Expanding Your Toolkit – AQ Analysis

Does your project contribute to reduction of NOx, VOC, or GHG emissions?

- Qualitative
  - *This project's contribution to reductions in roadway volume and delay is expected to reduce idle time, thereby reducing emissions because...*
- Quantitative (NEW)
  - **MO**bile **S**ource **E**mission **R**eduction **S**trategies (**MOSERS**)
    - Texas A&M Transportation Institute (TTI)
    - incorporates local Houston/Galveston/Brazoria emissions factors
  - **C**ongestion **M**itigation & **A**ir **Q**uality (**CMAQ**) Emissions Calculator Toolkit
    - Federal Highway Administration (FHWA)
    - incorporates national emissions factors
- Both tools use Excel to calculate AQ impact.
- These are **not** H-GAC developed tools.

Use Cases for MOSERS & CMAQ Tools

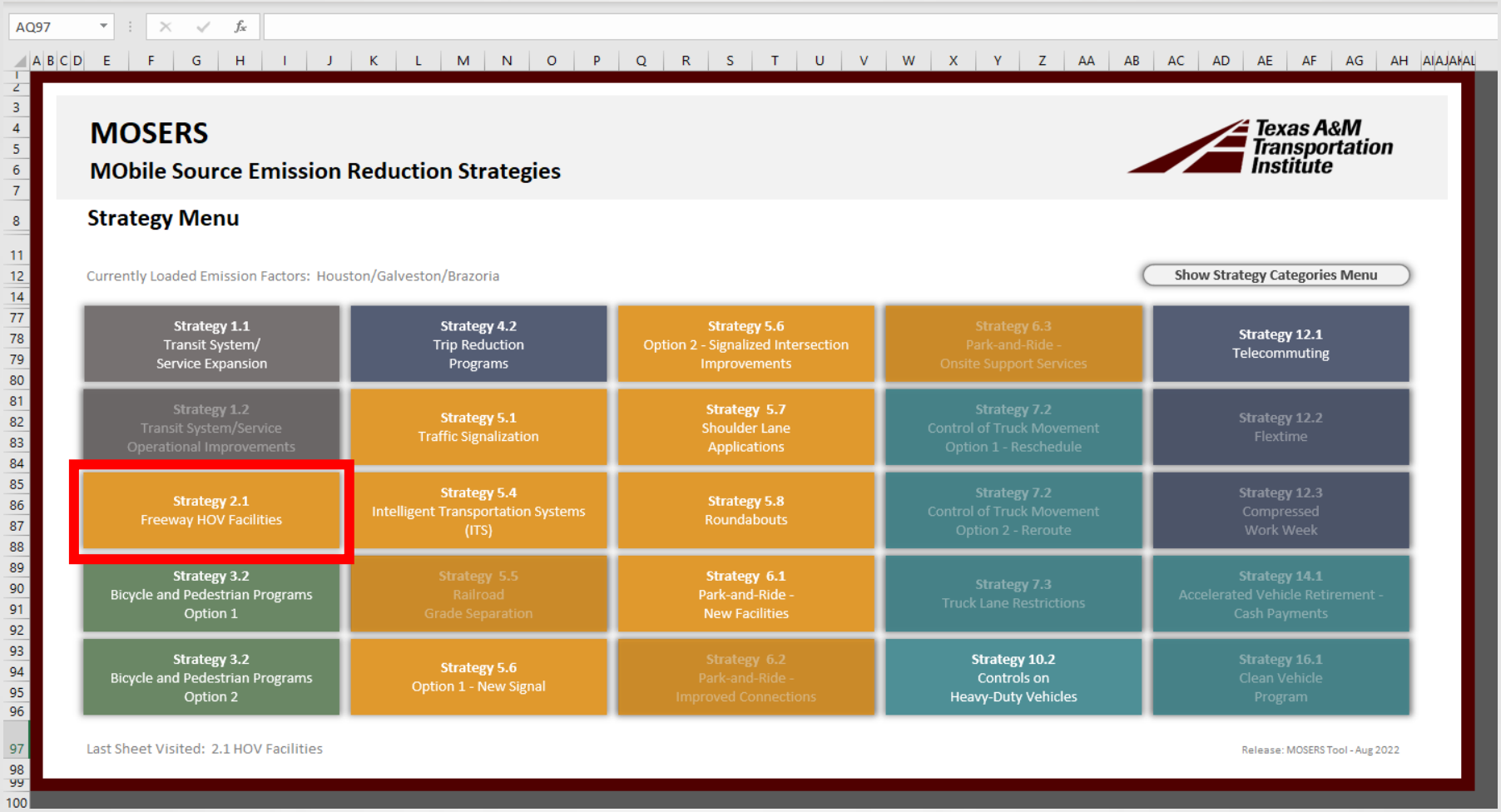
MOSERS

- Transit System/Service Expansion
- Freeway HOV Facilities
- Bicycle and Pedestrian Programs
- Trip Reduction Programs
- Traffic Signalization
- Intelligent Transportation Systems
- New Signals
- Signalized Intersection Improvements
- Shoulder Lane Applications
- Roundabouts
- Park-and-Ride – New Facilities
- Controls on Heavy-Duty Vehicles
- Telecommuting

CMAQ

- Adaptive Traffic Control Systems
- Alternative Fuel Vehicles and Infrastructure
- Bicycle, Pedestrian, and Shared Micromobility
- Carpooling and Vanpooling
- Congestion Reduction and Traffic Flow Improvements
- Diesel Idle Reduction Strategies
- Diesel Truck and Engine Retrofit & Replacement
- Electronic Open-Road Tolling
- Electric Vehicles and EV Charging Infrastructure
- Freight Modal Shift
- Managed Lanes
- Telework Tool
- Transit Bus Upgrades & System Improvements
