

Performance Task

Funding Roundabouts to
Relieve Traffic Congestion



Modeled after Smarter Balanced Performance Tasks

Funding Roundabouts to Relieve Traffic Congestion

Introductory Classroom Activity (25 minutes)

- Present on a projector (or distribute a handout of) diagrams of a traditional four-way stop and a typical traffic roundabout.
- After giving students a moment to look at the diagrams, ask, “Have you ever traveled through a traffic roundabout, either as a driver or a passenger? Was your level of comfort with it any different than what you have experienced at four-way stops?”
- Let students know that they are going to watch a short video from the popular television show “MythBusters.” Inform students that “MythBusters is a science entertainment show that uses elements of the scientific method to test whether certain beliefs or theories are accurate or not.” Encourage students to take notes during the video as they might be helpful for the performance task they will be taking later.
- Present on a projector the video clip from the “MythBusters” series:
<http://www.youtube.com/watch?v=OvoFjirrgYA>
- Following the video, engage students in a brief classroom discussion using the following as discussion questions:
 - What information was provided about how a four-way stop works as opposed to a traffic roundabout?
 - How realistic or “genuine” did the reenactment seem to you? What most likely caused the show to do the reenactment in a parking lot with barriers rather than using a real 4-way stop and a roundabout?
 - Were there any factors that might make you question whether this exercise was totally accurate or not? (Consider things such as the experience of the drivers, the length of time for the study, motivations of the show’s producers, etc.)
 - What specific steps were taken by the show to make sure that their data would be as accurate as possible? What effect might the “human randomizer” have had on the experiment on the roundabout course? Why include this feature?
 - What elements of the video were done purely for entertainment? How did those elements affect the impact of the video? Did attempts at humor make you any more or less inclined to accept the video’s conclusions?
- Say to the students, “In the performance task that you are going to start today, you will learn more about traffic roundabouts and the debate over their pros and cons. Eventually, you will need to take a position on whether we should encourage or discourage their use to reduce traffic congestion and accidents, and you will defend your position in an argumentative report. It is important to know that, as some of the resources you will be using point out, some people support constructing roundabouts while others are adamantly opposed to investing in them.

Student Directions

Funding Roundabouts to Relieve Traffic Congestion

Task:

In your civics class, you are discussing the potential benefits of constructing traffic roundabouts at some street intersections to reduce traffic congestion and decrease the number of traffic accidents. You have learned that roundabouts are widely used in Europe and other countries throughout the world, but there has been some resistance to their use in the United States for a variety of reasons. As part of your research on this issue, you have found four sources giving information about roundabouts.

After you have reviewed these sources, you will answer some questions about them. Briefly scan these sources and the three questions that follow. Then, go back and read the sources carefully so you will have the information you need to answer the questions and complete your research. You may take notes in the margin as you find information in the sources to capture your thoughts, reactions, and questions as you read.

In Part 2, you will write an argumentative essay on a topic related to the sources.

Directions for Beginning:

You will now examine several sources. You can re-examine the sources as often as you like.

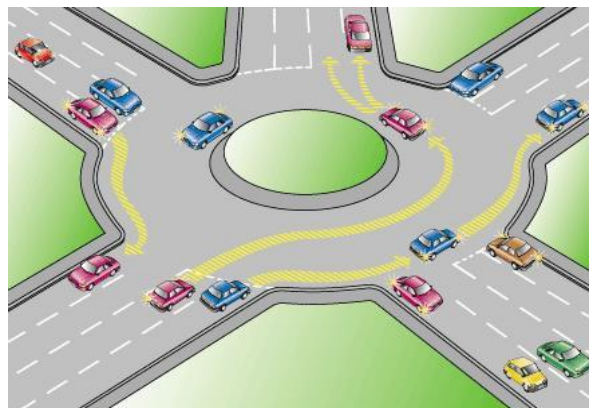
Initial Questions:

After examining the research sources, use the rest of the time in Part 1 to answer the three questions about them. Your answers to these questions will be part of your score for the reading portion of this assessment. Also, your answers will help you think about the information you have read and viewed, which should help you write your argumentative essay. Both your margin notes and your answers to the questions will be available to you as you work on your essay.

