (mi)	1692.8
Travel Time (hr)	82.6
Avg Speed (mph)	21
Vehicles Entered	2660
Vehicles Exited	2607
Hourly Exit Rate	1738
Input Volume	4950
% of Volume	35
Density (ft/veh)	585
Occupancy (veh)	55

Queuing and Blocking Report
Existing

09/03/2024

Intersection: 1: Main Street & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	TR
Maximum Queue (ft)	42	109	81	117	47	84	119	35	72	109
Average Queue (ft)	8	35	11	31	6	32	47	11	23	43
95th Queue (ft)	31	77	43	84	27	66	95	34	55	83
Link Distance (ft)		1025		1684			982			1130
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110		140		250	150		150	200	
Storage Blk Time (%)		0		0			0			
Queuing Penalty (veh)		0		0			0			

Intersection: 2: Mellen Street & Riverside Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	95	119	64	112
Average Queue (ft)	27	29	20	43
95th Queue (ft)	69	87	51	82
Link Distance (ft)	1684	660	1239	1097
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: East Street & Riverside Avenue

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	12	43	29
Average Queue (ft)	0	12	4
95th Queue (ft)	5	37	19
Link Distance (ft)	660	1189	1248
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Existing

09/03/2024

Intersection: 4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	SB	SE
Directions Served	<L	TR	L	T	R>	<LTR	LTR>	<LR
Maximum Queue (ft)	26	214	40	159	232	54	298	277
Average Queue (ft)	2	99	7	69	110	9	146	136
95th Queue (ft)	11	171	24	125	183	30	287	239
Link Distance (ft)	790	790		1116	1116	1169	1054	2229
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	550							
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:45	4:45	4:45	4:45	4:45	4:45
End Time	6:15	6:15	6:15	6:15	6:15	6:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	75	75	75	75	75	75
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2
Vehs Entered	3150	3054	3105	3049	3102	3093
Vehs Exited	3133	3070	3093	3051	3109	3093
Starting Vehs	86	113	72	93	80	88
Ending Vehs	103	97	84	91	73	86
Travel Distance (mi)	1978	1961	1974	1919	2030	1972
Travel Time (hr)	99.8	102.6	99.6	109.3	111.2	104.5
Total Delay (hr)	30.2	33.2	30.0	41.6	39.5	34.9
Total Stops	2622	2667	2625	2664	2743	2668
Fuel Used (gal)	70.6	70.8	70.3	71.3	74.1	71.4

Interval #0 Information Seeding

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:00
End Time	6:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	2490	2442	2510	2428	2516	2474
Vehs Exited	2509	2482	2492	2436	2505	2485
Starting Vehs	86	113	72	93	80	88
Ending Vehs	67	73	90	85	91	80
Travel Distance (mi)	1573	1565	1592	1528	1640	1579
Travel Time (hr)	77.1	81.5	80.6	87.3	88.9	83.1
Total Delay (hr)	21.8	26.0	24.5	33.3	31.1	27.3
Total Stops	2048	2135	2128	2108	2226	2127
Fuel Used (gal)	55.8	56.5	56.7	56.8	59.7	57.1

Interval #2 Information Ending

Start Time	6:00
End Time	6:15
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	660	612	595	621	586	615
Vehs Exited	624	588	601	615	604	607
Starting Vehs	67	73	90	85	91	80
Ending Vehs	103	97	84	91	73	86
Travel Distance (mi)	405	395	382	391	390	393
Travel Time (hr)	22.8	21.1	19.0	22.1	22.3	21.4
Total Delay (hr)	8.5	7.2	5.5	8.3	8.4	7.6
Total Stops	574	532	497	556	517	534
Fuel Used (gal)	14.8	14.2	13.5	14.6	14.5	14.3

1: Main Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.6	0.3	0.3	0.0	0.0	0.0	3.5	0.3	3.7	3.3	0.3	0.2
Total Delay (hr)	0.2	0.3	0.0	0.2	0.7	0.1	0.8	0.9	0.0	0.2	0.9	0.2
Total Del/Veh (s)	11.5	5.5	3.2	11.8	7.6	4.7	30.6	22.2	4.9	27.2	22.7	11.3
Travel Dist (mi)	9.7	43.7	9.2	16.3	114.2	23.8	17.4	27.5	2.1	6.0	31.4	11.1
Travel Time (hr)	0.6	1.8	0.4	0.7	4.6	1.0	1.5	1.9	0.1	0.5	2.0	0.6
Avg Speed (mph)	19	24	24	22	25	25	12	15	23	14	16	19
Vehicles Entered	50	224	48	49	348	72	94	148	11	28	146	52
Vehicles Exited	50	224	48	49	347	73	95	148	11	28	146	52
Hourly Exit Rate	40	179	38	39	278	58	76	118	9	22	117	42
Input Volume	40	191	38	43	267	56	73	114	11	31	120	42
% of Volume	100	94	101	91	104	104	104	104	80	72	97	99
Density (ft/veh)												
Occupancy (veh)	0	1	0	1	4	1	1	1	0	0	2	0

1: Main Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.2
Denied Del/Veh (s)	0.7
Total Delay (hr)	4.6
Total Del/Veh (s)	12.9
Travel Dist (mi)	312.5
Travel Time (hr)	15.6
Avg Speed (mph)	20
Vehicles Entered	1270
Vehicles Exited	1271
Hourly Exit Rate	1017
Input Volume	1026
% of Volume	99
Density (ft/veh)	1005
Occupancy (veh)	12

2: Mellen Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.2
Total Delay (hr)	0.0	0.3	0.0	0.0	0.7	0.1	0.1	0.2	0.0	0.4	0.3	0.1
Total Del/Veh (s)	8.8	4.5	4.1	6.8	6.0	4.1	26.6	22.0	7.8	25.5	22.7	11.0
Travel Dist (mi)	5.1	79.7	3.4	1.3	60.1	12.3	3.5	7.9	3.1	10.4	11.3	4.4
Travel Time (hr)	0.2	3.0	0.1	0.1	2.8	0.6	0.2	0.5	0.1	0.7	0.7	0.2
Avg Speed (mph)	23	26	25	20	22	21	15	17	22	14	15	19
Vehicles Entered	15	243	10	9	434	89	15	34	13	50	54	21
Vehicles Exited	16	241	10	9	433	89	15	33	13	50	54	21
Hourly Exit Rate	13	193	8	7	346	71	12	26	10	40	43	17
Input Volume	12	214	9	7	335	73	14	30	9	41	40	17
% of Volume	107	90	89	103	103	98	86	88	116	98	108	99
Density (ft/veh)												
Occupancy (veh)	0	2	0	0	2	0	0	0	0	1	1	0

2: Mellen Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	2.3
Total Del/Veh (s)	8.4
Travel Dist (mi)	202.4
Travel Time (hr)	9.3
Avg Speed (mph)	22
Vehicles Entered	987
Vehicles Exited	984
Hourly Exit Rate	787
Input Volume	801
% of Volume	98
Density (ft/veh)	644
Occupancy (veh)	7

3: East Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.0	1.1	0.6	4.8	3.1	1.8	9.0	9.3	6.1	4.1	8.2	3.7
Travel Dist (mi)	0.2	40.8	0.8	0.7	216.5	0.9	5.8	0.4	1.2	0.1	0.7	2.4
Travel Time (hr)	0.0	1.5	0.0	0.0	8.4	0.0	0.3	0.0	0.1	0.0	0.0	0.1
Avg Speed (mph)	22	27	24	24	26	25	21	22	22	23	24	24
Vehicles Entered	1	295	6	2	497	2	26	2	5	1	3	10
Vehicles Exited	1	296	6	2	496	2	26	2	5	1	3	10
Hourly Exit Rate	1	237	5	2	397	2	21	2	4	1	2	8
Input Volume	2	256	5	2	388	1	19	1	5	1	2	8
% of Volume	40	92	96	80	102	160	109	160	80	80	120	100
Density (ft/veh)												
Occupancy (veh)	0	1	0	0	7	0	0	0	0	0	0	0

3: East Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	0.6
Total Del/Veh (s)	2.7
Travel Dist (mi)	270.5
Travel Time (hr)	10.5
Avg Speed (mph)	26
Vehicles Entered	850
Vehicles Exited	850
Hourly Exit Rate	680
Input Volume	690
% of Volume	99
Density (ft/veh)	648
Occupancy (veh)	8

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.2	0.1	2.1	0.5	0.4	0.4		0.1	0.1	0.1
Total Delay (hr)	0.0	0.0	1.3	0.0	0.5	2.6	2.8	1.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	52.0	81.3	12.5	2.6	21.8	15.1	20.4	16.7		33.0	36.3	7.8
Travel Dist (mi)	0.1	0.3	57.7	0.3	17.9	131.7	104.5	45.1	0.1	1.0	2.8	0.9
Travel Time (hr)	0.0	0.1	3.3	0.0	1.2	7.1	6.8	2.7	0.0	0.1	0.2	0.0
Avg Speed (mph)	5	5	18	22	16	19	16	17	11	14	12	21
Vehicles Entered	1	2	382	2	84	618	493	213	0	4	13	4
Vehicles Exited	1	2	385	2	84	620	493	213	0	4	12	4
Hourly Exit Rate	1	2	308	2	67	496	394	170	0	3	10	3
Input Volume	1	2	305	1	72	481	382	175	1	5	8	3
% of Volume	80	80	101	160	93	103	103	97	0	64	120	107
Density (ft/veh)												
Occupancy (veh)	0	0	3	0	1	6	5	2	0	0	0	0

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	SBL	SBT	SBR	SBR2	SEL2	SEL	SET	SER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Denied Del/Veh (s)	0.3	0.7	0.2	0.4		0.0	0.0	0.0	0.4
Total Delay (hr)	8.3	0.1	0.1	0.1	0.0	8.0	0.0	0.1	25.1
Total Del/Veh (s)	126.7	207.5	158.0	93.0		91.4	0.2	105.9	37.8
Travel Dist (mi)	46.0	0.3	0.6	0.5	0.2	129.8	0.1	1.0	540.7
Travel Time (hr)	10.0	0.1	0.2	0.1	0.0	12.5	0.0	0.1	44.5
Avg Speed (mph)	5	4	4	5	13	10	27	10	12
Vehicles Entered	232	1	3	2	0	297	1	2	2354
Vehicles Exited	225	1	3	2	0	301	1	2	2355
Hourly Exit Rate	180	1	2	2	0	241	1	2	1884
Input Volume	180	1	4	2	1	258	1	1	1884
% of Volume	100	80	60	80	0	93	80	160	100
Density (ft/veh)									267
Occupancy (veh)	8	0	0	0	0	10	0	0	35

Total Network Performance

Denied Delay (hr)	0.5
Denied Del/Veh (s)	0.6
Total Delay (hr)	34.4
Total Del/Veh (s)	39.0
Travel Dist (mi)	1972.2
Travel Time (hr)	104.5
Avg Speed (mph)	19
Vehicles Entered	3093
Vehicles Exited	3093
Hourly Exit Rate	2474
Input Volume	6870
% of Volume	36
Density (ft/veh)	385
Occupancy (veh)	83

Arterial Level of Service: EB Riverside Avenue

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Main Street	1	5.5	29.3	0.2	25
Mellen Street	2	4.7	43.9	0.3	27
East Street	3	1.2	17.8	0.1	28
Memorial Boulevard	4	91.6	143.4	0.4	11
Total		103.0	234.4	1.1	17

Arterial Level of Service: WB Riverside Avenue

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
East Street	3	3.2	60.3	0.4	26
Mellen Street	2	6.0	22.7	0.1	22
Main Street	1	7.8	47.1	0.3	25
Total		17.0	130.2	0.9	25

Queuing and Blocking Report
Existing

09/03/2024

Intersection: 1: Main Street & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	TR
Maximum Queue (ft)	57	105	86	154	66	106	135	30	68	141
Average Queue (ft)	20	43	18	53	14	48	58	6	16	64
95th Queue (ft)	49	88	52	118	43	89	106	25	46	117
Link Distance (ft)		1025		1684			982			1130
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110		140		250	150		150	200	
Storage Blk Time (%)		0		0		0	0			
Queuing Penalty (veh)		0		0		0	0			

Intersection: 2: Mellen Street & Riverside Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	93	208	81	124
Average Queue (ft)	34	67	31	53
95th Queue (ft)	79	150	66	96
Link Distance (ft)	1684	660	1239	1097
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: East Street & Riverside Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	16	16	52	33
Average Queue (ft)	0	0	18	8
95th Queue (ft)	6	8	46	29
Link Distance (ft)	660	2229	1189	1248
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Existing

09/03/2024

Intersection: 4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue

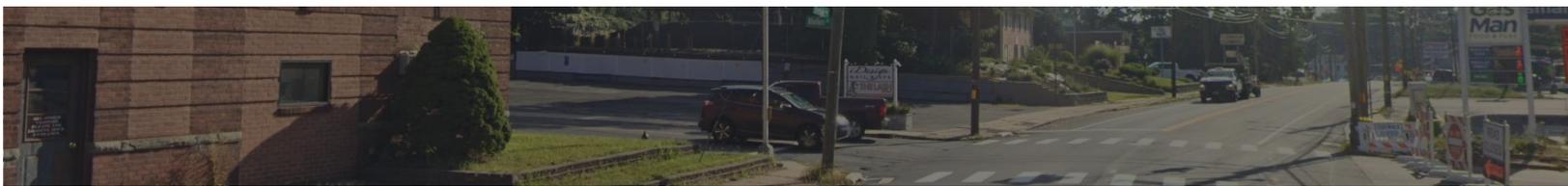
Movement	EB	EB	WB	WB	WB	NB	SB	SE
Directions Served	<L	TR	L	T	R>	<LTR	LTR>	<LR
Maximum Queue (ft)	14	207	83	285	458	37	406	445
Average Queue (ft)	1	93	29	150	197	6	223	214
95th Queue (ft)	8	161	64	249	346	23	405	397
Link Distance (ft)	790	790		1116	1116	1169	1054	2229
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	550							
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

Network wide Queuing Penalty: 0

Appendix C

No-Build Intermediate Year (2030) Intersection Analysis



Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	90	90	90	90	90	90
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	3	3	3	3	3	3
Vehs Entered	2812	2913	2785	2824	2709	2810
Vehs Exited	2744	2869	2733	2770	2637	2750
Starting Vehs	0	0	0	0	0	0
Ending Vehs	68	44	52	54	72	58
Travel Distance (mi)	1763	1864	1763	1808	1710	1781
Travel Time (hr)	83.4	98.4	85.4	94.1	88.9	90.0
Total Delay (hr)	21.3	32.9	23.3	30.5	28.8	27.4
Total Stops	2227	2536	2310	2429	2268	2357
Fuel Used (gal)	61.3	67.1	61.5	65.0	61.2	63.2

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	455	483	464	481	478	471
Vehs Exited	410	410	400	413	413	409
Starting Vehs	0	0	0	0	0	0
Ending Vehs	45	73	64	68	65	64
Travel Distance (mi)	266	276	269	283	287	276
Travel Time (hr)	12.1	14.5	12.4	13.5	13.6	13.2
Total Delay (hr)	2.8	4.8	3.0	3.6	3.5	3.5
Total Stops	323	408	325	340	356	345
Fuel Used (gal)	9.1	10.0	9.1	9.8	9.9	9.6

