4. ENVIRONMENTAL CONSEQUENCES

4. ENVIRONMENTAL CONSEQUENCES

4.1. Introduction

The following sections describe the alternatives' impacts to the transportation system, impacts to natural resources and cultural resources, and impacts to social and economic characteristics of the area.

4.2. Transportation System Impacts

4.2.1 Traffic Operations

This section addresses the impact of the No-Build and Build Alternatives on traffic operations. The traffic forecasts and corresponding analysis for this project were based on the Chittenden County Transportation Model, calibrated to the base year 1998. This information was provided by the Resource System Group (RSG) (refer to Section 3.2).

The travel demand model for this project included the following:

- Land use projections provided by the City of Burlington and the Chittenden County Metropolitan Planning Organization (CCMPO).
- Kennedy Drive improvements to provide a four-lane roadway (Completed 2008).
- U.S. Route 7 widening south of the study area (Completed 2007)
- Winooski Redevelopment Project (Completed 2006)
- Full build of the Circumferential Highway (Williston section under NEPA review)

No-Build Alternative

The travel demand model for the study area was updated by RSG to reflect the No-Build Alternative for the current design horizons for the project, namely the 2008 (ETC) and 2028 (ETC+20) design years. Average Daily Traffic (ADT) Volumes were estimated for the 2008 and 2028 No-Build Alternative design years based on the travel demand model data. These volumes are presented in Table 4-1, and indicate the expected level of increases in traffic volumes without construction of the Southern Connector/Champlain Parkway (i.e., the No-Build Alternative). The average annual percent growth along Pine Street from the 2003 Existing Condition to the 2008 No-Build Alternative is about 2.5% per year. This percentage is higher on Lakeside Avenue due to proposed site development and lower on Battery Street due to different traffic flow patterns. The average annual percent growth from the 2008

to 2028 No-Build Alternative is about 0.5% per year throughout the Primary study area (refer to Figure 3-1).

Table 4-1: Average Daily Traffic Volume Summary - Primary Study Area: No-Build Alternative

Location	No-Build Alternative		
	2003	2008 (ETC)	2028 (ETC+20)
Pine Street: Home Avenue to Flynn Avenue	8,600	9,600	10,300
Pine Street: Flynn Avenue to Lakeside Avenue	14,100	16,300	17,500
Pine Street: Lakeside Avenue to Maple Street	12,800	14,000	14,900
Pine Street: Maple Street to Main Street	5,500	6,600	6,700
Battery Street: Maple Street to Main Street	9,500	7,400	7,600
Lakeside Avenue	4,300	6,100	7,500
Maple Street: Pine Street to Battery Street	7,400	5,900	6,100
King Street: Pine Street to Battery Street	4,000	4,100	4,100
Main Street: Pine Street to Battery Street	7,900	8,900	9,100

Traffic flow networks were also developed from these model runs for the AM and PM peak hours. These No-Build volumes are shown on Figures 4-1 through 4-4, as follows:

- Figure 4-1: 2008 AM No-Build
- Figure 4-2: 2008 PM No-Build
- Figure 4-3: 2028 AM No-Build
- Figure 4-4: 2028 PM No-Build

A review of the No-Build peak hour volumes indicates the following traffic flow patterns:

- Northbound (NB) volume on U.S. Route 7 with destinations along Pine Street and points further north; and Southbound (SB) volume on Pine Street with destinations on U.S. Route 7 and points further south use Home Avenue and Flynn Avenue to transfer between the two corridors.

- The Pine Street and Maple Street intersection is the focal point for traffic entering and exiting the City Center District (CCD).

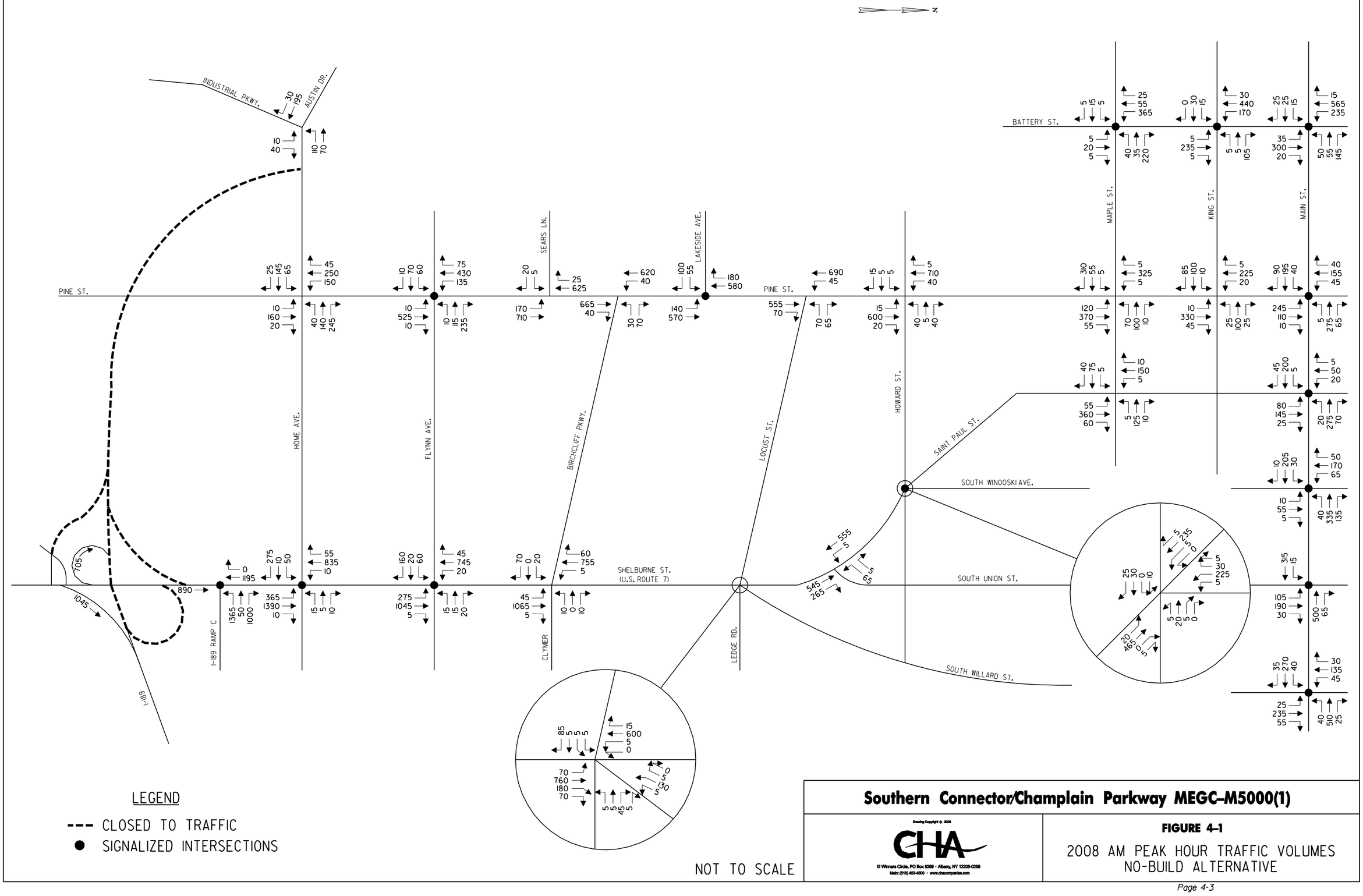

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FIGURE 4-1

2008 AM PEAK HOUR TRAFFIC VOLUMES
NO-BUILD ALTERNATIVE

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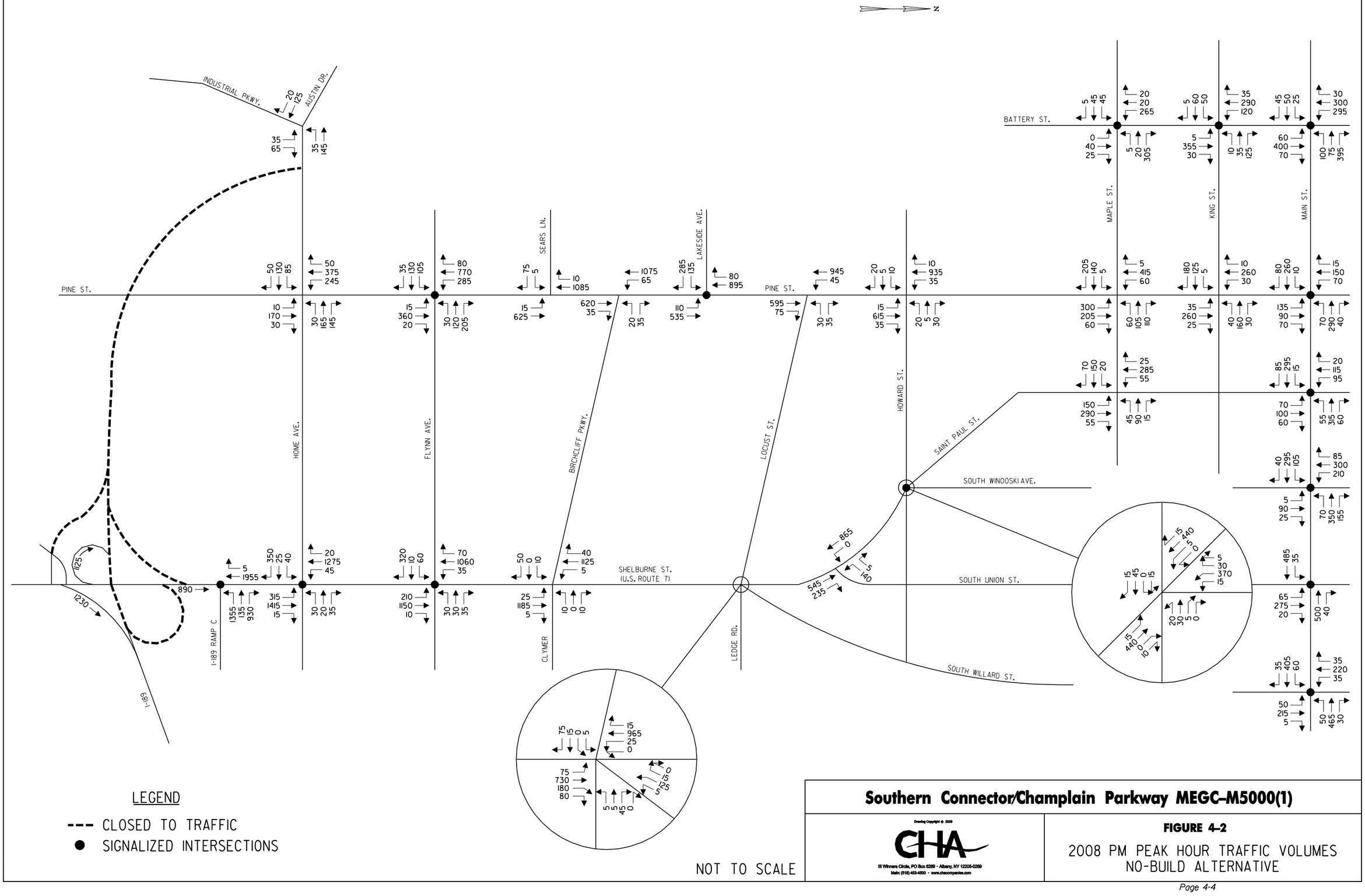

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FIGURE 4-2

2008 PM PEAK HOUR TRAFFIC VOLUMES
NO-BUILD ALTERNATIVE

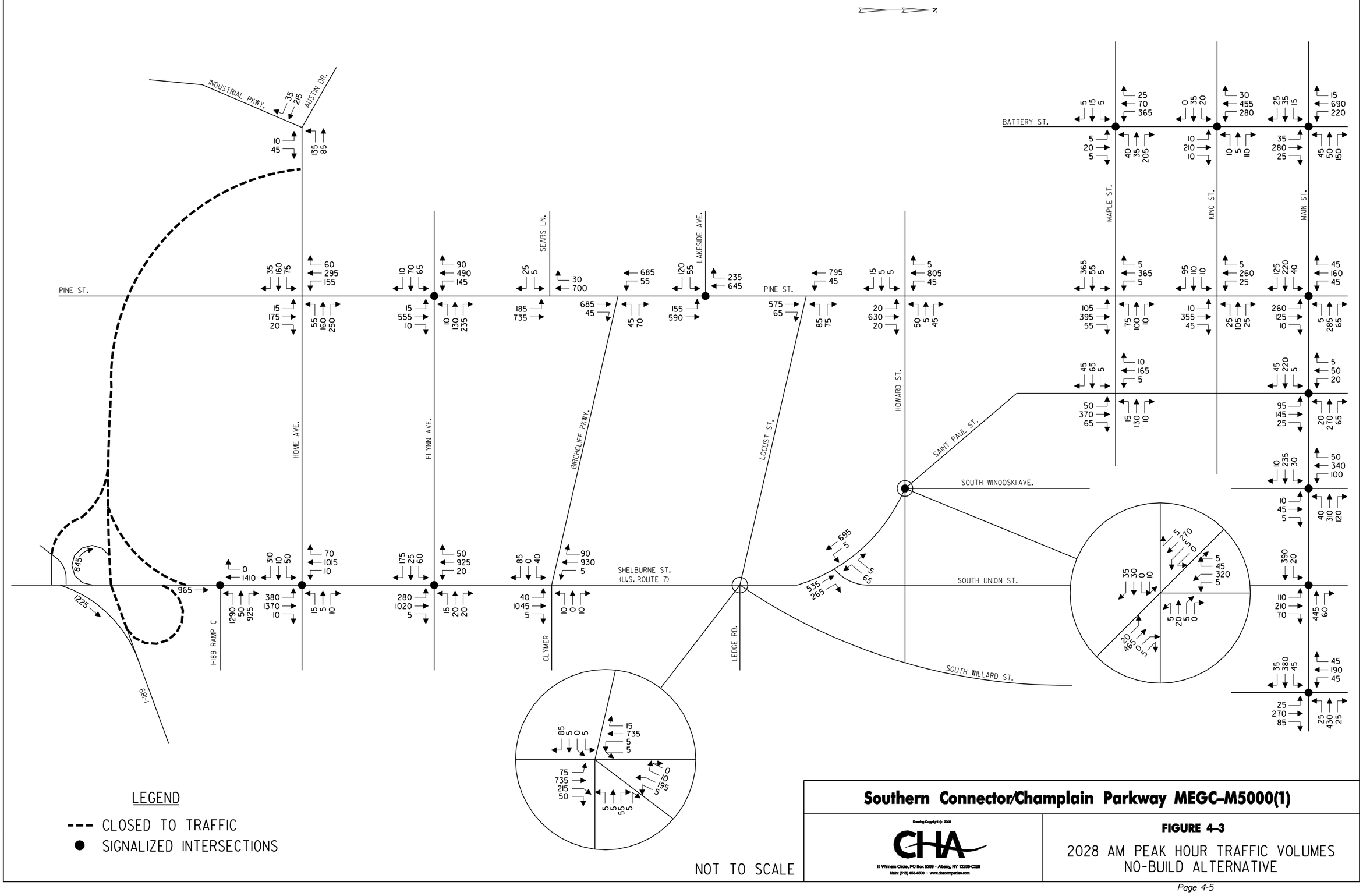

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FIGURE 4-3

2028 AM PEAK HOUR TRAFFIC VOLUMES
NO-BUILD ALTERNATIVE

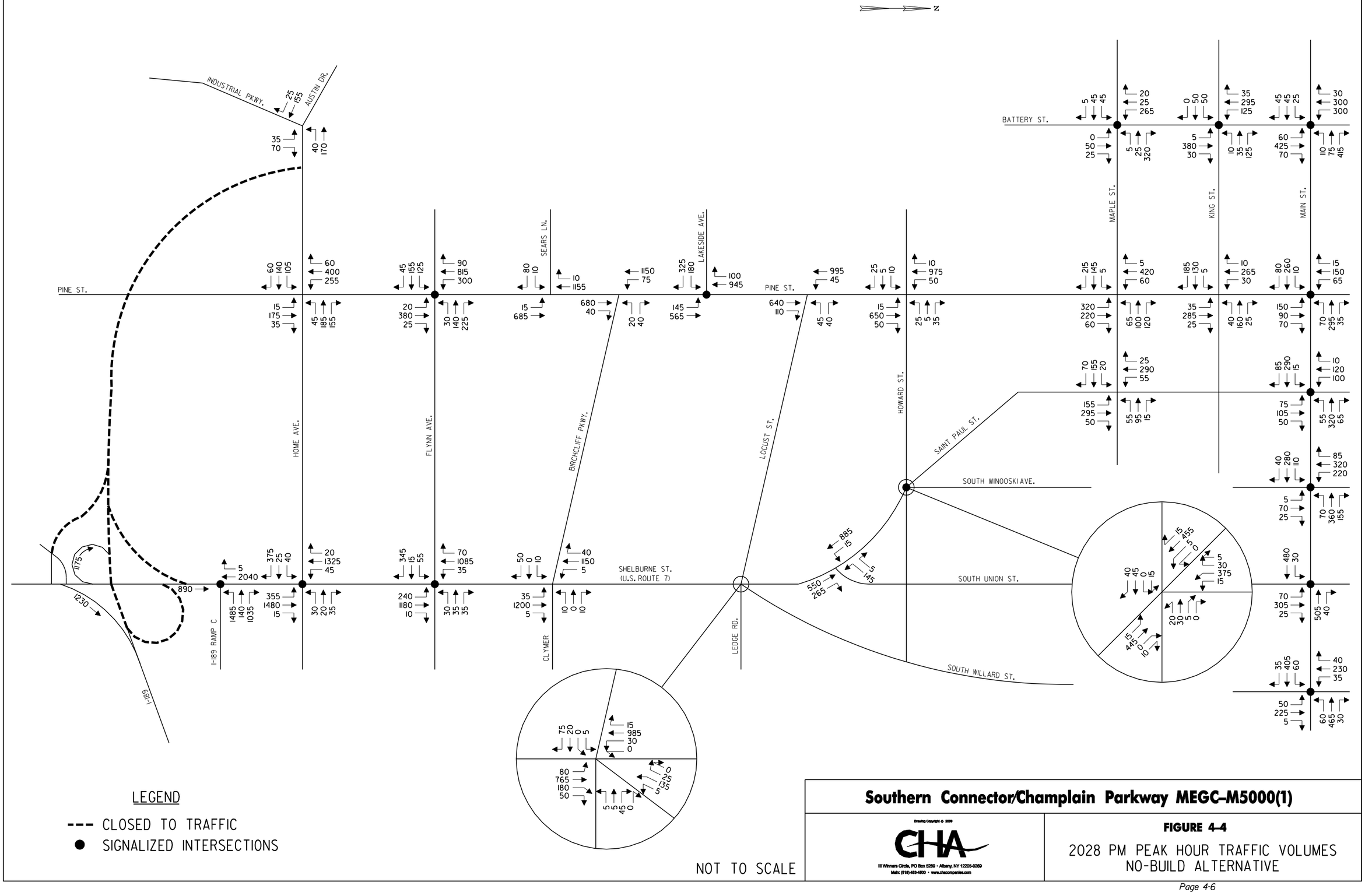

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FIGURE 4-4

2028 PM PEAK HOUR TRAFFIC VOLUMES
NO-BUILD ALTERNATIVE

Traffic operations for the No-Build Alternative were analyzed for the same twenty-six intersections located within the Primary and Secondary study area as were analyzed for existing conditions. Table 4-2 summarizes the overall levels of service (LOS) for the No-Build Alternative analyses in the Primary study area for each of the design year horizons.

Table 4-2: Level of Service Summary – Primary Study Area: No-Build Alternative

Location	2008 (ETC) AM Peak Hour	2008 (ETC) PM Peak Hour	2028 (ETC+20) AM Peak Hour	2028 (ETC+20) PM Peak Hour
Signalized Intersections				
Battery Street & Main Street	B	B	B	C
Battery Street & King Street	B	B	C	B
Battery Street & Maple Street	B	B	B	B
Pine Street & Main Street	B	B	B	B
Pine Street & Lakeside Avenue	A	B	A	C
Pine Street & Flynn Avenue	B	C	B	F
AWSC (1) Intersections				
Pine Street & King Street	C	C	C	D
Pine Street & Maple Street	F	F	F	F
Pine Street & Home Avenue	F	F	F	F
TWSC (2) Intersections				
Pine Street & Howard Street				
Eastbound Approach	D	F	E	F
Westbound Approach	F	F	F	F
Pine Street & Locust Street				
Westbound Approach	F	F	F	F
Pine Street & Birchcliff Parkway				
Westbound Approach	E	F	F	F
Pine Street & Sears Lane				
Eastbound Approach	D	F	E	F

(1) AWSC = All-Way Stop Control

(2) *TWSC = Two-Way Stop Control (i.e., Side Street Stop). Note that the LOS for TWSC intersections represents the operation of the minor stop-controlled approach movements. Mainline movements are free-flow.*

Figures 4-5 through 4-8 present the overall LOS for each intersection within the Primary and Secondary study areas. Detailed LOS and delay summaries for each location are provided in Appendix 3.

2008 Design Year: No-Build Alternative

Primary Study Area:

All signalized intersections located within the Primary study area would operate at LOS C or better for both peak hours.

The AWSC intersection of Pine Street at King Street would operate at LOS C or better for both peak hours. The AWSC intersections of Pine Street at Maple Street and Pine Street at Home Avenue would operate at LOS F with increased delays compared to the existing condition on all approaches.

Analyses of the TWSC intersections in the Primary study area along Pine Street, at Sears Lane, Birchcliff Parkway, Locust Street and Howard Street, show substantial delay for the stop-controlled approaches. These approaches would operate at a LOS E or F in at least one of the peak hours.

Secondary Study Area:

All of the signalized intersections located in the Secondary study area would operate at LOS D or better except for the intersection of U.S. Route 7 & I-189 Ramp C (westbound off-ramp), which would operate at a LOS F in the PM peak hour. This poor LOS is a result of heavy westbound volume on the ramp.

The AWSC intersection of Saint Paul Street at Maple Street in the Secondary study area would operate at a LOS C in the AM and LOS E in the PM peak hours.

Analyses of the TWSC intersections in the Secondary study area along U.S. Route 7, at South Union Street, Birchcliff Parkway, and South Willard Street, show substantial delay for the stop-controlled approaches as well. These approaches would operate at a LOS E or F in at least one of the peak hours.

2028 Design Year: No-Build Alternative

Primary Study Area:

The LOS at the signalized intersections within the Primary study area would continue to be within acceptable thresholds in the 2028 design year with the exception of the intersection of Pine Street at Flynn Avenue. The operations at Flynn Avenue would change from LOS C to LOS F during the PM peak hour.

N

INDUS TRIAL PKWY.

AUSTIN DR.

PINE ST.

HOME AVE.

FLYNN AVE.

SEARS LN.

BIRCHCLIFF PKWY.

LAKESIDE AVE.

LOCUST ST.

HOWARD ST.

BATTERY ST.

MAPLE ST.

KING ST.

MAIN ST.

SAINT PAUL ST.

SOUTH WINOOSKI AVE.

SHELBURNE ST.
(U.S. ROUTE 7)

SOUTH UNION ST.

SOUTH WILLARD ST.

I-189

I-189 RAMP C

CLYMER

LEDGE RD.

LEGEND

--- CLOSED TO TRAFFIC

(X) SIGNAL CONTROL (OVERALL LOS)

ALL-WAY STOP CONTROL (OVERALL LOS)

[X] 2-WAY STOP CONTROL (MINOR STREET APPROACH LOS)

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FIGURE 4-5

2008 AM PEAK HOUR LEVEL OF SERVICE
NO-BUILD ALTERNATIVE

N

INDUS TRIAL PKWY.

AUSTIN DR.

PINE ST.

HOME AVE.

FLYNN AVE.

SEARS LN.

BIRCHCLIFF PKWY.

LAKESIDE AVE.

LOCUST ST.

HOWARD ST.

BATTERY ST.

MAPLE ST.

KING ST.

MAIN ST.

SAINT PAUL ST.

SOUTH WINOOSKI AVE.

SOUTH UNION ST.

SOUTH WILLARD ST.

SHELBURNE ST.
(U.S. ROUTE 7)

I-189

I-189 RAMP C

CLYMER

LEDGE RD.

LEGEND

--- CLOSED TO TRAFFIC

(X) SIGNAL CONTROL (OVERALL LOS)

⚠X ALL-WAY STOP CONTROL (OVERALL LOS)

[X] 2-WAY STOP CONTROL (MINOR STREET APPROACH LOS)

NOT TO SCALE

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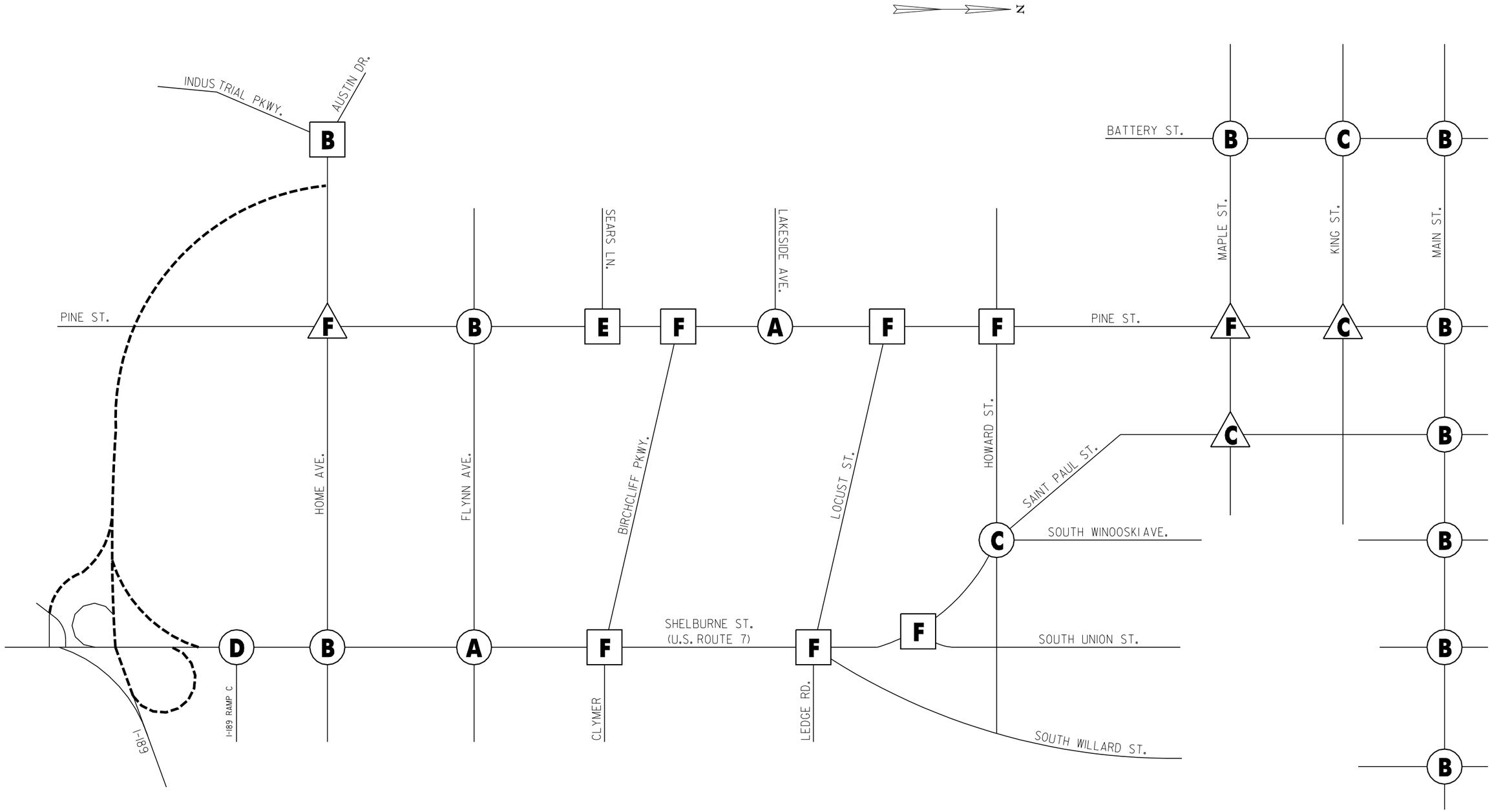
FIGURE 4-6

2008 PM PEAK HOUR LEVEL OF SERVICE
NO-BUILD ALTERNATIVE



LEGEND

--- CLOSED TO TRAFFIC

(X) SIGNAL CONTROL (OVERALL LOS)

AWS ALL-WAY STOP CONTROL (OVERALL LOS)

[X] 2-WAY STOP CONTROL (MINOR STREET APPROACH LOS)

NOT TO SCALE

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FIGURE 4-7

2028 AM PEAK HOUR LEVEL OF SERVICE
NO-BUILD ALTERNATIVE

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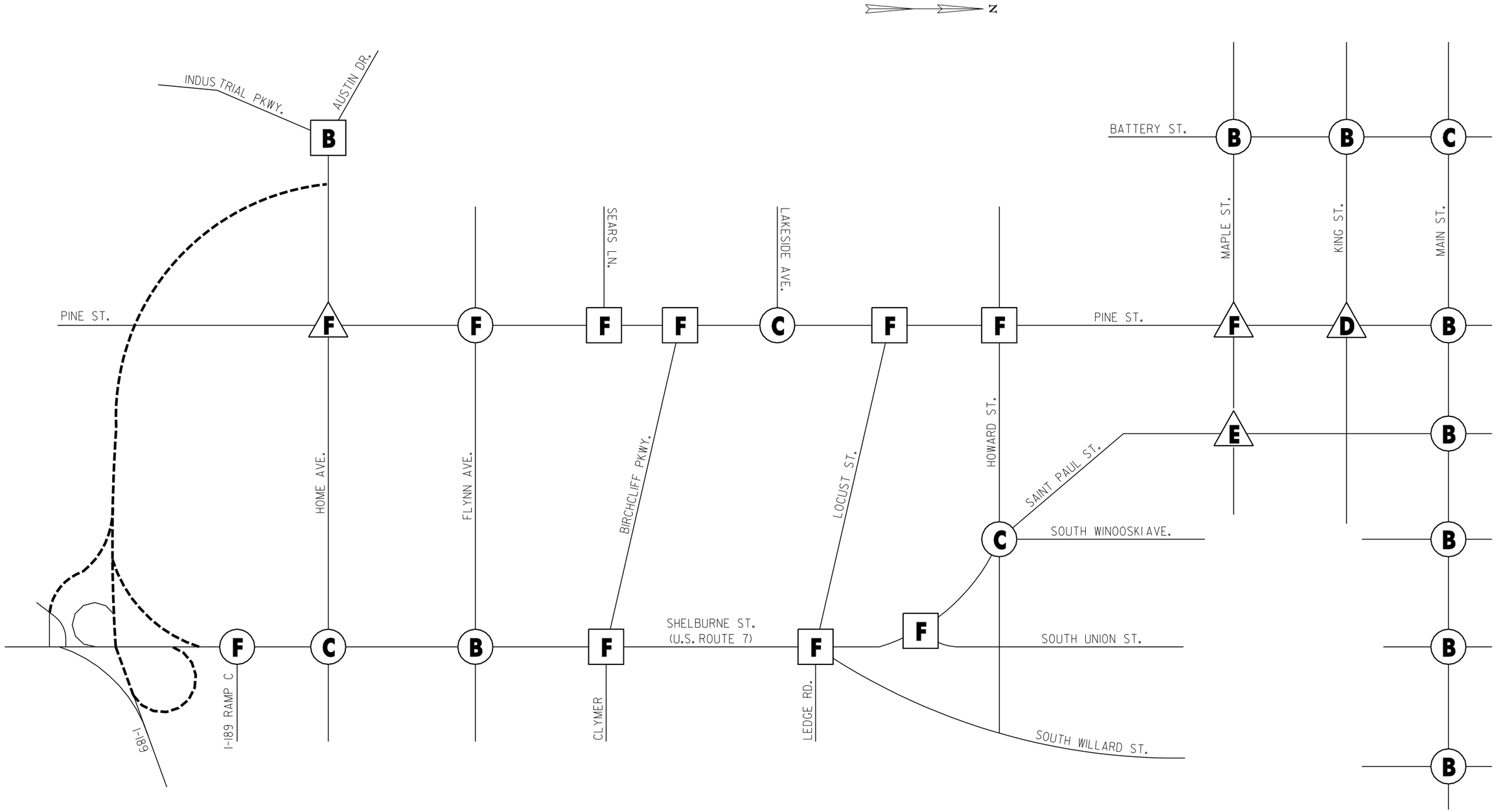

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FIGURE 4-8

2028 PM PEAK HOUR LEVEL OF SERVICE
NO-BUILD ALTERNATIVE

In the Primary study area, the LOS F congestion on Pine Street at the AWSC intersections with Maple Street and Home Avenue would continue to increase through this design year.

In the Primary study area, the projected long-range traffic volume increases along Pine Street would also continue to increase delays for access to the corridor from the stop-controlled side streets (TWSC intersections). The side street approaches would operate at LOS F in at least one of the peak hours.

Secondary Study Area:

The LOS at the signalized intersections within the Secondary study area would continue to be within acceptable thresholds in the 2028 design year except for the U.S. Route 7 at I-189 Ramp C intersection. This intersection would continue to operate at a LOS F during the PM peak hour.

The AWSC intersection of Saint Paul Street at Maple Street in the Secondary study area would operate at a LOS C in the AM and LOS E in the PM peak hours.

The projected long-range traffic volume increases along the U.S. Route 7 corridor in the surrounding study area would continue to increase delays for the stop-controlled side streets to this corridor. The TWSC intersections along this corridor would operate at a LOS F during both peak hours.

Summary of No-Build Analyses

The general traffic volume increases projected to naturally occur within the entire study area over the 25-year planning horizon would contribute to increase congestion on this transportation system. LOS at the existing signalized intersections along Pine Street and U.S. Route 7 are projected to decrease over this period. The following intersections would have a substantial increase in delay during the PM peak hour:

- Pine Street at Lakeside Avenue
- Pine Street at Flynn Avenue
- U.S. Route 7 at I-189 Ramp C

Traffic increases along the Pine Street and U.S. Route 7 corridor would also produce increased congestion and queuing, especially for traffic entering these corridors from the unsignalized side streets. These conditions would result in LOS F operations for these traffic movements. Left-turn movements from Pine Street onto the side streets would also contribute to congestion along Pine Street due to reductions in the available gaps in opposing travel direction resulting from increased volume and uncoordinated flow.

The AWSC intersection of Pine Street with Maple Street is projected to operate at an overall LOS F during all of the future No-Build AM and PM peak periods. The

AWSC intersection of Pine Street with Home Avenue is projected to operate at an overall LOS F during all No-Build years and peak periods.

These operating conditions represent a substantial corridor capacity constraint, which would result in recurrent system-wide congestion and excess delay. The No-Build Alternative would not meet the purpose and need of the project.

Build Alternatives

The evaluation of the traffic operations for the Build Alternatives were based on travel demand models developed for the Primary and Secondary study areas for the project design years 2008 and 2028. The analyses of traffic operations for these Build Alternatives were based on the following general infrastructure characteristics:

1. A 30 mph posted speed limit on the Southern Connector/Champlain Parkway from the I-189/U.S. Route 7 interchange northward to the terminus with the local street system.

2. Proposed signalized intersections along the primary corridor of the Southern Connector/Champlain Parkway feature exclusive pedestrian phases. Where signal improvements are indicated at other locations (i.e., along Pine Street and/or Battery Street) associated with specific Build Alternatives, these locations would also have exclusive pedestrian phases. Intersections along the C-2 Section of the project (with Home Avenue, Flynn Avenue, Sears Lane, and Lakeside Avenue) would be signalized.

3. Signals within 0.5 mile of each other would be coordinated using cycle lengths that were optimized for each peak hour and design year condition.

4. Geometric and signal operation improvements and equipment replacement were assumed for the Pine Street at Lakeside Avenue intersection for all Build Alternatives.

5. Signal operation (i.e. timing/phasing) improvements were also assumed for the intersections along Battery Street for all Build Alternatives.

Build Alternative 1

Build Alternative 1 consists of constructing a two-lane roadway on the C-1 Section, C-2 Section and C-6 Section. The C-6 Section provides a connection on new location between Pine Street, in the vicinity of Pine Place, and Battery Street south of Maple Street. This connection is known as the Battery Street Extension. This alternative provides similar connectivity to the CCD from the Southern Connector/Champlain Parkway as the Null Alternative (See Appendix 3), but on an

alignment that avoids the Superfund Site. This alternative utilizes the existing section of Pine Street between Lakeside Avenue and the proposed Battery Street Extension as part of the Southern Connector/Champlain Parkway corridor.

Traffic Volumes

The projected ADT volumes in the Primary study area for Build Alternative 1 are shown in Table 4-3. A review of this data indicates that traffic volumes on the section of Pine Street between Lakeside Avenue and Pine Place would increase by 30% compared to the No-Build Alternative. This increase is a result of this section of Pine Street serving as the link between the C-1 Section and C-2 Section and the CCD. Traffic volumes on the sections of Pine Street external to this linkage would decrease substantially: volume on the section south of Lakeside Avenue is projected to decrease by more than 50% and volume north of Maple Street is projected to decrease 20%.

Table 4-3: Average Daily Traffic Volume Summary – Primary Study Area: Build Alternative 1

Location	Build Alternative 1	
	2008 (ETC)	2028 (ETC+20)
Southern Connector/Champlain Parkway: Home Avenue to Lakeside Avenue	13,500	13,800
Pine Street: Home Avenue to Flynn Avenue	3,100	3,100
Pine Street: Flynn Avenue to Lakeside Avenue	8,200	8,200
Pine Street: Lakeside Avenue to Pine Place	18,000	18,100
Pine Street: Pine Place to Main Street	5,200	5,200
Battery Street: Maple Street to Main Street	13,000	13,200
Lakeside Avenue: Connector to Pine Street	11,100	11,600
Maple Street: Pine Street to Battery Street	3,200	3,200
King Street: Pine Street to Battery Street	3,100	3,100
Main Street: Pine Street to Battery Street	5,700	5,700

The design year peak hour volumes produced from the travel demand modeling for Build Alternative 1 are presented in Figures 4-9 through 4-12, as follows:

- Figure 4-9: 2008 AM Build Alternative 1
- Figure 4-10: 2008 PM Build Alternative 1
- Figure 4-11: 2028 AM Build Alternative 1
- Figure 4-12: 2028 PM Build Alternative 1

The following traffic flow trends are observed from these peak hour volumes:

- Home Avenue and Flynn Avenue would see a substantial reduction in traffic volume as these roadways convert to a primary function of local access, and through traffic is diverted to the Southern Connector/Champlain Parkway.

- Traffic volumes on the section of Pine Street between Lakeside Avenue and Pine Place would be higher than in the No-Build Alternative as a result of this section of Pine Street serving as the link between the C-1 Section, C-2 Section and the CCD.

- The C-6 Section of Build Alternative 1 processes the primary traffic flow to and from the CCD as through movements from Pine Street to Battery Street rather than the heavy turn volumes that occur in this north section of the project in the No-Build Alternative.

- The intersection of Pine Street at Maple Avenue would not be a critical congestion point for traffic access and circulation to the CCD in this alternative.

