

Department of Public Works



Nadeen M. Daniels  
Assistant City Manager  
Director

**CITY OF PORTLAND**

William J. Bray  
Deputy Director

October 22, 1997

Mr. Brian Peterson  
229 Prospect St.  
Portland, Maine 04103

RE: Stevens Avenue

Dear Mr. Peterson:

Attached please find a copy of the report you wanted for Stevens Avenue. This should contain the information you are requesting.

Sincerely,

*William J. Bray*  
**WILLIAM J. BRAY, P.E.**  
**ACTING PUBLIC WORKS DIRECTOR** *cmw*

WJB/cmw

Attachment

**CONGESTION MITIGATION/AIR QUALITY  
PROGRAM APPLICATION**

**FOR  
STEVENS AVENUE  
PORTLAND, MAINE**

**SUBMITTED BY  
CITY OF PORTLAND**

# CONGESTION MITIGATION/AIR QUALITY PROGRAM APPLICATION

## Part I - General Information

### **L1 Applicant Name, Address and Phone Number**

Applicant Name: City of Portland  
Contact: Mary Theriault  
Address: 65 Hanover Street  
Portland, Me 04101  
Phone : 207-874-8894

### **L2 MPO/Municipal Coordination:**

Attachment 1 - is a letter from PACTS stating that the proposal is being considered by both PACTS committees for compliance with the MPO's plan. A formal letter will follow.

### **L3 Project Location**

The project is located on Stevens Avenue in Portland as described below. The general location is shown in Figure 1 of Attachment 1.

Permanent traffic calming measures: Stevens Avenue from Pleasant Street to Woodford Street. This section is approximately 1,600 feet long and located in front of Deering High School and the Longfellow School. Permanent measures are also requested on Stevens Avenue in front of the Lincoln School. This section is 400 feet long.

Temporary traffic calming measures: A temporary pilot program is also planned between these two sections.



#### **L4 Project Type**

Based upon the categories contained in the CMAQ Proposal Selection Policy, the project is applicable to the following categories:

##### **Type: Transportation Control Measures**

- (ix) Programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
- (x) programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
- (xiv) programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity.

##### **Type 3: Bicycle and Pedestrian Facility Programs**

Construction of bicycle and pedestrian facilities and traffic calming measures to enhance the safety for pedestrians and bicyclists.

#### **L5 Project Description**

The CMAQ funds will be used to implement traffic calming measures along portions of Stevens Avenue. Traffic calming incorporates physical alterations of the street along with signage to decrease speeds and increase the safety of both motorized and non-motorized traffic.

This project will be a demonstration project of traffic calming measures on a minor arterial with an Annual Average Daily Traffic Volume of 14,500 vehicles per day through a neighborhood with numerous institutional uses including public schools (2,500 school children), colleges, churches, and



elderly housing. The information learned from the project will be utilized for projects in other communities throughout the state and the northeast.

The permanent and temporary traffic calming plan which the funds will be used to construct are included in the back of this application and include the following construction:

- a. Construction of permanent traffic calming measures on Stevens Avenue south of Pleasant Street to north of Woodford Street. Traffic calming measures planned for this section include:
  - Textured and/or colored pavement in the parallel parking lane to visually narrow the street width
  - Bollards at neck downs to channelize pedestrian traffic
  - A raised crosswalk directly in front of the Longfellow school
  - Ten foot wide flush crosswalks with interlocking concrete pavers at various points along the corridor
  - Tree plantings (to be furnished by the City)
  - Signage (to be furnished by the City)
- b. Construction of permanent traffic calming measures in front of the Lincoln Middle School consisting of the following:
  - Extended raised area of Stevens Avenue fronting the school
  - Neck downs with bollards
  - Five ten foot wide flush crosswalks with interlocking concrete pavers
  - Signage (to be furnished by the City)
  - Tree plantings (to be furnished by the City)
- c. Temporary traffic calming measures on Stevens Avenue between Pleasant Street and Lincoln School:
- d. Topographic survey for the areas where the permanent traffic calming measures are planned.
- e. A monitoring program to determine the effectiveness of both the permanent and temporary traffic calming measures. This monitoring will include air quality testing.

- f. To design both the permanent and temporary measures.
- g. A city wide educational and marketing project in the adjacent schools to promote public awareness of the transportation mode choice/air quality relationship.

## **L6 Estimated Project Costs**

### **L6.a Construction Costs**

A complete construction cost estimate is included as Attachment 2 to this application.

