Bridge of the Americas

(BOTA)

TAA-021 NADB22
AIR QUALITY ASSESSMENT

RESEARCH PROGRAM

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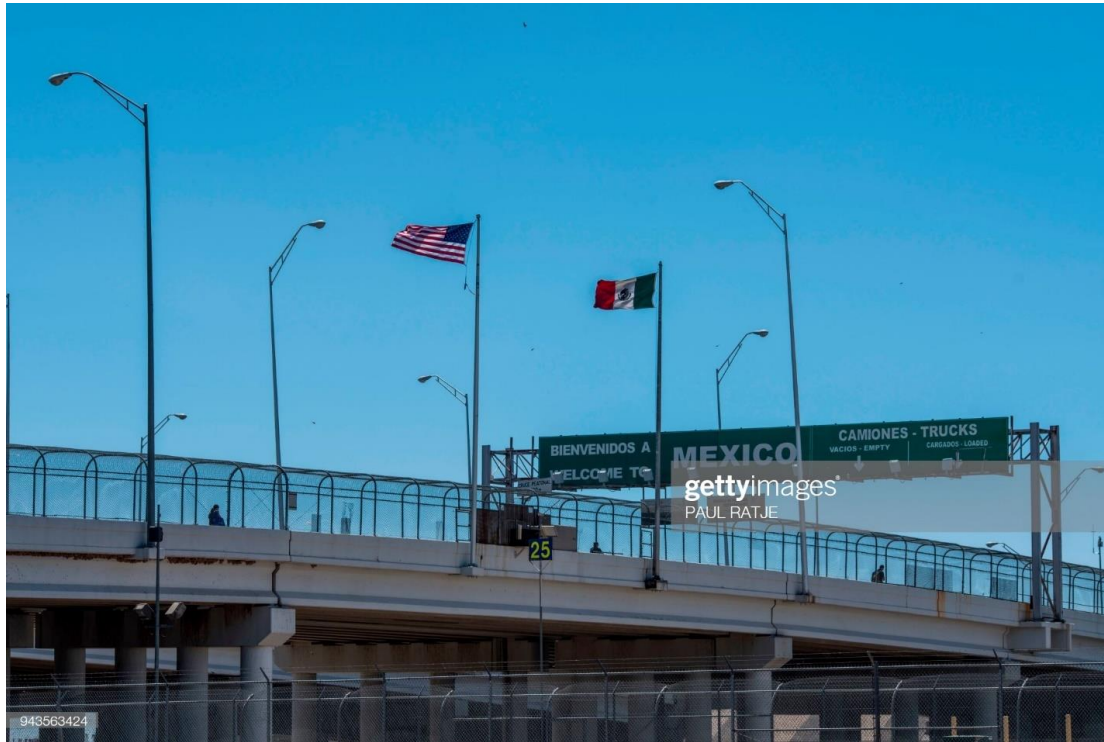## Presented to:

Join Advisory Committee

FEBRUARY 16, 2023

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BACKGROUND

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BACKGROUND

❑ **Border Crossings Situation from JRZ to El Paso**

- ➢ 50 years of steady increasing activity

- ➢ Continue population growth on both sides

- ➢ Increase in manufacturing plants in JRZ

- ➢ Border traffic crossing modifications done to mitigate long crossing waiting periods

- ➢ Crowdedness and long times for crossing have caused hysteria and violence in citizens while crossing from Juarez to El Paso

- ➢ Typical car crossing waiting periods from 20 min. – 3 hrs. Pedestrian traffic waiting lines also have increased considerably from 30 min. – 3 hrs. Depending on annual seasons.

- ➢ Good changes have been made about the way vehicles cross the US/MX Border in over 50 years, but continuous increase traffic catch up and the slow waiting lines continue.

BACKGROUND (CONT'D)

❑ **Border Crossings Situation from El Paso to Juarez**

➢ CBP, Border Patrol & El Paso Police Control Check Points

✓ Traffic control is a challenge with traffic jams, undocumented persons, drugs and arms control program.

