Transportation Air Quality Conformity Report for Houston-Brazoria-Galveston Region

Agency in charge: Houston-Galveston Area Council

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Abstract

On July 19, 2013, the Federal Highway Administration and the Federal Transit Administration certified that the amendments to the Houston-Galveston area's *2035 Regional Transportation Plan (RTP) Update* and the *2013-2016 Transportation Improvement Program (TIP)* met all the requirements for making a joint conformity determination to the Air Quality State Implementation Plan for the Houston-Galveston-Brazoria (HGB) ozone nonattainment area.

Due to federal regulations, the Regional Transportation Plan needs to be updated every four years. Currently, H-GAC is updating the new long range plan which is called "2040 Regional Transportation Plan". This plan and its conformity determination need to be approved by January 25, 2015 to avoid initiation of a 1-year transportation conformity lapse grace period.

Following are the major projects[1] included in the 2040 Regional Transportation Plan:

- SH 249 Toll Road, from Pinehurst to Todd Mission – Restore to RTP
- SH 99/Grand Parkway Segments H/I, from US 59 N to Baytown – Advance within RTP
- BW 8, Ship Channel Bridge Widening – Add to RTP
- SH 3 Commuter Rail – Delay beyond RTP
- METRO Solutions Light Rail Corridor Extensions (North/IAH, Southeast/Sunnyside, and Northwest/Hempstead) – Delay within RTP

[1]This list is not exhaustive of all projects that affect this conformity. A complete listing of such revisions is contained within Appendix 3.

The transportation conformity determination is needed to establish conformity for the non-attainment designation with a classification of "marginal" for the Houston-Galveston-Brazoria area under the 2008 8- hr ozone standard (75 ppb) with 2015 as the attainment year.

This conformity finding will be using the Motor Vehicle Emission Budgets (MVEBs) coming from the latest revisions to the *Houston-Galveston-Brazoria Attainment Demonstration and Reasonable Further Progress State Implementation Plan for the 1997 Eight-Hour Ozone Standard* (hereafter referred to as the "AD and RFP SIPs"), which are the "April 2013 HGB MVEB Update SIP Revision (TCEQ Project No. 2012-002-SIP-NR, adopted April 23, 2013)". These SIP revisions were done to replace the on-road mobile source emissions inventories for Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOCs) based on EPA's MOBILE6 model with those based on EPA's MOVES model. The EPA found these MVEBs adequate on August 2, 2013 (effective date August 19, 2013).

The below table displays the results of the new conformity finding, which show that the emissions coming from the transportation plan conform to the emission budgets coming from the 8-hr Ozone SIP.

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Year	NOx Emissions (t/d)	NOx Budgets (t/d)	VOC Emissions (t/d)	VOC Budgets (t/d)	VMT
2015*	124.50	171.63	52.62	71.56	149,002,991
2017**	102.70	130.00	48.27	59.76	157,175,294
2018	91.80	103.34	46.09	50.13	161,261,445
2025	62.58	103.34	36.00	50.13	189,704,202
2035	63.36	103.34	38.49	50.13	227,258,318
2040	68.74	103.34	41.04	50.13	248,661,265

*2015 used the emission budget from the year 2014 RFP SIP for the 1997 8-hr ozone standard.
**The emissions for year 2017 have been linearly interpolated using the data for the years 2015 and
 2018 regional air quality analysis. The year 2017 was interpolated per EPA 40 CFR 93.118(d)(2).

1. <u>Introduction</u>

Reason for the Transportation Conformity Regional Emissions Analysis (40 CFR 93.104) Beginning 9/3/2014

Table 1: Explanation

X	New Metropolitan Transportation Plan (demographics, horizon year)
	Modify Existing Metropolitan Transportation Plan (interim year adjustments)
	New or Amended Transportation Improvement Program
	State Implementation Plan (SIP) Requirement
	Newly Designated Nonattainment Area
	Other

Link to the Conformity Rule:http://www.gpo.gov/fdsys/pkg/FR-2012-03-14/pdf/2012-6207.pdf

Due to federal regulations, a Metropolitan Transportation Plan (long rage plan) needs to be updated every four years. The new HGB Metropolitan Transportation Plan and its conformity need to be approved by January 25, 2015. If the plan is not approved by this deadline, it will enter a 12 month grace period where neither the RTP nor the TIP can be amended until the new transportation plan is approved.

The following is the timeline that represents the chronology of the main events representing this conformity:

- Wednesday, September 3 2014 – Conformity conference call to begin the conformity process for the 2040 RTP.
- Wednesday, November 21 2014 - Transportation Policy Council approval to enter into public comment period for the 2040 RTP and Conformity.
- Wednesday, December 17 2014 - Two Public Meetings at H-GAC (Noon and 6 pm).
- Friday, January 9, 2015 - End public comment period (50 Days).
- Friday, January 23, 2015 - Transportation Policy Council approval of 2040 RTP and Conformity.
- Sunday, January 25, 2015 – 12 months grace period starts
- Friday, February 13, 2015 – begin second public comment period due to US Court of Appeals rule that reinstated the 1997 8-hr Ozone standard for conformity.
- Tuesday, February 17, 2015 - Public Meeting at H-GAC 5:30 pm.
- Thursday, February 26, 2015 – end of second public comment period
- Friday, February 27, 2015 – new conformity results presented to the Transportation Policy Council for information only.
- Friday, March 6, 2015 – EPA revocation of 1997 8-hr Ozone standard for all purposes (effective 4/6/2015)

