2045 Appendix
Long Range Multimodal Transportation Plan

Puerto Rico Highways and Transportation Authority (PRHTA)

Final Report December 2018

Long Range Transportation Plan for Puerto Rico

APPOVED BY PUERTO RICO METROPOLITAN PLANNING ORGANIZATION

December 12, 2018

The Puerto Rico Department of Transportation and Public Works and the Puerto Rico Highway and Transportation Authority after a 45-day public comment period for revision and comments, has presented and approved this Plan by the Puerto Rico Metropolitan Planning Organization Policy Board Committees.

December, 20, 2018

Carlos M. Contreras Aponte
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Date

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2045 Appendix Long Range Multimodal Transportation Plan

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Puerto Rico Highways and Transportation Authority (PRHTA)

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A APPENDIX A REVIEW RESULTS, DATA REQUIREMENTS AND MODEL FINDINGS

As part of the initial tasks for developing of the 2045 LRTP an analysis of the Base Conditions and Options was performed. The main objective of this task is to capture an objective picture of available data related to the transportation system in Puerto Rico. This chapter is divided into 4 sections:

1. LRTP 2040 Report and Model Assessment;
2. Existing Conditions Assessment;
3. Existing Traffic Counts and Travel Time Databases;
4. Global Information System (GIS) Database.

As part of this analysis the following documents were reviewed:

- The previous version of the 2040 Puerto Rico Long Range Transportation Plan (2040 LRTP) report, model and related files;
- PRHTA Construction Improvement Program (CIP);
- Heavy vehicles federal requirement files;
- Recent transit demand files for AMA;
- Data related to the effects of Hurricane María on the transportation infrastructure;
- Public Participation Plan (Plan de Participación Ciudadana, DTOP);
- Federal Highway Online Travel Survey Manual Update – based on the National Cooperative Highway Research Program's (NCHRP's) Report 571 and its technical appendix (titled Standardized Procedures for Personal Travel Surveys, authored by Peter Stopher and teammates) and the Federal Highway Administration's (FHWA's) in 1996;
- 2001 National Household Travel Survey User's Guide;
- Global Information System (GIS) files related to existing infrastructure;
- Latest version of the Unified Planning Work Program (UPWP); and
- Various versions of the Statewide Transportation Improvement Program (STIP);
- The PRHTA Fiscal Plan.

Additional information from existing traffic counts was obtained from the Data Collection Office of the PRHTA and their consultants. It includes data from the Highway Performance Monitoring System (HPMS) and the Surface Transportation Program (STP).

This chapter includes a summary of the general findings related to the reviewed data.

LRTP 2040 REPORT AND MODEL ASSESSMENT

The files from the previous LRTP were the starting point of the 2045 LRTP report. DATA AVAILABLE FOR LRTP BY SOURCE goes into more detail regarding the content of the report and the modelling approach for 2040 as well as into the improvements proposed to the regional model for the 2045 Plan.

These documents were published from August 2013 to December 2013 and consist of four main publications:

1. Puerto Rico 2040 Island-wide Long-Range Transportation Plan;
2. San Juan Transportation Management Area;
3. Aguadilla Transportation Management Area; and
4. Five Transportation Planning Regions.

The new 2045 LRTP is a continuation of the previous plan and is based the Vision Goals and Objectives from the 2040 LRTP. Adjustments to these were made considering the new local conditions in Puerto Rico and the requirements under federal regulations. These changes were validated with the LRTP stakeholders including the general public, the MPO and the project committees; these are discussed further along in this document.

Regarding to the 2040 CUBE model, the spatial coverage of the Puerto Rico travel demand model (the model), also referred to as the Island-wide model, spans the main island of Puerto Rico and the islands of Culebra and Vieques. It includes seven transportation planning regions, which are subdivided into 4,296 transportation analysis zones (TAZ).

The model is a traditional trip-based model which has four sequential steps:

- Trip generation;
- Trip distribution;
- Mode choice; and
- Assignment.

The forecasting process classifies all trips into one of six cores trip purposes or commercial vehicle trips:

- Home-based work (further disaggregated into three subgroups based upon income level) - including trips from home to work place or from work place to home;
- Home-based shopping – including trips from home to shops or restaurants;
- Home-based school – including school trips from home to K-12;
- Home-based university – including trips from home to university, mainly during off-peak;

- Home-based other – including all home-based trips beginning or ending at places not listed above;
- Non-home based – including trips with home as neither the origin nor the destination; and
- Non-household based vehicle classes – including commercial vehicles, medium weight trucks, and heavy trucks.

The model for 2040 LRTP was calibrated and validated to the 2010 traffic conditions. It is worth noting the 2045 LRTP model was calibrated to 2016 traffic conditions. 2017 traffic conditions were not considered because hurricane aftermath conditions did not allow for data collection. The following sections, include a review of each of the forecasting steps in more detail.

Socioeconomic Data

The 2040 LRTP travel demand model requires socioeconomic data that are commonly used inputs to travel demand models. The following data are required for each Traffic Analysis Zone (TAZ):

- Household variables;
- Employment variables; and
- School Enrollment.

The household variables are input to a household synthesizer to disaggregate total households into a disaggregated household database. The synthesizer stratifies the households in each TAZ into five dimensions:

- Household Size (number of persons) (1,2,3,4+);
- Income Group (Low, medium, high)[1];
- Number of Workers (0,1,2,3+);
- Number of Children (0,1,2,3+); and
- Presence of Senior Citizens (0,1+).

The household synthesizer uses Iterative Proportional Fitting (IPF) to estimate the number of households of each household type in each TAZ. The IPF requires a seed distribution of households and marginal totals for each of the household dimensions.

An auto ownership model uses the household synthesizer outputs to estimate the number of households by auto ownership level in each zone. Four auto ownership levels are used:

- Zero autos;
- One auto;
- Two autos; and
- Three or more autos.

Table A.1 outlines the data sources for each base year variable. The following section discusses the process used for forecasting and allocating these variables to the TAZ level.

[1] Low: <$25,000, medium: < $75,000, high: $75,000 or greater; 2009 dollars.

Table A.1: Summary of Base Year Data and Sources

Variable	Sources	Geography
Population and Households	Census 2010	Census Block Level
Income	American Community Survey five-year data (2005-2009). If median income not available in ACS, the median income for the municipality was assumed.	Census tract level
IPF Seed Household Distribution	Public Use Micro Sample (PUMS) for PR.	
Employment	• Puerto Rico Dept. of Labor; • 2000 Census Journey-to-Work; • BLS Data (QCEW- Quarterly Census of Employment and Wages); • Dun and Bradstreet Database; • National Land Cover Database (NLCD) from ArcGIS Online; • Land use data from PRHTA;	PR Total – Parcel Level
School Enrollment	• Puerto Rico Department of Education; • ESRI – National Center for Education; • Middle States Association of Colleges and Schools; and • National Center for Educations Statistics.	

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

The socioeconomic forecasts approach and methods used in the previous model (2040 LRTP) are sections outlined in DATA AVAILABLE FOR LRTP BY SOURCE.

For the updated modeling effort as part of the 2045 LRTP, the most recent socioeconomic data available was gathered to update the socioeconomic forecasts travel demand model. These included:

- Population by Island Total: 1985 – 2016;
- Population by Municipio: 1999 – 2016;
- Population by Census Block Group: 2000 and 2010;
- Puerto Rico – US migration: 2005 – 2016;
- Puerto Rico Life Expectancy: 1960 – 2015;
- Puerto Rico Fertility Rates: 1960 – 2015;
- Persons per Household Ratio by Municipio: 2009 – 2015 (5-year datasets);
- Employment by Workplace Location by Municipio: 2001 – 2016;
- Employment by Home Location by Municipio: 1983 – 2016;
- Journey to work flows by Municipio (CTPP): 2006-2010 (5-year dataset);
- Employment by NAICS Industry by Municipio: 2007, 2012, and 2014 – 2016;
- Average Weekly Wages by Municipio: 2001 – 2016;
- Median Household Income by Municipio: 2009 – 2015 (5-year datasets); and
- Public Use Microdata Sample: 2016.

Regional econometric models were used for the development of MPO-level population and employment forecasts. These models relate population, employment, and wages in order to have a consistent forward-looking view on Puerto Rico's socioeconomic situation. Allocations of MPO control totals to TAZs are based off historic trends and 2010 Census data.

Trip Generation

The inputs to the trip generation component of the 2040 LRTP travel demand model are discussed in detail in DATA AVAILABLE FOR LRTP BY SOURCE; these include:

- 2010 Census Data;
- National Land Cover Database (NLCD);
- American FactFinder Public Use Microsample (PUMS) data; and
- 2011 Puerto Rico Household Travel Survey (HHTS).

The end-product of the 2040 LRTP model trip generation component is a table of productions and attractions by trip purpose for each TAZ in the model. The trip purposes include:

- Home based work (HBW), disaggregated into three income groups;
- Home based retail (HBR);
- Home based school (HBS);
- Home based university (HBU);
- Home based other (HBO);
- Non-home based (NHB); and
- Truck, split into three truck types, and identical production and attraction models.

The attraction and truck models are primarily derived from external sources and publications, applied directly to TAZ-level variables, discussed further in the Trip Generation Statistical Models section.

The production models, however, used variables at the individual household level, and therefore require a two-step process:

- Production Models Step 1: Population Synthesizer; and
- Production Models Step 2: Calculating each TAZ's productions.

Trip Attraction Models

Table A.2 shows the variables in the TAZ-level socioeconomic data file created from census data, NLCD data and GIS processes. Most of these are used in one or more of the trip attractions models. Unlike the productions models, no population synthesizer is necessary, because these are TAZ level variables that do not interact with each other, and thus it is only necessary to know these variables' values in aggregate at the TAZ level; dividing the TAZ into 'types' based on these variables is not required.

Table A.2: Trip Attraction Variables

Variable Name	Description	Values
FIPS	Federal Information Processing Code for Municipio of TAZ.	Serial Numbers starting at 72
POP	Number of persons in TAZ.	0,1,2, 3…
HH	Number of households in TAZ.	0,1,2, 3…
RETAIL	Number of employees working in retail occupations in TAZ.	0,1,2, 3…
SERVICE	Number of employees working in service occupations in TAZ.	0,1,2, 3…
MANUF	Number of employees working in manufacturing occupations in TAZ.	0,1,2, 3…
GOVT	Number of employees working in government occupations in TAZ.	0,1,2, 3…
OTHER	Number of employees working in other[2] occupations in TAZ.	0,1,2, 3…
TOTEMP	Number of total employees working in TAZ.	0,1,2, 3…
ACRES	Number of acres inside TAZ boundaries.	1,2, 3…
INCOME	Median annual household income in TAZ.	The median annual household income vary by TAZ, ranging from $2,425 to $78,950 in 2016.
STUDENTS	Number of children aged (5-17) in TAZ.	0,1,2, 3…
COLLEGE	Number of persons attending college or trade school in TAZ	0,1,2, 3…
DORMS	A flag denoting if the college inside a TAZ has dormitory facilities.	0: No 1: Yes

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Trip Generation Statistical Models

As discussed, the 2040 LRTP travel demand model trip generation component contains a series of statistical sub-models that were used to produce the end-product of trip generation, i.e. a table of productions and attractions for each trip purpose for each of the 4,296 TAZs in the travel demand model.

Table A.1: List of Sub-models within Trip Generation Component

Model(s)	Data Set	Estimation Method	Purpose
Household Size and Income Group Models	Census Tract	Linear regression of average household size / income on size / income group distribution	Disaggregate households into the 384 types by size, income group, numbers of workers, children, and seniors

[2] Other employment included all other industry categories that were not captured by retail, service, manufacturing and government.

Model(s)	Data Set	Estimation Method	Purpose
Household Composition Models	Census Tract	Cross-classification	Estimate probability of having 0, 1, 2 or 3+ autos per household for each household type
Household Auto ownership model	PUMS	Logit	
Production models for each trip purpose (other than truck trips)	HHTS	Linear regression of trips generated on hh characteristics derived from PUMS / IPF process	Generate productions by TAZ
Attraction models for each trip purpose (other than truck trips)	NCHRP 365	n/a	Generate attractions by TAZ
Truck productions / attractions model	External Models	n/a	Generate truck productions and attractions by TAZ

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

The attractions models use previously-developed parameters from NCHRP Report 365, and the truck models use a combination of external models developed in other regions. The production models are estimated from the HHTS, which was updated for the 2045 LRTP but was not complete until May 2018, after the required deadline for model calibration. For those reasons, it was not feasible or significantly beneficial to update the bottom three sub-models listed in Table A.3**.**

Special Generators

The 2040 LRTP model incorporated special generators in certain TAZs that do not conform to the trip generation characteristics along with other TAZs in the study area. Special generators are used in many MPO travel demand model to generate trips associated with shopping centers, airports, sports/convention centers, hospitals, military bases, and universities.

2045 Scope for Trip Generation

The 2045 model recalibration consisted of the following tasks related to trip generation:

- Collection and QA/QC of most recent PUMS and Census data;
- Aggregation the census data into PR model TAZs;
- Updating of the sub-models that feed into the population synthesizer, as listed in the final column of Table A.3: ;
- Comparison of latest available household data (2016) to prior version and potential revision of 2040 projections based on differences;
- Revision and estimation of special generators; and
- Minor modifications to reduce run time and size of some of the model's intermediate files.

Trip Distribution

General Process

The trip distribution model takes as inputs the productions and attractions produced by the trip generation step, and estimates the zone-to-zone trip flows using the minimum generalized impedance as controlling determinant.

The model utilizes a standard gravity model procedure to perform the trip distribution process by trip purposes and by income groups. The trip purposes in the trip distribution are the same as those defined in the trip generation step. For each trip purpose, the process for producing each trip matrix has the following three general steps (refer to DATA AVAILABLE FOR LRTP BY SOURCE for details):

- **Step 1:** Calculate the generalized impedance for each origin-destination pair in peak and off-peak;
- **Step 2:** Calculate the friction factors by trip purposes; and
- **Step 3:** Distribute trips.

2045 Scope for Trip Distribution

During the process of updating and calibrating the model for the 2045 model; the following tasks were completed:

- Comparison of average trip length and trip length distribution of household data to prior version;
- Revision of the friction factor functions based upon differences; and
- Introduction of K factors to better approximate the observed region to region flows.

Mode Choice

The mode choice is the third key stage in the operation of the LRTP travel demand model, following the trip generation and trip distribution steps. The purpose of this stage is to split the forecast trip demand into different modes. The formulation of the mode choice model is described here along with recommendations for future work.

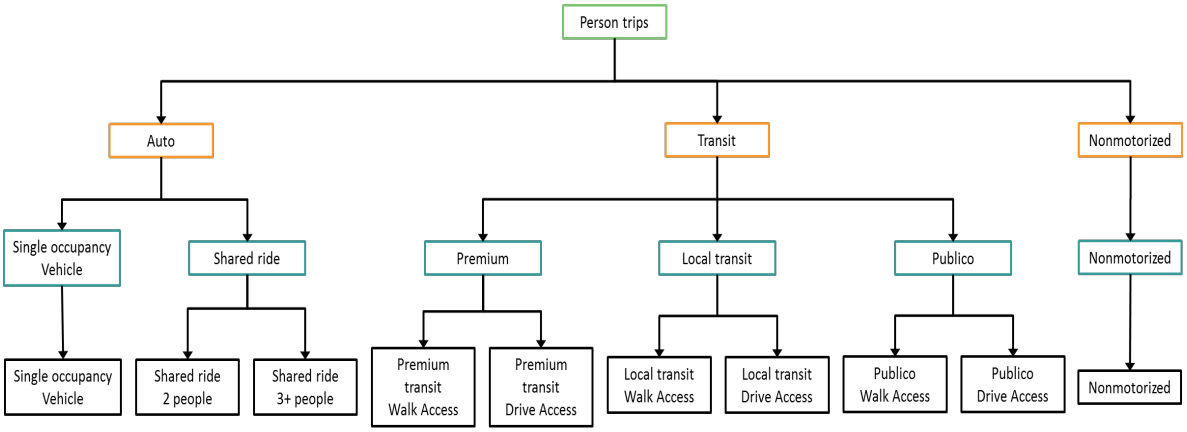
Data Sources

Based on the available model documentation, no data collection was done for estimating the mode choice model for the 2040 work. Instead, only national benchmark values were used. It also, seems that the assumptions in the model were validated based on trip behavior reported in the household travel survey, ACS, transit on-board survey, NTD, and local transit ridership. That is, industry standard benchmarks were used to set up the mode choice model with parameters adjusted to hit certain estimated mode share targets.

General Process

The final outputs of the 2040 Mode Choice stage were trip matrices for each of the ten modes for each of the eight trip purposes. This gives 80 individual trip matrices. All calculations were applied for each TAZ in the model on an origin-destination basis. The ten modes are shown in Figure A.1.

Figure A.1: Mode Choice Hierarchy



Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

For each trip purpose, the process for producing each trip matrix has the following three general steps (refer to DATA AVAILABLE FOR LRTP BY SOURCE for details):

- Calculate utilities for each mode;
- Calculate mode choice split for each mode; and
- Calculate total trips for each mode.

2045 Scope for Mode Choice

Within the model it was assumed that the peak period is the best indicator of home based work behavior while the off-peak period is the best indicator of the other trip purposes. In reality, individuals make trips for all purposes in both the peak and off-peak period. As such to the 2045 estimate the mode choice for each purpose independently for each time period, depending on data available.

Time of Day

The 2040 model's four-time periods are defined as:

- AM Peak: 7:00 – 9:00 am;
- Midday: 9:00 am – 3:00 pm;
- PM Peak: 3:00 – 6:00 pm; and
- Night: 6:00 pm – 7:00 am.

The 2040 time of day factors used the following datasets:

- Puerto Rico Household Travel Survey (PRHTS) database (percent of person trips by time period and by trip purpose); and
- Time period percentages for truck. See Table A.4 .

The 2040 LRTP travel demand model general procedures are discussed in more detail in DATA AVAILABLE FOR LRTP BY SOURCE.

Truck Model Development

This section discusses the truck model development for the 2040 LRTP travel demand model and recommendations to the modeling update; more detail is included in DATA AVAILABLE FOR LRTP BY SOURCE.

Within the 2040 LRTP travel demand model, three types of non-personal vehicle trips are defined. These are:

- Commercial Vehicle (COM);
- Medium Truck (MTRK); and
- Heavy Truck (HTRK).

However, no survey data was available to describe these trips as these surveys tend to be extremely expensive and are not very productive or cost-efficient. The only data that was available to describe these trips are classification counts done for the 2040 study.

Truck Trip Generation

Daily truck trips are estimated separately by purpose (COM, MTRK, HTRK) and use the convention that zonal productions are set equal to zonal attractions.

One new variable was included for truck zones in the model; this variable identifies whether a zone contains land uses that appear likely to generate a higher-than-average number of truck trips per employee. This includes truck stops, warehouses, transfer terminals, ports, and concentrations of manufacturing or industrial buildings (more details in DATA AVAILABLE FOR LRTP BY SOURCE).

Truck Trip Time of Day Distribution

The truck time of day model is a simple application of a set of fixed factors that split the daily COM, MTRK, and HTRK trip tables into the four-time periods.

This is a conventional practice, consistent with most four-step models. The trip fractions in the model were developed by examining data from other models and were adjusted based on comparison of the estimated MTRK and HTRK period volumes to a limited set of hourly MTRK/HTRK counts taken in 2011-2012. Truck factors are presented in Table A.4.

Table A.1: Truck Time of Day Factors

Period	Commercial Trucks	Medium Trucks	Heavy Trucks
AM Peak	17%	12%	14%
Midday	44%	42%	40%
PM Peak	23%	18%	17%
Night	16%	28%	29%

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Truck Trip Assignment

Truck trips were assigned to the network as part of the overall vehicle assignment process which is detailed in the Highway Assignment section. It was assumed that commercial vehicles, medium trucks, and heavy trucks have the same kind of path-selection logic as automobiles and that their choice of paths is as sensitive to congestion as autos:

- Passenger Car Equivalent (PCEs);
- Truck Value of Time (VOT);
- Truck Tolls;
- Truck Prohibitions; and
- Output Volumes (more details in DATA AVAILABLE FOR LRTP BY SOURCE).

2045 Scope for Truck Model

For model development, calibration, and validation the following tasks were undertaken:

- Compare and update the trip generation and distribution results with the new socioeconomic data collected for this study;
- Compare and update truck percentages by time of day with observed data;
- Update the gamma function to calibrate the truck trip length and trip length distribution; and
- Update the truck volume-delay function (VDF) during the assignment (see Model Parameters).

Transit Assignment

The transit assignment was used throughout the modelling process, both for the final assignment of the forecast transit demand, as well as input into other processes. While transit assignment is one of the final steps of the model some items needed for assignment are needed earlier in the model are therefore generated earlier. For example, transit skims are input into the distribution and mode choice processes. Detail related to the transit assignment are included in DATA AVAILABLE FOR LRTP BY SOURCE.

Data Sources

Previously ridership (boarding) information was available for the transit modes to varying levels of detail. The information available for each mode is shown in the Table A.5.

Table A.1: Source of Transit Ridership Data

Mode	Data Source	Detail Level
Tren Urbano	ACI data from stations access machines	Average daily boardings (Sun-Sat) by station Monthly boardings by station

Mode	Data Source	Detail Level
AMA buses	AMA fare collection system	Average weekday boardings
Metrobus	National Transit Database	Monthly total boardings
Públicos	National Transit Database	Monthly total boardings
Ferries	National Transit Database	Monthly total boardings

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

General Process

The public transit assignment occurs in two stages within the 2040 LRTP model. These stages are as follows:

- Network building and skimming; and
- Final assignment.

The transit network was built and origin to destination trip details were skimmed for use in the distribution and mode choice stages of the model. Six different transit networks were built and skimmed and these are shown in the Table A.6.

Table A.1: Transit Networks

Peak Transit Networks	Off-Peak Transit Network	Primary Mode
Premium services only	Premium services only	Premium services
Local and Premium services	Local and Premium services	Local services
Públicos, Local, and Premium services	Públicos, Local, and Premium services	Públicos

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Note that times skimmed from the above networks were based on each trip using at least one of the services from the Primary modes. That is, if Local services are the primary mode, then each trip must use a Local service, although it may also use other services as well.

The inputs for the network building are outlined below:

- Highway network;
- Transit lines;
- Transfer legs;
- Park and ride access;
- System file;
- Fares; and
- Factor file (more details in DATA AVAILABLE FOR LRTP BY SOURCE).

In order to skim end to end times the non-transit network also needs to be defined. This is done through a series of GENERATE statements. There are five GENERATE statements in the Puerto Rico model which are described briefly below.

- Transfer legs;
- Walk access legs;
- Walk egress legs;

- Park and ride access; and
- Kiss and ride access.

At this point a complete transit and non-transit network was built and so the model is able to skim the relevant transportation attributes for use in the distribution, mode choice, and final transit assignment.

Final Assignment

The final public transit assignment within the model is an uncrowded, multi user class assignment for each trip purpose, and primary transit mode. The only difference between the two user classes is access mode with one being walk access and the other car access (more details in DATA AVAILABLE FOR LRTP BY SOURCE). From the final assignment, the following outputs were produced:

- Total mode to mode transfers;
- Travel times and distances by service; and
- Boardings and alightings for each service at each stop location.

2045 Scope for Transit Assignment

The following improvements to the transit assignment were proposed:

- Peak and off-peak transit assignment for both work and non-work trips;
- Consolidation of transit assignments; and
- Optimization of transit assignment.

These are discussed further detail below.

Peak and Off-Peak Transit Assignment for both Work and Non-Work Trips

For the 2045 model the transit assignment included both peak and off-peak transit assignments for work and non-work trips, consistent with the team's recommendations to the mode choice model. As part of this task, key transit parameters were reviewed and updated based on available data. For example, initial wait and transfer curves needed to be updated due to different service headways and the extent to which these align. Different perceptions of out of vehicle times across different periods and purposes is another area considered.

Consolidation of Transit Assignments

In the specification of the hierarchy of transit modes Premium is at the top. As such it has its own assignment. However, due to the limited coverage of the Premium services this means that access to these services is quite difficult. Table A.7 presents the changes made to the assignment in order to get a better picture of the value of the Premium services.

Table A.1: Recommended Transit Assignment Consolidation

Available Modes	Primary Mode
Premium, Local, Público	Premium
Local, Público	Local
Local, Público	Público

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Under this structure, any trip which uses a Premium service is classified as a Premium trip and appears in the Premium trip matrix and assignment. In this way the benefit of the Premium services beyond the core corridor can be assessed. This is the preferred approach used in advanced transit models around the world.

In addition, given the different markets served by Local and Público services it is also possible to consolidate the Local and Público primary mode assignments into a single assignment with little expected loss of information. The main potential downside of this is that should the Local bus services be extended beyond San Juan in order to compete directly with the Públicos the analysis may be more involved. The upside however is that analysis of the transit networks more generally will be more straightforward and efficient.

Optimization of Transit Assignment

Within the assignment, there are some inefficiencies that were improved. While the transit assignment is quick, this may increase in the future with ongoing development. For example, the inclusion of crowding in a future version is likely to significantly increase the transit assignment run time. As such, the model was optimized where possible.

Highway Assignment

General Process

The 2040 LRTP travel demand model uses a multi-class static assignment method as explained in more detail in DATA AVAILABLE FOR LRTP BY SOURCE. Each vehicle class is assigned to its own path, enabling modeled volumes for each class to be reported separately. Vehicle classes defined in the model are:

- Single Occupant Vehicles (SOV);
- Two Person Shared Ride Vehicles (SR2);
- Three-or-more Person Shared Ride Vehicles (SR3);
- Commercial Vehicles (COM);
- Medium Trucks (MTRK); and
- Heavy Trucks (HTRK).

Model Parameters

This section summarizes technical details for each of the major traffic assignment model components:

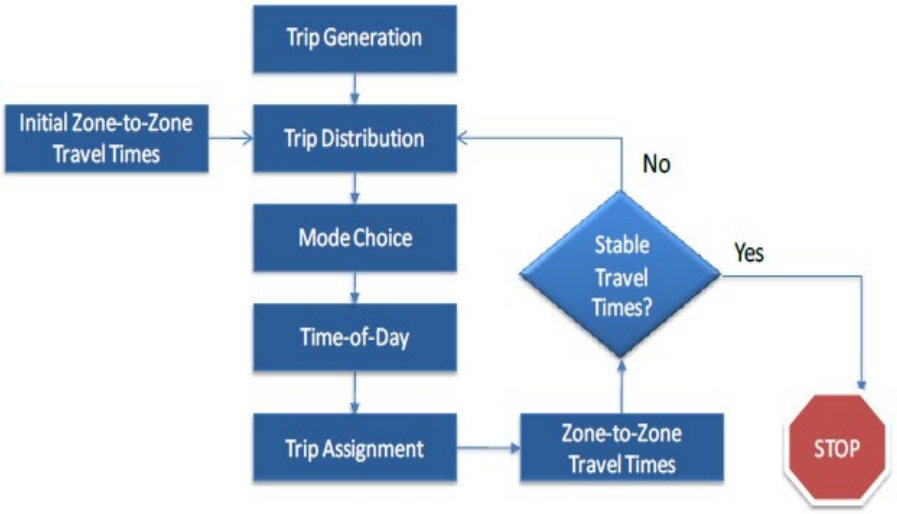
- Equilibrium Convergence;
- Period Capacity Factors;

- Path Building;
- Value of Time;
- Vehicle Operating Costs;
- Passenger Car Equivalents (PCE); and
- Volume Delay Function (VDF) (more details in DATA AVAILABLE FOR LRTP BY SOURCE).

Feedback

The 2040 LRTP travel demand model uses a feedback loop to achieve consistency between input travel times and output congested times. The general procedure is presented in Figure A.2.

Figure A.1: Typical Feedback Loop Application



Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Travel Demand Model Validation

To ensure the accuracy of the travel demand model, the highway assignments were validated using several widely used measures.

- Vehicle Miles Traveled (VMT);
- Comparisons of modeled volumes to observed traffic counts using screenlines: six screenlines were defined; and
- Percent Root Mean Squared error (% RMSE) (more details in DATA AVAILABLE FOR LRTP BY SOURCE).

2045 Scope for Traffic Assignment

For the 2045 model the highway assignment considered:

- Include GEH estimates during the model calibration;
- If travel time data available, include travel time validation along major corridors;
- Update/revise modeling parameters such as VOT, VOC, BPR curves alpha and beta, and others;
- Revisit VDF curves during model calibration; and

- If travel data available, review the definitions of link free-flow speed based upon the speed overnight.

EXISTING CONDITIONS ASSESSMENT

The 2045 LRTP was developed under a new local context that is affected by the existing economic situation and the effect on local mobility and socioeconomic trends after Hurricane María:

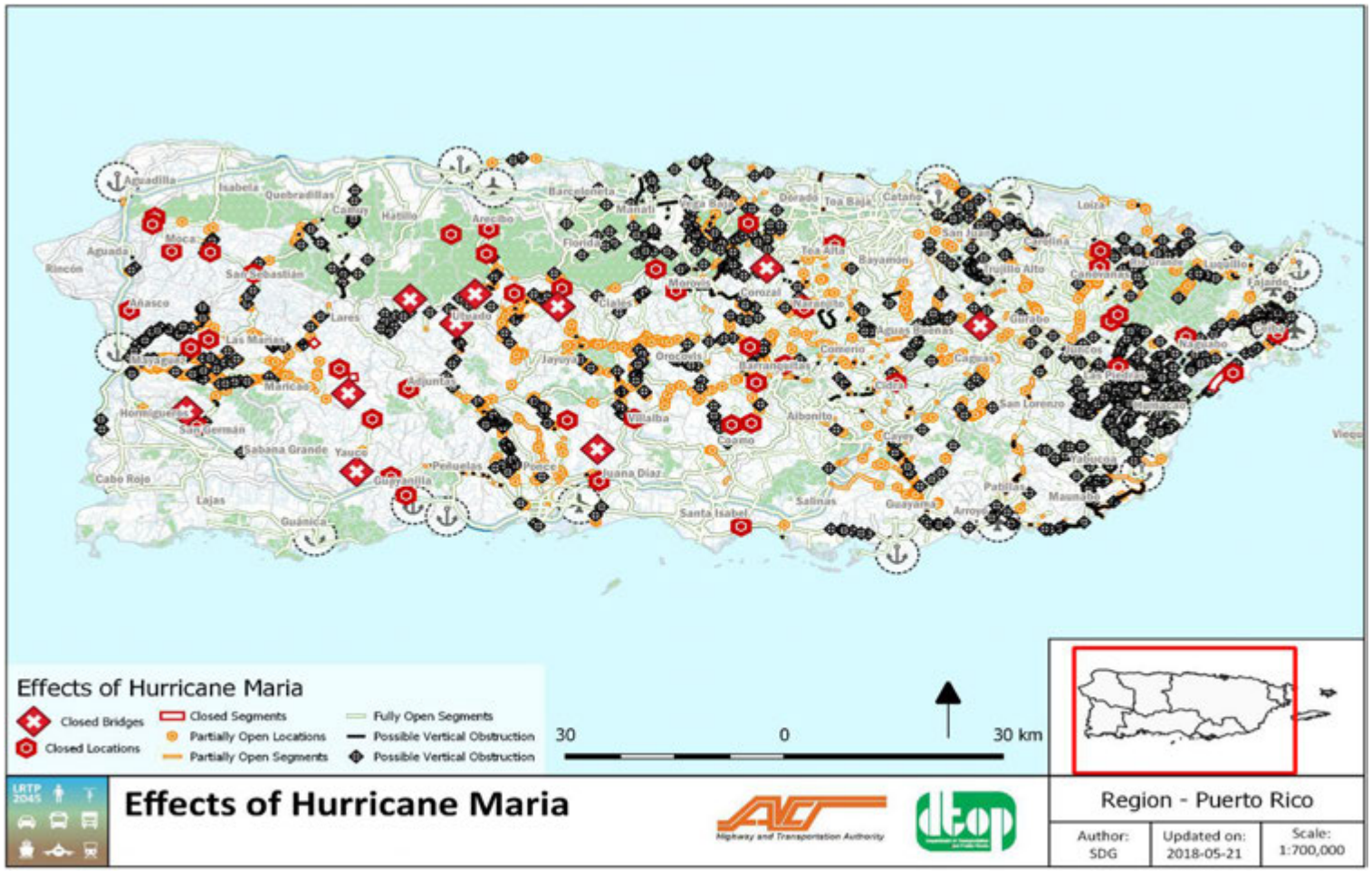
- In 2016, the Financial Oversight and Management Board for Puerto Rico was created under the Puerto Rico Oversight, Management and Economic Stability Act. The Board consists of seven members appointed by the President of the United States and one ex officio member designated by the Governor of Puerto Rico. The Board is tasked with working with the people and Government of Puerto Rico to create the necessary foundation for economic growth and to restore opportunity to the people of Puerto Rico. The PRHTA was required to issue a Fiscal Plan for the approval of the Oversight Board by end of 2017.
- The 2045 LRTP based its short-term projections, capital improvement plan and funding assumptions on the approved Fiscal Plan.
- Hurricane María affected Puerto Rico September 20, 2017. This powerful Category 4 hurricane with 150 mph winds bisected the entire island having catastrophic effects on the entire Island. The PRHTA has prepared an inventory of the effect on the transportation infrastructure as shown in Figure A.3.

In terms of the transportation network there were not many projects that were not already part of the existing conditions presented in the original 2010 base model:

- The team reviewed the main roadway network model and no major changes were logged; only two roadway improvements that have been completed since the last model version (2010) were identified and coded into the 2016 highway network (refer to Chapter 5; and
- The bus transit network was updated considering new routes of state bus network (AMA) and the major municipalities bus services.

The conditions after the hurricane did not allow for traffic counts and surveys to be undertaken as part of this plan – alternatively, the team used existing data from 2015-2016 as the base scenario for the plan updated using the projections from the fiscal plan.

Figure A.1: Effects of Hurricane María



Source: Hurricane Maria impacts were geolocated with the aid of information obtained from multiple meetings with the Highway and Transportation Authority Regional Directors during the first quarter of 2018.

GLOBAL INFORMATION SYSTEM (GIS) DATABASE

This section reviews the GIS Database used for the 2045 LRTP, as well as other databases received and available for this project.

Geospatial Database

The geographic data in the GIS Database are stored as both shapefiles and as a geodatabase and are grouped into the following categories: Buildings and Infrastructure (which include electricity network, water distribution network, along with building footprints and locations), Demography, Education, Health, Land Use, Permits and Transportation Infrastructure. Each shapefile and its contents will be summarized below by name (e.g. AEP Infrastructure, Diagnostic and Treatment Center (CDT), Centers 330, etc.).

1. Buildings and Infrastructure
   - Government Centers: includes the latitude and longitude location of 58 buildings maintained by the Public Buildings Authority (*Autoridad de Edificios Públicos, AEP*); at the municipality level it includes: government centers, specific offices such as the prosecutor's office in Río Grande, maintenance buildings, the Mayor's Office, the Puerto Rico Lottery building, and the Juan C. Cordero Dávila Building are included; and
   - AEP Infrastructure: includes an additional 472 infrastructure buildings maintained by the Public Buildings Authority (AEP); it contains public infrastructure on schools, police and fire stations, judicial centers, hospitals and clinics, prisons, and various office centers. For each building, its latitude and longitude location, address, corresponding municipality, and square footage are included.
2. Education
   - Schools: includes 1,292 schools under the Puerto Rico Department of Education, all of which are open for the 2016-2017 year. Each school is defined by its name, latitude and longitude location, along with its corresponding district, municipality, and region.
3. Health
   - CDT: includes 134 CDT Hospitals, as well as the ownership status for each hospital: state government owned, municipality government owned, Private-For-Profit by individual or corporation, and Private-Non-Profit. Additionally. Each CDT Hospital is defined by its name, latitude and longitude location, address, and corresponding region and municipality;
   - Centers 330: includes 40 health centers, which make up the Centers 330 Association. Center specific information includes the ownership status for each hospital: state government owned, municipality government owned, Private-For-Profit by individual or corporation, and Private-Non-Profit. Additionally, each center is defined by name, owning corporation, address, municipality, and latitude and longitude location; and
   - Hospitals: outlines 66 Hospitals based on their classification as public or private, the services they provide such as morgue and autopsy service, number of licensed professional employees, and the names of management heads. Additionally, telephone and fax contact information are provided along with hospital name, latitude longitude location, and corresponding barrio and municipality.

4. Land Use
   - Puerto Rico Land Use (PUT_PR): outlines all land in Puerto Rico and its current or designated use (i.e. bodies of water, non-developable land/rustic land based on soil classification, non-developable land protected for agricultural reasons, non-developable land protected for ecological reasons, non-developable land protected for hydrology reasons, non-developable land protected for landscape reasons, developable un-used land, urban land, and land used for road systems); each parcel is defined by length and area.

5. Permits
   - Permits USO – Sip and SuperSip: two shapefiles that combine include 30,143 permits issued, canceled, or archived by the Office of Permit Management (*Oficina de Gerencia de Permis*os, *OGP*) between 2012 and 2015. Details about each permit include the address of the site in question, corresponding municipality, and a name description of the business/apartment/other in question. Additional information includes the name and contact information of the permit holder, public or private status, and location status being urban or rural; and
   - Consultas_JP: compiles 1,065 queries occurring between 2012 and 2017 with its corresponding status (i.e. resolved and archived, pending, resolved and approved, resolved and denied, and various other statuses). Additional information includes date, corresponding municipality and barrio, name of query participant, and a short description of the query.

6. Transportation Infrastructure
   - Paradas_Américo_Miranda_RedConecta: maps out the Américo Miranda Avenue route from the trolley system of Red Conecta into 39 distinct points;
   - Terminales_ACT: includes the location of transit terminals owned by the PRHTA including Público terminals and bus/rail terminals;
   - Plazas_Peaje: includes 24 toll plazas located in Puerto Rico along PR-5, PR-17, PR-20, PR-22, PR-52, PR-53, and PR-66;
   - Rutas_Carros_Públicos: This shapefile breaks out the Público system into 3,266 segments across the island; each segment is defined by its road name, corresponding municipality, and distance;
   - AMA_Paradas_Autobuses_2015: outlines all 1,201 stops across the Metropolitan Area of San Juan, as of 2015;
   - AMA_Rutas_Autobuses_2015: includes the polyline structures displaying the AMA bus routes through the 1,201 San Juan bus stops, broken into 44 segments;
   - Tren_Urbano_Stations: contains point structures for the 16 Tren Urbano stations, as well as all intermediate stops between Bayamon, Guaynabo, and San Juan;
   - Tren_Urbano: includes the polyline structure displaying the Tren Urbano route through all 16 stations;
   - Stops_Red_Conecta: This shapefile contains point structures for all Red Conecta trolley stops across San Juan;
   - Red_Conecta_SJ: This shapefile includes polyline structures displaying the Red Conecta routes through their corresponding stops as seen in shapefile "Stops_Red_Conecta";
   - SITRAS_Ponce: includes a single polyline structure that displays the SITRAS (Southern Integrated Transportation System */ Sistema Integrado de Transportación del Sur)* route in Ponce;

- SITRAC_Carolina: includes a single polyline structure displaying SITRAC route in Carolina. Terminales_Lancha_Metro: contains point structures for the ferry system between the Old San Juan Pier and the Maritime Transportation Authority in Cataño; and
- San_Juan_Cataño_Ferry Route: includes the polyline structure displaying the ferry route between the Maritime Transportation Authority in Cataño to the Old San Juan Pier.

Section below shows details regarding missing shapefiles.

DATA AVAILABLE FOR LRTP BY SOURCE

Client Folder

I. 2045 LRTP

1. 2040 Data2017
    - 2040LRTP-Documentation-pdf
        - PR_LRTP_Model_Documents
        - Task 3.2.1 - Trip Generation
        - Task 3.2.2 - Trip Distribution
        - Task 3.2.3 - Mode Choice
        - Task 3.2.4 - Time of Day
        - Task 3.2.5 – Assignment
        - Task 3.2.6 - Feedback Loop
        - Task 3.2.7 – Trucks
        - Task 3.2.8 - Delta Matrix
        - Task 3.2.9 – Transit
        - Task 3.3 - Software Model Platform
        - Task 3.4 - Model Design
        - Task 4.1 - Traffic Counts
        - Task 4.2 - Travel Time Survey
        - Task 4.3 - Transit Usage
        - Task 4.6.1 - Household Survey
        - Task 4.6.1 - Household-English
        - Task 4.6.1 - Household-Spanish
        - Task 4.6.1 - PR Household Survey Pilot Test Summary
        - Task 4.6.1 - Travel Diary_English
        - Task 4.6.1 - Travel Diary_Spanish
        - Task 4.6.1 -Vehicle Information Sheet_English
        - Task 4.6.1 -Vehicle Information Sheet_Spanish
        - Task 4.6.2 - On Board Pilot Summary and Final Sampling Plan
        - Task 4.6.2 - On Board Transit Survey_BUS
        - Task 4.6.2 - On Board Transit Survey_PÚBLICOS
        - Task 4.6.2 - On Board Transit Survey_Tren Urbano
        - Task 4.6.2 - OnBoardTransitSurvey_BUS_ENGLISH
        - Task 4.6.2 - OnBoardTransitSurvey_PUBLICO_ENGLISH
        - Task 4.6.2 - OnBoardTransitSurvey_TREN_ENGLISH
        - Task 4.6.2.6 - Transit Survey Preliminary Analysis
        - Task 4.7.1 - Base Year 2010 Socioeconomic Data Development

- Task 4.7.1.1 - SE Household Data TAZ Allocation Procedures
- Task 4.7.1.2 - SE Employment Data TAZ Allocation Procedures
- Task 5.1 - Traffic Analysis Zone Development
- Task 5.2 - Highway Network Development
- Task 5.3 - Transit Network Development
- Task 5.4.1 - Trip Purposes
- Task 5.4.2 - Trip Productions
- Task 5.4.3 - Trip Attractions
- Task 5.4.4 - Production and Attraction Trip End Balancing
- Task 5.4.5 - Special Generator Trip End Estimating
- Task 5.5 - Trip Distribution
- Task 5.6 - Mode Choice
- Task 5.7 - Truck Model Development
- Task 5.8 - Time of Day
- Task 5.9 - Trip Assignment
- Task 5.10 - Validation and Applications

- Data_Deliverables
  - HH_Survey
    - ✓ HHsurv4: Access Database
    - ✓ PR_HH_ Final_Report_Aug 7
    - ✓ TRIP0217
  - On_Board_Transit
    - ✓ Backup of PR_Transit_TRANSITALLFORMS_SUBMITTEDTOATKINS_OCT25_expand
    - ✓ Final Task 4 6.2.6 - Transit Survey TWP
    - ✓ PR_Transit_TRANSITALLFORMS_SUBMITTEDTOATKINS_OCT25_expand
  - Traffic_Knts
    - ✓ Counts
      - Batch 1 1-24-2012
        - Formatted
          - 39 Excel Files
        - 60 Excel files
      - Batch 2 1-29-2012
        - Formatted
          - 29 Excel Files
        - 35 Excel files
      - Batch 3 1-1-2012
        - Formatted
          - 18 Excel Files
        - 25 Excel files
        - PR 40-50
          - 25 Excel Files
      - Batch 4 2-1-2012
        - Formatted
          - 9 Excel Files
        - 13 Excel files

- Batch 5 2-1-2012
  - Formatted
    - 10 Excel Files
  - 16 Excel files
- Batch 6 2-1-2012
  - Formatted
    - 8 Excel Files
  - 12 Excel files
- Batch 7 2-1-2012
  - Formatted
    - 3 Excel Files
  - 7 Excel files
- Batch 8 2-1-2012
  - Formatted
    - 17 Excel Files
  - 19 Excel files
- Batch 9 2-7-2012
  - Formatted
    - 2 Excel Files
  - 15 Excel files

✓ Map_Index
- Map_index
- Map1
- Map2
- Map3
- Map4
- Map5
- Map6
- Map7
- Map8
- Map9
- Map10
- Map11
- Map12
- Map13
- Map14
- Map15
- Map16
- Vclassmaplis
- Vehclass_locs_all

✓ Count Summary 2-3-2012

✓ Count Summary Check

✓ Task 4.1 - Traffic Counts Working Paper-Revised 2102012

➢ Travel_Time

✓ Final Task 4 2 1 - Travel Time Survey Results Working Paper jjp

✓ PR_segment: Access Data Base

- Satour-Tren Liviano San Juan
  - ➢ DIA Satour-Tren Liviano San Juan

- DIA Satour-Tren Liviano San Juan-Indice
- DIA Satour-Tren Liviano San Juan-Portada
- EIS Satour- (Eng) Ch. 1
- EIS Satour- (Eng) Ch. 2
- EIS Satour- (Eng) Ch. 3
- EIS Satour- (Eng) Ch. 5
- EIS Satour- (Eng) Ch. 6
- EIS Satour- (Eng) Ch. 7
- EIS Satour- (Esp) Ch. 3
- EIS Satour- (Esp) Ch. 4
- EIS Satour-Tren Liviano San Juan (Eng) Ex. Summ

2. Highway Performance Monitoring System-HPMS
   - HPMS2013
   - HPMS2014
   - HPMS2015
   - HPMS-DailyTRavelReport2013-2016
   - 2013_FUNCTIONAL_CLASSIFICATION_MANUAL
   - fhwa_all_public_road_geospatial_representative_study
   - FHWA-arnold_reference_manual_2014
3. pr-Island-wide-lrtp-final-dec-2013

II. CIP
Copia de CIP_JUNIO_2017
Copia de CIP_JUNIO_2017F

III. GIS
- STATE ROADS
  - PRDOT_STATE_ROADS_LRS_DEC_2017

IV. Heavy
- 2017 Metropolitan Planning Organization Assessment_Puerto Rico MPO
- Task 5.7 - Truck Model Development

V. Hurricane Effects
- PRDOT_HURRICANE_MARIA_EVENTS_NOV_14_2017
- SHP
  - Closed Locations
  - Closed Segments
  - Fully Open Segments
  - Partially Open Locations
  - Partially Open Segments
  - Possible Vertical Obstructions
  - Puentes Cerrados La Fuente

VI. Modelo 2040 LRTP-2017
Cube Model

VII. Plan de Transportación a Largo Plazo 2040

- Borrador agosto 2013 LRTP
  - Comentarios y presentación
    - ✓ 14 photos
    - ✓ Plan 2040 Capitulo 6
  - Fotos afiches taller
    - ✓ 14 photos
  - APPENDIX Island-wide LRTP-June-2013
  - Appendix_SAN JUAN_Final (3)
  - Carta DTOP Long Range
  - Comentarios OPOT Long Range Ago 2013
  - Comentarios_LRTP_MSJ
  - Plan 2040 Capitulo 6
  - Plan de Transportación Cap. 5 y 7
  - PR_Island-wide-6-30-2013-D
  - San Juan LRTP comentarios
  - San Juan TMA 5 2013 highlight
  - San Juan TMA Main Report (May 2013)-2 draft
- Final enmendado Octubre 2013
  - Appendixsanjuantma
  - plandeparticipacionesp-2
  - prlrtpsanjuantmaoct2013amended
  - tip-2014-2017-sanjuan
  - tipmetropolitanfhwa20142017
- Final Report
  - 5 TPR LRTP Main Report 093013
  - Appendix AGUADILLA TMA Final 093013
  - Appendix SAN JUAN TMA Final 093013
  - Five TPR Appendix Final Sept 2013 (1)
  - PR LRTP Aguadilla TMA Sept 2013 091613 (1)
  - PR LRTP San Juan TMA Sept 2013 091613 (1)
- 12-4850 MPO Tercera reunión comité técnico
- 2015-july29-publicinvolvementplan
- 20120403104414202
- 20120912153648555
- FHWA_COMPONENT_AMENDED_2010-2013
- FTA- tabla de grants (modificada)
- INVITACION Taller informativo español 6 11 12
- JANUARY_2011_FINAL_SJUA_2030_LRTP_Feb4_2011
- Plan_Participacion_Ciudadana_para_PTLP2040
- PRLRTP_2040-Public_Meetings_El_Nuevo_Dia_(May_1-3-2012)
- Proyectos TIP San Juan
- Public_Involvement_Plan_for_LRTP2040
- STIP_2010-2013_FTA_FHWA_100824
- TIP SAN JUAN 2011-2014_100630
- UPWP 2010-2011 FINAL _100630

VIII. STIP

- 2017-2020tipsanjuan-amendment_2-aug15

- cambiosstip2017-2020amendment2all
- copy-of-2017-05-tip-2017-2020-amendment-1-added-projects-(004)
- tipaguadillaaugust152017
- tipuzaaugust152017

IX. Transit demand
- First Transit-Resumen patrocinio, horas, millaje- Tres sistemas-FY2017

X. UPWP
- upwp_2018_2019_approved_september2017

Other Consultants

I. VAGTEG Counts (Dropbox Download)
- 2016-11
  - 16STP109: the next structure files apply to the folders 2016-11 and 2016-12
    - ✓ 16STP109 FIELD DATA FORMS
    - ✓ 16STP109 FINAL
    - ✓ 16STP109 FINAL
    - ✓ 16STP109 NB CLASS
    - ✓ 16STP109 NB VOLUME SPEED
    - ✓ 16STP109 SB CLASS
    - ✓ 16STP109 SB VOLUME SPEED
    - ✓ 16STP109_NB
    - ✓ 16STP109_NB.tvp
    - ✓ 16STP109_SB
    - ✓ 16STP109_SB.tvp
  - 16STP110
  - 16STP111 (VOLUME ONLY)
  - 16STP130
  - 16STP131
  - 16STP132
  - 16STP133
  - 16STP135
  - 16STP193
  - 16STP194

- 16STP196
- 16STP197
- 16STP198
- 16STP199
- 16STP200
- 16STP201
- 16STP202
- 16STP210
- 16STP211
- 16STP212 (VOLUME ONLY)
- 16STP217
- 16STP219
- 16STP341
- 16STP342
- 16STP410
- 16STP411
- 16STP412
- 16STP413

- 2016-12
  - 16STP113
  - 16STP114
  - 16STP115
  - 16STP204
  - 16STP205
  - 16STP206
  - 16STP207
  - 16STP220
  - 16STP221
  - 16STP226
  - 16STP229
  - 16STP340
  - 16STP361

- 16STP416
- 16STP421
- 16STP422
- 16STP423

- 2017-01
  - 17NHS252: The following structure applies to folders 17STP208 and 17STP213
    - ✓ 17NHS252 FIELD FORMS
    - ✓ 17NHS252 FINAL
    - ✓ 17NHS252 FINAL
    - ✓ 17NHS252_EB CLASS
    - ✓ 17NHS252_EB VOLUME SPEED
    - ✓ 17NHS252_EB
    - ✓ 17NHS252_EB.tvp
    - ✓ 17NHS252_WB CLASS
    - ✓ 17NHS252_WB VOLUME SPEED
    - ✓ 17NHS252_WB
    - ✓ 17NHS252_WB.tvp
  - 17STP208
  - 17STP213

Other Organization

I. ATI

- Infraestructura de Transporte
  - Paradas Autobuses 2015
  - Rutas Autobuses 2015
  - Terminales Lancha Metro
  - Tren Urbano

II. JP

- GIS DATA
  - Map Documents
    - ✓ Shapefiles_JP

- Shapefiles
  - ✓ CDT
  - ✓ Centros 330
  - ✓ Centros de Gobierno AEP
  - ✓ Consultas JP
  - ✓ Escuelas 2017
  - ✓ Hospitales
  - ✓ Infraestructura AEP
  - ✓ Permisos de Uso
  - ✓ Plazas de Peajes
  - ✓ PUT_PR
  - ✓ Rutas Carros Públicos
  - ✓ Terminales ACT

Socioeconomic Forecast Used In 2040 LRTP

This section briefly outlines the approaches and methods used for the 2040 LRTP.

Population and Households

- Population was evaluated at the municipality level, including an evaluation of birth and death rates, as well as migration trends. A simple trend was computed for each municipality to forecast future population, which was then used to guide migration and age analyses. Cohort methodology was used at the MPO level to estimate age groups.
- Households were estimated using a forecast of persons per household in conjunction with the population forecasts. The persons per household forecasts were based off United States national trends.
- The population and household trends at the municipality level were disaggregated to the TAZ level using 2010 Census data and GIS methods.

Employment

- Employment forecasts were developed using a compilation of data sources. Employment data used in the model represents total employees by place of work.
- Household surveys that inquire how many people in a household are employed refer to total employees by home location. 2040 LRTP compiled datasets (see Table A.8) that considered both types of employment figures.
- Linear trends were developed for Puerto Rico employment as a control total.
- MPO-level employment was forecasted using logarithmic trends. Shares of municipality employment in each MPO were assumed to be unchanging, meaning 2010 shares of municipality employment were applied to the MPO forecasts to get municipality-level employment forecasts.
- To disaggregate municipality employment to the TAZ level, National Land Cover Database (NCLD) and Puerto Rico Highway and Transportation Authority (PRHTA) land use data were used with a GIS process. This step also allowed for a breakdown of total

employment into the five employment categories: retail, service, manufacturing, government, and other.

Table A.8: Summary of Base Year Data and Sources

Variable	Sources	Geography
Population and Households	Census 2010	Census block level
Income	American Community Survey 5-year data (2005-2009) If median income not available in ACS, the median income for the municipality was assumed	Census tract level
IPF Seed Household Distribution	Public Use Micro Sample (PUMS) for PR	
Employment	• Puerto Rico Dept of Labor • 2000 Census Journey-to-Work • BLS Data (ES 202) • Dun and Bradstreet Database • National Land Cover Database (NLCD) from ArcGIS Online • Land use data from PRHTA	PR Total – Parcel Level
School Enrollment	• Puerto Rico Department of Education • ESRI – National Center for Education • Middle States Association of Colleges and Schools • National Center for Educations Statistics	

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

School Enrollment

- School enrollment data also involved a compilation of data sources, as can be seen in Table A.8. Forecasts for school enrollment (5-14 years old) were based on changes in population by age group at the municipality level. Forecasts for university employment (15-24 years old) were based on changes in population by age group at the Puerto Rico level. Locations and numbers of schools were assumed to be constant.

Trip Generation

This section describes the trip generation component of the 2040 LRTP travel demand model, including the data sources, general process, and SDG's ability to update in the time available for the 2045 LRTP modeling update project.

Data Sources

The inputs to the trip generation component of the 2040 LRTP travel demand model include:

- 2010 Census Data;
- National Land Cover Database (NLCD);
- American FactFinder Public Use Microsample (PUMS) data; and
- 2011 Puerto Rico Household Travel Survey (HHTS).

Block Level 2010 Census Data and NLCD Data

The 2010 census data is collected at the census block level and aggregated into the PR model TAZs using GIS processes. The less-precise NLCD data is processed similarly, with a series of

parameters that allocate NLCD land use types and densities into jobs by sector. The data were supplemented by GIS data of retail centers throughout Puerto Rico to ensure a certain level of accuracy. The parameters are calibrated to municipality-wide and island-wide job numbers.

The GIS processing of the Census and NLCD data produced a database of the 4,296 TAZs in the model, with the following information for each TAZ:

- Population;
- Number of Households;
- Employment by Category (Retail, Service, Manufacturing, Government, Other);
- Average Household Income (from ACS data at the tract level);
- Number of K-12 Students (age 5-17); and
- Number of College Students.

American FactFinder PUMS Data

The PUMS Data included a sample of households, with detailed information that affects trips generated by the household. This information supplemented the census data by the additional detail it contains about each household. It is not sufficient to replace the census data, however, because it is a sample, and thus unable to provide total numbers of households or population in each TAZ of the model.

The PUMS data used in the current PR model includes about 37,000 households. The following information is part of the PUMS data:

- Sample Weight;
- Household Size;
- Household Income;
- Number of Workers;
- Number of Students;
- Number of Seniors;
- Number of Children; and
- Number of Vehicles.

2011 Household Travel Survey

The 2011 Household Travel Survey provided data which was used to develop household trip production models, estimated with statistical linear regression techniques.

General Process

The end-product of the 2040 LRTP model trip generation component is a table of productions and attractions by trip purpose for each TAZ in the model. The trip purposes include:

- Home based work (HBW), disaggregated into three income groups;
- Home based retail (HBR);
- Home based school (HBS);
- Home based university (HBU);
- Home based other (HBO);
- Non-home based (NHB); and
- Truck, split into three truck types, and identical production and attraction models.

The attraction and truck models are primarily derived from external sources and publications, applied directly to TAZ-level variables, discussed further in the Trip Generation Statistical

Models section. The production models, however, used variables at the individual household level, and therefore require a two-step process, as discussed immediately below.

Production Models Step 1: Population Synthesizer

Most traditional trip-based travel demand models have trip production equations that relate only to average household characteristics within each TAZ. However, many models are moving towards "population synthesizers" which depend on a series of household characteristics not readily available at the individual household level. The 2040 LRTP model used this population synthesizer method. To generate the information necessary for each household's productions to be estimated, the households in each TAZ must be disaggregated into household "types", defined by

- Household Size (1, 2, 3 or 4+);
- Household Income Group (low, medium or high);
- Number of workers (1, 2, 3 or 4+);
- Number of children (1, 2, 3 or 4+); and
- Number of non-working seniors (none or 1+).

This results in 384 (4 x 3 x 4 x 4 x 2) different household types, though in reality, not all of them will be possible; for example, it is not possible for a household of size 1 to have 3 children.

The population synthesizer performs the following steps:

- Totals for each type are tabulated from the PUMS data;
- Marginal distributions of each type characteristic are determined for each of the PR model's 4,296 TAZ;
- Each TAZ's households are disaggregated into the types by iterative proportional fitting (IPF), a mathematical technique which fits the PUMS totals by type to the TAZ marginal distributions; and
- Each TAZ's households of each type are further segmented into auto ownership bins.

Production Models Step 2: Calculating each TAZ's productions

Once each TAZ has been segmented into households of each type, the production equations can be applied. The variables used in the production model are shown in Table A.9, taken from the model documentation.

Table A.9: Trip Production Variables

Variable Name	Description	Values
TOTAL	Number of households in TAZ for that particular 'characteristic-type'.	0,1,2,3, 4,…
WORKERS	Number of workers in TAZ for household of that particular 'characteristic-type'.	0,1,2,3+
WORK1	Binary flag indicating if the 'characteristic-type' is a 1-worker household.	0: No 1: Yes
WORK2	Binary flag indicating if the 'characteristic-type' is a 2-worker household.	0: No 1: Yes
WORK3	Binary flag indicating if the 'characteristic-type' is a 3+-worker household.	0: No 1: Yes
INCGRP	Income group for that particular household 'characteristic-type'.	1: Low Income 2: Middle Income 3: High Income

Variable Name	Description	Values
AUTOSPERHH	Number of autos per household ration for particular 'characteristic-type'.	0-9.99
SENIORS	Binary flag indicating if the household 'characteristic-type' denotes the presence of an adult aged 65 or higher.	0: No 1: Yes
CHILDFLAG	Binary flag indicating if the household 'characteristic-type' denotes the presence of a child aged 5-17.	0: No 1: Yes
NWADULTS	Number of non-working adults in TAZ for household of that particular 'characteristic-type'.	0,1,2,3,4+
ADULTS	Number of adults in TAZ for household of that particular 'characteristic-type'.	0,1,2,3,4+
CHILDREN	Number of children in TAZ for household of that particular 'characteristic-type'.	0,1,2,3+
COLLEGEACC	Relative accessibility index (for each TAZ) to colleges and universities.	0.1-99.99

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

For each of the 384 household types, the values of these are directly implied, e.g. a household with two workers and two children aged 14 and 11 and high income will have:

- WORKERS = 2;
- WORK1 = 0;
- WORK2 = 1;
- WORK3 = 0;
- INCGRP = 3;
- SENIORS = 0;
- CHILDFLAG = 1;
- NWADULTS = 0;
- ADULTS = 2; and
- CHILDREN = 2.

Note the presence of the AUTOSPERHH variable; this is derived by applying the auto ownership model to each household type within the TAZ and weighing the overall TAZ by its household type distribution. Each of the 384 types is assigned a probability of having 0, 1, 2 or 3+ autos, based on a logit model estimated from the PUMS data.

Note also the presence of a college accessibility variable; this is calculated from the network skims and the socioeconomic data which indicated which TAZs contain college.

Trip Distribution

Trip Distribution Step 1: Calculate Generalized Impedance for each Zone Pair

The trip distribution is largely relied on the generalized impedance of auto trips but it also considers the generalized impedance of transit and non-motorized trips. The generalized impedance function converts all measures into equivalent minutes, including operating costs, tolls, transit fares, and walk distance.

- **Generalized Impedance (Minutes) of Person Trips During Peak and Off-Peak**:

$$GC_{Person} = \min(GC_{Auto}, GC_{Walk-to-transit}, GC_{Drive-to-transit}, GC_{Non-motorized});$$

Where:

- $GC_{Auto} = \left(Journey\ Time_{Auto} + Distance \times VOC_{Auto} \times \frac{60}{VOT_{Auto}} \times 0.1 + Toll \times \frac{60}{VOT_{Auto}}\right);$

- $GC_{Walk-to-transit} = \left(Journey\ Time_{Transit} + \text{Fare} \times \frac{60}{VOT_{Auto}}\right)$;
- $GC_{Drive-to-transit} = \left(Journey\ Time_{Transit} + \text{Fare} \times \frac{60}{VOT_{Auto}}\right)$; *and*
- $GC_{Non-motorized} = \left(Walk\ Distance \times \frac{60}{Speed_{Walk}}\right)$

- **Generalized Impedance of Truck Trips (Minutes)**:

$$GC_{Truck} = (Journey\ Time_{Truck})$$

The trip distribution model calculated the shortest "travel impedance" among all travel modes (drive, walk-to-transit, drive-to-transit, and walk) as generalized impedance for person trips in peak and off-peak, respectively. Varied by trip purpose, the model selected the impedance from peak or off-peak period. The work and school trips utilized the peak impedance, while the shopping, university, other and non-home-based trips choose the off-peak impedance. The commercial vehicle trips and truck trips used the off-peak door-to-door highway time as generalized impedance.

Trip Distribution Step 2: Calculate the Friction Factors by Trip Purpose

The trip length frequency distribution factor (friction factor) is one of the key components to the gravity model. It is a function of time/cost between production and attraction and represented the reluctance of persons to make trips of various duration. The friction factors of the person trips are computed using an exponential function.

$$FF = \mathrm{C} \times e^{(\theta \times \mathrm{T})}$$

Where:

C – constant (100000)

θ – calibrated friction factor parameters

T – generalized impedance by trip purpose

The parameters in this function were developed from the 2011 Puerto Rico household survey by trip purpose, presented in Table A.10. Between the 2011 survey and now, the travel pattern in the island would have been changed. However, due to the delayed starting of the new household survey and the tight project deadline, we are not able to incorporate the new survey results into the trip distribution.

Table A.10: Calibrated Friction Factor Parameters in Gravity Model

Trip Purpose	Calibration parameter
HBW1 (low Income)	(0.064)
HBW2 (Medium Income)	(0.048)
HBW3 (High Income)	(0.040)
HBO	(0.072)
HBR	(0.104)
HBS	(0.136)
HBU	(0.043)
NHB	(0.075)

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Mode Choice

Mode Choice Step 1: Calculate Utilities for Each Mode

Utilities for each mode are calculated for each trip purpose. For the mode choice step, the eight trip purposes are simplified into the following trip purposes

- Home based work – low, medium, and high income;
- Home based other; and
- Non-home based.

That is, for the mode choice model, the home-based retail, school, university, and other all have the same utility calculation.

For each mode, the utility function has the following variables and coefficients which vary by each trip purpose. These are listed below.

- In-vehicle time, including a factor for premium transit services;
- Out-of-vehicle time;
- Fare and car costs, including car access to transit;
- Transfer penalty, both car to transit and transit to transit; and
- Nesting coefficients.

The utility for each mode and purpose is calculated for each origin-destination pair.

Note that skims from different time periods were used depending on the trip purpose. The time period used for each purpose is shown in the Table A.11.

Table A.11: Time Periods for Each Trip Purpose

Trip Purpose	Time Period
Home Based Work	Peak
Home Based Other	Off-peak
Non-Home Based	Off-peak

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Mode Choice Step 2: Calculate Mode Choice Split for Each Mode

Each utility is used in a nested logit model to calculate the mode share for each trip purpose. Before being input into the mode choice model each utility has a bias factor, or alternate specific constant, applied so that the results better match observed mode splits. These bias factors are applied as a constant factor to each origin-destination pair.

From this stage mode share matrices are created for each purpose and mode.

Mode Choice Step 3: Calculate Total Trips for Each Mode

The mode share matrices are multiplied by the relevant PA matrices from the Distribution stage of the model to produce trip matrices for each mode and purpose. Note that the home based other mode share matrix is multiplied by all four of the home based other modes to produce trip matrices by mode for retail, school, university, and other home-based trips.

As a final step, the shared ride trip matrices are divided by the occupancy factors to produce vehicle trip matrices for use in the highway assignment.

Time of Day

General Procedure

The 2040 LRTP travel demand model uses the following guidelines for the time of day modeling procedures:

- Use a fixed factor methodology for time of day estimating;
- Place the time of day process between mode choice and traffic assignment;
- Use four-time periods to differentiate individuals' time of day behavior; and
- Peak spreading is not used in the modeling process because individuals' time of day decisions are expected to be relatively stable over time.

The time of day factors are applied to all vehicle trip tables used in the traffic assignment procedure, by trip purpose. The 2040 LRTP travel demand model includes six trip tables:

- Single Occupant Vehicles (SOV);
- Two Person Shared Ride Vehicles (SR2);
- Three-or-more Person Shared Ride Vehicles (SR3);
- Commercial Vehicles (COM);
- Medium Trucks (MTRK); and
- Heavy Trucks (HTRK).