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1848	1945	1870	1859	1771	1859
Vehs Exited	1840	1952	1880	1864	1759	1860
Starting Vehs	45	73	64	68	65	64
Ending Vehs	53	66	54	63	77	59
Travel Distance (mi)	1177	1264	1185	1211	1121	1192
Travel Time (hr)	56.0	68.8	57.4	65.6	57.6	61.1
Total Delay (hr)	14.5	24.3	15.6	22.9	18.4	19.2
Total Stops	1483	1739	1604	1661	1504	1598
Fuel Used (gal)	41.0	45.9	41.6	44.3	40.0	42.5

Interval #2 Information Ending

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	509	485	451	484	460	0
Vehs Exited	494	507	453	493	465	0
Starting Vehs	53	66	54	63	77	0
Ending Vehs	68	44	52	54	72	0
Travel Distance (mi)	321	325	309	313	302	0
Travel Time (hr)	15.3	15.1	15.6	15.0	17.6	0.0
Total Delay (hr)	4.0	3.8	4.7	4.0	6.9	0.0
Total Stops	421	389	381	428	408	0
Fuel Used (gal)	11.2	11.3	10.8	10.9	11.3	0.0

1: Main Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
Denied Del/Veh (s)	3.3	0.3	0.3	0.0	0.0	0.0	3.6	0.3	3.7	3.7	0.3	0.3
Total Delay (hr)	0.1	0.3	0.1	0.1	0.5	0.0	0.6	0.8	0.0	0.4	0.5	0.1
Total Del/Veh (s)	6.6	4.4	2.4	9.9	6.2	4.2	28.4	23.4	4.5	28.4	22.2	8.4
Travel Dist (mi)	7.0	53.3	15.0	12.0	91.1	14.1	14.1	22.3	4.1	11.5	19.2	11.9
Travel Time (hr)	0.3	2.2	0.6	0.5	3.6	0.6	1.2	1.5	0.2	0.9	1.2	0.6
Avg Speed (mph)	22	25	24	23	26	25	13	15	22	14	16	21
Vehicles Entered	36	274	77	36	279	43	76	120	22	54	89	55
Vehicles Exited	36	272	77	36	276	43	75	119	22	54	89	55
Hourly Exit Rate	24	181	51	24	184	29	50	79	15	36	59	37
Input Volume	23	181	47	27	196	28	54	82	15	33	63	34
% of Volume	104	100	109	89	94	102	93	97	98	109	94	108
Density (ft/veh)												
Occupancy (veh)	0	1	0	0	2	0	1	1	0	1	1	0

1: Main Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.2
Denied Del/Veh (s)	0.7
Total Delay (hr)	3.6
Total Del/Veh (s)	11.1
Travel Dist (mi)	275.6
Travel Time (hr)	13.4
Avg Speed (mph)	21
Vehicles Entered	1161
Vehicles Exited	1154
Hourly Exit Rate	769
Input Volume	783
% of Volume	98
Density (ft/veh)	1412
Occupancy (veh)	9

2: Mellen Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0		0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1
Total Delay (hr)	0.0	0.4	0.0	0.0	0.3	0.0	0.0	0.2	0.0	0.3	0.4	0.0
Total Del/Veh (s)	5.7	3.9	2.6		3.4	2.2	35.2	19.3	5.0	21.8	22.4	9.4
Travel Dist (mi)	3.6	108.5	3.3	0.0	47.1	4.3	0.6	7.6	1.9	9.2	12.6	3.1
Travel Time (hr)	0.1	4.1	0.1	0.0	1.9	0.2	0.0	0.4	0.1	0.6	0.8	0.2
Avg Speed (mph)	25	27	25	24	24	23	14	18	23	16	16	20
Vehicles Entered	11	330	10	0	341	31	2	33	8	44	61	15
Vehicles Exited	11	328	10	0	340	31	2	32	8	44	61	15
Hourly Exit Rate	7	219	7	0	227	21	1	21	5	29	41	10
Input Volume	7	219	5	1	238	21	2	23	5	33	36	10
% of Volume	105	100	133	0	95	98	67	93	107	89	113	100
Density (ft/veh)												
Occupancy (veh)	0	3	0	0	1	0	0	0	0	0	1	0

2: Mellen Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	1.6
Total Del/Veh (s)	6.6
Travel Dist (mi)	201.9
Travel Time (hr)	8.6
Avg Speed (mph)	24
Vehicles Entered	886
Vehicles Exited	882
Hourly Exit Rate	588
Input Volume	600
% of Volume	98
Density (ft/veh)	841
Occupancy (veh)	6

3: East Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0		0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.3	1.1	0.9		2.5	3.2	6.6	5.4	3.2	6.2	5.1	3.2
Travel Dist (mi)	0.2	50.1	2.0	0.1	152.3	0.9	5.1	0.4	0.6	0.5	0.1	0.6
Travel Time (hr)	0.0	1.8	0.1	0.0	5.9	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Avg Speed (mph)	24	27	24	23	26	25	23	24	24	23	23	26
Vehicles Entered	1	362	14	0	351	2	23	2	3	2	1	2
Vehicles Exited	1	361	14	0	347	2	23	2	3	2	1	2
Hourly Exit Rate	1	241	9	0	231	1	15	1	2	1	1	1
Input Volume	1	243	12	1	245	1	14	1	1	2	1	1
% of Volume	67	99	78	0	94	133	110	133	200	67	67	133
Density (ft/veh)												
Occupancy (veh)	0	1	0	0	4	0	0	0	0	0	0	0

3: East Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	0.4
Total Del/Veh (s)	2.0
Travel Dist (mi)	212.8
Travel Time (hr)	8.2
Avg Speed (mph)	26
Vehicles Entered	763
Vehicles Exited	758
Hourly Exit Rate	505
Input Volume	523
% of Volume	97
Density (ft/veh)	1004
Occupancy (veh)	5

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.3	0.1	2.9	0.3	0.3	0.2	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.0	2.0	0.0	0.2	1.4	1.4	0.5	0.0	0.0	0.2	0.0
Total Del/Veh (s)	14.4	23.2	13.2	10.4	24.8	13.1	14.4	10.0	31.3	18.6	34.1	5.1
Travel Dist (mi)	0.1	0.5	80.7	0.4	5.4	79.6	74.3	41.5	0.4	0.4	5.8	0.4
Travel Time (hr)	0.0	0.0	4.7	0.0	0.4	4.1	4.2	2.1	0.0	0.0	0.4	0.0
Avg Speed (mph)	12	13	17	16	15	20	18	20	12	16	13	21
Vehicles Entered	1	3	536	3	25	375	351	196	2	2	26	2
Vehicles Exited	1	3	534	3	25	372	348	195	1	2	26	2
Hourly Exit Rate	1	2	356	2	17	248	232	130	1	1	17	1
Input Volume	1	2	361	1	17	256	244	132	2	1	18	1
% of Volume	67	100	99	200	98	97	95	98	33	133	96	133
Density (ft/veh)												
Occupancy (veh)	0	0	3	0	0	3	3	1	0	0	0	0

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	SBL	SBT	SBR	SBR2	SEL2	SEL	SET	SER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Denied Del/Veh (s)	0.2	0.2	0.1	0.3	0.0	0.0	0.0	0.0	0.3
Total Delay (hr)	7.8	0.1	0.0	0.1	0.0	6.0	0.0	0.0	19.8
Total Del/Veh (s)	101.4	133.1	52.0	149.7	15.2	60.1	1.6	48.9	32.9
Travel Dist (mi)	55.3	0.7	0.1	0.4	0.3	155.7	1.1	0.8	503.8
Travel Time (hr)	9.8	0.2	0.0	0.1	0.0	11.4	0.0	0.1	37.7
Avg Speed (mph)	6	4	6	4	22	14	28	14	13
Vehicles Entered	278	4	1	2	1	358	5	2	2173
Vehicles Exited	269	4	1	2	1	350	5	2	2146
Hourly Exit Rate	179	3	1	1	1	233	3	1	1431
Input Volume	179	3	1	1	1	242	2	1	1466
% of Volume	100	89	67	133	67	96	167	133	98
Density (ft/veh)									377
Occupancy (veh)	7	0	0	0	0	8	0	0	25

Total Network Performance

Denied Delay (hr)	0.4
Denied Del/Veh (s)	0.5
Total Delay (hr)	27.0
Total Del/Veh (s)	34.6
Travel Dist (mi)	1781.5
Travel Time (hr)	90.0
Avg Speed (mph)	20
Vehicles Entered	2810
Vehicles Exited	2750
Hourly Exit Rate	1833
Input Volume	5251
% of Volume	35
Density (ft/veh)	536
Occupancy (veh)	60

Intersection: 1: Main Street & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	TR
Maximum Queue (ft)	38	128	82	119	54	82	110	34	81	106
Average Queue (ft)	9	41	13	34	8	34	47	10	24	40
95th Queue (ft)	32	87	46	91	32	69	90	33	59	79
Link Distance (ft)		1025		1684			982			1130
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110		140		250	150		150	200	
Storage Blk Time (%)		0		0			0			
Queuing Penalty (veh)		0		0			0			

Intersection: 2: Mellen Street & Riverside Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	104	130	65	95
Average Queue (ft)	30	32	20	42
95th Queue (ft)	75	87	50	79
Link Distance (ft)	1684	660	1239	1097
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: East Street & Riverside Avenue

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	8	40	28
Average Queue (ft)	0	13	3
95th Queue (ft)	3	38	17
Link Distance (ft)	660	1189	1248
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	SB	SE
Directions Served	<L	TR	L	T	R>	<LTR	LTR>	<LR
Maximum Queue (ft)	18	246	45	199	260	29	364	329
Average Queue (ft)	1	107	9	75	114	7	187	151
95th Queue (ft)	9	191	29	140	199	22	373	282
Link Distance (ft)	790	790		1116	1116	1169	1054	2229
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	550							
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:45	4:45	4:45	4:45	4:45	4:45
End Time	6:15	6:15	6:15	6:15	6:15	6:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	75	75	75	75	75	75
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2
Vehs Entered	3313	3276	3427	3196	3260	3297
Vehs Exited	3292	3243	3363	3227	3211	3268
Starting Vehs	84	86	91	116	69	86
Ending Vehs	105	119	155	85	118	114
Travel Distance (mi)	2101	2068	2201	2055	2116	2108
Travel Time (hr)	116.4	121.0	138.3	140.3	119.9	127.2
Total Delay (hr)	42.3	48.1	60.5	67.7	45.0	52.8
Total Stops	2903	2930	3085	2810	2846	2913
Fuel Used (gal)	77.3	78.0	84.2	81.8	78.3	79.9

Interval #0 Information Seeding

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:00
End Time	6:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	2637	2606	2697	2610	2596	2629
Vehs Exited	2617	2570	2673	2605	2553	2604
Starting Vehs	84	86	91	116	69	86
Ending Vehs	104	122	115	121	112	114
Travel Distance (mi)	1675	1656	1746	1672	1695	1689
Travel Time (hr)	89.0	91.3	102.4	114.5	93.1	98.1
Total Delay (hr)	30.0	32.9	40.6	55.4	33.1	38.4
Total Stops	2312	2376	2429	2291	2266	2331
Fuel Used (gal)	60.8	61.2	65.2	66.6	62.1	63.2

Interval #2 Information Ending

Start Time	6:00
End Time	6:15
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	676	670	730	586	664	666
Vehs Exited	675	673	690	622	658	664
Starting Vehs	104	122	115	121	112	114
Ending Vehs	105	119	155	85	118	114
Travel Distance (mi)	426	412	455	383	421	419
Travel Time (hr)	27.4	29.7	35.9	25.9	26.8	29.1
Total Delay (hr)	12.4	15.3	19.9	12.3	12.0	14.4
Total Stops	591	554	656	519	580	581
Fuel Used (gal)	16.5	16.7	19.1	15.2	16.3	16.7

1: Main Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.3	0.4	0.3	0.0	0.0	0.0	3.5	0.4	3.4	3.5	0.3	0.3
Total Delay (hr)	0.1	0.4	0.1	0.2	0.8	0.1	0.8	0.9	0.0	0.3	1.0	0.2
Total Del/Veh (s)	10.1	6.1	3.8	12.5	8.5	4.9	28.7	21.5	4.8	26.9	22.3	11.3
Travel Dist (mi)	9.8	50.2	10.2	19.6	116.6	25.3	18.3	28.9	3.4	8.4	35.4	12.5
Travel Time (hr)	0.5	2.2	0.4	0.9	4.8	1.0	1.5	1.9	0.2	0.6	2.2	0.7
Avg Speed (mph)	20	24	23	22	24	25	13	15	22	14	16	19
Vehicles Entered	50	258	53	59	353	76	98	155	18	39	164	58
Vehicles Exited	50	258	52	59	354	78	98	155	18	39	165	58
Hourly Exit Rate	40	206	42	47	283	62	78	124	14	31	132	46
Input Volume	44	205	43	47	285	59	81	123	12	33	130	46
% of Volume	91	101	97	100	99	106	97	101	120	95	102	101
Density (ft/veh)												
Occupancy (veh)	0	2	0	1	4	1	1	2	0	0	2	1

1: Main Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.7
Total Delay (hr)	5.1
Total Del/Veh (s)	13.0
Travel Dist (mi)	338.6
Travel Time (hr)	17.0
Avg Speed (mph)	20
Vehicles Entered	1381
Vehicles Exited	1384
Hourly Exit Rate	1107
Input Volume	1108
% of Volume	100
Density (ft/veh)	922
Occupancy (veh)	13

2: Mellen Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.2
Total Delay (hr)	0.0	0.4	0.0	0.0	0.8	0.1	0.1	0.2	0.0	0.3	0.4	0.1
Total Del/Veh (s)	9.7	5.1	3.5	7.1	6.0	4.1	25.3	22.1	10.5	23.2	26.0	9.8
Travel Dist (mi)	5.5	95.5	3.6	1.6	62.1	12.9	3.9	7.6	3.1	10.2	10.9	4.5
Travel Time (hr)	0.2	3.7	0.1	0.1	2.9	0.6	0.3	0.5	0.2	0.7	0.8	0.2
Avg Speed (mph)	23	26	26	19	22	21	15	17	20	15	15	20
Vehicles Entered	17	288	11	11	450	93	17	32	13	49	52	22
Vehicles Exited	17	288	11	11	449	93	16	32	13	49	52	22
Hourly Exit Rate	14	230	9	9	359	74	13	26	10	39	42	18
Input Volume	13	228	9	7	358	76	15	30	9	43	41	18
% of Volume	105	101	98	126	100	98	85	85	116	91	101	98
Density (ft/veh)												
Occupancy (veh)	0	3	0	0	2	0	0	0	0	1	1	0

2: Mellen Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	2.5
Total Del/Veh (s)	8.4
Travel Dist (mi)	221.3
Travel Time (hr)	10.2
Avg Speed (mph)	22
Vehicles Entered	1055
Vehicles Exited	1053
Hourly Exit Rate	842
Input Volume	847
% of Volume	99
Density (ft/veh)	592
Occupancy (veh)	8

