

# TRANSPORTATION / AIR QUALITY DOCUMENT



## LINKING TRANSPORTATION AND AIR QUALITY

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# W A M P O

Wichita Area Metropolitan Planning Organization

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## Overview

Transportation decisions have a major impact on air quality. Most of the vehicles we travel in (cars, trucks, buses, trains, and planes) are fueled by gasoline or other petroleum products. **Mobile emissions**, caused mostly by these vehicles are a significant source of air pollution in our communities. The choices we make to meet our future transportation needs will substantially affect the future air quality of the region.

This document provides an overview of the common air pollutants related to transportation and how they are measured. This document is not designed or meant to be a plan on how the region will approach air quality issues. It is meant as a document to provide basic information.

This document discusses key transportation related air quality issues in the region including what happens if the region fails to meet certain federal air quality standards. Strategies and ideas on how to maintain or enhance our air quality, especially with the potential of the region to fail to meet these federal standards, are included.

## What Are Common Air Pollutants Related to Transportation?

Any transportation vehicles powered by gasoline or other fossil fuels emit pollutants into the air. These are called mobile emissions because the vehicle moves from place to place while emitting pollutants. Mobile emissions differ from what are called **point sources emissions**; facilities such as factories that emit pollution at a stationary location. Exhaust from motorized vehicles contains several pollutants of concern, with varying effects on local and regional air quality. The following paragraphs discuss the most common air pollutants related to transportation.

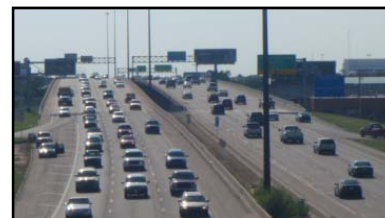
### Ground Level Ozone

Ground level ozone is part of what we commonly call smog. Prolonged exposure to ground level ozone can cause irritation to the eyes, nose, and lungs. Ground level ozone also damages vegetation and reduces crop production. The transportation system contributes to a large portion of

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### What are mobile emissions?

Pollutants caused by moving sources such as cars, trucks, trains, buses, and airplanes.



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### What are point source emissions?

Pollutants caused by stationary sources such as factories, homes, and businesses.





ozone emissions. In the WAMPO region, the highest levels of ground level ozone typically occur from April 1<sup>st</sup> to October 31<sup>st</sup>, the time period federally designated as ozone season for the WAMPO region. Two other transportation related pollutants, nitrogen oxides and volatile organic compounds are emissions which, in the presence of air and sunlight, combine to form ozone.



**Idling Vehicles Causing Air Pollution**

### **Carbon Monoxide**

Carbon monoxide is a colorless and odorless gas which is the product of incomplete combustion. It is a major pollutant from gasoline-fueled motor vehicles. Carbon monoxide is harmful because it reduces oxygen delivery to the body's organs and tissues. It is most harmful to those who suffer from heart and respiratory disease. Carbon monoxide emissions are greatest from vehicles operating at low speeds and prior to complete engine warm-up (within approximately eight minutes of starting), particularly in colder winter months. Congested urban intersections tend to be the principal problem areas for carbon monoxide.

### **Particulate Matter**

Particulate matter is the term for solid or liquid particles suspended in the air. Some particles are large or dark enough to be seen as soot or smoke, but fine particles of particulate matter are of concern. Small particulate matter, PM10 (ten microns or smaller) particulates, are coarse particles such as windblown dust from fields and unpaved roads. Extremely small particulate matter, PM2.5 (2.5 microns or smaller) particulates, include finer particles. PM2.5 particulates are generally emitted from activities such as industrial and residential combustion, fires, and from vehicle exhaust. PM2.5 is a health concern because fine particles can reach the deepest regions of the lungs. Health effects include asthma, difficult or painful breathing, and chronic bronchitis, especially in children and the elderly. Transportation is one of the causes of both sizes of particulate matter.



**Construction Equipment Causing Air Pollution**

### **Other Air Pollutants**

There are other air pollutants that the Environmental Protection Agency (EPA) sets standards for, but are less related to transportation.



