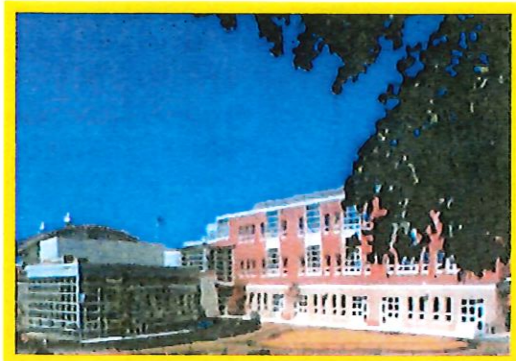
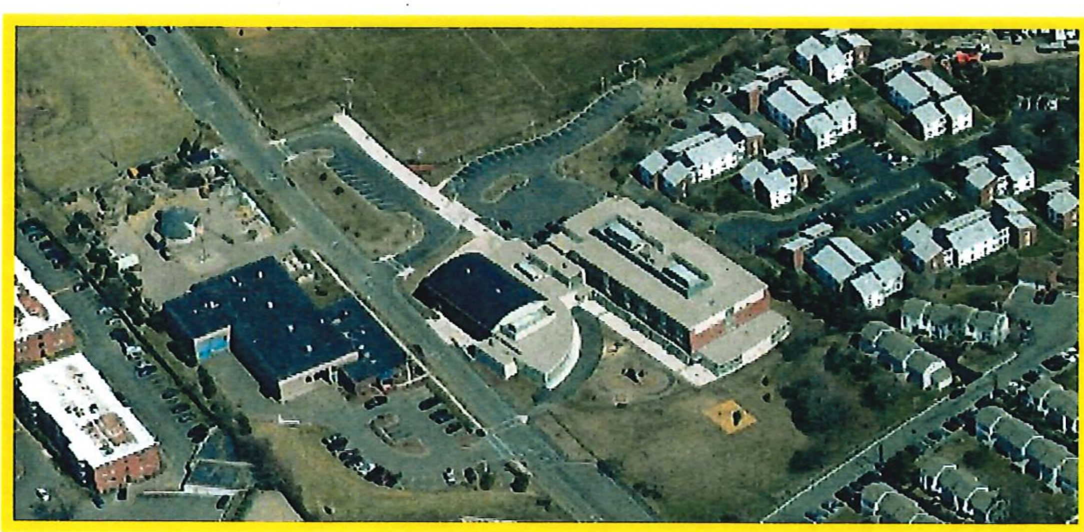
FORT BANKS ELEMENTARY SCHOOL
WINTHROP, MA



ACCESS ROAD FEASIBILITY STUDY

Prepared For:

The Town of Winthrop
Winthrop, Massachusetts



Prepared By:

GEOD Consulting
24 Ray Avenue
Burlington, Massachusetts
Rev. June 10, 2009

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EXECUTIVE SUMMARY:

The Town of Winthrop working through its Department of Public Works (DPW) in conjunction with Fort Banks Elementary School has contracted GEOD Consulting to perform a feasibility assessment of three traffic relief options proposed by the DPW. The focus of the Study is to identify the safest and best option while considering the obstacles to permit, design and construct the options. The existing condition poses daily safety concerns because of the pedestrian nature of elementary school children, the bus and parent drop off/pick up, and the municipal activities including the movement of large construction equipment. The goal was to identify the best available option with the greatest potential to improve the safety and traffic situation at the school during morning drop-off and afternoon pick-up of children attending the elementary school. The following are a list of the three options:

Option A	Argyle Street
Option B	Banks Street
Option C	Golden Drive

The process for selecting the best option to help improve the current traffic situation at the school was a decision based on six categories:

1. Traffic Circulation
2. Environmental Permitting
3. Property Ownership
4. Neighborhood Impacts & Safety
5. Cost Analysis & Construction Schedule

Each option is described in detail following this summary and analyzed for each category with an explanation of the impact. A matrix, illustrated in the Conclusion, was developed, which numerically rates the options for each category.

Additional options were discussed, however, the three that are described in the report are the most viable from an Engineering perspective. Space and right-of-way limitations; existing one-way traffic patterns; easement and land takings were all concerns that limited the choice of options to the three chosen.

Following the analysis is a conclusion which illustrates the probable best option when considering the categories analyzed. However, because this is a feasibility study the full impact and effort required to permit, design and construct the options are not known with certainty. The procedure of Permitting associated with each of the options can be as varied as the designs themselves. It is anticipated that a major impact to two of the three options will be Environmental issues as detailed in the Wetland Protection Act. Investigation into the possible Wetland Resource Areas associated with each of the Options indicates that both A and B are subject to more Environmental constraints and restrictions than Option C, and may not be able to be permitted as a result.

GEOD Consulting's professional opinion is that the Town should proceed to the next step with Option C.

ACCESS OPTIONS:

The location of the Fort Banks Elementary School situated on Kennedy Drive, a single lane, two-way travel, dead-end road, is the only means of access and egress for the School to the Towns roadway network. Kennedy Drive in combination with inadequate temporary parking facilities at the school for morning student drop-off and afternoon student pick-up is the major cause of traffic congestion in the area and the surrounding network of streets that provide access to the school. It is the lack of temporary parking space combined with peak AM and PM student traffic that inhibits vehicular and pedestrian circulation and accessibility both at the school and the surrounding neighborhood, creating a scenario for safety concerns.

The traffic analysis shows that the Kennedy Dr/Revere St intersection operates with an average wait (delay) time of over 140 seconds to exit Kennedy onto Revere St during the Schools afternoon dismissal time (PM peak period). This is a result of both the large volume of vehicles exiting Kennedy and traversing on Revere St. The excessive delay time at the intersection generally creates frustrated drivers who take chances (exiting onto Revere St without adequate gaps between cars) they wouldn't normally take if they didn't have to wait so long. If another option to leave Kennedy Drive was available, the delay time and safety condition at Kennedy Dr/Revere St would be improved because less vehicles would be using it.

The following proposed options designed to improve traffic circulation at the school are all single 12 foot lane, one-way travel egress road options that begin after the drop-off/ pick-up occurs and leads traffic volume away from the school, connecting to existing adjoining roads. An egress road, as opposed to additional access, was chosen as the solution because it benefits circulation on Kennedy Dr and reduces impact to the Kennedy Dr/Revere St intersection. A 12 foot lane was selected as a common roadway width and has no bearing on roadway volumes. The actual roadway and pavement width will be refined as the project proceeds beyond the feasibility stage. Reconfiguration of the existing drop-off and pick-up areas were analyzed for each option as well as the addition of a right-turn only lane on Kennedy Drive for traffic exiting the school. Access to the school will remain the same entry way that currently exists from Revere Street to Kennedy Drive however with the reduction in exiting traffic and a free right-turn only lane introduced, the peak traffic volume at the Kennedy Dr/Revere St intersection will be reduced as will the back-up of vehicles on Kennedy Dr. that the commuters and residents currently experience. The combination of selective design choices common to all the options will contribute to the overall improvement of the roadway network circulation. Graphic representations of the Options are shown in Figures 2, 3, and 4, and Attachment B drawings C-A, C-B and C-C.

Option A – Argyle Street

Option A was chosen due to the proximity to the school, prior use and availability, no property taking and/or easements required, and minimal intrusion into the neighborhoods. As indicated on drawing C-A, students will be dropped-off and picked-up at the circle to the West of the school and the parent will proceed through the Easterly parking lot to the proposed single lane road laid out on the former Dump Road behind the N/F Edmund F. Hannon property currently used by Cicarelli Landscaping and connecting on to Argyle Street.

Option B – Banks Street

Option B was chosen primarily due to less construction costs than Option A, minimal property taking and/or easements, and less environmental impact than Option A. As indicated on drawing C-B, students will be dropped-off and picked-up at the Southwesterly parking area to the west of the school. The parent will proceed through the parking lot to the existing exit and during school commuting periods will head west across Kennedy Drive to the proposed single lane roadway layout at the rear of the DPW and the Governors Park Condominium Complex, connecting at the intersection of Winthrop and Banks Streets where the parent will continue on Banks Street out onto Main Street.