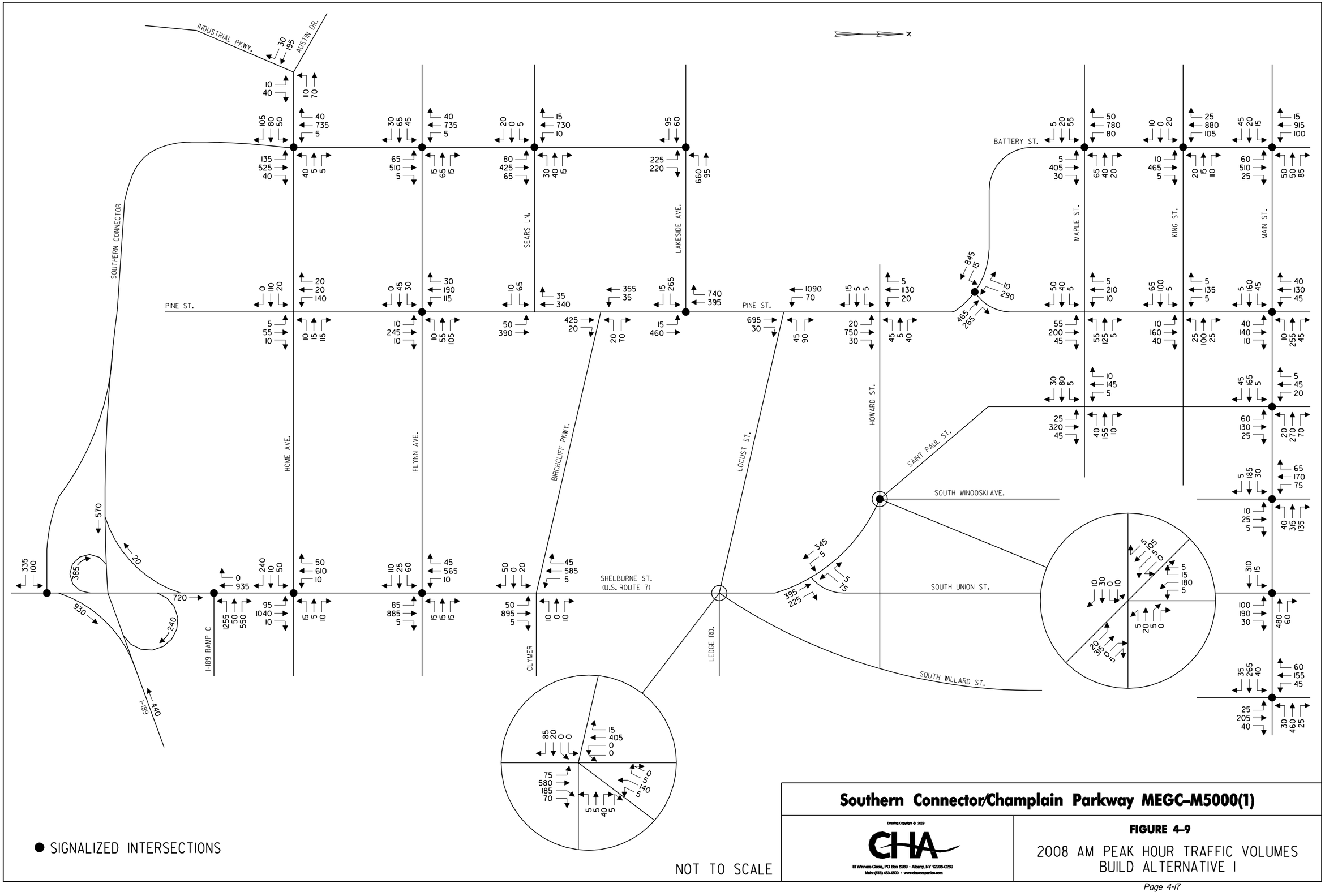

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FIGURE 4-9

2008 AM PEAK HOUR TRAFFIC VOLUMES
BUILD ALTERNATIVE I

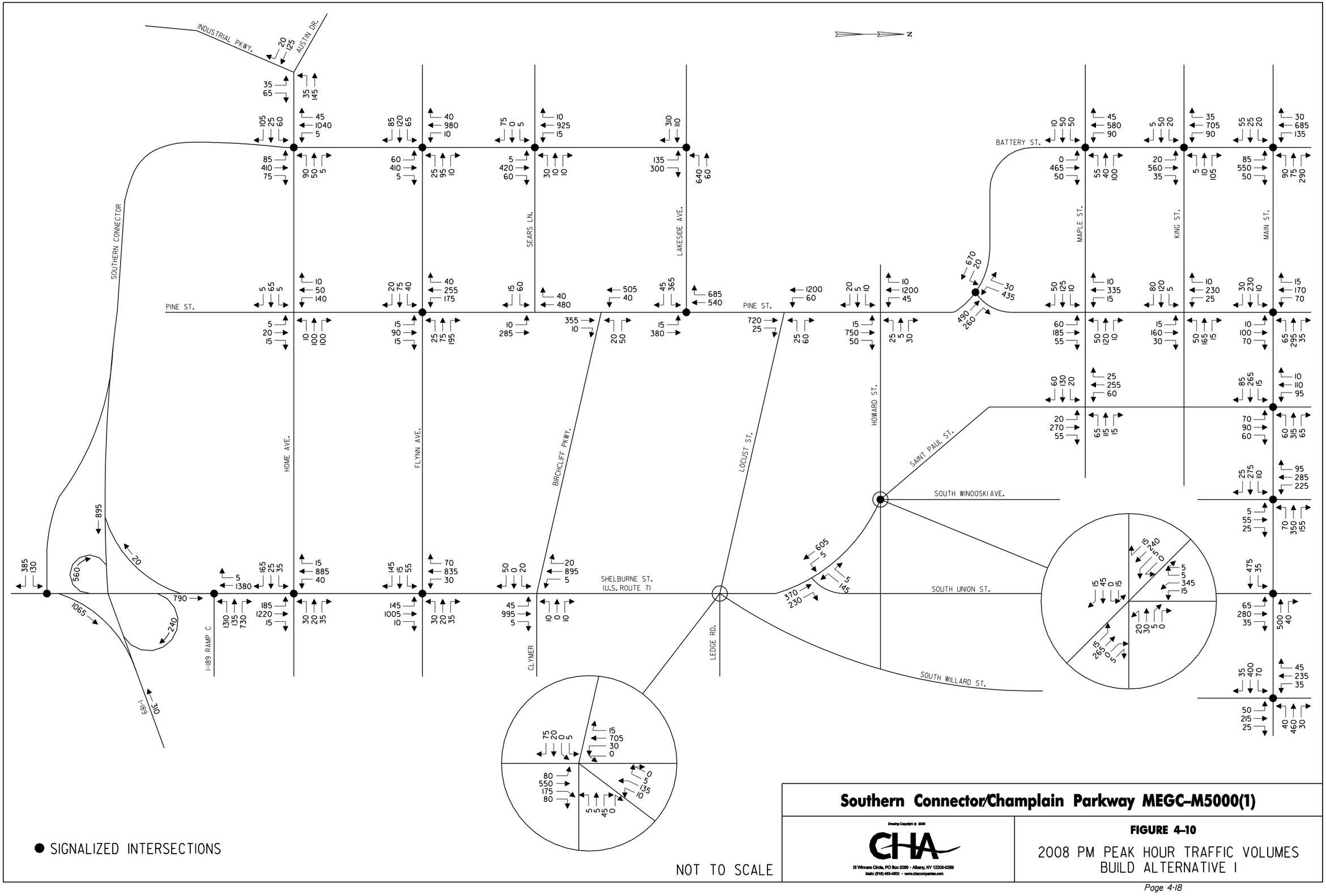

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FIGURE 4-10

2008 PM PEAK HOUR TRAFFIC VOLUMES
BUILD ALTERNATIVE I

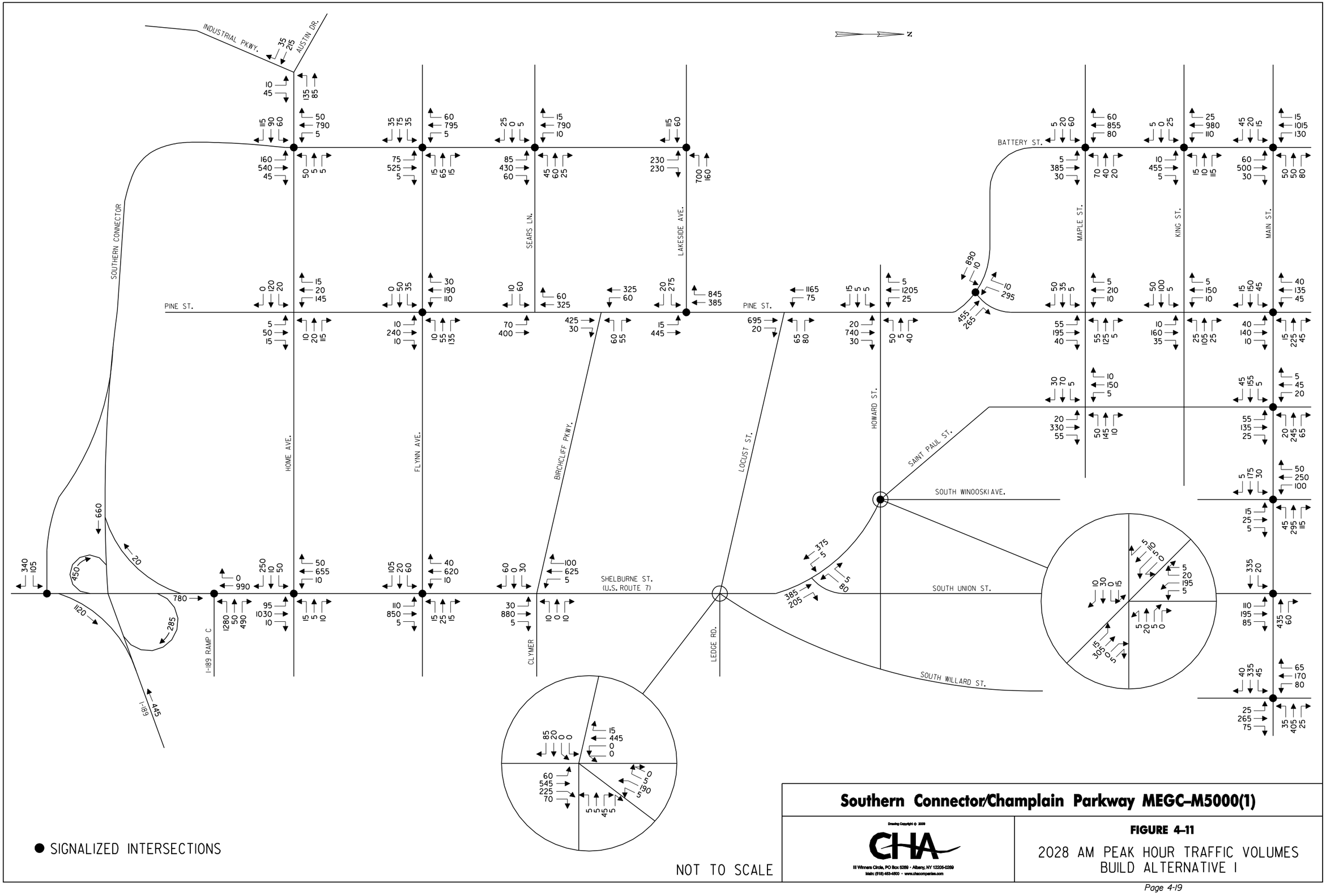

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FIGURE 4-11

2028 AM PEAK HOUR TRAFFIC VOLUMES
BUILD ALTERNATIVE I

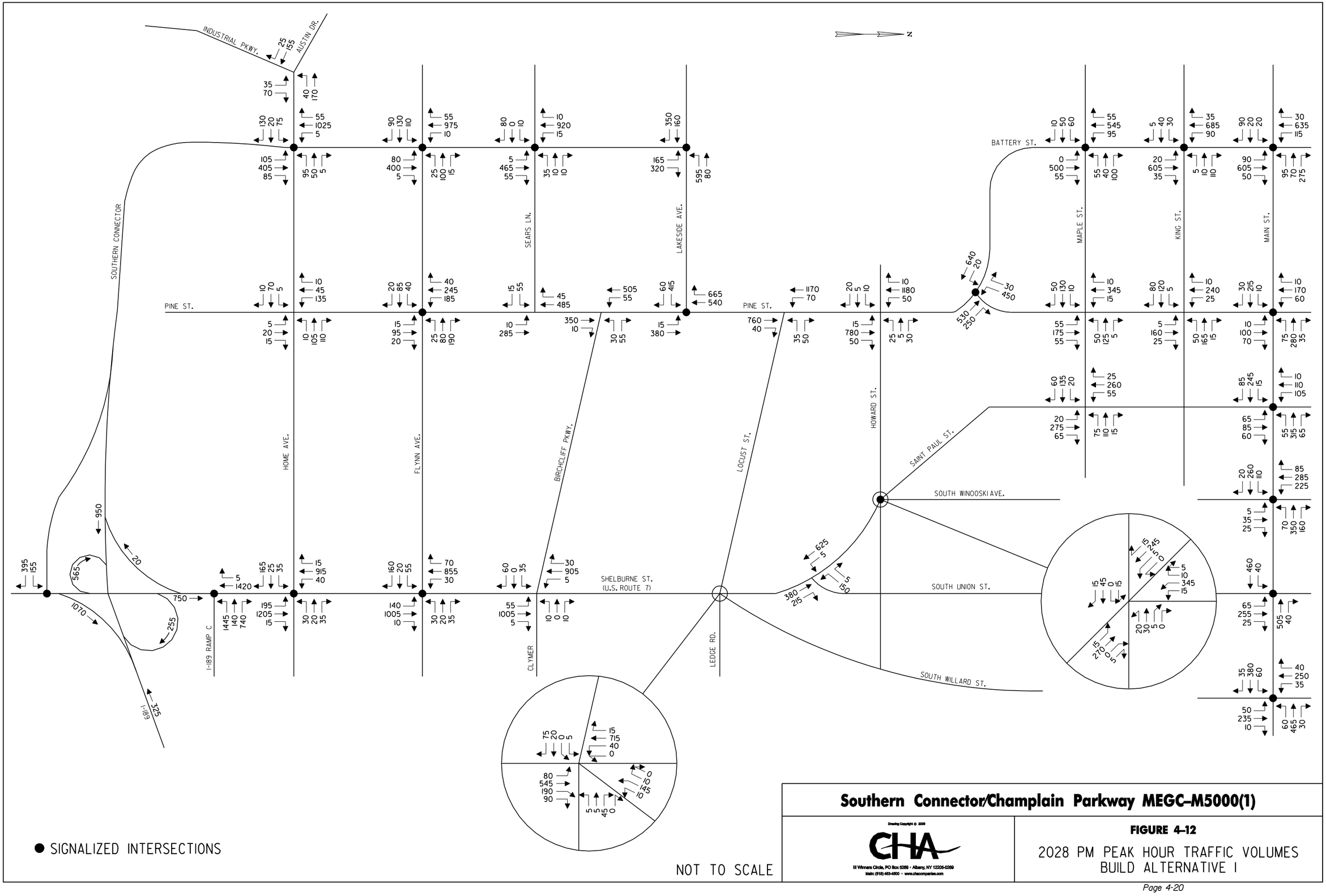

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FIGURE 4-12

2028 PM PEAK HOUR TRAFFIC VOLUMES
BUILD ALTERNATIVE I

Traffic Operations

Table 4-4 presents the results of the capacity analyses for the Primary study area intersections in the 2008 and 2028 design years, for Build Alternative 1. Figures 4-13 and 4-14 present the overall LOS at each study intersection within the Primary and Secondary study areas for the 2008 Design Year AM and PM peak hours, respectively. The LOS for the combined Primary and Secondary study areas in the 2028 design year AM and PM peak hours are shown on Figures 4-15 and 4-16. Detailed LOS and delay calculations are provided in Appendix 3.

2008 Design Year: Build Alternative 1

Primary Study Area

The existing signalized intersections within the Primary study area would operate at an overall LOS C or better. The intersection of Pine Street at Battery Street Extension created by this alternative would be signalized and would operate at LOS C or better in this design year. The new intersections created along the Southern Connector/Champlain Parkway would operate at acceptable LOS D or better.

It is noted that the LOS on Battery Street are generally lower than in the No-Build Alternative (LOS C compared to LOS B). Factors that contribute to this include the increased volume associated with the improved access to the CCD and signal timing considerations to incorporate an exclusive pedestrian phase. However, these intersections would continue to provide acceptable LOS C or better operations.

A similar condition is also produced at the intersection of Lakeside Avenue and Pine Street in this alternative. The increased traffic volume through this intersection would cause operations to change from a LOS A/B to a LOS C. These analyses show that this intersection also has adequate capacity within its design to accommodate the traffic volume demand in this alternative.

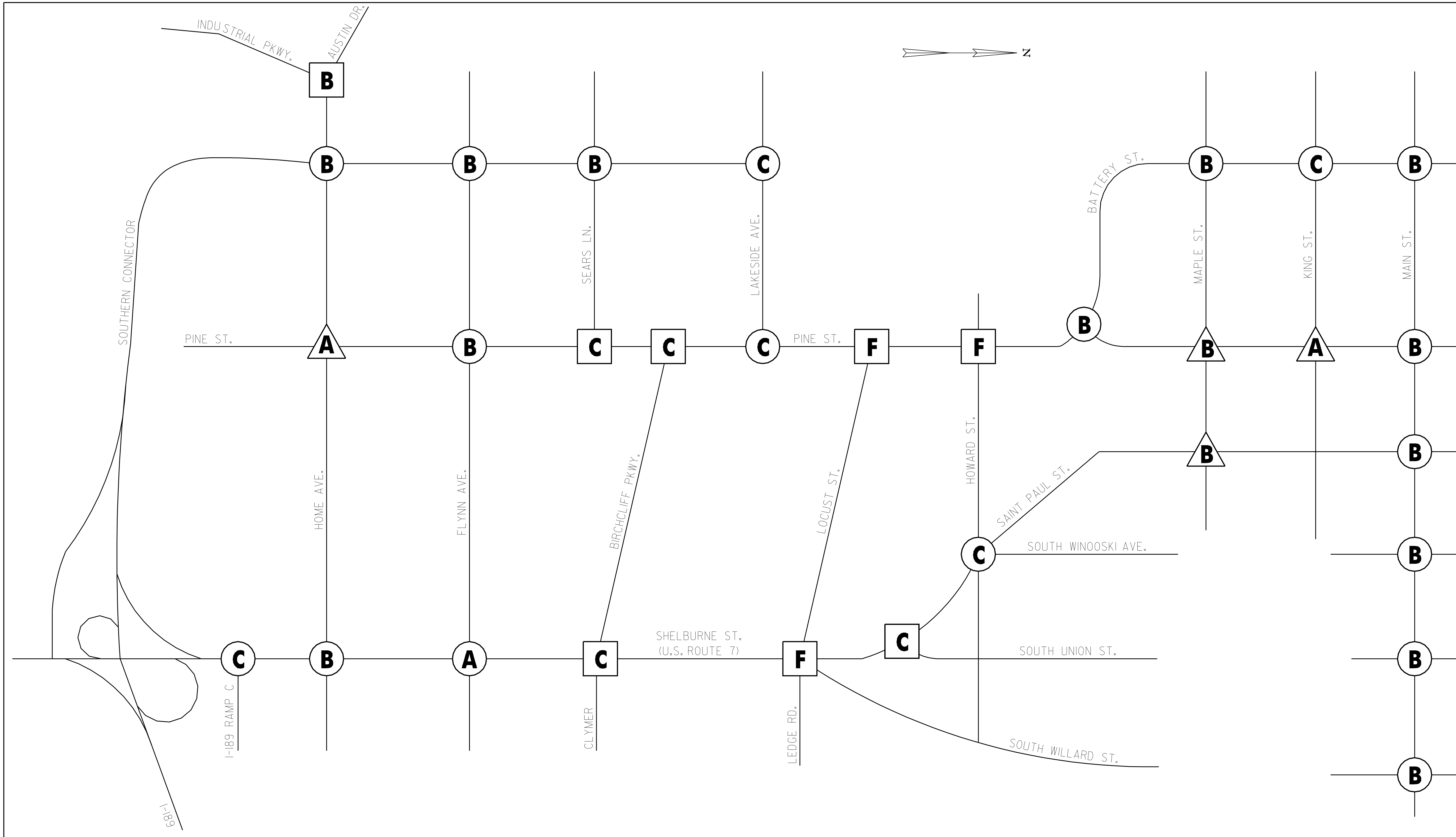
In Build Alternative 1, traffic is projected to be diverted away from the intersection of Pine Street and Maple Street via the Battery Street Extension. The operation of this AWSC intersection would be LOS B during the AM peak hour and LOS C during the PM peak hour. This LOS and associated vehicle delay is an improvement from the LOS F conditions indicated for the No-Build Alternative. The other AWSC intersections in the Primary study area are Pine Street at King Street and Pine Street at Home Avenue. These two intersections also see improvement and would operate at LOS B or better for both peak hours.

Table 4-4: Level of Service Summary – Primary Study Area: Build Alternative 1

Location	2008 (ETC) AM Peak Hour	2008 (ETC) PM Peak Hour	2028 (ETC+20) AM Peak Hour	2028 (ETC+20) PM Peak Hour
Signalized Intersections				
Battery Street & Main Street	B	C	B	C
Battery Street & King Street	C	C	C	C
Battery Street & Maple Street	B	C	B	C
Pine Street & Main Street	B	B	B	B
Pine Street & Battery Street Ext	B	C	B	C
Pine Street & Lakeside Avenue	C	C	D	C
Pine Street & Flynn Avenue	B	B	B	B
Connector & Lakeside Avenue	C	B	B	C
Connector & Sears Lane	B	B	B	B
Connector & Flynn Avenue	B	D	B	F
Connector & Home Avenue	B	D	C	D
AWSC (1) Intersections				
Pine Street & King Street	A	B	B	B
Pine Street & Maple Street	B	C	B	C
Pine Street & Home Avenue	A	A	A	A
TWSC (2) Intersections				
Pine Street & Howard Street				
Eastbound Approach	F	F	F	F
Westbound Approach	F	F	F	F
Pine Street & Locust Street				
Westbound Approach	F	F	F	F
Pine Street & Birchcliff Parkway				
Westbound Approach	C	C	C	C
Pine Street & Sears Lane				
Eastbound Approach	C	C	D	C

(1) AWSC = All-Way Stop Control
(2) *TWSC = Two-Way Stop Control (i.e., Side Street Stop). Note that the LOS for TWSC intersections represents the operation of the minor stop-controlled approach movements. Mainline movements are free-flow.*

In the Primary study area, the operations of the TWSC intersections on Pine Street between Lakeside Avenue and Maple Street would continue to be LOS F as in the No-Build Alternative, and the amount of delay would increase as a result of the additional volume on Pine Street. However, the LOS for the TWSC intersections south of Lakeside Avenue improve to a LOS C for both peak hours.



LEGEND

(X) SIGNAL CONTROL (OVERALL LOS)

△X ALL-WAY STOP CONTROL (OVERALL LOS)

[X] 2-WAY STOP CONTROL (MINOR STREET APPROACH LOS)

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FIGURE 4-13

2008 AM PEAK HOUR LEVEL OF SERVICE
BUILD ALTERNATIVE I

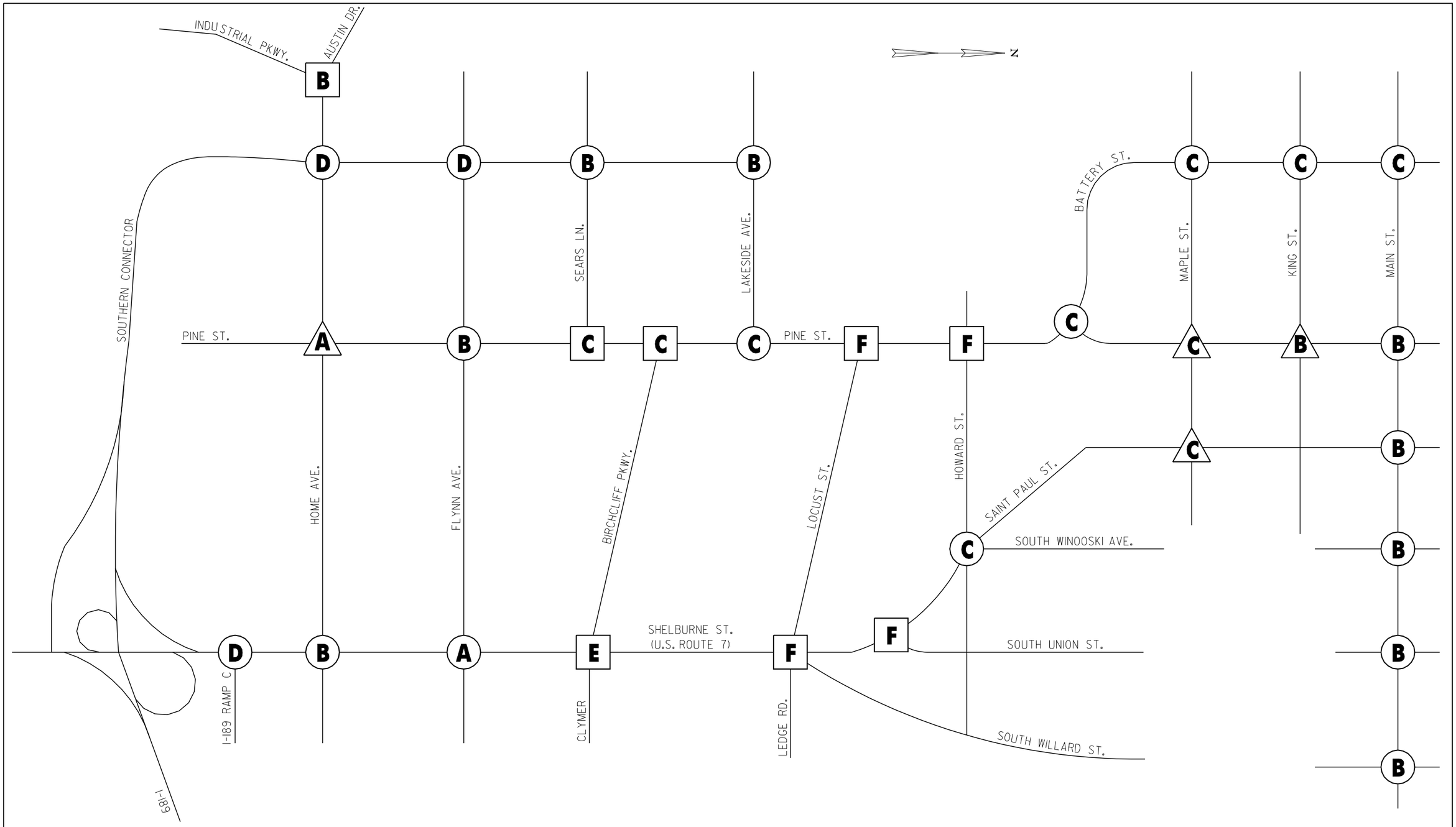

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FIGURE 4-14

2008 PM PEAK HOUR LEVEL OF SERVICE
BUILD ALTERNATIVE I

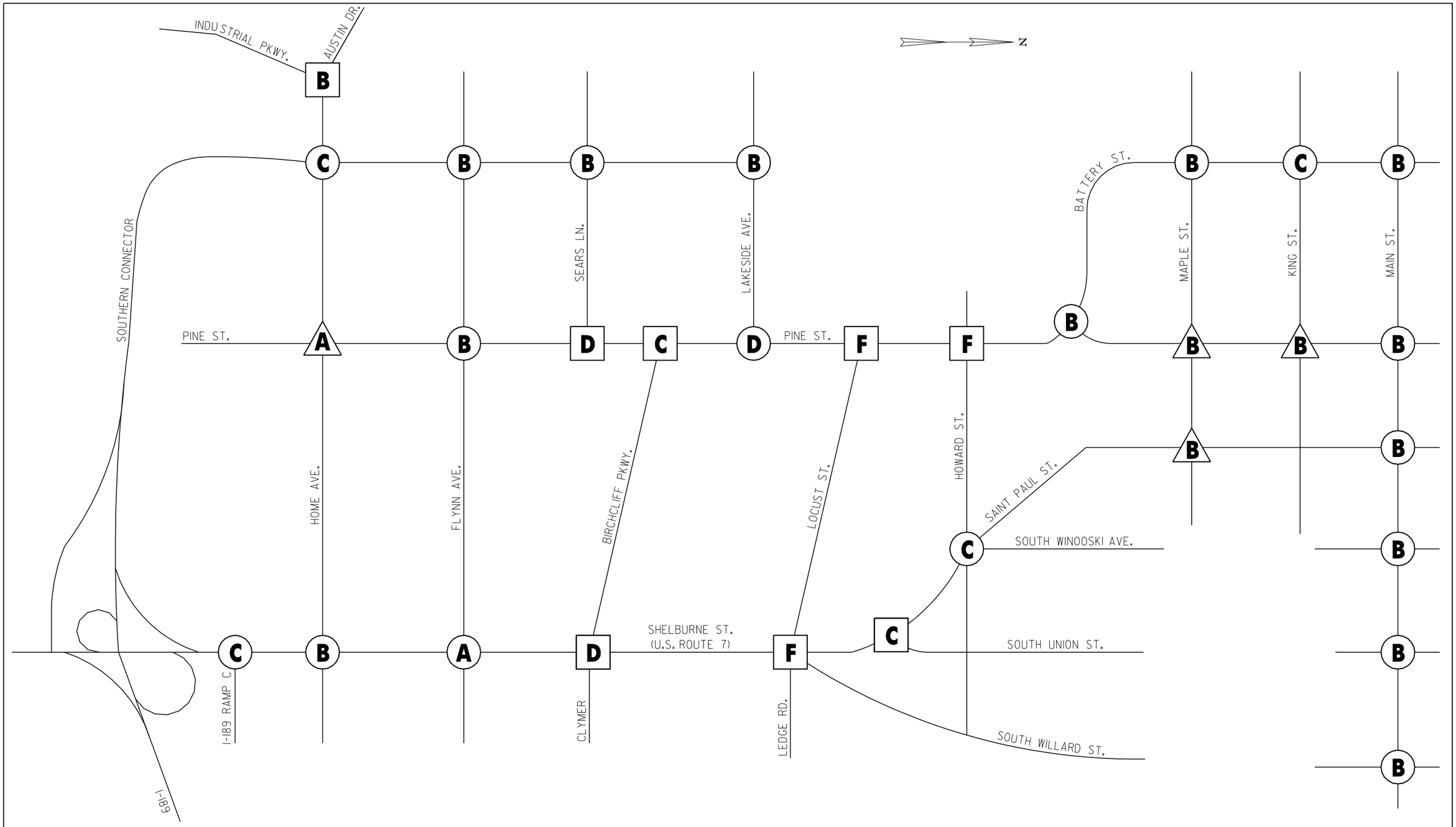

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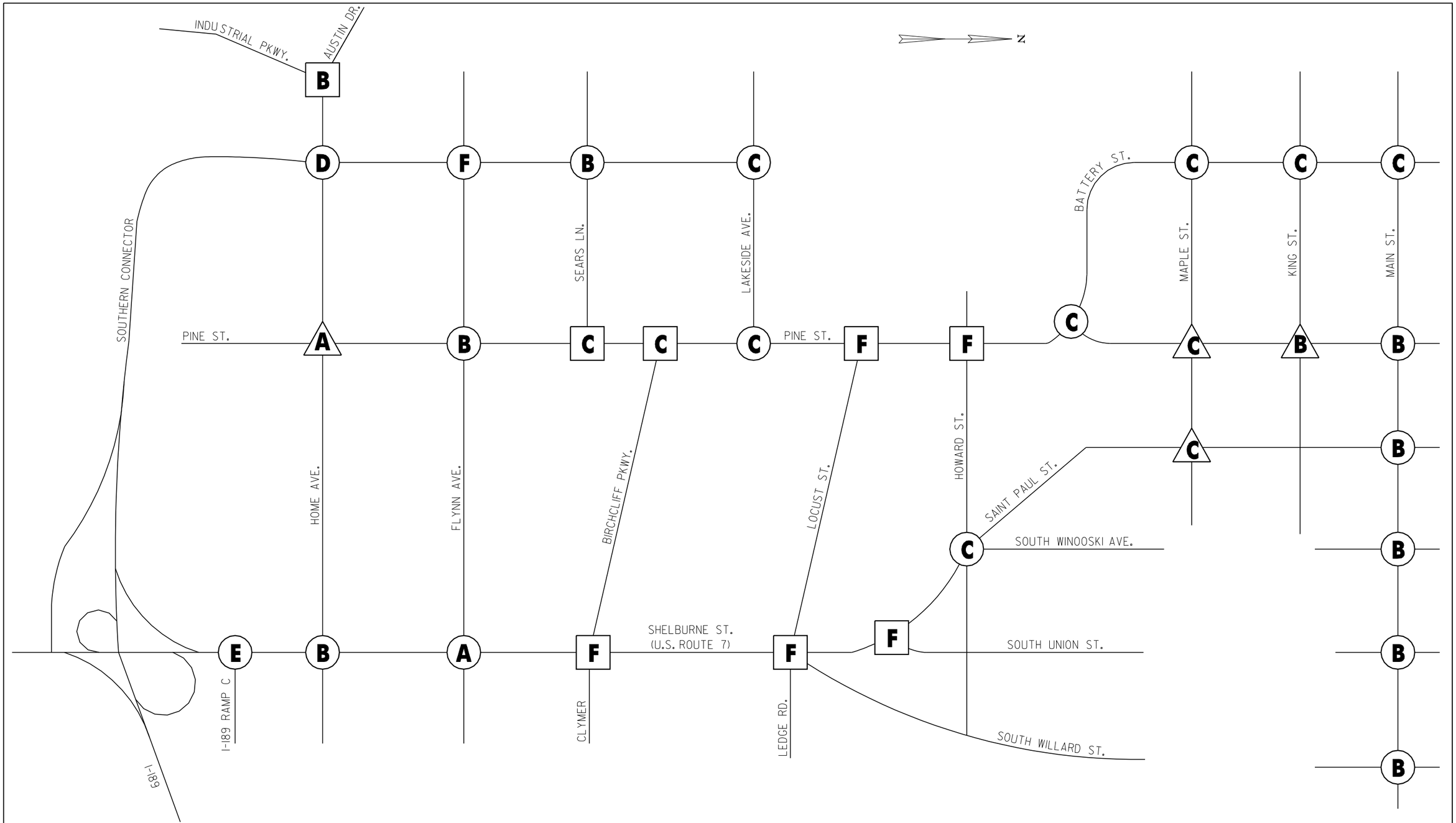
FIGURE 4-15

2028 AM PEAK HOUR LEVEL OF SERVICE
BUILD ALTERNATIVE I



LEGEND

- (X) SIGNAL CONTROL (OVERALL LOS)
- (X) ALL-WAY STOP CONTROL (OVERALL LOS)
- [X] 2-WAY STOP CONTROL (MINOR STREET APPROACH LOS)

NOT TO SCALE

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FIGURE 4-16

2028 PM PEAK HOUR LEVEL OF SERVICE
BUILD ALTERNATIVE I

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Secondary Study Area

The signalized intersections within the Secondary study area would operate at LOS D or better during both the AM and PM peak hour. These operations are generally comparable or better than operations in the No-Build Alternative. Most intersections would operate at LOS C or better.

The AWSC intersection in the Secondary study area would operate at a LOS C or better for both peak hours. The operations of the minor approaches along U.S. Route 7 at stop-controlled intersections would have some improvement associated with reduction in vehicle delay compared to the No-Build Alternative, although the LOS would continue to be LOS E/F during one or both peak hours for these movements.

2028 Design Year: Build Alternative 1

Primary Study Area

The existing signalized intersections within the Primary study area would operate at overall LOS C or better through this design horizon. The proposed signalized intersections along the new Southern Connector/Champlain Parkway as well as the Pine Street intersection with Battery Street Extension would generally operate at overall LOS D or better in this design year except for the intersection of the Southern Connector/Champlain Parkway and Flynn Avenue, which would operate at LOS F during the PM peak hour.

The AWSC intersections in the Primary study area would continue to operate at LOS C or better during both peak hours. These operations continue to represent an improvement from the No-Build Alternative.

In the Primary study area, the LOS F conditions for the stop-controlled approaches at the TWSC intersections along Pine Street at Howard Street and Locust Street would be comparable to the conditions in the 2008 design year, although the amount of delay would increase as a result of increased traffic volume flow on Pine Street. The stop-controlled approaches at Birchcliff Parkway and Sears Lane would continue to operate acceptably at LOS D or better.

Secondary Study Area

The existing signalized intersections within the Primary study area would operate at overall LOS D or better through this design horizon, with the exception of the intersection of U.S. Route 7 at I-189 Ramp C. This intersection would operate at a LOS E during the PM peak hour. This LOS is still an improvement from the LOS F operations at this location in the No-Build Alternative. Most signalized intersections would operate at LOS C or better.

The AWSC intersections in the Secondary study area would continue to operate at better levels of service than in the No-Build alternative, with LOS C or better operations during both peak hours.

The stop-controlled intersections within the Secondary study area would continue to have LOS E/F operations during one or both peak hours. These operations would be consistent with the operations in the No-Build Alternative for the 20-year design horizon.

Summary of Build Alternative 1 Analyses

Traffic volumes along the sections of Pine Street south of Lakeside Avenue and north of Pine Place would be dramatically reduced in this alternative due to the improved connection from the Southern Connector/Champlain Parkway to Battery Street. This shift in traffic volume would also produce improved LOS and mobility through these areas of the Pine Street corridor.

The Battery Street Extension (C-6 Section) of this alternative processes the primary traffic flow to and from the CCD as through movements from Pine Street to Battery Street in a fashion similar to, but not as effectively as, the C-8 Section alignment of the Null Alternative (see Appendix 3).

Traffic volumes on the section of Pine Street between Lakeside Avenue and Pine Place would increase from the No-Build Alternative as a result of this section of Pine Street serving as the link between the C-1 Section and C-2 Section and CCD. This would increase the delays for traffic entering Pine Street from TWSC intersections in this area, although the LOS F conditions would be comparable to the No-Build Alternative.

The intersections of Battery Street at Maple Street, Pine Street at Maple Street, and Pine Street at King Street would have improved LOS as compared to the No-Build Alternative. This is due to the improved processing of the primary traffic flows as through movements rather than as turn movements through these intersections. This alternative would similarly improve operations along the section of Pine Street from Maple Street to Main Street by alleviating the congestion created in the No-Build Alternative by turning movements from Pine Street onto the intersecting streets to access Battery Street.

The traffic operations of the southern section of Pine Street in this alternative would be an improvement from the projected No-Build Alternative. The LOS in this area would be improved to LOS D or better. Because through traffic is diverted to the Southern Connector/Champlain Parkway, the local connecting streets between Shelburne Street and Pine Street in the southern section of the project would convert to a primary function of local access.

Build Alternative 1 satisfies the purpose and need of this project by providing mobility and access to the CCD. This alternative is also very effective in diverting through traffic away from the residential neighborhoods and providing connectivity to existing industrial facilities.

Build Alternative 2

Build Alternative 2 consists of constructing a two-lane roadway on the C-1 Section, C-2 Section and C-6 Section. Similar to Build Alternative 1, this alternative provides connectivity to the CCD on an alignment that avoids the Superfund Site. This alternative utilizes the existing section of Pine Street from Lakeside Avenue to Main Street as part of the Southern Connector/Champlain Parkway corridor.

During the development of Build Alternative 2, various options were considered to address the traffic operations and circulation issues in the northern section of Pine Street and to reduce the affect of new traffic introduced to this section of the corridor. The options investigated included the following:

- Implementing one-way traffic circulation for north-south movements between Maple Street and Main Street (including variations using Pine Street and either South Champlain Street or Battery Street as one-way pairs). This option also considered a variation of the Battery Street Extension to provide an extension of South Champlain Street south to a new intersection with Pine Street near Pine Place for one-way southbound traffic.

- Implementing one-way traffic circulation for east-west movements on Maple Street and King Street between Battery Street and Pine Street.

- Implementation of a combination of one-way circulation for north-south and east-west movements.

- Changing traffic control at the intersections of Pine Street at Maple Street and Pine Street at King Street from an AWSC intersection to a TWSC intersection with free flow conditions on Pine Street.

Traffic analyses for these options have been provided in Appendix 3 of this 2009 FSEIS.

Build Alternative 2 includes changing traffic control at the intersections of Pine Street at Maple Street and Pine Street at King Street from an AWSC intersection to signalized control.

The signal operations at these intersections would be interconnected with the signal at Pine Street and Main Street to provided coordinated traffic progression. This alternative also includes infrastructure improvements to this section of Pine Street, as

described in Chapter 2 of this document. Summaries of the investigations of the various options considered above, but not advanced are included in Appendix 3.

Traffic Volumes

The projected ADT volumes in the Primary study area for Build Alternative 2 are shown in Table 4-5. A review of this data indicates that traffic volumes on the section of Pine Street south of Lakeside Avenue would decrease substantially compared to the No-Build volumes. This change in volume is comparable to the patterns observed for other Build Alternatives. However, traffic volumes on the section of Pine Street north of Maple Street would increase by approximately 30% compared to the No-Build Alternative. This increase is associated with changes in traffic circulation in this area as a result of the traffic control changes, not because additional traffic is drawn to the corridor from other areas. The projected volume on Pine Street, between Maple Street and Main Street, will be comparable to the projected volume on Pine Street south of Lakeside Avenue.

Table 4-5: Average Daily Traffic Volume Summary – Primary Study Area: Build Alternative 2

Location	Build Alternative 2	
	2008 (ETC)	2028 (ETC+20)
Southern Connector/Champlain Parkway: Home Avenue to Lakeside Avenue	12,800	13,200
Pine Street: Home Avenue to Flynn Avenue	2,700	2,800
Pine Street: Flynn Avenue to Lakeside Avenue	7,300	7,600
Pine Street: Lakeside Avenue to Maple Street	15,900	16,300
Pine Street: Maple Street to Main Street	8,500	8,500
Battery Street: Maple Street to Main Street	7,000	7,000
Lakeside Avenue	10,400	11,000
Maple Street: Pine Street to Battery Street	4,800	4,800
King Street: Pine Street to Battery Street	5,500	5,600
Main Street: Pine Street to Battery Street	10,400	10,400

The design year peak hour volumes produced from the travel demand modeling for the Build Alternative 2 are presented in Figures 4-17 through 4-20, as follows:

- Figure 4-17: 2008 AM Build Alternative 2
- Figure 4-18: 2008 PM Build Alternative 2
- Figure 4-19: 2028 AM Build Alternative 2
- Figure 4-20: 2028 PM Build Alternative 2

The trends for Build Alternative 2 are summarized as follows:

- Home Avenue and Flynn Avenue would see a substantial reduction in traffic volume as these roadways convert to a primary function of local access, and through traffic is diverted to the Southern Connector/Champlain Parkway.

- This alternative would provide improved access to existing industrial facilities in the project area, but accessibility to the CCD for freight movements would be essentially unchanged from the No-Build Alternative.

- Traffic volumes on the section of Pine Street between Lakeside Avenue and Maple Street would increase by 10-15% from the No-Build Alternative. Traffic volumes on the section of Pine Street between Maple Street and Main Street would increase by approximately 30% from the No-Build Alternative. This increase is due to changes in turning movement distributions at Pine Street and Maple Street, such that more traffic continues north on Pine Street to the King Street and Main Street intersections.

- The section of Pine Street between Maple Street and Main Street would continue to function as a regional access to the CCD as in the No-Build Alternative.

- The Pine Street and Maple Street intersection would not be a critical congestion location for access and circulation to the CCD, as in the No-Build Alternative.

- The change in traffic control at the intersections of Pine Street at Maple Street and at King Street would reduce the congestion indicated for this area compared to the existing condition and the No-Build Alternative.

Traffic Operations

Table 4-6 presents the results of the capacity analyses for the Primary study area intersections in the 2008 and 2028 design years, for the Build Alternative 2. Figures 4-21 and 4-22 present the overall LOS at each study intersection within the Primary and Secondary study areas for the 2008 Design Year AM and PM peak hours, respectively. The LOS for the combined Primary and Secondary study areas in the 2028 design year AM and PM peak hours are shown on Figures 4-23 and 4-24. Detailed LOS and delay calculations are provided in Appendix 3.

2008 Design Year: Build Alternative 2

Primary Study Area

The existing and proposed signalized intersections within the Primary study area would all operate at LOS D or better. At most locations, these operations would be LOS B or C. Traffic volumes would increase at the intersection of Pine Street and Lakeside Avenue as a result of the C-1 Section & C-2 Section connection. Even with this change in volume, the intersection would operate at LOS C or better for both peak hours with the proposed geometric and signal-control improvements.

The new traffic signals at the intersections of Pine Street and Maple Street and at Pine Street and King Street would also operate at LOS D or better, which alleviates the LOS F conditions in this area in the No-Build Alternative. It is noted that the signal operations at these intersections would feature exclusive pedestrian phases to maintain the quality of pedestrian accessibility.

Traffic volumes south of Lakeside Avenue would be diverted onto the Southern Connector/Champlain Parkway and the AWSC intersection of Pine Street and Home Avenue would experience a substantial improvement of operations with LOS A conditions during both peak hours.

The operations of the TWSC intersections between Lakeside Avenue and Maple Street would continue to operate at the same LOS F as in the No-Build Alternative during peak hours, but with a general increase in delay due to the additional volume on Pine Street. The LOS for the intersections south of Lakeside Avenue would be LOS C, which is an improvement from the No-Build Alternative.

Secondary Study Area

The signalized intersections within the Secondary study area would operate at LOS D or better in this alternative, with most operating at LOS C or better. These LOS are generally better than the operations in the No-Build Alternative.

