

OLD COLONY PLANNING COUNCIL

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TECHNICAL MEMORANDUM

Date: February 8, 2010

To: Francis Lynam, Whitman Town Administrator

From: Charles Kilmer, Transportation Program Manager

Subject: South Avenue (Route 27)/Pleasant Street/Franklin Street intersection

At the request of the Whitman Board of Selectmen, OCPC has undertaken a traffic study to determine the suitability of combining the existing left turn lane and straight through lane and adding an island on the northbound Franklin Street approach to the South Avenue (Route 27)/Pleasant Street/Franklin Street intersection. According to the town, the purpose of combining these two lanes would be to improve safety by preventing northbound left turning vehicles from blocking the view of vehicles in the northbound through lane.

A previous study of traffic and safety at this intersection was completed by OCPC for the Town of Whitman in 2008. That study recommended interim and long term improvement alternatives, which included the installation of flashing beacons (red for the stop controlled approaches and yellow for the approaches with the right of way) to emphasize the existing traffic controls, and the installation of traffic signals as a long term improvement solution.

This updated study includes an update of peak hour turning movement counts, level-of-service operations analyses, and crash data analyses. This study includes morning and afternoon peak hour traffic operations analyses in accordance with the standards in the Transportation Research Board's Highway Capacity Manual. A copy of the request from the town is included in the Appendix to this report. The previous 2008 OCPC study for this intersection included a four way stop alternative warrant analysis, traffic signal warrant analyses, a review of existing physical and geometric attributes of the intersection (stopping sight distances), automatic traffic counts and 85th percentile speed studies, and a review of the latest available three year crash records history.

The Route 27 corridor is an important highway corridor through Whitman that connects to Brockton to the west and Hanson, Kingston, and Plymouth to the east. The South Avenue (Route 27)/Pleasant Street/Franklin Street intersection is under local jurisdiction, although Route 27 is a state numbered route. Route 27 is part of the National Highway System (NHS) and is eligible for Federal and State funding through the Transportation Improvement Program (TIP).

The South Avenue (Route 27)/Pleasant Street/Franklin Street intersection in Whitman is currently un-signalized with a stop control on the northbound Franklin Street approach and the southbound Pleasant Street approach. Right turns from Franklin Street to South Avenue are channeled with a raised island and are controlled with a yield sign. South Avenue, Franklin Street, and Pleasant Street are all two-lane roads. The intersection alignment is such that the southbound Pleasant



Street approach is not directly aligned with Franklin Street. This northbound Franklin Street approach provides two lanes, including an exclusive left turn lane and a through lane. The right turn is channeled with a raised island off of the through lane. The speed limit is posted at 25 miles on the Franklin Street and South Avenue approaches to the intersection.

The Whitman MBTA Commuter Rail Station is located on South Avenue approximately 800 feet west of the intersection. The intersection has undergone improvements in the 1990's as mitigation for traffic generated by the commuter rail station. At that time, Franklin Street was not aligned opposite of Pleasant Street and two islands channeled traffic in and out of Franklin Street. Improvements were made to the turning radii, two islands were removed, and a new raised island was added to line up Franklin Street as much as possible with Pleasant Street. The design for these improvements is included in the Appendix to this report.

According to the previous 2008 OCPC study, the 85th percentile speed on South Avenue west of the intersection is 35 miles per hour (ten miles per hour above the posted speed limit). The 85th percentile speed on Franklin Street south of the intersection is 45 miles per hour. The 85th percentile speed on South Avenue east of the intersection is 44 miles per hour (nine miles per hour above the posted speed limit) and the 85th percentile speed on Pleasant Street north of the intersection is 32 miles per hour.

The available stopping sight distances at the South Avenue (Route 27)/Pleasant Street/Franklin Street intersection were measured by OCPC in the 2008 study in accordance with the guidelines in the American Association of Highway and Transportation Officials (AASHTO) publication, [A Policy on Geometric Design of Highways and Streets](#). The stopping sight distance is approximately 150 to 175 feet looking west from the stop line from the northbound Franklin Street approach. This sight line is hindered by the alignment of the road, which sets the stop line further back on the approach, and by a sign and fence from the automotive business located on the southwest quadrant of the intersection. This sight distance of 150 to 175 feet is not adequate for northbound vehicles pulling out into traffic onto South Avenue, where vehicles are traveling at a prevailing speed of 35 miles per hour. According to AASHTO standards, the stopping sight distance should be at 250 feet looking west from the northbound approach for conditions where the main street traffic is 35 miles per hour. Field observations show that most vehicles on the northbound approach encroach further into the intersection into the crosswalk in order for the motorist to view oncoming vehicles to the left. This increases the stopping sight distance on the northbound approach to approximately 225 to 250 feet; however, it also results in vehicles encroaching into the intersection, which creates safety problems for pedestrians as well as other vehicles. The previous 2008 study stated that there are additional stopping sight issues to the east of the intersection. The chiropractor's building on the northeast blocks the view of vehicles approaching on Pleasant Street southbound. Southbound vehicles also go beyond the stop line and encroach into the crosswalk in order to increase the sight lines looking east. This stopping sight distance is approximately 200 feet, and is further limited by a curve in the road. According to AASHTO standards, 200 feet of stopping sight distance is not adequate for vehicles on the east leg of the intersection, which travel at prevailing speeds of 44 miles per hour.



Crash Experience

Motor vehicle crash reports for the latest three available years, 2007, 2008, and 2009, were obtained from the Whitman Police Department records. Table 1 summarizes the data. In addition, the intersection crash rate was calculated, based on the methods in the Institute of Transportation Engineer’s (ITE) publication, A Manual on Traffic Engineering Studies.

Table 1 Crashes at South Avenue (Route 27)/Franklin Street/Pleasant Street

	2007	2008	2009	Total
Personal Injury	5	0	4	9
Property Damage Only	6	6	1	13
Total	11	6	5	22
Franklin St Northbound South Ave Eastbound Angle - Cross Movement	5	1	3	9
Franklin St Left Turn Northbound South Ave Eastbound Angle - Cross Movement	3	1	1	5
Franklin St Northbound South Ave Westbound Angle - Cross Movement	0	0	1	1
Pleasant Street Cross Movement	2	2	0	4
Ran off road	1	1	0	2
Movement unknown	0	1	0	1
Total	11	6	5	22
Morning	2	0	2	4
Afternoon (Noon to 6:00 PM)	7	4	2	13
Night	2	2	1	5
Total	11	6	5	22

A summary of the crash data for the intersection is as follows:

- The data shows that there were 22 total crashes in the three-year period, with eleven in 2007, six in 2008, and five in 2009.
- The crash data shows that there were nine angle or cross-movement type crashes involving Franklin Street northbound through vehicles with South Avenue eastbound vehicles, five angle crashes involving Franklin Street northbound left turning vehicles with South Avenue eastbound vehicles, and one angle crash involving a Franklin Street northbound vehicle with a South Avenue westbound vehicle. These crashes on the Franklin Street northbound approach make up the bulk of crashes at the intersection (15 out of the 22 total crashes).
- The data shows that 13 of the 22 crashes occurred during the afternoon, between noon and 6:00 PM when the traffic volumes are the highest during the day.

A collision diagram of the intersection was developed showing the time, date, type of crash, and severity of the crashes. The collision diagram was developed in accordance with the ITE publication, Manual of Traffic Engineering Studies and is included in the Appendix.

The crash rate indicates the frequency of crashes at intersections and measures the crash exposure. It is based on the number of crashes per million entering vehicles (MEV). The number of crashes often increases as traffic volumes increase. Traffic growth creates more opportunities



for crashes to occur thereby increasing exposure. A condition that causes crashes at an intersection can become exacerbated with increased traffic, and therefore frequency will rise. The crash rate calculated for the South Avenue (Route 27)/Pleasant Street/Franklin Street intersection is based upon the ITE equation in the Manual of Traffic Engineering Studies.

The crash rate for the intersection was calculated to be 1.58 crashes per million entering vehicles. The average crash rate for un-signalized intersections for the MassDOT's District 5 is 0.62 crashes per million entering vehicles. The intersection crash rate is almost three times that of the District 5 average.

Traffic Operations

During November 2009, manual turning movement counts were conducted during the morning and afternoon peak periods for the South Avenue (Route 27)/Pleasant Street/Franklin Street intersection in Whitman. The counts took place between 7:00 AM and 9:00 AM in the morning and between 2:00 PM and 6:00 PM during a weekday. The results of the turning movement counts are shown in the appendix to this report. These peak traffic counts were used to determine the operational characteristics of the morning and afternoon peak hours.

Level-of-service analyses (LOS) were completed for the South Avenue (Route 27)/Pleasant Street/Franklin Street intersection to determine the operating conditions during the morning and afternoon peak hours under current conditions. Level-of-service analysis is a qualitative and quantitative measure based on the analysis techniques published in the Highway Capacity Manual by the Transportation Research Board. Level-of-service is a general measure that summarizes the overall operation of an intersection or transportation facility. It is based upon the operational conditions of a facility including lane use, traffic control, and lane width, and takes into account such factors as operating speeds, traffic interruptions, and freedom to maneuver.

Level-of-service represents a range of operating conditions and is summarized with letter grades from "A" to "F", with "A" being the most desirable. Level-of-service "E" represents the maximum flow rate or the capacity on a facility. The following describes the characteristics of each level-of-service:

- LOS "A" represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream.
- LOS "B" is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is still relatively unaffected.
- LOS "C" is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. Occasional backups occur behind turning vehicles.
- LOS "D" represents high-density, but stable, flow. Speed and freedom to maneuver are restricted, and the driver experiences a below average level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.
- LOS "E" represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform level. Freedom to maneuver within the traffic stream is extremely limited, and generally requires forcing other vehicles to give way. Congestion levels and delay are very high.
- LOS "F" is representative of forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse the point, resulting in lengthy queues and delay.



The LOS definitions describe conditions based on a number of operational parameters. There are certain parameters utilized as measures of effectiveness for specific facilities. In the case for intersections, time delay and average stop delay are used as measures of operational effectiveness to which levels of service are assigned.

In addition to LOS operations analyses that were completed for existing physical conditions, LOS analyses were also conducted for the intersection assuming the proposed consolidation of the Franklin Street northbound left turn and through movement lanes was in place. Level-of-service analyses assuming a four-way stop control and traffic signal operation were also performed to test the viability of alternative improvements. In addition, traffic warrants analyses for an all-way stop control and traffic signal were performed in the previous OCPC study for this intersection (in accordance with the Manual on Uniform Traffic Control Devices, MUTCD).

Table 2 shows the peak hour LOS results for the Route 27 South Avenue/Pleasant Street/Franklin Street intersection.