A traditional four-way stop:



A traffic roundabout:



Source #1: "Mythbusters" shows why...

This article, from the June 9, 2014 issue of THE OREGONIAN, reaches some interesting conclusions about traffic roundabouts as a result of a visit from the popular television show "Mythbusters," a program that tests out common "myths" to see if they have any basis in truth.

Notes on my thoughts, reactions and questions as I read.

SCORE ANOTHER VICTORY for traffic engineers who support wider adoption of free-flowing roundabouts at U.S. intersections.

"Mythbusters" has staged what just might be the ultimate transportation-geek showdown: An American four-way stop vs. an uncontrolled one-lane European roundabout.

Roundabouts are becoming more common in Portland, but they're far from mainstream.

But as I wrote in a 2009 column, the Wanker's Corner roundabout at the juncture of Stafford and Borland roads in Clackamas County shows the benefits of removing traffic signals in favor of allowing a little chaos. Uncertainty now breeds caution and mostly free-flowing traffic in what was once a congested crossroads.

Also, in roundabouts, crashes tend to be slower and involve rear-end collisions, versus more deadly side collisions typical at traditional intersections.

On "Mythbusters," stars Jamie Hyneman and Adam Savage tested "the myth" that roundabouts are a triumph of efficiency in fighting traffic congestion.

Their verdict: It's true.

It wasn't even close to being busted.

During two 15-minute tests, 385 vehicles passed through the four-way intersection. During the same time period, 460 vehicles moved through the roundabout intersection.

So, the roundabout actually improved traffic flow by 20 percent, according to the test runs.

I can think of at least 10 intersections in the greater Portland area, including a few on Southwest Scholls Ferry Road and along the Beaverton-Hillsdale Highway, that are begging for a roundabout.

Watch the video for yourself:

Still, there are plenty of good arguments against adopting this piece of European infrastructure in the U.S. Roundabouts require a good

chunk of space (so don't expect to see any in the central city). Plus, bicyclists and pedestrians tend to despise them.

Also, overly polite Portland drivers might find a way to ruin the roundabout experience.

If nothing else, "Mythbusters" has given us something worth bringing up at the water cooler.

Source #2: "Debate goes in circles about benefits of roundabouts"

The following is an article from the MILWAUKEE WISCONSIN JOURNAL SENTINEL published July 27, 2013. As you will discover, Wisconsin has experienced some debate related to the construction of roundabouts on its highways.

Notes on my thoughts, reactions and questions as I read.

WISCONSIN IS INSTALLING ROUNDABOUTS at an aggressive pace, with nearly 150 added in the past three years — more than the past decade combined.

Engineers and transportation officials say the circular intersections are safer than traditional ones, and studies show they're right.

But not everyone agrees they're better: There's enough pushback from Wisconsinites that lawmakers have drafted a bill that would give local communities the power to veto the ring-shaped intersections in their area.

Rep. David Craig (R-Big Bend) has drafted a proposal in which local engineers could weigh in on proposals by the state Department of Transportation (DOT) and make community-oriented decisions. Currently, the DOT holds public hearings before they build a roundabout, but it can go ahead with construction despite local opposition. With Sen. Tim Carpenter (D-Milwaukee) signing on as a co-sponsor, Craig said he was happy about the bipartisan support.

"They are controversial. In some places they work, in other places they don't," Craig said, adding that most drivers in his district are "extremely opposed" to roundabouts. "It comes down to local control."

Craig's bill, which is in its earliest stages, has not been formally introduced, but its authors have advertised the legislation and asked for co-sponsorship.