Option C – Golden Drive

Option C was chosen primarily due to less construction costs than Option A and B, minimal property taking and/or easements, and no environmental impact. As indicated on drawing C-C, students will be dropped-off and picked-up at the circle to the West of the school and the parent will proceed through the circle onto the proposed single lane road for a short distance to the cul-de-sac on Golden Drive. The parent will continue on Golden Drive through the Town of Winthrop Housing Authority Complex and connect back onto Revere Street.

ACCESS OPTION ANALYSIS – REVIEW CATEGORIES:

TRAFFIC CIRCULATION:

Proposed Traffic Reassignment Options

The following proposed traffic reassignment options have been developed to improve traffic circulation at the vicinity of the school site. The reassignment refers to taking a percentage of the vehicles that are presently exiting via Kennedy Dr/Revere St and sending them in the direction of the proposed egress option. This Study does not require which vehicles exit to Kennedy Rd/Revere St and which exit the new Option. The vehicles/drivers will exit in the manner which they feel is most beneficial to them. For instance, if Option A is implemented and a driver is attempting to get to Winthrop St, they will most likely exit via Kennedy Dr/Revere St, and not Argyle St. In this regard traffic movements are free flowing and in some cases trial and error is needed by the driver to determine the most beneficial route. Another example is, if Option C is implemented, a driver trying to get to Summit Ave could pick either egress route. In discussions with the School Principal we learned that Fort Banks students are not coming from a particular district or section of Winthrop, but rather they could be coming from any part of Town to get to the School.

Part of our analysis requires an estimation regarding the direction of vehicles exiting the School. We use the existing distribution of vehicles and model the proposed circulation accordingly. In other words, the percentage of vehicles presently making left and right hand turns exiting Kennedy Dr would give us an indication of where the drivers were going. We understand that making left hand turns out of Kennedy Dr. is prohibited, however a sufficient number of left hands were being made to convince us that the number is valid.

The options consider different egress movements in conjunction with the only existing egress movement on Kennedy Drive. Access to the school will remain via Kennedy Drive only. The street network is comprised of Revere Street, Main Street, Argyle Street, Golden Drive, Kennedy Drive and Banks Street. All roadways are two-way and have a single lane, except for Banks Street, which is one way from Morton Street to Main Street. Currently Kennedy Drive does not allow left-turns onto Revere Street; however left hand turn movements are occurring, as evidenced in the turning movement traffic counts. The options are described below:

Option A – Argyle Street

Option A will reassign trips from Kennedy Drive to Argyle Street. As mentioned previously left-turns are not allowed from Kennedy Drive onto Revere Street, but they occur at the present condition. This option will significantly eliminate those left-turn trips from Kennedy Drive and redirect them to Argyle Street.

Option B – Banks Street

Option B will reassign trips from Kennedy Drive to Banks Street. Option B essentially attempts to reduce the number of right hand turn movements from Kennedy onto Revere Street. This option is subdivided in two other options:

Option B-1

- ➢ Reassignment of 50% of right-turn vehicles from Kennedy Drive to Banks Street; without addressing the left-turn trips onto Revere Street.

Option B-2

- ➢ Reassignment of 50% of right-turn vehicles from Kennedy Drive to Banks Street; and addressing the left-turn trips onto Revere Street by creating a 100 ft left turn storage lane on Kennedy Drive.

The reassignment percentage values are a professional estimation based on the vehicles splitting approximately 50% between Revere St. and Main St. at the intersection.

Option C – Golden Drive

Option C will reassign trips from Kennedy Drive to Golden Drive. As mentioned previously left-turns are not allowed from Kennedy Drive onto Revere Street, but they occur at the present condition. This option will significantly eliminate those left-turn trips from Kennedy Drive and redirect them to Golden Drive.

EXISTING CONDITIONS

A field investigation was conducted to obtain an inventory of existing roadway conditions, posted traffic controls, parking, adjacent land uses, lane configurations of intersections in the study area, and existing vehicular traffic patterns.

Turning movement counts were collected at the following intersections:

- ♦ Revere Street / Argyle Street
- ♦ Revere Street / Golden Drive / Hutchinson Street
- ♦ Revere Street / Kennedy Drive
- ♦ Main Street / Banks Street

Existing traffic counts and parking were obtained for the study area intersections. The actual count data obtained are shown in **Appendix A**. Turning movement counts were collected on Thursday, June 5, 2008 from 7:30am to 8:15am and from 1:45pm to 2:30pm. These hours represent the peak traffic periods for the school (arrival and dismissal times). The existing 2008 AM and PM traffic movement volumes are shown in **Figure 1**.

CAPACITY ANALYSIS

The Highway Capacity Manual (HCM) methodology uses LOS as an index to the operational qualities of an intersection. Level of service measures the operating conditions of signalized and unsignalized intersections for a specific period of time, which is usually the peak hour. The methodology evaluates operating conditions and assigns a level of service rating from LOS "A" to "F" with LOS A being the most desirable. The LOS is a function of the average vehicle delay at the intersection. **Table 1** illustrates the LOS thresholds for unsignalized and signalized intersections.

Existing Conditions

GEOD CONSULTING
ENGINEERING SITE DEVELOPMENT TRANSPORTATION
24 Roy Avenue, Burlington, MA 01803
Phone (781) 273-3434 Fax (781) 273-3430

FORT BANKS ES
WINTHROP, MASSACHUSETTS

AM and (PM) PEAK HOUR COUNTS

Figure: 1

TABLE 1			
LEVEL of SERVICE (LOS) DELAY THRESHOLD for INTERSECTIONS			
UNSIGNALIZED INTERSECTION AVERAGE VEHICLE DELAY (SECONDS)	**SIGNALIZED INTERSECTION AVERAGE VEHICLE DELAY (SECONDS)**	**LEVEL OF SERVICE**	**EXPECTED DELAY**
Equal to or Less than 10.0	Equal to or Less than 10.0	A	Little or no delay
Between 10.1 and 15.0	Between 10.1 and 20.0	B	Short traffic delays
Between 15.1 and 25.0	Between 20.1 and 35.0	C	Average traffic delays
Between 25.1 and 35.0	Between 35.1 and 55.0	D	Long traffic delays
Between 35.1 and 50.0	Between 55.1 and 80.0	E	Very long traffic delays
Greater than 50.0	Greater than 80.0	F	Forced flow

TRAFFIC ANALYSIS METHODOLOGY

The methodology used to evaluate each option was to employ a "before and after" comparison. The condition of the existing intersections were evaluated utilizing turning movement counts (TMC) to establish the "before" performance of the intersections. The trips were then reassigned based on the option, and the intersections were re-evaluated to establish the "after" condition. A comparison between the "before and after" condition is made to assess the benefit and impact of each option. The specific methodology for each option is described below.

Option A – Argyle Street

- All left-turn vehicles from Kennedy Drive to Revere Street were reassigned to Argyle Street.
- The reassigned vehicles to Argyle Street were assumed to take a left or right hand turn from Argyle Street into Revere Street.
- **Figure 2** shows the PM traffic movement reassigned volumes for Option A.

Option B – Banks Street

- Eight intersections on Revere Street and Main Street separate Banks Street and Kennedy Drive. According to the existing traffic pattern a considerable number of people traveling westbound on Revere Street will dissipate by the time they get to the Banks Street/Main Street intersection.
- Approximately 60% of the trips from Banks Street presently take a left turn into Main Street.
- For this option 50% of right-turn vehicles from Kennedy Drive were redirected to Banks Street and distributed according to the existing traffic flow. (60% taking a left-turn onto Main Street and 40% taking a right-turn onto Main Street)
- **Figure 3** shows the PM traffic movement reassigned volumes for Option B-1 and B-2.