2. Planning Detail [40 CFR 93.110, 40 CFR 93.106]

Table 2: Metropolitan Transportation Plan/Transportation Improvement Program

Plan or Program names	Years covered	Fiscally Constrained	website
2040 Regional Transportation Plan	2015-2040	Yes	http://www.h-gac.com/taq/plan/2040/default.aspx
Transportation Improvement Program	2015-2018	Yes	http://www.h-gac.com/taq/tip/default.aspx

Table 3: Projects
[23 CFR 450.322(b)(6), 23 CFR 450.324(f)(5), 40 CFR 93.126, 40 CFR 93.127, 40 CFR 93.105(c)]

Project Element	Describe
Regionally Significant Definition	read below
Projects that trigger conformity	see Appendix 3
Other	

Regionally Significant Definition:

Regionally Significant Roadway Projects

Non-exempt projects[1] on regionally significant roadways will be treated as regionally significant projects if they:

    a)   Provide additional through traffic lanes greater than 1 mile in length;

    b)   Construct a bypass to a principal arterial/interstate along on a new alignment;

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[1] Non-exempt projects include all projects that are not identified under 40 CFR § 93.126 and 40 CFR § 93.127 as exempt or exempt from regional emissions analysis.

c) Add or extend freeway auxiliary/weaving lanes from one interchange to a point beyond the next interchange;

d) Construct a new interchange that provides access from or allows movement between facilities that was not previously possible; *and/or*

e) Remove an existing interchange and result in the elimination of access from or movement between facilities which previously existed;

Regionally significant roadways are limited to:

1. All freeways, tollways and other highways classified as principal arterial or higher; *and*

2. As identified in Figure 1, select highways currently designated as minor arterials that serve significant interregional and intraregional travel, and connect rural population centers not already served by a principal arterial, or connect with intermodal transportation terminals not already served by a principal arterial.

Regionally Significant Transit Projects

Any transit facility within an exclusive right-of-way ("fixed guideway") that offers an alternative to regional highway travel including light rail, commuter rail, bus rapid transit, and barrier separated High Occupancy Vehicles (HOV) lanes will be considered regionally significant.

Other Projects

The regional significance of non-exempt projects[1] not addressed in the above statements will be decided on a case-by-case basis through the interagency consultation process. The consultation will occur before taking the plan to the Transportation Policy Council (TPC) (either plan or TIP revision), and prior to the environmental determination.
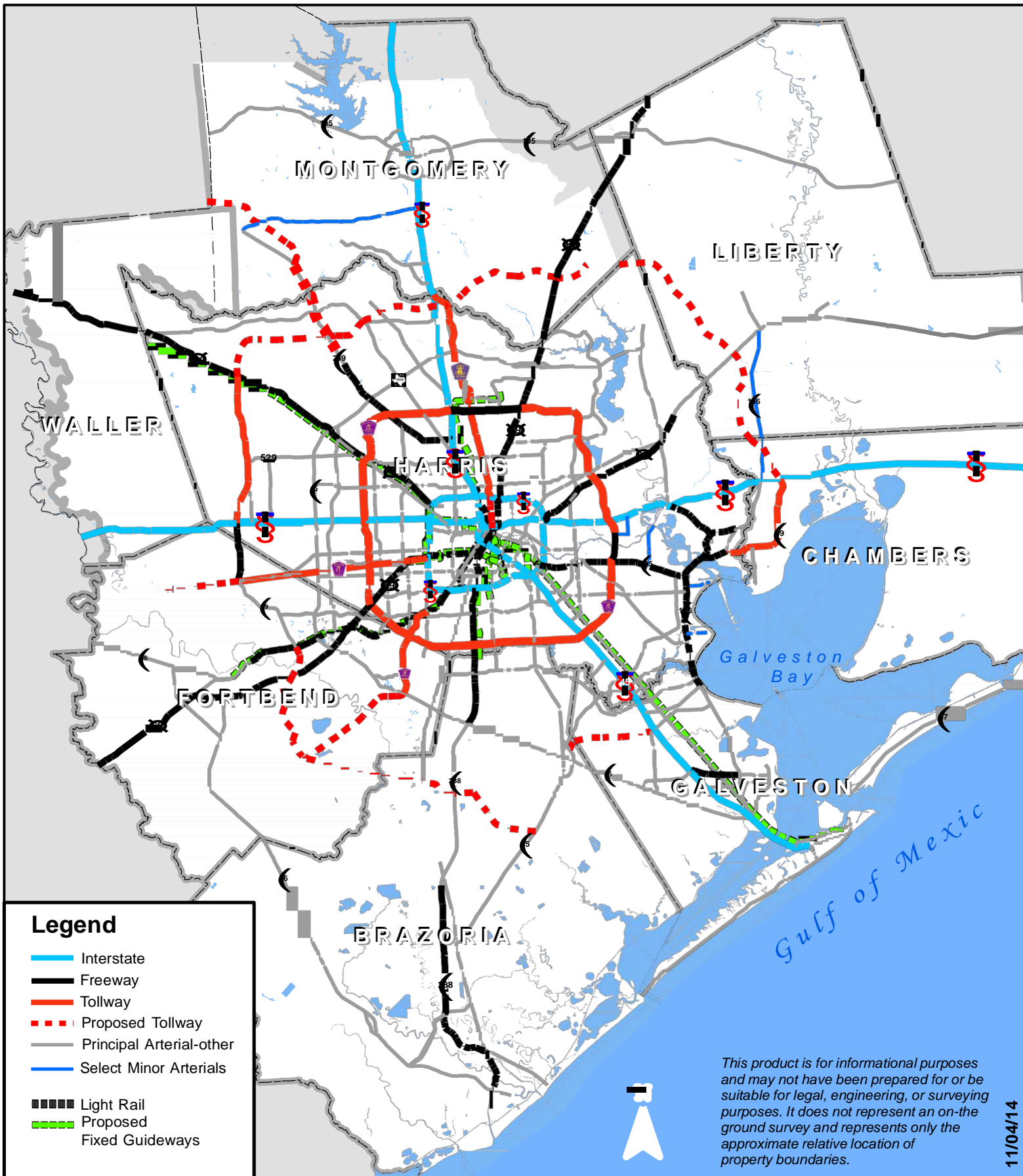
Figure 1: Regionally Significant Transportation Facilities (Conformity Network):

