SCREENING OF PRELIMINARY ALTERNATIVES, PROSPECT STREET BYPASS

State of Connecticut
Department of Transportation

State Project No. 42-239
Federal Project No. IXAF-63(105)

August 22, 1990

EMJ/McFarland-Johnson Engineers, Inc.
Binghamton, New York

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I. INTRODUCTION

This report analyzes preliminary highway alignment alternatives that have been developed to address the current transportation deficiencies on Prospect Street and Main Street - U.S. 5 in East Hartford, Connecticut. The project area begins at the "Mix Master" exit of Interstate 84 to Governor Street and extends northward to Goodwin Brook (Figure 1). The project area is bounded on the west by the Connecticut River and by Main Street/Rt. 5 on the east. Commuters currently use Prospect Street, a two lane, local urban street, to bypass downtown East Hartford. Heavy trucks are prohibited from using Prospect Street and must travel through East Hartford via Main Street/Rt. 5 and Governor Street.

Traffic projections indicate that major intersections and roadways in the project area will be operating over capacity in the design year (2010). To identify solutions to the capacity problems within East Hartford, seven alternatives are presented for consideration (Table 1). These alternatives have been developed in response to the public scoping process conducted during the fall of 1989. The alternatives include:

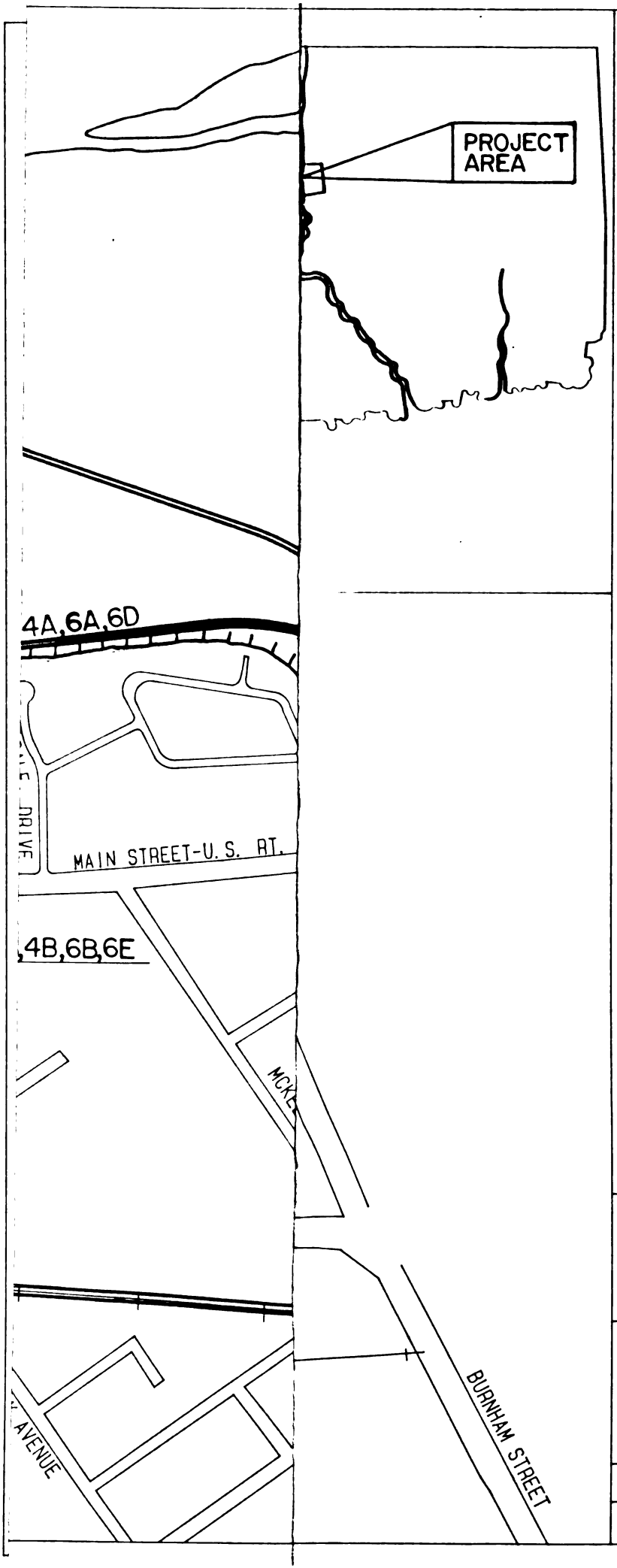
- Do Nothing
- Transportation System Management (TSM)
- Bypass Alternatives
- Widen Prospect Street
- Combination Alternatives
- Railroad Viaduct Alternative

Each alternative and its possible options are illustrated on Figure 1. Information on project costs, right-of-way impacts, major environmental factors, and engineering considerations are summarized for each alternative in Table 2. Based on these preliminary evaluations, "candidate" alternatives considered viable will be selected as study alternatives and will be evaluated further in the Environmental Impact Statement (EIS) for the Prospect Street Bypass.

TABLE 1

LIST OF ALTERNATIVES

ALTERNATIVES	DESCRIPTION
DO NOTHING	
Alt. 1	Do not change the existing tranportation network.
TRANSPORTATION SYSTEM MANAGEMENT (TSM)	
Alt. 2	Improve traffic flow by widening Governor Street, eliminating parking on Main Street, and encouraging ridesharing, intersection and signalization improvements, etc.
BYPASS ALTERNATIVES	
Dike Alignments	
Alt. 3A	A two lane facility extending north from the Governor/ Mixmaster intersection along the dike. Continues past the dike through the wetlands and terminates near King St./Rt. 5 with an at-grade intersection.
Alt. 3A.1	The same as 3A, but includes viaducts over wetland areas.
Alt. 3B	Similar to 3A, but follows the entire length of the dike. Terminates with a T-intersection on Main Street.
Alt. 3B.1	The same as 3B, but includes viaducts over wetland areas.
Wetland Edge Alignments	
Alt. 4A	A four lane facility extending north from the Governor/ Mixmaster intersection, following the eastern edge of the wetland. Terminates near King St./Rt. 5 with an at-grade intersection.
Alt. 4A.1	The same as 4A, but includes viaducts over the wetland area.
Alt. 4B	Follows the same path as 4A, but turns east and follows the dike to terminate at Main Street.
Alt. 4B.1	The same as 4B, but includes viaducts over the wetland area.
WIDEN PROSPECT STREET	
Alt. 5	Widens Governor Street to six lanes from the Mixmaster to Prospect and widens Prospect Street to four lanes from Governor to Main Street.
COMBINATION ALTERNATIVES	
Alt. 6A	A four lane facility which follows Prospect Street from the railroad to Case Road. It extends north along the edge of the wetland and terminates near King St./Rt. 5.
Alt. 6A.1	The same as 6A, but includes viaducts over the wetland area.
Alt. 6B	Same as 6A, but turns east at the dike and terminates at Main Street.
Alt. 6B.1	The same as 6B, but includes viaducts over the wetland area.
Alt. 6C	A four lane facility which joins Prospect Street in the vicinity of the railroad and follows Prospect Street to Main Street.
Alt. 6C.1	The same as 6C, but includes viaducts over the wetland area.
Alt. 6D	Widening of Governor and Prospect Street to Case Road. The alignment then follows the edge of the wetland and terminates in the vicinity of King St./Rt. 5.
Alt. 6E	Follows the same path as 6D, but turns east at the dike and terminates Main Street.
RAILROAD VIADUCT ALTERNATIVE	
Alt. 7A	A two lane facility extending north to the railroad and then supported with a continuous viaduct over the railroad. Terminates at School Street.
Alt. 7E	Same as 7A, but the alignment ends at Park Avenue.



LEGEND

WETLAND

CULTIVATED LAND

100 YEAR FLOODPLAIN

PROSPECT STREET BYPASS
STATE PROJECT NO 42-239
FED. PROJECT NO IXAF-63(1-5)
EAST HARTFORD CONNECTICUT

LOCATION MAP

FIGURE 1 | MAY 1990

EMJ/McFARLAND-JOHNSON ENGINEERS, INC.

TABLE 2

SUMMARY OF PROSPECT STREET PRELIMINARY ALTERNATIVES

ALTERNATIVE	NOISE IMPACTS(1)	ACQUISITIONS		KNOWN HISTORIC RESOURCES	WETLANDS IMPACTED (acres)	FLOODPLAINS IMPACTED (acres)	LENGTH OF PROPOSED PROJECT (miles)	ESTIMATED COST (millions of dollars)	DESIGN YEAR INTERSECTION LEVEL OF SERVICE
		DWELLING UNITS(2)	BUSINESSES						
DO NOTHING ALT. 1	0	0	0	-	0	-	-	0	F
TSM ALT. 2	0 (3)	28	1	-	0	-	1.8	3.7	F
BYPASS-DIKE ALT. 3A	22	-	1	-	19.7	28	1.8	16.9	D
ALT 3A.1	22	-	1	-	7.1	0	1.8	38.8	D
ALT. 3B	31	16	0	-	10.8	0	1.4	13.9	D
ALT 3B.1	31	16	0	-	8.3	0	1.4	18.6	D
BYPASS-WETLAND EDGE ALT. 4A	45	6	1	1	7.4	.9	1.8	10.4	D
ALT. 4A.1	45	6	1	1	6.3	.9	1.8	15.7	D
ALT. 4B	43	18	0	-	6.5	-	1.3	9.8	D
ALT. 4B.1	43	18	0	-	5.4	-	1.3	15.0	D
WIDEN PROSPECT ALT. 5	0 (3)	47	4	1	-	-	.9	7.5	D
COMBINATION ALTS. ALT. 6A	78	10	3	1	4.3	.9	1.8	6.2	D
ALT. 6A.1	78	10	3	1	3.3	0	1.8	11.3	D
ALT. 6B	72	22	2	1	3.5	-	1.3	5.4	D
ALT. 6B.1	72	22	2	1	2.5	-	1.3	10.5	D
ALT. 6C	0 (3)	47	4	1	2.3	-	1.0	8.1	D
ALT. 6C.1	0 (3)	47	4	1	1.3	-	1.0	13.6	D
ALT. 6D	96	11	2	1	2.1	.9	1.7	6.0	D
ATL. 6E	0 (3)	21	2	1	1.2	-	1.2	5.1	D
RR ALIGNMENTS ALT. 7A	45	1	0	0	.9	-	2.6	86.2	D
ALT. 7B	40	1	0	0	.9	-	1.4	47.4	D

1). Number of dwelling units that are impacted by noise levels in excess of 67 (dBA) Leq.
2). A dwelling unit is equivalent to a housing unit occupied by one family.
3). Assumes that trucks would not be allowed to use Prospect Street.

II. REVIEW OF THE SCOPING PROCESS

The goal of the scoping process was to solicit comments and ideas on solutions to traffic congestion along the Governor/Prospect/Rt. 5 corridor from all interested individuals and government agencies and incorporate those comments and ideas at an early stage in the EIS process. To begin the scoping process, the Connecticut Department of Transportation (ConnDOT) on October 20, 1989 published the project Notice of Intent to prepare an Environmental Impact Statement (EIS) in the Federal Register and the Hartford Courrant. The Notice of Intent proposed transportation improvements in the area of Prospect Street. The official comment period for this phase of the project began on October 20, 1989 and ended December 18, 1989.

ConnDOT held a scoping meeting with cooperating agencies on October 31, 1989 to discuss initial environmental concerns and ideas regarding the project. Representatives from the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, and Connecticut Department of Environmental Protection were in attendance. A tour of the project area with the cooperating agencies was conducted on November 29, 1989.

On December 4, 1989, public scoping meetings (afternoon and evening sessions) were held in East Hartford to gather public input on how the traffic problem on Governor and Prospect Streets should be addressed. Approximately 100 people attended the meetings. ConnDOT presented three possible roadway construction alternatives for consideration. The first alternative was a new bypass which would follow the alignment of the East Hartford Dike and join Route 5 in the vicinity of the Rt. 5/King Street intersection. A second alternative was also a bypass on new alignment which would follow the eastern edge of a wetland complex located in the Connecticut River Floodplain and terminate at Rt. 5 where Main Street and Rt. 5 split. Widening Prospect Street was presented as a third alternative. Suggestions made during the scoping process are listed in Appendix A. Many of these suggestions were analyzed further and are presented as preliminary alternatives in this report. Other suggestions were not considered during this analysis because they were not considered reasonable approaches for addressing the traffic concerns.

III. PROJECT NEED

Three major intersections in the project area currently experience congestion and delay problems (Mixmaster/Governor, Governor/Prospect and Prospect/Main - U.S. Rt. 5). A traffic capacity analysis was conducted utilizing existing (1988/1991) and future (2010) traffic volumes to evaluate conditions in the project area. This analysis utilized three traffic engineering criteria: 1.) intersection level of service (LOS), 2.) intersection volume/capacity ratios and, 3.) predicted traffic volumes to evaluate major intersections in the project area.

The Level of Service for signalized intersections is defined in terms of the average stopped delay per vehicle (Table 3). Traffic conditions for the LOS categories range from favorable vehicle progression, with little or no stopping at Level of Service A, to oversaturation of the intersection, poor progression rates, and frequent delays at Level of Service F. Volume/capacity (V/C) ratios provide a second indicator of the intersection capacity. A V/C ratio of 1.0 indicates a saturated intersection and an intersection in which not all desired traffic movements can be accommodated in a single traffic control signal cycle. Intersection capacity, the third indicator of intersection performance, is based on traffic volumes as determined by critical movement analysis. An intersection that is required to accommodate a total volume less than 1,200 vehicles per hour (vph) is described as "under" capacity. An intersection with projected traffic volumes between 1,200 and 1,400 vph is described as "near" capacity. An "over" capacity intersection must accommodate more than 1,400 vph.

TABLE 3

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Stopped Delay Per Vehicle (sec)
A	< 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	> 60.0

Source: Highway Capacity Manual, 1985.

Two types of traffic volumes are reported in this document. Existing traffic conditions are described as peak hourly volumes. Future traffic volume projections for the design year are described as design hourly volumes. To derive design hourly volumes, all of the hourly volumes measured in a year are expressed as a percentage of the average daily traffic and arranged in descending order of magnitude. The design hourly volume represents the 30th highest hourly volume of the year which is a reasonable representation of daily peak traffic hours during the year.[1]

Results of a traffic capacity analysis on the intersections using existing peak hour traffic volumes are presented in Table 4. The Mixmaster/Governor and Governor/Prospect intersections are over capacity with a V/C ratio greater than 1.3 and a Level of Service F during both morning and evening peak periods.

The Prospect/Main intersection operates adequately during the morning peak traffic, but drops to near capacity during the evening peak hours with a V/C ratio exceeding 1.3 and a Level of Service F. Intersections located north of the Prospect/Main Street intersection currently operate at an acceptable level. The intersections of Main Street and McKee and Goodwin Streets currently exhibit a Level of Service B, V/C ratios less than 1.0, and are near or under capacity based on critical movement analysis. Therefore, the existing traffic problem centers around the three major intersections (Mixmaster/Governor, Governor/Prospect, and Prospect/Main), but does not extend north of the Prospect/Main intersection.