Table 2 - LOS Summary

	AM Peak 7:00 to 8:00 AM		Afternoon Peak 2:00 to 3:00 PM		PM Peak 4:30 to 5:30 PM	
	LOS	Average Delay (sec.)	LOS	Average Delay (sec.)	LOS	Average Delay (sec.)
Existing peak hour volumes with existing two way stop control	E	40	F	73	F	77
Existing peak hour volumes with proposed consolidation of the northbound Franklin Street left turn and through lanes	F	83	F	168	F	126
Existing peak hour volumes with four-way stop control	C	20	C	16	C	19
Existing peak hour volumes with signal control	A	9.9	B	11.9	B	11.5

Table 2 shows that the proposed consolidation of the northbound Franklin Street left turn and through movement lanes will most likely cause longer delays at the intersection than currently exist. Under this lane consolidation proposal, the LOS for the AM peak hour will go from LOS “E” and 40 seconds average delay under existing conditions to “F” with 83 seconds average delay. The Afternoon peak and PM peak will also experience higher delays under the lane consolidation proposal. The average delay will go from 73 seconds during the Afternoon peak and 77 seconds under the PM Peak under existing conditions to 168 seconds and 126 seconds respectively under the proposed lane consolidation proposal.

Table 2 shows that an all-way stop sign alternative and a traffic signal alternative would greatly improve the level-of-service at the intersection over the existing conditions and the northbound lane consolidation proposal.

Warrant analyses for an all-way stop control and for signalized operations at the intersection were performed in conformance with the FHWA’s Manual on Uniform Traffic Control Devices (MUTCD) in the previous 2008 OCPC study of this intersection. The South Avenue (Route 27)/Pleasant Street/Franklin Street intersection satisfies warrants for both a four-way stop control and a traffic signal.

Improvement Options

A meeting was held on January 25, 2010 at Whitman Town Hall to discuss the problems and potential solutions to these problems at the South Avenue (Route 27)/Franklin Street/Pleasant



Street intersection. OCPC staff presented updated traffic counts, LOS analyses, updated crash analyses, and videos of peak hour traffic at the intersection. Those present at the meeting included:

Dan Salvucci, Vice-Chairman of the Whitman Board of Selectmen
Frank Lynam, Whitman Town Administrator
Sgt. Harry Bates, Safety Officer, Whitman Police Department
Don Westhaver, Superintendent (Water and Sewer Department)
Jack Lowe, Associate Superintendent (Park, Tree, and Highway Department)
Pat Ciaramella, Executive Director, OCPC
Ray Guarino, Transportation Planner, OCPC
Eric Arbeene, Planner, OCPC

The improvements from the previous OCPC 2008 study were discussed. The 2008 study recommended improvements included short-term, interim, and a long term improvements. The short term improvement recommendations called for installing flashing beacons (red for the stop controlled approaches and yellow for the approaches with the right of way) to emphasize the existing traffic controls. This 2008 recommendation also included improved pavement markings to properly channel vehicles, show lane use, and emphasize the stop control on the northbound and southbound approaches implemented in concert with the flashing beacons. The OCPC 2008 study included a long term recommendation to install traffic signals at this location, and reconstruct and re-align the intersection for safe, efficient traffic flow. A traffic signal installation project, with reconstruction and re-alignment, will bring higher costs and a longer period of implementation in order to obtain programming of federal and state funds. An option for funding this project is the Transportation Improvement Program (TIP), which utilizes 80 percent Federal funds and 20 percent State funds, while the town pays for the design, and is responsible for a secure right-of-way and permitting. In order to commence the TIP process, the town must first complete and submit a Project Needs Form (PNF) to MassDOT District 5. A PNF is included in the Appendix.

The January 25, 2010 meeting discussion focused on the traffic volumes, number and types of crashes, sight distance problems, the geometric and physical conditions, the condition and placement of signs, drainage issues, vehicle speeds, pedestrian and bicycle safety, and the impact of trip generators such as the schools and commuter rail. The discussion also included a review of the history of the intersection and the improvements made at this location over time. The discussion also focused on the improvement alternatives and the effectiveness and potential impacts that each of these might have at this location. Although the proposed consolidation of the Franklin Street northbound approach left turn and through movements would help improve sight distances by preventing left turn vehicles from blocking sight lines, this proposal will more than double delays on the northbound approach. The four-way stop alternative is an effective low cost countermeasure for reducing angle crashes at un-signalized intersections; however, a stop sign on the eastbound South Avenue approach could potentially back up along South Avenue to the commuter rail tracks and trap vehicles inside the railroad gates on the track.

The crash data showed that the overwhelming number of crashes in the three year period (2007, 2008, and 2009) involved northbound Franklin Street vehicles colliding with eastbound South Avenue vehicles. According to the crash reports, many of the drivers on the Franklin Street approach commented that they did not notice the two stop signs on that approach. The attendees at the January 25th meeting made the following conclusions and recommendations:



- A traffic signal would work best to improve safety for vehicles and pedestrians at this location. This recommendation will be pursued as a long term improvement by the town. In the interim, short term improvements that improve driver awareness, especially on the Franklin Street approach, will be implemented. The Town Administrator will communicate the need for a traffic signal at this location to the full Board of Selectmen in order for the town to submit the Project Need Form (PNF) to MassDOT to begin the process of obtaining federal aid for a traffic signal project. OCPC will provide assistance, including cost estimates, to the town in completing the PNF.
- Effective countermeasures for stop sign violations (according to the MassDOT “traffic Safety Toolbox Series”) include upgrading stop signs for retro-reflectivity, adding advanced signage, and installing flashing beacons. More emphasis is needed on the Franklin Street northbound approach to the intersection; a stand-alone flashing red beacon, closer to eye level, would be more visible than flashing beacons on wires over the intersection. Superintendent Jack Lowe will look into obtaining a portable, solar powered, red flashing beacon for the northbound approach.
- The town will improve signage by updating posted speed limit signs on all the approaches, removing the redundant stop sign on the Franklin Street northbound approach, replacing the stop sign on the island on the Franklin Street approach with a larger 36 inch sign and updated retro-reflectivity (to be used in tandem with the stand alone red flashing beacon).
- Sgt. Bates will communicate the need for enhanced police presence and enforcement of speeds and stop sign violators at this location to the acting Whitman Police Chief.
- OCPC will provide assistance in monitoring the intersection after implementation of short-term and long term improvements are in place to evaluate the effectiveness of the improvements.

Should you have any questions or comments regarding this report, please contact Ray Guarino at (508) 583-1833, Ext. 210, or rguarino@ocpcrpa.org.

c.c.

Carl Kowalski, Char, Whitman Board of Selectman
Daniel Salvucci, Vice-Chairman, Whitman Board of Selectman,
Sgt. Harry Bates, Safety Officer, Whitman Police Department
Don Westhaver, Superintendent (Water and Sewer Dept.)
Jack Lowe, Associate Superintendent (Park, Tree, and Highway Department)
Pat Ciaramella, Executive Director OCPC
Trey Wadsworth, MPO liaison, MassDOT - Planning
Pamela Haznar, P.E., Project Development Engineer, MassDOT District 5
Paul Maloney, P.E., Metropolitan Planner, FHWA
Fred Gilmetti, Whitman Alternate, Old Colony Planning Council



APPENDIX


- **Study Request from the Town of Whitman**
- **Previous Design for Improvements**
- **Updated Collision Diagram**
- **Updated AM and PM Turning Movement Counts**
- **Multi-Way Stop Sign Warrant Analysis (from previous OCPC 2008 study)**
- **Traffic Signal Warrant Analysis (from previous OCPC 2008 study)**
- **MassDOT Project Need Form**



Memorandum

DATE: November 12, 2009

TO: Selectman Vice-Chair Daniel Salvucci

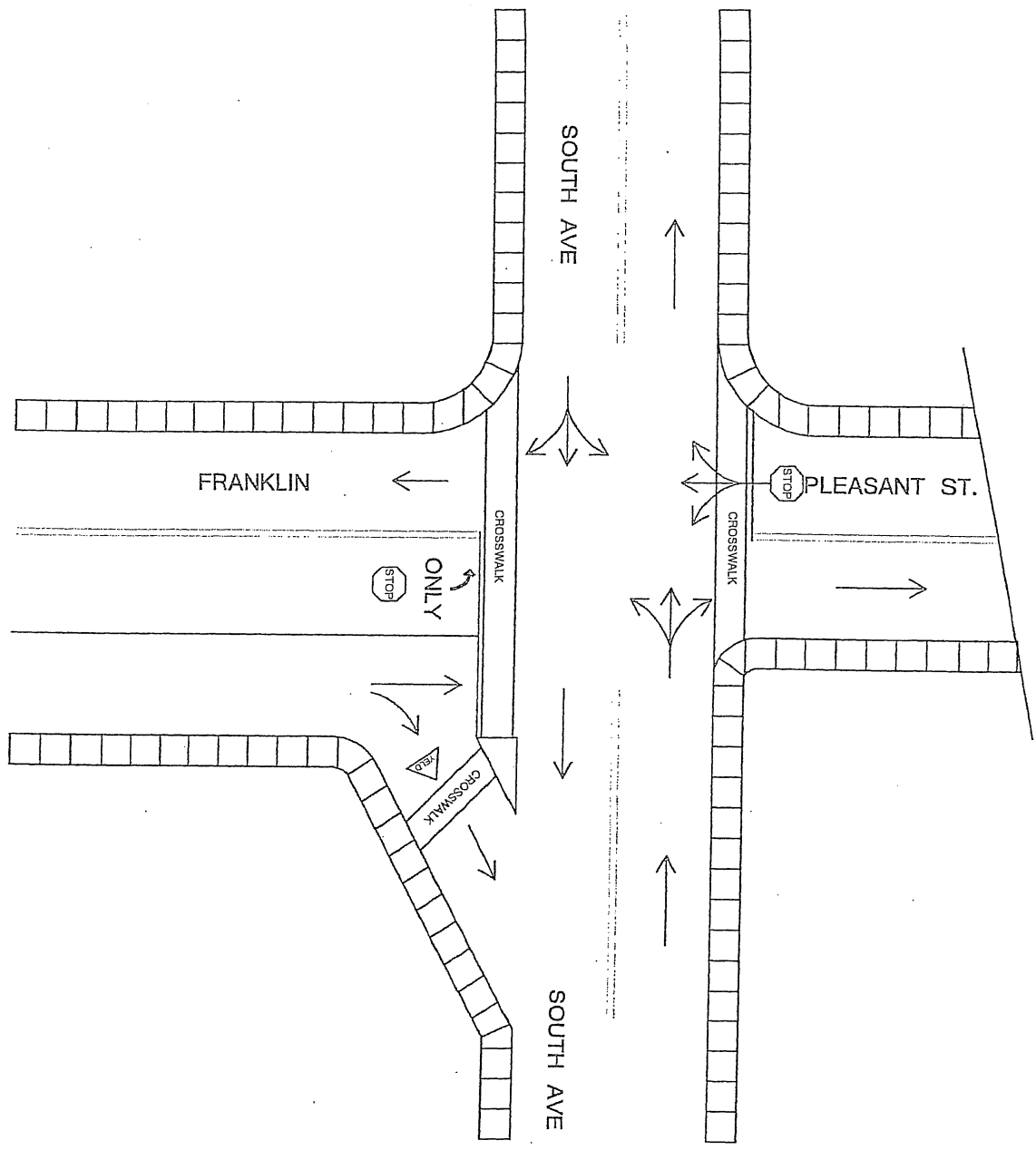
FROM: Frank Lynam, Town Administrator 

SUBJECT: Intersection of Franklin, Pleasant, and South Avenue

The Board of Selectmen voted unanimously on Tuesday, November 10, 2009 to request Old Colony Planning Council evaluate the referenced intersection to determine the suitability of placing an island on Franklin Street where it meets South Avenue to reduce the width of the northbound side to one vehicle to improve safety at that intersection, or in the alternative, to seek advice and planning assistance for other appropriate remedies to mitigate the dangerousness of that intersection.