Houston-Galveston Area Council

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Regionally Significant Transportation Facilities
(Conformity Network)

MONTGOMERY

LIBERTY

WALLER

HARRIS

CHAMBERS

Galveston Bay

FORT BEND

GALVESTON

BRAZORIA

Gulf of Mexic

Legend

— Interstate
— Freeway
— Tollway
- - - Proposed Tollway
— Principal Arterial-other
— Select Minor Arterials

▮▮▮ Light Rail
- - - Proposed Fixed Guideways

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the ground survey and represents only the approximate relative location of property boundaries.

11/04/14

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Table 4: State Implementation Plan

SIP Element	Description
Title of Applicable SIP(s)	Houston-Galveston-Brazoria Attainment Demonstration and Reasonable Further Progress State Implementation Plan Revisions for the 1997 Eight-Hour Ozone Standard Which MVEB were found adequate by EPA 8/2/2013 (effective 8/19/2013) 2013 HGB MVEB Update SIP Revision for the 1997 Eight-Hour Ozone Standard (Project No. 2012-002-SIP-NR) http://www.tceq.texas.gov/airquality/sip/HGB_eight _hour.html#MVEB
Motor Vehicle Emissions Budgets	**RFP SIP** 2014 NOx= 171.63 tpd VOC= 71.56 tpd (Please note that the 2014 budget will be used for the year 2015 per EPA guidance) 2017 NOx= 130.00 tpd VOC= 59.76 tpd **AD SIP** 2018 NOx= 103.34 tpd VOC= 50.13 tpd
Transportation Control Measures	1. 2000 HGB RFP and AD SIP, Approved Nov. 2001 ID#2000-0826-SIP 2. 2004 HGB Mid Course Review SIP, Approved Dec. 2004 ID# 2004-42-NR 3. TCM Substitution for HGB 2006 4. 2010 HGB AD SIP for the 1997 8-hr Ozone Standard (2009-017-SIP-NR)

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Table 5: Conformity Analysis Years

Requirement	Years
Conformity Base Year	2012
Attainment Year	2015
Last Year of Maintenance Plan	---
Motor Vehicle Emissions Budget Years	2014, 2017, 2018**
First Analysis Year	2015
Intermediate Analysis Years	2025, 2035
Last Year of Transportation Plan (MTP/RTP)	2040
Interpolation Years*	2017
Other	---

* The year 2017 was interpolated per EPA 40 CFR 93.118(d)(2).
** The year 2018 could have been interpolated according to EPA 40 CFR 93.118(d)(2), but a regional emission analysis was done instead due to the fact that a linear interpolation for 2018 could not show consistency with the 2018 budgets.

3. Travel Demand Modeling

Table 6: Demographics Used in Conformity Analysis

Data Element	Detail and Source of Data
Population	H-GAC uses a house developed model for regional econometric forecast, and feeds it into the UrbanSim model for local area forecasts. The base year demographic was developed on the basis of 2010 Census and American Community Survey (ACS) PUM. The base year demographic is fed into a house developed demographic evolution model to simulate future population mix.
Employment	H-GAC uses an in house developed model for regional econometric forecast – supplied data as baseline, and feeds this into the UrbanSim model for local area forecasts. H-GAC forecasts the regional employments according to multiple sources such as Texas Workforce Commission, ACS PUM, and Woods & Poole.
Socio-economic	H-GAC's socio-economic model uses the 2010 base year. The forecast uses the following external data as input: Texas Workforce Commission, ACS PUM, and Woods & Poole.
Other	N/A

Activity Detail

H-GAC releases an updated forecast each quarter. The forecasted items include population, employment, and land use. The forecasting system produces outputs in annual increments from 2011 through 2040. The base year for the forecast is 2010.

The forecast is produced in phases.