Under No Build conditions in the 2010 design year, the three major intersections will continue to operate poorly from a traffic capacity standpoint by all three measures of intersection capacity (Table 4). All three intersections are projected to be over capacity with a V/C ratio greater than 1.3 and delay times greater than 60 seconds. Critical movement analysis does indicate, however, that the intersections in the northern part of the project area (Rt. 5/Main, Rt. 5/King, and Rt.

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[1] A Policy on Geometric Design of Highways and Streets. American Association of State and Transportation Officials, 1990, p. 54.

TABLE 4

EXISTING (1988) AND DESIGN YEAR (2010) INTERSECTION ANALYSIS-NO BUILD CONDITIONS

INTERSECTION	EXISTING (1988) CONDITIONS						DESIGN YEAR (2010) CONDITIONS		
	LOS/Delay Time (sec./vehicle)		Volume Capacity Ratio		Intersection Capacity		LOS/Delay Time (sec./vehicle)	Volume Capacity Ratio	Intersection Capacity
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.			
aster/ rnor	F/>60	F/>60	>1.3	>1.3	OVER	OVER	F/>60	>1.3	Over
nor/ spect	F/>60	F/>60	>1.3	>1.3	OVER	OVER	F/>60	>1.3	Over
	C/16	F/>60	1.04	>1.3	UNDER	UNDER/ NEAR	F/>60	>1.3	Over
	B/10	B/8	0.98	0.91	UNDER	NEAR	N/A	N/A	N/A
Main*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Near
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Under
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Under
win*	B/13	B/5	0.75	0.58	UNDER	UNDER	N/A	N/A	N/A

* Unsignalized Intersections

TABLE 4

EXISTING (1988) AND DESIGN YEAR (2010) INTERSECTION ANALYSIS-NO BUILD CONDITIONS

INTERSECTION	EXISTING (1988) CONDITIONS						DESIGN YEAR (2010) CONDITIONS		
	LOS/Delay Time (sec./vehicle)		Volume Capacity Ratio		Intersection Capacity		LOS/Delay Time (sec./vehicle)	Volume Capacity Ratio	Intersection Capacity
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.			
Mixmaster/ Governor	F/>60	F/>60	>1.3	>1.3	OVER	OVER	F/>60	>1.3	Over
Governor/ Prospect	F/>60	F/>60	>1.3	>1.3	OVER	OVER	F/>60	>1.3	Over
Prospect/ Main-US 5	C/16	F/>60	1.04	>1.3	UNDER	UNDER/ NEAR	F/>60	>1.3	Over
Main-US 5/ McKee*	B/10	B/8	0.98	0.91	UNDER	NEAR	N/A	N/A	N/A
US 5/Main*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Near
US 5/King*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Under
US 5/ Tiffany*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Under
US 5/Goodwin*	B/13	B/5	0.75	0.58	UNDER	UNDER	N/A	N/A	N/A

* Unsignalized Intersections

5/Tiffany) will operate at an acceptable level (near or under capacity) under projected 2010 traffic volume conditions.

Projected 1995 design hourly volumes calculated for the U.S. Route 5 Spot Improvement Study (1989) by the Connecticut Department of Transportation provide additional intersection capacity data for Prospect/Main Street, Main Street/McKee, and Route 5/Goodwin Street intersections (Table 5). The report states that by 1995 the Prospect/Main intersection will be over capacity, have a V/C ratio that exceeds 1.3, and have a Level of Service F during both morning and evening peak traffic periods. As indicated in Table 5, the roadway improvements recommended in that report can not alleviate intersection capacity constraints at Prospect and Main Streets. However, the northern intersections were found to remain under or near capacity in the spot improvement study.

In summary, the traffic analysis demonstrates that there are existing capacity problems which are concentrated at the three major intersections in the project area. As indicated in Table 4, these capacity problems will worsen in the future if a project is not undertaken. Available data indicates that intersections north of Prospect/Main Street intersection operate at a satisfactory level under existing conditions and are not expected to experience capacity constraints in the design year 2010.

TABLE 5

DESIGN YEAR (1995) INTERSECTION ANALYSIS

INTERSECTION	DESIGN YEAR (1995) CONDITIONS					
	LOS/Delay Time (sec./vehicle)		Volume Capacity Ratio		Intersection Capacity	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Prospect/ Main-US 5	F/>60	F/>60	>1.3	>1.3	OVER	OVER
Main-US 5/ McKee*	B/>6	B/>5	0.85	0.84	UNDER	NEAR
US 5/Goodwin*	B/7	B/12	0.86	1.15	UNDER	NEAR

* Unsignalized Intersections
Data from U.S. Rte. 5 East Hartford, Spot Improvement Study.
ConnDOT Office of Traffic Engineering, 1/89.

IV. DESIGN AND LOCATION CONSIDERATIONS

A. Projected Traffic Volumes

The projected traffic volumes for each alternative are presented in Table 6 and Figures 2-5. It is anticipated that traffic reductions up to 59 % on Prospect Street and between 20 and 45 % on Main Street will occur by constructing any of the bypass alternatives. If Prospect Street is widened, the projected traffic volumes on Main and Prospect Streets are expected to remain the same as the No Build Alternative.

The physical TSM improvements described in this report assumed a worse case scenario, one in which traffic volume was not reduced by Level I or Level II TSM strategies (see Section 5, Part B for a description of TSM strategies). Estimating the traffic reduction on Prospect Street for the TSM alternative was difficult with the information available. ConnDOT assumed that bypass build alternatives (Alternatives 3 and 4) would divert approximately 50 % of the traffic volume from Prospect and Main Streets. To determine how much traffic would be diverted from Prospect to Governor/Main Streets after TSM improvements, the TSM Alternative was considered a bypass route and it was estimated that 50 % of the traffic currently using Prospect Street would be diverted to the Governor/Main Street route due to improved traffic conditions.

TABLE 6

TRAFFIC VOLUME COMPARISONS BETWEEN ALTERNATIVES
Year 2010 Two Way Design Hourly Volumes

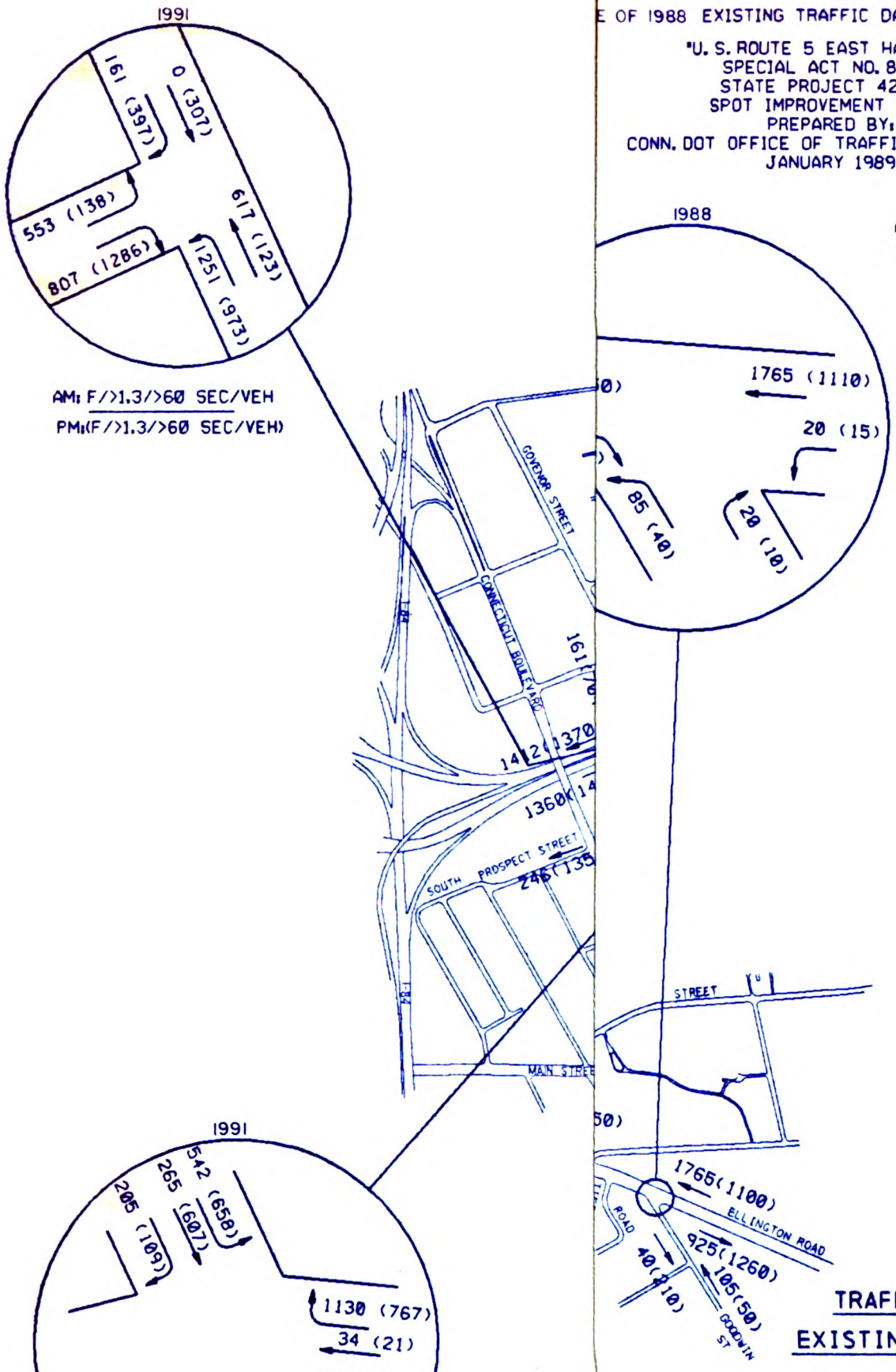
ALTERNATIVE / ROADWAY SEGMENT	DO NOTHING	TSM*			WIDENING PROSPECT	BYPASS ALTERNATIVES	
		Level I 5% Reduction	Level II 9% Reduction After Level I Implemented	No Traffic Reduction**		DIKE/MAIN	MAIN/KING
GOVERNOR STREET							
MIXMASTER TO PROSPECT	3600	3429	3153	3600	3600	2350	2350
PROSPECT TO MAIN	1650	2333	2146	2450	1650	1500	1500
PROSPECT STREET	1850	1000	920	1050	1850	750	750
MAIN STREET							
GOVERNOR TO PROSPECT	3300	3905	3591	4100	3300	2650	2650
PROSPECT TO FLORADALE	4150	3952	3635	4150	4150	2400	2400
FLORADALE TO KING	4000	3810	3504	4000	4000	4200	2200
NORTH OF RT. 5	450	429	394	450	450	450	450
KING ST. NORTH OF RT. 5	174	166	152	174	174	174	174
RT. 5 NORTH OF MAIN/KING	3624	3451	3174	3624	3624	3824	3824

* Assumed that half of the traffic currently using Prospect Street would switch to the Governor/Main Street route if TSM improvements made (Refer to Section V, Part B, page 21).

** Physical TSM improvements based upon these traffic volumes.

E OF 1988 EXISTING TRAFFIC DATA AND ANALYSIS:

"U. S. ROUTE 5 EAST HARTFORD"
SPECIAL ACT NO. 88-73
STATE PROJECT 42-252
SPOT IMPROVEMENT STUDY
PREPARED BY:
CONN. DOT OFFICE OF TRAFFIC ENGINEERING
JANUARY 1989



TRAFFIC VOLUMES
EXISTING CONDITIONS

EXISTING (1988/1991)
AM AND PM PEAK HOURS (VPH)

L.O.S. / V/C RATIO / VEHICLE DELAY TIME (SEC.)

EAK HOUR (P. M. PEAK HOUR
UMES VOLUMES)

PROSPECT STREET BYPASS
STATE PROJECT NO. 42-239
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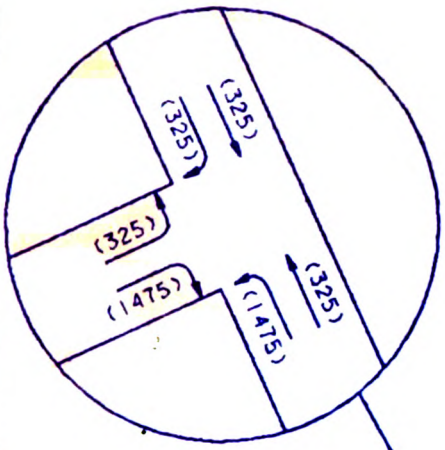
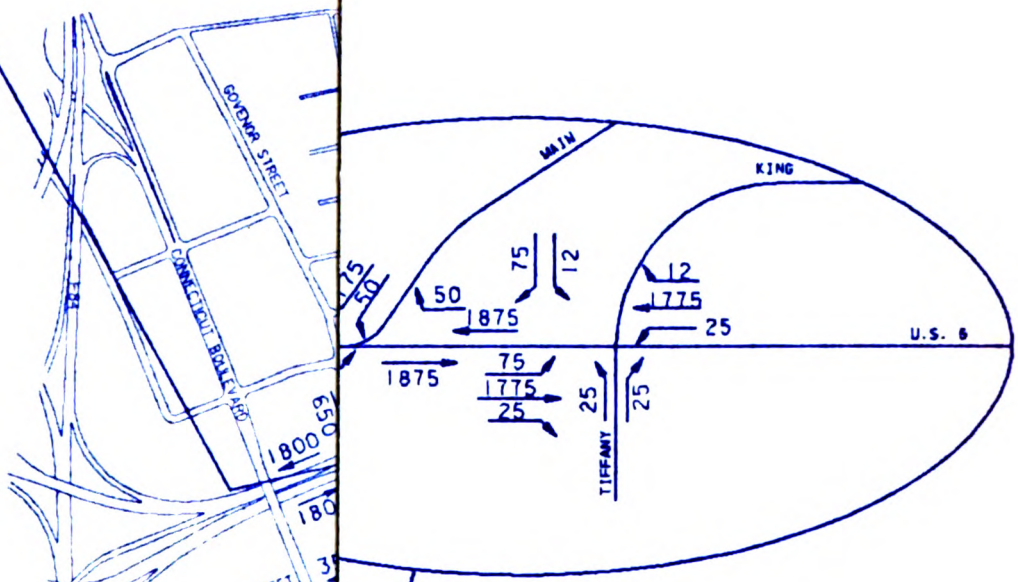
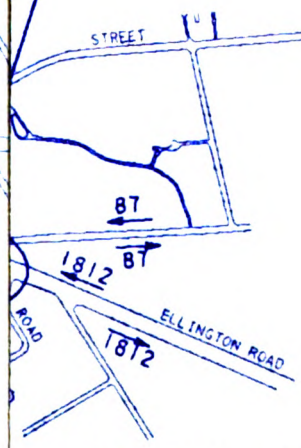
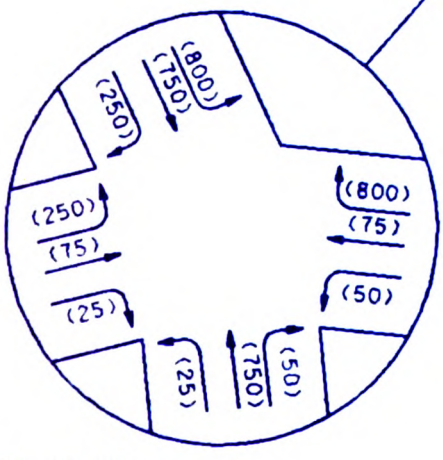


ALTS 6D,6E
D / 1.24 / 31 SEC /VEH



ALTS 5,6C,6E





ALTS 6D,6E
/ 1.20 / 36 SEC /VEH

WIDENING AND COMBINATION ALTERNATIVES

YEAR (2010) DESIGN HOURLY VOLUMES
AND TURNING MOVEMENTS

L.O.S. / V/C RATIO / VEHICLE DELAY TIME (SEC.

