Update of MOSERS Guide

Updating MOSERS Guide

- Updating existing modules
  - Content
  - Formatting

- Developing a new module
  - Analytical procedures for activity parameters used with MOSERS equations

Updating Existing Modules

- Existing modules were reorganized
  - Module 1 – Background Material
  - Module 2 – Strategies and Equations

- Content
  - Based on the most recent information
  - Reorganized and condensed - Deliver key items for practitioners
- Formatting
  - A more visual format to improve user experience

Updating Existing Modules

1.0 The Basics

This Chapter provides an overview of the main pollutants involved in the relationship between air quality and transportation as well as the standards by which these pollutants are regulated (National Ambient Air Quality Standards [NAAQS]) and an explanation of attainment designations.

1.1 Air Pollutants

The United States Environmental Protection Agency (EPA), in response to the Clean Air Act of 1970 (CAA) and subsequent amendments, established NAAQS for several pollutants that adversely affect human health and welfare. These are termed "criteria pollutants". The EPA, through state or local air quality agencies, monitors these pollutants against NAAQS. The six criteria pollutants are:

- Carbon monoxide (CO)
- Particulate matter (PM)
- Ground Level Ozone (O_3)
- Nitrogen dioxide (NO_2)
- Lead (Pb)
- Sulfur dioxide (SO_2)

Of these six pollutants, transportation is a major contributor to three pollutants: CO, PM, and ground-level ozone. Exposure to these pollutants can cause or exacerbate health problems and even increase mortality rates. Ozone also contributes to what typically experienced as "smog" or haze. CO and PM are directly emitted from motor vehicles. Ground-level ozone is formed through a complex chemical reaction between two pollutants emitted from motor vehicles: hydrocarbons (HC) and oxides of nitrogen (NO_x), in the presence of sunlight. HC and NO_x are called "precursor" pollutants. The following provides a summary of these pollutants.

Table 1 provides a summary of these emissions and their effects on human health and welfare.

Quick Facts

- Ground level ozone is the major pollutant of concern in Texas.
- Ground level ozone concentrations peak in the summertime.

Equation

Daily Emission Reduction = A + B – C – D (g/day)

$A = VT_R * TEF_{AUTO}$

Reduction in auto start emissions from trips reduced

$B = VMT_R * EF_R$

Reduction in auto running exhaust emissions from VMT reductions

$C = VT_{BUS} * TEF_{BUS}$

Increase in emissions from additional bus starts

$D = VMT_{BUS} * EF_{BUS}$

Increase in emissions from additional bus running exhaust emissions

$VT_R = N_{TR} * F_{T,\ SOV}$

Number of new transit riders multiplied by the percentage of riders shifting from single-occupant auto use

$VMT_R = VT_R * TL_W$

Number of vehicle trips reduced multiplied by the average auto trip length

Source: Texas A&M Transportation Institute

Developing Module 3 - Activity Module

- Developing common estimation methods for activity parameters used in MOSERS equations (delay, VMT, speed, etc.)

- For most common strategies
  - A web-survey of TWG members

- Implement them in an Excel-based tool

Web Survey Results

- 4 participants
  - NCTCOG, HGAC, Longview MPO
- Profile of respondents
  - Air quality planner
  - MPO director
  - Program manager
- Application of MOSERS
  - CMAQ
  - SIP Credit
  - Other grants and funding source applications
  - General project evaluation (sketch planning)
- Provided helpful feedback on potential improvements to MOSERS

Most Common Strategies

- Intersection Improvements
  - Intersection turn lanes and timing optimization
  - New signal
  - Coordinated signals

- Public transit
- Bike and pedestrian projects
- Traffic flow improvements

Excel-Base Tool

Mobile Source Emission Reduction Strategies (MOSERS)

Texas A&M Transportation Institute

Project Description:

Scenario Year: 2015

Scenario: New Signal

Inputs	
Area Type	Rural
Facility Type - Street 1	Principal Arterials
Total Number of Lanes - Street 1	2
Facility Type - Street 2	Major Collector
Total Number of Lanes - Street 2	1
Peak Hour Volume - Street 1 (Both directions)	1,500
Peak Hour Volume - Street 2 (Both directions)	500
Off-Peak Hour Volume - Street 1 (Both directions)	554
Off-Peak Hour Volume - Street 2 (Both directions)	354
Percent Trucks (Street 1)	5%
Percent Trucks (Street 2)	7%
Proposed Intersection Signal Cycle Length (sec)	100

