

# 2015 NYS Geospatial Applications Awards Competition Entry Form

Please use the below template to submit your entry for the **2105 NYS Geospatial Applications Awards Competition**. By entering the competition, you grant permission for the NYSGIS Association to publish and publicize your entry.

## Required Information

**Sponsoring Organization:** NYC Department of Education, Office of Pupil Transportation

### **Stakeholder/Participant List (by Organization):**

Office of Pupil Transportation staff

New York City Schools administrative personnel

Students attending schools in New York City

**Title:** PUTES, distance based transportation eligibility for New York City students

### **Abstract:**

The Office of Pupil Transportation, within the New York City Department of Education, determines transportation eligibility for all New York City students based on the distance from the school and their grade. The GIS team administers the Pupil Transportation Eligibility System (PUTES) which assigns transportation eligibility codes to each street segment by measuring the distance from that segment to each school. This measurement and code assignment is done for each segment in the city to every school in the city. When a student's address is related to a street segment their transportation eligibility to any school can be determined. The results populate student's records and are also displayed on a web map application called "PUTES on the Web". The application allows for a visual display of school location and the eligibility zones around it. This application is extensively used by OPT staff as a visualization tool and to respond to disagreements about transportation eligibility.

### **Statement of the Problem:**

Prior to 2009, transportation eligibility to school was not processed by the Department of Education; the Department of City Planning, who managed street centerline data, developed an algorithm for a mainframe system that was the working definition of "black box". No one but a handful of programmers understood how distance calculations were made. There was no map interface to visualize results and it was extremely difficult to diagnose and correct issues.

In 2009 the Department of City Planning transferred ownership of the process to the Department of Education and the Office of Pupil Transportation began engineering a new solution to calculate transportation eligibility using GIS. This approach would allow non-technical staff to visualize and inspect results for accuracy and explanation.

NYC students can attend school anywhere in the city. Therefore a distance must be calculated from each of over 100,000 street segments, to each of over 3,000 different schools. This calculation determines a distance for each student to each school. In addition, four zones (0.5, 1.0, 1.5 and >1.5 miles) are created around each school. Location within one of these zones generates an eligibility code for a student to that school. A student's eligibility code will vary from school to school depending on which zone he resides in for that school. Finally, a student's code for a particular school, in conjunction with their age, determines what type of transportation (yellow bus, MetroCard, half fare MetroCard, or none) the student is eligible for to that school.

### **Response to the Problem:**

GIS Team prepared a series of ArcGIS models, which select from NYC streets only those appropriate for students to walk. For all schools a point of main entrance is determined and used as a seed in creation of service area polygons. A custom Python script selects street segments within these polygons and assigns distance values to it (A – less than 0.5 mile, B more than 0.5 mile, but less than 1 mile, and C more than 1 mile, but less than 1.5 mile). Resulting feature classes are uploaded to various applications used by OPT and schools, as well as to ArcGIS server. Datasets from the server are used to create and publish map services, which are displayed in an application called “PUTES on the Web”. The application is used to visualize the structure of a schools eligibility zones, as well as to settle disputes with schools and parents when disputes about transportation eligibility arise. As of now “PUTES on the Web” is an in-house application available only within OPT's network, but it has potential to be made publicly available to parents who need to make decisions about school choice. Transportation eligibility information can be an important part of that decision.

### **Results:**

PUTES is run twice a year for all schools. New schools are added on a monthly basis. Schools no longer require printed directories but, if needed, may request and receive a table for their school derived from “PUTES on the Web”. Since all results are now visible in the application, there is no longer a need to send staff into the field to resolve disagreements about transportation eligibility.

As it was before, twice a year all schools are processed, but unlike before now new schools are added and processed on monthly basis. Schools do not receive any more printed directories (tons and tons of paper), but may request and receive within minutes Excel document derived from “PUTES on the Web”. All results are visible on the map and in a web browser and parents' disagreements about students transportation eligibility can be responded promptly without a need of sending somebody with a wheel to a field.

### **Return on Investment/Cost-Benefit Analysis:**

PUTES was developed over a six months at low cost, and the system undergoes continuous improvement every year. OPT leveraged an existing ArcGIS enterprise license and uses a single full-time employee to administer the system on a part-time basis. Once a year, college interns

conduct a quality assurance review on all street segments and schools. The new PUTES process is less labor-intensive and far more transparent than the old process. Through “PUTES on the Web”, non-technical staff can review and ensure that school main entrances are located correctly and that distance calculations are accurate. If errors are found, corrections can be made within hours; in the past, corrections would only be made every six months. Moreover, the results of transportation eligibility determination can be shared with schools and parents; OPT staff send letters containing turn-by-turn directions and distances to parents who dispute their eligibility status. OPT can respond faster to eligibility questions and parents can better understand OPT’s answers.

**Key Participants: (Name, Organization, Title)**

Calabrese Tim, DOE OPT, Manager

Laroussi Joanna, DOE OPT, ArcGIS Administrator

Jenkins Kevin, DOE OPT, GIS Analyst

**Contact Information:**

Name Joanna Laroussi Phone #718-482-3849 Email [jloussi@schools.nyc.gov](mailto:jloussi@schools.nyc.gov)

***Deadline & Submission Information***

**The deadline for entries is Tuesday, September 15, 2015.** Please E-mail this completed template to Ben Houston at [Benjamin.h.houston@gmail.com](mailto:Benjamin.h.houston@gmail.com), with “GIS Applications: [Name of Submitting Organization]” in the message Subject line.

Thank you for your submission and Good Luck!