Common in Europe, roundabouts first came to the U.S. in the 1990s and to Wisconsin in 1999. Since then, Wisconsin has seen 268 new roundabouts, with nearly 100 more in the pipeline coming in the next several years. State data show that roundabout projects trickled in during the 2000s, then took off starting in 2010, adding about 50 a year.

Most have been built as part of the DOT's reconstruction of the Highway 41 corridor, said Paul Van Noie, Brown County's highway commissioner. Van Noie said the influx of roundabouts "have worked out very well."

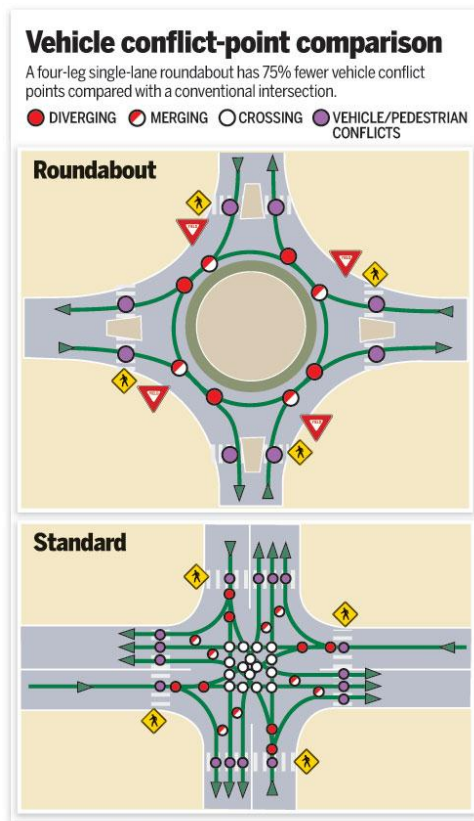
They're less costly to maintain — there are no signals or electricity — and they keep traffic flowing better than signals.

"People resist change," Van Noie said. "But once the public gets used to them, it really is a nice feature."

On Friday afternoon outside Conejito's on S. 6th and W. Virginia streets, a few honks sounded from the nearby roundabout.

"I was here last week, and we were talking about how many horns you hear in an hour," Milwaukee resident Jessica Valona said Friday. "I think it's a great concept, but people panic when it should just be a constant flow."

Valona said the back-to-back roundabouts on either side of I-43 and Moorland Road in New Berlin were supposedly the worst in the area.



"People just don't get it yet," she said. "There should be an instructional video."

Patrick Fleming, a DOT project manager, said converting a two-lane roadway to a single-lane roundabout can cost up to \$1.25 million, while converting a four-lane roadway into a dual-lane roundabout can cost up to \$1.5 million.

Roundabouts aren't more expensive than installing signals to create a traditional intersection, he said.

Engineers say roundabouts are safer because they eliminate the most dangerous element of the traditional intersection: the left turn.

Traditional intersections breed head-on and T-bone collisions that can be fatal, and during a left turn, each additional lane a car has to cross increases the chance of a fatality exponentially, said Ash Anandanarayanan, a transportation analyst at 1000 Friends of Wisconsin, an environmental advocacy group.

Roundabouts will generate side swipes, which usually cause only property damage.

Patrick Fleming, a DOT project manager, said the most common crashes in roundabouts happen when drivers entering a roundabout fail to yield to a car that's exiting from the inner lane.

Another frequent problem: when cars in the inner lane abruptly change to an outer lane. That's not allowed. Also, while there are 32 places in a traditional intersection where a car could crash or hit something, there are only 8 in a roundabout.

"Their advantages really outweigh the disadvantages, and DOTs across the country are investing heavily in roundabouts because accidents are one of the hugest drains on the economy," Anandanarayanan said. "Reducing crashes is such a huge benefit that they will likely put in more."

Roundabouts also force traffic to slow down, and that helps pedestrians.

A study done in 2011 by the University of Wisconsin-Madison's Traffic Operations and Safety Laboratory (TOPS) analyzed crashes and severity for 24 Wisconsin roundabouts in the years before and after they were installed.