While the pollutants listed above come from a variety of sources, a dominant source is motorized vehicles. A 2005 National Emission Inventory for the Wichita area commissioned by the EPA concluded that 25% to 35% of the emissions of chemicals that lead to ozone (the range depends on the different chemicals) were released by on-road motor vehicles. This study shows how important it is to consider the effects of future transportation choices on the region's air quality.

## How Is Air Quality Measured and What Standards Need to be Followed?

The federal government has set standards for air quality. In order to see if the region meets the standards, air quality must be monitored.

### National Ambient Air Quality Standards

Due to the health effects of the various air pollutants previously discussed, the EPA has established a series of National Ambient Air Quality Standards (NAAQS) for various air pollutants. These standards set maximum levels of air pollution that can exist in a region before severe measures to reduce air pollution are required. As a result of these standards, there are a number of agencies involved in monitoring air pollution in the WAMPO region and educating the community on ways to reduce air pollution. **Exhibit 1** presents the key agencies involved in air pollution monitoring.



Air Quality Monitors



Air Quality Monitors



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## Exhibit 1: Key Agencies Involved in Air Quality Decisions in the WAMPO Region

Agency	Role in Monitoring Air Pollutions
Sedgwick County Department of Environmental Resources	The Sedgwick County Department of Environmental Resources works with the City of Wichita Air Quality Section in the monitoring of air pollution at 18 monitors at eight sites in the County and making decision on air quality issues.
City of Wichita, Public Works Department	The City of Wichita works to reduce air pollution in Sedgwick County and works cooperatively with other agencies and the public to control air pollution and prevent the degradation of air quality. The City coordinates and staffs the Wichita Air Quality Improvement Task Force that includes local, state, and federal agencies as well as companies and stakeholders. Monitors ambient air for pollutants in accordance with regulations set forth in the federal Clean Air Act.
Kansas Department of Health and Environment (KDHE)	KDHE gathers and analyzes air quality data from across the state and develops strategies in locations where air quality improvement is needed. KDHE is responsible for establishing the locations of air quality monitors and contacts with the City of Wichita who maintains the monitors. KDHE make recommendations to EPA when regional air pollution standards are exceeded.
United States Environmental Protection Agency (EPA)	The EPA administers the federal Clean Air Act and sets and monitors compliance with the NAAQS for various air quality emissions. The EPA also provides grant funds to local agencies such as the City of Wichita to monitor air pollution and provide local education.

The agencies listed in **Exhibit 1** work together to maintain an air quality monitoring program in the region.

### Measuring



Air Quality Monitor Filter

The level of air pollution is typically measured by assessing the amount of a specific pollutant that exists in the air compared to the total volume of air, typically measured in a certain number of parts per million. For example, for ozone, a level above 0.075 parts per million exceeds the current federal standard. The standard for ozone is currently being updated and is expected to be changed to between 0.060 and 0.070 parts per million within the next year. The new lower values mean that it will be more likely that the region will violate (exceed) the standards.



## Monitoring

KDHE has established a series of eight local monitoring sites where the air is consistently sampled (most often hourly). The results from the monitors at these sites are used to determine if the air quality standards are being exceeded for the region. They are also used to determine the **Air Quality Index**, a daily measure of the region's overall level of air pollution and its potential effects on people. Due to the predominant wind direction, a monitor at Peck measures the pollutants in the air before it enters Sedgwick County. A monitor near Park City measures the pollutants in the air as it exits Wichita. The EPA and KDHE have determined that samples collected at the monitor located at the health department in Wichita (I-135 and 9<sup>th</sup> Street N.) represent typical urban air quality in the region. **Exhibit 2** identifies the air quality monitoring sites in, or just outside, the WAMPO region.

## What is the Air Quality Index (AQI)?

A way of reporting daily air quality. It tells you how clean or polluted the air is and associated health effects that might be a concern. The AQI focuses on health effects experienced within a few hours or days after breathing polluted air. The EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide.

Think of the AQI as a yardstick from 0 to 500; the higher the AQI value, the greater the level of air pollution and the greater the health concern. A value of 100 is generally thought to be satisfactory.