Time-of-day factors that were applied to auto trip tables were computed by model trip purpose to account for the variability of trip departure times that are inherently associated with an individual's reason for making a trip. The trip purposes are:

- HBW - Home Based Work;
- HBO – Home Based Other;
- HBR – Home Based Retail or Shop;
- HBS – Home Based School;
- HBU – Home Based University; and
- NHB – Non-Home Based.

The truck time of day model used is a fairly simple application of a set of fixed factors that split the daily commercial (COM), medium (MTRK), and heavy trucks (HTRK) into the same four-time periods as household vehicle trips were split. Using four-time periods and truck type breakdown is a conventional practice, consistent with most four-step models. The trip fractions were developed by examining data from other models and were adjusted based on comparison of the estimated MTRK and HTRK period volumes to a limited set of hourly MTRK/HTRK counts taken on Puerto Rico highway facilities in 2011-2012.

Truck Model Development

Truck Trip Generation

Daily truck trips are estimated separately by purpose (COM, MTRK, HTRK) and use the convention that zonal productions are set equal to zonal attractions.

The independent variables are the basic set of 2010 zonal variables: population, households, retail employment, service employment, manufacturing employment, government employment, other employment, acres, income, school enrollment, and college/university enrollment. In addition, one new variable was created: truck zones. This is a binary (0/1) variable that identifies whether a zone contains land uses that appear likely to generate a

higher-than-average number of truck trips per employee. This includes truck stops, warehouses, transfer terminals, ports, and concentrations of manufacturing or industrial buildings.

The development of trip end equations is based on similar equations documented in the travel literature and developed for other areas. The final equations are presented in Table A.12.

Table A.12: Truck Model Trip Generation Equations

Vehicle Type	Equation	Area Type Adjustment Factors (ATFAC) Area Type						
		1	2	3	4	5	6	7
Commercial Vehicles	(0.42 x retemp + (0.28 x svcemp + govemp) + 0.35 x mfgemp + 0.12 x otheremp + 0.20 x hh) * ATFAC	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Medium Trucks	(0.187 x retemp + (0.05 x svcemp + govemp) + 0.15 x mfgemp + 0.009 x otheremp + 0.069 x hh) * ATFAC	0.7	0.7	1.1	1.1	1.2	0.7	0.7
Heavy Trucks	(0.11 x retemp + 0.015 x svcemp + 0.01 x govemp) + 0.10 x mfgemp + 0.12 x otheremp + 0.20 x hh) * ATFAC	0.7	0.7	1.3	1.3	1.3	0.7	0.7
Variables:								
mfgemp =	Manufacturing Employment							
retemp =	Retail Employment							
svcemp =	Service Employment							
otheremp =	Other Employment							
govemp =	Government Employment							
hh =	Households							
ATFAC =	Area Type Adjustment Factor							

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Truck Trip Distribution

Trips are distributed in a conventional manner, using a gravity model as described in Section 0 TRIP DISTRIBUTION. Model parameters are presented in Table A.13.

Table A.13: Trip Distribution Results

Parameter	Commercial Trucks	Medium Trucks	Heavy Trucks
a	100,000	100,000	100,000
b	(0.127)	(0.0007)	0
g	(0.116)	(0.0677)	(0.0553)
Target Average Trip Length (minutes)	22.4	32.8	37.3
Estimated Average Trip Length (minutes)	22.5	32.8	37.2
Percent Difference	0.45%	0.0%	(0.27%)

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Truck Trip Assignment

- **Passenger Car Equivalent (PCEs)**: assumed values medium trucks is 1.5 and for heavy trucks is 2.
- **Truck Value of Time (VOT):** The assignment process determined the "best" path for each origin/destination (O/D) pair by minimizing the impedance between the O/D zone pairs. This impedance is a weighted average of time, toll, and distance, with the result expressed in dollars. The toll component is simply the value of the toll itself; time was converted to monetary terms by multiplying it by the assumed VOT in dollars per minute. For both types of trucks (MTRK and HTRK), this value was assumed to be 0.350 ($21.00/hour). This number accounts for the value of the driver's time and the time value of the cargo and is slightly lower than similar values used in other studies. Distance is converted to monetary terms by multiplying it by the incremental cost of operating the vehicle; i.e., the cost of fuel per mile, calculated as 0.5833 $/mi (this assumes $3.50/gallon and 6 miles/gallon).
- **Truck Tolls:** Trucks pay a higher rate of toll on all existing toll facilities. In general, 3-axle vehicles (assumed to represent MTRK) pay about 2.3 times the auto toll and 6-axle vehicles (assumed to represent HTRK) pay about 3.8 times the auto toll. A single weighted average was needed (and only the auto toll was coded in the network), so for path choice purposes, truck tolls are all calculated as the auto toll multiplied by 2.69.
- **Truck Prohibitions:** The 2010 network has no special provisions for trucks. They are not restricted on any links and there are no truck-only links. However, the network coding and assignment procedure provide for both such options in the future, with the USE field. If USE is coded as 4, both MTRK and HTRK will not be allowed to use that link. If USE is coded as 5, only MTRK and HTRK will be allowed to use that link (no autos). Generally, such usage restrictions will be in effect all day, but with a slight adjustment, such restrictions could be made separately for each time period. Trucks are assumed to be prohibited from all HOV links.
- **Output Volumes:** The assignment procedure builds four sets of paths: 1) single-occupant vehicles (includes COM), 2) 2-person autos, 3) 3+-person autos, and 4) trucks (MTRK/HTRK). MTRKs and HTRKs both use path set #4 and the truck types are saved separately in the output network: MTRK is volume field #5 and HTRK is volume field #6. Commercial trips are not output separately.

Transit Assignment

The inputs for the network building are outlined below.

- **Highway network**: The highway network was required for two reasons. The first reason is that links for all transit services must be coded into the highway network. The second reason is that the highway network was used to define the non-transit legs: access, egress, and transfer.
- **Transit lines**: Each transit service was defined in terms of the route it takes on the highway network, along with other attributes such as headway, fare system, and speed. This is done separately for Premium, Local, and Público services.
- **Transfer legs**: The transfer legs, both between transit services and from park-and-ride lots to transit services are defined explicitly.
- **Park and ride access**: Trips from origin to park and ride lot are produced by the highway assignment.
- **System file**: The system file defines the mode names, mode numbers, along with the initial and transfer wait curves. The latter are the two key components as they allow the model to calculate wait times for services based on service headways.
- **Fares**: Fares for each service are defined. Both fixed and distance based fares are modelled.
- **Factor file**: The factor file defines most of the input parameters for the transit assignment. It defines which wait curves and fair systems are used by which services. It also defines the transfer penalties, required modes to be used, and any in-vehicle time or non-transit time factors to be applied.

The above inputs represent the transit network. In order to skim end to end times the non-transit network also needs to be defined. This is done through a series of GENERATE statements. There are five GENERATE statements in the Puerto Rico model which are described briefly below.

- **Transfer legs**: These are defined explicitly by the user;
- **Walk access legs**: Walk access up to 60 minutes is allowed however only the 30 shortest routes are used;
- **Walk egress legs**: Walk egress up to 60 minutes is allowed however only the 30 shortest routes are used;
- **Park and ride access**: Drive routes from origin to transit stop are read in from the highway assignment; and
- **Kiss and ride access**: Car access up to 30 minutes is allowed however only the 30 shortest routes are used.

At this point a complete transit and non-transit network was built and so the model is able to skim the relevant transport attributes for use in the distribution, mode choice, and final transit assignment.

Final Assignment

The transit network and time period used for each of these assignments is shown in the following Table A.14.

Table A.14: Transit Assignments

Trip Purpose	Primary Mode	Transit Network	Time Period
Work	Premium	Premium services only	Peak
Work	Local	Local and Premium services	Peak
Work	Público	Público, Local, and Premium services	Peak
Nonwork	Premium	Premium services only	Off-peak
Nonwork	Local	Local and Premium services	Off-peak
Nonwork	Público	Público, Local, and Premium services	Off-peak

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Highway Assignment

General Process

Model Parameters

- **Equilibrium Convergence**: equilibrium solutions are found using Cube Voyager's Bi-Conjugate Frank-Wolfe algorithm with closure achieved at a relative gap of 0.001.
- **Period Capacity Factors**: hourly capacities must be converted to an appropriate period capacity to be consistent with the period demands. Period capacity factors were calculated to represent both the highest one-hour in each period and the highest two-hours in each period. Both cases returned the same factors, because there is very little difference between the highest and second highest hourly shares. Factors are presented in Table A.15.

Table A.15: Period Capacity Factors

Period	Hours	Capacity Factors
AM Peak	2	2
Midday	6	5.8
PM Peak	3	2.9
Night	13	6.2

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

- **Path Building**: paths are based on highway generalized cost (GC), which is a weighted average of auto and truck costs. All vehicle classes are assigned to the shortest generalized cost path, but the "USE" highway network attribute controls whether a vehicle class can use any specific link, as seen in Table A.16. The GC function takes the following form:

$$GC = \left(Time \times \frac{VOT_{Auto}}{60} + Distance \times VOC_{Auto} \times 0.1 + Toll\right) \times 0.95 + \left(Time \times \frac{VOT_{Truck}}{60} + Distance \times VOC_{Truck} + Toll \times 2.69\right) \times 0.05$$

Where

Time: link travel time (minutes)
VOT_{Auto}: Auto Value of Time ($/hr)
VOT_{Truck}: Truck Value of Time ($/hr)

Distance: link distance (miles)
VOC_{Auto}: Auto Operating Cost ($/mile)
VOC_{Truck}: Truck Operating Cost ($/mile)
Toll: toll cost ($)

Table A.16: Highway Network USE Codes and Vehicle Class Exclusions

USE Code	Description	Vehicle Classes Excluded
1	Transit only links	SOV, SR2, SR3, Com, MTKR, HTKR
2	High-Occupancy Vehicles (2+)	SOV, Com, MTKR, HTKR
3	High-Occupancy Vehicles (3+)	SOV, SR2, Com, MTKR, HTKR
4	No Trucks	MTKR, HTKR
5	Trucks Only	SOV, SR2, SR3, Com

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

- **Value of Time**: parameter was based on the median hourly wage rates for Puerto Rico. The 2010 overall median wage rate for Puerto Rico was $9.42/hour and auto VOT was set at 76%[3] of the 2010 median rate, or $7.25/hour. The truck VOT is set at 58%[4] the national average truck VOT of $36/hour, or $21/hour. Traffic assignments at the toll booth locations were compared to traffic counts to help calibrate the auto VOT for the generalized cost assignments, while truck VOT was left unchanged to be consistent with the truck model development procedure (See section TRUCK MODEL DEVELOPMENT). Final were set to $12/hour for autos and $21/hour for trucks.
- **Vehicle Operating Costs**: values based on assumed vehicle fuel efficiencies and average fuel costs. Values were assumed as 16.25 cents/mile for auto and 58.33 cents/mile for trucks. The auto VOC is based on an average fuel cost of $3.25/gallon and a fuel efficiency 20mpg, while trucks VOC were based on an average fuel cost of $3.50/gallon and a fuel efficiency of 6mpg.
- **Passenger Car Equivalents (PCE):** medium and heavy trucks have a greater impact on highway capacity than smaller vehicles; medium trucks PCE is equivalent to 1.5, while heavy trucks PCE is equal to 2.0.
- **Volume Delay Function (VDF):** functions were developed using the traditional Bureau of Public Roads (BPR) formulation, with modified alpha (α) and beta (β) coefficients. The BPR formula is most commonly shown and used in time forms. Separate curves were used for limited access roads (freeways/toll roads) and other roads. Special beta parameters were also used when the volume/capacity ratios exceeded one, as seen in Table A.17.
  The volume delay function takes the following form:

$$T_c = T_f \times \left(1 + \alpha \times \left(\frac{V}{C}\right)^{\beta}\right)$$

  Where
  T_c = congested travel time
  T_f = free-flow travel time
  α, β = alpha and beta coefficients
  V = volume in PCE

[3] Value set as a weighted average of trip purpose shares and assumed wage rate percent by trip purpose.

[4] Value set based on PR's average wage rate of $9.42/hour relative to the United States median wage rate of $16.27.

C = period capacity

Table A.27: BPR Formula VDF Parameters

Facilities	Alpha	Beta (V/C<=1.0)	Beta (V/C >1.0)
Limited access highways	1.78	6.0	4.0
Other highways and roads	1.50	5.0	4.0

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

A summary of the model parameters is presented in Table A.18.

Table A.38: Traffic Assignment Model Parameters Summary

Parameter	Value
Equilibrium Convergence	Bi-Conjugate Frank-Wolfe, 0.001
Period Capacity Factors	AM Peak: 2 Midday: 5.8 PM Peak: 2.9 Night: 6.2
Path Building	$GC = \left(Time \times \frac{VOT_{Auto}}{60} + Distance \times VOC_{Auto} \times 0.1 + Toll\right) \times 0.95 + \left(Time \times \frac{VOT_{Truck}}{60} + Distance \times VOC_{Truck} + Toll \times 2.69\right) \times 0.05$
Value of Time (VOT)	VOT_{Auto} = \$12/hour VOT_{Trucks} = \$21/hour
Vehicle Operating Cost (VOC)	VOC_{Auto} = 16.25 cents/mile VOC_{Trucks} = 58.33 cents/mile
Passenger Car Equivalents (PCE)	Medium trucks = 1.5 Heavy trucks = 2.0
Volume Delay Function (VDF)	Limited access & toll roads: alpha = 1.78, beta varies by V/C Other roads: alpha = 1.5, beta varies by V/C

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Feedback

The 2040 LRTP travel demand model uses a feedback loop to achieve consistency between input travel times and output congested times. The general procedure is presented in Table A.1.

The 2040 LRTP travel demand model feedback loop uses the Method of Successive Averages (MSA), a weighted averaging technique that is most frequently used in feedback loop weighting method because it has been shown to effectively converge to a stable condition. MSA progressively places more and more confidence in previously averaged results.

The 2040 LRTP model evaluates the stability of link travel times to determine feedback closure. Congested link travel times are calculated using MSA averaged volumes within the assignment BPR VDF curves. If either one of the following closure checks are met, then the feedback process ends:

- Percent Root Mean Squared Error of Link Travel Times less than 5%; and
- Less than a 0.5% change in %RMSE.

Closure checks are made for the AM peak period and the Mid-day period, and both periods must be satisfied to end feedback. Since the AM period is typically more congested, AM closure checks tend to determine when feedback ends.

Travel Demand Model Validation

- Vehicle Miles Traveled (VMT): target VMT values were obtained from national Highway Performance Monitoring System (HPMS) reports;
- Comparisons of modeled volumes to observed traffic counts using screenlines: six screenlines were defined; and
- Percent Root Mean Squared error (% RMSE).

Table A.19 shows the model calibration results, with all screenlines falling within desirable deviations except 6.

Table A.19: 2045 LRTP Travel Demand Model Calibration Results

Screenline	Modeled Volumes	Traffic Counts	Volume/Count Ratio	Percent Deviation	Max. Desirable Deviation
1	375,225	345,402	1.1	9%	+/- 15%
2	164,408	175,482	0.9	(6%)	+/- 20%
3	188,697	157,566	1.2	20%	+/- 21%
4	305,392	345,838	0.9	(12%)	+/- 15%
5	582,349	586,212	1.0	(1%)	+/- 13%
6	287,221	241,698	1.2	19%	+/- 18%
7	797,838	800,462	1.0	0%	+/- 11%
Total	**2,701,130**	**2,652,660**	**1.0**	**2%**	**+/- 7%**

Source: Puerto Rico's 2040 Long Range Multimodal Transportation Plans Model Documentation

Missing Shapefiles

Transportation Infrastructure

Our current GIS Database is missing transportation infrastructure and services in the municipalities of Ponce and Carolina. Specifically, we need the entire system for:

- **SITRAS, Ponce**: our database (SITRAS_Ponce) only includes the northeast route; hence, we need the full network, both polylines and all stops along the routes; and
- **SITRAC, Carolina**: our database only includes one of the existing lines; we need both polylines and route stops.

B APPENDIX B - POPULATION AND EMPLOYMENT FORECASTING

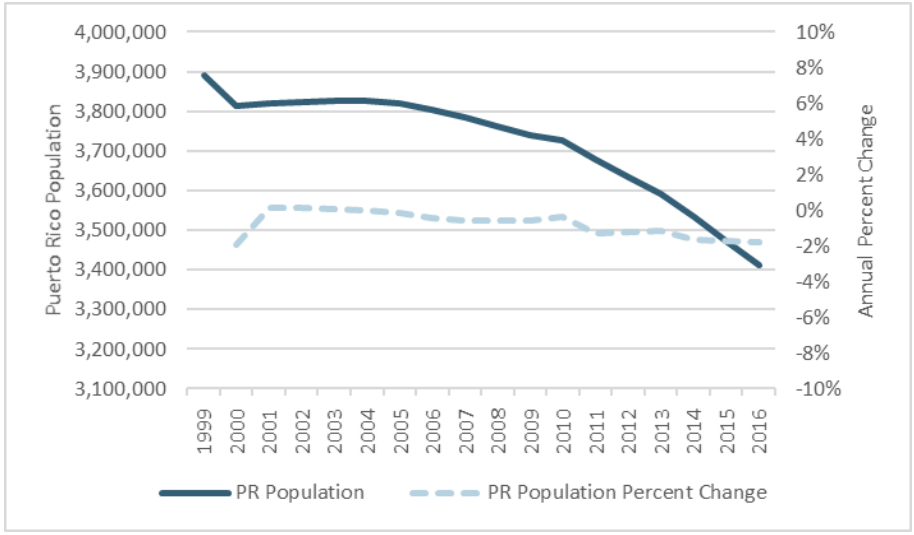
INTRODUCTION

This memo outlines the preliminary long-range forecasts for population and employment by region in Puerto Rico. As part of Task 6 of the Long-Range Transportation Plan (LRTP) project, SDG has been developing long-range population and employment forecasts that combine regional economic forecasting techniques with demographic analysis.

Our analysis follows standard practice in regional economic forecasting by focusing on the relationship between population growth (or decline) and economic growth (or decline). The approach focuses on the interplay between population, employment and the cost-of-doing business, as measured by regional wage rates. Wage costs are important to Puerto Rico, providing a relatively competitive labor force that has been attractive for firms from the US mainland. See Figure B.2 for Puerto Rico average weekly wages by region.

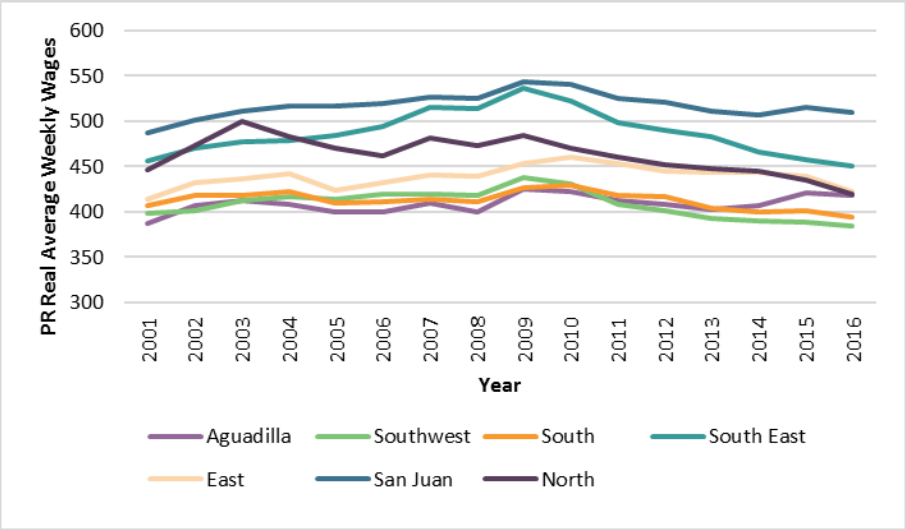
The process of forecasting population and employment growth in Puerto Rico needs to contend with the fact that island is undergoing structural change in its employment base. This change, coupled with several other events discussed below, have led to a decrease in both employment and population within the last decade. As shown in Figure B.1, Puerto Rico's population has seen a significant reversal in recent years, culminating in annual decreases of over 1% a year since 2011.

Figure B.1: Puerto Rico Historic Population



Source: SDG analysis of US Census Data

Figure B.2: Puerto Rico Average Weekly Wages (Constant 2010 Prices)



Source: SDG analysis of Bureau of Labor Statistics Data

This reversal is likely rooted in several factors, including:

- A significant decline in birth rates;
- A decline in manufacturing employment, tied to changes in federal taxation policy, international competition and the fact that manufacturing productivity growth with tend to decrease employment through automation;
- An increase in the rate of out-migration to the rest of the United states.

This trend is likely to continue and, from initial estimates, has already been exacerbated by a series of impactful exogenous events, including;

- The recent Hurricane María that gravely disrupted economic activity; and
- A long-running fiscal imbalance that culminated in the declaration of quasi-bankruptcy appointment of the federal oversight board in 2017. The financial crisis has exacerbated the economic challenges on several fronts, forcing cuts in public sector spending and employment and increasing the perceived risk of investing in Puerto Rico's economy.

Our forecasts described below suggest that Puerto Rico will recover from recent events (most notably Hurricane María), but will continue to see employment levels declining albeit at a slower rate. Population growth will continue to be negative (but at a much slower rate than recent experience), as lower birth rates will tend to amplify the long-standing pattern for Puerto Rico of net out-migration, principally to the United States mainland.

Some key forecast results include the following:

- Puerto Rico is expected to lose nearly 520,000 persons and over 90,000 jobs by 2045. This corresponds to an 15.2% decline in population and a 10.4%decline in employment from Puerto Rico's 2016 figures;
- South and Southwest regions lose the largest share of their population, with declines of over 17% since 2016. Southwest also sees employment declines of 12.6% over the same period – second only to the 14.6% forecasted employment decline in the San Juan region.

- Aguadilla, with forecasted population growth of 3.9% by 2045, is the lone region with forecasted population growth, while the North and South-East regions experience the lowest rates of decline across the island, losing under 15% of their respective populations by 2045. Aguadilla and East regions experience slight employment growth during this period.

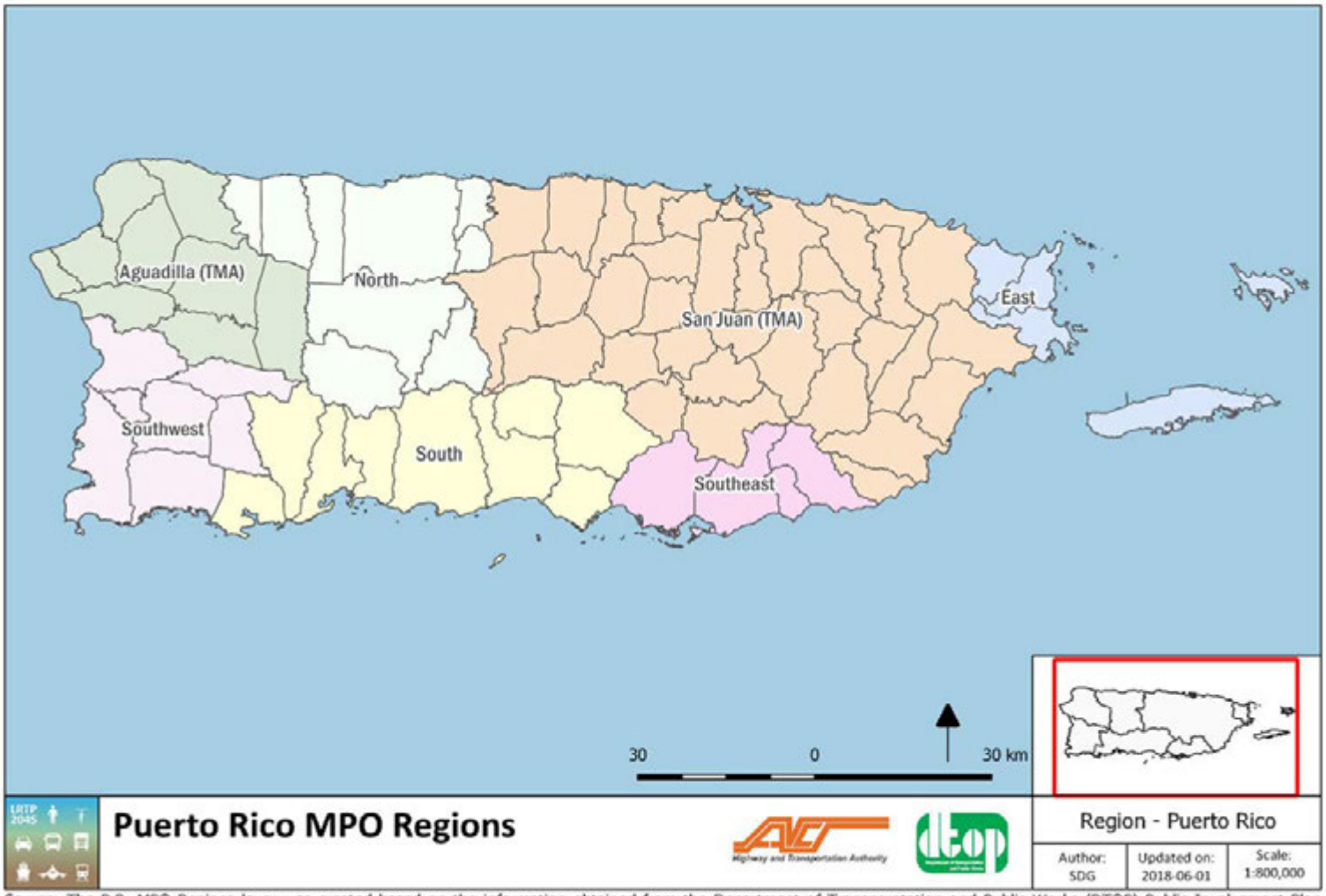
Our forecasting approach (described below) does not include scenarios, in the sense that our forecasts **do not** consider various changes in policy, such as:

- The possibility that current debt restructuring for Puerto Rico could yield a relaxation of fiscal constraints for the government of the island;
- The possibility that current changes in the structure of Federal taxes affects Puerto Rico's competitive position negatively; or
- The possibility that Puerto Rico develops new sources of employment and growth, for example in high technology sectors.

FORECASTING METHODOLOGY

The models developed for Puerto Rico build "bottom-up" from separate models for the seven-metropolitan planning organization (MPO) regions in Puerto Rico. The regions are detailed below in Figure B.3.

Figure B.1: Seven MPO Regions in Puerto Rico



Source: The P.R. MPO Regions layer was created based on the information obtained from the Department of Transporatation and Public Works (DTOP) Public Involvement Plan found at http://www.dtop.gov.pr/fotos/coordinacionfederal/2015-july29-publicinvolvementplan.pdf

Description of Econometric Models

The econometric models used for this exercise consider population, employment, and wages. The models can be understood to be a representation of labor market conditions. These models use past values of related variables to predict future values, while also incorporating the dynamics of regional economies and labor markets:

While growth tends to follow a general trend, high wages will, at the margin, act as a break on growth and investment. Similarly, lower wages will tend to attract investment. The model structure is therefore grounded in regional economic theory and is capable of predicting beyond trend growth.

Specifically, the models were used to estimate the growth rates for each of the seven MPO regions in Puerto Rico. Forecasted growth rates are then applied to base historic levels of population and employment. The models also use manufacturing value added as an exogenous predictor. The general system of equations takes the following form:

$$Population_t = \alpha_0 + \alpha_1 Population_{t-1} + \alpha_2 Employment_{t-1} + \alpha_3 Real\ Wages_{t-1} + \alpha_4 Manuf\ Value\ Added_{t-1} + u_{pt}$$

$$Employment_t = \beta_0 + \beta_1 Population_{t-1} + \beta_2 Employment_{t-1} + \beta_3 Real\ Wages_{t-1} + \beta_4 Manuf\ Value\ Added_{t-1} + u_{et}$$

$$Real\ Wages_t = \gamma_0 + \gamma_1 Population_{t-1} + \gamma_2 Employment_{t-1} + \gamma_3 Real\ Wages_{t-1} + \gamma_4 Manuf\ Value\ Added_{t-1} + u_{wt}$$

The Southeast region is forecasted slightly differently and is discussed in the Southeast results section.

Estimation of Impact of Hurricane María

One advantage of using these models for this exercise is their ability to predict impacts of exogenous shocks. In addition to forecasting long-term growth, these models are used to estimate the persistent effects of an event such as Hurricane María. Studies of other regions suffering natural disasters show that post-disaster population can be slow to recover to pre-disaster trends. These models first estimate long-term population and employment forecasts based on pre-Hurricane levels, then separately estimate the impact of Hurricane Maria. What these models can do is tell us the trajectory of outmigration specifically due to the Hurricane, followed by the return of some residents. They determine how long population and employment levels should take to return to the trends forecasted without the impact of the Hurricane. Specifically, the model captures the persistence effect of the hurricane's impact (generally estimated to have been a 7.7% reduction population[5] in 2017).

FORECAST RESULTS: PUERTO RICO TOTALS

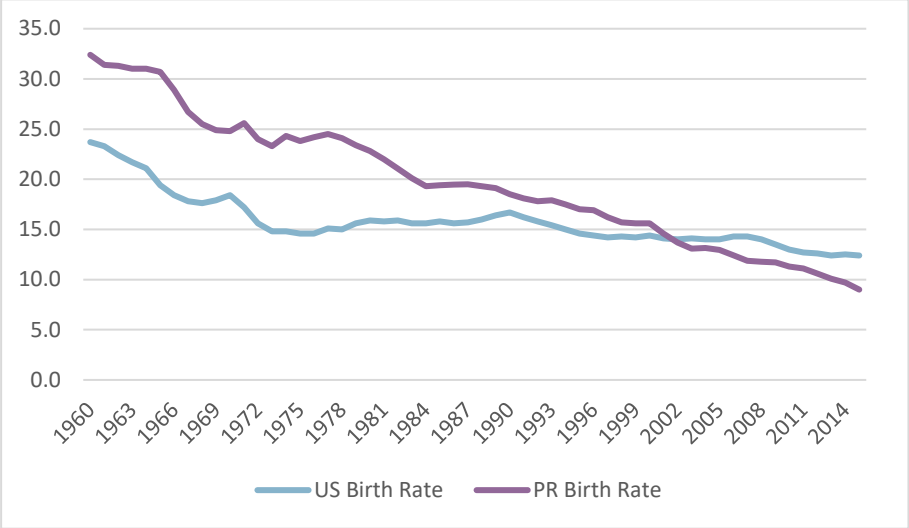
Models estimated at the MPO region level were aggregated to island-wide forecasts for this section. Population and employment forecasts both show continued modest declines.

[5] PR Fiscal Board.

Population Forecasts

Puerto Rico lost 8.4% of its population between 2010 and 2016, which equates to a CAGR of -1.5%. This population decline is in part due to a shrinking natural increase in population – a trend occurring since the 1970s, as can be seen in Figure B.4. Falling birth rates and rising death rates due to an aging population are common patterns in countries that have experienced rising incomes and female labor force participation. Recent declines in fertility are also due to the current conditions of the economy in Puerto Rico: As seen for example in the Post-1989 Russia, increased economic uncertainty is often accompanied by declining birth rates.

Figure B.1: United States and Puerto Rico Birth Rates

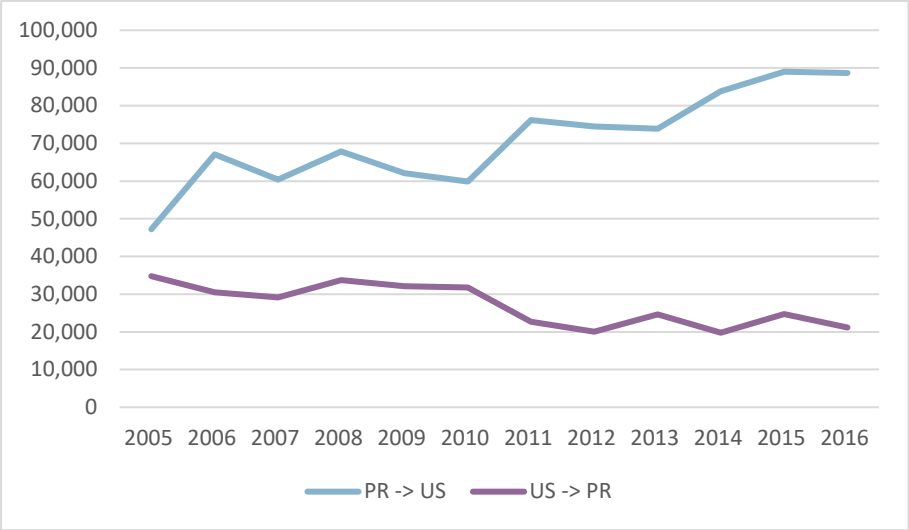


Source: SDG analysis of World Bank Data

The other source of population decline is migration. Out-migration to the United States mainland has always been a factor in Puerto Rico, but employment declines in sectors such as manufacturing have greatly accentuated this trend in the last decade, as shown in Figure B.5 and Table B.1[6].

[6] https://www.newyorkfed.org/medialibrary/media/research/current_issues/ci20-4.pdf.

Figure B.2: Puerto Rico Historic Migration Trends to and from the United States Mainland



Source: SDG analysis of US Census data

Table B.1: Puerto Rico Net Migration to US Mainland

Puerto Rico	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Migration	(12,444)	(36,603)	(31,252)	(34,128)	(29,966)	(28,153)	(53,569)	(54,456)	(49,194)	(64,073)	(64,238)	(67,480)

Source: SDG analysis of US Census data

The forecasts suggest that recent rates of population decline are expected to continue in the short-term, with slower long-term declines. Figure B.6 and Table B.2 outline the long-term population forecasts in Puerto Rico. Note that all forecasts presented include the trend forecasts as well as the impacts of Hurricane María as a dotted line representing the impact of the shock.

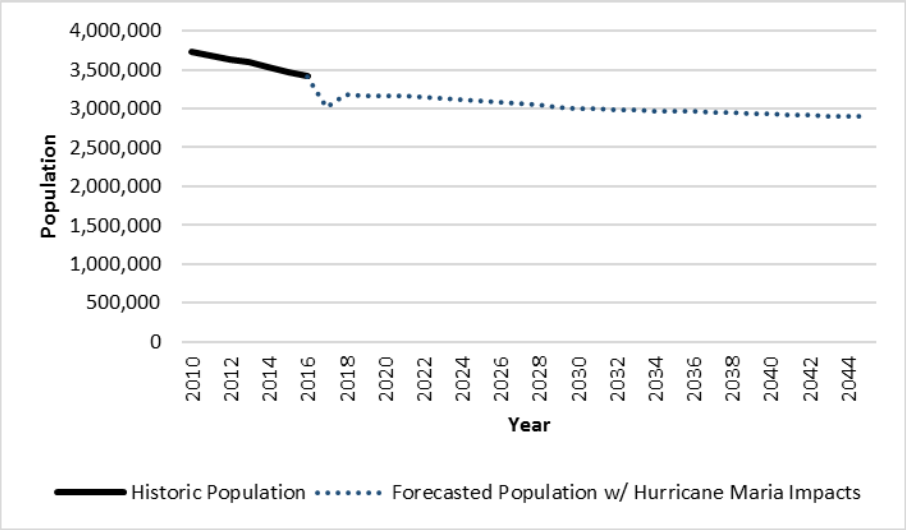
As part of a two-step process, initial forecasts are developed through the models discussed above without further calculations. These "unconstrained" forecasts are detailed in Figure B.6 through Figure B.24.

In a second step, however, we incorporate a set of realistic assumptions: Fertility declines are assumed to stabilize as Puerto Rico fertility rates (already among the world's lowest) reach levels well below replacement. In a second alteration of the unconstrained forecasts, out-migration is assumed to stabilize with the economy.

These assumptions result in a "constrained" forecast for population, suggesting slower declines post-2030 than in the unconstrained forecast. In the constrained forecast the unconstrained forecast for population is altered to match the trend for employment after 2030.[7]

[7] SDG developed its forecasting models using decennial and annual population estimates spanning 2001-2016 from the U.S. Census Bureau. Following the release of the decennial census, preceding annual population estimates are adjusted to produce intercensal estimates. SDG models do not use intercensal estimates, choosing to specify models on annual estimates, and are presented in graphics from 2010 to 2045.

Figure B.3: Population Forecasts - Puerto Rico



Source: SDG – "Unconstrained" Forecast

Table B.2: Population Forecast Growth Rates - Puerto Rico

Year	Population	Percent change from 2016	CAGR from 2016
2016	3,411,307	-	-
2020	3,168,498	(7.1%)	(1.8%)
2025	3,094,020	(9.3%)	(1.1%)
2040*[8]	2,929,693	(14.1%)	(0.6%)
2045*	2,893,950	(15.2%)	(0.6%)

Source: SDG

As shown in Figure B.6, the impact of Hurricane María is noticeable for about six years. Population returns to close to 0.5% of the base forecasts by 2022.

Comparison with other forecasts

The Puerto Rico Fiscal Plan Projections estimate a cumulative population decline of 19.4% by 2022. Separately, the Hunter College Center for Puerto Rican Studies estimates a 14% population decline by 2019. SDG forecasts come in at less drastic rates of decline, with a 7.3% decline between 2016 and 2022.

[8] indicates that the following numbers are from the SDG constrained forecast. As mentioned, the constrained forecast has an additional adjustment made to population growth, with the growth adjusted to reflect a constant population to employment ratio after 2030. As discussed below, the adjustment reflects the fact that both the decline in fertility and the increase in out-migration are seen as stabilizing, in turn slowing the decline in population.

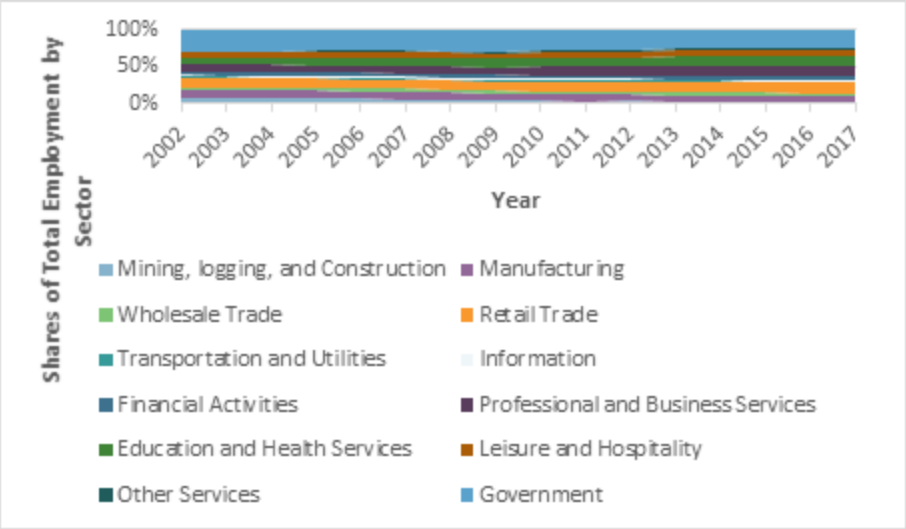
Employment Forecasts[9]

Puerto Rico lost 4.6% of its employment between 2010 and 2016, which amounts to approximately 43,000 jobs and a CAGR of -0.8%. Declining manufacturing employment is a large source of the overall employment issues in Puerto Rico, as described in Figure B.7 .

Section 936 of the US tax code, signed in 1976, had been allowing U.S. manufacturing companies to avoid corporate income taxes on profits made in U.S. territories. This section was phased out between 1996 and 2006, in what resulted in a decline of nearly 40% of manufacturing employment.[10] Heavy borrowing by the Puerto Rican government eventually resulted in the island's bankruptcy declaration in May 2017. This historic decline combined with the impacts of Hurricane María make it not immediately clear that overall employment will see upturns any time soon without external forces such as a fiscal package or further tax incentives.

As shown in Figure B.7, Government, Manufacturing and Mining, Logging and Construction have all shrunk relative to the overall employment base, while Professional and Business Services, Education and Health and Leisure and Hospitality (where most Tourism employment lies) all increased.

Figure B.1: Puerto Rico Historic Employment Shares by Sector



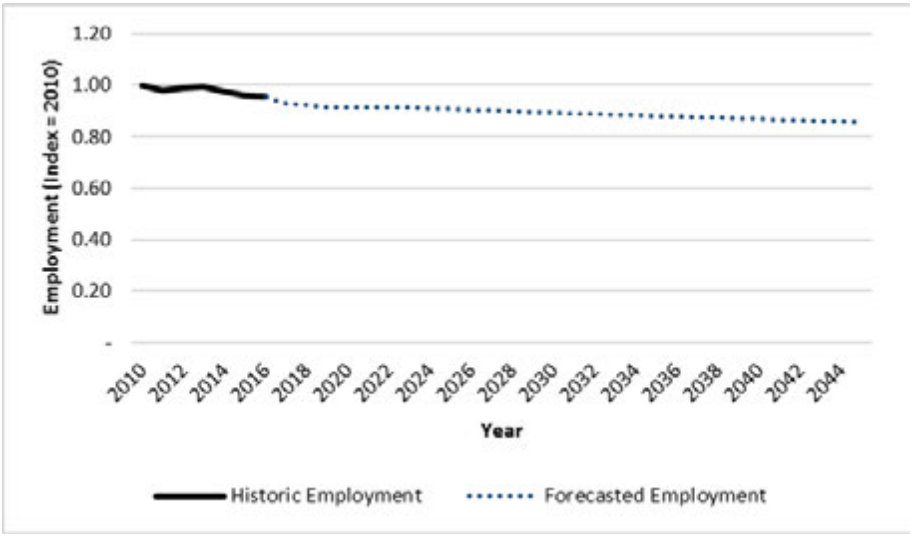
Source: SDG analysis of Bureau of Labor Statistics data

Short-term employment decline is expected to occur at slightly higher rates of decline than recent historic rates, with a CAGR of 1.2% from 2016 to 2020. Long-term employment decline is expected to stabilize below 0.1% per year.

[9] Note that employment numbers referenced are from the BLS QCEW. The 2016 Base Year data was produced through a transformation of BLS LAUS data from Place of Residence to Place of Work. The BLS LAUS encompasses a greater definition of employment, including self-employed and farm employees. Growth rates and not levels will be applied to the 2016 Base Year data, to produce employment forecasts.

[10] https://www.cnbc.com/2017/09/26/heres-how-an-obscure-tax-change-sank-puerto-ricos-economy.html.

Figure B.2: Employment Forecasts - Puerto Rico (Indexed to 2010)



Source: SDG - "Unconstrained" Forecast

Figure B.8 and Table B.3 outline the Puerto Rico employment forecasts. The population shock in 2017 of -7.7% estimated from Hurricane María, results in an immediate decline in employment of -1.4%. Employment returns to within 0.1% of the base forecast by 2022.

Table B.1: Employment Forecast Growth Rates – Puerto Rico

Year	Employment	Percent change from 2016	CAGR from 2016
2016	888,513	-	-
2020	852,177	(4.1%)	(1.0%)
2025	843,813	(5.0%)	(0.6%)
2040	807,808	(9.1%)	(0.4%)
2045	796,491	(10.4%)	(0.4%)

Source: SDG

RESULTS: REGIONAL TOTALS

As previously mentioned, the models were estimated at the regional level. The previous section gave an idea of the island-wide forecasts and Hurricane María effects. This section discusses each region individually; forecasts reported include the impact of Hurricane María. Key findings are:

- Population decline is expected to continue in all regions. Short-term annual rates of decline are between -1.2% and -3.3%. Long-term annual rates of decline are between -0.8% and .1%.
- Employment declines in all regions excluding Aguadilla and the East. With short-term annual rates of decline ranging from -.05% in the South East to -.54% in San Juan.
- Employment in Aguadilla and the East is expected to increase at rates below 1% a year through 2045.

All Regions: Side-by-Side

It is useful to compare the differential projected growth of the seven MPO regions in Puerto Rico.

All regions show short-term rates of population decline that slow by 2045, and in Aguadilla alone is their population growth in the long-term. South and East both have the greatest historic rates of decline at -1.8% per year since 2010. These regions are expected to see short term rates of decline greater than 2%. In the long-term, East and South retain the largest population CAGR's, at .8% and .7% respectively. Table B.4 and Table B.5 outline the population and employment forecasts and trends over the short and long term for each of the seven Puerto Rico regions.

Figure B.9 outlines the projected population for each region. The South and East regions experience the greatest population declines relative to their size, while it is important to note that the East is the smallest region in terms of population.

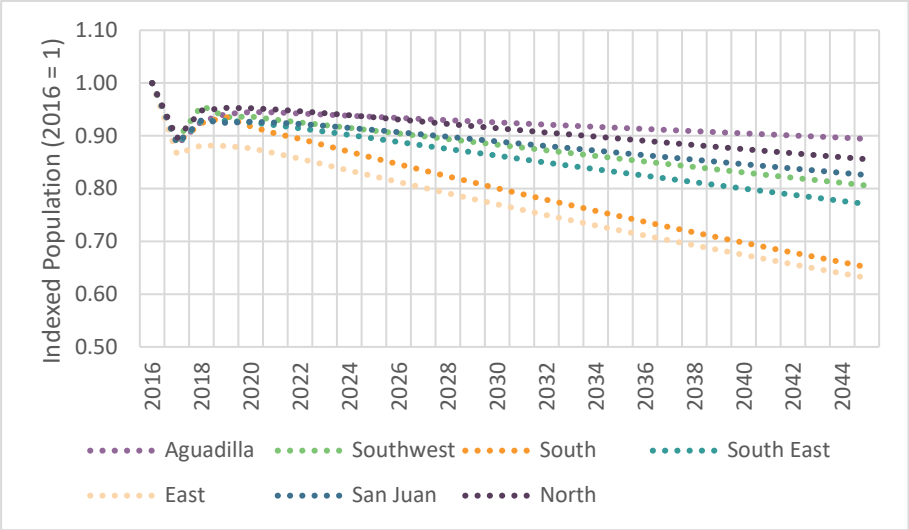
Table B.1: Population Forecast Growth Rates - All Regions

	Aguadilla	Southwest	South	South East	East	San Juan	North
Historic CAGR 2010 - 2016	(1.5%)	(1.5%)	(1.8%)	(1.3%)	(1.8%)	(1.4%)	(1.2%)
2016	288,777	228,103	371,347	106,617	73,438	2,058,458	284,567
2020	272,906	213,558	340,868	98,686	64,345	1,907,174	270,961
2025	270,331	207,547	318,541	95,405	60,452	1,875,705	266,038
2040*	288,743	192,447	293,994	91,814	59,200	1,750,807	252,687
2045*	300,126	188,107	292,328	91,757	60,566	1,712,058	249,008
Short-Term CAGR 2016 - 2020	(1.4%)	(1.6%)	(2.1%)	(1.9%)	(3.3%)	(1.9%)	(1.2%)
Long-Term CAGR 2016 - 2045	0.1%	(0.7%)	(0.8%)	(0.5%)	(0.7%)	(0.6%)	(0.5%)

Source: SDG

As Figure B.9 shows, each region has a different response to the Hurricane María shock. All regions see population returns between 2017 and 2018. Aguadilla and North are projected to have the lowest rates of decline of the seven regions.

Figure B.1: Indexed Population Forecasts (2016 = 1)



Source: SDG "unconstrained" Forecast

Employment projections are mostly positive compared to the population forecasts. Historic rates of decline have not been as large as respective population rates. In the East region, employment has grown modestly since 2010. Aguadilla and East ad roughly 1,000 jobs by 2020. In the long-term, Aguadilla and East regions combine to add nearly 14,500 jobs. All other regions collectively lose over 105,000 jobs by 2045.

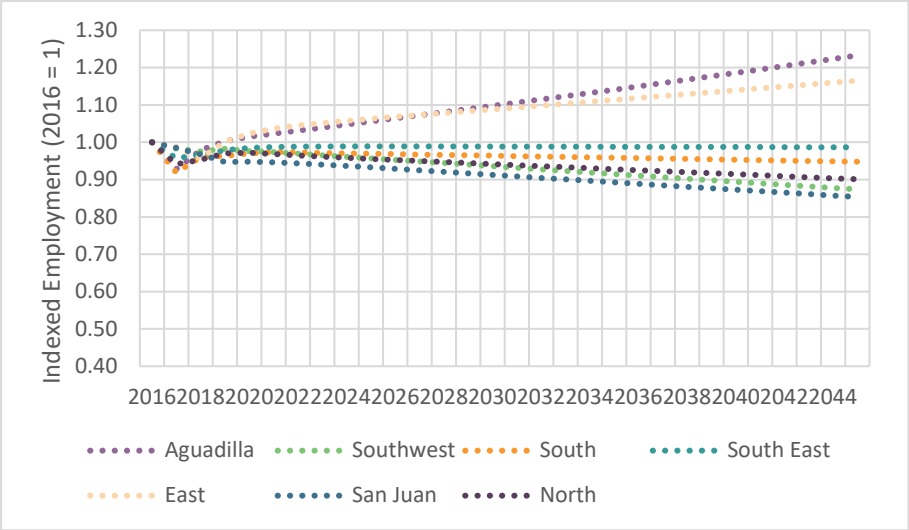
Table B.2: Employment Forecast Growth Rates – All Regions

	Aguadilla	Southwest	South	South East	East	San Juan	North
Historic CAGR 2010 - 2016	(0.3%)	(1.3%)	(0.6%)	(2.3%)	0.2%	(0.8%)	(0.7%)
2016	49,794	54,724	83,618	18,323	16,986	611,380	53,688
2020	50,549	53,418	81,146	18,048	17,390	579,451	52,175
2025	52,573	52,367	81,066	18,119	18,057	570,335	51,296
2040	59,039	48,927	79,693	18,090	19,346	533,627	49,086
2045	61,366	47,823	79,241	18,079	19,792	521,817	48,372
Short-Term CAGR 2016 - 2020	0.4%	(0.6%)	(0.7%)	(0.4%)	0.6%	(1.3%)	(0.7%)
Long-Term CAGR 2016 - 2045	0.7%	(0.46%)	(0.2%)	(0.05%)	0.5%	(0.54%)	(0.4%)

Source: SDG

As shown in Figure B.10 , Post-Maria the South East, North, Southwest, and San Juan regions follow fairly similar employment growth patterns.

Figure B.2: Indexed Employment Forecasts (2016 = 1)

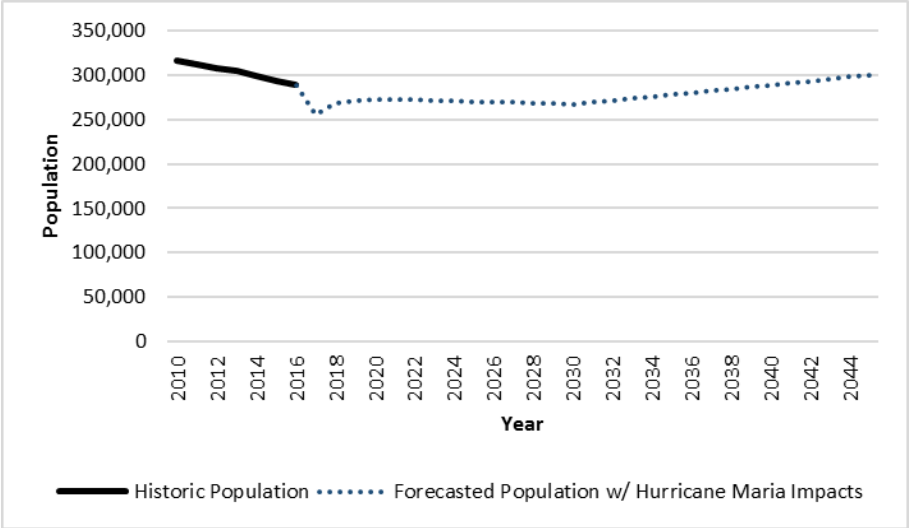


Source: SDG - "Unconstrained" Forecast

The following sections provide graphs, specifically Figure B.11 to Figure B.24, and charts, specifically Table B.6 to Table B.19, for each region individually.

Region 1: Aguadilla

Figure B.11: Population Forecasts - Aguadilla



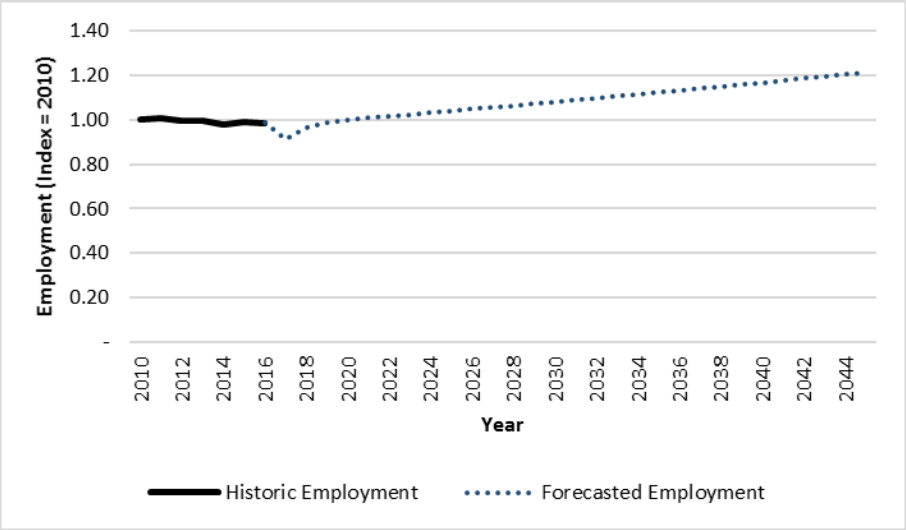
Source: SDG

Table B.1: Population Forecast Growth Rates - Aguadilla

Year	Population	Percent change from 2016	CAGR from 2016
2016	288,777	-	-
2020	272,906	(5.5%)	(1.4%)
2025	270,331	(6.4%)	(0.7%)
2040*	288,743	(0.0%)	(0.0%)
2045*	300,126	3.9%	0.1%

Source: SDG

Figure B.2: Employment Forecasts - Aguadilla (Indexed to 2010)



Source: SDG

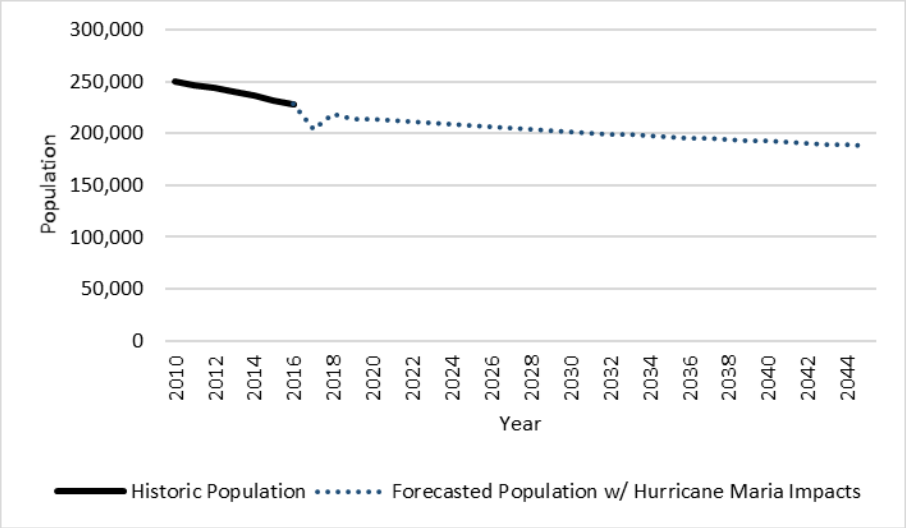
Table B.2: Employment Forecast Growth Rates - Aguadilla

Year	Employment	Percent change from 2016	CAGR from 2016
2016	49,794	-	-
2020	50,549	1.5%	0.4%
2025	52,573	5.6%	0.6%
2040	59,039	18.6%	0.7%
2045	61,366	23.2%	0.72%

Source: SDG

Region 2: Southwest

Figure B.1: Population Forecasts - Southwest



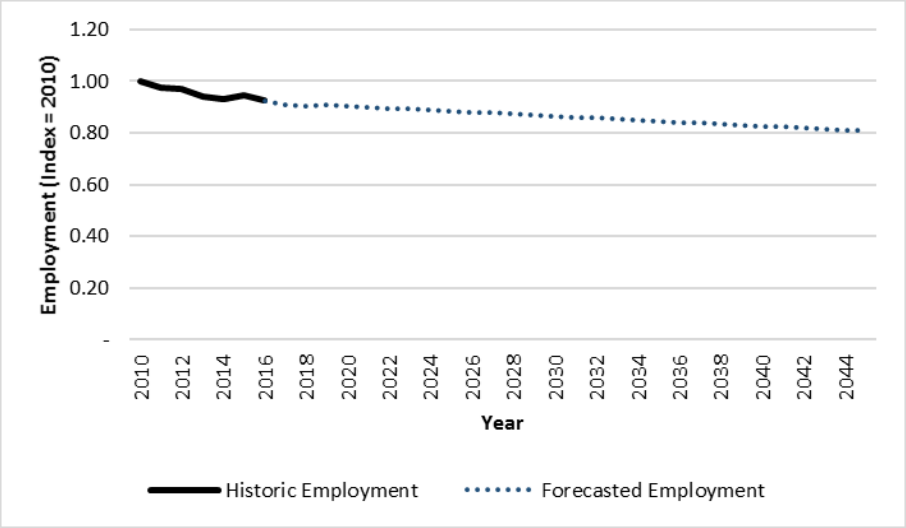
Source: SDG

Table B.1: Population Forecast Growth Rates - Southwest

Year	Population	Percent change from 2016	CAGR from 2016
2016	228,103	-	-
2020	213,558	(6.4%)	(1.6%)
2025	207,547	(9.0%)	(1.0%)
2040*	192,447	(15.6%)	(0.7%)
2045*	188,107	(17.5%)	(0.7%)

Source: SDG

Figure B.2: Employment Forecasts - Southwest (Indexed to 2010)



Source: SDG

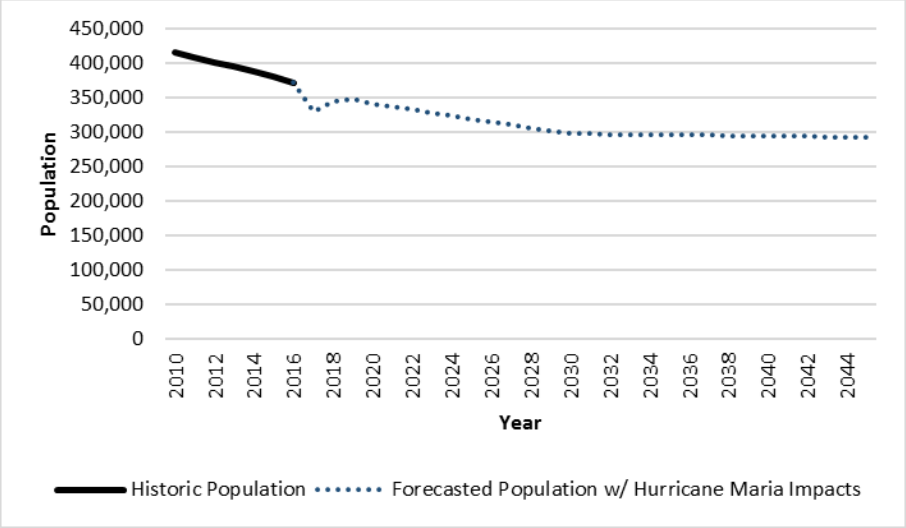
Table B.2: Employment Forecast Growth Rates - Southwest

Year	Employment	Percent change from 2016	CAGR from 2016
2016	54,724	-	-
2020	53,418	(2.4%)	(0.6%)
2025	52,367	(4.3%)	(0.5%)
2040	48,927	(10.6%)	(0.5%)
2045	47,823	(12.6%)	(0.46%)

Source: SDG

Region 3: South

Figure B.1: Population Forecasts - South



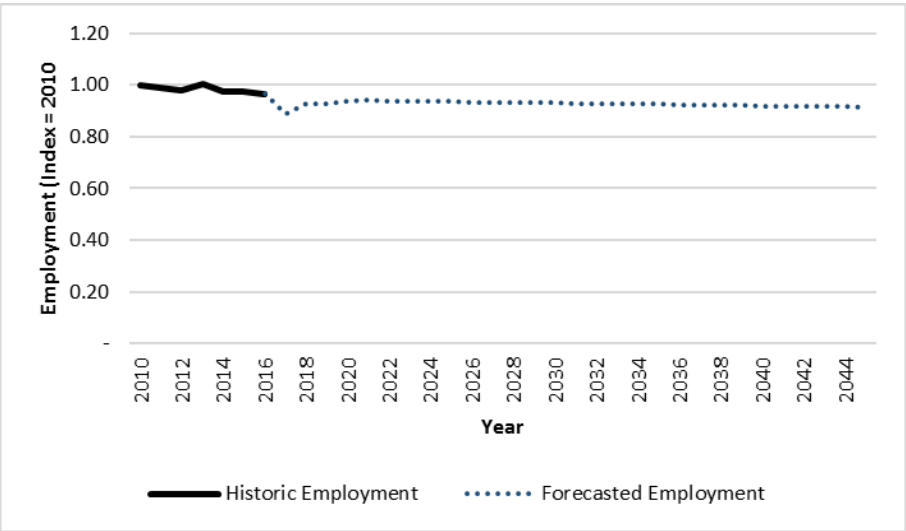
Source: SDG

Table B.1: Population Forecast Growth Rates - South

Year	Population	Percent change from 2016	CAGR from 2016
2016	371,347	-	-
2020	340,868	(8.2%)	(2.1%)
2025	318,541	(14.2%)	(1.7%)
2040*	293,994	(20.8%)	(1.0%)
2045*	292,328	(21.3%)	(0.8%)

Source: SDG

Figure B.2: Employment Forecasts - South (Indexed to 2010)



Source: SDG

Table B.2: Employment Forecast Growth Rates - South

Year	Employment	Percent change from 2016	CAGR from 2016
2016	83,618	-	-
2020	81,146	(3.0%)	(0.7%)
2025	81,066	(3.1%)	(0.3%)
2040	79,693	(4.7%)	(0.2%)
2045	79,241	(5.2%)	(0.19%)

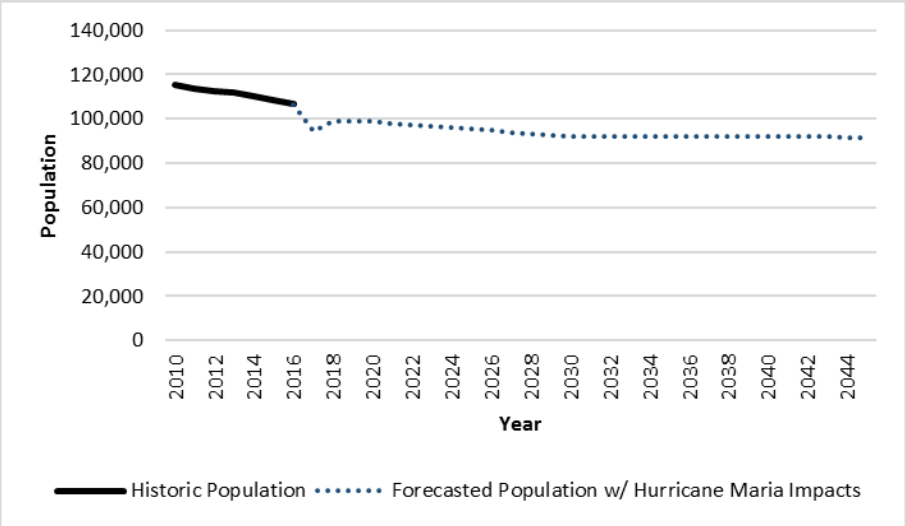
Source: SDG

Region 4: Southeast

The Southeast region's population and employment forecasts proved difficult to model satisfactorily, principally due to its small size. Regions characterized by small populations or employment bases can be prone to important ***relative*** fluctuations, which makes the calibration of these types of models challenging.

As the estimated models did not prove satisfactory, the Southeast region's final forecast was produced differently: Here the process was to impute the same growth rates as the other six MPO regions combined. The average rate of change for population and employment from 2016-2045 for the six other regions was applied to the Southeast base year 2016 population and employment. This regional forecast adjustment does not have much impact on the aggregate Puerto Rico forecasts due to the Southeast's small relative size, as can be seen in Figures B.17 to B.18 and Tables B.12 to B.13.