PROSPECT STREET BYPASS
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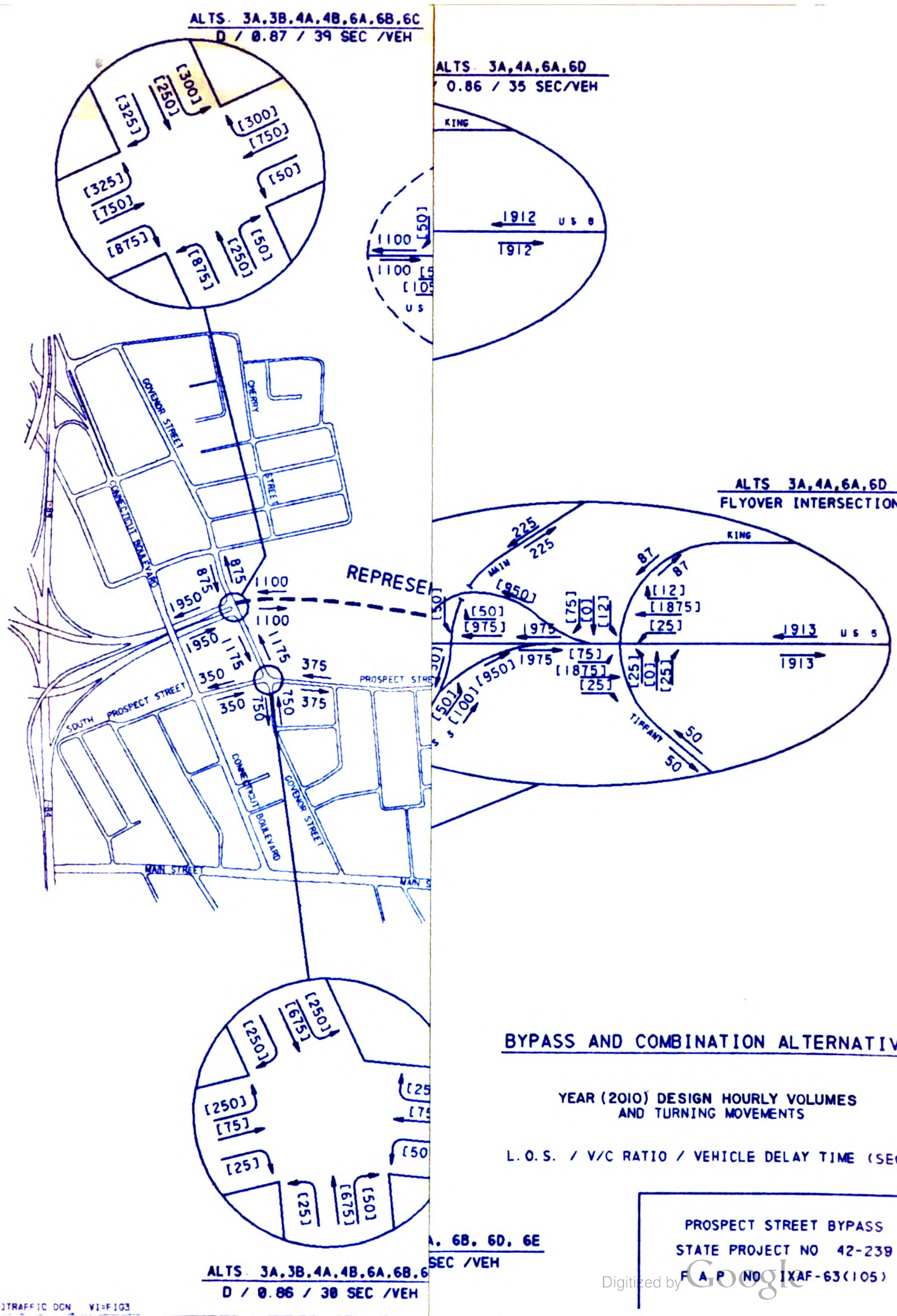

BYPASS AND COMBINATION ALTERNATIVES

YEAR (2010) DESIGN HOURLY VOLUMES
AND TURNING MOVEMENTS

L.O.S. / V/C RATIO / VEHICLE DELAY TIME (SEC.)

PROSPECT STREET BYPASS
STATE PROJECT NO 42-239
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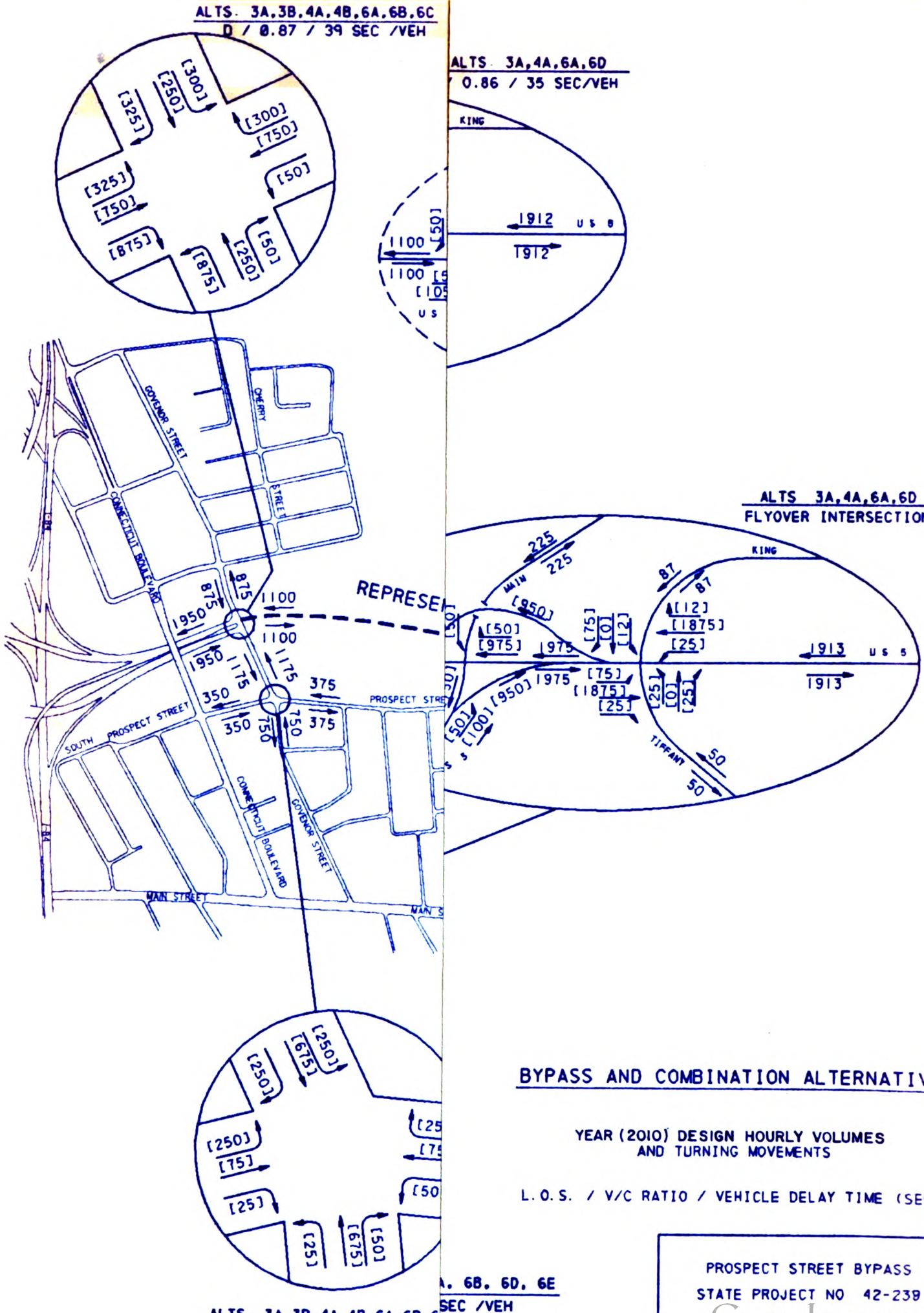
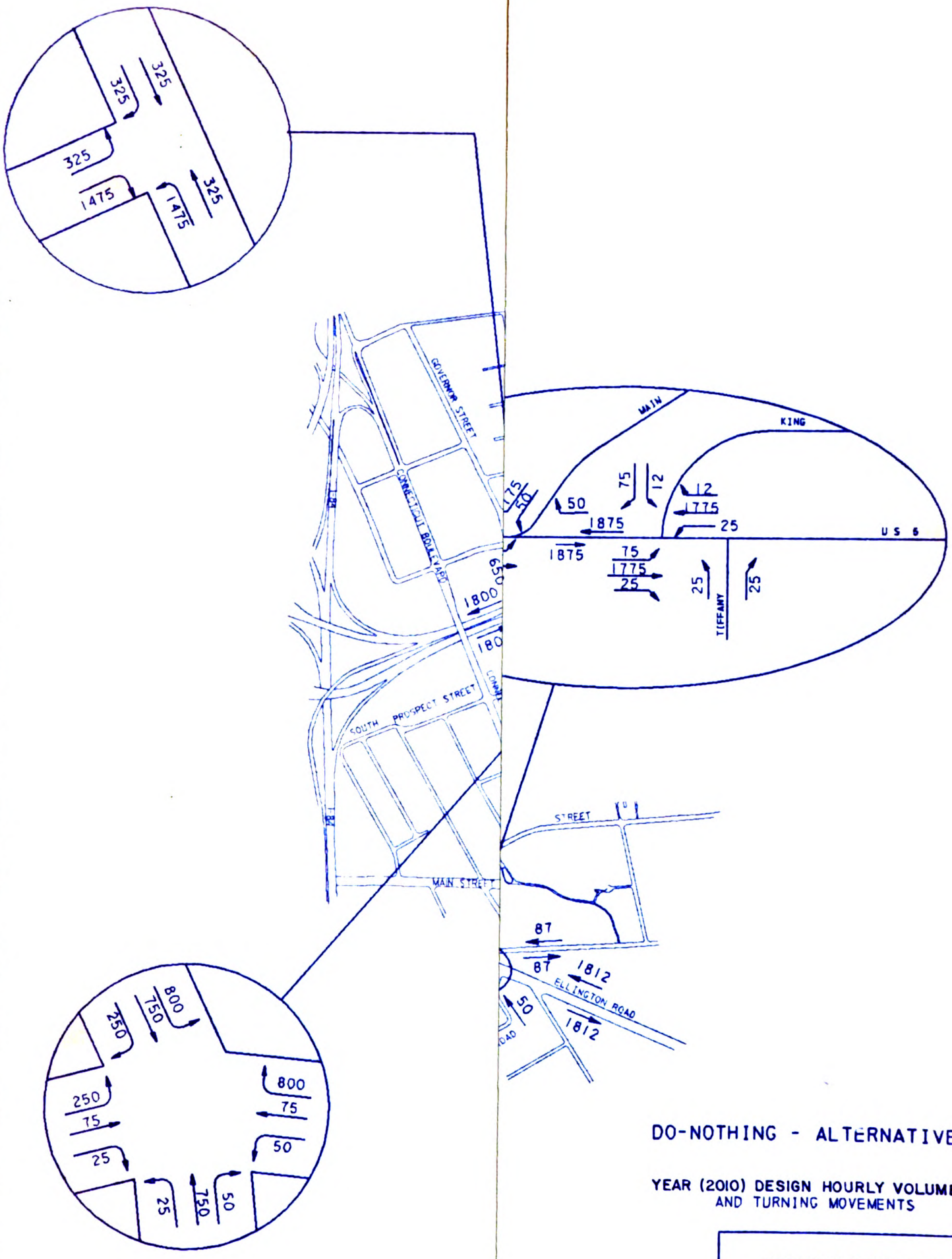


BYPASS AND COMBINATION ALTERNATIVES

YEAR (2010) DESIGN HOURLY VOLUMES
AND TURNING MOVEMENTS

L. O. S. / V/C RATIO / VEHICLE DELAY TIME (SEC.)

PROSPECT STREET BYPASS
STATE PROJECT NO 42-239
F A P NO IXAF-63(105)



DO-NOTHING - ALTERNATIVE I

YEAR (2010) DESIGN HOURLY VOLUMES
AND TURNING MOVEMENTS

icles per hour)
d V/C ratios>1.3

PROSPECT STREET BYPASS
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B. Design Criteria

The design speeds used in the development of preliminary alternatives are based upon the functional classification of the roadway segments. The bypass alternatives which utilize the flood control dike were isolated enough from residential areas to be considered urban roadways and have a design speed of 50 mph. A concrete "Jersey" barrier will separate the directional lanes. Alignments located closer to residential areas were classified as minor arterial roadways with a design speed of 45 mph. The design criteria for both typical roadway cross sections are listed in Table 7.

TABLE 7

ROADWAY DESIGN CRITERIA

FUNCTIONAL CLASSIFICATION	LANE WIDTH (feet)	RIGHT SHOULDER WIDTH (feet)	LEFT SHOULDER WIDTH (feet)	MEDIAN WIDTH (feet)	DESIGN SPEED (mph)	MAXIMUM GRADIENT (percent)	MAXIMUM SUPER-ELEVATION (ft./ft.)	ALTERNATIVES USED
URBAN ROADWAY	12	10	6	14	50	6	.06	3A, 3B
URBAN MINOR ARTERIAL	11	4	4	0	45	6	.06	4A, 4B, 5, 6A 6B, 6C, 6D, 6E 7A, 7B

Intersections for all build alternatives were designed to operate at a minimum Level of Service of D and roadways were designed to accommodate 1,700 vph.

C. Project Termini

C.1 Southern Project Terminus

The Mixmaster/Governor Street intersection is the logical southern terminus of the project for all of the proposed alternatives. This at-grade intersection has a signal and will be widened to six lanes. A four way intersection is required for Alternatives 3A, 3B, 4A, 4B, 6A, 6B, 6C, 7A, and 7B. A three way intersection has been designed for the remaining Alternatives.

A comment was made at the public scoping meeting that traffic exiting Interstate 84 at the Mixmaster be routed onto Connecticut Boulevard instead of Governor Street. However, Connecticut Boulevard has been dismissed as a southern terminus for this project because of the extreme grade separation between Connecticut Boulevard and Governor Street and the lack of access from the Mixmaster interchange.

C.2 Northern Project Terminus

Bypass alternatives 3A, 4A, 6A, and 6D terminate in the vicinity of King Street and Route 5. Two intersection configurations in this area were considered: an at-grade intersection and a flyover. The at-grade intersection is signalized and the Bypass flares to five lanes to accommodate turning movements. Route 5 must be widened to six lanes near the intersection.

The flyover configuration, schematically illustrated in Figure 6, includes a 250 foot long bridge structure that rises over Main Street and the bypass to carry southbound traffic on Route 5 over the intersection. The two intersection options are compared in Table 8.