OPTION A (Argyle Street)

GEOD CONSULTING ENGINEERING SITE DEVELOPMENT TRANSPORTATION 24 Ray Avenue, Burlington, MA 01803 Phone (781) 273-3434 Fax (781) 273-3430	FORT BANKS ES WINTHROP, MASSACHUSETTS PM PEAK HOUR	Figure: 2

OPTION B (Banks Street)

GEOD CONSULTING
ENGINEERING SITE DEVELOPMENT TRANSPORTATION
24 Roy Avenue, Burlington, MA 01803
Phone (781) 273-3434 Fax (781) 273-3430

FORT BANKS ES
WINTHROP, MASSACHUSETTS

PM PEAK HOUR

Figure:
3

As previously mentioned this option is subdivided in two other options as follows:

Option B-1

- ➢ Left-turn trips continue to be made onto Revere Street with the existing configuration on Kennedy Drive.

Option B-2

- ➢ The pavement on Kennedy Drive is widened to provide a 100 ft left-turn storage lane to address left-turn trips onto Revere Street.

Option C – Golden Drive

- ➢ Redirected left-turn vehicles from Kennedy Drive to Golden Drive.
- ➢ All left-turn vehicles from Kennedy Drive were assumed to take a left or right hand turn from Golden Drive into Revere Street.
- ➢ **Figure 4** shows the PM traffic movement reassigned volumes for Option C.

Operational analyses were performed using SYNCRO 6; Traffic Signal Coordination Software for the studied intersections. The software utilizes the methods for intersection analyses contained in the latest version of the Highway Capacity Manual (HCM), Special Report 209; Transportation Research Board.

Options A, B and C were analyzed for the PM peak hour, because it represents the worst case scenario. A spreadsheet was developed to compare each option with the existing condition. For each condition the analysis calculated level of service (LOS), queue lengths, approach delay times and volume to capacity ratio (v/c). **Table 2** shows the analysis results. The calculations and input data are shown in **Appendix A**.

OPTION C (Golden Drive)

GEOD CONSULTING
ENGINEERING SITE DEVELOPMENT TRANSPORTATION
24 Roy Avenue, Burlington, MA 01803
Phone (781) 273-3434 Fax (781) 273-3430

FORT BANKS ES
WINTHROP, MASSACHUSETTS

PM PEAK HOUR

Figure:
4

TABLE 2

PM PEAK HOUR OPERATIONAL ANALYSIS TABLE

CONDITION/ INTERSECTION			EXISTING CONDITIONS				OPTION A				OPTION B-1				OPTION B-2				OPTION C			
KEY #	TYPE	DESCRIPTION	V/C[1]	Delay[2]	LOS[3]	Q/95th	V/C[1]	Delay[2]	LOS[3]	Q/95th	V/C[1]	Delay[2]	LOS[3]	Q/95th	V/C[1]	Delay[2]	LOS[3]	Q/95th	V/C[1]	Delay[2]	LOS[3]	Q/95th
1	Unsignalized	**Revere St. / Argyle St.**	-				-				-				-				-			
		Argyle St. - SB Left/Right	0.14	16.8	C	12	0.27	19.3	C	27												
		Revere St. - EB Left/Through	0.03	1.0	A	3	0.03	1.0	A	3												
		Revere St. - WB Through/Right	0.31	0.0	A	0	0.31	0.0	A	0												
2	Unsignalized	**Revere St. / Golden Dr. / Hutchinson St.**	-				-				-				-				-			
		Golden Dr. - SB Left/Through/Right	0.10	17.5	C	8													0.33	24.2	C	34
		Revere St. - EB Left/Through/Right	0.02	0.5	A	1													0.02	0.5	A	1
		Revere St. - WB Left/Through/Right	0.02	0.6	A	2													0.02	0.6	A	2
3	Unsignalized	**Revere St. / Kennedy Dr.**	-				-				-				-				-			
		Kennedy Dr. - SB Left/Right	1.18	143.3	F	408	0.62	22.0	C	105	0.87	70.2	F	183	-				0.62	22.0	C	105
		Kennedy Dr. - SB Left	-				-				-				0.56	80.2	F	65	-			
		Kennedy Dr. - SB Right													0.31	14.7	B	33				
		Revere St. - EB Left/Through	0.25	5.5	A	24	0.25	5.5	A	24	0.25	5.5	A	24	0.25	5.5	A	24	0.25	5.5	A	24
		Revere St. - WB Through/Right	0.34	0.0	A	0	0.34	0.0	A	0	0.34	0.0	A	0	0.34	0.0	A	0	0.34	0.0	A	0
4	Unsignalized	**Main St. / Banks St.**	-				-				-				-				-			
		Main St. - EB Through	0.27	0.0	A	0					0.27	0.0	A	0	0.27	0.0	A	0				
		Main St. - WB Through	0.28	0.0	A	0					0.28	0.0	A	0	0.28	0.0	A	0				
		Banks St. - SB Left/Right	0.15	17.0	C	13					0.52	25.7	D	71	0.52	25.7	D	71				

[1] - Volume to Capacity Ratio

[2] - Average Delay expressed in seconds per vehicle

[3] - Level of Service

~ - Volume exceeds capacity

- 95th percentile volume exceeds capacity

TRAFFIC SUMMARY

Four intersections were analyzed and assessed for project impacts under each option. Each of the intersections was evaluated for their operational capacity during school dismissal. The following is a summary of each option's impact.

Option A impacts two intersections; Revere Street / Kennedy Drive and Revere Street / Argyle Street. Revere Street / Kennedy Drive intersection has improved from LOS F to C on Kennedy Drive (southbound movement) and the delay time has decreased from 143.3 seconds to 22.0 seconds. The queue on Kennedy Drive has decreased from approximately 17 vehicles (408 ft.) to 5 vehicles (105 ft.). Revere Street / Argyle Street intersection has maintained the LOS C on Argyle Street (southbound movement) and has increased the delay time from 16.8 seconds to 19.3 seconds. The queue on Argyle Street had a minimal increase from approximately 1 vehicle (12 ft.) to 2 vehicles (27 ft.).

We understand that left hand turns from Argyle St. to Revere St. has caused concerns. Our analysis shows that during the Schools dismissal period the left hand turns were not difficult. The left hand turn may be more difficult during the commuter peak hour of 4 – 6pm. We advise the Town to enforce the current regulation that backing up on a Town road is prohibited.

Option B is divided into Option B-1 and B-2. Both have impacted the intersections of Revere Street / Kennedy Drive and Main Street / Banks Street.

- In **Option B-1**; which redirects 50% of right-turn vehicles to Banks Street; Revere Street / Kennedy Drive intersection has maintained the unacceptable LOS F on Kennedy Drive (southbound movement), but has decreased the delay from 143.3 seconds to 70.2 seconds. The queue on Kennedy Drive has decreased from approximately 17 vehicles (408 ft.) to 8 vehicles (183 ft.). Revere Street / Banks Street intersection has degraded the LOS from a C to a D on Banks Street (southbound movement) and has increased the delay time from 17.0 seconds to 25.7 seconds. The queue on Banks Street had a minimal increase from approximately 1 vehicle (13 ft.) to 3 vehicles (71 ft.).

- In **Option B-2**; which redirects 50% of right-turn vehicles to Banks Street and adds a 100 ft left-turn storage lane on Kennedy Drive; Revere Street / Kennedy Drive intersection shows a LOS F with 80.2 seconds of delay on Kennedy Drive for the left-turn movement and shows a LOS B with 14.7 seconds of delay on Kennedy Drive for the right-turn movement. The queue on Kennedy Drive has decreased from approximately 17 vehicles (408 ft.) to 5 vehicles; 3 vehicles (65 ft.) queued on the left turn storage lane and 2 vehicles (33 ft.) queued on the right turn lane. Since this intersection is unsignalized and Revere Street has a free flow condition the high traffic volume will cause the high delay time to occur; however the queue impact for the left-turn storage lane is about 3 vehicles, therefore no blocking problems will occur and right-turns can proceed unimpeded. Revere Street / Banks Street intersection has degraded the LOS from a C to a D on Banks Street (southbound movement) and has increased the delay time from 17.0 seconds to 25.7 seconds. The queue on Banks Street had a minimal increase from approximately 1 vehicle (13 ft.) to 3 vehicles (71 ft.).