Figure B.1: Population Forecasts - Southeast



Source: SDG

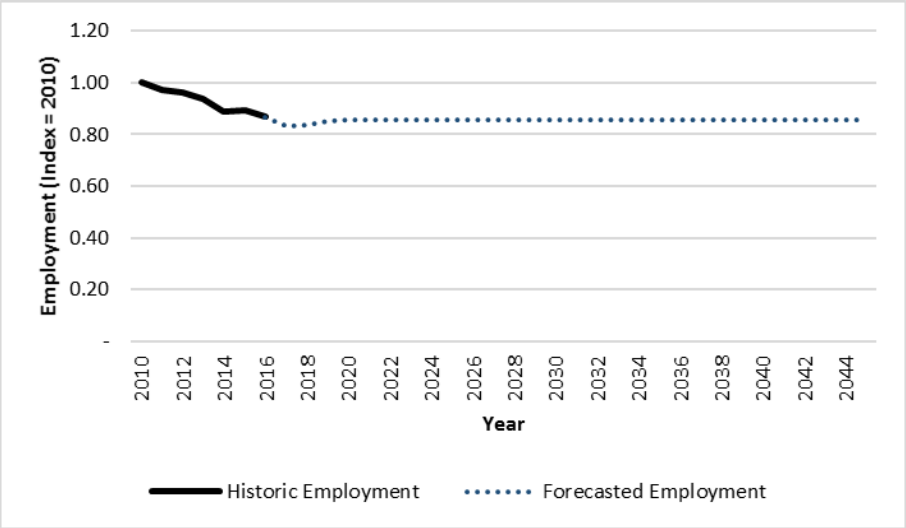
Table B.1: Population Forecast Growth Rates - Southeast

Year	Population	Percent change from 2016	CAGR from 2016
2016	106,617	-	-
2020	98,686	(7.4%)	(1.9%)
2025	95,405	(10.5%)	(1.2%)
2040*	91,814	(13.9%)	(0.6%)

Year	Population	Percent change from 2016	CAGR from 2016
2045*	91,757	(13.9%)	(0.5%)

Source: SDG

Figure B.2: Employment Forecasts - Southeast (Indexed to 2010)



Source: SDG

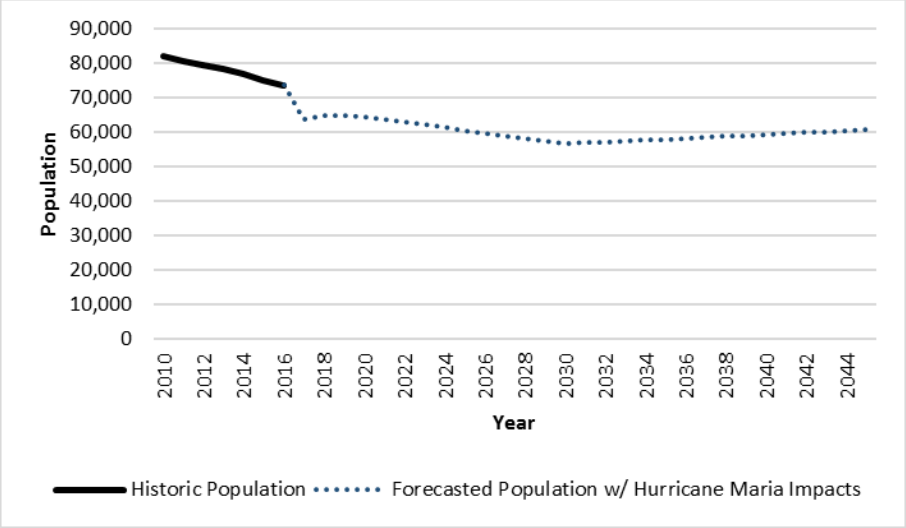
Table B.2: Employment Forecast Growth Rates - Southeast

Year	Employment	Percent change from 2016	CAGR from 2016
2016	18,323	-	-
2020	18,048	(1.5%)	(0.4%)
2025	18,119	(1.1%)	(0.1%)
2040	18,090	(1.3%)	(0.1%)
2045	18,079	(1.3%)	(0.05%)

Source: SDG

Region 5: East

Figure B.1: Population Forecast Growth Rates - East



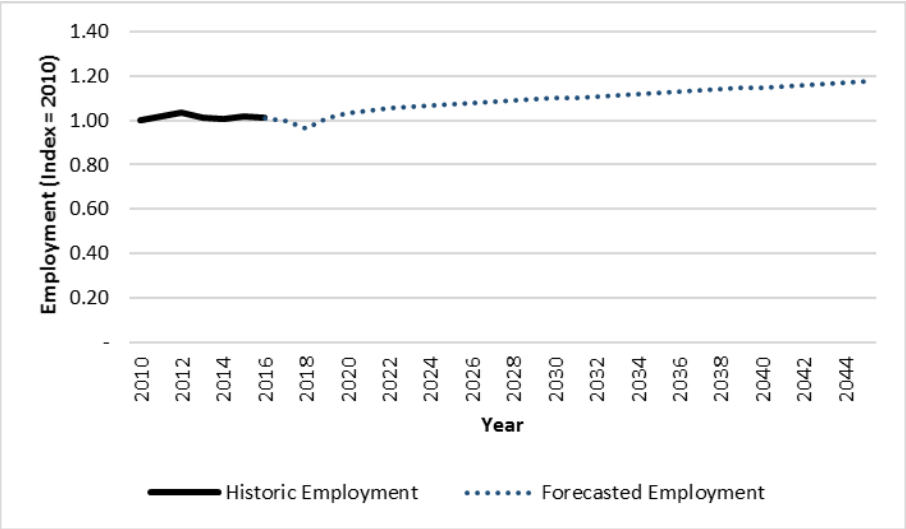
Source: SDG

Table B.1: Population Forecast Growth Rates - East

Year	Population	Percent change from 2016	CAGR from 2016
2016	73,438	-	-
2020	64,345	(12.4%)	(3.3%)
2025	60,452	(17.7%)	(2.1%)
2040*	59,200	(19.4%)	(0.9%)
2045*	60,566	(17.5%)	(0.7%)

Source: SDG

Figure B.2: Employment Forecast Growth Rates - East (Indexed to 2010)



Source: SDG

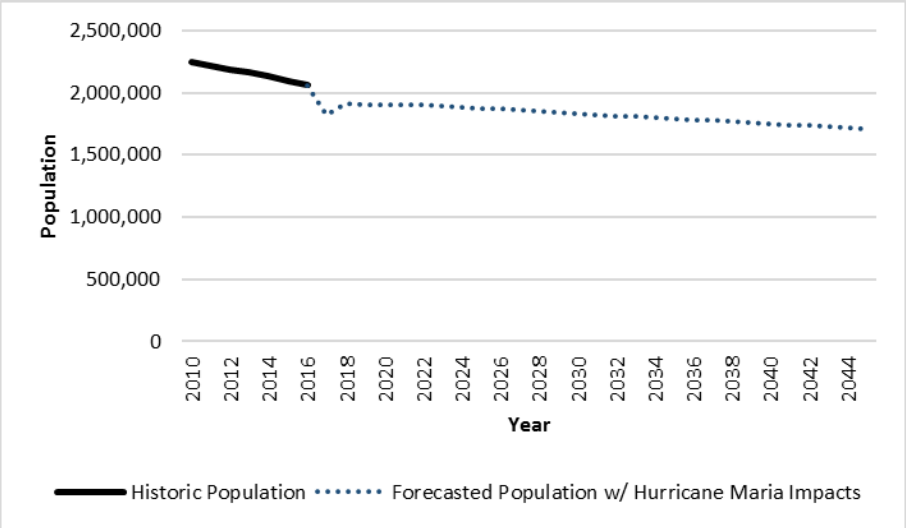
Table B.2: Employment Forecast Growth Rates - East

Year	Employment	Percent change from 2016	CAGR from 2016
2016	16,986	-	-
2020	17,390	2.4%	0.6%
2025	18,057	6.3%	0.7%
2040	19,346	13.9%	0.5%
2045	19,792	16.5%	0.53%

Source: SDG

Region 6: San Juan

Figure B.1: Population Forecasts - San Juan



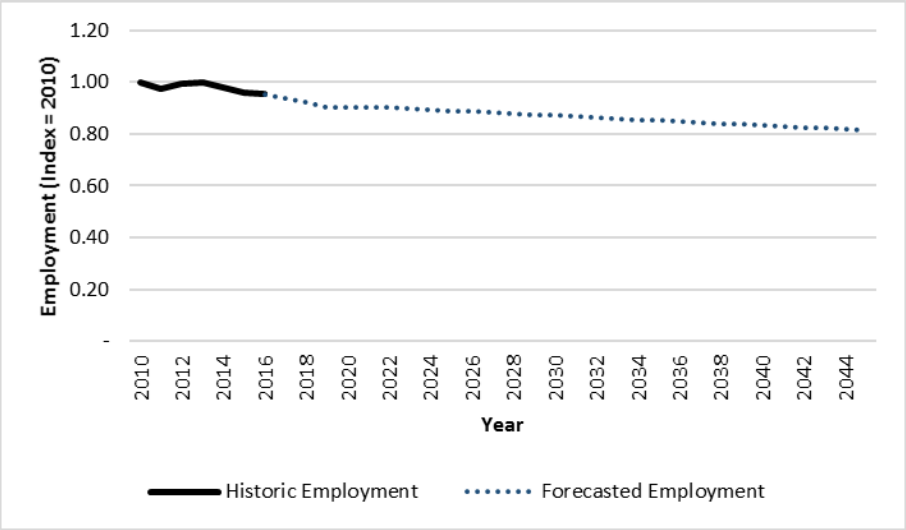
Source: SDG

Table B.1: Population Forecast Growth Rates - San Juan

Year	Population	Percent change from 2016	CAGR from 2016
2016	2,058,458	-	-
2020	1,907,174	(7.3%)	(1.9%)
2025	1,875,705	(8.9%)	(1.0%)
2040*	1,750,807	(14.9%)	(0.7%)
2045*	1,712,058	(16.8%)	(0.6%)

Source: SDG

Figure B.2: Employment Forecasts - San Juan (Indexed to 2010)



Source: SDG

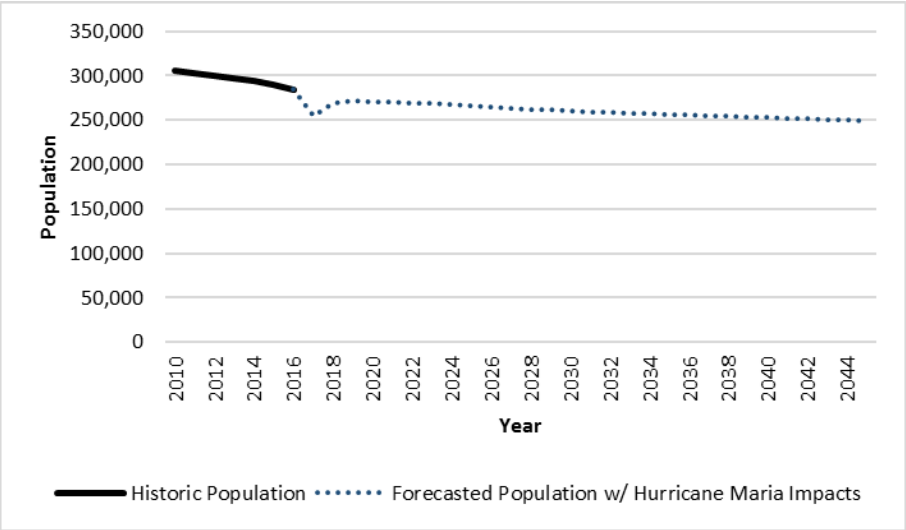
Table B.2: Employment Forecast Growth Rates - San Juan

Year	Employment	Percent change from 2016	CAGR from 2016
2016	611,380	-	-
2020	579,451	(5.2%)	(1.3%)
2025	570,335	(6.7%)	(0.8%)
2040	533,627	(12.7%)	(0.6%)
2045	521,817	(14.6%)	(0.54%)

Source: SDG

Region 7: North

Figure B.1: Population Forecasts - North



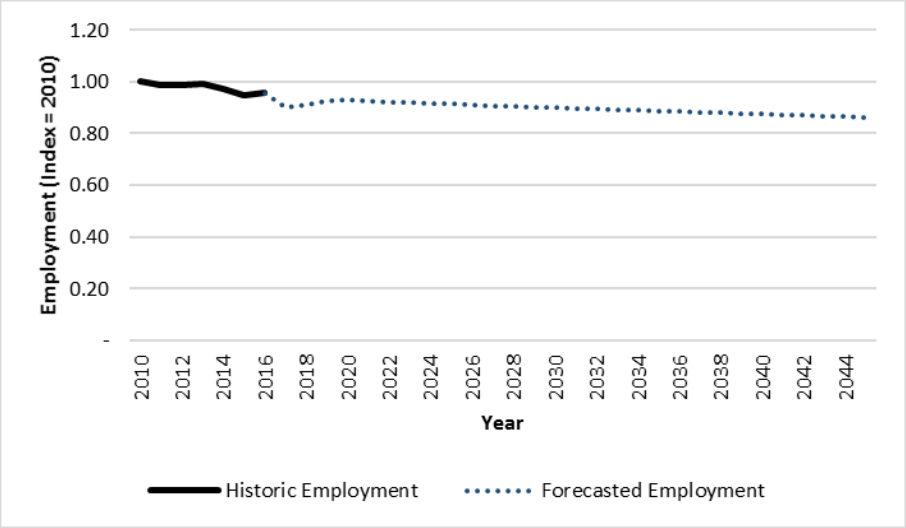
Source: SDG

Table B.1: Population Forecast Growth Rates - North

Year	Population	Percent change from 2016	CAGR from 2016
2016	284,567	-	-
2020	270,961	(4.8%)	(1.2%)
2025	266,038	(6.5%)	(0.7%)
2040*	252,687	(11.2%)	(0.5%)
2045*	249,008	(12.5%)	(0.5%)

Source: SDG

Figure B.2: Employment Forecasts - North (Indexed to 2010)



Source: SDG

Table B.2: Employment Forecast Growth Rates - North

Year	Employment	Percent change from 2016	CAGR from 2016
2016	53,688	-	-
2020	52,175	(2.8%)	(0.7%)
2025	51,296	(4.5%)	(0.5%)
2040	49,086	(8.6%)	(0.4%)
2045	48,372	(9.9%)	(0.36%)

Source: SDG

CONCLUSION

The forecasts for population and employment growth in Puerto Rico suggest a continued decrease in both, though at a much slower rate than has been the trend over the last decade. The slowing of the recent decreases reflects several factors, including:

- The on-going recovery from the impacts of Hurricane María;
- Puerto Rico's relative attractiveness as a location for investment, notably a competitive wage structure compared to the United States mainland;
- An existing base of industrial activity that is relatively diversified; and

- The island's locational amenities, which include its climate, history and natural beauty.

C APPENDIX C - COMPREHENSIVE BICYCLE AND PEDESTRIAN PLAN FOR PUERTO RICO

http://www.movilidadparatodospr.com/web/docs/Comprehensive_Bicycle_and_Pedestrian_Plan_-_Main_Document.pdf

D APPENDIX D - COMPLETE STREETS PLAN AND DESIGN GUIDELINES.

http://www.movilidadparatodospr.com/web/docs/Complete_Streets_Plan_and_Design_Guidelines_-_Main_Document.pdf

E APPENDIX E – PUBLIC INVOLVEMENT PLAN

INTRODUCTION

Public participation is an essential to any planning process. It is an integral part of the transportation development which helps ensure that decisions are made in consideration of and to benefit public needs and preferences. Public participation enables agencies to make better informed decisions through collaborative efforts and builds mutual understanding and trust between the agencies and the public they serve

This document describes the Public Involvement Plan for the development of the 2045 Long Range Multimodal Transportation Plan for Puerto Rico. It is based on the principal statements already approve in the MPO PIP; *Public Involvement Plan in the Transportation Planning Process*[11]. However, this plan also took into consideration any requirements established in recent federal and local regulations.

PURPOSE

As part of the MPO planning process, the Long Range Transportation Plan (LRTP) required a broad insight from the general public, professional and civic organizations, private companies and key governmental stakeholders. This Public Involvement Plan (PIP) considered various communication methods and identified key stakeholders that the project considered during its development.

This document was aligned with the MPO PIP vision, goals and objectives. This PIP has the following:

Vision

Involve and enable agencies, the interested parties and the community to provide meaningful input to the *LRTP*.

Goals

- Consult with the public and stakeholders to gather their ideas for solutions to LRTP;
- Inform and involve the public throughout the process.

[11] Federal joins approval February 18,2014. Revised and approved by the members of the MPO on August 6, 2015.

Objectives

- Develop an effective, and proactive participation process that includes agencies, stakeholders, interested parties[12]) and the public, at regional and local level;
- Create communication channels with the public to encourage public participation and obtain input;
- Use of innovative tools and media including utilizing the DTPW's webpage to inform the public of upcoming planning activities; and
- Encourage the participation of minority and low-income populations in the LRTP development process.

PUBLIC OUTREACH AND COMMUNICATIONS

Target Audiences

While the communications across different media seeks to involve residents across the island, targeted efforts were made to engage a group of stakeholders, as described in Table E.1.

Table E.1: Stakeholders

Sector	Level	Entities
Public Sector	Agencies	Ports Authority
		Metropolitan Bus Authority
		Planning Board
		Public Services Commission
		Environmental Quality Board
		Maritime Transportation Authority
		Permissions Management Office
		Department of Environmental and Natural Resources
		Puerto Rico Integrated Transportation Authority
		Transportation and Infrastructure Commission
	Federal	Federal Highway Administration
		Federal Transit Administration
		Environmental Protection Agency
	Municipal	Mayors, land-use and transportation planners, and other personnel from the municipalities of the Urbanized and Rural Areas
	Regional	Regional Council
Private Sector	Interested and affected parties	Private providers
		Trucking Freight Industry
		Private Paratransit Operators
		Airports
NPO	Interested	Professional Groups

[12] The FAST Act explicitly adds public ports and certain private providers of transportation, including intercity bus operators and employer-based commuting programs to the list of interested parties that an MPO must provide with reasonable opportunity to comment on the transportation plan.

		Elderly and people with disability organizations
		Environmental organizations
Public	Affected	Bicycle and pedestrians
		Minority and low-income populations
		Students
	Interested	Transport users

Source: SDG and PRHTA

A series of meetings were undertaken with specific committees covering most of the stakeholders:

- **Project Management Committee (PMC):** The project management team consisted of the SDG team and the key personnel assigned by the SPO. They met at least twice a month to provide guidance and insight to the project team, monitor the progress and support compliance with schedule, as shown in Table E.2.

Table E.2: Project Management Committee Members

Office
PRHTA Project Manager
PRHTA Office
SDG Project Coordinator

Source: SDG and PRHTA

- **Advisory Committees (AC):** The main objective of the ACs was to integrate under-represented populations, interest parties as well as professionals, academia, and public agencies that could contribute to the discussion adding elements concerning their group or expertise. These committees are: Citizen's Advisory Committee (CAC), and Government Advisory Committee (GAC).
  - Citizen's Advisory Committee (CAC), as seen in Table E.3.

Table E.3: Citizen's Advisory Committee Members

Represented Sector	Organization
Elderly population	Puerto Rico Office of the Ombudsman for the Elderly American Association of Retired Persons (AARP)
People with disabilities	Puerto Rico Office of the Ombudsman for People with Disabilities
Environmental Justice (Communities)	Center for Volunteer Development
Professionals Organizations	Puerto Rico Planners Society Institute of Transportation Engineer (ITE-PR) Economist Association Puerto Rico Professional College of Architecture and Landscaping Architecture
Logistics	PR Shipping Association
Universities	Civil Engineer Department – UPRM Graduate School of Planning – UPRRP Civil Engineer Department – UPPR
Non-motorized	Mobility Advisory Council

Source: SDG and PRHTA

  - Government Advisory Committee (GAC), as seen in Table E.4.

Table E.4: Government Advisory Committee Members

Office/Area
PRHTA Project Manager
SDG Project Coordinator
UZAs Representatives
TMAs Representatives
Planning Board
Ports Authority
Metropolitan Bus Authority
Puerto Rico Integrated Transportation Authority
Maritime Transportation Authority
Tren Urbano
Public Private Partnership Authority
Puerto Rico Infrastructure Financing Authority
Public Services Commission
PRIDCO
Puerto Rico Economic Development Bank
Puerto Rico Statistics Institute

Source: SDG and PRHTA

- **Technical Committee (TC):** SDG Project Coordinator and key members representing PRHTA technical areas. This Committee had been appointed by the PRHTA's Executive Director, and its members are the following offices shown in Table E.5.

Table E.5: Technical Committee Members

Office/Area
PRHTA Project Manager
SDG Project Coordinator
Strategic Planning Office
6FHWA Liaison Office
FTA Liaison Office
Data Collection and Traffic Analysis Office
GIS Office
Project Programming Office
Traffic Engineer Office
Puerto Rico Integrated Transportation Authority
Soil Engineer Office
Bridge Program
Highway Safety Program

Source: SDG and PRHTA

This committee were meet regularly to discuss general technical issues and assumptions within the project mostly related to the process of project prioritization, and revision of technical papers.

Additional to this Technical Committee there were 4 subcommittees they met as needed to discuss specific topics, these are:

- Freight Advisory Committee, as seen in Table E.6: focused on the issues of freight mobility for Puerto Rico.

Table E.6: Freight Advisory Committee Members

Sector	Office/Area
Government	PRHTA Project Manager
	PRHTA SPO Office
	PRHTA Salinas Toll Station
	PRHTA Programming and Environmental Affairs
	Field Operation PR Police
	Highway and Traffic PR Police
	PR Ports Authority
	Public Services Commission
	Mayaguez Port
	Puerto Rico Trade and Export Company
	Federal Motor Carrier Administration
	Planning Board – Subprogram of Economic Analysis
Private	PR Shipping Association
	PR Industrial Association
	PR Retail Trade Association
	PR Chamber of Commerce
	MIDA

Source: SDG and PRHTA

- Resilience Transportation Infrastructure Committee, shown in Table E.7, focused in ensuring that the topic of resilience was properly attended and represented in the Plan.

Table E.7: Resilience Transportation Infrastructure Committee Members

Office/Area
PRHTA Project Manager
PRHTA employees from regional offices
PR Climate Change Commission representative
Internal leader of this Committee
PRHTA SPO Office
Puerto Rico Emergency Management Agency
SDG Project Coordinator

Source: SDG and PRHTA

- Socioeconomic Committee, shown in Table E.8, Worked on discussing forecast of economy, population and employment in Puerto Rico.

Table E.8: Socioeconomic Committee Members

Office/Area
PRHTA Project Manager
SDG Project Coordinator
SDG Socioeconomic Forecasting Expert
Advantage Business Consulting

Source: SDG and PRHTA

- Financial Committee, shown in Table E.9 Responsible of prioritizing and identifying the funding available for the different projects.

Table E.9: Financial Committee Members

Office/Area
PRHTA Project Manager
Auxiliary Executive Director of Administration and Finance (or delegate)
Finance Director (or delegate)
SDG Project Coordinator
SDG Finance Expert
Advantage Business Consulting

Source: SDG and PRHTA

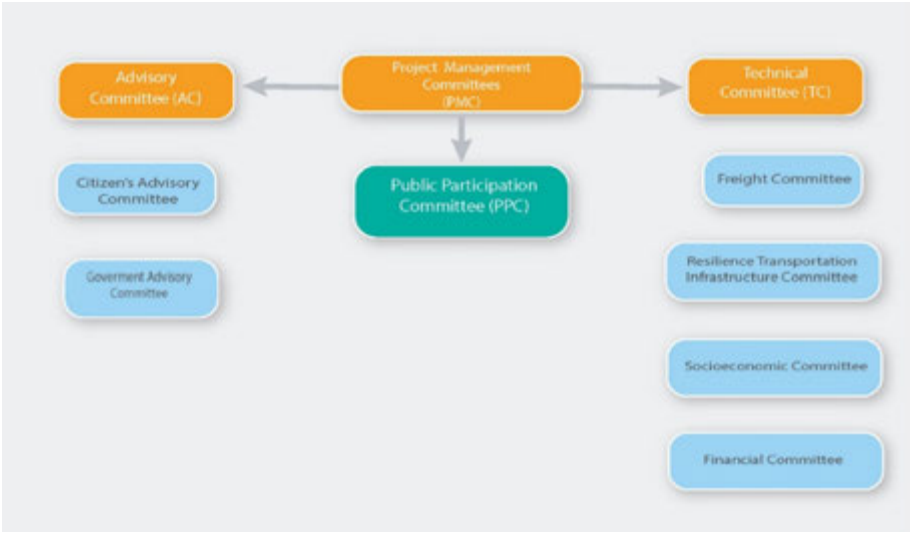
- **Public Participation Committee (PPC):** This committee was responsible of implementing and updating this PIP. It was also responsible of promoting and facilitating the participation of representatives of local agencies, private's entities related to transportation, community organizations and the general public, as well as to assure that the interested and social, economic and environmental concerns of the community were being considered in the planning process. This can be seen in Table E.10 and Figure E.1.

Table E.10: Public Participation Committee Members

Office
PRHTA Project Manager
PRHTA Public Involvement Expert
SDG Project Coordinator
SDG Public Involvement Experts

Source: SDG and PRHTA

Figure E.1: LRTP Stakeholders Committees



Source: SDG

OUTREACH AND COMMUNICATION STRATEGY

The strategy outlined below informed and solicited crucial input from various stakeholders at appropriate times in the process. The multi-pronged approach engaged a broad cross-section of stakeholders while simultaneously working closely with a core group of interested.

Recurrent Meetings

Project Management Committee

The project contemplated having monthly meetings with the Project Management from the PRHTA team to monitor the project development and obtain information crucial to the project.

Advisory Committees

The Advisory Committee participated in 4 meetings (2 with the GAC and 2 with the CAC) in order to provide their opinions on the development of the projects in order to have a Plan and a Guide responsive to their realities.

Technical Committee

Over 15 meetings were held with the different technical committees in order to provide their opinions on the development of the projects in order to have specific support from technical experts from the PRHTA and specifically on subjects related to project list, freight, reliance, socioeconomics and finances.

Stakeholders Meetings

As needed, additional meetings were set up with other stakeholders.

Open Houses

While all aspects of community engagement and outreach are important, nothing can replace an open community forum where individuals can come and hear information about the study process and as well provide inputs regarding their specific needs and concerns.

Two sets of Open Houses were held; the first round happened in December 2017 and the second one in March 2018.

Interactive Engagement

Through a clear and coherent digital strategy, a project website and email blasts were proposed, that the project team will enable stakeholders to participate in the project 24/7.

Do to the communications issues in the entire island after Hurricane María, this strategy was adjusted. Instead of a website page a Facebook page was created. This page was the social media platform to inform about the project, activities were people can participate and served as a direct communication channel between the team and the public.

PUBLIC INVOLVEMENT DOCUMENTATION

Throughout the project, all public involvement activities were coordinated with the PRHTA/SPO and their participation was key importance to success. This appendix documents all efforts including meeting, summaries, contact databases and comment databases.

Open Houses

First Open House

In the first round, we educated people about the LRTP and ask people about their mobility needs. Hurricane María affected Puerto Rico's transportation infrastructure and probably

made a significance change on people's regular trips, in this Open House we focused on gathering input on how this situation changed people's trips and where are the most affected areas.

First Open Houses were performed between December 11th and the 22nd in 7 different locations around the island: Humacao, San Juan, Mayaguez, Utuado, Aguadilla, Barranquitas, Ponce, Fajardo. Figure E.2 and Figure E.3 show de announcement and public notice where the open houses where promoted.

Informative Station

This station had the objective to inform all participants about the transportation planning process, specifically in aspects such as: (1) long-range transportation planning process, (2) current status and challenges, (3) importance of the public involvement through the process, and (4) timeline of this planning process, as seen in Figure E.2 through Figure E.5.

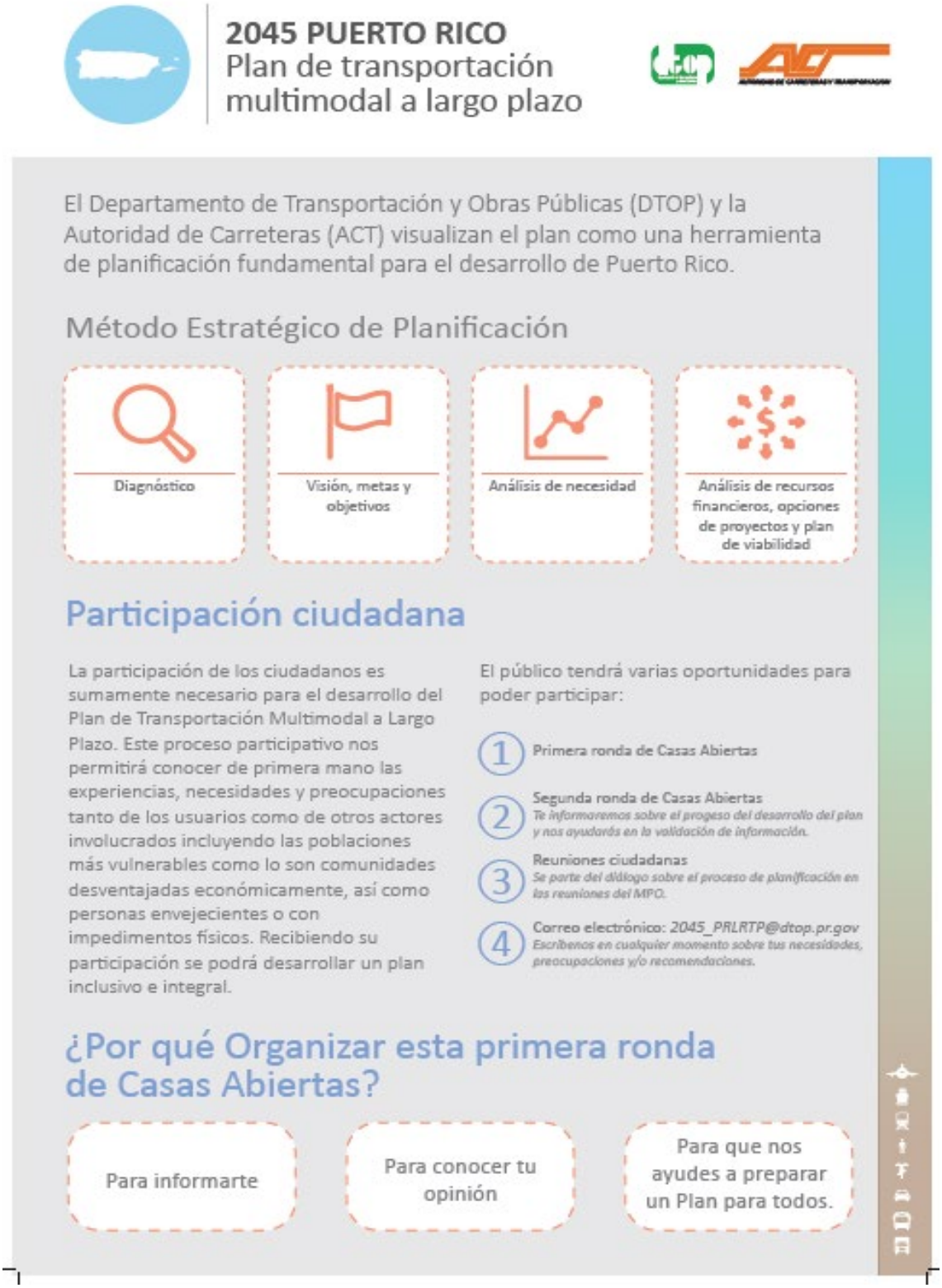
Figure E.2: Informative Boards – Long Range Transportation Planning Process

Source: SDG

Figure E.3: Informative Board – Current Status and Challenges

Source: SDG

Figure E.4: Informative Board – Public Involvement



Source: SDG

Figure E.5: Informative Board – Timeline

Source: SDG

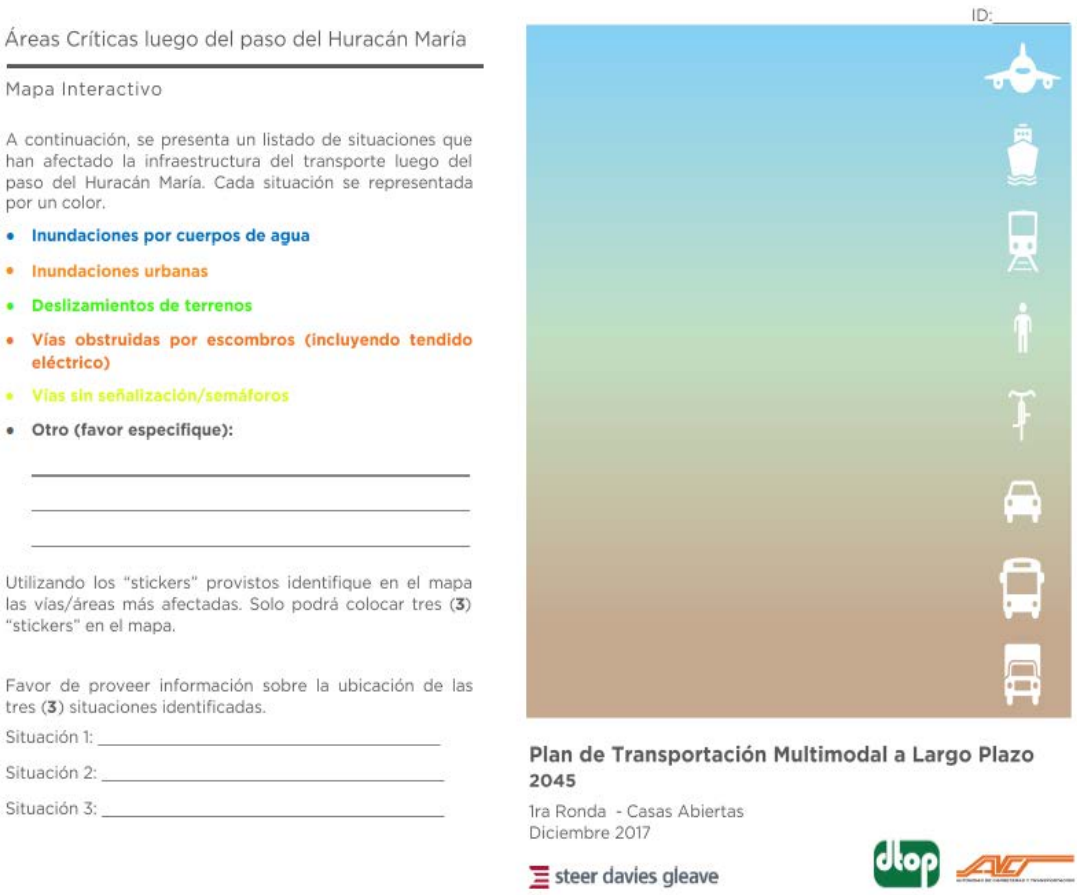
Interactive Station

The interactive station had the objective of gathering information about transportation needs and concerns. Participants provided their input through questionnaires, boards and maps, as seen in Figure E.6 through Figure E.15.

Figure E.6: Informative Board – Transportation issues

Source: SDG

Figure E.7: Survey – First Open House



Áreas Críticas luego del paso del Huracán María

Mapa Interactivo

A continuación, se presenta un listado de situaciones que han afectado la infraestructura del transporte luego del paso del Huracán María. Cada situación se representada por un color.

- **Inundaciones por cuerpos de agua**
- **Inundaciones urbanas**
- **Deslizamientos de terrenos**
- **Vías obstruidas por escombros (incluyendo tendido eléctrico)**
- **Vías sin señalización/semáforos**
- **Otro (favor especifique):**

_____

_____

_____

Utilizando los "stickers" provistos identifique en el mapa las vías/áreas más afectadas. Solo podrá colocar tres (**3**) "stickers" en el mapa.

Favor de proveer información sobre la ubicación de las tres (**3**) situaciones identificadas.

Situación 1: _____

Situación 2: _____

Situación 3: _____

ID:_____

Plan de Transportación Multimodal a Largo Plazo 2045

1ra Ronda - Casas Abiertas
Diciembre 2017

steer davies gleave

Source: SDG

Figure E.8: Mobility Survey

Encuesta de Movilidad

Información Personal

1. Género

☐ Masculino ☐ Femenino

2. ¿A qué grupo de edad pertenece?

☐ 15 a 19 años
☐ 20 a 24 años
☐ 25 a 29 años
☐ 30 a 34 años
☐ 35 a 39 años
☐ 40 a 45 años
☐ 46 a 49 años
☐ 50 a 54 años
☐ 55 a 59 años
☐ 60 a 64 años
☐ 65 a 69 años
☐ 70 a 74 años
☐ 75 a 79 años
☐ 80 a 84 años
☐ 85 años en adelante

3. ¿Cuál es su nivel de estudio más alto obtenido?

☐ Escuela Elemental
☐ Escuela Intermedia
☐ Escuela Superior
☐ Grado Asociado
☐ Universidad sin titulo
☐ Bachillerato
☐ Maestría
☐ Grado Profesional más allá de Bachillerato
☐ Doctorado
☐ Ninguna de las Anteriores

4. Favor seleccione el rango de ingreso anual por unidad familiar que mejor le aplique a usted:

☐ Menos de $10,000
☐ $10,000-$14,999
☐ $15,000-$24,999
☐ $25,000-$34,999
☐ $35,000-$49,999
☐ $50,000-$74,999
☐ $75,000-$99,999
☐ $100,000-$149,000
☐ $150,000-$199,000
☐ $200,000 o más

Comentarios

Información de Movilidad **antes** del Huracán María

Favor contestar las siguientes preguntas tomando en consideración como eran sus viajes diarios antes del paso del huracán de María.

5. ¿Cuál era su modo principal de transportación antes de paso del huracán?

☐ Caminar
☐ Bicicleta
☐ Transporte público (Tren Urbano, AMA, carros públicos, otros)
☐ Transporte privado (Taxi, Uber, otros)
☐ Vehículo de motor
☐ Otro: _____

6. ¿Dónde comenzaba su primer viaje diario?

6a) Municipio _____
6b) Barrio, zona o urbanización. Por favor provea Calle, No. o Km. _____

7. ¿Dónde terminaba su primer viaje?

7a) Municipio _____
7b) Barrio, zona o urbanización. Por favor provea Calle, No. o Km. _____

8. ¿Cuál era su ruta principal?

Favor indique las carreteras por las que transita ya sea en auto, bicicleta o caminando. Si utiliza transporte público favor indicar la ruta.

Encuesta de Movilidad

Información de Movilidad **antes** del Huracán

9. ¿ Cuál era la razón principal de su viaje?

- ☐ Ir al trabajo
- ☐ Ir a la universidad/ escuela (llevar o dejar a alguien)
- ☐ Ir a la universidad/ escuela (ser estudiante)
- ☐ Ir de compras
- ☐ Cita Médica
- ☐ Ir a sus actividades sociales y/o recreación
- ☐ Otra : _____

10. ¿Dónde comenzaba su viaje?

- ☐ Casa
- ☐ Su Lugar de Trabajo
- ☐ Otro Lugar de Trabajo (una reunión)
- ☐ Escuela/Universidad
- ☐ Facilidad Médica
- ☐ Facilidad Recreacional
- ☐ Restaurante
- ☐ Otra: _____

11. ¿ Dónde terminaba su viaje?

- ☐ Casa
- ☐ Su Lugar de Trabajo
- ☐ Otro Lugar de Trabajo (una reunión)
- ☐ Escuela/Universidad
- ☐ Facilidad Médica
- ☐ Facilidad Recreacional
- ☐ Restaurante
- ☐ Otra: _____

Comentarios

Favor indique cualquier comentario que entiendan pertinente acerca de los problemas, necesidades y soluciones del sistema de transportación en Puerto Rico y si son relevante al paso de los huracanes o si es una situación ya existente.

Problemas en la Transportación

Favor indicar en el afiche presentado, los cinco (**5**) problemas que entiende son más prioritarios y que deben ser atendidos, siendo el uno (1) el de mayor importancia y cinco (5) el de menor importancia.

1. _____
2. _____
3. _____
4. _____
5. _____

De los modos de transportación en los que no seleccionó algún problema, ¿entiende que alguno también amerita atención? Indique solo dos (**2**).

1. _____
2. _____

Información de Movilidad **después** del Huracán

Favor contestar las siguientes preguntas tomando en consideración como son sus viajes diarios luego del paso del huracán María. **Solo responda aquellas preguntas donde la respuesta sea diferente en la sección anterior.**

12. ¿Cuál es su modo principal de transportación después del huracán?

- ☐ Caminar
- ☐ Bicicleta
- ☐ Transporte público (Tren Urbano, AMA, carros públicos, otros)
- ☐ Transporte privado (Taxi, Uber, otros)
- ☐ Vehículo de motor
- ☐ Otro: _____

13. ¿Dónde comienza su primer viaje diario?

6a) Municipio _____
6b) Barrio, zona o urbanización. Por favor provea Calle, No. o Km. _____

14. ¿Dónde termina su primer viaje?

7a) Municipio _____
7b) Barrio, zona o urbanización. Por favor provea Calle, No. o Km. _____

15. ¿Cuál es su ruta principal?

Favor indique las carreteras por las que transita ya sea en auto, bicicleta o caminando. Si utiliza transporte público favor indicar la ruta.

Encuesta de Movilidad

Información de Movilidad **después** del Huracán

16. ¿ Cuál es la razón principal de su viaje?

☐ Ir al trabajo
☐ Ir a la universidad/ escuela (llevar o dejar a alguien)
☐ Ir a la universidad/ escuela (ser estudiante)
☐ Ir de compras
☐ Cita Médica
☐ Ir a sus actividades sociales y/o recreación
☐ Otra : _____

17. ¿Dónde comienza este viaje?

☐ Casa
☐ Su Lugar de Trabajo
☐ Otro Lugar de Trabajo (una reunión)
☐ Escuela/Universidad
☐ Facilidad Médica
☐ Facilidad Recreacional
☐ Restaurante
☐ Otra: _____

18. ¿ Dónde termina este viaje?

☐ Casa
☐ Su Lugar de Trabajo
☐ Otro Lugar de Trabajo (una reunión)
☐ Escuela/Universidad
☐ Facilidad Médica
☐ Facilidad Recreacional
☐ Restaurante
☐ Otra: _____

Inversión en el Sistema de Transportación

19. Si usted tuviese $100 para invertir en el sistema de transportación del país, ¿Cómo distribuiría el dinero para mejorar el sistema?

Mejoras	**Cantidad de la inversión**
Mantenimiento de las carreteras	$
Reducción de la congestión en carreteras	$
Mejoras al servicio de transporte colectivo	$
Construcción de más aceras	$
Mejoras a la sincronización de señales e intersecciones	$
Construcción de accesos peatonales y ciclistas	$
Mejoras al movimiento de camiones y carga	$
Mejoras a los patrones de uso de suelo (Ej.: cercanía a centros de empleo para reducir viajes y distancia recorridas)	$

Source: SDG

Maps by MPO Region

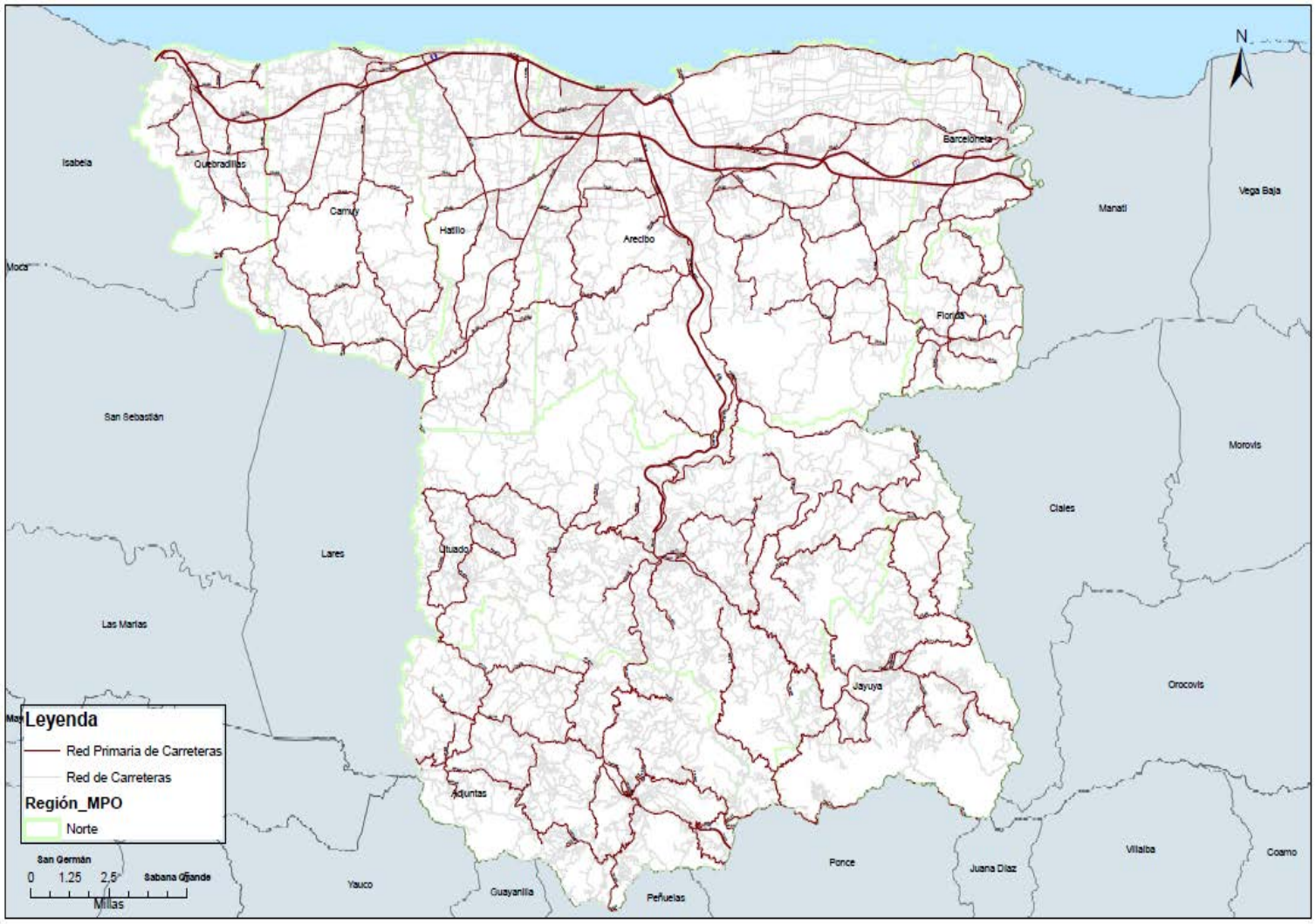
Figure E.9: Aguadilla TMA

Source: SDG

Figure E.10: Northeast

Source: SDG

Figure E.11: North

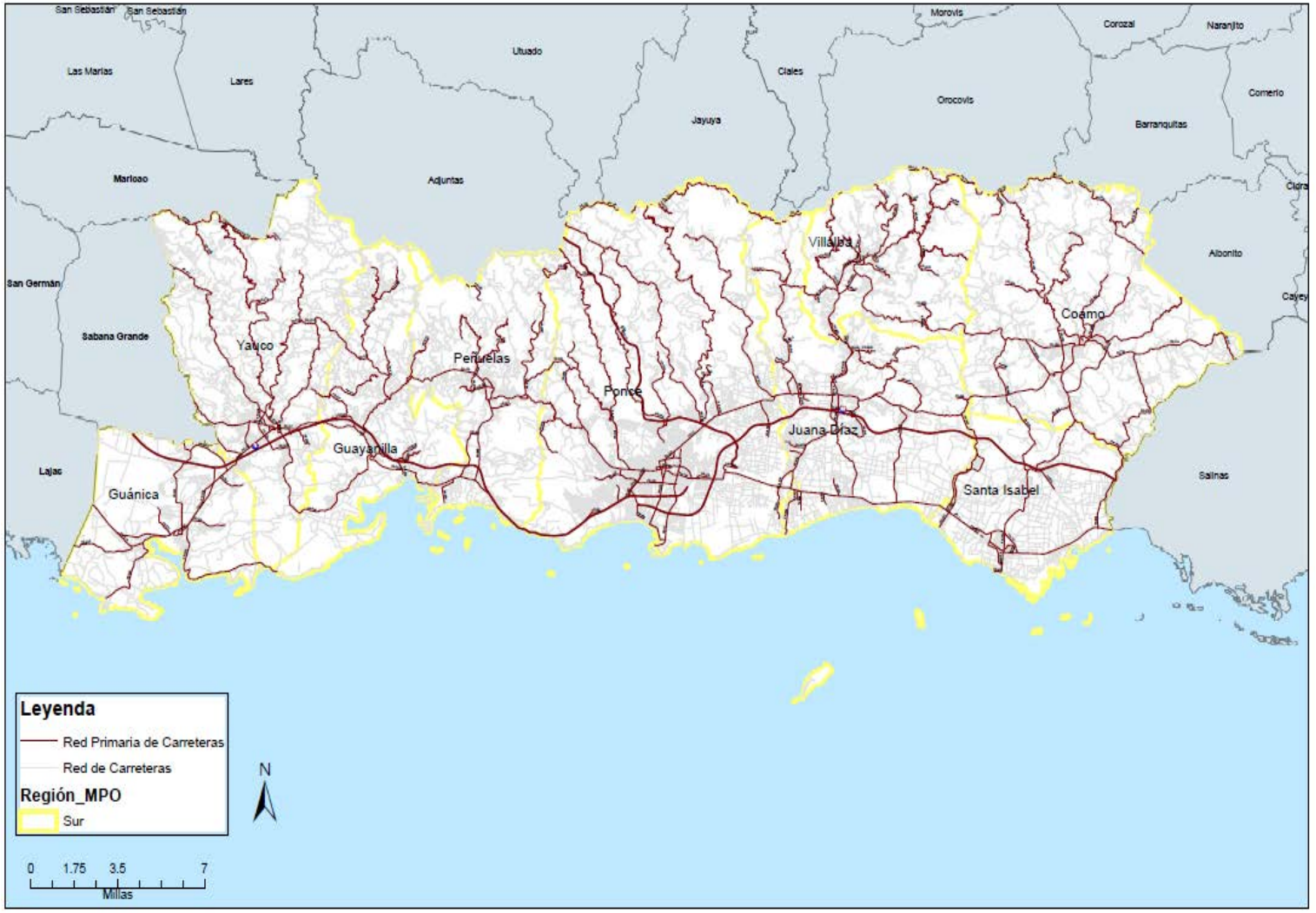


Source: SDG

Figure E.12: San Juan TMA

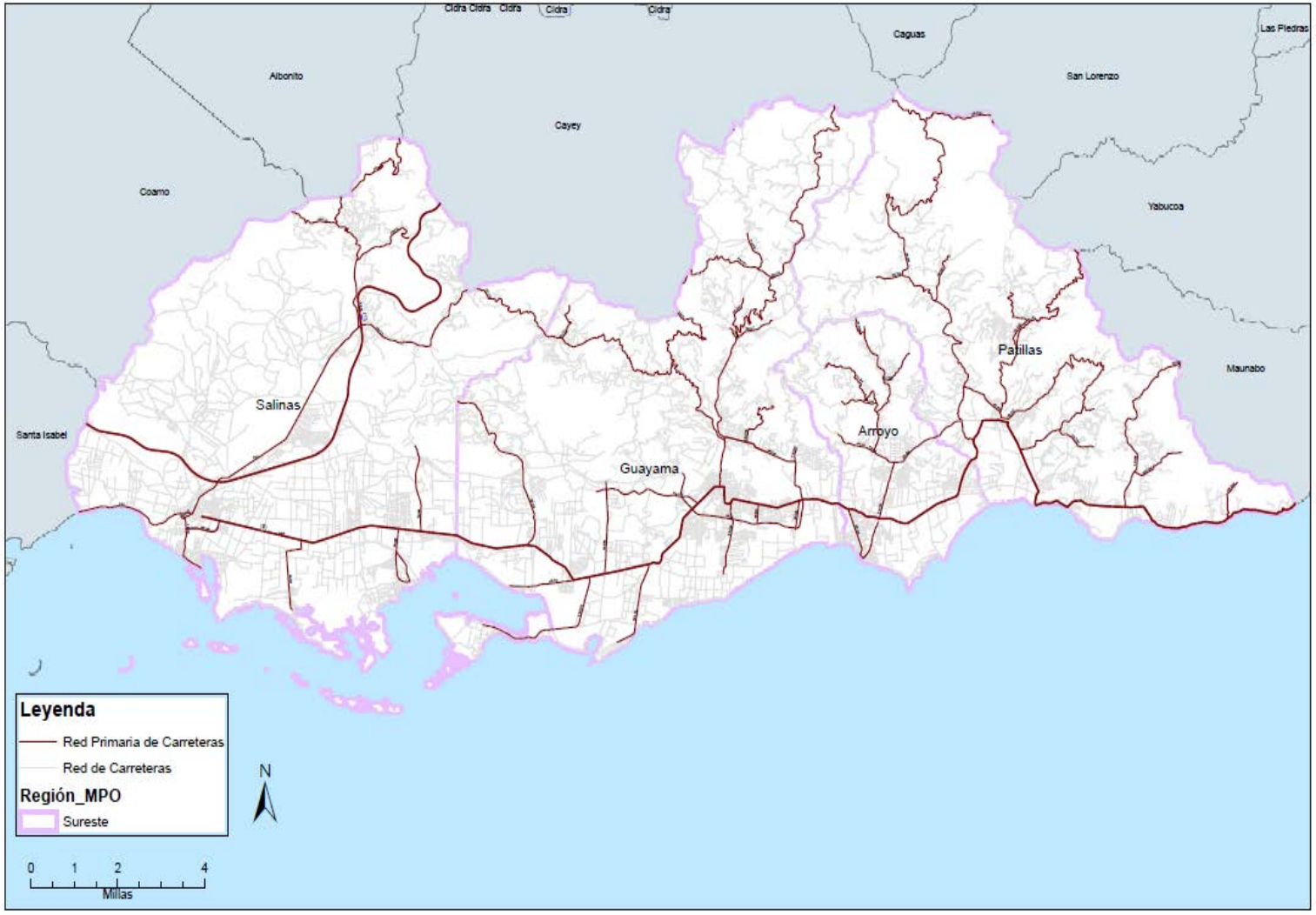
Source: SDG

Figure E.13: South



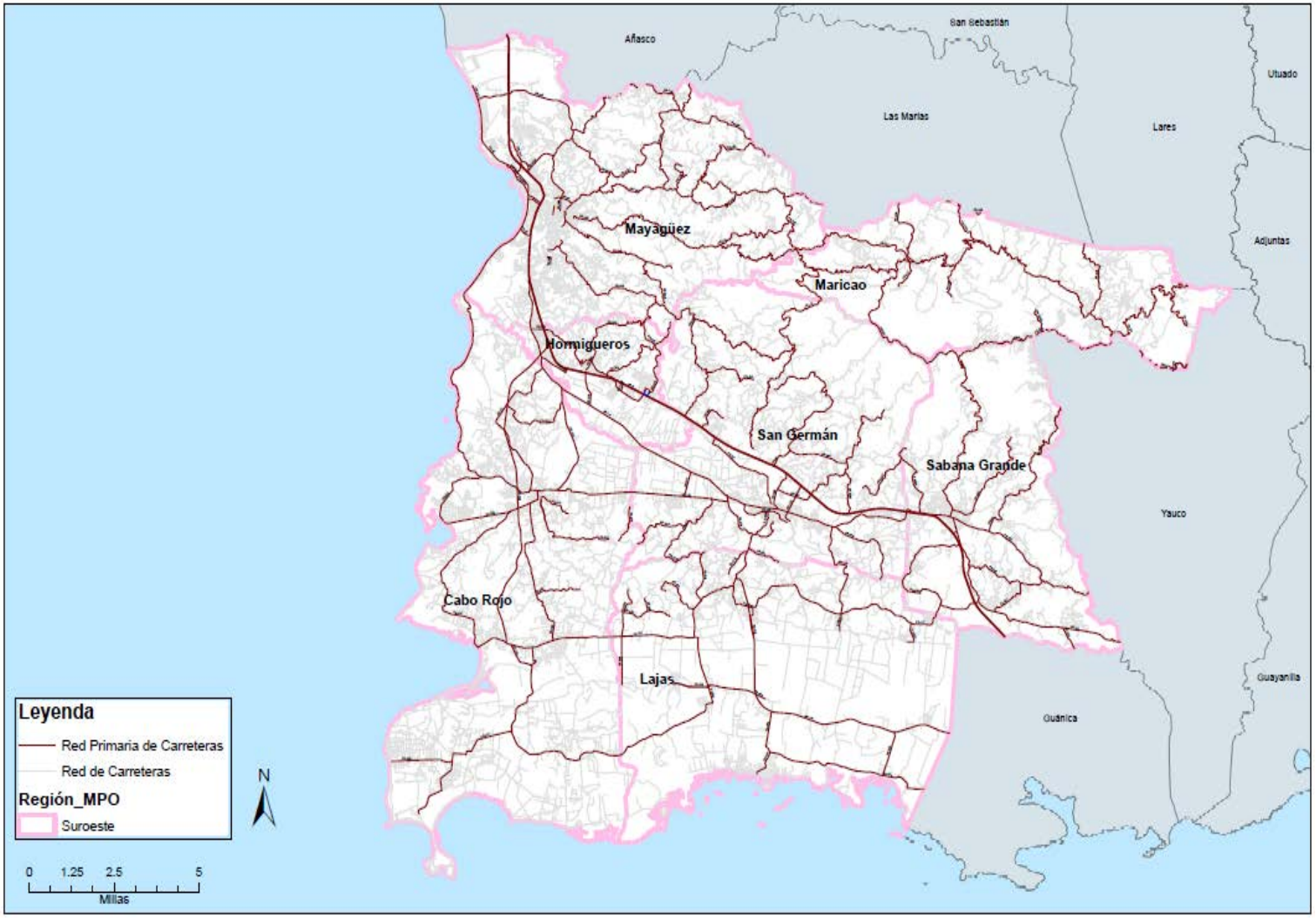
Source: SDG

Figure E.14: Southeast



Source: SDG

Figure E.15: Southwest



Source: SDG

Announcement

The first round was announced through a digital platform that includes social media and email blast (PRHTA data base). It was also announced through the newspaper, as can be seen in Figure E.16 and Figure E.17.

Figure E.16: First Open House – Announcement

Source: SDG

Figure E.17: First Open Hose – Public Notice

EL NUEVO DÍA Jueves, 30 de noviembre de 2017 74

COOPERATIVA DE AHORRO Y CRÉDITO DE LA ASOCIACIÓN DE MAESTROS DE PR (EDUCOOP)

PO Box 192770 San Juan, PR 00919-2770 / Tel. (787) 754-7895

Aviso de Dinero y Otros Bienes Líquidos No Reclamados en Poder de la Cooperativa de Ahorro y Crédito de la Asociación de Maestros de Puerto Rico

Nombre	Pueblo de Residencia	Cuenta de Ahorros	Cuenta de Acciones	Cuenta de Suspenso
AMAURY R. DE JESUS Y/O CARLOS	RIO PIEDRAS	271.19		
AVILES MARTINEZ MIRIAM	AÑASCO	21.97	27.64	
BANOS CRUZ ELSA	EASTON, PA	30.00		
BATALLA RODRIGUEZ ANTONIO E.	HUMACAO	43.25		
BELLO RUIZ BLANCA I.	VEGA BAJA	804.72	803.95	
CARABALLO FELICIANO AFCELIO	YAUCO	2,871.55	1,228.54	
CARABALLO ROLDAN CARMEN G.	SAN JUAN	10.00		
CARTAGENA VAZQUEZ AMARILYS	AIBONITO	44.87		
CASTRO AGUAYO MARIA DE L	CAGUAS	296.02		
CHRISTIAN I. ALEMAN Y/O HIRAM	TRUJILLO ALTO	6.77		
COLON RAMOS JENNY	RIO GRANDE	72.04		
COLON TORRES MARIELY	BAYAMON	56.89	297.89	
CONCEPCION FEBO AIDA	SAN JUAN	2.83		
CORREA RIVERA ANGELICA	RIO GRANDE	1,992.44	3,174.23	
DIAZ VAZQUEZ LYDIA	GUAYAMA	61.86		
FIGUEROA RIVERA CARMEN I.	BAYAMON	1,150.93		
FLORES BONILLA VILMA O.	RIO PIEDRAS	5.54		
FLORES CASTRO JORGE F.	SAN JUAN	30.00		
GAVILLAN FONTANEZ JOSE	CAROLINA	36.37		
GUTIERREZ SANJURJO ARACELIS	CAROLINA	126.40	1,339.99	
HERNANDEZ APONTE VILMA	TRUJILLO ALTO	20.03		
HERNANDEZ MALDONADO ROCIO DEL	TRUJILLO ALTO			497.40
IBARRA PEREIRA CELESTE	BAYAMON	55.93	102.96	
JUNTA LOCAL MAESTROS PATILLAS	PATILLAS	8,128.51		
LEON RIVERA NILSA	CAYEY	160.69		
MALDONADO MONTANEZ MINERVA	BAYAMON	1,799.20	865.35	
MARCANO MARCANO ENRIQUE O.	AGUAS BUENAS			20.00
MELO LAPPOST QUINTANA Y/O WENC	RIO PIEDRAS	81.79		
MERCEDES DE JESUS MIRILY	GUAYNABO	124.51		
MICHAEL ANGELO DE JESUS Y/O CARLOS	RIO PIEDRAS	271.29		
MORALES MARIBEL Y/O ERIKA M. TORRES	AGUAS BUENAS	30.77		
NIEVES BARRIENTOS JOSE C.	CAMUY	60.10	72.77	
OCASIO YERA CARMEN C.	GUAYAMA	0.28		
OLIVER HERNANDEZ JOAQUIN A	GUAYNABO	314.70		
OTERO VICENTE VINELIA	COMERIO			2.33
PEREZ BOLIVAR WULFRAN	CAGUAS	10.92	467.34	
RAMOS MUÑIZ IRIS YOLANDA	COROZAL	154.33	158.50	
RAMOS PEREZ JAVIER	CAROLINA	398.60	397.10	
RAMOS RODRIGUEZ CASELIN	CAGUAS	6.17		
RIVERA CAMACHO MARIA E.	VIEQUES	30.13		
RIVERA DIAZ SHERWIN AYALA DIAZ	SAN JUAN	10.57		
RODRIGUEZ PEREZ DEIDAD M	RIO PIEDRAS	228.07		
RODRIGUEZ TORRES IDAELI	COAMO	5.47		
ROLON NARVAEZ RUMAR	MOROVIS			5.00
ROSADO RODRIGUEZ ABIGAIL	CAGUAS	693.42	231.88	
ROSARIO OTERO RUTH E.	RIO PIEDRAS	10.58		
ROSARIO RODRIGUEZ STELLA NOLA	TRUJILLO ALTO	524.62		
SANTIAGO PEREZ SANDRA Y/O WENCESLAO	GUAYNABO	38.45		
SANTIAGO PINERO LISANDRA	CANOVANAS	94.85		
SANTIAGO SALDANA ELSA I.	VIEQUES	10.54		
SERRANO RODRIGUEZ LIZETTE	FAJARDO	11.46	258.17	
TORRES ORTIZ NOEMI	SAN JUAN	15.00		
VALENTIN ECHEVARRIA GLADYS	PONCE	2,310.14	2,192.17	
VAZQUEZ SANTOS IRMA I.	GURABO	40.00	31.08	
VELEZ TORRES MARIA TERE	GURABO	10.00	30.86	

Los fondos no reclamados aquí señalados serán pagados por la Cooperativa de Ahorro y Crédito de la Asociación de Maestros de Puerto Rico a aquella persona que establezca a su satisfacción su derecho a recibir los mismos. La Cooperativa de Ahorro y Crédito de la Asociación de Maestros de Puerto Rico no se hace responsable de ...

COSSEC $250,000

Public Notice

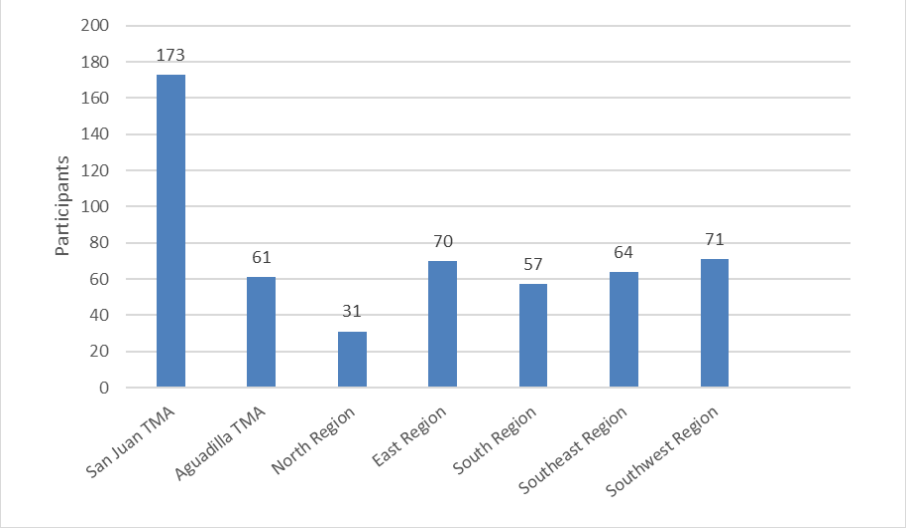
Aviso Público

Source: El Nuevo Día Newspaper

Results and Documentation

Figure E.18 shows the number of participants by region in the first Open House

Figure E.18: Participants of First Open House

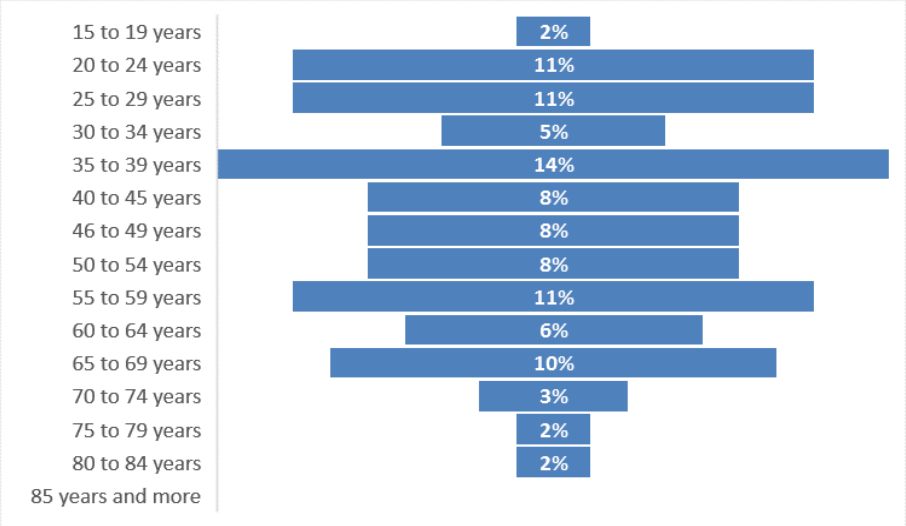


Source: SDG

Aguadilla

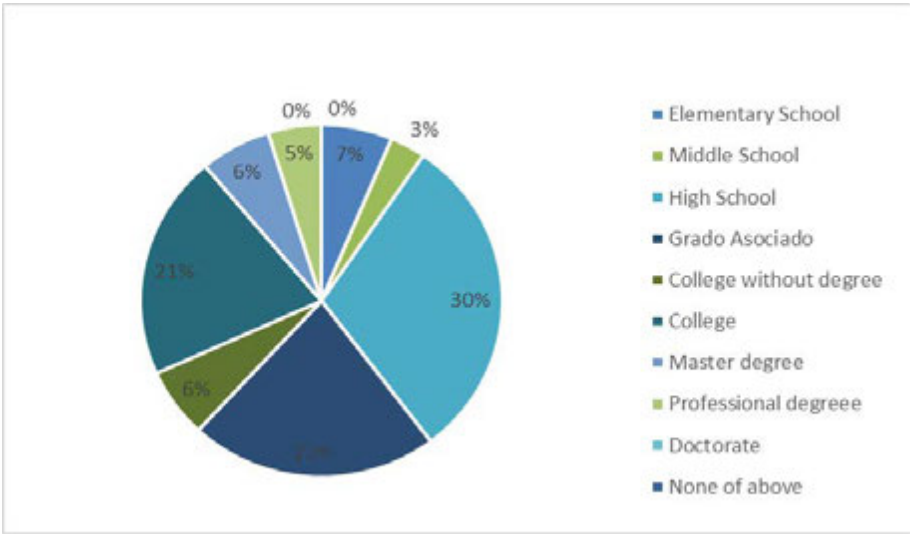
Figure E.19 to Figure E.26 and Table E.11 show the results, photos and participants list of Aguadilla (part of Aguadilla TMA).