Building the flyover will cost an estimated $873,000 more than the at-grade intersection. Because the performance of both intersections is nearly identical, the additional construction cost, displacements, and stream crossing do not justify the flyover intersection. This intersection was therefore dropped from further consideration and the alternatives that terminate in this area incorporate an at-grade intersection.

TABLE 8

IMPACT AND DESIGN COMPARISON OF THE
AT-GRADE AND FLYOVER INTERSECTIONS

ITEM	AT-GRADE INTERSECTION	FLYOVER INTERSECTION
Structures Taken	2	5
Level of Service	D	D
Delay Time	35	34
Volume/Capacity Ratio (second/vehicle)	0.86	0.96
Stream Crossings	0	1
Visual Impact	Low	High

INTERSECTION OPTION WITH FLYOVER

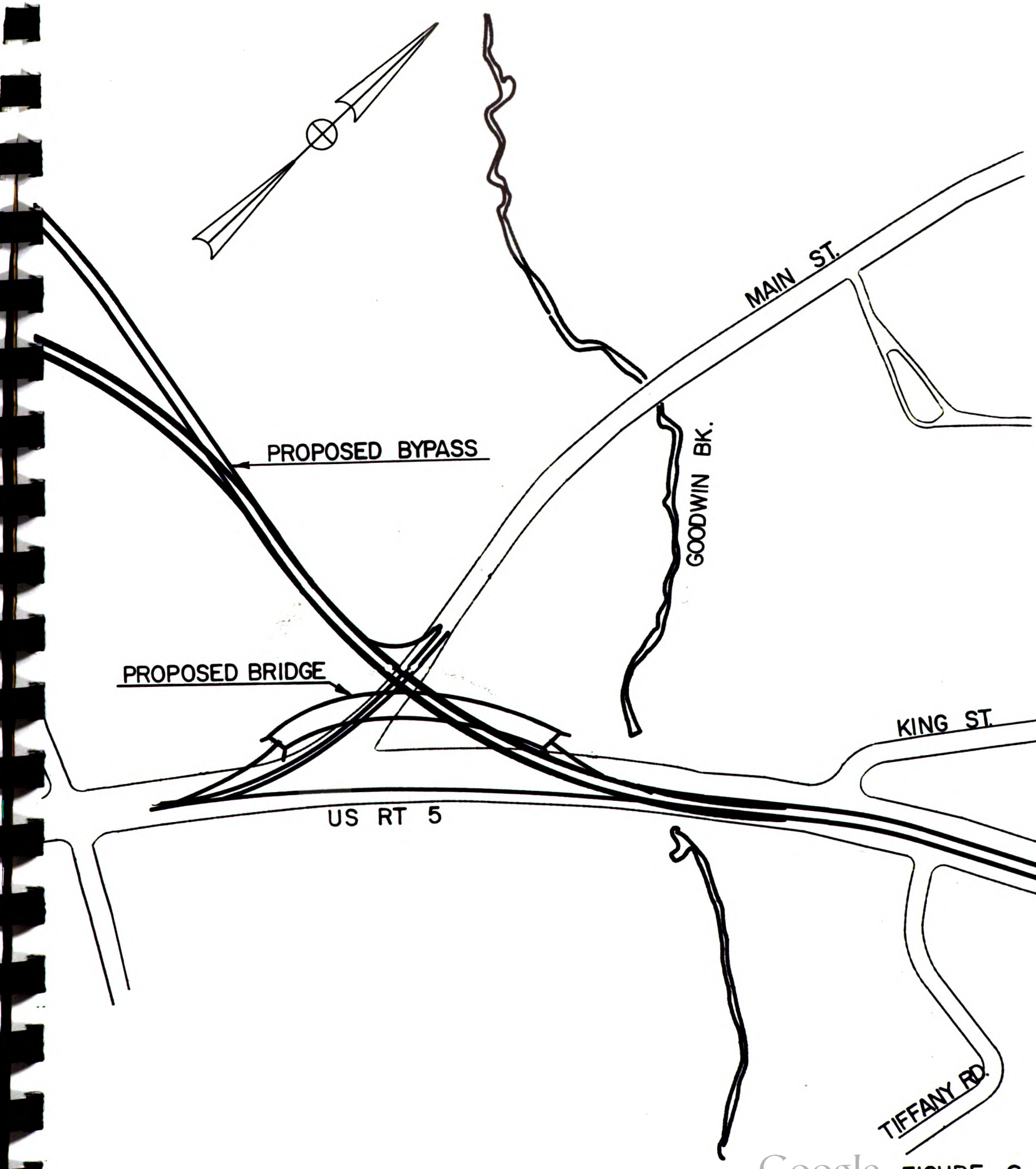


FIGURE 6

D. Social and Environmental Constraints

The major environmental factors which influenced the development of alternatives are wetland and floodplain impacts, residential and commercial displacements and noise impacts. The land bounded by the flood control dike, the Connecticut River and the 34 foot contour is within the 100 year floodplain. The loss of floodplain storage by the placement of fill for roadbed is a stated concern of the Connecticut DEP. Essentially, all of that same area and the land within the interior of the dike is regulated wetland which is considered high quality wildlife habitat by natural resource agencies.

Residential and commercial development in the project area also affected alternatives development. The entire project area east of the Connecticut River floodplain is quite intensely developed, and alternatives in proximity to those areas result in varying degrees of noise impacts and displacements.

V. PRELIMINARY ALTERNATIVES STUDIED

This section describes the preliminary alternatives that have been developed as possible solutions to the traffic capacity problems in the Prospect Street area. As noted previously, there are six basic alternatives consisting of the following:

A. Do Nothing
B. Transportation System Management (TSM)
C. Bypass Alignments
D. Widen Prospect Street
E. Combinations (Bypass and Widen Prospect Street)
F. Railroad Viaduct Alignment

A. Do Nothing: Alternative 1

Under the Do Nothing Alternative, there would be no change to the existing roadway network other than normal maintenance.

B. Transportation System Management (TSM): Alternative 2

The TSM alternative attempts to utilize existing transportation facilities more efficiently through traffic engineering and operational improvements, improving public transit, restructuring parking and work schedules, and encouraging ride-sharing programs to meet the project's design goals. Reducing traffic volumes through TSM strategies in turn reduces the need and impact of roadway improvements. The potential traffic reduction from TSM strategies is discussed below.

The ConnDOT Statewide Transit Study (Connecticut Department of Transportation, anticipated in October, 1990) suggests a two level approach to reduce traffic: 1.) strategies that encourage high occupant vehicle use with a peak commuter hour occupancy goal of 1.19 persons/vehicle, and 2.) financial incentives and disincentives with a peak commuter hour occupancy goal of 1.27 persons/vehicle. Examples of strategies for each level are listed in Table 9. The first level includes strategies that are the least severe and easiest to implement. If implemented, these strategies are expected to reduce traffic volume by approximately 5%. The second level of TSM strategies builds upon Level I by attempting to indirectly raise the cost of single occupant auto transportation. With Level I strategies in place, Level II strategies are estimated to reduce vehicle volumes by an additional 9%. Level II strategies require more effort and greater commitment from state transportation officials, government officials, and employers.

Levels I and II, outlined in the Statewide Transit Study (expected to be published in October, 1990) in conjunction with physical and operational improvements, comprise the TSM options contained in this report. The projected design year traffic volumes after implementation of Levels I and II are listed in Table 6.

The required physical improvements for the TSM alternatives are based on a worst case scenario which assumes that traffic will be redistributed from the Prospect Street to the Governor/Main Street route, but that overall traffic volumes will not be reduced. These traffic volumes are reported in the "No Traffic Reduction" column in Table 6 and are 5 percent higher than the volumes developed for the Level I TSM alternative.

TABLE 9

APPROACHES TO REDUCING SINGLE OCCUPANT VEHICLES

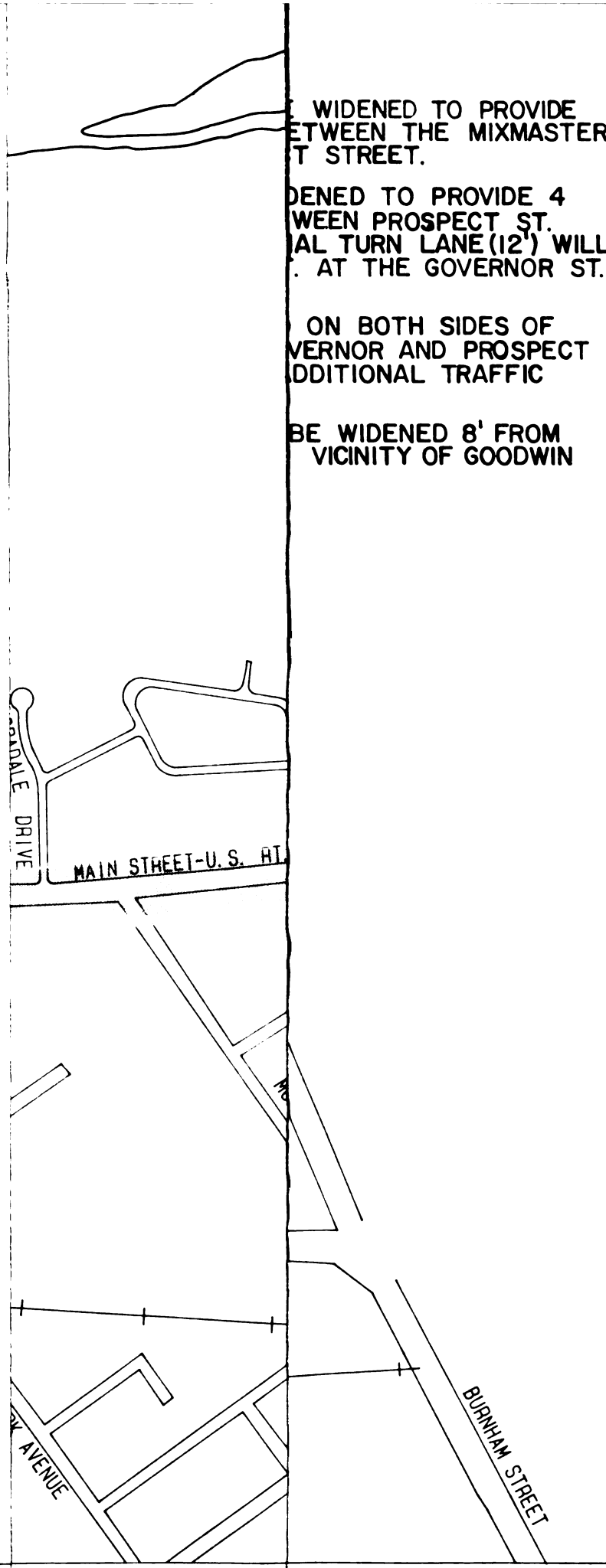
Level I: Strategies to Encourage High Occupant Vehicle Use
Transit shelters and pedestrian walkways
Jitney services
Coordinated transit fares and schedules
Improve reliability of existing transit systems
Variable transit routes
Demand responsive transit systems (subscription buses)
Flex-time
Computer matching for ridesharing
Preferential parking for high occupant vehicles
Company vehicles for errands, ride home when working late
Employer provided vanpool
Bus traffic signal preemption
Level II: Incentives and Disincentives
Reduce transit fares
Employee bonuses for ridesharing
Employee transit subsidies
Reduce parking fees for high occupant vehicles
Increase parking fees for single occupant vehicles

Source: ConnDOT Statewide Transit System Study, (expected to be published in October, 1990).

DUA1:[J8739480]ITDCMT.68

Four additional lanes are needed on Governor Street from the Mixmaster to Main Street (Figure 7) under the worst case TSM alternative. On Main Street between Governor and Prospect Street, two additional lanes are required. Removing curbside parking and the median on Main Street could provide enough space for the two lanes. North of Prospect Street, space for two additional lanes on Main Street can be obtained by reducing the existing median and widening the existing roadway 8 feet. The estimated cost of these physical TSM improvements is $3.7 million. Additional TSM costs not directly associated with roadway and intersection improvements may include: loss of local business, the cost of additional parking facilities, and the cost of public information campaigns to encourage ridesharing.

For evaluation purposes, the required number of takings for three widening scenarios were determined: 1.) widening Governor Street two additional lanes entirely on the north side of the existing roadway, 2.) two additional lanes entirely on the south side of existing Governor Street, or 3.) adding one lane to either side of the existing street. Adding two lanes to the south of Governor Street proved to be the scenario with the least number of impacted dwelling units and in this report it is assumed that widening would occur on the south side.



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STATE PROJECT NO 42-239
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EAST HARTFORD CONNECTICUT

TRANSPORTATION SYSTEM MANAGEMENT ALTERNATIVE 2

FIGURE 7 | MAY 1990

EMJ/McFARLAND-JOHNSON ENGINEERS, INC.

C. Bypass Alternatives

C.1 Dike Alignment: Alternative 3

The Alternative 3 alignments provide for a new two lane bypass which will utilize the East Hartford Dike for part or all of its length. Where the alignment follows the dike it would be located on the eastern (interior) side and would in part use the dike for support, although additional fill would be required.

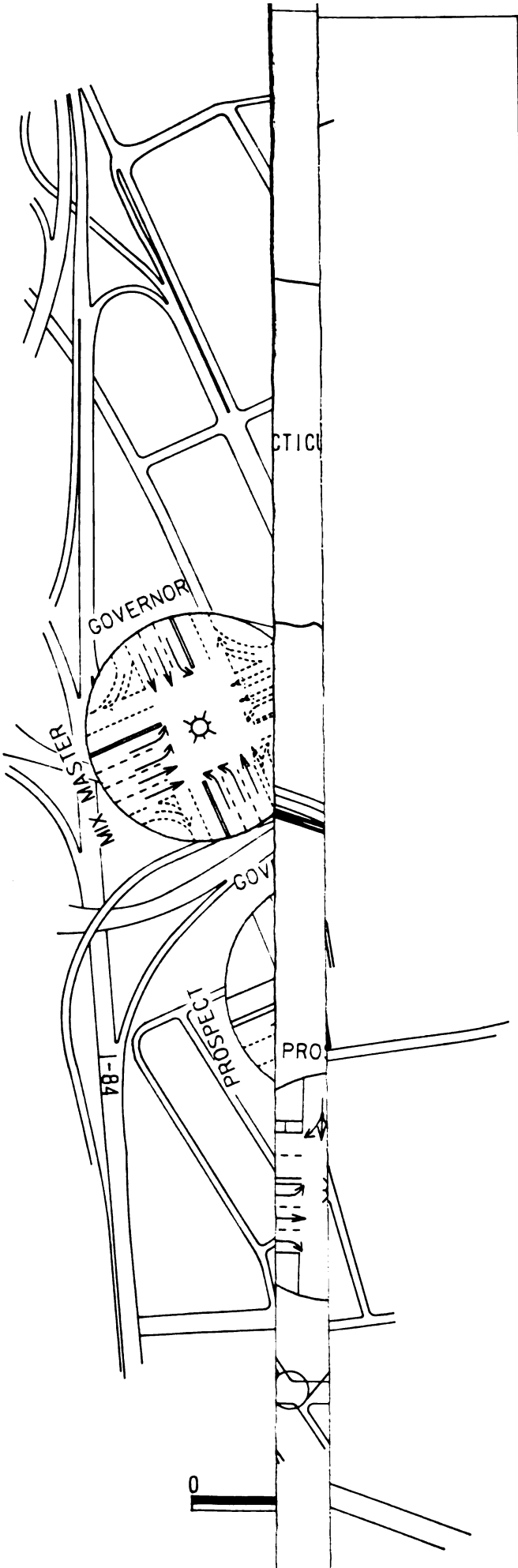
The southern terminus of this alternative is the Mixmaster interchange. Alternative 3A extends north of the dike and terminates in the vicinity of the Rt. 5/King Street intersection. Alternative 3B follows the entire length of the dike and terminates at Main Street between Floradale Drive and Greene Terrace. These alternatives allow the roadway to be built away from residential areas. Use of the dike for structural support also reduces the amount of fill required for the roadway and thus minimizes the impact on the wetland. However, the engineering feasibility of locating the roadway on the dike will be confirmed pending a detailed geotechnical investigation. All of these alternatives require a 220 foot long bridge over the Conrail railroad located between the Mixmaster and the East Hartford Dike.