### **L6.b Amount of CMAQ request**

In addition to the construction costs in areas where the permanent plan will be implemented, CMAQ funds are requested to design the permanent plan; to install and monitor a temporary devices plan which will be reflective of the permanent traffic calming for the balance of the corridor; and for an educational program. The temporary devices will be in place for a period of 12 months during which time a traffic study replicating that of the Phase I Traffic Study analysis will be performed to test the effectiveness of the measures. The data collected from this monitoring program will be utilized not only to evaluate the effectiveness of the proposed permanent plan on Stevens Avenue, but can be transferred to other communities and arterials throughout the state.

The amount of CMAQ funds requested are as follows:

Construction Cost	\$ 214,000.00
Education Program	10,000.00
Monitoring - Evaluation of Pilot Program	15,000.00
Temporary Improvements	30,000.00
Engineering & Survey for Permanent Improvements	<u>18,000.00</u>
Total Requested	\$ 287,000.00

The total project costs are \$287,000.00 and the amount of CMAC funds requested are 80% of this amount, or \$229,600.00.

#### L6.c Amount of Non-Federal Match

The City of Portland will provide 20% of the project funds, \$57,400.00, as the local match. In addition to these monies, the City will provide the landscaping improvements.

#### L7 Post CMAQ Funding

When the permanent traffic calming improvements planned for Stevens Avenue are completed, the City of Portland will maintain the street. The City agrees to maintain the temporary measures for a 24 month period. If a subsequent grant is not approved, then the City agrees to remove the temporary measures. A letter from the commitment from the City is attached to this application as Attachment 3.

#### L8 Proposed Construction/Implementation Schedule

Should the project receive CMAQ funding, the following implementation schedule will be followed:

Traffic Calming Event	Beginning Date	Completion Date
Survey and Design Improvement	10/1/95	4/1/96
Implement Permanent & Temporary Measures	4/1/96	8/1/96
Monitor Permanent & Temporary Measures	3/1/96	7/1/97



## **L9 Matching Funds**

The City of Portland will provide the non-federal CMAQ cost share of \$57,400.00. A letter from the City is included as Attachment 3.

## **L10 Who Would Design and Construct/Implement This Project?**

A qualified professional will be retained to design the project through a qualification-based contract selection procedure. These professionals will be selected through a formal Request for Proposals and interview procedure complying with local State and Federal guidelines. The project construction will be publicly advertised for bid to contractors including the City's new public works construction company and the lowest qualified bidder will be awarded a contract to implement the project.

## **Part II - Specific Information**

### **II.A.1 Initial Ozone Precursor Reductions**

Data used in analysis:

- Traffic calming measures should reduce the average travel speed by up to 10 mph.
- The AADT on Stevens Avenue is 14,500 vehicles per day.
- Traffic calming generally encourages more use of walking, bicycles and calmer driving. Based on data published in Germany, a 10 mile reduction in speed through traffic calming reduces idle time by 15%, gear changing by 12%, brake use by 14% and gasoline use by 12%.
- Based upon the above experience, and a study entitled "Winning Back the Cities" by Peter Newman and Jeff Kenworthy, it is assumed there will be no change in VOC emission and a 32% reduction in NOX.

- It is assumed that traffic calming will reduce the local trips by 7.5%.

Estimated VOC reduction:

None

Estimated NOX reduction:

NOX emission at 35 mph = 2.14 grams/mile traveled.

$2.14 \times 0.32 = 0.68$  grams/vehicle reduction per traveled mile

Corridor length =  $3,950/5,280 = 0.75$  miles

$$\frac{0.68 \text{ grams}}{\text{veh. mile}} \times 0.75 \text{ mi} \times \frac{14,500 \text{ vehicles}}{\text{day}} \times 0.925 \times \frac{1 \text{ kg}}{1,000 \text{ g}} = \underline{6.8 \text{ kg/day}}$$

Additional benefits of 7.5% reduction in local trips:

$$0.075 \times \left[ \frac{2.14 \text{ grams}}{\text{veh. mile}} \times 0.75 \right]$$

$$\times \frac{14,500 \text{ veh}}{\text{day}} \times \frac{1 \text{ kg}}{1,000 \text{ g}}$$

$$= 1.75 \text{ kg/day}$$

$$\text{Total } 6.8 + 1.75 = \underline{8.55 \text{ kg/day}}$$

## II.A.2 Potential Long-Term Air Quality Benefits

Estimated VOC Reduction:

None

Estimated NOX Reduction:

8.55 kg/day (see calculations for initial)

This daily estimated reduction in NOX will continue throughout the 20 year design life of the project provided the temporary measures also are later implemented on a permanent basis.