1. We forecast the total number of people and households in the region.
2. Based on the future labor force, we forecast the number of jobs.
3. The model makes predictions about the location, type, and size of residential and non-residential development projects which would be needed to accommodate the expected growth in households and jobs.
4. The expected growth in households and jobs is allocated to different areas in such a way that each household has a home (housing unit) and each job has a work site.

These phases correspond to different components of our forecasting system:
• Demographic Evolution Model
• Employment Model
• Real Estate Development Model
• Household Location Model
• Employment Location Model

There are several important features of our forecasting system that are data-driven - disaggregation and interrelation; which means that inside each model there are dozens of tables with data elements that control the rules which govern the simulation. *Disaggregation* means that our models deal with individual elementary entities: people, households, jobs, land parcels, and buildings. All summary statistics, such as county population or total jobs in a census tract, are derived from data on the individual entities. For a future year, that data is not observed but rather created in a process known as "simulation". A simulation is a computational game-like technique which aims to imitate the dynamics of real life by setting up the "players" (entities or agents) and "rules" (propensities or parameters) and then letting the action unfold over time. In that respect, when we develop a forecast, we construct long lists of plausible future events for millions of entities

Interrelation means that the different models are connected:
• Population determines the short-term supply of labor force;
• Change in the number of households determines the demand for housing;
• The development industry responds to demand for housing and non-residential buildings; and
• Employers' and households' location choices are limited to what is available at the moment.

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Table 7: Travel Demand Model
(§93.122(b)(3))

Model Factor	Detail and Methodology
Model Validation Year	2012
Software	Cube Voyager
Mode Split/Mode Choice	Updated and simplified model with help from Houston METRO
Vehicle Miles Travel (VMT) HPMS Adjustment	H-GAC will adjust the forecasted VMT to TxDOT's HPMS for all roadway facilities. Please see below and Appendix 4
VMT adjustment -Seasonal Correction Factor	Please see Table 8
Time Periods Designation	Refer to Table 9
Counties Covered by Model	Harris, Galveston, Brazoria, Fort Bend, Montgomery, Liberty, Chambers and Waller.
Center-line miles and lane miles summaries for each analysis year	Please see Table 10
Other	N/A

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HPMS adjustment factor calculation: The factor used to reconcile model estimated regional Vehicle Miles Traveled (VMT) to HPMS estimated regional VMT is calculated by dividing the HPMS estimated average non- summer weekday VMT as follows:

HPMS Adjustment Factor

= (HPMS estimated ANSWT) / (Model estimated ANSWT)

= (152,958,024) / (168,168,738)

= 0.90955

Table 8: Seasonal Correction Factors

	County Type	Factors (Midweek)
Year (Weekday Non- Summer to August)	Harris, Brazoria, Fort. Bend, Galveston, Montgomery, Waller	0.99135
	Liberty, Chambers	1.03609

Texas Transportation Institute (TTI) communication

These factors are used to adjust the Travel Demand Model (TDM) and estimated intrazonal VMT to summer weekday VMT. The adjustment factors were developed using aggregated Automated Traffic Recorder (ATR) data for the years 2004-2013. These factors were calculated by dividing the average day-of-week (weekday) count for the June-August episode by the Annual Non-Summer Weekday Traffic (ANSWT) count.

Two seasonal factors are needed because there are 2 different sources for data. The counties of Liberty and Chambers belong to the Beaumont TxDOT district while the counties of Harris, Brazoria, Ft. Bend, Galveston, Montgomery and Waller belong to the Houston TxDOT district.

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Table 9: Time Period Designations

Hours	Designations
12:00 a.m. – 12:59 a.m.	Overnight
1:00 a.m. – 1:59 a.m.	Overnight
2:00 a.m. – 2:59 a.m.	Overnight
3:00 a.m. – 3:59 a.m.	Overnight
4:00 a.m. – 4:59 a.m.	Overnight
5:00 a.m. – 5:59 a.m.	Overnight
6:00 a.m. – 6:59 a.m.	AM Peak
7:00 a.m. – 7:59 a.m.	AM Peak
8:00 a.m. – 8:59 a.m.	AM Peak
9:00 a.m. – 9:59 a.m.	Midday
10:00 a.m. – 10:59 a.m.	Midday
11:00 a.m. – 11:59 a.m.	Midday
12:00 p.m. – 12:59 p.m.	Midday
1:00 p.m. – 1:59 p.m.	Midday
2:00 p.m. –2:59 p.m.	Midday
3:00 p.m. – 3:59 p.m.	PM Peak
4:00 p.m. – 4:59 p.m.	PM Peak
5:00 p.m. – 5:59 p.m.	PM Peak
6:00 p.m. – 6:59 p.m.	PM Peak
7:00 p.m. – 7:59 p.m.	Overnight
8:00 p.m. – 8:59 p.m.	Overnight
9:00 p.m. – 9:59 p.m.	Overnight
10:00 p.m. – 10:59 p.m.	Overnight
11:00 p.m. – 11:59 p.m.	Overnight

Table 10: Centerline miles and lane miles summaries for each analysis year

Year	Centerline Miles	Lane Miles
2015	8,640	27,280
2018	8,891	28,424
2025	9,069	29,623
2035	9,201	30,200
2040	9,201	30,200

H-GAC has updated and validated the Track-1 trip-based regional travel demand model to the year 2012. The primary motivation for updating the model was to make use of a new source of observed travel data collected between 2007 and 2012. This same set of travel data is being used by H-GAC in the development, calibration and validation of an activity-based model (ABM) for the region. By updating the trip-based model, H-GAC will have increased travel demand analysis flexibility as well as the ability to compare results of the two models; not only for the base year that the models share (2012), but also for any other applications of the models.