Option C impacts two intersections Revere Street / Kennedy Drive and Revere Street / Golden Drive / Hutchinson Street. Revere Street / Kennedy Drive intersection has improved the LOS from F to C on Kennedy Drive (southbound movement) as well as the delay time that has decreased from 143.3 seconds to 22.0 seconds. The queue on Kennedy Drive has decreased from approximately 17 vehicles (408 ft.) to 5 vehicles (105 ft.). Revere Street / Golden Drive / Hutchinson Street intersection has maintained the LOS C on Golden Drive (southbound movement) and has increased the delay time from 17.5 seconds to 24.2 seconds. The queue on Golden Drive had a minimal increase from approximately 1 vehicle (8 ft.) to 2 vehicles (34 ft.).

ENVIRONMENTAL PERMITTING:

The Environmental analysis is based on information gathered in part by project documentation from the construction of Fort Bank School provided to GEOD from the Winthrop DPW, from on-line research of the MassGIS website, and site visits to the school and the surrounding area. Drawings C-A, C-B, and C-C located in **Attachment B** depict the various estimated Environmental boundary lines according to their respective regulation.

The analysis required research of the Town of Winthrop Zoning Bylaws, Chapter 12.40 Wetland Protection (Chapter 138, Wetlands) and Chapter 17.40 Flood Hazard Control Regulations; the Massachusetts Department of Environmental Protection - Wetland Protection Act - 310 CMR 10.00; Area of Critical Environmental Concern (ACEC) - 301 CMR 12.00 administered by Department of Conservation and Recreation (DCR); Massachusetts Environmental Policy Act (MEPA) - 301 CMR 11.00; Natural Heritage and Endangered Species Program (NHESP); Coastal Zone Management (CZM); The MassDEP Waterways Regulation Program - Chapter 91; MassDEP Bureau of Waste Site Cleanup (BWSC); and the Federal Emergency Management Agency (FEMA).

The following is a summarized listing of potential Environmental regulations which may have an affect on one or all of the Options selected followed by a full detailed description of each regulation (**X** = potential impact; **ND** = not determined):

OPTION	**A**	**B**	**C**
LOCALLY REGULATED:			
Town of Winthrop, Winthrop Conservation Commission			
Coastal Wetlands (Salt Marshes)	**X**		
Freshwater Wetlands (Vegetated Wetlands)	**ND**	**ND**	**ND**
Coastal Bank	**X**	**X**	
Land Subject to Flooding	**X**		
Area of Critical Environmental Concern (ACEC)	**X**	**X**	
Coastal Beaches (includes Tidal Flats)	**X**		
Riverfront Area – Tidal Rivers (25 foot Riverfront Area)	**X**		
STATE REGULATED:			
State Regulated:			
Mass Department of Environmental Protection (DEP)			
Coastal Banks (See Winthrop Con Com – Coastal Banks)	**X**	**X**	
Salt Marches (See Winthrop Con Com – Coastal Wetlands)	**X**		
Bordering Vegetated Wetlands (BVW)	**ND**	**ND**	**ND**
Land Subject to Flooding (Bordering and Isolated Areas)	**X**		
Area of Critical Environmental Concern (ACEC)	**X**	**X**	
Coastal Beaches (Includes Tidal Flats)	**X**		
Riverfront Area – Tidal Rivers (25 foot Riverfront Area)	**X**	**ND**	
Area of Critical Environmental Concern (ACEC) admin. by Department of Conservation and Recreation (DCR)	**X**	**X**	
Massachusetts Environmental Policy Act (MEPA)	**No**	**No**	**No**

Natural Heritage & Endangered Species Program (NHESP)	**No**	**ND**	**No**
Coastal Zone Management (CZM)	**No**	**No**	**No**
The Waterways Regulation Program – Chapter 91	**ND**	**ND**	**ND**
MassDEP Bureau of Waste Site Cleanup (BWSC) – M.G.L. Chapter 21E Activity and Use Limitation (AUL)	**ND**	**ND**	
FEDERALLY REGULATED:			
Federal Emergency Management Agency (FEMA)	**X**		

Included in **Addendum B** are MassGIS plans for: ACEC; NHESP; AUL; and FEMA.

The following are detailed descriptions of each regulation:

Locally Regulated:

Town of Winthrop, Winthrop Conservation Commission (Con Com)

The areas under the jurisdiction of the Winthrop Conservation Commission are all resource areas identified under the Massachusetts Wetland Protection Act and the local Wetland By-law, Chapter 138 included in the Winthrop Zoning By-law. The resource areas specifically identified under the local By-law are: (A) Coastal wetlands; (B) Freshwater wetlands; and (C) Bank, beach, dune, marsh or flat bordering a water body; or land within 100 feet of these resource areas; or land under a water body; or land subject to flooding, tidal action or coastal storm flowage or vernal pools within a wetland; or land within 100 feet of the Marsh Area of Critical Environmental Concern.

The following resource areas have been identified at or near the site:

<u>(A) Coastal Wetlands (Salt Marshes):</u> Coastal Wetlands (marsh or flat) and it's 100 buffer are located in the vicinity of Option A. Only the 100 foot buffer is located near but not in Option B.

<u>(B) Freshwater Wetlands (Vegetated Wetlands):</u> As defined in the By-laws, Vegetated Wetlands are "Any area of at least 200 square feet where surface or ground water or ice, at or near the surface of the ground, supports a plant community dominated (at least 50%) by wetland species. The Town, by definition, has placed further restriction on the DEP definition of the resource area "Bordering Vegetative Wetlands" by defining "Vegetated Wetland" as the potential of an isolated wetland, which is not regulated by the Massachusetts Department of Environmental Protection.

It is possible that Bordering Vegetated Wetlands are present at the project site and will require further investigation.

<u>(C) Coastal Bank:</u> Both Option A and Option B will have possible impact on Coastal Bank and it's associated 100 foot buffer. As indicated on the drawing provided to GEOD, Coastal Bank will run through or near both options.

Of particular importance relating to the project site is the Town's verses DEP definition of Coastal Bank: "The first significant break in slope beyond the one-hundred-year storm elevation on a seaward face or elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action or other coastal wetlands." If the FEMA Flood Map determines the basis for determining bank, then nearly all Option A would be in both Coastal Bank and Floodplain and Option B would just miss the Floodplain but may be located in the Coastal Bank. Thus Coastal Bank appears to be a design constraint and will require further investigation and clarification.

Land Subject to Flooding: As indicated above, if the FEMA Flood Map is used as the basis for determining flood zone, then nearly all Option A would be in Floodplain and Option B would just miss the Floodplain.

Area of Critical Environmental Concern (ACEC): The Town has placed further restriction on the Rumney Marshes ACEC in the By-law with the extension of their jurisdiction to include "land within 100 feet of the Marsh Area of Critical Environmental Concern".

The ACEC boundary as described by the state and shown on MassGIS includes all of Option A and most of Option B. With the extension of the ACEC by 100 feet under local jurisdiction, the ACEC will again include all of Option A and all of Option B.

Further investigation will be required to determine the boundary of the ACEC as described by the state in the Rumney Marshes ACEC Designation, dated 22 August, 1988, ie. has the boundary line in the project area been established by Salt Marsh or Floodplain. In addition, a determination as to which agency will be reviewing for the ACEC if a MEPA filing is not required.

Coastal Beaches (includes Tidal Flats): Tidal Flat and it's 100 buffer are located in the vicinity of Option A. Only the 100 foot buffer is located near but not in Option B.

Riverfront Area – Tidal Rivers (25 foot Riverfront Area for Winthrop): Tidal Rivers are located in the vicinity of Option A and possibly Option B where further investigation is required.

310 CMR 10.24: If Option A could be considered "Maintenance and improvement of existing public roadway", then the Argyle Street option could be issued an Order of Conditions by the Conservation Commission.