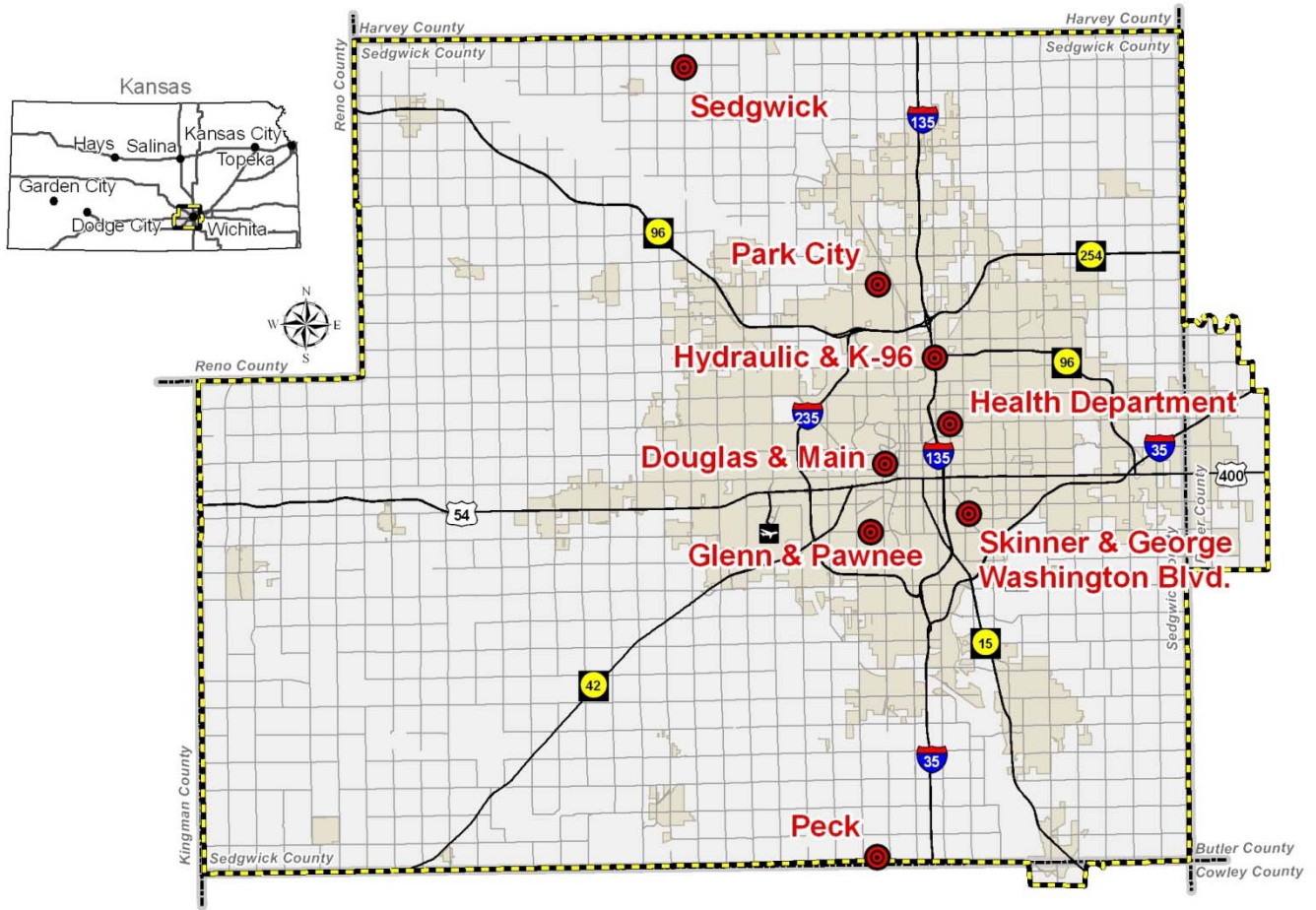


The Air Quality Index is color coded. Green means the air quality is good. Yellow means that it is acceptable. Orange means that groups sensitive to air quality may begin to experience health effects. Red or higher means the air quality may affect everyone's health.