The 2012 Track-1 model is structured very much the same as the 2009 Track-1 model with one exception. Toll demand is now estimated in the Track-1 model in the traffic assignment component rather than in the mode choice component. The motivation for this change is twofold. First, the practice of estimating toll demand as part of the route choice component (i.e., traffic assignment) has become increasingly common. Second, one change was due to a desire to create consistency among the Track-1 model and the new ABM.

Besides this one structural change to the regional travel models, many of the individual components of the Track-1 model set have been updated with new survey data. Also, some of the model component application procedures have been changed as part of this model update. This section of the validation report presents a brief summary of those aspects of the model components and procedures that have been changed.

Traffic Analysis Zones (TAZs)

The TAZ structure of the Track-1 travel models was updated to a more detailed TAZ structure throughout the 8-county. This updated TAZ structure is designed to reflect increased development in the suburban portions of region and re-development in the urban portions of the region.

Demographics

The TAZ demographics of the Track-1 model were updated to represent the year 2012. Estimates of TAZ-level cross-tabulations of households by size, income and workers per household were developed using H-GAC's population synthesizer. The estimates were controlled to 2010 Census SF1 and 5-year (2006-2010) American Community Survey household size, income and worker distributions. Employment estimates by employment type and TAZ for the year 2012 were

developed from a variety of sources of business data as well as local appraisal district building data.

Area Type

TAZ area type was updated to reflect the 2010 demographic density based on the updated 2010 TAZ demographics.

Trip Generation

Trip Rates

The trip production rates of the previous Track-1 model have been replaced with trip rates derived from the 2007-2009 regional household survey. The production rates have been enhanced to include a third dimension, workers per household, in addition to household size and household income. In this way, trip demand is sensitive to differences in the number of workers in a household, be that with respect to the base year 2012 or in application of the models to forecasted number of workers per household.

While the trip attraction rates are dimensioned as they were in the previous Track-1 model, updated rates were developed based on the 2010/2011 regional workplace survey.

Special Generators

Site trip control totals for Bush Intercontinental and Hobby airports were updated using data from the 2010/2011 regional special generator survey.

Non-resident trips

Estimates of trip ends for trips made by non-residents for the coastal portions of the region were updated based on year 2010 estimates of tract-level seasonal housing as well as hotel and seasonal housing vacancy rates.

Truck Trips

Truck trip demand for the 2012 Track-1 model was developed using H-GAC's Cube Cargo-based truck model. The procedures of this model segment truck demand into cargo truck and service truck demand and estimates of both internal and external truck movements in the H-GAC region. As opposed to estimating truck demand based on trip rates, H-GAC's truck model estimates demand for cargo-carrying trucks based on demand for and flow of commodities to, from and through the Houston region.

External travel

External travel demand, both local and through, was updated based on external volume and vehicle classification counts conducted by H-GAC in 2011. The new volume and classification counts were used to create external-local and through trip ends for auto travel and external-through trips for truck travel. External-local truck travel was estimated separately through the Cube Cargo-based truck demand modeling.

Trip Distribution

The source of Track-1 model off-peak highway travel time impedances used in the distribution of the non-work trip purposes was changed for the 2012 model update from average daily impedance to mid-day impedances. The mid-day impedances were based on assignment output volume-to-capacity ratios from a mid-day traffic assignment.

Friction factors for all internal trip purposes other than truck trips were re-calibrated as part of the

2012 Track-1 model update so that model-estimated average trip lengths by trip purpose were consistent with 2007-2009 household survey observed average trip length.

Mode Choice

The regional mode choice model was re-calibrated with year 2010 observed modal target values developed from the 2007-2009 regional household survey and a 2010 transit on-board survey. As previously mentioned, the one change in model structure involved the movement of the toll demand estimation procedures from the mode choice model to the assignment model. For this reason the toll sub-nests of the mode choice model were not included in the re-calibration.

Time-of-Day Models

A fifth time-of-day period was added to the time-of-day modeling procedures of the 2012 Track-1 model to acknowledge peak spreading that has occurred in the region, particularly the spreading of the PM peak period. This fifth period, referred to as the 'evening' period is designed to capture the PM peak period spill-over congestion while maintaining the length of the original PM peak period. As a result of the creation of the evening period, the length of the overnight period was reduced. However to be consistent with all pervious Conformity analyses the five periods were collapsed to four (morning, midday, evening and overnight).

Using data from the 2007-2009 regional household travel survey, time-of-day factors for the five time-of-day periods were developed. As with the prior set of diurnal factors, the updated factors perform two functions. First, to factor the daily demand to the demand for the time period of interest, and second, impart the appropriate directionality of travel for the time period of interest.