- Transit Bus Service and Fleet Expansion

MOSERS Tool – Main Menu



MOSERS Tool – Input (HOV Facilities)

MOSERS

MObile Source Emission Reduction Strategies

Texas A&M Transportation Institute

Strategy 2.1 - HOV Facilities

Main Menu | Save Report as PDF | View Report | Project Information | Open Strategy Documentation

Input Data		Press here to clear input values	Variable	Value	Units
Region	Metropolitan area		Select ▼	Houston/ Galveston/ Brazoria	
Year	Analysis year				
Road Type	Urban or rural with restricted or unrestricted access		Select ▼	Urban-Freeway	-
Facility Geographic Information	Area type		Select ▼	Urban	-
	Corridor length		L	5.0	mile
	Facility type		Select ▼	Freeway	-
	Peak time of the day		Select ▼	Both Morning/Evening Peaks	-
	Separation type		Select ▼	Barrier separated	-
	HOT conversion		Select ▼	Yes	-
General Purpose Lane	Number of general purpose lanes - before		$N_{GPL,B}$	5	lane
	Number of general purpose lanes - after		$N_{GPL,A}$	4	lane
HOV Lane	Number of additional HOV lanes - before		$N_{HOV,B}$	1	lane
	Number of HOV lanes - after		$N_{HOV,A}$	2	lane
Volume Inputs	General purpose lane vehicle volume - before		$V_{GP,B}$	5,000	vehicles / hour
	General purpose lane vehicle volume - after		$V_{GP,A}$	6,000	vehicles / hour
	Existing HOV lane volume (Only for HOT)		$V_{H,B}$	1,000	vehicles / hour
	Additional HOV/HOT lane volume		$V_{H,A}$	500	vehicles / hour

Default Data			Default	Variable	Value	Units	
Default Service Hours		Peak service hours per day	6 **	N_{PH}	5	hour	Restore
Default Traffic Constant	Capacity	Facility capacity	2,231 **	C	3,000	vehicles / lane / hour	Restore
	Free Flow Speed	Facility free flow speed	60.00	$v_{Free\ Flow}$	60	mph	Restore