BACKGROUND (CONT.') INSTITUTIONS INVOLVED IN AIR QUALITY IN THE PDNA

| INSTITUTION	N A M E
Local Government	Air Group, El paso City-County Health Department Direccion General de Desarrollo Ecologia del Gobierno del Municipio de Juarez
State Goverments	Direccion General de Desarrollo Urbano y Ecologia del Gobierno del Estado de Chihuahua New Mexico Air Quality Department Texas Commission on Air Quality Western Governors Association
Federal Government	Instituto Nacional de Ecologia of Mexico Secretaria del Medio Ambiente y Recursos Naturales US Air Quality Protection Agency US Centers for Disease Control and Prevention
International, US - Mexico	Joint Advisory Committee for the Improvement of Air Quality in the Cd. Juarez, Chihuahua, El Paso, Texas; Dona Ana Co., New Mexico Airbasin
Academic Institutions	Arizona State University New Mexico Institute of Technology New Mexico State University University of Utah San Diego State University Universidad Autonoma de Cd. Juarez Southwest Center for Env. Research & Policy
Non-Governmental Organizations	Border Health Research Center of the El Paso del Norte Health Foundation Paso del Norte Health Foundation Air Quality Defense Clean Cities Coalition Physicians for Social Responsibility Paso del Norte Air Task Force

AIR QUALITY CHALLENGES
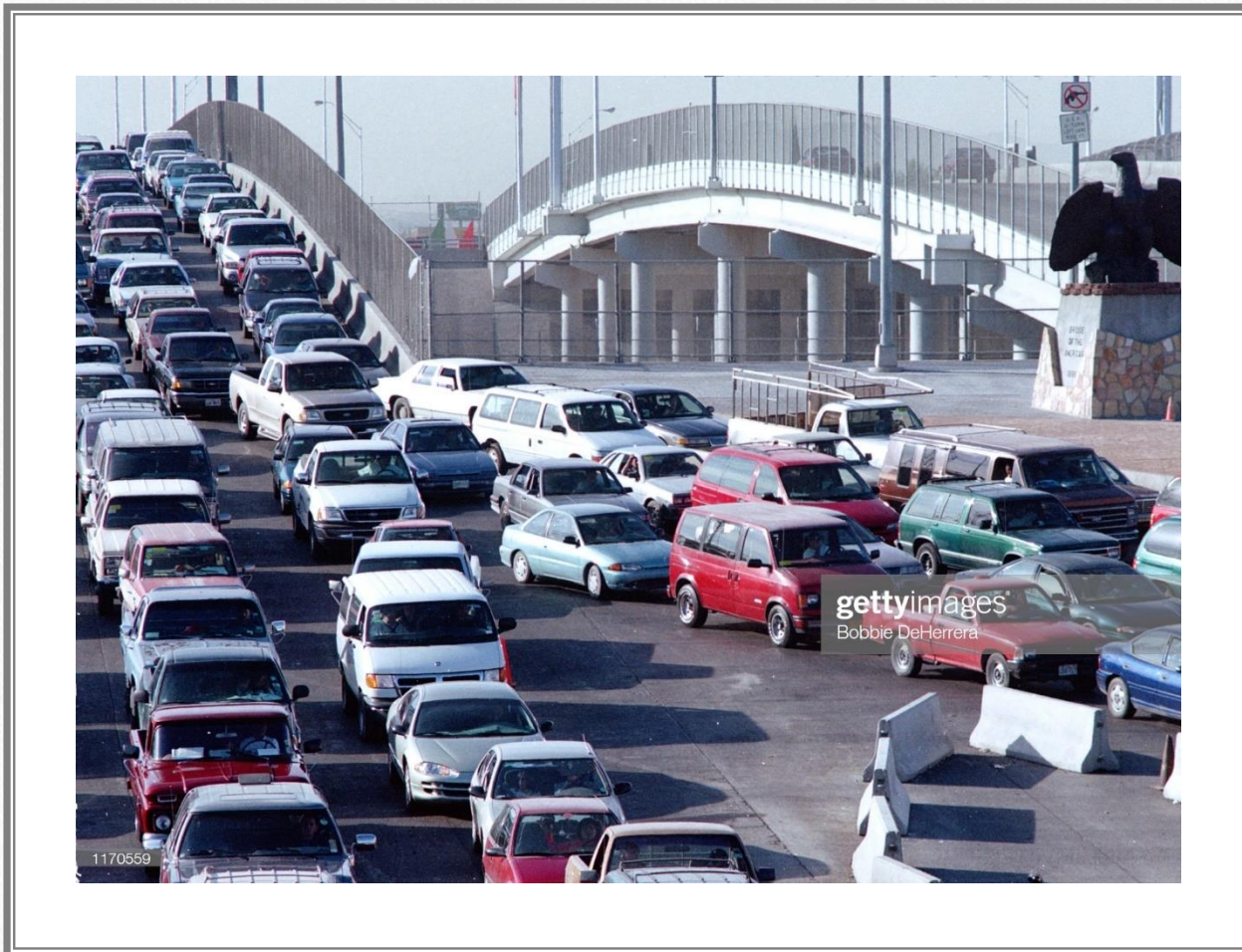
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AIR QUALITY CHALLENGES – US/MEXICO BORDER REGION (PdNA)