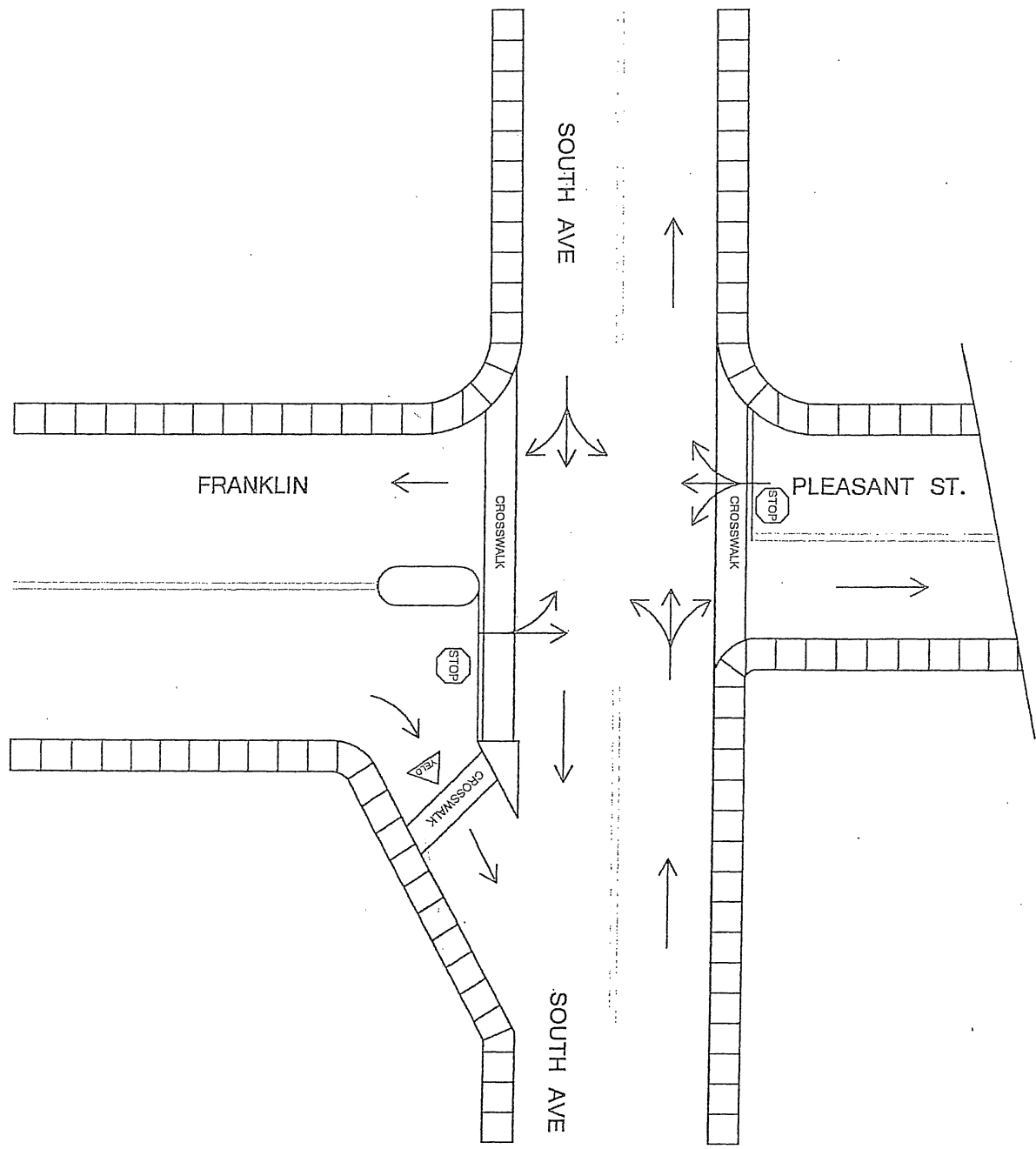
Please bring this request forward to O.C.P.C.

FJL/



CURRENT LAYOUT

TITLE: STREET PROPOSAL PLAN
DRAWING: CURRENT STREET LAYOUT 1 OF 2
BY: DAVID SALVUCI
DATE: 11-07-09



PROPOSAL

TITLE: STREET PROPOSAL PLAN
DRAWING: NEW STREET LAYOUT 2 OF 2
BY: DAVID SALVUCCI
DATE: 11-07-09

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

SOUTH AVE. =
30 FRANKLIN ST. B

AVENUE N 79-04-37° E

(ROUTE 27)

LIMIT OF CONSTRUCTION

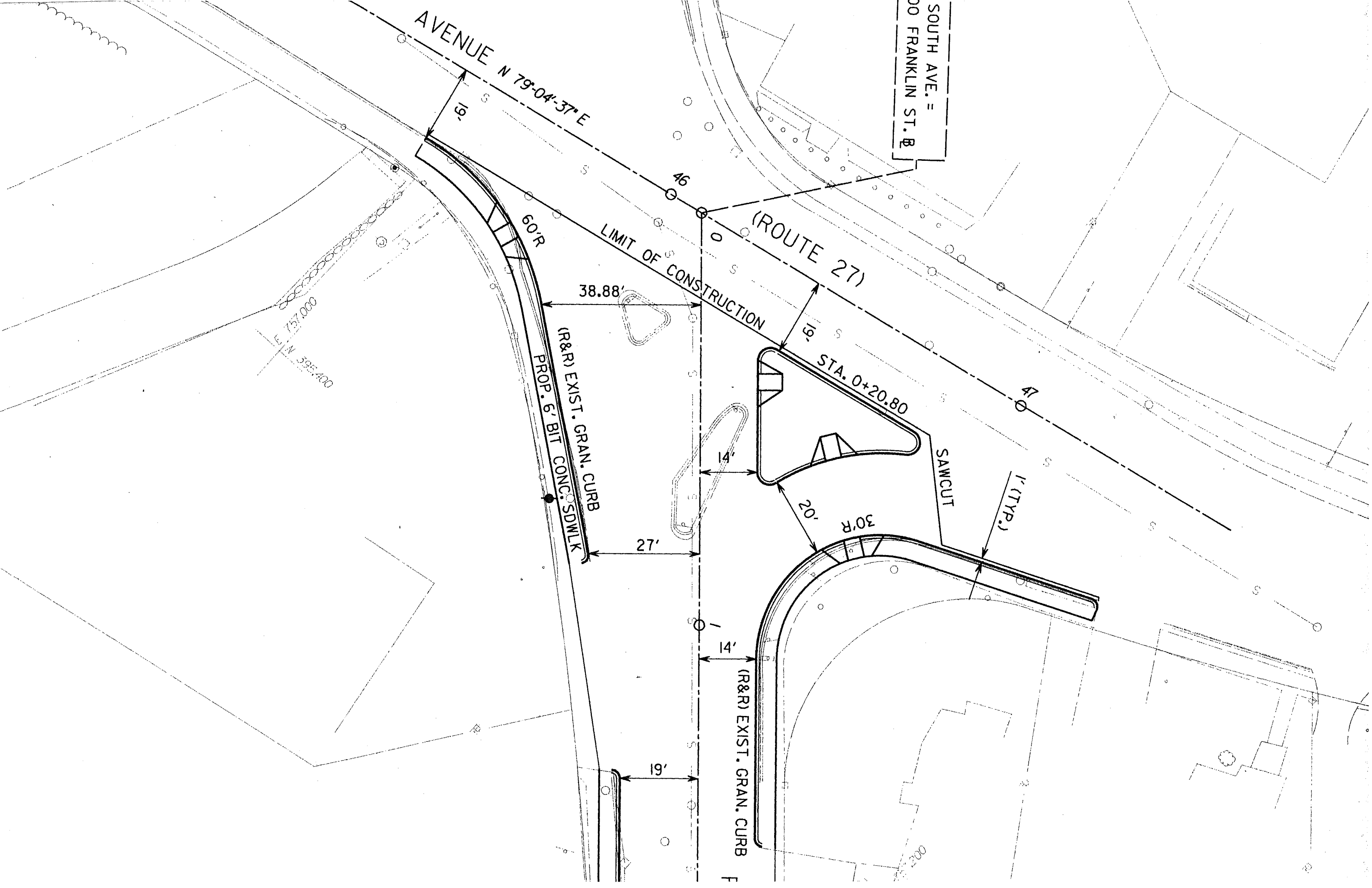
STA. 0+20.80

PROP. 6' BIT CONC. SDW/LK
(R&R) EXIST. GRAN. CURB

SAWCUT

1' (TYP.)