3: East Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.8	1.3	1.0	5.0	3.2	3.0	9.0	7.9	3.2	5.9	8.6	4.9
Travel Dist (mi)	0.1	47.1	0.9	0.9	226.8	0.5	5.4	0.2	1.0	0.2	0.7	2.6
Travel Time (hr)	0.0	1.7	0.0	0.0	8.9	0.0	0.3	0.0	0.0	0.0	0.0	0.1
Avg Speed (mph)	21	27	24	23	26	24	21	23	24	24	23	23
Vehicles Entered	1	341	7	2	518	1	24	1	5	1	3	11
Vehicles Exited	1	341	7	2	519	1	24	1	5	1	3	11
Hourly Exit Rate	1	273	6	2	415	1	19	1	4	1	2	9
Input Volume	2	272	5	2	413	1	19	1	5	1	2	8
% of Volume	40	100	112	80	101	80	101	80	80	80	120	110
Density (ft/veh)												
Occupancy (veh)	0	1	0	0	7	0	0	0	0	0	0	0

3: East Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	0.7
Total Del/Veh (s)	2.7
Travel Dist (mi)	286.4
Travel Time (hr)	11.2
Avg Speed (mph)	26
Vehicles Entered	915
Vehicles Exited	916
Hourly Exit Rate	733
Input Volume	731
% of Volume	100
Density (ft/veh)	612
Occupancy (veh)	9

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.3	0.1	2.3	0.5	0.4	0.4	0.1	0.2	0.1	0.1
Total Delay (hr)	0.0	0.0	1.4	0.0	0.5	2.9	3.1	1.2	0.0	0.1	0.1	0.0
Total Del/Veh (s)	44.1	87.4	12.6	8.1	21.2	15.7	21.8	18.7	37.6	32.8	41.3	9.4
Travel Dist (mi)	0.2	0.3	61.8	0.3	19.4	139.1	107.9	48.0	0.1	1.6	2.4	1.0
Travel Time (hr)	0.0	0.1	3.6	0.0	1.3	7.6	7.2	3.0	0.0	0.1	0.2	0.1
Avg Speed (mph)	7	5	18	18	16	18	15	16	9	12	12	19
Vehicles Entered	2	2	410	2	91	654	510	227	1	7	11	5
Vehicles Exited	1	2	409	2	91	650	508	225	1	8	11	5
Hourly Exit Rate	1	2	327	2	73	520	406	180	1	6	9	4
Input Volume	1	2	325	1	73	513	407	181	1	5	8	3
% of Volume	80	80	101	160	100	101	100	99	80	128	110	133
Density (ft/veh)												
Occupancy (veh)	0	0	3	0	1	6	6	2	0	0	0	0

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	SBL	SBT	SBR	SBR2	SEL2	SEL	SET	SER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Denied Del/Veh (s)	0.3	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.4
Total Delay (hr)	13.1	0.1	0.3	0.2	0.0	18.8	0.0	0.1	42.2
Total Del/Veh (s)	192.4	203.4	189.0	165.3	108.2	192.3	0.4	418.3	59.6
Travel Dist (mi)	46.7	0.4	1.1	0.6	0.3	148.0	0.5	0.6	580.4
Travel Time (hr)	14.8	0.1	0.4	0.2	0.0	24.0	0.0	0.1	62.9
Avg Speed (mph)	3	3	3	3	8	6	29	4	9
Vehicles Entered	237	2	6	3	1	341	2	1	2515
Vehicles Exited	226	2	6	4	1	327	2	1	2482
Hourly Exit Rate	181	2	5	3	1	262	2	1	1986
Input Volume	186	1	4	2	1	273	2	1	1990
% of Volume	97	160	120	160	80	96	80	80	100
Density (ft/veh)									188
Occupancy (veh)	12	0	0	0	0	19	0	0	50

Total Network Performance

Denied Delay (hr)	0.5
Denied Del/Veh (s)	0.6
Total Delay (hr)	52.2
Total Del/Veh (s)	55.6
Travel Dist (mi)	2108.3
Travel Time (hr)	127.2
Avg Speed (mph)	17
Vehicles Entered	3297
Vehicles Exited	3268
Hourly Exit Rate	2614
Input Volume	7296
% of Volume	36
Density (ft/veh)	316
Occupancy (veh)	101

Intersection: 1: Main Street & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	TR
Maximum Queue (ft)	80	155	66	159	54	131	140	30	70	151
Average Queue (ft)	19	52	22	61	17	50	59	10	21	69
95th Queue (ft)	52	111	58	129	46	95	108	32	54	124
Link Distance (ft)		1025		1684			982			1130
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110		140		250	150		150	200	
Storage Blk Time (%)		1		0		0	0			0
Queuing Penalty (veh)		0		0		0	0			0

Intersection: 2: Mellen Street & Riverside Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	131	222	73	121
Average Queue (ft)	42	67	31	52
95th Queue (ft)	96	157	65	95
Link Distance (ft)	1684	660	1239	1097
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: East Street & Riverside Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	4	17	48	33
Average Queue (ft)	0	0	17	10
95th Queue (ft)	2	7	43	31
Link Distance (ft)	660	2229	1189	1248
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue

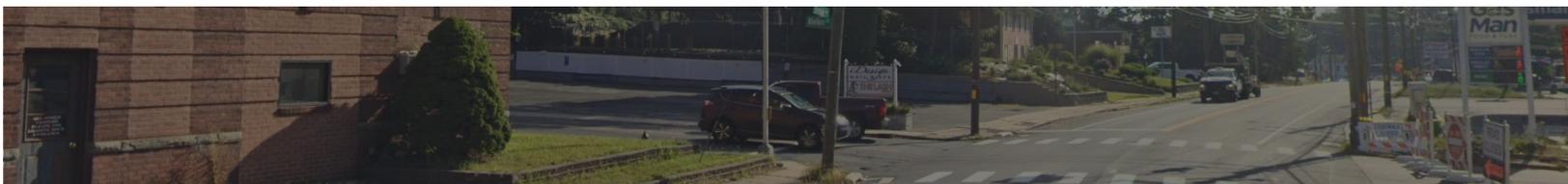
Movement	EB	EB	WB	WB	WB	NB	SB	SE
Directions Served	<L	TR	L	T	R>	<LTR	LTR>	<LR
Maximum Queue (ft)	28	203	84	321	417	43	603	741
Average Queue (ft)	2	97	32	157	213	7	320	417
95th Queue (ft)	13	176	68	264	351	26	630	772
Link Distance (ft)	790	790		1116	1116	1169	1054	2229
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	550							
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

Network wide Queuing Penalty: 1

Appendix D

No-Build Design Year (2040) Intersection Analysis



Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	90	90	90	90	90	90
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	3	3	3	3	3	3
Vehs Entered	3144	3090	3073	3113	3028	3089
Vehs Exited	3056	3021	3007	3047	2947	3015
Starting Vehs	0	0	0	0	0	0
Ending Vehs	88	69	66	66	81	71
Travel Distance (mi)	2030	1935	1942	1988	1918	1962
Travel Time (hr)	105.5	100.0	101.4	106.5	98.2	102.3
Total Delay (hr)	34.1	31.8	33.2	36.5	30.7	33.3
Total Stops	2703	2603	2518	2676	2528	2606
Fuel Used (gal)	72.7	68.9	69.5	71.8	68.3	70.3

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	545	508	515	531	501	519
Vehs Exited	465	450	440	454	449	452
Starting Vehs	0	0	0	0	0	0
Ending Vehs	80	58	75	77	52	67
Travel Distance (mi)	321	285	291	306	305	302
Travel Time (hr)	15.4	13.6	13.3	14.7	15.9	14.6
Total Delay (hr)	4.1	3.5	3.2	3.9	5.1	4.0
Total Stops	414	373	349	414	415	389
Fuel Used (gal)	11.1	9.7	9.9	10.6	10.9	10.4

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2040	2071	2046	2038	1985	2040
Vehs Exited	2064	2066	2031	2032	1988	2036
Starting Vehs	80	58	75	77	52	67
Ending Vehs	56	63	90	83	49	68
Travel Distance (mi)	1340	1331	1303	1350	1284	1322
Travel Time (hr)	70.1	69.2	69.3	74.5	64.6	69.6
Total Delay (hr)	22.9	22.4	23.5	27.1	19.5	23.1
Total Stops	1789	1782	1692	1833	1676	1755
Fuel Used (gal)	48.4	47.6	47.0	49.3	45.5	47.6

Interval #2 Information Ending

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	559	511	512	544	542	0
Vehs Exited	527	505	536	561	510	0
Starting Vehs	56	63	90	83	49	0
Ending Vehs	88	69	66	66	81	0
Travel Distance (mi)	368	319	348	333	328	0
Travel Time (hr)	20.0	17.2	18.8	17.3	17.7	0.0
Total Delay (hr)	7.1	6.0	6.5	5.5	6.1	0.0
Total Stops	500	448	477	429	437	0
Fuel Used (gal)	13.3	11.6	12.6	11.9	11.9	0.0

1: Main Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.4	0.3	0.3	0.0	0.0	0.0	3.6	0.4	3.6	3.7	0.2	0.2
Total Delay (hr)	0.1	0.4	0.1	0.1	0.6	0.0	0.7	0.8	0.0	0.4	0.7	0.1
Total Del/Veh (s)	8.4	4.9	2.5	11.1	7.4	3.9	28.4	21.2	5.0	26.7	22.1	8.6
Travel Dist (mi)	7.3	59.9	16.6	14.7	103.5	13.6	16.6	24.9	5.2	10.4	23.3	12.7
Travel Time (hr)	0.4	2.5	0.7	0.7	4.1	0.5	1.4	1.6	0.3	0.8	1.5	0.6
Avg Speed (mph)	21	25	24	23	25	25	13	15	22	14	16	21
Vehicles Entered	38	308	86	45	317	41	89	134	28	48	108	59
Vehicles Exited	37	306	85	44	314	41	88	132	28	48	108	59
Hourly Exit Rate	25	204	57	29	209	27	59	88	19	32	72	39
Input Volume	27	200	56	29	216	30	63	92	17	35	70	39
% of Volume	91	102	101	101	97	91	93	96	110	91	103	101
Density (ft/veh)												
Occupancy (veh)	0	2	0	0	3	0	1	1	0	0	1	0

1: Main Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.7
Total Delay (hr)	4.1
Total Del/Veh (s)	11.3
Travel Dist (mi)	308.6
Travel Time (hr)	15.0
Avg Speed (mph)	21
Vehicles Entered	1301
Vehicles Exited	1290
Hourly Exit Rate	860
Input Volume	874
% of Volume	98
Density (ft/veh)	1257
Occupancy (veh)	10

2: Mellen Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Total Delay (hr)	0.0	0.4	0.0	0.0	0.4	0.0	0.0	0.2	0.0	0.3	0.3	0.0
Total Del/Veh (s)	6.9	4.1	2.9	3.0	4.0	3.1	35.0	21.6	5.3	22.4	22.3	8.3
Travel Dist (mi)	3.8	119.6	3.2	0.1	53.0	4.6	0.6	7.5	1.9	10.3	10.7	3.6
Travel Time (hr)	0.2	4.5	0.1	0.0	2.2	0.2	0.0	0.4	0.1	0.7	0.7	0.2
Avg Speed (mph)	24	27	26	22	24	22	15	17	23	15	16	21
Vehicles Entered	12	361	10	1	384	33	2	32	8	50	52	17
Vehicles Exited	11	358	10	1	382	33	2	32	8	50	52	17
Hourly Exit Rate	7	239	7	1	255	22	1	21	5	33	35	11
Input Volume	8	239	6	1	261	22	2	23	5	34	37	11
% of Volume	92	100	111	67	98	100	67	93	107	98	94	103
Density (ft/veh)												
Occupancy (veh)	0	3	0	0	1	0	0	0	0	0	0	0

2: Mellen Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	1.8
Total Del/Veh (s)	6.7
Travel Dist (mi)	218.9
Travel Time (hr)	9.3
Avg Speed (mph)	24
Vehicles Entered	962
Vehicles Exited	956
Hourly Exit Rate	637
Input Volume	649
% of Volume	98
Density (ft/veh)	774
Occupancy (veh)	6

3: East Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0		0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0
Total Delay (hr)	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Del/Veh (s)	3.5	1.3	0.8		2.7	1.0	6.9	2.4	6.5	7.1	2.4	2.1
Travel Dist (mi)	0.1	54.1	3.2	0.1	173.8	1.2	4.1	0.2	0.7	0.7	0.5	238.7
Travel Time (hr)	0.0	2.0	0.1	0.0	6.7	0.0	0.2	0.0	0.0	0.0	0.0	9.2
Avg Speed (mph)	22	27	24	24	26	25	23	24	23	24	25	26
Vehicles Entered	1	393	23	0	400	3	18	1	3	3	2	847
Vehicles Exited	1	392	23	0	396	3	18	1	3	3	2	842
Hourly Exit Rate	1	261	15	0	264	2	12	1	2	2	1	561
Input Volume	1	266	12	1	268	1	14	1	2	1	1	569
% of Volume	67	98	128	0	99	200	86	67	100	200	133	99
Density (ft/veh)												893
Occupancy (veh)	0	1	0	0	4	0	0	0	0	0	0	6

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)		0.1	0.3	0.2	2.7	0.3	0.3	0.3	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	2.3	0.0	0.2	1.4	1.7	0.7	0.0	0.0	0.3	0.0
Total Del/Veh (s)		34.1	13.6	7.8	21.2	11.7	15.3	11.1	48.4	19.1	35.6	11.3
Travel Dist (mi)	0.1	0.9	90.3	0.6	5.7	88.9	85.2	46.3	0.3	0.2	6.2	0.5
Travel Time (hr)	0.0	0.1	5.4	0.0	0.4	4.4	4.9	2.4	0.0	0.0	0.5	0.0
Avg Speed (mph)	12	10	17	19	16	20	17	19	13	17	13	19
Vehicles Entered	0	6	600	4	27	419	403	219	1	1	27	2
Vehicles Exited	0	6	597	4	26	415	400	217	1	1	27	2
Hourly Exit Rate	0	4	398	3	17	277	267	145	1	1	18	1
Input Volume	1	3	398	1	17	282	267	140	2	1	19	1
% of Volume	0	133	100	267	102	98	100	103	33	67	95	133
Density (ft/veh)												
Occupancy (veh)	0	0	4	0	0	3	3	2	0	0	0	0

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	SBL	SBT	SBR	SBR2	SEL2	SEL	SET	SER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Denied Del/Veh (s)	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.3
Total Delay (hr)	7.5	0.1	0.0	0.1	0.0	10.5	0.0	0.1	24.8
Total Del/Veh (s)	96.0	107.0	75.2	101.9	71.4	97.3	0.9	198.3	37.3
Travel Dist (mi)	55.6	0.8	0.3	0.4	0.3	168.6	0.9	0.6	552.6
Travel Time (hr)	9.5	0.1	0.1	0.1	0.0	16.3	0.0	0.1	44.4
Avg Speed (mph)	6	5	6	6	11	10	29	8	12
Vehicles Entered	280	4	2	2	1	388	4	1	2391
Vehicles Exited	270	4	2	2	1	379	4	1	2359
Hourly Exit Rate	180	3	1	1	1	253	3	1	1573
Input Volume	190	3	1	1	1	264	2	1	1595
% of Volume	95	89	133	133	67	96	133	67	99
Density (ft/veh)									320
Occupancy (veh)	6	0	0	0	0	11	0	0	29

Total Network Performance

Denied Delay (hr)	0.4
Denied Del/Veh (s)	0.5
Total Delay (hr)	32.8
Total Del/Veh (s)	38.3
Travel Dist (mi)	1962.5
Travel Time (hr)	102.3
Avg Speed (mph)	19
Vehicles Entered	3089
Vehicles Exited	3015
Hourly Exit Rate	2010
Input Volume	5745
% of Volume	35
Density (ft/veh)	472
Occupancy (veh)	68