➢ AREA OF IMPACT – 60 MILES ON EITHER SIDE OF THE BORDER

➢ THREE STATES – TX, NM, CHIHUAHUA

➢ HIGH DENSITY OF PEOPLE

➢ FAST GROWING INDUSTRIAL SECTOR DUE TO US, CANADA AND MEXICO FREE TRADE AGREEMENT

➢ EXISTENCE OF ECONOMICALLY DISTRESSED COUNTIES ON BOTH SIDE OF THE BORDER

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AIR QUALITY CHALLENGES – US/MEXICO BORDER REGION (PdNA)

➢ CRITICAL BORDER ENV. ISSUES

- ✓ Rapid urbanization and inadequate infrastructure

- ✓ Open burning air pollution

- ✓ Surface and groundwater contamination from open sewers and industrial waste

- ✓ Transportation and illegal dumping of hazardous waste

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RESEARCH ORGANIZATION

➢ **JOIN ADVISORY COMMITTEE (JAC)**

- ✓ Local Community-based Organization – Oversees process of achieving cleaner air for El Paso de Norte Region.

- ✓ Created in 1983 "La Paz" Agreement. First funded by Congress in 1991.

- ✓ Purpose – To address environmental issues of the US/Mexico border region and to begin a comprehensive analysis of possible solutions to acute air, water and hazardous waste problems.

- ✓ Has implemented 400 projects involving 1,000 individuals including students.

- ✓ Collaborates closely with Border XXV. Programs are sponsored by the US EPA, Department of Health and Human Services, SEMARNAT, and other multi-national organizations In the Border Environmental Program.

- ✓ Involved in applied research, outreach, education, policy development and regional capacity-building for communities who are its ultimate customer.

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RESEARCH PROJECT

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Primary Objectives

The goal is to evaluate **a**) the health risks for BOTA employees exposed to daily high carbon monoxide emission levels and **b**) environmental justice concerns of the neighboring underserved communities affected by high carbon monoxide emission levels.

The Project seeks *To Improve Air Quality* by implementing a program aimed at **a)** Assessing health effects and risks related to vehicular emissions, and **b)** Defining viable and cost-effective mitigation measures.

The Project will be **piloted at the International Bridge of the Americas (BOTA)** and its access streets, one of the largest international border-crossing sites along the U.S Mexican border and an important vehicular connector of the binational Paso del Norte airshed (El Paso-Juárez-Sunland Park).

The proposed demonstration project is responding to SOLTA RFA's:

❑ **Goal 1**, Objective 4a. It seeks To Improve Air Quality.

  ➢ The project also responds to **Priority Objective** 4, **of the Border 2025 Goal and Objective to the Project by aiming to promote an environment free of air pollution that can contribute to the full realization of the right to a healthy environment.**

❑ **To this end, the results of the study will serve to:**

  ➢ a) Outline policies needed to achieve a healthy workplace environment for bridge government employees
  ➢ b) Help determine measures to achieve environmental justice for the low-income community populations who live, work, and go to school in the surrounding neighborhoods.