Figure E.19: Participants Age – Aguadilla TMA



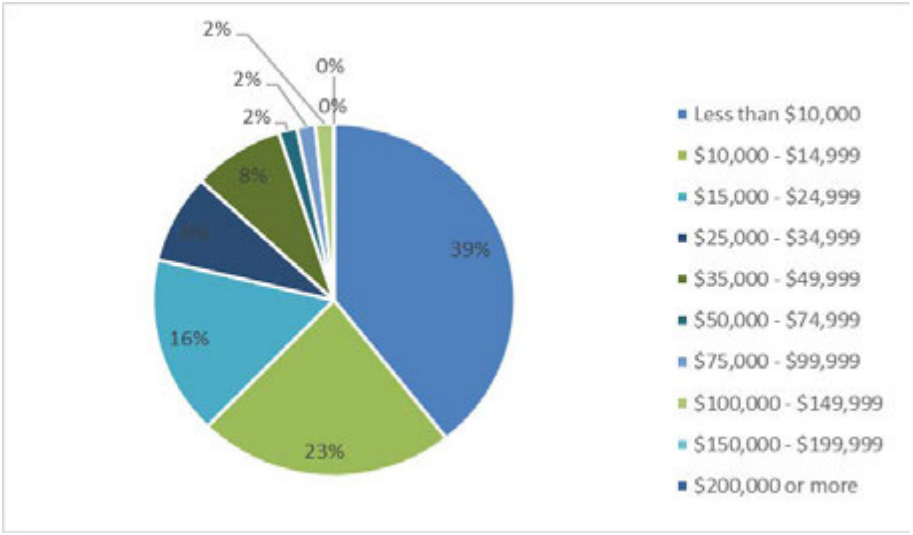
Source: SDG

Figure E.20: Participants Level of Education – Aguadilla TMA



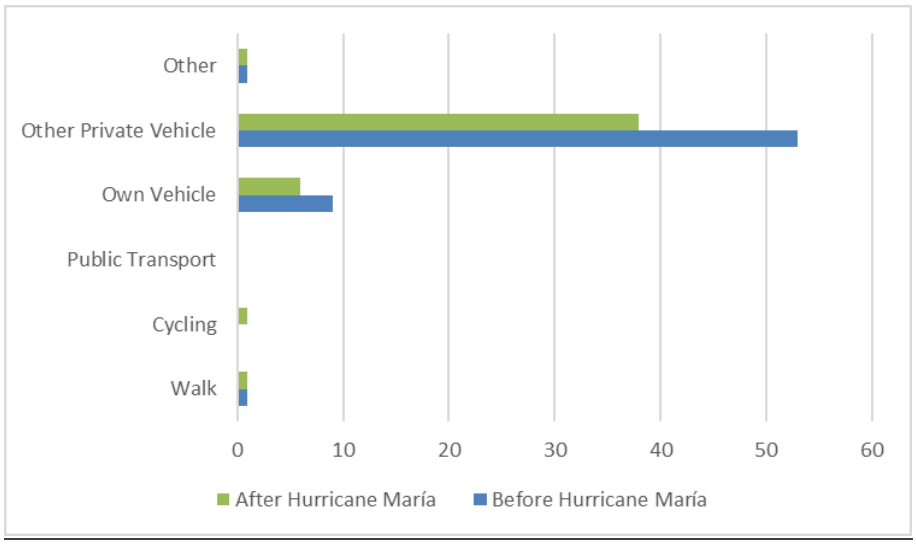
Source: SDG

Figure E.21: Participants Annual Income – Aguadilla TMA



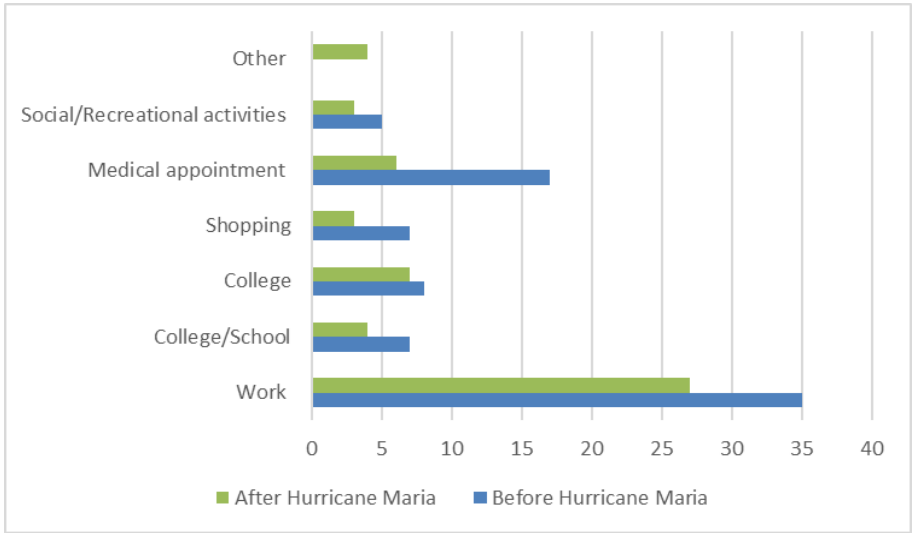
Source: SDG

Figure E.22: Participants Regular Trips Before and After Hurricane María – Aguadilla TMA



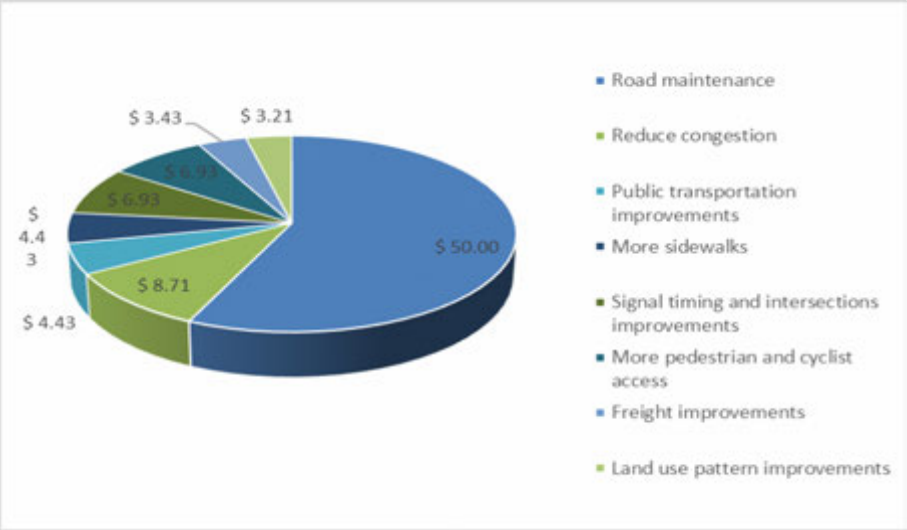
Source: SDG

Figure E.23: Participants Main Reason Trips Before and After Hurricane María – Aguadilla TMA



Source: SDG

Figure E.24: Transportation Investment – Aguadilla TMA



Source: SDG

Table E.11: Transportation Issues – Aguadilla TMA

Priority level	Aguadilla TMA
Urgent	Roads in bad condition
High	Lack of lighting
Medium	Lack of sidewalks
Low	Lack of cyclist infrastructure
Very Low	Insufficient routes/poor coverage

Source: SDG

Figure E.25: Open House Participants – Aguadilla

Source: SDG

Figure E.26: Attendance Lists – Aguadilla

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO | Aguadilla

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Edwin García	787 618-4339	[illegible] yahoo.com	[illegible]	Camuy	[illegible]	3	4	Sí
2. Evan Rosado [illegible]	787-599-4633	policia municipal camuy @ yahoo	[illegible]	Camuy	comisionado	3	3	Sí
3. Bethlehem Pérez	787-484-0202	—	[illegible]	Isabela	oficial correccional	4	5	Sí
4. David Ramos	787-560-7480	[illegible]@gmail.com	[illegible]	Aguadilla	desempleado	2	5	Sí
5. Kristal Figueroa Mayo	787 539-0937	[illegible]	[illegible]	Villalba	estudiante	2	2	Sí
6. David Santiago	787 372 9909	[illegible]@gmail.com	[illegible]	Aguada	[illegible]	1	1	Sí
7. [illegible]	(787)-383-3889		[illegible]	San Sebastián	[illegible]	1	1	Sí
8. Ruben Pérez Torres	787-639-2923	[illegible]@gmail .com	[illegible]	San Sebastián	retirado	1	3	Sí
9. Milton Feliciano	787632[illegible]		[illegible]	Isabela	retirado	1	3	Sí
10. Carlos Vargas	787-[illegible]	—	[illegible]	Aguadilla	Gobierno.	3	3	Sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO | Aguadilla

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. [illegible] Díaz Muñiz Municipio de Moca	787-877-3011	planificacion gis@gmail.com	[illegible]	Moca	Auxiliar Administrativo	2	2	Sí
2. Esteban Rodríguez	787-487-7811		[illegible]	Isabela		1	1	Sí
3. [illegible]	787-[illegible]		[illegible]	Moca	oficial de [illegible]	2	2	Sí
4. [illegible]	787-318-[illegible]	[illegible]	[illegible]	Aguada	[illegible]	4	4	Sí
5. Nora L. Rodríguez	787-496-2042		[illegible]	Aguadilla	Enfermera	2	2	Sí
6. Lina D. Cintrón [illegible]	787-596-2040	linda67_c@hotmail.com	[illegible]	Moca	cocinera	1	3	Sí
7. Ramiro Cintrón [illegible]	787-560-0681	cintron_123@hotmail.com	[illegible]	Cabo Rojo	Enfermero	3	3	Sí
8. [illegible]	787-542-9544	N/A	[illegible]	Camuy	N/A	2	5	Sí
9. Alvin R. Rivera [illegible]	(787)374-6652	alvinrivera776@yahoo.com	[illegible]	Arecibo	Retirado Bacharelo S. Social	2	3	Sí
10. Nancy Jiménez Medina	(787)932-7849	N/A	[illegible]	Aguadilla	Zona de Carga	—	2	Sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO | Aguadilla

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Emily González	787-400-3706	[illegible]	[illegible]	Moca	Asistente Adm	5	4	Sí
2. Carmen Cabán	787-666-3592		Carmen Cabán	Isabela	ama de casa	1	3	sí
3. Luis Méndez	787-231-0974	luismendez7@live.com	[illegible]	Moca	ARMY	3	5	Sí
4. Sergio Abreu	216-7291	el_gato_88@[illegible]	[illegible]	Isabela	Barbero	1	2	Sí
5. Héctor Méndez	787-518-2513	[illegible]	[illegible]	Isabela	vendedor de carros	2	4	NO
6. Dora Luz	939-200-5135		[illegible]	Moca	Ama de casa	1	1	Sí
7. Yoralis Tirado	787-212-1219		Yoralis Tirado	Guayanilla	Ama de Casa	1	2	Sí
8. Jennifer M Cruz	787-690-[illegible]	[illegible]	[illegible]	San Sebastián	Estudiante	2	4	Sí
9. Jose Cruz	787-213-4287		[illegible]	San Sebastián	Discapacitado	4	4	Sí
10. Eugenio Salamanca Rodríguez	939 322-2473	venezoos.HV@gmail.com	[illegible]	Isabela	[illegible] municipio	2	4	sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO | Aguadilla

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Mildred Lorenzo	(787) 252-6[illegible]		Mildred Lorenzo	Rincón	desempleada	1	3	S
2. Natalia Figueroa	787-910-3[illegible]	[illegible]	[illegible]	Rincón	TASFI	1	2	S
3. Magdalena [illegible]	898 787-9157		[illegible]	[illegible]	Retirada	1	1	S
4. Jose Del Ramos	(787) 611-[illegible]	Tony_1894@yahoo.com	[illegible]	San Sebastián	Comerciante	3	4	Sí
5. Juan C Sánchez	787-556-1610	JuanSanchez@live.com	Juan Sánchez	San Sebastián	músico	2	2	Sí
6. Daniel Román	973-593-0500		Daniel Román	Moca	(Incapacitado) Retirado	1	1	4 meses
7. Madelyn Acevedo	593-9946		[illegible]	Isabela	tienda	1	4	Sí
8. Rafael López			[illegible]	Moca	hojalatero	1	3	Sí
9. Rosa M. Barreto	438-7749		Rosa M Barreto	Moca	ama de casa	2	3	Sí
10. Carlos Rosado	922 6534		Carlos Rosado	Aguadilla	Chofer	2	3	Sí

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1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO| Aguadilla

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1 Jacqueline Hernández	939-277-7967		[illegible]	San Sebastián	Ama de casa	Ninguno	3	Sí
2 Angel L. Rivera	787-613-3049		[illegible]	San Sebastián	Instructor	3	2	Sí
3 Rubén Villanueva	787 645-1185		[illegible]	Moca	Jubilado	3	2	Sí
4 [illegible]	787-6[illegible] 6619		[illegible]	Moca	Ferretería	3	3	Sí
5 Hector Sanabria	75740 0621		[illegible]	Carolina	Gerente	2	2	Sí
6 Ricardo Villanueva	787 218 0403		[illegible]	Aguada	Retirado	2	3	Sí
7 Leyda Gómez	787 550-1804		[illegible]	Aguadilla		2	5	Sí
8 Jacqueline López			[illegible]	Hatillo	ama de casa	1	4	Sí
9								
10								

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1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO| Aguadilla

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1 Marisol [illegible]	954-6070121		[illegible]	Isabela	Ama de casa	2	2	S
2 [illegible] Pérez			[illegible]	Aguadilla	Ama de casa	1	1	Sí
3 Angel Luis Cedeño	787-360-1211		[illegible]	Camuy	Retirado	2	2	Sí
4 [illegible] Hernández	939-394-1586	Sj Hernández 2-78[illegible]	[illegible]	Moca	Operador Equipo Pesado	2	3	Sí
5 Neishaly Pérez			[illegible]	Moca	Estudiante	2	3	Sí
6								
7								
8								
9								
10								

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1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO| Aguadilla

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.	[illegible]	787-638-[illegible]		[illegible]	Quebradillas	Retirado	1	3	Sí
2.	[illegible]	[illegible]		[illegible]	San Sebastián	ventas	5	4	sí
3.	Carlos Nonguel	(787) 209-9127		[illegible]	Aguada	ventas	1	2	Sí
4.	[illegible]	787-628-[illegible]		[illegible]	Aguada	empl. público	2	4	Sí
5.									
6.									
7.									
8.									
9.									
10.									

1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO| Aguadilla

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.	Rafael Santori	787 431 4337	rafysantori@gmail.com	[illegible]	Aguadilla	chofer	3	4	Sí
2.	[illegible] I. Cruz Estrada	(787) 405-5171	—	[illegible]	Quebradillas	Ama de casa	1	2	Sí
3.	Longino Perez	787 666-8139	—	Longino Perez	Aguada	Retirado	2	3	Sí
4.	Dalaisha S. Galarza	787-907-7943	[illegible]@gmail.com	[illegible]	Aguadilla	Estudiante	1	8	Sí
5.	Marcus Alvarez	(787) 546 4342	marcusalvarez[illegible]	[illegible]	Aguadilla	mesero	2	2	Sí
6.									
7.									
8.									
9.									
10.									

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
18 de diciembre de 2017 | 8:00am – 1:00pm | CESCO1 Aguadilla

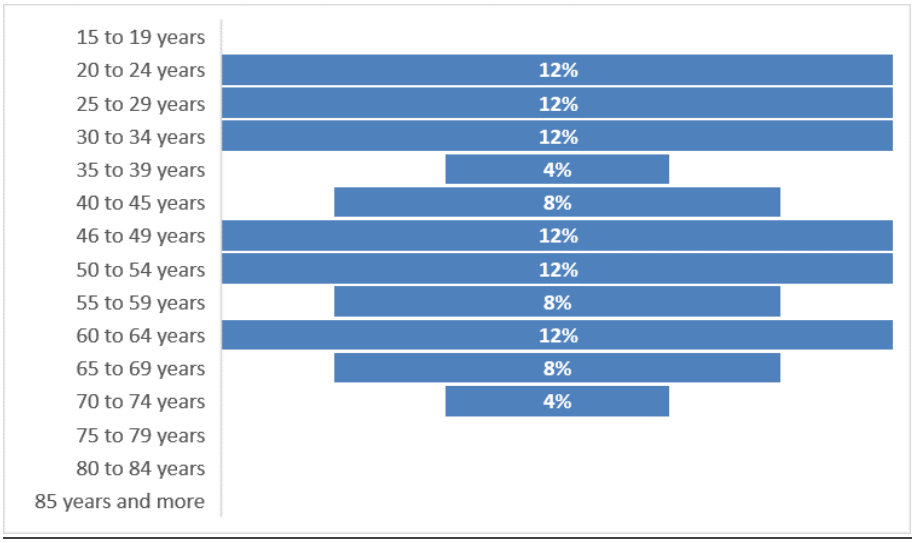
	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (Sí/No)
1.	Rafael Ramírez	(939)253-9016			Aguadilla		5	5	Sí
2.	Grisel Santiago	(787) 413-7398			Aguadilla		2	2	Sí
3.	Marilyn Giron	(787) 347-6256			Moca		1	3	Sí
4.		393-1979					2	3	Sí
5.							1	5	Sí
6.									
7.									
8.									
9.									
10.									

Source: SDG

Barranquitas

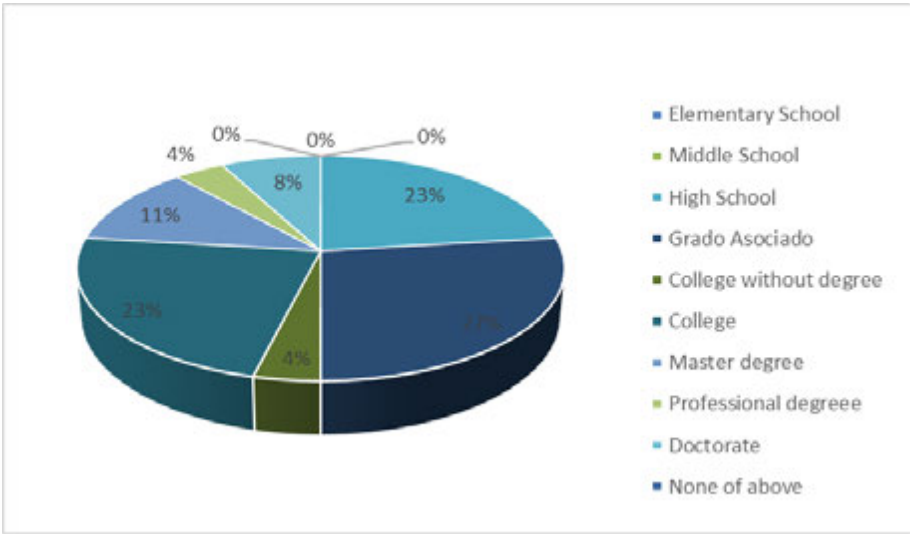
Figure E.27 to Figure E.34 show the results, photos and participants list of Barranquitas (part of San Juan TMA).

Figure E.27: Participants Age – Barranquitas (San Juan TMA)



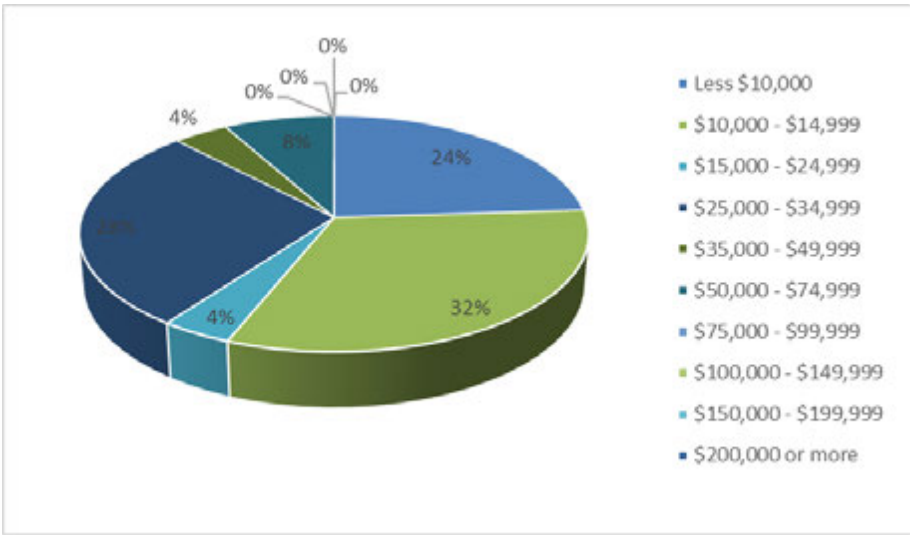
Source: SDG

Figure E.28: Participants Level of Education – Barranquitas (San Juan TMA)



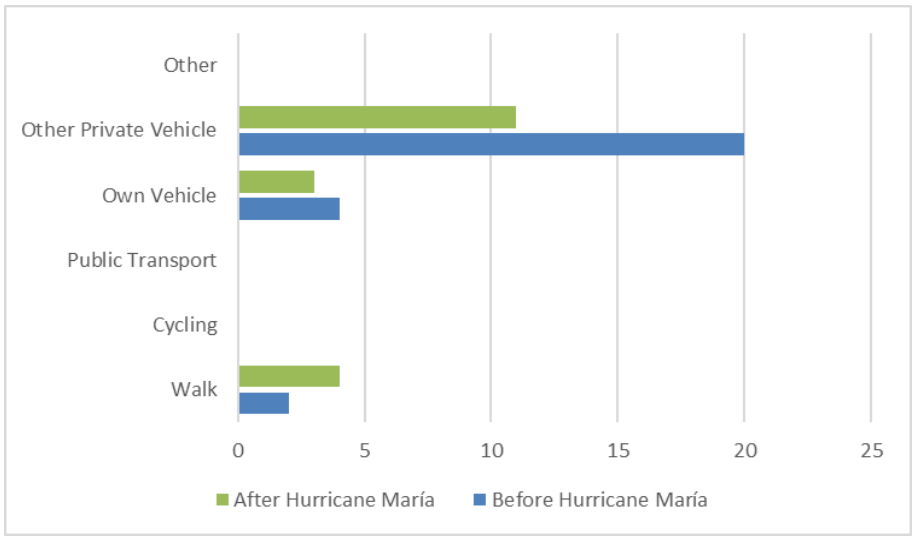
Source: SDG

Figure E.29: Participants Annual Income – Barranquitas (San Juan TMA)



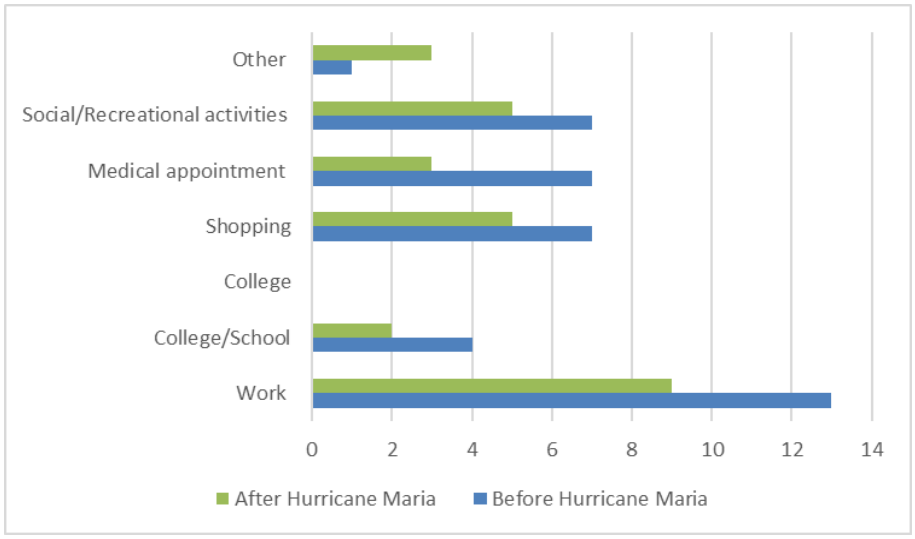
Source: SDG

Figure E.30: Participants Regular Trips Before and After Hurricane María – Barranquitas (San Juan TMA)



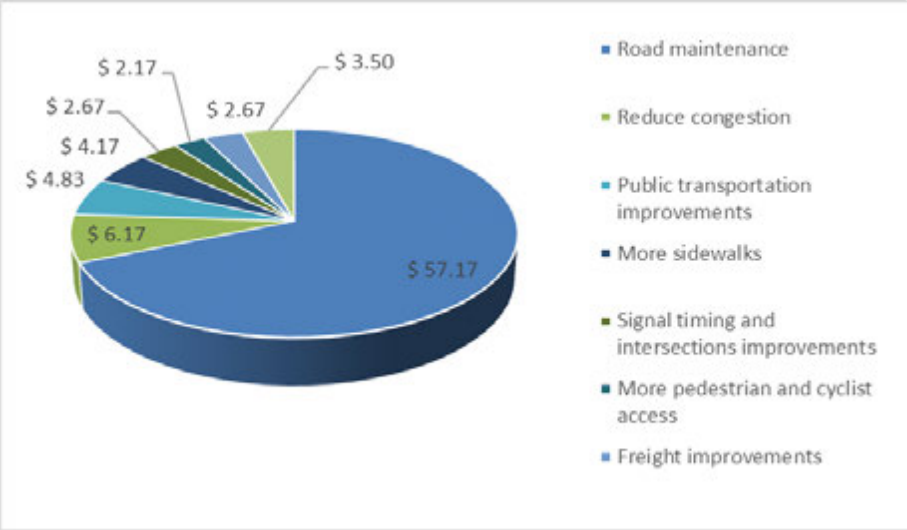
Source: SDG

Figure E.31: Participants Main Reason Trips Before and After Hurricane María – Barranquitas (San Juan TMA)



Source: SDG

Figure E.32: Transportation Investment – Barranquitas (San Juan TMA)



Source: SDG

Figure E.33: Open House Participants – Barranquitas

Source: SDG

Figure E.34: Attendance Lists – Barranquitas

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
19 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Barranquitas

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Alexis [illegible]	939-246-9851	[illegible]@yahoo.com	[illegible]	Aibonito	Desempleado	1	2	Sí
2. Sheila [illegible]	787-202-9778	sheila93[illegible]@gmail.com	[illegible]	Corozal	Desempleada			Sí
3. Jose E. Rodriguez	939 244 2562	—	[illegible]	Aibonito	Pensionado	1	2	Sí
4. Luis E. Santiago	787-451-3508	Luisantiago1997@[illegible]	[illegible]	Aibonito	Gobierno Estudiante	1	3	Sí
5. Maritza Lopez	939-218-1338		[illegible]	Barranquitas	Desempleada	2	3	Sí
6. Jaime Colón	787-387-4712		[illegible]	Morovis	Desempleado	1	3	Sí
7. Leslie Ann Torres	787-598-1497	Ltorres[illegible]@gmail.com	[illegible]	Barranquitas	Estudiante	5	3	Sí
8. Gladys R. Moreno	787-615-1531		[illegible]	Barranquitas	Retirada	2	3	Sí
9. Luis F. Vez			[illegible]	Coamo	Retirado	1	2	Sí
10. Alfonso Hernandez	787 452-8704		[illegible]	Caguas	Estudiante	2	2	Sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
19 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Barranquitas

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Municipio de Naranjito Pedro Santiago	787-869-2200 787-648-8000 787-227-0129	psantiago@municipiodenaranjito.com	[illegible]	Naranjito	Director de Programas Federales	4	4	Sí
2. Jovino Laboy Torres	787-380-9128		[illegible]	Villalba	Oficial Correccional	03	4	Sí
3. Agueda R. Torres	787-215-1820	[illegible]@gmail.com	[illegible]	Barranquitas	maestra	01	2	Sí
4. Natasha Rivera	787-309-5804	[illegible]@gmail.com	[illegible]	San Juan	Planificadora	1	1	Sí
5. Gabriel G. Quiñones	787-316-1853	gq[illegible]@gmail.com	[illegible]	San Juan	Planificador	1	1	Sí
6. Herminia Colón Rivera	787-530-1453		[illegible]	Aibonito	Ama de casa	1	3	Sí
7. Wanda Maldonado	(787)857-3125		[illegible]	Barranquitas	Ama de casa	2	4	Sí
8.								
9.								
10.								

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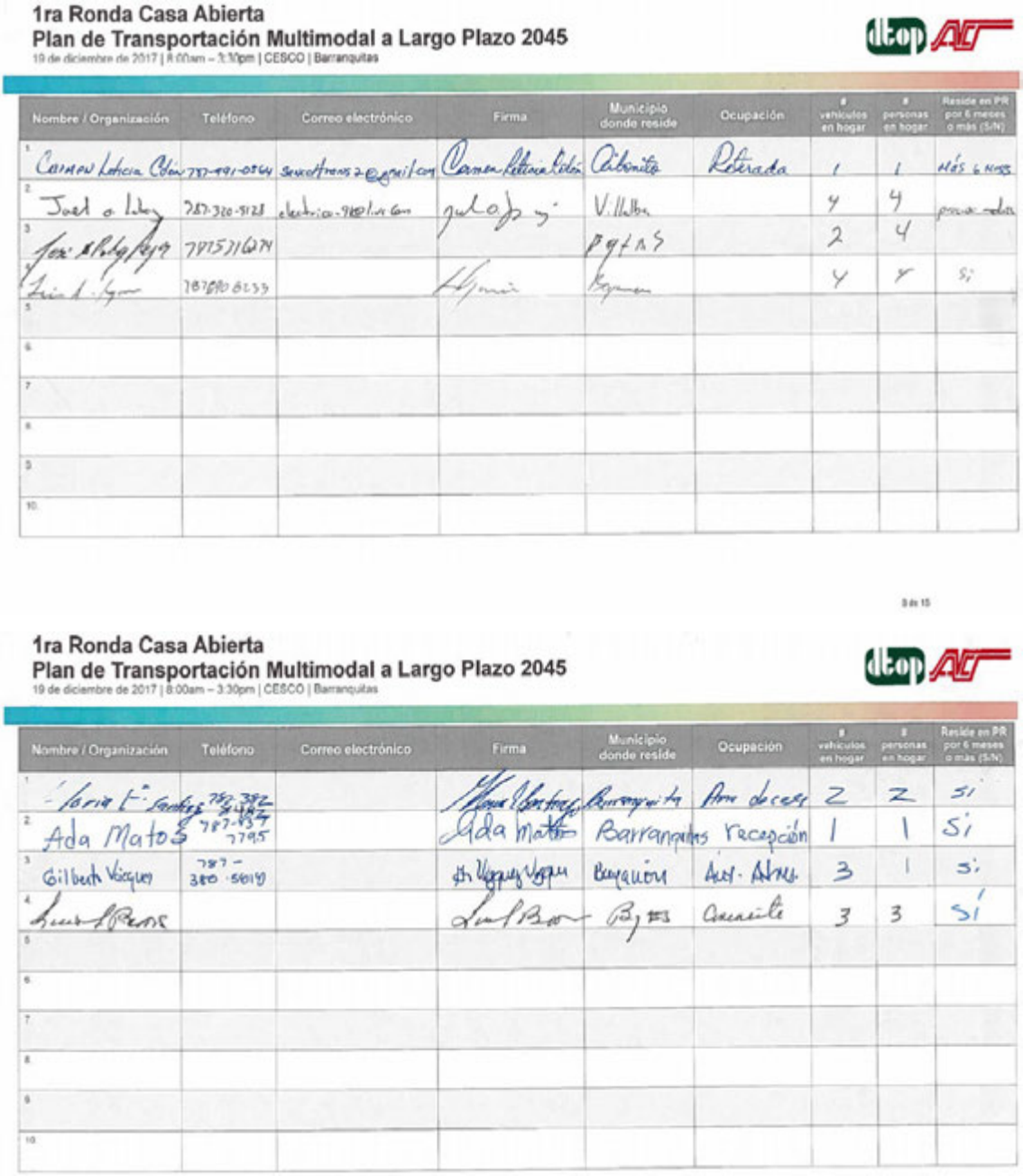

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
19 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Barranquitas

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
19 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Barranquitas

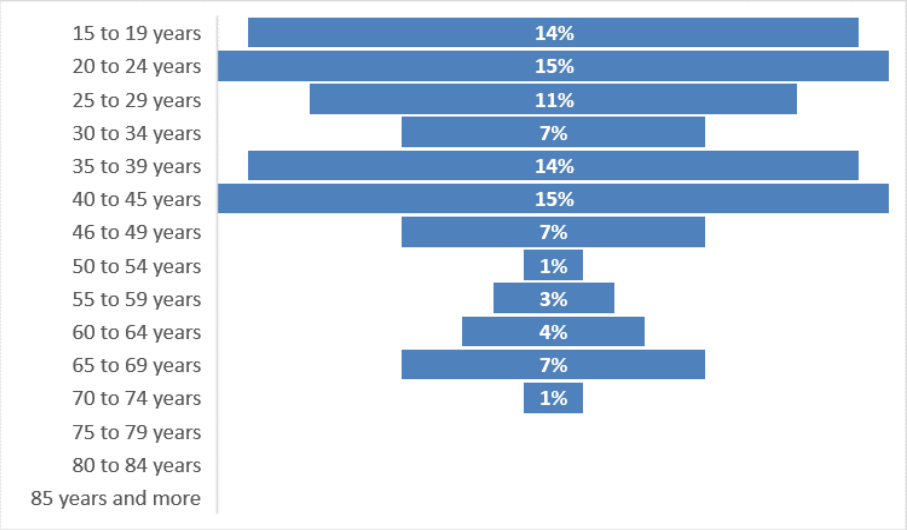
	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1									
2	Ada Matos	787-934-7795		Ada Matos	Barranquitas	Recepción	1	1	Si
3									
4									
5									
6									
7									
8									
9									
10									

Source: SDG

Fajardo

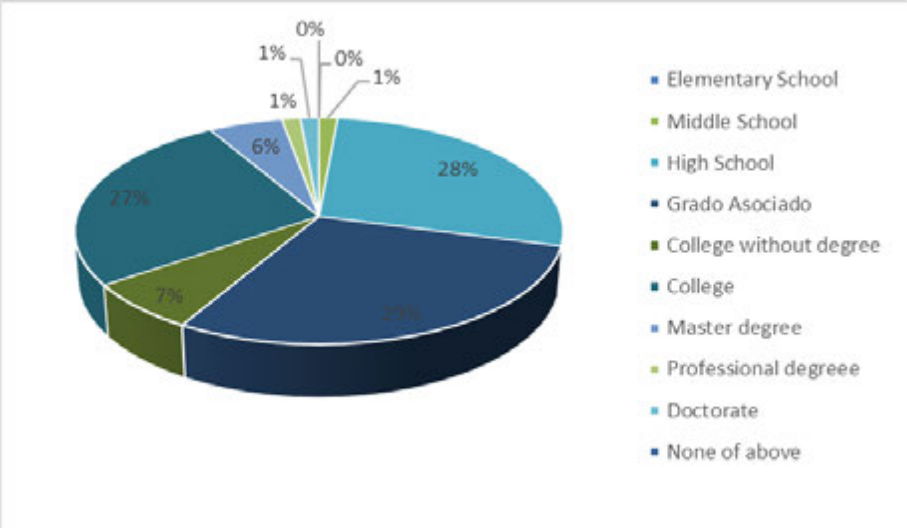
Figure E.35 to Figure E.42 and Table E.12, show the results, photos and participants list of Fajardo (East Region).

Figure E.35: Participants Age – Fajardo (East Region)



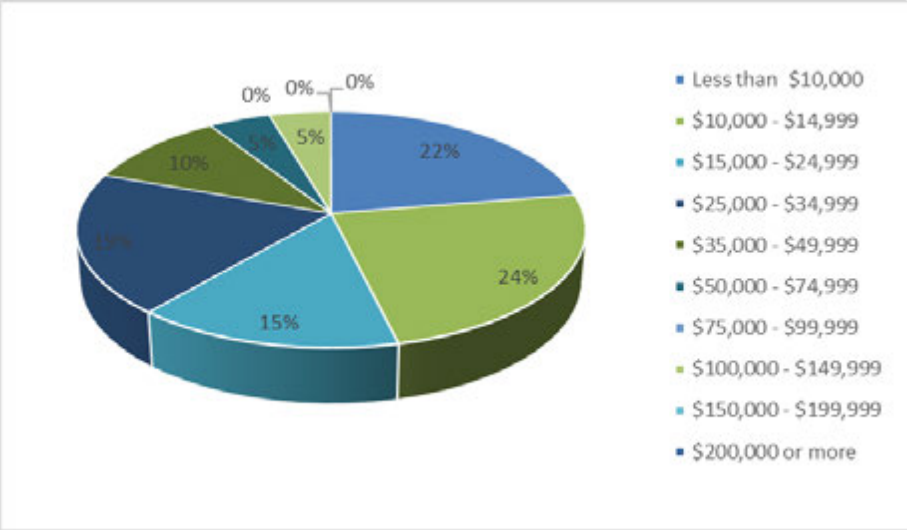
Source: SDG

Figure E.36: Participants Level of Education – Fajardo (East Region)



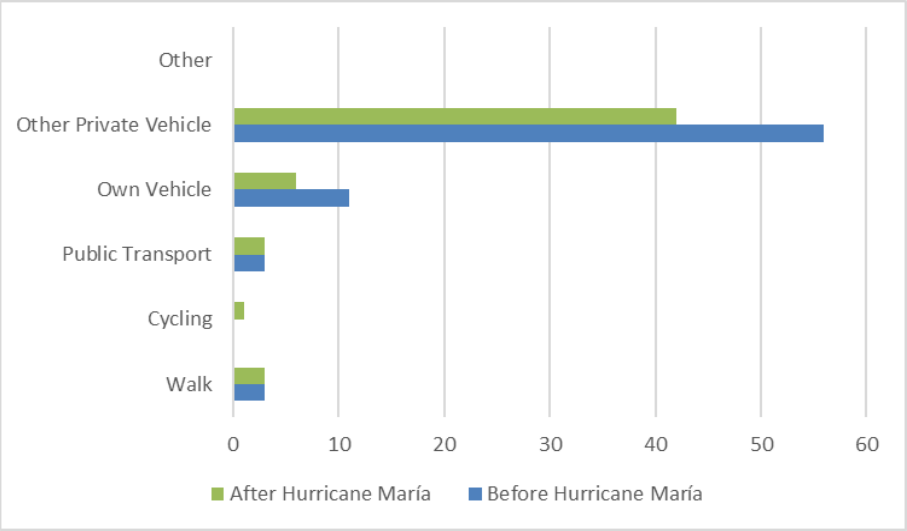
Source: SDG

Figure E.37: Participants Annual Income – Fajardo (East Region)



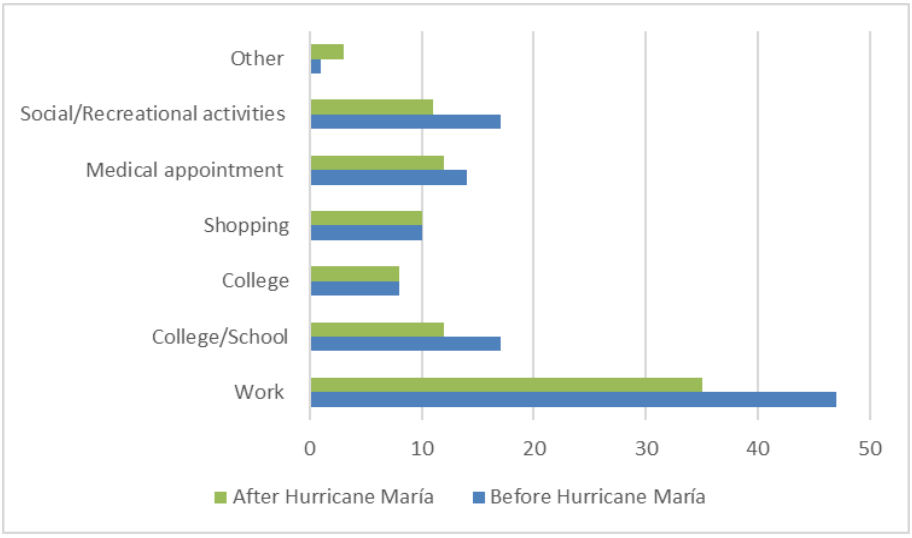
Source: SDG

Figure E.38: Participants Regular Trips Before and After Hurricane María – Fajardo (East Region)



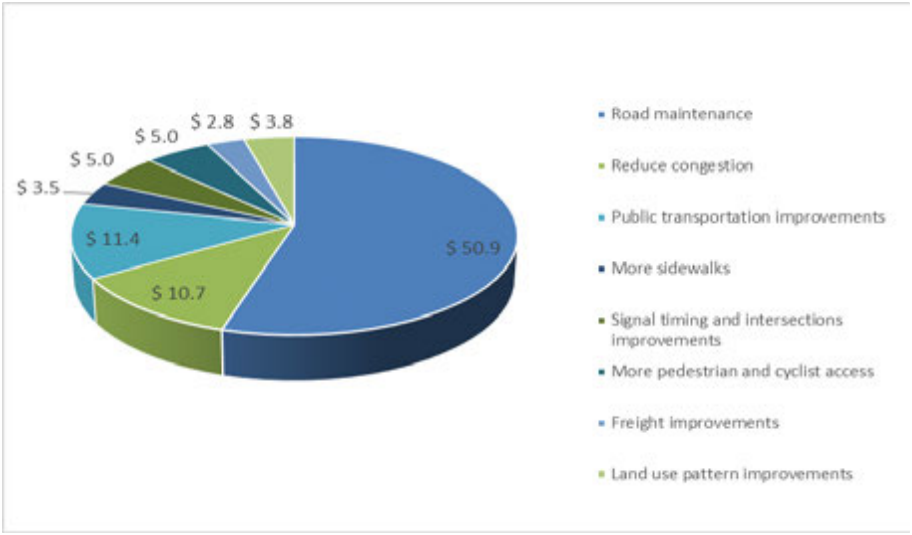
Source: SDG

Figure E.39: Participants Main Reason Trips Before and After Hurricane María – Fajardo (East Region)



Source: SDG

Figure E.40: Transportation Investment – Fajardo (East Region)



Source: SDG

Table E.12: Transportation Issues – Fajardo (East Region)

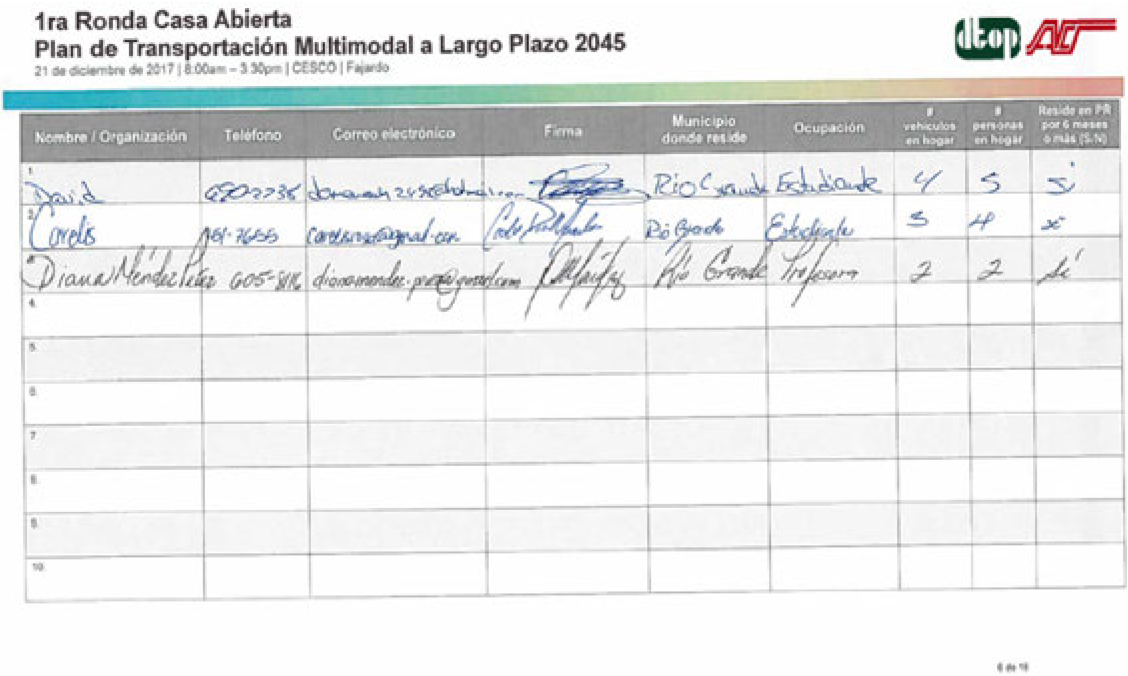
Priority level	East
Urgent	Roads in bad condition
High	Congestion
Medium	Lack of sidewalks
Low	Insufficient routes/poor coverage
Very Low	Lack of lighting

Source: SDG

Figure E.41: Open House Participants – Fajardo

Source: SDG

Figure E.42: Attendance Lists – Fajardo



1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
21 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Fajardo

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1	David	[illegible]	[illegible]	[illegible]	Rio Grande	Estudiante	4	5	Sí
2	Carlos	[illegible]	[illegible]	[illegible]	Río Grande	Estudiante	5	4	Sí
3	Diana Méndez Pérez	[illegible]	[illegible]	[illegible]	Río Grande	Profesora	2	2	Sí
4									
5									
6									
7									
8									
9									
10									

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
21 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Fajardo

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Angel Fargas			[illegible]	[illegible]		2	4	sí
2. Mayra Cruz			Mayra Cruz	Luquillo		1	3	sí
3. Mariela Quiñones			[illegible]	Humacao		1	4	sí
4. [illegible]			[illegible]	Naguabo		2	3	sí
5. Gary Padilla Chóf [illegible]	321-356-[illegible]	garypadilla[illegible]@[illegible]	[illegible]	Luquillo		1	5	sí
6. Wilfredo Casanova	787	238-6511	[illegible]	Luquillo		2	6	sí
7. [illegible]	787	647-1009	[illegible]	Humacao		1	1	sí
8. Leslie Rivera Municipio Canóvanas	787-957-1076	lrivera.opd@gmail.com	[illegible]		Analista de Mapas			
9. Ashley Díaz Municipio Canóvanas	787-[illegible] 2744	[illegible]@gmail.com	Ashley Díaz	Canóvanas	Inspectora	2	2	sí
10. Sonia Solivan			Sonia Solivan	Río Grande	Ama de Casa	1	3	sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
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Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. José R. Vega	—	—	[illegible]	Dorado	Chofer	5	4	sí
2. José Pellicer [illegible]	787-909-2354	—	[illegible]	Ceiba	Jubilado	4	4	sí
3. Naeisha Torres	787 307-7435	—	[illegible]	Naguabo	conductor	2	2	Si
4. Jenifer E. B	787-527-8684	—	[illegible]	Bo Grande	Estudiante	1	5	Si
5. Cristina Marks	787-340-[illegible]		[illegible]	Luquillo	Teleoperadora	1	4	Si
6. OSCAR R Hernández	939-529-0180		OSCAR	Canóvanas	Estudiante	1	3	Si
7. James M. [illegible]	434-208-5135	—	[illegible]	VQS	Paramédico	2	3	Si
8. Ruben Cristal	787-248-[illegible]	—	[illegible]	Carolina	vendedor	3	5	sí
9. Erick Padilla	787-941-0919	erickpadilla[illegible]@gmail.com	[illegible]	Luquillo	vendedor	1	1	Si
10. [illegible]	939-337-5403	[illegible]@gmail.com	[illegible]	Canóvanas	Ama de Casa	2	5	Si

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
21 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Fajardo

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Abiel Rosado		arservices229@gmail	[illegible]	Juncos		4	5	
2. Fabian Rosado		arservices229@gmail	Fabian Rosado	Juncos		4	5	
3. Juan C. Rivera		[illegible]	[illegible]	Humacao	Ventas	2	3	Sí
4. Daisy Vázquez		[illegible]	[illegible]	Canóvanas		2	4	Sí
5. Graysely Bossa		[illegible]@hotmail.com	[illegible]	Naguabo		3	3	Sí
6. Johanna Graciani			[illegible]	Culebra		2	2	Sí
7. Ivayana Arismendi			[illegible]	Culebra		2	3	Sí
8. [illegible]			[illegible]	Carolina		2	5	Sí
9. [illegible]			[illegible]	Carolina		2	5	Sí
10. Elizabeth Figueroa		elyfigueroapr@yahoo.com	[illegible]	Fajardo		4	3	Sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
21 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Fajardo

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Maribel Rosario Municipio de Ceiba	(787) 685-6847	[illegible]@gmail.com	Maribel Rosario	Fajardo	Directora Programas Federales	3	3	Sí
2. Giovanni Deliz	787-433-6014	giovanni.deliz@upr.edu	[illegible]	Luquillo	Estudiante Doctoral	3	3	Sí
3. Beatriz Velázquez Municipio Las Piedras	(787) 733-[illegible]		Beatriz Velázquez	Las Piedras	Técnica [illegible]	1	2	Sí
4. Berlys [illegible]	787 435-2877	Derys.[illegible]1043@gmail	[illegible]	Canóvanas	Policía de Puerto Rico	5	3	Sí
5. Beiny Pinet	787-327-5302		Beiny Pinet	Loíza		2	3	Sí
6. Miguel Mercado	(787) 530-6764	[illegible]@gmail.com	[illegible]	Río Grande	Asambleísta	2	4	Sí
7. Carlos M. Alvarado	787-307-6557	[illegible]@gmail.com	[illegible]	Canóvanas	Estudiante [illegible]	2	5	Sí
8. [illegible]	787-241-7539	[illegible]@hotmail.com	[illegible]	Río Grande	[illegible]	3	3	Sí
9. Samuel Natal Hernández	787-478-1113		Samuel Natal Hernández	Río Grande	Prencista	2	4	Sí
10. Valeria López	787-605-[illegible]	Valeria_[illegible]@hotmail	[illegible]	Fajardo	Recepcionista	1	1	Sí

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1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

21 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Fajardo

dtop ATI

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1 Juliana Ramírez	787 224 1685		[illegible]	Carolina	Secretaria	3	5	sí
2 [illegible]	787-635-5797	[illegible]	[illegible]	Luquillo	Retirado	1	1	sí
3 Karen Rodríguez	787-550-8808		[illegible]	Fajardo	cocinera	1	3	sí
4 Yolanda Escalera	787-9604 9548		J Escalera	Fajardo	cocina	1	3	sí
5 [illegible]	787-885-1000		[illegible]	Ceiba	ama de casa	3	6	sí
6 Zonlys Rosario	787-926-4824	[illegible]	Zonlys Rosario	Ceiba		3	6	sí
7 Nerjanberlyma F.	550 0186	Kimberly [illegible]	[illegible]	Canóvanas	Farmaceutica	2	4	sí
8 Mirelsa Ramos	787-435-1555	mirelsa1@yahoo.com	Mirelsa Ramos	Luquillo	Front Desk Agent	1	3	sí
9 Tai M [illegible]	787-509-3218	[illegible]@hotmail.com	[illegible]	San Juan	Gerente	1	1	sí
10 Carla M. Febo	787-709-8269	[illegible]@gmail.com	Carla M. Febo	Fajardo		1	2	sí

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1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

21 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Fajardo

dtop ATI

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1 José R. Vázquez	(787) 402-7462		José R. Vázquez	Bayamón	Retirado	1	1	sí
2 Nellie González	787 435-7938	nelliegonzalez[illegible]	N González	Luquillo	Maestra	3	3	sí
3 [illegible]	787 909-0411	[illegible]@gmail	[illegible]	Río Grande	Artesana	2	6	sí
4 Angel Santiago	787-[illegible]		[illegible]	Fajardo	[illegible]	1	4	sí
5 Carolyn Luiz	787 902-0063		[illegible]	Carolina	Supervisora en Costco	2	3	sí
6 Odie Acosta	787-667-5765		[illegible]	Culebra	Gerente en Costa de Sol	2	2	sí
7 Sandra Lebrón	787-527-4994	[illegible]@gmail.com	[illegible]	Canóvanas	ama de casa	1	2	sí
8 Rita Meléndez	939-201-9832	—	[illegible]	Río Grande	ama de casa	1	2	sí
9 Lorenzo Ávila	787-805-6773		[illegible]	Río Grande	negocio propio	2	3	sí
10 Angel Ojeda	787-204-3155	[illegible]@Gmail.com	[illegible]	Río Grande	Empleado Rico	1	3	sí

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1ra Ronda Casa Abierta
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21 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Fajardo

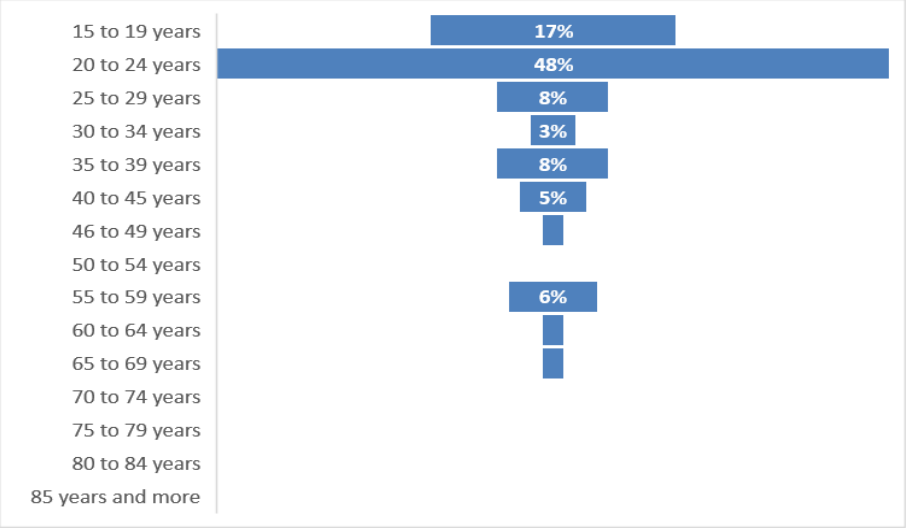
	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1	Josue Y Correa	787 721 8787 x 1090	Jcorrea@dtop.gov.pr		Toa Alta	Planificador	2	4	Sí
2	Ruth Gago		jrdc.gago@gmail.com		Trujillo Alto	contratista	4	5	Sí
3	Camila Hernández		jrdc.camila@gmail.com		Trujillo Alto	estudiante	4	5	Sí
4	Paola Villegas				Loíza	Estudiante	2	5	Sí
5	Alondra Soldevila		alondrasofia@gmail		Río Grande	estudiante	4	21	Sí
6	Adriana Marrero		adrianasofia179@gmail		Carolina	estudiante	4	5	Sí
7	Elisa Lopez				Río Grande	Retirada	1	2	Sí
8	Hilda Serrano	787 485-1936	hserrano@aol.com		Río Grande	Directora Recursos Hu	8	11	Sí
9	Rafael Mayol	787-479 3163			San Juan	ventas	4	3	Sí
10	Maribel Rodriguez				fajardo	Desempleada	3	5	Sí

Source: SDG

Guayama

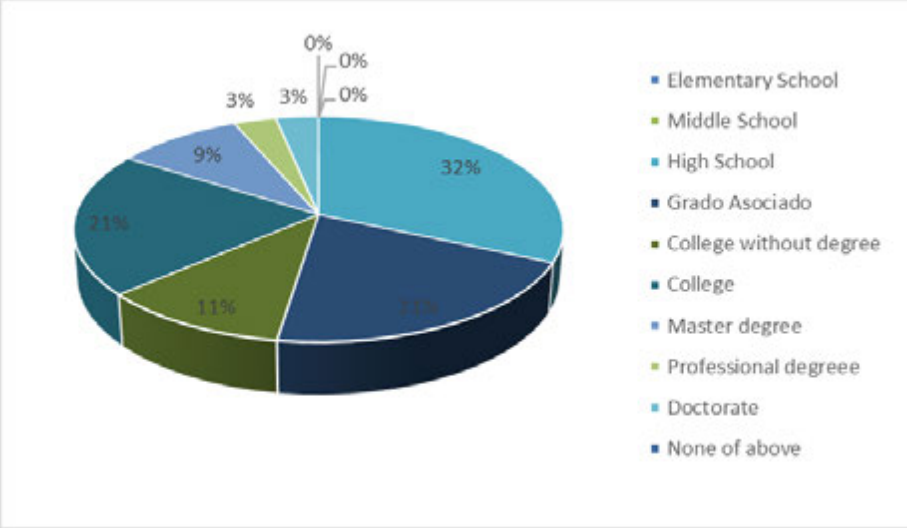
Figure E.43 to Figure E.50 and Table E.13 show the results, photos and participants list of Guayama (Southeast Region).

Figure E.43: Participants Age – Guayama (Southeast Region)



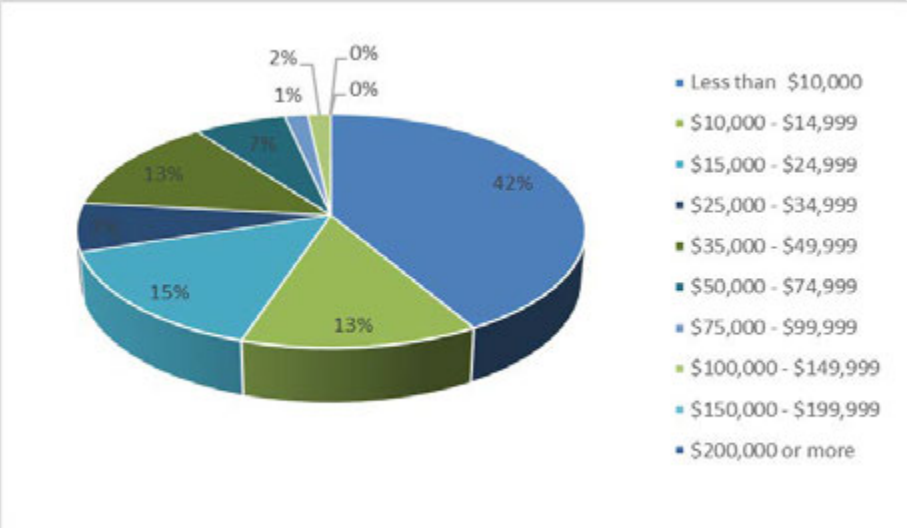
Source: SDG

Figure E.44: Participants Level of Education – Guayama (Southeast Region)



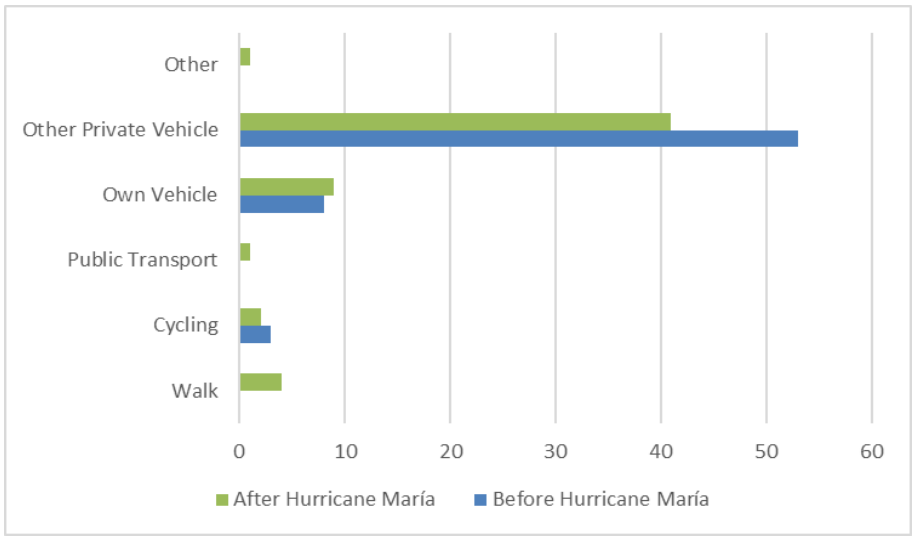
Source: SDG

Figure E.45: Participants Annual Income – Guayama (Southeast Region)



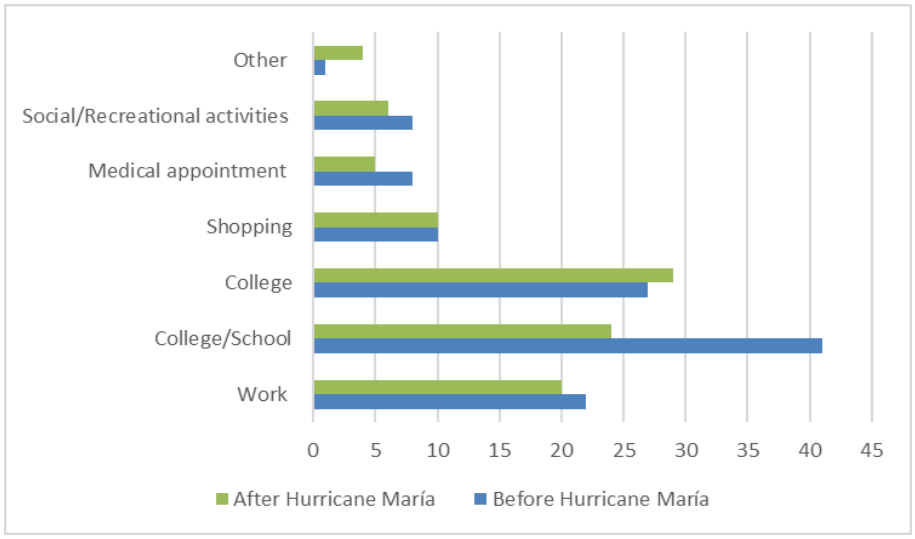
Source: SDG

Figure E.46: Participants Regular Trips Before and After Hurricane María – Guayama (Southeast Region)



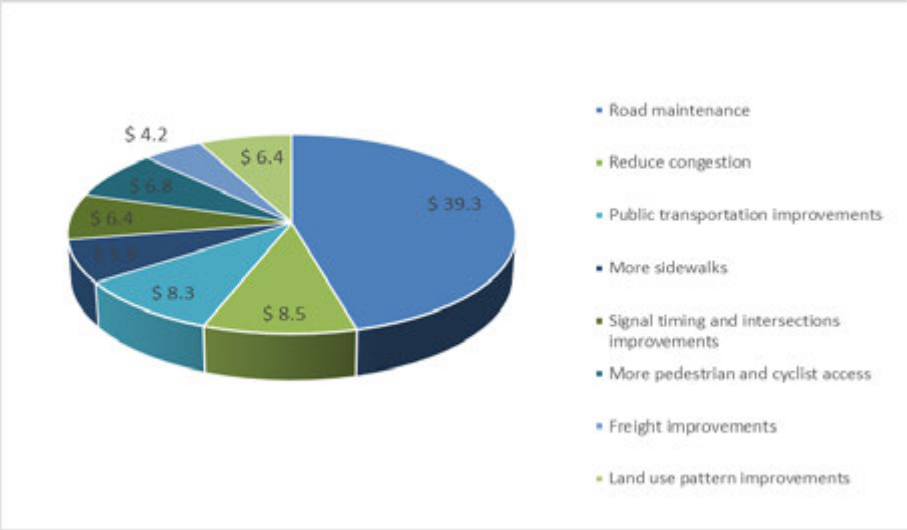
Source: SDG

Figure E.47: Participants Main Reason Trips Before and After Hurricane María – Guayama (Southeast Region)



Source: SDG

Figure E.48: Transportation Investment – Guayama (Southeast Region)



Source: SDG

Table E.13: Transportation Issues – Guayama (Southeast Region)

Priority level	Southeast
Urgent	Roads in bad condition
High	Lack of cyclist infrastructure
Medium	Lack of sidewalks
Low	Insecure intersections
Very Low	Insufficient routes/poor coverage

Source: SDG

Figure E.49: Open House Participants – Guayama

Source: SDG

Figure E.50: Attendance Lists – Guayama

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13 de diciembre de 2017 | 8:00am – 3:30pm | Universidad Interamericana | Guayama

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Edwin [illegible]	787-391-[illegible]	[illegible]@yahoo.com	[signature]	Guayama	Comerciante	2	5	Sí
2. Roselyn Rodríguez	787-204-[illegible]	roselyn.[illegible]@gmail.com	[signature]	Guayama	estudiante	4	6	Sí
3. Ivania Naveda	787 930 9577	ivania.naveda@gmail.com	[signature]	Guayama	estudiante	3	4	Sí
4. Brenda E. Álvarez	939-[illegible]	brenda.[illegible]	[signature]	Cayey	estudiante	2	2	Sí
5. [illegible] Vázquez	(787) 601-7[illegible]	[illegible]@gmail.com	[signature]	Guayama	Estudiante	1	2	Sí
6. Rosa [illegible]	787-391-7264	guayama.inter.edu [illegible]	[signature]	Salinas	Profesora	4	3	Sí
7. Geralise Vázquez	(787) 204-5764		[signature]	Guayama	estudiante	2	4	Sí
8.								
9.								
10.								