Intersection: 1: Main Street & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	TR
Maximum Queue (ft)	64	108	79	171	54	101	102	39	73	130
Average Queue (ft)	10	43	13	44	7	38	46	11	22	46
95th Queue (ft)	37	87	45	113	30	77	86	35	53	91
Link Distance (ft)		1025		1684			982			1130
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110		140		250	150		150	200	
Storage Blk Time (%)	0	0		0						
Queuing Penalty (veh)	0	0		0						

Intersection: 2: Mellen Street & Riverside Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	105	140	70	113
Average Queue (ft)	31	38	20	45
95th Queue (ft)	78	101	51	86
Link Distance (ft)	1684	660	1239	1097
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: East Street & Riverside Avenue

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	4	35	28
Average Queue (ft)	0	11	5
95th Queue (ft)	2	35	21
Link Distance (ft)	660	1189	1248
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	SB	SE
Directions Served	<L	TR	L	T	R>	<LTR	LTR>	<LR
Maximum Queue (ft)	25	261	39	209	241	43	390	482
Average Queue (ft)	3	118	8	79	127	8	181	233
95th Queue (ft)	13	202	28	148	207	25	312	421
Link Distance (ft)	790	790		1116	1116	1169	1054	2229
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	550							
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:45	4:45	4:45	4:45	4:45	4:45
End Time	6:15	6:15	6:15	6:15	6:15	6:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	75	75	75	75	75	75
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2
Vehs Entered	3654	3639	3537	3556	3516	3583
Vehs Exited	3591	3595	3513	3531	3490	3543
Starting Vehs	107	107	114	108	99	100
Ending Vehs	170	151	138	133	125	141
Travel Distance (mi)	2298	2317	2268	2305	2284	2294
Travel Time (hr)	165.3	155.3	147.9	150.4	135.7	150.9
Total Delay (hr)	84.2	73.7	68.0	69.1	55.2	70.0
Total Stops	3317	3365	3285	3345	3294	3323
Fuel Used (gal)	92.9	91.8	88.8	90.3	86.2	90.0

Interval #0 Information Seeding

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:00
End Time	6:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	2907	2918	2842	2851	2772	2858
Vehs Exited	2883	2891	2801	2832	2767	2836
Starting Vehs	107	107	114	108	99	100
Ending Vehs	131	134	155	127	104	130
Travel Distance (mi)	1833	1862	1819	1842	1795	1830
Travel Time (hr)	127.2	118.5	112.8	120.6	105.2	116.8
Total Delay (hr)	62.7	53.0	48.6	55.6	42.0	52.4
Total Stops	2624	2699	2632	2701	2568	2643
Fuel Used (gal)	73.2	72.4	70.0	72.3	67.5	71.1

Interval #2 Information Ending

Start Time	6:00
End Time	6:15
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	747	721	695	705	744	727
Vehs Exited	708	704	712	699	723	708
Starting Vehs	131	134	155	127	104	130
Ending Vehs	170	151	138	133	125	141
Travel Distance (mi)	465	455	448	463	489	464
Travel Time (hr)	38.0	36.8	35.2	29.8	30.5	34.1
Total Delay (hr)	21.6	20.7	19.3	13.5	13.2	17.7
Total Stops	693	666	653	644	726	677
Fuel Used (gal)	19.8	19.4	18.8	18.0	18.7	18.9

1: Main Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.2	0.4	0.4	0.0	0.0	0.0	3.4	0.4	3.6	3.4	0.3	0.3
Total Delay (hr)	0.2	0.6	0.1	0.2	1.3	0.1	1.1	1.0	0.0	0.3	1.1	0.2
Total Del/Veh (s)	13.9	7.2	4.7	15.6	11.0	5.5	30.6	21.1	5.0	28.3	22.1	11.7
Travel Dist (mi)	11.1	54.7	11.4	18.4	134.4	28.7	22.9	32.7	2.8	8.9	38.4	13.8
Travel Time (hr)	0.7	2.4	0.5	0.9	5.8	1.2	2.0	2.2	0.1	0.7	2.4	0.7
Avg Speed (mph)	18	23	23	21	23	25	12	15	22	14	16	19
Vehicles Entered	57	281	58	56	408	87	124	175	15	42	178	64
Vehicles Exited	57	281	58	55	406	87	123	174	15	42	179	64
Hourly Exit Rate	46	225	46	44	325	70	98	139	12	34	143	51
Input Volume	50	227	51	52	316	64	95	138	13	34	146	51
% of Volume	91	99	91	85	103	109	104	101	92	99	98	100
Density (ft/veh)												
Occupancy (veh)	0	2	0	1	5	1	2	2	0	1	2	1

1: Main Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.7
Total Delay (hr)	6.3
Total Del/Veh (s)	14.5
Travel Dist (mi)	378.2
Travel Time (hr)	19.6
Avg Speed (mph)	20
Vehicles Entered	1545
Vehicles Exited	1541
Hourly Exit Rate	1233
Input Volume	1237
% of Volume	100
Density (ft/veh)	800
Occupancy (veh)	15

2: Mellen Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.1	0.5	0.0	0.0	0.9	0.1	0.1	0.3	0.0	0.4	0.3	0.1
Total Del/Veh (s)	13.4	6.1	4.9	6.8	6.3	4.5	25.4	23.2	7.2	24.0	22.9	11.0
Travel Dist (mi)	6.3	101.5	4.4	1.2	70.1	14.0	4.1	9.1	2.3	10.8	10.5	5.6
Travel Time (hr)	0.3	4.0	0.2	0.1	3.3	0.7	0.3	0.6	0.1	0.7	0.7	0.3
Avg Speed (mph)	21	25	25	20	21	21	15	16	22	15	16	19
Vehicles Entered	19	306	13	9	508	101	18	39	10	53	51	27
Vehicles Exited	19	305	13	9	508	101	18	39	10	52	51	27
Hourly Exit Rate	15	244	10	7	406	81	14	31	8	42	41	22
Input Volume	14	251	10	7	397	80	16	31	9	45	42	21
% of Volume	109	97	104	103	102	101	90	101	89	92	97	103
Density (ft/veh)												
Occupancy (veh)	0	3	0	0	3	1	0	0	0	1	1	0

2: Mellen Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	2.8
Total Del/Veh (s)	8.7
Travel Dist (mi)	240.0
Travel Time (hr)	11.1
Avg Speed (mph)	22
Vehicles Entered	1154
Vehicles Exited	1152
Hourly Exit Rate	922
Input Volume	923
% of Volume	100
Density (ft/veh)	540
Occupancy (veh)	9

3: East Street & Riverside Avenue Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.6	1.4	1.4	1.3	3.5	0.3	8.1	5.6	4.3	5.5	10.9	3.7
Travel Dist (mi)	0.5	48.9	1.1	0.3	253.5	0.7	5.9	0.2	1.5	0.1	0.7	2.8
Travel Time (hr)	0.0	1.8	0.0	0.0	9.9	0.0	0.3	0.0	0.1	0.0	0.0	0.1
Avg Speed (mph)	21	27	24	26	26	25	22	25	23	21	22	24
Vehicles Entered	4	354	8	1	580	2	26	1	7	1	3	12
Vehicles Exited	4	353	8	1	580	2	26	1	7	1	3	12
Hourly Exit Rate	3	282	6	1	464	2	21	1	6	1	2	10
Input Volume	2	296	6	2	455	1	20	1	4	1	2	8
% of Volume	160	95	107	40	102	160	104	80	140	80	120	120
Density (ft/veh)												
Occupancy (veh)	0	1	0	0	8	0	0	0	0	0	0	0

3: East Street & Riverside Avenue Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	0.8
Total Del/Veh (s)	2.9
Travel Dist (mi)	316.2
Travel Time (hr)	12.3
Avg Speed (mph)	26
Vehicles Entered	999
Vehicles Exited	998
Hourly Exit Rate	798
Input Volume	798
% of Volume	100
Density (ft/veh)	554
Occupancy (veh)	10

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.3	0.2	2.1	0.5	0.4	0.5		0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	1.6	0.0	0.7	3.5	4.6	1.8	0.0	0.1	0.1	0.0
Total Del/Veh (s)	85.8	189.7	13.0	8.1	24.2	17.2	28.5	26.7		34.2	41.2	11.5
Travel Dist (mi)	0.2	0.3	67.3	0.4	20.6	151.7	120.2	51.2	0.0	1.9	2.3	1.1
Travel Time (hr)	0.0	0.1	3.9	0.0	1.4	8.7	9.1	3.8	0.0	0.1	0.2	0.1
Avg Speed (mph)	6	3	17	17	15	18	13	14	9	13	11	19
Vehicles Entered	1	2	446	3	97	712	566	242	0	8	10	5
Vehicles Exited	1	2	446	3	96	713	568	242	0	8	11	5
Hourly Exit Rate	1	2	357	2	77	570	454	194	0	6	9	4
Input Volume	1	2	359	1	75	566	448	193	1	6	8	3
% of Volume	80	80	99	240	102	101	101	100	0	107	110	133
Density (ft/veh)												
Occupancy (veh)	0	0	3	0	1	7	7	3	0	0	0	0

4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue Performance by movement

Movement	SBL	SBT	SBR	SBR2	SEL2	SEL	SET	SER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Denied Del/Veh (s)	0.3	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.4
Total Delay (hr)	12.6	0.1	0.4	0.2	0.0	31.6	0.0	0.1	57.5
Total Del/Veh (s)	187.6	169.4	226.9	171.2	167.6	305.2	27.1	193.3	75.2
Travel Dist (mi)	46.8	0.3	1.1	1.1	0.3	153.0	0.2	0.3	620.4
Travel Time (hr)	14.2	0.1	0.4	0.3	0.1	37.0	0.0	0.1	79.6
Avg Speed (mph)	3	3	3	4	5	4	15	4	8
Vehicles Entered	236	1	6	5	1	358	1	1	2701
Vehicles Exited	226	2	6	5	1	332	1	0	2668
Hourly Exit Rate	181	2	5	4	1	266	1	0	2134
Input Volume	198	1	5	3	1	298	1	1	2171
% of Volume	91	160	96	133	80	89	80	0	98
Density (ft/veh)									149
Occupancy (veh)	11	0	0	0	0	30	0	0	63

Total Network Performance

Denied Delay (hr)	0.6
Denied Del/Veh (s)	0.6
Total Delay (hr)	69.4
Total Del/Veh (s)	67.8
Travel Dist (mi)	2294.3
Travel Time (hr)	150.9
Avg Speed (mph)	15
Vehicles Entered	3583
Vehicles Exited	3543
Hourly Exit Rate	2834
Input Volume	8002
% of Volume	35
Density (ft/veh)	267
Occupancy (veh)	120

Intersection: 1: Main Street & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	L	T	R	L	T	R	L	TR
Maximum Queue (ft)	73	156	142	222	68	119	138	30	57	158
Average Queue (ft)	23	61	27	85	19	58	65	8	22	79
95th Queue (ft)	55	120	78	176	52	104	114	29	52	141
Link Distance (ft)		1025		1684			982			1130
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	110		140		250	150		150	200	
Storage Blk Time (%)		1		2		0	0			
Queuing Penalty (veh)		1		2		0	0			

Intersection: 2: Mellen Street & Riverside Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	172	196	70	124
Average Queue (ft)	51	76	32	54
95th Queue (ft)	115	163	63	97
Link Distance (ft)	1684	660	1239	1097
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: East Street & Riverside Avenue

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	28	48	33
Average Queue (ft)	1	19	9
95th Queue (ft)	13	44	31
Link Distance (ft)	660	1189	1248
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Downs Street/Blakeslee Street & Memorial Boulevard & Riverside Avenue

Movement	EB	EB	WB	WB	WB	NB	SB	SE
Directions Served	<L	TR	L	T	R>	<LTR	LTR>	<LR
Maximum Queue (ft)	18	221	105	371	551	33	547	1069
Average Queue (ft)	2	109	35	184	263	7	313	660
95th Queue (ft)	10	190	77	304	464	23	586	1129
Link Distance (ft)	790	790		1116	1116	1169	1054	2229
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	550							
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

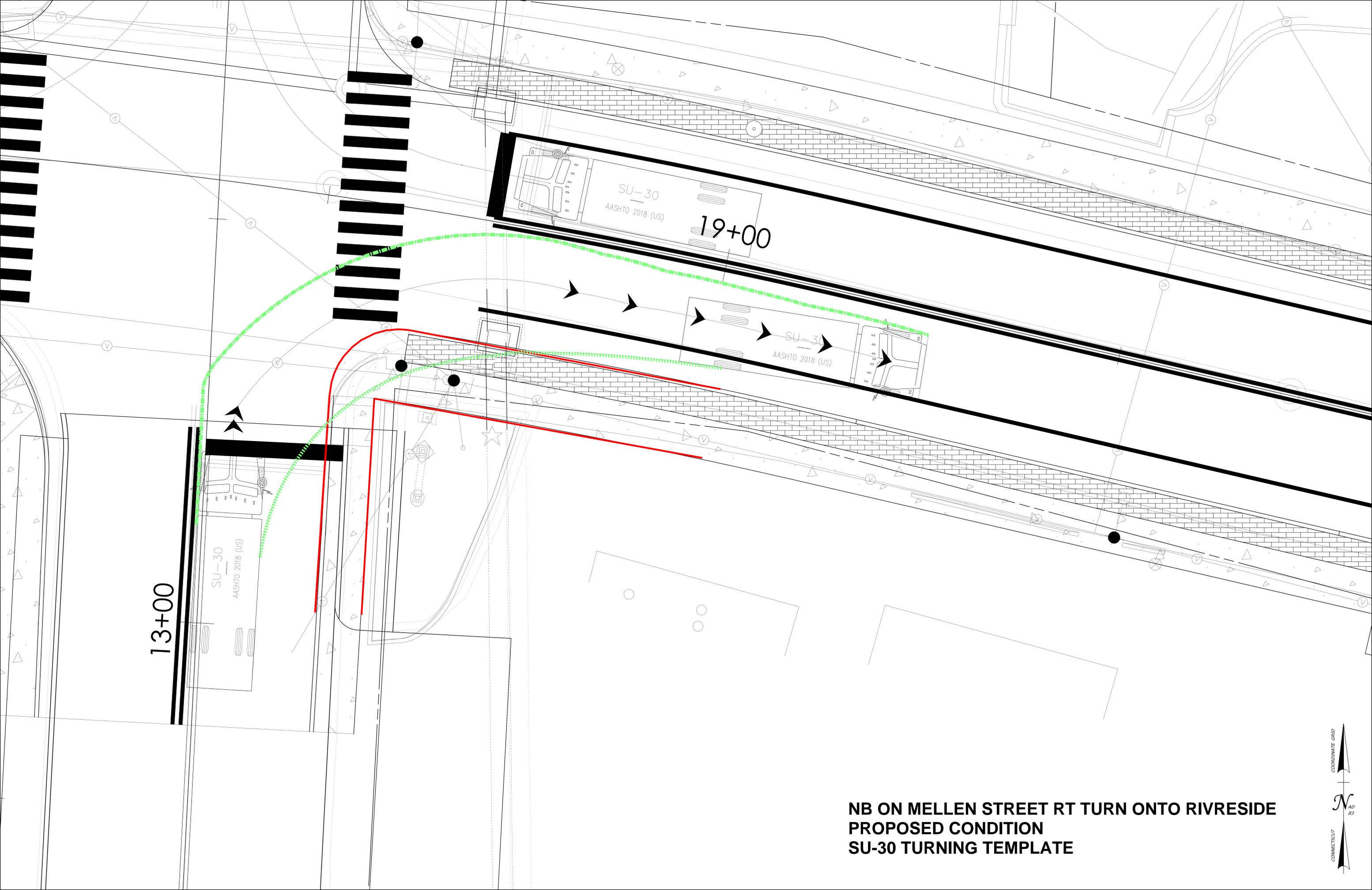
Network wide Queuing Penalty: 3

Appendix B: Turning Templates

Streetscape Improvements on Riverside Avenue | Bristol

Preliminary Design Statement
September 2024

RIVERSIDE AVENUE & MELLEN STREET INTERSECTION



13+00

SU-30
AASHTO 2018 (US)

