Air Quality Technical Report

Loop 336 South
From IH 45 to FM 1314
Montgomery County

TxDOT Houston District
CSJ: 0338-11-056

July 2017

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.

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1.0 Introduction

The Texas Department of Transportation (TxDOT) proposes to improve approximately 2.5 miles of Loop 336 South from Interstate Highway (IH) 45 to Farm-to-Market (FM) 1314 in Conroe, Montgomery County, Texas. The proposed project would create a divided 4-lane highway by constructing a 2-lane roadway to the south of the existing roadway. The new lanes would serve as the eastbound lanes with the existing lanes being converted to serve westbound traffic.

Loop 336 South from East of Cypress Lane Boulevard to West of FM 1314

The existing Loop 336 (from East of Cypress Lane Boulevard to West of FM 1314) consists of one 13.5-foot wide lane (westbound lane) and one 12-foot wide lane (eastbound lane) with an 8-foot wide outside shoulder, within a 300-foot right-of-way (ROW).

The proposed Loop 336 westbound lanes would consist of one 13.5-foot wide lane and one 12-foot wide lane with an 8-foot wide outside shoulder. The proposed eastbound lanes would consist of one 12-foot wide lane, a 15-foot wide lane, and a sidewalk. An approximately 192-foot wide median would be located between the eastbound and westbound lanes.

Loop 336 South at FM 1314

The existing Loop 336 at FM 1314 consists of one 13.5-foot wide lane and one 12-foot wide lane (westbound lanes), a center left turn lane, two 12-foot wide lanes (eastbound lanes) and an 8-foot wide outside shoulder.

The proposed Loop 336 at FM 1314 westbound lanes would consists of one 12-foot left turn lane, one 12-foot lane, one 15-foot shared lane, and one 12-foot right turn lane, and a sidewalk. The sidewalk would be off-set from the shoulder. An approximately 142-foot wide median would be located between the eastbound and westbound lanes.

2.0 Project Conformity

This project is located within Montgomery County, which is part of the Houston-Galveston-Brazoria area that has been designated by the U.S. Environmental Protection Agency (EPA) as a moderate nonattainment area for the 2008 Ozone national ambient air quality standards (NAAQS); therefore, the transportation conformity rules apply.

Both the Houston-Galveston Area Council (H-GAC) 2040 Regional Transportation Plan (RTP) and the 2017-2020 Transportation Improvement Program (TIP) were initially found to conform to the Texas Commission on Environmental Quality (TCEQ) State Implementation Plan (SIP) by the Federal Highway Administration (FHWA) and Federal Transit Administration on September 11, 2015 and December 19, 2016, respectively; however, the proposed project is not consistent with this conformity determination, because the project is not included in either of the plans. TxDOT will not take final

action on this environmental document until the proposed project is consistent with a currently conforming RTP and TIP.

3.0 Hot Spots Analysis

The project is not located within a carbon monoxide (CO) or particulate matter (PM) nonattainment or maintenance area; therefore, a project level hot-spot analysis is not required.

4.0 Traffic Air Quality Analysis

Traffic data for the design year (2035) is estimated to be 30,700 vehicles per day (vpd), as shown in **Appendix B**. A prior TxDOT modeling study and previous analyses of similar projects demonstrated that it is unlikely that the CO standard would ever be exceeded as a result of any project with an average annual daily traffic (AADT) below 140,000 vpd. The AADT projections for the project do not exceed 140,000 vpd; therefore, a Traffic Air Quality Analysis was not required.

5.0 Mobile Source Air Toxics

Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS)[1]. In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA)[2]. These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority MSAT, the list is subject to change and may be adjusted in consideration of future EPA rules.