### **II.A.3 Benefit/Cost Ratio**

Estimated VOC Benefit Cost Ratio:

0 grams/day/\$1

Estimated NOX Benefit Cost Ratio:

$= 8.55 \text{ kg/day} \times 1,000 \text{ gm/kg} = 8,550 \text{ gms/day}$   
 $= 8,550 / \$229,600 = 0.037 \text{ gms/federal CMAQ dollar}$

### **II.B Qualitative Analysis**

The general belief based on generalized vehicle emission tables is that traffic calming will not benefit the air quality and may in fact increase vehicle emissions. There is no experience in Maine and little in the United States that documents the effect of traffic calming on air quality. Based on published data, the City of Portland believes the proposed traffic calming measures will improve the air quality. This demonstration project will offer the opportunity to document the air quality changes associated with traffic calming. Many of the significant traffic calming projects in Europe have been sponsored as demonstration projects by both the local and federal governments to test the effect of calming on key environmental indicators.

Research on traffic calming in Europe shows that in built up areas the higher the vehicle speed, the greater the frequency of acceleration, deceleration and braking, all of which add to air pollution. Contrasting this study is German evidence showing that in residential areas idle times are reduced by 15%, gear changing by 12%, brake use by 14%, and gasoline by 12% due to the effects of slower, calmer and more uniform driving. In Buxtehude, Germany, which has a population of 33,000 people, a traffic calming demonstration project documented changes in different types of emissions for two styles of driving when the speed was reduced from 30 to 18 mph:



<u>Emission Type</u>	<u>Driving Style</u>	
	<u>2nd Gear Aggressive</u>	<u>3rd Gear Calm</u>
CO	- 17%	- 13%
HC	- 10%	- 22
NOX	- 32%	- 48%
Fuel Consumption	+ 7%	- 7%

In addition to calming and more uniform driving, it is anticipated that implementation of traffic calming measures may reduce the number of trips within the neighborhood. For example, many of the parents who currently drive their children to and from school and related activities, may decide after traffic calming measures that the street is safe enough to allow their children to bicycle or walk to school.

## II.C Additional Considerations

### II.C.1 Congestion Impacts

It is anticipated that the proposed traffic calming project will reduce congestion by reducing the number of internal neighborhood trips by making the street safer for children to bicycle or walk to school and by diverting through truck traffic to roadways where there is less congestion.

The peak hour traffic along one of the more congested areas of Stevens Avenue, near Deering High School is 1,047 vehicles per hour (vph). The City estimates that this project may result in a 7.5% reduction in local trips (non-through) and a 25% reduction in truck traffic which will reduce the peak hour traffic in front of the high school from 1,047 vph to 969 vph, which is calculated as follows:

PM peak hour two way traffic = 1,047

5% of traffic is trucks  $(1,047 \times 0.05 = 52)$

70% of traffic is non-through traffic  $[0.7 \times (1,047 - 52) = 697]$

Computed reduction in traffic:  $0.075 \times 697 = 52$

Reduction in truck traffic:  $52 \times 0.5 = 26$

Total traffic reduction:  $52 + 26 = 78$

Percent reduction in congestion:  $100 \times (78/1,047) = 7.4\%$

## **II.C.2 VMT Impacts**

The project is estimated to reduce the VMT/day as follows:

$$\begin{aligned} \text{AADT} &= 14,500 \\ 0.074 \times 14,500 \text{ vpd} \times 0.75 \\ &= 805 \text{ VMT/day reduction} \end{aligned}$$

## **II.C.3 Education**

The project provides an excellent stage to promote a City wide public awareness of the transportation mode choice/air quality relationship. The marketing approach will include the community, buss access and public officials in the program. The pedestrian and bicycle facilities are intended to be highlighted in this project to promote their use. Highlighting will be accomplished through textured paving, painting, bump outs at pedestrian crossings, and signage. The location of the project relative to five schools/colleges provides an excellent tool for both the faculty and City to teach students about the benefits of reduced congestion, transportation mode choice and air quality relationships.

## **II.C.4 Other Long-Term Project Benefits**

The purpose of the traffic calming project is to make the Stevens Avenue environment safer and more attractive. This usually results in a greater level of pedestrian and bicycle activity. In Berlin's Federal demonstration project, non-motorized traffic on a wide range of streets increased by between 27% and 114%. Similar results are documented throughout Europe and it is hoped that these effects can be realized on Stevens Avenue. Thus the results of a demonstration project on Stevens Avenue could be utilized to evaluate future projects.

## **II.C.5 Affect on Motorized Trips**

The project is expected to reduce motorized trips by encouraging use of Stevens Avenue by bicycles and pedestrians. The percent reduction is forecast to be 7.4% or 78 trips during the peak hour as discussed in II.C.1.