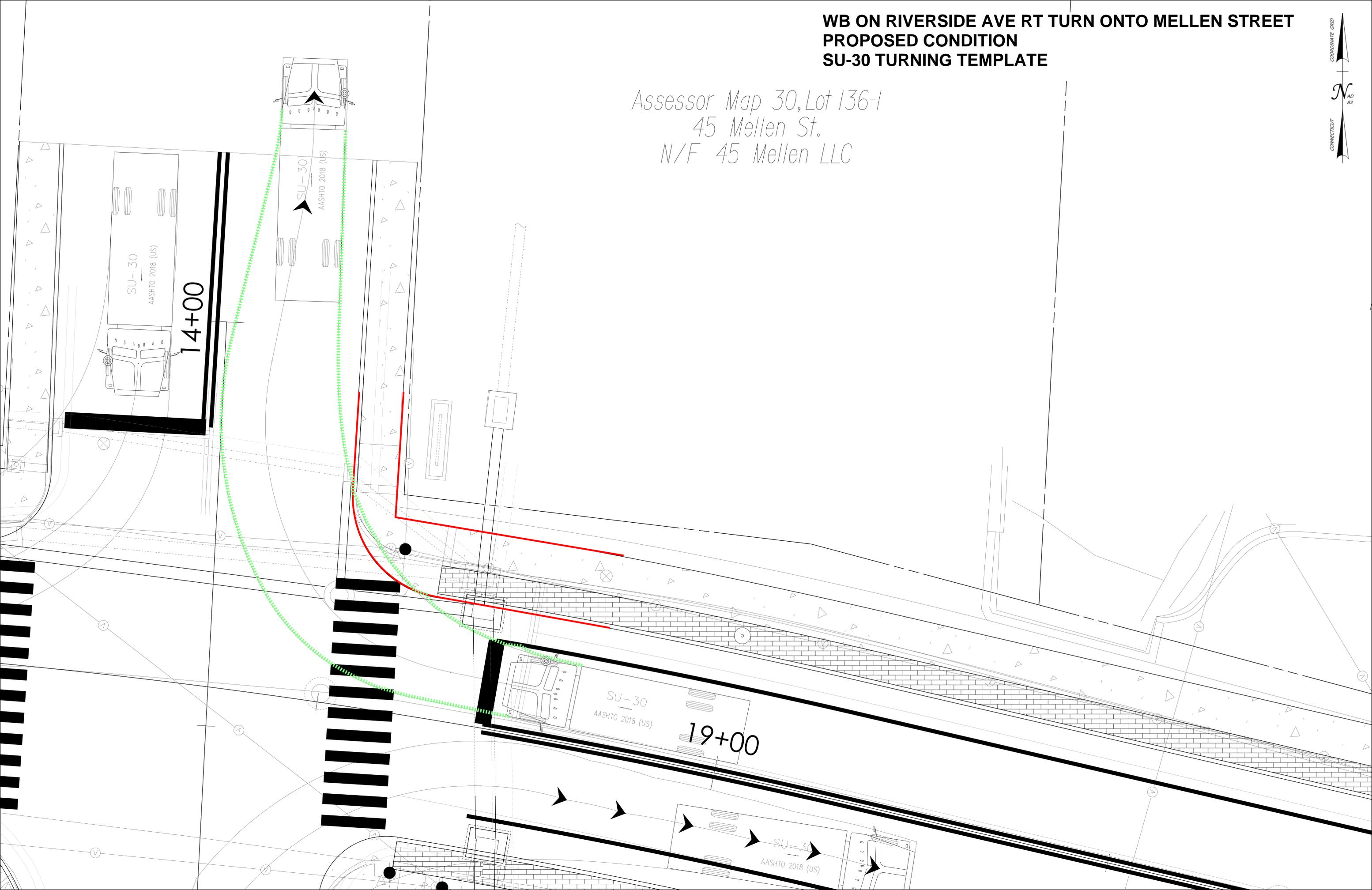
SU-30
AASHTO 2018 (US)
19+00

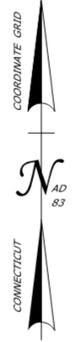
SU-30
AASHTO 2018 (US)

NB ON MELLEN STREET RT TURN ONTO RIVRESIDE
PROPOSED CONDITION
SU-30 TURNING TEMPLATE

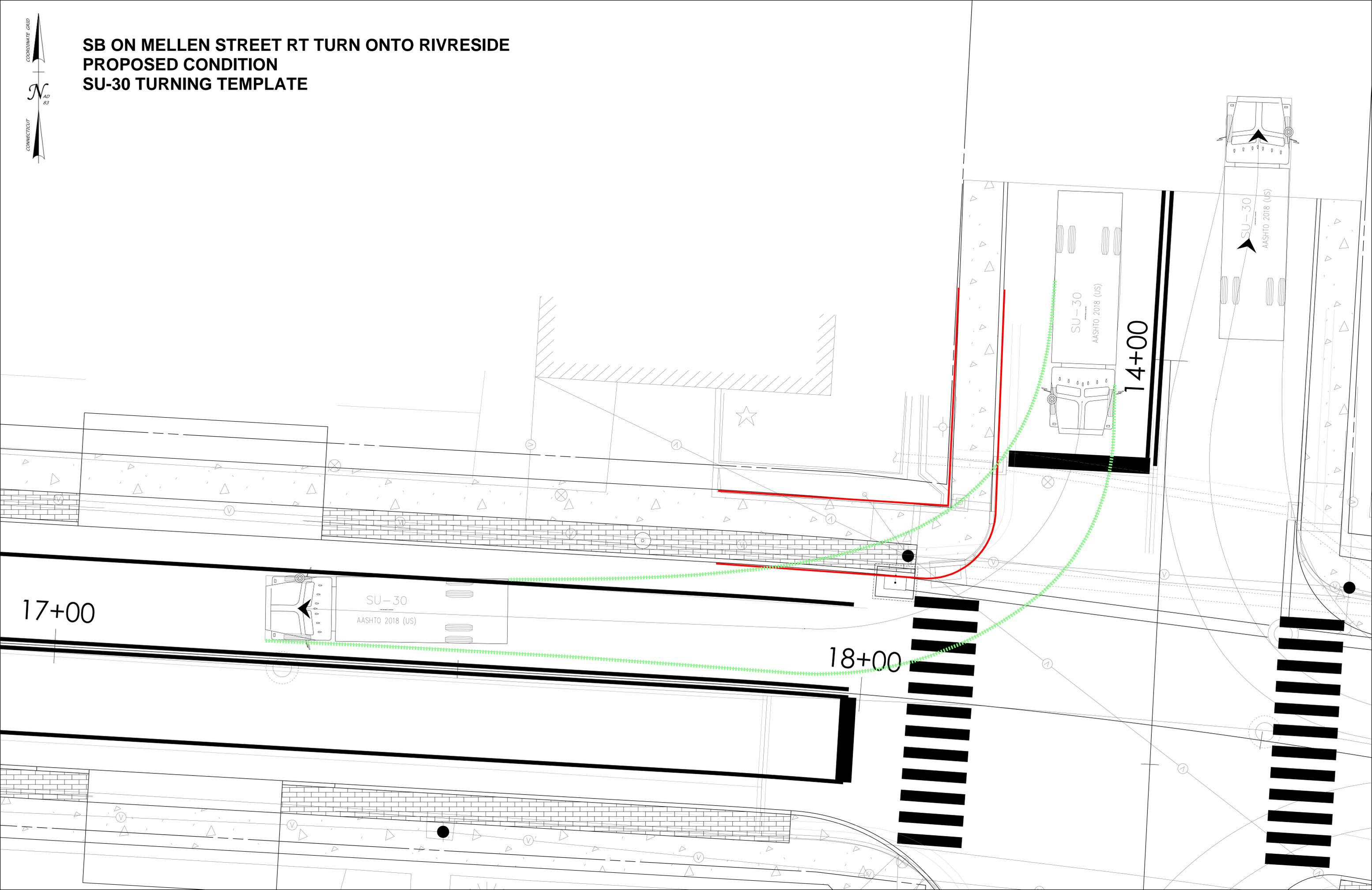
**WB ON RIVERSIDE AVE RT TURN ONTO MELLEN STREET
PROPOSED CONDITION
SU-30 TURNING TEMPLATE**