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
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Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Roberto [illegible]	[illegible]834[illegible]	roberto.[illegible]@yahoo.com	[signature]	Ponce	Creador Contenidos	2	2	Yes
2. Evelyn Rivera	[illegible]	[illegible]@gmail.com	[signature]	Coamo / Guayama	estudiante	2	3	Yes
3. Benito Cintrón	787-[illegible]	bcintron@[illegible]	[signature]	Patillas	fotógrafo	1	1	Sí
4. Rey Robles UI			[signature]	Guayama	Catedrático	5	4	Sí
5. Janice Pagán	(787) 667-3227	ypaganpag@yahoo.com	[signature]	San Juan	Profesora	2	2	Sí
6. [illegible]	787-[illegible]	ysiadyrrazir@gmail.com	[signature]	Guayama	Profesora	3	4	Sí
7.								
8.								
9.								
10.								

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
13 de diciembre de 2017 | 8:00am – 3:30pm | Universidad Interamericana | Guayama

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. [illegible]	787-[illegible]-6177	[illegible]@gmail.[illegible]	[illegible]	Guayama	Estudiante	3	4	Sí
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
13 de diciembre de 2017 | 8:00am – 3:30pm | Universidad Interamericana | Guayama

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Jose Abraham Gonzalez	787 [illegible]	[illegible]	[illegible]	Yabucoa	Estudiante	√		
2. Natalee M. [illegible]	787-374-1836	[illegible]	[illegible]	Guayama	Estudiante	2√	4	Sí
3. Catherine Rodríguez	[illegible]	catherine.rodriguez[illegible]	[illegible]	Guayama	Estudiante	2	4	Sí
4. Janie Santiago	215-6890	[illegible]@[illegible].edu	[illegible]	Guayama	Estudiante	2	3	Sí
5. Julio López	709-5199	juliolopez@yahoo.com	[illegible]	Patillas	Estudiante	3	3	Sí
6. John C. Ocasio	787-439-2026	[illegible]@gmail.com	[illegible]	Arroyo	Estudiante	5	7	Sí
7. Nitza A Fernández	[illegible]-4341	[illegible]@gmail.com	[illegible]	Maunabo	Estudiante	2	5	Sí
8. Omar Rodríguez	787-[illegible]	[illegible]@hotmail.com	[illegible]	Patillas	Estudiante	2	3	Sí
9. Ashley Colón	787-[illegible]	[illegible]	Ashley Colón	Guayama	Estudiante	1	4	Sí
10. Jean [illegible]	[illegible]	[illegible]	[illegible]	Guayama	Estudiante	3	5	Sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
13 de diciembre de 2017 | 8:00am – 3:30pm | Universidad Interamericana | Guayama

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1	Paola González	787-712-3[illegible]5		P González	Patillas	Student	4	2	Si
2	Khaymar A. Díaz	787-204-8[illegible]		Khaymar Díaz	Salinas	Student	3	4	Si
3	Hendrick Torres	787-517-[illegible]		[illegible]	Guayama	Student	3	3	Si
4	Benny Cintrón	787-788-3570		Benny Cintrón	Guayama	Student	1	4	Si
5	Alonna S. Ruiz	787-521-[illegible]		[illegible]	Guayama	Student	5	6	Si
6	Josmario De Jesús	787-981-2909		[illegible]	Salinas	Student	2	9	Si
7	Dianashca M. Aponte	787-450-3605		[illegible]	Arroyo	Student	2	2	Si
8	Jonathan S. Vargas	939-[illegible]-4311		Jonathan Vargas	Salinas	Student	9	9	Si
9	Jerlin Rivera	787-932-5765		[illegible]	Salinas	Student	3	4	Si
10	Diana Rivera	939-276-1175	[illegible]@hotmail.com	[illegible]	Guayama	Estudiante	6	6	Si

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
13 de diciembre de 2017 | 8:00am – 3:30pm | Universidad Interamericana | Guayama

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1	Freddie Pillot	787-233-4774	[illegible]	[illegible]	Arroyo	[illegible]	1	2	
2	Eddie Cintrón	787-596-2003	edcintron@gmail	Eddie	Guayama	Técnico	2	1	
3	Carlos F. [illegible]	787-543-5196	[illegible]@gmail	[illegible]	Guayama	Estudiante	1	4	
4	Yesiel O. Gavillán	787 455-3120	[illegible]	[illegible]	Cayey	Estudiante	3	3	Sí
5	Ricardo Rivera	(787) 510-4179	[illegible]@gmail.com	[illegible]	Arroyo	Profesor	2	6	Sí
6	Brenda Ríos	787 5573152	brendarios[illegible]@gmail.com	Brenda Ríos	Patillas	Estudiante	2	4	Sí
7	Zuleyka Báez Nieves	939 218-8926	[illegible]@upr.edu	[illegible]	Naguabo	Estudiante	4	4	Sí
8	Vanessa C. Guzmán	787-644-8047	[illegible]@gmail.com	[illegible]	Salinas	Estudiante	2	4	Sí
9	Emmanuel [illegible] Tirado	787-963-3536	emmanuel[illegible]@gmail.com	[illegible]	Arroyo	Estudiante	2	4	Sí
10	[illegible] Colón Sánchez	787 996 [illegible]	[illegible]@gmail.com	[illegible]	Salinas	Estudiante	2	4	Sí

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Plan de Transportación Multimodal a Largo Plazo 2045

13 de diciembre de 2017 | 8:00am – 3:30pm | Universidad Interamericana | Guayama

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Luis S. Márquez	787-209-9960	sammyteo@gmail.com	[illegible]	Arroyo	Estudiante	5	4	Sí
2. Ángel L. Cruz	787-481-0051	angelcul9@gmail.com	[illegible]	Salinas	Estudiante	5	4	Sí
3. Alana N. [illegible]	939-217-2121	[illegible]@hotmail.com	[illegible]	Guayama	Estudiante	2	2	Sí
4. Pablo Castro	787-318-4875	[illegible]@gmail.com	[illegible]	Guayama	Estudiante	4	2	Sí
5. Julio A. DeJesús	787-614-[illegible]		[illegible]	Maunabo	Estudiante	4	3	Sí
6. Raiza A. Morales	609-992-2779	raizamorales[illegible]@gmail.com	[illegible]	Guayama	Estudiante	1	3	Sí
7. [illegible] Rivera	939-732-1446	[illegible]@gmail.com	[illegible]	Salinas	Estudiantes	2	5	Sí
8. Carlimar Banks	787-232-6014	carlimar.[illegible]@gmail.com	[illegible]	Guayama	Estudiante	3	5	Sí
9. José A. Cruz	787-518-6571	[illegible]@hotmail.com	[illegible]	Arroyo	Estudiante	5	4	Sí
10. [illegible] Roldán	787-916-3178	[illegible]@yahoo.com	[illegible]	Guayama	Estudiante	2	4	Sí

1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

13 de diciembre de 2017 | 8:00am – 3:30pm | Universidad Interamericana | Guayama

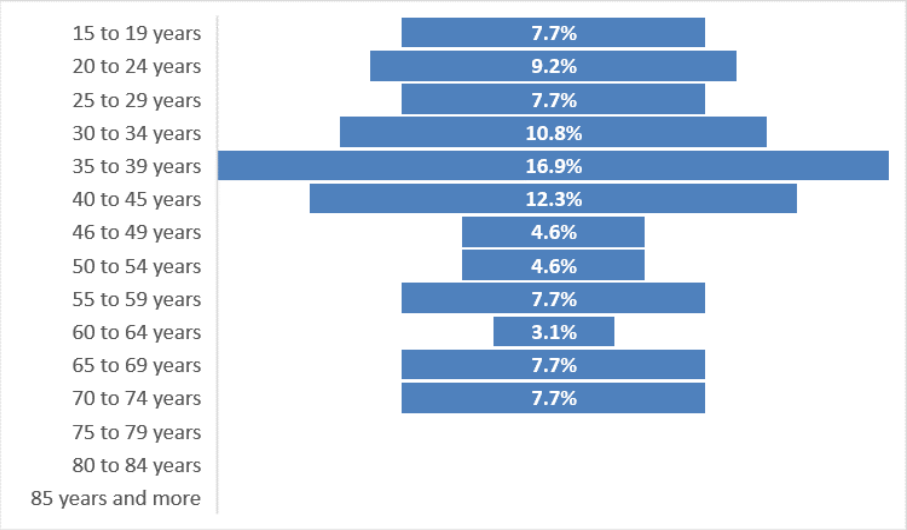
Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. [illegible] UIPR-Guayama	787-[illegible]	[illegible]@guayama.inter.edu	[illegible]	Patillas	Oficial Administrativo II	2	3	Sí
2. [illegible]	939-260-[illegible]	[illegible]@gmail.com	[illegible]	Patillas	[illegible]	1	6	Sí
3. Karlenne González Nerís	787-220-2801	karlenne[illegible]@yahoo.com	[illegible]	Patillas		2	4	Sí
4. Dianex Rodríguez [illegible]	787-929-[illegible]	dianex925@[illegible]	[illegible]	Guayama		1	3	Sí
5. Marielis Figueroa Pérez	787-[illegible]-7637	[illegible]@hotmail.com	[illegible]	Guayama	Estudiante	3	3	Sí
6. [illegible] Pérez [illegible]	787-931-[illegible]	[illegible]@gmail.com	[illegible]	Salinas	Estudiante	5	4	Sí
7. Cindy [illegible] López	787-218-2201	Cindy.[illegible]@gmail.com	[illegible]	Patillas	estudiante	3	4	Sí
8. Prof. Carlos Cobeo	787-[illegible]-1251	carlos.cobeo@guayama.inter.edu	[illegible]	Guayama	Profesor	2	3	Sí
9. [illegible] M. [illegible]	787-567-[illegible]	[illegible]@gmail	[illegible]	Arroyo	[illegible]	3	4	Sí
10. Diana I. Reverón Lebrón	787-[illegible]-6694	diana.reveron@guayama.inter.edu	[illegible]	Patillas	profesora	2	2	Sí

Source: SDG

Humacao

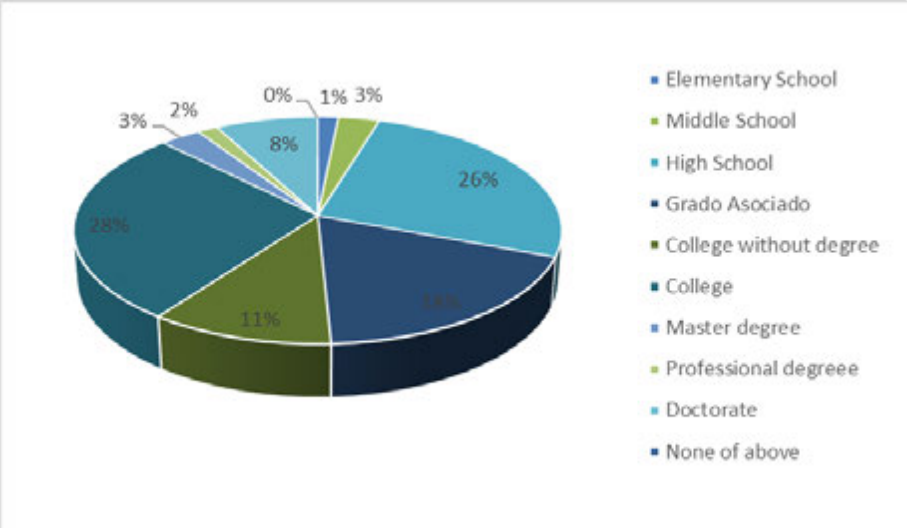
Figure E.51 to Figure E.58 show the results, photos and participants list of Humacao (San Juan TMA).

Figure E.51: Participants Age – Humacao (San Juan TMA)



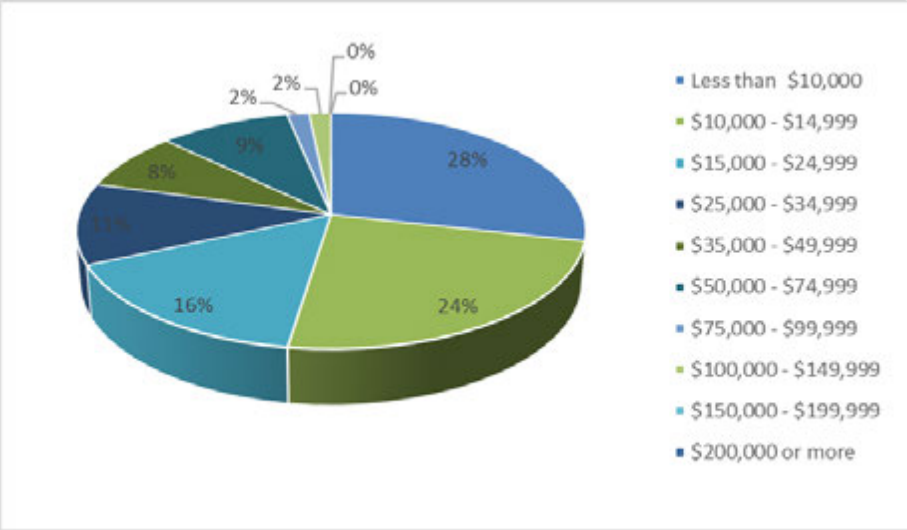
Source: SDG

Figure E.52: Participants Level of Education – Humacao (San Juan TMA)



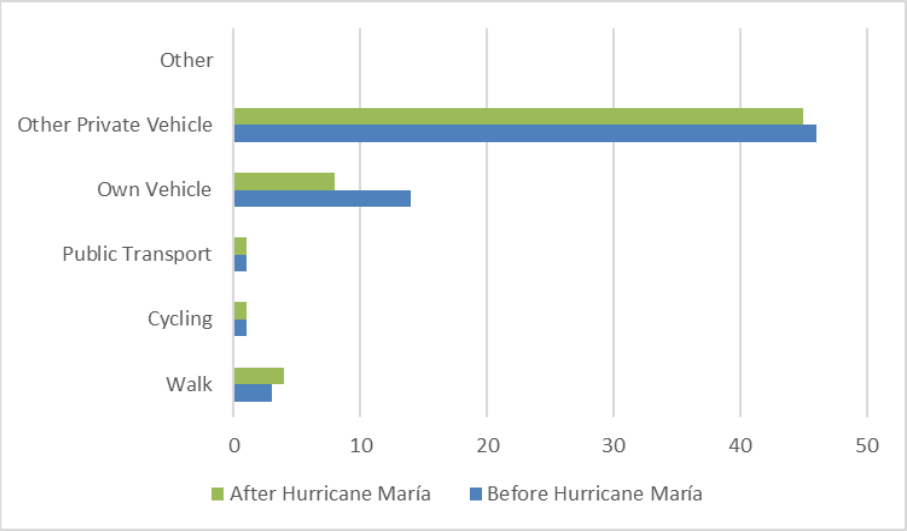
Source: SDG

Figure E.53: Participants Annual Income – Humacao (San Juan TMA)



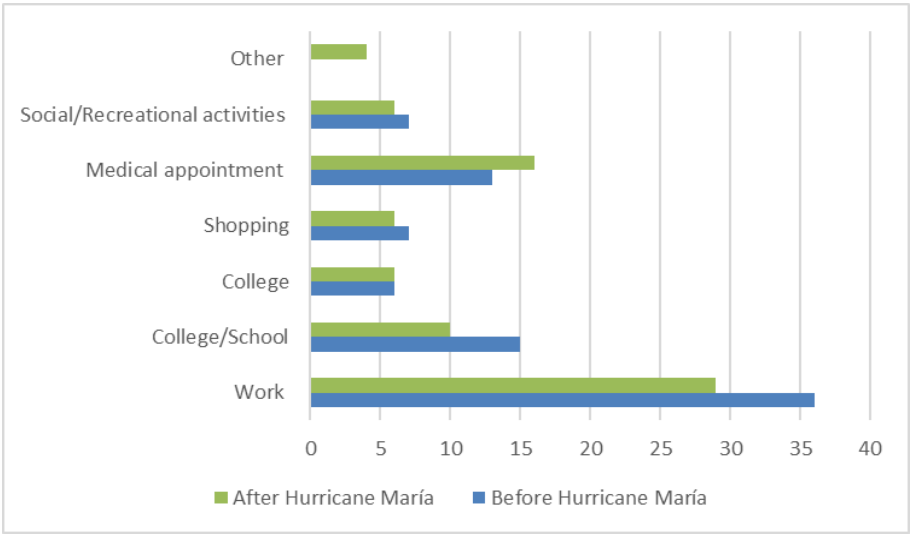
Source: SDG

Figure E.64: Participants Regular Trips Before and After Hurricane María – Humacao (San Juan TMA)



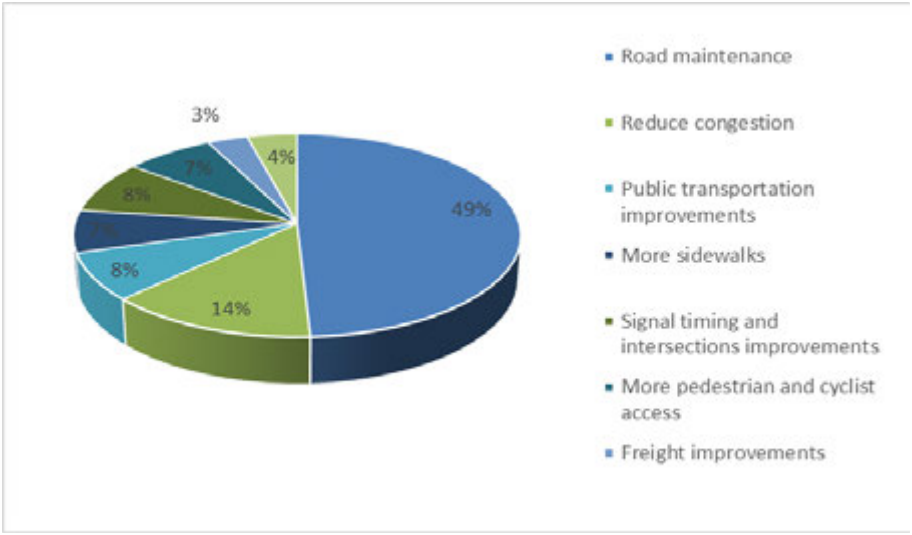
Source: SDG

Figure E.75: Participants Main Reason Trips Before and After Hurricane María – Humacao (San Juan TMA)



Source: SDG

Figure E.86: Transportation Investment – Humacao (San Juan TMA)

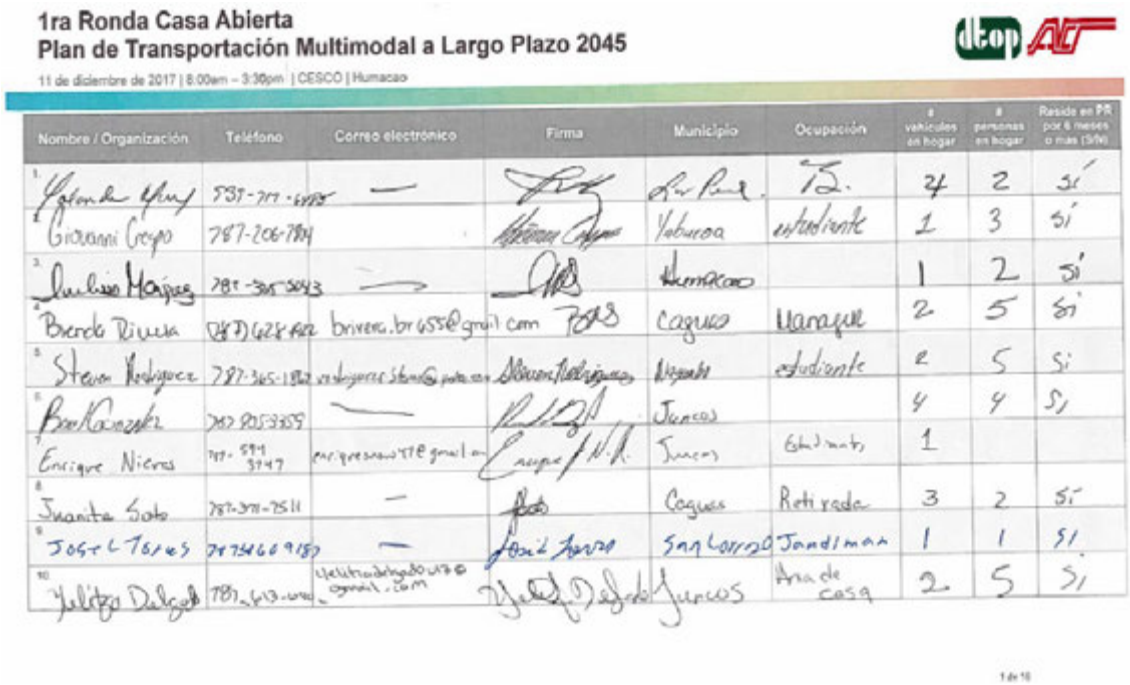


Source: SDG

Figure E.57: Open House Participants – Humacao

Source: SDG

Figure E.58: Attendance Lists – Humacao



1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

11 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Humacao

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (Sí/No)
1.								
2. Giovanni Crespo	787-206-7804			Yabucoa	estudiante	1	3	Sí
3.						1	2	Sí
4.				Caguas	Manager	2	5	Sí
5.					estudiante	2	5	Sí
6.				Juncos		4	4	Sí
7. Enrique Nieves				Juncos		1		
8. Juanita Soto	787-378-7511			Caguas	Retirada	3	2	Sí
9.				San Lorenzo	Jandiman	1	1	Sí
10.				Juncos	Ama de casa	2	5	Sí

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Plan de Transportación Multimodal a Largo Plazo 2045

11 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Humacao

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
11 Pedro Figueroa	939-253-5215		[signature]	Hcao		2	4	Sí
12 Wanda V. Castillo	787-525-3692		[signature]	Hcao		1	2	Sí
13 Betty Colón Ortiz			[signature]	L.P. (Las Piedras)	Ama de Casa	1		
14 Wilson Mojica			[signature]					
15 Jaime E. Sánchez	266-5197		[signature]	Naguabo		2	2	Sí
16 Wanda I Santiago			[signature]	Toa Baja	Secretaria	2	2	Sí
17 William Ortiz	787-381-8581		[signature]	Hcao	Mercadeo	2	3	Sí
18 [illegible]				Humacao				
19 Edwin Hernández	208-4644		[signature]	Humacao	oficinista			
20 Héctor Cosme			[signature]	Las Piedras	vendedor autos	4	3	Sí

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Plan de Transportación Multimodal a Largo Plazo 2045

11 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Humacao

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
21 Diane C Sánchez	787-404-1010	diane.sanchez@upr.edu	[signature]	Caguas	Artesana	1	1	Sí
22 María C. Lafuente	787-599-3603	[illegible]@yahoo.com	[signature]	Naguabo	Retirada	2	2	Sí
23 Luz Nimia Ortiz	787-945-0413	—	[signature]	Humacao	Retirada	1	2	Sí
24 Ada M. Rivera	787-399-9806		[signature]	Las Piedras	Ama de Casa	2	4	Sí
25 [illegible]	787-893-2284	N	[signature]	Yabucoa	Retirado	1	1	Sí
26 Alberto González	787-450-5094	[illegible]@hotmail.com	[signature]	Caguas	Desempleado	3	2	Sí
27 Maureen Flores	787-371-5010	[illegible]@yahoo	[signature]	Humacao	Comerciante	4	5	Sí
28 Ramón Morales	787-971-4156	[illegible]@hotmail	[signature]	Caguas	Desempleado	3	3	No
29 [illegible]			[signature]	San Lorenzo	CPL	3	5	Sí
30 Juan Carlos Serrano	787-205-5023	juan.serrano@[illegible]	[signature]	Gurabo	Servicio al cliente Molina Healthcare	1	2	Sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

11 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Humacao

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
31. Valeria Valdés	787-554-6642	[illegible]	[illegible]	Guaynabo	Tecnología [illegible]	2	3	S
32. [illegible]	787-341-5735		[illegible]	Humacao	[illegible]	5	1	Sí
33. Rey Berrios	787-527-4349		[illegible]	Cidra	ingeniero	1	4	Sí
34. Carmen M. Rivera	787-6053116		CMR	San Lorenzo	Retirada	3	2	Sí
35. César Rodríguez	787-308-7975		[illegible]	Juncos	Líder Recreativo	2	2	Sí
36. Mónica L. Del Valle	787-556-8057	[illegible]@gmail.com	Mónica Del Valle	Ceiba	Ama de casa	3	2	Sí
37. Efraín Mendoza	187-598-2416	Villas de Candelero #111 Humacao [illegible] [illegible]	[illegible]	Humacao	vendedor	4	2	Sí
38. [illegible]	[illegible]	[illegible]@[illegible].com	[illegible]	Naguabo	Nada	1	5	Sí
39. Kevin J. Rodríguez	787-914-9009	[illegible]@gmail.com	Kevin Rodríguez	Naguabo	Nada	1	6	Sí
40. Luis Ortiz	787)632-0081		Luis Ortiz	Humacao	Sup. en La Estancia	2	4	SI

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Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
41. [illegible]	787531 [illegible]		[illegible]	Naguabo	Ayudante de Auto Electricista	2	1	yes
42. Nelia Guzmán	(939) 645-5262		Nelia Guzmán	Las Piedras	Maestra Retirada	1	3	yes.
43. Antonio Melaus	(787) 400-3792		[illegible]	Las Piedras	Retirado	1	3	Sí
44. Carlos y Sáez	(787) 439-3777		[illegible]	Bayamón	[illegible]	2	4	Sí
45. Katherine Hunt	787 998-5[illegible]		Katherine Hunt	Yabucoa	Estudiante	3	4	Sí
46. Luz Serrano	787-341-5952		[illegible]	Yabucoa	ama de casa	1	4	Sí
47. [illegible]								
48. Jessica Nieves	787-810-4278		[illegible]	Naguabo	CSR/AE)	1	6	Sí
49. Bianca Casanova	7875149871		[illegible]	Fajardo	CSR Auto Express	3	2	Sí
50. [illegible] A. Hernández	787-514-[illegible]		[illegible]	San Sebastián	Estudiante	2	5	Sí

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Plan de Transportación Multimodal a Largo Plazo 2045

11 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Humacao

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
51. Ana Melendez	(939) 247-4502	Pequis1223@gmail.com	[illegible]	Ceiba	ama de casa	3	4	Sí
52. Janice Ruiz	787-914-4239		[illegible]	Naguabo	Assemblea	1	3	Sí
53. José Casillas	787-[illegible]-[illegible]28	[illegible]@gmail.com	[illegible]	Las Piedras	[illegible]	2	3	Sí
54. [illegible]	787-581-9778	[illegible]	[illegible]	[illegible]	[illegible]	4		Sí
55. [illegible] Santiago	787-[illegible]-4209	[illegible]@yahoo.com	[illegible]	Yabucoa	Ama de casa	4	3	Sí
56. Elizabeth Ruiz	939-859-3739	cruiz[illegible]@gmail.com	[illegible]	Humacao	[illegible]	1	1	[illegible]
57. [illegible] Claudio	(787) 205-0057		[illegible]	Caguas		1	3	Sí
58.								
59.								
60.								

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11 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Humacao

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
61. Yahaira Osorio	(939) 219-2429		[illegible]	Rio Grande	Enfermera	2	4	Sí
62. Tania Torres	787-463-8781	[illegible]@gmail.com	[illegible]	Carolina	Asist. Adm.	1	2	Sí
63. Lydia [illegible]	787-447-[illegible]	[illegible]@yahoo.com	[illegible]	San Juan	Administradora	2	4	Sí
64.								
65.								
66.								
67.								
68.								
69.								
70.								

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

11 de diciembre de 2017 | 8:00am – 2:30pm | CESCO | Humacao

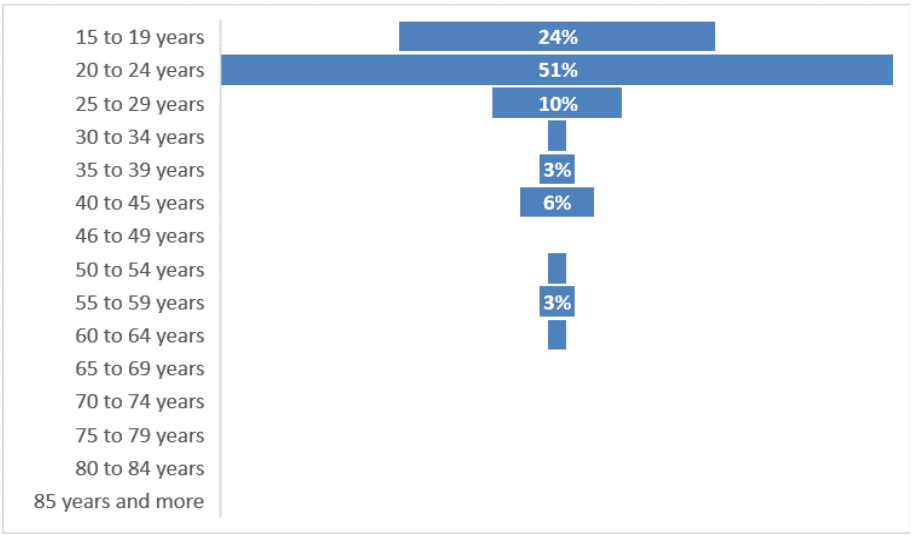
Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
71.				SJ				
72.								
73.								
74.								
75.								
76.								
77.								
78.								
79.								
80.								

Source: SDG

Mayagüez

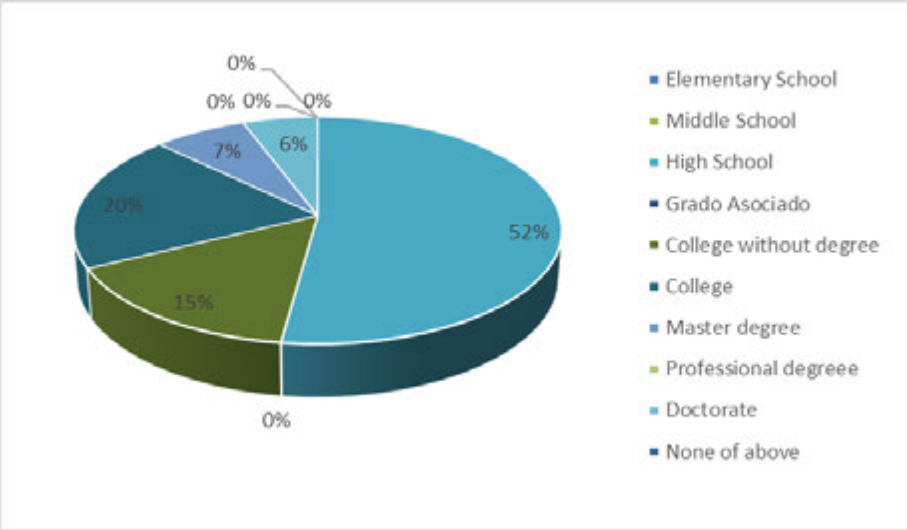
Figure E.59 to Figure E.66 and Table E.14 show the results, photos and participants list of Mayaguez (Southwest Region).

Figure E.59: Participants Age – Mayaguez (Southwest Region)



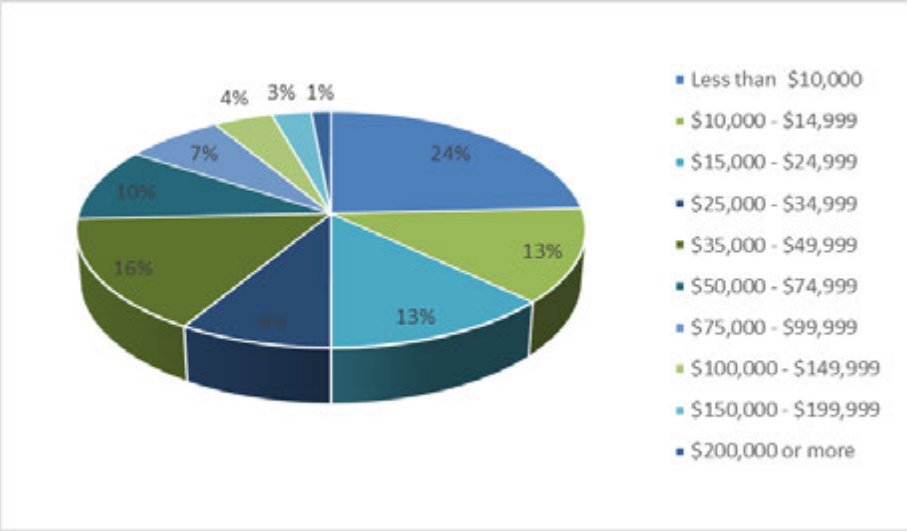
Source: SDG

Figure E.60: Participants Level of Education – Mayaguez (Southwest Region)



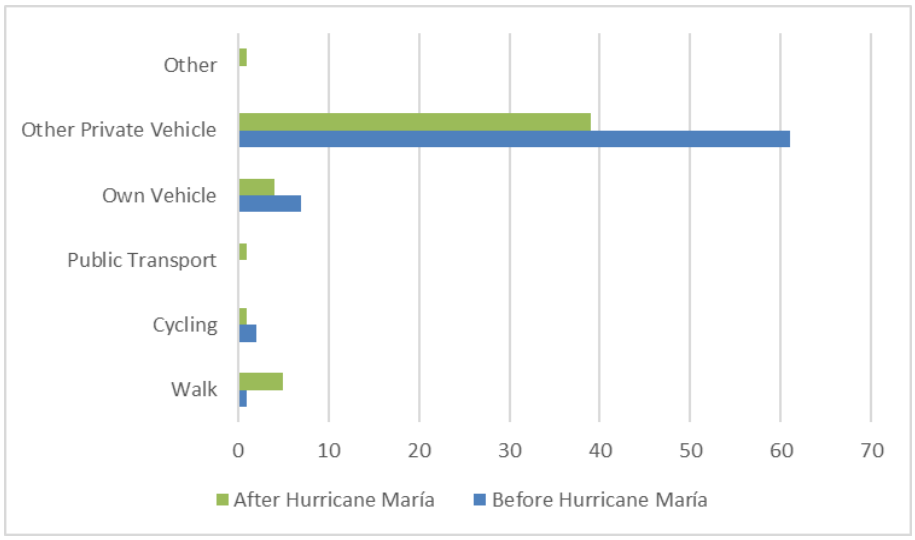
Source: SDG

Figure E.61: Participants Annual Income – Mayaguez (Southwest Region)



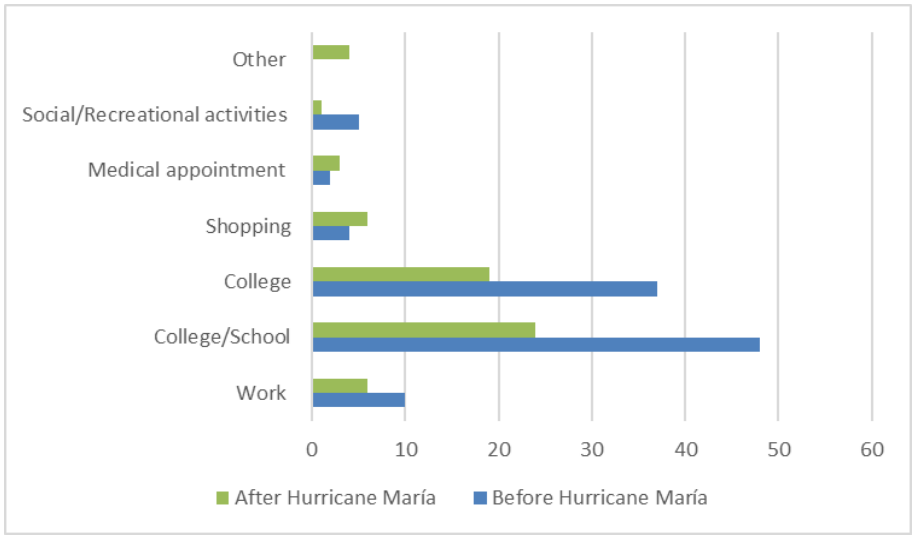
Source: SDG

Figure E.92: Participants Regular Trips Before and After Hurricane María – Mayaguez (Southwest Region)



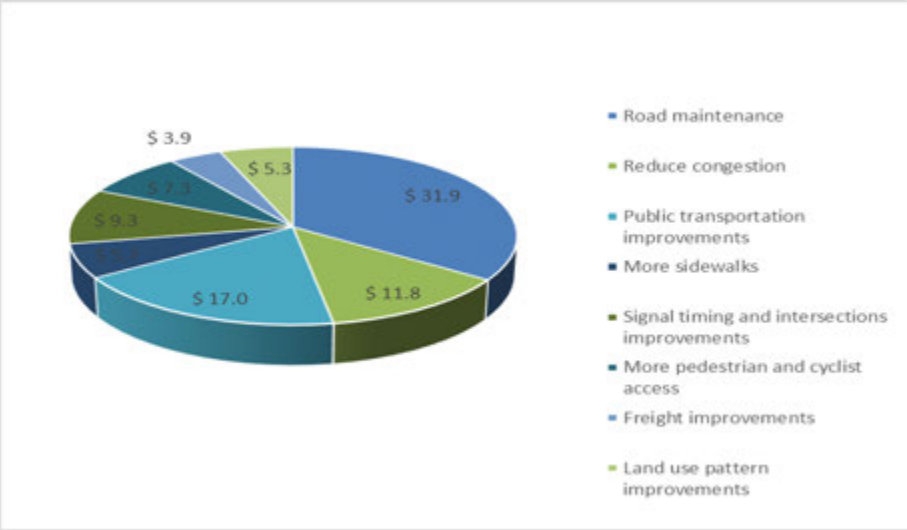
Source: SDG

Figure E.63: Participants Main Reason Trips Before and After Hurricane María – Mayaguez (Southwest Region)



Source: SDG

Figure E.64: Transportation Investment – Mayaguez (Southwest Region)



Source: SDG

Table E.14: Transportation Issues – Mayaguez (Southwest Region)

Priority level	Southwest
Urgent	Roads in bad condition
High	Congestion
Medium	Insecure intersections
Low	Lack of sidewalks
Very Low	Lack of cyclist infrastructure

Source: SDG

Figure E.65: Open House Participants – Mayagüez

Source: SDG

Figure E.66: Attendance Lists – Mayagüez

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
14 de diciembre de 2017 | 9:00am – 1:30pm | Universidad de Puerto Rico | Mayagüez

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.								
2.								
3.								
4. Antonio Marrero	787 464 9547			Mayagüez	Estudiante	2	2	Sí
5.								
6.								
7.								
8.				Lajas	estudiante	2	2	Sí
9.				Mayagüez	Profesora	4	3	Sí
10. Didier Valdés	787-464-4163	didier.valdes@upr.edu		Mayagüez	Profesor	3	4	S

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
14 de diciembre de 2017 | 9:00am – 1:30pm | Universidad de Puerto Rico | Mayagüez

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.								
2.								
3.								
4.								
5. Jorge D. López	787-486-1352	jorge.lopez33@upr.edu		Oracovis	estudiante	3	4	Si
6.								
7.								
8.								
9.								
10.								

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
14 de diciembre de 2017 | 9:00am – 3:30pm | Universidad de Puerto Rico | Mayagüez

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.	Yulissa Berrios	787-364-7782	yulissa.berrios@upr.edu	Y. Berrios	Lajas	Estudiante	2	5	Si
2.	Nicole Rivera	939-400-2726	nicole.rivera8@upr.edu	N. Ri	Fajardo	Estudiante	2	3	Si
3.	Erick M Negron	787 661 3897	erick.negron@upr.edu	Erick M. Negrón	Cabo Rojo	Estudiante	2	5	Sí
4.	Jesse Villafane	939-401-8118	jesse.villafane@upr.edu		Lajas	Estudiante	2	3	Si
5.	Luis Gonzalez	787-458-0[illegible]	luis.gonzalez76@upr.edu		Mayagüez	Estudiante	4	4	Si
6.	Jesmarie Hernandez	787-909-7905	jesmarie.hernandez@upr.edu		Aguada	Estudiante	3	4	Si
7.	Xaimarie Hernández	787-546-3628	xaimarie.hernandez@upr.edu		Aguada	Estudiante	3	4	Si
8.	Belandia Ramírez	787-717-7713	belandia.ramirez@upr.edu		San Juan	Estudiante	4	5	Si
9.	César Rosa	787-430-1560	cesar.rosa@upr.edu		Aguadilla	Estudiante	2	3	Si
10.	Carolyn Castillo	939-255-5[illegible]	carolyn.castillo@upr.edu		Añasco	Estudiante	4	5	Si

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
14 de diciembre de 2017 | 9:00am – 3:30pm | Universidad de Puerto Rico | Mayagüez

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.	Yan Lee Feng		yan.feng@upr.edu		Aguada	estudiante	3	4	S
2.	Adriana Molero		adriana.molero1@upr.edu	A.C.M	Benjamín	estudiante	3	5	S
3.	DANNY Rivera		danny.rivera@yahoo.com		Mayagüez	Ingeniero	3	5	S
4.	Erick Negrón		erick.negron4@upr.edu	Erick Negrón	Cabo Rojo	estudiante	2	5	S
5.	Juan M. Nieves Lebrón		juan.nieves16@upr.edu		Lares	estudiante	2	5	Si
6.	Amarilis Amaro		amarilis.amaro@upr.edu		Mayagüez	estudiante	3	5	Si
7.	Raúl Giusti		raul.giusti@upr.edu		San Germán	estudiante	3	5	Si
8.	Yamil Lopez		yamil.lopez@upr.edu		Mayagüez	estudiante	4	2	Si
9.	Yudhira Tavarez		yudhira.tavarez@upr.edu		mayagüez	Estudiante	0	2	Si
10.	Maria Negro Rojas		maria.negro@upr.edu		mayagüez	estudiante	1	2	NO

1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

14 de diciembre de 2017 | 9:00am – 3:30pm | Universidad de Puerto Rico | Mayagüez

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Johnathan Ruiz ITE UPRM	787-673-0997	johnathan.ruiz30@gmail.com	[illegible]	Mayagüez	Estudiante	2	2	S
2. Ivette Cancado UPRM	787-370-9219	ivette.cancado@upr.edu	[illegible]	Rincón	Profesora	2	1	S
3. Ricardo García ITE UPRM	787-241-5310	ricardo.garcia5@upr.edu	[illegible]	Mayagüez	Estudiante	1	2	S
4. Bryan Ruiz Cruz ITE-UPRM	(787) 366-6349	bryan.ruiz@upr.edu	[illegible]	Yauco	Estudiante	2	3	S
5. Andy W. López	(787) 205-7492	Andy.lopez1@upr.edu	[illegible]	Aguada	Estudiante	3	4	S
6. [illegible]	787-[illegible]	[illegible]	[illegible]	Mayagüez	Estudiante	3	4	S
7. Bryan J. Quiñones Ramos	787-[illegible]	bryan.quinones3@upr.edu	[illegible]	Aguada	Estudiante	4	3	S
8. Mario A. Hernández Correa	787-673-4486	mario.hernandez[illegible]@upr.edu	[illegible]	Mayagüez	Estudiante	2	3	S
9. Sabrina Sierra Pagán	(787) 309-8081	sabrina.sierra@upr.edu	[illegible]	Mayagüez	Estudiante	3	5	S
10. Juan C. Rossi	(787)-3[illegible]	juan.rossi@upr.edu	[illegible]	Añasco	Estudiante	2	4	S

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1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

14 de diciembre de 2017 | 9:00am – 3:30pm | Universidad de Puerto Rico | Mayagüez

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Mónica T Rivera	939 424 0044	monica.rivera16@upr.edu	[illegible]	Isabela	Estudiante	2	6	S
2. Mark A. Ferrer	787-458-6917	mark.ferrer01@upr.edu	[illegible]	Añasco	Estudiante	3	4	S
3. Marta Arroyo	787-672-2737	arroyo.marta[illegible]@gmail	[illegible]	Cabo Rojo	Empleado	5	4	S
4. Paola Gorrado	787 458 3187	paola.gorrado20@upr.edu	[illegible]	Cabo Rojo	Estudiante	3	2	S
5. Laura Colón	787-50[illegible]	laura.colon10@upr.edu	[illegible]	Arecibo	Estudiante	6	9	S
6. Gustavo Dávila	939-2[illegible]	gustavo.davila3@upr.edu	[illegible]	Mayagüez	Estudiante	3	5	S
7. Gabriel Febles	787-667-3583	Gabriel.Febles@upr.edu	[illegible]	San Juan	estudiante	2	5	S
8. Gabriana Romero		gaby.romero[illegible]@hotmail.com	[illegible]	Camuy	estudiante	2	3	S
9. Cristian N. Torres	787-318-8110	cristian.torres9@upr.edu	[illegible]	San Germán	estudiante	4	4	S
10. Antonio Ramos	787-923-9963	antonio.ramos4@upr.edu	[illegible]	Mayagüez	empleado	3	2	S

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
14 de diciembre de 2017 | 9:00am – 3:30pm | Universidad de Puerto Rico | Mayagüez

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.	Angel Burgos/UPRM	787-859-1100	angelburgos@gmail.com		Mayaguez	estudiante	2	2	S
2.	Elixa Martinez		elixa.martinez@upr.edu		Mayagüez	estudiante	1	1	S
3.	victor Martinez	787-373-7813	v.martinez76@yahoo.com		Aguada	IT	2	3	S
4.	Alexander Molero UPRM	787 349 5724	alexander.molero@upr.edu		Mayagüez	estudiante	1	2	S
5.	Carlos Sierra UPRM	787-[illegible]-9126	carlos.sierra6@upr.edu		Bayamón	est	3	5	Asi
6.	Leilany V. Casillas	—			Bayamón	estudiante	1	3	Sí
7.	Gabriel [illegible]	787-834-1547	gabriel.cuevas@upr.edu		Mayagüez	estudiante	2	4	Si
8.	Daniel Pérez	787-477-5[illegible]			Rio Piedras	estudiante	2	5	Sí
9.	Christopher Ramírez	203-430-6[illegible]	[illegible]		Toa Alta	estudiante	3	4	SI
10.	Alexandra Rivera	939-268-9970	[illegible]		Cabo Rojo	estudiante	3	4	SI

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
14 de diciembre de 2017 | 9:00am – 3:30pm | Universidad de Puerto Rico | Mayagüez

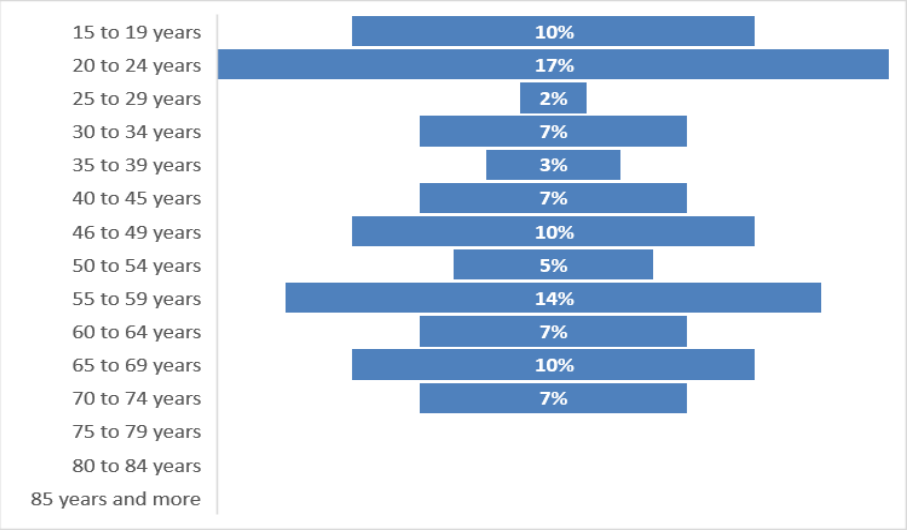
	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.	Alejandro Centeno	939-[illegible]-1018	alejandro.centeno1@upr.edu		Utuado	Estudiante	2	3	S
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

Source: SDG

Ponce

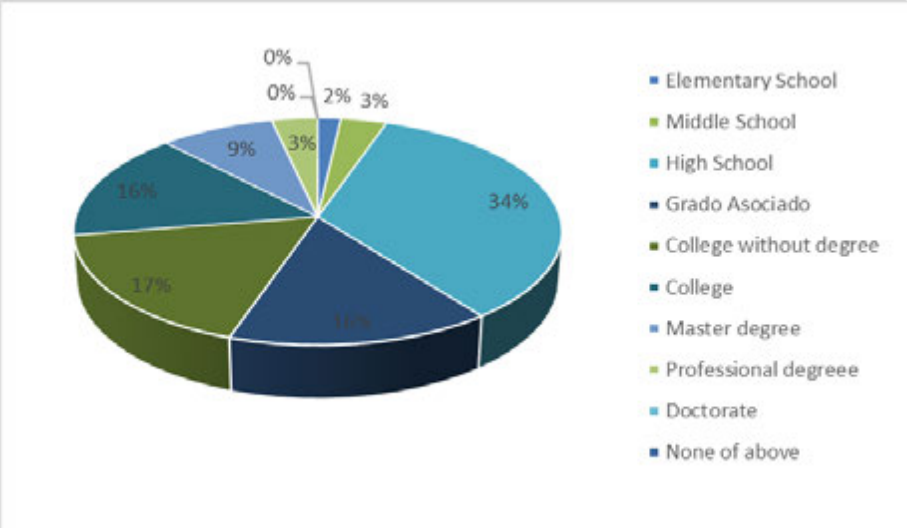
Figure E.67 to Figure E.74 and Table E.15 show the results, photos and participants list of Ponce (South Region).

Figure E.67: Participants Age – Ponce (South Region)



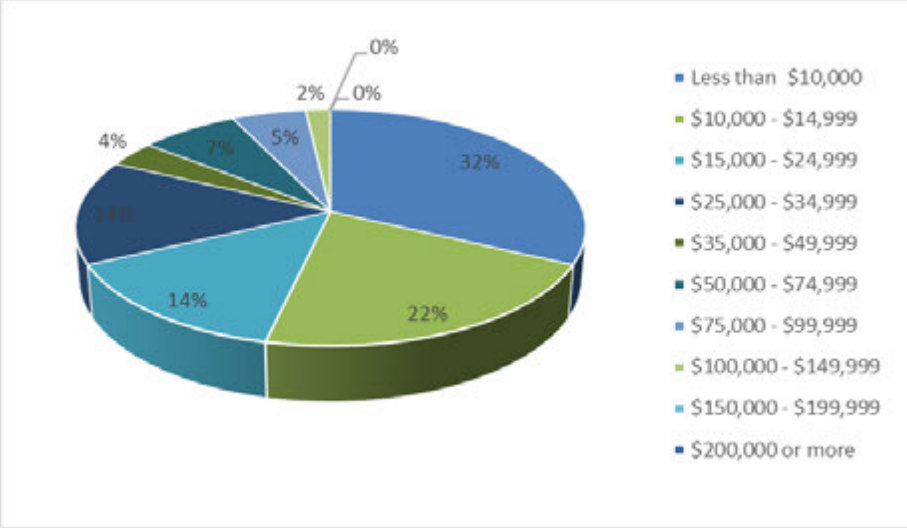
Source: SDG

Figure E.68: Participants Level of Education – Ponce (South Region)



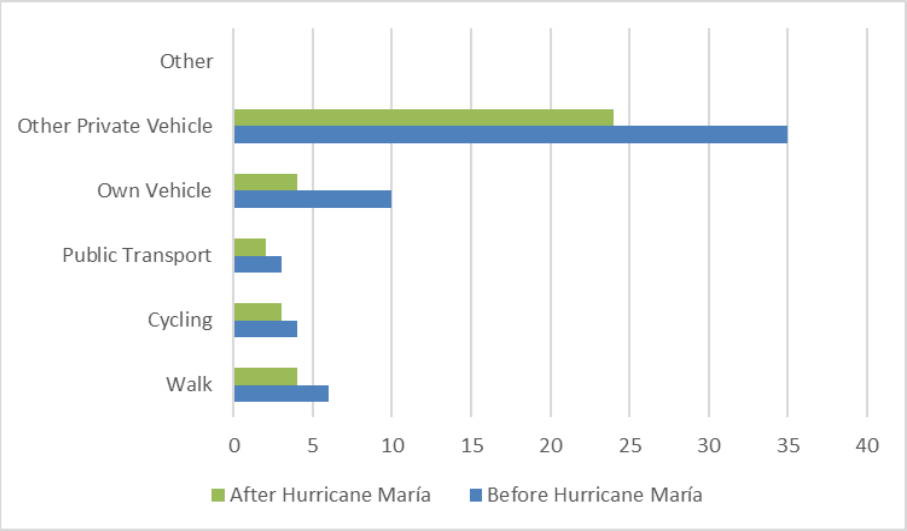
Source: SDG

Figure E.69: Participants Annual Income – Ponce (South Region)



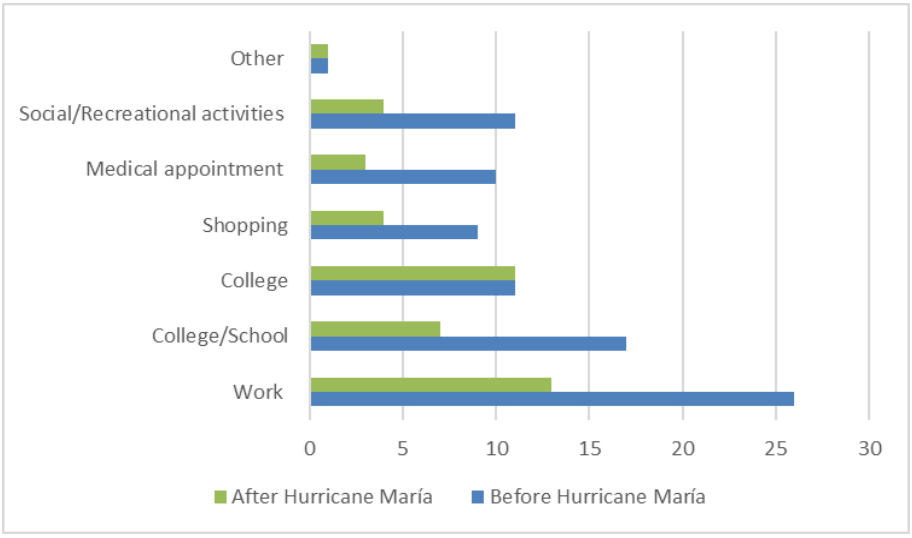
Source: SDG

Figure E.70: Participants Regular Trips Before and After Hurricane María – Ponce (South Region)



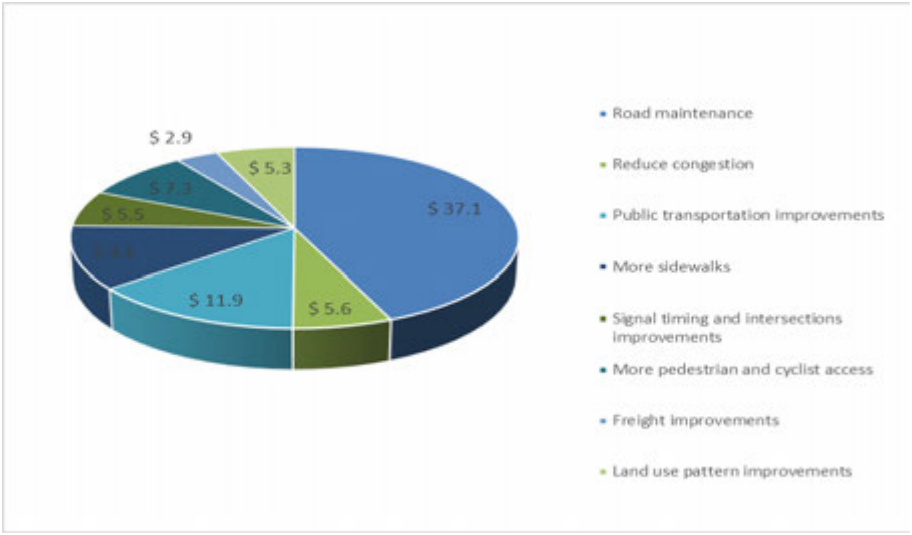
Source: SDG

Figure E.71: Participants Main Reason Trip Before and After Hurricane María – Ponce (South Region)



Source: SDG

Figure E.102: Transportation Investment – Ponce (South Region)



Source: SDG

Table E.15: Transportation Issues – Ponce (South Region)

Priority level	South
Urgent	Roads in bad condition
High	Lack of cyclist infrastructure
Medium	Insufficient routes/poor coverage
Low	High costs
Very Low	Facilities in bad condition

Source: SDG

Figure E.73: Open House Participants – Ponce

Source: SDG

Figure E.74: Attendance Lists – Ponce

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
19 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Barranquitas

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1 Alexis [illegible]	939-246-985[illegible]	[illegible]@yahoo.com	[illegible]	Aibonito	Desempleado	1	2	Sí
2 Sheila [illegible]	787-202-9778	sheila93[illegible]@gmail.com	[illegible]	Corozal	Desempleada			Sí
3 Jose E. Rodriguez	939 244 2562	—	[illegible]	Aibonito	Pensionado Gobierno	1	2	Sí
4 Luis E. Santiago	787-451-3508	Luisantiago4979[illegible]	[illegible]	Aibonito	Estudiante	1	3	Sí
5 Maritza Lopez	939-218-[illegible]		[illegible]	Barranquitas	Desempleada	2	3	Sí
6 Jaime [illegible]	787-387-4712		[illegible]	Morovis	Desempleado	1	3	Sí
7 Leslie Ann Torres	787-598-149[illegible]	[illegible]	[illegible]	Barranquitas	Estudiante	5	3	Sí
8 Gladys E. Moreno	787-615-1531		[illegible]	Barranquitas	Retirada	2	3	Sí
9 [illegible]			[illegible]	Coamo	Retirado	1	2	Sí
10 [illegible]	787 452-8724		[illegible]	Caguas	Estudiante	2	2	Sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

19 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Barranquitas

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1 Municipio de Naranjito Pedro Santiago	787-869-[illegible] 787-698-8000 787-627-0129	psantiago@municipiodenaranjito.com	[illegible]	Naranjito	Director de Programas Federales	4	4	Sí
2 Jovino Labor Torres	787-380-9128		[illegible]	Villalba	Oficial Correccional	03	4	Sí
3 Agueda R. Torres	787-215-18[illegible]	aguedato@gmail.com	[illegible]	Barranquitas	maestra	[illegible]	[illegible]	Sí
4 Natasha Rivera	787-309-5804	[illegible]@gmail.com	[illegible]	San Juan	Planificadora	1	1	Sí
5 Gabriel b. Quiñones	787-316-[illegible]	[illegible]@gmail.com	[illegible]	San Juan	Planificador	1	1	Sí
6 Herminia Colón Rivera	787-530-1483		[illegible]	Aibonito	Ama de casa	1	3	Sí
7 Wanda Maldonado	(787)857-3125		[illegible]	Barranquitas	Ama de casa	2	4	Sí
8								
9								
10								

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

19 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Barranquitas

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1 Carmen Leticia Colón	787-491-0564	[illegible]@gmail.com	[illegible]	Aibonito	Retirada	1	1	Más 6 mes
2 Joel [illegible]	787-380-9128	electrico-[illegible]	[illegible]	Villalba		4	4	[illegible]
3 [illegible]	787571[illegible]			Piñas		2	4	
4 [illegible]	787[illegible]8233		[illegible]	[illegible]		4	[illegible]	Sí
5								
6								
7								
8								
9								
10								

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
10 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Barranquitas

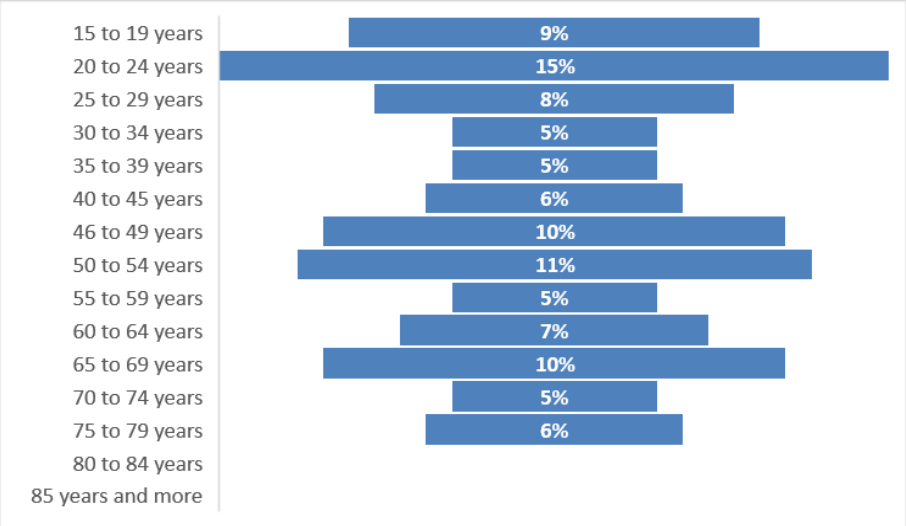
	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1.							2	2	Si
2.	Ada Matos	787-[illegible] 7795		Ada Matos	Barranquitas	Recepción	1	1	Si
3.	Gilberth Vázquez	787-[illegible]			Bayamón	Asst. Admin.	3	1	Si
4.					Bayamón	Comerciante	3	3	Si
5.									
6.									
7.									
8.									
9.									
10.									

Source: SDG

Sagrado Corazón

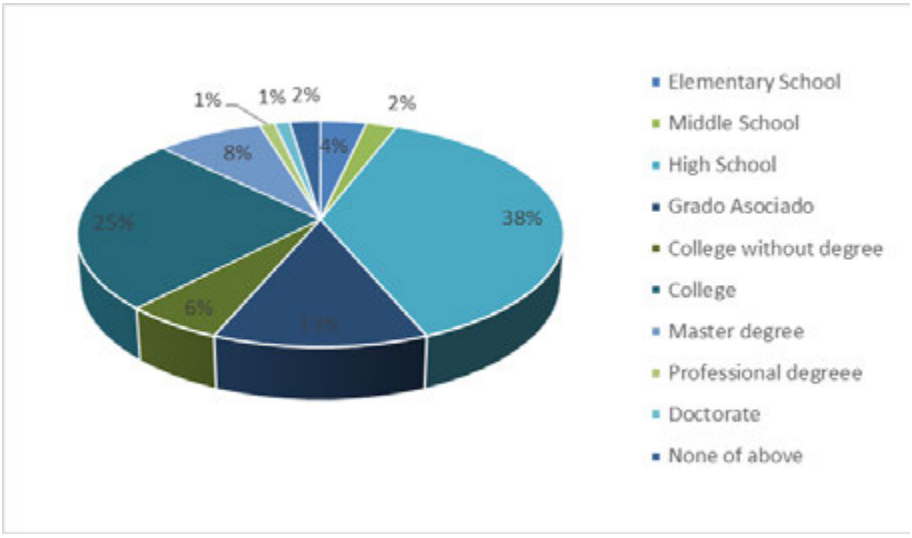
Figure E.75 to Figure E.82 and Table E.16 show the results, photos and participants list of Sagrado Corazón (San Juan TMA).