Traffic Assignment

As previously mentioned, H-GAC changed the step in which the Track-1 model estimates toll demand. The Track-1 2012 model estimates toll demand via the traffic assignment component rather than the mode choice component. This was accomplished through a generalized-cost assignment (GC) for each of the five time-of-day periods. One of the primary motivations for choosing to move to a generalized-cost assignment is to allow for the use of the same assignment procedures for both the trip-based model and the H-GAC's in-development ABM. The GC assignment method made use of values-of-time that are segmented by trip purpose, income and mode. In this way, toll demand was affected not only by time-of-day, but also by the purpose of the trip and whether the trip is a Single Occupancy Vehicle (SOV) trip or an HOV trip.

A second change to the traffic assignment procedures involved the replacement of a daily assignment with the sum of time-of-day assignments. H-GAC's travel models have included time-of-day traffic assignment for many years. However, H-GAC also performed daily traffic assignments. As part of the 2012 Track-1 model update, H-GAC used summed time-of-day assignments to represent daily traffic assignment demand.

Feedback

The feedback procedures used in the Track-1 model were updated to evaluate mid-day along with AM peak period assignment and impedance statistics as part of the departure from the creation of daily impedances for trip distribution and the performance of daily traffic assignments. The 2012 Track-1 model update achieved the convergence criteria in three iterations.

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Assignment Validation

The results of the time-of-day traffic assignments were summed to represent daily traffic volume on the modeling network. The resulting daily traffic volumes were then compared to the year 2012 daily traffic counts both on the basis of traffic volume and vehicle miles of travel.

Summary

The 2012 Track-1 model set is structured virtually the same as the 2009 Track-1 model set, except for movement of toll demand estimation from the mode choice to the traffic assignment procedure. The trip generation, trip distribution, and mode choice components were updated and calibrated to match a new set of survey data and external count data while the modified traffic assignment procedures were validated against counted daily traffic.

4. Emission Factors Modeling
Emissions factors input detail (MOVES Emission Factor Model Information)

- Development of Emission Factors:

Table 11: Model External Conditions

Utility used	Spatial Emission Estimator (SEE) developed by ERG
Emission Model Version	MOVES2010b
Analysis Year Runs	2015, 2018, 2025, 2035, 2040
Time Periods	AM, MD, PM, OV
Pollutants Reported	NOx, VOC, CO
Evaluation Month	July

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Table 12: MOVES2010b Input Parameters and Source

Input Parameter Name	Description	Source
Source Type Population	Input the number of vehicles in the geographic area which is to be modeled for each vehicle. A module is used to convert MOVES2010b based TXDMV registration data for each county into 13 MOVES SUT population.	TXDMV registration data for July 2014
Source Type Age Distribution	Input that provides the distribution of vehicle counts by age for each calendar year and vehicle type. TXDMV registration data is used to estimate the age distribution of vehicle types up to 30 years. The distribution of Age fractions should sum up to 1.0 for all vehicle types for each analysis year.	TXDMV registration data for July 2014; MOVES default used for buses
Vehicle Type VMT	County specific VMT is distributed to 6 HPMS Vehicle types.	Travel Model Output
Average Speed Distribution	Input average speed data specific to vehicle type, road type, and time of day/type of day into 16 speed bins. The sum of speed distribution to all speed bins for each road type, vehicle type, and time/day type would be 1.0.	Travel Model Output
Road Type Distribution (VMT Fractions)	Input County Specific VMT by road type. VMT fraction is distributed between the road type and must sum to 1.0 for each source type.	Travel Model Output
Ramp Fraction	Input county specific fraction of ramp driving time on rural and urban restricted roadway type.	Travel Model Output
Fuel Supply	Input to assign existing fuels to counties, months, and years, and to assign the associated market share for each fuel.	TCEQ, EPA Fuel Surveys and default MOVES input where local data unavailable. Table 13a
Meteorology	County Specific data on temperature and humidity.	Regional data from TCEQ. Appendix 7
Fuel Formulation	Input county specific fuel properties in the MOVES database.	TCEQ, EPA Fuel Surveys and default MOVES input where local data unavailable. Table 13b
I/M Coverage	Input I/M coverage record for each combination of pollutants, process, county, fuel type, regulatory class and model year are specified using this input.	See Table 14

Fuel Engine Fraction / Diesel Fraction	Input fuel engine fractions (i.e. Gasoline vs. Diesel Engines types in the vehicle population) for all vehicle types.	TXDMV registration Data July 2014; MOVES default used for light duty vehicles and buses; County regional data applied for heavy duty vehicles.

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Table 13.a: MOVES2010b Fuel Supply

Fuel Formulation ID	Market Share
10005 (gasoline)	1
30011 (diesel)	1

Table 13.b: MOVES2010b Fuel Properties

	2015		2017 and later years	
Fuel Type	**Gasoline***	**Diesel**	**Gasoline****	**Diesel**
Fuel Formulation ID	10005	30011	10005	30011
Fuel Subtype ID	12	20	12	20
RVP	7.09	0	7.09	0
Sulfur Level	29.05	11	10	11
ETOH Volume	9.757	0	9.757	0
MTBE Volume	0	0	0	0
ETBE Volume	0	0	0	0
TAME Volume	0	0	0	0
Aromatic Content	14.439	0	14.439	0
Olefin Content	12.732	0	12.732	0
Benzene Content	0.495	0	0.495	0
e200	49.445	0	49.445	0
e300	84.662	0	84.662	0
T50	202.042	0	202.042	0
T90	327.641	0	327.641	0
BioDieselEster Volume	0	0	0	0
Cetane Index	0	0	0	0
PAH Content	0	0	0	0

*Based on EPA Houston Summer 2013 retail outlet RFG survey data.