Alternative 3A - This alternative extends 1,800 feet northward from the Governor/Mixmaster intersection, crosses over the railroad on a bridge structure, travels 3,600 feet along the dike, and continues north past the dike 2,400 feet through wetlands and terminates at the King Street/Rt. 5 intersection (Figure 8). The alignment terminates with a four way, at-grade, signalized intersection. The estimated cost is $16.9 million.

The horizontal alignment of Alternative 3.A.1 is identical to that of Alternative 3A but includes a 730 foot long bridge structure over wetlands located between the Mixmaster and the railroad and a 2,180 foot long viaduct over the wetlands between the dike and the northern terminus in order to minimize wetland impacts. The estimated cost of 3A.1 is $38.8 million.

Alternative 3B - This alternative extends northward 1,800 feet from the Governor/Mixmaster intersection, travels 5,550 feet along the entire length of the dike, and terminates in a T-intersection configuration with Main Street-U.S. 5 (Figure 9). The estimated cost is $13.9 million.

Alternative 3B.1 follows the same alignment but includes a bridge that is 730 feet in length over the wetland south of the railroad to minimize wetland impacts. The estimated cost of Alternative 3B.1 is $18.6 million.



MIXMASTER INTERCHANGE

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BYPASS ALTERNATIVE 3A AND 3A.1

FIGURE 8 | MAY 1990

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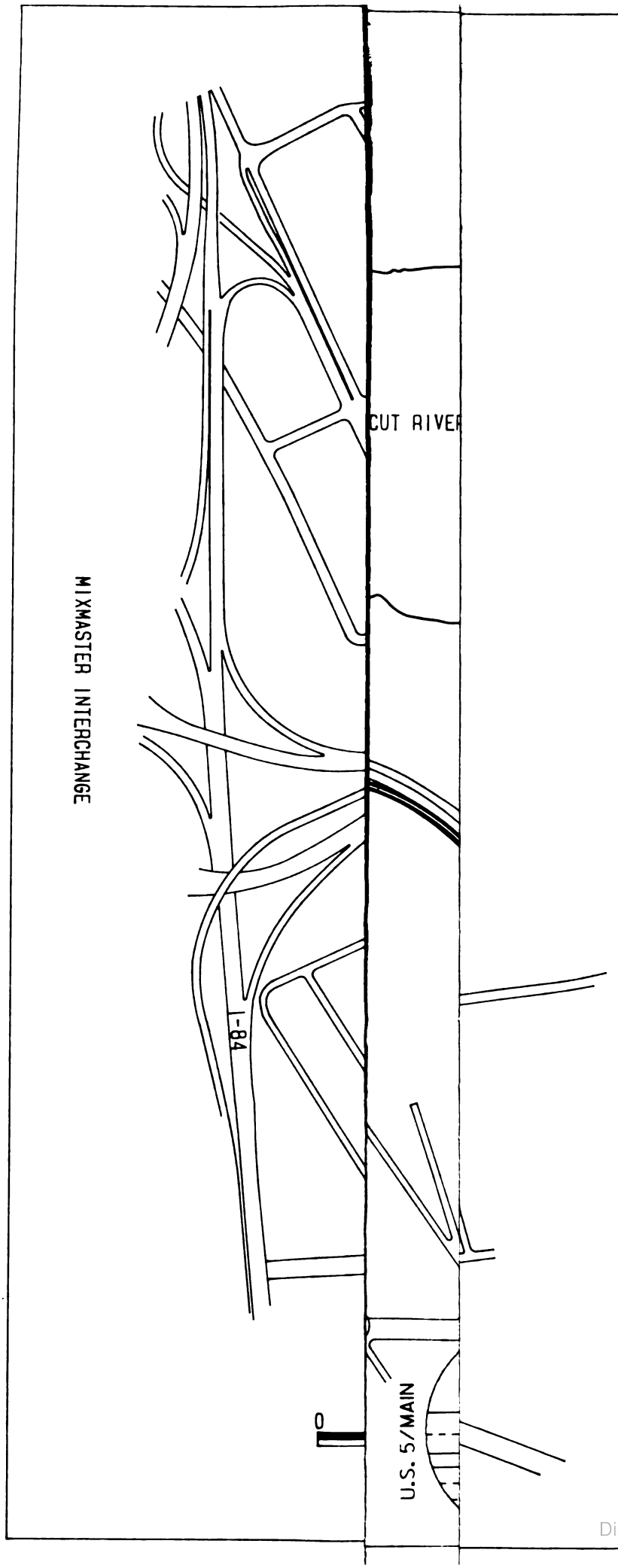

PROSPECT STREET BYPASS
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EAST HARTFORD CONNECTICUT

BYPASS ALTERNATIVE 3B AND 3B.1

FIGURE 9 | MAY 1990

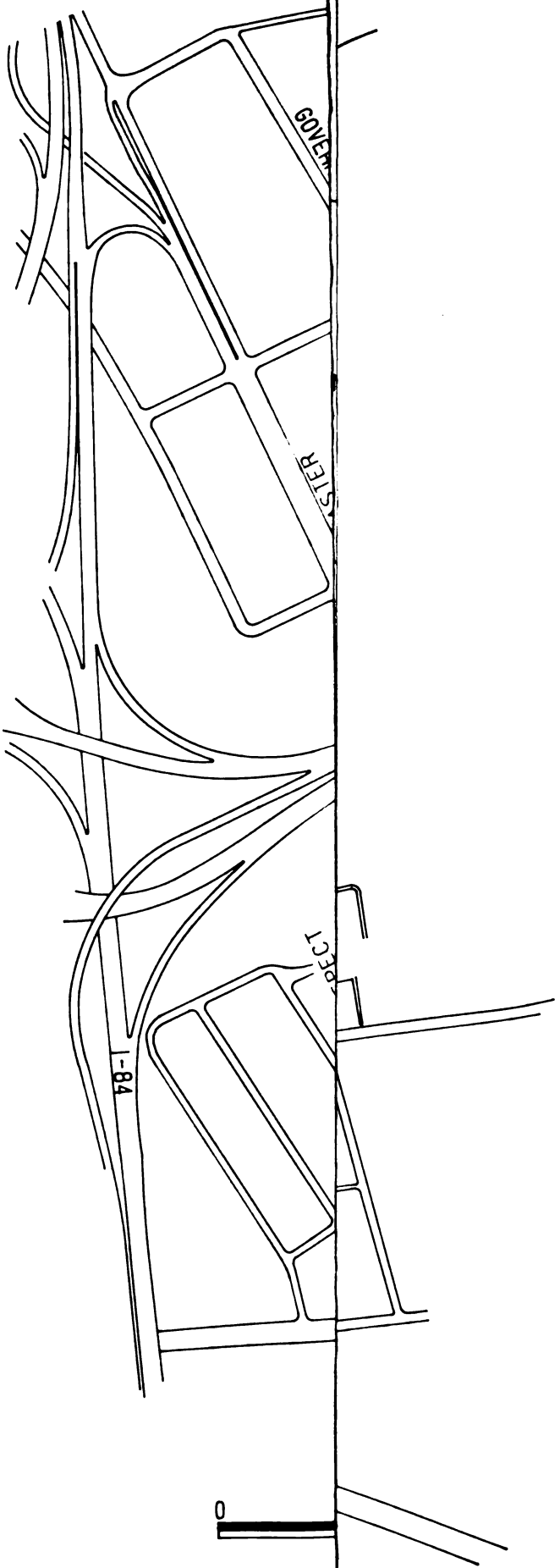
EMJ/McFARLAND-JOHNSON ENGINEERS, INC.

C.2 Wetland Edge Alignment: Alternative 4

Alternative 4 consists of a new bypass which proceeds northward from the Mixmaster interchange along the eastern perimeter of the wetland and Connecticut River floodplain.

Alternative 4A - Alternative 4A extends northward from the Governor/Mixmaster intersection for a total distance of approximately 7,400 feet, generally following the eastern margin of the wetland. The alignment terminates in the vicinity of King Street and Rt. 5 with an at-grade intersection (Figure 10). This Alternative costs an estimated $10.4 million. Alternative 4A.1 follows the same alignment but reduces wetland impacts by incorporating a 750 foot long bridge over the wetland south of the railroad. Alternative 4A.1 is estimated to cost $15.7 million.

Alternative 4B - Alternative 4B follows the same initial alignment as Alternative 4A but turns east and follows the dike 860 feet, terminating in a T-intersection with Main Street/Rt 5 (Figure 11). The estimated cost of Alternative 4B is $9.8 million. Alternative 4B.1 follows the same horizonal alignment as 4B, but includes an additional bridge 750 feet long over the wetlands south of the railroad to mitigate wetland impacts. The estimated cost is $15.0 million.



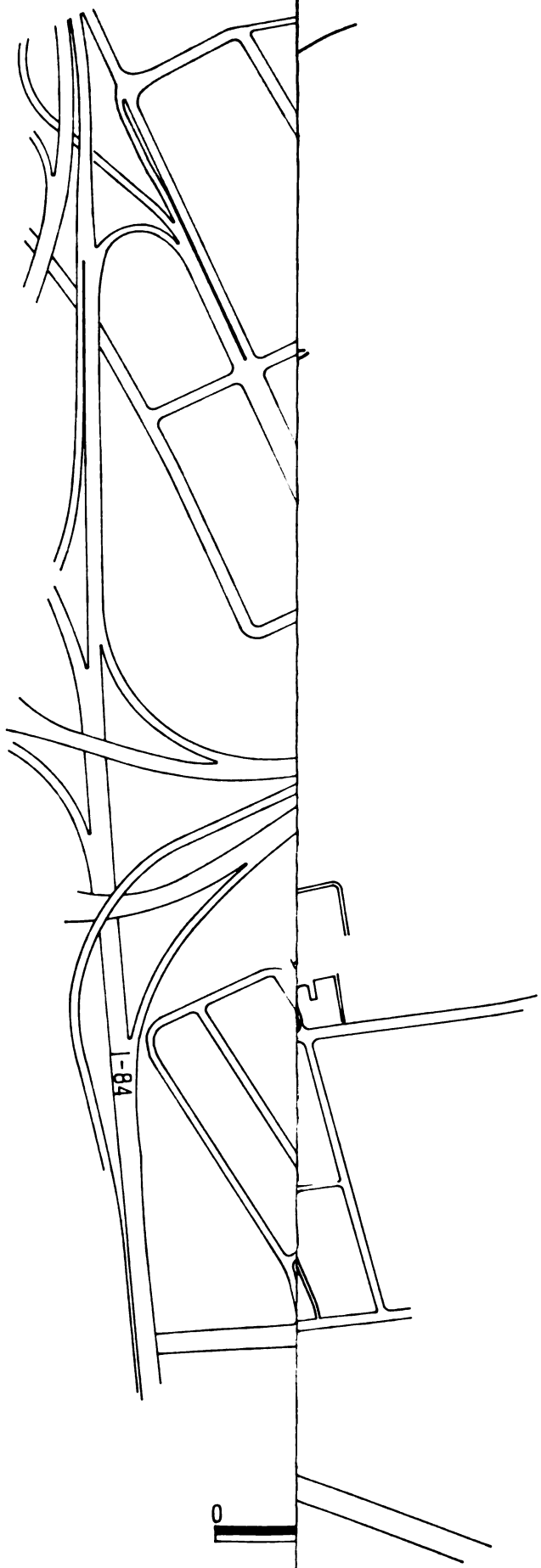
MIXMASTER INTERCHANGE

PROSPECT STREET BYPASS
STATE PROJECT NO 42-239
FED. PROJECT NO IXAF-63(1-5)
EAST HARTFORD CONNECTICUT

BYPASS ALTERNATIVE 4A AND 4A.1

FIGURE 10 | MAY 1990

EMJ/McFARLAND-JOHNSON ENGINEERS, INC.



PROSPECT STREET BYPASS
STATE PROJECT NO 42-239
FED. PROJECT NO IXAF-63(1-5)
EAST HARTFORD CONNECTICUT

BYPASS ALTERNATIVE 4B AND 4B.1

FIGURE 11 | MAY 1990

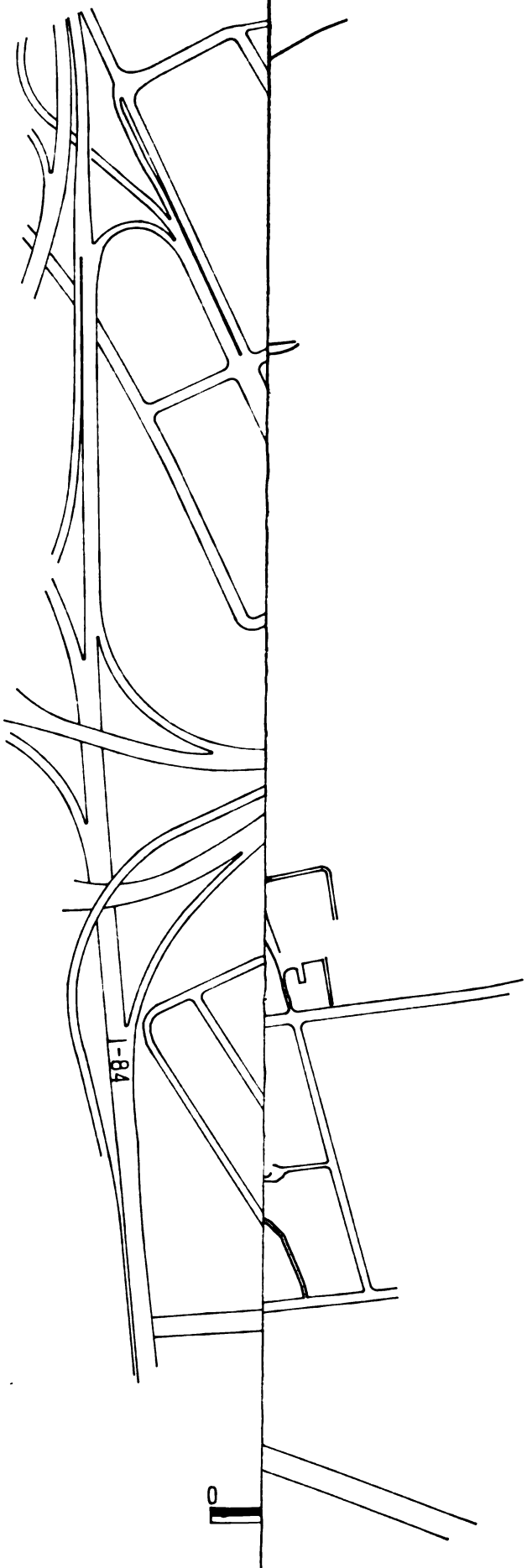
EMJ/McFARLAND-JOHNSON ENGINEERS, INC.