Motor Vehicle Emissions Simulator (MOVES)

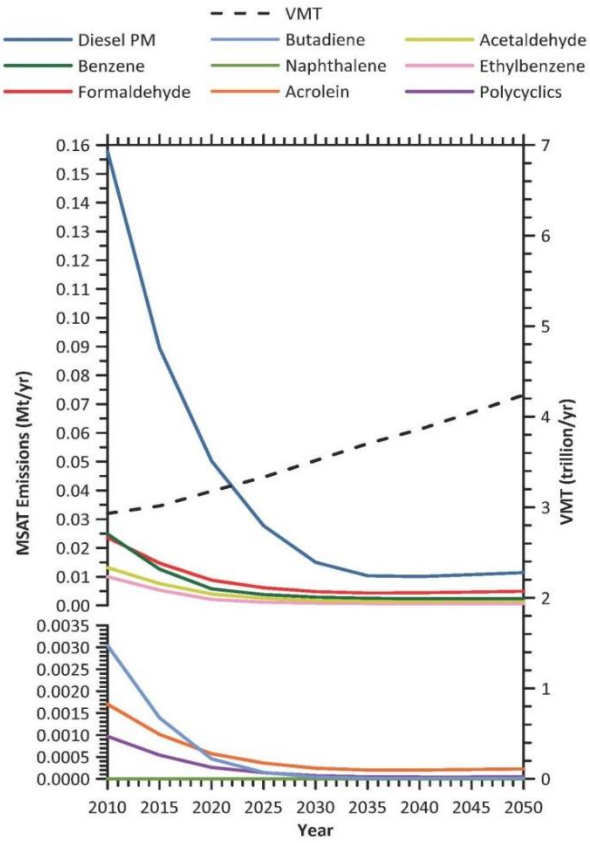
According to EPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and vehicle miles travelled (VMT) data. MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include Tier 3 emissions and fuel standards

[1] See: http://www.epa.gov/iris/
[2] See: http://www.epa.gov/ttn/atw/nata1999/

starting in 2017 (79 FR 60344), heavy-duty greenhouse gas regulations that phase in during model years 2014–2018 (79 FR 60344), and the second phase of light duty greenhouse gas regulations that phase in during model years 2017–2025 (79 FR 60344).

Since the release of MOVES2014, EPA has released MOVES2014a. In the November 2015 MOVES2014a Questions and Answers Guide, EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014. Using EPA's MOVES2014a model, as shown in **Figure 1**, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Figure 1: Projected National MSAT Emissions Trends For Vehicles Operating on Roadways (2010-2050)



Source: EPA MOVES2014a model runs conducted by FHWA, September 2016.
Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorological, and other factors.

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES2014a will notice some differences in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes compared to MOVES2010b, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project level decision-making within the context of the National Environmental Policy Act (NEPA). The FHWA, EPA, Health Effects Institute (HEI), and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this emerging field.

Project-Specific MSAT Information

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives, found at*: http://www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/mobile_source_air_toxics/msatemissions.pdf.

For The Build Alternative, the amount of MSAT emitted would be proportional to the VMT assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Build Alternative is slightly higher than that for the No Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for the Build Alternative along the roadway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOVES2014 model, emissions of all of the priority MSAT decrease as speed increases. Also, regardless of the alternative chosen, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent between 2010 and 2050[3]. Local

[3] Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, Federal Highway Administration, October 12, 2016

conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The additional travel lanes contemplated as part of the Build Alternative would have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under the Build Alternative than the No Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the expanded roadway sections at IH 45 and FM 1314. However, the magnitude and the duration of these potential increases compared to the No Build Alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, when a highway is widened, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSAT would be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects"[4]. Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

[4] See: http://www.epa.gov/iris/

Other organizations are also active in the research and analyses of the human health effects of MSAT, including HEI. Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile source Air Toxic Analysis in NEPA Documents*. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations[5] or in the future as vehicle emissions substantially decrease[6].

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI[7]. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, in particular for diesel PM. The EPA[8] and the HEI[9] have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of

[5] See: HEI, http://pubs.healtheffects.org/view.php?id=282
[6] See: HEI, http://pubs.healtheffects.org/view.php?id=306
[7] See: http://pubs.healtheffects.org/view.php?id=282
[8] See: http://www.epa.gov/risk/basicinformation.htm#g
[9] See: http://pubs.healtheffects.org/getfile.php?u=395

people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework.

Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable. Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Conclusion

In this document, a qualitative MSAT assessment has been provided relative to the various alternatives of MSAT emissions and has acknowledged that the Build Alternative may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain and, because of this uncertainty, the health effects from these emissions cannot be estimated.

6.0 Congestion Management Process

The congestion management process (CMP) is a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs. The project was developed from the H-GAC's CMP, which meets all requirements of 23 CFR 450.320 and 500.109, as applicable. The CMP was adopted by HGAC in January of 2013 and amended in January of 2015.

The region commits to operational improvements and travel demand reduction strategies at two levels of implementation: program level and project level. Program level commitments are inventoried in the regional CMP, which was adopted by H-GAC; they are included in the financially constrained RTP, and future resources are reserved for their implementation.

The CMP element of the plan carries an inventory of all project commitments (including those resulting from major investment studies) that details type of strategy, implementing responsibilities, schedules, and expected costs. At the project's programming stage, travel demand reduction strategies and commitments will be added to the regional TIP or included in the construction plans.

The regional TIP provides for programming of these projects at the appropriate time with respect to the single occupancy vehicle (SOV) facility implementation and project-specific elements.

Committed congestion reduction strategies and operational improvements within the study boundary would consist of the addition of lanes with access management treatments, a 15-foot wide shared lane, sidewalk, and transit amenities. Individual projects are listed in **Table 1**.

Table 1: Congestion Management Process Strategies

Operational Improvements in the Travel Corridor		
Location	**Type**	**Implementation Date**
SH 75 from Gladstell Dr to the IH 45 Underpass (*bisects Loop 336*)	Widen from 2 to 4 lanes with bicycle accommodations	2017
Crighton Rd from IH 45 to FM 1314 (*parallel arterial*)	Widen to 4 lanes	2017

In an effort to reduce congestion and the need for SOV lanes in the region, TxDOT and H-GAC will continue to promote appropriate congestion reduction strategies through the Congestion Mitigation and Air Quality Improvement (CMAQ) program, the CMP, and the MTP. The congestion reduction strategies considered for this project would help alleviate congestion in the SOV study boundary, but would not eliminate it.

Therefore, the proposed project is justified. The CMP analysis for added SOV capacity projects in the transportation management area is on file and available for review at H-GAC. This project level-analysis is included in **Appendix C**.

7.0 Construction Emissions

During the construction phase of this project, temporary increases in PM and MSAT emissions may occur from construction activities. The primary construction-related emissions of PM are fugitive dust from site preparation, and the primary construction-related emissions of MSAT are diesel PM from diesel powered construction equipment and vehicles.