** : The *Default* value is dependent on *Input Data Value(s)* and can vary based on user input data selections

Volume, Capacity, and Free Flow Speed data available from H-GAC's transportation modeling group

MOSERS Tool – Input (HOV Facilities)

Input Data		Pre
Region		Metropolitan area
Year		Analysis year
Road Type		Urban or rural with restricted or unrestricted access
Facility Geographic Information		Area type
		Corridor length
		Facility type
		Peak time of the day
		Separation type
		HOT conversion
General Purpose Lane		Number of general purpose lanes - before
		Number of general purpose lanes - after
HOV Lane		Number of additional HOV lanes - before
		Number of HOV lanes - after
Volume Inputs		General purpose lane vehicle volume - before
		General purpose lane vehicle volume - after
		Existing HOV lane volume (Only for HOT)
		Additional HOV/HOT lane volume
Default Data		
Default Service Hours		Peak service hours per day
Default Traffic Constant	Capacity	Facility capacity
	Free Flow Speed	Facility free flow speed

MOSERS Tool – Output (HOV Facilities)

Calculated Data			Variable	Value	Units
General Purpose Lane	V/C Ratio	General purpose lane V/C ratio - before	$V/C_{GP,B}$	0.33	-
		General purpose lane V/C ratio - after	$V/C_{GP,A}$	0.50	-
	Speed	General purpose lane speed - before	$v_{GP,B}$	60.0	mph
		General purpose lane speed - after	$v_{GP,A}$	60.0	mph
	Travel Time	Travel time under free-flow conditions	$TT_{Free\ Flow}$	5.00	minute
		General purpose lane travel time - before	$TT_{GP,B}$	5.00	minute
		General purpose lane travel time - after	$TT_{GP,A}$	5.00	minute
	VMT	Daily peak hour general purpose lane VMT - before	$VMT_{GP,B}$	125,000	-
		Daily peak hour general purpose lane VMT - after	$VMT_{GP,A}$	150,000	-
HOV Lane	VMT	Daily peak hour HOV lane VMT - before (Only for HOT)	$VMT_{H,B}$	50,000	-
		Daily peak hour HOV/HOT lane VMT - after	$VMT_{H,A}$	12,500	-
	Speed	HOV lane speed - before (Only for HOT)	$v_{H,B}$	37.2	mph
		HOV/HOT lane speed - after	$v_{H,A}$	60.0	mph
	Travel Time	HOV lane travel time - before (Only for HOT)	$TT_{H,B}$	8.07	minute
		HOV/HOT lane travel time - after	$TT_{H,A}$	5.00	minute

Activity Output Data			Variable	Value	Units
Peak Hour Summary		Number of peak hours (AM and/or PM)	N_{PH}	5	hour
Facility Length		Length of HOV facility	L	5.0	mile
General Purpose Lane Summary	Speed	General purpose lane speed during peak hours - before	$v_{GP,B}$	60	mph
		General purpose lane speed during peak hours - after	$v_{GP,A}$	60	mph
	Peak-hour VMT	VMT on general purpose lanes during peak hours - before	$VMT_{GP,B}$	125000	-
		VMT on general purpose lanes during peak hours - after	$VMT_{GP,A}$	150000	-
	Trip Reductions	Number of vehicle Trips Reduced	VT_R	500	-
HOV Lane Summary	Peak-hour VMT	VMT on HOV lanes during peak hours - before (Only for HOT)	$VMT_{H,B}$	50,000	-
		VMT on HOV lanes during peak hours - after	$VMT_{H,A}$	12,500	-
	Speed	HOV lane speed - before (Only for HOT)	$v_{H,B}$	37	mph
		HOV lane speed - after	$v_{H,A}$	60	mph

Daily Emissions Reduction							
Description	Variable	Pollutant					Units
		NO_X	VOC	PM_{10}	CO	CO_2	
Daily Emissions Reduction	A - B + C	0.588	0.688	1.372	19.589	4,136.891	kg / day
		1.296	1.516	3.025	43.187	9,120	lbs / day