Default Data	
Peak Hour Intersection Delay Before Improvement (s/veh)	50
Off-Peak Hour Intersection Delay Before Improvement (s/veh)	25
Peak Hour in a Day	6
Off-Peak Hour in a Day	18
Effective Green to Cycle Length Ratio of Subject Approaches	0.613
Effective Green to Cycle Length Ratio of Conflict Approaches	0.448
Incremental Delay Upstearm Filtering or Metering Adjustment Factor for Isolated Intersection	1
Incremental Delay Adjustment for the Actuated Control	0.5
Capacity at Intersection - Subject Approaches (Both Directions)	2,036
Capacity at Intersection - Conflict Approaches (Both Directions)	1,488

Restore Default Data

Calculated Data

Menu | Instructions | Signal Coordination | New Signal | Intersection Improvements

Mobile Source Emission Reduction Strategies (MOSERS)

Texas A&M Transportation Institute

Project Description:

Scenario Year: 2015

Scenario: Signal Coordination

Inputs	
Area Type	Rural
Facility Type	Minor Arterial
Length of the Signalized Corridor (Miles)	4
Existing Number of Signalized Intersections	8
Existing Number of Lanes (One Direction)	1
Average Hourly Volume During Peak Period (One Direction)	800
Average Hourly Volume During Off-Peak Period (One Direction)	500
Truck Percentage Peak Period	3%
Truck Percentage Off-Peak Period	3%
Existing Average Corridor Travel Time (One Direction) During Peak Period (Minutes)	11
Existing Average Corridor Travel Time (One Direction) During Off-Peak Period (Minutes)	7
Existing Average Cycle Length (seconds)	60

Default Data	
Reduction Factor of Uniform Delay	0.55
Hours in Peak Period	6
Hours in Off-Peak Period	18
Facility Capacity per Lane	831
Number of Weekdays per Year	250
Incremental Delay Upstearm Filtering or Metering Adjustment Factor for Isolated Intersection	1
Incremental Delay Upstearm Filtering or Metering Adjustment Factor for Nonisolated Intersection	0.1782

Mobile Source Emission Reduction Strategies (MOSERS)

Texas A&M Transportation Institute

Project Description:

Scenario Year: 2015

Scenario: General Intersection Improvements

Inputs			
Area Type			Small Urban
Existing Intersection Signal Cycle Length (sec)			100
Major Directions	Existing Facility Description	Facility Type	Principal Arterials
		Existing Numbers of Through Lanes	2
		Existing Numbers of Exclusive Left-turn Lanes	1
		Existing Numbers of Exclusive Right-turn Lanes	1
		Existing Numbers of Shared Left-turn Lanes	0
		Existing Numbers of Shared Right-turn Lanes	0
		Existing Left Turn Phase	Protected
	Existing Traffic Description	Peak Hour Volume - Through and Right-turn Lane Group (Each Direction)	1,000
		Peak Hour Volume - Left-turn Lane Group (Each Direction)	300
		Off-Peak Hour Volume - Through and Right-turn Lane Group (Each Direction)	300
		Off-Peak Hour Volume - Left-Turn Lane Group (Each Direction)	100
		Truck Percentage	5%
	Expected Changes	Expected Increase Number of Through Lanes	1
		Expected Increase Number of Exclusive Left-turn Lanes	1
		Expected Increase Number of Exclusive Right-turn Lanes	1
		Expected Left Turn Phase	Protected
Minor Directions	Existing Facility Description	Facility Type	Major Collector
		Existing Number of Through Lanes	1
		Existing Number of Exclusive Left-turn Lanes	1
		Existing Number of Exclusive Right-turn Lanes	1
		Existing Number of Shared Left-turn Lanes	0
		Existing Number of Shared Right-turn Lanes	0
		Existing Left Turn Phase - Minor Directions	Protected
	Existing Traffic Description	Peak Hour Volume - Through and Right-turn Lane Group (Each Direction)	300
		Peak Hour Volume - Left-turn Lane Group (Each Direction)	100
		Off-Peak Hour Volume - Through and Right-turn Lane Group (Each Direction)	250

Menu | Instructions | Signal Coordination | New Signal | Intersection Improvements