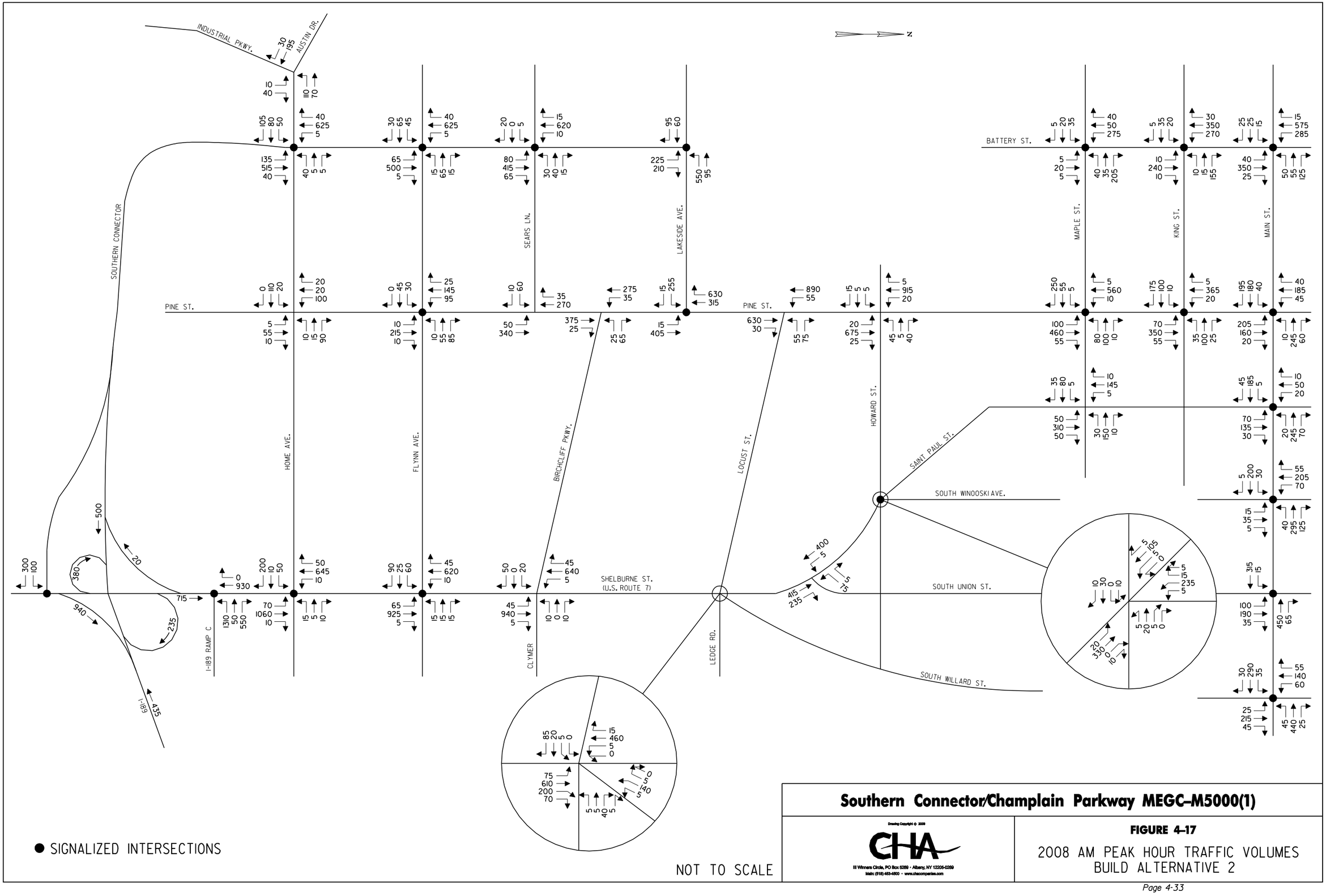

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FIGURE 4-17

2008 AM PEAK HOUR TRAFFIC VOLUMES
BUILD ALTERNATIVE 2

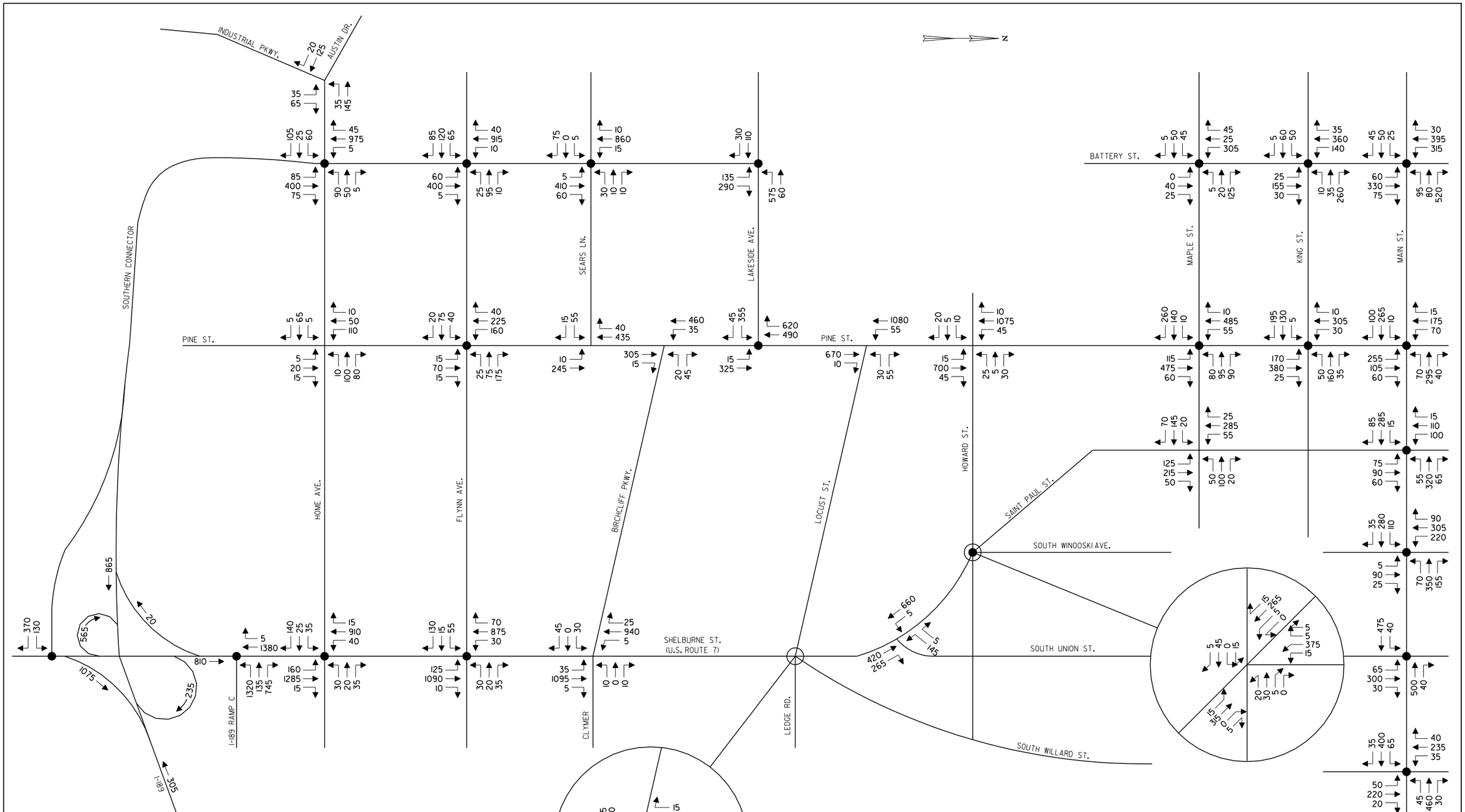

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FIGURE 4-18

2008 PM PEAK HOUR TRAFFIC VOLUMES
BUILD ALTERNATIVE 2

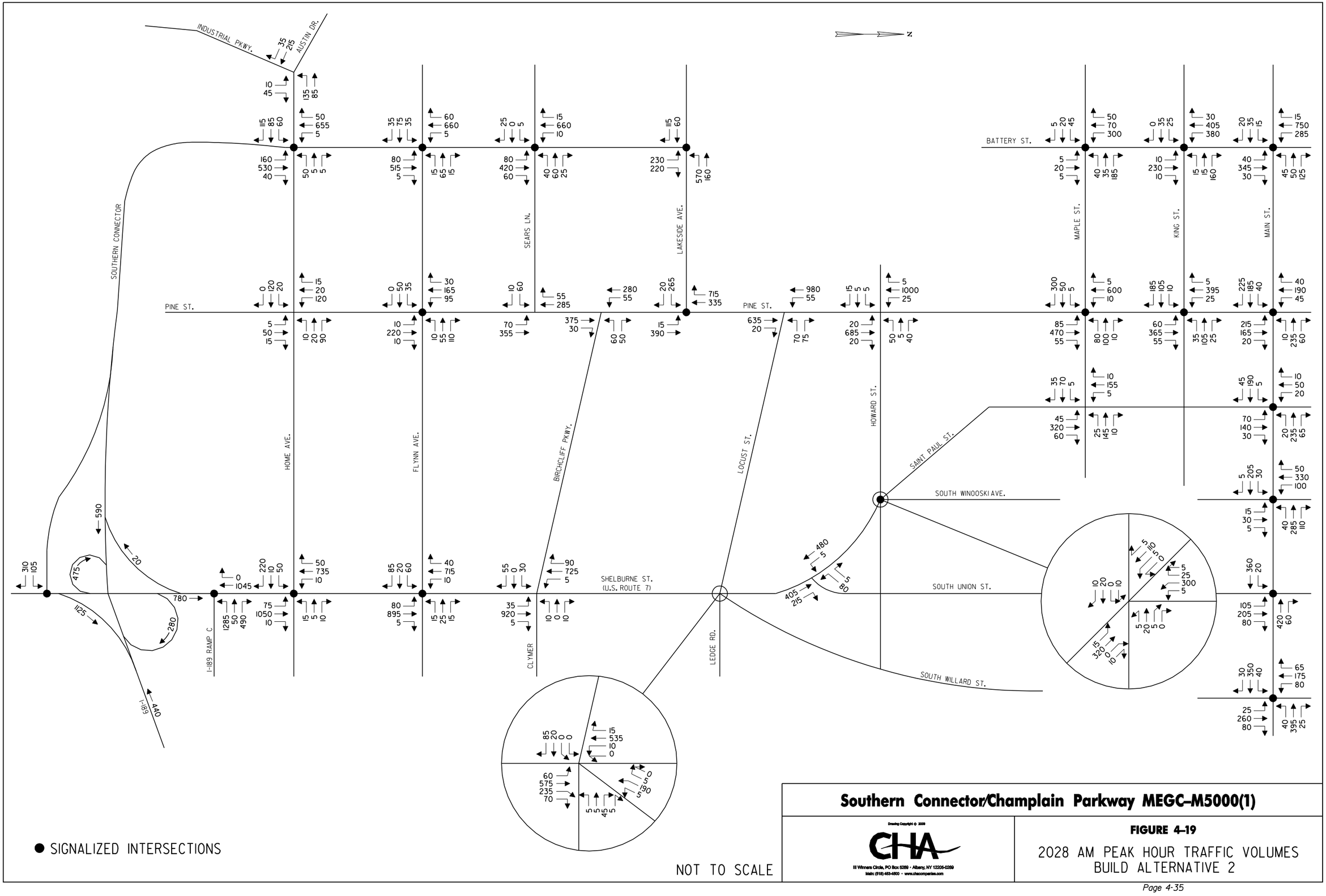

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FIGURE 4-19

2028 AM PEAK HOUR TRAFFIC VOLUMES
BUILD ALTERNATIVE 2

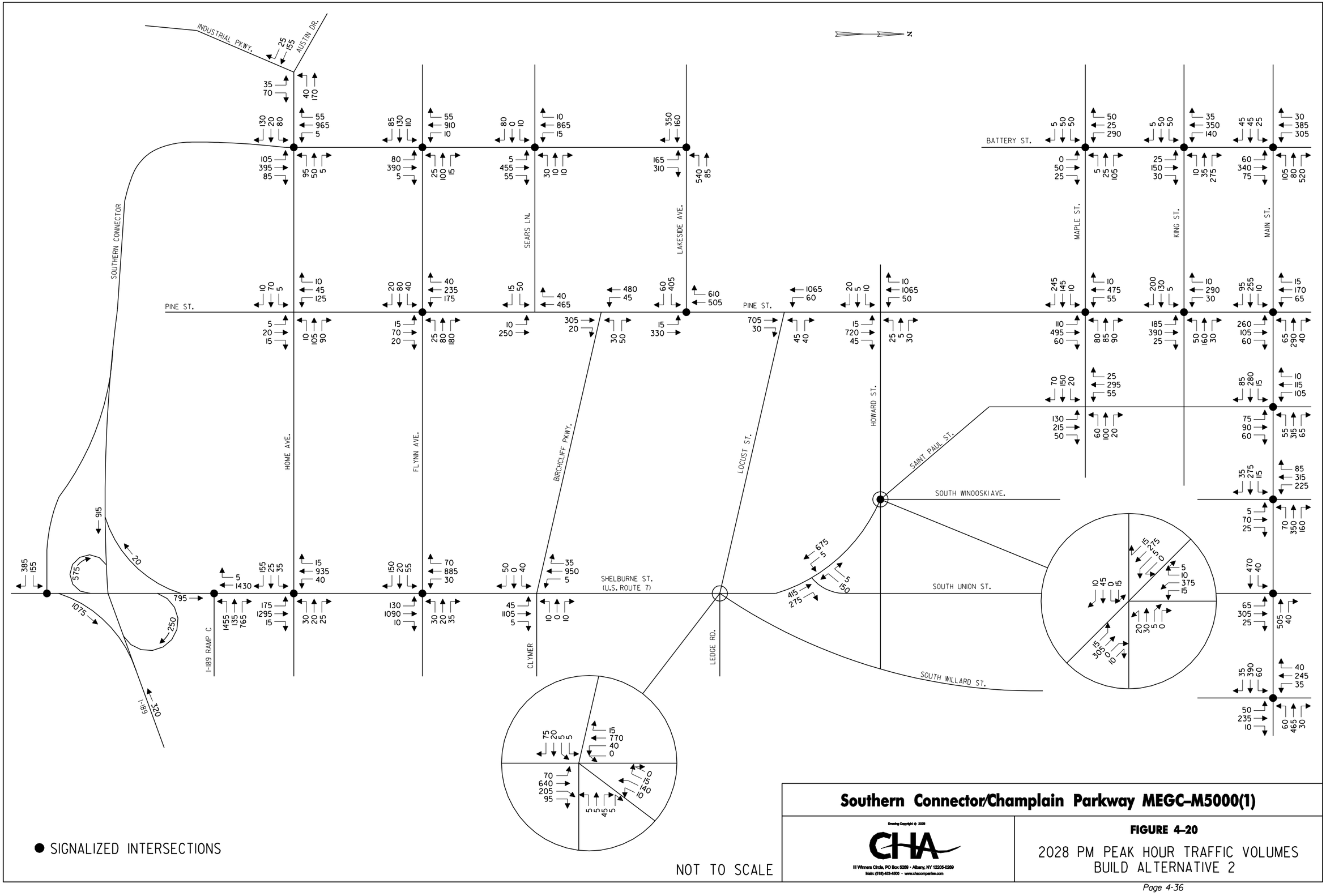

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FIGURE 4-20

2028 PM PEAK HOUR TRAFFIC VOLUMES
BUILD ALTERNATIVE 2

Table 4-6: Level of Service Summary–Primary Study Area: Build Alternative 2

Location	2008 (ETC) AM Peak Hour	2008 (ETC) PM Peak Hour	2028 (ETC+20) AM Peak Hour	2028 (ETC+20) PM Peak Hour
Signalized Intersections				
Battery Street & Main Street	C	C	C	C
Battery Street & King Street	B	B	C	B
Battery Street & Maple Street	B	B	B	B
Pine Street & Main Street	C	C	C	C
Pine Street & Lakeside Avenue	C	C	C	C
Pine Street & Flynn Avenue	B	B	B	B
Connector & Lakeside Avenue	B	C	B	C
Connector & Sears Lane	B	B	B	B
Connector & Flynn Avenue	B	D	C	E
Connector & Home Avenue	C	C	C	C
AWSC (1) Intersections				
Pine Street & King Street	B(3)	C(3)	B(3)	C(3)
Pine Street & Maple Street	C(3)	D(3)	C(3)	D(3)
Pine Street & Home Avenue	A	A	A	A
TWSC (2) Intersections				
Pine Street & Howard Street				
Eastbound Approach	F	F	F	F
Westbound Approach	F	F	F	F
Pine Street & Locust Street				
Westbound Approach	F	F	F	F
Pine Street & Birchcliff Parkway				
Westbound Approach	B	B	C	C
Pine Street & Sears Lane				
Eastbound Approach	C	C	C	C

(1) AWSC = All-Way Stop Control
(2) *TWSC = Two-Way Stop Control (i.e., Side Street Stop). Note that the LOS for TWSC intersections represents the operation of the minor stop-controlled approach movements. Mainline movements are free-flow.*
(3) This intersection is signalized in this alternative

The operations of the unsignalized intersections within the Secondary study area would be essentially the same as noted for the other Build alternatives. Although there is some improvement at these locations associated with reductions in delay compared to the No-Build Alternative, these changes are modest and the LOS would continue to be LOS E or F during one or both peak hours for the stop-controlled movements.

2028 Design Year: Build Alternative 2

Primary Study Area

The signalized intersections within the Primary study area would generally operate at acceptable LOS D or better during both peak hours in this 20-year design horizon. However, signs of congestion would begin to show along the Southern Connector/Champlain Parkway, as evidenced by a LOS E operation at the intersection of the Southern Connector/Champlain Parkway and Flynn Avenue. These operations are consistent with those identified for Build Alternative 1. The signalized intersections of Pine Street at Maple Street and at King Street in this alternative would also continue to operate at LOS D or better in this 2028 design year.

In the Primary study area, the LOS F conditions for the stop-controlled approaches at the TWSC intersections of Pine Street at Howard Street and Locust Street would be comparable to the conditions in the 2008 design year, although the amount of delay would increase as a result of increased traffic volume flow on Pine Street. The approaches of Sears Lane and Birchcliff Parkway to Pine Street would continue to operate at a LOS C during the 2028 peak hours.

Secondary Study Area

The existing signalized intersections within the Secondary study area would generally operate at acceptable LOS C or better through this design horizon. The one exception to this is the intersection of U.S. Route 7 at I-189 Ramp C, which would operate at LOS E during the PM peak hour. This is consistent with the operations for the other Build alternative and is an improvement from the LOS F operations in the No-Build Alternative.

The operations of the stop-controlled intersections would be comparable to the operations in the No-Build Alternative, with LOS E/F conditions for the stop-controlled approaches during peak hours.

Summary of Build Alternative 2 Analyses

Build Alternative 2 would improve mobility to the CCD compared to the No-Build Alternative. This mobility improvement would not be as substantial as the Null Alternative or Build Alternative 1, but would be better than the C-1 Section and C-2 Section Only alternative (See Appendix 3 for alternatives considered and dismissed). This alternative would also be effective in reducing the movement of through traffic in the residential neighborhoods on the southern side of the project area. This alternative would also alleviate the congestion issue identified for the section of Pine Street between Maple Street and Main Street for the No-Build Alternative.

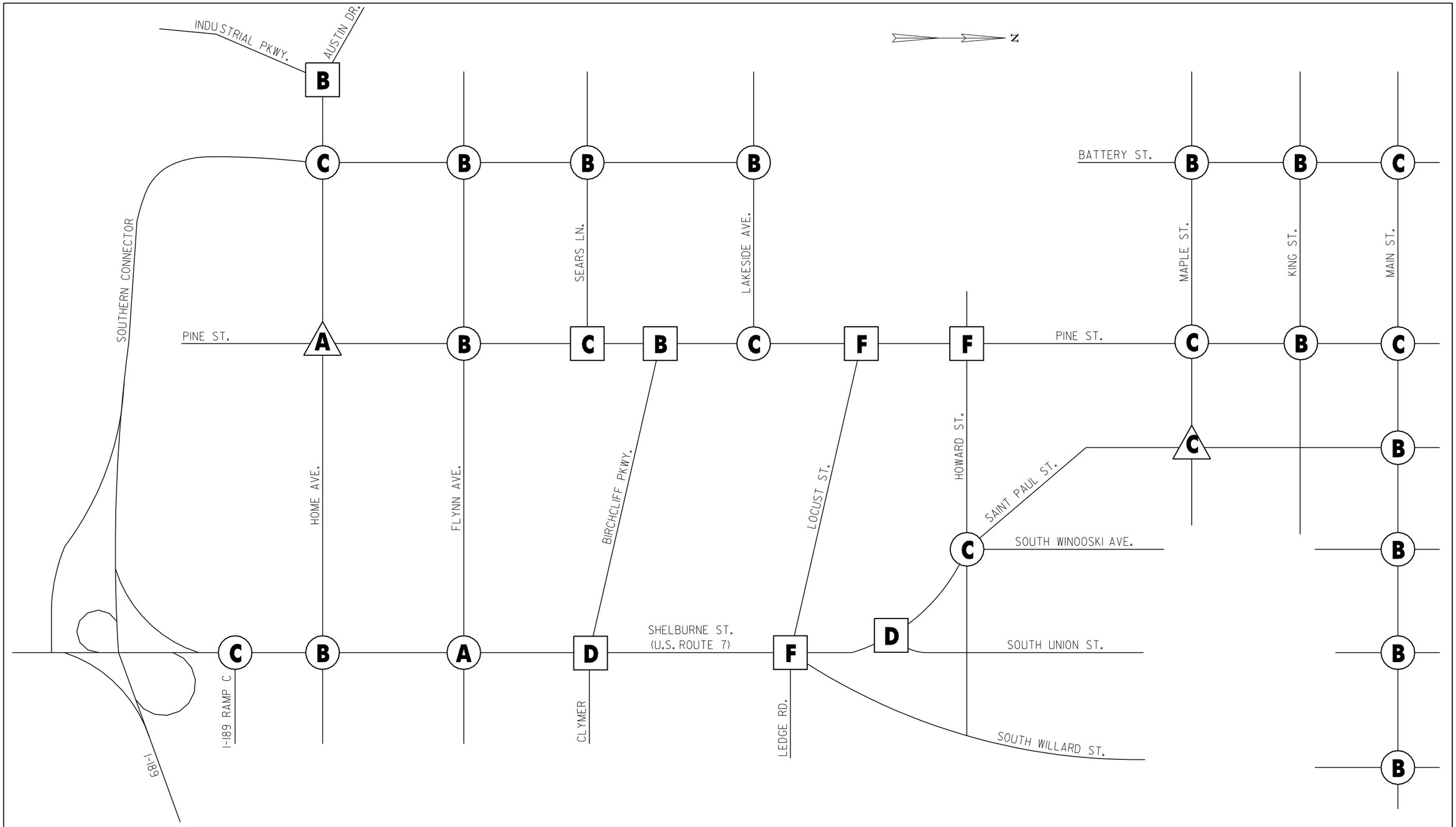

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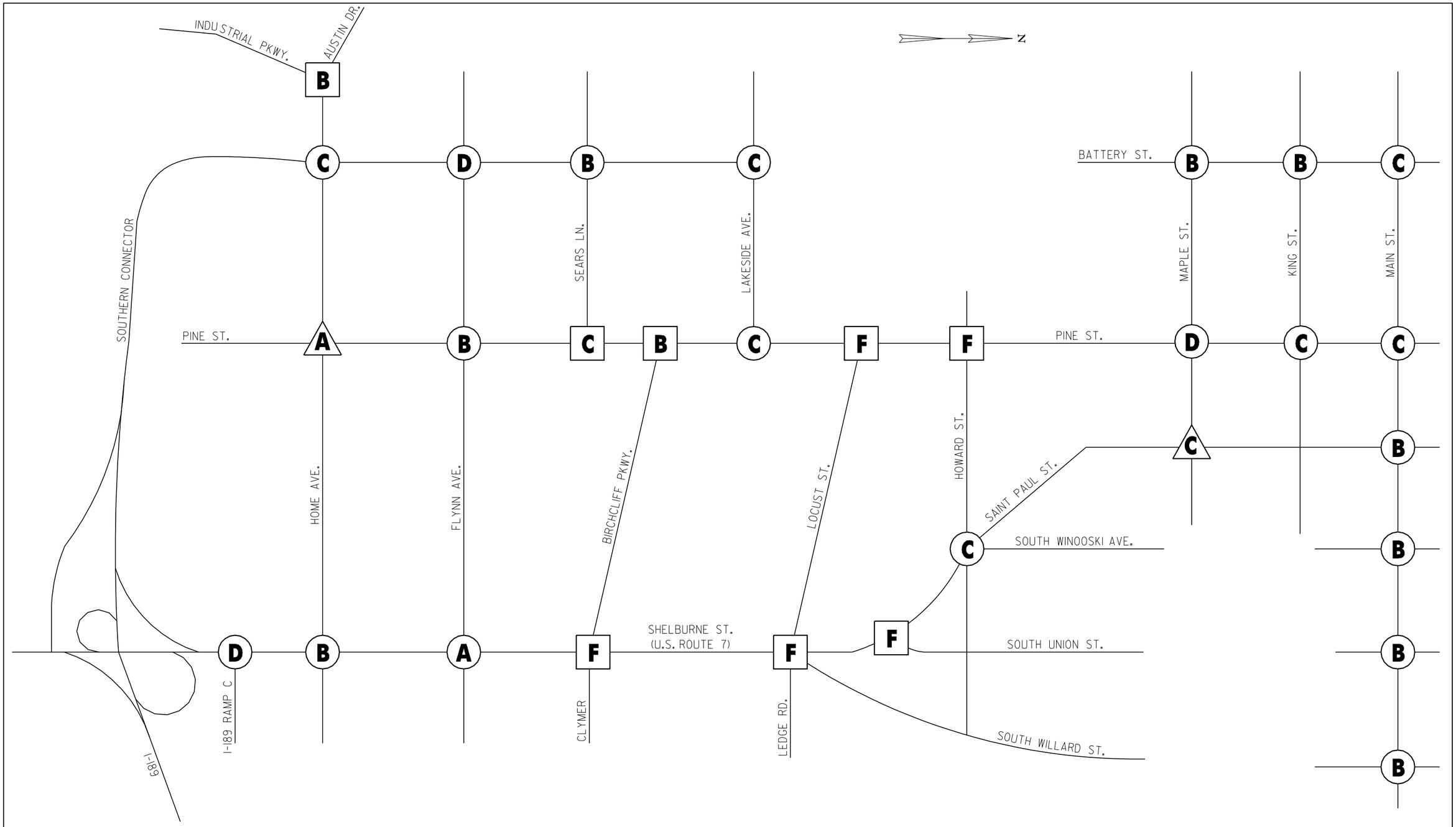
FIGURE 4-21

2008 AM PEAK HOUR LEVEL OF SERVICE
BUILD ALTERNATIVE 2



LEGEND

- (X) SIGNAL CONTROL (OVERALL LOS)
- (X) ALL-WAY STOP CONTROL (OVERALL LOS)
- [X] 2-WAY STOP CONTROL (MINOR STREET APPROACH LOS)

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FIGURE 4-22

2008 PM PEAK HOUR LEVEL OF SERVICE
BUILD ALTERNATIVE 2

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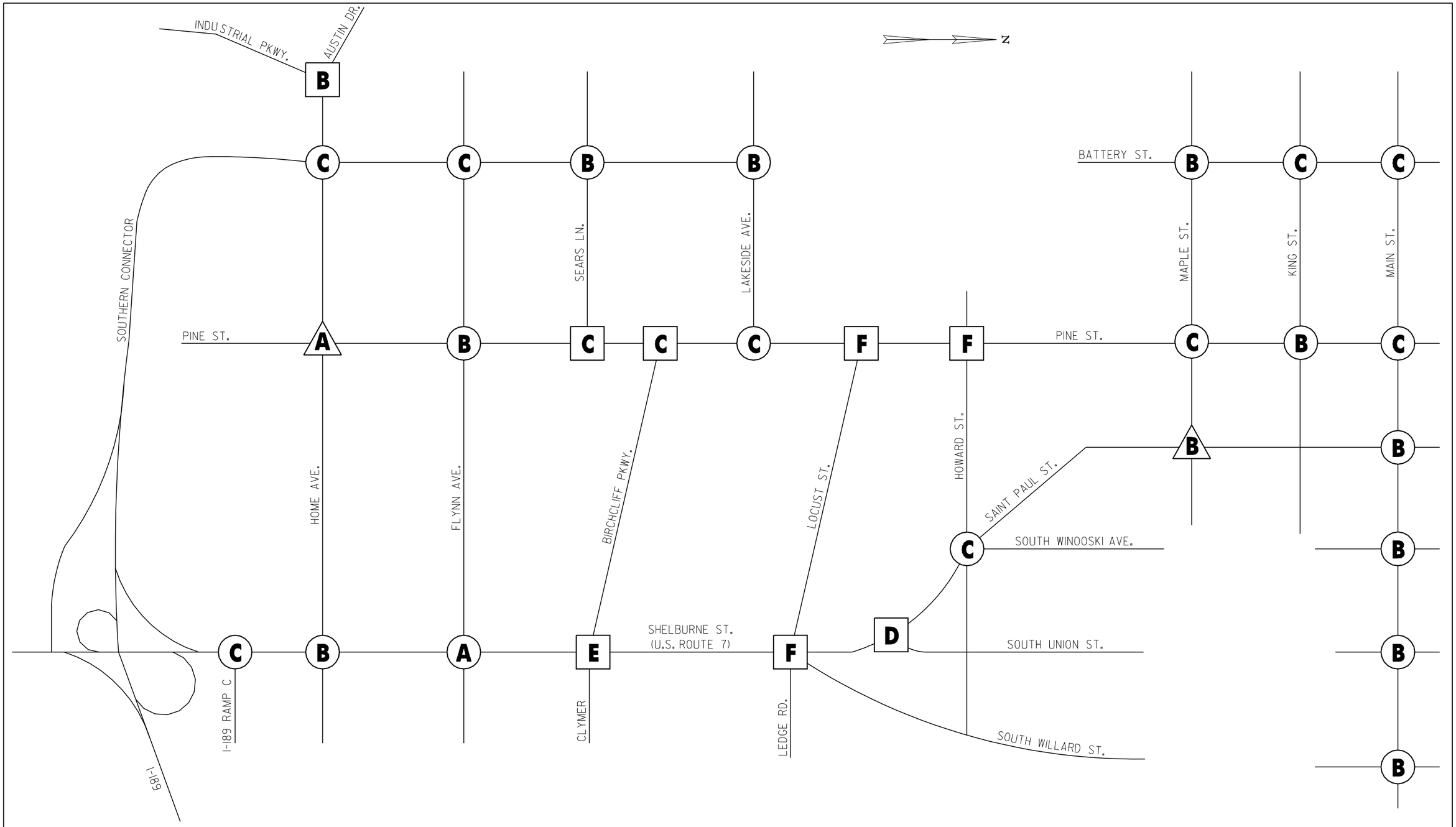

LEGEND

- (X) SIGNAL CONTROL (OVERALL LOS)
- (X) ALL-WAY STOP CONTROL (OVERALL LOS)
- [X] 2-WAY STOP CONTROL (MINOR STREET APPROACH LOS)

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FIGURE 4-23

2028 AM PEAK HOUR LEVEL OF SERVICE
BUILD ALTERNATIVE 2

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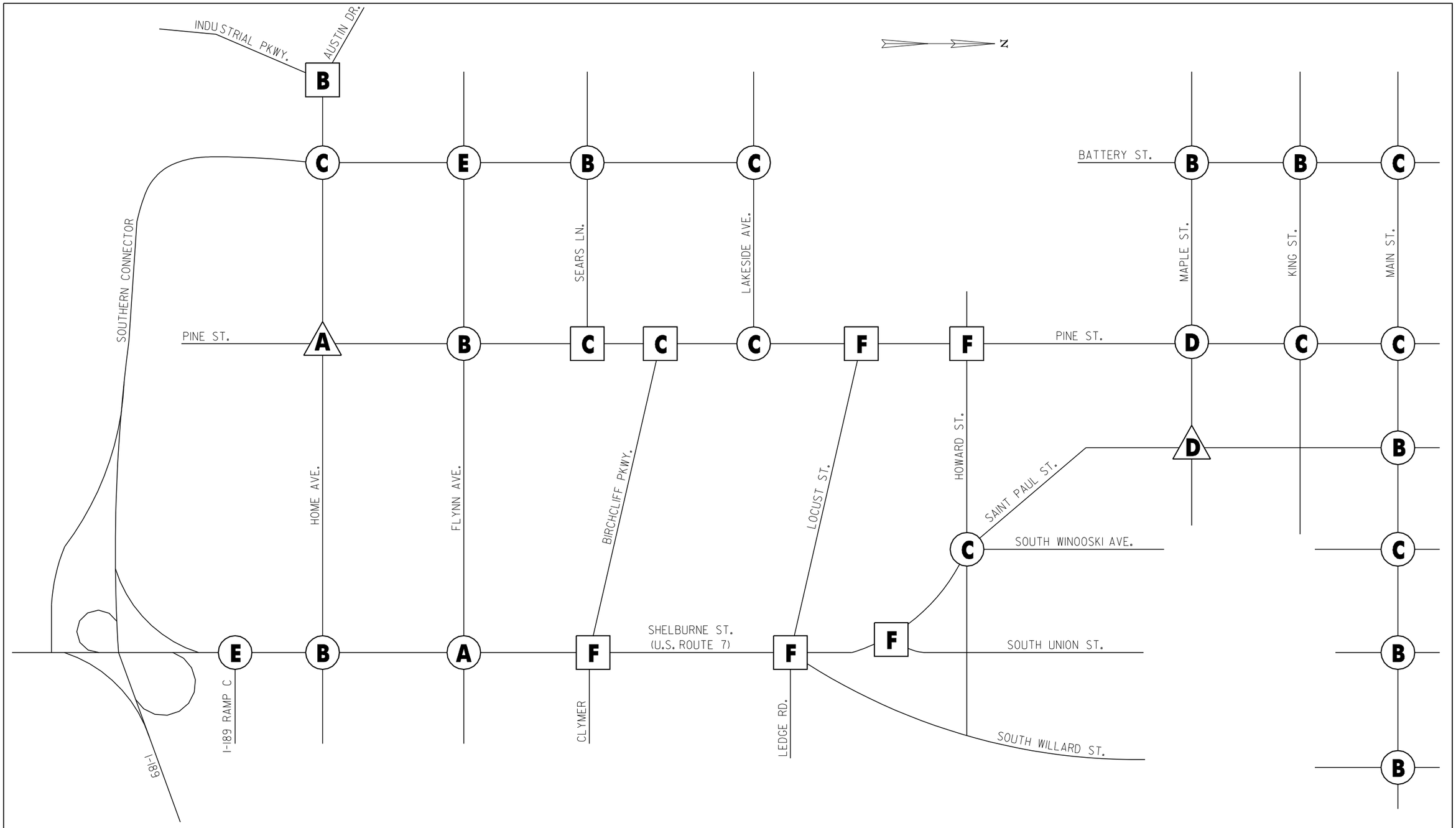

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FIGURE 4-24

2028 PM PEAK HOUR LEVEL OF SERVICE
BUILD ALTERNATIVE 2

Traffic operations along the Southern Connector/Champlain Parkway for this alternative would be at an overall LOS D or better during peak hours (except at the intersection of the Southern Connector/Champlain Parkway and Flynn Avenue, where the LOS would be LOS E).

Build Alternative 2 addresses the overall mobility objectives of the project and provides improved access to the industrial facilities within the corridor when compared to the No-Build Alternative. It also removes through traffic from residential areas in the southern section of the project corridor, and mitigates the effect of traffic increases in the northern section of the Pine Street to the extent practicable.

Build Alternative 2 satisfies the purpose and need of this project by providing mobility and access to the CCD.

Comparison of Alternatives - Traffic

The following is a summary overview and comparison of the traffic volumes and operations for each of the project alternatives.

Table 4-7 summarizes the projected ADT volumes for each of the alternatives in the 2008 and 2028 design years. A review of the data shown in Table 4-7 indicates that traffic volumes on Pine Street between Lakeside Avenue and Maple Street would increase by approximately 25-30% in Build Alternative 1 compared to the No-Build Alternative, while the volumes on this section of Pine Street would increase 10-15% in Build Alternative 2 compared to the No-Build Alternative.

Traffic volumes on the section of Pine Street south of Lakeside Avenue are projected to decrease by 50% or more in both Build alternatives. Volumes on this section of Pine Street would be generally lower in Build Alternative 2 than in Build Alternative 1. This is a result of the fact that Build Alternative 1 draws more regional traffic to the study area due to the improved connectivity to the CCD from the Battery Street Extension (which effects volumes on both the Southern Connector/Champlain Parkway and on Pine Street) than occurs in Build Alternative 2.

The proposed Battery Street Extension from Maple Street to Pine Street near Marble Avenue included in the Build Alternative 1 also diverts traffic from the northern section of Pine Street (from Maple Street to Main Street), reducing traffic volumes by 20% compared to the No-Build Alternative. In Build Alternative 2, traffic volumes on the section of Pine Street from Maple Street to Main Street are projected to increase by 30% compared to the No-Build Alternative. Some of this increase is a product of the improved connectivity to the CCD created by the Southern Connector/Champlain Parkway. Another factor contributing to this volume pattern is that the conversion of the two AWSC intersections (at Maple Street and at King

Street) to traffic signal control in this alternative will equalize the distribution of travel time and delay through the corridor. This effect will retain traffic on Pine Street, and reduce the infiltration of traffic onto the Maple Street and King Street neighborhoods. It is also noted that the projected Build Alternative 2 traffic volume on the section of Pine Street north of Maple Street will be comparable to the projected volume on the section south of Lakeside Avenue.

Tables 4-8 & 4-9 summarize the signalized and unsignalized intersection analysis for each of the alternatives in the 2008 and 2028 design years. These tables show the overall LOS for the intersection or each unsignalized minor street approach. Detailed LOS and delay for each approach is listed in Appendix 3. As shown in the table, the main differences between the alternatives focus on Pine Street from Lakeside Avenue to Main Street. Both Build Alternatives improve operations along the southern section of Pine Street. Both Build Alternatives improve operations along the northern section of Pine Street (Maple Street to Main Street); however, Build Alternative 1 would provide better LOS.

Summary of Comparisons

No-Build Alternative

In the No-Build Alternative, traffic would continue to use Home Avenue and Flynn Avenue to travel between U.S. Route 7 and Pine Street. Traffic increases along the Pine Street and U.S. Route 7 corridor would also produce increased congestion and queuing, especially for traffic entering these corridors from the unsignalized side streets. These conditions would result in LOS F operations for these traffic movements. Left-turn movements from Pine Street onto the side streets would also contribute to congestion along Pine Street due to reductions in the available gaps in opposing travel direction resulting from increased volume and uncoordinated flow.

Traffic volumes would increase and the congestion experienced at the intersection of Pine Street and Maple Street would become a constraint on the existing corridor. This intersection is the focal point of the CCD area and it would control the operations of traffic entering/exiting the CCD. The AWSC intersection of Pine Street with Maple Street is projected to operate at an overall LOS F during all of the future No-Build AM and PM peak periods. The AWSC intersection of Pine Street with Home Avenue is projected to operate at an overall LOS E during the 2008 AM peak hour, and then at LOS F during all other No-Build years and peak periods.

These operating conditions represent a substantial corridor capacity constraint, which would result in recurrent system-wide failure. The No-Build Alternative would not meet the purpose and need of the project, but is considered throughout this chapter as a baseline for comparison to the Build Alternatives.

Table 4-7: Average Daily Traffic Volume Summary: Comparison of Alternatives

Location	No-Build Alternative		Build Alternative 1		Build Alternative 2	
	2008	2028	2008	2028	2008	2028
Southern Connector/ Champlain Parkway: Home Avenue to Lakeside Avenue	--	--	13,500	13,800	12,800	13,200
Pine Street: Home Avenue to Flynn Avenue	9,600	10,300	3,100	3,100	2,700	2,800
Pine Street: Flynn Avenue to Lakeside Avenue	16,300	17,500	8,200	8,200	7,300	7,600
Pine Street: Lakeside Avenue to Maple Street	14,000	14,900	18,000	18,100	15,900	16,300
Pine Street: Maple Street to Main Street	6,600	6,700	5,200	5,200	8,500	8,500
Battery Street: Maple Street to Main Street	7,400	7,600	13,000	13,200	7,000	7,000
Lakeside Avenue: Connector to Pine Street	6,100	7,500	11,100	11,600	10,400	11,000
Maple Street: Pine Street to Battery Street	5,900	6,100	3,200	3,200	4,800	4,800
King Street: Pine Street to Battery Street	4,100	4,100	3,100	3,100	5,500	5,600
Main Street: Pine Street to Battery Street	8,900	9,100	5,700	5,700	10,400	10,400

Table 4-8: Level of Service Summary - 2008 (ETC) Design Year						
Location	**AM Peak Hour**			**PM Peak Hour**		
	No-Build	Build Alt. 1	Build Alt. 2	No-Build	Build Alt. 1	Build Alt. 2
Signalized Intersections						
Battery Street & Main Street	B	B	C	B	C	C
Battery Street & King Street	B	C	B	B	C	B
Battery Street & Maple Street	B	B	B	B	C	B
Pine Street & Main Street	B	B	C	B	B	C
Pine Street & Battery Street Ext	Note 1	B	Note 1	Note 1	C	Note 1
Pine Street & Lakeside Avenue	A	C	C	B	C	C
Pine Street & Flynn Avenue	B	B	B	C	B	B
Connector & Lakeside Avenue	Note 1	C	B	Note 1	B	C
Connector & Sears Lane	Note 1	B	B	Note 1	B	B
Connector & Flynn Avenue	Note 1	B	B	Note 1	D	D
Connector & Home Avenue	Note 1	B	C	Note 1	D	C
AWSC (1) Intersections						
Pine Street & King Street	C	A	B (3)	C	B	C (3)
Pine Street & Maple Street	F	B	C (3)	F	C	D (3)
Pine Street & Home Avenue	F	A	A	F	A	A
TWSC (2) Intersections						
Pine Street & Howard Street						
Eastbound Approach	D	F	F	F	F	F
Westbound Approach	F	F	F	F	F	F
Pine Street & Locust Street						
Westbound Approach	F	F	F	F	F	F
Pine Street & Birchcliff Parkway						
Westbound Approach	E	C	B	F	C	B
Pine Street & Sears Lane						
Eastbound Approach	D	C	C	F	C	C

(1) AWSC = All-Way Stop Control

(2) *TWSC = Two-Way Stop Control (i.e., Side Street Stop). Note that the LOS for TWSC intersections represents the operation of the minor stop-controlled approach movements. Mainline movements are free-flow.*

(3) This intersection is signalized in this alternative

Notes:

1- this intersection does not exist in this alternative

Table 4-9: Level of Service Summary - 2028 (ETC+20) Design Year

Location	AM Peak Hour			PM Peak Hour		
	No-Build	Build Alt. 1	Build Alt. 2	No-Build	Build Alt. 1	Build Alt. 2
Signalized Intersections						
Battery Street & Main Street	B	B	C	C	C	C
Battery Street & King Street	C	C	C	B	C	B
Battery Street & Maple Street	B	B	B	B	C	B
Pine Street & Main Street	B	B	C	B	B	C
Pine Street & Battery Street Ext	Note 1	B	Note 1	Note 1	C	Note 1
Pine Street & Lakeside Avenue	A	D	C	C	C	C
Pine Street & Flynn Avenue	B	B	B	F	B	B
Connector & Lakeside Avenue	Note 1	B	B	Note 1	C	C
Connector & Sears Lane	Note 1	B	B	Note 1	B	B
Connector & Flynn Avenue	Note 1	B	C	Note 1	F	E
Connector & Home Avenue	Note 1	C	C	Note 1	D	C
AWSC (1) Intersections						
Pine Street & King Street	C	B	B (3)	D	B	C (3)
Pine Street & Maple Street	F	B	C (3)	F	C	D (3)
Pine Street & Home Avenue	F	A	A	F	A	A
TWSC (2) Intersections						
Pine Street & Howard Street						
Eastbound Approach	E	F	F	F	F	F
Westbound Approach	F	F	F	F	F	F
Pine Street & Locust Street						
Westbound Approach	F	F	F	F	F	F
Pine Street & Birchcliff Parkway						
Westbound Approach	F	C	C	F	C	C
Pine Street & Sears Lane						
Eastbound Approach	E	D	C	F	C	C

(1) AWSC = All-Way Stop Control

(2) *TWSC = Two-Way Stop Control (i.e., Side Street Stop). Note that the LOS for TWSC intersections represents the operation of the minor stop-controlled approach movements. Mainline movements are free-flow.*

(3) This intersection is signalized in this alternative

Notes:

1- this intersection does not exist in this alternative

Build Alternative 1

By diverting traffic onto the Southern Connector/Champlain Parkway, Build Alternative 1 provides the same benefits for the southern section of Pine Street as the Null Alternative (See Appendix 3). Likewise, in the northern section of Pine Street, the connection for the north/south circulation to the CCD area needed to improve traffic operations is provided by the construction of the Battery Street Extension portion of the C-6 Section. The intersection of Pine Street and Maple Street would no longer be a congestion point that would affect access to the CCD. This alternative also provides connectivity to existing industrial facilities. However, without the C-8 Section in this alternative, traffic volumes on Pine Street would increase between Lakeside Avenue and the Battery Street Extension. This would increase delays for the stop-controlled approaches trying to access Pine Street.

By removing through traffic from the neighborhood streets in the southern and northern sections of Pine Street, and providing acceptable LOS for the signalized intersections within the project study area, Build Alternative 1 meets the purpose and need of this project. However, the C-6 Section of this alternative requires new roadway construction through the existing Burlington rail yard facilities. As a result of substantial environmental and rail yard operation mitigation issues associated with the relocation of these operations, this alternative is not recommended as the Preferred Alternative at this time.

Build Alternative 2

Build Alternative 2 reduces the through volume on the southern sections of Pine Street, avoids the negative implications with the construction of the C-8 or C-6 Section as discussed in chapter 2, and with the installation of traffic signals at the intersections of Pine Street at Maple Street and Pine Street at King Street, provides acceptable operation conditions in the CCD area and mitigates the affect of traffic increases to the extent practicable. Although this alternative increases the traffic volumes on Pine Street north of Maple Street, the projected volumes are comparable to the projected volumes on Pine Street south of Lakeside Avenue. Build Alternative 2 addresses the overall mobility objectives of the project and provides improved access to the industrial facilities within the corridor when compared to the No-Build Alternative.

Build Alternative 2 would not only improve conditions within the Primary study area, but also improve conditions for the Secondary study area as well. Traffic volumes on U.S. Route 7 would decrease and signalized operations would improve as the Southern Connector/Champlain Parkway creates a more favorable route to access the CCD area. U.S. Route 7 through traffic currently using Home Avenue and Flynn Avenue to access Pine Street would also decrease. By removing through traffic from the neighborhood streets and providing acceptable LOS for the signalized

intersections within the project study area, Build Alternative 2 satisfies the purpose and need of this project. This alternative is identified by the City of Burlington and VTrans as the Preferred Alternative at this time.

4.2.2 Rail Operations

This section describes the impacts to the existing rail yard operations resulting from the No-Build, Build Alternative 1 and Build Alternative 2.

4.2.2.1 No-Build Alternative

There would be no impact to the State of Vermont's existing rail yard as a result of the Southern Connector/Champlain Parkway project if the No-Build Alternative were implemented.

However, the Vermont Legislature's directive to VTrans to study the potential for relocating the VTR's operations completely out of the downtown and waterfront areas in an effort to redefine the land uses and economic development opportunities may continue.

VTrans' study was commissioned under Vermont State Law, Section 8 of the 2000 House Bill No. 853 with the intent "to evaluate the feasibility of funding options for the proposed relocation of the Burlington Railroad Yard". The first phase of the VTrans study was completed in February 2001 and found that it would be feasible to relocate the switching yard and commercial yard to another location somewhere in the greater Burlington area, but a site has not been determined.

4.2.2.2 Build Alternative 1

The construction of Build Alternative 1 would directly impact the rail yard property and a number of operations and infrastructure components within the existing Burlington Rail Yard. Specifically, the impacts to the existing rail yard are caused by the construction of the Battery Street Extension portion of the C-6 Section that would connect Pine Street and Battery Street immediately north and east of the existing rail yard. The Battery Street Extension portion of the C-6 Section departs from Pine Street by curving westerly just north of the Pine Place intersection with Pine Street in the vicinity of the former Burlington Street Department, Curtis Lumber (formerly Gregory Supply Company) and the Burlington Rail Yard.

The reconfiguration of the Burlington Rail Yard as mitigation for Build Alternative 1 would include the relocation of the commercial yard area of the Burlington Rail Yard and the relocation of several rail yard tracks and transloading facilities. However, in order to maintain rail access to the commercial establishments located along Pine Street and to avoid the creation of two new grade crossings on an urban principal arterial, all of the proposed rail yard mitigation associated with this alternative would

be on the western side of the proposed Battery Street Extension. As a result, the former Burlington Street Department building, a historic resource, would have to be relocated or partially demolished.

Avoiding the creation of any new grade crossings would promote the safest and highest levels of service possible for vehicular traffic along the proposed Battery Street Extension.

Incorporating mitigation for those operations impacted by the construction of the Build Alternative 1 within the Burlington Rail Yard is not physically feasible due to track geometry limitations and site constraints. Therefore, the Rail Yard mitigation plan reflects the track relocations necessary to mitigate the operations impacted in order to accommodate the construction of Build Alternative 1, as shown in Figure 4-25. It would not be possible to reconfigure the rail yard within the existing limits; therefore the proposed mitigation limits extend south to adjacent properties.

Under the Burlington Rail Yard mitigation plan proposed for Build Alternative 1, the proposed relocation and separation of the commercial yard from the switching yard would greatly enhance the ability to relocate these operations sometime in the future.

The presence of peat in the subsurface may pose a potential problem to the structural integrity of the relocated rail yard facilities. Variable depths and thicknesses of the peat layer could lead to differential consolidation settlements under the imposed loads. It is important to understand the profile of the peat layer beneath proposed track and other facilities to evaluate the potential for differential consolidation settlement to occur. Measures then could be taken to mitigate the impacts of differential settlement on the integrity of the relocated facilities. Additional soil borings would be installed in the areas of rail yard relocation to further profile peat within those areas. Additional information regarding the subsurface soils in the area of the rail yard mitigation is discussed in Section 4.11.

These impacts and mitigation to the operations associated with Build Alternative 1 are summarized as follows:

1 – Horn Track: The existing Horn Track is impacted because the roadway alignment bisects the track. The relocated Horn Track is a critical element of the proposed rail yard mitigation plan because it is the primary running track and longest continuous track for loading and unloading operations in the yard. The placement of the pit and conveyor determines the location for unloading material from the rail cars; therefore, it should be placed approximately in the middle of the track to maximize the capacity of the track.

The proposed Horn Track alignment would consist of a shorter and sharper-curved track compared to the existing Horn Track. As a result of the reduction in track

length, the ability to handle continuous loading and unloading operations on the track would be reduced. Its new location also substantially reduces the amount of available storage adjacent to the track in order to stage aggregate commodities such as salt, ballast, stone and sand that are currently being handled on the Horn Track. Due to necessary changes to other tracks in the rail yard, the Horn Track becomes more important as the primary running track around the switching yard and continuous unloading track. The Horn Track would also serve as the lead track to the relocated commercial operations. Access to many of the relocated operations would be obstructed when the Horn Track is being utilized for continuous loading operations.

2 – Salt Shed: The existing salt shed and its supporting facilities are not impacted by this alternative. Salt unloading operations would continue from Track 8 into the existing pit and conveyor.

3 – Scale: The existing scale is impacted because trucks would not be able to maneuver onto the ramps due to the reduced separation between the relocated Horn Track and the scale. The existing Scale is used primarily by operations associated with the Salt Shed, but it also supports other operations. It is proposed that a new Scale would be located at the southern end of the yard adjacent to the proposed access road so that any truck leaving the commercial yard would have convenient access.

4 – Stone Loading Area: The existing stone loading operation is impacted because the length of track and adjacent area available for transloading and commodity storage are substantially reduced. It is proposed that this operation be relocated to the proposed commercial yard. The proposed location would be adjacent to the relocated Horn Track; however, due to space constraints inside the curve of the Horn Track, the stone loading area would be located outside of the curve. Although the proposed Horn Track is shorter than the existing, there would be adequate track and area next to the track to unload cars and pile the stone.

5 – Ballast Area: The existing ballast operation is impacted because this operation is handled with a continuous train located on the Horn Track which would be bisected by the construction of the roadway alignment. This operation involves transloading operations which occur adjacent to the Horn Track. While the available track for this operation is also slightly reduced from the existing layout, the loading operation could be accommodated by loading fewer cars at one time, but loading more frequently.

6 – Type 1 Cement: The existing Type 1 cement operation is not impacted by Build Alternative 1; however, because the existing Type 2 Cement (Operation 7) would be impacted by the project and these two operations share equipment, Type 1 Cement requires relocation from the northern end of Track 4. Type 1 Cement is proposed to

be consolidated with the Type 2 Cement (Operation 7) on one 220-foot track. Even though it would be slightly smaller than the combined operations in the existing rail yard, this location would provide adequate space for the portable transloading equipment as well as adequate truck access.