(R&R) EXIST. GRAN. CURB



COLLISION DIAGRAM

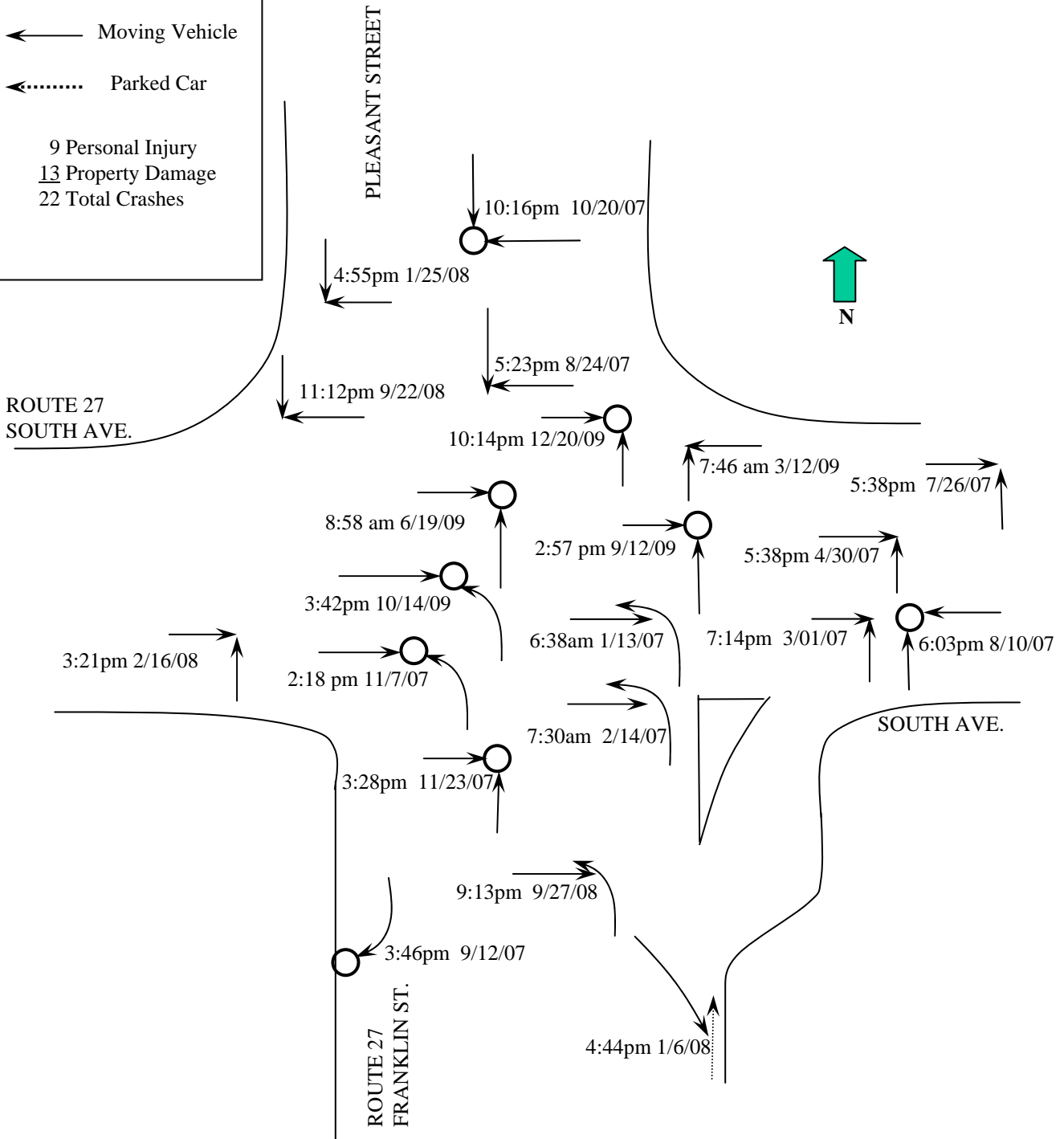
Intersection: Route 27 South Ave. at Pleasant Street and Franklin Street

Period: Three Years From 2007 to 2009

Community: Whitman, MA Prepared by RG

- Fatal Crash
- Injury Crash
- Moving Vehicle
- Parked Car

9 Personal Injury
13 Property Damage
22 Total Crashes





Old Colony Planning Council
70 School Street
Brockton, MA 02301
508-583-1833
www.ocpcrpa.org

Community: Whitman
 Weather: Clear
 Board #: DB-400 (4)
 Staff: RG

File Name : 338_South(27)&Pleasant&Frankin(27)_AM
 Site Code : 338
 Start Date : 11/17/2009
 Page No : 1

Groups Printed- 3 - FHWA Class 4 - 13

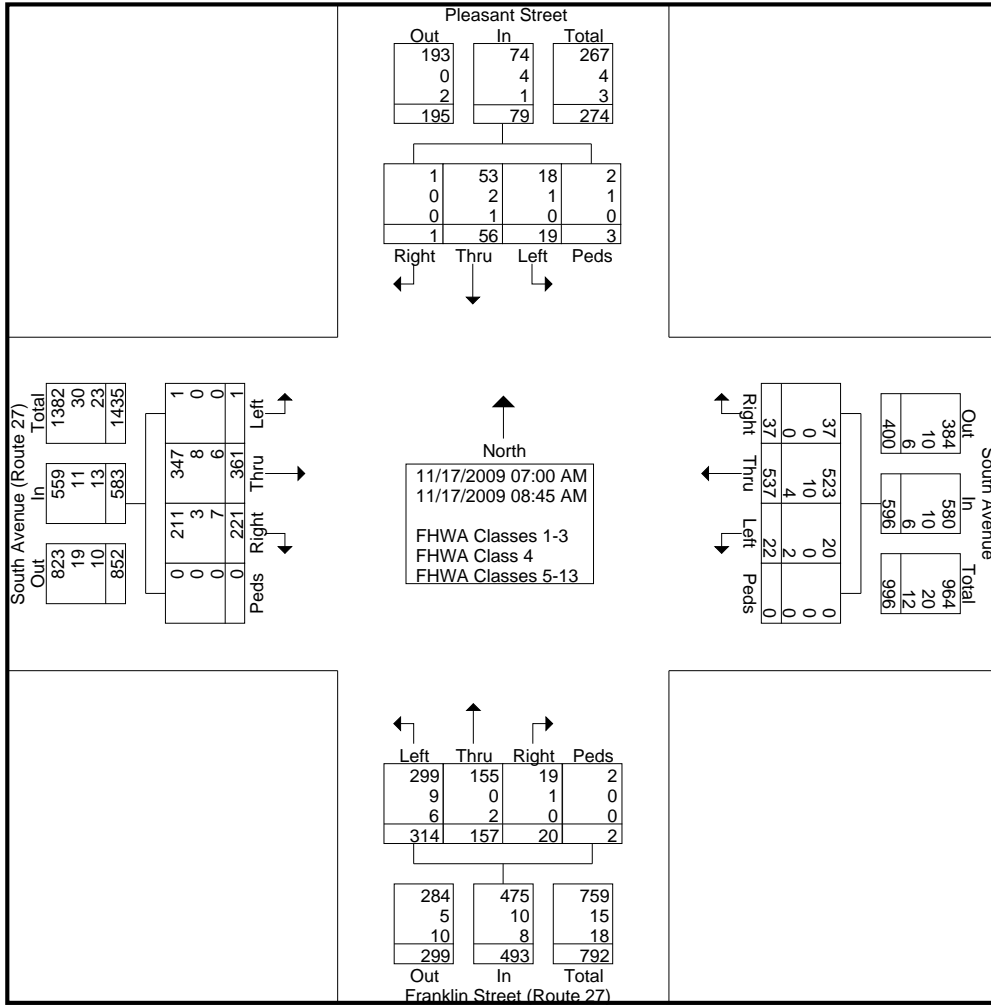
Start Time	Pleasant Street Southbound					South Avenue Westbound					Franklin Street (Route 27) Northbound					South Avenue (Route 27) Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	4	13	0	0	17	7	61	6	0	74	59	20	2	0	81	0	26	65	0	91	263
07:15 AM	1	9	0	1	11	2	78	4	0	84	55	24	6	1	86	0	36	16	0	52	233
07:30 AM	2	9	0	1	12	3	78	10	0	91	38	25	3	0	66	1	38	13	0	52	221
07:45 AM	3	6	1	1	11	3	69	3	0	75	43	24	2	1	70	0	46	32	0	78	234
Total	10	37	1	3	51	15	286	23	0	324	195	93	13	2	303	1	146	126	0	273	951
08:00 AM	1	9	0	0	10	0	53	2	0	55	23	19	0	0	42	0	57	23	0	80	187
08:15 AM	0	3	0	0	3	2	52	1	0	55	35	14	3	0	52	0	43	25	0	68	178
08:30 AM	1	5	0	0	6	1	49	4	0	54	32	14	3	0	49	0	53	25	0	78	187
08:45 AM	7	2	0	0	9	4	97	7	0	108	29	17	1	0	47	0	62	22	0	84	248
Total	9	19	0	0	28	7	251	14	0	272	119	64	7	0	190	0	215	95	0	310	800
Grand Total	19	56	1	3	79	22	537	37	0	596	314	157	20	2	493	1	361	221	0	583	1751
Apprch %	24.1	70.9	1.3	3.8		3.7	90.1	6.2	0		63.7	31.8	4.1	0.4		0.2	61.9	37.9	0		
Total %	1.1	3.2	0.1	0.2	4.5	1.3	30.7	2.1	0	34	17.9	9	1.1	0.1	28.2	0.1	20.6	12.6	0	33.3	
FHWA Classes 1-3	18	53	1	2	74	20	523	37	0	580	299	155	19	2	475	1	347	211	0	559	1688
% FHWA Classes 1-3	94.7	94.6	100	66.7	93.7	90.9	97.4	100	0	97.3	95.2	98.7	95	100	96.3	100	96.1	95.5	0	95.9	96.4
FHWA Class 4	1	2	0	1	4	0	10	0	0	10	9	0	1	0	10	0	8	3	0	11	35
% FHWA Class 4	5.3	3.6	0	33.3	5.1	0	1.9	0	0	1.7	2.9	0	5	0	2	0	2.2	1.4	0	1.9	2
FHWA Classes 5-13	0	1	0	0	1	2	4	0	0	6	6	2	0	0	8	0	6	7	0	13	28
% FHWA Classes 5-13	0	1.8	0	0	1.3	9.1	0.7	0	0	1	1.9	1.3	0	0	1.6	0	1.7	3.2	0	2.2	1.6