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## Exhibit 2: WAMPO Region Air Quality Monitoring Sites



\*Peck monitor is just south of Sedgwick County. umner County

### What Are the Key Air Quality Issues in the WAMPO Region?

The following paragraphs identify important air quality issues in the WAMPO region and specifically identify ground level ozone as the primary threat to air quality.

#### Potential to Exceed Federal Standards

The region must monitor many air pollutants to see if NAAQS are exceeded. The following outlines the potential for the region to exceed these standards for a few of the major pollutants.



Some Congestion on US-54/400 (Kellogg)



## Ground Level Ozone

The region has been close to exceeding (violating) the air pollution standards for ground level ozone in recent years. When a region is meeting all of the NAAQS set by EPA, it is in **attainment**. When regional air pollution exceeds the NAAQS, the region is designated as being in **non-attainment** for that pollutant. Whether or not a region's air quality meets the standard is determined by averaging near peak levels of pollution over a three year period. In other words, one single day of bad air quality does not mean that the federal standard is exceeded. During a three year period, the average value of the fourth highest level of pollution measured for each year exceeds the standard, this will most likely result in the region being designated as non-attainment. The WAMPO region is close to that point for ground level ozone. **Exhibit 3**, from the Sedgwick County Department of Environmental Resources, shows how close the region has come to exceeding the standard for ground level ozone at various sites (purple dotted line is the current standard).

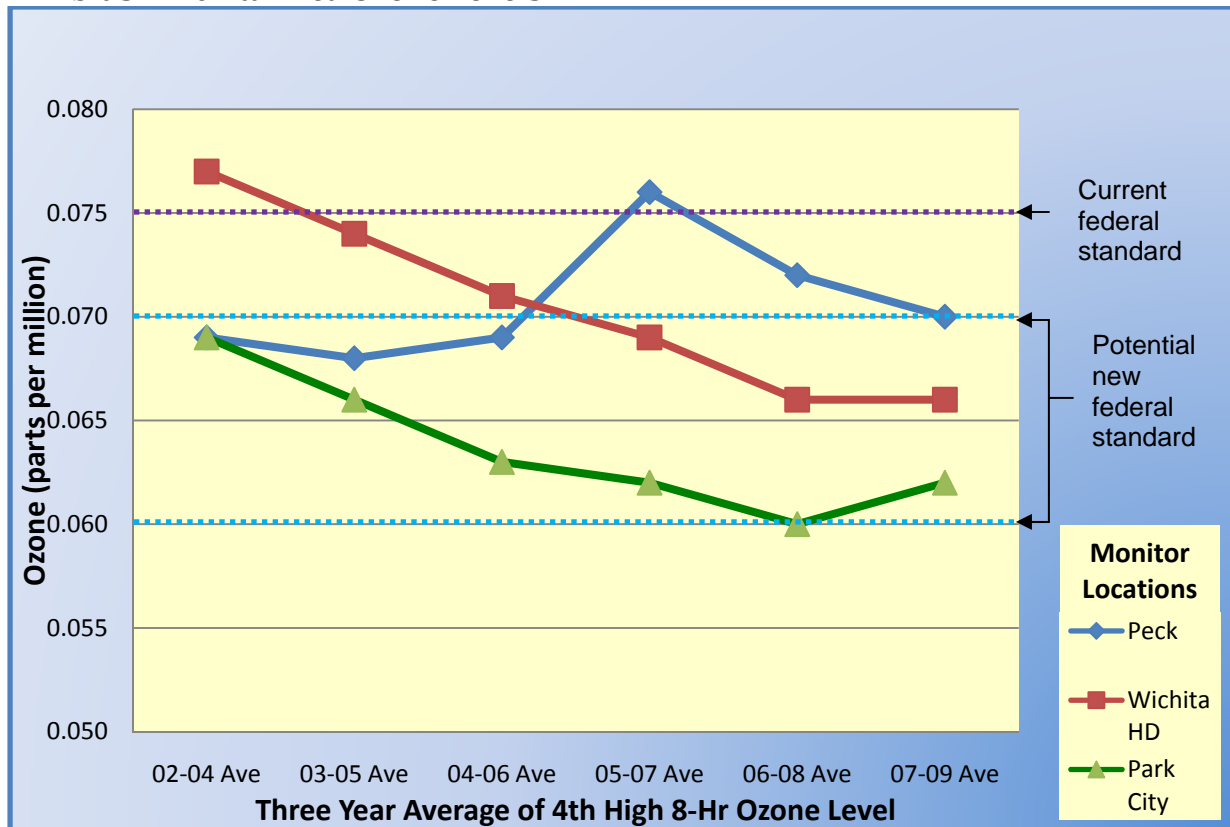
### What does attainment mean?