Figure E.75: Participants Age – Sagrado Corazón (San Juan TMA)



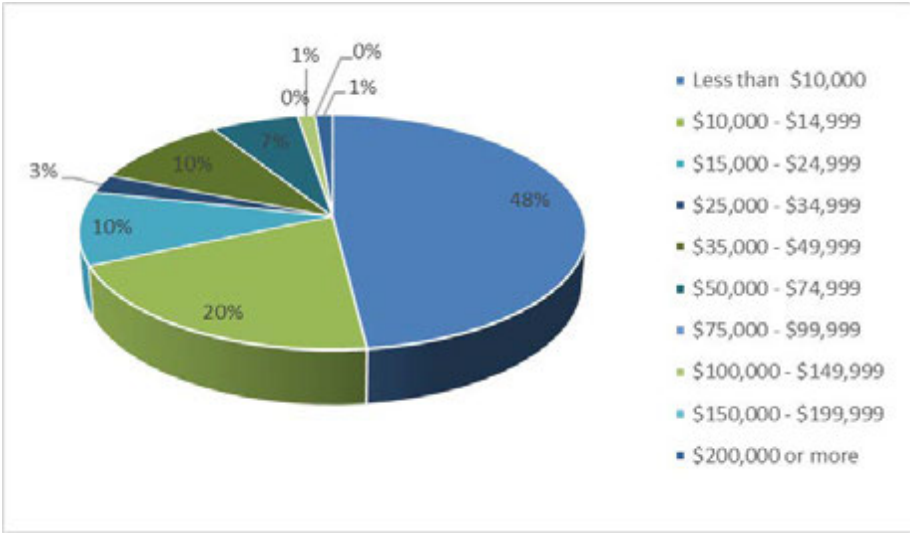
Source: SDG

Figure E.76: Participants Level of Education – Sagrado Corazón (San Juan TMA)



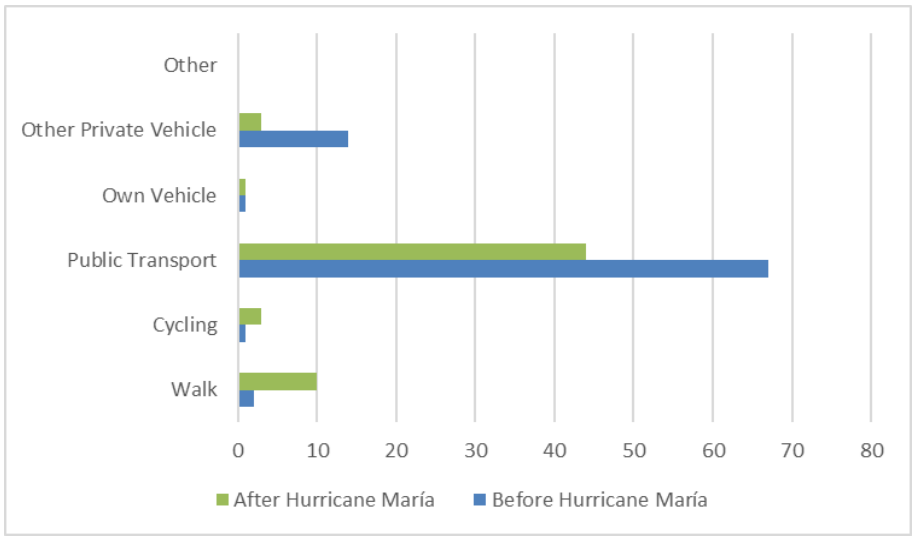
Source: SDG

Figure E.77: Participants Annual Income – Sagrado Corazón (San Juan TMA)



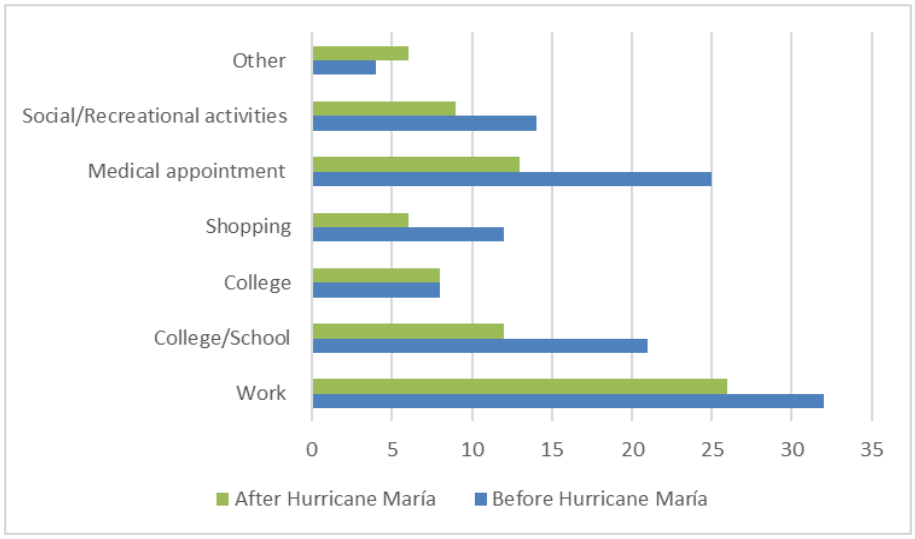
Source: SDG

Figure E.78: Participants Regular Trips Before and After Hurricane María – Sagrado Corazón (San Juan TMA)



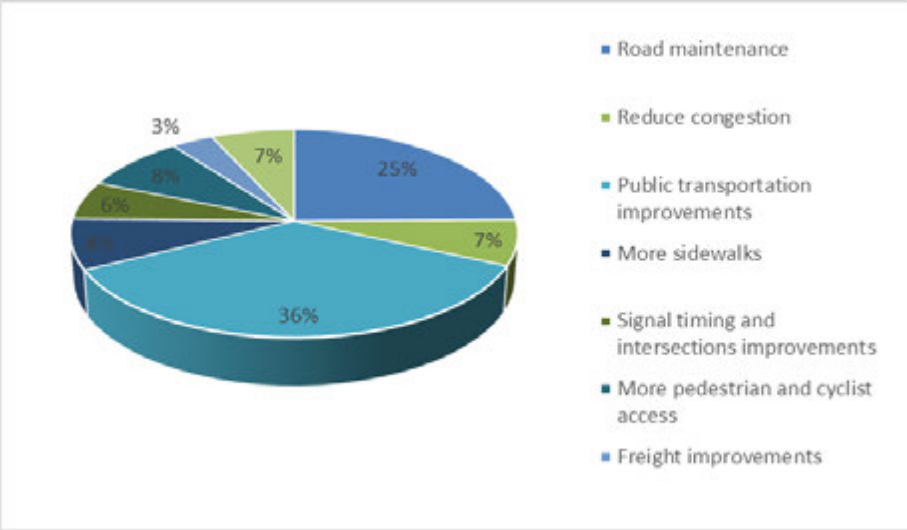
Source: SDG

Figure E.79: Participants Main Reason Trip Before and After Hurricane María – Sagrado Corazón (San Juan TMA)



Source: SDG

Figure E.80: Transportation Investment – Sagrado Corazón (San Juan TMA)



Source: SDG

Table E.16: Transportation Issues – San Juan TMA

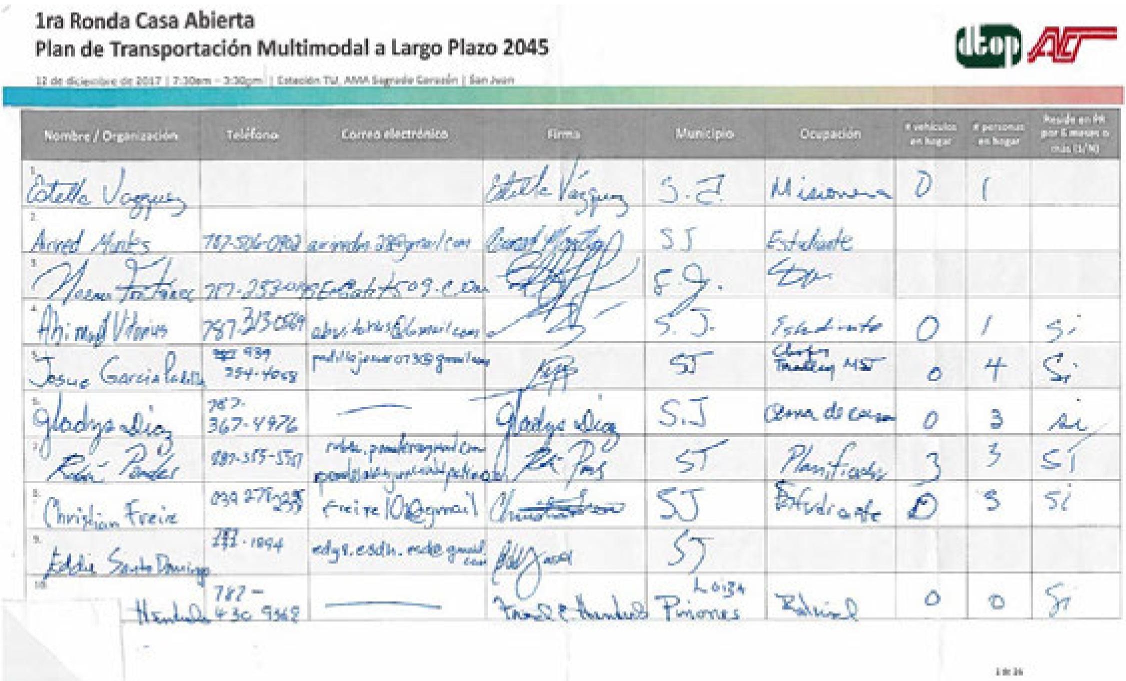
Priority level	San Juan TMA
Urgent	Roads in bad condition
High	Lack of sidewalks
Medium	Lack of lighting
Low	Lack of cyclist infrastructure
Very Low	Insufficient routes/poor coverage

Source: SDG

Figure E.81 Open House Participants – Sagrado Corazón

Source: SDG

Figure E.82: Attendance Lists – Sagrado Corazón



1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Estelle Vazquez			Estelle Vázquez	S.J.	Misionera	0	1	
2. Arned Montes	787-506-0962	[illegible]	[illegible]	SJ	Estudiante			
3. [illegible]	787-253-[illegible]	[illegible]	[illegible]	S.J.	[illegible]			
4. [illegible]	787 313 0569	[illegible]	[illegible]	S.J.	Estudiante	0	1	Sí
5. Josue Garcia Padilla	787 939 354-4068	padillajosue0735@gmail.com	[illegible]	SJ	[illegible]	0	4	Sí
6. Gladys Díaz	787-367-4976	—	Gladys Díaz	S.J	Ama de casa	0	3	Sí
7. Rubén Ponder	787-315-5517	[illegible]	[illegible]	SJ	Planificador	3	3	SI
8. Christian Freire	[illegible]	freire10@gmail	[illegible]	SJ	Estudiante	0	3	Sí
9. Eddie Santo Domingo	[illegible]-1894	[illegible]@gmail.com	[illegible]	SJ				
10. [illegible]	787-430-9368	—	[illegible]	Loiza Piñones	[illegible]	0	0	Sí

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1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
11. Ana Alcantara	—	—	Ana Alcant[illegible]	San Juan	ama de ca[illegible]			
12. [illegible]		[illegible]@gmail.com	[illegible]	San Juan	Enfermera			
13. Victoria Peña	(787) 585-6899	—	[illegible]	San Juan	mantenimiento			
14. [illegible]	391-8441		[illegible]	S.J.	[illegible]			
15. [illegible]	(787) 214 4514	[illegible]@gmail.com	[illegible]	SJ	estudiante			
16. Inés Sarmiento	—		[illegible]	San Juan	mantenimiento			
17. Olga Casellas	(787) 221-8787	—		San Juan	Retirada			
18. Alejandro Colón	(787) 217-7129		[illegible]	San Juan	Retira			
19. Ileana Maldonado	(787) 358-9909		[illegible]	S.J.	Ama de Casa			
20. Odalis Fernández	—	—	Odalis Fernández	San Juan	Masajista terapéutico			

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1ra Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
21. Reinaldo [illegible]	388-7458		Reinaldo S.	Trujillo A.	Maestro	0	2	sí
22. Edwin	297-5678		Edwin S.	San Juan	Estudio	0	2	sí
23. Victor Rivera	787-643-9907	—	[illegible]	San Juan	desempleado	4	1	sí
24. David Picorna Ros.	787-527-1266		D.P.R.	San Juan	desempleado	0	1	sí
25. [illegible]	787-568-4985		[illegible]	San Juan	Estudiante	0	2	sí
26. Maribel Hernández	787-3[illegible] 4176		[illegible]	San Juan	Ama de casa	0	4	sí
27. Alfredo Carrillo	787-654-1974		Alfredo Carrillo	San Juan	retirado	N	3	sí
28. AMANDA [illegible]	787-[illegible]		Amanda [illegible]	San Juan	Retirada	1	3	sí
29. Bolaquis Caracel			[illegible]		ama de casa	0	2	sí
30. Pablo Rivera	939-287-4505		[illegible]	San Juan	Desempleado	0	1	sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
31. Dalitza Báez Barreto	787-370-3058	dalitzabaez@gmail.com	[illegible]	Toa Baja	Estudiante	2	4	Sí
32. Francisco Morales	787-[illegible]	[illegible]@gmail.com	Francisco Morales	Guaynabo	Estudiante	2	5	Sí
33. Felix O. Rivera	787-[illegible]	[illegible]	[illegible]	Dorado	Estudiante	2	4	Sí
34. [illegible]	787-627-6760	[illegible]	[illegible]	Trujillo Alto	Estudiante	1	3	Sí
35. Charlie Martinez	787-[illegible]	C.Martinez[illegible]	[illegible]	San Juan	estudiante	0	2	Sí
36. Angel Flores	787-[illegible]	AFLORES[illegible]	[illegible]	SJ	Profesor	0	1	Sí
37. [illegible]	787 302 [illegible]	[illegible]	[illegible]	SJ	Estudiante	0	2	Sí
38. Monica Rivera	—	—	[illegible]	San Juan	estudiante	2	6	Sí
39. Sebastian Lopez	—	—	Sebastian Lopez	San Juan	estudiante	2	6	Sí
40. Antonio R.	787-810-[illegible]	antoniocastro[illegible]144@gmail.com	[illegible]	San Juan	Estudiante	1	3	Sí

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
41. Natanael Cotto	787-[illegible]	transporte[illegible]@yahoo.com	[illegible]	Gurabo	chofer	3	3	Sí
42. Nilsa Medero	215-3198		[illegible]	San Juan	estilista	0	3	Sí
43. Jorge Clemente	787-220-[illegible]		Jorge Clemente	Loíza	trabajo por su cuenta	0	1	Sí
44. Anónimo				Bo. Obrero San Juan	Vendedor ambulante			
45. Felicita Maldonado	—	felamaldonado[illegible]@yahoo.com	Felicita Maldonado	San Juan	Retirada			
46. Amparo García	—	[illegible]	[illegible]	San Juan	empleada de colmado	2	2	Sí
47. CESAR GARCIA		[illegible]@gmail.com	[illegible]	SAN JUAN	SUPERVISOR TREN URBANO	1	3	Sí
48. Alice Delgado	486-9057		[illegible]	Bayamon	ama de casa	0	1	Sí
49. Nissa Pimentel	(787) 727-4155		[illegible]	San Juan	Comerciante			
50. Guillermina de Jesus	761-6946		[illegible]	San Juan	Retirada			

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
51. Christian Fernández			Christian Fernández	San Juan	N/A	0	1	S
52. José A. Ortiz	787 649-9416	[illegible]	[illegible]	San Juan Trujillo Alto	Retirado Junta Comunitaria	3	2	S
53. Ricardo Rivas	605-8781	[illegible]	[illegible]	San Juan	[illegible] Estudiante			
54. Ivonne Gonzalez	939-334-7989		[illegible]	[illegible]	Ama de casa	0	2	Sí
55. José M Rosa	787 713[illegible]		José M. Rosa	San Juan	Retirado	2	2	Sí
56. Carlos R[illegible]	787-991-[illegible]		[illegible]	San Juan	N/A	0	4	Sí
57. Eileen Williams	787-374-1645		[illegible]	San Juan	Retired Logistic Agent [illegible]	0	1	Sí
58. Carlos [illegible]	787-599-[illegible]	[illegible]@gmail.com	[illegible]	San Juan	[illegible]	1	2	Sí
59. Leslie Jiménez	787-637-[illegible]	[illegible]@yahoo.com	[illegible]	Guaynabo	[illegible]	0	5	Sí
60. Jaemily Rosa	787-212-[illegible]	rosajaemily@yahoo.com	Jaemily Rosa	San Juan	Estudiante	1	4	Sí

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
61. Adrián Carelio	(787)922-3277	Adrian.carelio@hotmail.com	[illegible]	San Juan	Estudiante	4	4	S
62. Joseph Arroyo	(787)[illegible]-2806		[illegible]	Guaynabo	Estudiante	2	3	S
63. Carlos Soutto	980-2675	territoriumlab@gmail.com		San Juan.				
64. Carlos Ocasio		caranto69@hotmail.com	[illegible]	Toa Baja	Estudiante	1	3	Sí
65. Rubén Darío Tirado	200-5861	Ruben71@hotmail.com	[illegible]	Bayamón	Chofer			
66. Luis Cortoso	787983[illegible]		Luis Cortoso	San Juan	Retirado	0	1	P.R.
67. María [illegible]	75[illegible]		[illegible]	S. Juan	Retirada	3	4	Sí
68. Alfie Martinez	787-717-7545		[illegible]	S. Juan	[illegible]	0	1	Sí
69.								
70.								

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
71.		201-5161					2	5	S
72.	René Ruiz					Auxiliar	0	3	Si
73.	Elvin Torres	787 725 1076			San Juan	Seguro Social	0	1	Si
74.		787-342-9779					0	1	Si
75.		787 671 0076			San Juan		4	5	Si
76.		787-529-8854			SJ				
77.	Sergio	787-783-	N/A		SJ		0	2	Si
78.									
79.									
80.									

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

	Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
81.					San Juan	Retirado	0	1	S
82.									
83.	Arturo Corrón	646-7055			SAN JUAN	COMERCIANTE	2	4	S
84.		787 920-6285			San Juan	Conductor Cardiac	0	2	S
85.	Rafael Febres Olivieras	796-6941 787-			Bayamón	Retirado	2	4	Si
86.									
87.									
88.									
89.									
90.									

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
91. Francisco [illegible]	787-452-[illegible]	[illegible]	[illegible]	Guaynabo	estudiante	2	5	sí
92. Diego J. [illegible]	787-590-[illegible]	[illegible]	[illegible]	Vega Baja	estudiante	1	4	[illegible]
93. Luis I. [illegible]			[illegible]	San Juan	Estudiante	2	6	Sí
94. Luz Cortés	787-308-[illegible]	[illegible]@gmail	[illegible]	San Juan	[illegible]	1	2	Sí
95. [illegible] Medina	787-333-[illegible]	[illegible]	[illegible]	Bayamón	estudiante	1	2	Sí
96. [illegible] Rodz.	750-8050		[illegible]	San Juan	trabajo	1		sí
97. [illegible]	787-480-4981			[illegible]	[illegible]	1	2	[illegible]
98. Luis E. [illegible]	—	Luis23[illegible]@gmail.	[illegible]	San Juan	Tecnico	1	3	Sí
99. [illegible]	(939)368-2894	[illegible]@gmail	[illegible]	San Juan	[illegible]	0	1	Sí
100.								

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1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
12 de diciembre de 2017 | 7:30am – 3:30pm | Estación TU, AMA Sagrado Corazón | San Juan

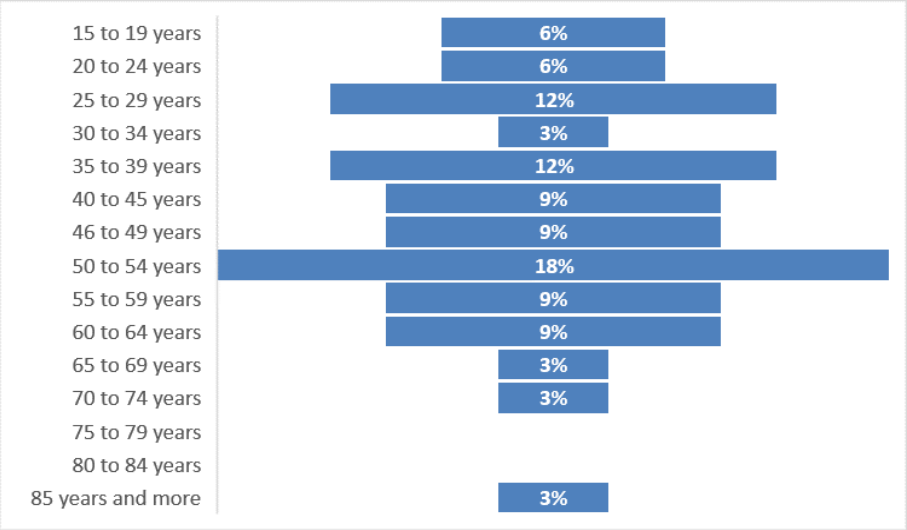
Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
101. Sandra Sierra	787 [illegible]	N/A	[illegible]	[illegible]	Retirada	N/A	2	Sí
102.								
103.								
104.								
105.								
106.								
107.								
108.								
109.								
110.								

Source: SDG

<u>Utuado</u>

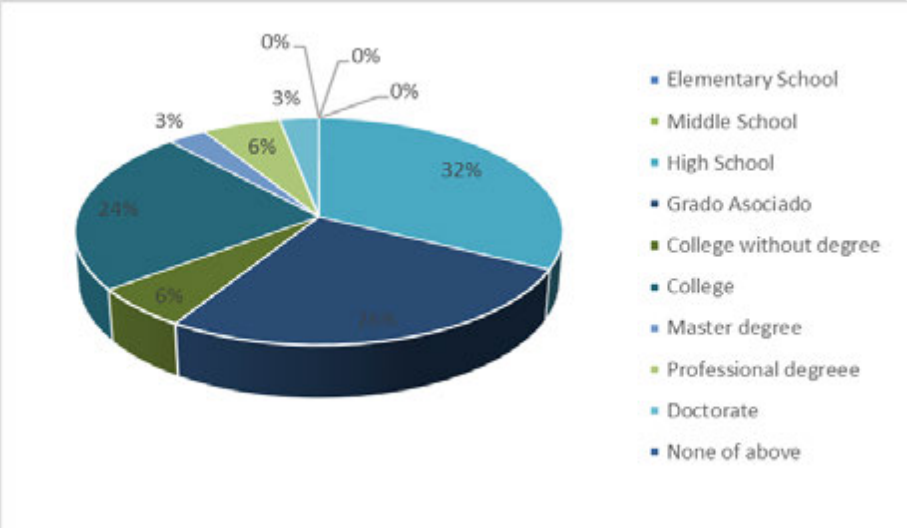
Figure E.83 to Figure E.90 and Table E.17 show the results, photos and participants list of Utuado (North Region).

Figure E.83: Participants Age – Utuado (North Region)



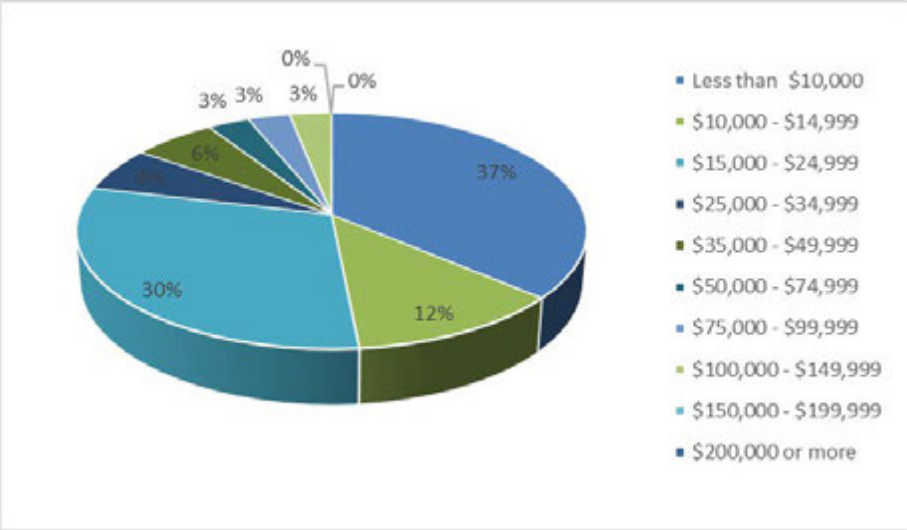
Source: SDG

Figure E.84: Participants Level of Education – Utuado (North Region)



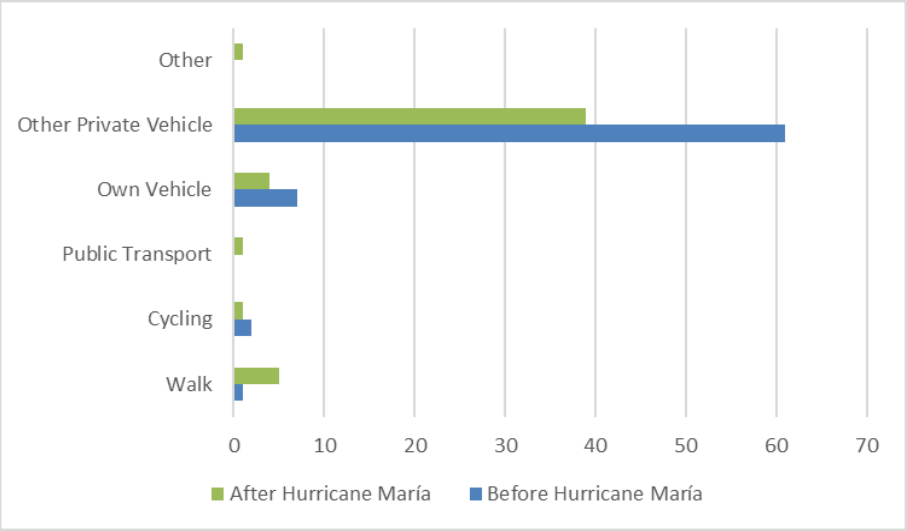
Source: SDG

Figure E.85: Participants Annual Income – Utuado (North Region)



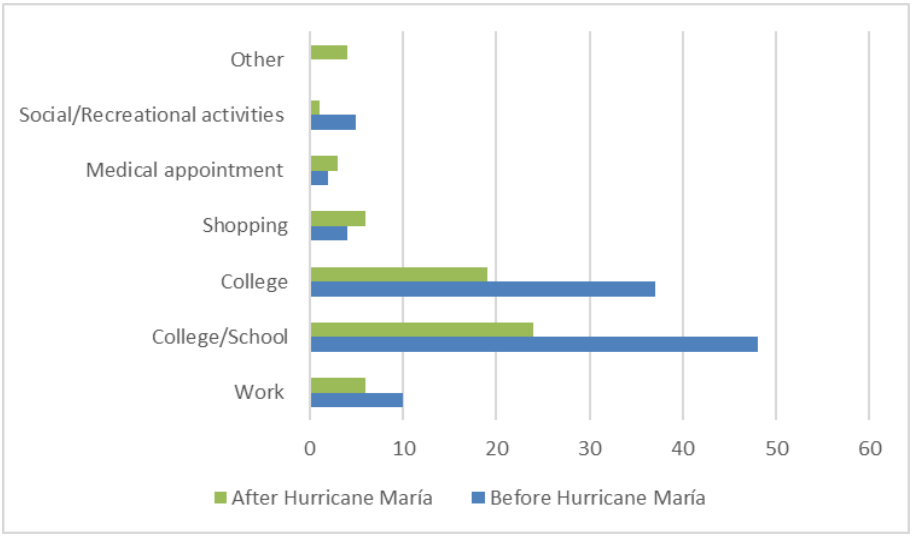
Source: SDG

Figure E.86: Participants Regular Trips Before and After Hurricane María – Utuado (North Region)



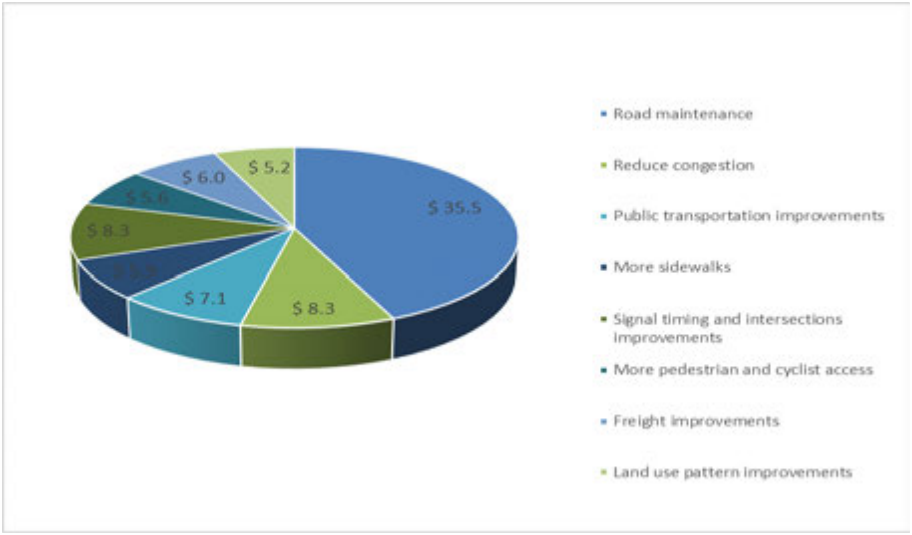
Source: SDG

Figure E.87: Participants Main Reason Trips Before and After Hurricane María – Utuado (North Region)



Source: SDG

Figure E.88: Transportation Investment – Utuado (North Region)



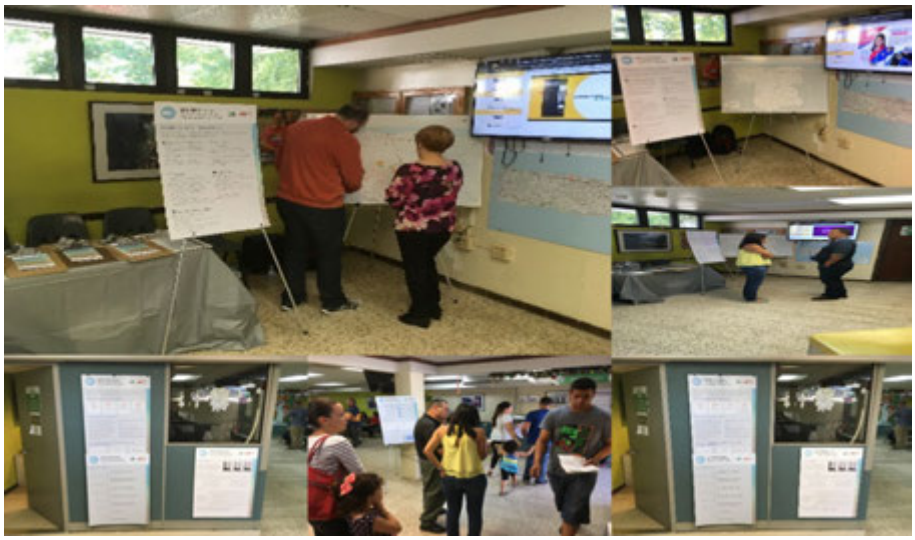
Source: SDG

Table E.17: Transportation Issues – Utuado (North Region)

Priority level	North
Urgent	Roads in bad condition
High	Congestion
Medium	Lack of sidewalks
Low	Lack of lighting
Very Low	Insecure intersections

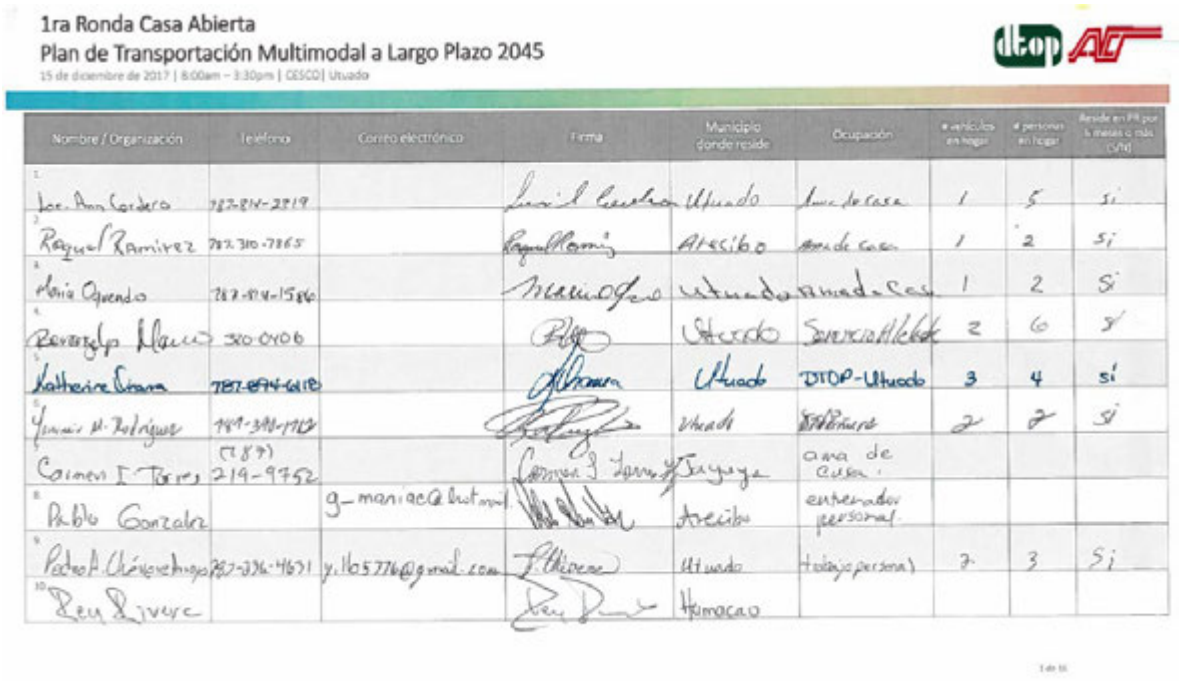
Source: SDG

Figure E.89: Open House Participants – Utuado



Source: SDG

Figure E.90: Attendance Lists – Utuado



1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
15 de diciembre de 2017 | 8:00am – 3:30pm | CESCO | Utuado

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (Sí/No)
1. Lcdo. Ann Cordero	787-814-2819			Utuado	Ama de casa	1	5	Si
2. Raquel Ramirez	787-310-7865			Arecibo	Ama de casa	1	2	Si
3. Maria Oquendo	787-894-1586			Utuado	Ama de casa	1	2	Si
4. [illegible]	320-0406			Utuado	Servicios Medicos	2	6	Si
5. Katherine Sierra	787-894-6818			Utuado	DTOP-Utuado	3	4	si
6. [illegible]	787-398-1913			Utuado	[illegible]	2	2	Si
7. Carmen I. Torres	(787) 219-9752			[illegible]	ama de casa			
8. Pablo Gonzalez		g_maniaca@hotmail		Arecibo	entrenador personal			
9. Pedro A. Chévere Hugo	787-376-4671	y.llo5776@gmail.com		Utuado	Trabajo personal	2	3	Si
10. Rey Rivera				Hatillo				

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
15 de diciembre de 2017 | 8:00am – 3:30pm | CESCO| Utuado

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. Rafael Rivera	7878944475		[illegible]	Utuado	Retirado	2	2	
2. Wilson Santiago			[illegible]	Utuado PR	"	2	2	
3. María Vélez	787-717-7496		María Vélez	Vega Alta	Ama de casa	2	5	
Providencia De Jesús	787-[illegible]-0065		[illegible]	Utuado	Jubilada	2	2	
5. Luis Rodríguez	787-408-[illegible]		[illegible]	Jayuya	retirado	4	5	
6. [illegible]	787-[illegible]		[illegible]	[illegible]	[illegible]	2	4	
7. Alfonso Pérez Hdz	787 9504717		[illegible]	Lares	"	2	3	
8. [illegible]	939-259-3652		[illegible]	Arecibo	chofer	1	2	
9. Walter Ramos	787-627-0869	WalterTwins30@Gmail.com	Walter Ramos	Arecibo	Operador	Ø	1	Sí
10. Hector M. Rivera	787-455-5751		[illegible]	Jayuya	N/A	1	1	Sí

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
15 de diciembre de 2017 | 8:00am – 3:30pm | CESCO| Utuado

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (S/N)
1. José A. Vázquez	787-613-4[illegible]	[illegible]@yahoo.com	[illegible]	Adjuntas	Dr. Sicología	3	2	Sí
2. Juan Eloy Alicea	787-377-3771		[illegible]	Adjuntas				
3. Eduardo Hernández	787-566-7236	eduardohernandez1992@hotmail.com	[illegible]	Arecibo	Desempleado	1	2	Sí
4. Miladys Pérez	(787)892-8702	miladys.perez@upr.edu	[illegible]	Utuado	Estudiante	4	4	Sí
5. Gerardo Sotomayor	(787)597-6900	grsotomayor@yahoo.com	[illegible]	Utuado	Maestro	2	2	Sí
6. Roberto Medina	787)642-0075	[illegible]@live.com	[illegible]	[illegible]	Maestro	2	3	Sí
7. Marta Alicea Méndez	(787)328-8611	[illegible]@gmail.com	[illegible]	Utuado	Oficinista III	2	4	Sí
8. Bryan Herrón	787-479-01[illegible]	Herron3000@hotmail.com	[illegible]	Utuado	Seguridad	4	3	Sí
9. Ernesto Rivera	787-616-7638	–	[illegible]	Utuado	Oficial	1	2	Sí
10.								

1ra Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

Nombre / Organización	Teléfono	Correo electrónico	Firma	Municipio donde reside	Ocupación	# vehículos en hogar	# personas en hogar	Reside en PR por 6 meses o más (Sí/No)
1.								
2. Maritza Lambey		m. lambey@hotmail		Adjuntas		3	3	
3.								
4.								
5. Kevin Matos				Adjuntas	Estudiante	3	4	Sí
6.								
7.								
8.								
9.								
10.								

Source: SDG

Second Open Houses

In the second round, participants were also educated about the LRTP process, the main focus of this open house was to validate the vision, goals and objectives of the plan. Participants were asked about their opinion and suggestions that could improve the vision, goals and objectives.

Second round of open houses were performed between March 13th and April 6th in 8 different locations around the island: Caguas, Ponce, Camuy, Rincón, Cabo Rojo, Fajardo, San Juan and Patillas.

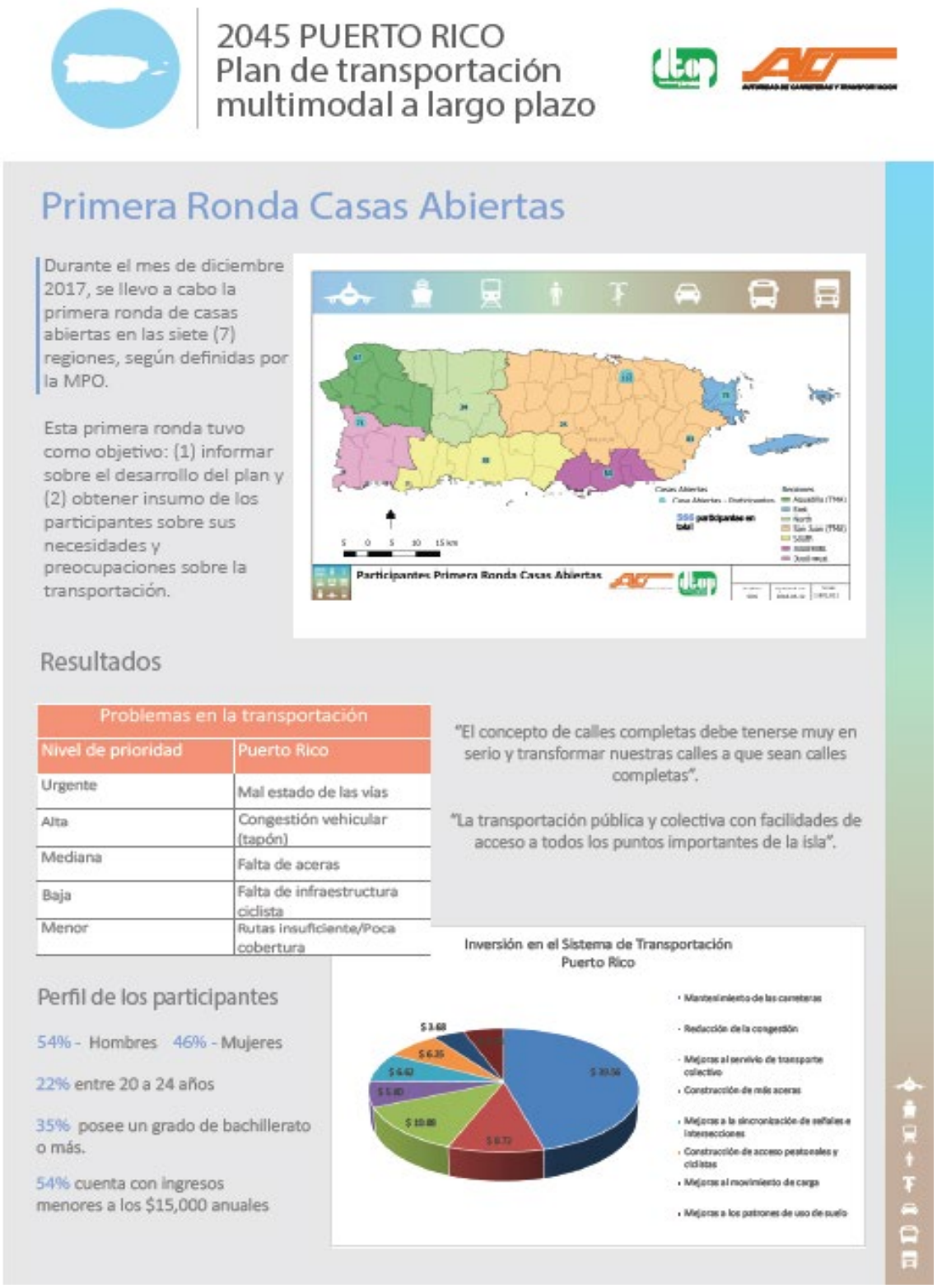
Informative Station

This station had the objective to inform all participants about the transportation planning process, specifically in aspects such as: (1) long-range transportation planning process, (2) current status and challenges, (3) importance of the public involvement through the process, and (4) timeline of this planning process.

The informative boards were the same presented in the first round, as previously shown in Figures E.2 to Figure E.5. Also, the results from the first round of the open house were presented.

Figure E.91 shows a new board incorporated into the informative station for this second round.

Figure E.91: Informative Boards- Results from First Round



Source: SDG

Interactive Station

The interactive station had the objective of gathering information and validating the vision, goals and objectives of the plan. Participants provided their inputs through boards and a questionnaire, as shown in Figure E.92 to Figure E.95.

Figure E.92: Vision Board

Source: SDG

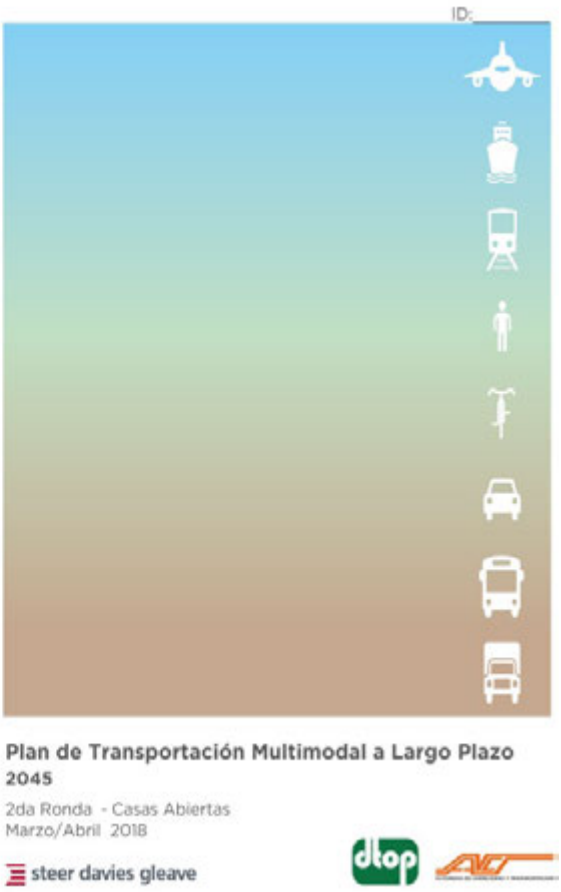
Figure E.93: Goals Board

Source: SDG

Figure E.94: Strategies Board

Source: SDG

Figure E.95: Objectives, Transit Improvements and Road in Bad Condition Survey



Objetivos del Plan

A continuación se presentan los objetivos definidos para cada una de las metas. Estos objetivos se han descritos como maneras específicas de apoyar las metas. Favor evalué y clasifique los objetivos por orden de importancia para usted, siendo uno (1) el de mayor importancia y tres (3), cuatro (4) o cinco (5) el de menor importancia, según aplique por meta.

Meta A: Mejorar el desempeño del sistema de transportación	
Objetivos	Ranking
Reducir la congestión y el tiempo de viaje, a través del proceso de manejo de congestión y otros proyectos similares.	
Optimizar el uso de los bienes de transportación y balancear la eficiencia de inversiones previas.	
Mantener los bienes de la transportación en buen estado de reparación.	
Mejorar la eficiencia en los costos de administración y operación de los sistemas de transportación.	
Mejorar la seguridad y protección del sistema y su capacidad de apoyo en las emergencias.	

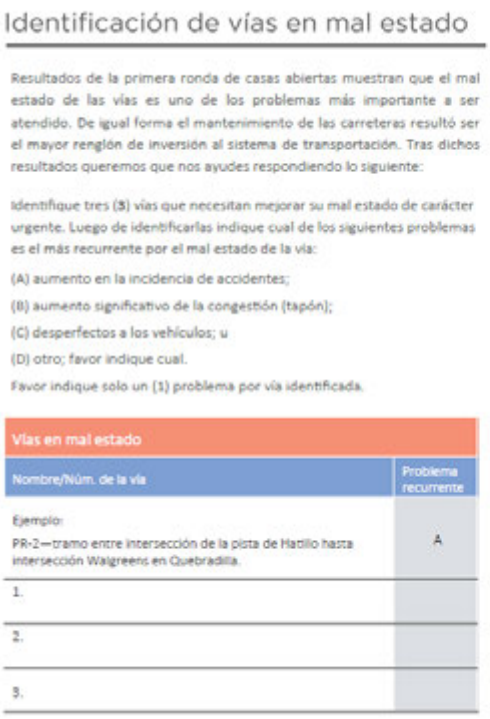
Meta B: Promover la sustentabilidad del medio ambiente	
Objetivos	Ranking
Minimizar los impactos adversos a los ambientes naturales y construidos.	
Reducir las emisiones de gases de efecto invernadero, el consumo de energía y mejorar la calidad del aire.	
Apoyar a la integración de los planes de uso de terrenos y la transportación para tener comunidades más habitables y reducciones en el tiempo de viaje.	
Mejorar las estrategias de modos alternos y la demanda de viajes.	
Reducir la vulnerabilidad de la infraestructura de transportación ante eventos y desastres naturales.	

Comentarios

Objetivos del Plan

Meta C: Mejorar la movilidad y el acceso a la transportación para personas y carga	
Objetivos	Ranking
Mejorar la conectividad entre los centros de actividad primaria, incluyendo empleo, turismo y distritos residenciales de alta densidad.	
Mejora la integración del sistema entre y dentro de los modos.	
Aumentar las opciones de viaje para los residentes, visitantes y trabajadores.	
Concentrar las inversiones en las áreas de mayor beneficio al usuario.	
Facilitar el acceso a la transportación a las poblaciones desfavorecidas.	

Meta D: Reforzar la vitalidad económica	
Objetivos	Ranking
Mejorar la competitividad económica al facilitar el movimiento eficiente de bienes y servicios.	
Generar la posibilidad de oportunidades público – privadas.	
Proveer conectividad estratégica y capacidad en la red a través de todo Puerto Rico.	



Identificación de vías en mal estado

Resultados de la primera ronda de casas abiertas muestran que el mal estado de las vías es uno de los problemas más importante a ser atendido. De igual forma el mantenimiento de las carreteras resultó ser el mayor renglón de inversión al sistema de transportación. Tras dichos resultados queremos que nos ayudes respondiendo lo siguiente:

Identifique tres (3) vías que necesitan mejorar su mal estado de carácter urgente. Luego de identificarlas indique cual de los siguientes problemas es el más recurrente por el mal estado de la vía:

(A) aumento en la incidencia de accidentes;

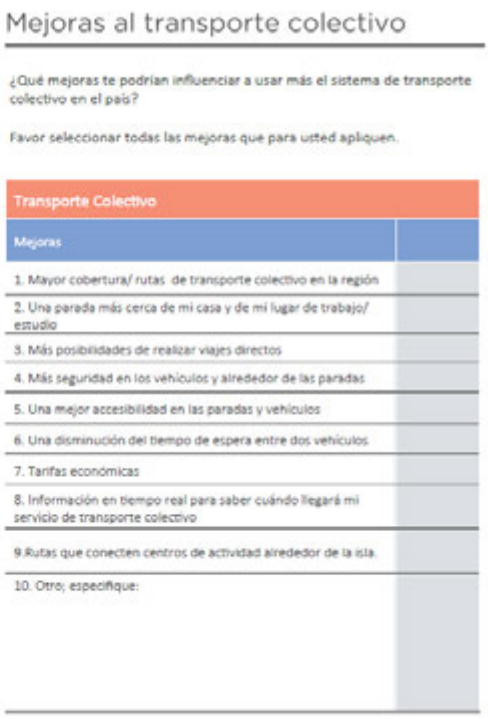
(B) aumento significativo de la congestión (tapón);

(C) desperfectos a los vehículos; u

(D) otro; favor indique cual.

Favor indique solo un (1) problema por vía identificada.

Vías en mal estado	
Nombre/Núm. de la vía	Problema recurrente
Ejemplo: PR-2—tramo entre intersección de la pista de Hatillo hasta intersección Walgreens en Quebradilla.	A
1.	
2.	
3.	



Mejoras al transporte colectivo

¿Qué mejoras te podrían influenciar a usar más el sistema de transporte colectivo en el país?

Favor seleccionar todas las mejoras que para usted apliquen.

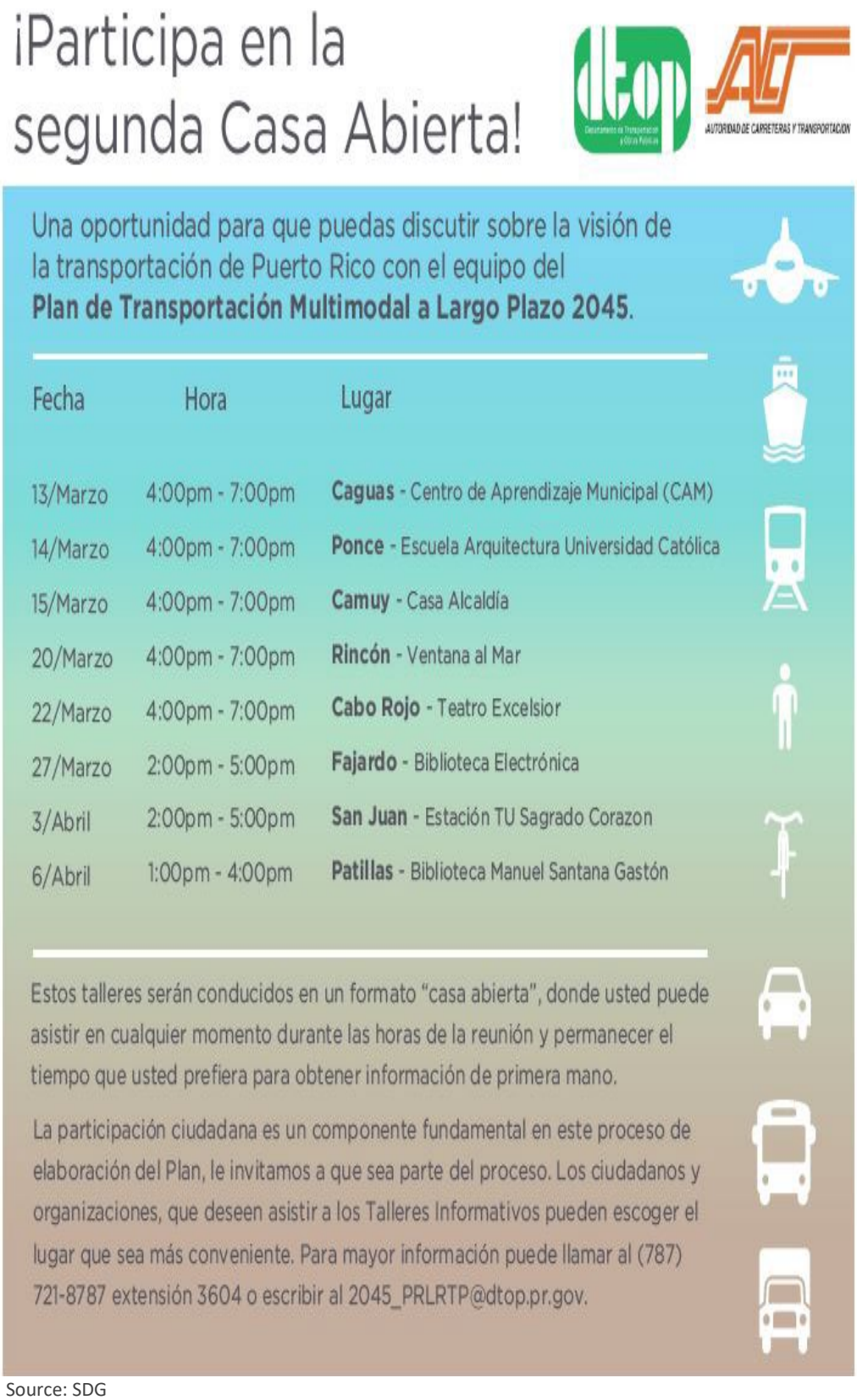
Transporte Colectivo	
Mejoras	
1. Mayor cobertura/ rutas de transporte colectivo en la región	
2. Una parada más cerca de mi casa y de mi lugar de trabajo/ estudio	
3. Más posibilidades de realizar viajes directos	
4. Más seguridad en los vehículos y alrededor de las paradas	
5. Una mejor accesibilidad en las paradas y vehículos	
6. Una disminución del tiempo de espera entre dos vehículos	
7. Tarifas económicas	
8. Información en tiempo real para saber cuándo llegará mi servicio de transporte colectivo	
9.Rutas que conecten centros de actividad alrededor de la isla.	
10. Otro; especifique:	

Source: SDG

Announcement

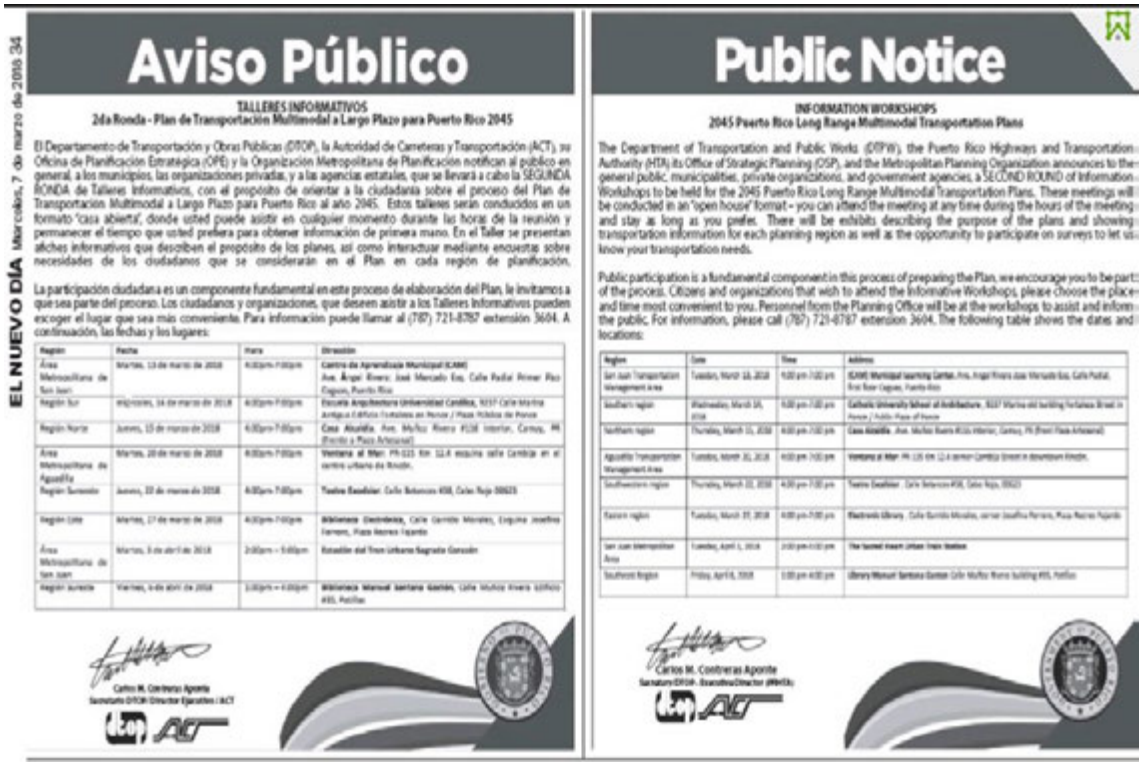
The second round was also announced through a digital platform that included social media and email blast (PRHTA data base). It was also announced through the newspaper, as can be seen in Figure E.96 and Figure E.97.

Figure E.96: Digital Announcement



Source: SDG

Figure E.97: Second Open Hose – Public Notice



Aviso Público

TALLERES INFORMATIVOS
2da Ronda - Plan de Transportación Multimodal a Largo Plazo para Puerto Rico 2045

El Departamento de Transportación y Obras Públicas (DTOP), la Autoridad de Carreteras y Transportación (ACT), su Oficina de Planificación Estratégica (OPE) y la Organización Metropolitana de Planificación notifican al público en general, a los municipios, las organizaciones privadas, y a las agencias estatales, que se llevará a cabo la SEGUNDA RONDA de Talleres Informativos, con el propósito de orientar a la ciudadanía sobre el proceso del Plan de Transportación Multimodal a Largo Plazo para Puerto Rico al año 2045. Estos talleres serán conducidos en un formato 'casa abierta', donde usted puede asistir en cualquier momento durante las horas de la reunión y permanecer el tiempo que usted prefiera para obtener información de primera mano. En el Taller se presentan afiches informativos que describen el propósito de los planes, así como interactuar mediante encuestas sobre necesidades de los ciudadanos que se considerarán en el Plan en cada región de planificación.

La participación ciudadana es un componente fundamental en este proceso de elaboración del Plan, le invitamos a que sea parte del proceso. Los ciudadanos y organizaciones, que deseen asistir a los Talleres Informativos pueden escoger el lugar que sea más conveniente. Para información puede llamar al (787) 721-8787 extensión 3604. A continuación, las fechas y los lugares:

Carlos M. Contreras Aponte
Secretario DTOP- Director Ejecutivo - ACT

Public Notice

INFORMATION WORKSHOPS
2045 Puerto Rico Long Range Multimodal Transportation Plans

The Department of Transportation and Public Works (DTPW), the Puerto Rico Highways and Transportation Authority (HTA) its Office of Strategic Planning (OSP), and the Metropolitan Planning Organization announces to the general public, municipalities, private organizations, and government agencies, a SECOND ROUND of Information Workshops to be held for the 2045 Puerto Rico Long Range Multimodal Transportation Plans. These meetings will be conducted in an 'open house' format - you can attend the meeting at any time during the hours of the meeting and stay as long as you prefer. There will be exhibits describing the purpose of the plans and showing transportation information for each planning region as well as the opportunity to participate on surveys to let us know your transportation needs.

Public participation is a fundamental component in this process of preparing the Plan, we encourage you to be part of the process. Citizens and organizations that wish to attend the Informative Workshops, please choose the place and time most convenient to you. Personnel from the Planning Office will be at the workshops to assist and inform the public. For information, please call (787) 721-8787 extension 3604. The following table shows the dates and locations:

Carlos M. Contreras Aponte
Secretary DTOP- Executive Director (PRHTA)

Source: SDG

Results and Documentation

Caguas and Sagrado Corazón – San Juan TMA

Table E.18 to Table E.20 and Figure E.98 to Figure E.105, show the results, photos and participants list of Caguas and Sagrado Corazón (San Juan TMA).

Table E.18: Participants Agreement with the Vision Presented

Vision Agreement	
Agree	**75%**
Suggestions	**25%**

Source: SDG

Table E.19: Participants Goals Prioritization – San Juan TMA

Goals	Priority Level								
	1 Priority		2 Priority		3 Priority		4 Priority		Total
Goal A	19	76	13	39	5	10	3	3	128
Goal B	7	28	8	24	16	32	9	9	93
Goal C	8	32	16	48	7	14	9	9	103
Goal D	6	24	3	9	12	24	19	19	76

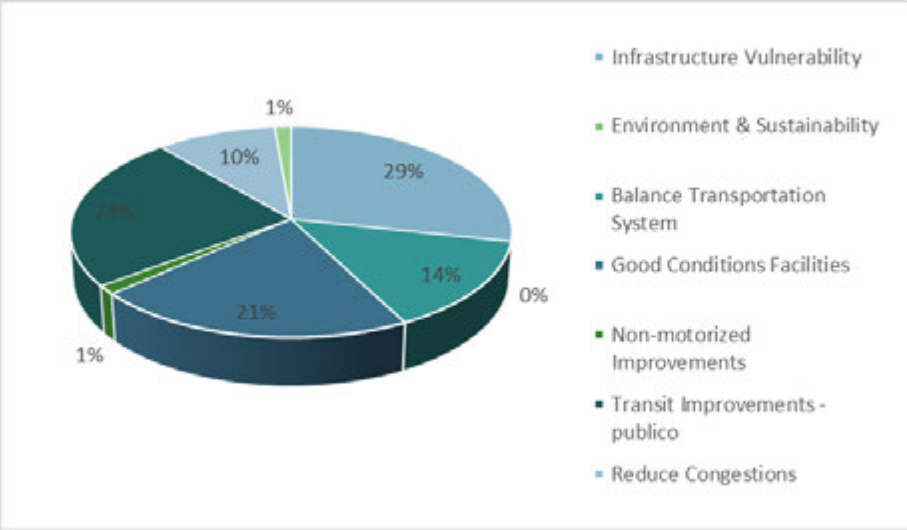
Source: SDG

Table E.20: Participants Objectives Prioritization – San Juan TMA

Objective	Priority Level									Total
	1		2		3		4		5	
Goal A: Improve transportation system performance										
Reduce congestion and travel time	19	95	6	24	1	3	6	12	6	140
Optimize the use of transportation assets and balance the efficiency of previous investments	8	40	8	32	7	21	8	16	6	146
Maintain transportation assets in good condition	11	55	12	48	7	21	5	10	2	171
Improve administrative and operation cost efficiency	5	25	4	16	9	27	6	12	13	117
Improve safety and security of the system and it emergency capability	4	20	6	24	11	33	10	20	7	135
Goal B: Promote environmental sustainability										
Minimize adverse impacts to natural and built environments.	10	50	9	36	8	24	6	12	5	127
Reduce greenhouse gas emissions, energy consumption and improve air quality.	18	90	9	36	3	9	5	10	3	148
Support the integration of land use plans	10	50	7	28	9	27	5	10	7	122
Improve the strategies of alternative modes and travel demand.	5	25	7	28	3	9	11	22	12	96
Reduce the vulnerability of the transportation infrastructure to events and natural disasters.	4	20	5	20	13	39	8	16	8	103
Goal C: Improve transportation mobility and access for people and freight										
Improve connectivity among primary activity centers, including employment, tourism and high density residential districts.	13	65	7	28	4	12	2	4	9	144
Improves system integration between and within modes.	5	25	3	12	7	21	5	10	14	102
Increase travel options for residents, visitors and workers	12	60	9	36	6	18	4	8	3	0
Concentrate investments in the areas of greatest benefit to the user.	4	20	5	20	8	24	14	28	3	126
Facilitate access to transportation to disadvantaged populations.	10	50	9	36	6	18	6	12	4	151
Goal D: Reinforce economic vitality										
Improve economic competitiveness by facilitating the efficient movement of goods and services	15	45	12	24	6		n/a		n/a	75
Public-private opportunities	4	12	13	26	16		n/a		n/a	54
Provide strategic connectivity and capacity in the network throughout Puerto Rico	19	57	7	14	9		n/a		n/a	80

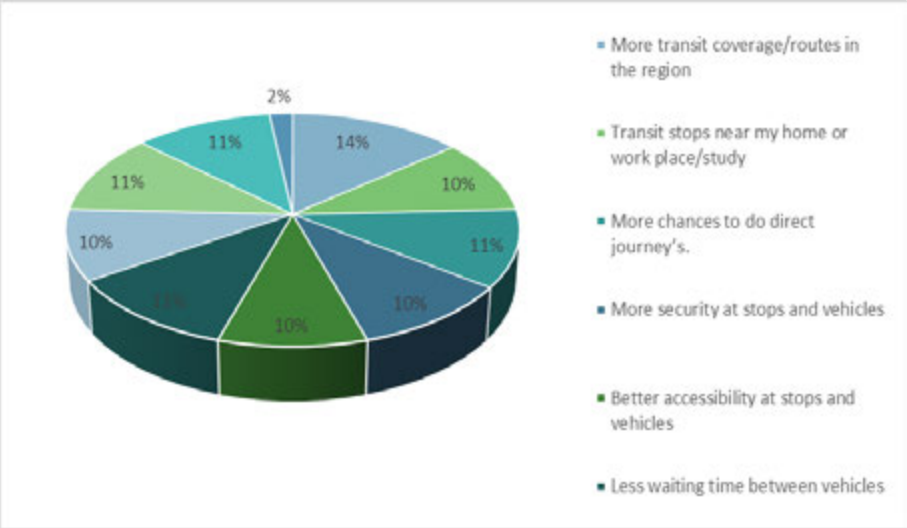
Source: SDG

Figure E.98: Transportation Strategies – San Juan TMA



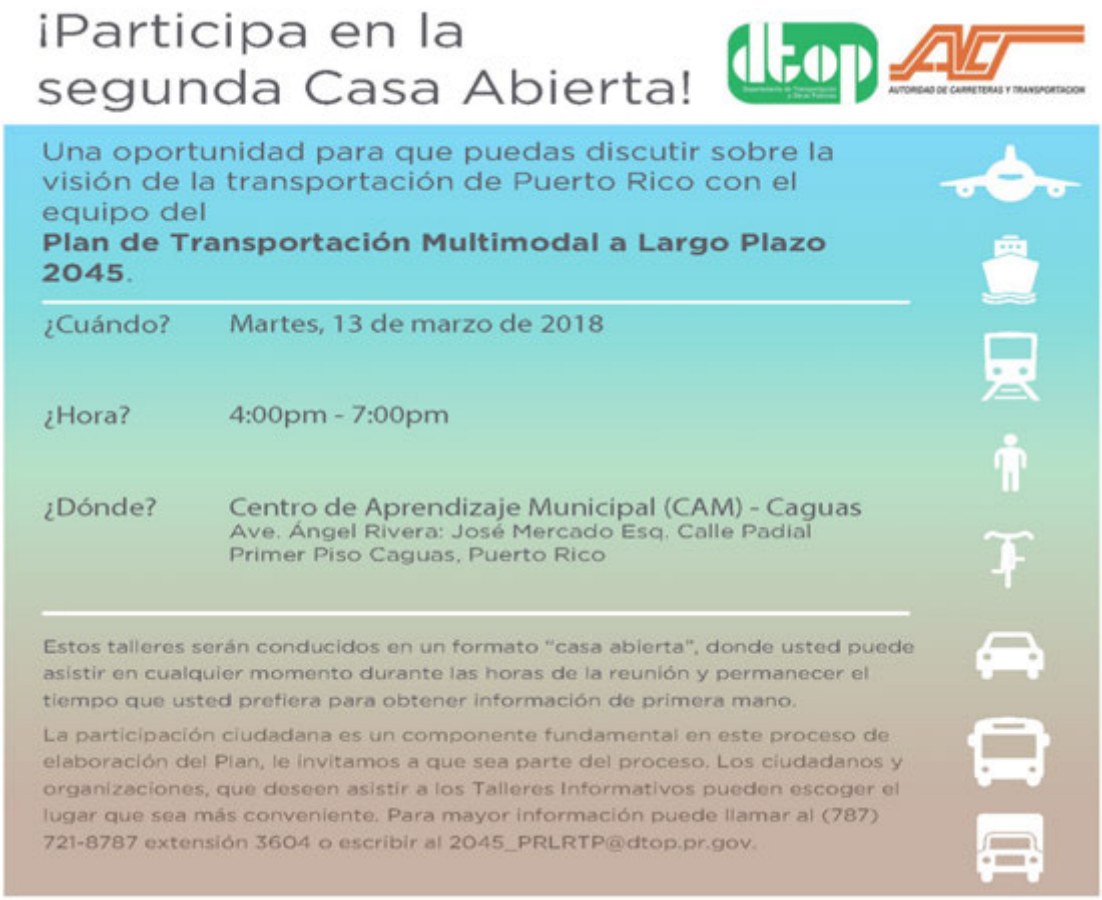
Source: SDG

Figure E.99: Transit Improvements – San Juan TMA



Source: SDG

Figure E.100: Announcement – Caguas



Source: SDG

Figure E.101: Open House Participants – Caguas

Source: SDG

Figure E.102: Attendance Lists – Caguas

2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

13 de marzo de 2018 | 4:00pm – 7:00pm | Centro de Aprendizaje Municipal (CAM)| Caguas

Nombre / Organización		Teléfono	Correo electrónico	Firma
1. Melissa Torres		(787)586-9279	melissatorres1997@gmail.com	Melissa Torres
2. Carlos Virella García		(787)603-6046	cvirella@dtop.pr.gov	[illegible]
3. Natasha Rivera Hdz	SDG	787-721-2002		[illegible]
4. Lourdes López Oliveras		(939)599-2687		Lourdes López Oliveras
5. Yesenia Cruz	SDG	787-721-2002		[illegible]
6. Orlando Fontánez	O.F.F.	787-239-5385		Orlando Fontánez
7. Lymarie Urbina	CSA Arch + Eng	787-645-7329	Lurbina@csagroup.com	[illegible]
8. Sandra Velázquez	Ayudante Ejecutiva de Alcalde	(787) 723-4807	svelazquez@caguas.gov.pr	[illegible]
9.				
10.				