*Assessor Map 30, Lot 136-1
45 Mellen St.
N/F 45 Mellen LLC*



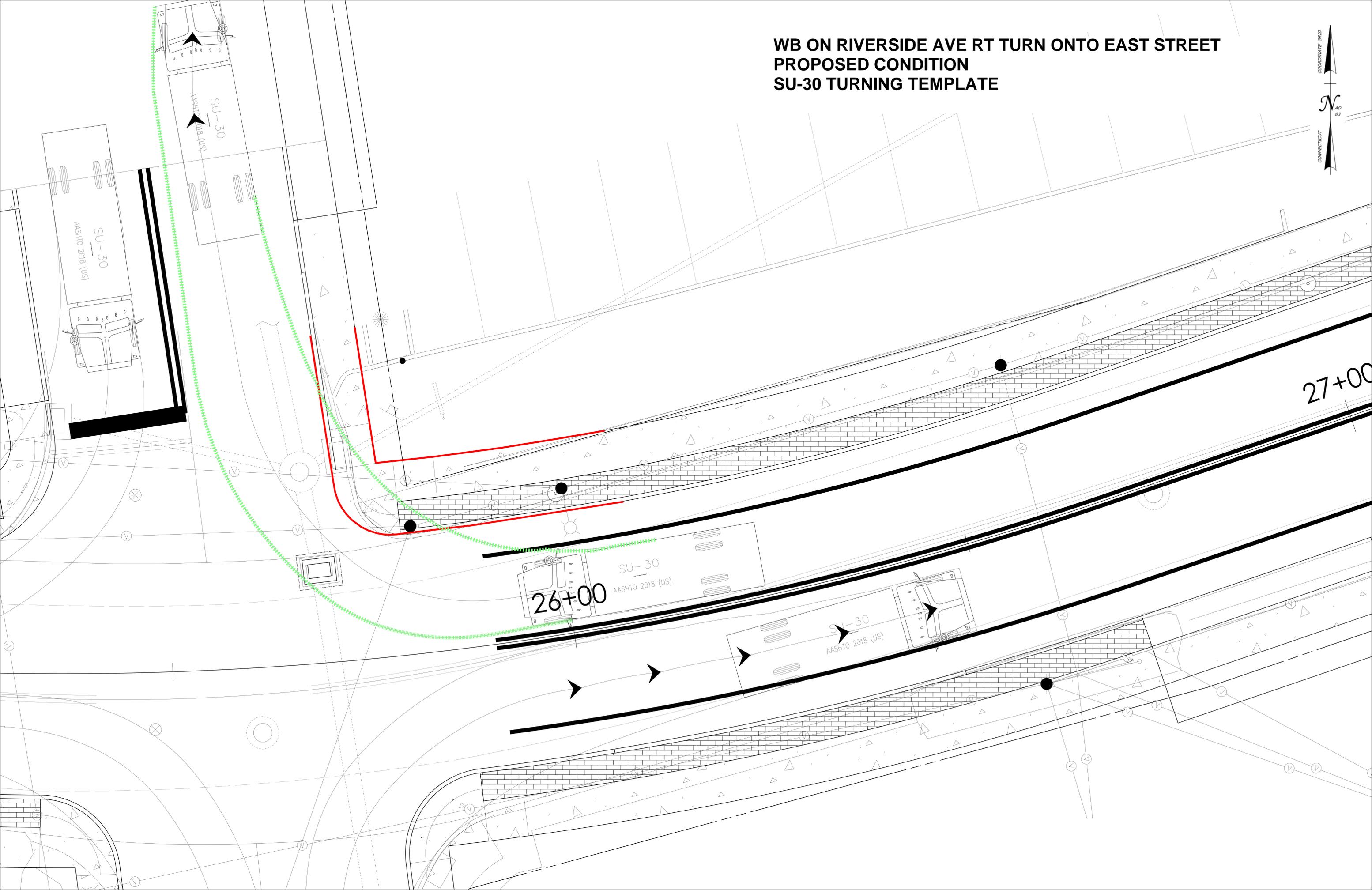


SB ON MELLEN STREET RT TURN ONTO RIVRESIDE
PROPOSED CONDITION
SU-30 TURNING TEMPLATE

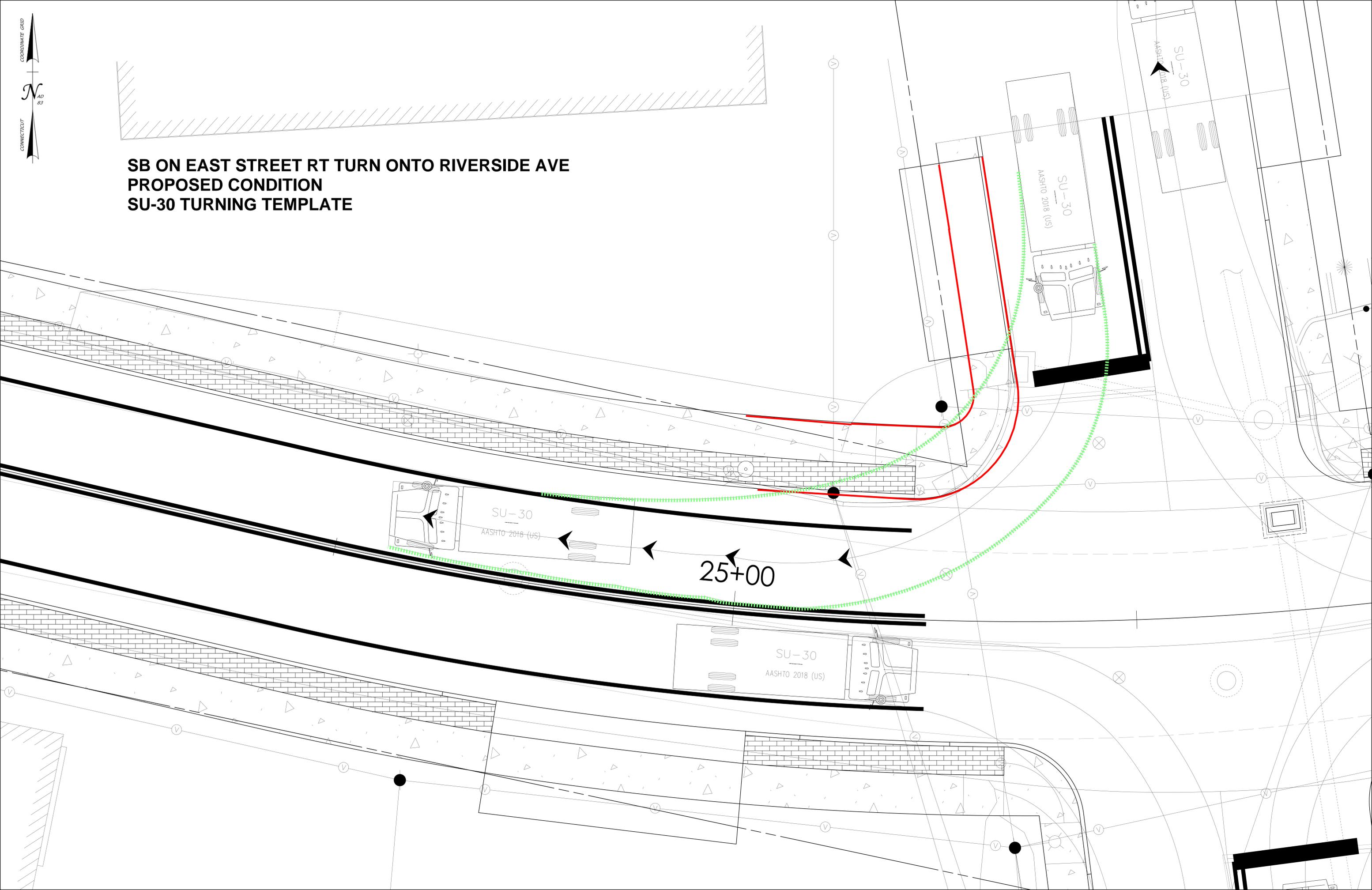


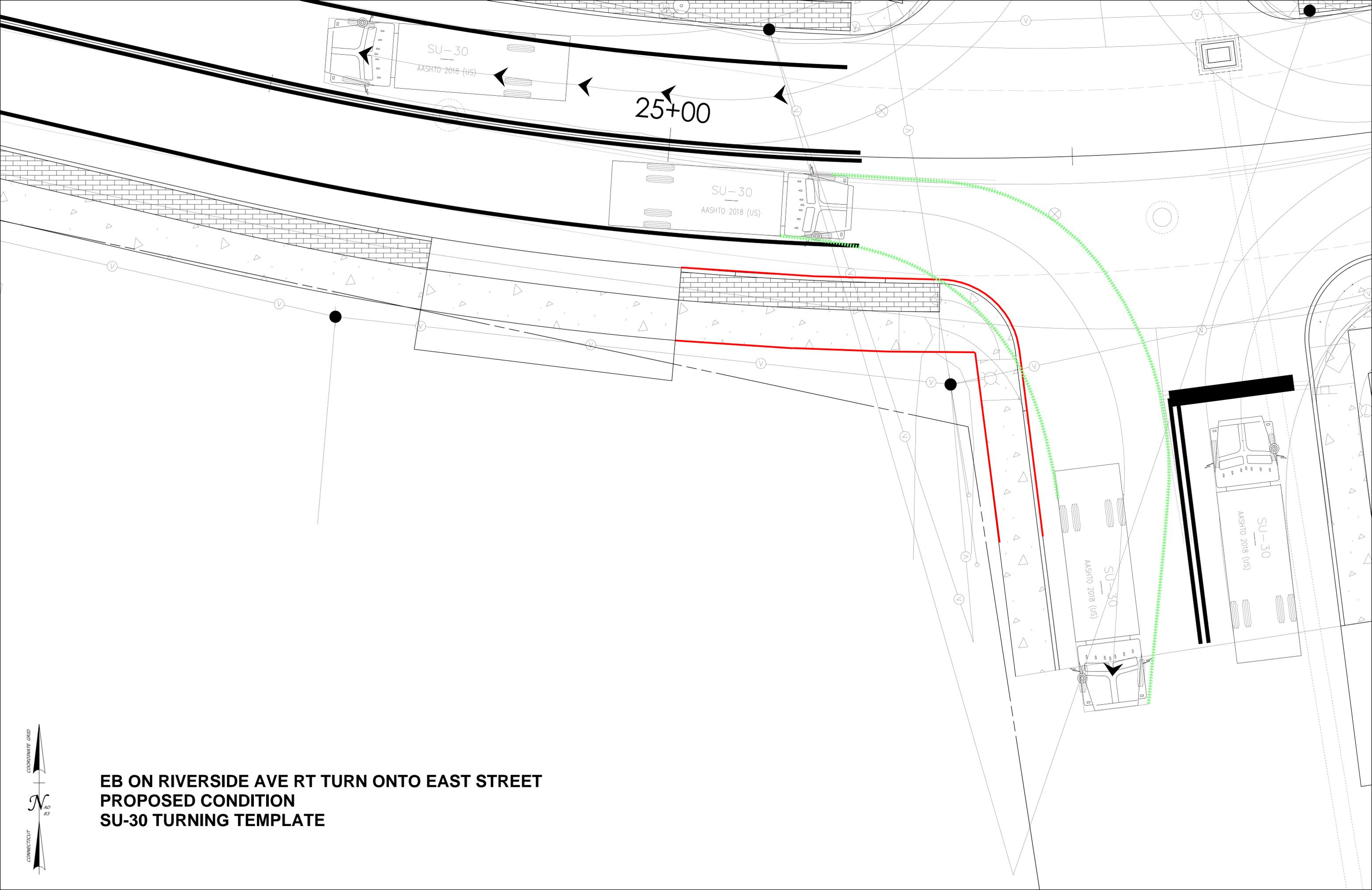
RIVERSIDE AVENUE & EAST STREET INTERSECTION

**WB ON RIVERSIDE AVE RT TURN ONTO EAST STREET
PROPOSED CONDITION
SU-30 TURNING TEMPLATE**



**SB ON EAST STREET RT TURN ONTO RIVERSIDE AVE
PROPOSED CONDITION
SU-30 TURNING TEMPLATE**





25+00

SU-30

AASHTO 2018 (US)

SU-30

AASHTO 2018 (US)

SU-30

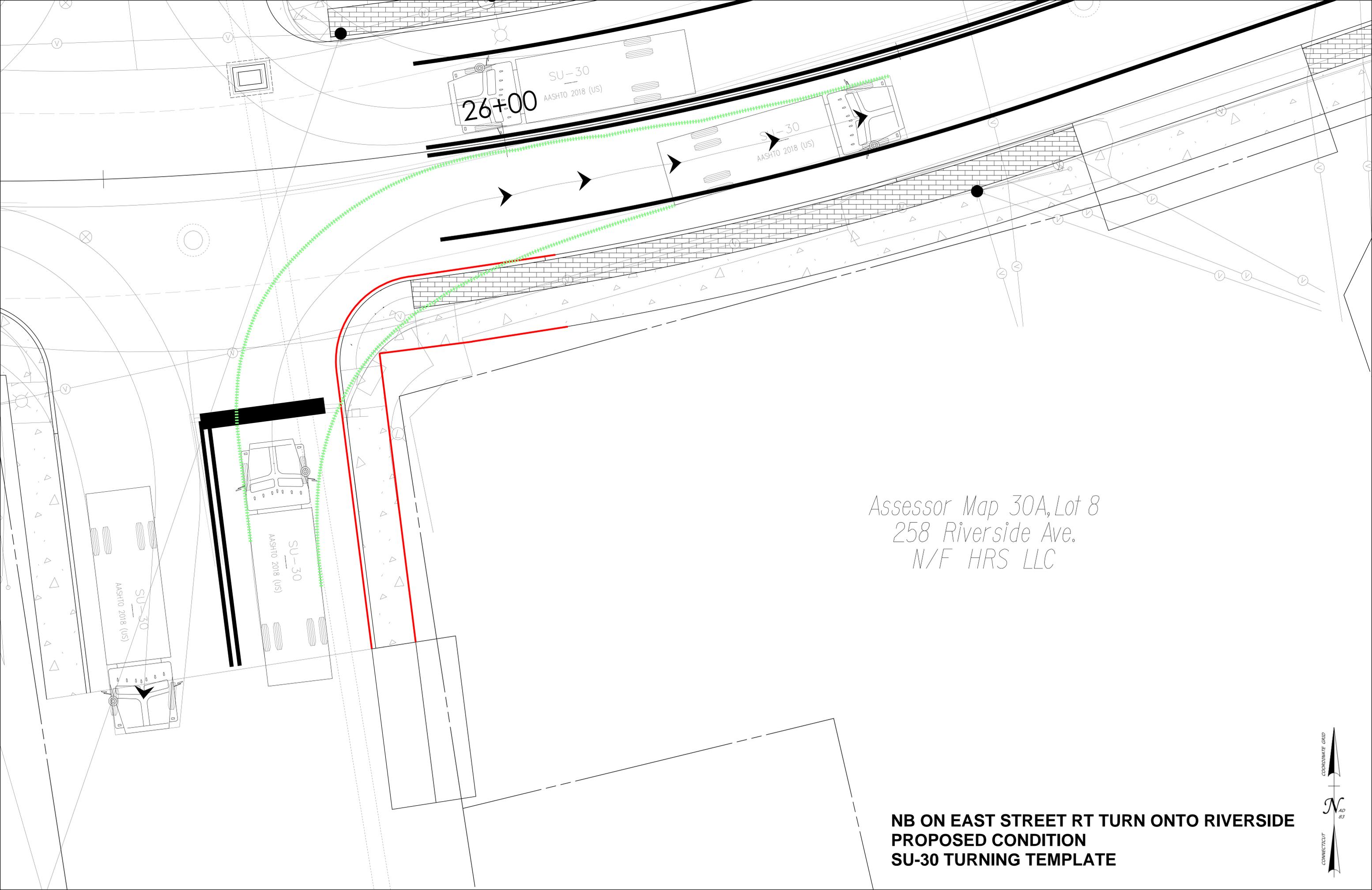
AASHTO 2018 (US)

SU-30

AASHTO 2018 (US)

COORDINATE GRID
N
AD
83
CONNECTICUT

**EB ON RIVERSIDE AVE RT TURN ONTO EAST STREET
PROPOSED CONDITION
SU-30 TURNING TEMPLATE**



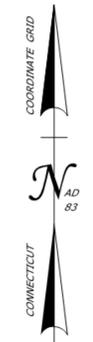
26+00
SU-30
AASHTO 2018 (US)

SU-30
AASHTO 2018 (US)

SU-30
AASHTO 2018 (US)

*Assessor Map 30A, Lot 8
258 Riverside Ave.
N/F HRS LLC*

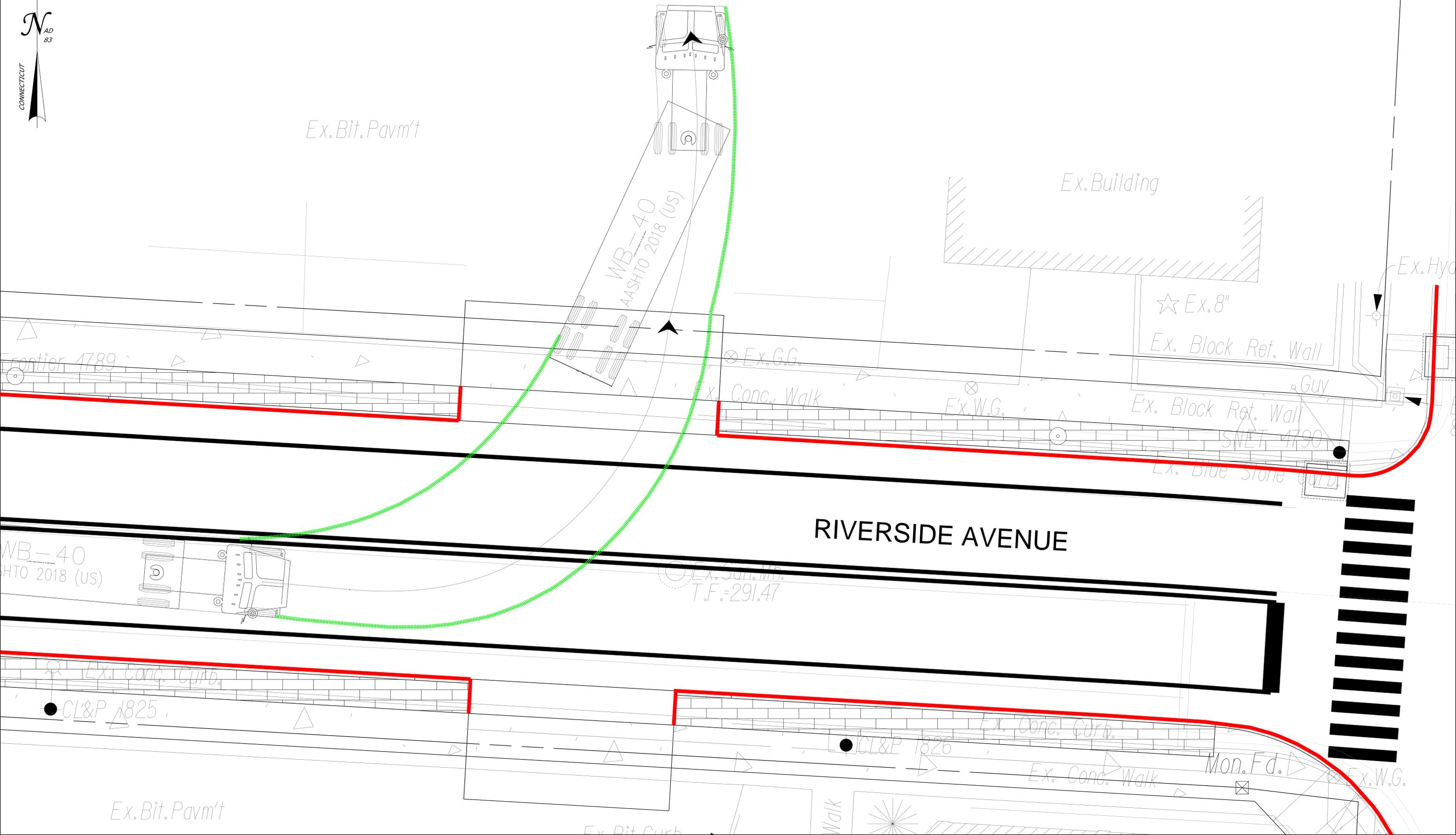
**NB ON EAST STREET RT TURN ONTO RIVERSIDE
PROPOSED CONDITION
SU-30 TURNING TEMPLATE**