They found a 9% decline in crashes and a 52% drop in fatal and serious injury crashes. An updated study is due out next month.

For all the safety benefits, there's a trade-off: Drivers often don't like them, and there's a good reason.

At a roundabout, it's not as simple as "green means go," TOPS researcher Andrea Bill said.

"It's a lot of information to process. As you come up to a roundabout, you have to know what lane to get in, where to go afterward, and you have to judge a gap to enter the roundabout," Bill said. "I think there's some angst with that, especially when there's a learning curve."

Bill said that at dual lane roundabouts drivers are supposed to yield to both lanes of traffic, and one of their studies showed Wisconsinites having difficulty doing that.

When asked why roundabouts were so controversial after a decade-long history in Wisconsin, DOT Assistant Deputy Secretary Steve Krieser sighed and replied that he didn't know.

"It's kind of an interesting dynamic," he said. "Once they are there and people learn how to drive them, in many cases people come to like them. It's certainly a very strange phenomenon."

Source #3: Research on Roundabouts

This excerpt is part of a longer selection citing studies related to a variety of aspects of roundabouts. Note the difference in style between this academic piece written by Victoria Fromme and the previous two newspaper articles.

Safety

Notes on my thoughts, reactions and questions as I read.

The National Cooperative Highway Research Program states that a “substantial reduction in injury accidents” has been the primary reason for the great success of modern roundabouts in France and in Germany. The significant decline in crashes occurs because of the reduction of points of conflict. Points of conflict are areas in which accidents with other cars, pedestrians, or bicyclists can occur. Limiting traffic and separating the movements through the use of splitter islands reduces the number of conflict points to eight in a roundabout in comparison to a common four-way intersection with a total of 32 possible conflict points (Persaud 2).

Many studies have proved this finding. For instance, Schoon and van Minnen investigated 181 Dutch intersections that were transformed from a traffic signal or stop sign intersection to a roundabout (Persaud 2). The study found that crashes and injuries decreased by 47 percent in the former traffic signal and 71 percent in the former stop sign intersections. Furthermore, the severe injury crashes were reduced by 81 percent (Persaud 2). Similarly, Troutbeck reported an average of 74 percent decrease in the rate of injury crashes at 73 intersections in Australia that were converted from typical signal designs to roundabouts (Persaud 2).

Elvik supports this conclusion with the finding that conversion of a yield, two-way stop, or traffic signal control to a roundabout lessens the total of injury crashes by 30-40 percent (Persaud 2). Furthermore, bicycle crashes were lessened by 20 percent (Persaud 2). The number of accidents involving pedestrians was decreased by 30 percent. Pedestrians are also typically safer because of several reasons. Pedestrians do not actually cross the roundabout, they circumnavigate or cross the vehicular entrances (Persaud 2). At the vehicular entrance crossways, the splitter islands allow for safer crossings because pedestrians do not have to jolt continuously cross two lanes of traffic. Instead, the pedestrian cross one lane of traffic, break in the splitter island, then cross the other lane of traffic. Furthermore, pedestrian crossings are placed one car length from the entry point (Persaud 2).

According to the National Cooperative Highway Research Program “All of the survey respondents agreed that U.S. roundabouts performed

well in terms of the following criteria: shorter delays, increased capacity, improved safety, and improved aesthetics” (Jacquemart 32).

Also, the study showed that “delay measurements at seven roundabout sites showed that the peak-hour delays decreased by about 75 percent, in relation to the previous traffic control. Before-and-after crash statistics at 11 existing roundabouts showed a reduction of 37 percent in total crashes, 51 percent in injury crashes, and 29 percent in property damage-only crashes. For the eight small-to-moderate-size roundabouts, with an outside diameter of up to 37 m (121 ft), the crash reductions were statistically significant for total crashes (a reduction of 51 percent) and for injury crashes (a reduction of 70 percent)” (Jacquemart 32).