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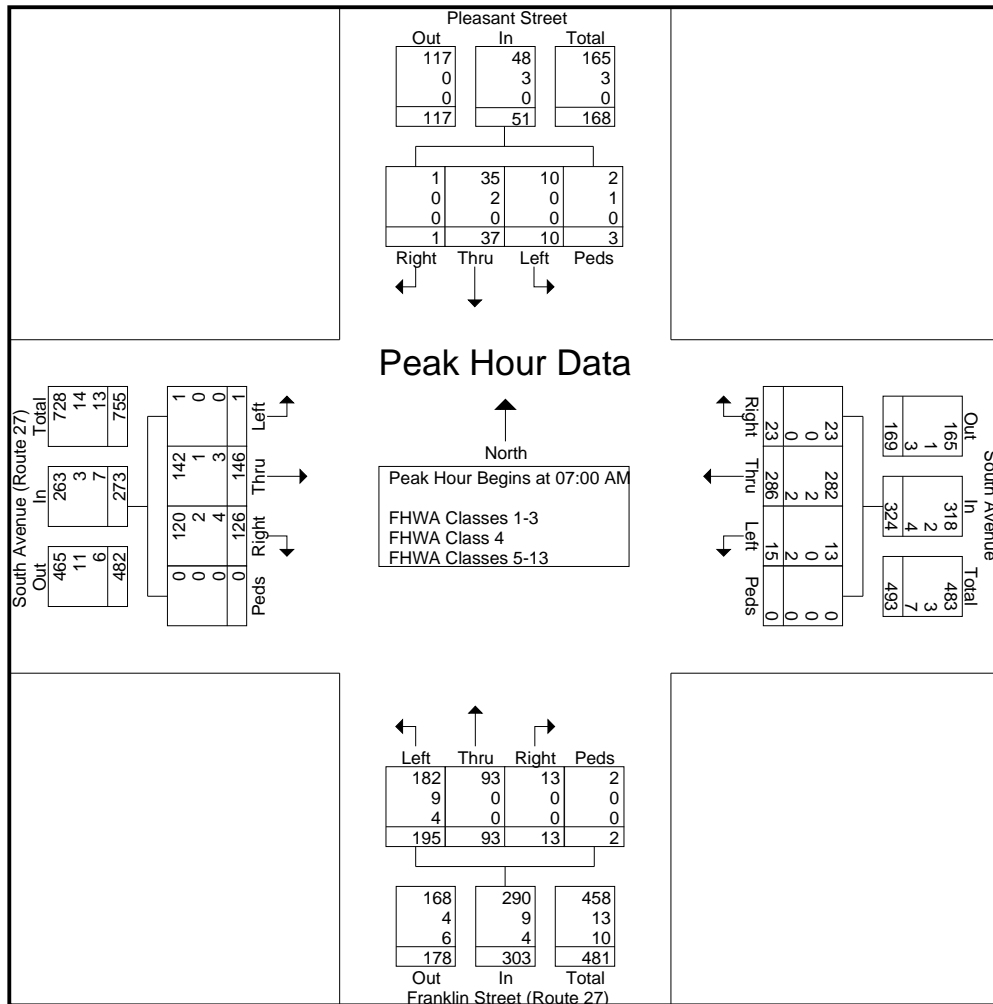


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Start Time	Pleasant Street Southbound					South Avenue Westbound					Franklin Street (Route 27) Northbound					South Avenue (Route 27) Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	4	13	0	0	17	7	61	6	0	74	59	20	2	0	81	0	26	65	0	91	263
07:15 AM	1	9	0	1	11	2	78	4	0	84	55	24	6	1	86	0	36	16	0	52	233
07:30 AM	2	9	0	1	12	3	78	10	0	91	38	25	3	0	66	1	38	13	0	52	221
07:45 AM	3	6	1	1	11	3	69	3	0	75	43	24	2	1	70	0	46	32	0	78	234
Total Volume	10	37	1	3	51	15	286	23	0	324	195	93	13	2	303	1	146	126	0	273	951
% App. Total	19.6	72.5	2	5.9		4.6	88.3	7.1	0		64.4	30.7	4.3	0.7		0.4	53.5	46.2	0		
PHF	.625	.712	.250	.750	.750	.536	.917	.575	.000	.890	.826	.930	.542	.500	.881	.250	.793	.485	.000	.750	.904
FHWA Classes 1-3	10	35	1	2	48	13	282	23	0	318	182	93	13	2	290	1	142	120	0	263	919
% FHWA Classes 1-3	100	94.6	100	66.7	94.1	86.7	98.6	100	0	98.1	93.3	100	100	100	95.7	100	97.3	95.2	0	96.3	96.6
FHWA Class 4	0	2	0	1	3	0	2	0	0	2	9	0	0	0	9	0	1	2	0	3	17
% FHWA Class 4	0	5.4	0	33.3	5.9	0	0.7	0	0	0.6	4.6	0	0	0	3.0	0	0.7	1.6	0	1.1	1.8
FHWA Classes 5-13	0	0	0	0	0	2	2	0	0	4	4	0	0	0	4	0	3	4	0	7	15
% FHWA Classes 5-13	0	0	0	0	0	13.3	0.7	0	0	1.2	2.1	0	0	0	1.3	0	2.1	3.2	0	2.6	1.6





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Community: Whitman
 Weather: Clear
 Board #: TDC-8 (1)
 Staff: EA

File Name : 338_South(27)&Pleasant&Frankin(27)_2-4PM
 Site Code : 338
 Start Date : 11/17/2009
 Page No : 1

Groups Printed- 3 - FHWA Class 4 - 13

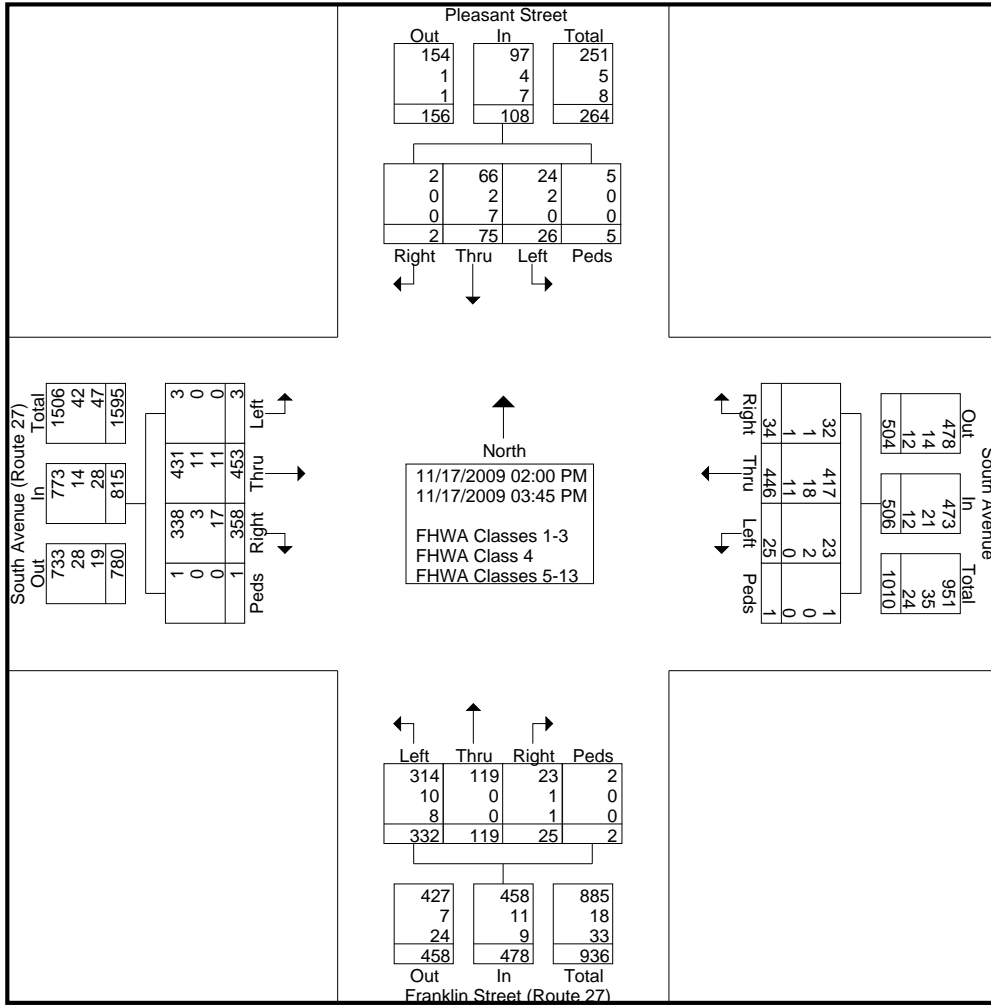
Start Time	Pleasant Street Southbound					South Avenue Westbound					Franklin Street (Route 27) Northbound					South Avenue (Route 27) Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
02:00 PM	2	7	1	1	11	2	51	3	0	56	87	23	6	1	117	0	48	43	0	91	275
02:15 PM	4	9	0	0	13	2	39	3	1	45	36	14	3	0	53	0	61	40	0	101	212
02:30 PM	3	10	0	1	14	8	55	4	0	67	33	12	4	0	49	0	69	38	1	108	238
02:45 PM	6	7	0	0	13	1	56	5	0	62	41	13	5	0	59	0	61	43	0	104	238
Total	15	33	1	2	51	13	201	15	1	230	197	62	18	1	278	0	239	164	1	404	963
03:00 PM	7	9	0	1	17	2	70	4	0	76	36	13	0	1	50	1	50	49	0	100	243
03:15 PM	1	12	0	1	14	3	59	6	0	68	28	16	4	0	48	0	60	38	0	98	228
03:30 PM	0	11	1	0	12	5	59	4	0	68	30	18	3	0	51	0	47	53	0	100	231
03:45 PM	3	10	0	1	14	2	57	5	0	64	41	10	0	0	51	2	57	54	0	113	242
Total	11	42	1	3	57	12	245	19	0	276	135	57	7	1	200	3	214	194	0	411	944
Grand Total	26	75	2	5	108	25	446	34	1	506	332	119	25	2	478	3	453	358	1	815	1907
Apprch %	24.1	69.4	1.9	4.6		4.9	88.1	6.7	0.2		69.5	24.9	5.2	0.4		0.4	55.6	43.9	0.1		
Total %	1.4	3.9	0.1	0.3	5.7	1.3	23.4	1.8	0.1	26.5	17.4	6.2	1.3	0.1	25.1	0.2	23.8	18.8	0.1	42.7	
FHWA Classes 1-3	24	66	2	5	97	23	417	32	1	473	314	119	23	2	458	3	431	338	1	773	1801
% FHWA Classes 1-3	92.3	88	100	100	89.8	92	93.5	94.1	100	93.5	94.6	100	92	100	95.8	100	95.1	94.4	100	94.8	94.4
FHWA Class 4	2	2	0	0	4	2	18	1	0	21	10	0	1	0	11	0	11	3	0	14	50
% FHWA Class 4	7.7	2.7	0	0	3.7	8	4	2.9	0	4.2	3	0	4	0	2.3	0	2.4	0.8	0	1.7	2.6
FHWA Classes 5-13	0	7	0	0	7	0	11	1	0	12	8	0	1	0	9	0	11	17	0	28	56
% FHWA Classes 5-13	0	9.3	0	0	6.5	0	2.5	2.9	0	2.4	2.4	0	4	0	1.9	0	2.4	4.7	0	3.4	2.9