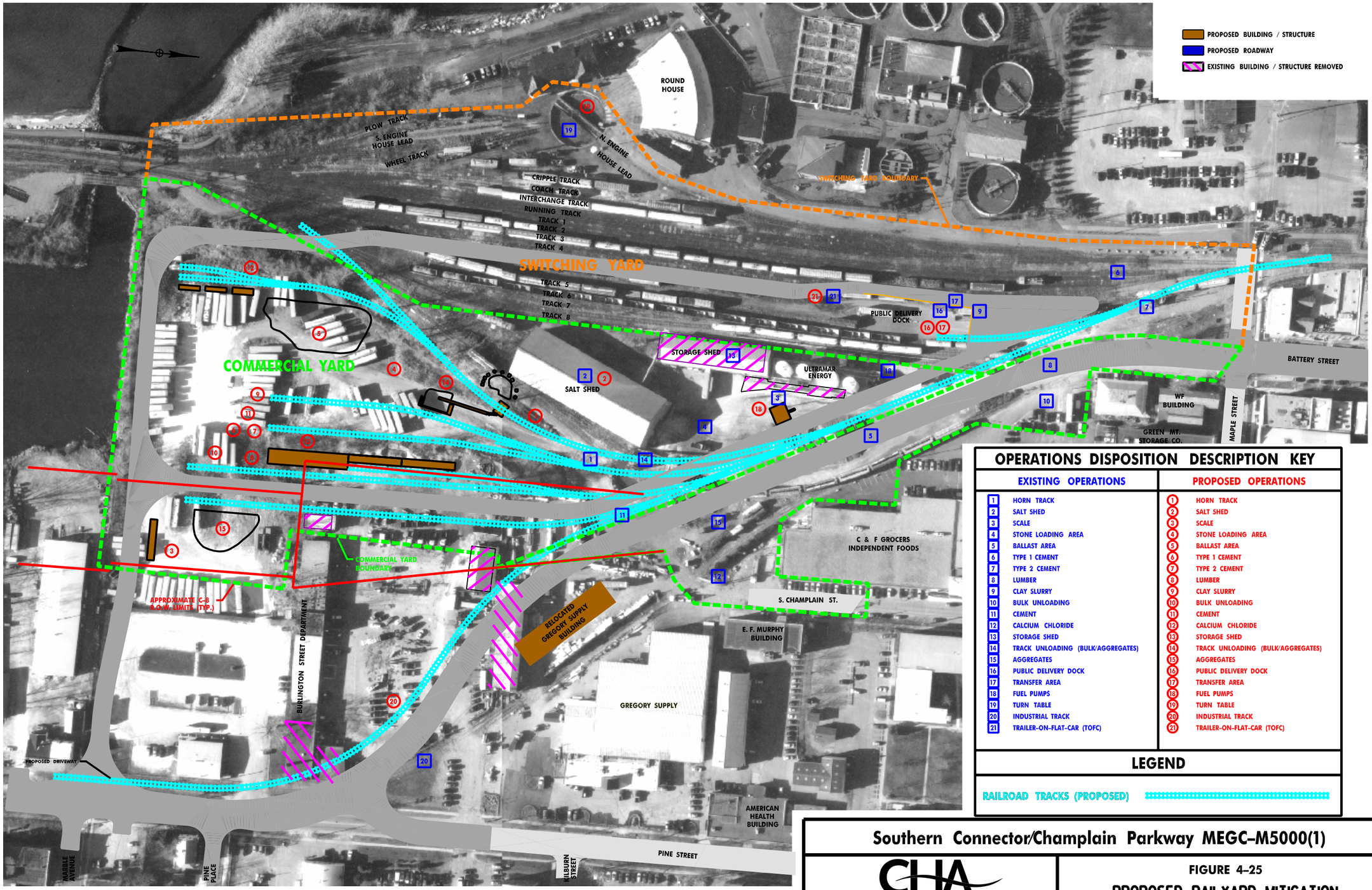
7 – Type 2 Cement: The existing Type 2 cement operation is impacted because the relocated Horn Track would be located through the current location of this operation. As stated in Type 1 Cement (Operation 6), this operation is proposed to share the same 220 foot track and unloading facilities as Type 1 Cement as these commodities are typically shipped to the same customer.

8 – Lumber: The existing lumber operation would be impacted because the roadway alignment would traverse through the existing area that is used to complete this operation. This operation is one of several commercial yard operations that require the track to have forklift or truck access from one or both sides as well as close proximity to a covered storage area or elevated transfer area that can be accessed by trucks. The existing lumber and building materials unloading operation currently utilizes the support facilities shared by the Public Delivery Dock (Operation 16), Truck Transfer (Operation 17), and TOFC operation (Operation 21) because they all require a ramp and a loading dock. This operation is proposed to be relocated to a new, shared transfer facility at the southeastern end of the new commercial yard. There would be a new track, ramp and storage facility that would be shared with other similar operations (see Operation 13). The new location would have 160 feet of available track storage as well as adequate forklift and truck access.

9 – Clay Slurry: The existing clay slurry operation is impacted because the proposed Horn Track would be constructed in the area currently used to conduct this operation. This operation requires a 135 foot storage track as well as adequate access for trucks and transloading equipment. This operation is proposed to be relocated to the western end of the new commercial yard where there would be adequate track length and truck access as well as room for the tank car transloading equipment.

10 – Bulk Unloading: The existing bulk unloading operation is impacted because the roadway alignment traverses through the existing area that is used to complete this operation. This operation requires a 150 foot storage track with primary direct access to the rail cars by forklifts and trucks. Access to this operation is also necessary for cranes on a limited basis. Some commodities handled as part of this operation also require covered storage or truck transfer facilities. The proposed mitigation for this operation includes relocation to a shared track adjacent to the Lumber and Building Materials (Operation 8) and the Storage Shed (Operation 13).

11- Cement: The existing cement operation is impacted because several lead tracks for the relocated railroad operations and the internal circulation road would be constructed in the area currently used to conduct this operation. This operation



OPERATIONS DISPOSITION DESCRIPTION KEY

EXISTING OPERATIONS	PROPOSED OPERATIONS
1 HORN TRACK	1 HORN TRACK
2 SALT SHED	2 SALT SHED
3 SCALE	3 SCALE
4 STONE LOADING AREA	4 STONE LOADING AREA
5 BALLAST AREA	5 BALLAST AREA
6 TYPE 1 CEMENT	6 TYPE 1 CEMENT
7 TYPE 2 CEMENT	7 TYPE 2 CEMENT
8 LUMBER	8 LUMBER
9 CLAY SLURRY	9 CLAY SLURRY
10 BULK UNLOADING	10 BULK UNLOADING
11 CEMENT	11 CEMENT
12 CALCIUM CHLORIDE	12 CALCIUM CHLORIDE
13 STORAGE SHED	13 STORAGE SHED
14 TRACK UNLOADING (BULK/AGGREGATES)	14 TRACK UNLOADING (BULK/AGGREGATES)
15 AGGREGATES	15 AGGREGATES
16 PUBLIC DELIVERY DOCK	16 PUBLIC DELIVERY DOCK
17 TRANSFER AREA	17 TRANSFER AREA
18 FUEL PUMPS	18 FUEL PUMPS
19 TURN TABLE	19 TURN TABLE
20 INDUSTRIAL TRACK	20 INDUSTRIAL TRACK
21 TRAILER-ON-FLAT-CAR (TOFC)	21 TRAILER-ON-FLAT-CAR (TOFC)

LEGEND

RAILROAD TRACKS (PROPOSED)

Southern Connector/Champlain Parkway MEGC-M5000(1)

CLOUGH HARBOUR & ASSOCIATES LLP
III Winners Circle, PO Box 5269, Albany, NY 12205
www.cloughharbour.com

FIGURE 4-25

PROPOSED RAILYARD MITIGATION
BUILD ALTERNATIVE I

would be relocated in the area of the proposed Type 1 Cement (Operation 6) and Type 2 Cement (Operation 7) to enable the sharing of unloading equipment. This operation requires an approximately 150 foot storage track to accommodate three 50-foot hopper cars. The approximate location of this operation has been shown on Figure 4-25; however, the specific features related to this operation have not been shown at this time since Build Alternative 1 is not being identified as the Preferred Alternative.

12 – Calcium Chloride: The existing calcium chloride operation is impacted because the roadway alignment severs connection to the existing area that is used to complete this operation unless an at-grade crossing is installed. The Calcium Chloride operation requires a dedicated storage track 120 feet long for rail cars to be unloaded, adequate track capacity (120 feet) for three rail tank cars typically used for storage, and area for three wayside storage tanks (either above or below ground). There are two proposed, 120 foot tracks at this location as well as adequate room for storage tanks and transloading equipment at the southwestern end of the new commercial yard.

13 – Storage Shed: The existing storage shed operation and facilities are not impacted by Build Alternative 1. It is proposed to be relocated to the southeastern portion of the proposed commercial yard so that it can be combined with the Lumber (Operation 8) and supporting facilities in the commercial yard. As previously discussed, Lumber (Operation 8) requires a covered storage area in close proximity to the unloading operation. The proposed structure would be providing a covered storage area that does not exceed the existing capacity of the Storage Shed. This operation requires 120 feet of track and is used by both shippers and the railroad for handling commodities that require covered storage.

14 – Track Unloading (Bulk/Aggregates): The existing track unloading (bulk/aggregates) operation is impacted because this operation is handled with a continuous train located on the Horn Track which has been bisected by the construction of the roadway alignment. This operation involves transloading operations which occur adjacent to the Horn Track. This continuous unloading operation in the rail yard utilizes a remote control engine and requires at least 700 feet of unobstructed track on each side of the unloading pit and conveyor and a storage area with truck access adjacent to the track. The location of the pit and conveyor are critical in determining the track capacity. It is proposed to relocate the pit and conveyor approximately 200 feet to the south. This would cause a reduction of 200 feet of track capacity (without conflicts) along the proposed Horn Track.

15 – Aggregates: The existing aggregates operation is impacted because this operation is handled with a continuous train located on the Horn Track which has been bisected by the construction of the roadway alignment. This operation involves transloading operations which occur adjacent to the Horn Track. This continuous

unloading operation requires 500 feet of unobstructed track on either side of the unloading pit, storage area and adequate truck access adjacent to the track. The existing storage capacity for this operation is being directly impacted by the proposed Southern Connector/Champlain Parkway roadway alignment. As a result, it is proposed that this operation be relocated to the southeastern portion of the new commercial yard west of the Vermont Transit facility. This location would provide adequate track capacity (500 feet) and commodity storage area and adequate truck access.

16 – Public Delivery Dock: The existing public delivery dock is not impacted by Build Alternative 1. The public delivery dock would remain in its current location.

17 – Transfer Area: The existing transfer area is not impacted by Build Alternative 1. The transfer area would remain in its current location.

18 – Fuel Pumps: The existing fuel pumps are impacted because the proposed location of the new rail yard circulation road would directly impact their current location. This operation must remain in close proximity to the Ultramar Energy fuel tanks. It should be noted that the proposed project only impacts the fuel pumps, not the fuel storage tanks. Fuel would continue to be unloaded from the rail cars located on Track 7 and Track 8 to the storage tanks in the same manner as it is today. The fuel pumps require close proximity to the storage tanks and easy access by tanker trucks (WB-62) and home delivery trucks (SU).

19 – Turntable: The existing turntable is not impacted by this project. The existing 85 foot turntable would remain in place.

20 – Industrial Track: The existing industrial track (Pine Street Lead) is impacted because the proposed alignment bisects its current location. The Pine Street Lead formerly provided rail access to the former Specialty Filament company on the eastern side of Pine Street. The portion of this track located on the eastern side of Pine Street was recently removed during the redevelopment of the former Specialty Filament property. Subsequently, in July, 2009, the City of Burlington removed the skewed grade crossing across Pine Street under a separate roadway project. The Pine Street Lead currently is only being utilized to support the Calcium Chloride transloading operations (Operation 12). This approximately 1,000 foot long track is proposed to be relocated to the western side of the proposed Battery Street Extension. The relocation of this track would reduce the track length to approximately 900 feet. The Calcium Chloride transloading operations supported by this track would also require relocation as described under Calcium Chloride (Operation 12). In an effort to balance the impacts to the Burlington Street Department property and the existing Vermont Transit property, a 16 degree curve is proposed to connect to the existing track in the vicinity of Marble Avenue. Any track curvature that exceeds the maximum curvature of 12 degrees would be subject to the approval of VTrans.

21 – Trailer-on-Flat-Car (TOFC): The existing TOFC operation is not impacted by this project. The TOFC or "piggyback" operation requires a ramp that can be used by a trailer mover to back trailers onto rail cars from the existing loading dock platform. This type of ramp operation is also referred to as "Circus Loading" versus the more modern gantry crane loading methods. This location currently utilizes the same area as the existing Public Delivery Dock (Operation 16) and Transfer Area (Operation 17). The existing ramp and loading dock are proposed to remain in place at the northern end of Track 5 so that this operation would not require mitigation.

Rail Yard Access

Vehicular and truck access to the proposed commercial yard would be provided from Pine Street at its intersection with Marble Street. At this time, it is not anticipated that this intersection would be signalized based on the estimated traffic volumes associated with the proposed Southern Connector/Champlain Parkway and the volumes that are anticipated to be directed through the proposed rail yard access road. The appropriate warning system for the proposed grade crossing created at the new rail yard access road would be determined by the grade-crossing diagnostic team. An internal circulation road has been provided to facilitate orderly flow of trucks through the commercial portion of the rail yard. This would eliminate the open, uncontrolled paved areas found on the existing rail yard.

Build Alternative 1 also requires the relocation of the Curtis Lumber (formerly Gregory Supply Company) lumber storage building. However, this alternative eliminates the portion of the Industrial Track and associated fencing that currently bisects Curtis Lumber's yard area immediately west of their building. This change was acceptable to the owner of Gregory Supply because they utilized this track on a limited basis and its removal would have substantially improved access and mobility within the parcel. The materials which were obtained from this siding could have also been obtained from other conventional sources. At this time, Build Alternative 1 is not being identified as the Preferred Alternative, and coordination with Curtis Lumber regarding the removal of the Industrial track is not warranted at this time.

4.2.2.3 Build Alternative 2

Build Alternative 2 does not impact the Burlington Rail Yard because the C-6 Section under this alternative involves the rehabilitation of Pine Street from approximately Lakeside Avenue to Main Street to provide access to the CCD. However, a minor portion of the existing rail spur on the western side of Pine Street would require removal for the construction of the proposed sidewalk.

4.2.3 Impacts on Additional Transportation Services in the Study Area

4.2.3.1 Impacts on Existing Facilities

The study area is currently served by several additional travel modes as discussed in Chapter 3. The impacts to these existing facilities as a result of the Southern Connector/Champlain Parkway are described below:

- **Bus Service**: The City of Burlington is currently served by four types of transit services. These include:

  - Chittenden County Transportation Authority (CCTA) provides a fixed-route bus service throughout the study area.

    The No-Build Alternative would not impact any of the current bus routes or services provided by CCTA.

    CCTA's Pine Street route (Route 5) would be impacted by either Build Alternative 1 or Build Alternative 2. This bus route loops through the southern limits of the study area on Home Avenue, Industrial Parkway, Queen City Park Road and Pine Street. Build Alternative 1 and Build Alternative 2 would cul-de-sac Pine Street; thereby, severing the connection between Pine Street and Queen City Park Road. CCTA would need to alter this bus route.

  - Special Services Transportation Agency's (SSTA) demand-response van service within Chittenden County for area human service agencies would not be impacted by the No-Build Alternative or either Build Alternative.

  - Campus Area Transportation Management Association's (CATMA) fixed-route service within the University of Vermont Campus would not be impacted by the No-Build Alternative or either Build Alternative.

  - Vermont Transit's inter-city bus service throughout Vermont and New England would not be impacted by the No-Build Alternative or either Build Alternative.

- **Burlington Bike Path**: Burlington's Waterfront Bike Path would not be impacted by the No-Build Alternative or either Build Alternative. As part of Build Alternative 1 or Build Alternative 2, bicycle accommodations would be incorporated to compliment the City's bicycle network.

- **Ferry Service**: The Lake Champlain Transportation Company's ferry service between the City of Burlington and Port Kent, New York would not be impacted by the No-Build Alternative or either Build Alternative.

- **Park and Ride**:The Downtown Park and Ride Connection (PARC) offers commuters parking in the South End surface lot located between Sears Lane and Lakeside Avenue. The PARC would not be impacted by the No-Build Alternative. The area of the existing parking lot that is designated for use by PARC would be impacted by both Build Alternative 1 and Build Alternative 2. Approximately 70 parking stalls would be removed from PARC's 336 existing parking spaces.

4.2.3.2 Planned Facilities

- Downtown Transit Center: The City of Burlington and the Community and Economic Development Office (CEDO) are in the process of developing a Downtown Transit Center in the area of Cherry Street and Saint Paul Street. This would not be impacted by the No-Build Alternative or either of the Build Alternatives.

- South End Neighborhood Transit Center: The City of Burlington, CATMA and CCTA have partnered to develop the South End Neighborhood Transit Center in the vicinity of the proposed intersection of the Southern Connector/Champlain Parkway and Sears Lane. This project would not be impacted by the No-Build Alternative or by either of the Build Alternatives, as it has been developed in coordination with the Southern Connector/Champlain Parkway project.

- **Bicycle/Pedestrian**: The No-Build Alternative would not impact other planned bicycle or pedestrian improvements for the study area.

  Build Alternative 1 would incorporate a shared-use path paralleling the C-2 Section on the eastern side from Home Avenue to Lakeside Avenue. This shared-use path would connect with the terminus of the existing path located on the western side of the C-1 Section. Sidewalks would connect the shared-use path adjacent to the C-2 Section with the existing sidewalks on Home Avenue, Lyman Avenue, Ferguson Avenue and Flynn Avenue. A new sidewalk would be constructed along the north side of Sears Lane within the limits of the project and would provide connections to the proposed shared-use path. Build Alternative 1 would include five-foot bicycle lanes to both sides of Pine Street from Lakeside Avenue to Pine Place. Appropriate signage would alert vehicles to share the roadway with bicyclists. Coordination with the Burlington Bicycle Council revealed that Pine Street, north of Pine Place would continue to be the major bicycle route to the CCD. A continuous sidewalk would also be included along the eastern side of Pine Street from Lakeside Avenue to Pine Place. The proposed traffic signals would have exclusive pedestrian phases and crosswalks would be provided to maintain the east/west connectivity for pedestrians.

The planned improvements would be consistent with local and regional plans and would not negatively impact planned bicycle facilities in the study area.

Build Alternative 2 would provide the same bicycle and pedestrian accommodations as Build Alternative 1 except that Pine Street would not include five-foot bicycle lanes. Instead Pine Street would include 13-foot minimum shared-lanes to accommodate bicycles and motor vehicles. Build Alternative 2 would not impact planned bicycle and pedestrian improvements in the study area. A continuous sidewalk would be provided along both the eastern and western sides of Pine Street from Lakeside Avenue to Main Street.

- **Park and Ride**: No planned Park and ride lots would be impacted by the No-Build Alternative or either Build Alternative. The City of Burlington continues to support the development of commuter park and ride lots throughout the region, and continues to promote their implementation at the regional level. Of particular interest is the potential for developing park and ride, or commuter capture lots at the outskirts of the City to reduce congestion in the City street network. Commuters and visitors could leave their cars outside of the City and enter via bicycle or public transportation - bus or rail.

- **Passenger Rail**: No planned passenger rail services would be impacted by the No-Build Alternative or either Build Alternative.

4.2.4 Emergency Vehicle Access

The proposed project would result in a change in the existing street pattern in the vicinity of the C-2 Section under Build Alternative 1 and Build Alternative 2. These revisions would include the "dead-ending" of Ferguson Avenue, Lyman Avenue, and Morse Place, west of Foster Street (refer to Figure 3-1 in Section 3). The City of Burlington Fire Station No. 5 is currently located on Ferguson Avenue, east of the proposed Southern Connector/Champlain Parkway. Ferguson Avenue connects directly to Foster Street, which provides direct access to Home Avenue, Morse Place, Lyman Avenue, and Flynn Avenue. Therefore, sufficient alternative routings exist such that access by residents and emergency response vehicles and general travel patterns would not be substantially affected by the proposed project. Also, during construction of the proposed improvements along the C-6 Section, access for emergency vehicles would be maintained at all times for either Build Alternative 1 or Build Alternative 2.

4.2.5 Parking

The No-Build Alternative would not impact current parking facilities within the study area.

Build Alternative 1 would maintain a parking lane along the eastern side of Pine Street from Locust Street to approximately 200-feet north of Howard Street. A new parking lane would be created along Battery Street, from Maple Street to King Street. Approximately ten new on-street parking spaces would be created on Battery Street.

Build Alternative 2 would not impact the existing parking lane along the eastern side of Pine Street within the study area.

4.2.6 Mitigation

The No-Build Alternative would not require mitigation.

The Preferred Alternative does not result in negative impacts to traffic compared to the 2028 No-Build Alternative.

Both Build Alternatives would provide exclusive pedestrian phases at signalized intersections and crosswalks to maintain the accessibility across the Southern Connector/Champlain Parkway.

Build Alternative 1 would relocate VTR's railroad operations to mitigate the impacts to the existing railroad operations resulting from the construction of the Battery Street Extension. Build Alternative 2 does not impact any railroad operations; therefore, no mitigation would be required.

No mitigation would be provided for impacts to existing bus services or park and ride facilities resulting from either Build Alternative.

No mitigation would be provided for the impacts to the existing PARC commuter parking lot for the loss of 70 parking stalls. Adequate parking exists within the remaining parking lot to continue to provide services at this location. Also, this lot is the site of the proposed South End neighborhood Transit Center, which would redevelop the site.

Both Build Alternative 1 and Build Alternative 2 would include a shared-use path paralleling the C-1 Section, from Shelburne Street to Pine Street. This path would provide mitigation for bicyclists and pedestrians that would no longer be able to access Queen City Park Road from Pine Street.

No mitigation would be provided for emergency vehicle access. Sufficient alternative routings exist for emergency vehicles to provide services within the study area.

4.3 Land Use and Socio-Economic Impacts

This section describes impacts to land uses and socio-economics in the study area.

4.3.1 Impacts to Neighborhoods

The No-Build Alternative would not impact any of the neighborhoods located within the study area.

Build Alternative 1 would be adjacent to the South Meadow, Flynn Avenue/Home Avenue and Calahan Park neighborhoods (refer to Figure 3-7 in Section 3). The C-1 Section, which has been previously constructed, is adjacent to the South Meadows neighborhood and several homes located along Queen City Park Road and Arthur Court. Air and noise impacts associated with Build Alternative 1 are discussed in Sections 4.8 and 4.9, respectively.

Under Build Alternative 1, the C-2 Section would traverse vacant land owned by the City of Burlington and that is adjacent to the Flynn Avenue/Home Avenue neighborhood. The C-2 Section is located in right-of-way which was previously acquired for the project. Only minor additional right-of-way acquisitions are required to accommodate the intersection turning movements, the addition of the shared-use path adjacent to the eastern side of the C-2 Section and to satisfy current environmental permitting requirements. On the western side of the C-2 Section is Briggs Street. Since the western side of Briggs Street is primarily industrial use, the C-2 Section would reinforce the separation of the industrial uses and the residential neighborhood. However, there would be two residences located on the western side of Briggs Street between Morse Place and Lyman Avenue that would be isolated by the C-2 Section from the residential area. There would also be one residence on Home Avenue located west of the C-2 Section. Landscaping within the Southern Connector/Champlain Parkway right-of-way would be incorporated into the project adjacent to these homes to provide an aesthetic delineation from the roadway corridor.

Build Alternative 1 would cul-de-sac or "dead-end" Ferguson Avenue, Lyman Avenue, Morse Place and Batchelder Street, between Foster Street and the C-2 Section (refer to Figure 2-12 Drawings 2 to 4). Briggs Street would also require a cul-de-sac at the southern end of the street, west of the C-2 Section (refer to Figure 2-12 Drawing 3). Since the current travel pattern in this portion of the neighborhood is predominately to and from the Pine Street area, the termination of these streets is not expected to impact access to the area. Foster Street provides direct access to Home Avenue, Morse Place, Lyman Avenue, Ferguson Avenue, and Flynn Avenue, sufficient alternative routings exist such that access for residents and emergency response services and general travel patterns would not be affected. Pine Street would also become a cul-de-sac at its southern end. The termination of these streets

would eliminate the through-traffic that presently uses these local streets, thereby creating a more desirable environment for that neighborhood.

The C-2 Section would have no appreciable impact upon the following neighborhood areas (refer to Figure 3-7 in Section 3):

- Birchcliff Parkway Neighborhood;
- Lakeside Neighborhood;
- Oakledge Neighborhood; and
- Austin Drive Neighborhood.

Under Build Alternative 1, the C-6 Section extends along the western border of the Calahan Park (South Park) Neighborhood. Under Build Alternative 1, the Battery Street Extension and improvements on Battery Street would extend along the western border of the King Street/Maple Street neighborhood. The location of the C-6 Section in these areas is along the existing Pine Street and Battery Street corridors, respectively. These areas primarily include commercial and industrial uses. This section would not fragment or directly impact these neighborhoods areas.

Under Build Alternative 1, non-residential land uses on Lakeside Avenue and Pine Street would experience minimal impacts as a result of the proposed project. The widening of Pine Street is primarily on the western side of the street due to the close proximity of the buildings located on the eastern side of Pine Street. A continuous sidewalk would be developed on the western side of Pine Street from Lakeside Avenue to Howard Street; this may encourage more pedestrian use in the area. The construction of the C-2 and C-6 Sections would improve access to and from this part of the City for businesses located there. It would also increase business visibility as more vehicles would pass through the area compared to the existing traffic.

Under Build Alternative 2, the C-1 Section and C-2 Section would have the same impacts as described above for Build Alternative 1. Build Alternative 2 would have similar impacts to Build Alternative 1 along Pine Street, from Lakeside Avenue to Pine Place.

Under Build Alternative 2, Pine Street, from Pine Place to Main Street would follow the existing roadway into the King Street/Maple Street neighborhood. The proposed improvements would primarily be contained to the existing transportation corridor. This area is primarily residential.

Under Build Alternative 2, a 27 percent increase in traffic is anticipated along Pine Street, from Maple Street to Main Street, compared to the No-Build Alternative (See Table 4-7). The installation of traffic signals with exclusive pedestrian phases at the

intersections of Pine Street with Maple Street and King Street will provide acceptable levels of service along Pine Street and maintain connectivity across Pine Street for pedestrians.

4.3.2 Right-of-Way Impacts

Both Build Alternatives would require small strip takings of land as part of the project.

The right-of-way impacts along the C-2 Section would be the same for both Build Alternatives. Only small strip takings would be required along the C-2 Section.

Both of the Build Alternatives would have similar impacts to properties along the C-6 Section until the alignment reaches the vicinity of the former Burlington Street Department building. This is where the proposed Battery Street Extension would begin and Build Alternative 1 would proceed northwesterly to the intersection of Battery Street and Maple Street. Build Alternative 1 would impact the former Burlington Street Department property, impact the Curtis Lumber (formerly Gregory Supply Company) lumber shed and continue to impact several VTR operations (refer to Figure 2-9).

Build Alternative 2 would continue north along the existing alignment of Pine Street. Build Alternative 2 would require small strip takings near the intersections of Pine Street at Maple Street and Pine Street at King Street to accommodate proposed traffic signals.

A summary of potential relocations resulting from Build Alternative 1 and Build Alternative 2 for the Southern Connector/Champlain Parkway have been evaluated and are presented in Table 4-10.

Table 4-10: Summary of Potential Relocations

	Alternatives	
Property	**Build Alternative 1**	**Build Alternative 2**
Former Burlington Street Department Property	Yes	No
Curtis Lumber Property/Operations	Yes	No
Vermont Railway (Relocation of Operations-Partial)	Yes	No
Vermont Transit	Yes	No

No residential properties require relocation under either Build Alternative.

Improved accessibility may help commercial and industrial businesses in the area and would also improve accessibility to the CCD from communities to the south and east.

4.3.3 Impacts on Properties With Land-Use Restrictions

The No-Build Alternative would not impact any of the properties with deed restrictions imposed upon them as identified in the EPA's 1998 Pine Street Barge Canal Superfund Site Record of Decision (PSBC ROD).

Build Alternative 1 would impact the former Burlington Street Department property and the City of Burlington/Havey property directly. Both of these properties have land-use restrictions imposed upon them.

It is not anticipated that Build Alternative 2 would impact any of the properties identified as having restrictions imposed upon them as identified in the EPA's 1998 PSBC ROD.

Under both Build Alternatives, a Health and Safety Plan (HASP) would need to be developed for use by all individuals involved in the construction of the Southern Connector/Champlain Parkway. The HASP would address the possibility of encountering coal tar, a highly mobile and toxic liquid, during construction along the C-6 Section. The HASP would aid workers in recognizing that there had been a release of coal tar, and what to do to protect both themselves and the environment should coal tar flow into an excavation.

4.3.4 Environmental Justice

Both Build Alternatives extend into the Old North End Enterprise Community, which has been defined by its pervasive poverty, high unemployment and general distress (refer to Figure 3-7 in Section 3). Based on this description, the requirements of Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations need to be considered. Executive Order 12898 directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.

The following conclusions have been made:

- Both Build Alternatives would result in acceptable LOS along local streets within the residential area of the Enterprise Community (bound by the study area and south of Main Street).

- Both Build Alternatives would improve access into and out of the Enterprise Community.

- There would be no widening of Battery Street or Pine Street within the Enterprise Community. Both Build Alternatives are expected to result in a net benefit to the Enterprise Community by improving access to the CCD area, and to employment, health care, etc. opportunities.

Accordingly, there would not be a disproportionately high and adverse human health or environmental effect on minority or low-income populations.

4.3.5 Consistency with Local and Regional Plans

Both Build Alternatives are consistent with the City of Burlington's zoning and growth plans for the area. The following is indicated in the 2001 Burlington Municipal Plan:

> "Historically Burlington's major industrial corridor, Pine Street, has seen continued activity with new and expanded industrial uses and the adaptive reuse of old warehouses and factories. The City encourages the continuation of this trend and would protect this economic development corridor for future growth.
>
> As noted previously, however, this area includes the South End residential neighborhood. Issues of particular concern of the residents include the impact of through-traffic, particularly trucks, on neighborhood streets, protecting neighborhood character, safety of pedestrians and children, and access to local parks and the waterfront.
>
> The City would work to protect these residential areas from the impacts of nearby industrial uses, and would promote light manufacturing instead of uses that are transportation and trucking oriented. Traffic calming techniques applied to residential streets should discourage their use by through-traffic, enhance neighborhood character and improve safety."

Specific policies presented in the Plan include the following:

- Encourage mixed-use development patterns, at urban densities, which limit the demand for parking and unnecessary automobile trips, and support public transportation.

- Strengthen the Pine Street corridor for commercial development, while minimizing adverse impacts on the adjacent neighborhood.

- Strengthen the CCD as the regional core, while ensuring that it serves the needs of city residents, particularly those in adjacent neighborhoods.

- Target new development in the CCD, Downtown Waterfront, Pine Street corridor, Institutional Core Campuses, and the Neighborhood Activity Centers.

- Encourage the development of an active, urban waterfront that offers mixed uses, is open to the public and linked to adjacent neighborhoods.

- Encourage light industry in appropriate locations including the Pine Street corridor.

Both Build Alternatives would provide improved pedestrian and bicycle facilities and result in reduced traffic volumes along local streets. The CCD and waterfront would also be more accessible. This would have a positive benefit for businesses located along Pine Street with additional pedestrian traffic in the area.

The following features have been incorporated, including:

- Landscaping;

- Accommodations for a shared-use path on the C-2 Section (from Home Avenue to the Lakeside Avenue intersection with Pine Street); and

- Reconstruction of a continuous sidewalk along the eastern side of Pine Street from Lakeside Avenue to the Battery Street Extension under Build Alternative 1 or along the eastern side of Pine Street from Lakeside Avenue to the Pine Street intersection with Main Street under Build Alternative 2;

- Accommodations for a shared-use path between Pine Street and Shelburne Street (U.S. Route 7).

Pedestrian safety would be promoted on the C-2 Section under Build Alternative 1 or Build Alternative 2 because it would be a limited-access highway with appropriate fencing and traffic signals including exclusive pedestrian phases at C-2 Section/Home Avenue intersection, C-2 Section/Flynn Avenue intersection, C-2 Section/Sears Lane intersection, and C-2 Section/Lakeside Avenue intersection.

Under Build Alternative 1 traffic signals including exclusive pedestrian phases would be provided at the Battery Street/Maple Street intersection, the Battery Street/King Street intersection, and the Battery Street/Main Street intersection.

Under Build Alternative 2 traffic signals including exclusive pedestrian phases would be provided at the Pine Street/Maple Street intersection, the Pine Street/King Street intersection, and the Pine Street/Main Street intersection.

4.3.6 Mitigation

The isolation of three houses, one on Home Avenue and two on Briggs Street, on the west of the C-2 Section is not considered to be an impact to the cohesiveness to the Flynn Avenue/Home Avenue neighborhood, because connectivity will be maintained at the Southern Connector/Champlain Parkway intersections with Home Avenue and Flynn Avenue.

The acquisition and relocation program would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and the relocation resources are available to all relocatees without discrimination.

Build Alternative 1 would impact and require relocations for three industrial properties, including the historic former Burlington Street Department property, Curtis Lumber's (formerly Gregory Supply Company's) lumber storage building and the operations within the existing Burlington Rail Yard.

Build Alternative 2 would have no substantial impacts to properties along the proposed alignment.

A HASP would be developed to address the potential of encountering coal tar during construction along the C-6 Section.

Under either Build Alternative there would not be a disproportionately high and adverse effect on minority or low-income populations; therefore, no mitigation would be required.

Both Build Alternatives would provide pedestrian amenities that would enhance the project corridor for pedestrians, including landscaping, shared-use paths, sidewalks, crosswalks, and traffic signals with exclusive pedestrian phases.

4.4 Land Resource Impacts

This section describes the impacts to land resources in the study area resulting from the Build Alternatives.

4.4.1 Farmlands and Woodlands

As identified in Chapter 3, there are no farmland or woodland resources along the Southern Connector/Champlain Parkway; therefore, there are no farmland or woodland impacts associated with either Build Alternative.

4.4.2 Earth Resources

The Burlington area, and specifically the site of the proposed Southern Connector/Champlain Parkway project, is located within the Champlain Lowland. The Champlain Lowland contains the most nearly horizontal and least altered rocks in Vermont. Limestones, dolomites, and shales are abundant over the area. The Lowland is part of a slight downfold, or syncline, known as the Hinesburg Synclinaorium.

All modifications under either Build Alternative are superficial and would not affect these resources. The Southern Connector/Champlain Parkway project would not have any adverse impact on geological resources.

4.5 Water Resource Impacts

This section describes the impacts to water resources in the study area resulting from the Build Alternatives.

4.5.1 Wetland Impacts

The wetland areas that exist within the study area are described in Section 3.5.1.

The No-Build Alternative would not impact any of the existing wetland areas located within the study area.

Of the 20 individual wetland areas identified, seven would be impacted by Build Alternative 1. The extent of these impacts is described below.

The proposed shared-use path adjacent to the C-1 Section would impact Wetland N (Figure 4-26). Wetland N is considered a Class III wetland under Vermont statute and a water of the United States under federal jurisdiction. This wetland is a small, low-value, degraded area. A wetland delineation performed in June 2002 determined the wetland area to be approximately 0.080 acres (3,500 square feet). The wetland would be impacted by slope limits extending down from the shared-use path toward

Potash Brook. The area that would be impacted is approximately 0.031 acres (1,364 square feet).

The proposed C-2 Section for both Build Alternatives would cross Englesby Brook and a surrounding wetland, Wetland H/I (Figure 4-27). Englesby Brook is a small stream oriented east to west that discharges to Lake Champlain. The wetland would be impacted by the proposed C-2 Section, including construction of the 12-foot wide by 8-foot high culvert with a 2-foot deep natural streambed bottom at Englesby Brook. This wetland is a low value, degraded wetland area. The area that would be impacted is approximately 0.473 acres (20,620 square feet).

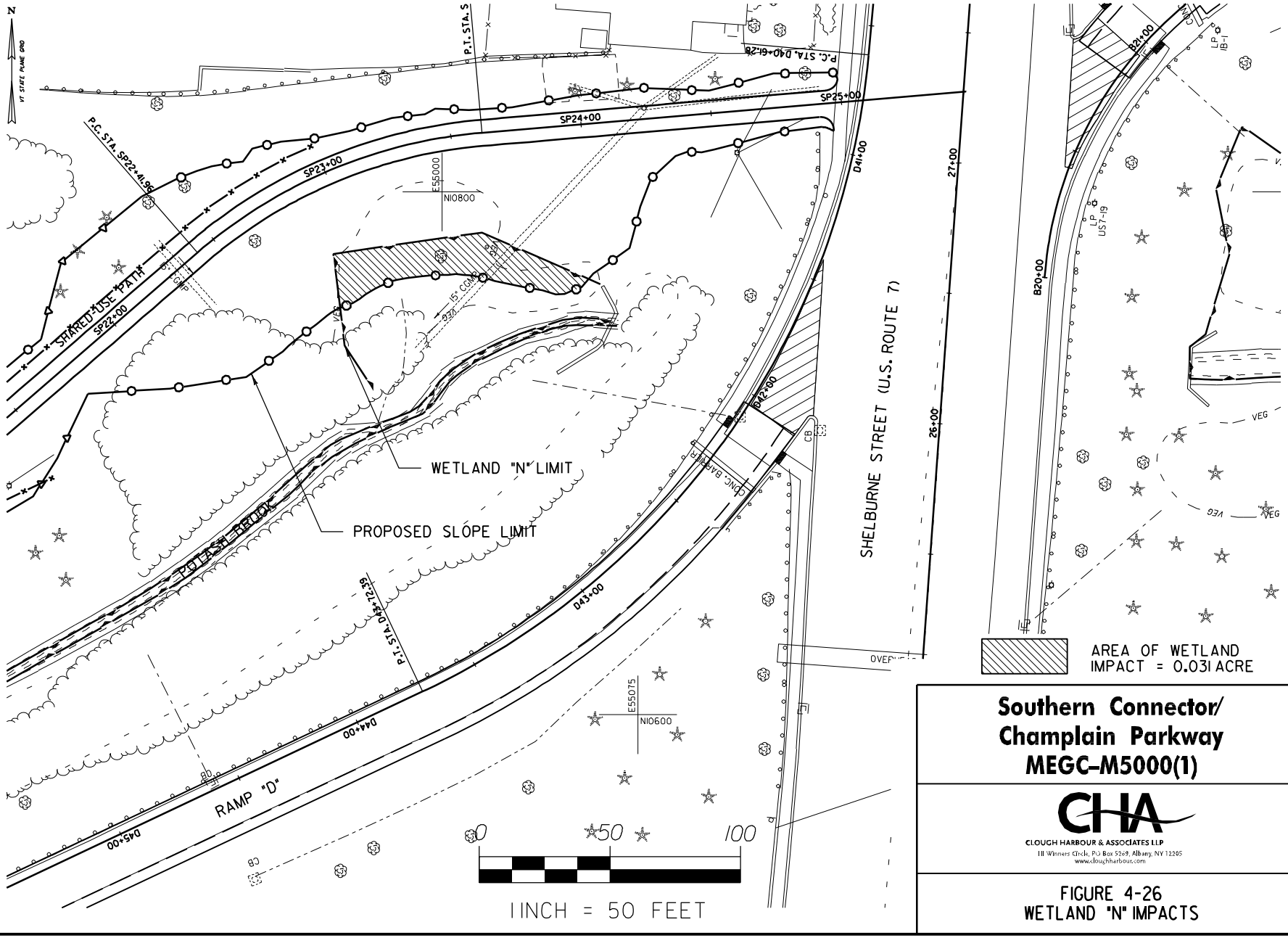
Since the C-2 Section of the Southern Connector/Champlain Parkway is oriented south to north and the project area is heavily developed, crossing Englesby Brook cannot be avoided.

The C-2 Section would impact Wetland A at its terminus at Lakeside Avenue (Figure 4-28). The entire wetland area is anticipated to be impacted due to the construction of the shared-use path adjacent to the C-2 Section and a sand filter with a sedimentation forebay which is proposed for the treatment of stormwater. Wetland A is considered a Class III wetland under Vermont statute; however it is not under federal jurisdiction. This wetland is a small, low-value, degraded area.

Build Alternative 1 would require relocation of the existing rail yard to an adjacent property (refer to Section 4.2.2). The relocation of the rail yard would impact four small, low value, degraded wetland areas (see Figure 4-29). These wetland areas include Wetland AA, BB, CC and DD.

The Pine Street Barge Canal Superfund Site wetland was evaluated in the 1979 FEIS. However, this wetland is located outside of the project limits, and no impacts to the wetland are anticipated as a result of Build Alternative 1.

Of the 20 individual wetland areas identified, only three would be directly impacted by Build Alternative 2. These wetland areas include Wetlands N, H/I, and A. The extent of these impacts would be the same as described above for Build Alternative 1. No additional wetland areas would be impacted by Build Alternative 2.



Southern Connector/ Champlain Parkway MEGC-M5000(1)

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FIGURE 4-26
WETLAND "N" IMPACTS

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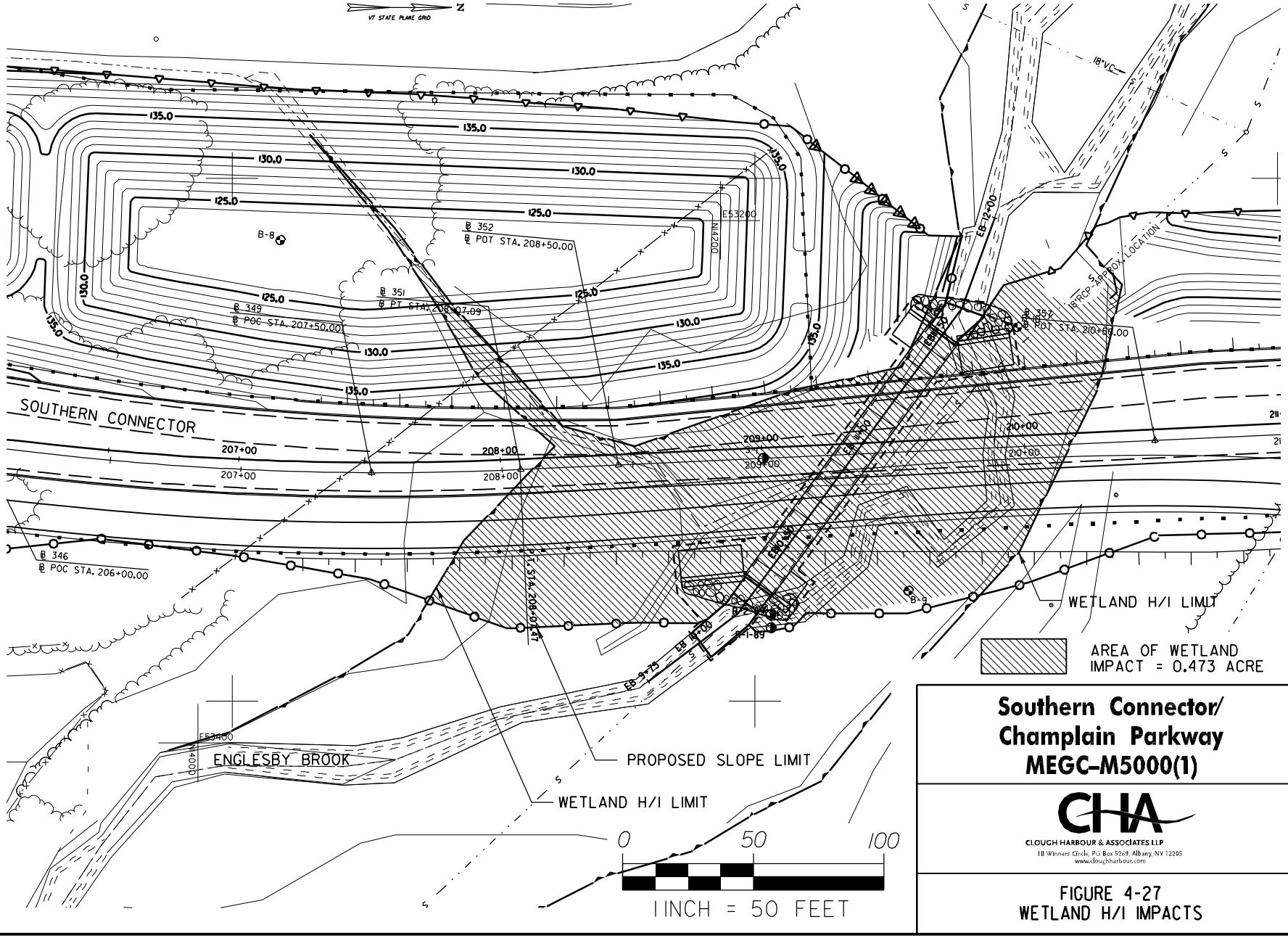

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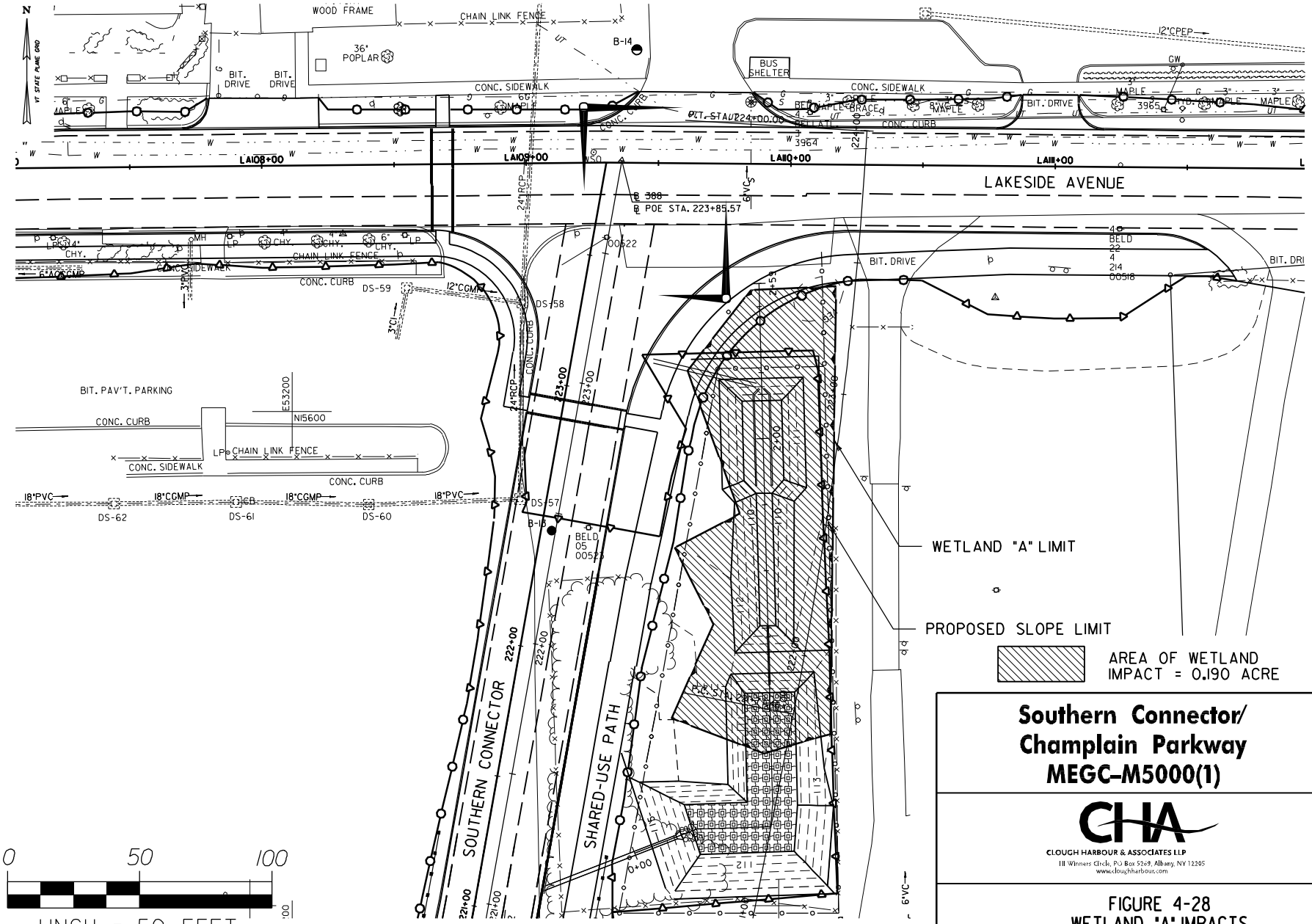
FIGURE 4-27
WETLAND H/I IMPACTS



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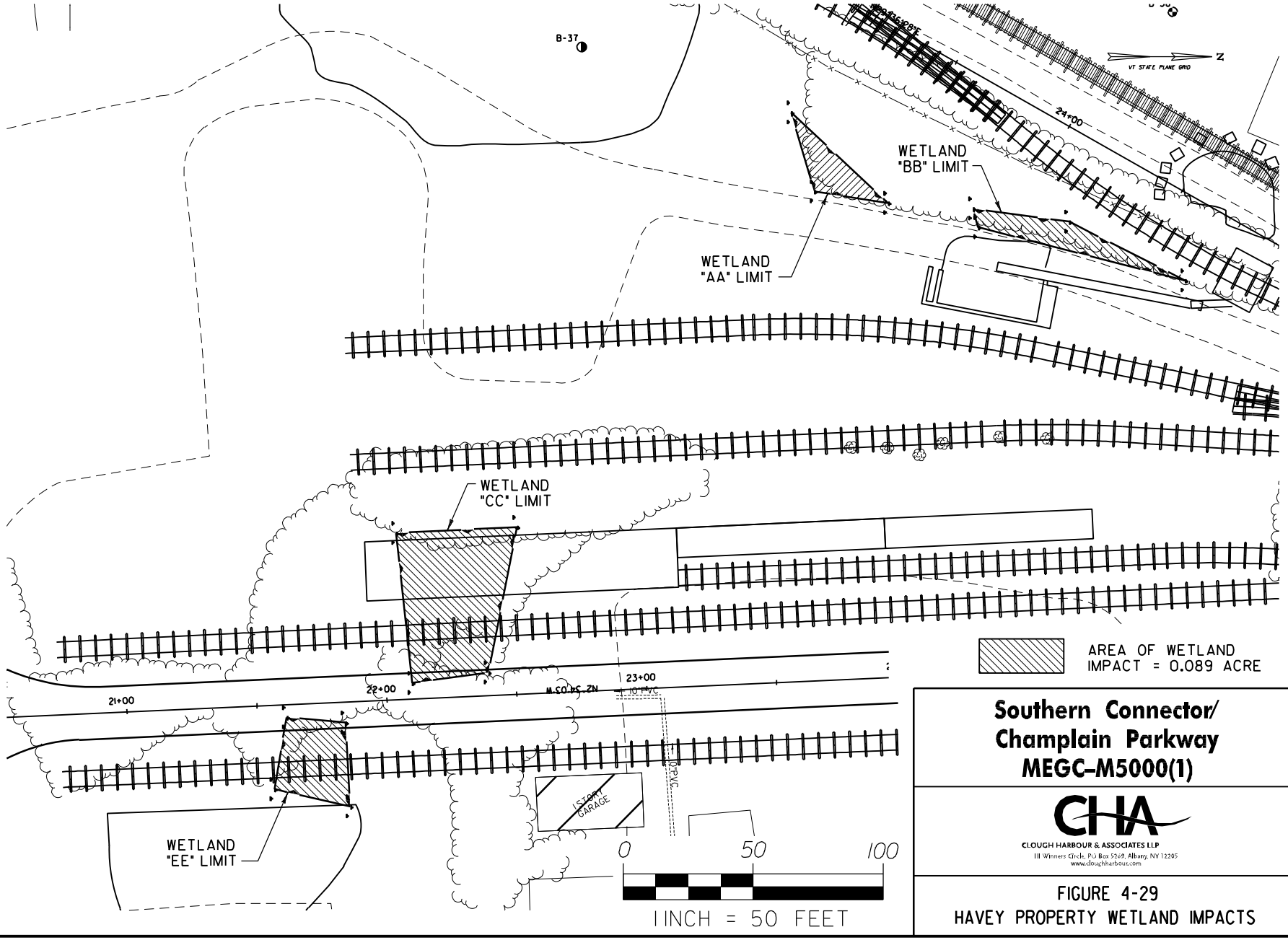

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FIGURE 4-29
HAVEY PROPERTY WETLAND IMPACTS

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Table 4-11 below illustrates the impacts to all wetland areas by Build Alternative 1 and Build Alternative 2 (see Figure 3-9).