Permits Required by the Town of Winthrop, Winthrop Conservation Commission:

> Notice of Intent (NOI) filed to the Winthrop Conservation Commission with copy to the Massachusetts Department of Environmental Protection

State Regulated:

Massachusetts Department of Environmental Protection (DEP)

Plan 1.3.1, entitled Site Utilities and Storm Drainage, from the Fort Banks School project has identified the following regulated areas as defined in the Massachusetts Wetland Protection Act to be within the project area:

- Coastal Banks - 310 CMR 10.30: (See Winthrop Con Com – Coastal Banks)

The definition of a Coastal Bank means the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland. However, the DEP has further defined Coastal Banks and the "Definition and Delineation Criteria" are attached to this Report.

When a Coastal Bank is determined to be significant to storm damage prevention of flood control because it supplies sediment to Coastal Beaches, Coastal Dunes or Barrier Beaches, the following shall apply:

10.30 (4) Any project on a coastal bank or within 100 feet landward of the top of a coastal bank, shall not have an adverse effect due to wave action on the movement of sediment from the coastal bank to coastal beaches or land subject to tidal action.

10.30 (5) The Order of Conditions and the Certificate of Compliance for any new building within 100 feet landward of the top of a coastal bank permitted by the issuing authority, shall contain the specific condition: requires that no coastal engineering structure, such as a bulkhead, revetment, or seawall shall be permitted on an eroding bank at any time in the future to protect the project allowed by this Order of Conditions.

When a Coastal Bank is determined to be significant to storm damage prevention of flood control because it is a vertical buffer to storm waters, the following shall apply:

10.30 (6) Any project on such a coastal bank or within 100 feet landward of the top of such coastal bank shall have no adverse effects on the stability of the coastal bank.

10.30 (7) Bulkheads, revetments, seawalls, groins or other coastal engineering structures may be permitted on such a coastal bank except when such bank is significant to storm damage prevention or flood control because it supplies sediment to coastal beaches, coastal dunes, and barrier beaches.

- Salt Marches - 310 CMR 10.32: (See Winthrop Con Com – Coastal Wetlands)

Salt March means a coastal wetland that extends landward up to the highest high tide line, that is, the highest spring tide of the year, and is characterized by plants that are well adapted to or prefer living in, saline soils. A salt marsh may contain tidal creeks, ditches and pools.

When a salt marsh is determined to be significant to the protection of marine fisheries, the prevention of pollution, storm drainage prevention or ground water supply, the following shall apply:

10.32 (3) A proposed project in a salt marsh, on land within 100 feet of a salt marsh, or in a body of water adjacent to a salt marsh shall not destroy any portion of the salt marsh and shall not have an adverse effect on the productivity of the salt marsh. Alterations in growth, distribution and composition of salt marsh vegetation shall be considered in evaluating adverse effects on productivity.

- Bordering Vegetated Wetlands (BVW) - 310 CMR 10.55

See Winthrop Con Com, Freshwater Wetlands

- Land Subject to Flooding (Bordering and Isolated Areas) - 310 CMR 10.57

See Winthrop Con Com, Land Subject to Flooding

- Area of Critical Environmental Concern (ACEC)

See Winthrop Con Com, ACEC, and the following DCR ACEC

- Coastal Beaches (Includes Tidal Flats) - 310 CMR 10.27

When a Tidal Flat is determined to be significant to marine fisheries or the protection of wildlife habitat, the following shall apply: In addition to complying with the requirements of 310 CMR 10.27 (3) and 10.27 (4), a project on a tidal flat shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water-dependent, have no adverse effects, on marine fisheries and wildlife habitat caused by:

(a) alterations in water circulation,
(b) alterations in the distribution of sediment grain size, and
(c) changes in water quality, including, but not limited to, other than natural fluctuations in the levels of dissolved oxygen, temperature or turbidity, or the addition of pollutants.

- Riverfront Area – Tidal Rivers (25 foot Riverfront Area/Winthrop) 310 CMR 10.58

A Riverfront Area is the area of land between a river's mean annual high water line and a parallel line measured horizontally outward from the river and a parallel line located 25 feet away (25' for the Town of Winthrop). The Riverfront Area may include or overlap other resource areas or their buffer zones. The Riverfront Area does not have a buffer zone.

In Tidal Rivers, the mean annual high-water line is coincident with the mean high water line determined under 310 CMR 10.23.

- 310 CMR 10.24(7)(c)1. – General Provisions

Notwithstanding the provisions of 310 CMR 10.25 through 10.35, the issuing authority may issue an Order of Conditions and impose such conditions as will contribute to the interests identified in M.G.L. c. 131, S 40 permitting the following limited project:

Maintenance and improvement of existing public roadways, but limited to widening less that a single lane, adding shoulders, correcting substandard intersections, and improving drainage systems.

Permits Required by the Massachusetts Department of Environmental Protection (DEP):

Notice of Intent (NOI) filed to the Winthrop Conservation Commission with copy to the Massachusetts Department of Environmental Protection

Area of Critical Environmental Concern (ACEC) administered by Department of Conservation and Recreation (DCR)

As previously noted, Rumney Marshes ACEC was designated by the Secretary of Environmental Affairs on 22 August, 1988. Portions of the project are situated within the ACEC, specifically Options A and Option B, as identified above under the Town of Winthrop Conservation Commission jurisdiction of Marsh Area of Critical Environmental Concern.

Guidelines for implementing ACEC designations are not found in one set of laws or regulations. Rather, the purpose and goals of ACEC designations are implemented through a variety of state agency programs and regulations.

Among the several state agencies involved in review of ACECs are: the Department of Environmental Protection (DEP) – Wetlands Protection, the Massachusetts Environmental Policy Act (MEPA) Office, the Natural Heritage and Endangered Species Program (NHESP), the Office of Coastal Zone Management (CZM), and DEP Waterways Regulation Program – Chapter 91, all of which contain specific provisions regarding ACECs.

Permit Required for projects located in Areas of Critical Environmental Concern (ACEC):

See Massachusetts Environmental Policy Act (MEPA)
See Natural Heritage and Endangered Species Program (NHESP)
See Coastal Zone Management (CZM)
See The Waterways Regulation Program – Chapter 91

Massachusetts Environmental Policy Act (MEPA)

Under MEPA guidelines an ACEC is considered a review "threshold" and is subject to the MEPA review process if the following certain criteria are met: Projects proposed within an Area of Critical Environmental Concern (ACEC) are subject to a MEPA review if the project is above a certain size that involves some state agency action. That is, they are either proposed by a state agency or are proposed by municipal, nonprofit or private parties and require a permit, financial assistance, or land transfer from state agencies. The review process involves, at minimum, filing an Environmental Notification Form (ENF).

With the exception of the ACEC, none of the other 12 MEPA Review Thresholds are met and assuming none of the other criteria mentioned above is applicable to any of the options considered in this study, then no action will be required.

A Notice of Intent (NOI) is not considered an agency action unless it is appealed and a Superseded Order of Conditions" is generated by the Massachusetts Department of Environmental Protection (DEP).

Therefore, we will assume that filing an Environmental Notification Form (ENF) with MEPA will not be necessary at this time. Should an issue arise as the project progresses, a request for an Advisory Opinion can be submitted to MEPA.

Permit required by the Massachusetts Environmental Policy Act (MEPA)

None

Natural Heritage and Endangered Species Program (NHESP)

As illustrated in the Massachusetts Natural Heritage Atlas, 12th Edition, Effective October 1, 2006, and the MassGIS website; the Priority Habitats of Rare Species and the Estimated Habitats of Rare Wildlife are present West of the Bank Street area (Option B), however, they appear to be far enough removed so as not to be in conflict with any of the proposed options. It would be advisable to submit a MESA Information Request Form to NHESP for project review and verification.

Permit required by the Natural Heritage and Endangered Species Program (NHESP)

None

Massachusetts Coastal Zone Management (MCZM)

The purpose of the Massachusetts Coastal Zone Management (MCZM) Program is to secure for the inhabitants of the Commonwealth the objectives and benefits of the federal Coastal Zone Management Act 19 U.S.C. 1451 *et seq*.