TASKS, ACTIVITIES, METHODS AND INSTITUTION RESPONSIBLE

AREA/ORGANIZATION	TASK	ACTIVITIES AND METHODS DESCRIPTION	COORDINATION
PROJECT COORDINATION UTEP	**1**	**Preparation (3-4 months)** • Assist all team members in setting up meetings and relationships needed to initiate field research • Process required permits, as needed • Finalize, with the researchers involved, the needed Institutional Review Board (**IRB)** protocols	• City & County Authorities • Bridge Personnel (CBP-DHS, GSA) • TCEQ • US/MX Consulates • Research Partners (UTEP/NMSU)
	2	**Coordination (18 months):** • Coordinate meetings with team members to prepare the planning of activities and relevant schedules. • Coordinate meetings with key immigration officers to plan the activities and schedules to be followed by the research teams. • Coordinate team activities with BOTA key officials to conduct team activities and inform all relevant parties of project activities, who will be conducting these activities and the dates.	
	3	**Financial Management and Oversight (18 months)**	

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AREA/ORGANIZATION	TASK	ACTIVITIES AND METHODS DESCRIPTION	COORDINATION
	4	**Quality Control Assurance (18 months)**	
	5	**Reporting –** (Monthly for the duration of the project) • Prepare progress monthly report and submit them to key NADB/EPA officials and BOTA and key regulatory agencies such as the City of El Paso Air Quality Department, El Paso County management, and the Texas Commission of Environmental Quality. • Coordinate and prepare Final report for the Agency.	

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AREA/ORGANIZATION	TASK	ACTIVITIES AND METHODS DESCRIPTION	COORDINATION
AIR QUALITY MONITORING NMSU	**1**	**Preparation** • Procure the air quality monitoring personal particulate matter samplers to ensure that they are operating properly and according to specifications. A cellular-based Wi-Fi system will be purchased to provide a Wi-Fi network for the PurpleAir samplers. • A **QAPP** will be drafted prior to any sampling and will include instrument **Standard Operating Procedures** (**SOP**) for each sampler used in this study. The **QAPP** will be based on the procedures outlined in the guidelines of **EPA QA/G-5** "Guidance for Quality Assurance Project Plans", https://www.epa.gov/sites/default/files/2015-06/documents/g5-final.pdf . The **QAPP** and **SOP** will be prepared as outlined in EPA procedures. • **Specific locations** for the sampling equipment will be in coordination with BOTA Port of Entry (POE) staff and management. This includes the location of the portable weather station and the three air quality samplers knowing that the PurpleAir and DustTrak equipment requires AC power. (2 months). • **Air Monitoring Coordinates** – BOTA Port of Entry Center Lane ✓ ☐ 31.766857º -106.451036	All activities will be coordinated with Bridge authorities by Dr. Henry Van, Principal Investigator for the project. **City Authorities – UTEP Bridge Personnel – UTEP NMSU – Bridge Personnel UTEP-NMSU**

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AREA/ORGANIZATION	TASK	ACTIVITIES AND METHODS DESCRIPTION	COORDINATION
AIR QUALITY MONITORING NMSU	**2**	**Direction of Project** • Project piloted at BOTA will be northbound **Conduct Monitoring** • Air quality monitoring will be comprised of measurements primarily focusing on exposure of the workers at BOTAPOE to fine particulate matter from vehicular exhaust and urban pollution sources. To measure particulate exposure, we will use a combination of personal, indoor air, and outdoor air sampling. **We anticipate collecting particulate and meteorological data for 9- months starting 4-months after initiating the project.** • The proposal mentioned **CO** being an issue because of the **1989 Report prepared (Dr. Howard Applegate et al.)** in which indicated the **CO** being a contaminant of concern for human health. However, due to the cost of chemical testing and the budget not been sufficient to sample **CO** and other chemical parameters the air monitoring team decided for this pilot study to use the funds and sample particulate matter (**PM 2.5 microns**) which is a very good indicator of health risks which cause serious health effects. Then based on the **PM 2.5** results we would propose a second phase for chemical testing where **CO** and other key air contaminants would be tested.	

AREA/ORGANIZATION	TASK	ACTIVITIES AND METHODS DESCRIPTION	COORDINATION
		Sampling. We will operate the Personal Environmental Monitor (**PEM**) sampling on a 1in a 6-day frequency coinciding with the USEPA sampling schedule, collecting five samplers per month. We will conduct a prestudy test over a month with the samplers to work out the details of the **SOP** and **QAPP** prior to the bridge sampling. Overall, we will collect at least 30 filter samplers at the bridge using the **PEM** sampler over a period of 6-months. We anticipate coordinating the sampling details with bridge management and have them wear the sampler during their shift. In addition to the filter samplers, we will operate a continuous **TSI DustTrak PM2.5** sampler collecting data at 5-minute averages and will be collocated with the **TAS** (**Tactical Air Sampler**) MiniVol PM2.5 samplers to provide acute exposure. Dr. David Dubois at NMSU will analyze data at his laboratory. • We will also install two to three low-cost **PurpleAir samplers** at the **POE** using our portable cellular modem and Wi-Fi system. We will collocate one of the samplers in the same space as the **PEM**, **TAS,** and **DustTrack** samplers and the others in close proximity. Due to the limited signal, the PurpleAir sensors will collect data within an approximate 200-foot radius from the equipment.	