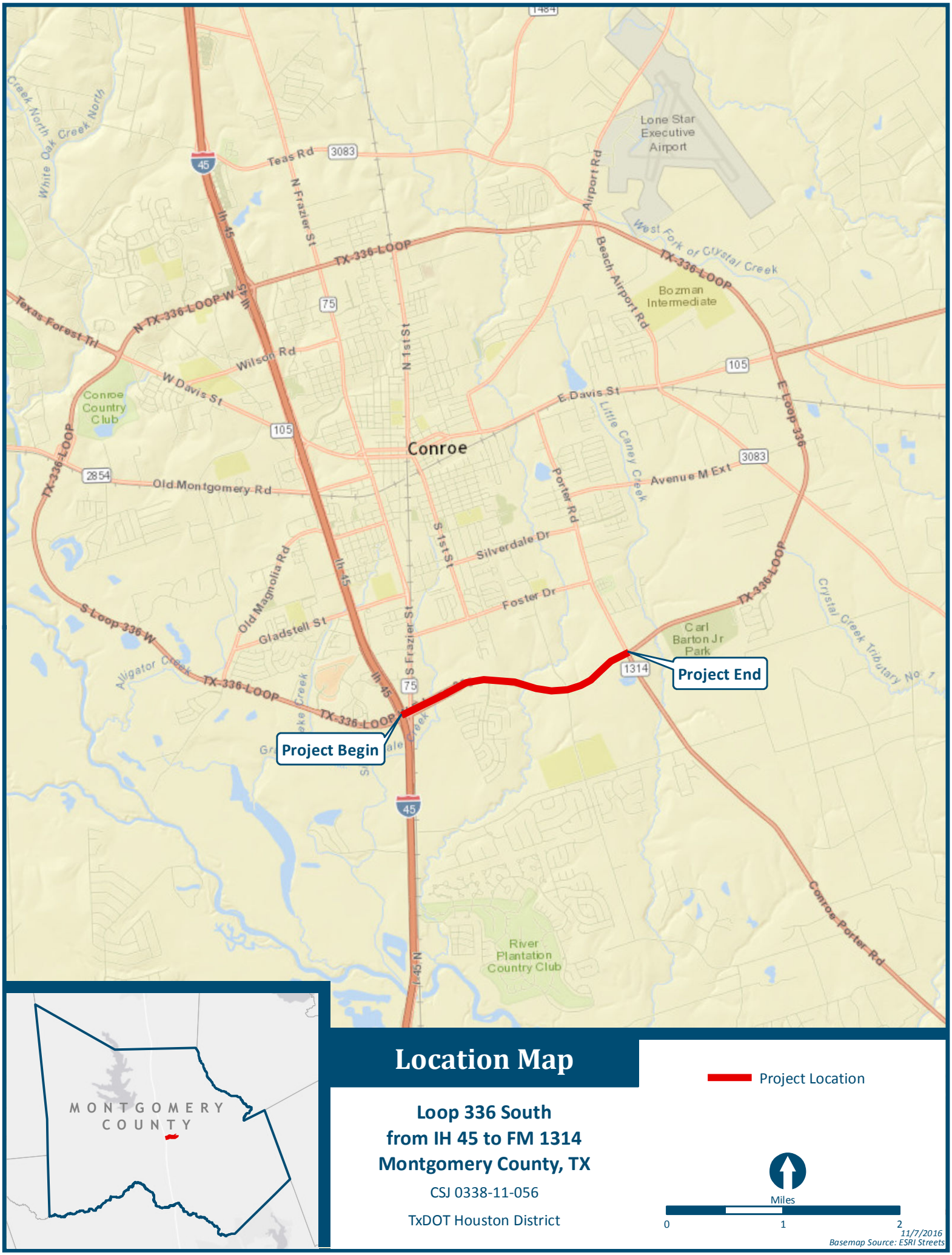
The potential impacts of PM emissions would be minimized by using fugitive dust control measures contained in standard specifications, as appropriate. The Texas Emissions Reduction Plan (TERP) provides financial incentives to reduce emissions from vehicles and equipment. TxDOT encourages construction contractors to use this and other local and federal incentive programs to the fullest extent possible to minimize diesel emissions. Information about the TERP program can be found at: http://www.tceq.state.tx.us/implementation/air/terp/.

However, considering the temporary and transient nature of construction-related emissions, the use of fugitive dust control measures, the encouragement of the use of TERP, and compliance with

applicable regulatory requirements, it is not anticipated that emissions from construction of this project would have any significant impact on air quality in the area.

APPENDIX A

Project Location Map



Location Map

Loop 336 South
from IH 45 to FM 1314
Montgomery County, TX

CSJ 0338-11-056

TxDOT Houston District

Project Location

Miles

0 1 2

11/7/2016

Basemap Source: ESRI Streets

APPENDIX B

TPP Traffic Data

TEXAS DEPARTMENT OF TRANSPORTATION
P.O. BOX 1386
HOUSTON, TEXAS 77251-1386

Number of Pages (including this sheet): 1

Date: August 19, 2015

To: Gerald Foster
TxDOT, HOU, APD
Ph: (713) 802-5987
Fax: (713) 802-5350

From: Emmanuel C. Samson
TxDOT, HOU, ATP
Ph: (713) 802-5309
Fax: (713) 802-5439

Subject: ADT

Regarding your traffic data request for the above subject area, please see the following data.