4 de 15

2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

13 de marzo de 2018 | 4:00pm – 7:00pm | Centro de Aprendizaje Municipal (CAM)| Caguas

Nombre / Organización		Teléfono	Correo electrónico	Firma
1. Iris D. García	Oficina de Plan. Fiscal	787.653.8833 x2500	igarcia@caguas.gov.pr	[illegible]
2. María del C. de Jesús / Autoridad de Carreteras		723-4200 x1657	[illegible]@dtop.pr.gov	María del C. de Jesús [illegible]
3. Carmen Del Río / Asociación de Residentes Nuevo Renacer Inc. Barrio Turabo		787-614-2977	cdelrio777@yahoo.com	[illegible]
4. Luis D. López / Fdwa		404-807-6420	luis.d.lopez@dot.gov	[illegible]
5. Marisol Laureano		787-758-0734	[illegible]	Marisol Laureano
6.				
7.				
8.				
9.				
10.				

Source: SDG

Sagrado Corazón

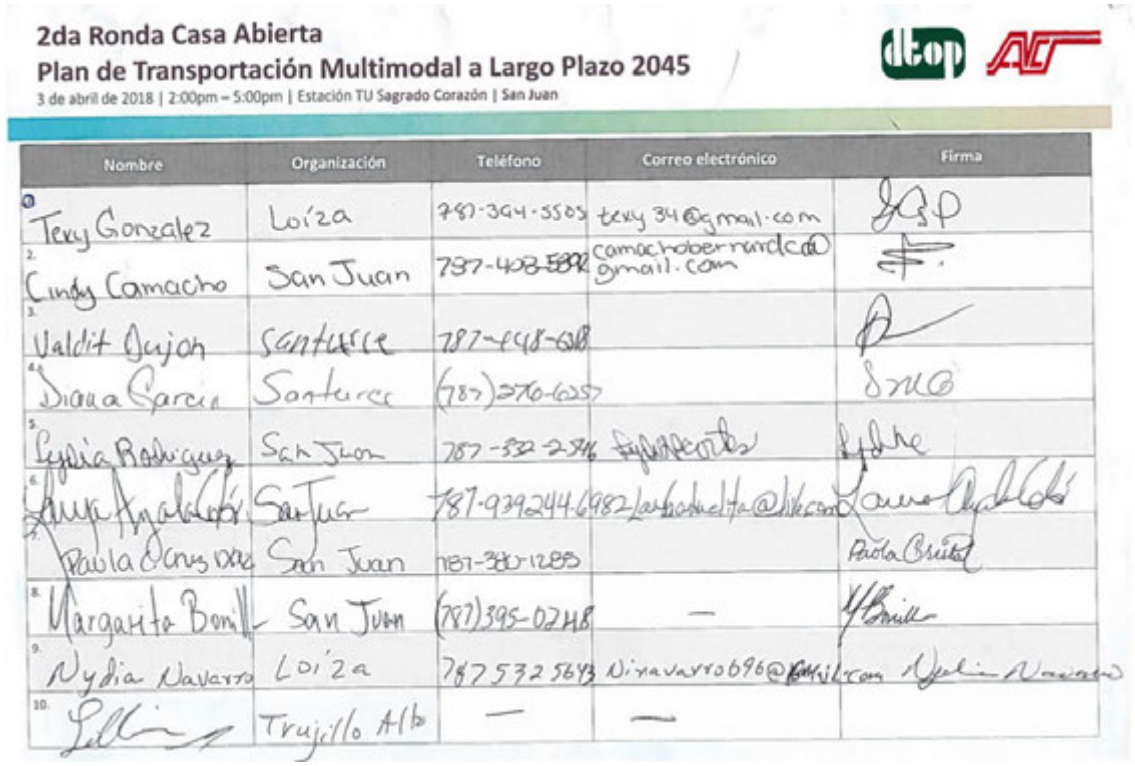
Figure E.103: Announcement –Sagrado Corazón

Source: SDG

Figure E.104: Open House Participants – Sagrado Corazón

Source: SDG

Figure E.105: Attendance Lists – Sagrado Corazón



2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
3 de abril de 2018 | 2:00pm – 5:00pm | Estación TU Sagrado Corazón | San Juan

	Nombre	Organización	Teléfono	Correo electrónico	Firma
1.	Texy Gonzalez	Loíza	787-364-3585	texy 34@gmail.com	
2.	Cindy Camacho	San Juan	787-408-5892	camachoberrardca@gmail.com	
3.	Valdit Dujon	Santurce	787-448-618		
4.	Diana Garcia	Santurce	(787)370-6257		
5.	Cynthia Rodriguez	San Juan	787-532-2346		
6.		San Juan	787-939244-6982		
7.	Paula Davis	San Juan	787-380-1285		
8.	Margarita Bonilla	San Juan	(787)395-0248	—	
9.	Nydia Navarro	Loíza	787 532 5643	Nivavarro696@	
10.		Trujillo Alto	—	—	

2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

3 de abril de 2018 | 2:00pm – 5:00pm | Estación TU Sagrado Corazón | San Juan

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. Jesús Ortiz		348-0247		Jesús Ortiz
2. [illegible]		787-585-9708		
3. [illegible]		939-538-5948		
4. Jesús Quiñones		748-3897		Jesús Quiñones
5. María Luisa Otero		787 690-0191		María L. Otero
6. Carmen López		(787) 367-6060		[illegible]
7. Rubén Rosales		787-359-5951	rposalesesungurnciudadpatria.com	[illegible]
8. Melba Díaz		787-245-4307	mediaz@dtop.pr.gov	[illegible]
9. [illegible]		787-6685[illegible]		
10. Altagracia D		" " 6685[illegible]		A D

2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

3 de abril de 2018 | 2:00pm – 5:00pm | Estación TU Sagrado Corazón | San Juan

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. Laura Rivera Ramírez	Residente MSJ	(787)405-9623	[illegible]@gmail.com	[illegible]
2. Carmencita Baez	Residente Carolina	[redacted] 939-290-0909	carmencitabaez@gmail.com	[illegible]
3. Víctor M. García	Residente Corozal	(787) 297-0899		[illegible]
4. José Gonzalez Mangual	Residente San Juan	([redacted]) 939-400-7054	josegonzalezmangual@gmail.com	[illegible]
5. Luis Falero Morales	Res. de San Juan	787-671-4364	luisfalero03@gmail.com	[illegible]
6. Sonia Alvarez	San José	787-902-0599	margarita1912@outlook.com	[illegible]
7. Marcelo García	San Juan	(787) 368-7534	gmanele1919@gmail.com	[illegible]
8. Luis A. Morales	San Juan	787564[illegible]	armandoluis95@yahoo.com	[illegible]
9. Angel Luis Quiles	[illegible]	787 443[illegible]		[illegible]
10. M Amanda del [illegible]	San Juan	787-214-[illegible]		[illegible]

2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

3 de abril de 2018 | 2:00pm – 5:00pm | Estación TU Sagrado Corazón | San Juan

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. Karen Rdgz	Chef	(787) 940-3451	Kerodriguez2417@gmail.com	[signature]
2. Felix Martinez	Estudiante	(787) 367-3755	felixjaviermartinez@gmail.com	[signature]
3. Zorynelly Silver	Estudiante	939 585 0933	nelly.silverte@gmail	[signature]
4. [illegible]		787 598 2137		[signature]
5.				
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2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

3 de abril de 2018 | 2:00pm – 5:00pm | Estación TU Sagrado Corazón | San Juan

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. Eric Miguel Santiago		787 223-0108		
2. Nitza Viader		787-757-6080		
3. Marcela Mauri		787-450-6903		
4. No identificación				
5. Ana M. Díaz [illegible]		(787)-407-2781		
6. Jo[illegible]ces Cruz		(787) 210-2066		
7. Silvia García		(787) 209-9079		
8.				
9.				
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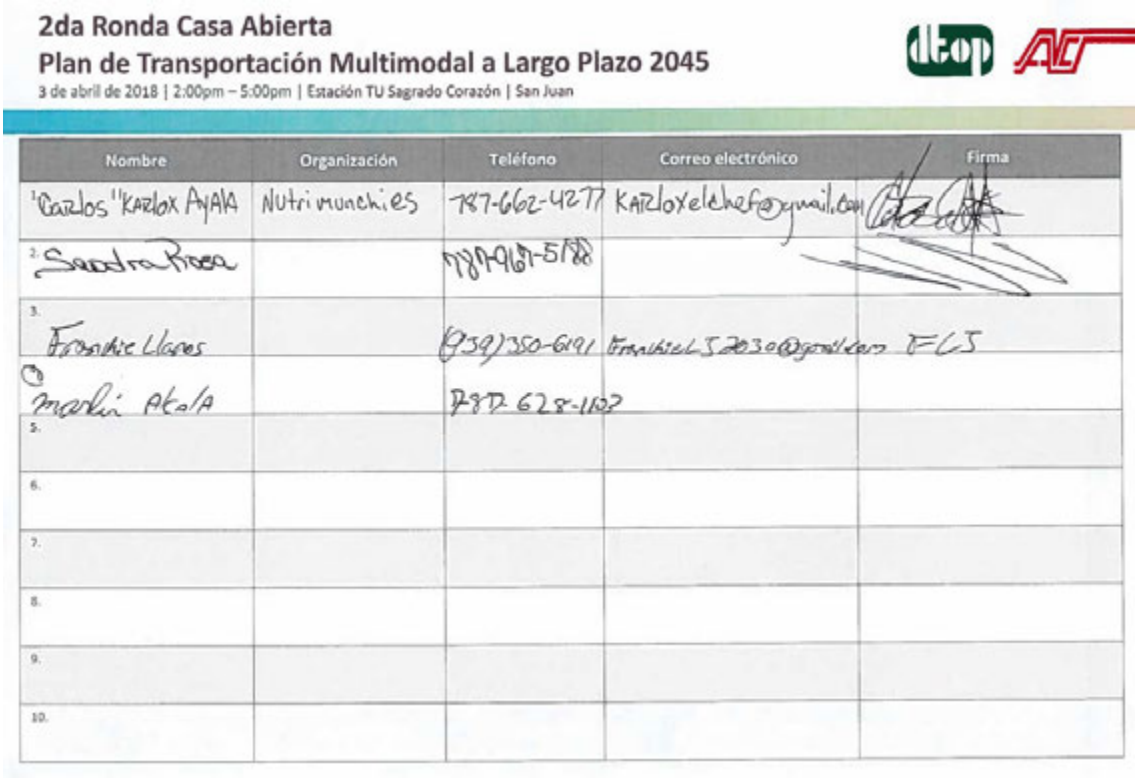

2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
3 de abril de 2018 | 2:00pm – 5:00pm | Estación TU Sagrado Corazón | San Juan

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. "Carlos "Karlox Ayala	Nutrimunchies	787-662-4277	karloxelchefe@gmail.com	
2. Sandra Rosa		787-967-5788		
3. Frankie Llanos		(939) 350-6191	frankiell52030@gmail.com	FLS
4. Marli Ayala		787-628-1102		
5.				
6.				
7.				
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9.				
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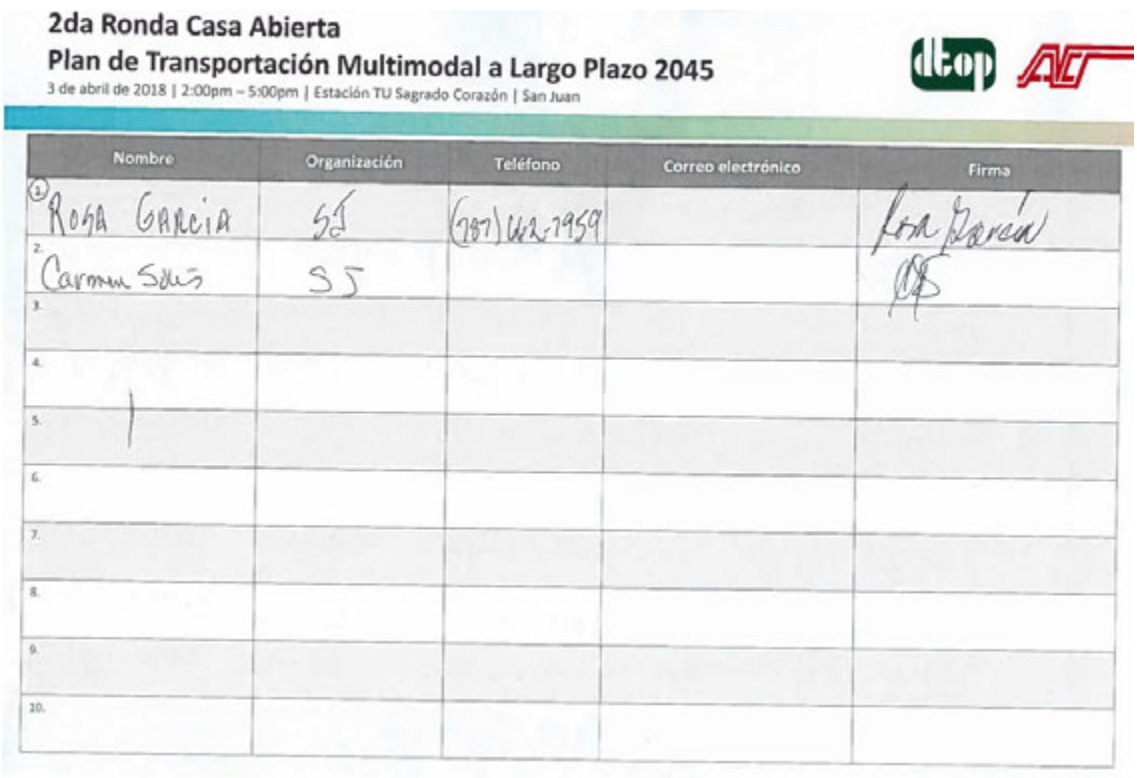


2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
3 de abril de 2018 | 2:00pm – 5:00pm | Estación TU Sagrado Corazón | San Juan

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. Rosa García	SJ	(787) 462-7959		
2. Carmen Solís	SJ			
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Source: SDG

Rincón – Aguadilla TMA

Table E.21 to Table E.23 and Figure E.106 to Figure E.110, show the results, photos and participants list of Rincón (Aguadilla TMA).

Table E.21: Participants Agreement with the Vision – Rincón (Aguadilla TMA)

Vision Agreement	
Agree	**50%**
Suggestions	**50%**

Source: SDG

Table E.22: Participants Goals Prioritization – Rincón (Aguadilla TMA)

Goals	Priority Level								
	1 Priority		2 Priority		3 Priority		4 Priority		Total
Goal A	1	4	1	3	1	2	0	0	9
Goal B	1	4	1	3	1	2	0	0	9
Goal C	1	4	0	0	1	2	1	1	7
Goal D	0	0	1	3	0	0	2	2	5

Source: SDG

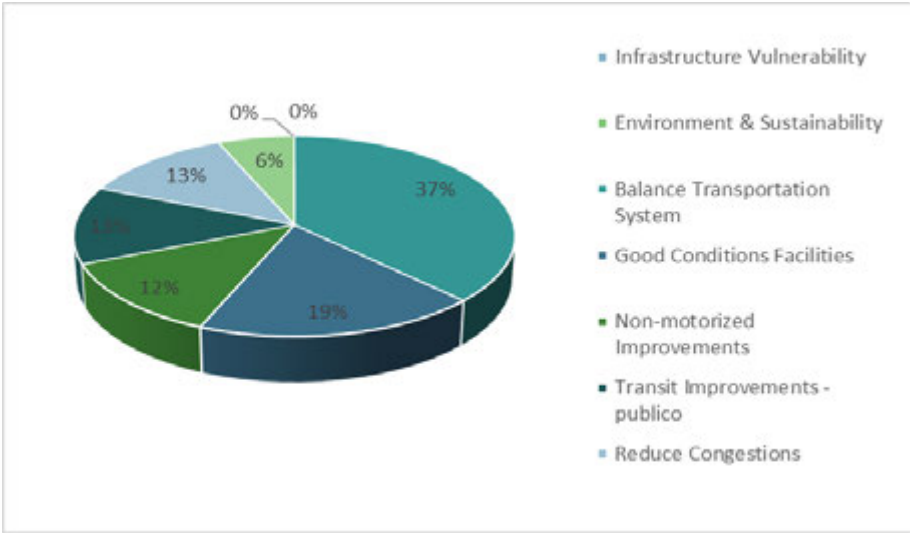
Table E.23: Participants Objectives Prioritization – Rincón (Aguadilla TMA)

Objective	Priority Level									
	1		2		3		4		5	Total
Goal A: Improve transportation system performance										
Reduce congestion and travel time	0	0	1	4	1	3	1	2	1	10
Optimize the use of transportation assets and balance the efficiency of previous investments	28	10	0	0	1	3	0	0	1	14
Maintain transportation assets in good condition	1	5	0	0	1	3	1	2	1	11
Improve administrative and operation cost efficiency	0	0	2	8	1	3	1	2	0	13
Improve safety and security of the system and it emergency capability	1	5	1	4	0	0	1	2	1	12
Goal B: Promote environmental sustainability										
Minimize adverse impacts to natural and built environments.	0	0	0	0	3	9	1	2	0	11
Reduce greenhouse gas emissions, energy consumption and improve air quality.	0	0	1	4	0	0	0	0	3	7
Support the integration of land use plans	2	10	1	4	0	0	1	2	0	16
Improve the strategies of alternative modes and travel demand.	1	5	1	4	0	0	1	2	1	12

Objective	Priority Level									Total
	1		2		3		4		5	
Reduce the vulnerability of the transportation infrastructure to events and natural disasters.	1	5	0	0	1	3	1	2	0	10
Goal C: Improve transportation mobility and access for people and freight										
Improve connectivity among primary activity centers, including employment, tourism and high density residential districts.	2	10	1	4	0	0	0	0	1	15
Improves system integration between and within modes.	0	0	1	4	2	6	1	2	0	12
Increase travel options for residents, visitors and workers	2	10	0	0	1	3	1	2	0	15
Concentrate investments in the areas of greatest benefit to the user.	0	0	1	4	0	0	2	4	1	9
Facilitate access to transportation to disadvantaged populations.	0	0	1	4	1	3	0	0	2	9
Goal D: Reinforce economic vitality										
Improve economic competitiveness by facilitating the efficient movement of goods and services	2	6	1	2	1		n/a		n/a	9
Public-private opportunities	0	0	3	6	1		n/a		n/a	7
Provide strategic connectivity and capacity in the network throughout Puerto Rico	2	6	0	0	2		n/a		n/a	8

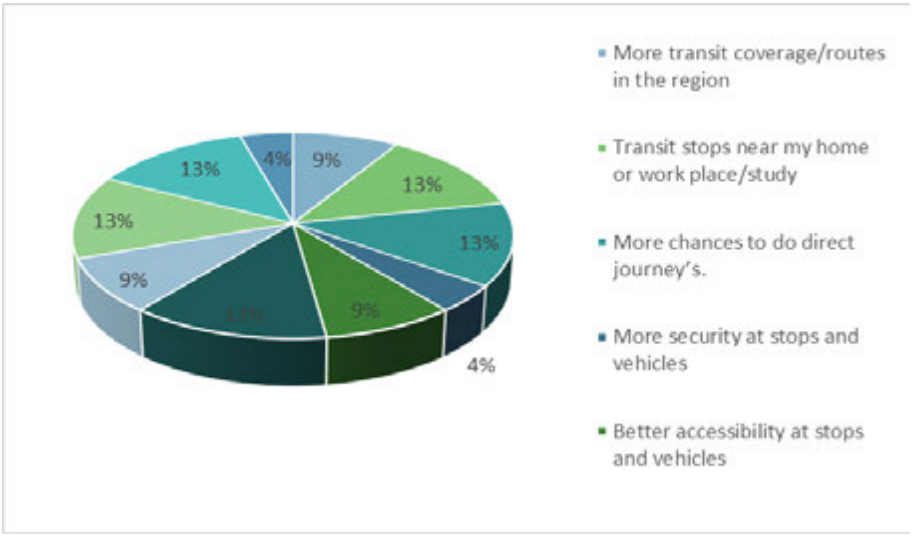
Source: SDG

Figure E.106: Transportation Strategies – Rincón (Aguadilla TMA)



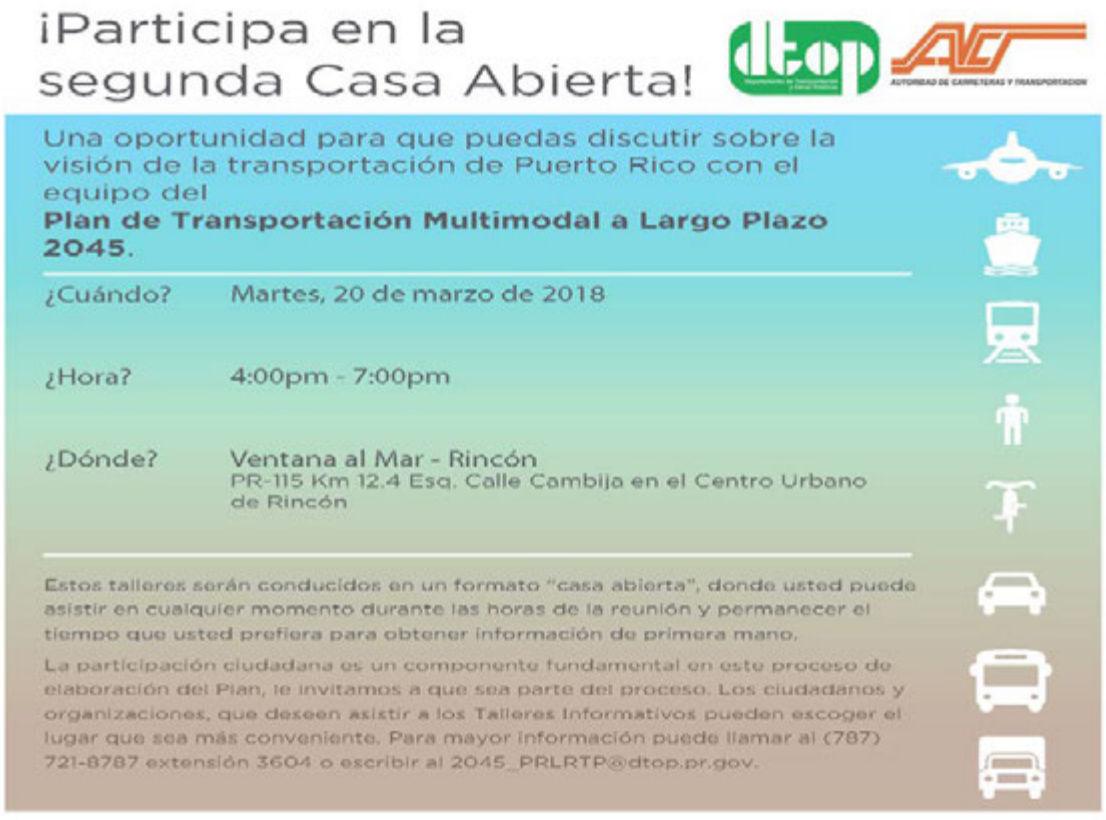
Source: SDG

Figure E.17: Transit Improvements – Rincón (Aguadilla TMA)



Source: SDG

Figure E.108: Announcement – Rincón



Source: SDG

Figure E.109: Attendance Lists – Rincón

Source: SDG

Figure E.110: Attendance Lists – Rincón

2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
20 de marzo de 2018 | 4:00pm – 7:00pm | Ventana al Mar | Rincón

	Nombre	Organización	Teléfono	Correo electrónico	Firma
1.	Felix [illegible]	MMPPO	787-316-5[illegible]	[illegible]@[illegible]	[illegible]
2.	Carlos G. Colón	Mun Rincón	787-234-0001	ccolon@rincon.gov.pr	[illegible]
3.	Feli José Jiménez	Escultór	787-649-4626	jimmen@ymail.com	[illegible]
4.	Natasha Rivera		787-319-5204	natasha.rivera@gmail.com	[illegible]
5.	Marisol Tornuella	Galería Café	(787)671-8897	tornuella46@gmail.	[illegible]
6.					
7.					
8.					
9.					
10.					

Source: SDG

Cabo Rojo

Table E.24 to Table E.26 and Figure E.111 to Figure E.115, show the results, photos and participants list of Cabo Rojo (Southwest Region).

Table E.24: Participants Agreement with the Vision – Cabo Rojo (Southwest Region)

Vision Agreement	
Agree	**92%**
Suggestions	**8%**

Source: SDG

Table E.25: Participants Goals Prioritization – Cabo Rojo (Southwest Region)

Goals	Priority Level								
	1 Priority		2 Priority		3 Priority		4 Priority		Total
Goal A	1	4	0	0	5	10	2	2	16
Goal B	0	0	0	0	0	0	0	0	0
Goal C	4	16	2	6	3	6	3	3	31
Goal D	3	12	3	9	4	8	2	2	31

Source: SDG

Table E.26: Participants Objectives Prioritization – Cabo Rojo (Southwest Region)

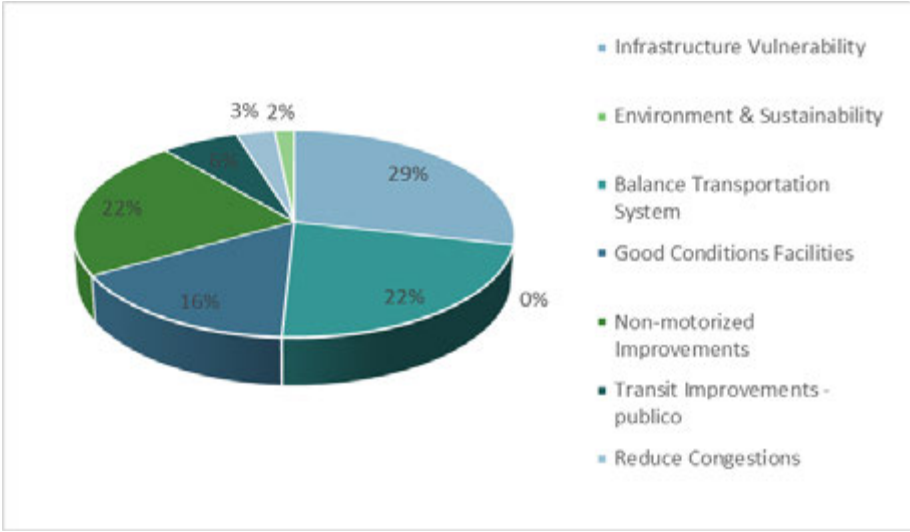
Objective	Priority Level										
	1		2		3		4		5		Total
Goal A: Improve transportation system performance											
Reduce congestion and travel time	5	25	2	8	3	9	2	4	0	0	46
Optimize the use of transportation assets and balance the efficiency of previous investments	1	5	2	8	2	6	4	8	3	3	30
Maintain transportation assets in good condition	2	10	4	16	3	9	2	4	1	1	40
Improve administrative and operation cost efficiency	1	5	1	4	2	6	3	6	5	5	26
Improve safety and security of the system and it emergency capability	3	15	3	12	2	6	1	2	3	3	38
Goal B: Promote environmental sustainability											

Objective	Priority Level										
	1		2		3		4		5		Total
Minimize adverse impacts to natural and built environments.	2	10	3	12	5	15	1	2	1	1	40
Reduce greenhouse gas emissions, energy consumption and improve air quality.	4	20	3	12	0	0	4	8	1	1	41
Support the integration of land use plans	5	25	1	4	1	3	3	6	2	2	40
Improve the strategies of alternative modes and travel demand.	0	0	1	4	3	9	1	2	7	7	22
Reduce the vulnerability of the transportation infrastructure to events and natural disasters.	1	5	3	12	3	9	3	6	1	1	33
Goal C: Improve transportation mobility and access for people and freight											
Improve connectivity among primary activity centers, including employment, tourism and high density residential districts.	4	20	3	12	4	12	1	2	0	0	46
Improves system integration between and within modes.	0	0	2	8	2	6	3	6	5	5	25
Increase travel options for residents, visitors and workers	3	15	2	8	3	9	3	6	1	1	39

Objective	Priority Level										
	1		2		3		4		5		Total
Concentrate investments in the areas of greatest benefit to the user.	1	5	1	4	2	6	3	6	5	5	26
Facilitate access to transportation to disadvantaged populations.	4	20	4	16	1	3	2	4	1	1	44
Goal D: Reinforce economic vitality											
Improve economic competitiveness by facilitating the efficient movement of goods and services	4	12	5	10	3		3		n/a	n/a	25
Public-private opportunities	3	9	2	4	7		7		n/a	n/a	20
Provide strategic connectivity and capacity in the network throughout Puerto Rico	5	15	5	10	2		2		n/a	n/a	27

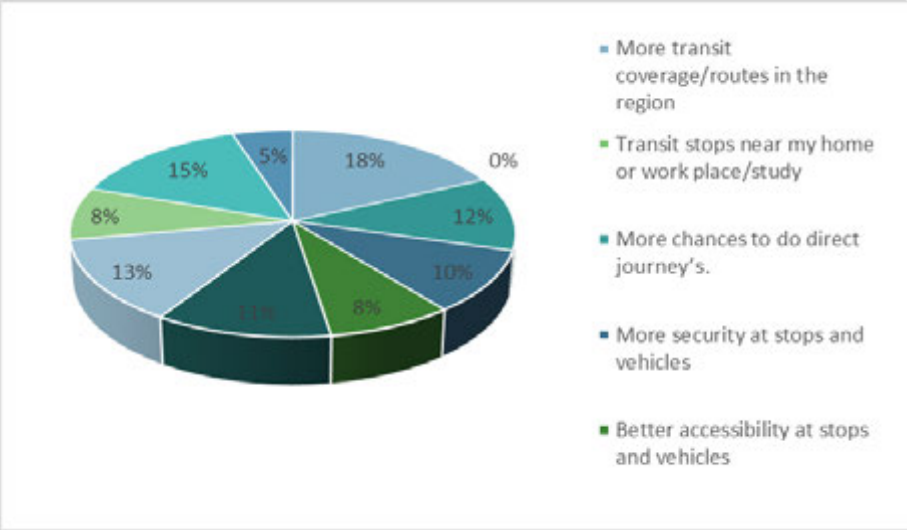
Source: SDG

Figure E.111: Transportation Strategies – Cabo Rojo (Southwest Region)



Source: SDG

Figure E.112: Transit Improvements – Cabo Rojo (Southwest Region)



Source: SDG

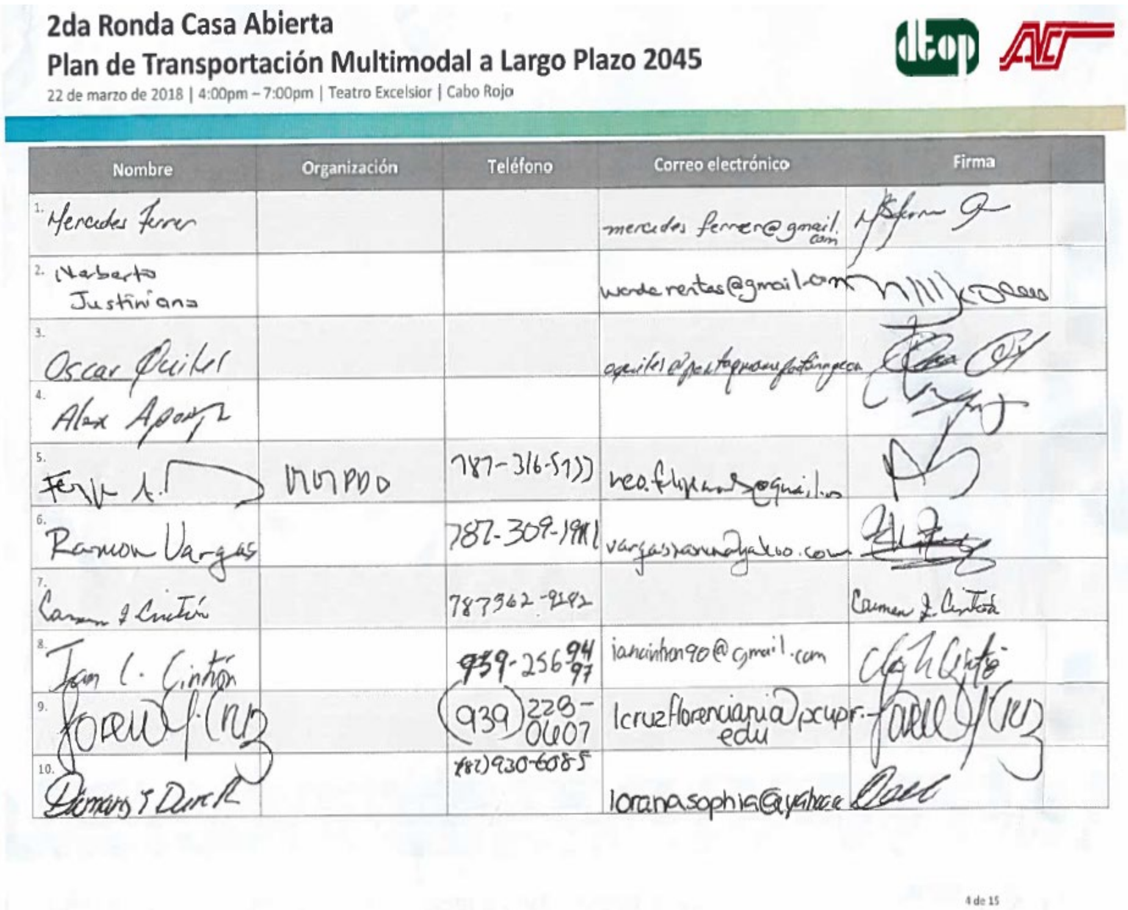
Figure E.113: Announcement – Cabo Rojo (Southwest Region)

Source: SDG

Figure E.114: Open House Participants – Cabo Rojo

Source: SDG

Figure E.115: Attendance Lists – Cabo Rojo



2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
22 de marzo de 2018 | 4:00pm – 7:00pm | Teatro Excelsior | Cabo Rojo

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. Mercedes Ferrer			mercedesferrer@gmail.com	
2. Norberto Justiniano			wendarentas@gmail.com	
3. Oscar Quiles			oquiles@[illegible]	
4. Alex Aponte				
5. Felipe A. [illegible]	[illegible]	787-316-5133	[illegible]	
6. Ramon Vargas		787-309-1981	vargasramon@yahoo.com	
7. Carmen J. Cintrón		787-362-9192		Carmen J. Cintrón
8. Ian L. Cintrón		939-256-9497	iancintron90@gmail.com	
9. [illegible] Cruz		(939) 228-0607	lcruzflorenciani@pucpr.edu	
10. [illegible]		(787) 930-6085	loranasophia@yahoo	

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2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
22 de marzo de 2018 | 4:00pm – 7:00pm | Teatro Excelsior | Cabo Rojo

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. Brian Ramos Grivas		787-367-5273		
2. Wilmarie Plaza				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Source: SDG

Camuy

Table E.27 to Table E.29 and Figure E.116 to Figure E.120, show the results, photos and participants list of Camuy (North Region).

Table E.27: Participants Agreement with the Vision – Camuy (North Region)

Vision Agreement	
Agree	**69%**
Suggestions	**31%**

Source: SDG

Table E.28: Participants Goals Prioritization – Camuy (North Region)

Goals	Priority Level								
	1 Priority		2 Priority		3 Priority		4 Priority		Total
Goal A	3	12	7	21	1	2	1	1	36
Goal B	3	0	2	0	1	0	6	0	0
Goal C	3	12	3	9	2	4	4	4	29
Goal D	3	12	0	0	8	16	1	1	29

Source: SDG

Table E.29: Participants Objectives Prioritization – Camuy (North Region)

Objective	Priority Level					
	1	2	3	4	5	Total
Goal A: Improve transportation system performance						

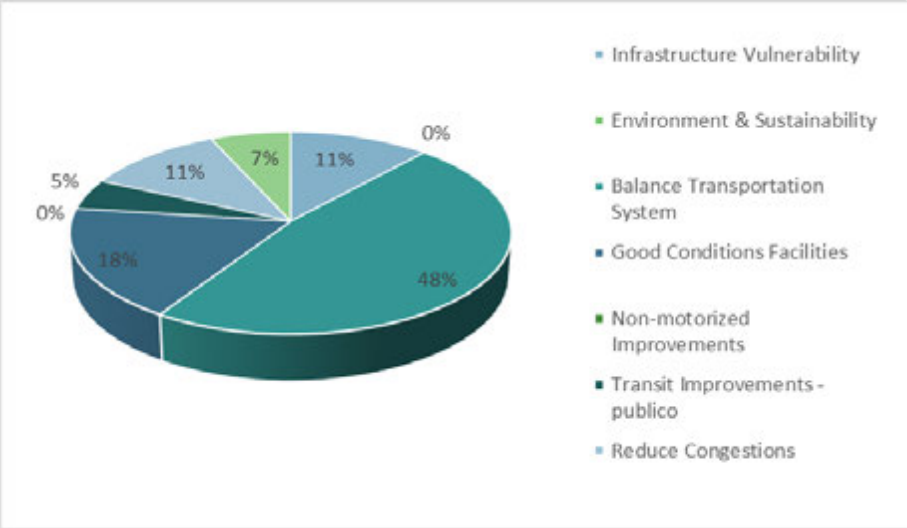
Objective	Priority Level										
	1		2		3		4		5		Total
Reduce congestion and travel time	4	20	4	16	2	6	1	2	1	1	45
Optimize the use of transportation assets and balance the efficiency of previous investments	4	20	2	8	2	6	3	6	1	1	41
Maintain transportation assets in good condition	1	5	1	4	5	15	2	4	4	4	32
Improve administrative and operation cost efficiency	0	0	2	8	2	6	4	8	4	4	26
Improve safety and security of the system and it emergency capability	4	20	3	12	1	3	2	4	2	2	41
Goal B: Promote environmental sustainability											
Minimize adverse impacts to natural and built environments.	1	5	3	12	5	15	1	2	2	2	36
Reduce greenhouse gas emissions, energy consumption and improve air quality.	4	20	2	8	1	3	1	2	5	5	38
Support the integration of land use plans	3	15	4	16	2	6	1	2	2	2	41
Improve the strategies of alternative modes and travel demand.	0	0	0	0	5	15	3	6	4	4	25

Objective	Priority Level										
	1		2		3		4		5		Total
Reduce the vulnerability of the transportation infrastructure to events and natural disasters.	4	20	2	8	0	0	5	10	1	1	39
Goal C: Improve transportation mobility and access for people and freight											
Improve connectivity among primary activity centers, including employment, tourism and high density residential districts.	4	20	4	16	1	3	3	6	1	1	46
Improves system integration between and within modes.	0	0	3	12	2	6	1	2	6	6	26
Increase travel options for residents, visitors and workers	1	5	2	8	5	15	3	6	1	1	35
Concentrate investments in the areas of greatest benefit to the user.	1	5	3	12	5	15	3	6	0	0	38
Facilitate access to transportation to disadvantaged populations.	6	30	1	4	0	0	1	2	4	4	40
Goal D: Reinforce economic vitality											
Improve economic competitiveness by facilitating the efficient movement of goods and services	4	12	8	16	1		1		n/a	n/a	29
Public-private opportunities	2	6	2	4	8		8		n/a	n/a	18

Objective	Priority Level								
	1		2		3	4	5		Total
Provide strategic connectivity and capacity in the network throughout Puerto Rico	6	18	2	4	4	4	n/a	n/a	26

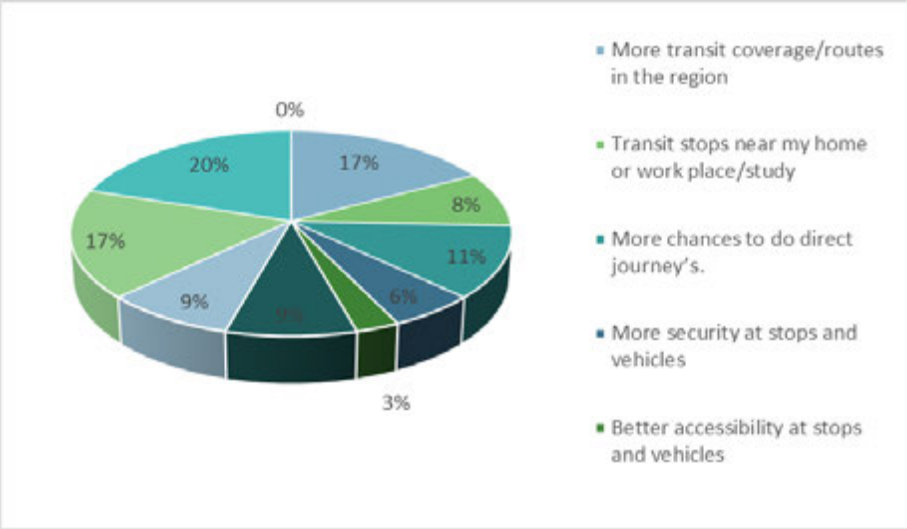
Source: SDG

Figure E.116: Transportation Strategies – Camuy (North Region)



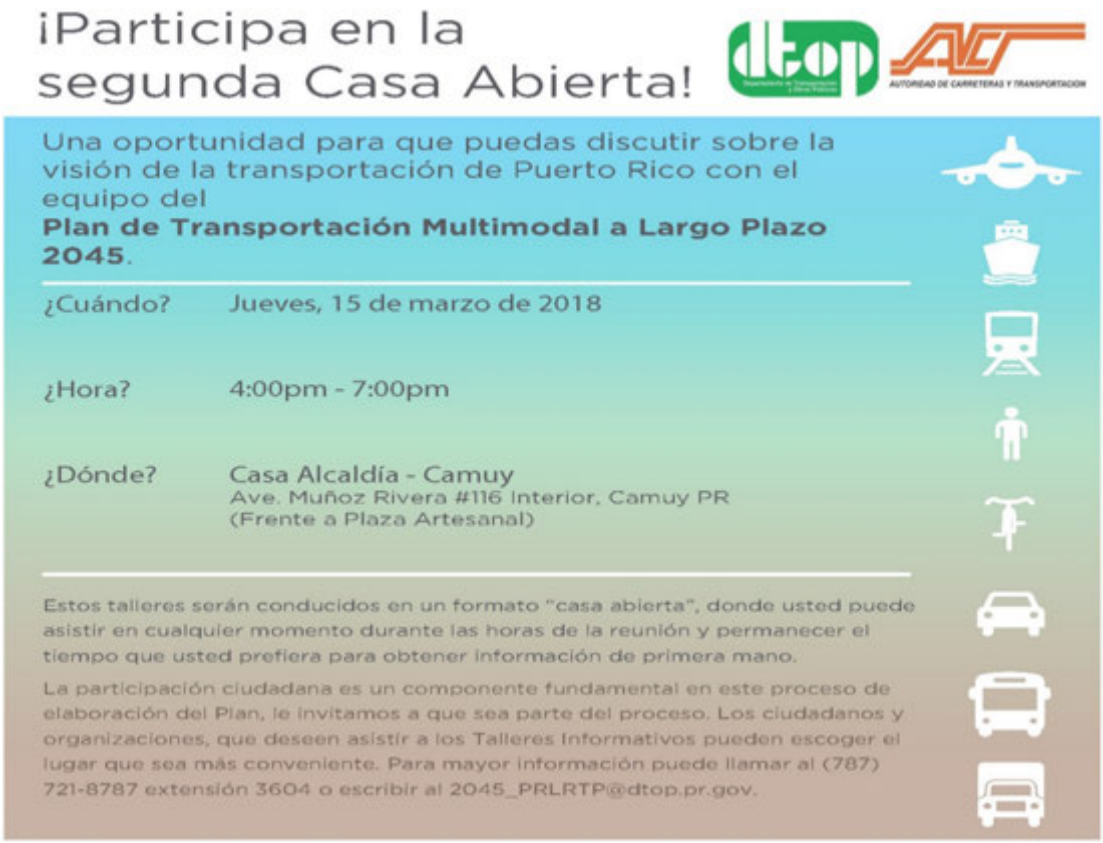
Source: SDG

Figure E.117: Transit Improvements – Camuy (North Region)



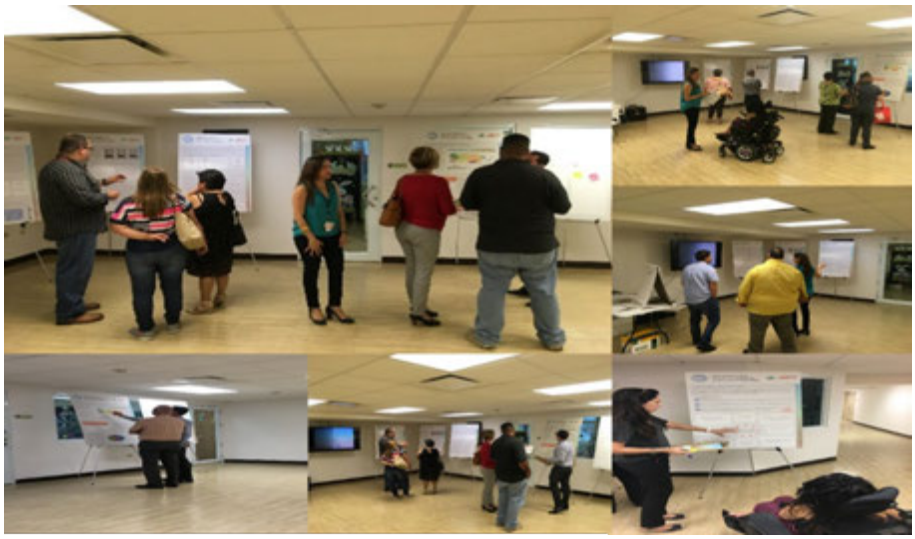
Source: SDG

Figure E.118: Announcement – Camuy



Source: SDG

Figure E.119: Open House Participants – Camuy (North Region)



Source: SDG

Figure E.120: Attendance Lists – Camuy

2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

15 de marzo de 2018 | 4:00pm – 7:00pm | Casa Alcaldía | Camuy

	Nombre	Organización	Teléfono	Correo electrónico	Firma
1.	Mary N. Santiago	Municipio de Camuy	898-2160		[illegible]
2.	Yolanda Nieves	" "	" "		[illegible]
3.	[illegible]	"	"		[illegible]
4.	[illegible]	"	"		[illegible]
5.	Clara I. Rodríguez	M " Camuy	898-2160		[illegible]
6.	Roberto [illegible]	Mun Camuy	8982160		[illegible]
7.	Awilda Martínez	Mun. Camuy	898-1988	secretaria.camuy@yahoo.com	[illegible]
8.	María Moya Méndez	Mun. Camuy	898-2160	copcamuy@yahoo.co	[illegible]
9.	[illegible] Nieves [illegible]	Mun. Camuy	898-2160	enieves8935@yahoo.com	[illegible]
10.	Velma Nogueras	Mun Camuy	898-2160	recurhumanoscamuy[illegible]	[illegible]

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2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

15 de marzo de 2018 | 4:00pm – 7:00pm | Casa Alcaldía | Camuy

	Nombre	Organización	Teléfono	Correo electrónico	Firma
1.	Yelitza Tirado	Municipio Camuy	787-451-6387	yelitzatirado@gmail.com	[illegible]
2.	Antonio Hernández		787-452-8764	tonito_1976@hotmail.com	[illegible]
3.	Dennis R. Román	Consultor Municipios	787-567-2518	roman.dennis@[illegible]	[illegible]
4.	Edwin García	Municipio de Camuy	787-618-4339	[illegible]@yahoo.com	[illegible]
5.	Eleazar [illegible]	Cámara de Representantes Distrito 15	787-324-2131	[illegible]@hotmail.com	[illegible]
6.					
7.					
8.					
9.					
10.					

Source: SDG

Fajardo

Table E.30 to Table E.32 and Figure E.121 to Figure E.125, show the results, photos and participants list of Fajardo (East Region).

Table E.30: Participants Agreement with the Vision – Fajardo (East Region)

Table E.31: Participants Agreement with the Vision – Fajardo (East Region) Vision Agreement	
Agree	**75%**
Suggestions	**25%**

Source: SDG

Table E.31: Participants Goals Prioritization – Fajardo (East Region)

Goals	Priority Level								
	1 Priority		2 Priority		3 Priority		4 Priority		Total
Goal A	3	12	3	9	4	8	2	2	31
Goal B	5	20	3	9	3	6	1	1	36
Goal C	3	12	1	3	4	8	4	4	27
Goal D	1	4	1	3	1	2	1	1	10

Source: SDG

Table E.32: Participants Objectives Prioritization – Fajardo (East Region)

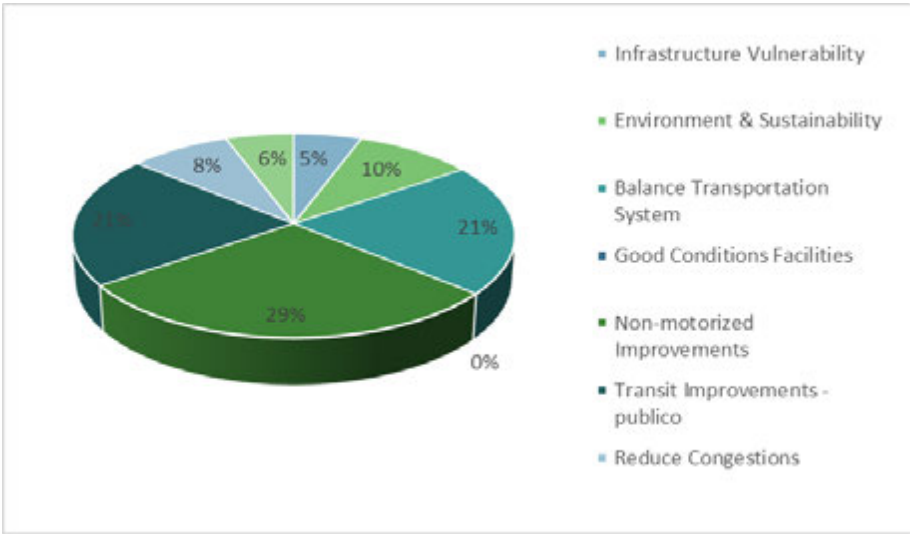
Objective	Priority Level										
	1		2		3		4		5		Total
Goal A: Improve transportation system performance											
Reduce congestion and travel time	1	5	1	4	1	3	1	2	7	7	21
Optimize the use of transportation assets and balance the efficiency of previous investments	3	15	2	8	1	3	4	8	1	1	35
Maintain transportation assets in good condition	3	15	1	4	5	15	1	2	1	1	37
Improve administrative and operation cost efficiency	2	10	4	16	1	3	3	6	1	1	36

Objective	Priority Level										
	1		2		3		4		5		Total
Improve safety and security of the system and it emergency capability	2	10	3	12	3	9	2	4	1	1	36
Goal B: Promote environmental sustainability											
Minimize adverse impacts to natural and built environments.	3	15	1	4	4	12	3	6	0	0	37
Reduce greenhouse gas emissions, energy consumption and improve air quality.	5	25	2	8	2	6	1	2	1	1	42
Support the integration of land use plans	3	15	2	8	0	0	4	8	2	2	33
Improve the strategies of alternative modes and travel demand.	0	0	4	16	2	6	3	6	2	2	30
Reduce the vulnerability of the transportation infrastructure to events and natural disasters.	0	0	1	4	3	9	0	0	6	6	19
Goal C: Improve transportation mobility and access for people and freight											
Improve connectivity among primary activity centers, including employment, tourism and high density residential districts.	6	30	0	0	2	6	1	2	2	2	40
Improves system integration between and within modes.	0	0	4	16	2	6	2	4	3	3	29

Objective	Priority Level										
	1		2		3		4		5		Total
Increase travel options for residents, visitors and workers	0	0	6	24	3	9	2	4	0	0	37
Concentrate investments in the areas of greatest benefit to the user.	2	10	0	0	1	3	3	6	5	5	24
Facilitate access to transportation to disadvantaged populations.	3	15	1	4	3	9	3	6	1	1	35
Goal D: Reinforce economic vitality											
Improve economic competitiveness by facilitating the efficient movement of goods and services	6	18	1	2	4		4		n/a	n/a	24
Public-private opportunities	1	3	7	14	3		3		n/a	n/a	20
Provide strategic connectivity and capacity in the network throughout Puerto Rico	4	12	3	6	4		4		n/a	n/a	22

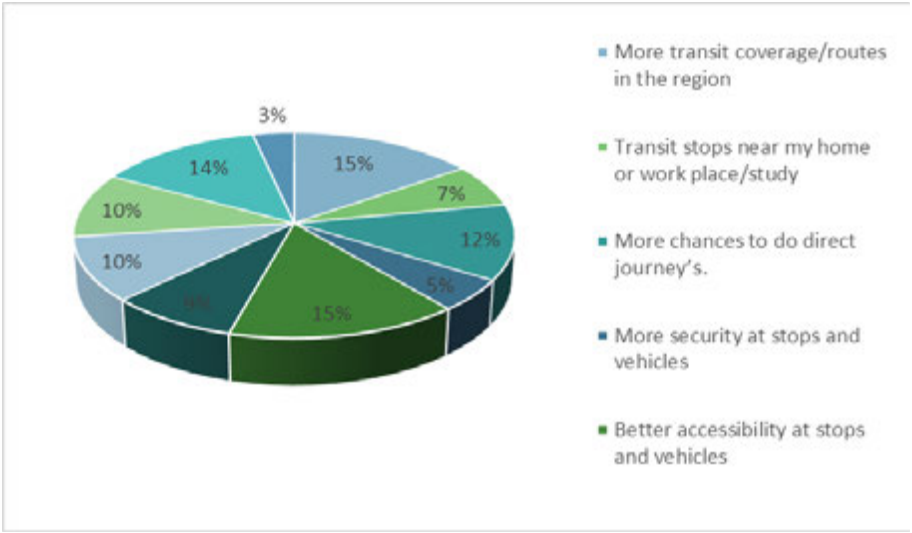
Source: SDG

Figure E.121: Transportation Strategies – Fajardo (East Region)



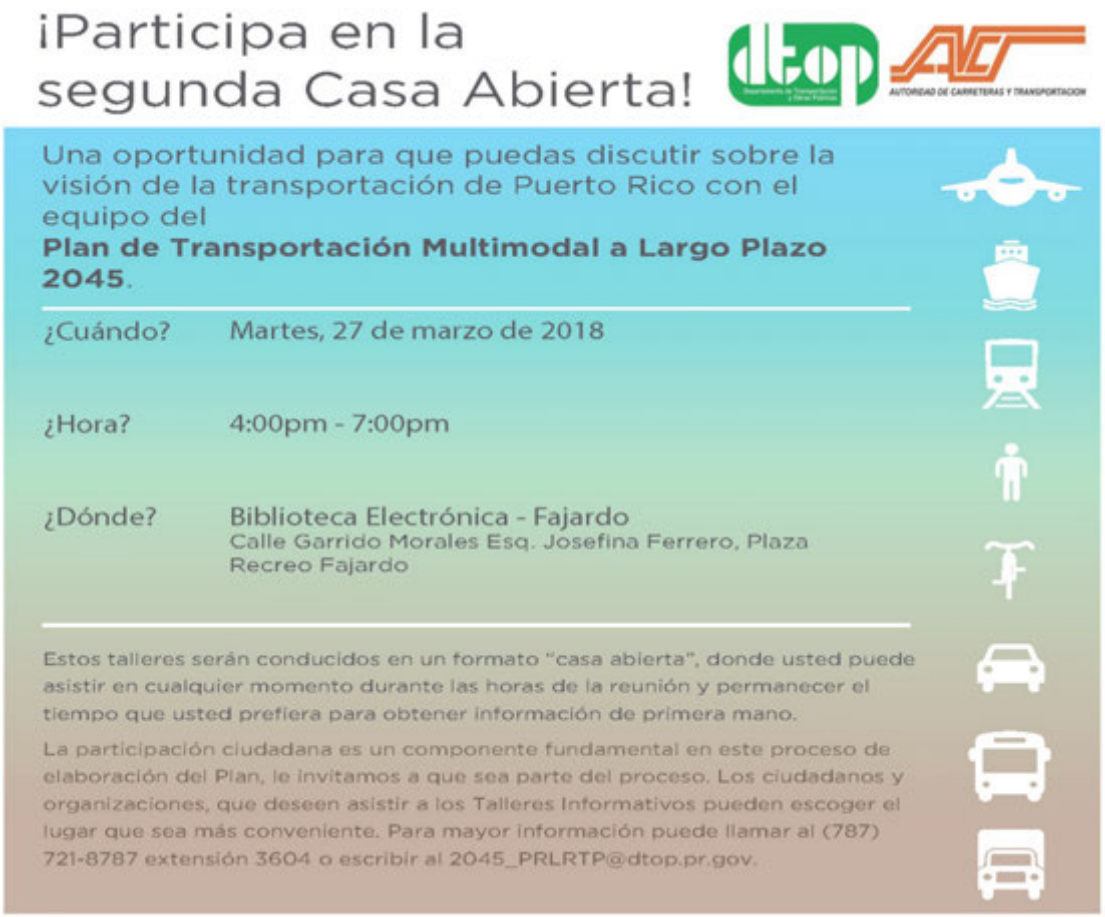
Source: SDG

Figure E.122: Transit Improvements – Fajardo (East Region)



Source: SDG

Figure E.123: Announcement – Fajardo



Source: SDG

Figure E.13: Open House Participants – Fajardo

Source: SDG

Figure E.145: Attendance Lists – Fajardo

2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

27 de marzo de 2018 | 4:00pm – 7:00pm | Biblioteca Electrónica | Fajardo

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. MANUEL MELENDEZ	CIUDADANO	939-271-1954	mm#2K2@gmail.com	[illegible]
2. Edil Velez	Luquillo	939-334-2387	EdilVelezSanchez[illegible]@gmail.com	
3. Dexiemyleiddy Alvarez	fajardo	787-435-3487	Alvarezmyleiddy@gmail.com	[illegible]
4. Nancy Vázquez	Naguabo	939-358-1636	Jorey Vázquez 9[illegible]@gmail.com	[illegible]
5. [illegible]	Fajardo	787-[illegible]-2766	[illegible]@gmail.com	[illegible]
6. [illegible]	Ciudadano			[illegible]
7. Luis G. Suárez	Fajardo / Estudiante	939-383-9140	suarez luis1273@gmail.com	[illegible]
8. Edgardo Rosa	Luquillo	(787)692-9013	[illegible]	[illegible]
9. Alexander Vega	Fajardo	939-629-9163	Valexander72@gmail	Alexander
10. [illegible]	Fajardo	939-339-4998	[illegible]@yahoo.com	[illegible]

2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

27 de marzo de 2018 | 4:00pm – 7:00pm | Biblioteca Electrónica | Fajardo

Nombre	Organización	Teléfono	Correo electrónico	Firma
1. Gianella Roque		787-568-1094	Gianellaroque@yahoo.com	[illegible]
2. Gabriel G. Quiñones		787-316-1683	[illegible]@gmail.com	[illegible]
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Source: SDG

Patillas

Table E.33 to Table E.35 and Figure E.126 to Figure E.130, show the results, photos and participants list of Patillas (Southeast Region).