** Based on EPA Houston Summer 2013 retail outlet RFG survey data except sulfur content was set to 10 ppm for Tier 3 gasoline sulfur standard consistency.

Table 14: MOVES2010b I/M Descriptive Inputs for Subject Counties
(one table for each year of analysis)

2015 Brazoria, Fort Bend, Galveston, Harris, Montgomery						
I/M Program ID	30	51	40	60		Identifies program number with MOVES database
Pollutant Process ID	101,102, 201,202, 301,302	112	101,102, 201,202, 301,302	112		
Source Use Type	21,31*, 32**	21,31*,32**	21	21,31*,32**		
Begin Model Year	1991	1991	1996	1996		
End Model Year	1995	1995	2013	2013		
Inspect Freq	1	1	1	1		Annual testing; program specifications
Test Standards Description						
Test Standards ID	23	41	51	45		Indentify test with MOVES database test standards IDs
I/M Compliance	93.12 for source type 21 (passenger car) *87.53 for source type 31 (passenger truck) **81.95 for source type 32 (light commercial truck)					Expected compliance (%)

	30	51	40	60	
2018 **Brazoria, Fort Bend, Galveston, Harris, Montgomery**					
I/M Program ID	30	51	40	60	Identifies program number with MOVES database
Pollutant Process ID	101,102, 201,202, 301,302	112	101,102, 201,202, 301,302	112	
Source Use Type	21,31*, 32**	21, 31*, 32**	21,31*,32**	21,31*,32**	
Begin Model Year	1994	1994	1996	1996	
End Model Year	1995	1995	2016	2016	
Inspect Freq	1	1	1	1	Annual testing; program specifications
Test Standards Description					
Test Standards ID	23	41	51	45	Identifies test with MOVES database test standards IDs
I/M Compliance	93.12 for source type 21 (passenger car) *87.53 for source type 31 (passenger truck) **81.95 for source type 32 (light commercial truck)				Expected compliance (%)

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2025 Brazoria, Fort Bend, Galveston, Harris, Montgomery						
I/M Program ID			41	61		Identifies program number with MOVES database
Pollutant Process ID			101,102, 201,202, 301,302	112		
Source Use Type			21,31*,32**	21,31*,32**		
Begin Model Year			2001	2001		
End Model Year			2023	2023		
Inspect Freq			1	1		Annual testing; program specifications
Test Standards Description						
Test Standards ID			51	45		Indentify test with MOVES database test standards IDs
I/M Compliance	93.12 for source type 21 (passenger car) *87.53 for source type 31 (passenger truck) **81.95 for source type 32 (light commercial truck)					Expected compliance (%)

2035 Brazoria, Fort Bend, Galveston, Harris, Montgomery						
I/M Program ID			41	61		Identifies program number with MOVES database
Pollutant Process ID			101,102, 201,202, 301,302	112		
Source Use Type			21,31*,32**	21,31*,32**		
Begin Model Year			2011	2011		
End Model Year			2033	2033		
Inspect Freq			1	1		Annual testing; program specifications
Test Standards Description						
Test Standards ID			51	45		Indentify test with MOVES database test standards IDs
I/M Compliance	93.12 for source type 21 (passenger car) *87.53 for source type 31 (passenger truck) **81.95 for source type 32 (light commercial truck)					Expected compliance (%)

2040 Brazoria, Fort Bend, Galveston, Harris, Montgomery						
I/M Program ID			41	61		Identifies program number with MOVES database
Pollutant Process ID			101,102, 201,202, 301,302	112		
Source Use Type			21,31*,32**	21,31*,32**		
Begin Model Year			2016	2016		
End Model Year			2038	2038		
Inspect Freq			1	1		Annual testing; program specifications
Test Standards Description						
Test Standards ID			51	45		Indentify test with MOVES database test standards IDs
I/M Compliance	93.12 for source type 21 (passenger car) *87.53 for source type 31 (passenger truck) **81.95 for source type 32 (light commercial truck)					Expected compliance (%)

Table 15: MOVES2010b Emissions Factor Post-Processing to Be Performed by County and Year

Strategy and Post-Processing	Analysis Year	Counties
Texas Low Emission Diesel Fuel	2015, 2018, 2025, 2035, 2040	Harris, Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, Waller

TCEQ,TTI. Refer to Appendix 10 for parameters used.

Emissions Controls Used for Conformity Credit: This conformity did not use any credits from voluntary mobile emission reduction programs since they were not needed to show conformity to the emission budgets.

5. <u>Regional Transportation Emissions</u>

Table 17: Model used to calculate regional emissions

Utility used: Spatial Emission Estimator (SEE)	Refer to Appendix 8
Inputs: Hourly VMT per link and speeds, link definitions, time period designations, emission factors per vehicle type, road type and speed, VMT mix.	Refer to Appendix 9

Table 18: VMT Mix Year/Analysis Year Correlations

VMT Mix Year	Analysis Years
2005	2003 through 2007
2010	2008 through 2012
2015	2013 through 2017
2020	2018 through 2022
2025	2023 through 2027
2030	2028 through 2032
2035	2033 through 2040

The VMT mix designates the vehicle types included in the analysis, and specifies the fraction of on-road fleet VMT attributable to each vehicle type by MOVES road type.