The traffic data for the above subject area are listed below. Traffic data listed below represent Average Daily Traffic (ADT). Current and projected traffic data were obtained from 2013 Houston District RI-2T log exclusively.

	2014	2015	2034	2035
Loop 336(S): From IH 45 to FM 1314	21,500	21,800	30,100	30,700

APPENDIX C

Congestion Mitigation Analysis

Houston-Galveston Area Council

Congestion Mitigation Analysis

CSJ 0338-11-056
June 6, 2017

Analyst:
Stephan Gage

June 6, 2017

Mr. Charles Airiohoudion
Texas Department of Transportation
Houston District
7600 Washington Ave.
Houston, Texas 77007

RE: Congestion Mitigation Analysis for from Interstate Highway (IH) 45 to Farm-to-Market (FM) 1314 in Conroe, Montgomery County, Texas — CSJ# 0338-11-056

Dear Mr. Airiohoudion:

The Houston-Galveston Area Council (H-GAC), the designated Metropolitan Planning Organization (MPO) for the region, has completed the Congestion Mitigation Analysis (CMA) for the above referenced project. Please review the findings of the CMA and forward them to the appropriate parties at the Texas Department of Transportation (TxDOT) and/or other organizations.

The results of the analysis indicate that the Level of Service for Loop 336 IH-45 to FM 1314 is at Level E under current conditions. The proposed project would raise the Level of Service to Level A. TxDOT would be justified in adding capacity with the inclusion of proposed access management treatments as part of this project.

If you have any questions or concerns about the CMA report, please do not hesitate to contact me at (713) 499-6692.

Sincerely,

Stephan Gage
Chief Transportation Planner
Houston-Galveston Area Council

Project Description

The Texas Department of Transportation (TxDOT) proposes to improve approximately 2.5 miles of Loop 336 South from Interstate Highway (IH) 45 to Farm-to-Market (FM) 1314 in Conroe, Montgomery County, Texas. The proposed project would create a divided 4-lane highway by constructing a 2-lane roadway to the south of the existing roadway. The new lanes would serve as the eastbound lanes with the existing lanes being converted to serve westbound traffic.

Loop 336 South from Stewarts Forest Drive to East of FM 1314

The proposed Loop 336 westbound lanes would consist of one 13.5-foot wide lane and one 12-foot wide lane with an 8-foot wide outside shoulder. The proposed eastbound lanes would consist of one 12-foot wide lane, a 15-foot wide shared lane, and a sidewalk. An approximately 192-foot wide median would be located between the eastbound and westbound lanes.

Loop 336 South at FM 1314

The proposed Loop 336 at FM 1314 westbound lanes would consist of one 12-foot left turn lane, one 12-foot lane, one 15-foot shared lane, and one 12-foot right turn lane, and a sidewalk. The sidewalk would be off-set from the shoulder. An approximately 142-foot wide median would be located between the eastbound and westbound lanes.

Findings

The Level of Service (LOS) on Loop 336 from the IH-45 to FM 1314 is currently Level E (See Exhibit A). LOS for projected roadway volumes in 2041 are Level A (See Exhibit B). Additional roadway capacity is justified based on LOS and planned access management treatments described in the project application.

This section of the facility is in a transitional area with a limited number of intersecting roadways and a sparse, but growing population. Transportation System Management (TSM) or Travel Demand Management (TDM) measures appropriate for this facility in anticipation of future growth. The TSM/TDM measures mentioned in the project application include sidewalks, raised medians, and transit amenities in the project area. These measures are appropriate for the project, and sufficient for the project area under current and near future conditions.

Background

The current Congestion Management Process (CMP) for the Houston-Galveston metropolitan area was adopted in January 2015. The CMP requires the performance of a Congestion Mitigation Analysis (CMA) on significant added capacity roadway projects. It is the stated policy of the CMP to apply cost-effective TSM and/or TDM measures as the first component of all congestion reduction strategies. Added capacity roadway projects, such as those being considered for this section of Loop 336 are typically

only justified if cost-effective congestion reduction strategies fail to reduce vehicular congestion to acceptable levels.