Table 4-11: Wetlands Impact Summary

Wetland Area	Vermont Wetland Class	Approx. Wetland Size (acres)	Build Alternative 1 Wetland Impact (acres)	Build Alternative 2 Wetland Impact (acres)
Wetland A	III	0.190	0.190	0.190
Wetland B	III	0.012	0.000	0.000
Wetland C/D	III	0.138	0.000	0.000
Wetland E	III	0.145	0.000	0.000
Wetland F	III	0.320	0.000	0.000
Wetland G	II	N/A *	0.000	0.000
Wetland H/I	III	0.782 **	0.473	0.473
Wetland J	III	0.005	0.000	0.000
Wetland K	III	0.010	0.000	0.000
Wetland L	III	0.056	0.000	0.000
Wetland M	III	0.010	0.000	0.000
Wetland N	III	0.080	0.031	0.031
Wetland O	III	0.306	0.000	0.000
Wetland Y	II	0.467 ***	0.000	0.000
Wetland Z	III	0.049	0.000	0.000
Wetland AA	III	0.009	0.009	0.000
Wetland BB	III	0.013	0.013	0.000
Wetland CC	III	0.049	0.049	0.000
Wetland DD	II	***	0.000	0.000
Wetland EE	III	0.018	0.018	0.000
Total	**---**	**2.593**	**0.783**	**0.694**

* This wetland was originally delineated in June 2002 and subsequently has been modified by the EPA as part of the Pine Street Barge Canal Superfund Site Remediation Plan. No impacts are anticipated to this wetland.

** Only 0.782 acre (34,065 square feet) of wetland were delineated based on anticipated project limits. Previous estimates presented in the 1997 Final Environmental Impact Statement indicate that this wetland area encompasses approximately 13.3 acres (579,350 square feet).

*** These are part of the approximately 11.5 acres (500,950 square feet) Class II wetland associated with the Pine Street Barge Canal Site. No impacts are proposed to these wetlands.

- **Mitigation**

Appropriate limit-of-work barriers and erosion and sedimentation control measures would ensure protection of the wetlands surrounding the project and any indirect impacts.

The realignment of the 1979 Selected Alternative out of the C-8 Section to the C-6 Section under either of the Build Alternatives would result in a reduction of wetland impacts. The 1979 FEIS estimated that the 1979 Selected Alternative would impact approximately two acres of wetlands in the vicinity of the Pine Street Barge Canal. This would be in addition to the wetland impacts identified in Table 4-11 above.

Wetland impacts for the project area have already been mitigated as part of the wetland creation performed in conjunction with the previously constructed Northern Connector. In December, 1980, VTrans applied for a Section 404 Permit through the ACOE for the Vermont Route 127 (Northern Connector) highway project. Subsequent review of the application by the ACOE and other Federal resource agencies indicated a need to provide mitigation for wetland impacts due to the proposed project. At the same time, VTrans was conducting early coordination with State and Federal resource agencies relative to the proposed Southern Connector/Champlain Parkway. The ACOE and the United States Fish and Wildlife Service (FWS) recommended that a Habitat Evaluation Procedure (HEP) be conducted to determine the potential for impacts upon wetlands. Subsequently, in 1983, VTrans, in conjunction with FHWA, developed a HEP and a Mitigation Management Plan including both the Northern Connector and the Southern Connector/Champlain Parkway. Analysis of the wetland resources in the area revealed that the potential wetland impacts of both projects would be 35.6 acres. Two locations within the Northern Connector corridor were identified as suitable for wetland mitigation development. VTrans acquired 104 acres of marsh wetland from BED for mitigation for wetland impacts. In addition, VTrans acquired 66 acres of former farmland from the Howe Farm for mitigation for impacts to wetland buffers by means of conversion

the former farm fields to a combined forest/scrub shrub/open water wildlife habitat area.

The findings and recommendations of the HEP report were accepted by ACOE, FWS, the former Vermont Agency of Environmental Conservation, FHWA and VTrans on August 15, 1983. A Notice of Intent was published in the Federal Register on September 1, 1984 regarding VTrans' commencement of the 1984 DSEIS for the Southern Connector/Champlain Parkway. In response to that notice, an October 11, 1984 correspondence from FWS confirmed that early planning and coordination relative to wetland resources and impacts had occurred in conjunction with the HEP analysis and mitigation plan developed for the Northern Connector and that wetland impacts of the Southern Connector/Champlain Parkway had been adequately addressed.

The EPA commented on the 1995 DSEIS for the Southern Connector/Champlain Parkway that the wetland mitigation provided for the Northern Connector was poorly managed and inconsistent with the permit conditions in the ACOE authorization for that project. The mitigation project was considered to only have been marginally successful, as the wildlife ponds were constructed with steep side slopes that provided minimal habitat value.

As part of the EPA's recent remediation at the Pine Street Barge Canal Superfund Site, a project was undertaken as resolution to a claim for alleged injury to aquatic resources associated with the Pine Street Barge Canal Superfund Site. The EPA's project site was within the mitigation project for VTrans' Northern Connector highway project and the Southern Connector/Champlain Parkway, which involved the construction of wildlife ponds within the Howe Farm. The goal of the EPA's project was to restore or improve habitat that would be functionally equivalent to the habitat that has been impaired at the Pine Street Barge Canal Site. Work at the site has been completed is being monitored by the Vermont Fish and Wildlife Department; however, there is no permit requirement to continue this monitoring.

4.5.2 Surface Waters

The surface waters within the Southern Connector/Champlain Parkway corridor include Potash Brook, Englesby Brook, the Pine Street Barge Canal, the "Oakledge Tributary, and Lake Champlain.

- **Potash Brook**

A portion of the C-1 Section beginning at Sta. 141+00 and extending westerly to approximately Sta. 171+50 falls within the Potash Brook Watershed. The Potash Brook watershed boundary is depicted in Figure 4-30. This previously

constructed section would have modifications, which include pavement overlay along the mainline and ramps, removal of the existing concrete median barriers and construction of a new 22-foot wide, grass median, termination of Pine Street with a cul-de-sac and construction of a new shared-use path.

The construction of the grassed median, shared-use path and the Pine Street cul-de-sac would have an impact on the quality of Potash Brook. The removal of concrete median barriers and replacement with a new 22-foot wide raised grass median accounts for a 0.77 acre decrease in impervious surfaces. Termination of Pine Street results in a decrease in impervious surfaces of 0.13 acre. However, the construction of the proposed shared-use path accounts for 0.24 acre of new impervious surface.

As such, project impacts within the Potash Brook watershed result in a net reduction of impervious surface area of 0.66 acre. Due to the overall net reduction of impervious surfaces within the Potash Brook watershed, no additional stormwater treatment practices are proposed. To support this conclusion, estimated sediment loadings were developed for this area. These loads were determined by using the "Simple Method", or otherwise titled the "USEPA Guidance Manual Method". The results are developed utilizing the total suspended solids concentrations (TSS) presented in Table 4-12 with respect to corresponding land use characteristics.

Table 4-12: Pollutant Concentration and Land Use Characteristics

Land Use Characteristics	TSS Concentration (mg/l)
Medium Density Residential	75
High Density Residential	100
Commercial	100
Industrial	120

Source - Englesby Brook Watershed Restoration Project Report, Dec. 2000. (Center for Watershed Protection)

Using the "Simple Method" with a unit TSS concentration of 75 mg/l the annual sediment loading to Potash Brook under the No-Build, Build Alternative 1 or Build Alternative 2 conditions are presented in Table 4-13.

Table 4-13: Estimated Sediment Loadings to Potash Brook

Receiving Stream	No-Build Sediment Loading (lbs/year)	Build Alternative 1 and Build Alternative 2 Sediment Loading (lbs/year)	Net Loading (lbs/year)
Potash Brook	2,857 *	2,557	- 300

* This sediment loading is not anticipated because under the No-Build condition, there would be no traffic on the C-1 Section.

A net reduction of 300 lbs/year is realized for Potash Brook. This reduction is a direct result of the decrease in impervious surface of 0.66 acre within the watershed.

- **Englesby Brook/Oakledge Tributary**

Potential impacts to Englesby Brook and the "Oakledge Tributary" are due both to the existing portion of the C-1 Section and the proposed C-2 Section. For the C-1 Section beginning at approximately Sta. 171+50 and extending to Sta. 182+00, the proposed improvements include pavement overlay along the mainline and replacement of the existing concrete median barriers with a new 22-foot wide, raised grass median. C-2 Section improvements within the Englesby Brook watershed begin at the terminus of the C-1 Section and extend northerly to approximately Sta. 213+50 at Sears Lane. Improvements include full construction of a new two-lane, principal arterial roadway with turning lanes and a parallel shared-use path.

Other improvements include a new approximately 130-foot long, precast concrete, box culvert to be constructed at Sta. 209+39 for conveyance of Englesby Brook under the C-2 Section. The 12-foot wide by 8-foot high culvert would be constructed with a 2-foot deep natural streambed bottom.

Runoff to Englesby Brook from the project corridor is divided into two sub-watersheds. Each sub-watershed, collection and conveyance system, and proposed stormwater treatment practice is described below:

- **Englesby South Sub-Watershed**

The Englesby South sub-watershed begins approximately at Sta. 171+50 and extends northerly past Flynn Avenue to Sta. 205+85 with the South Crest development and Foster Avenue defining the easterly boundary and Briggs Street delineating the boundary to the west. The total drainage area is 34.58 acres including 11.51 acres of impervious surfaces. The sub-watershed boundary is depicted on Figure 4-30.

- **Englesby South Collection and Conveyance System**

The Englesby South system currently has a section constructed within the existing C-1 Section. This existing drainage system presently discharges to the "Oakledge Tributary" after what could be considered partial treatment in a small detention facility at the southwestern corner of C-1 Section and Home Avenue intersection. This detention facility was constructed with the original drainage

system for the existing C-1 Section. The C-2 Section is intended to have a main storm sewer constructed parallel to the proposed Southern Connector/Champlain Parkway. This system begins by abandoning the existing temporary detention basin and the corresponding discharge to the "Oakledge Tributary" and connecting the C-1 Section to the new main conveyance system that runs parallel to C-2 Section to the area adjacent to the crossing of Englesby Brook. Lines would be installed that collect runoff from side streets including the South Crest development, Home Avenue, Batchelder Street, Briggs Street, Ferguson Avenue, and Flynn Avenue.

The City of Burlington's combined (storm and sanitary waste) sewer currently serves portions of the area adjacent to Batchelder Street, Briggs Street, Morse Place and Ferguson Avenue. As part of this project, these areas would be disconnected from the combined system and served by the new stormwater collection system. The proposed piping network does not collect runoff originating from the new Lyman Avenue cul-de-sac. Instead, this area would continue to drain easterly in a similar fashion as in the No-Build Alternative.

- **Englesby South Stormwater Treatment**

Based on the *Vermont Stormwater Management Manual* dated April 2002, *third printing*, as authored by the Vermont Agency of Natural Resources (ANR), an extended wet detention pond with sediment forebay is proposed for treatment of stormwater runoff from this sub-watershed. While there are a number of approved stormwater treatment practices (STP's) each tend to have certain ideal applications. In this case, available land area, as well as being able to meet the required unified sizing criteria contained in the State's manual, led to selection of the Wet Extended Detention Basin. Utilization of this approved practice in accordance with the Vermont Stormwater Management Manual meets the requirement of 80% reduction in Total Suspend Solids and 40% reduction in Total Phosphorus from the discharge of stormwater. The proposed Englesby South Wet Extended Detention Pond is located just south of the C-2 Section's crossing of Englesby Brook. Drainage from the closed collection system is first conveyed to a sedimentation forebay with a permanent pool, and lined with a precast concrete mat system to aid in maintaining the facility. Primary discharge from the forebay is via rectangular orifices located in the outlet structure. Water from the outlet structure is conveyed to the primary permanent pool through a reinforced concrete pipe, and a stone-lined overflow weir for secondary release. The primary outlet structure is a pre-cast concrete box which contains three orifices for controlled release to the Englesby Brook. An emergency overflow weir is also provided.

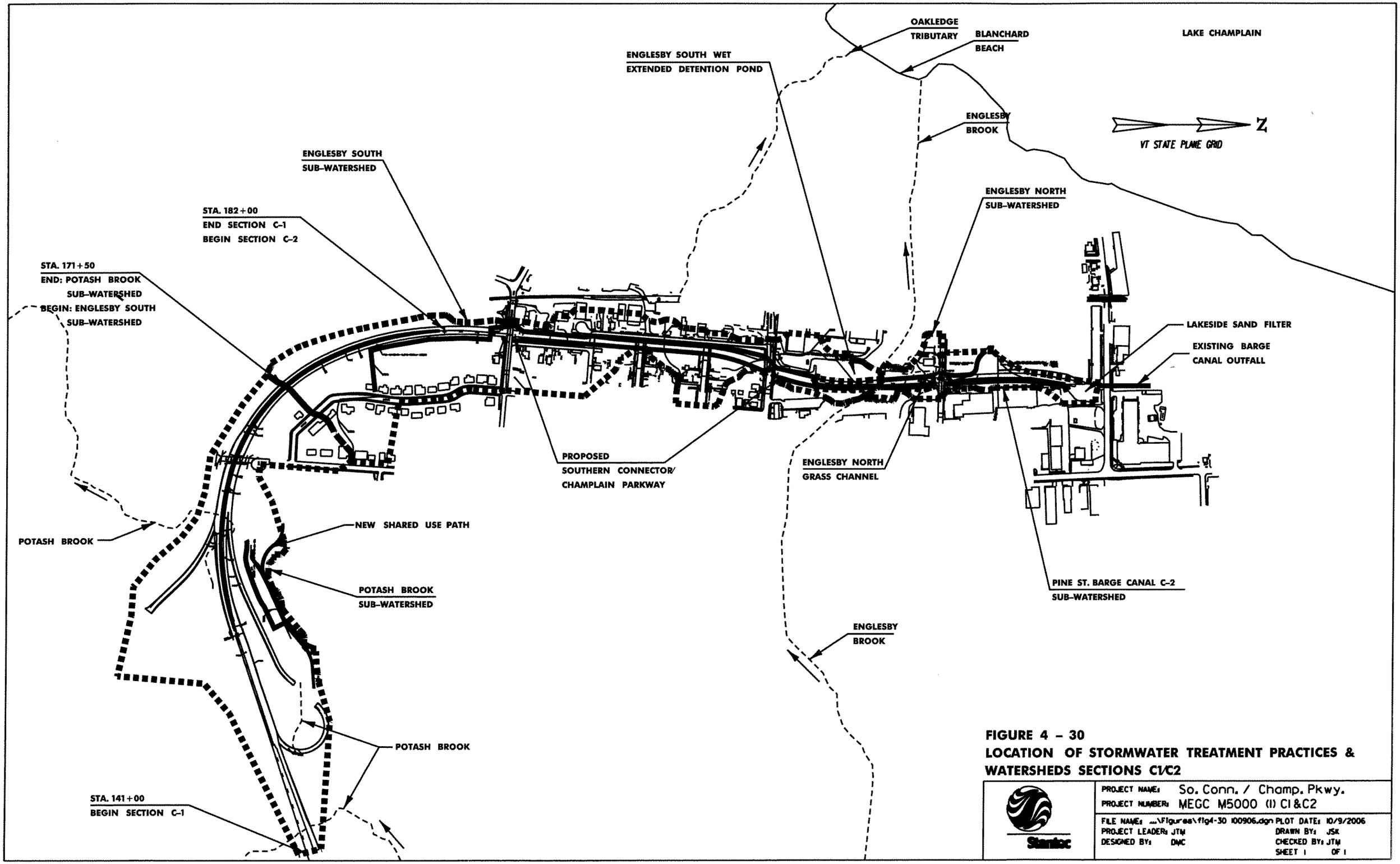


FIGURE 4 – 30
LOCATION OF STORMWATER TREATMENT PRACTICES & WATERSHEDS SECTIONS C1/C2

Stantec

PROJECT NAME: So. Conn. / Champ. Pkwy.
PROJECT NUMBER: MEGC M5000 (1) C1&C2
FILE NAME: ...\Figures\fig4-30 100906.dgn PLOT DATE: 10/9/2006
PROJECT LEADER: JTM DRAWN BY: JSK
DESIGNED BY: DMC CHECKED BY: JTM
SHEET 1 OF 1

A hydraulic and hydrologic performance summary of the Englesby South Wet Extended Detention Pond is presented in Table 4-14.

Table 4-14: Performance Summary Table for the Englesby South Wet Extended Detention Pond

Event	Rainfall (inches)	No-Build			Build Alternative 1 or Build Alternative 2	
		Peak Runoff to Englesby Brook (cfs)	Peak Runoff to Oakledge Tributary (cfs)	Peak Discharge to Sewer (cfs)	Detention Pond Peak Inflow (cfs)	Detention Pond Peak Outflow (cfs)
Water Quality Storm (WQ_V)	0.9	N/A	N/A	N/A	11.08	0.78
Channel Protection Storm (Q_1)	2.1	N/A	N/A	N/A	23.69	0.88
Overbank Flood Storm (Q_{10})	3.2	21.46	26.66	7.81	53.17	11.63

Also reflected in Table 4-14 are the following No-Build Alternative values: the overbank flood (Q_{10}) peak runoff to the "Oakledge Tributary" is 26.66 cfs, and the peak discharge to Burlington's combined sewer is estimated to be 7.81 cfs. These two flows account for a majority of the increase in runoff from the No-Build Alternative when compared to Build Alternative 1 and Build Alternative 2 inflow to the detention pond.

- **The Englesby North Sub-Watershed**

The Englesby North sub-watershed encompasses the project corridor beginning approximately 250 feet north of Flynn Avenue (Sta. 205+85) and extending northerly to Sears Lane at Sta. 213+50. The total drainage area is 2.45 acres including 1.55 acres of impervious surfaces. The approximate watershed boundary is presented on Figure 4-30.

- **Englesby North Collection and Conveyance System**

Runoff from within the sub-watershed area is collected by a series of catch basins on the roadway and conveyed via a closed system consisting of concrete pipes that parallel the proposed Southern Connector/Champlain Parkway to a point just south of Sears Lane where it discharges to the proposed Englesby North Grass Channel.

- **Englesby North Stormwater Treatment System**

Due to the small sub-watershed, a grass-lined channel with a sedimentation forebay is proposed for treatment of stormwater. The discharge from the closed collection system is first conveyed to a precast concrete mat lined sedimentation forebay. This would typically be dry except during a storm event and for a short

period thereafter. Discharge from the forebay is via an overflow bench to the grass channel, with a stone-lined outfall. As with the Englesby South stormwater treatment system, this is an approved treatment practice from the State of Vermont Stormwater Management Manual. A performance summary of stormwater treatment for the Englesby North Grass Channel is presented in Table 4-15.

Table 4-15: Performance Summary Table for the Englesby North Grass Channel

Event	Rainfall (inches)	No-Build	Build Alternative 1 or Build Alternative 2	
		Peak Runoff to Englesby Brook (cfs)	Grass Channel Peak Inflow (cfs)	Grass Channel Peak Outflow (cfs)
Water Quality Storm (WQ_V)	0.9	N/A	2.21	1.70
Channel Protection Storm (Q_1)	2.1	N/A	4.85	4.03
Overbank Flood Storm (Q_{10})	3.2	0.34	8.71	7.57

- **Englesby North and South Watershed Combined Performance**

Hydraulic and sediment evaluations were performed to confirm compliance with State permit requirements. For the hydraulic criteria the No-Build overbank flood (Q_{10}), peak runoff to Englesby Brook from both the southern and northern sub-watersheds is 21.70 cfs. The combined post development overbank flood (Q_{10}) peak outflow from both the Englesby South Wet Extended Detention Pond and the Englesby North Grass Channel to Englesby Brook is 12.45 cfs.

A performance summary of stormwater treatment for the combined Englesby North and South Watersheds is presented in Table 4-16.

Table 4-16: Performance Summary Table for the Englesby North and South Watersheds

Event	Rainfall (inches)	No-Build	Build Alternative 1 or Build Alternative 2
		Peak Runoff to Englesby Brook (cfs)	Treatment Structure Peak Outflow (cfs)
Overbank Flood Storm (Q_{10})	3.2	21.70	12.45

For the sediment load analysis, Blanchard Beach was used as a common analysis point. Blanchard Beach is located at the confluence of the "Oakledge Tributary" and Englesby Brook where both watercourses discharge to Lake Champlain. Using the "Simple Method", the estimated annual sediment loadings to Blanchard Beach were analyzed.

Table 4-17 reports the estimated loadings for the "Oakledge Tributary", Englesby Brook and Blanchard Beach under both No-Build and Build Alternative 1 and Build Alternative 2.

The "Oakledge Tributary" realizes a net reduction of 2,515 lbs/year. This is due to runoff that previously originated from a portion of the C-1 Section and the South Crest development being redirected and treated prior to discharge to Englesby Brook. The net sediment loading reduction at Blanchard Beach due to construction of the Southern Connector/Champlain Parkway is estimated to be 2,166 lbs/year.

Table 4-17: Estimated Sediment Loadings to Blanchard Beach

Receiving Stream		No-Build Sediment Loading (lbs/year)	Build Alternative 1 or Build Alternative 2 Sediment Loading to STP (lbs/year)	Build Alternative 1 or Build Alternative 2 Sediment Loading from STP (lbs/year)
"Oakledge Tributary"		2,515	0	0
Englesby Brook	(No-Build)	1,234	NA	NA
	(Build Alternative 1 or Build Alternative 2)	NA	7,915	1,583
Total Loading at Blanchard Beach		3,749	NA	1,583

However, as a result of this approach there is a net increase in calculated sediment load to the last 800 feet of Englesby Brook of 349 lbs/year (1,583 - 1,234). The design approach that takes the current discharge to the "Oakledge Tributary" and combines it with the Englesby South Watershed was done in consultation with the regulatory agencies. ANR has indicated an opinion that urbanization likely caused the "Oakledge Tributary" to be separated from Englesby Brook. Based on the current State stormwater permitting procedures, this annual increase of 349 lbs/year is not acceptable.

In order to mitigate this impact an additional sediment reduction approach is needed. In order to "offset" this load, a sediment removal device is being installed. A Watershed Report developed by the City, estimates that approximately 3,766 lbs/year of sediment is generated from an area identified as Foster Street Outfall. Based on literature provided by manufacturers of these systems, an 80% removal efficiency of TSS can be documented during a design

flow event. In this instance, the design flow event is the water quality event. The removal of 80% of 3,766 lbs/year of sediment would be 3,012 lbs/year.

By adding a swirl separator to the existing storm drainage collection system, the net reduction in load to Englesby Brook is estimated to be 2,663 lbs/yr (3,012 – 349) as a result of this project. The total net sediment loading reduction to Lake Champlain/Blanchard Beach is estimated to be 5,178 lbs/yr (2,663 + 2,515).

An additional benefit that is also presented under the C-6 Section is that construction of the C-2 Section storm sewer in the Batchelder and Briggs Street area disconnects surface water collection from the combined sewer system. Using the methodology presented previously, the estimated annual sediment loading eliminated from discharge to the City of Burlington's combined sewer and Main Wastewater Treatment Plant is 2,792 lbs/year.

- **Pine Street Barge Canal C-2 Section Watershed**

  Beginning at Sears Lane (Sta. 213+40) and extending northerly to Sta. 221+85, the proposed C-2 Section improvements within the Pine Street Barge Canal watershed include full construction of a new two-lane, principal arterial roadway with turning lanes and a parallel shared-use path. The total drainage area for this segment is 3.99 acres including 1.55 acres of impervious surfaces. The approximate watershed boundary is presented in Figure 4-30.

  - **Pine Street Barge Canal C-2 Section Collection System**

    Runoff from within the watershed is to be conveyed via a closed drainage system that would parallel the proposed Southern Connector/Champlain Parkway. Drainage from the closed collection system is conveyed to a diversion structure. The diversion structure is designed to direct the water quality storm event to a treatment system and to bypass larger events away from the treatment system. These bypassed events are conveyed to the existing closed drainage system for discharge to the Pine Street Barge Canal.

  - **Pine Street Barge Canal C-2 Section Stormwater Treatment System**

    Due to the relatively small watershed, a sand filter with a sedimentation forebay is proposed for treatment of stormwater. The proposed Sand Filter is located at the southeastern corner of Lakeside Avenue and the Southern Connector/Champlain Parkway. From the diversion structure discussed above flow is directed to a sedimentation forebay that would typically be dry except during a storm event and for a short period thereafter. The floor of the forebay would be lined with a precast concrete mat to aid in removal of accumulated sediment during maintenance. Discharge from the forebay is controlled via a one

inch diameter orifice for release to the sand filter. The filtering mechanism includes six-inches of topsoil, 12-inches of sand, and six-inches of gravel installed above a six-inch diameter perforated pipe that is connected to an outlet structure. Filtered stormwater runoff is then discharged to the existing closed drainage system. The Sand Filter is an acceptable STP, and is contained in the State of Vermont Stormwater Management Manual.

Discharge from the existing closed drainage system, including both filtered and bypassed runoff, would be directed to the polishing pond of the recently constructed Pine Street Barge Canal sedimentation basin.
The hydrologic and hydraulic performance summary for the Lakeside Sand Filter is presented in Table 4-18.

Table 4-18: Performance Summary Table for the Lakeside Sand Filter

Event	Rainfall (inches)	No-Build	Build Alternative 1 or Build Alternative 2			
		Peak Runoff to Barge Canal (cfs)	Peak Runoff From Site (cfs)	Sand Filter Peak Inflow (cfs)	Sand Filter Peak Outflow (cfs)	Peak Outflow to Barge Canal (cfs)
Water Quality Storm (WQ_V)	0.9	N/A	1.35	1.35	0.04	0.04
Channel Protection Storm (Q_1)	2.1	N/A	2.70	1.92	0.23	0.82
Overbank Flood Storm (Q_{10})	3.2	13.85	5.93	2.86	1.42	3.27

A unit TSS concentration of 100 mg/l was utilized in assessing the annual sediment loading to the Pine Street Barge Canal under the No-Build, Build Alternative 1 or Build Alternative 2 conditions. Utilizing an 80% removal rate across the Lakeside Sand Filter to collected runoff, estimated sediment loadings can be developed and are presented in Table 4-19.

Table 4-19: Estimated Sediment Loadings to the Pine Street Barge Canal

Receiving Stream	No-Build Sediment Loading (lbs/year)	Build Alternative 1 or Build Alternative 2 Sediment Loading to STP (lbs/year)	Build Alternative 1 or Build Alternative 2 Sediment Loading from STP (lbs/year)
Pine Street Barge Canal	1,559	1,073	215

The net reduction in sediment loading to the Pine Street Barge Canal is a result of two factors. First, due to the configuration of the proposed closed drainage system, the drainage area is reduced when compared to the No-Build Alternative. A 1.28 acre area located southerly of Sears Lane previously discharged to the Pine Street Barge Canal. Under Build Alternative 1 or Build Alternative 2, the area is to be treated at the Englesby North Grass Channel with discharge to Englesby Brook. Secondly, with inclusion of the proposed STP, an additional

reduction in sediment loading is realized. Therefore, the total net reduction to the Pine Street Barge Canal in sediment loading is estimated to be 1,344 lbs/year.

4.5.2.1 C-6 Section Build Alternative 1 and Build Alternative 2

- **Pine Street Barge Canal Watershed - C-6 Section Build Alternative 1 and Build Alternative 2**

Build Alternatives 1 and Build Alternative 2, of the C-6 Section, in the Pine Street Barge Canal Watershed begins near Lakeside Avenue at the terminus of the C-2 Section (Sta. 221+25) including Lakeside Avenue to the Pine Street intersection and extends northerly along Pine Street to approximately the intersection of Howard Street. Runoff in this watershed is actually broken into two sub-watersheds (1 and 2). Sub-watershed 1 covers the Pine Street and Lakeside Avenue intersection that discharges to the sedimentation basin located north of the Burlington Public Works building which was constructed as part of the EPA's Pine Street Barge Canal superfund site remediation in 2003. This discharge is via an existing 48 inch CMP outfall. The existing closed drainage system also serves areas outside the project limits including the Birchcliff Parkway neighborhood westerly of Shelburne Street, as well as the Pine Street area in the vicinity of Sears Lane northerly to Lakeside Avenue.

Sub-watershed 2 is along the C-6 Section located between Locust Street and Howard Street. Runoff in this area currently drains directly to the Pine Street Barge Canal via a 42 inch CMP. The outfall is located westerly of Pine Street, behind the Burlington Electric Department facilities. A weir at the Pine Street Barge Canal's discharge point to Lake Champlain fixes the normal water surface elevation, which typically submerges the existing 42 inch CMP outlet except during periods of seasonally-low water levels in the canal, turning basin and Lake Champlain.

An existing closed drainage system is also connected to this outfall that serves the Locust Street and Locust Terrace neighborhoods, and a small segment of Shelburne Street. The C-6 Section Pine Street Barge Canal Watershed is depicted on Figure 4-31.

- **Pine Street Barge Canal C-6 Section Collection System**

The proposed closed drainage system for sub-watershed 1 would collect runoff along the Lakeside Avenue corridor and along Pine Street southerly of Locust Street. The proposed improvements would include intercepting the existing system, collection of runoff from the reconstructed roadways, and connecting back into the existing system for conveyance to the Pine Street Barge Canal sedimentation basin.

The existing closed drainage system for sub-watershed 2 collects runoff from Pine Street along the reconstructed roadway between Locust Street and Howard Street. The existing

system also intercepts the existing Locust Street system. The proposed closed system along Pine Street and the intercepted system are combined in an area located on the northern side of the Burlington Electric Department facilities.

- **Pine Street Barge Canal C-6 Section Stormwater Treatment System**

Since little, if any, new impervious surfaces are proposed within sub-watershed, no new stormwater treatment practices are proposed. Additionally, sediment loadings should not increase to the sedimentation basin as a result of this portion of the project. With the new sedimentation basin constructed as part of the Barge Canal remediation, a degree of water quality protection is provided and the project is neither adding to, nor impairing, the performance of this new system.

For sub-watershed 2 prior to connection to the existing 42 inch CMP outlet pipe, stormwater would be treated via installation of a vortex dynamic separator. These separators are not currently part of the approved STP contained in the State's Stormwater Manual. However, they do have a proven track record of sediment removal. This measure is proposed to offer some treatment above what is currently occurring. This section of the project produces no new impervious surfaces within this drainage area and as a result should cause no increase in load to the receiving water. No device currently treats stormwater at this outlet as compared to the sedimentation basin serving sub-watershed 1.

Removal efficiencies for swirl separators, reported by various manufacturers have approached an 80% removal efficiency of TSS. Utilizing an 80% removal rate across the proposed swirl chamber, estimated sediment loadings can be developed and are presented in Table 4-20.

Table 4-20: Estimated Sediment Loadings to the Pine Street Barge Canal

Receiving Stream	No-Build Sediment Loading (lbs/year)	Build Alternative 1 or Build Alternative 2 Sediment Loading to STP (lbs/year)	Build Alternative 1 or Build Alternative 2 Sediment Loading from STP (lbs/year)
Pine Street Barge Canal	845	896	179

4.5.2.2 C-6 Section Howard Street to Battery Street - Build Alternative 1

- **Lake Champlain/Burlington Main Wastewater Treatment Plant (WWTP) Watershed - C-6 Section Build Alternative 1**

The C-6 Section from approximately Howard Street to the termination of the proposed Battery Street Extension covers this sub-watershed. Also included in this watershed is the rail yard mitigation or reconfiguration of VTR's yard as a result of the project. New impervious surface resulting from construction of the Battery Street Extension is approximately 1.5 acres. Proposed improvements that are required to mitigate impacts to the existing rail yard include relocation of track, construction of a commercial yard for associated docking facilities, construction of a truck trailer terminal and storage area, and construction of approximately 3,300 linear feet of perimeter/access roadway of varying widths. New impervious area resulting from the rail yard mitigation is approximately 4.0 acres. The approximate watershed boundary is depicted on Figure 4-31.

- **Lake Champlain/Main WWTP Watershed C-6 Section Collection System**

Pine Street from Howard Street currently is served by a combined sewer system that combines sanitary waste and stormwater runoff. It is anticipated that with Build Alternative 1 of this section of Pine Street, a separate storm sewer would be installed to collect stormwater from this section of Pine Street. As the proposed roadway leaves the existing Pine Street corridor with the westerly swing through the rail yard, a new stormwater collection system consisting of catch basins and pipes would collect and convey runoff from the road and some of the adjacent property. Also, with the reconfigured rail yard a new collection system would need to be installed for the main purpose of draining the area and conveying the stormwater to a treatment location rather then overland flow to Lake Champlain.

- **Lake Champlain/Burlington Main WWTP Watershed C-6 Section Treatment System**

Currently, stormwater collected in this watershed is treated at the Burlington Main WWTP. Burlington's Main WWTP is a combined sewer facility, meaning that it treats both sanitary sewage and stormwater. Typically, the WWTP meets or exceeds the effluent limitations stated in its NPDES permit. However, incidents of non-compliance have occurred during wet weather flows. The facility was previously cited for excessive total residual oxidant. Excessive oxidant in the facility's effluent is typically a result of overdosing disinfection chemicals during higher wet weather flows to ensure compliance for pathogen kills.

Discussions with personnel at the ANR's Wastewater Management Division indicate that the ANR would not authorize a permit for a new connection for stormwater runoff from the project's proposed impervious surfaces without addressing the WWTP's limitations as they relate to its history of poor performance during wet weather events. The ANR's position is summarized in the following correspondence dated July 17, 2003:

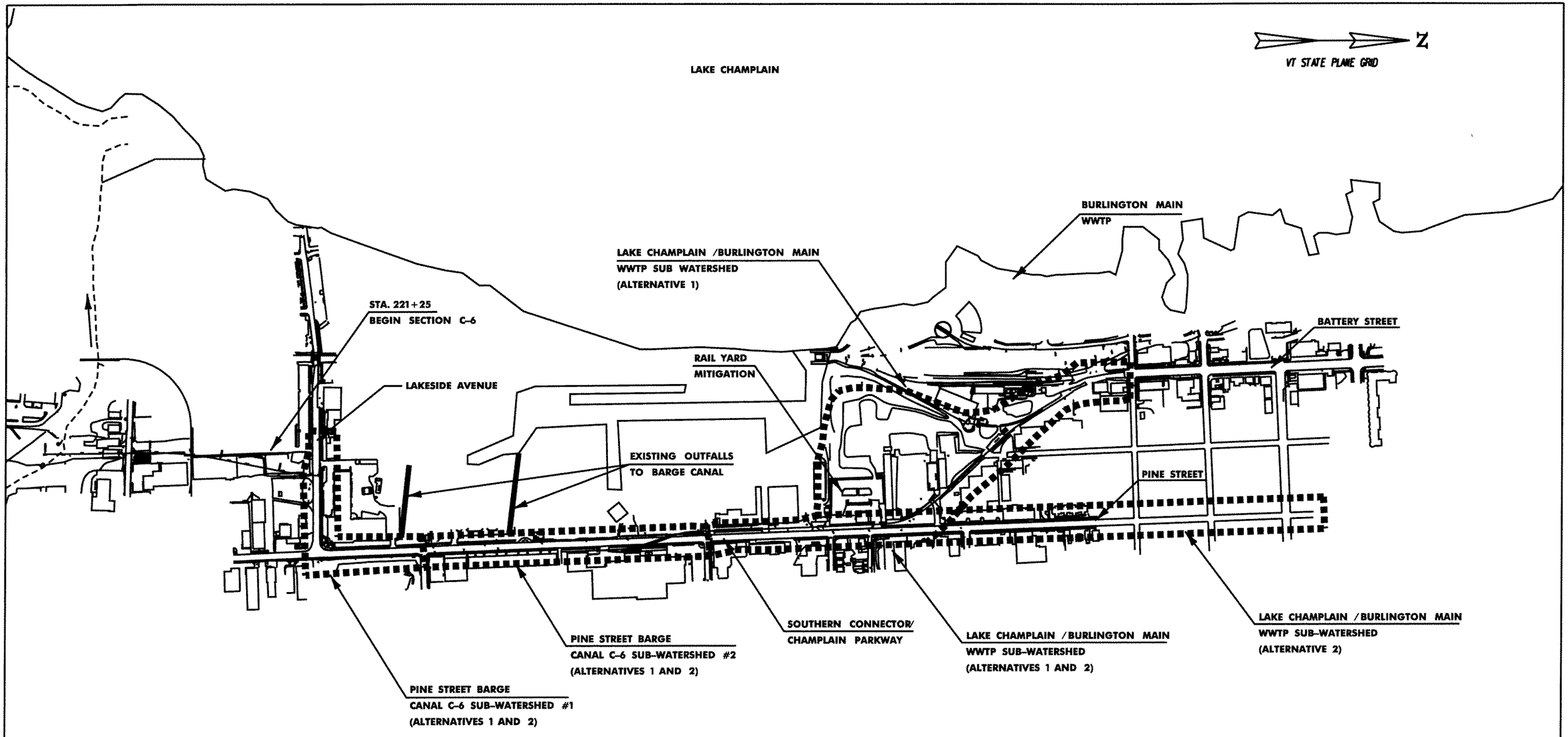


FIGURE 4 – 31
LOCATION OF STORMWATER TREATMENT PRACTICES & WATERSHEDS SECTION C6

Stantec

PROJECT NAME: So. Conn. / Champ. Pkwy.
PROJECT NUMBER: MEGC M5000 (1) C6

FILE NAME: ...\Figures\fig4-31100906.dgn PLOT DATE: 10/9/2006
PROJECT LEADER: JTM DRAWN BY: JSK
DESIGNED BY: DMC CHECKED BY: JTM
SHEET 1 OF 1

"This is in response to your July 15, 2003 e-mail message pertaining to the Supplemental Environmental Impact Statement being prepared for the Southern Connector/Champlain Parkway, and in particular regarding the impact the project would have on the Combined Sewer Overflow (CSO) Treatment System at the Burlington Main Wastewater Treatment Facility. It is the Division's position that any additional flow to the CSO treatment system would exacerbate the current operational problem being experienced by the City in meeting the Total Residual Oxidant (TRO) limit for the CSO discharge. Therefore the Division would not support any increase in stormwater flow to the system as a result of the proposed project, unless modifications are made which would assure that any discharge from the CSO treatment system would conform fully with the Discharge Permit limits and the Vermont Water Quality Standards. At a minimum, this would more than likely necessitate that the capability for dechlorination be provided for the entire discharge volume, or the CSO disinfection system be substantially enhanced over the current configuration."

In order to mitigate the potential impacts to surface water (Lake Champlain) of the new impervious areas associated with the project through discharge to the Main WWTP, performance limitations of the plant would need to be addressed.

In this situation, the preference to treat stormwater would be to utilize urban Best Management Practices similar to the approaches used in the C-2 Section. However, certain physical constraints associated with the land area limit the ability to apply these practices. These constraints include, among others, limited available land area and inadequate elevation differences to allow gravity driven systems due to the proximity to Lake Champlain.

Approaches to stormwater treatment appear limited, the most promising approach appears to be providing storage volume for the new impervious areas as well as a portion of the City's existing stormwater collection system within the project's boundary.

The goal of this approach recognizes that the City's Main WWTP encounters performance problems when high flows are directed to the treatment processes during short-duration, high-intensity rainfall events. By adding the ability to store a certain volume from inside the project boundary, then feeding the stored water to the plant at a lower more consistent rate, would likely improve performance of the facility.

The storage facility would be below ground and constructed with pre-cast concrete sections. Stored water would be fed to the Burlington Main WWTP with lift pumps designed to operate at varying speeds. The facility would be equipped with emergency power (generators) to allow operation during an extended power outage.

4.5.2.3 C-6 Section Howard Street to Battery Street - Build Alternative 2

- **Lake Champlain/Burlington Main WWTP Watershed C-6 Section - Build Alternative 2**

The C-6 Section along Pine Street corridor from approximately Howard Street, northerly to Main Street, covers this sub-watershed. There are no proposed improvements to the existing drainage system or increases in impervious area. Collection of runoff from roadways, would continue through the existing combined system for conveyance to City of Burlington's Main WWTP. The approximate watershed boundary is depicted on Figure 4-31.

- **Lake Champlain/Main WWTP Watershed C-6 Section Collection System**

Pine Street, from Howard Street to Main Street, currently is served by a combined sewer system that co-mingles sanitary waste and stormwater runoff. Since there are no new impervious surfaces proposed within this sub-watershed, no new stormwater treatment practices are proposed. Additionally, sediment loadings should not increase to the Burlington Main WWTP as a result of this portion of the project.

- **Lake Champlain/Burlington Main WWTP Watershed C-6 Section Treatment System**

Stormwater collected in this watershed would continue to be treated at the Burlington Main WWTP. Burlington's Main WWTP is a combined sewer facility, meaning that it treats both sanitary sewage and stormwater. Typically, the WWTP meets or exceeds the effluent limitations stated in its NPDES permit.

By utilizing Best Management Practices for treatment of the project and surrounding areas for the C-1 and C-2 Sections there should be a net improvement to surface waters as a result of this project. For the C-6 Section, the goal is to overcome existing limitations that the Main WWTP currently has, as well as build in capacity to properly treat the C-6 Section improvements. Build Alternative 2 proposes no additional impervious area and as a result, no net impact to water resources. In conclusion, by following these water resource design approaches outlined in this portion of the document, the C-1, C-2, and C-6 Sections alternatives would not have an adverse impact on surface water bodies.