D. WIDEN PROSPECT STREET: Alternative 5

This alternative provides for the widening of Prospect Street from the Governor Street/Prospect Street intersection to the Main Street/Prospect Street intersection (Figure 12). It is classified as a minor urban arterial roadway because of its proximity to residential areas. The widening alternative is designed as a low speed, four lane facility with an at-grade railroad crossing.

Because of residential and commercial development along Prospect Street, displacement of homes or businesses is unavoidable. The number of displacements depends upon the final horizontal alignment selected. For evaluation purposes, the required number of takings for three widening scenarios were determined: 1.) two additional lanes entirely on the north side of the existing roadway, 2.) two additional lanes entirely on the south side of existing Prospect Street, or 3.) adding one lane to either side of the existing street. Adding two lanes to the south of Prospect Street proved to be the scenario with the least number of impacted dwelling units and in this report it is assumed that widening would occur on the south side (a dwelling unit is equivalent to a household unit occupied by a family).

Turning movements and traffic storage requirements necessitate the widening of Governor Street to six lanes between the Mixmaster exit and Prospect Street for this Alternative. Prospect Street would also be widened to five lanes as it approaches Main Street/Rt. 5 to accommodate turning and storage capacity requirements. The estimated cost of Alternative 5 is $7.5 million.



PROSPECT STREET BYPASS
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EAST HARTFORD CONNECTICUT

WIDEN PROSPECT ALTERNATIVE 5

FIGURE 12 | MAY 1990

EMJ/McFARLAND-JOHNSON ENGINEERS, INC.

E. COMBINATION ALTERNATIVE (Alternative 6)

Alternative 6 includes options that combine a partial bypass on new alignment along the wetland edge with the widening of Prospect Street for a part of its length. These alternatives are classified as minor urban arterial roadways because of their proximity to residential areas. All of these alignments were developed as low speed facilities with a four lane typical roadway section. At this point in the analysis, it has not yet been determined how connections between these alternatives and existing roadways, including Prospect Street, would be treated (i.e., if cul-de-sacs or intersections would exist).

Alternative 6A - Alternative 6A extends northward from the intersection of Governor/Mixmaster on new alignment and joins existing Prospect Street in the vicinity of the existing railroad crossing (Figure 13). An at-grade crossing would be maintained with this Alternatve. The alignment then follows Prospect Street which would be widened between the railroad and Case Road. At Case Road, the alignment diverges from Prospect Street and continues north along the eastern edge of the wetlands, crossing the dike and following same alignment as Alternative 4A. The alignment terminates in the vicinity of Main Street/Rt. 5 with a four way, at-grade intersection. The portion of Prospect Street that would be widened provides partial access to downtown East Hartford. The estimated cost of Alternative 6A is $6.2 million. Alternative 6A.1 follows the same alignment but includes an additional 600 foot long bridge over the wetland south of the railroad to minimize wetland impacts. The estimated cost is $11.3 million.

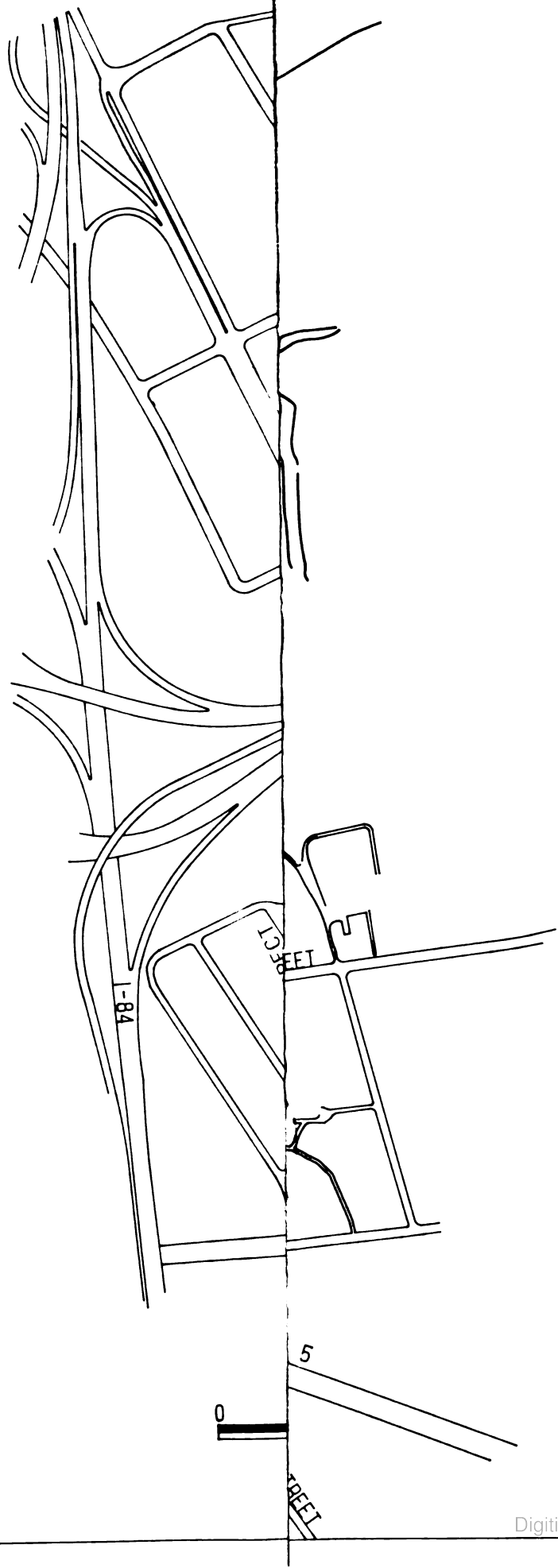
Alternative 6B - This alternative begins at the Governor/Mixmaster exit and follows the same route as Alternative 6A, but turns east at the dike and terminates in a T-intersection with Main Street/Rt. 5 (Figure 14). The portion of Prospect Street that

would be widened maintains partial access to the East Hartford downtown area. The estimated cost of Alternative 6B is $5.4 million. Alternative 6B.1 is identical but includes a bridge over the wetland south of the railroad to mitigate wetland impacts. The cost of Alternative 6B.1 is estimated to be $10.5 million.

Alternative 6C - Alternative 6C is identical to Alternatives 6A and 6B from its southern terminus to Case Road. From this point, Alternative 6C includes a widened Prospect Street from Case Road to its terminus at the existing intersection of Prospect Street and Main Street (Figure 15). Starting Alternative 6C at the Governor/Mixmaster intersection reduces noise and displacement impacts in the residential area south of the railroad compared to Alternative 5, widen Prospect Street. The estimated cost of Alternative 6C is $ 8.1 million. Alternative 6C.1 is identical but includes a bridge over the wetland south of the railroad to mitigate wetland impacts. The estimated cost is $13.6 million.

Alternative 6D - Alternative 6D includes the widening of existing Prospect Street from Governor Street to Case Road and then follows the eastern edge of the wetlands along the same new alignment as Alternatives 4A and 6A, terminating with an at-grade intersection in the vicinity of King Street and Rt. 5 (Figure 16). Storage capacity and traffic volumes require that Governor Street be widened to six lanes between the Mixmaster exit and Prospect Street. The estimated cost of this alternative is $7.9 million.

Alternative 6E - Alternative 6E follows the same alignment as Alternative 6D from its southern terminus, then along Prospect Street to the vicinity of Case Road. At Case Road this Alternative diverges from existing Prospect Street and proceeds on new alignment along the eastern edge of the wetlands to the East Hartford Dike, where it turns east and terminates in a T-intersection at Main Street/Rt. 5 (Figure 17). Storage capacity and traffic volumes require the widening of Governor Street to six lanes between the Mixmaster exit and Prospect Street. The estimated cost of this alternative is $6.0 million.



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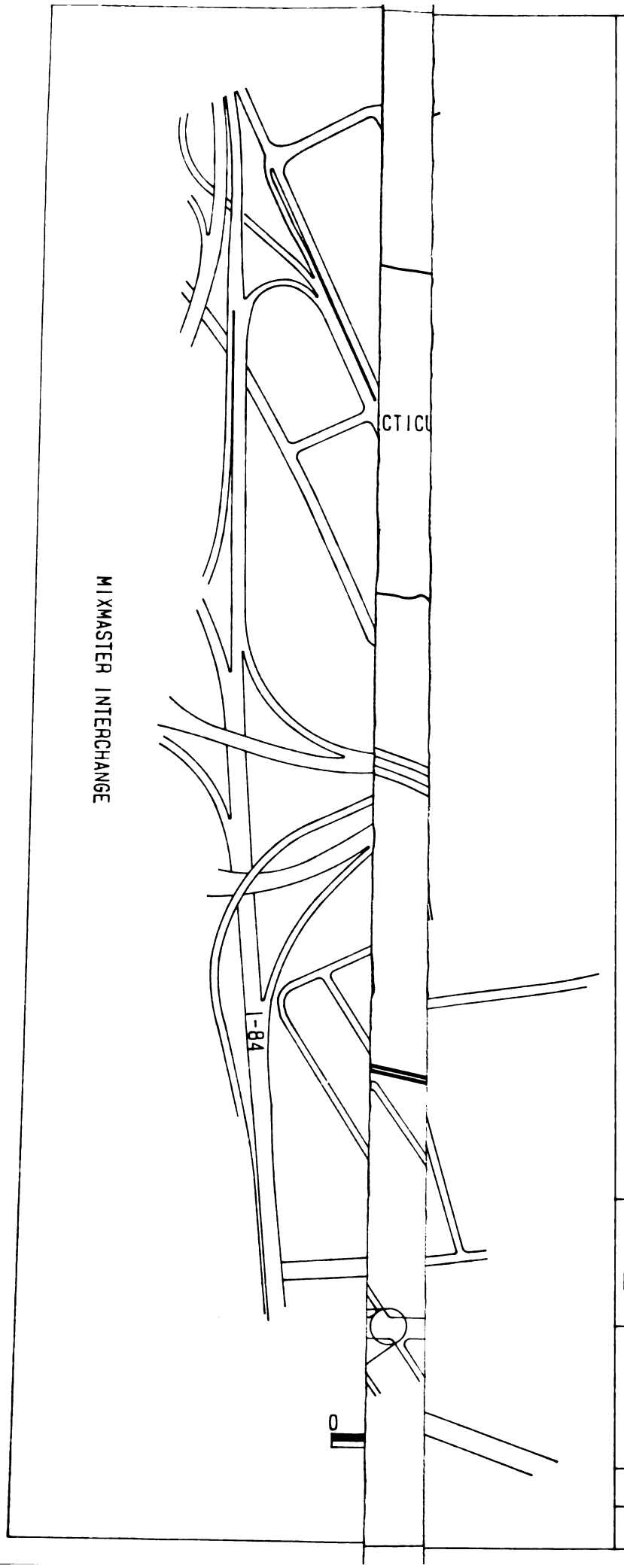
COMBINATION ALTERNATIVE 6A AND 6A.1

FIGURE 13 | MAY 1990

EMJ/McFARLAND-JOHNSON ENGINEERS, INC.



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COMBINATION ALTERNATIVE 6B AND 6B.1

FIGURE 14 | MAY 1990

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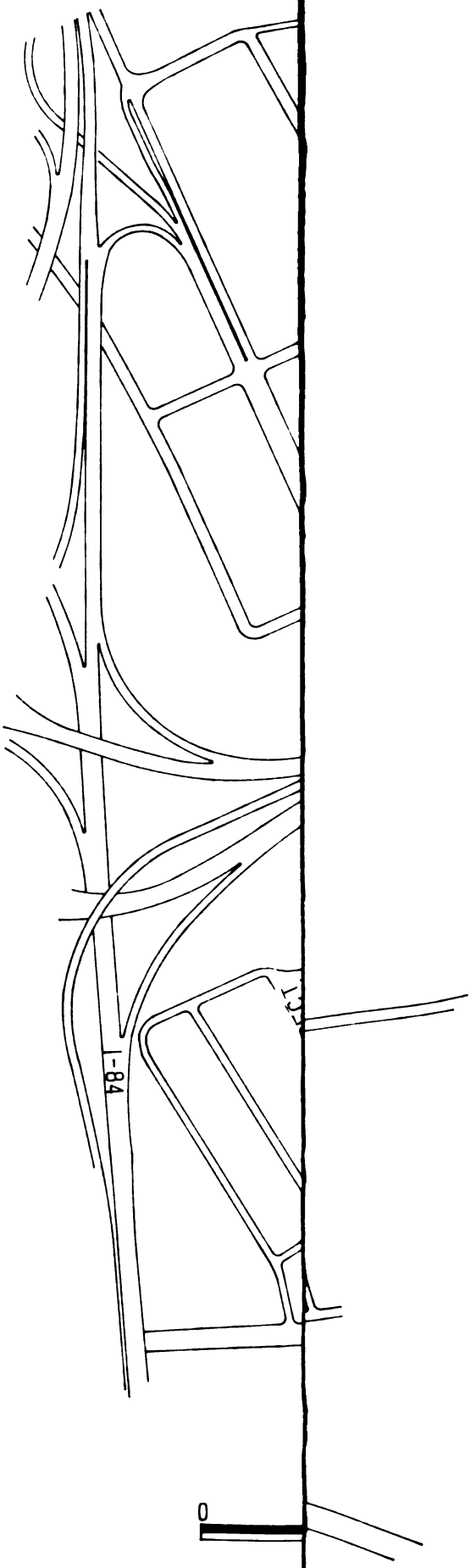

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COMBINATION ALTERNATIVE 6C AND 6C.1