MOSERS Tool – Output (HOV Facilities)

Pollutant					Units
NO_X	VOC	PM_{10}	CO	CO_2	
0.588	0.688	1.372	19.589	4,136.891	kg / day
1.296	1.516	3.025	43.187	9,120	lbs / day

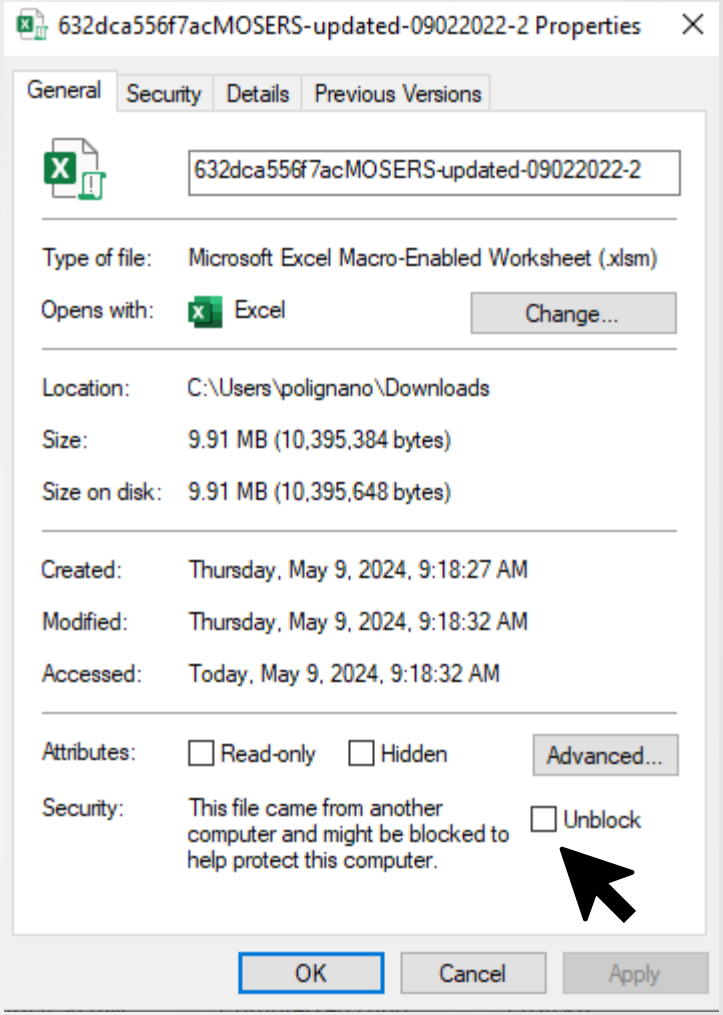
- Please submit estimates in kg/day. This matches the federal and regional reporting standards.
- A project's result is *not* final, in the sense that these projects are *not* final. Recognizing that each project could change substantially this result offers you and your project:
  - a useful baseline metric
  - a guidepost for planning over the lifecycle of the project
  - a first quantitative metric

Pollutants – NOx and VOC

- NOx – Nitrogen Oxides
- VOC – Volatile Organic Compounds
  - Both are byproducts of combustion processes
- These are ozone precursors. They form ground level ozone when exposed to sunlight as ozone is not emitted directly into the air
- Reductions of NOx and VOC for roadway projects tend to appear low, especially in a kg/day metric.
- Ranges for reductions based on RTP projects could be very small. Emissions of less than 1.000 kg/day are quite common.

MOSERS tool - Notes

- The Excel spreadsheet is downloaded from the internet. Microsoft and/or any agency or computer security may disable macros (**necessary to run calculations and download emission factors**).
  - Select Unblock and Apply
- The main menu will list: “Currently Loaded Emissions Factor:”
  - Default displays Dallas/Fort Worth
  - Once Houston/Galveston/Brazoria is selected within a strategy for the first time, it will list Houston/Galveston/Brazoria



Contact Information

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Requests for data (i.e., volume and speed) & General RTP Process

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