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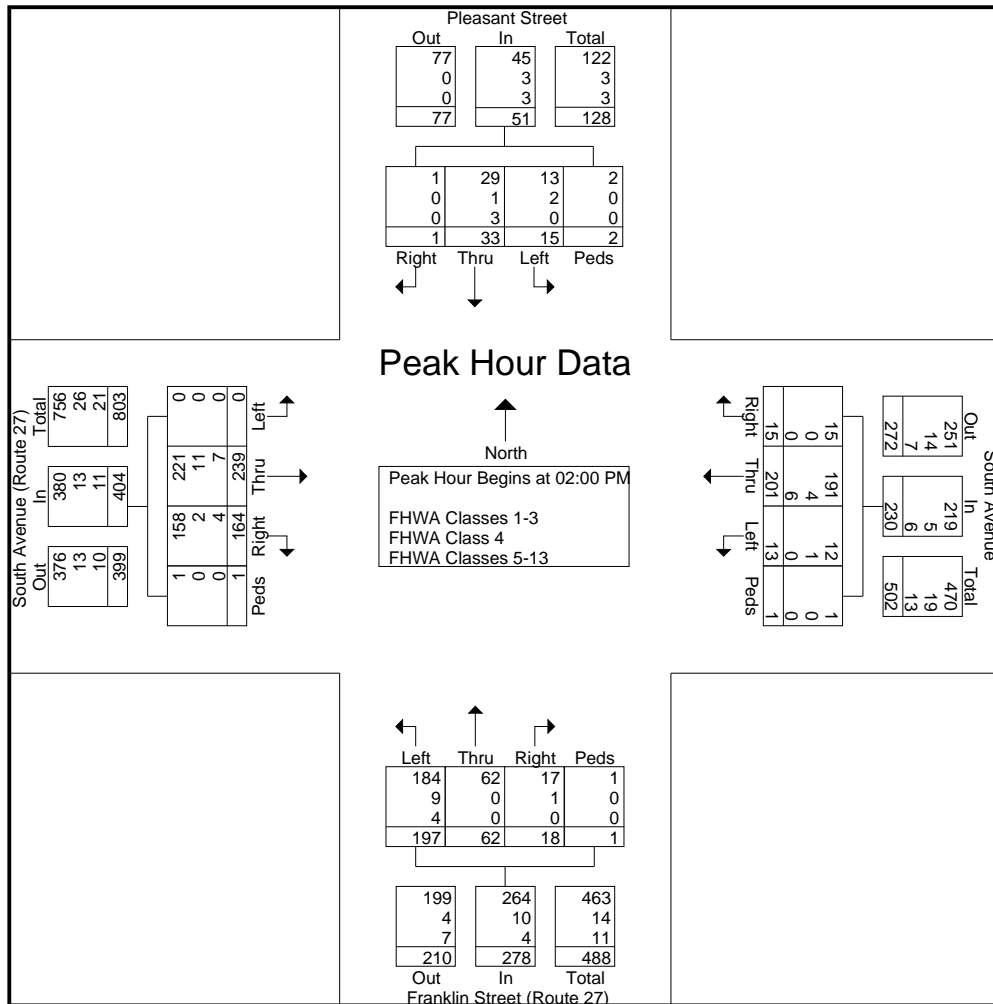


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Start Time	Pleasant Street Southbound					South Avenue Westbound					Franklin Street (Route 27) Northbound					South Avenue (Route 27) Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:00 PM																					
02:00 PM	2	7	1	1	11	2	51	3	0	56	87	23	6	1	117	0	48	43	0	91	275
02:15 PM	4	9	0	0	13	2	39	3	1	45	36	14	3	0	53	0	61	40	0	101	212
02:30 PM	3	10	0	1	14	8	55	4	0	67	33	12	4	0	49	0	69	38	1	108	238
02:45 PM	6	7	0	0	13	1	56	5	0	62	41	13	5	0	59	0	61	43	0	104	238
Total Volume	15	33	1	2	51	13	201	15	1	230	197	62	18	1	278	0	239	164	1	404	963
% App. Total	29.4	64.7	2	3.9		5.7	87.4	6.5	0.4		70.9	22.3	6.5	0.4		0	59.2	40.6	0.2		
PHF	.625	.825	.250	.500	.911	.406	.897	.750	.250	.858	.566	.674	.750	.250	.594	.000	.866	.953	.250	.935	.875
FHWA Classes 1-3	13	29	1	2	45	12	191	15	1	219	184	62	17	1	264	0	221	158	1	380	908
% FHWA Classes 1-3	86.7	87.9	100	100	88.2	92.3	95.0	100	100	95.2	93.4	100	94.4	100	95.0	0	92.5	96.3	100	94.1	94.3
FHWA Class 4	2	1	0	0	3	1	4	0	0	5	9	0	1	0	10	0	11	2	0	13	31
% FHWA Class 4	13.3	3.0	0	0	5.9	7.7	2.0	0	0	2.2	4.6	0	5.6	0	3.6	0	4.6	1.2	0	3.2	3.2
FHWA Classes 5-13	0	3	0	0	3	0	6	0	0	6	4	0	0	0	4	0	7	4	0	11	24
% FHWA Classes 5-13	0	9.1	0	0	5.9	0	3.0	0	0	2.6	2.0	0	0	0	1.4	0	2.9	2.4	0	2.7	2.5





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Groups Printed- 3 - FHWA Class 4 - 13

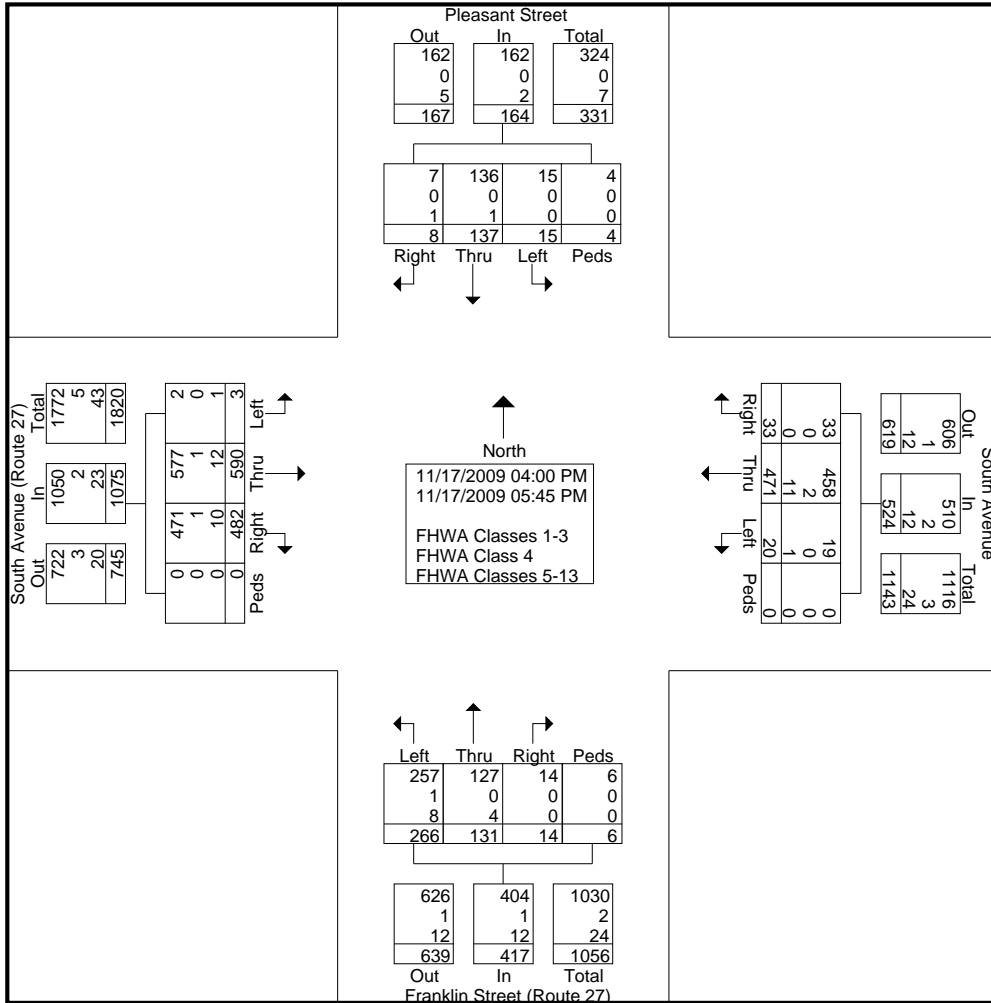
Start Time	Pleasant Street Southbound					South Avenue Westbound					Franklin Street (Route 27) Northbound					South Avenue (Route 27) Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
04:00 PM	2	13	1	1	17	1	50	3	0	54	45	19	2	0	66	1	61	61	0	123	260
04:15 PM	0	17	0	0	17	4	49	4	0	57	23	20	1	0	44	0	62	59	0	121	239
04:30 PM	1	28	0	2	31	1	51	5	0	57	24	20	1	0	45	0	82	56	0	138	271
04:45 PM	2	12	1	0	15	0	70	5	0	75	45	16	3	1	65	1	78	69	0	148	303
Total	5	70	2	3	80	6	220	17	0	243	137	75	7	1	220	2	283	245	0	530	1073
05:00 PM	2	20	4	0	26	1	53	2	0	56	37	20	4	2	63	1	78	60	0	139	284
05:15 PM	3	21	1	1	26	4	72	6	0	82	40	13	1	0	54	0	69	59	0	128	290
05:30 PM	3	13	0	0	16	6	65	5	0	76	20	13	1	1	35	0	75	42	0	117	244
05:45 PM	2	13	1	0	16	3	61	3	0	67	32	10	1	2	45	0	85	76	0	161	289
Total	10	67	6	1	84	14	251	16	0	281	129	56	7	5	197	1	307	237	0	545	1107
Grand Total	15	137	8	4	164	20	471	33	0	524	266	131	14	6	417	3	590	482	0	1075	2180
Apprch %	9.1	83.5	4.9	2.4		3.8	89.9	6.3	0		63.8	31.4	3.4	1.4		0.3	54.9	44.8	0		
Total %	0.7	6.3	0.4	0.2	7.5	0.9	21.6	1.5	0	24	12.2	6	0.6	0.3	19.1	0.1	27.1	22.1	0	49.3	
FHWA Classes 1-3	15	136	7	4	162	19	458	33	0	510	257	127	14	6	404	2	577	471	0	1050	2126
% FHWA Classes 1-3	100	99.3	87.5	100	98.8	95	97.2	100	0	97.3	96.6	96.9	100	100	96.9	66.7	97.8	97.7	0	97.7	97.5
FHWA Class 4	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	1	1	0	2	5
% FHWA Class 4	0	0	0	0	0	0	0.4	0	0	0.4	0.4	0	0	0	0.2	0	0.2	0.2	0	0.2	0.2
FHWA Classes 5-13	0	1	1	0	2	1	11	0	0	12	8	4	0	0	12	1	12	10	0	23	49
% FHWA Classes 5-13	0	0.7	12.5	0	1.2	5	2.3	0	0	2.3	3	3.1	0	0	2.9	33.3	2	2.1	0	2.1	2.2