Benefits to the Environment and Aesthetics

Research suggests that roundabouts are more beneficial for the environment than typical intersections. Because “drivers do not have to wait as long at roundabouts as at signalized intersections, roundabouts are friendlier to both the driver and to the environment” (Jacquemart 12). Roundabouts allow for a steady stream of traffic which prevents drivers from idling a car and wasting gas. In addition “the reduced amount of paved areas and the reduction in noise and air pollutant emissions are also cited in the European literature as advantages for roundabouts. Field measurements in Sweden showed reductions in pollutant emissions and fuel consumption in the range of 21 to 29 percent” (Jacquemart 12).

If designed correctly, roundabout design can benefit the environment. Roundabouts can include pervious treatments to absorb runoff. Roundabouts are also such an important roadway feature, because they have the potential to serve as gateways, especially if the roundabouts are placed in strategic areas such as main intersections. The center medians can be transformed into gardens, contain statues or public art, and be a symbol for the community. Roundabouts essentially have the potential to redefine an image of a community through the transformation of a roadway intersection.

Costs and Economic Impact

Roundabouts also cost significantly less than conventional intersections. Conventional traffic light intersections require an average of \$125,000 of equipment (“A Guide”). Also, the electricity costs \$8,000 to \$10,000 per stop light each year (“A Guide”). Findings also show that roundabouts improve the surrounding commercial venues. In 1999

Golden, Colorado changed four intersections into roundabouts. They created a commercial roundabout district. This district had experienced a decrease in injury crashes by 94 percent, and a decrease in overall crashes by 88 percent. Also, the commercial district experienced a sales tax revenue increase of sixty percent which resulted because of the traffic volumes that increased by 35 percent (more customers), speeds that decreased by 30 percent (more time to be allured by signs of stores), and increased traffic volumes of 35 percent (Sides 2). Roundabouts not only cost less to maintain than typical intersections, but also have the capability to improve the appeal of an area. Roundabouts often refresh the image of a community; after all, the new roundabout consists of new pavement and signs. The fresh image allures people to the area. More people yield more customers.

Responses to Roundabouts in the US

According to the National Cooperative Highway Research Program “A survey of residents and workers near the Montpelier, Vermont roundabout indicated that 56 percent of the respondents had a favorable opinion of the roundabout, 29 percent had a neutral opinion, and 15 percent had an unfavorable opinion. Of the 106 respondents, 93 percent had driven through the roundabout, 82 percent had walked through the roundabout, and 18 percent had bicycled through the roundabout. No differences in opinion were discerned among the drivers, pedestrians, and bicyclists” (Jacquemart 20).

After the first American prestigious roundabout in Clearwater, Florida was proposed, many of the residents protested the new road project (Sides 2). However, after the Clearwater Beach Entryway Roundabout opened in 1999, the residents and business owners presented the City of Clearwater funding to encourage the construction of a second roundabout (Sides 2).

In the following years, residents of Clearwater rallied the City to convert 14 more intersections into roundabouts (Sides 2). These examples exemplify the initial, negative reaction to roundabouts in the United States. However, once the roundabouts are installed and properly working, the citizen approval drastically changes. Citizens even demanded more roundabouts. Therefore, those with power to implement roundabouts should not waver the implantation based on citizen’s initial opposition, because it is very likely that the citizens will approve the roundabout once the roundabout is installed and properly operating.

Source 4: "Are roundabouts dangerous? So far, yes"

This final resource also comes from a Wisconsin newspaper and is dated September 1, 2009. New Berlin is a city in Waukesha County with a population of about 40,000, a slightly smaller community than Albany, Oregon.

Notes on my thoughts, reactions and questions as I read.

New Berlin — After negotiating his way through the Moorland Road/Rock Ridge roundabout to take in a movie at the Ridge Cinemas, Steffen Smith didn't mince words when asked about driving through the circle of asphalt.