4.5.3 Groundwaters

No impact to either Class III or Class IV groundwaters in the vicinity of the project would occur due to placement of the roadway within existing transportation corridors (either roadway or railway) and the use of closed drainage and treatment systems in the design of the proposed roadway.

The Southern Connector/Champlain Parkway project would not have any measurable impact upon groundwater.

4.5.4 Floodplains

The proposed construction of the Southern Connector/Champlain Parkway project would not affect flood levels or impact 100-year floodplains. This was verified by review of the most recent Federal Emergency Management Agency (FEMA) floodway map, Community Panel (5000320010C) revised January 16, 1987, for Burlington, Vermont.

There would be no impacts to floodplains due to construction of the Southern Connector/Champlain Parkway project.

4.5.5 Wild and Scenic Rivers

As identified in Chapter 3, there are no wild and scenic rivers designated within the area of the Southern Connector/Champlain Parkway project. Therefore, there would be no impacts to any wild and scenic rivers due to the construction of the Southern Connector/Champlain Parkway project.

4.6 Vegetation and Wildlife Impacts

This section describes the impacts to vegetation and wildlife resources, and threatened and endangered species in the study area.

4.6.1 Vegetation and Wildlife Resources

In August 1988, the City of Burlington prepared "The Identification and Characterization of Burlington, Vermont's Wetlands and Significant Natural Areas, with Recommendations for Management". Previous investigations of this study did not identify wetlands other than those associated with the Pine Street Barge Canal Superfund Site. The Pine Street Barge Canal Superfund Site wetland area would not be impacted by the proposed roadway construction.

The Pine Street Barge Canal Superfund Site was previously investigated and three distinct ecological settings or habitat types were identified: aquatic (open water), wetland and upland (dry forests and fields). However, the Pine Street Barge Canal Superfund Site is generally outside the project corridor, and no impacts to this are anticipated.

Neither Build Alternative would impact protected vegetation or wildlife resources.

4.6.2 Threatened and Endangered Species

Several letters were received from the Vermont Nongame and Natural Heritage Program (NNHP) and the United States Fish and Wildlife Service (See Appendix 1). No impacts to threatened or endangered species are anticipated for either Build Alternative 1 or Build Alternative 2, according to information provided by the United States Fish and Wildlife Service.

The latest coordination with NNHP indicated that there are rare fish species, Mottled Sculpin (*Cottus bairdi*) and Rosyface Shiner (*Notropis rubellus*), known to exist in Englesby Brook. NNHP requested that the crossing of Englesby Brook simulate natural stream conditions. Both Build Alternatives propose to provide a natural stream channel through the culvert at Englesby Brook.

Other rare and uncommon species located within the study area are Canada Buffaloberry (*Shepherdia Canadensis*) and Border Meadow-rue (*Thalictrum venulosum*). However, these species have not been encountered along the alignment of either Build Alternative.

Neither Build Alternative would impact any threatened and endangered species.

4.7 Historic and Archaeological Resource Impacts

This section describes the impacts to historic and archaeological resources in the study area of the Southern Connector/Champlain Parkway resulting from the Build Alternatives.

The No-Build Alternative would not impact any historic or archaeological resources within the study area.

4.7.1 Introduction

As stated in Chapter 3, Section 106 analysis is being performed pursuant to the 2000 Programmatic Agreement between SHPO, ACHP, VTrans and FHWA regarding implementation of the Federal-Aid Highway Program in Vermont.

4.7.2 Effects on Historic Resources

Section 3.7 of this document provides a description of the historic properties and Districts determined to be eligible for listing on the National Register of Historic Places.

Determinations of Effect were determined based on 36 CFR 800 Section 106 of the National Historic Preservation Act (NHPA) as amended, which specifies the following:

1. Effect: Undertaking may alter National Register-qualifying characteristics and features of location, setting or use.

2. Adverse Effect: May diminish the integrity of design, setting, materials, workmanship, feeling or association. Adverse effects include, but are not limited to:

    - physical destruction, damage, or alteration of all/part of the property;

- isolation from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
- introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
- neglect of a property resulting in its deterioration or destruction; and
- transfer, lease, or sale of the property.

A summary of the historic properties and Districts impacted by each of the alternatives is discussed below.

4.7.2.1 Battery Street Historic District

Build Alternative 1

The proposed roadway construction associated with Build Alternative 1 proceeds on new alignment in a northwesterly direction from Pine Place to the intersection of Battery Street and Maple Street. This new connection is referred to as the Battery Street Extension (refer to Figure 3-11 in Section 3.7). From the intersection of Battery Street and Maple Street, Build Alternative 1 would consist of pavement rehabilitation of the existing pavement and would proceed along existing Battery Street to its intersection with Main Street. Within this portion of the proposed action, improvements on the existing alignment include a shift in the eastern curbline limited to approximately seven feet for a distance of approximately 270 feet to create a parking lane between Maple Street and King Street. The shift of the eastern curbline creates a corresponding reduction in green space for essentially this entire area. No other substantial landscaping features are affected as a result of this change. The western curbline remains unchanged. Battery Street, from approximately Maple Street to just south of Main Street, is located within the Battery Street Historic District.

Currently, Battery Street, south of Maple Street, ends at the rail yard with no clear physical definition. When the proposed improvement is in place, it would be a defined street with curbs and pavement adjacent to the rail yard. The typical section for the roadway would be two lanes with left-turn lanes at the intersections. The proposed traffic signals at the Battery Street/Maple Street intersection and the Battery Street/King Street intersection would be historically compatible to blend into the surrounding Historic District. This would be accomplished by using pedestal mounted traffic signal poles. This equipment would also be painted to blend into the surrounding Historic District to the extent possible. A parking lane would be constructed on the eastern side of Battery Street between its intersections with Maple

Street and King Street. No historic buildings would be acquired or demolished within the Battery Street Historic District boundaries.

Build Alternative 1 would result in changes within the roadway network of the Battery Street Historic District. It has been determined that Build Alternative 1 would not adversely effect the Battery Street Historic District for the purposes of Section 106. This would be consistent with the Section 106 determination for the 1997 FSEIS.

Preferred Alternative

Build Alternative 2 includes cold planing and resurfacing the existing Pine Street pavement, limited drainage improvements, new granite curb, and construction/ replacement of sidewalk to provide a continuous walkway for pedestrians from the Lakeside Avenue intersection with Pine Street to Main Street. Pine Street, from approximately Maple Street to just south of Main Street, is located within the Battery Street Historic District. The traffic signal installations proposed at the intersections of Pine Street at Maple Street and Pine Street at King Street may require the acquisition of land from the adjacent contributing resources located within the Battery Street Historic District. The acquisitions are anticipated to be minor and would not result in an adverse effect to the Battery Street Historic District. The modifications to the existing aerial utilities would be limited to areas where they are impacted as a result of these traffic signal installations. The proposed traffic signals at the Pine Street/Maple Street intersection and the Pine Street/King Street intersection would be historically compatible to blend into the surrounding Historic District. This would be accomplished by using pedestal mounted traffic signal poles. This equipment would also be painted to blend into the surrounding Historic District to the extent possible.

It has been determined that Build Alternative 2 will not adversely affect the Battery Street Historic District for the purposes of Section 106.

4.7.2.2 Pine Street Historic District

Pine Street Improvements (Build Alternative 1)

Under Build Alternative 1, the C-6 Section connects the C-2 Section in the vicinity of Lakeside Avenue and then proceeds north along Pine Street to the site of the former Burlington Street Department building near Pine Place (refer to Figure 3-11 in Section 3.7).

Under Build Alternative 1, the improvements proposed on Pine Street include pavement widening to accommodate parking and bicyclists, construction of new sidewalks, adding traffic signals**,** pavement markings, curbing, landscaping and

relocation of aerial utilities underground. The western curbline shifts approximately four feet west. The shift of the western curbline creates a corresponding reduction in green space for essentially the entire area and impacts approximately 21 immature trees and 13 bushes. The construction of the new sidewalk along the eastern curbline impacts approximately 22 immature trees and seven bushes. The shift in the eastern curbline creates a limited reduction in green space because this side of the roadway has already been altered with the addition of modern concrete sidewalks, driveways and parking areas. Driveways into several properties located along Lakeside Avenue and Pine Street would be altered, but access would be maintained. The proposed roadway would be constructed at approximately the existing grade and would not create substantial increases in elevation. No other substantial landscaping features are affected as a result of this change.

Battery Street Extension (Build Alternative 1)

Under Build Alternative 1, the proposed C-6 Section consists of the Battery Street Extension connecting Pine Street to Battery Street. This connection would be constructed close to the existing grade with limited changes in elevation. Build Alternative 1 from Pine Place across the rail yard to Battery Street is located between the former Burlington Street Department building and the Curtis Lumber (formerly Gregory Supply Company) building on Pine Street. Currently, this land is occupied by a rail spur which is part of the historic transportation network within the Historic District and represents a historic transportation corridor. The Curtis Lumber building is not a contributing structure to the Historic District, but its function as an industrial/commercial property continues the historic use of this property within the Historic District.

Build Alternative 1 would involve changes within the environs in this part of the Historic District as follows:

Build Alternative 1 would affect the access into, within and out of the former Burlington Street Department property for heavy trucks and other maintenance equipment, and would require the demolition of sheds used to store materials. Build Alternative 1 would require the demolition of a portion of the building and would affect movement of heavy equipment within the property reducing the usable space. The City of Burlington has relocated their operations to another property with sufficient facilities to serve their purposes. As a result, Build Alternative 1 would result in an Adverse Effect. Build Alternative 1 would result in an alteration of the street pattern in the vicinity of the historic buildings located east and west of Pine Street, from Pine Place to Maple Street. The relocation of the rail spur would be within the existing rail transportation corridor. The location of a new roadway across the Curtis Lumber property would not be consistent with its historic use and the environment surrounding the historic buildings immediately adjacent to this property

would be altered. A gap would be created within the Historic District, between historic buildings. There would be no substantive noise or air quality impacts.

Consistent with the 1997 FSEIS Section 106 determination made in consultation with VTrans, SHPO, FHWA and the Advisory Council on Historic Preservation, Build Alternative 1 would result in an Adverse Effect for the purposes of Section 106 because:

1. The action would result in the destruction or alteration of properties contributing to the Historic District.

2. The project would result in the transfer, lease or sale of property.

Pine Street Improvements (Preferred Alternative)

Under Build Alternative 2, the proposed C-6 Section consists of the improvements proposed on Pine Street include rehabilitation of the existing pavement within the limits of the existing roadway, construction of new sidewalks, adding traffic signals, pavement markings, curbing, landscaping. The Maltex Partnership driveway is not relocated under this alternative. Driveways into several properties located along Lakeside Avenue and Pine Street would be altered, but access would be maintained. The proposed roadway would be constructed at approximately the existing grade and would not create substantial increases in elevation. No other substantial landscaping features are affected as a result of this change.

It has been determined that the alterations of the lane configurations, new traffic signals, changes in access, and other related improvements will not result in an adverse effect on the Pine Street Historic District.

4.7.2.3 Queen City Cotton Mill Historic District

The impacts to the Queen City Cotton Mill Historic District created as a result of the construction of either Build Alternative 1 or Build Alternative 2 are identical.

The Lakeside Avenue portion of the C-6 Section has one alignment from its connection with the C-2 Section (refer to Figure 3-11 in Section 3.7). The southern end of the C-6 Section would abut the southern boundary of the Queen City Cotton Mill Historic District along the northern side of Lakeside Avenue. The intersection of Lakeside Avenue with the C-2 Section would be signalized with traffic signal poles located within the Queen City Historic District and would also include the reconfiguration of the driveway entrance to the City of Burlington Department of Public Works.

All improvements would be at-grade and no buildings would be acquired and/or demolished along Lakeside Avenue within the Queen City Cotton Mill Historic

District. There would not be any visual, noise or air quality impacts in the Historic District.

It has been determined that neither Build Alternative 1 nor Build Alternative 2 will adversely affect properties within the Queen City Cotton Mill Historic District.

4.7.2.4 Lakeside Historic District

It has been determined that neither Build Alternative 1 nor Build Alternative 2 will adversely affect the Lakeside Historic District.

4.7.2.5 Individual Structures

It has been determined that neither Build Alternative 1 nor Build Alternative 2 will adversely affect the individual eligible structures identified in Section 3.7.2.5.

4.7.3 Archaeological Resources

Build Alternative 1

Under Build Alternative 1, a portion of C-6 (Battery Street Extension area) has been identified within the proposed transportation corridor as an area that would require further archaeological testing.

The Rutland and Burlington Railroad Site (VT-CH-736), identified to be eligible to be listed on the National Register of Historic Places, would be impacted by Build Alternative 1. Therefore, Phase III data recovery would be completed before Build Alternative 1 could go to the construction phase. The determination of effect for archaeology alone would be a No Adverse Effect determination under Criteria D in which data recovery would be accomplished and preservation in-place would not be considered.

Also, the areas located north of the Pine Street Barge Canal Superfund Site and west of Pine Street, have been determined to be archaeologically sensitive for both precontact Native American sites and historic archaeological sites associated with the Pine Street Barge Canal and the waterfront.

Preferred Alternative

Under Build Alternative 2, no rail yard mitigation would be required; therefore, no archaeological resources would be impacted.

Under the Preferred Alternative (Build Alternative 2), no additional archaeological testing is anticipated because it is apparent that the areas associated with the

anticipated construction limits created by the proposed scope of work have been previously disturbed.

4.7.4 Mitigation

A Memorandum of Agreement (MOA) was previously prepared in consultation among VTrans, SHPO, FHWA, the City of Burlington and the Advisory Council on Historic Preservation (refer to Appendix 5). The MOA was prepared during the development of the 1997 FSEIS and was written to include a wide range of potential alternatives that were being considered at that time. Although the names and impacts associated with Build Alternative 1 have changed, Build Alternative 1 would result in impacts similar to those for the 1997 FSEIS Selected Alternative. Therefore, Build Alternative 1 is still considered within the range of potential solutions that were considered in the previous MOA. The former Burlington Street Department Building no longer serves the purpose that was summarized in the 1997 FSEIS. Currently, this property and building are being used for recycling operations.

Build Alternative 1 would be committed to the mitigation measures described in the MOA; however, Build Alternative 2 has been identified as the Preferred Alternative. The mitigation measures listed for Build Alternative 1 in the MOA do not apply to the Preferred Alternative. The Preferred Alternative does not require an MOA.

Build Alternative 2 will not adversely affect any historic resources. Historically compatible traffic signals at the intersections of Pine Street at Maple Street and Pine Street at King Street would be provided.

4.8 Air Quality Impacts

The State of Vermont is categorized as an attainment area for all of the United States Environmental Protection Agency (EPA) criteria pollutants (total suspended particulates, carbon monoxide, sulfur dioxide, nitrogen oxides, ozone and lead).

As a result of the Vermont attainment status, a mesoscale analysis is not required for this project.

A microscale analysis was performed using the EPA's MOBILE6 Mobile Source Emission Factor Model which provides the most updated data for motor vehicle emissions and traffic.

CO is used in microscale studies to indicate roadway pollutant levels since it is the most abundant pollutant emitted by motor vehicles and can result in so called "hot spot" (high concentration) locations around congested intersections. State and National Ambient Air Quality Standard (NAAQS) levels have been established for

CO to protect the public health. These standards, known as primary standards, do not allow ambient CO concentrations to exceed 35 ppm for a one-hour averaging period and 9 ppm for an eight-hour averaging period, more than once per year at any location. Air quality modeling techniques (computer simulation programs) are used to predict CO levels. The objective of the microscale analysis is to show compliance with state and NAAQS standards established for CO with construction of the project.

The following intersections were considered to represent the worst-case intersections and were selected for this supplemental microscale analysis. These intersections are as follows and have been separated into each specific Build Alternative:

Build Alternative 1

1. Southern Connector/Champlain Parkway at Home Avenue
2. Southern Connector/Champlain Parkway at Flynn Avenue
3. Southern Connector/Champlain Parkway/Lakeside Avenue/Pine Street

Build Alternative 2

1. Southern Connector/Champlain Parkway at Home Avenue
2. Southern Connector/Champlain Parkway at Flynn Avenue
3. Pine Street at Maple Street

The Southern Connector/Champlain Parkway intersection with Home Avenue; the Southern Connector/Champlain Parkway intersection with Flynn Avenue; and the Southern Connector/Champlain Parkway intersections with Lakeside Avenue and Pine Street were modeled because they are considered to be new intersections under the Build Alternatives. The Southern Connector/Champlain Parkway intersection with Lakeside Avenue and the Southern Connector/Champlain Parkway intersection with Pine Street were combined and modeled together under Build Alternative 1 because of their close proximity and anticipated Level of Service (LOS). The Pine Street intersection with Maple Street was studied for Build Alternative 2 because traffic data demonstrated the project would reduce service at this location to below LOS C. All intersections analyzed would be signalized. The microscale analysis evaluated the 2008 design year for comparison with ambient air quality standards. The 2008 design year was selected per the Air Pollution Control Division (APCD) guidelines for Vermont. This year is likely to generate the highest level of emissions. If the project does not cause any air quality impact for this year, then no air quality impact would be expected in any other year.

Receptors were located at the head, middle, and the end of queues; at a perpendicular distance of approximately 16 feet from the queue. At a minimum, receptors were located approximately 16, 31, 78 and 155 feet from intersection corners consistent with EPA and APCD guidelines. A receptor height of six feet was used.

Peak one-hour traffic volumes and turning movements, based on design hour traffic data, were used to assess one-hour CO concentrations. For the peak eight-hour

period, roadway concentrations were calculated using an eight-hour to one-hour ratio (or persistence factor) of 0.6 as recommended by the APCD. This persistence factor accounts for the variability in meteorology over an eight-hour period as compared to one-hour conditions. Eight-hour concentrations were calculated by multiplying predicted one-hour levels by this persistence factor.

An air quality analysis also requires an estimate of "background" air quality levels, representing the contribution of all sources in the project area, less the specific intersections analyzed. Background levels of 3.0 ppm (one-hour) and 1.5 ppm (eight-hour), as recommended by APCD guidelines, were used for the 2008 design year.

The air quality analysis results of predicted CO concentrations are presented in Table 4-21, below**:**

Table 4-21: Air Quality Analysis CO Concentrations at Study Intersections

Study Intersection	Concentrations (ppm) 2008	
	1-Hr	8-Hr
NAAQS*	35.0	9.0
No-Build		
Pine Street/Maple Street	4.9	3.1
Build Alternative 1		
Southern Connector/Champlain Parkway at Home Avenue	5.2	2.8
Southern Connector/Champlain Parkway at Flynn Avenue	3.9	2.1
Southern Connector/Champlain Parkway / Lakeside Avenue / Pine Street	5.1	2.7
Pine Street/Maple Street	3.7	2.4
Build Alternative 2		
Southern Connector/Champlain Parkway at Home Avenue	5.1	2.7
Southern Connector/Champlain Parkway at Flynn Avenue	3.9	2.1
Pine Street/Maple Street	5.4	3.4

* Vermont and National Ambient Air Quality Standard

These concentrations are well below the Vermont and NAAQS of 35.0 ppm (one-hour) and 9.0 ppm (eight-hour) for both Build Alternative 1 and Build Alternative 2.

Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates a group of emissions called "air toxics" or "hazardous air pollutants". Most air toxics originate from human-made sources, including on-road mobile sources,

non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

The Clean Air Act identified 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list of toxics and selected a group of 21 that it considers mobile source air toxics. More recently, the EPA has extracted a subset of this list of 21 and developed what it now labels the six priority Mobile Source Air Toxics (MSATs). These are *benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene*. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. While EPA has identified these as the more substantial MSATs, the EPA has not proposed to establish ambient standards for any of these pollutants.

Technical shortcomings of emissions and dispersion models, and uncertain science with respect to health effects, prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives.*

For each alternative in this 2009 FSEIS, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. Because the VMT estimated for the No-Build Alternative is higher than for any of the Build Alternatives, higher levels of regional MSATs are not expected from either Build Alternative compared to the No-Build. See traffic data in Appendix 3. Since the estimated VMT under each of the Build Alternatives are nearly the same (approximately varying by less than 15.2 percent), it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is

so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Due to the specific characteristics of the project alternatives (i.e. new connector roadway), there may be localized areas where VMT would increase, and other areas where VMT would decrease under each alternative. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur. The localized increases in MSAT emissions would likely be most pronounced along the new roadway sections that would be built at the Southern Connector/Champlain Parkway at Home Avenue intersection and at the Southern Connector/Champlain Parkway/Lakeside Avenue at Pine Street intersection, under both Build Alternative 1 and Build Alternative 2. However, even if these increases do occur, they too would be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

Under either Build Alternative in the design year, it is expected there would be reduced MSAT emissions in the immediate area of the project relative to the No-Build Alternative due to the reduced VMT associated with more direct routing, and due to EPA's MSAT reduction programs. In comparing various project alternatives, MSAT levels could be higher in some locations than others, but current tools and science are not adequate to quantify them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, would over time cause substantial reductions that, in almost all cases, would cause region-wide MSAT levels to be substantially lower than today.

Existing and Required Permits

The project was permitted in December 1982 by the APCD of the Vermont Agency of Environmental Conservation based on the following criteria:

1. The project would neither cause a violation nor exacerbate the levels of carbon monoxide (CO), nitrogen oxides (NO_X), and total suspended particulates (TSP).

2. The project had been reviewed for its impact on the regional oxidant problem by estimating its expected hydrocarbon contribution.

3. All reasonable hydrocarbon emission reduction strategies had been incorporated in the project's design.

Based on the additional analyses completed, the project remains in compliance with State and NAAQS. There are no impacts anticipated, nor mitigation required, for the proposed project. However, an Indirect Source Permit (ISP) is not in place at this

time. Coordination with ANR would be required in order to obtain this permit approval prior to the project letting.

4.9 Noise Impacts

The 1979 FEIS identified receptors within the study area. Many of these receptors were acquired by the project and demolished, especially along the C-1 Section and C-2 Section. It is no longer appropriate to model these receptors; therefore, this 2009 FSEIS identifies new receptors that are more appropriate for the existing conditions. For example, Receptor No. 29 is located within the proposed alignment of the Southern Connector/Champlain Parkway. To properly assess the impacts to receptors proximate to Receptor No. 29, an additional receptor at an adjacent structure, Res-4, was added to the model.

Due to the time lapse of this project, the 1997 noise analysis and 2006 review of that analysis have been evaluated to determine if the previous findings can still be considered valid. As a result of public comments received on the 2006 DSEIS additional modeling was completed for the C-1 Section and C-2 Section to reassess noise impacts using current FHWA guidelines, updated traffic counts and projections, and the most current FHWA noise modeling software (TNM V.2.5). Only the Preferred Alternative (Build Alternative 2) has been updated. Since the C-1 Section has been partially constructed for the Null Alternative, the Null Alternative has been modeled as a basis of comparison along the C-1 Section. The C-1 Section and the C-2 Section were modeled in various scenarios and design years to predict potential noise impacts. The C-1 Section was modeled for Existing Conditions (2003), the No-Build Alternative (ETC & ETC+20), Build Alternative 2 (ETC & ETC+20), and the Null Alternative – (ETC & ETC+20). The C-2 Section was modeled for Existing Conditions (2003), the No-Build Alternative (ETC+20), and the Build Alternative 2 (ETC+20). No additional modeling was performed for the C-6 Section due to the fact that the majority of noise analysis procedures and predictive methodology of the time still holds true to date. Traffic growth is expected because of normal growth. This review addresses the additional traffic implications for the Preferred Alternative.

Common terms used in noise analysis, and appearing herein, include the following:

- dBA – (decibels A weighted) representing values adjusted to reflect human sensitivity;
- L_{eq} - equivalent noise level, representing the level of a steady sound that has the same energy of the observed fluctuating sound over a time interval;

- L_{10} - a sound level that is exceeded no more than 10 percent of a time interval; and roughly equivalent to L_{eq} plus 3dBA for traffic noise.

The applicable Noise Abatement Criteria (NAC) according to 23 CFR 772 are as follows:

- Category B which includes schools, residential areas, etc., 67 dBA L_{eq} or 70 dBA L_{10} exterior; and

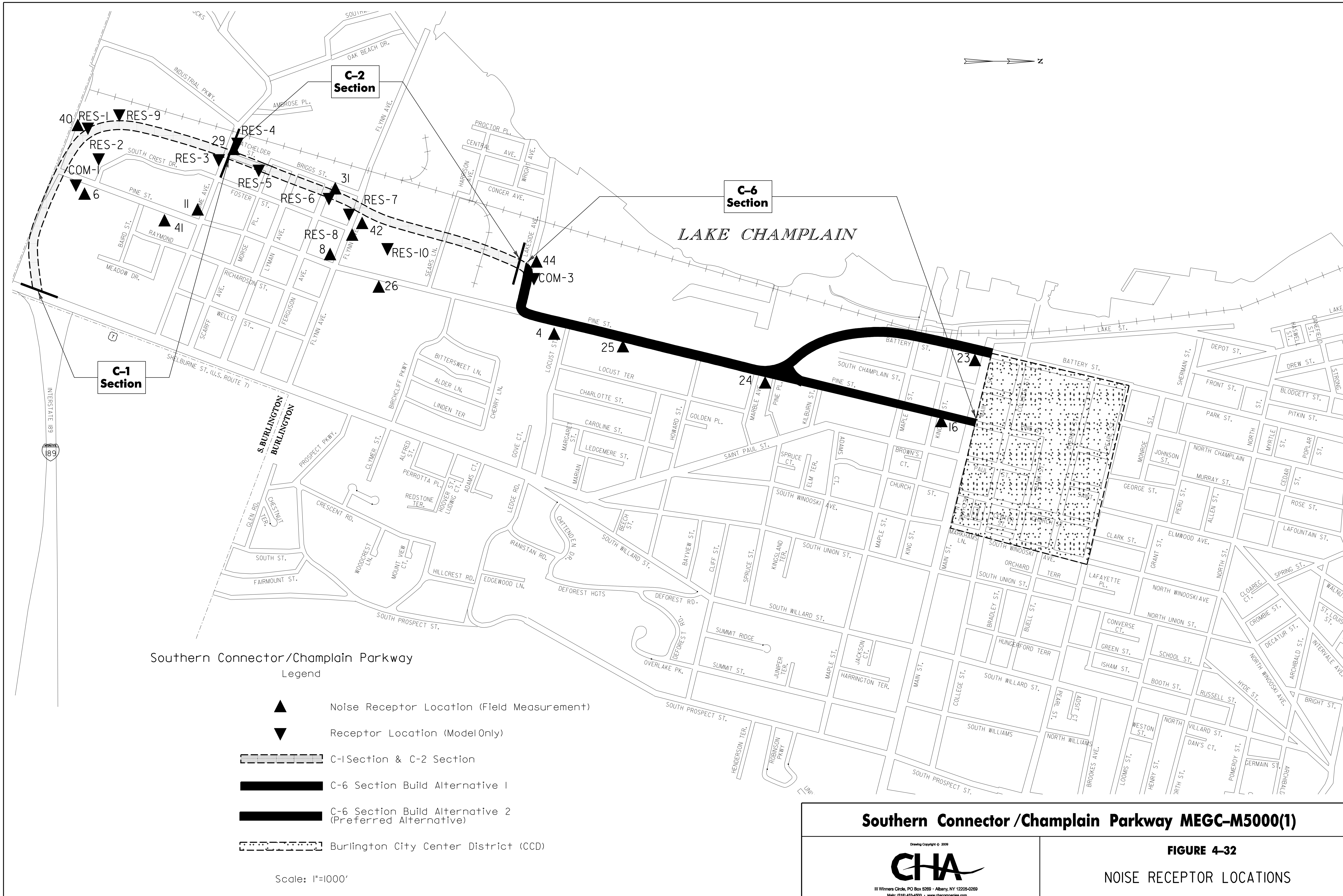
- Category C which includes developed lands not included in NAC category A & B, commercial areas, etc., 72 dBA L_{eq} or 75 dBA L_{10} exterior.

The noise analysis was performed as outlined in the VTrans noise policy entitled *Vermont Agency of Transportation Noise Analysis and Abatement Policy* approved by the FHWA in August 1997. The Southern Connector/Champlain Parkway project is an urban highway project. The review is based upon the current alignment and typical cross section for the Preferred Alternative. Updated traffic projections for the 2008 (ETC) design year were analyzed, as well as 2028 (ETC+20).

Noise impacts occur at receptors where the levels approach or exceed the NAC. VTrans defines "approach" as 1 dBA below the NAC. VTrans' noise policy also defines a noise impact when project noise levels substantially exceed the existing ambient noise levels. Table 1 – Noise Abatement Criteria and Figure 1 – Effects of Increase, of the VTrans noise policy, provide additional information regarding the applicable criteria to be followed for this project (refer to Appendix 7). Noise mitigation would be considered where impacts occur.

The ambient noise levels at several representative project area locations were measured as part of the original 1979 FEIS, the 1997 FSEIS, and the 2006 DSEIS. This information was previously summarized in the 1997 FSEIS and 2006 DSEIS documents. The ambient noise levels for specific locations were again measured in 2008 (refer to Figure 4-32). These measurements were then used for calibrating the inputs used in the FHWA Traffic Noise Model (TNM V.2.5) for the C-1 Section and the C-2 Section. In response to comments received on the 2006 DSEIS, additional receptors were included in the model for the C-1 Section and C-2 Section to provide more complete information.

The highest increase in vehicles anticipated throughout the project limits is anticipated at the intersection of the Southern Connector/Champlain Parkway and Home Avenue. Vehicular traffic was analyzed throughout the study area to determine a worst-case representation of the traffic increases anticipated between the Existing (2003) to Build Alternative 2 (ETC+20).



Southern Connector/Champlain Parkway MEGC-M5000(1)

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FIGURE 4-32

NOISE RECEPTOR LOCATIONS

FILE NAME =U:\8659\RPTS\FSEIS\Display\FIG 4.32.dgn
DATE/TIME =8/19/2009
USER =1933

When determining the noise levels along the C-6 Section, the number of vehicles anticipated within the DHV, vehicle speed, and the distance of the vehicle to a receptor has a direct relationship to the sound pressure level that could be expected at a nearby receptor. For instance, if the number of vehicles increases by 100% then a 3 dBA increase in sound pressure level can be expected, if the number of vehicles increases by 50% a 2 dBA increase in sound pressure level can be expected, and if the number of vehicles increases by 25% a 1 dBA increase in sound pressure level can be expected.

Tables 4-22 and 4-23 show the existing noise levels measured in the field and the values calculated by the model for the C-1 Section and C-2 Section, respectively. Differences of up to 3 dBA represent good correlation between the field measurements and the modeled values. The data shows good correlation between the measured and modeled noise levels along the alignment.

Tables 4-24 through 4-27 show the anticipated noise levels for the No-Build Alternative, Build Alternative 2 and/or the Null Alternative.

Tables 4-24 and 4-25 show the anticipated noise levels along the C-1 Section for the ETC (2008) and ETC+20 (2028), respectively. Table 4-26 shows the anticipated noise levels along the C-2 Section for the ETC +20 (2028). Noise levels at Res-4 do not exceed the NAC in the case of the Preferred Alternative. This is a reduction in noise levels compared to the Null Alternative, because the noise levels exceed the NAC at this receptor under the Null Alternative.

The Preferred Alternative resulted in a substantial increase in noise levels at Res-9, a receptor point adjacent to the northernmost duplex along Arthur Court, south of the C-1 Section. The modeled noise levels for Build Alternative 2 did not exceed the NAC, but rather indicated a substantial increase over the existing noise levels. Noise impacts are not anticipated at any other receptors in the C-1 Section and C-2 Section.

Table 4-27 shows the incremental increases in noise levels anticipated at each of the Build Alternatives compared to the No-Build Alternative along the C-6 Section. It should be noted that for each receptor where impacts are anticipated, the noise levels are the same for each Build Alternative. The receptor representing the Marble Business near Pine Street is conservatively located at the residential setback from Pine Street. The commercial NAC is 1 dBA below the criteria described; however, as defined by VTrans, this location is classified as an impact because this level "approaches" the NAC criteria established.

The receptor representing the Jackson Terrace Apartments is conservatively located at the residential setback from Pine Street. The residential NAC is exceeded by 1 dBA.

Table 4-22: C-1 Section Existing Noise – Field Measurements vs. Modeled Values

(All values presented represent L_{10} values in dBA.)

Observation Point (NAC Category)	2008 Existing Noise Measurements	Existing Conditions Noise Analysis – Modeled Values (2003)	Difference Between Measured and Modeled Values
#6 The Howard Center for Human Services, Inc. (C)	60	62	+2
#11 Residence on Pine Street and Home Avenue (B)	67	67	0
#40 Arthur Court Residences (B)	64	61	-3
#41 Baird Park (B)	60	60	0

Table 4-23: C-2 Section Existing Noise – Field Measurements vs. Modeled Values

(All values presented represent L_{10} values in dBA.)

Observation Point (NAC Category)	2008 Existing Noise Measurements	Existing Conditions Noise Analysis – Modeled Values (2003)	Difference Between Measured and Modeled Values
#4 Calahan Park (B)	63	64	+1
#8 Church @ Pine Street & Flynn Avenue	67	64	-3
#26 Champlain Elementary School (B)	63	64	+1
#42 Flynn Avenue Apartments (B)	66	64	-2
# 44 C-2 Section & Lakeside Avenue (C)	62	60	-2

Table 4-24: Noise Summary for Observation Points – C-1 Section ETC (2008)

(All values presented represent L_{10} values in dBA. Shaded values represent noise impacts.)

Observation Point (NAC Category)	Existing Conditions Noise Analysis – Modeled Values (2003)	No Build Noise Analysis - ETC (2008)	Null Alternative ETC (2008)	Build Alternative 2 ETC (2008)
#6 The Howard Center for Human Services, Inc. (C)	62	63	60	58
#11 Residence on Pine Street and Home Avenue (B)	67	68	63	63
#40 Arthur Court Residences (B)	61	60	62	62
#41 Baird Park (B)	60	61	53	53
Res-1 Arthur Court (B)	50	49	59	57
Res-2 South Crest Drive (B)	51	53	58	56
Res-3 Home Avenue (B)	67	67	69	67
Res-4 Near Home Avenue (B)	65	65	73	68
Res-9 Arthur Court (B)	45	46	67	63
Com-1 The Howard Center for Human Services, Inc. (C)	62	63	65	61

Table 4-25: Noise Summary for Observation Points – C-1 Section ETC+20 (2028)

(All values presented represent L_{10} values in dBA. Shaded values represent noise impacts.)

Observation Point (NAC Category)	Existing Conditions Noise Analysis – Modeled Values (2003)	No Build Noise Analysis ETC+20 (2028)	Null Alternative ETC+20 (2028)	Build Alternative 2 ETC+20 (2028)
#6 The Howard Center for Human Services, Inc. (C)	62	63	60	57
#11 Residence on Pine Street and Home Avenue (B)	67	68	63	63
#40 Arthur Court Residences (B)	61	60	62	62
#41 Baird Park (B)	60	62	53	53
Res-1 Arthur Court (B)	50	49	59	57
Res-2 South Crest Drive (B)	51	53	58	56
Res-3 Home Avenue (B)	67	67	69	67
Res-4 Near Home Avenue (B)	65	65	73	68
Res-9 Arthur Court (B)	45	46	67	63
Com-1 The Howard Center for Human Services, Inc (C)	62	63	65	61

Table 4-26: Noise Summary for Observation Points – C-2 Section ETC +20 (2028)

(All values presented represent L_{10} values in dBA. Shaded values represent noise impacts.)

Observation Point	Existing Conditions Noise Analysis – Modeled Values (2003)	No Build Noise Analysis ETC +20 (2028)	Build Alternative 2 ETC+20 (2028)
#4 Calahan Park (B)	64	63	65
#8 Church @ Pine Street & Flynn Avenue	64	66	63
#26 Champlain Elementary School (B)	64	66	62
#42 Flynn Avenue Apartments (B)	64	65	64
# 44 C-2 Section & Lakeside Avenue (C)	60	62	61
Res-5 Batchelder Street @ Morse Place	63	63	65
Res-6 Residences near C-2 Section & Ferguson Avenue (B)	63	63	66
Res-7 Residences at C-2 Section and Flynn Avenue (B)	63	65	67
Res-8 Flynn Avenue Apartments, Proximate to C-2 Section (B)	64	65	65
Res-10 Champlain School Apartments (C)	62	63	58
Com-3	57	58	65

Table 4-27: Noise Summary for 1979 FEIS Observation Points – C-6 Section

(Shaded values represent noise impacts.)

Observation Point	2006 Existing Noise Measurements	2006 Noise Analysis Review for No-Build Alt. ETC+20 (2028)	2006 Noise Analysis Review for Build Alt. 2 ETC+20 (2028)	Applicable Noise Abatement Criteria
#16 Residence on Pine and King	L_{10} = 66	DHV = 1195 L_{10} = 66	DHV = 1505 L_{10} = 68	L_{10} = 70
#23 Battery Street Business	L_{10} = 58	DHV = 725 L_{10} = 69	DHV = 585 L_{10} = 69	L_{10} = 75
#24 Pine Near Marble Business	L_{10} = 72	DHV = 1730 L_{10} = 74	DHV = 1,780 L_{10} = 74	L_{10} = 75
#25 Jackson Apartments	L_{10} = 71	DHV = 1720 L_{10} = 71	DHV = 1,895 L_{10} = 71	L_{10} = 70

The 1979 FEIS utilized L_{10} sound levels for determination of noise levels. Updates to the modeling have continued to exclusively use the L_{10} values for consistency. In response to community concerns, the 1997 FSEIS had addressed the expected combined noise impact of trains and roadway traffic. Since the 1979 FEIS and the 1997 FSEIS, the potential noise sources resulting from rail improvements within the project area have changed.

However, these rail changes do not reduce source to receptor distances or provide for an increase in track or rail yard uses within the project limits. As a result, rail improvements are not anticipated to outweigh the main contributing noise source of vehicular traffic within the project area.

4.9.1 Mitigation for Noise Impacts

Build Alternative 1 was not modeled for this 2009 FSEIS, because Build Alternative 2 has been identified as the Preferred Alternative. However, Build Alternative 1 is the practically the same as the Preferred Alternative up to Pine Place.

C-1 Section

The addition of a noise barrier along the southwest right-of-way, from the terminus of the existing barrier to a point approximately 200 feet north of the northernmost house on Arthur Court, would provide a noise level reduction for the impacted

receptors in this area. The proposed barrier would be approximately 600 feet long and 15 feet high. The barrier would also provide a benefit (> 5 dBA decrease) to two other duplexes along Arthur Court. The barrier would have would have an approximate area of 9,000 square feet and an approximate cost of $180,000. In all, six total residences would benefit from the barrier.

A cost-benefit analysis was then performed for the proposed barrier and the surrounding residences. Per the Vermont Agency of Transportation's *Noise Analysis and Abatement Policy*, a cost of $20/sf of noise barrier structure was used for the analysis. The calculated cost of the barrier is $30,000 per benefitted residence. The *Noise Analysis and Abatement Policy* defines a reasonable cost for a noise barrier to be $20,000 per benefitted receptor. Therefore, the cost of the barrier is not considered reasonable; thus no noise abatement measures are proposed for the C-1 Section.

C-2 Section

No mitigation is proposed for the Preferred Alternative along the C-2 Section, because there are no noise impacts anticipated along the C-2 Section.

C-6 Section

For the anticipated noise impact at the Marble Avenue business, a typical noise mitigation measure is the introduction of transmission loss between the roadway and the residential space. This could take the form of barriers, berms, or upgrades to the building itself. The Marble Avenue business is located on the corner of Pine Street and is situated close to the adjacent streets. There are many driveway openings and other properties in close proximity to this business. Due to the spatial constraints that surround this location, inclusion of a noise mitigation measure, such as a barrier wall, would not provide any value to the Marble Avenue business. Therefore, due to the urban environment that surrounds this area, no further abatement measures are recommended because it is not feasible given the inadequate space needed to properly implement effective mitigation measures.

For the anticipated noise impact at the Jackson Terrace apartments, noise barrier was considered; however, due to the spatial constraints and the number of openings needed to maintain adequate access to the apartments; inclusion of a noise mitigation measure, such as barrier walls, would not be effective in providing any value to the Jackson Terrace Apartments. Therefore, due to the urban environment that surrounds these apartments, no further abatement measures are recommended because it is not feasible given the inadequate space needed to properly implement effective mitigation measures.

In Summary, no mitigation is proposed for noise impacts for the Preferred Alternative. Abatement measures have not been found to be feasible or reasonable.

4.10 Public, Conservation and Recreation Land Impacts

Publicly owned parks located within the study area were described in Section 3.10. No publicly owned parks in the study area would be impacted by either Build Alternative.

The most recent records of properties improved by the Land and Water Conservation Fund (LWCF) were obtained from the ANR (see Section 3.10). The only LWCF projects (Section 6(f)) in the study area are Calahan Park (South Park), Perkins Pier, Lakeside Park and Smalley Park.

Neither Build Alternative will impact any LWCF projects (Section 6(f)) in the study area.

Calahan Park (South Park) is not anticipated to be impacted by either Build Alternative, as it is topographically higher than Pine Street and separated from Pine Street by a wooded slope extending along the east side of Pine Street. Furthermore, Perkins Pier, Lakeside Park and Smalley Park are remote from the physical improvement corridor, and negative indirect impacts are not expected.

4.11 Hazardous Materials Impacts

4.11.1 Introduction

Since portions of the proposed C-6 Section along Lakeside Avenue and Pine Street are adjacent to the Pine Street Barge Canal Superfund Site, and since the Battery Street Extension portion of Build Alternative 1 is in close proximity to the northern portion of the Pine Street Barge Canal Superfund Site; the potential exists to encounter hazardous materials including contaminated soil (and possibly groundwater) during construction of the Build Alternative 1. Of particular concern is whether the proposed construction would encounter coal gasification waste and/or impact remediation efforts associated with the Pine Street Barge Canal Superfund Site.

Based upon comments and discussions with EPA, supplemental hazardous waste testing and analyses were conducted along the C-6 Section. The primary purpose of this supplemental testing and analysis was to determine the type and extent of hazardous materials likely to be encountered during construction, if any; and if

construction activities may cause the migration of Superfund Site material (i.e., to review the anticipated effect of construction and loading on the Superfund Site hazardous materials); and to identify if any, non-Superfund Site related hazardous material may be encountered during construction.

In addition, a review of previously collected data for the Havey property (former LASMO property) was evaluated to identify potential impacts associated with the proposed relocation of VTR operations to this site.

Section 4.11.2 summarizes the results of the supplemental hazardous material testing and analysis along the C-6 Section. Section 4.11.3 presents a summary of the Havey property assessment.

4.11.2 Supplemental Hazardous Material Testing Along the C-6 Section

4.11.2.1 Supplemental Subsurface Investigation – April 1996

The supplemental testing consisted of drilling 16 borings along the proposed C-6 Section and on properties that could impact or be impacted by the C-6 Section, the installation of groundwater monitoring wells in two of the borings near the former Burlington Street Department facility, and the collection and laboratory analysis of two groundwater and 32 soil samples (refer to Figure 4-33). The purposes of the field investigation were to provide additional environmental information: (1) on the type and concentration of constituents that may be encountered in the proposed right-of-way during construction of the C-6 Section, (2) on other areas along and outside of the right-of-way that may be impacted by construction and use of the C-6 Section, (3) to assist in determining whether contamination on properties near the alignment could migrate to and impact the C-6 Section, (4) to assess the short-term and long-term impacts of the construction and use of the C-6 Section on the remedial response actions completed at the Pine Street Barge Canal Superfund Site, and (5) if needed, to assist in the development of remedial alternative(s) to mitigate the presence of materials that may exceed regulatory standards or that may pose a risk to human health and the environment.

Based on the supplemental field investigation, the soil along the proposed alignment contains low concentrations of VOC's, PAH's, and TPH that would not need to be remediated from a risk-based standpoint. Soils from the former Burlington Street Department facility containing petroleum constituents resulting from a past UST release would need to be remediated by the UST owner/operator per Vermont's UST regulations. Per VTrans policy, petroleum-contaminated soils previously encountered in boring P12, located at the end of South Champlain Street, are classified as Class II soils and would require excavation, treatment to Class I levels, and reuse or disposal once the extent of contamination has been determined. In addition, the petroleum contaminated soils from the vicinity of boring P12 are considered "state-regulated

material" and would need to be handled and treated and/or disposed of following Vermont's UST regulations. Excess soil generated from areas near the Pine Street Barge Canal Superfund Site (near borings P4, P5, P6, P8, and P9) would need to be handled and treated and/or disposed of as "Superfund" material, or Vermont regulated hazardous waste. Additional soil borings are planned in this area to further characterize the soils for determination of appropriate handling and/or disposal methods.

The compounds detected in groundwater in the two wells in front of the former Burlington Street Department facility include the VOC's vinyl chloride (in MW-P2, but not detected in the duplicate sample), benzene (in MW-P1), 1,2-DCE (total) (in both wells), and TCE (in MW-P2 and the duplicate sample). A very low concentration of the PAH acenaphthylene (0.6 J ug/l) was detected in the duplicate sample from MW-P2. A TPH-GRO concentration of 53 ug/l was detected in MW-P1, which may indicate that the benzene detected in MW-P1 is gasoline-related.

The State of Vermont has promulgated standards established for constituents in groundwater. These "Primary Groundwater Quality Standards" are listed in Chapter 12, "Groundwater Protection Rule and Strategy" with a last amended effective date of January 20, 2000.

In the standards, an "Enforcement Standard" and a "Preventive Action Level" are listed for each constituent. The Enforcement Standard is essentially equal to the federal standard or "maximum contaminant level" (MCL) for drinking water, whereas the proposed Preventive Action Level is less than the Enforcement Standard, often by half (50%). Therefore, if the Enforcement Standard is exceeded, then the Preventive Action Level is also exceeded.