It means that the air quality in the region meets the National Ambient Air Quality Standards for a specific air pollutant, such as ground level ozone.

### What does non-attainment mean?

It means that the air quality in the region violates, or exceeds, the National Ambient Air Quality Standards for one or more air pollutants.

**Exhibit 3: Wichita Area Ozone Levels**





Clear Sky Over the WAMPO Region

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### What are green house gas emissions?

These are air pollutants that contribute to the green house effect. They include carbon dioxide, methane, chlorofluorocarbons, and others. The green house effect is caused when these gases trap the energy and heat from the sun, which is reflected by the earth, and keep it within the atmosphere.

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### What is meant by climate change?

This refers to the alteration of long-term weather patterns and temperatures at many locations on the earth. Green house gases are believed to contribute to long-term changes in climate.

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In addition to emissions from vehicles and other sources, weather often plays a key role in determining if air quality standards are exceeded. Hot and muggy weather tends to keep pollutants closer to ground level and increases the chance of exceeding the standard. The summers of 2008 and 2009 were unseasonably mild in the WAMPO region. This cooler weather helped keep the ozone levels down. Should the summer of 2010 bring typical Kansas summer heat, the region could approach unhealthy levels of ozone in the air. This could lead to exceeding the standard. In addition, if the standard for ozone pollution is lowered to between 0.060 and 0.070 parts per million as expected, the graph shows that the region will likely exceed the standard. This would likely result in the region being designated as non-attainment for ozone pollution. The effects of being designated non-attainment are discussed later in this chapter.

### *Carbon Monoxide*

Carbon monoxide pollution tends to be more of a local issue than a regional issue. While ozone may affect the entire region, areas of higher than average carbon monoxide levels tend to only occur at highly congested intersections or other locations of congestion. The potential for exceeding carbon monoxide levels is monitored on a case by case basis and investigated as new road projects are considered and designed. The current levels of carbon monoxide in the region are below EPA standards and are not considered an immediate concern.

### *Particulate Matter*

Similar to carbon monoxide, the region has not come close to exceeding the standards for particulate matter.

### *Green House Gas Emissions and Climate Change*

Green house gas emissions from motorized vehicles, primarily carbon dioxide, are of concern as they relate to **climate change**, including long-term warming trends across the earth. Green house gas emissions are an important issue for the region to consider in planning transportation infrastructure. The combustion of fossil fuels is by far the biggest source of green house gas emissions. In the United States, transportation is the second largest source of green house gas emissions, after electricity generation. Cars and trucks account for a majority of these transportation related emissions.



Opportunities to reduce green house gas emissions from transportation include switching to alternative fuels, using more fuel efficient vehicles, and reducing the total number of miles driven. Each of these options require a mixture of community, individual, and private sector involvement.

Transportation infrastructure may also be affected by climate change over time. Transportation infrastructure is vulnerable to increases in severe weather and long periods of higher than average or extreme fluctuations in temperature. Damage due to changing climate may increase the cost of maintenance for transportation projects in the region. WAMPO and its partner communities and agencies will need to consider the effects of climate change on the transportation facilities in planning for the future.

### **Mobile Source Air Toxics**

Mobile Source Air Toxics (MSATs) are becoming an air quality issue of increasing concern for major transportation projects. MSATs are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Others are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics, which are a subset of MSATs, also result from engine wear or impurities in oil or gasoline. MSATs are really of concern at locations where there are large concentrations of idling vehicles, particularly those powered by diesel. Examples of these would be truck stops, intermodal centers, and distribution yards if trucks and other vehicles are left idling for long periods of time. Anti-idling rules and strategically locating these facilities are potential solutions to reduce exposure to MSATs.