AREA/ORGANIZATION	TASK	ACTIVITIES AND METHODS DESCRIPTION	COORDINATION
		• The data from the **PurpleAir sensors** will be used to compare with the existing PurpleAir sensor network in El Paso and Ciudad Juarez. • Finally, a small solar powered portable weather station will be used to gather 5-minute wind speed, wind direction, temperature, relative humidity, barometric pressure, and rainfall amounts. • **Metadata** will be collected to provide detail on each sample to include locations, heights above the ground, air sampler flow rates, calibration information, air temperature and pressure during calibrations, and relative humidity conditions during the collection and storage of the filters. Photographs will be used to document placements of the samplers as much as possible. 9-months, starting 4-months after initiating the project.	
	3	**Data Collection & Analysis** • A student or staff member from Las Cruces will bring the **PEM** sampler to the **POE** to be used that day. After the day's sampling is completed, the sampler will be picked up the next day and another sampler will be provided five days later to be used for the next sampling day.	Dr. Dubois - NMSU

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		• The **40 Teflon filters** collected by the **PEM** will be sent to the **Desert Research Institute (DRI)** for analysis. **DRI** will conduct a gravimetric analysis on each filter and supply **PM2.5** concentrations in units of micrograms per cubic meter. **DRI** will retain the filters in case we want to chemically analyze them in the future with additional funds. NMSU will also collect Teflon filter samples using the TAS samplers as a comparison with the PEM. The TAS filters will be analyzed at NMSU using their microbalance and provide aerosol concentrations in units of micrograms per cubic meter. • All air quality data collected during this study will be analyzed by **Dr. David DuBois of NMSU** in his laboratory.	
	4	**Final Report Preparation** • Based on data analysis Dr. Dubois will prepare a report describing the EPA procedure followed during the collection and analysis and will infer the exposure conditions of the target areas.	

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HEALTH RISK ASSESSMENT UTEP	1	**Preparation** • Preparation will involve the following activities. ✓ Planning and Scoping ✓ Dialogue between interested parties and/or stakeholders ✓ Identify the hazards ✓ Gather information to determine the numerical relationship between exposure and effects. • Examine what is known about the frequency, timing, and levels of contact particle matter • Outline risk characterization that includes: **1)** Risk estimation and **2)** Risk description	All activities will be well coordinated with bridge authorities by Dr. Henry Van, Principal Investigator for the project.
	2	**Employees Interviews** • Specific questionnaires will be developed and used to interview employees • Objective of the interviews will be to identify their experience and comments about working at the international bridges • Analyze the data collected and identify conclusions	
	3	**Data Review and Data Analysis** • This team, led by **Dr. Gabriel Ibarra-Mejia,** will review data obtained from the ambient air quality monitoring and employee exposure to identify the health risks of pollution associated with vehicle emissions. Specifically, they will review individual employee monitoring to determine the level of exposure and estimate the health risk. Key pollutant is particulate matter (**PM2.5**).	

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	4	**Prepare Report** Based on the air quality data and the employee interview Dr. Ibarra-Mejia will prepare his report.	
SOCIOLOGICAL ASSESSMENT OF ENVIRONMENTAL IMPACT	**1**	**Preparation** • We will notify and consult with the community in the **Chamizal** neighborhoods about this project. We will organize a public meeting to notify residents of the study and gain knowledge from the residents about important social, economic, and political issues that should be captured on our survey instrument. • **IRB** approval	