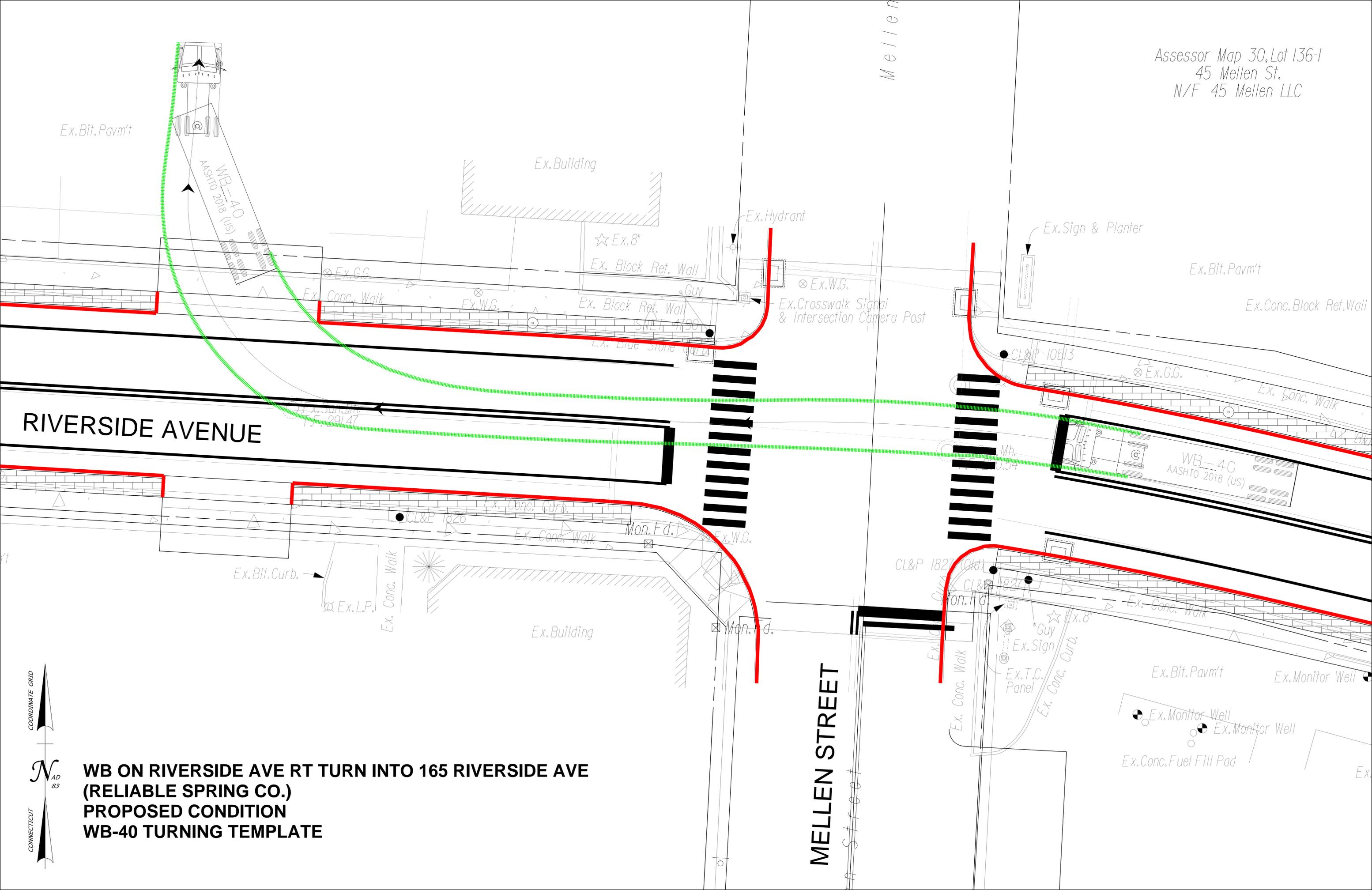
165 RIVERSIDE AVENUE - RELIABLE SPRINGS CO.



EB ON RIVERSIDE AVE LT TURN INTO 165 RIVERSIDE AVE (RELIABLE SPRING CO.) PROPOSED CONDITION WB-40 TURNING TEMPLATE



Assessor Map 30, Lot 136-1
45 Mellen St.
N/F 45 Mellen LLC



RIVERSIDE AVENUE

MELLEN STREET

**WB ON RIVERSIDE AVE RT TURN INTO 165 RIVERSIDE AVE
(RELIABLE SPRING CO.)
PROPOSED CONDITION
WB-40 TURNING TEMPLATE**



180 RIVERSIDE AVENUE - GAS MAN GAS STATION

RIVERSIDE AVENUE

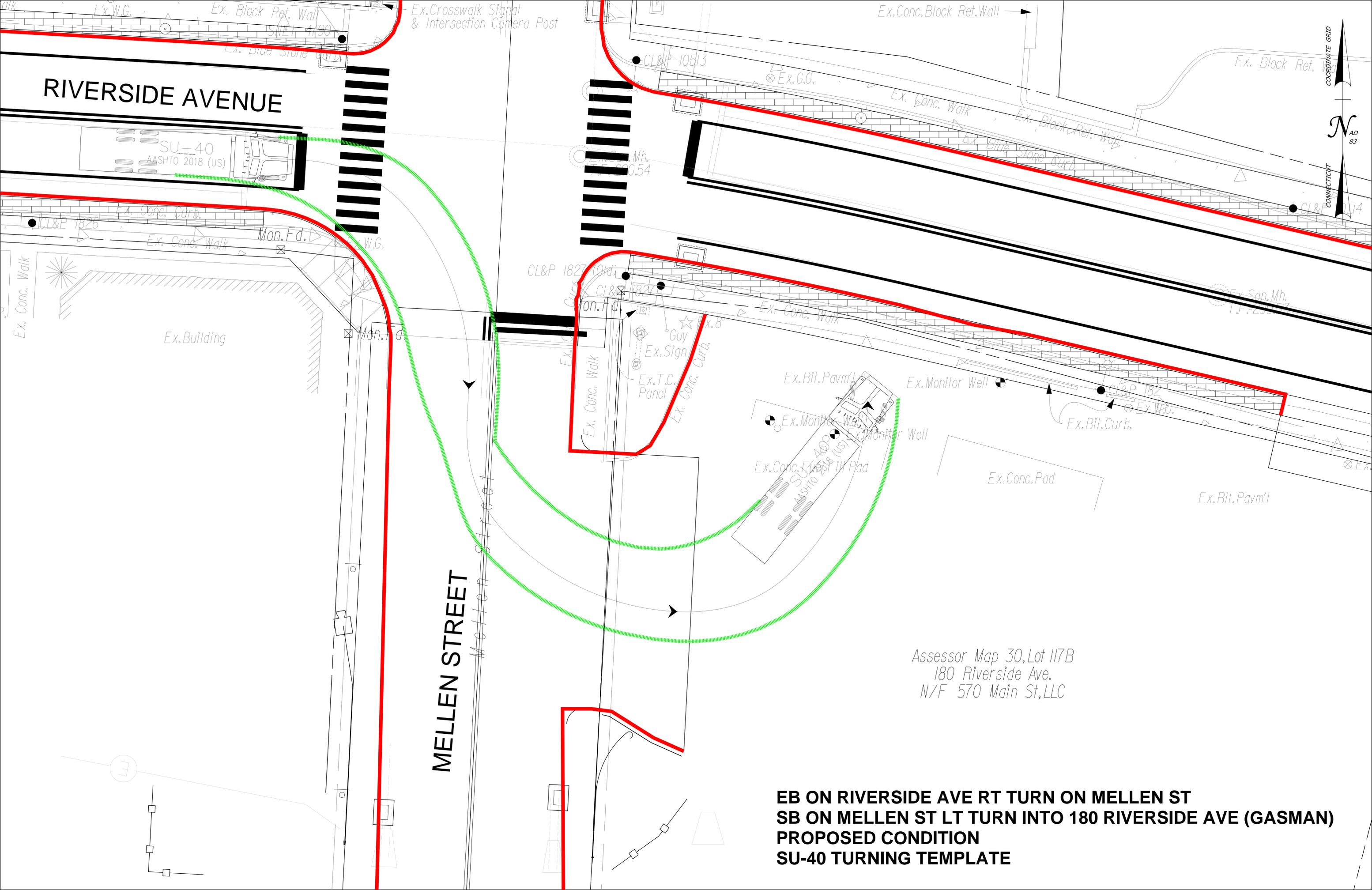
MELLEN STREET



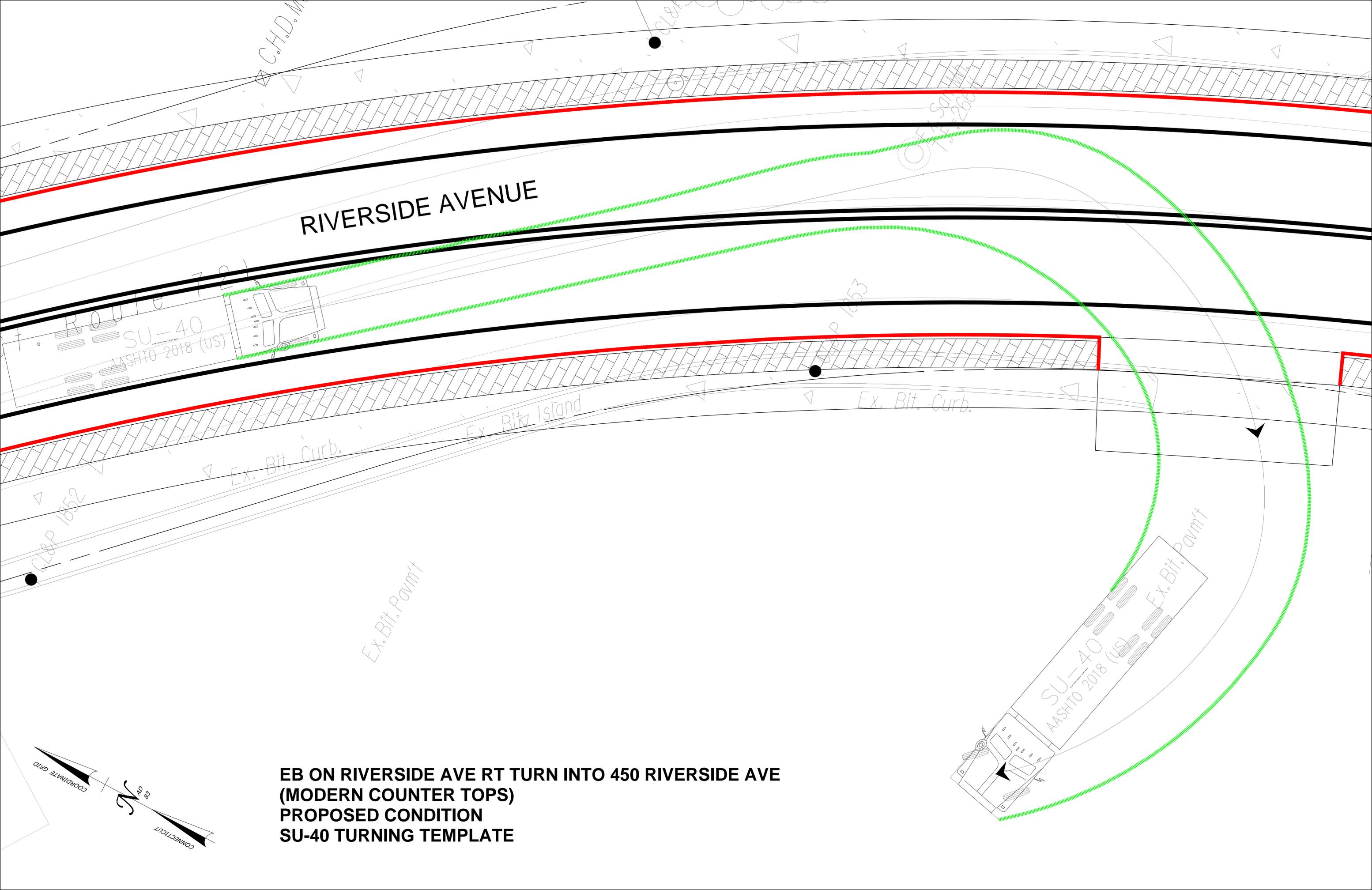
EB ON RIVERSIDE AVE RT TURN ON MELLEN ST
SB ON MELLEN ST LT TURN INTO 180 RIVERSIDE AVE (GASMAN)
PROPOSED CONDITION
SU-40 TURNING TEMPLATE

Assessor Map 30, Lot 117B
 180 Riverside Ave.
 N/F 570 Main St, LLC

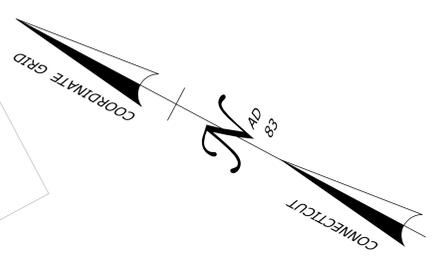
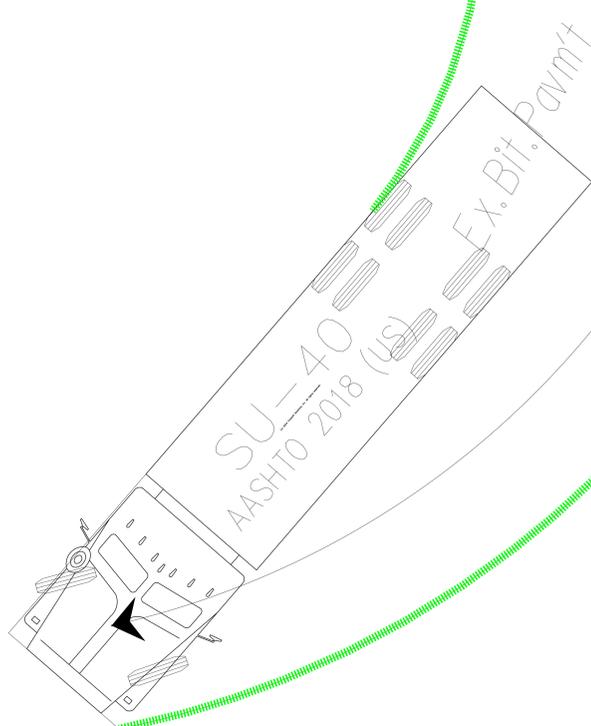
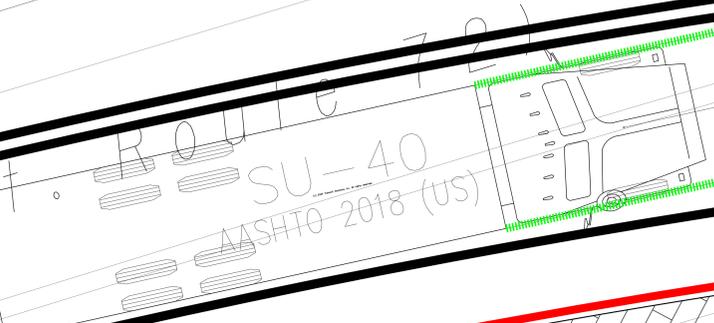
COORDINATE GRID
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 83
 CONNECTICUT



450 RIVERSIDE AVENUE - MODERN COUNTER TOPS

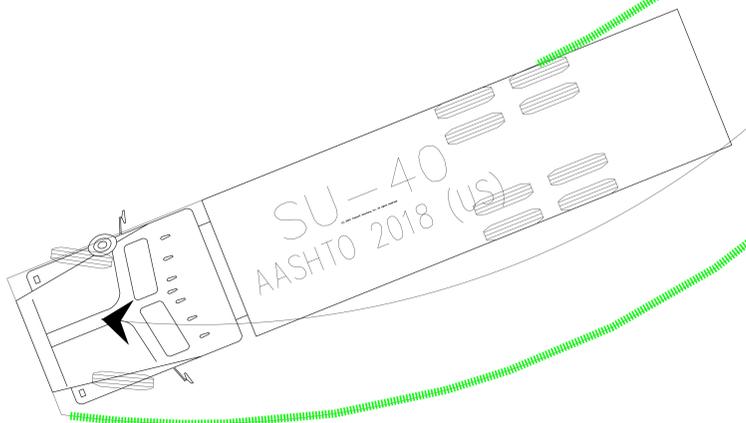


RIVERSIDE AVENUE



**EB ON RIVERSIDE AVE RT TURN INTO 450 RIVERSIDE AVE
(MODERN COUNTER TOPS)
PROPOSED CONDITION
SU-40 TURNING TEMPLATE**

RIVERSIDE AVENUE



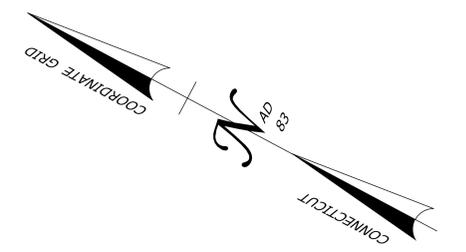
Ex. Bit. Curb.