The geographic scope of the MCZM's jurisdiction includes the Coastal Zone which includes: intertidal areas, coastal wetlands and beaches, tidal rivers and adjacent uplands to the maximum extent of vegetation affected by measurable saline water..., and extends in width to 100 feet inland of the 100 year floodplain along tidal rivers...

The type of activities associated with the options represented in this report which would require review by MCZM in the Coastal Zone includes:

- Federal Activities or Development Projects in or affecting the Coastal Zone;
- Federal License or Permit in or affecting the Coastal Zone;
- Federal Assistance to State and Local Governments; and
- In addition, MCZM participates in the Massachusetts Environmental Policy Act (MEPA) review process through which it identifies aspects of a proposed project that appear to be inconsistent with MCZM's program policies and recommends alternatives, where appropriate.

Review required by the Massachusetts Coastal Zone Management (MCZM)

None (MEPA Permit not required)

Chapter 91 – The Waterways Regulation Program

The Waterways Regulation Program, the section of MassDEP that oversees Chapter 91, is the primary division charged with implementation. Specifically, the MassDEP Waterways Regulation Program protects Areas of Critical Environmental Concern, ocean sanctuaries and other ecologically sensitive areas from unnecessary encroachment by fill and structures.

Chapter 91 comprises four basic areas of geographical jurisdiction, two of which may apply to this project. Any activity that takes place in one of the hot link areas requires Chapter 91 authorization. These areas are as follows:

- Flowed Tidelands – Any project located in, on, over or under tidal waters seaward of the present mean high water (MHW) shoreline. Jurisdiction in this case extends seaward three miles, to the state limit of territorial jurisdiction.
- Filled Tidelands – The limit on filled tidelands is A.) Outside Designated Port Areas, the first public way or 250 feet from mean high water, whichever is farther landward and B.) Inside Designated Port Areas, the historic MHW shoreline (ie. all filled areas).

Flowed Tidelands: Depending on the exact location of the MHW in the area of the old Dump Road could impact Option A (fill to grade road could come close to MHW, retaining wall might be required which could also impact bank).

Filled Tidelands – Outside Designated Port Areas: Depending on the exact location of the Historic MHW shoreline to indicate where fill has taken place and where the first public way is located in relation to Option A and Option B, both could be impacted.

Filled Tidelands – Inside Designated Port Areas: Not applicable.
Additional survey may be required to locate MHW, HMHW, and Bank as well as Resource Area identification by a Wetland Scientist.

Permits Required by The Waterways Regulation Program (DEP) – Chapter 91:

> Request for Determination of Applicability which could lead to an application for a Waterways License.

MassDEP Bureau of Waste Site Cleanup (BWSC) - M.G.L. Chapter 21E Activity and Use Limitation (AUL)

According to the MassGIS website, the area in the vicinity of the Fort Banks Athletic Fields on Kennedy Drive has an Activity and Use Limitation (AUL) listed. The AUL is listed as site number 3-0017310.

Release of oil and/or hazardous material to the environment are required to be reported to the Massachusetts Department of Environmental Protection's (MassDEP) Bureau of Site Cleanup (BWSC), in accordance with M.G.L. Chapter 21E and procedures established within the Massachusetts Contingency Plan (MCP) (310 CMR 40.00).

The DEP Oil or Hazardous Materials Sites with Activity and Use Limitations (AUL) provides notice of the presence of oil and/or hazardous material contamination remaining at the location after a cleanup has been conducted pursuant to Chapter 21E and the MCP. The AUL is a legal document that identifies activities and uses of the property that may and may not occur, as well as the property owner's obligation and maintenance conditions that must be followed to ensure the safe use of the property. The complete AUL is suppose to be filed at the County Registry of Deeds, the MassDEP BWSC site files, and with the Town, however we were unable to find the file in any of these locations.

Based upon the graphic location of the AUL as illustrated on MassGIS, Option A and possibly Option B could be affected by the presence of an AUL. The extent of interference with construction activity can only be assessed by review of the AUL and the impact to the various Options.

Federally Regulated:

Federal Emergency Management Agency (FEMA)

According to the National Flood Insurance Program, the Flood Insurance Rate Map (FIRM) for the Town of Winthrop, Massachusetts, Suffolk County, Community Panel Number 250289 0001 C, Map Revised, July 2, 1992, indicates that the study area is partially located in a Zone A2 – Elevation 10. Specifically, Option A, Argyle Street is located in Zone A2; Option B, Banks Street appears to be located in Zone B (500 year flood zone); and Option C, Golden Drive, is located in Zone C.

A permit is required before construction or development begins within any Special Flood Hazard Area (SFHA). Permits are required to ensure that proposed development projects meet the requirements of the NFIP and the community's floodplain management ordinance.

Zone A2 – Elevation 10: Areas subject to inundation by the 1-percent-annual chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. Zone A is included in the Special Flood Hazard Area (SFHA). The SFHA is the area where the NFIP's floodplain management regulations must be enforced and the area where mandatory purchase of flood insurance applies. Compensatory Storage and Permitting are required.

Zone B: Areas between limits of the 100-year flood and the 500-year flood; Areas outside the 1-percent annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than 1 foot. Zone B is not included in the Special Flood Hazard Area (SFHA). Insurance purchase is not required in these zones. Compensatory Storage and Permitting are not required.

Zone C: Areas of minimal flooding; Areas outside the 1-percent annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than 1 foot. Zone C is not included in the Special Flood Hazard Area (SFHA). Insurance purchase is not required in these zones. Compensatory Storage and Permitting are not required.

Any project in a floodway must be reviewed to determine if the project will increase flood heights. An engineering analysis must be conducted before a permit can be issued. The community's permit file must have a record of the results of this analysis, which can be in the form of a "No-rise Certification". This No-rise Certification must be supported by technical data and signed by a registered professional engineer.

Permits Required by the Federal Emergency Management Agency (FEMA):

A "No-rise Certification" for floodways will be required for Option A.
No permit required for Option B.
No permit required for Option C.

PROPERTY OWNERSHIP:

The following address the land rights issues for each Option. This task was accomplished by on-line deed research, Registry of Deed research, and with information provided by DPW. The preliminary research and investigation will require follow-up by Town Counsel in order to confirm the legal aspects of any easement and/or taking for right-of-way including the use of Town owned property, currently in use, for an access way. Various deeds and excerpts from deeds acquired as part of this research are located in **Attachment C**.

Option A – Argyle Street:

The proposed configuration of the "Option A" scheme which originates from the Northwest parking lot of the school adjacent to the Town ball fields continues in a Northeasterly direction onto Town of Winthrop property on land formerly owned by the RR. Although not in use today, the Town used the RR right-of-way as a "Dump Road" to gain access to the Town dump. From the RR right-of-way the old Dump Road makes an abrupt right turn in a Southerly direction and terminates onto Argyle Street.

Properties located adjacent to the old RR right-of-way and Dump Road are noted on the attached plan. The major abutters to the Town property are the Massachusetts Department of Conservation and Recreation (DCR) formally the Commonwealth of Massachusetts Metropolitan District Commission and the property of N/F Edmund F. Hannon.

Because the land is currently owned by the Town and the proposed Argyle Street Extension remains within the right-of-way, there should be no cost associated with transferring the property rights to the Town and using the land as a public way.

Option A – Argyle Street easement and/or property taking cost estimate: $ 0.00

Option B – Banks Street:

The proposed configuration of the "Option B" scheme which originates from the school's Westerly parking lot egress located on Kennedy Dr and also adjacent to the Town ball fields continues in a Southwesterly direction across Kennedy Dr through the rear storage area of the DPW property. Continuing in a Southwesterly direction, the road utilizes a portion of the internal roadway system of the Governors Park Condominium Complex and connects to Banks Street at the intersection of Winthrop Street.

The portion of the Option B scheme that runs approximately 180 feet through DPW land should have no cost associated with a taking. The DPW would lose approximately 5,000 sq ft of land which is primarily used today for stock piling material and equipment.