"I don't like them," he said. "They're not as safe as they wanted them to be. People don't know if they should yield or go, and that creates a hazard."

Smith made it through the roundabout with no problem, but dozens of motorists have been less fortunate.

In fact, new figures from the city show that drivers were more likely to have a crash in the Moorland Road/Rock Ridge roundabout last year than at any other major intersection in New Berlin.

There were 2.08 crashes per 1 million vehicles through the intersection, the highest crash rate among the top 25 New Berlin intersections in 2008.

New Berlin's other roundabout, at Moorland Road and Interstate 43, had the third highest crash rate with 1.43 crashes per 1 million vehicles.

Those figures are based on accidents reported to the state—those that involve injuries or more than \$1,000 in property damage. Eight of the city's top 25 intersections had crash rates more than 1 per 1 million vehicles in 2008, an indication that the intersection should be looked at for safety improvements, city officials say.

Roundabouts take the place of traffic lights at intersections. Motorists drive around in a circle counterclockwise in the middle of the intersection and exit onto the street they want.

The state built both New Berlin roundabouts: the one at I-43 and Moorland Road, and the Moorland Road/Rock Ridge roundabout, a short distance south of there.

The Rock Ridge roundabout had 19 reportable accidents in 2008 and the I-43 roundabout had 17.

In terms of total accidents last year, the most dangerous intersection was Moorland Road and Greenfield Avenue, where there

were 30 crashes. But there is so much traffic driving through the crossroads that its crash rate of 1.57 per million vehicles ranked second in the city.

Reasons cited for high rates

It is hardly a surprise that the roundabouts had such high accident rates, however. Both were under construction most of last year while traffic struggled through them. On top of that, drivers were trying to get used to the new form of intersection.

"It's a whole new driving experience," Police Chief Joseph Rieder said. "It's a matter of drivers getting comfortable with roundabouts and paying attention to the signs."

Now that construction is finished and drivers can concentrate on getting used to the roundabouts, Rieder said he hopes the accident rate will go down.

But he said the number of accidents at the Rock Ridge/Moorland Road roundabout is significantly higher than what it was at the two intersections with traffic lights in that section of the road that were replaced by the roundabout.

Question #1: Based on the information in these articles, complete the chart below. To the right of each argument, indicate the source #(s) where you found the argument.

Arguments in Support of Constructing Roundabouts	Source #(s)	Arguments in Opposition to Constructing Roundabouts	Source #(s)

Question #2: In the space below, describe the difference in purpose between Source #3 and the other articles and how this leads to differences in the writers' style and structure. Be sure to include specific examples from the various texts. Continue on to the back of this page, if needed.

Question #3: Researchers and reporters have a purpose when they quote sources in their articles, whether these sources are experts on a topic or ordinary citizens. Sometimes the credibility of these sources could be questioned because of their occupation or how a decision might affect them personally. Choose at least four sources that were quoted or cited in these articles, and complete the chart below to analyze how they are used. (If you would like to choose more than four, add them by creating more lines on the bottom of the chart.)

Source #	Person or Group Cited/Quoted	Reason(s) why author likely chose to include this source	Possible bias or motivation that might affect credibility of this source

Part 2

You will now have the opportunity to review your notes and sources, plan, draft, and revise your report. You may use your notes and refer to the sources. You may also refer to the answers you wrote to the questions in Part 1. Now read your assignment and begin your work.

Your Assignment

A local community's city council is responding to complaints about traffic congestion at three major intersections and is considering options to deal with their problem. They are deciding whether to spend funds on traditional traffic lights or to construct roundabouts. Based on the research you and your civics class have done, write an argumentative essay that recommends the position that you think the city council should take. Be sure that your recommendation acknowledges both sides of the issue so that people know that you have considered this recommendation carefully. You do not need to use all the sources, only the ones that most effectively and credibly support your position and your consideration of the opposing view.