Ex. Bit. Pavm't

Ex. Bit. Pavm't

CL&P / 1854

**WB ON RIVERSIDE AVE LT TURN INTO 450 RIVERSIDE AVE
(MODERN COUNTER TOPS)
PROPOSED CONDITION
SU-40 TURNING TEMPLATE**



Appendix C: Cost Estimate

Streetscape Improvements on Riverside Avenue | Bristol

Preliminary Design Statement
September 2024



PROJECT NO. 0017-XXXX
STREETSCAPE IMPROVEMENTS ON RIVERSIDE AVENUE
CITY OF BRISTOL
PRELIMINARY DESIGN ESTIMATE - ALTERNATIVE 1

Anticipated year of expenditure: 2025
 Base year (cost based on expenditure in this year): 2024
 Phase of Development: Preliminary Design (30%)

Construction Cost Summary			
		ROADWAY	\$ 3,750,209
		TRAFFIC	\$ 200,000
		STRUCTURES	\$ -
		ENV. COMPLIANCE/LANDSCAPE/ILLUMINATION	\$ -
		Subtotal of Known Items =	70% \$ 3,950,209
% of Base Estimate	Equivalent % of Known Items		
15%		MINOR ITEMS	21% \$ 846,473
3%	0201001	CLEARING AND GRUBBING	4% \$ 169,295
4%	0971001	MAINTENANCE AND PROTECTION OF TRAFFIC	6% \$ 225,726
1%	0980020 A	CONSTRUCTION SURVEYING	1% \$ 56,432
7%	0975004 A	MOBILIZATION AND PROJECT CLOSEOUT	10% \$ 395,021
		Contract Items (Base Estimate) =	\$ 5,643,155
		INFLATION FACTOR	4%
		YEARS TO OBLIGATION	1
		Contract Items Corrected for Inflation =	\$ 5,869,000
		CONTINGENCIES	10% \$ 586,900
		INCIDENTALS	25% \$ 1,467,250
		TOTAL CONSTRUCTION COST	\$ 7,923,150

Project No. 0017-XXXX						
SECTION A - ROADWAY ITEMS ALTERNATIVE 1						
ITEM NO.	A	Construction Items	UNIT	QUANTITY	UNIT PRICE	COST
0201214		RESET SIGN	ea.	8	\$ -	\$ -
0202529		CUT BITUMINOUS CONCRETE PAVEMENT	l.f.	6860	\$ 3.50	\$ 24,010.00
0209001		FORMATION OF SUBGRADE	s.y.	17150	\$ 3.00	\$ 51,450.00
0212000		SUBBASE	c.y.	3835	\$ 58.58	\$ 224,654.30
0304002		PROCESSED AGGREGATE BASE	c.y.	2980	\$ 57.15	\$ 170,307.00
0406171		HMA S0.5	ton	2065	\$ 138.35	\$ 285,692.75
0406172		HMA S0.375	ton	2005	\$ 173.51	\$ 347,887.55
0409001		FINE MILLING OF BITUMINOUS CONCRETE (0" TO 4")	s.y.	101	\$ 4.22	\$ 426.22
0586001.10		TYPE 'C' CATCH BASIN - 0' - 10' DEEP	ea.	14	\$ 5,345.67	\$ 74,839.38
0586040.10		TYPE 'C-L' CATCH BASIN - 0' - 10' DEEP	ea.	1	\$ 5,714.26	\$ 5,714.26
0586500.10		MANHOLE - 0' - 10' DEEP	ea.	1	\$ 6,328.31	\$ 6,328.31
0586601		RESET TYPE 'C' CATCH BASIN	ea.	5	\$ 1,658.60	\$ 8,293.00
0586620		RESET TYPE 'C-L' CATCH BASIN	ea.	4	\$ 2,032.06	\$ 8,128.24
0586750		TYPE 'C' CATCH BASIN TOP	ea.	5	\$ 860.43	\$ 4,302.15
0586760		TYPE 'C-L' CATCH BASIN TOP	ea.	4	\$ 668.70	\$ 2,674.80
0586790.10		REMOVE DRAINAGE STRUCTURE - 0' - 10' DEEP	ea.	13	\$ 1,192.20	\$ 15,498.60
0686000.12		12" R.C. PIPE - 0' - 10' DEEP	l.f.	48	\$ 105.00	\$ 5,040.00
0686000.15		15" R.C. PIPE - 0' - 10' DEEP	l.f.	296	\$ 108.36	\$ 32,074.56
0686000.18		18" R.C. PIPE - 0' - 10' DEEP	l.f.	62	\$ 99.09	\$ 6,143.58
0686000.24		24" R.C. PIPE - 0' - 10' DEEP	l.f.	12	\$ 142.51	\$ 1,710.12
0686000.30		30" R.C. PIPE - 0' - 10' DEEP	l.f.	16	\$ 177.63	\$ 2,842.08
0686200.08		8" POLYVINYL CHLORIDE PIPE - 0' - 10' DEEP	l.f.	4	\$ 71.72	\$ 286.88
0686230.12		12" HIGH DENSITY POLYETHYLENE PIPE - 0' - 10' DEEP	l.f.	38	\$ 86.66	\$ 3,293.08
0686860.12		12" SLOTTED DRAIN PIPE	l.f.	35	\$ 320.00	\$ 11,200.00
0813021		6" GRANITE STONE CURBING	l.f.	7800	\$ 68.66	\$ 535,548.00
0910300		METAL BEAM RAIL (R-B MASH)	l.f.	338	\$ 31.23	\$ 10,540.13
0911923		R-B END ANCHORAGE-TYPE I	ea.	2	\$ 2,017.35	\$ 4,034.70
0913000		REMOVE CHAIN LINK FENCE	l.f.	145	\$ 8.59	\$ 1,245.55
0913041		8' CHAIN LINK FENCE	l.f.	145	\$ 60.27	\$ 8,739.15
0921001		CONCRETE SIDEWALK	s.f.	49515	\$ 15.33	\$ 759,064.95
0921005		CONCRETE SIDEWALK RAMP	s.f.	1050	\$ 32.34	\$ 33,957.00
0921008	A	BRICK SIDEWALK	s.f.	22850	\$ 33.22	\$ 759,077.00
0921048		DETECTABLE WARNING SURFACE	s.f.	170	\$ 47.68	\$ 8,105.60
0922500		BITUMINOUS CONCRETE DRIVEWAY (COMMERCIAL)	s.y.	1260	\$ 72.77	\$ 91,690.20
0922501		BITUMINOUS CONCRETE DRIVEWAY	s.y.	16	\$ 69.37	\$ 1,109.92
0924002		CONCRETE DRIVEWAY RAMP	c.y.	180	\$ 585.07	\$ 105,312.60
1002110		DECORATIVE LIGHT POLE FOUNDATION	ea.	33	\$ 1,565.23	\$ 51,652.59
1002300		LIGHT STANDARD	ea.	33	\$ 2,000.00	\$ 66,000.00
1206036		REMOVE AND RELOCATE SIGN	ea.	9	\$ 485.00	\$ 4,365.00
1210101		4" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	9930	\$ 0.54	\$ 5,362.20
1210102		4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	l.f.	9041	\$ 0.48	\$ 4,339.68
1210118		EPOXY RESIN PAVEMENT MARKINGS SYMBOLS AND LEGEND	s.f.	1275	\$ 5.70	\$ 7,267.50
ROADWAY ITEMS SUBTOTAL						\$ 3,750,208.63
					SAY	\$ 3,751,000.00



PROJECT NO. 0017-XXXX
STREETSCAPE IMPROVEMENTS ON RIVERSIDE AVENUE
CITY OF BRISTOL
PRELIMINARY DESIGN ESTIMATE - ALTERNATIVE 1C

Anticipated year of expenditure

2025

Base year (cost based on expenditure in this year):

2024

Phase of Development:

Preliminary Design (30%)

Construction Cost Summary				
		ROADWAY	\$	3,715,693
		TRAFFIC	\$	200,000
		STRUCTURES	\$	-
		ENV. COMPLIANCE/LANDSCAPE/ILLUMINATION	\$	-
Subtotal of Known Items =			70%	\$ 3,915,693
% of Base Estimate		Equivalent % of Known Items		
15%		MINOR ITEMS	21%	\$ 839,077
3%	0201001	CLEARING AND GRUBBING	4%	\$ 167,815
4%	0971001	MAINTENANCE AND PROTECTION OF TRAFFIC	6%	\$ 223,754
1%	0980020 A	CONSTRUCTION SURVEYING	1%	\$ 55,938
7%	0975004 A	MOBILIZATION AND PROJECT CLOSEOUT	10%	\$ 391,569
Contract Items (Base Estimate) =				\$ 5,593,847
		INFLATION FACTOR	4%	
		YEARS TO OBLIGATION	1	
		Contract Items Corrected for Inflation =		\$ 5,818,000
		CONTINGENCIES	10%	\$ 581,800
		INCIDENTALS	25%	\$ 1,454,500
TOTAL CONSTRUCTION COST			\$	7,854,300

Project No. 0017-XXXX						
SECTION A - ROADWAY ITEMS ALTERNATIVE 1C						
ITEM NO.	A	Construction Items	UNIT	QUANTITY	UNIT PRICE	COST
0201214		RESET SIGN	ea.	8		\$ -
0202529		CUT BITUMINOUS CONCRETE PAVEMENT	l.f.	6835	\$ 3.50	\$ 23,922.50
0209001		FORMATION OF SUBGRADE	s.y.	17535	\$ 3.00	\$ 52,605.00
0212000		SUBBASE	c.y.	3900	\$ 58.58	\$ 228,462.00
0304002		PROCESSED AGGREGATE BASE	c.y.	3020	\$ 57.15	\$ 172,593.00
0406171		HMA S0.5	ton	2095	\$ 138.35	\$ 289,843.25
0406172		HMA S0.375	ton	2035	\$ 173.51	\$ 353,092.85
0409001		FINE MILLING OF BITUMINOUS CONCRETE (0" TO 4")	s.y.	101	\$ 4.22	\$ 426.22
0586001.10		TYPE 'C' CATCH BASIN - 0' - 10' DEEP	ea.	14	\$ 5,345.67	\$ 74,839.38
0586040.10		TYPE 'C-L' CATCH BASIN - 0' - 10' DEEP	ea.	1	\$ 5,714.26	\$ 5,714.26
0586500.10		MANHOLE - 0' - 10' DEEP	ea.	1	\$ 6,328.31	\$ 6,328.31
0586601		RESET TYPE 'C' CATCH BASIN	ea.	5	\$ 1,658.60	\$ 8,293.00
0586620		RESET TYPE 'C-L' CATCH BASIN	ea.	4	\$ 2,032.06	\$ 8,128.24
0586750		TYPE 'C' CATCH BASIN TOP	ea.	5	\$ 860.43	\$ 4,302.15
0586760		TYPE 'C-L' CATCH BASIN TOP	ea.	4	\$ 668.70	\$ 2,674.80
0586790.10		REMOVE DRAINAGE STRUCTURE - 0' - 10' DEEP	ea.	13	\$ 1,192.20	\$ 15,498.60
0686000.12		12" R.C. PIPE - 0' - 10' DEEP	l.f.	35	\$ 105.00	\$ 3,675.00
0686000.15		15" R.C. PIPE - 0' - 10' DEEP	l.f.	289	\$ 108.36	\$ 31,316.04
0686000.18		18" R.C. PIPE - 0' - 10' DEEP	l.f.	72	\$ 99.09	\$ 7,134.48
0686000.24		24" R.C. PIPE - 0' - 10' DEEP	l.f.	12	\$ 142.51	\$ 1,710.12
0686000.30		30" R.C. PIPE - 0' - 10' DEEP	l.f.	4	\$ 177.63	\$ 710.52
0686200.08		8" POLYVINYL CHLORIDE PIPE - 0' - 10' DEEP	l.f.	4	\$ 71.72	\$ 286.88
0686230.12		12" HIGH DENSITY POLYETHYLENE PIPE - 0' - 10' DE	l.f.	38	\$ 86.66	\$ 3,293.08
0686860.12		12" SLOTTED DRAIN PIPE	l.f.	35	\$ 320.00	\$ 11,200.00
0813021		6" GRANITE STONE CURBING	l.f.	7885	\$ 68.66	\$ 541,384.10
0910300		METAL BEAM RAIL (R-B MASH)	l.f.	338	\$ 31.23	\$ 10,540.13
0911923		R-B END ANCHORAGE-TYPE I	ea.	2	\$ 2,017.35	\$ 4,034.70
0913000		REMOVE CHAIN LINK FENCE	l.f.	145	\$ 8.59	\$ 1,245.55
0913041		8' CHAIN LINK FENCE	l.f.	145	\$ 60.27	\$ 8,739.15
0921001		CONCRETE SIDEWALK	s.f.	49764	\$ 15.33	\$ 762,882.12
0921005		CONCRETE SIDEWALK RAMP	s.f.	750	\$ 32.34	\$ 24,255.00
0921008	A	BRICK SIDEWALK	s.f.	21335	\$ 33.22	\$ 708,748.70
0921048		DETECTABLE WARNING SURFACE	s.f.	190	\$ 47.68	\$ 9,059.20
0922500		BITUMINOUS CONCRETE DRIVEWAY (COMMERCIAL)	s.y.	1280	\$ 72.77	\$ 93,145.60
0922501		BITUMINOUS CONCRETE DRIVEWAY	s.y.	16	\$ 69.37	\$ 1,109.92
0924002		CONCRETE DRIVEWAY RAMP	c.y.	180	\$ 585.07	\$ 105,312.60
1002110		DECORATIVE LIGHT POLE FOUNDATION	ea.	33	\$ 1,565.23	\$ 51,652.59
1002300		LIGHT STANDARD	ea.	33	\$ 2,000.00	\$ 66,000.00
1206036		REMOVE AND RELOCATE SIGN	ea.	9	\$ 485.00	\$ 4,365.00
1210101		4" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	9930	\$ 0.54	\$ 5,362.20
1210102		4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	l.f.	9041	\$ 0.48	\$ 4,339.68
1210118		EPOXY RESIN PAVEMENT MARKINGS SYMBOLS AND LEGEND	s.f.	1310	\$ 5.70	\$ 7,467.00
ROADWAY ITEMS SUBTOTAL						\$ 3,715,692.92
					SAY	\$ 3,716,000.00