FIGURE 15 | MAY 1990

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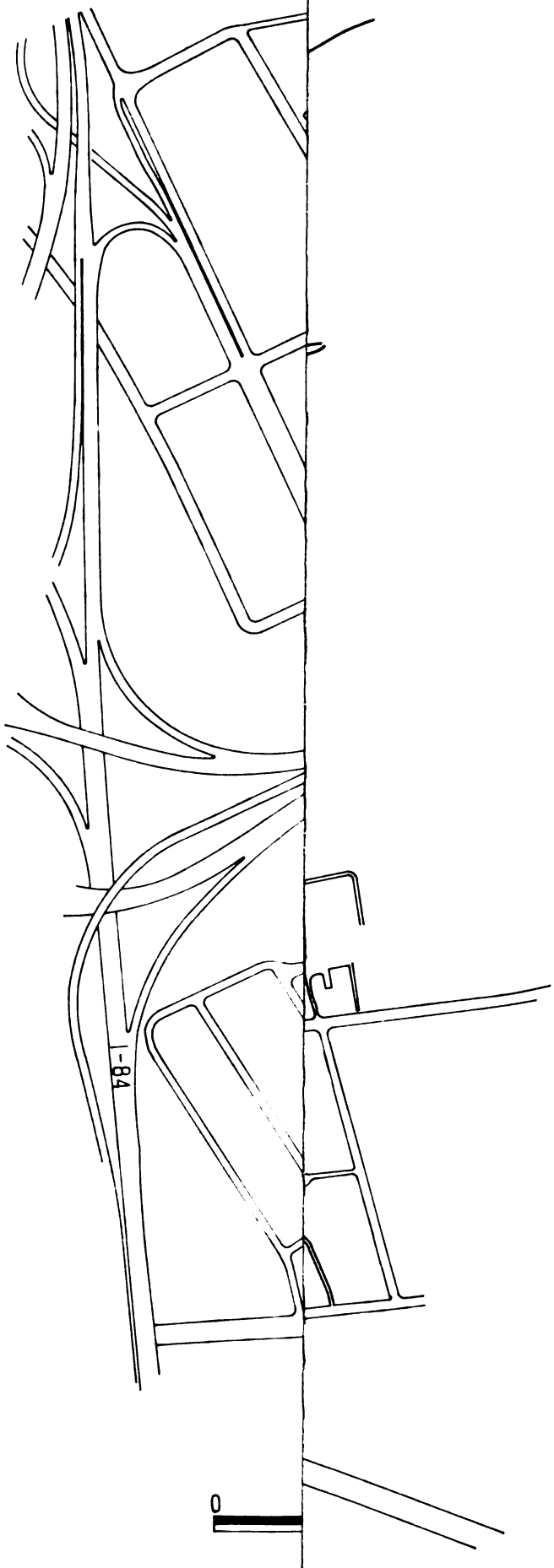

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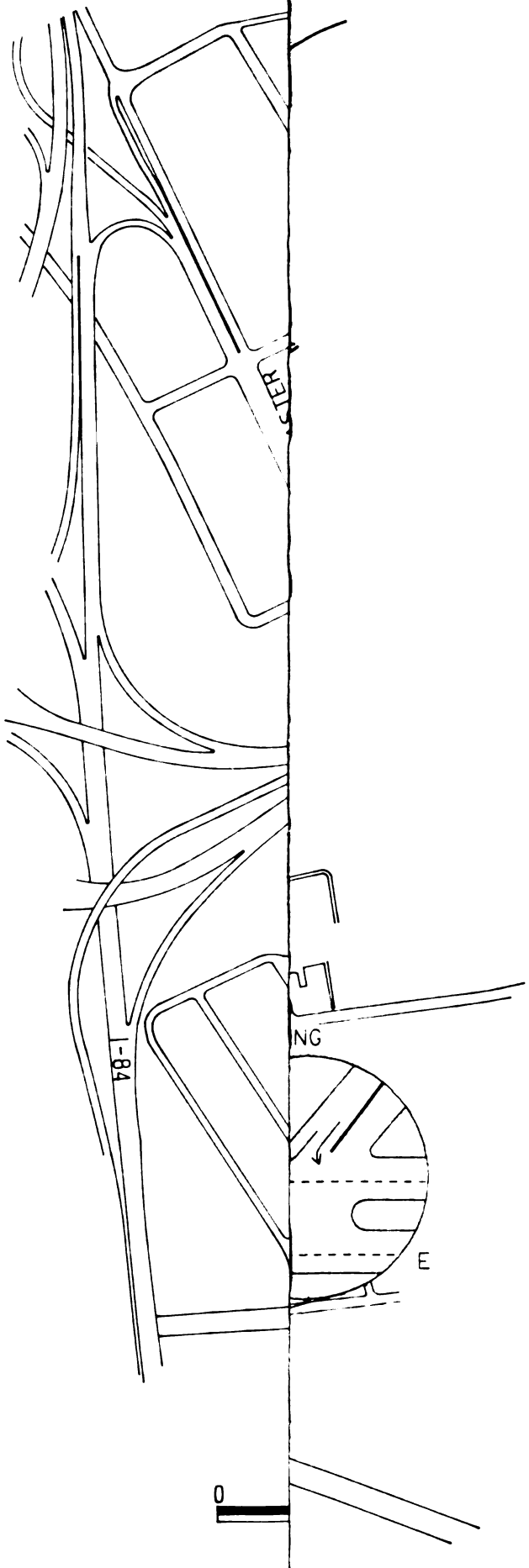
EAST HARTFORD CONNECTICUT

COMBINATION ALTERNATIVE 6D

FIGURE 16 | MAY 1990

EMJ/McFARLAND-JOHNSON ENGINEERS, INC.



PROSPECT STREET BYPASS
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EAST HARTFORD CONNECTICUT

COMBINATION ALTERNATIVE 6E

FIGURE 17 | MAY 1990

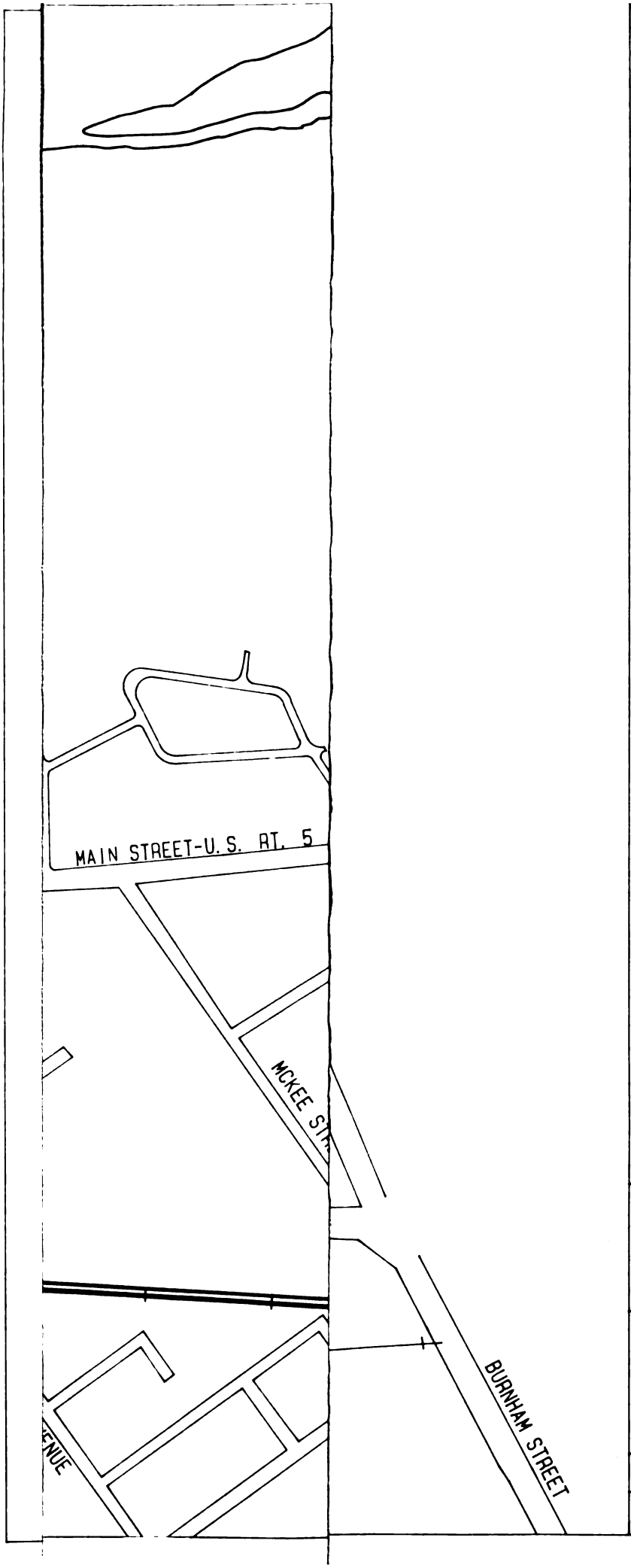
EMJ/McFARLAND-JOHNSON ENGINEERS, INC.

F. RAILROAD VIADUCT ALTERNATIVE (Alternative 7)

This alternative consists of a continuous viaduct over the existing Conrail railroad tracks (Figure 18). The alignment could end at Park Avenue or continue to Goodwin Street/Rt. 5. Residential noise impacts would be minimal because the railroad tracks pass through a predominately industrial area. The roadway typical section was designed to be 40 feet wide and would accommodate a service road along the railroad tracks. The required clearance for the viaduct (from top of the rail to the bottom of the structure) over the railroad is 22.5 feet. A full preliminary analysis was not done on Alternative 7 because of the high estimated structure cost.

Alternative 7A - This alternative begins at the intersection of Governor/Mixmaster, proceeds in a northerly direction to the railroad and then follows the existing Conrail railroad tracks on a continuous viaduct for approximately 8,500 feet (Figure 18). The alignment terminates in the vicinity of Goodwin Street/Rt. 5. The estimated cost of Alternative 7A is $86.2 million.

Alternative 7B - Alternative 7B follows a similar path, but ends at Park Avenue. This alternative is estimated to cost $47.4 million.



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EAST HARTFORD CONNECTICUT

RAILROAD VIADUCT ALTERNATIVE 7A AND 7B

FIGURE 18 | MAY 1990

EMJ/McFARLAND-JOHNSON ENGINEERS, INC.

VI. COMPARISON OF ALTERNATIVES

This section provides a comparison of the preliminary alternatives from engineering, social, and environmental perspectives. Information contained in this section is summarized in Table 11 on Page 46.

A. Traffic Analysis

A traffic analysis which considered Level of Service, volume/capacity ratio and intersection capacity was conducted for all of the alternatives for the design year 2010 and is summarized in Table 10.

The results of the analysis suggest two main conclusions. The first relates to the nature of the traffic problems in the Prospect Street area. As shown in Table 10, under the Do Nothing Alternative (Alternative 1) all three of the major intersections in the southern part of the project area (Mixmaster/Governor, Governor/Prospect, and Prospect/Main-Rt. 5) will be operating over capacity in the design year. However, the three intersections in the northern part of the project area (Rt. 5/ Main, Rt. 5/King, and Rt. 5/Tiffany) will be operating near or under capacity even under No-Build conditions. This demonstrates that the traffic congestion problems are in East Hartford itself.

If the projected intersection capacities for all other alternatives (2-6) are examined, it can be seen that the current problem intersections in the southern portion of the project area can be improved to operate near or under capacity, and that the acceptable operating conditions of the northern project intersections will be maintained. This analysis demonstrates that a solution to traffic problems in East Hartford can be accomplished by correcting capacity problems within the currently contemplated project area and prevent congestion further north along the Hartford-Windsor corridor.

TABLE 10

DESIGN YEAR INTERSECTION AND TRAFFIC ANALYSIS

ALTERNATIVES	Mix Master/ Governor	Governor/ Prospect	Prospect/ Main-US5	Bypass/ Main-US5	US5/ Main	US5/ King	US5/King/ Tiffany	US5/ Tiffany
L.O.S./Delay Time (sec/vehicles)								
ALT 1	F/>60	F/>60	F/>60	---	---	---	---	---
ALT 2	D/27	E/40	E/57	---	---	---	---	---
ALT 3A	D/39	D/30	D/27	D/35	---	---	---	---
ALT 3B	D/39	D/30	D/27	C/24	---	---	---	---
ALT 4A	D/39	D/30	D/27	D/35	---	---	---	---
ALT 4B	D/39	D/30	D/27	C/24	---	---	---	---
ALT 5	D/31	D/36	D/38	---	---	---	---	---
ALT 6A	D/39	D/30	D/27	D/35	---	---	---	---
ALT 6B	D/39	D/30	D/27	C/24	---	---	---	---
ALT 6C	D/39	D/30	D/38	---	---	---	---	---
ALT 6D	D/31	D/36	D/27	D/35	---	---	---	---
ALT 6E	D/31	D/36	D/27	C/24	---	---	---	---
Volume Capacity Ratio								
ALT 1	>1.3	>1.3	>1.3	---	---	---	---	---
ALT 2	1.05	0.94	1.04	---	---	---	---	---
ALT 3A	0.87	0.86	0.94	0.86	---	---	---	---
ALT 3B	0.87	0.86	0.94	0.91	---	---	---	---
ALT 4A	0.87	0.86	0.94	0.86	---	---	---	---
ALT 4B	0.87	0.86	0.94	0.91	---	---	---	---
ALT 5	1.24	1.20	0.98	---	---	---	---	---
ALT 6A	0.87	0.86	0.94	0.86	---	---	---	---
ALT 6B	0.87	0.86	0.94	0.91	---	---	---	---
ALT 6C	0.87	0.86	0.98	---	---	---	---	---
ALT 6D	1.24	1.20	0.94	0.86	---	---	---	---
ALT 6E	1.24	1.20	0.94	0.91	---	---	---	---
Intersection Capacity								
ALT 1	Over	Over	Over	---	Near	Under	---	Under
ALT 2	Under	Under	Under	---	Near	Under	---	Under
ALT 3A	Near	Under	Near	Under	---	---	Near	---
ALT 3B	Near	Under	Near	Under	Near	Under	---	Under
ALT 4A	Near	Under	Near	Under	---	---	Near	---
ALT 4B	Near	Under	Near	Under	Near	Under	---	Under
Alt 5	Under	Under	Near	---	Near	Under	---	Under
ALT 6A	Near	Under	Near	Under	---	---	Near	---
ALT 6B	Near	Under	Near	Under	Near	Under	---	Under
ALT 6C	Near	Under	Near	---	Near	Under	---	Under
ALT 6D	Under	Under	Near	Under	---	---	Near	---
ALT 6E	Under	Under	Near	Under	Near	Under	---	Under

The design objectives for the project in terms of operational criteria are to provide a level of service D at project intersections. Table 10 indicates that the Do Nothing Alternative (Alternative 1) clearly could not satisfy the project objectives. The projected level of service at major project intersections under Alternative 1 is F with associated delay times greater than 60 seconds. The volume/capacity ratios at the intersections will be greater than 1.3 and in terms of traffic volumes the major intersections will be operating over capacity.

The TSM alternative (Alternative 2) will provide a Level of Service D at the Mixmaster/Governor Street intersection and a LOS E at the Governor/Prospect and Prospect/Main-Rt. 5 intersections. However, the volume/capacity ratios for both these intersections are projected to be close to 1.0 or less, and in terms of traffic volumes both intersections will be under capacity. Therefore, the TSM alternative effectively provides a LOS of D and thus can be further considered to satisfy the project objective.

Alternatives 3-6 all provide a LOS of D or better for all of the signalized intersections under consideration. While there are some differences in the dely times and volume/capacity ratios of each alternative, Alternatives 3-6 and their variations can all satisfy the project objectives.

B. Environmental and Social Considerations

Impacts to wetlands, floodplains, and wildlife habitat are the major areas of concern associated with the bypass alignments located in the Connecticut River Floodplain (Alternatives 3 and 4). Because of their distance from existing residential areas, these Alternatives reduce noise and air pollution impacts and residential and commercial displacements, but generally increase costs.

Moving the proposed alignments closer to residential areas reduces impacts on wetlands and the Connecticut River floodplain, as well as on a major visual and open space resource for East Hartford. Alignments close to residential areas have reduced construction costs, but increased noise and air pollution impacts and residential and business displacements.

