Points of Conflict

THE CHALLENGE
Determine the number of conflict points and the average potential collision angles for different intersection designs.

GRADE LEVEL
Middle School.

ACTIVITY DURATION
Approximately 5 to 10 minute introduction, 15 to 20 minute activity, followed by a 5 to 10 minute discussion.

MATERIALS
Printed 11”x17” copies of aerial images of two local intersections: a four-leg, single-lane approach stop-controlled intersection and a four-leg, single-lane approach roundabout.
Pipe cleaners or metal wire (that can hold its’ shape well).
Pencils/ Colored Pencils / Markers / Pens.
Protractors.

SET UP
This activity requires table space that is big enough to hold the medium-sized (11”x17”) maps.

ACTIVITY
Provide a brief introduction to various intersection designs: trail crossings, 4-legs, 3-legs, roundabouts, interchanges, etc. and the importance of safety in intersection design. (Simply alert them to the existence of different designs. Do not describe the difference in the number of conflict points/ relative safety just yet – this is something they will begin to discover on their own during the activity).

Describe what an intersection conflict point is and how it is identified, using an aerial view of an intersection. Show them how to measure the potential collision angle.

Intersection conflict points occur when two movement paths cross over each other.

Introduce the activity: "Now that you know how to identify and calculate the conflict points, I want you to calculate the total number of conflict points for each of the two intersections and measure the potential collision angles."

Split the students into pairs. Pass out the maps and materials.
Have the students use two pieces of yarn/string to depict conflicting intersection approaches. Have them take their writing utensil and mark the two approach lines and the point where two yarn/string pieces cross.
Once they can visualize it, they can simply hand-sketch the approaches and the conflict points (using different colors for different approaches). They will then repeat this process for all approaches and tally the total number of conflict points for each intersection.

Once they have marked all the conflict points, they will then begin to measure the collision angles using their protractors. Once they have all the angles for an intersection, ask them to calculate the average collision angle for the intersection.

During the activity, walk around the students to answer questions and provide hints as needed.

After 15 to 20 minutes, ask the students to regroup, and close with a group discussion.
FOR DISCUSSION

Ask the students what they found: Which intersection design had less conflict points? What were their average angles? How do they think that these findings could impact the overall safety at each intersection? Walk them through the reasons why transportation engineers believe that roundabouts are a safer design for vehicles.

LEVEL OF DIFFICULTY

IMPORTANT: It is crucial to have a conversation with the classroom teacher prior to performing the activity. This will aid in understanding the educational level of the class which will help determine the appropriate level of difficulty of the materials and items for discussion. For example, regular classes vs. gifted & talented or AP classes.

Increase difficulty by:

1. Increasing the number of intersections (either a greater variety of types or multiple intersections for each type – if the latter, then have the students calculate an average).
2. Increasing the complexity of the intersections
3. Giving each pair of students a unique set of intersections and asking them to write their average number of conflict points and their average collision angles for each type on the board. Then have the entire group calculate the averages across the many pairs of students.
4. Asking the students to find their own intersections by perusing Google Maps online.
5. Increasing the number of modes being considered. Ask the students to add the pedestrian and bicycle conflict points to their diagram.

Decrease difficulty by:

1. Increasing the number of intersections (by assigning only one intersection type to each pair).
2. Decreasing the complexity of the intersections (i.e. 3 leg, instead of 4+ legs).
3. Decreasing the number of legs being calculated (i.e. only have them calculate the conflict points associated with one movement)
4. Removing the numerical calculations and simply having the students simply draw the conflict points.