### **What Will Happen if the Region Becomes Non-Attainment for Air Pollutants?**

As discussed in the section above, the WAMPO region has a high risk of being designated a non-attainment area for exceeding the air pollution standards for ground level ozone. This is a key reason why one of the short-term objectives for the MTP 2035 is “maintain air quality



**Multiuse Paths Can Reduce Mobile Source Emissions**



**Idling Trucks**



**Freight Trucks**



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### What is a State Implementation Plan (SIP)?

A document that outlines federally approved control strategies to minimize air pollution.

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### What is an emissions budget?

The maximum amount of certain air pollutants that the federal government will allow the region to emit.

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Air Quality Monitoring Equipment

attainment status.” A designation of the region as non-attainment would lead to several costly changes and require mandatory initiatives to reduce air pollution. The non-attainment requirements are discussed in the following paragraphs.

### Develop a Plan

If the WAMPO region were to be designated as a non-attainment area by the EPA under the standards of the Clean Air Act, KDHE would develop a **State Implementation Plan (SIP)** for the area within the air quality boundary. KDHE would develop the SIP in consultation with WAMPO and other entities, which ultimately must be approved by the EPA. The SIP is a collection of strategies and programs for reducing air pollution in the region in order to meet the NAAQS and bring the region back into attainment and maintain attainment status. An important element of the SIP is the **emissions budget**, which sets a limit for the amount of pollution that the region can emit. WAMPO would use the emissions budget in the conformity process.

### Conformity Analysis

WAMPO would be required to perform a conformity analysis to show that plans and programs will not exceed the emissions budget. WAMPO must demonstrate conformity by comparing the SIP’s emissions budget to the projected emissions for all projects included in the MTP and the Transportation Improvement Program (TIP). Conformity analysis is the process and documentation where WAMPO demonstrates that its plans, programs, and projects are consistent with the SIP’s emissions budget and air quality goals.

### Air Quality Modeling

If the region is designated as a non-attainment area, it would be required to do air quality modeling. This is to analyze the effects of proposed transportation projects. WAMPO’s regional travel demand model would be an input to the regional air quality modeling process. In order for projects in the MTP and TIP to be implemented, the model would have to show that the projects do not produce emissions in excess of the established emissions budget.



## Potential Effects

Potential effects of being designated as non-attainment that would impact transportation and economic development could include<sup>1</sup>:

- Increased costs to industry/commerce for air pollution controls.
- Potential limits on existing business expansion plans.
- Possible annual motor vehicle inspection and maintenance programs.
- Introduction of new carpooling programs.

Federal competitive funds such as the Surface Transportation Program funding administered by WAMPO could be restricted to only projects with substantial air quality benefits. The flexibility of Congestion Mitigation and Air Quality funds would be reduced.

The potential for the region to be designated as non-attainment has led the City of Wichita, Sedgwick County, and other agencies to pursue measures to help reduce the risk of exceeding the air quality standards for ground level ozone. This has included the formation of a regional Air Quality Improvement Task Force, which made several recommendations on how to reduce air pollution. Potential measures that can be taken on an individual and community basis are discussed below.

## What Can WAMPO Region Communities and Residents Do to Enhance Air Quality?

We all have the potential to positively or negatively impact regional air quality. Actions can be taken to mitigate negative impacts and focus on maintaining air quality attainment status.

## Strategies for Reducing Air Pollution

There are several measures that residents and local communities can take to fulfill the WAMPO MTP 2035 objective of maintaining air quality attainment status.

<sup>1</sup> City of Wichita, Office of Environmental Health, Air Quality Section Presentation on Air Quality Issues.



Dynamic Message Sign to Alert Travelers and Reduce Travel Delay



Bike Route Sign



## TRANSPORTATION/AIR QUALITY DOCUMENT

Many of the strategies, as proposed by the MTP 2035, would reduce the amount of vehicle emissions by decreasing the amount of driving and congestion. Some of the key strategies proposed by the MTP 2035 to enhance air quality include the following:



Transit Stop

- Support and assist in the study, development, and implementation of a regional transit system, when appropriate. The future transit system should particularly focus on providing connections to and between major public facilities.