In comparing the concentrations of detected constituents in groundwater to these standards, the 10 ug/l of vinyl chloride in MW-P2 exceeds the Enforcement Standard of 2 ug/l. The certainty of this detection is somewhat suspect because it was detected at a concentration equal to the detection limit, but it was not detected in the duplicate sample. The 21 ug/l of benzene detected in MW-P1 exceeds the Enforcement Standard of 5 ug/l. The 8 ug/l of TCE in MW-P2 (7 ug/l in the duplicate sample) exceeds the Enforcement Standard of 5 ug/l. For 1,2-DCE, the Enforcement Standards are given for the cis-isomer (70 ug/l) and the trans-isomer (100 ug/l proposed), not for "total" concentrations as was analyzed in this investigation. Because the cis-isomer standard is more stringent, it was conservatively assumed that the "total" concentration was 100% attributable to the cis-isomer. If this assumption were true, then the concentration of 1,2-DCE in MW-P2 of 77 ug/l (74 ug/l in the duplicate sample) would exceed the Enforcement Standard. Conversely, if the "total" concentration is 100% attributable to the trans-isomer, then the Enforcement

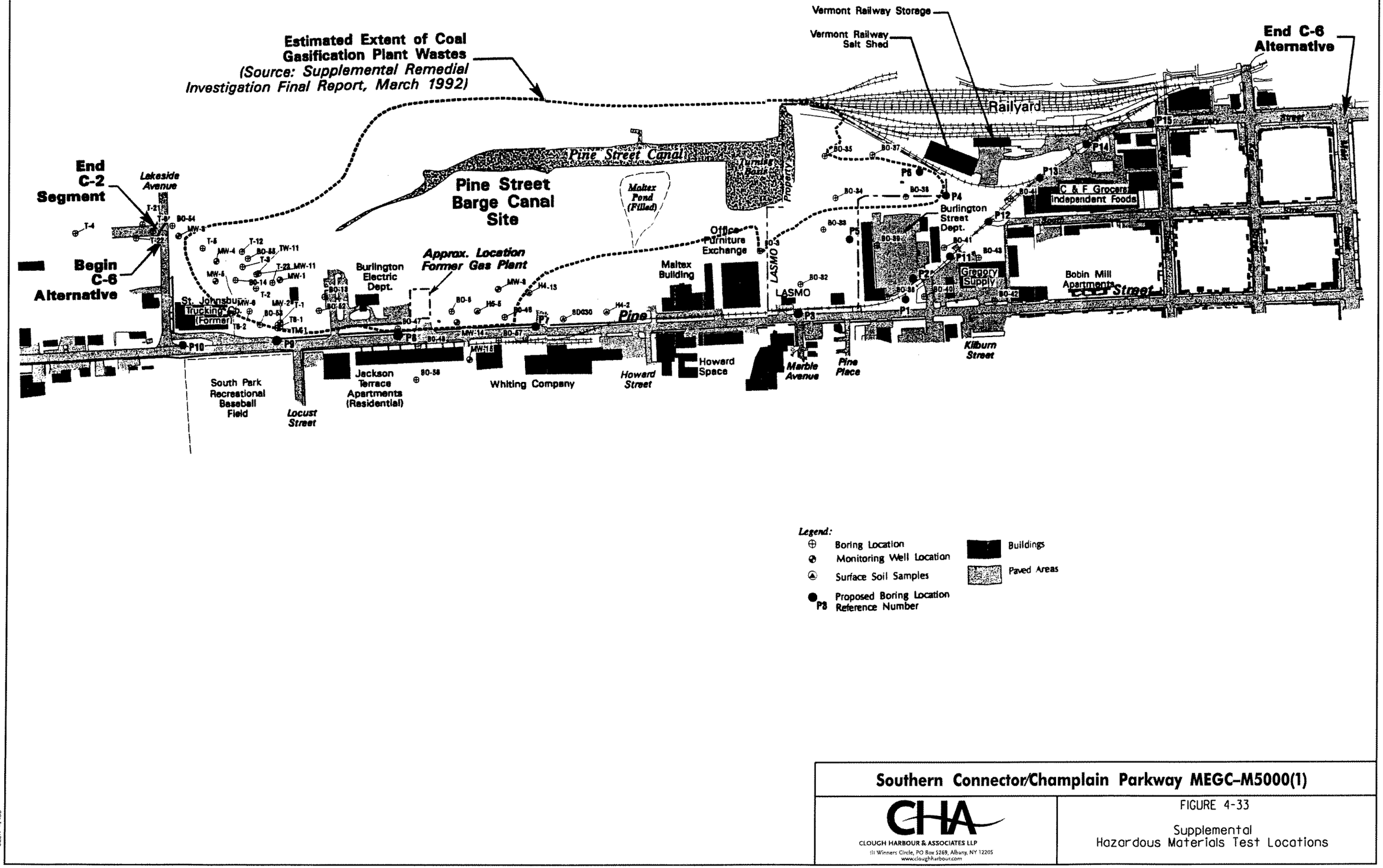

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FIGURE 4-33

Supplemental
Hazardous Materials Test Locations

FILE NAME =\\ALBSRV\PRTS\FSEIS\Displays\FIG 4-16.dgn
DATE/TIME =10/12/2006
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Standard would not be exceeded. It is probable that the "total" concentration is attributable to a percentage of both isomers. The 1,2-DCE concentration exceeds the Preventive Action Level of 35 ug/l for the cis-isomer and the proposed level of 50 ug/l for the trans-isomer.

The DEC was contacted about the potential implications of these exceedances of the Enforcement Standards for groundwater. According to DEC, it appears that groundwater near MW-P1 and MW-P2 likely would not need to be remediated because the detected concentrations are relatively low (although the Enforcement Standards are exceeded) and the wells are adjacent to the Pine Street Barge Canal Superfund Site. Groundwater on the Pine Street Barge Canal Superfund Site has been classified as "Class IV" groundwater (the lowest class), which means it is not for potable use but could be used for some agricultural, commercial, or industrial purposes.

Based on the stratigraphy as determined in the 16 borings drilled during the field investigation to a depth of 15 feet below ground surface, soils along the proposed alignment consist predominantly of loose to medium-dense, fine-grained to medium-grained sand with silt and little clay. Groundwater was encountered in the borings at average depths of five to seven feet below ground surface.

It is not anticipated that additional soil loadings during and after construction of Build Alternative 1 would affect contaminant migration on the Pine Street Barge Canal Superfund Site due to the following factors:

1) Loose to medium-dense sand is not very compressible,

2) Compressible materials such as peat were not encountered in any boring,

3) The free-phase product detected in the subsurface of the Site is concentrated towards the center of the Site in the wetlands west of the former coal gasification plant in the more porous peat and fill material and would preferentially stay in the more porous materials versus migrating off-site into denser, less compressible material such as fine sand,

4) Groundwater on the Site apparently migrates predominantly westward toward Lake Champlain and potential loading from the alignment, which appears to be hydraulically up-gradient, would not change that direction, and

5) Currently, the method of construction is anticipated to be widening the existing roadway along Pine Street, which should not result in a considerable increase in loading along the alignment. Also, the proposed widening should not affect the amount of groundwater recharge to the point of altering migration direction. While it is true that drainage pipes and future underground utility lines may periodically be

below the seasonal water table, these features are not likely to substantially impact the regional groundwater flow patterns. In addition, it should be noted that the majority of the identified sources of contamination are hydraulically downgradient of the alignment, therefore, it is not expected that the installation of subsurface drainage systems adjacent to the alignment would act as a conduit for migration of contamination.

Because soils apparently do not need to be remediated from a risk-based standpoint, potential remedial actions for soil are not evaluated. If the source of petroleum constituents detected in soils (especially in boring P12) is from a UST release, then the UST owner/operator would be responsible for complying with Vermont's UST regulations, which include specific requirements for the handling and treatment/disposal of petroleum-contaminated soil. If the source of contamination is other than from a UST release, contaminated materials would be assessed according to Vermont Hazardous Waste Management Regulations, EPA's Region III Risk-Based Concentrations Table and/or site specific risk-based standards. The VTrans policy on the excavation, handling, and treatment and/or disposal of any petroleum-contaminated soils not related to a UST release would be followed unless directed otherwise due to actual site conditions encountered. Based on discussions with DEC, currently it appears that remediation of groundwater near wells MW-P1 and MW-P2 would not be required by DEC. However, continued monitoring by periodic sampling and analysis of the groundwater has been required. Construction of Build Alternative 1 likely would need to be conducted following a Health and Safety Plan to address potential short-term exposure of workers to compounds in the groundwater and soils.

4.11.2.2 Groundwater Monitoring and Additional Investigation at Burlington Street Department Facility – January 2001

Since September 1998, Heindel and Noyes (H&N) has been investigating petroleum contamination originating from releases from UST's and AST's at the former Burlington Street Department facility on Pine Street. The H&N investigations included confirmation of contamination, closure in place of three USTs, installation of nine groundwater monitoring wells, and quarterly groundwater monitoring. In addition, H&N also provides oversight of the on-site remediation of a contaminated soil pile and soil mass on the southern side of the garage, and oversight of the cleanup of a waste oil release.

4.11.2.3 Additional Geotechnical and Environmental Subsurface Investigations – December 2003 through November 2004

Additional subsurface investigations were conducted by the City of Burlington's consultant for geotechnical and environmental purposes between December 2003 and November 2004 along the proposed alignment for Build Alternative 1. The

additional subsurface investigation included installing 37 soil borings and two groundwater monitoring wells extending to depths ranging from 4 to 47 feet. The location of each soil boring is indicated on the Boring Location Plans. Refer to Figure 4-34 (Drawing 1 to Drawing 4).

Prior to conducting the subsurface investigation, the City of Burlington's consultant submitted the Field Activities Work Plan (January 2003) to the EPA and DEC for review. The Work Plan outlined the additional geotechnical and environmental investigations proposed to resolve uncertainties that existed regarding subsurface conditions and characteristics of soils and groundwater along the proposed transportation corridor.

The purpose of the additional investigation was to:

1) Determine whether the existing soils were sufficient to provide long-term support of the roadway,

2) Determine the extent of soil that would require special handling during construction due to contaminants, and

3) Evaluate the requirements for managing impacted groundwater, if dewatering would be required.

The geotechnical soil borings were completed approximately every 500 feet along the alignment using a drill rig and hollow stem auger methods. The geotechnical borings were used to evaluate physical/geotechnical soil properties, to provide a preliminary indication of subsurface environmental conditions, and to determine the presence and thickness of peat deposits. Environmental samples were collected from several of the selected geotechnical borings.

Additional soil borings were completed to collect environmental samples using the same drill rig and hollow stem auger methods. The environmental samples were collected from the following locations due to the potential for contamination based on field review:

- Soil stockpiles in C-1 Section: three surface soil samples (Stock-1, 2, and 3),
- Shared-use path adjacent to the C-1 Section: two soil borings (B-3 and B-4),
- Former Vermont Structural Steel, Briggs Street: one soil boring (B-5),
- Former Vermont Gas Supply, Briggs Street: one soil boring (B-7),
- Tamarack Auto, Sears Lane: one soil boring (B-11),
- Former Morton Property, Sears Lane: one soil boring (B-12),

- Former Bell Aircraft Dump, Lakeside Avenue: one soil boring (B-14),
- Casella Waste, Lakeside Avenue: one soil boring (B-13),
- Former Rosetti Real Estate, Lakeside Avenue: one soil boring (B-15),
- City of Burlington DPW (Former St. Johnsbury Trucking), Lakeside Avenue: three soil borings (B-16, B-17, and B-18),
- Former Gas Plant and Pine Street Barge Canal Superfund Site, west side of Pine Street: three soil borings (B-19, B-20, and B-22),
- P-12 Boring Location, Pine Street: five soil borings (B-25, B-26, B-27, B-28, and B-29),
- Vermont Railway: eight soil borings (B-22, B-30, B-31, B-32, B-33, B-34, B-35, B-36, and B-37).

During the subsurface investigation, two groundwater monitoring wells were installed and environmental samples were collected at the following locations: B-27/MW-1 and B-34/MW-2. Several existing groundwater monitoring wells located near the P-12/railroad tracks and Pine Street were scheduled for sampling but could not be sampled due to activities in the area that caused damage or abandonment of the wells.

The soil and groundwater samples were analyzed for volatile organic compounds via EPA Method 8260, semi-volatile organic compounds via EPA Method 8270, PCBs via EPA Method 8082, and total and TCLP RCRA metals via EPA Method 6010 and 7471.

Groundwater Analytical Results. The groundwater analytical results for groundwater monitoring well B-27/MW-1 indicated that no VOCs, SVOCs, or PCBs were detected. It should be noted that areas along the Pine Street Barge Canal Superfund Site, Havey Property, and VTR rail yard have had historical remediation for polynuclear aromatic hydrocarbon (PAH) and for VOCs. The following metals were detected at levels above the Vermont Groundwater Enforcement Standards (VTGWES): arsenic, cadmium, chromium, and lead. The groundwater analytical results for groundwater monitoring well B-34/MW-2 indicated benzo (a) pyrene and lead were detected at levels above VTGWES and arsenic was detected above the Vermont Preventive Action Level. There may be some groundwater displaced or pumped from the general area of these wells where excavations from 2 to 6 feet are proposed and would require treatment where elevated levels exceed Vermont DEC groundwater quality standards.

Stockpile Surface Soils Analytical Results. The results from the previously remediated stockpiles in C-1 Section indicated that there were PCB's exceeding the

VT STATE PLANE GRID

N

DRAWING 2

HOME AVENUE

BRIGGS STREET

FLYNN AVENUE

BATCHELDER STREET

MORSE PLACE

LYMAN AVENUE

FERGUSON AVENUE

DRAWING 3

SOUTHERN CONNECTOR

LAKESIDE AVENUE

ENGLESBY BROOK

SEARS LANE

LOCUST STREET

DRAWING 4

BUILD ALTERNATIVE I

PINE STREET

PINE STREET

BUILD ALTERNATIVE 2

HOWARD STREET

MARBLE AVENUE

PINE PLACE

0 300 600

1 INCH = 300 FEET
@ FULL SIZE

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FIGURE 4-34
(DRAWING 1)

BORING INDEX PLAN

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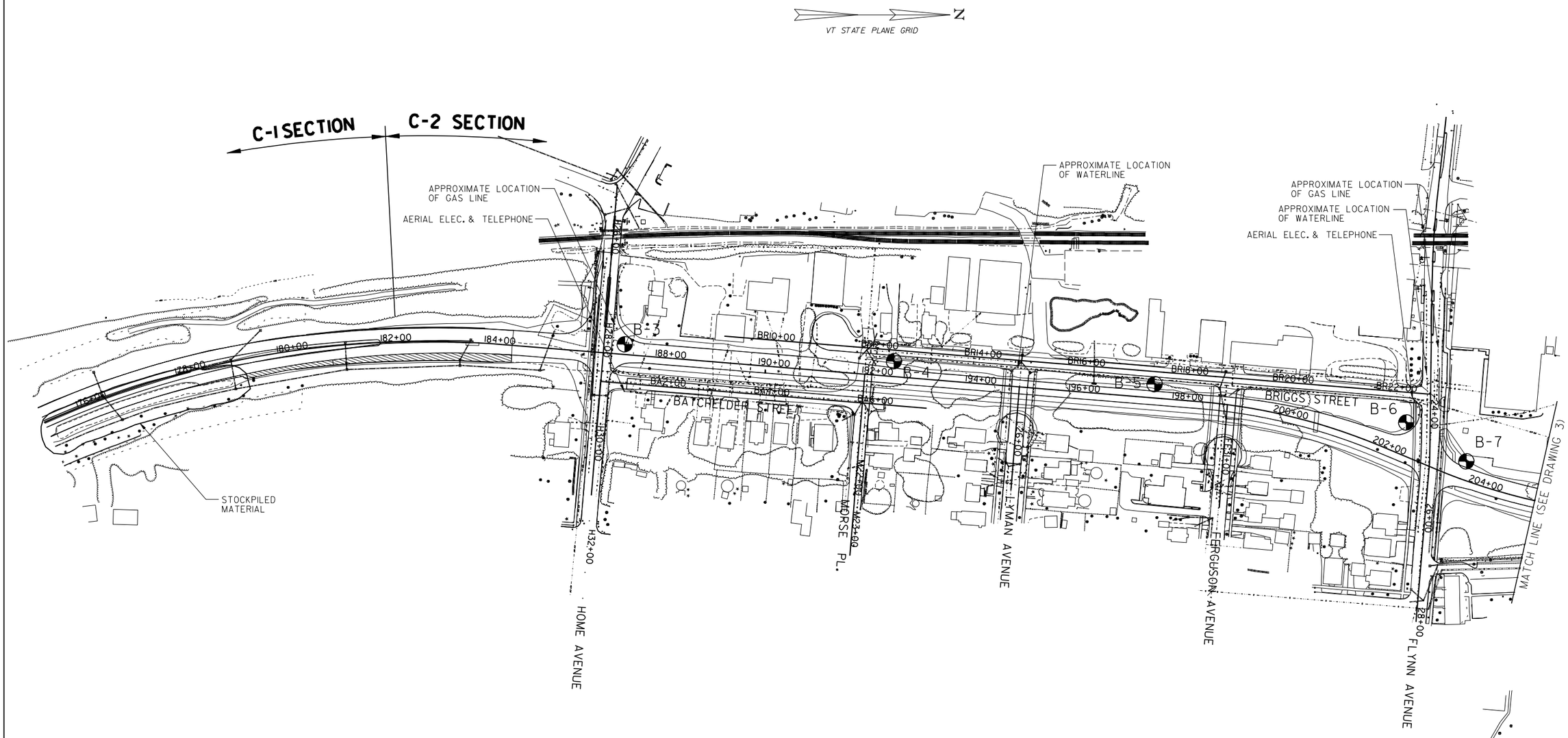
DATE/TIME =8/19/2009
USER =1933



LEGEND

B-3 BORING LOCATION

0 100 200

1 INCH = 100 FEET @ FULL SIZE

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FIGURE 4-34 (DRAWING 2)

BORING LOCATION PLAN

FILE NAME =U:\8659\RPTS\FSEIS\Displays\FIG 4-57_02.dgn
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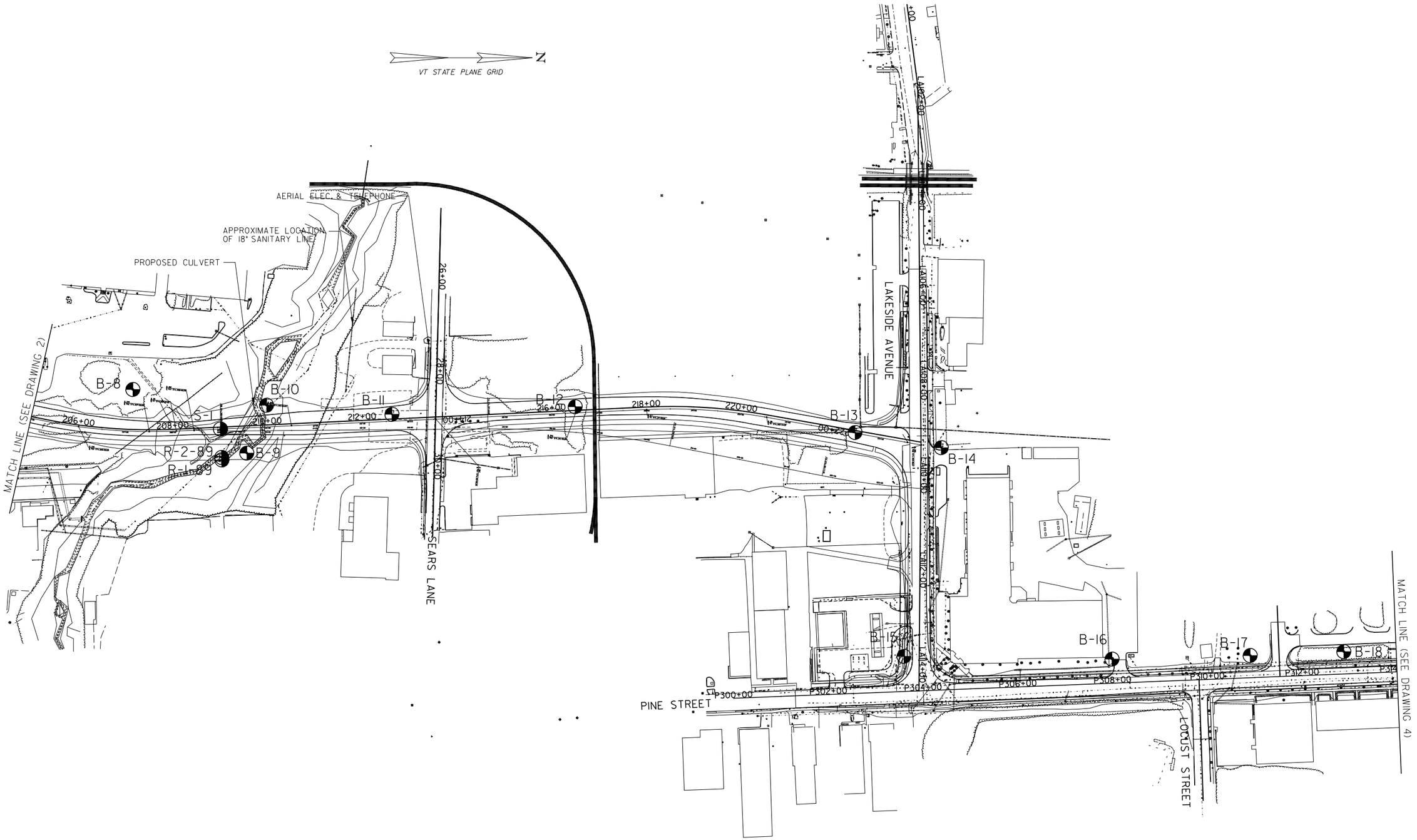

LEGEND

B-3	BORING LOCATION
R-1-89 S-1	APPROXIMATE LOCATIONS OF OLD SOIL BORINGS

0 100 200
1 INCH = 100 FEET @ FULL SIZE

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FIGURE 4-34 (DRAWING 3)

BORING LOCATION PLAN

FILE NAME =U:\8659\RPTS\FSEIS\Display\FIG 4-57_03.dgn
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N

VT STATE PLANE GRID

PINE STREET BARGE CANAL
SUPERFUND SITE

VERMONT RAILWAY YARD

B-35
PEAT
(5.5' - 11.5')

B-36
NO PEAT
TO 10'

B-37
PEAT
(BELOW 6.1')

B-38
PEAT
(8.5' - 16')

DENNIS HAVEY

APPROX. LOCATION OF
PROPOSED STORAGE SHED

APPROX. LOCATION
OF WATERLINE

APPROX. LOCATION OF
PROPERTY BOUNDARIES
(TYP.)

B-33
NO PEAT
TO 15'

B-34

B-34A/MW-2

B-29
B-30
B-28
B-27/MW-1
B-26
B-25

RF 342+00
RF 344+00
RF 346+00

PROPOSED
STORAGE SHED

GREGORY
SUPPLY

B-24

APPROX. LOCATION OF
UNDERGROUND TELEPHONE

APPROX. LOCATION
OF WATERLINE

APPROXIMATE
LOCATION OF
GAS LINE

453 PINE LLC

MALTEX
PARTNERSHIP

LOUIS
FARRELL

CITIZENS OIL
CO., INC.

B-19
B-20
B-21
B-22
B-23

P316+00
P318+00
P320+00
P322+00
P324+00
P326+00
P328+00
P330+00
P332+00
P400+00
P402+00

PINE STREET

MATCH LINE (SEE DRAWING 3)

HOWARD STREET

26+00

27+56 MARBLE AVENUE

PINE PLACE

APPROX. LOCATION OF PROPOSED
UNDERGROUND STORMWATER
STORAGE SYSTEM

CITY OF BURLINGTON
(DEPT. OF PUBLIC WORKS)

LEGEND

B-3	BORING LOCATION
B-35	BORINGS THAT ENCOUNTERED PEAT (5.5' - 11.5')
	APPROXIMATE EXTENT OF PEAT

0 100 200

1 INCH = 100 FEET
@ FULL SIZE

FILE NAME =U:\8659\RPTS\FSEIS\Displays\FIG 4-57_D4.dgn
DATE/TIME = 8/19/2009
USER = 1933

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FIGURE 4-34
(DRAWING 4)

BORING LOCATION PLAN

EPA's risk based soil screening for residential soil. These stockpiles were near the residential homes at the south end of the corridor. The stockpiled material would require further characterization during construction before grading in this area.

Soil Sample Analytical Results. The soil sample analytical results are summarized in Table 4-28 for detected parameters.

Based on the review of the analytical data for soil sample B-29, the parameter Benzo(b) fluoranthene was detected at a concentration exceeding the EPA risk based soil screening level of 3,900 ug/kg for industrial soils. Boring B-29 location was sampled at the surface from 0 to 2 feet below ground and the PID/headspace reading was less than 1 ppm.

As shown in Table 4-28, the soil sample analytical data for several locations exceeded the EPA risk based soil screening level of 390 ug/kg for Benzo(a) pyrene for industrial soils. The locations where the industrial standards were exceeded were for samples collected at B-20, B-25, B-27, B-28, B-29, B-31, B-33, B-34, B-35, and B-37. The highest concentration detected was for B-29 at 5,000 ug/kg and the range for benzo (a) pyrene was detected between 480 to 5,000 ug/kg.

The soil sample analytical data for B-20, B-29, and B-31 exceeded the EPA risk based soil screening level of 390 ug/kg for Dibenzo(a,h) anthracene for industrial soil standards. The highest concentration detected was for B-29 at 910 ug/kg.

The soil sample analytical data for B-16 and B-17 exceeded detection levels above EPA's residential cleanup of lead in soils. The detected level exceeded the EPA standard of 400 ug/kg at B-16 with a detected value of 2,640 ug/kg and at B-17 with a detected value of 1,850 ug/kg. These two locations are located on Pine Street, north of the current Burlington DPW building near Locust Street.

As a result of these concerns, a Soil and Groundwater Management Plan relative to the proposed construction activities would be required for development of Build Alternative 1. In addition, USEPA has institutional controls prohibiting excavations deeper than five feet for the parcels in the vicinity of the Pine Street Barge Canal Superfund Site, Havey property, VTR rail yard, Burlington DPW, and several adjoining properties. Any soils requiring excavations in the C-6 Section would require prior approval by EPA and proper soil management methods including stockpiling, characterizing, and transporting to a waste disposal facility by following the Soil and Groundwater Management Plan.

4.11.3 Havey Property (Former LASMO Property) Assessment

Under Build Alternative 1, the potential relocation of impacted VTR facilities and operations to the Havey property is affected by the following: 1) whether peat is present, and if so, at what depths and thicknesses at which it is present, and 2) the types and concentrations of constituents that may be encountered during potential relocation activities which may dictate how excavated material would be handled.

Build Alternative 2 does not affect the Havey property.

4.11.3.1 Presence of Peat – Previous Investigations

Fifteen borings were drilled on and near the proposed locations of rail tracks and rail yard structures during past studies conducted by several consultants as part of the Pine Street Barge Canal Superfund investigation (refer to Figure 4-35). A review of the available logs of 14 of these 15 borings and other information indicates that peat was encountered in nine of the 15 borings at varying depths and thicknesses (refer to Figure 4-36). Generally, it appears that peat is present in the borings closer to the former barge canal. The origin of the peat likely is associated with aquatic vegetation deposited in backwater or wetland conditions during flooding events and/or higher-water level periods associated with Lake Champlain. The varying depths to the peat likely result from varying thicknesses of material overlying the peat that historically was used to fill and regrade the surface of the area, and from elevation differences in the depositional surface of the peat.

Information contained in the M&E Supplemental Remedial Investigation (SRI) report indicates that compaction of the peat is variable because of differences in the composition and thicknesses of the overlying fill material. In areas where the fill material is thicker, the underlying peat is more consolidated or compressed because of the weight of the overlying fill. Also, historical activities on the Havey property could have further compacted the peat in localized areas.

Additional information in the SRI report indicates that groundwater in the fill and peat layers in the area of the Havey property migrate predominantly in a westerly direction towards Lake Champlain. Water levels in the peat/fill layer fluctuate up to six feet annually, and the water levels directly correspond to water elevation changes in the canal and lake. However, the fluctuations do not appear to affect the overall westward flow direction or the horizontal gradient of the groundwater.

TABLE 4-28
Summary of Detected Parameters - Soil Samples
Burlington Southern Connector
Burlington , Vermont

Parameters	*Human Health Direct Contact Standard [1] Industrial*	*Human Health Direct Contact Standard [2] Residential*	*Sample I.D.:*	*B-4*	*B-5*	*B-7*	*B-11*	*B-12*	*B-13*	*B-14*	*B-15*	*Stock-1*	*Stock-2*	*Stock-3*	*B-16*	*B-17*	*B-19*	*B-20*	*B-22*	*B-25*	*B-26*	*B-27 (MW-1)*	*B-28*	*B-29*	*B-30*	*B-31*	*B-33*	*B-34 (MW-2)*	*B-35*	*B-36*	*B-37*
			Interval (ft. bgs):	*2.0 - 4.0*	*14.0-16.0*	*2.0 - 4.0*	*8.0-10.0*	*2.0 - 4.0*	*8.0-10.0*	*4.0 - 6.0*	*4.0 - 6.0*	*0.0 - 1.0*	*0.0 - 1.0*	*0.0 - 1.0*	*15.0-17.0*	*4.0 - 6.0*	*15.0-17.0*	*0.0 - 2.0*	*6.0 - 8.0*	*2.0 - 4.0*	*4.0 - 6.0*	*0.0 - 2.0*	*2.0 - 4.0*	*0.0 - 2.0*	*6.0 - 8.0*	*2.0 -4.0*	*2.0 - 4.0*	*4.0 - 6.0*	*2.0 - 4.0*	*2.0 - 4.0*	*2.0 - 4.0*
			Matrix:	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*
			Date:	*6/8/04*	*6/8/04*	*6/16/04*	*6/8/04*	*6/7/04*	*6/7/04*	*6/16/04*	*6/10/04*	*9/24/04*	*9/24/04*	*9/24/04*	*6/7/04*	*6/17/04*	*6/9/04*	*6/17/04*	*6/9/04*	*6/17/04*	*6/17/04*	*6/17/04*	*6/17/04*	*6/17/04*	*6/17/04*	*6/10/04*	*6/10/04*	*12/17/03*	*12/17/03*	*12/16/03*	*12/17/03*	*12/16/03*
				Res	**Res**	**Res**	**Res**	**Res**	**Res**	**Res**	**Res**	**Res**	**Res**	**Res**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**	**Industrial**
Volatiles (ug/Kg)																														
Acetone	920,000,000	7,000,000		<6.4	<5.6	<6.2	14	<6.1	<6.6	2.0 J	24	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	2400 J	8.6	62	76	<6.2	63	<5.4	480 J	21	71	100	100	15	27
2-Butanone	NL	NL		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	1400 JB	<6.6	<6.5	<9300	<6.8	10	18	<6.2	14	<5.4	1600 B	<6.7	11	11	23	<5.0	<5.5
1,2-Dichloroethane	31,000	7,000		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	<1900	<6.8	<6.2	<6.6	<6.2	<6.2	<5.4	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
1,2-Dichlorobenzene	92,000,000	7,000,000		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	<1900	<6.8	<6.2	<6.6	<6.2	<6.2	<5.4	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
Isopropylbenzene	NL	NL		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	21900	<6.8	<6.2	8.4	<6.2	<6.2	<5.4	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
4-Isopropyltoluene	NL	NL		<6.4	<5.6	<6.2	<6	17	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	<1900	<6.8	<6.2	<6.6	<6.2	<6.2	<5.4	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
Naphthalene	20,000,000	1,600,000		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	64000	<6.8	4.8 JB	5.7 JB	1.3 JB	8.2 B	11 B	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
Toluene	200,000,000	16,000,000		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	170 J	<6.8	<6.2	1.2J	<6.2	<6.2	1.1 J	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
1,3,5-Trimethylebenzene	51,000,000	3,900,000		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	890 J	<6.8	<6.2	50	<6.2	<6.2	<5.4	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
1,2,4-Trimethylbenzene	51,000,000	3,900,000		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	1200 J	<6.8	<6.2	140	<6.2	<6.2	<5.4	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
Xylene (mp)	NL	NL		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	440 J	<6.8	<6.2	49	<6.2	<6.2	<5.4	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
Xylene (total)	200,000,000	16,000,000		<6.4	<5.6	<6.2	<6	<6.1	<6.6	<6.5	<6	<5.6	<5.7	<5.7	<2900	<6.6	<6.5	720 J	<6.8	<6.2	52	<6.2	<6.2	<5.4	<640	<6.7	<6.0	<4.9	<6.1	<5.0	<5.5
Semi-Volatiles (ug/Kg)																														
16 EPA PAHs																														
Acenaphthene	61,000,000	4,700,000		<420	<370	<410	<400	<400	<430	<430	<400	<360	<380	<370	<440	<220	<430	3800	<450	<410	<430	96 J	<410	<900	<430	<440	74 J	240 J	260 J	<370	160J
Acenaphthylene	61,000,000	4,700,000		<420	<370	<410	<400	<400	<430	<430	<400	<360	<380	<370	<440	<220	<430	970 J	<450	<410	<430	<410	<410	<900	<430	53 J	74 J	<350	<490	<370	<380
Anthracene	310,000,000	23,000,000		<420	<370	<410	<400	<400	<430	<430	<400	<360	<380	<370	<440	<220	<430	3600	<450	180 J	<430	300 J	170 J	230 J	<430	190 J	110 J	110 J	470 J	<370	510
Benzo (a) anthracene	3,900	870		<420	<370	<410	<400	<400	<430	<430	270 J	<360	<380	43 J	290J	<220	<430	3700	<450	820	94 J	910	620	2000	<430	830	430 J	420	860	<370	1100
Benzo (a) pyrene	390	87		<420	<370	<410	<400	<400	<430	<430	240 J	35 J	<380	43 J	410J	<220	<430	3100	<450	1100	110 J	1300	720	5000	<430	1000	480	570	780	<370	1000
Benzo (b) fluoranthene	3,900	870		<420	<370	<410	<400	<400	<430	<430	350 J	<360	<380	<370	330J	<220	<430	2400	<450	1100	65 J	2100 Y	760	4200	<430	1100	670	510	760	<370	1200
Benzo (g,h,i) perylene	NL	NL		<420	<370	<410	<400	<400	<430	<430	230 J	<360	<380	<370	280J	70 J	<430	1500 J	<450	860	<430	1100	670	9200	<430	950	280 J	340 J	300 J	<370	940
Benzo (k) fluoranthene	39,000	8,700		<420	<370	<410	<400	<400	<430	<430	310 J	<360	<380	<370	410J	<220	<430	2900	<450	1000	91 J	<410	750	5000	<430	1100	540	580	730	<370	1000
Chrysene	390,000	87,000		<420	<370	<410	<400	<400	<430	<430	580	<360	<380	40 J	390J	<220	<430	3900	<450	1100	100 J	1200	830	2000	<430	1200	660	510	870	<370	1200
Dibenzo (a,h) anthracene	390	87		<420	<370	<410	<400	<400	<430	<430	98 J	<360	<380	<370	76J	<220	<430	820 J	<450	350 J	<430	230 J	220 J	910	<430	390 J	76 J	97 J	90 J	<370	150 J
Fluoranthene	41,000,000	3,100,000		<420	<370	<410	<400	<400	66 J	<430	480	35 J	<380	81 J	400J	<220	<430	8600	<450	1700	130 J	1900	1200	4900	<430	1200	900	1200	1800	<370	2500
Fluorene	41,000,000	31,000,000		<420	<370	<410	<400	<400	<430	<430	47 J	<360	<380	<370	<440	<220	<430	3100	<450	55 J	<430	120 J	65 J	<900	<430	<440	75 J	93 J	250 J	<370	230 J
Indeno (1,2,3-cd) pyrene	3,900	870		<420	<370	<410	<400	<400	<430	<430	210 J	<360	<380	<370	240J	34 J	<430	1300 J	<450	800	<430	830	580	7300	<430	800	240 J	280 J	270 J	<370	690
Napthalene	20,000,000	16,000,000		<420	<370	<410	<400	<400	<430	<430	120 J	<360	<380	<370	<440	30 J	<430	26000	<450	210 J	800	210 J	230 J	290 J	<430	220 J	620	120 J	110 J	<370	250 J
Phenanthrene	NL	NL		<420	<370	<410	<400	<400	<430	<430	370 J	<360	<380	55 J	46J	30 J	<430	10000	<450	900	94 J	1200	740	750 J	<430	1100	850	550	2100	<370	2300
Pyrene	31,000,000	2,300,000		<420	<370	<410	<400	<400	51 J	<430	450	43 J	<380	80 J	490	36 J	<430	6700	<450	1600	130 J	1700	1200	6900	<430	1300	540	990	1400	<370	1900
Other SVOCs (ug/Kg)																														
Benzoic Acid	4,100,000,000	310,000,000		<1100	<920	<1000	<1000	<1000	<1100	<1100	87 J	<1800	<1900	<1900	<1100	1300	<1100	<4100	<1100	1000	<1100	<1000	<1000	<2200	<1100	200 J	490 JB	40 JB	740 JB	<930	150 JB
Bis (2-ethylhexyl) phthalate	200,000	46,000		<420	<370	<410	<400	<400	<430	<430	<400	<360	340J	84 J	<440	<220	<430	<1600	<450	38J	<430	460	42 J	120 J	<430	58 J	180 J	170 J	86 J	41 J	140 J
Carbazole	142,000	32,000		<420	<370	<410	<400	<400	<430	<430	40 J	<360	<380	<370	<440	<220	<430	870 J	<450	91 J	<430	170 J	62 J	<900	<430	76 J	76 J	54 J	200 J	<370	250 J
Dibenzofuran	2,000,000	160,000		<420	<370	<410	<400	<400	<430	<430	40 J	<360	<380	<370	<440	<220	<430	3300	<450	97 J	<430	120 J	100J	<900	<430	150 J	170 J	94 J	170 J	<370	180 J
1,2-Dichlorobenzene	92,000,000	7,000,000		<420	<370	<410	<400	<400	<430	<430	<400	<360	<380	<370	<440	<220	<430	<1600	<450	<410	<430	<410	<410	<900	<430	<440	<440	<350	<490	<370	<380
Di-n-butylphthalate	NL	NL		<420	<370	<410	<400	<400	<430	<430	<400	<360	<380	<370	<440	<220	<430	<1600	<450	<410	<430	<410	<410	<900	<430	46 J	67 J	<350	<490	<370	42 J
2-Methylnapthalene	NL	NL		<420	<370	<410	<400	<400	<430	<430	56 J	<360	<380	<370	<440	<220	<430	6800	<450	120 J	72 J	170 J	120 J	230 J	<430	300 J	1000	100 J	120 J	<370	220 J
4-Methylphenol	5,100,000	390,000		<420	<370	<410	<400	<400	<430	<430	<400	<360	<380	<370	<440	<220	<430	<1600	<450	<410	<430	<410	<410	<900	<430	42 J	58 J	<350	<490	<370	<380
Nitrobenzene	510,000	39,000		<420	<370	<410	<400	<400	<430	<430	<400	<360	<380	<370	<440	<220	<430	<1600	<450	<410	<430	<410	<410	<900	<430	<440	<440	<350	<490	<370	<380
Phenol	310,000,000	23,000,000		<420	<370	<410	<400	<400	<430	<430	<400	<360	<380	<370	<440	<220	<430	<1600	<450	<410	<430	<410	<410	<900	<430	<440	<440	<350	<490	<370	<380
Metals (mg/Kg)																														
Arsenic	1.9	0.43		9.5	3.7	11.1	2.2	3.2	6.9	8.1	5.4	4.1	6.2	5	23	11	5.1	6.1	7.4	9.4	4	10	10.8	3.1	5.2	5.1	10.6	3.3	3.2	3.6	3.6
Barium	72,000	5,500		106	67	72.4	39.2	17.7 B	67.6	45.6	66.7	63	45.4	32	97.7	239	64.9	48.5	137	56	23.4B	65.4	57.2	25.3	60.3	52.7	144	17.3 B	40.3	11.1 B	128
Cadmium	1,000	78		1.6	0.75	1.4	0.65	0.43 B	1.5	1.1	0.84	0.4 B	0.6	0.32 B	70.2	4.7	1.4	0.86	1.8	0.97	0.48B	1.7	1	0.77	0.79	0.5 B	1.3	0.24 B	0.17 B	0.10 B	0.88
Chromium	1,500,000	120,000		41.4	10.3	35.3	19.7	15.1	37.4	23.7	15.9	17.5	23.8	17.6	36.9	19.5	32.6	16.7	49.9	15.4	9.9	23.4	13.9	7.7	19.7	11.9	21.5	10	11.8	9.8	7.6
Lead	NL	400 [3]		12	6.2	13.3 B	6	2.6	11.5	10.1 E	108	10.7 E	12.3 E	6.3 E	2640	1850 E	10.7	105 E	13.2	80.1 E	37.4 E	93.7 E	88.9 E	31.3 E	66	106	167	37	18	4.1	145
Mercury [4]	100	7.8		<0.15	<0.018	<0.02	<0.017	0.026 B	<0.022	<0.018	0.051	<0.018	0.04	<0.018	0.017 B	0.3	<0.017	0.078	0.064	0.15	0.067	0.096	0.24	0.05	0.12	1.4	0.26	0.018 B	0.038 B	<0.018	0.19
Selenium	5100	390		2.3	1.1	<0.39	1.1	0.67	1.6	<0.47	0.97	<0.34	<0.3	<0.33	11.3	<.44	1.6	<0.4	3	<0.39	<0.46	<0.44	0.45B	0.38 B	1.5	1.9	1.2	<0.37	0.71	<0.41	<0.40
Silver	5100	390		0.29 B	<0.11	<0.11	0.15 B	<0.12	0.3 B	<0.13	0.16 B	<0.16	<0.15	<0.16	0.61 B	1.7	0.26 B	<0.11	0.44 B	<0.11	<0.13	<0.12	<0.096	0.74 B	0.14 B	0.12 B	0.27 B	0.18 B	<0.22	<0.18	0.26 B
PCBs (ug/kg)																														
Aroclor 1016	41,000	5,500		<21	<19	<21	<20	<20	<22	<22	<20	<19	<38	<19	<22	<22	<22	<21	<23	<21	<22	<21	<21	<18	<22	<22	<22	<18	<25	<19	<19
Arpclor 1221	1,400	320		<21	<19	<21	<20	<20	<22	<22	<20	<19	<38	<19	<22	<22	<22	<21	<23	<21	<22	<21	<21	<18	<22	<22	<22	<18	<25	<19	<19
Aroclor 1232	1,400	320		<21	<19	<21	<20	<20	<22	<22	<20	<19	<38	<19	<22	<22	<22	<21	<23	<21	<22	<21	<21	<18	<22	<22	<22	<18	<25	<19	<19
Aroclor 1242	1,400	320		<21	<19	<21	<20	<20	<22	<22	<20	<19	150	60	<22	<22	<22	<21	<23	<21	<22	<21	<21	<18	<22	<22	<22	<18	<25	<19	<19
Aroclor 1248	1,400	320		<21	<19	<21	<20	<20	<22	<22	<20	<19	<38	<19	<22	<22	<22	<21	<23	<21	<22	<21	<21	<18	<22	<22	<22	<18	<25	<19	<19
Aroclor 1254	1,400	320		<21	<19	<21	<20	<20	<22	<22	<20	29	340	52	<22	<22	<22	<21	<23	<21	<22	26	<21	<18	<22	<22	39	<18	<25	<19	<19
Aroclor 1260	1,400	320		<21	<19	<21	<20	<20	<22	<22	<20	<19	<38	<19	<22	<22	<22	<21	<23	<21	<22	<21	<21	<18	<22	<22	54	<18	<25	<19	<19

Notes:
All borings and sample locations were considered industrial settings beginning with Boring B-16 northward toward the Vermont Railway Yard. The residental settings were identified with (Res) south of Lakeside Avenue noted below the date for each location in the table.
All units are reported in milligrams per kilogram, approximately equivalent to parts per million (ppm) or micrograms per kilogram, approximately equivalent to parts per billion (ppb).
NA - Not Analyzed
N/A - Not Applicable
E - Value exceeds calibration range.
J - Estimated value between the MDL and the reporting limit.
B - Method blank exhibited presence of a few select compounds above the reporting limit.
(1) Direct contact standards based on EPA Region III Risk-based Concentration Table (updated October 15, 2003) for industrial soils.
(2) Direct contact standards based on EPA Region III Risk-based Concentration Table (updated October 15, 2003) for residential soils.
(3) Risk based cleanup level is not included in Region III Risk-based ConcentrationTable. Standard is therefore based on EPA Directive for risk assessment and residendial cleanup of lead in soils.
(4) Methylmercury direct contact standard was used as the as the default standard for mercury.

Result exceeds EPA Generic Risk Based Concentration for residential soil direct contact.

Result exceeds EPA Generic Risk Based Concentration for industrial soil direct contact.

The depths to groundwater on the western half of the Havey property (as indicated on M&E's boring logs for BO-33 through BO-37) range from four to six feet below ground surface. These depths to water correspond with the levels noted in wells MW-P1 and MW-P2 installed during the C-6 Section field investigation.

Floating or sinking free-phase product was not detected in any of the monitoring wells installed on the western half of the Havey property (former LASMO property). M&E noted an oily sheen on the water surface in well BO-34. In boring BO-36, M&E also noted petroleum product in a soil sample from a depth of eight feet and oily material in soil from a depth interval of 14 to 21 feet. However, free-phase product, or sheen, was not noted on the water surface in well BO-36. Because borings BO-34 and BO-36 (as interpreted) were drilled in the filled barge slip, the origin of oil in these borings may be associated with oily material that may have been used to fill the barge slip.

4.11.3.2 Presence of Peat – December 2003 Investigation

In December 2003, Clough Harbour & Associates LLP conducted a subsurface investigation to determine the thickness of a compressible peat layer in the area of the rail yard. Eight soil borings were completed in the proposed area of the rail yard relocation (refer to Figure 4-34 (Drawing 4) and Figure 4-35). This information was evaluated to qualitatively determine whether and possibly to what degree, the proposed rail yard relocations would affect groundwater and contaminant migration patterns on the western portion of the Havey property. Peat was encountered in four of the soil borings, B-31, B-35, B-37, and B-38 at variable depths from 5 feet to 13 feet below the ground surface. The peat layer was black and was observed to be variable in thickness from 6 to 17 feet. The peat layer contained varying amounts of organic roots and decaying wood, clayey silt, and fine sand. Based on the penetration resistance during drilling and sampling, the compressible peat layer was very soft to medium stiff.

Based on the evaluation of this information, it is concluded that the proposed relocation of the rail yard facilities to the western half of the Havey property would not substantially affect or alter the overall groundwater and contaminant migration patterns, for the following reasons:

- It appears that peat would be present under some, and not all of the relocated facilities. As indicated on Figure 4-36, peat is not present under the northern portion of the proposed rail spurs or under the proposed calcium chloride, ballast, stone and pike loading areas. Therefore, these facilities should not impact the underlying areas that do not contain peat.