The 380 foot strip of land that travels on Governors Park Condominium Complex property which is privately owned will require an easement or taking. We received information regarding the cost of non buildable land from the Town Assessors Department. The ROW cost associated with the Governors Park Condominium was deemed to be approximately between $7.35/sf and $9.10/sf. For the purposes of this Study we are assuming that easements will be obtained, not ROW takings. Assuming the cost of an easement is half a taking, and then being conservative by rounding the higher of the approximate taking range, we estimate the cost of a non buildable easement to be $5.00/sf. A Right Of Way easement is required and the fee shown below is based on the $5/sf cost discussed above.

Option B-2 will require a minor street widening of Kennedy Drive to add a right turn only lane at Revere Street. Kennedy Drive is bounded on both sides of the road by the Winthrop Housing Authority, and the Town of Winthrop owns the adjoining property consequently, there should be no fee associated with a land taking for the widening.

Option B – Banks Street easement cost estimate: $ 32,400.

Option C – Golden Drive:

The proposed configuration of the "Option C" scheme which originates at the current circular drive drop-off pick-up location at the Westerly side of the school, continues in a Northeasterly direction on school property for 55 feet through the Town of Winthrop Housing Authority property for 65 feet and terminates into the Golden Drive cul-de-sac.

We understand that the Town owns Golden Drive, however if the Housing Authority is provided a means of obtaining a fee for easements, a Right Of Way easement fee shown below is based on the $5/sf cost discussed above.

Option C – Golden Drive easement and/or property taking cost estimate: $ 92,250.00

NEIGHBORHOOD IMPACTS & SAFETY:

Option A – Argyle Street

Option A would be utilized by the school as an "exit only" onto Argyle Street during a forty-five minute interval at the morning drop-off (7:30 – 8:15am) and afternoon pick-up (1:45 – 2:30pm) session, five days a week. Signage will be posted that will indicate time of operation and use, and state that during any other time use will be prohibited with violators penalized. Gating is an option depending upon input from the Police and Fire Departments for safety and security issues.

Whereas the right-of-way was previously used by the railroad and more recently by the Town as a Dump Road, impacts to Abutters and the neighborhood should be minimal and consistent with past usages.

The Winthrop Public Safety Team has expressed concern regarding the existing proximity of the Revere St/Argyle St intersection to the Revere St/Highland Ave/Crest Ave intersection. The anticipated additional traffic from Argyle is 34 vehicles which will likely occur in approximately 30 minutes, equating to about 1 min/vehicle. The analytical traffic model shows an increase in the amount of time a car will wait on Argyle before being able to access Revere (in either direction) is less than 3 seconds. We do not consider this to be a safety issue. MassHighway generally requires a 25 foot minimum distance curb cuts and intersections, however that is not a design criteria because intersection layouts vary. Argyle St is approximately 155 feet from the Revere St stop line, allowing for a 6 to 7 vehicle queue before hindering Argyle's ability to process left hand turns.

Option B – Banks Street

Option B would be utilized by the school as an "exit only" onto Banks Street during the same forty-five minute intervals noted above. Again, same as above, signage will be utilized and gating is an option.

The route from the school parking lot exit across Kennedy Road through the rear of the DPW storage area should pose no significant inconvenience to the DPW operation as the proposed road will be at the rear property line of the facility. The road continuing through the Governors Park Condominium Complex during the specified periods of time will provide added traffic volume to the existing internal road as well as additional volume to Banks Street as indicated in the Traffic section of this Report.

The distance from the Kennedy Drive stop line at Revere Street to Overlook Road is approximately 200 feet. Option B-1 has a 95th percentile (happens 5% of the time) of the queue extending 183 feet. Consequently, the back up on Kennedy Dr should not grid lock Overlook Road.

Although no adverse safety condition appears to be present, the added traffic volume may be seen as an inconvenience to the residents at the Housing Complex and on Banks Street. We would note that the traffic generated by the school will only slightly impact the AM and PM commute for the residence of Banks Street, and the afternoon dismissal should have no impact on the residential PM commute. The Bank St/Main St presently has adequate site distance and that will continue.

Option C – Golden Drive

Option C would be utilized by the school as an "exit only" from the school into the Golden Drive cul-de-sac during the same forty-five minute intervals noted above. Again, same as above, signage will be utilized and gating is an option.

The route from the school through the Town of Winthrop Housing Authority for 65 feet to the cul-de-sac, should not pose a significant inconvenience, however, several public safety officials in the Town consider the dead end configuration of Golden Drive to be a concern.

Drawing information from the traffic analysis, 22 vehicles currently exit Golden Drive during the hour that contains the 45 minute dismissal period. Option C would add 34 more vehicles making the total 56 in the hour. This equates into approximately 1 car every minute, which is very little. With Option C the queue on Golden Drive at Revere Street goes from 1 vehicle to 2, and the average delay to goes from 17.5 seconds to 24.2 seconds, less than 7 seconds. The Golden Dr/Revere St intersection has adequate site distance and stopping site distance and this would not change.

The reason that the traffic impact to Golden Drive is so minimal and the effect at Kennedy and Revere is so significant is because we are relocating the left hand turns from Kennedy to Golden, and the left hand turns create the greatest delay on Kennedy. The same is true for relocating the left hand turns on Kennedy to Argyle Street, Option A.

COST ANALYSIS and SCHEDULE:

The following cost analysis was based on plans provided by the Department of Public Works and includes fees for Design; Permitting; Construction; ROW Easement; and Contingency Fees associated with each Option.

We received information regarding the cost of non buildable land from the Town Assessors Department. The ROW cost associated with the Governors Park Condominium was deemed to be approximately between $7.35/sf and $9.10/sf. For the purposes of this Study we are assuming that easements will be obtained, not ROW takings. Assuming the cost of an easement is half a taking, and then being conservative by rounding the higher of the approximate taking range, we estimate the cost of a non buildable easement to be $5.00/sf.

Not included in the cost estimate are fees associated with on-site school improvements such as the modifications to the drop-off/pick-up locations that would include minor demolition, repavement, curbing, drainage structures, signage, and re-striping. Attached as **Addendum D** is a Construction Cost Estimate in accordance with MassHighway Department.

Option A – Argyle Street:

The length of Option A is the longest at 1,100 feet. The proposed road ranges in elevation from approximately 7 feet in the vicinity of the salt marsh to a high of approximately 17 feet where the road will begin at the school parking lot. It is also at the parking lot to the salt marsh where the steepest slope of the road may range between 3% to 8% depending on the use of retaining walls. The width of the road will be 12 feet wide with two 3 foot wide shoulders on both sides for a total road width of 18 feet. Do to environmental factors, it is anticipated that grading (cuts/fills) will be kept to a minimum in order to maintain the current topography as close to existing as possible. Retaining wall design and construction was not included in the estimate but could be a consideration at a later time if allowed by the various environmental regulatory agencies. Drainage requirements will have to comply with new Mass DEP Stormwater Management practices as of January 2008. Based on historical knowledge the design fee is approximately 10 to 12 percent of the construction cost. The design fee includes surveying, preliminary design and construction documents (construction plans, specifications and estimate). Extensive permitting will be required, and because the cost cannot be accurately estimated a nominal permitting has been attributed.

1. Design Fee:	$40,000
2. Permitting Fee	$50,000
3. Construction Cost:	$371,000
4. Contingency (20% +/-):	$90,000
The Total Estimated Cost of Option A:	$551,000

Option B – Banks Street:

The length of Option B is 600 feet. The proposed road ranges in elevation from approximately 11 feet at the termination point at the intersection of Banks and Winthrop Streets to a high of approximately 18 feet where the road will begin at Kennedy Road. The elevation on the DPW parcel ranges in elevation of 18 feet at Kennedy Road to an elevation of 13 feet at the bottom of a 4 foot embankment on the property line between the DPW and the Housing Complex. The Housing Complex begins at elevation 13 feet and runs approximately 360 feet to the intersection of Banks and Winthrop Streets at elevation 11 feet. The width of the road will be 12 feet wide and depending upon the location, two 3 foot wide shoulders on both sides of the road may be added for a total road width of 18 feet. Another option may be to curb both sides of the road, however curbing the road prevents passing of broken down vehicles. Drainage requirements will have to comply with new Mass DEP Stormwater Management practices as of January 2008. Based on historical knowledge the design fee is approximately 10 to 12 percent of the construction cost. The design fee includes surveying, preliminary design and construction documents (construction plans, specifications and estimate). A Right Of Way easement is required and the fee shown below is based on the $5/sf cost discussed above. However, no discussions have occurred between the property owner and the Town. Permitting as described previously in this Study will be required, however we believe the extent of permitting will be less than Option A.