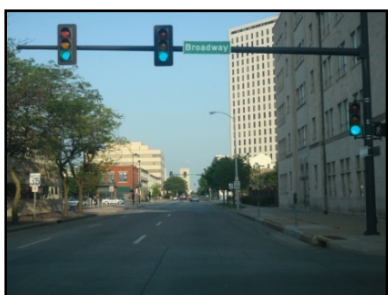
Higher Density Mixed Use Development

- Support local jurisdictions and agencies in developing land use policies that support programs such as transit-oriented development and complete streets. Typically these land use policies include focusing on increasing land use density, re-using or redeveloping existing sites, and locating stores, homes, and community facilities near each other to encourage more walking and use of transit.



Bike Lane

- In 2007, WAMPO completed the Regional Pathway System Plan that identified ideas for building and connecting regional trails and bicycle routes. WAMPO should now work to build the support of the local communities to make this plan happen.
- Prioritize projects that are located in areas that have been identified as being highly congested in WAMPO's Congestion Management Process. This would include projects that reduce congestion on existing highly congested roads as well as those that help reduce the length of back-ups due to crashes and other incidents.



Signal Timing Can Reduce Congestion

- Ensure that WAMPO's transportation plans and use of funding reflect national priorities and inform local jurisdictions about national trends and priorities. Some current examples of national priorities include: transportation projects that create jobs, addressing climate change and other environmental issues, emphasizing transit, rail and other alternative forms of transportation, and making the best use of limited transportation funding.

- The federal government currently provides WAMPO with funds to address congestion and air quality issues.



WAMPO should have a policy of only using these funds on projects that specifically reduce congestion and/or motor vehicle emissions.

- Participate in special events to encourage increased levels of bicycling and walking.
- Create and provide a bicycle user's map.
- Conduct public outreach on one or more of the following topics: public transportation, share the road, air quality, and other safety issues.
- Develop a process to determine information needed to create baseline measures of transportation related energy consumption and CO<sub>2</sub> emissions.



Multiuse Path

Many of the other strategies proposed in the MTP 2035 would also assist in improving air quality through congestion reduction or encouraging more use of transit, cycling, and walking.

## Evaluation of Projects to Reduce Air Pollution

As part of the project selection process for the MTP 2035, the MTP Project Advisory Committee members specifically allocated points for projects that helped to maintain the region's air quality attainment status. This was done through use of the Measures of Effectiveness discussed in the MTP 2035. Approximately 20% of the total score (depending on the type of project) was allotted to meeting this objective. Information on the exact evaluation criteria and project selection process is available in the MTP 2035.



I-135 Not Congested

Transportation projects that reduce congestion, reduce idling, or promote alternative transportation modes are beneficial to air quality. The MTP 2035 project list includes a wide variety of road, transit, bicycle, pedestrian, and other types of projects that can reduce negative impacts on regional air quality.

WAMPO will continue planning efforts that address air quality concerns. In evaluating future projects for funding, WAMPO will continue to address their effects on air pollution levels, particularly ground level ozone.



### Individual Actions by Residents and Communities

Actions by individual residents and communities can collectively help to reduce air pollution in the region. Every day, residents can make small transportation related changes that will help the region stay in air quality attainment status.



Multiuse Path and Bridge

- Refueling vehicles after 6 p.m.
- Driving less and seeking alternative transportation when possible including transit, cycling, or walking.
- Keeping cars well maintained and tires properly inflated.
- Reducing unnecessary vehicle idling.
- Combining errands and car pooling for activities when possible.

The regional Air Quality Improvement Task Force included the following recommendations to encourage communities to reduce air quality emissions related to transportation.



Car Pooling Sign

- City and county governments should consider purchasing cleaner fuels and more efficient vehicles.
- Consider funding a gas cap replacement project to reduce emissions due to poor gas caps.
- Continue voluntary emission testing programs.
- Continue public awareness and education efforts.

The WAMPO region may be unable to avoid violating the proposed new air quality standards for ground level ozone. Whether or not the region is designated non-attainment, cooperative efforts such as the ones outlined above will be needed to meet the air quality related objectives and strategies of the MTP 2035.