TABLE 11

SUMMARY OF PROSPECT STREET PRELIMINARY ALTERNATIVES

ALTERNATIVE	NOISE IMPACTS(1)	ACQUISITIONS		KNOWN HISTORIC RESOURCES	WETLANDS IMPACTED (acres)	FLOODPLAINS IMPACTED (acres)	LENGTH OF PROPOSED PROJECT (miles)	ESTIMATED COST (millions of dollars)	DESIGN YEAR INTERSECTION LEVEL OF SERVICE
		DWELLING UNITS(2)	BUSINESSES						
DO NOTHING ALT. 1	0	0	0	-	0	-	-	0	F
TSM ALT. 2	0 (3)	28	1	-	0	-	1.8	3.7	F
BYPASS-DIKE ALT. 3A	22	-	1	-	19.7	28	1.8	16.9	D
ALT 3A.1	22	-	1	-	7.1	0	1.8	38.8	D
ALT. 3B	31	16	0	-	10.8	0	1.4	13.9	D
ALT 3B.1	31	16	0	-	8.3	0	1.4	18.6	D
BYPASS-WETLAND EDGE ALT. 4A	45	6	1	1	7.4	.9	1.8	10.4	D
ALT. 4A.1	45	6	1	1	6.3	.9	1.8	15.7	D
ALT. 4B	43	18	0	-	6.5	-	1.3	9.8	D
ALT. 4B.1	43	18	0	-	5.4	-	1.3	15.0	D
WIDEN PROSPECT ALT. 5	0 (3)	47	4	1	-	-	.9	7.5	D
COMBINATION ALTS. ALT. 6A	78	10	3	1	4.3	.9	1.8	6.2	D
ALT. 6A.1	78	10	3	1	3.3	0	1.8	11.3	D
ALT. 6B	72	22	2	1	3.5	-	1.3	5.4	D
ALT. 6B.1	72	22	2	1	2.5	-	1.3	10.5	D
ALT. 6C	0 (3)	47	4	1	2.3	-	1.0	8.1	D
ALT. 6C.1	0 (3)	47	4	1	1.3	-	1.0	13.6	D
ALT. 6D	96	11	2	1	2.1	.9	1.7	6.0	D
ATL. 6E	0 (3)	21	2	1	1.2	-	1.2	5.1	D
RR ALIGNMENTS ALT. 7A	45	1	0	0	.9	-	2.6	86.2	D
ALT. 7B	48	1	0	0	.9	-	1.4	47.4	D

1). Number of dwelling units that are impacted by noise levels in excess of 67 (dBA) Leq.
2). A dwelling unit is equivalent to a housing unit occupied by one family.
3). Assumes that trucks would not be allowed to use Prospect Street.

B-1. Wetlands and Floodplain

The dike alignment (Alternative 3) reduces wetland and floodplain impacts compared to an alignment that would proceed directly through the wetlands because of the partial use of the existing dike embankment for roadbed support. However, all variations of this Alternative still require the placement of some fill adjacent to the dike. The sections of these alignments not on the dike require new fill or a viaduct through the wetland areas. Using fill to support the roadway (Alternative 3A) would directly impact 19.7 acres of wetland and 28.0 acres of floodplain. Use of a viaduct in Alternative 3A.1 reduces the floodplain impact and the direct wetland impact to 7.1 acres. A viaduct also allows wildlife movement beneath the roadway.

Edge of Wetland, Widening Prospect Street, and Combination Alternatives (Alternatives 4, 5, and 6) greatly reduce wetland and floodplain impacts. These alternatives minimize their wetland impacts by skirting the wetland areas and/or utilizing viaduct structures whenever possible. Wetland areas directly impacted range from zero acres (Alternative 5) to 7.4 acres for Alternative 4A.1 (Table 11). Floodplain impacts for all of these alternatives are minor.

B.2 Social Impacts

Construction of an arterial roadway in an urban area rarely avoids social impacts. The most direct and significant of these impacts is the displacement of people and businesses in order to provide the necessary right-of-way. All Preliminary Alternatives were analyzed to determine the number of dwelling units and commercial establishments that would likely be displaced as a result of the project. A dwelling unit is equivalent to a housing unit occupied by a family. This information is summarized in Table 2.

Dwelling unit impacts were determined by lot size. A house lot impacted by a proposed alignment that did not meet the minimum lot area, as specified by East Hartford's zoning regulations, is considered to result in a total property acquisition. This assumption was applied only to main

buildings. Displacement of garages and other secondary buildings were not counted as lost dwelling units. Logically, the alternatives located apart from the residential areas (Alternatives 3 and 4) would result in the fewest property takings. Alternative 3A has the least impacts, displacing only one dwelling unit and one business. Correspondingly, the TSM, Widening, and Combination Alternatives (Alternatives 2, 5 and 6) are the most disruptive by displacing up to 50 dwelling units and six commercial establishments. The largest of the commercial structures include buildings owned by Sterling Auto and Body and the Connecticut Despatch Company (200 and 222 Prospect Street respectively).

Alternative 7, by utilizing the existing Conrail railroad right-of-way, would likely displace only one dwelling unit. However, as discussed above, this alternative is extremely expensive. One known historic house (92 Prospect Street) would be displaced under Options 6A, 6B and 6D.

B.3 Noise Impacts

A preliminary noise impact analysis was performed for each alternative utilizing the Stamina/Optima 2.0 computer model. Traffic noise was modelled with a vehicle mix of 4 % heavy trucks and a design speed of 45 or 50 mph depending on the alignment. Shielding effects were not modelled for this analysis. Noise impacts above the FHWA Noise Abatement Criteria (FHPM 7-7-3) of 67 dBA Leq for residential areas occur approximately 130 feet on either side of the roadway in alternatives 3, 4, 6A, 6B, and 7. The approximate number of impacted residences is presented in Table 2.

The Widening Prospect Street and Combination Alternatives (Alternatives 5, 6C, and 6D) result in fewer noise impacts because it was assumed that trucks would not be allowed to use the improved bypass and instead be rerouted onto Main Street. Slower vehicle speeds associated with these alternatives (35 mph) will also result in less noise impact.

The TSM alternative primarily involves commercial land use on Main Street. The FHWA Noise Abatement Criteria for commercial land use areas is 72 dBA Leq, which is above the predicted noise levels on Main Street.

VII. COST ANALYSIS

A cost breakdown for each preliminary alternative is found in Table 12. The major cost difference between the alternatives results primarily from the number of bridge structures proposed. The cost of Alternatives 5, 6A, 6B, 6C, and 6D is substantially lower because these alternatives do not require bridge structures. The second largest cost is earthwork, which is reflected most heavily in Alternative 3. Alternative 3 also has utility relocation costs of the H.E.L. Co. transmission towers. Approximately 4 or 5 transmission towers may need to be relocated. Right-of-way costs were determined utilizing data provided by the ConnDOT.

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TABLE 12

COST BREAKDOWN FOR PRELIMINARY ALTERNATIVES ($ in thousands)

ALTERNATIVE	PAVEMENT	DRAINAGE	EARTHWORK	STRUCTURES	MAINTENANCE OF TRAFFIC (APPROX. 5%)	MISCELANEOUS CONTINGENCIES (APPROX. 20%)	RELOCATION OF TRANSMISSION TOWERS	ESTIMATED RIGHT OF WAY**	TOTAL
1	---	---	---	---	---	---	---	---	---
2	644	---	---	---	148	594	---	2325	3,711 *
3A	2,338	333	5,470	1,350	675	2,698	4,000	0	16,864
3A.1	2,338	333	2,435	22,700	675	6,361	4,000	0	38,842
3B	1,874	212	3,169	1,350	555	2,221	3,000	1,500	13,881
3B.1	1,874	212	2,594	5,840	555	3,004	3,000	1,500	18,579
4A	2,138	575	2,804	2,150	416	1,663	---	650	10,396 *
4A.1	2,138	575	2,061	7,280	416	2,541	---	650	15,661 *
4B	1,519	453	2,028	2,150	390	1,560	---	1,650	9,750 *
4B.1	1,519	453	1,289	7,280	390	2,438	---	1,650	15,019 *
5	1,080	307	80	---	300	1,198	---	4,525	7,490 *
6A	2,104	508	1,096	---	249	997	---	1,275	6,229 *
6A.1	2,104	508	1,065	4,220	249	1,834	---	1,275	11,256 *
6B	1,485	427	287	---	217	870	---	2,150	5,436 *
6B.1	1,485	427	256	4,220	217	1,708	---	2,150	10,463 *
6C	1,654	269	62	---	326	1,302	---	4,525	8,138 *
6C.1	1,654	269	45	4,570	326	2,213	---	4,525	13,601 *
6D	1,980	508	1,064	---	241	965	---	1,275	6,034 *
6E	1,373	412	238	---	202	810	---	2,025	5,060 *
7A	---	---	---	82,000	4,105	---	---	100	86,205 *
7B	---	---	---	45,000	2,255	---	---	100	47,355 *

Notes:

* Unknown existing utility relocation cost.

** Does not include commercial properties.

APPENDIX A

SUMMARY OF PUBLIC SCOPING SESSION COMMENTS

Comment: Construct a two lane bypass around East Hartford that utilizes the flood control dike and terminates at Rt. 5 just north of the Main Street/Rt. 5 intersection.

Response: Alternative 3A utilizes the dike and terminates at Rt. 5 north of the Main Street/Rt. 5 intersection. This Alternative is described in the next section of this report.

Comment: Construct a two lane bypass around East Hartford that utilizes the dike, but also extends northward on a viaduct over the wetlands and connects to Interstate 291.

Response: This scheme was originally proposed in the 1982 EIS and rejected as too destructive to the natural habitats within the project area. In addition, the traffic capacity analysis suggests a localized traffic problem within East Hartford. Although the existing roadway network within East Hartford is under-designed for the 2010 design year, the roadway network north of East Hartford will provide an adequate level of service for future traffic volumes. A roadway to Interstate 291 is not justified.

Comment: Build a four lane bypass that either utilizes the dike or follows the eastern edge of the wetland.

Response: The traffic volumes predicted for the design year indicate that only a single lane in each direction is needed. However, widening at the termini is necessary to accommodate additional turning lanes and provide an adequate intersection Level of Service.

Comment: Construct a two lane bypass that follows the entire length of the dike and terminates with a T intersection at Main Street/Rt. 5.

Response: Alternative 3B follows the dike to Main Street/Rt. 5 and is described in the next section of this report.

Comment: Construct a two lane roadway that follows the old Connecticut Riverbank on the eastern edge of the wetland and terminates at Rt. 5 north of the Main Street/Rt. 5 intersection.

Response: Alternatives 4A and 4B analyze the option of following the eastern edge of the wetland.

Comment: Utilize the existing rail line for commuter traffic.

Response: Development of a light rail commuter train has been researched extensively by the Greater Hartford Transit District. Their conclusions regarding the East Hartford - South Windsor Corridor are documented in a report entitled "Greater Hartford Region, Phase I Rail Corridor Project" (June 1989). In summary, the Transit District found that sufficient ridership density exists in the corridor to support a spur that would extend from a proposed Hartford - Manchester light rail line to a park and ride parking lot at the Pratt and Whitney manufacturing plant. However, it would be necessary to structurally upgrade the railroad bridge across the Connecticut River to support the increased rail traffic and resolve safety issues that arise from sharing the same tracks as the Conrail freight operation. Also, the present construction of High Occupancy Vehicle lanes on Interstate 84 will reduce traffic volumes in the Hartford - Manchester Corridor and thus reduce the immediate need for a light rail line.
The Transit District decided to begin Phase II of their studies on the rail line between Hartford and Bradley International Airport (known as the Griffen Corridor) because this corridor contains an "anchor" at each end and would be the easiest corridor in which to implement a light rail system. However, the possibility of a light rail system in the Greater Hartford Area remains in the conceptual stage.

Comment: Extend Prospect Street northward from its bend south of Vine Street along the eastern edge of the wetland and connect to Rt. 5 north of the Main Street/Rt. 5 intersection.

Response: Alternative 6D addresses this possibility and is described in the next section of this report.

Comment: Restrict the direction of travel on Prospect Street to one-way travel during peak travel times.

Response: The traffic capacity analysis indicates that existing Prospect Street cannot carry the number of vehicles predicted in the Design Year even if all lanes on Prospect Street are one way.

Comment: Widen Prospect Street from Governor Street to the railroad tracks.

Response: Widening Prospect Street as far as the railroad tracks addresses only half the capacity problem. Over capacity conditions would still occur at the intersection of Prospect/Main Street if the widening did not extend to this intersection.

Comment: Close the Governor Street exit ramp and utilize the existing transportation network to transport traffic to South Windsor.

Response: This option is not considered feasible according to local officials because office development is planned for the land that is located to the west and north of Governor Street. Closing the Governor Street exit ramp would make access to this area difficult and restrict development.

Comment: Construct another bridge over the Connecticut River to carry traffic exiting at Governor Street to and from Interstate 91, north of the Bulkeley Bridge.

Response: Analysis of projected traffic volumes for the 2010 design year indicates a localized traffic problem within East Hartford rather than a through traffic problem. While the existing roadway network within East Hartford is under-designed for the 2010 design year, the network just north of East Hartford can accommodate its projected traffic. Constructing another bridge over the Connecticut River does not alleviate the traffic problem.

Comment: Analyze various intersection configurations at the King Street/Rt. 5 terminus. Explore the possibility of fewer traffic signals.

Response: Two intersection configurations are addressed at the King Street/Rt. 5 terminus and are described in the Section IV, Part C, p. 17. Alternatives 3A, 4A, 6A, and 6D require a reconfiguration of the King Street/Rt. 5 intersection.

Comment: Construct an elevated roadway over the railroad tracks from the Governor/Mix Master intersection to Rt. 5. Such a bypass could be terminated at Park Avenue or extend to School Street.

Response: A preliminary cost evaluation of the elevated roadway over the railroad tracks to Park Avenue or School Street is considered under Alternative 7A and 7B. The construction of this alternative was not considered further because of the high estimated cost (Table 2).

Comment: Extend Goodwin Street west to connect with a bypass that terminates at Rt. 5.

Response: The traffic capacity analysis of the projected traffic volumes indicates that the existing roadway network would have a high level of service and an extension of Goodwin Street does not appear to be necessary.

Comment: Direct traffic currently exiting Interstate 84 at Governor Street to exit onto Connecticut Boulevard.

Response: The traffic pattern presented in the 2010 design year projections indicate that the traffic exiting the expressway via the Mix Master is destined to locations north of Governor Street. Directing this traffic to Connecticut Boulevard would not solve the congestion problem. Furthermore, a direct exit from the I-84 expressway onto Connecticut Boulevard is not practical because of the severe grade differential between the two roadways.

Comment: Make provisions for a bikeway along any bypass roadway.

Response: Provisions for a bikeway along any bypass roadway can be accommodated on either the shouldered roadway or the curbed roadway typical section. However, a bikeway does not solve traffic capacity problems and is not addressed further in this report.

Comment: Construct alternative alignments similar to those described above on the west side of the East Hartford dike.

Response: Such alternatives would be subject to possible erosion before complete fill stabilization had occurred. Fill on the west side of the dike would also result in increased floodplain impacts.

Comment: Do nothing.

Response: The Do Nothing Alternative is one of the seven Alternatives analyzed.