- In areas where historical operations occurred, the peat may already be highly compressed locally and would not likely be further compressed to a

substantial degree from loads associated with rail yard activities. For example, the peat may be highly compressed under the former locations of above-ground fuel storage tanks associated with the former tank farm. Diagrams in the PEER and M&E SRI reports indicate that tanks formerly were located adjacent to borings BO-34, BO-35, BO-37, UM-3, and UM-5 in which peat was noted.

- Although the additional weight of the other relocated facilities may initially compress the peat and alter the migration direction and rate in the immediate vicinity of the facilities, in a short time the local hydrogeologic system likely would readjust and the overall westward migration direction would be maintained. The predominant control on the local hydrogeologic system appears to be Lake Champlain. The effect of Lake Champlain on the local hydrogeologic system would be much greater than the potential effect from relocating the rail yard facilities.

- Floating or sinking free-phase product was not detected in the borings that were drilled through peat. Therefore, compression of the peat from overlying facilities likely would not result in the spreading or "squeezing out" of free-phase product in the subsurface.

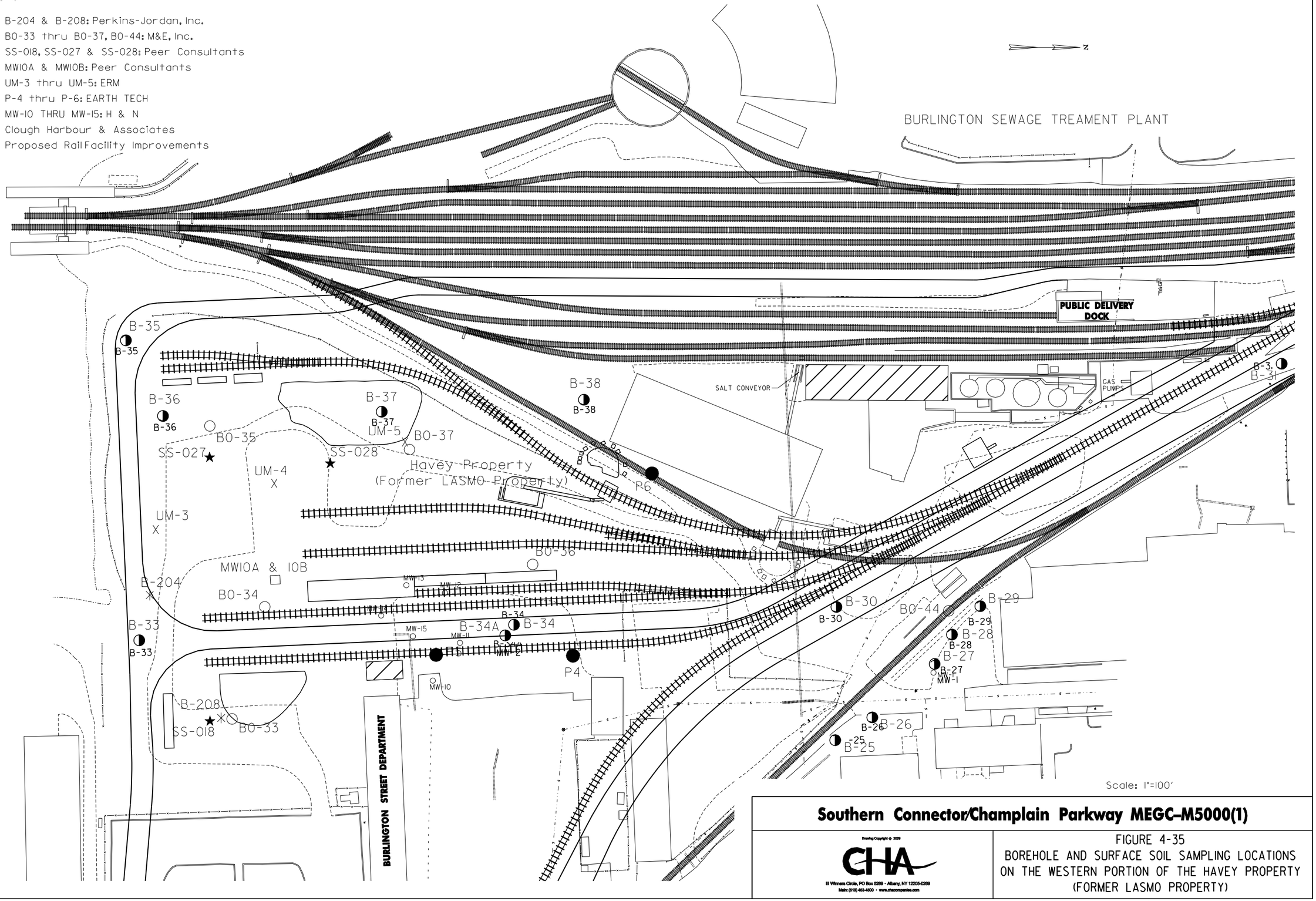
4.11.3.3 Types and Concentrations of Constituents

The available information and limited data provided in the Remedial Investigation reports prepared by PEER and M&E were reviewed to determine the types and concentrations of constituents that may be encountered during proposed rail yard relocation activities. This information was evaluated to determine how material that may be excavated during relocation activities may need to be handled and/or disposed.

Because hydrocarbons (specifically polycyclic aromatic hydrocarbons (PAH's)) were identified as a primary group of contaminants at the Superfund Site, M&E used non-routine testing procedures developed for the Superfund Site to differentiate between the different types and source(s) of hydrocarbon components, such as coal tar and fuel oil, detected in soil samples from the study area. Using the results of this testing procedure, M&E provided analytical data for "total coal tar-related PAH's", "total PAH's", and "total carcinogenic PAH's". M&E summarized the general results of the testing procedure in the Supplemental Remedial Investigation Report. A review of this information indicates that gas plant-related PAH's in soil were not detected in

Legend

- B-204 & B-208: Perkins-Jordan, Inc.
- B0-33 thru B0-37, B0-44: M&E, Inc.
- SS-018, SS-027 & SS-028: Peer Consultants
- MW10A & MW10B: Peer Consultants
- UM-3 thru UM-5: ERM
- P-4 thru P-6: EARTH TECH
- MW-10 THRU MW-15: H & N
- Clough Harbour & Associates
- Proposed Rail Facility Improvements



Scale: 1"=100'

Southern Connector/Champlain Parkway MEGC-M5000(1)

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FIGURE 4-35
BOREHOLE AND SURFACE SOIL SAMPLING LOCATIONS ON THE WESTERN PORTION OF THE HAVEY PROPERTY (FORMER LASMO PROPERTY)

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DATE/TIME = 8/19/2009
USER =1933

- ✳ B-204 & B-208: Perkins-Jordan, Inc.
- ◯ B0-33 thru B0-37, B0-44: M&E, Inc.
- ★ SS-018, SS-027 & SS-028: Peer Consultants
- □ MWIOA & MWIOB: Peer Consultants
- × UM-3 thru UM-5: ERM
- ● P-4 thru P-6: EARTH TECH
- ○ MW-10 THRU MW-15: H & N
- ◑ Clough Harbour & Associates
- ▮▮▮▮▮▮▮▮ Proposed Rail Facility Improvements
- ------- Approximate Limit of Peat

N

B-35
B-35
B-36 PEAT (5'-15')
B-36 (31'-32')
PEAT (10'-12')
B-37 PEAT (5'-6')
B-37 (8.5'-12')
UM-5
SS-027
SS-028
UM-4
X
(NO PEAT)
PEAT (5.8'-16.7')
(10'-11.2')
UM-3
X
B-38
B-38
P6
(NO PEAT)
P5
B-31
B-31
P13
(NO PEAT)
PEAT (11'-19')
B-33
B-33
PEAT (15'-16')
(21'-22')
MW-13
MW-12
MW-15
B-34A
B-34
B-34
MW-11
B-34A
MW-2
(NO PEAT)
MW-10
P4
(NO PEAT)
B-30
B-30
B-29
(NO PEAT)
B-28
B-28
B-27
B-27
MW-1
P12
B-26
B-26
B-25
B-25
PEAT (11'-19')
SS-018
PEAT (3.5'-14.5')
P11

Scale: 1"=100'

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FIGURE 4-36
APPROXIMATE LOCATION OF PEAT IN THE SUBSURFACE OF THE WESTERN PORTION OF THE HAVEY PROPERTY (FORMER LASMO PROPERTY)

FILE NAME =U:\8659\RPTS\FSEIS\Displays\FIG 4.18.dgn
DATE/TIME = 8/19/2009
USER =1933

BO-44 but were detected in borings BO-33, BO-34, and BO-36, and possibly in borings BO-35 and BO-37. Coal tar-related PAH's were identified in these borings at varying intervals and there was not a consistent pattern of PAH occurrence and distribution. Borings BO-34 and BO-36 were drilled within the filled barge slip.

The detections of coal tar-related PAH's in the samples likely are indicative of coal tar-related material deposited in the barge slip from surface runoff during flooding events and/or the possible use of coal tar-containing material to fill in the barge slip. The detections of coal tar-related PAH's in borings BO-35, BO-37, and BO-44 primarily were in the upper few feet, which indicates that the material likely was deposited during flooding events and/or was present in material used to fill and regrade the area. Petroleum-related PAH's also were detected in these borings. The petroleum-related PAH's likely are associated with past activities at the former fuel storage tank farm. PAH's were detected in every sample interval from these six borings, except for the 18 to 20 foot interval in BO-44. In general, the concentration of total PAH's were the highest in BO-34 and in the shallower samples from each boring.

Carcinogenic PAH's were detected in almost every sample from each boring (23 of 26 samples). The total carcinogenic PAH concentration of 42 ppm in the four to six foot interval of BO-34 exceeds the risk-based clean-up level of 35 ppm. The risk based clean-up concentrations are not exceeded in the other samples.

PAH's also were detected in each of two soil samples from the three borings (P4, P5, and P6) drilled in the vicinity of the proposed rail yard facility relocations. Analysis of these soils did not include distinguishing between coal tar- and non-coal tar-related PAH's. The two samples from each boring were collected from a maximum depth of six feet. The risk-based clean-up concentrations developed by M&E were not exceeded in these samples.

Based on the results of soil samples collected by M&E from six borings (BO-33 through BO-37 and BO-44) drilled on or near the western portion of the Havey property (former LASMO property), it appears that coal tar-related PAH's may be encountered at shallow depths only (less than four feet) in the area of three borings (BO-35, BO-37, and BO-44). In the remaining borings, coal tar-related PAH's may be encountered at a depth of 16 to 18 feet in BO-34, and throughout the boring at depths of up to ten feet and 24 feet in BO-33 and BO-36, respectively.

Because the three borings P4 through P6 were located near the periphery of the Superfund Site, as delineated in the supplemental Remedial Investigation, it is likely that material excavated from these areas during rail yard relocation would be considered "Superfund" material. The concentrations of PAH's in these three borings were among the highest of the 16 borings drilled during the investigation.

Based on the PAH analytical results of soil samples collected during the M&E investigations, it appears that if material is excavated during rail yard relocation activities, the material would need to be handled as "Superfund" material. M&E identified PAH concentrations in borings BO-33, BO-34, and BO-36 as being related to coal tar from the former coal gasification plant, with PAH concentrations in BO-35 and BO-37 possibly related to coal tar.

M&E also reported the sum total concentrations of benzene, toluene, ethylbenzene, and xylenes (collectively BTEX) for each sample interval from the six borings. It was stated in the M&E report that the higher BTEX concentration of 6.6 ppm in the two to four foot interval from BO-33 was likely associated with an adjacent fuel storage tank. Overall, the BTEX concentrations of the remaining samples are fairly low.

Soil samples were analyzed for concentrations of volatile organic compounds (VOC's), which include BTEX components. Concentrations of BTEX components were not detected in the soil samples from the three borings (P4 through P6) drilled near the proposed rail yard structures. Overall, concentrations of other VOC's detected in at least one sample were low.

Soil samples from three borings collected for the supplemental analysis also contained low concentrations of the diesel range organics (DRO) and gasoline range organics (GRO) portions of total petroleum hydrocarbons (TPH).

PEER collected surface soil samples from three locations (SS-018, SS-027, and SS-028) on the western portion of the Havey property (former LASMO property) (refer to Figure 4-33). Information in PEER's Remedial Investigation report indicates that concentrations of lead (873 ppm) and zinc (614 ppm) in SS-018 were elevated when compared to the average background concentrations (159 ppm and 138 ppm, respectively) determined for the Site. PEER also reported that the barium concentration at SS-018 was higher and that iron concentrations in the tank farm area were as high as 31,900 ppm.

In evaluating the collective information in the preceding section, it appears that material would need to be excavated during rail yard relocation activities and would need to be handled and/or disposed of as "Superfund" material because the PAH's in the material likely originates from the former coal gasification plant. Although evaluated in this text, the locations of boring BO-33 (which contain higher concentrations of BTEX) and surface soil sample SS-018 (which contains relatively higher concentrations of some metals) are far enough away from the proposed locations of rail yard facilities such that the material at these locations likely would not be encountered during construction activities.

By having the preceding information in advance of construction, the relocation of the rail yard facilities can be planned such that a minimal amount of material is excavated.

4.11.4 Summary of Impacts

The primary conclusions of the previous supplemental hazardous material assessment are as follows:

- Based on the supplemental field investigation, the soil along Build Alternative 1 contains low concentrations of VOC's, PAH's, and TPH that would not need to be remediated from a risk-based standpoint.

- Based on the stratigraphy as determined in the 16 borings drilled during the field investigation to a depth of 15-feet below ground surface, soils along the proposed alignment consist predominantly of loose to medium-dense, fine- to medium-grained sand with silt and little clay. Groundwater was encountered in the borings at average depths of five to seven feet below ground surface.

- It is not anticipated that loading during construction and use of Build Alternative 1 would affect contaminant migration from/to the Pine Street Barge Canal Superfund Site due to the following factors: 1) loose to medium-dense sand is not very compressible, 2) compressible materials such as peat were not encountered in any boring, 3) the free-phase product detected in the subsurface of the Site is concentrated towards the center of the Site in the wetlands west of the former coal gasification plant in the more porous peat and fill material and would preferentially stay in the more porous materials versus migrating off-site into denser, less compressible material such as fine sand, 4) groundwater on the Site apparently migrates predominantly westward toward Lake Champlain and potential loading from the alignment, which appears to be hydraulically up-gradient, would not change that direction, and 5) currently, the method of construction is anticipated to be widening the existing roadway along Pine Street under Build Alternative 1, which should not result in a considerable increase in loading along the alignment. Also, the proposed widening under Build Alternative 1 should not affect the amount of groundwater recharge to the point of altering migration direction. While it is true that drainage pipes and future underground utility lines may periodically be below the seasonal water table, these features are not likely to substantially impact the regional groundwater flow patterns. In addition, it should be noted that the majority of the identified sources of contamination are hydraulically downgradient of the alignment, therefore, it is not expected that the installation of subsurface drainage systems adjacent to the alignment would act as a conduit for migration of contamination.

- Excess soil potentially generated from areas near the Pine Street Barge Canal Superfund Site perimeter would need to be handled and treated and/or disposed of as "Superfund" material.

- It is concluded that the proposed relocation of the rail yard facilities to the western half of the Havey property (former LASMO property) would not substantially affect or alter the overall groundwater and contaminant migration patterns for the following reasons:

  - It appears that peat would be present under some, but not all of the relocated facilities. As indicated on Figure 4-35, peat is not present under the northern portion of the proposed rail spurs or under the proposed calcium chloride, ballast, stone and pike loading areas. Therefore, these facilities should not impact the underlying areas that do not contain peat.

  - In areas where historical operations occurred, the peat may already be highly compressed locally and would not likely be further compressed to a substantial degree from loads associated with rail yard activities. For example, the peat may be highly compressed under the former locations of above-ground fuel storage tanks associated with the former tank farm. Diagrams in the PEER and M&E SRI reports indicate that tanks formerly were located adjacent to borings (BO-34, BO-35, BO-37, UM-3, and UM-5) in which peat was noted.

  - Although the additional weight of the other relocated facilities may initially compress the peat and alter the migration direction and rate in the immediate vicinity of the facilities, in short time the local hydrogeologic system likely would readjust and the overall westward migration direction would be maintained. The predominant control on the local hydrogeologic system appears to be Lake Champlain. The effect of Lake Champlain on the local hydrogeologic system would be much greater than the potential effect from relocating the rail yard facilities.

  - Floating or sinking free-phase product was not detected in the borings that were drilled through peat. Therefore, compression of the peat from overlying structures likely would not result in the spreading or "squeezing out" of free-phase product in the subsurface.

  - Additional soil borings are recommended for the proposed salt storage structure and any additional buildings in the rail yard area to

determine the appropriate foundation type with respect to the presence of peat.

- Material to be excavated during rail yard relocation activities would need to be handled and/or disposed as "Superfund" material because the PAH's in the material may originate from the former coal gasification plant as state regulated hazardous waste. Disposal of other hazardous or potentially hazardous material would be properly disposed of, in accordance with state regulations, to prevent migration of contaminants. During construction, continued monitoring and periodic sampling and analysis of groundwater would be conducted proximate to the Pine Street Barge Canal Superfund Site.

- Impacts would be further evaluated pending additional field investigation along Build Alternative 1. Issues related to property access have delayed subsurface exploration to determine current conditions.

- Build Alternative 2 would not impact any hazardous materials.

4.12 Visual Impacts

The visual impacts within the project corridor were assessed along the following segments:

- C-1 Section
- C-2 Section - (Home Avenue to Flynn Avenue)
- C-2 Section - (Flynn Avenue to Lakeside Avenue)
- C-6 Section - (Lakeside Avenue between the C-2 Section and Pine Street) Build Alternative 1 and Build Alternative 2
- C-6 Section - (Pine Street between Lakeside Avenue and Pine Place) Build Alternative 1 and Build Alternative 2
- C-6 Section - (Battery Street Extension) Build Alternative 1
- C-6 Section - (Battery Street) Build Alternative 1
- C-6 Section - (Pine Street between Pine Place and Main Street) Build Alternative 2

Three photographic/computer simulations were generated to illustrate how landscaping would mitigate potential visual impacts and their importance to the visual quality of these sections (refer to Figure 3-18). For these selected viewpoints, the impact on the visual quality was assessed in terms of the proposed sections built within the vista of the viewer. An assessment was also made with respect to the users of the proposed facility.

- C-1 Section

  The C-1 Section has been constructed, and has established trees and shrubs from the initial construction. Some of these plantings would likely be pruned or removed as part of the project. Additional plantings as well as the existing screening walls would serve as visual barriers between the roadway and the South Meadows neighborhood. The existing concrete barrier would be removed and a landscaped median would replace it. There may be some residential sensitive visual receptors at the intersection of the C-1 Section, and Pine Street where a few residents would look over a proposed cul-de-sac and the Southern Connector/Champlain parkway, beyond. With the proposed landscaping either Build Alternative would mitigate visual impact. (See Simulation One) The townhouse complex built after Section C-1 was constructed would be screened by existing and proposed plantings.

C-1 SECTION EXISTING: FACING SOUTHEAST TOWARDS U.S. ROUTE 7

SIMULATION ONE: FACING SOUTHEAST ON C-1 SECTION TOWARDS U.S. ROUTE 7

- C-2 (Home Avenue to Flynn Avenue)

As noted in Section 3.12 the eastern side of this portion of the C-2 Section is residential. The residences highlighted in Section 3.12 may be considered visual receptors. The western side of Briggs Street is primarily industrial use; however, two residential units exist on the western side of Briggs Street (opposite the current terminus of Morse Place) and may be considered visual receptors. Residences east of the C-2 Section, along Ferguson Avenue, Lyman Avenue, and along Foster Street may be considered visual receptors. The view in Simulation Two looks north along the proposed Southern Connector/Champlain Parkway through the C-2 Section and residents at the ends of the streets to the east of the Southern Connector/Champlain Parkway, such as those on Lyman and

Ferguson Avenues, would look into a line of flowering trees, shade trees, metal picket fencing and decorative lighting. These landscape features would mitigate the views from the industrial western side of the Southern Connector/Champlain Parkway as well.

SIMULATION TWO: FACING NORTH ON C-2 SECTION TOWARDS LAKESIDE AVE.

- C-2 Section (Flynn Avenue to Lakeside Avenue)

  Similar to the residences along the C-2 Section from Home Avenue to Flynn Avenue, the residences located east of the C-2 Section along Flynn Avenue may be considered visual receptors. Some existing vegetation would help screen any visual impacts and the introduction of tree plantings, lighting and decorative fencing would mitigate the visual impacts. A pocket park is planned for the southeastern corner of Briggs Street and Flynn Avenue would help mitigate some of the visual impacts of the C-2 Section. The landscape elements like those shown in Simulation Two would mitigate any visual impacts.

- C-6 Section – (Lakeside Avenue between the C-2 Section and Pine Street)

  Build Alternative 1

  Lakeside Avenue (between the C-2 Section and Pine Street) is industrial and commercial use and is bordered to the north by the City of Burlington's Public Works building. None of these uses are considered receptors of visual importance. However, this segment would traverse the border of the Queen City Cotton Mill Historic District. Lakeside Avenue visual setting is framed by typical power and communication poles and the accompanying aerial lines. Burying the power and communication lines along this section would improve the visual setting in this area. The current industrial and "sea of asphalt" appearance would be enhanced by the proposed street trees and decorative lighting along Lakeside Avenue as well.

Build Alternative 2

Under Build Alternative 2 – no improvements other then repaving of Pine Street and sidewalk replacement would take place. As a result, there would be no visual enhancement in this area.

- C-6 Section – (Pine Street between Lakeside Avenue and Pine Place)

Build Alternative 1

Pine Street, between Lakeside Avenue and Pine Place, is primarily in industrial or commercial use, although there are several residential developments which may be considered sensitive receptors. This existing roadway is framed on both sides with aerial utilities and the corresponding poles extending the length of the section. At the northeastern corner of Locust Street and Pine Street intersection are the Jackson Terrace apartments which may be considered sensitive visual receptors. While not directly abutting Pine Street, there is residential development east of the industrial/commercial uses, which may be considered a sensitive receptor. The Calahan Park (South Park) recreation area, which borders the neighborhood area to the south in this vicinity, also may be considered a sensitive receptor. The street tree planting, and decorative lighting would help minimize the visual impact of the C-6 Section construction. As noted in Section 3.12 the power lines along both sides of Pine Street currently dominant the visual landscape and burying them would only improve the visual quality if the road as seen in Simulation Three below.

EXISTING VIEW – FACING NORTH ON PINE STREET TOWARDS BUS STATION (BUILD ALTERNATIVE 2)

SIMULATION THREE: FACING NORTH ON PINE STREET TOWARDS BUS STATION (BUILD ALTERNATIVE 1)

Build Alternative 2

Under Build Alternative 2 – no improvements other then repaving of Pine Street and sidewalk replacement would take place. As a result, there would be no visual enhancement in this area. The post construction would roughly match the view presented in the existing view.

- C-6 Section - Battery Street Extension – Build Alternative 1

  The Battery Street Extension alternative would connect Pine Street with Battery Street. Build Alternative 1 would traverse an area currently used for a variety of railroad operations. The proposed project would improve the visual characteristics of this area with the introduction of street trees, and decorative lighting.

- Battery Street – Build Alternative 1

  Battery Street is currently a commercial/business corridor. The proposed project is not expected to alter the uses along Battery Street. Any visual impact of the project would be mitigated by the introduction of street trees, and decorative lighting, as seen in Simulation Three.

- C-6 Section – Pine Street (between Pine Place and Main Street) Build Alternative 2

Pine Street from Pine Place to Main Street is currently primarily residential from just north of Kilburn Street to Main Street. Information detailing these receptors is presented in Section 3.12. No mitigation of impacts to visual receptors is proposed under this alternative. Traffic Signals are proposed to be placed at the Maple Street and King Street intersections with Pine Street.

4.13 Energy Impacts

The proposed project would involve a temporary increase in energy usage in order to complete construction; however, overall long-term usage is expected to be relatively minor, compared to the impacts of traffic congestion and energy consumption associated with the No-Build Alternative.

Maintenance activities, such as mowing, litter removal, plowing, salt and sand application, and repairs that may be associated with Build Alternative 1 or Build Alternative 2 would be higher compared to the No-Build Alternative. Either Build Alternative is expected to decrease energy usage, compared to the No-Build Alternative, by reducing traffic congestion and improving LOS within the study area. Queuing, idling time, and overall travel times within the study area would be improved, versus the No-Build Alternative.

4.14 Construction Impacts

Traffic on existing roadways would be maintained during the proposed construction; however, it is anticipated that a temporary detour may be utilized during the reconstruction of a portion of Home Avenue due to the close proximity of the at-grade rail crossing on Home Avenue. Procedures for traffic control during construction would be developed during the final design of the project. Vehicles moving through work areas would be protected by the appropriate level of traffic control. Provisions would be made for the passage of emergency response vehicles at all times. Despite the best efforts to minimize any disruption to existing traffic patterns, some temporary impacts would be unavoidable during the construction period. The most apparent of these, especially for the roadway user, would be the disruption of traffic flow along the existing facility. Since the majority of the C-1 Section is not currently open to traffic, the reconstruction of the roadway in this area would create limited disruption to the existing traffic. The construction of the C-2 Section would be mostly on new location; therefore, interruption to existing traffic during construction would be limited to project termini and at intersections of the proposed roadway with existing city streets. The construction of the C-6 Section is mostly on existing city streets and disruption to traffic would be more frequent than it would be for the C-1 Section and the C-2 Section; however, temporary traffic control devices would be utilized to maintain the flow of traffic during construction. Build Alternative 1 would include full-depth pavement reconstruction; whereas, Build

Alternative 2 would only consist of pavement rehabilitation along Pine Street. Build Alternative 1 would result in more disruption than Build Alternative 2.

The primary impacts associated with construction on the socio-economic environment are those related to the potential disruption of service. Past studies have found that commercial businesses tend to experience a loss of gross sales during reconstruction of an existing roadway. These losses are attributable to the difficulties created by construction for accessing commercial properties, and the fact that potential customers may stay away if they know that delays are expected as a result of the construction. However, reasonable access would be maintained to all properties as construction proceeds. The businesses that may be temporarily impacted during the construction would gain the long-term benefits achieved by the enhanced accessibility to the study area. Under Build Alternative 1, the temporary impacts to the commercial properties are anticipated to occur for a longer duration and to a greater extent than under Build Alternative 2 because Build Alternative 1 incorporates the complete reconstruction of the roadway pavement section while Build Alternative 2 incorporates rehabilitation of the existing pavement section along Pine Street which is a substantially less intrusive operation.

Construction activities associated with both Build Alternatives could result in temporary noise increases along affected roadways. Table 4-29 shows noise levels associated with various pieces of construction equipment. Actual noise levels and duration would depend on the type and extent of each construction activity. Time of day restrictions on construction activity may be used to mitigate construction noise effects in the vicinity of residential areas in accordance with the City of Burlington's noise ordinances.

Air quality impacts during the construction period would include emissions of carbon monoxide (CO), nitrogen oxides (NO_X), non-methane hydrocarbons (NMHC) and particulate matter from diesel and gasoline powered construction machinery. Emissions from this equipment may result in elevated ambient concentrations of these pollutants for short periods of time in the immediate vicinity of the equipment, but is not expected to have an impact outside the construction area. Additional air pollutant emissions may also result from traffic congestion caused by construction activity, particularly along Pine Street, but this would be temporary.

Fugitive dust may be emitted as a result of earth moving activities and from exposed soils during dry and windy conditions. This dust would be controlled by wetting unpaved areas in the construction zone, covering of loads on trucks and by reseeding or paving applicable open areas as soon as possible. Additional issues related to soil erosion would be addressed in accordance with General Permit 3-9020 (2006) for Stormwater Runoff from Construction Sites as amended February 2008.

TABLE 4-29: TYPICAL NOISE LEVELS OF PRINCIPAL CONSTRUCTION EQUIPMENT

Source	Noise Level (in dBA @ 50 feet)
Bulldozer	**80**
Front End Loader	**72-84**
Dump Truck	**83-94**
Jackhammer	**81-98**
Crane with Headache Ball	**75-87**
Backhoe	**72-93**
Scraper	**80-93**
Crane	**71-82**
Welding Generator	**71-82**
Concrete Mixer	**74-88**
Concrete Pump	**81-84**
Concrete Vibrator	**76**
Air Compressor	**74-87**
Pile Driver	**91-105**
Paver	**86-88**
Grader	**80-93**
Roller	**73-75**
Tamper	**74-77**

Source: United States Environmental Protection Agency, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances", December, 1971.

Under Build Alternative 1, the final design of relocated rail facilities would focus on maintaining service to VTR operations during construction. The City of Burlington would coordinate with VTR during the design and construction of the relocated facilities. Under Build Alternative 2, no rail facilities would be impacted.

4.15 Indirect Effects and Cumulative Impacts

The Council on Environmental Quality regulations (40 CFR Part 1508) defines indirect effects and cumulative impacts as follows:

> Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.
>
> Cumulative impacts are the impacts on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Estimating these types of impacts is very difficult, particularly at a larger geographic level, but should be considered in evaluating the range of project alternatives.

The City of Burlington's Municipal Development Plan recognizes the pressures for more intense development along Pine Street, and proposes that this area remain primarily in manufacturing, warehousing and transportation (rail, highway and waterfront) activities, that residential uses not be permitted (except those currently in use) in this area, and that retail uses be limited to an accessory use role only.

The proposed project is consistent with growth and development plans in the immediate area, and in the CCD. Specific action plans that have been identified in the Burlington Municipal Plan include the following:

Short-Term

- Continue to examine the desirability of reducing density allocations for natural areas, wetlands, steep slopes, and shorelines, and, if warranted, amend the zoning bylaws.
- Complete zoning amendments to permit single-occupancy accessory apartments in low-density residential districts.
- Complete the rezoning of designated Neighborhood Activity Centers.
- Advocate land use and development policy and strategies that limit suburban sprawl as a member of the Chittenden County Metropolitan Planning Organization.

- Develop a detailed Sector Plan for the Downtown.

Medium Term

- Update the Urban Renewal Plan for the Downtown Waterfront.
- Prepare a plan for the development of a network of connecting mid-block pathways within the downtown and into adjacent neighborhoods.
- Amend the zoning bylaws to allow for small commercial uses within large residential developments.
- Investigate the benefits of shoreline zoning to protect the Lake Champlain and Winooski River Waterfronts.
- Develop more detailed sector plans for Riverside Avenue and the Pine Street corridor.
- Develop a Remediation and Conservation Plan for the Urban Reserve.

Long-Term

- Explore the feasibility of relocating the Burlington rail yard from the Burlington Waterfront.
- Explore the feasibility of a more restrictive open space zoning category: Open Space-Natural Area.
- Examine the benefits and options for increasing allowable densities along selected portions of major transit corridors.
- Establish Neighborhood Conservation Plans in concert with each Neighborhood Planning Assembly.
- Identify, with assistance from the Neighborhood Planning Assemblies, possible locations for additional Neighborhood Activity Centers.
- Study the feasibility of using a transfer of development rights program for portions of the city.

It is expected that the additional traffic levels on Pine Street associated with the proposed project would be taking place in the context of the long-term trend of changing manufacturing and warehousing uses with office and retail uses. It is unlikely that current residential uses would change, as they are protected by the zoning ordinance.

If implemented, the proposed project would provide a benefit to several on-going City and regional initiatives, including:

- Improved bicycle facilities;
- Improved pedestrian facilities; and
- Infrastructure improvements and improved access to/within the Enterprise Community.

Local and regional master plans were consulted, as were local, state, and federal officials, in order to identify possible future development or infrastructure projects.

A cursory review of the project's impacts reveals that there are no natural resources substantially impacted by the Preferred Alternative. Other projects in the area would not impact the same resources. In addition, few large-scale projects were identified that could result in incremental cumulative impacts if taken in conjunction with either Build Alternative. Therefore, cumulative impacts to these resources would not be a concern.

No indirect and cumulative impacts would occur as a result of the Preferred Alternative; therefore, no mitigation would be required.

4.16 Relationship of Local Short-Term Uses versus Long-Term Productivity

Completion of the entire project, as approved in 1979, would result in the termination of some residential streets in the south end neighborhood. The immediate effect of this would be reduced accessibility to, and passing on the western edge of the residential neighborhood; but in the long run, "dead-ending" these streets would reduce traffic and benefit the neighborhood areas. An improved north-south highway would improve the economic setting of the City of Burlington by increasing property values and promoting business throughout the corridor. The CCD would be more accessible, and, thus, become a more desirable place to work and shop.

Construction of either Build Alternative would involve short-term impacts and use of resources, primarily related to construction activities, in order to enhance long-term productivity in the study area.

The short-term impacts and uses of resources are generally similar and are primarily associated with the construction phase. The short-term impacts include noise impacts, air pollution from disturbance of soils and from construction machinery, erosion and sedimentation, which is to be minimized by proper construction practices, and disruption of traffic during construction. Short-term uses of resources include machinery required for construction, which is not in short supply at this time.

The project is the result of both state and local planning processes, which consider the need for transportation facilities in the context of present and future land use.

4.17 Irreversible and Irretrievable Commitments of Resources

Each Build Alternative would use varying amounts of land and associated natural resources, socio-economic resources and fiscal resources. The resources consumed by the right-of-way for the proposed highway improvements would be irretrievably committed to transportation uses throughout the life of the project.

The Build Alternatives would result in irretrievable and irreversible commitments of resources to the project, as listed below:

- Public funds for other transportation projects;
- Construction materials such as aggregates, asphalt, steel and concrete; and
- Labor and energy for construction.

Once the Preferred Alternative is constructed, it is unlikely that the land would ever be converted back to its existing uses. Loss of the land for use as a highway is an irretrievable commitment of the land resource.

Use of limited public funds available for transportation projects is also an irretrievable commitment of this resource. The priorities for transportation projects are determined in part through the planning process by state and local agencies and in part by legislative action. It is presumed that the allocation of funds through the legislative process reflects the priorities of the public as established through planning agencies and the Legislature.

Although many of the materials used in highway construction are recyclable to some extent, the use of these materials must be presumed to be an irreversible commitment of these resources, as there is no expectation that they would ever be available for future use.

The labor and energy committed to the construction of the project are irretrievable. The project is intended to improve the long-term energy efficiency of the transportation system within the study area; the commitment of energy resources for construction should free up additional energy resources in the future.

In addition to the loss of the area and resources associated with the roadway improvements, construction would require considerable amounts of construction materials, energy resources, labor and fiscal resources. Once these materials are consumed for the construction of the highway, they are essentially irretrievable. There are also positive secondary socio-economic effects associated with the

proposed highway development, including the stimulation of the economy, and a reduction in energy consumption and air pollution associated with the existing poor levels of service on area roadways.

4.18 Permit Requirements and Environmental Regulatory Compliance

In addition to permit requirements and environmental regulatory compliance, this document fulfills the requirements of NEPA, Section 4(f) of the United States Department of Transportation Act of 1966 and Section 106 of the National Historic Preservation Act.

4.18.1 Federal Permitting

Section 404 of the Clean Water Act

The United States Army Corps of Engineers (ACOE) issues permits under Section 404 of the Federal Clean Water Act for work within vegetated wetland and open water areas.

Under Section 404 of the Clean Water Act, the ACOE regulates the placement of fill or dredged material in waters of the United States, including adjacent wetlands, by prohibiting the discharge of fill or dredged materials into said waters without a Federal permit from the ACOE. Waters of the United States extend ACOE regulatory jurisdiction beyond navigable waters and are very broadly defined by the ACOE to include wetlands, as well as actual water bodies and waterways. Wetland impacts are similar for both Build Alternatives and fall within the thresholds of the Vermont General Permit under the United States Army Corps of Engineers Section 404 Procedures.

Section 402(P) of the Clean Water Act

The EPA, under the authority of the Federal Clean Water Act, administers the National Pollution Discharge Elimination System (NPDES) permitting program for point source wastewater discharges into navigable waters or their tributaries. The types of discharges that are reviewed under the NPDES program relative to roadway construction projects are those associated with stormwater discharge at a construction site. EPA has established a one-acre construction disturbance threshold for filing for an NPDES stormwater permit for construction activities.

The State of Vermont is a delegated state in terms of NPDES and procedurally handles NPDES permitting. The DPW would need to submit a Construction General Permit 3-9020 (2006) for Stormwater Runoff from Construction Sites as amended February 2008 to the Vermont Agency of Natural Resources (ANR).

Section 401 of the Clean Water Act

This water quality certification is handled by the State of Vermont in which 401 certifications are issued through ANR. These 401 certifications are consistent with state water quality standards.

Clean Air Act

The Clean Air Act requires performance with State Implementation Plans (SIP) and Transportation Control Measures (TCM) in non-attainment areas. The State of Vermont is not presently a non-attainment area, and is in conformance.

4.18.2 State Permits and Approvals

Act 250

The State of Vermont has enacted a comprehensive land use regulation under 10 V.S.A. Chapter 151, referred to as Act 250. The Burlington Northern and Southern Connector Projects have been reviewed under the Act 250 provisions for potential impacts to air and water quality, impacts from waste disposal, soil erosion, impacts to streams, wetlands, floodways, traffic, aesthetics, historic sites and other natural areas. Construction of the Southern Connector/Champlain Parkway project has been authorized by the State of Vermont District #4 Commission through the issuance of a Findings of Fact allowing issuance of a Land Use Permit (#4 C0438-N&S) and numerous land use amendments thereto. These findings and amendments remain in effect for different periods.

A summary of the ACT 250 Permit actions to date is presented below:

- 5/14/80 Application for an Act 250 Permit filed
- 3/25/81 Land Use Permit issued to construct Northern and Southern Connector/Champlain Parkway
- 4/22/82 Amendment - construction approval for the C-2 Section
- 7/6/82 Land Use Permit issued to open and operate a borrow pit
- 1/12/83 Land Use Permit Amendment issued for closing of material and disposal areas
- 8/5/83 Land Use Permit Amendment issued approving Step V Plans for the C-1 Section
- 9/27/83 Land Use Permit Amendment issued to fill wetlands for Stage I, Contract 1
- 3/7/84 Land Use Permit Amendment issued to open a material supply/disposal area

- 7/27/84 Land Use Permit Amendment issued to extend construction completion date to 12/1/87
- 10/19/84 Land Use Permit Amendment issued to extend extraction completion date to 7/1/85
- 10/25/84 Land Use Permit Amendment issued to proceed with wetland mitigation work
- 10/25/84 Land Use Permit Amendment issued approving final plans for Stage III
- 4/10/85 Land Use Permit Amendment issued approving final plans for the C-1 Section
- 3/10/87 Land Use Permit Amendment issued to construct an additional stacking lane for the C-1 Section
- 3/10/87 Land Use Permit Amendment issued to extend construction completion date for the C-1 Section to 12/1/89
- 5/14/87 Land Use Permit Amendment issued to construct sidewalk on Queen City Park Road
- 9/29/89 Vermont Department of Fish & Wildlife Ponds, Island and Clearing Cattails - Intervale Wildlife Management Area
- 11/8/89 Land Use Permit Amendment issued to extend construction date for the C-2 Section to 12/1/92
- 9/5/91 Land Use Permit issued to construct final plans for the C-2 Section
- 9/27/91 Land Use Permit Amendment issued to extend construction completion date of C-2 to 12/1/94
- 2/18/94 Application for Amendment
- 2/22/94 Application for Act 250 Permit filed to evaluate an alternative route using Pine Street
- 10/25/94 Land Use Permit Amendment issued to extend the construction - completion date of the C-2 Section to 12/1/98

A revised application for an ACT 250 permit would need to be filed to reflect the revisions incorporated in this 2009 FSEIS.

Vermont Stream Alteration Permit

The construction of a culvert for Englesby Brook crossing was approved in 1991.

Vermont Water Quality Certification

The City of Burlington would prepare and submit a Water Quality Certification Documentation Summary for the Englesby Brook crossings.

Vermont Stormwater Discharge Permit

A Stormwater Discharge Permit for the C-1 Section and C-2 Section has been reviewed by ANR and approved. The discharge of stormwater from the C-6 Section for the Preferred Alternative must also be permitted.

Vermont Air Pollution Control Permit

The original Indirect Source Permit for the project was issued by the Agency of Natural Resources, Department of Environmental Conservation, Air Pollution Control Division in December, 1982. ANR determined that an amendment to the Indirect Source Permit (ISP) would be required for the use of Pine Street as a temporary routing alternative for Southern Connector/Champlain Parkway traffic. The ISP was then amended in March 1989, and then extended in November, 1991.

Based on present day review, ANR has determined that the proposed Southern Connector/Champlain Parkway is consistent with the Vermont State Implementation Plan for attainment of the National Ambient Air Quality Standards (NAAQS). The Federal Highway Administration has indicated that the CO review presented in the 1979 FEIS fulfilled the indirect source analysis required by 23 CFR 770. Vermont is in attainment for air quality purposes for ozone and carbon monoxide (CO).

4.19 Summary of Resource Impacts

Table 4-30 below lists the quantifiable resource impacts anticipated from the No-Build Alternative and both Build Alternatives.

Table 4-30: Summary of Impacts – Alternatives

	ALTERNATIVES		
	No-Build Alternative	**Build Alternative 1**	**Build Alternative 2 (Preferred Alternative)**
Meets Project Purpose and Need	No	Yes	Yes
C-6 Section Acquisitions Only Displacements / Relocations * C-1 and C-2 Section Acquisitions/Relocations were previously accomplished by the 1979 Approved FEIS. **Small strip takings and temporary easements are not included in this table.	0	4 VTR Operations Former Burlington Street Dept. Building City of Burlington/ Havey Parcel Curtis Lumber (formerly Gregory Supply) Lumbershed	0
Construction Cost Estimates	$0	$37,000,000	$20,000,000
Number of New Railroad Crossings	0	1	1
Air Quality (Violations of Standards)	0	0	0
Farmland Impacts (acres impacted)	0	0	0
Wetland Impacts (acres impacted)	0	0.78	0.69
Floodplain Impacts (acres impacted)	0	0	0
Urban Vegetation/Wildlife Impacts (acres impacted)	0	0	0
Threatened/Endangered Species Impacted	0	0	0
Section 4(f) Recreation Sites Used	0	0	0
Section 4(f) Historic Resources Used Former Burlington Street Department Property	N/A	Yes	No
HISTORIC DISTRICTS Battery Street Historic District	N/A	No Adverse Effect	No Adverse Effect
Pine Street Historic District	N/A	Adverse Effect	No Adverse Effect
Queen City Cotton Mill Historic District	N/A	No Adverse Effect	No Adverse Effect
Lakeside Historic District	N/A	No Adverse Effect	No Adverse Effect
Additional Archaeological Resource Work Required	N/A	Yes	No
Visual Impacts	N/A	Yes	Yes
Rivers/Streams (number crossed)	N/A	1	1
Superfund Site Involvement/Issues	N/A	Yes	No

4.20 Mitigation Measures and Commitments

The following bullet list is a summary of proposed mitigation measures for the Preferred Alternative. Mitigation is described in more detail in previous sections of this 2009 FSEIS.

Traffic Operations

- The Preferred Alternative does not result in negative impacts to traffic compared to the 2028 No-Build Alternative.
- The Preferred Alternative would provide exclusive pedestrian phases at signalized intersections and crosswalks to maintain the accessibility across the Southern Connector/Champlain Parkway.

Rail Operations

- The Preferred Alternative does not impact any railroad operations; therefore, no mitigation would be required.

Bus Service

- No mitigation would be provided for impacts to existing bus services.

Park and Ride Facilities

- No mitigation would be provided for impacts to existing park and ride facilities.
- No mitigation would be provided for the impacts to the existing PARC commuter parking lot for the loss of 70 parking stalls. Adequate parking exists within the remaining parking lot to continue to provide services at this location. Also, this lot is the site of the proposed South End neighborhood Transit Center, which would redevelop the site.

Bicycle/Pedestrian Facilities

- The Preferred Alternative would include a shared-use path along the C-1 Section, from Shelburne Street to Pine Street. This path would provide mitigation for bicyclists and pedestrians that would no longer be able to access Queen City Park Road from Pine Street.

Emergency Vehicle Access

- No mitigation would be provided for emergency vehicle access. Sufficient alternative routings exist for emergency vehicles to provide services within the study area.

Impacts to Neighborhoods

- The isolation of three houses, one on Home Avenue and two on Briggs Street, on the west of the C-2 Section is not considered to be an impact to the cohesiveness to the Flynn Avenue/Home Avenue neighborhood, because connectivity will be maintained at the Southern Connector/Champlain Parkway intersections with Home Avenue and Flynn Avenue.

Right-of-Way Impacts

- The acquisition and relocation program would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and the relocation resources are available to all relocatees without discrimination.

- The Preferred Alternative would have no substantial impacts to properties along the proposed alignment.

Impacts to Properties with Land-Use Restrictions

- A HASP would be developed to address the potential of encountering coal tar during construction along the C-6 Section.

Environmental Justice

- Under the Preferred Alternative, there would not be a disproportionately high and adverse effect on minority or low-income populations; therefore, no mitigation would be required.

Consistency with Local and Regional Plans

- The Preferred Alternative would provide pedestrian amenities that would enhance the project corridor for pedestrians, including landscaping, shared-use paths, sidewalks, crosswalks, and traffic signals with exclusive pedestrian phases.

Wetland Impacts

- Appropriate limit-of-work barriers and erosion and sedimentation control measures would ensure protection of the wetlands surrounding the project and any indirect impacts.

- The realignment of the 1979 Selected Alternative out of the C-8 Section to the C-6 Section would result in a reduction of wetland impacts.

- Wetland impacts for the project area have already been mitigated as part of the wetland creation performed in conjunction with the previously constructed Northern Connector.

Historic and Archaeological Resource Impacts

- Under the Preferred Alternative, no additional archaeological testing is anticipated because it is apparent that the areas associated with the anticipated construction limits have been previously disturbed.

- Historically compatible traffic signals at the intersections of Pine Street at Maple Street and Pine Street at King Street would be provided.

Air Quality Impacts

- Under the Preferred Alternative, no impacts are anticipated; therefore, no mitigation is required.

Noise Impacts

- No Mitigation is proposed for noise impacts for the Preferred Alternative. Abatement measures have not been found to be feasible or reasonable.

Public, Conservation and Recreation Land Impacts

- Under the Preferred Alternative, no impacts are anticipated; therefore, no mitigation is required.

Hazardous Materials Impacts

- The Preferred Alternative is not anticipated to impact any hazardous materials; therefore, no mitigation is proposed.

Visual Impacts

- Under the Preferred Alternative, landscaping would be provided to mitigate visual impacts.