1.	Design Fee:	$18,000
2.	ROW Easement:	$32,400
3.	Permitting Fee	$40,000
4.	Construction Cost:	$152,000
5.	Contingency (20% +/-):	$42,000

The Total Estimated Cost of Option B: $284,400

Option C – Golden Drive:

The length of road for Option C is 120 feet, and then continues onto Golden Drive for approximately 1,025 feet until Golden Drive meets Revere Street. The proposed road ranges in elevation from approximately 16 feet at the termination point at the cul-de-sac on Golden Drive to a high of approximately 20 feet where the road will begin at school's current drop-off location. The slope of the proposed road will be approximately 3%. Although a small 80 foot long by 2 foot high retaining wall is not necessary, it could be an option to reduce land disturbance at the Housing Complex. The width of the road will be 12 feet wide with two 3 foot wide shoulders on both sides of the road will be added for a total road width of 18 feet. Drainage requirements will have to comply with new Mass DEP Stormwater Management practices as of January 2008. Based on historical knowledge the design fee is approximately 10 to 12 percent of the construction cost. However, typically, the smaller the construction fee the higher the percentage for design, so we rounded the design fee to the nearest $10,000. The design fee includes surveying, preliminary design and construction documents (construction plans, specifications and estimate). We understand that the Town owns Golden Drive, however if the Housing Authority is provided a means of obtaining a fee for easements, a Right Of Way easement fee shown below is based on the $5/sf cost discussed above. Minimal permitting is required for Option C, however due to the proximity of so many environmental issues a nominal cost was attributed.

1.	Design Fee:	$10,000
2.	ROW Easement	$92,250
3.	Permitting Fee	$5,000
4.	Construction Cost:	$74,000
5.	Contingency (20% +/-):	$17,000

The Total Estimated Cost of Option C: $192,250

DEVELOPMENT SCHEDULE:

Option A – Argyle Street:

1. Design	16 weeks
2. Permitting	4 to 52+ weeks
3. Construction	20 weeks
Estimated time to complete:	40 to 52+ weeks

Option B – Banks Street:

1. Design	12 weeks
2. ROW/Easement	3 weeks (concurrent with Design)
2. Permitting	0 to 52+ weeks
3. Construction	10 weeks
Estimated time to complete:	22 to 52+ weeks

Option C – Golden Drive:

1. Design	6 weeks
2. Permitting	0 to 4 weeks
3. Construction	3 weeks
Estimated time to complete:	9 to 13 weeks

CONCLUSION:

Utilizing the analysis previously illustrated in this Report we have developed a simple rating score for each Option; a best, middle and worst designation. The Option which was best in the particular category was given a 1, the Option which was second best was given a 2 and the third "least desirable" Option for that category was given a 3. This type of scoring results in the best Option having the smallest number.

With regard to category 3 however, the extent of the expression "least desirable" in some instances cannot be economically measured at this time without further investigation which is out of the scope of this Report. For instance, environmental permitting may impose additional mitigation measures that will substantially increase the cost of implementation versus an option with less permitting and mitigation required. Another example may fall under the Neighborhood Impacts and Safety category where the community response may outweigh the additional cost of permitting and subsequent mitigation from another Option.

OPTION SELECTION MATRIX

	OPTION A	OPTION B	OPTION C
	Argyle St.	Banks St.	Golden Dr.
Traffic Circulation	1	2	1
Environmental Permitting	3	2	1
Property Ownership	1	3	2
Neighborhood Impacts and Safety	1	2	3
Cost Analysis	3	2	1
Schedule	3	2	1
TOTAL =	12	13	9

Clearly we can see from the matrix that Golden Drive has the lowest overall score, and if not for the Neighborhood Impact this Option would stand as the unopposed winner. As we have enumerated throughout the Report Golden Drive has an exceptional traffic value because it removes the left hand turns moves from Kennedy and puts them closer to their intended destination. Environmental permitting is extensive in every coastal community, however because Golden Drive is outside the environmental radius of influence their will be few or no environmental permits required. Golden is obviously the shortest route to an existing roadway, thereby making it the most cost effective. And, of course, all of these advantages relate into a condensed construction schedule.

From the traffic perspective the most significant benefit to Kennedy transpires when the left hand turns are removed and relocated in the direction of the drivers destination, north along Revere Street. Relocating significantly more right hand turns from Kennedy does not produce the same result as relocating the left hand turns because right hand turn movements require less conflict. A right hand turn is simply waiting one lane to open up, where a left hand turn movement requires waiting for both lanes on Revere Street to have an opening. Less vehicles are being relocated to Argyle or Golden, than Banks, however the benefit to Kennedy/Revere is much greater. In other words, we are saying removing 1 left hand turn is more beneficial than removing 10 right hand turn movements. This is why Argyle and Golden score higher than Banks.

The parking and procedural aspect of drop off/pick up will need to be addressed for the Option which is advanced to the next stage. Although not a part of this Study, we believe this issue can be readily addressed with any of the three Options. As the vehicles are moved through the school circulation more efficiently, as will be case for all three Options, the need for parking will be significantly reduced.

The environmental consideration is very significant. Of the three options, Golden Drive poses the least constraint to construction. Both Banks and Argyle have considerably more potential environmental considerations than Golden, and Argyle is the most problematic to permit. In terms of cost and schedule to permit for construction, it ranges from Golden with the possibility of no environmental permit required to the possibility of a year or more for Argyle given it's proximity to Rumney Marsh. However, until a preliminary discussion with the Winthrop Conservation Commission is held, this Report is speculative as to the location and extent of the Wetland Resource areas within the project limits as well as the other state and federally regulated areas identified in this Report.

The significance of property ownership and the need to acquire an easement or property taking should have no impact on Option A (Argyle Street) because the Town of Winthrop owns the property of the proposed road configuration. Option B (Banks Street), however, will require an agreement for the 380 foot strip of land that travels on the privately owned Governors Park Condominium Complex. As previously mentioned, the Condominium Complex could look for compensation in a number of ways including a flat fee, a percentage of the yearly condominium fee, or services such as free snow plowing. Option C (Golden Drive) is owned by the Winthrop Housing Authority (WHA), whose land appears to be actually owned by the Town of Winthrop. However, to be conservative, we added the cost of an easement to Option C. A review of the deeds encompassing all the Options should be assigned to the Town Counsel to verify any obstacles.

The least impact on a neighborhood and to its safety is Option A where during a brief duration twice a day there will be less vehicles using the old abandoned dump road than when it was previously used. Abutting a mix of commercial and residential use lots, Option A winds its way through the rear of each lot to Argyle Street and then on to Revere Street with virtually no effect on the neighborhood and only a short stretch from Argyle to Revere were the small increase in traffic will be noticed. Both Option B and C will have a greater effect on their respective neighborhoods than Option A, to the extent that traffic volume will only slightly increase during the two brief periods of the day on both Banks Street and Golden Drive. Where Option C uses Golden Drive, a dead end road, as its exiting scheme, the normally predictable traffic patterns that emerge from this retirement complex may be minimally disrupted for two brief periods of time twice a day. Therefore, Option C may have the greatest impact to its neighborhood, rather actual or perceived, than the other two Options.

As this Report concludes, there is little doubt that Option C – Golden Drive is both the most economical and cost efficient method of improving the traffic congestion at Banks School. In all categories studied with the exception of two, Golden Drive placed as the best or tied for best option in the assigned category.