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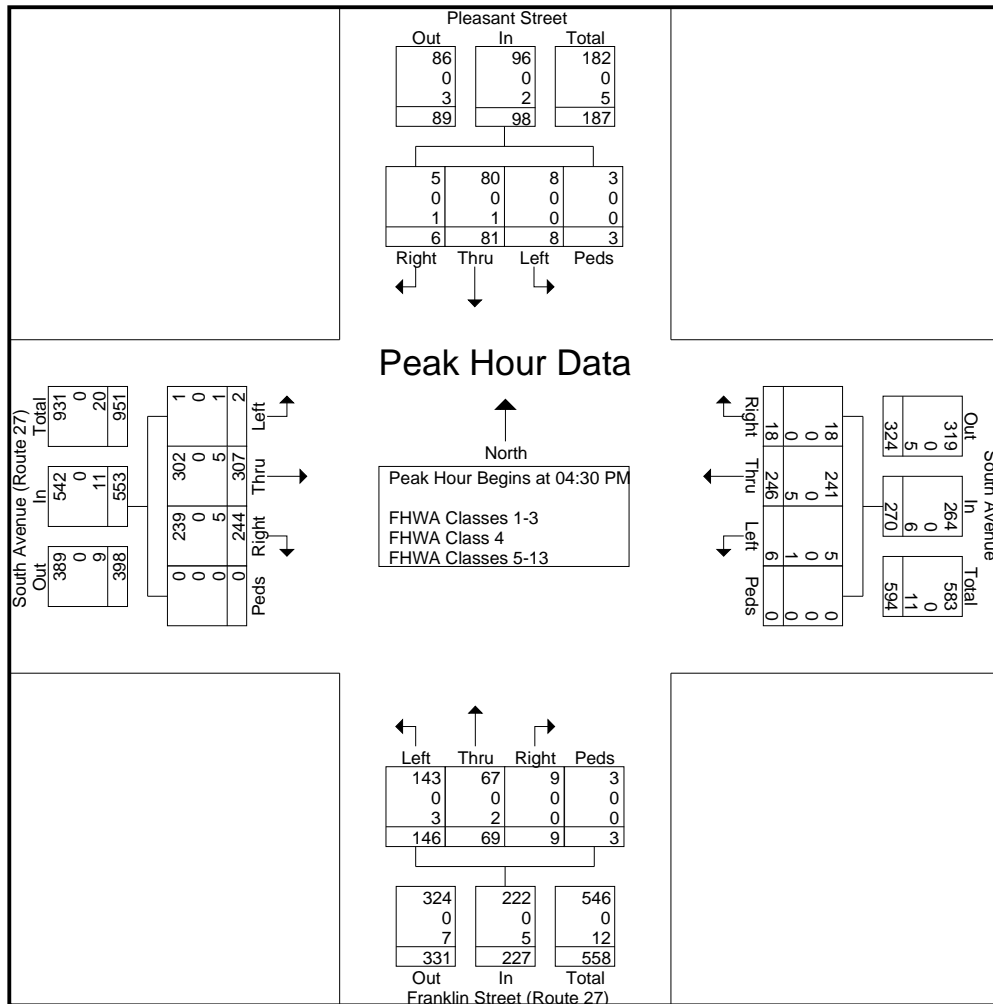


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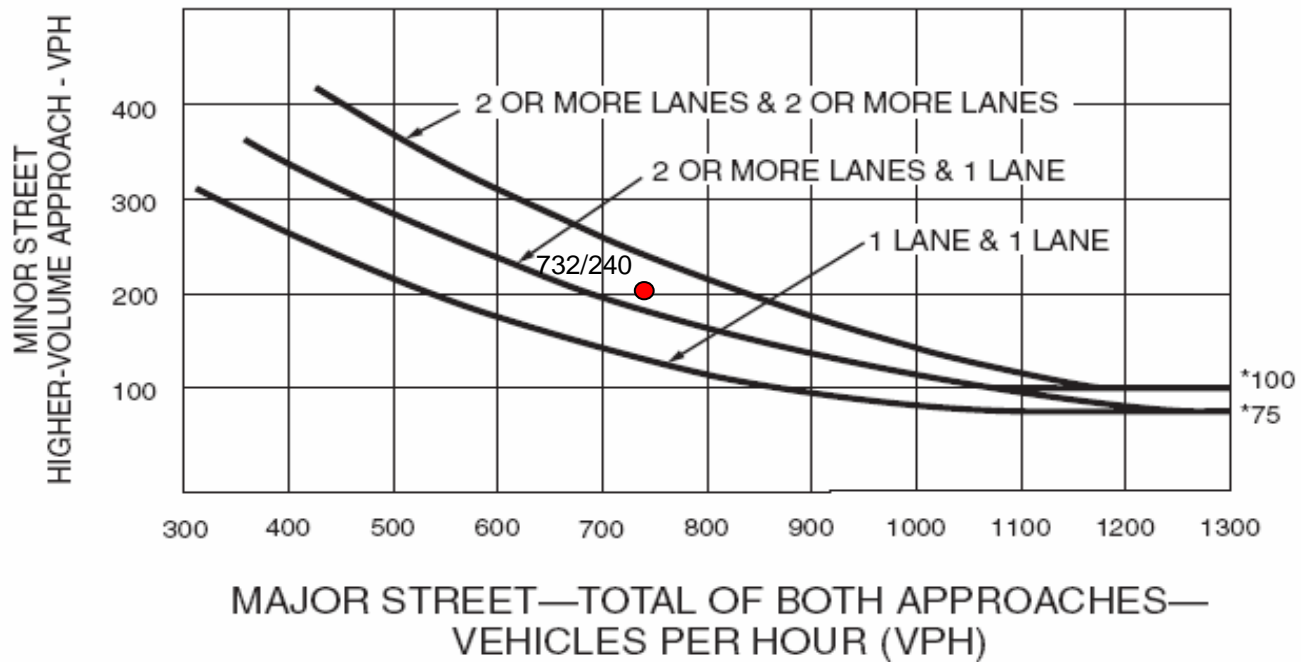
Start Time	Pleasant Street Southbound					South Avenue Westbound					Franklin Street (Route 27) Northbound					South Avenue (Route 27) Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	1	28	0	2	31	1	51	5	0	57	24	20	1	0	45	0	82	56	0	138	271
04:45 PM	2	12	1	0	15	0	70	5	0	75	45	16	3	1	65	1	78	69	0	148	303
05:00 PM	2	20	4	0	26	1	53	2	0	56	37	20	4	2	63	1	78	60	0	139	284
05:15 PM	3	21	1	1	26	4	72	6	0	82	40	13	1	0	54	0	69	59	0	128	290
Total Volume	8	81	6	3	98	6	246	18	0	270	146	69	9	3	227	2	307	244	0	553	1148
% App. Total	8.2	82.7	6.1	3.1		2.2	91.1	6.7	0		64.3	30.4	4	1.3		0.4	55.5	44.1	0		
PHF	.667	.723	.375	.375	.790	.375	.854	.750	.000	.823	.811	.863	.563	.375	.873	.500	.936	.884	.000	.934	.947
FHWA Classes 1-3	8	80	5	3	96	5	241	18	0	264	143	67	9	3	222	1	302	239	0	542	1124
% FHWA Classes 1-3	100	98.8	83.3	100	98.0	83.3	98.0	100	0	97.8	97.9	97.1	100	100	97.8	50.0	98.4	98.0	0	98.0	97.9
FHWA Class 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% FHWA Class 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FHWA Classes 5-13	0	1	1	0	2	1	5	0	0	6	3	2	0	0	5	1	5	5	0	11	24
% FHWA Classes 5-13	0	1.2	16.7	0	2.0	16.7	2.0	0	0	2.2	2.1	2.9	0	0	2.2	50.0	1.6	2.0	0	2.0	2.1



FOUR WAY STOP WARRANT							
Threshold: Total Major must be at least 300, total minor must be at least 200 for 8 hours							
If the 85th percentile is above 40 mph, then use 70 percent of the values meet the requirement							
(210 major street-140 minor street)							
Time	South Av Rt 27 Major Street- Entering	Franklin Street Rt 27 Major street entering	Total Major	South Av Minor St entering	Pleasant St Minor Street entering	Total minor	70 percent requirement
12:00 AM	46	7	53	26	8	34	
1:00	20	4	24	18	2	20	
2:00	8	4	12	10	0	10	
3:00	12	6	18	6	2	8	
4:00	16	21	37	4	2	6	
5:00	54	76	130	26	10	36	
6:00	167	158	325	66	28	94	
7:00	386	229	615	122	38	160	
8:00	302	156	458	131	32	163	
9:00	279	133	412	120	25	145	
10:00	248	118	366	126	24	150	
11:00	284	126	410	154	24	178	satisfied
12:00 PM	288	120	408	154	30	184	satisfied
1:00	297	125	422	162	28	190	satisfied
2:00	374	238	612	170	50	220	satisfied
3:00	460	160	620	192	64	256	satisfied
4:00	529	186	715	238	74	312	satisfied
5:00	530	202	732	240	77	317	satisfied
6:00	454	158	612	220	62	282	satisfied
7:00	349	119	468	170	32	202	satisfied
8:00	254	91	345	128	30	158	
9:00	178	52	230	112	25	137	
10:00	101	38	139	67	13	80	
11:00	70	18	88	50	14	64	
Total	5706	2545	8251	2712	694	3406	

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

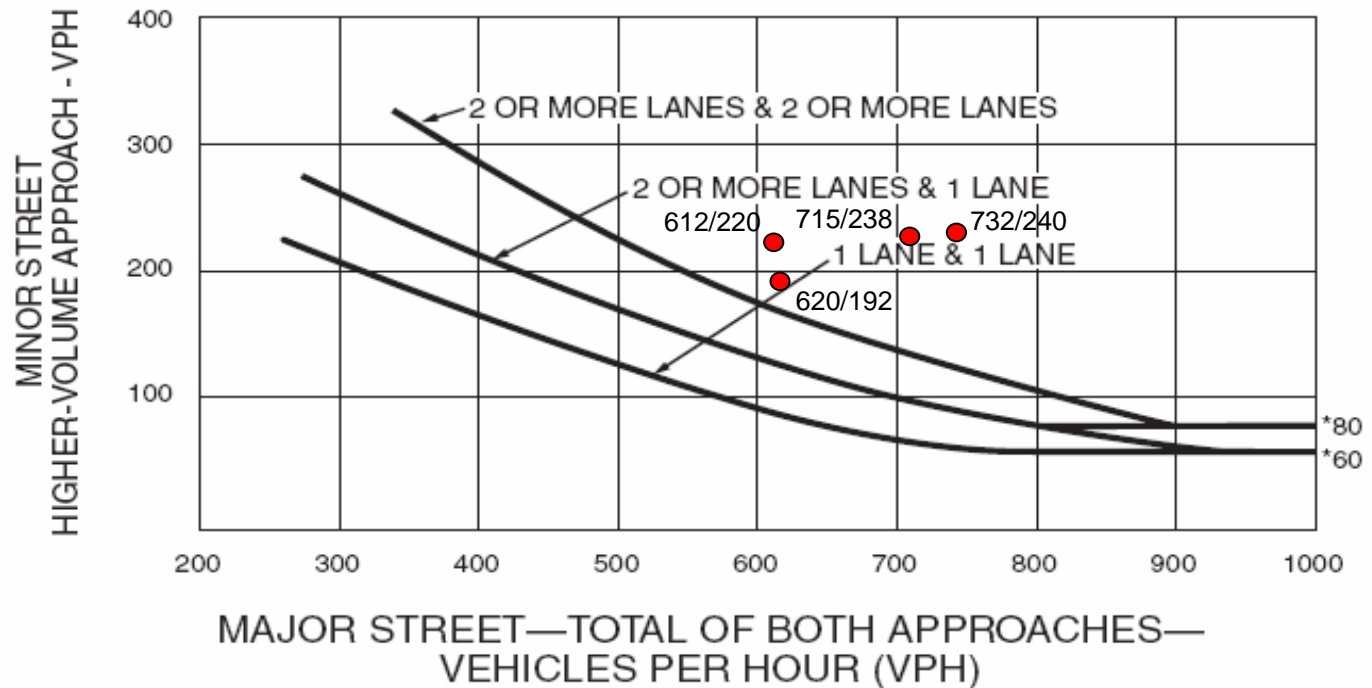
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