The VMT mixes were estimated based on TTI's 24-hour average VMT mix method (*Methodologies for Conversion of Data Sets for MOVES Model Compatibility.* TTI, August 2009) estimated for each TxDOT district associated with the eight-county HGB area (i.e., Houston and Beaumont districts). The 24-hour VMT mix was developed using vehicle classification counts (2001-2011), end-of-year registration data (2012), and MOVES defaults (where needed).

Table 19: Air Quality Emissions and VMT Results [40 CFR 93.118 or 40 CFR 93.119]

Year	NOx Emissions (t/d)	NOx Budgets (t/d)	VOC Emissions (t/d)	VOC Budgets (t/d)	VMT
2015*	124.50	171.63	52.62	71.56	149,002,991
2017**	102.70	130.00	48.27	59.76	157,175,294
2018	91.80	103.34	46.09	50.13	161,261,445
2025	62.58	103.34	36.00	50.13	189,704,202
2035	63.36	103.34	38.49	50.13	227,258,318
2040	68.74	103.34	41.04	50.13	248,661,265

*2015 used the emission budget from the year 2014 RFP SIP for the 1997 8 hr ozone standard.
**The emissions for year 2017 has been linear interpolated using the data for the years 2015 and 2018 regional air quality analysis. The year 2017 was interpolated per EPA 40 CFR 93.118(d)(2).

6. Interagency Consultation [40 CFR 93.112]

- List of agencies that participate in the process: H-GAC, TxDOT, TCEQ, EPA, FHWA, METRO, TTI

    Participants: Jeff Riley (EPA), Barbara Maley (FHWA), Jackie Ploch (TxDOT), Janie Temple (TxDOT), Jamie Zech (TCEQ), Dennis Perkinson (TTI), Laura Norton (TxDOT), Edmund Petry (METRO), Jinsan Lee (TxDOT), Charles Airiohuodion (TxDOT), Jose Campos (FHWA), Peggy Thurin (TxDOT), Andy Mao (TxDOT), Catherine McCreight (TxDOT), Guy Donaldson (EPA), Larry Badon (METRO), Michelle Conkle (TxDOT), Travis Milner (TxDOT)

- Pre-analysis consensus template (This document was not created for this conformity)
- Refer to Appendix 14 for summary of conference calls

7. Public Participation [40 CFR 93.112] **Please refer to Appendix 15**

- 30 day requirement

- Dates of beginning and end of public comment: November 21, 2014 to January 9, 2015

- Date and location of public meeting: two public meetings were hosted on **Wednesday, December 17, 2014, from Noon-1:00 p.m. and again from 6:00-7:00 p.m.** at H-GAC offices, 3555 Timmons Lane, 2nd Floor Conference Room B, Houston, TX 77027.

- Refer to Appendix 15 for public comments received and their responses

- Additional opportunity for public review and comment on the 2017 and 2018 regional air quality analysis: February 13, 2015 to February 26, 2015. Non-interpolation based emission analyses were completed for 2017 and 2018 to address the potential effects of a December 23, 2014 Court ruling that vacated EPA's revocation of the previous 1997 8-hour ozone NAAQS for conformity purposes only. Later EPA revoked the 1997 8-hr ozone standard for all purposes effective 4/6/2015.

- conformity timeline:

  - Wednesday, September 3 2014 – Conformity conference call to begin the conformity process for the 2040 RTP.
  - Wednesday, November 21 2014 - Transportation Policy Council approval to enter into public comment period for the 2040 RTP and Conformity.
  - Wednesday, December 17 2014 - Two Public Meetings at H-GAC (Noon and 6 pm).
  - Friday, January 9, 2015 - End public comment period (50 Days).
  - Friday, January 23, 2015 - Transportation Policy Council approval of 2040 RTP and Conformity.
  - Sunday, January 25, 2015 – 12 months grace period starts

- Friday, February 13, 2015 – begin second public comment period due to US Court of Appeals ruling that reinstated the 1997 8-hr Ozone standard for conformity.
- Tuesday, February 17, 2015 - Public Meeting at H-GAC 5:30 pm.
- Thursday, February 26, 2015 – end of second public comment period
- Friday, February 27, 2015 – new conformity results presented to the Transportation Policy Council for information only.
- Friday, March 6, 2015 – EPA revocation of 1997 8-hr Ozone standard for all purposes (effective 4/6/2015)

Appendices

Appendix 1: Resolution from Transportation Policy Council

Appendix 2: Applicable SIP Excerpts

Appendix 3: Project Listing

Appendix 4: Travel Model Validation

Appendix 5: Final RTP Link Listing

Appendix 6: MOVES information and Fact Sheets

Appendix 7: MOVES input parameters

Appendix 8: Suite of Programs

Appendix 9: MOVES input and output files

Appendix 10: Post Process (TxLED adjustment)

Appendix 11: Final MOVES emission factors **N/A**

Appendix 12: Transportation Control Measures in the State Implementation Plan **N/A**

Appendix 13: VMEPs **N/A**

Appendix 14: Interagency Conformity Consultation Process

Appendix 15: Public Comment process