AREA/ORGANIZATION	TASK	ACTIVITIES AND METHODS DESCRIPTION	COORDINATION
		Pilot Study • The sociological assessment entails a two-phase study: **1)** an ethnographic assessment including observations and interviews at BOTA; and **2)** a survey in the neighborhood of El Chamizal, a neighborhood adjacent to BOTA. • The general data gathered intends to capture a) a profile of who uses BOTA and for what purpose, and b) the connection between the demographic characteristics (i.e., immigrant status, race/ethnicity, education, occupation, gender, age) and subjection to pollution	
	2	**Data Collection & Analysis** • The data collection at phase one will entail observations at BOTA and conducting a convenience sample of 15 individuals for interviews. • Data will be analyzed with ethnographic techniques for field observations and coding of interviews. • Data will be analyzed with ethnographic techniques for field observations and coding of interviews. • For the second phase of data collection, in consultation with the community of El Chamizal, we will develop a survey instrument to capture their concerns and an assessment of the impact of the pollution on the neighborhood. • A stratified sampling design will then be implemented to ensure that the subjects selected will be representative of the population of interest. The data will be analyzed using descriptive statistical techniques and bivariate analysis.	

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	3	**Report Preparation** • The report will be prepared by Drs. Howard Campbell and Dr. Cristina Morales and be externally reviewed by experts in the field.	
CURRENT ENVIRONMENTAL REGULATORY POLICY FRAMEWORK **UTEP**	1	**Comparative Policy Review (federal & state)** This task will be undertaken in the first four quarters of the research period covered by the grant. This will involve examining the laws and policies of the EPA (federal) and search for policies in Texas that relate to transportation and air quality (most Texas government agencies or authorities focus on water). **The Border 2025** Program will be a key focus, including its important division of work within Region 6 on objective 3 concerning air pollution, covering the El Paso/Cd. Juárez bridges. Information provided by the EPA, the Region 6 Coordinator, the Texas/New Mexico/Chihuahua Work Group, the **IMIP** grant provided by the **NADB** to study emissions on the bridges.	

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		The early stages of the project will include reviewing the literature on reports and publications that center on air emissions on the US-Mexico border. Such studies will show the pattern of past emissions and whether they meet the EPA standards. Important policy advisors will be identified that affect or are affected by the policy.	
	2	**Identify Law and Regulatory Flaws** This task will be undertaken during the second and third quarters of the research period covered by the grant. Past reports and publications will be compared to the **Border 2025 Program** to trace continuing problems and flaws in past policies. Consultation will be conducted with regional advisors such as the Joint Advisory Committee (JAC), which is a binational committee comprised with private citizens, private businesses, university officials, and other members, along with other relevant non-governmental organizations (NGOs), to help identify concerns about existing policies on transportation, air pollution, and other policies that may affect emissions on the bridges.	

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	3	**Prepare Report** • This task is to help identify how the emissions data acquired through this project inform whether existing policies are effective and what programs need to be recommended. • This work will be provided in the last three quarters of the grant project. • The policy recommendations will be provided based on what would be required to reduce emissions to keep within the law and challenges to implementation of such policies. • The results will be shared with **Joint Advisory Committee (JAC),** other local **NGOs,** and **policy officials**, such as those **agencies with personnel at the ports of entry,** and **local/state officials.**	

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TRANSPORTATION ASSESSMENT UTEP	1	Research (vehicle traffic patterns, crossing process, and air quality)	**UTEP - City of El Paso**
	2	Data collection and review (traffic speed, volume, vehicle emissions, and traffic congestion pattern.	
	3	Assess current immigration crossing checkpoint operations pattern and procedures.	
	4	**Transportation Modeling Scenarios** • The transportation scenarios modeling techniques to be used will include (1) traffic flow condition (speed and volume) modeling using probe vehicle data; (2) traffic emission estimation using emission models; (3) map matching with vehicle GPS coordinates to support the identification of the road of interest.	

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		• **The limitation of modeling** using probe vehicle data is that the data penetration (data transfer) rate may be not high enough on some roadway segments during certain times or some of the cars do not have GPS capability installed because they are old models. • **The output** is expected to be the documentation of the models and experimental analysis. • **The outcome** is expected to be the recommendations that could address the challenges mentioned in the proposal.	
	5	**Prepare Report** • Dr. Ruimin Ke will prepare the report. • Dr. Henry Van and other experts in this field will review the report	

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Work Plan Gantt Chart for the Project: Air Quality Assessment: BOTA