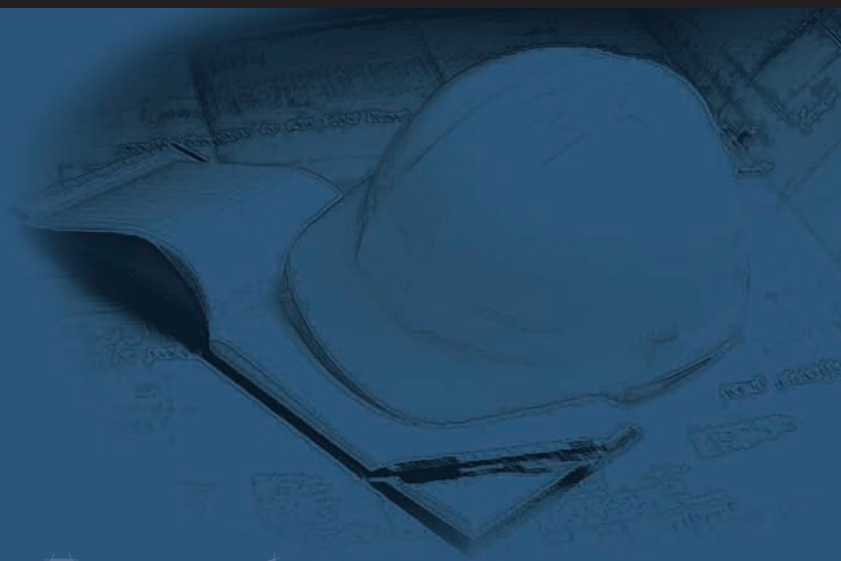
Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

TRAFFIC SIGNAL WARRANT ONE Minimum Vehicular Volume							
Threshold: Total Major must be at least 500, total minor must be at least 150 for 8 hours							
If the 85th percentile is above 40 mph, then use 70 percent of the values meet the requirement							
(350 major street-105 minor street)							
Time	South Av Rt 27 Major Street-Entering	Franklin Street Rt 27 Major street entering	Total Major	South Av Minor St entering	Pleasant St Minor Street entering	Total minor	70 percent requirement
12:00 AM	46	7	53	26	8	34	
1:00	20	4	24	18	2	20	
2:00	8	4	12	10	0	10	
3:00	12	6	18	6	2	8	
4:00	16	21	37	4	2	6	
5:00	54	76	130	26	10	36	
6:00	167	158	325	66	28	94	
7:00	386	229	615	122	38	160	satisfied
8:00	302	156	458	131	32	163	satisfied
9:00	279	133	412	120	25	145	satisfied
10:00	248	118	366	126	24	150	satisfied
11:00	284	126	410	154	24	178	satisfied
12:00 PM	288	120	408	154	30	184	satisfied
1:00	297	125	422	162	28	190	satisfied
2:00	374	238	612	170	50	220	satisfied
3:00	460	160	620	192	64	256	satisfied
4:00	529	186	715	238	74	312	satisfied
5:00	530	202	732	240	77	317	satisfied
6:00	454	158	612	220	62	282	satisfied
7:00	349	119	468	170	32	202	satisfied
8:00	254	91	345	128	30	158	
9:00	178	52	230	112	25	137	
10:00	101	38	139	67	13	80	
11:00	70	18	88	50	14	64	
Total	5706	2545	8251	2712	694	3406	



2-A-1

Project Need Form (PNF)

Massachusetts Highway Department – District ____
Project Need Form (PNF)

This form is intended to provide preliminary information about the proposed project. It is not expected that all information that is asked for is available or known but applicants are encouraged to complete the form as fully as possible.

From: _____ **Title:** _____

Municipality/Organization: _____

Phone: _____ **Fax:** _____

Date: _____ **Email:** _____

Project Reference No. (to be filled out by MassHighway): _____

PART I – LOCATION IDENTIFICATION AND DESCRIPTION OF NEED

Municipality: _____

Route and/or Street(s): _____

Bridge ID Number (if applicable): _____

Who owns the roadway/facility? _____

Estimated project limits by mile marker and station from MassHighway’s roadway database or other distinguishing landmarks such as cross street(s). Include a locus map of the project and photos illustrating project need:

Start: _____

End: _____

Total Mileage: _____

Please provide a brief description of the project need:

Estimated Construction Cost: _____

Does the project have Federal Funding? Yes No

If yes, legislation: _____ Amount: \$ _____

Is the project authorized in a state transportation bond bill? Yes No

If yes, bill: _____ Amount: \$ _____

PART II – PROJECT BACKGROUND

In what type of area is the project located? *Project limits may include more than one type of area. For a definition of areas, please refer to Chapter 3 of the Guidebook.*

- | | |
|---|---|
| <input type="checkbox"/> Rural Natural | <input type="checkbox"/> Suburban High Density |
| <input type="checkbox"/> Rural Village | <input type="checkbox"/> Suburban Village/Town Center |
| <input type="checkbox"/> Rural Developed | <input type="checkbox"/> Urban Residential or CBD |
| <input type="checkbox"/> Suburban Low Density | |

How does the roadway/facility function in the community?

- High-speed, primary corridor with limited access
- Moderate speed, major corridor between towns/regions
- Low to moderate speed corridor between towns/regions
- Moderate speed, major street connecting residential areas to a town center or major connector
- Low to moderate speed street connecting residential areas with other streets
- Primarily or exclusively a residential street

What is the federal functional classification of the road?

- | | |
|---|---|
| <input type="checkbox"/> Interstate | <input type="checkbox"/> Rural Principal Arterial |
| <input type="checkbox"/> Urban Principal Arterial | <input type="checkbox"/> Rural Minor Arterial |
| <input type="checkbox"/> Urban Minor Arterial | <input type="checkbox"/> Rural Major Collector |
| <input type="checkbox"/> Urban Collector | <input type="checkbox"/> Rural Minor Collector |

Is the proposed project on the National Highway System? Yes No

Does the project have any Intelligent Transportation System Components?

Yes No If yes, describe: _____

Is the project a footprint road project? Yes No

Is the project a footprint bridge project? Yes No

Provide whatever information is available to characterize the current, general use of the facility (attach traffic counts).

CHARACTERISTIC	USE/DATA	DATA SOURCE	NOT AVAILABLE/ Comments
Number of Lanes			
Lane Width			
Shoulder Width			
Sidewalk Availability/Width			
Bicycle Facility Availability/Width			
Existing Right of Way			
Current Average Annual Daily Traffic (AADT)			
Current Peak Hour Vehicular Volume			
Current Peak Hour Bicycle Traffic			
Current Peak Hour Pedestrian Traffic			
Percent Truck Traffic			
Current Transit Operations/Facilities			
Traffic Control (signal, flash, signs, etc.)			
Roadway Lighting			
Pavement Condition and Markings			
Posted Speed Limit			
85 th Percentile Speed			

PART III – TRANSPORTATION NEEDS ASSESSMENT

Choose a project type – Roadway, Sidewalk or Multiuse Path; Bridge or Other. Answer the questions that apply to the proposed project. Depending on the nature of the project, not all questions need to be answered. For all projects, answer **For All Projects**.

Roadway, Sidewalk, Multiuse Path

- Preventive Maintenance
- Rehabilitation/Resurfacing
- Reconstruction
- Widening
- New Facility
- Intersection, Roundabout or Traffic Signal Improvements
- New Interchange or Interchange Reconfiguration
- Safety

What is the condition of the facility, e.g. extent of cracking, deterioration, rideability/walkability, surface condition, structural adequacy, etc.? Include a pavement management system (PMS) condition rating from a MassHighway approved PMS, as appropriate, and attach photo documentation with this submittal showing typical facility surface or site conditions.

What year was the last repair made to the facility (at minimum a preventative maintenance treatment)?

What repair was made to the facility? (Use repair typed above and describe)

What is the crash history or other safety concerns of the facility? (For safety projects, consult MassHighway's Traffic Division for more detailed analysis requirements).

Are there mobility issues for motorists, bicyclists or pedestrians? (As an alternate to this question, attach Transportation Evaluation Criteria Form.)

Are there congestion issues? Provide level of service analysis results if necessary. (As an alternate to this question, attach Transportation Evaluation Criteria Form.)

What other conditions exist that warrant this project? (As an alternate to this question, attach Transportation Evaluation Criteria Form.)

Evaluate the impact of the project on the following resources/environmental conditions. If major impact”, “ minor impact”, or “will improve” are selected, describe below. (As an alternate to this question, attach Transportation Evaluation Criteria Form.)

RESOURCE/ CONDITION	MAJOR IMPACT	MINOR IMPACT	NO IMPACT	WILL IMPROVE	UNKNOWN
Cultural Resources					
Wetlands					
Hazardous Materials					
Air Quality					
Noise					
Other					

Bridge

- Maintenance
- Rehabilitation
- Replacement
- New or Widening

What is the bridge rating and date of inspection?

- Structurally Deficient?
- Functionally Obsolete?
- Posted?
- Unknown?

What is the condition of the bridge elements?

What is the condition of other infrastructure elements?

What is the schedule of preventative maintenance?

If a new bridge or a bridge that does not meet current eligibility requirements, describe why the project is proposed.

Other

- New or Expanded TDM/Park and Ride Lot**
- New or Expanded Traffic Management System**
- Traffic Calming, Streetscape, Lighting, or Transit Improvements**
- Intelligent Transportation Systems**
- Other**

Describe the conditions that warrant the project.

For All Projects

Describe Right of Way Issues

- Probably adequate**
- Probably will require takings**
- Probably will require easements and/or rights of entry**
- Unknown**

Describe known project area concerns or constraints.

Describe the project's effect on multimodal accommodation.

PART IV – PUBLIC PROCESS

Please describe the public process associated with the project to date.

None to Date

What is the expected level of community interest in the project?

High

Medium

Low

Unknown

Describe issues of concern raised by the public during the public process to date.