AREA	TASK	TASK DESCRIPTION	S1		S2		S3	S4	S5
			B1	B2	B3	B4	B5	B6	B7	B8/M15
Project Coordination	1	External Coordination	■	■	■	■	■	■	■	
	2	Internal Coordination	■	■	■	■	■	■	■	
		Monthly Update Reporting	■	■	■	■	■	■	■	
		Final Report								■
Air Quality Monitoring	1	Preparation	■	■						
	2	Conduct Monitoring			■	■	■	■	■	
	3	Data Collection & Analysis			■	■	■	■	■	
	4	Report Preparation								■
Health Risk Assessment	1	Preparation	■	■						
	2	Interviews of Employees			■	■				
	3	Data Review & Data Analysis					■	■	■	
	4	Prepare Report						■	■	■
										Pg 1

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Work Plan Gantt Chart for the Project: Air Quality Assessment: BOTA

AREA	TASK	TASK DESCRIPTION	S1 B1	S1 B2	S2 B3	S2 B4	S3 B5	S3 B6	S4 B7	S5 B8/M15
Sociological Assessment	1	Preparation	■	■						
	2	Pilot Study		■	■					
	3	Data Collection & Analysis				■	■	■		
	4	Prepare Report							■	■
Policy Framework Assessment	1	Comparative Policy Review (Federal & State)	■	■	■					
	2	Identify Law and Regulatory Flaws						■		
	3	Prepare Report							■	
Transportation Assessment	1	Research (vehicle traffic patterns, crossing process, and air quality)	■	■						
	2	Data Collection and Review (traffic speed, volume, vehicle emissions, and traffic congestion pattern)			■	■	■			
	3	Assess current immigration crossing checkpoint operations pattern and procedures							■	
	4	Prepare Report							■	■
Project Management	1	Coordination Meetings	■		■		■		■	■
	2	Progress Reports		■		■		■	■	
	3	Presentation Meetings		■			■		■	■

Faculty and Sub-consultant Capabilities		
Professional	**Expertise**	**Qualifications**
David Dubois, Ph.D. **Faculty Sub-consultant** **NMSU**	Air Monitoring/Climatology	Dr. DuBois is the State Climatologist and the focal point for climate information in the state of New Mexico. He will provide air pollution and air quality field studies expertise.
Gabriel, Ibarra-Mejia **MD and Ph.D.**	Health Risk Team Occupational Medicine Environmental Engineering Ergonomics	Dr. Ibarra-Mejia is an MD and Ph.D. environmental engineer expert in occupational medicine, public health and assessment of air pollution health risks identification and solution development strategist. His areas of expertise span government, private sector, and academia.
Howard Campbell, Ph.D. **Faculty UTEP**	Sociology Team Anthropology/ qualitative social research	Dr. Campbell is a professor and chair of anthropology at the University of Texas at El Paso (UTEP). He will provide expertise in the areas of ethnicity, political anthropology, social inequities, and U.S.-Mexico border culture
Maria Cristina Morales, Ph.D. **Faculty UTEP**	Sociology Team Sociology/ quantitative social research	Dr. Maria Cristina Morales is a professor of sociology at UTEP. Dr. Morales uses both quantitative and qualitative approaches and has conducted large-scale survey studies involving borderlandneighborhoods. Her expertise includes the sociology of the U.S.-Mexico border and social and environmental inequalities.

Faculty and Sub-consultant Capabilities

Professional	Expertise	Qualifications
Charles Boehmer, Ph.D. **Faculty UTEP**	Policy Analysis Team Political Science and Policy Analysis	Dr. Boehmer is a professor of political science at UTEP. He brings expertise on the regulatory policy network to assess regulatory systems in the Cd. Juárez/El Paso Metroplex
Ruimin, Ke, Ph.D. **Faculty UTEP**	Transportation Engineering	Dr. Ke is an assistant professor of civil engineering at UTEP. His expertise lies in intelligent transportation systems and smart cities with focuses on machine learning, transportation optimization, and the Internet-of-Things applications that expedite traffic flow
Henry Van, Ph.D. Faculty UTEP	Interdisciplinary Team Management Environmental Compliance/Construction Management	Dr. Van is a civil engineer experience in environmental compliance for industry and governments and has worked along the US/MX border in air compliance programs. He is a certified and registered environmental professional and an expert interdisciplinary program manager

Next Steps

- Prepare the Project Quality Assurance Plan
- Schedule Kickoff Meeting with Stakeholders
- Follow the Schedule
- Collect and Analyze the Data
- Develop Conclusions and Recommendations
- Present Final Report to Sponsors and Stakeholders

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QUESTIONS?

Thank you!