Table E.33: Participants Agreement with the Vision – Patillas (Southeast Region)

Vision Agreement	
Agree	**91%**
Suggestions	**9%**

Source: SDG

Table E.34: Participants Goals Prioritization – Patillas (Southeast Region)

Goals	Priority Level								
	1 Priority		2 Priority		3 Priority		4 Priority		Total
Goal A	12	48	6	18	4	8	2	2	76
Goal B	6	24	6	18	7	14	4	4	60
Goal C	4	16	4	12	7	14	8	8	50
Goal D	2	8	7	21	5	10	9	9	48

Source: SDG

Table E.35: Participants Objectives Prioritization – Patillas (Southeast Region)

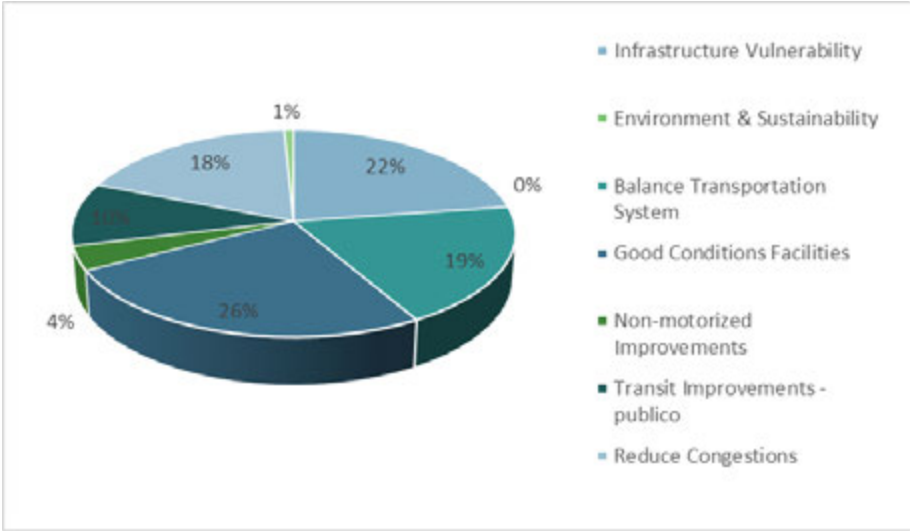
Objective	Priority Level										
	1		2		3		4		5		Total
Goal A: Improve transportation system performance											
Reduce congestion and travel time	10	50	3	12	4	12	6	12	5	5	91
Optimize the use of transportation assets and balance the efficiency of previous investments	4	20	1	4	3	9	10	20	9	9	62
Maintain transportation assets in good condition	10	50	9	36	5	15	2	4	1	1	106
Improve administrative and operation cost efficiency	4	20	4	16	7	21	6	12	6	6	75
Improve safety and security of the system and it emergency capability	9	45	7	28	5	15	3	6	3	3	97
Goal B: Promote environmental sustainability											

Objective	Priority Level										
	1		2		3		4		5		Total
Minimize adverse impacts to natural and built environments.	8	40	9	36	3	9	3	6	4	4	95
Reduce greenhouse gas emissions, energy consumption and improve air quality.	10	50	5	20	5	15	5	10	2	2	97
Support the integration of land use plans	6	30	1	4	6	18	6	12	8	8	72
Improve the strategies of alternative modes and travel demand.	2	10	3	12	6	18	8	16	8	8	64
Reduce the vulnerability of the transportation infrastructure to events and natural disasters.	9	45	6	24	3	9	7	14	2	2	94
Goal C: Improve transportation mobility and access for people and freight											
Improve connectivity among primary activity centers, including employment, tourism and high density residential districts.	10	50	4	16	5	15	3	6	5	5	92
Improves system integration between and within modes.	3	15	4	16	6	18	8	16	6	6	71
Increase travel options for residents, visitors and workers	4	20	4	16	8	24	5	10	6	6	76

Objective	Priority Level										
	1		2		3		4		5		Total
Concentrate investments in the areas of greatest benefit to the user.	7	35	2	8	3	9	7	14	8	8	74
Facilitate access to transportation to disadvantaged populations.	11	55	11	44	2	6	2	4	1	1	110
Goal D: Reinforce economic vitality											
Improve economic competitiveness by facilitating the efficient movement of goods and services	5	15	14	28	7		7		n/a	n/a	50
Public-private opportunities	10	30	5	10	10		10		n/a	n/a	50
Provide strategic connectivity and capacity in the network throughout Puerto Rico	15	45	4	8	7		7		n/a	n/a	60

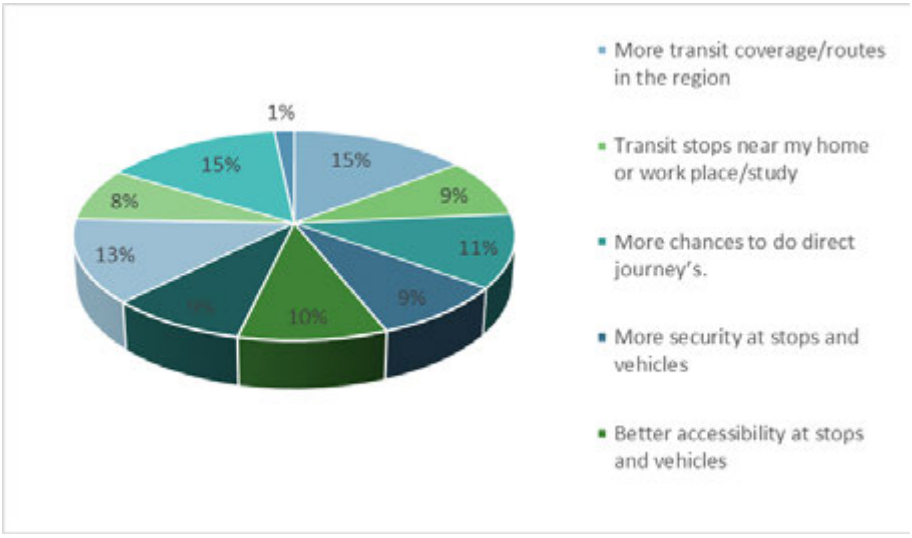
Source: SDG

Figure E.126: Transportation Strategies – Patillas (Southeast Region)



Source: SDG

Figure E.127: Transit Improvements – Patillas (Southeast Region)



Source: SDG

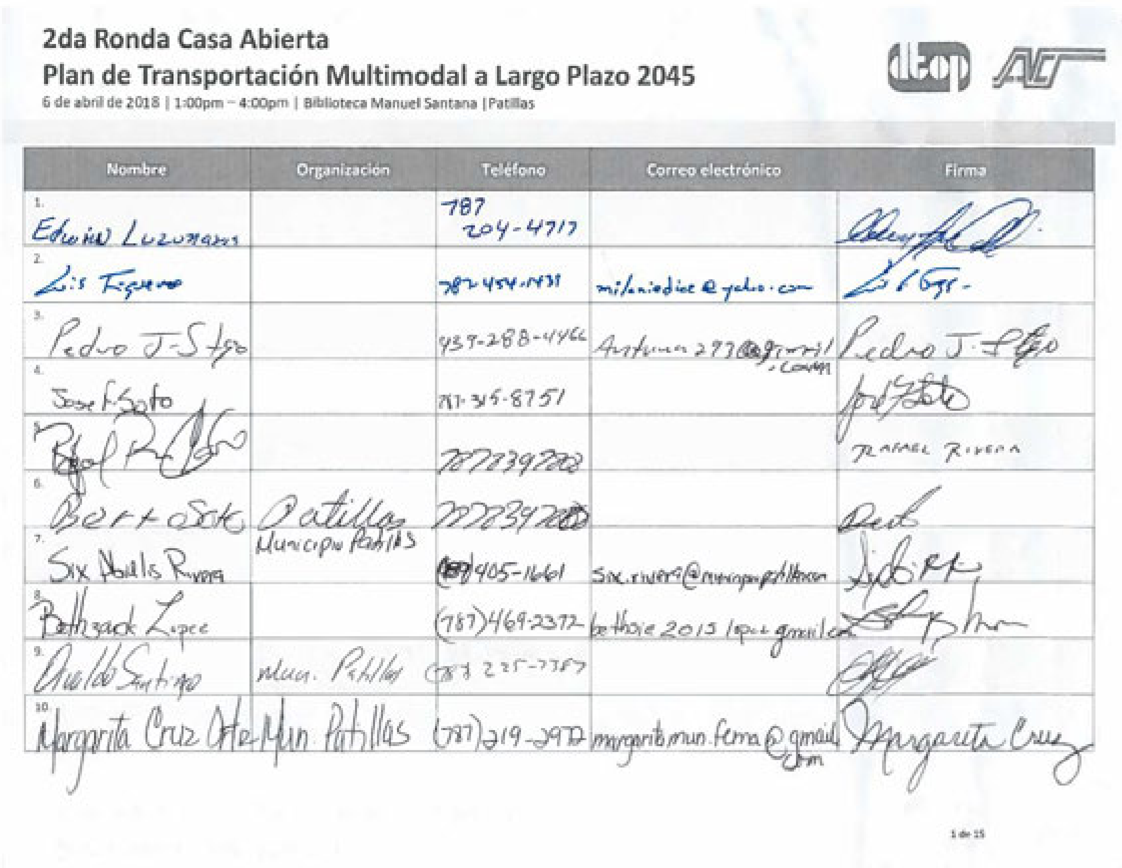
Figure E.128: Announcement – Patillas

Source: SDG

Figure E.129: Open House Participants – Patillas

Source: SDG

Figure E.130: Attendance Lists – Patillas



2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

6 de abril de 2018 | 1:00pm – 4:00pm | Biblioteca Manuel Santana | Patillas

Nombre	Organización	Teléfono	Correo electrónico	Firma
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5.		7877839288		RAFAEL RIVERA
6. Bert A Soto	Patillas	7877839288		
7. Six Nobles Rivera	Municipio Patillas	(787) 405-1661	six.rivera@municipiopatillas.com	
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10. Margarita Cruz Ortiz	Mun. Patillas	(787) 219-2972	margaritamun.ferna@gmail.com	Margarita Cruz

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2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

6 de abril de 2018 | 1:00pm – 4:00pm | Biblioteca Manuel Santana |Patillas

Nombre	Organización	Teléfono	Correo electrónico	Firma
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2da Ronda Casa Abierta

Plan de Transportación Multimodal a Largo Plazo 2045

6 de abril de 2018 | 1:00pm – 4:00pm | Biblioteca Manuel Santana |Patillas

Nombre	Organización	Teléfono	Correo electrónico	Firma
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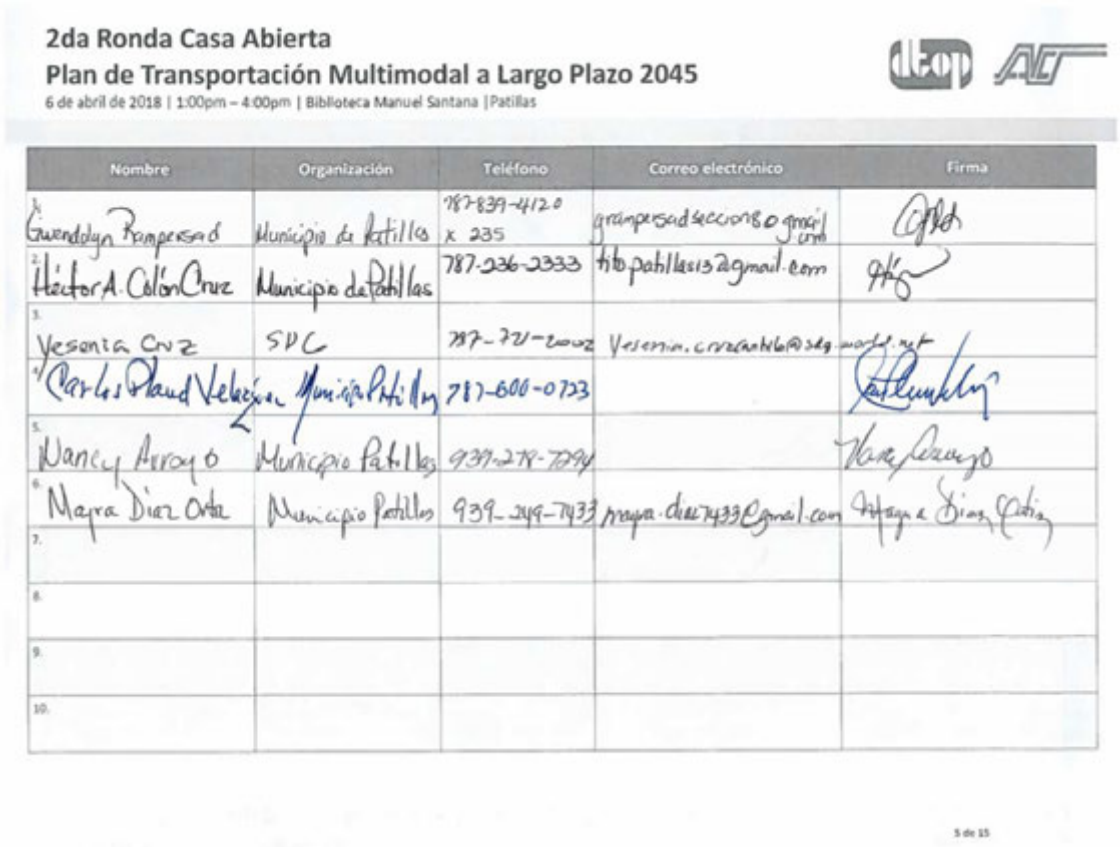

2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045
6 de abril de 2018 | 1:00pm – 4:00pm | Biblioteca Manuel Santana |Patillas

Nombre	Organización	Teléfono	Correo electrónico	Firma
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Source: SDG

Ponce

Table E.36 to Table E.38 and Figure E.131 to Figure E.135, show the results, photos and participants list of Ponce (South Region).

Table E.36: Participants Agreement with the Vision – Ponce (South Region)

Vision Agreement	
Agree	**56%**
Suggestions	**44%**

Source: SDG

Table E.37: Participants Goals Prioritization – Ponce (South Region)

Goals	Priority Level								
	1 Priority		2 Priority		3 Priority		4 Priority		Total
Goal A	3	12	6	18	6	12	11	11	53
Goal B	10	40	6	18	5	10	4	4	72
Goal C	8	32	6	18	6	12	5	5	67
Goal D	4	16	7	21	8	16	5	5	58

Source: SDG

Table E.38: Participants Objectives Prioritization – Ponce (South Region)

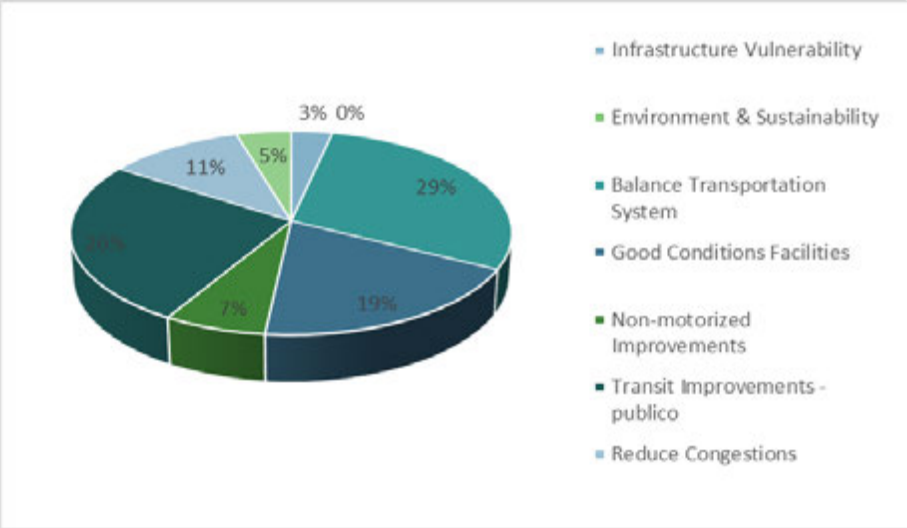
Objective	Priority Level										
	1		2		3		4		5		Total
Goal A: Improve transportation system performance											
Reduce congestion and travel time	4	20	4	16	1	3	8	16	7	7	62
Optimize the use of transportation assets and balance the efficiency of previous investments	3	15	4	16	5	15	6	12	6	6	64
Maintain transportation assets in good condition	7	35	9	36	4	12	4	8	0	0	91
Improve administrative and operation cost efficiency	7	35	2	8	7	21	3	6	5	5	75
Improve safety and security of the system and it emergency capability	7	35	6	24	7	21	1	2	3	3	85
Goal B: Promote environmental sustainability											
Minimize adverse impacts to natural and built environments.	9	45	5	20	3	9	4	8	3	3	85
Reduce greenhouse gas emissions, energy consumption and improve air quality.	6	30	6	24	6	18	3	6	3	3	81
Support the integration of land use plans	6	30	1	4	2	6	8	16	7	7	63
Improve the strategies of alternative modes and travel demand.	2	10	5	20	5	15	7	14	5	5	64

Objective	Priority Level										
	1		2		3		4		5		Total
Reduce the vulnerability of the transportation infrastructure to events and natural disasters.	2	10	5	20	11	33	1	2	3	3	68
Goal C: Improve transportation mobility and access for people and freight											
Improve connectivity among primary activity centers, including employment, tourism and high density residential districts.	5	25	4	16	4	12	7	14	4	4	71
Improves system integration between and within modes.	0	0	5	20	6	18	7	14	6	6	58
Increase travel options for residents, visitors and workers	7	35	4	16	8	24	2	4	3	3	82
Concentrate investments in the areas of greatest benefit to the user.	5	25	8	32	3	9	3	6	4	4	76
Facilitate access to transportation to disadvantaged populations.	10	50	3	12	6	18	2	4	3	3	87
Goal D: Reinforce economic vitality											
Improve economic competitiveness by facilitating the efficient movement of goods and services	4	12	13	26	7		7		n/a	n/a	45
Public-private opportunities	7	21	7	14	10		10		n/a	n/a	45

Objective	Priority Level										Total
	1		2		3		4		5		
Provide strategic connectivity and capacity in the network throughout Puerto Rico	16	48	4	8		4		4	n/a	n/a	60

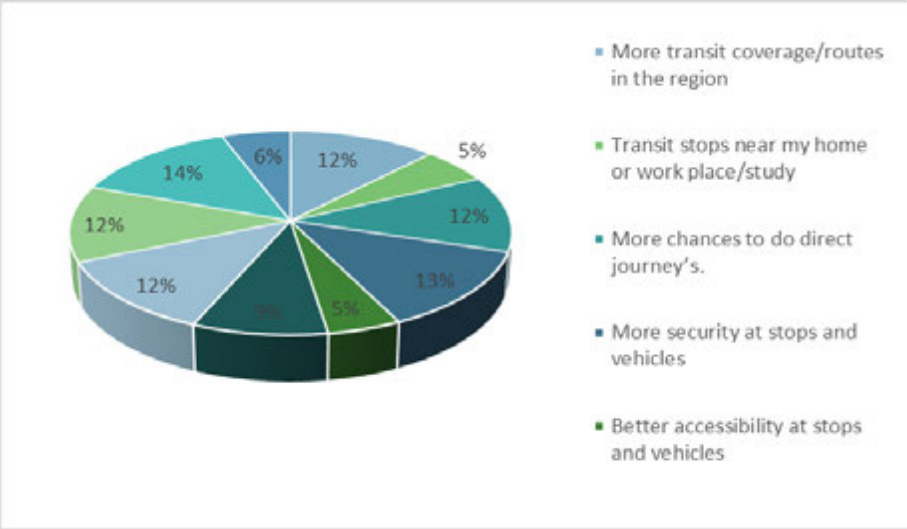
Source: SDG

Figure E.131: Transportation Strategies – Ponce (South Region)



Source: SDG

Figure E.132: Transit Improvements – Ponce (South Region)



Source: SDG

Figure E.133: Announcement – Ponce

Source: SDG

Figure E.134: Open House Participants – Ponce

Source: SDG

Figure E.135: Attendance Lists – Ponce

2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

14 de marzo de 2018 | 4:00pm – 7:00pm | Escuela de Arquitectura – Universidad Católica| Ponce

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2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

14 de marzo de 2018 | 4:00pm – 7:00pm | Escuela de Arquitectura – Universidad Católica| Ponce

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2da Ronda Casa Abierta
Plan de Transportación Multimodal a Largo Plazo 2045

14 de marzo de 2018 | 4:00pm – 7:00pm | Escuela de Arquitectura – Universidad Católica| Ponce

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Source: SDG

F APPENDIX F - MODEL DEVELOPMENT AND CALIBRATION

RE-ESTIMATION OF POPULATION SYNTHESIZER MODELS

Since the census tract and PUMS data serve as inputs to the models which support the population synthesizer, those models were re-estimated to reflect changes in demographics. These models estimate:

- The distribution of household sizes as a function of a zone's average household size;
- The distribution of income groups as a function of a zone's average household income;
- Numbers of workers, children and seniors as a function of a household's average size and income group; and
- Auto ownership as a function of household demographics.

This section presents the models above and compares them to those in the prior 2040 PR LRTP Model.

Household Size Distribution

The household size distribution model estimates the percentage of each census tract's households which are sizes 1, 2, 3 and 4+, based on the overall average size. The best-fit models were determined by regression models analogous to those developed for the 2040 PR LRTP Model. As it occurred previously, the % Size 1 and % Size 4+ models were determined first, since those can be expected to change monotonically with average household size. Then, a model was fit for the *relative* percentages of Size 2 vs. Size 3 households. The resultant equations were:

$$\%\ Size1 = 2.098 \times e^{-0.741 \times (Avg\ HH\ Size)}$$

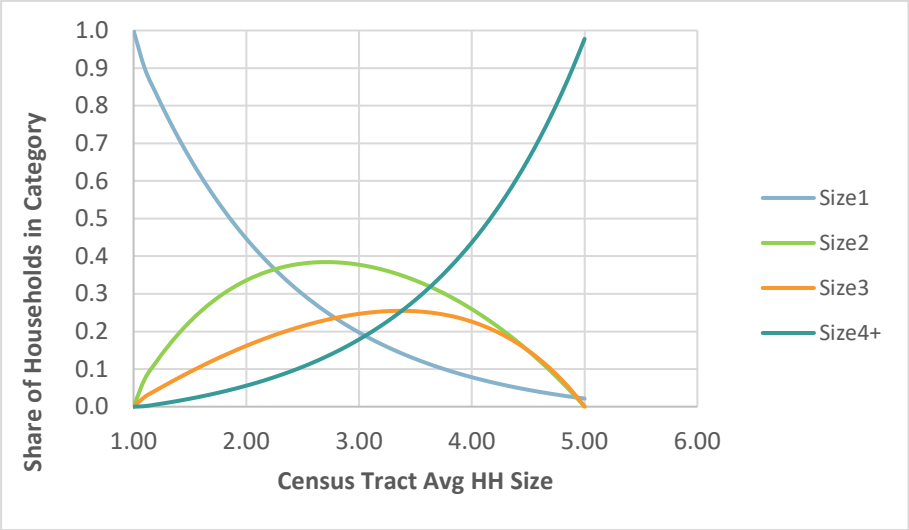
$$\%\ Size4+ = 0.0254 \times e^{0.7412 \times (Avg\ HH\ Size)} - 0.0533$$

$$\%\ Size3 = (1 - \%Size1 - \%Size4+) \times e^{0.0703 \times (Avg\ HH\ Size)} + 0.1845$$

$$\%\ Size2 = (1 - \%Size1 - \%Size3 - \%Size4+)$$

Figure F.1 illustrates the trend lines implied by the above equations. The trendlines of shares of household distribution by household sizes reveal very little difference compared to those from the 2040 LRTP Model obtained in the development of the original tool.

Figure F.1: Household Size Distribution Model Trends



Source: SDG

Income Group Distribution

Similar to the household size distribution models, the income group distribution model estimates the percentage of each census tract's households which are in each of the three income groups needed for the production models[13], based on overall average. The best-fit models were determined by regression models analogous to those developed for the 2040 PR LRTP Model. As it occurred previously, the % Income Group 1 and % Income Group 3 models were determined first, since those can be expected to change monotonically with average household size. Then, the percentage of households in income group was obtained by subtracting the other two percentages from 100%. The resultant equations were:

$$\%Income\ Group1 = 1.0401 \times e^{(-3\times10^{-5})\times(Avg\ Income)}$$

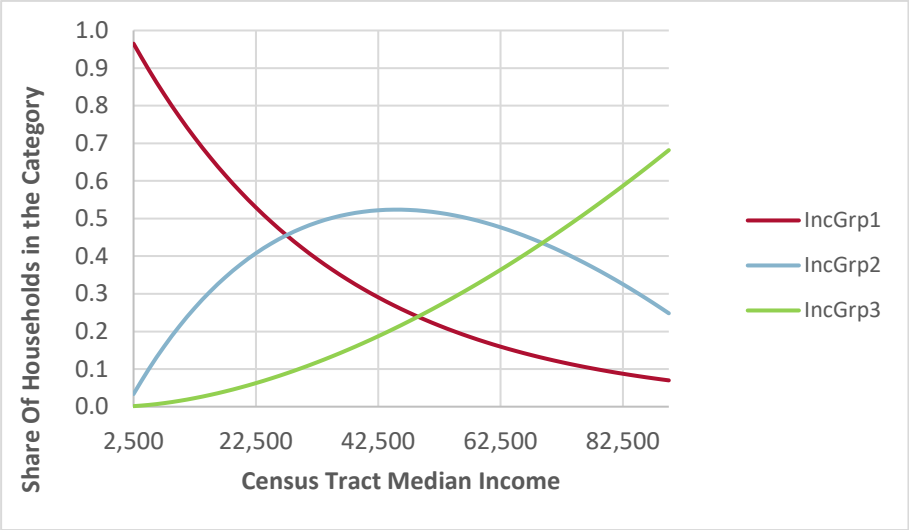
$$\%Income\ Group3 = (2 \times 10^{9}) \times (Avg\ Income)^{1.7223}$$

$$\%Income\ Group2 = 1 - \%Income\ Group1 - \%Income\ Group3$$

Figure F.2 illustrates the trend lines implied by the above equations. Comparison to the 2040 LRTP Model documentation reveals very little difference between these trend lines and those obtained in the development of the original tool.

[13] The three household income groups are defined as $0-$25,000, $25,000-$75,000 and over $75,000 annually.

Figure F.1: Income Group Distribution Model Trends



Source: SDG

Number of Workers, Children and Seniors

To estimate distributions of numbers of workers, children and seniors, it is necessary to use the PUMS data, since that level of detail is not available from the census or ACS data. These distributions do not need to be estimated with regression models, but are obtained directly from cross-classification data between household size – income group combination and the desired data field (workers, children or seniors).

Table F.1: Number of Workers Distribution

Group		2010 Model (2006-2008 PUMS Data)				2016 Model (2012-2016 PUMS Data)			
Size	Income Group	0 Workers	1 Worker	2 Workers	3+ Workers	0 Workers	1 Worker	2 Workers	3+ Workers
1	1	0.701	0.299	n/a	n/a	No Data		n/a	n/a
1	2	0.189	0.811	n/a	n/a			n/a	n/a
1	3	0.081	0.919	n/a	n/a			n/a	n/a
2	1	0.549	0.353	0.098	n/a	0.687	0.272	0.041	n/a
2	2	0.208	0.423	0.369	n/a	0.343	0.418	0.239	n/a
2	3	0.079	0.315	0.606	n/a	0.174	0.375	0.451	n/a
3	1	0.314	0.461	0.201	0.024	0.517	0.401	0.077	0.005
3	2	0.055	0.319	0.498	0.129	0.124	0.449	0.365	0.062
3	3	0.021	0.173	0.581	0.224	0.042	0.355	0.492	0.111
4	1	0.248	0.424	0.274	0.054	0.449	0.436	0.100	0.015
4	2	0.018	0.212	0.564	0.206	0.059	0.361	0.447	0.133
4	3	0.005	0.138	0.601	0.256	0.013	0.208	0.513	0.266

Source: SDG analysis of household data TAZ allocation

Table F.1 compares the number of workers distribution obtained from the PUMS data supporting the 2040 LRTP Model and the updates PUMS data. Overall, this table differed more from the 2040 LRTP Model than any other component of trip generation. There were

significant increases in the percentages of households with zero workers, and in many cases 1 worker, and consequently significant decreases in the percentages of 2 and 3+ (where applicable) workers. As a result, one would expect significant decreases in the number of home-based work trips generated in the production models. This will be discussed in the comparison of trip generation output later in this section.

Note also that the updated PUMS data did not include any information regarding numbers of workers in households of size 1. The same distribution as in the 2040 LRTP Model was used, due to lack of available data.

Table F.2: Number of Children Distribution

Group		2010 Model (2006-2008 PUMS Data)				2016 Model (2012-2016 PUMS Data)			
Size	Income Group	0 Children	1 Children	2 Children	3+ Children	0 Children	1 Children	2 Children	3+ Children
1	1	1.000	n/a	n/a	n/a	1.000	n/a	n/a	n/a
1	2	1.000	n/a	n/a	n/a	1.000	n/a	n/a	n/a
1	3	1.000	n/a	n/a	n/a	1.000	n/a	n/a	n/a
2	1	0.874	0.126	n/a	n/a	0.864	0.136	n/a	n/a
2	2	0.928	0.072	n/a	n/a	0.932	0.068	n/a	n/a
2	3	0.973	0.027	n/a	n/a	0.963	0.037	n/a	n/a
3	1	0.404	0.359	0.238	n/a	0.410	0.337	0.253	n/a
3	2	0.548	0.393	0.058	n/a	0.561	0.384	0.055	n/a
3	3	0.558	0.422	0.020	n/a	0.529	0.448	0.023	n/a
4	1	0.093	0.150	0.365	0.391	0.127	0.180	0.396	0.298
4	2	0.192	0.229	0.401	0.178	0.218	0.238	0.425	0.119
4	3	0.222	0.191	0.427	0.160	0.282	0.217	0.412	0.089

Source: SDG analysis of household data TAZ allocation

Table F.2 and Table F.3 compare, respectively, the number of children (age 17 or less) distribution and the percentage of households with one or more senior (age 65+). These distributions, along with the household size, income group, number of workers, and auto ownership, categorize the households into subgroups for subsequent application of the trip production models. Both these tables showed little difference from earlier results supporting the 2040 LRTP Model.

Table F.3: Percentage of Households with 1 or More Seniors

Size	Income Group	2010 Model (2006-2008 PUMS Data)	2016 Model (2012-2016 PUMS Data)
1	1	0.519	0.494
1	2	0.224	0.253
1	3	0.174	0.254
2	1	0.521	0.491
2	2	0.395	0.423
2	3	0.305	0.339
3	1	0.273	0.227
3	2	0.289	0.288

Size	Income Group	2010 Model (2006-2008 PUMS Data)	2016 Model (2012-2016 PUMS Data)
3	3	0.236	0.205
4	1	0.150	0.122
4	2	0.203	0.190
4	3	0.182	0.189

Source: SDG analysis of household data TAZ allocation

Auto Ownership Model

Using the 2012-16 PUMS data, the auto ownership model was re-estimated with the same multinomial logit form used in the 2040 LRTP Model with the 2006-08 PUMS data. For the most part, the variables and coefficients did not change significantly from the earlier estimation. The major difference was that the number of children in a household was found not to influence the auto ownership in a statistically significant way. The *presence* of children, regardless of the number, was found to be a better predictor of auto ownership.

To summarize, the variables found to influence the number of autos per household were:

- Income Group – households with higher incomes are likely to own more autos
- Workers – households with more workers are likely to own more autos
- Adults – households with more adults are likely to own more autos
- Child_dummy (0=no children, 1=one or more children) – households with children are more likely to own autos than households without children, but the *number* of children does not significantly influence the number of autos

The utility equations for the model are:

$$Utility\ (zero\ autos) = 0$$

$$Utility\ (one\ auto) = 1.06 \times IncGrp + 0.56 \times Workers + 0.14 \times Adults + 0.016 \times Child\_Dummy$$

$$Utility\ (two\ autos) = 1.94 \times IncGrp + 1.11 \times Worders + 0.52 \times Adults + 0.11 \times Child\_Dummy$$

$$Utility\ (three\ autos) = 2.41 \times IncGrp + 1.48 \times Workers + 1.25 \times Adults + 0.072 \times Child\_Dummy$$

All variables were statistically significant at the 95% or greater confidence level.

Table F.4 compares the model's "raw" (i.e. before trip balancing) productions to attractions, before and after the changes discussed above. For all but one trip purpose (home-based school), the balance either improved or remained very similar to before. As will be discussed later in this section, the home-based school productions are likely overestimated, and the data supporting home-based school productions models are generally less reliable than the data supporting home-based school attractions models (school enrollment).

Table F.1: Ratio of "Raw" Productions to Attractions by Trip Purpose

Trip Purpose	2040 PR LRTP Model	2045 PR LRTP Model Update
Home-Based Work	0.98	1.06
Home-Based Retail	2.05	1.93
Home-Based School	2.61	3.03
Home-Based University	0.74	1.05
Home-Based Other	0.79	0.91
Non-Home Based	0.72	0.70

Source: SDG

CHANGES TO TRIP BALANCING METHODOLOGY

In addition to updating the data and re-estimating the population synthesizer models as discussed above, SDG conducted a full review of the methodology was conducted finding several items to be addressed, all related to balancing productions and attractions. These included:

- A "validation factor" of 1.45 for home-based work attractions;
- The balancing alternative (balancing to productions vs attractions) for several trip purposes; and
- Trip balancing within each MPO individually.

This section discusses each of the above items, explains why they were changed, and the impact each had on trip generation.

Home-Based Work Attraction Validation Factor

The trip generation models in the 2040 PR LRTP Model estimated very similar numbers of home-based work productions and attractions, with attractions just 1.7% higher. However, that was after a "validation factor" of 1.45 was applied to all HBW attractions; the models in their raw form estimated only about 70% as many attractions as productions.[14]

With the reductions in numbers of workers reflected in updated TAZ inputs, the HBW productions fell by about 27 percent. Thus, the 1.45 validation factor felt unnecessary (its original purpose was to bring total attractions up to a level closer to productions), and the HBW attraction models could be used without adjustment. After removing this factor, HBW attractions were only about 6% lower than HBW productions.

Balancing to Productions vs Attractions

It is generally recognized that population is more accurate than employment data, and therefore standard practice in travel demand models to balance trips for most trip purposes to productions rather than attractions. For the trip purposes where this is done, attraction models are applied to each TAZ individually, but the results are all scaled up or down to match the total number of productions. The exception to this is school and university trips, because attractions depend on student enrollment, a pretty reliable source of information. Non-home-

[14] 1.017 divided by 1.45 equals about 0.70.

based trips are often done with a hybrid methodology, setting the total trips to the total productions, but the productions equal to the attractions for each TAZ.

Table F.5 shows the balancing methodology used in the 2040 PR LRTP Model and the methodology implemented for the update. It is worth noting that home-based work, home-based school and home-based university trips are balanced differently.

It is generally recognized that population is more accurate than employment data, and therefore standard practice in travel demand models to balance trips for most trip purposes to productions rather than attractions. For the trip purposes where this is done, attraction models are applied to each TAZ individually, but the results are all scaled up or down to match the total number of productions. The exception to this is school and university trips, because attractions depend on student enrollment, a pretty reliable source of information. Non-home-based trips are often done with a hybrid methodology, setting the total trips to the total productions, but the productions equal to the attractions for each TAZ.

Table F.1: Trip Balancing Methodology

Trip Purpose	2040 PR LRTP Model	2045 PR LRTP Model Update
Home-Based Work	Balance to Attractions	Balance to Productions
Home-Based Retail	Balance to Productions	Balance to Productions (no change)
Home-Based School	Balance to Productions	Balance to Attractions
Home-Based University	Balance to Productions	Balance to Attractions
Home-Based Other	Balance to Productions	Balance to Productions (no change)
Non-Home Based	NHB Method (Balance Total Trips to Total Productions, set each TAZ's productions equal to scaled attractions)	NHB Method (no change)

Source: SDG

Balancing Across MPOs

The travel demand model contains seven different MPOs following geographic division shown in Figure B.3. In the 2040 LRTP version, each MPO's trips were balanced individually. In other words, the trip balancing step was applied in a manner that resulted in each MPO having equal numbers of productions and attractions for each trip purpose. However, that approach is too restrictive, and it should be possible for individual MPOs to have more productions than attractions for any given trip purpose, as long as total productions and attractions balance island-wide. Hence, the individual MPO balancing restriction have been removed.

MODEL VALIDATION

The trip distribution of 2040 PR LRTP Model was calibrated by the average trip lengths and the trip length frequency distributions calculated from the 2011 Puerto Rico household survey. To examine the changes of travel patterns in the past five years, it was proposed to conduct a new household survey for information on origin-destination travel data for all trip purposes. However, due to Hurricane Irma and Hurricane María in Summer 2017 causing great damage to the island, the planned island wide household survey was postponed. Because of this delay,

it was not possible to update the trip length frequency distribution calculation, or re-estimate coefficients of the gamma function from the survey results.

A limited validation to the trip distribution step with three measures was conducted:

- MPO-to-MPO travel patterns;
- Average trip length; and
- Trip length frequency distribution.

MPO-to-MPO Travel Patterns

The main sources of data to validate the trip distribution of home-based work trips for the 2045 PR LRTP Model include the following:

- 2005-2009 Census Journey-to-Work travel between MPO regions;
- 2006-2010 Census Journey-to-Work travel between MPO regions; and
- 2012-2016 PUMS Journey-to-Work travel between MPO regions.

The greatest change between the two sets of CTPP data was within the East MPO, with an increase from 64% to 72% within the region, and a reduction from 35% to 27% from East MPO to San Juan. The MPO-to-MPO travel patterns derived from PUMS journey-to-work data were based upon 26,292 observations and were distinctly different for Aguadilla, North, South, and Southwest MPO Regions. All had declined intra-region travels in comparison to CTPP data.

Table F.6 presents a comparison of the MPO-to-MPO work trip travel patterns between the model estimates and the work flows from the data sources discussed above. The percentages are the shares of trips from an origin MPO to each destination MPO. Both Census data and the model estimates indicate the majority of work trips are intra MPO region trips. Overall, the trip distribution model produced a reasonable HBW travel pattern. The estimated percentages of MPO-to-MPO travel patterns were close to the targets.

It was not possible to fully validate the trip distribution of other trip purposes because of the lack of updated targets from the household survey. In Table F.7 and Table F.8 a comparison of the estimated MPO-to-MPO travel patterns of the home-based other[15] trips and non-home based trips in 2016 to the 2040 PR LRTP estimates in 2010 is shown. All changes seem in a reasonable range.

[15] HBO trips summarized in Table 18 combined with **home**-based other, home-based retail, home-based school, and home-based university trips.

Table F.1: Municipality-to-Municipality Travel: HBW Trips

Origin MPO Region	Destination MPO Region																											
	Aguadilla				East				North				San Juan				South				Southeast				Southwest			
	CTPP 05-09	CTPP 06-10	PUMS 12-16	Model HBW	CTPP 05-09	CTPP 06-10	PUMS 12-16	Model HBW	CTPP 05-09	CTPP 06-10	PUMS 12-16	Model HBW	CTPP 05-09	CTPP 06-10	PUMS 12-16	Model HBW	CTPP 05-09	CTPP 06-10	PUMS 12-16	Model HBW	CTPP 05-09	CTPP 06-10	PUMS 12-16	Model HBW	CTPP 05-09	CTPP 06-10	PUMS 12-16	Model HBW
Aguadilla	81.8%	80.8%	65.5%	79.6%	0.0%	0.0%	0.0%	0.0%	5.5%	4.5%	17.4%	9.1%	3.2%	2.8%	2.2%	0.5%	0.3%	0.4%	0.5%	0.4%	0.0%	0.1%	0.0%	0.0%	9.2%	11.4%	14.4%	10.5%
East	0.1%	0.1%	0.0%	0.0%	64.4%	72.2%	64.4%	64.6%	0.0%	0.1%	0.2%	0.0%	34.8%	27.1%	35.2%	34.7%	0.3%	0.2%	0.0%	0.2%	0.2%	0.3%	0.1%	0.5%	0.1%	0.0%	0.0%	0.0%
North	3.2%	3.1%	12.6%	16.1%	0.0%	0.0%	0.0%	0.0%	81.3%	79.7%	58.5%	64.5%	14.9%	14.5%	10.9%	14.4%	0.2%	2.0%	16.4%	3.1%	0.0%	0.1%	0.2%	0.0%	0.7%	0.5%	1.3%	1.8%
San Juan	0.1%	0.1%	0.3%	0.6%	0.6%	0.8%	3.1%	1.4%	0.8%	0.7%	2.1%	3.3%	97.7%	97.6%	92.2%	91.1%	0.3%	0.3%	1.0%	2.3%	0.3%	0.3%	1.1%	1.1%	0.7%	0.1%	0.3%	0.2%
South	0.2%	0.2%	0.5%	1.1%	0.0%	0.0%	0.0%	0.0%	0.3%	0.7%	17.3%	2.2%	6.2%	5.8%	3.3%	3.6%	88.1%	87.5%	74.3%	82.4%	2.5%	2.9%	2.5%	1.7%	2.7%	2.9%	2.1%	9.1%
Southeast	0.1%	0.2%	0.0%	0.3%	0.2%	0.1%	0.0%	0.4%	0.5%	0.3%	0.8%	0.6%	14.1%	13.1%	20.2%	27.3%	9.2%	7.5%	8.2%	27.0%	75.8%	78.6%	70.8%	43.4%	0.1%	0.2%	0.0%	1.0%
Southwest	3.0%	4.0%	17.7%	13.2%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	2.1%	0.4%	1.9%	1.8%	0.6%	0.0%	4.5%	4.1%	4.1%	8.0%	0.2%	0.2%	0.1%	0.0%	90.2%	89.7%	75.5%	78.4%

Source: SDG analysis of Trip Distribution

Table F.2: Municipality-to-Municipality Travel: HBO Trips

Origin MPO Region	Destination MPO Region													
	Aguadilla		East		North		San Juan		South		Southeast		Southwest	
	2010	2016	2010	2016	2010	2016	2010	2016	2010	2016	2010	2016	2010	2016
Aguadilla	84.1%	84.0%	0.0%	0.0%	9.2%	6.6%	0.1%	0.1%	0.1%	0.2%	0.0%	0.0%	6.4%	9.0%
East	0.0%	0.0%	75.1%	80.0%	0.0%	0.0%	24.8%	19.8%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
North	7.1%	11.8%	0.0%	0.0%	81.2%	76.5%	10.3%	8.7%	1.3%	2.3%	0.0%	0.0%	0.2%	0.7%
San Juan	0.0%	0.1%	0.9%	1.7%	0.7%	1.4%	97.5%	94.8%	0.4%	1.4%	0.5%	0.6%	0.0%	0.0%
South	0.2%	0.2%	0.0%	0.0%	1.3%	1.5%	2.2%	2.1%	89.7%	89.4%	2.6%	1.6%	4.0%	5.2%
Southeast	0.0%	0.0%	0.1%	0.2%	0.1%	0.2%	12.4%	15.3%	10.1%	25.1%	77.4%	59.1%	0.0%	0.2%
Southwest	9.2%	8.1%	0.0%	0.0%	0.3%	0.3%	0.0%	0.0%	5.5%	5.5%	0.0%	0.0%	85.0%	86.2%

Source: SDG analysis of Trip Distribution

Table F.3: Municipality-to-Municipality Travel: NHB Trips

Origin MPO Region	Destination MPO Region													
	Aguadilla		East		North		San Juan		South		Southeast		Southwest	
	2010	2016	2010	2016	2010	2016	2010	2016	2010	2016	2010	2016	2010	2016
Aguadilla	79.6%	82.8%	0.0%	0.0%	10.7%	8.9%	0.2%	0.1%	0.2%	0.2%	0.0%	0.0%	9.3%	8.1%
East	0.0%	0.0%	69.0%	77.3%	0.0%	0.0%	30.9%	22.6%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
North	9.9%	9.1%	0.0%	0.0%	78.4%	80.9%	9.7%	7.9%	1.8%	1.8%	0.0%	0.0%	0.2%	0.2%
San Juan	0.0%	0.0%	0.9%	1.1%	0.9%	1.2%	97.2%	96.7%	0.4%	0.5%	0.6%	0.6%	0.0%	0.0%
South	0.2%	0.2%	0.0%	0.0%	1.3%	1.6%	2.6%	2.3%	88.2%	88.4%	3.6%	2.8%	4.2%	4.6%
Southeast	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	16.5%	16.5%	13.2%	15.8%	70.2%	67.4%	0.0%	0.0%
Southwest	11.2%	10.1%	0.0%	0.0%	0.3%	0.3%	0.0%	0.0%	7.2%	6.0%	0.0%	0.0%	81.3%	83.6%

Source: SDG analysis of Trip Distribution

Average Travel Time

Average trip length is an important measure to validate the reasonableness of trip distribution. The average trip length was summarized with respect to travel time (minutes). Travel times from origin zones to destination zones used in this summary were the shortest among all transportation modes, namely auto, transit, and walking. Table F.9 and Figure F.3 show the modeled average trip length by trip purpose for 2010 and 2016, estimated by the 2040 and 2045 PR LRTP Models, respectively. Except for the high-income HBW trips, the changes of the average travel time from 2010 to 2016 ranged from -1% to 10%.

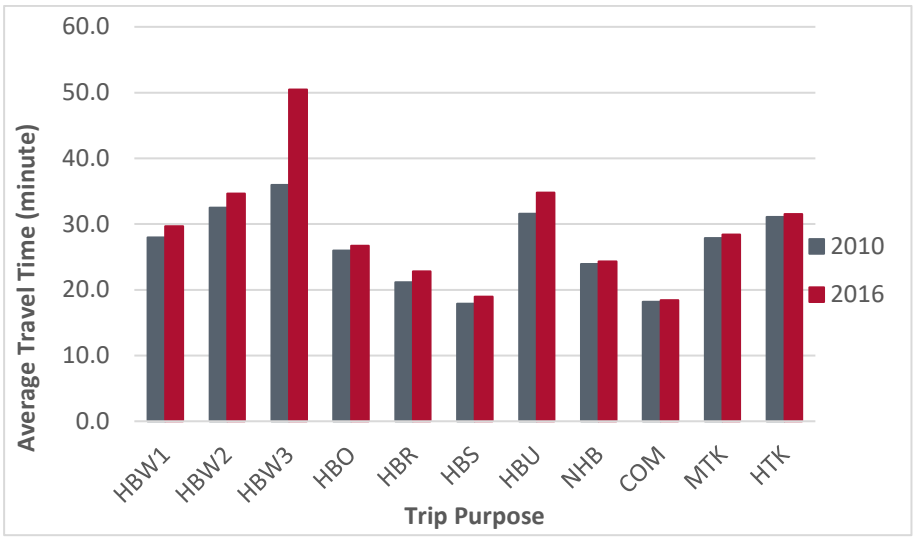
The travel time of the high-income HBW trips in 2016 was significantly longer than 2010 estimates, increased from 36 minutes to 50 minutes. It was also the longest travel time among all trip purposes, even longer than medium and heavy trucks. Previously in the 2040 PR LRTP Model, balancing trip productions and attractions were independent for each MPO. This kept the total productions equal to attractions of each trip purpose within the MPO region. This restriction was eliminated which allowed balancing trip ends across seven MPOs in the trip generation step during the 2045 PR LRTP Model development/update. It resulted in the significant trip attractions increase in San Juan and reductions in other regions, causing the extended travel time of the high-income HBW trips.

Table F.1: Average Trip Length (Minutes) by Trip Purpose

Trip Purpose	2040 PR LRTP 2010 Calibration	2045 PR LRTP 2016 Calibration	Difference	% Change
HBW – Low Income	27.9	29.6	1.7	6.1%
HBW – Medium Income	32.5	34.6	2.1	6.6%
HBW – High Income	36.0	50.5	14.5	40.4%
HBO	26.0	26.7	0.7	2.8%
HBR	21.2	22.8	1.7	7.9%
HBS	17.9	18.9	1.0	5.8%
HBU	31.6	34.8	3.2	10.2%
NHB	23.9	24.3	0.4	1.6%
COM	18.2	18.4	0.3	1.5%
MTK	27.8	28.4	0.6	2.0%
HTK	31.1	31.5	0.5	1.5%
Total	**24.8**	**26.9**	**2.2**	**8.7%**

Source: SDG analysis of Trip Distribution

Figure F.1: Average Trip Length Comparison (2010 vs. 2016)



Source: SDG analysis of Trip Distribution

Shares of Intrazonal Trips

The percentages of intrazonal trips are summarized for all trip purposes in Table F.10. The comparison shows that the shares of intrazonal trips in 2016 are generally close to those in 2010 calibration in the 2040 PR LRTP Model.

Table F.1: Shares of Intrazonal Trips by Trip Purpose

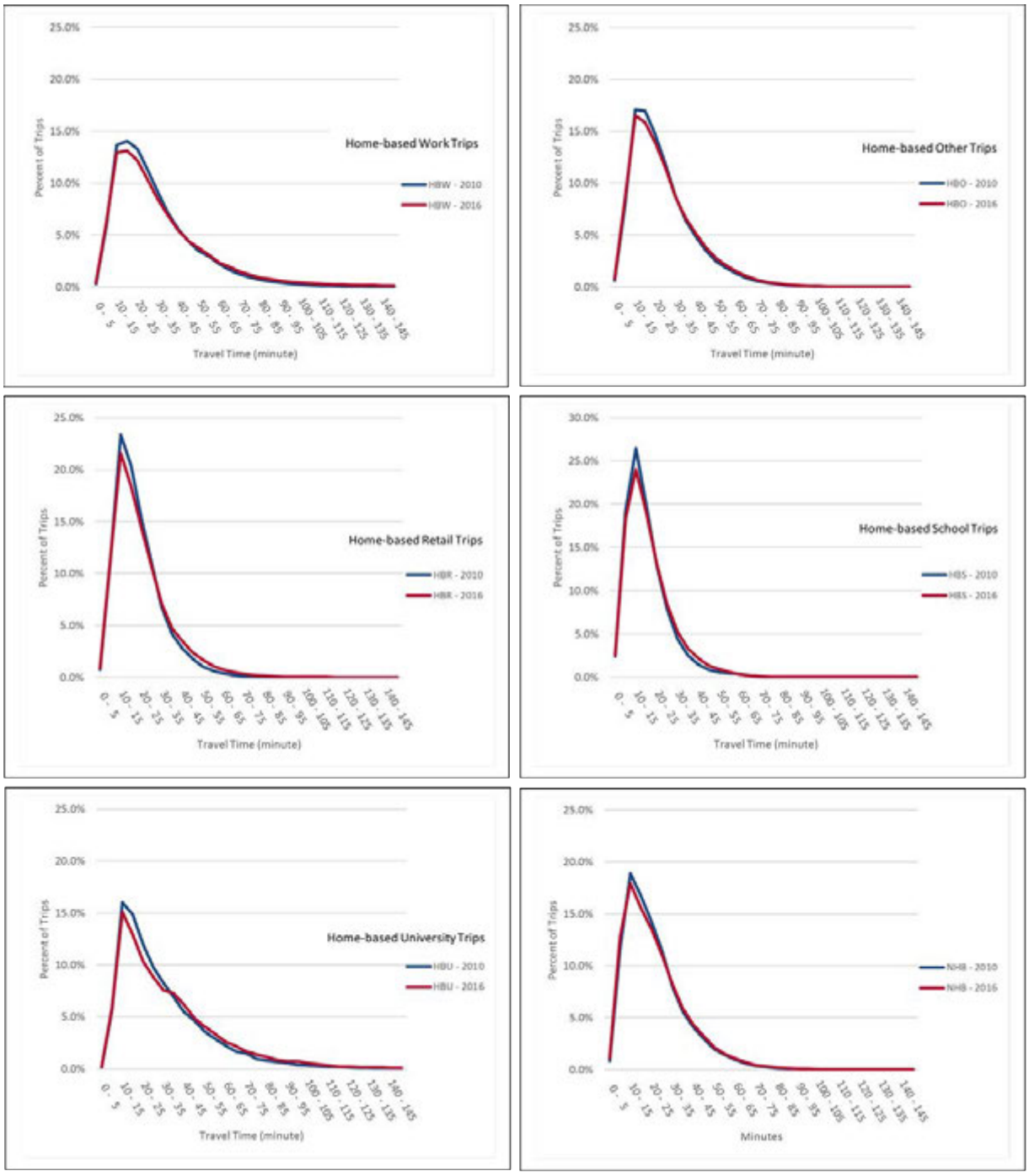
Trip Purpose	2040 PR LRTP	2045 PR LRTP
HBW – Low Income	1.2%	1.0%
HBW – Medium Income	0.8%	0.7%
HBW – High Income	0.5%	0.5%
HBO	1.4%	1.5%
HBR	1.8%	1.6%
HBS	6.0%	4.9%
HBU	0.4%	0.4%
NHB	2.7%	2.8%
COM	5.2%	5.0%
MTK	2.3%	2.2%
HTK	2.9%	2.8%
Total	**2.5%**	**2.0%**

Source: SDG analysis of Trip Distribution

Trip Length Frequency Distribution

Beyond the aggregate measures of average travel time discussed above, next figures plot the frequency distribution of trip lengths for all person trip purposes of 2010 and 2016 estimates in Figure F.4. No significant variations in the trip length distribution in 2016 is observed.

Figure F.1: Trip Length Frequency Distributions by Trip Purpose



Source: SDG analysis of Trip Distribution

MODE CHOICE AND TRANSIT ASSIGNMENT

In this section the update to the mode choice and transit (Public Transportation or PT) assignment is presented. Following this introduction, the section continues with a brief review of the mode choice framework established for 2040 PR LRTP, including a summary of the level of validation reported for the 2040 RP LRTP Model development. Improvements and updates

undertaken by SDG for the 2045 Puerto Rico Long Range Transportation Plan (PR LRTP) are presented, followed by the calibration and validation of these improvements. The final part of this section presents a range of sensitivity tests to show how responsive the model is to changes in input assumptions.

For this project, only a relatively minor update to the mode choice model was possible due to Hurricane María. As discussed in previous sections, this has two primary impacts on the project.

1. Due to the scale of the disaster, individuals trip making behavior was fundamentally changed. Furthermore, the extent to which these changes are permanent or may revert over the planning horizon for this project is unknown. As a result, the collection of additional data during the aftermath of the hurricane was not considered to be informative for the model.
2. In addition, following the hurricane progress on the PR LRTP was not possible due to widespread flooding, and electricity and communication outages. Key contacts were also rightly focusing on the humanitarian response which meant they were not able to provide clarity on how the project should proceed. As a result, the time available for model development was reduced and this meant that a full review and update of the modelling was not possible.

Developments for the 2045 PR LRTP

As a result of Hurricane María, no data collection proposed as part of the original project scope would be available for the model updates. In particular, the household travel survey data would not be completed and analyzed in time to update the relevant model inputs. As such, model development was relatively limited in scope. The main tasks are summarized as follows.

- Updated inputs where new data is available
- Updated hierarchy of PT modes within the transit assignment
- Mode choice modelling of the peak and off-peak periods for each trip purpose
- Revalidation for Base Year 2016

Each of these tasks is discussed further in the subsections which follow.

Updated Inputs Where New Data Is Available

While no new household travel survey data was available for this project, other data updates were incorporated into the model. These include

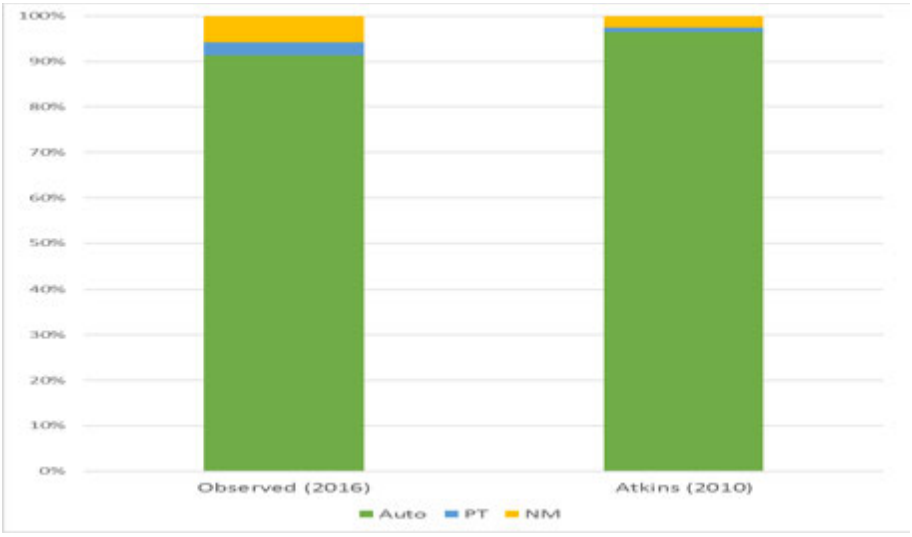
- The latest ACS (2012-2016) data, used to calculate work purpose mode shares.
- Updated transit data on Tren Urbano, Metro Urbano, and Metrobus (2017), Puerto Rico Metropolitan Bus Authority (AMA) ridership (2016), and Público trips (Check Ride data, 2015, National Transit Database, 2016) was used to produce more robust transit demand estimates compared to that recorded in the HTS and ACS data. Collectively the HTS, ACS, PT transit dataset is referred to as the *SDG combined data set*.
- The transit network, including fares, was updated based on the latest service specification provided by Puerto Rico Integrated Transit Authority (PRITA).

The impacts of each of these data updates is discussed below:

- Target mode shares

From the updated ACS, Census, and transit data a new snapshot of travel demand in Puerto Rico was developed. At a high level the PT and non-motorized (NM) mode share was observed to have increased slightly from the analysis undertaken for the 2040 LRTP. This is shown in Figure F.5.

Figure F.5: Comparison of 2010 (2040 LRTP) and 2016 (2045 LRTP) Target Mode Shares



Source: 2040 PR LRTP, SDG combined data set

These results are consistent with analysis contained in the 2040 PR LRTP. In particular, the 2040 PR LRTP shows that the journey to work data has a higher public transportation mode share compared to the HTS data. As the new hybrid data set incorporates both HTS and journey to work data it is expected that the updated target mode shares will therefore contain a higher PT and NM share.

Given the limited available observed data on travel demand across Puerto Rico, it is prudent for the analysis to take advantage of the all available data. For this reason, each data set was used in the development of our target mode shares as follows.

- The HTS data is the broadest ranging data set available, however it's age and relatively small sample size mean that it is appropriate to complement this data with other sources where available. For this reason, the HTS data provided the starting point for the mode share analysis. That is, initial target mode shares were calculated for all trip purposes.
- Within the HTS data only a very small number of public transportation trips were recorded. Furthermore, rail was not a valid mode choice option in the data providing more evidence that PT trips are under recorded in this data set. As such the number of PT trips in the HTS data was re-estimated based on the latest on board transit data provided by PRITA for bus and rail. Público patronage was obtained from the 2016 National Transit Database.
- ACS journey to work data for 2012-2016 was available for this study. Given the larger sample size this data was used to infill the modal trip estimates for work based trip purposes in the HTS data.

The net effect of this analysis on the initial HTS mode shares is shown in Table F.11.

Table F.11: Target Mode Share Evolution.

Scenario	HTS only	With On Board Transit Survey	And Journey to Work
Auto	90.2%	91.3%	91.4%
Transit	4.2%	3.0%	2.8%
Non-Motorized	5.6%	5.7%	5.8%

Source: SDG combined data set

- Mode choice coefficients

Updated mode choice coefficients were produced based on the latest available median household income data from the 2016 ACS data. The result of the analysis is presented in Table F.12 and is based on the following assumptions recommended by USDOT revised VOT Guidance 2016.

- Value of time for commuters is 60% of their hourly wage;
- Value of time for non-commuter trips is 50% of the island wide hourly wage; and
- Hourly wage is median household income divided by 2,080.

Table F.12: Value of Time ($/hour, in 2016$)

Trip purpose	Income range	Median Income	Value of Time
Home-based work - Low Income	< $30,000	$15,000	$4.33
Home-based work - Med. Income	$30,000 - $69,999	$50,000	$14.42
Home-based work - High Income	>= $70,000	$100,000	$28.85
Home-based other		$20,078	$4.83
Non-home based		$20,078	$4.83

Source: SDG analysis

Note that the values of time calculated in the table above are for each trip purpose. In the previous section – Trip Distribution – a separate value of time is used which is a weighted average of the above values of all trip purposes.

Based on the value of time calculated above, the mode choice coefficients from the 2040 Long Range Transportation Plan were scaled. Based on FTA guidance[16], the coefficients for non-home-based trips were scaled to be 1.8 times the home-based other trips. The mode choice coefficients used for the 2045 Long Range Transportation Plan are shown in Table F.13 below.

[16] FTA recommendations for mode choice model coefficients (http://tfresource.org/Model_Validation_and_Reasonableness_Checking/Mode_Choice).

Table F.13: Mode Choice Coefficients

Parameter	Home-based work – low income	Home-based work – medium income	Home-based work – high income	Home-based other	Non-home based
In vehicle time (mins)	(0.0250)	(0.0250)	(0.0250)	(0.0125)	(0.0225)
Out of vehicle time (mins)	(0.0500)	(0.0500)	(0.0500)	(0.0375)	(0.0675)
Cost (USD)	(0.3464)	(0.1040)	(0.0520)	(0.1553)	(0.2795)
Transfer penalty (IVT mins)	5	5	5	5	5
Premium IVT	0.7	0.7	0.7	0.7	0.7
Nest coefficient	0.5	0.5	0.5	0.5	0.5

Source: SDG analysis

The generalized cost equations in the mode choice have not changed from the 2040 PR LRTP and are reproduced below. To do this the following definitions are required. For each mode M and purpose P,

- Let a, b, c be the coefficients for in vehicle time IVT, out of vehicle time OVT, and cost; and
- Denote by$k_{M,P}$ a real number constant.
- Then for each purpose P, define the Generalized Cost $GC_{M,P}$for each mode as follows:

$$GC_{Auto,P} = \mathrm{a} \cdot IVT + \mathrm{b} \cdot OVT + \mathrm{c} \cdot Cost + k_{Auto,P}$$

$$GC_{Transit,P} = \mathrm{a} \cdot (IVT + 0.7 \cdot IVT(Premium) + 5 \cdot \mathrm{Transfers}) + \mathrm{b} \cdot OVT + \mathrm{c} \cdot Cost + k_{Transit,P}$$

$$GC_{Nonmotorized,P} = \mathrm{b} \cdot OVT - Distance^3 + k_{Nonmotorized,P}.$$

- Transit Network

The existing transit network was reviewed against transit service provided by PRITA. This involved checking the following components of the model.

- Train, bus, and ferry routes: Following a review of the transit routes, it was observed that from 2010 to 2016 there has been a rationalization of bus services within San Juan, as described in Table F.14. Overall the coverage of the bus network has changed, with an increased frequency in the remaining routes, although some reductions do occur. Overall there is a net reduction in bus services in the peak and off-peak periods as shown in the table below.

Table F.14: Total Bus Services – San Juan

Time of day	2010	2016
Peak	82	73
Off peak	77	52

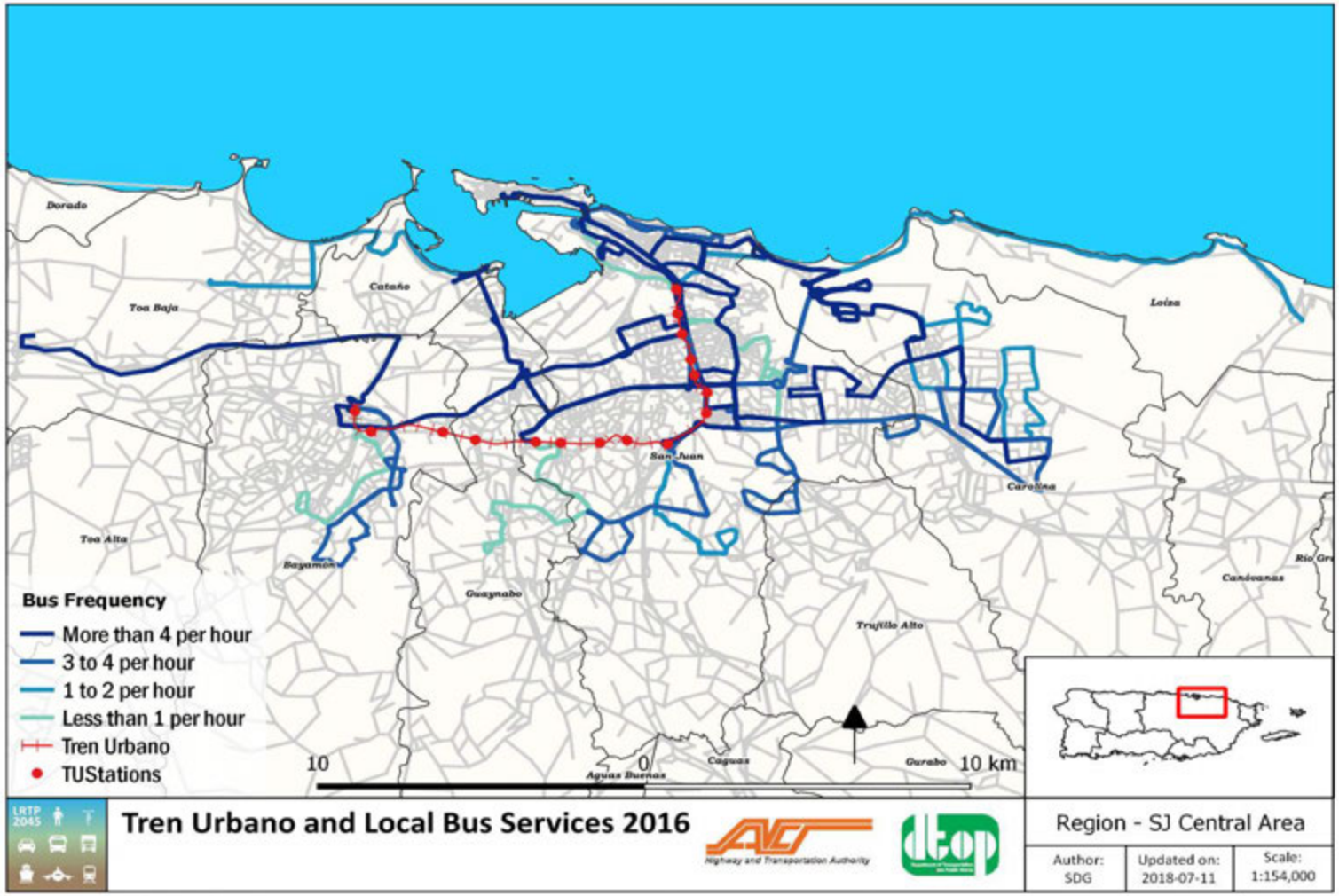
Sources: 2040 PR LRTP, Puerto Rico Integrated Transit Authority

Some specific key changes are listed below.

- Total number of distinct routes reduced from 40 to 30
- The Metro Urbano service from Toa Baja to Bayamon introduced
- Frequency of the Bayamon to Sagrado Corazon bus increased
- Frequency of feeder buses south of the Tren Urbano reduced

A plot of the transit services included for the 2016 Base Year is included in Figure F.6.

Figure F.6: Tren Urbano and Local Bus Services – 2016 – San Juan



Source: SDG analysis of transit service

In addition to the above route changes, the wider transit network was reviewed and updated as follows.

- Público terminal locations: No changes required.
- Rail stations: No changes required.
- Bus dwell times: Bus dwell times were reviewed and maintained at 1 minute per stop. The response of the model to change in bus dwell times has been included as a sensitivity test.
- Rail and ferry travel times: Travel times consistent with latest available timetable information.
- Rail, bus, ferry, and Público fares: PT fares were updated to be consistent with the current fare structure, as shown in Table F.15. The main change is the inclusion of the premium fare for Metrobus. Público fares were not changed.

Table F.15: Transit Fares (in 2016$)

Rail	Metrobus	Local bus	Ferry	Público
$1.5	$2	$0.75	$0.5-2.25	$0.33 + $0.07/mile

Source: SDG analysis of transit service

Note that transfers between Rail and Local bus are free. For transfers between Rail and Metrobus only cost the fare difference is paid.

Updated Hierarchy of PT Modes Within The Transit Assignment

For the 2045 PR LRTP, the hierarchy of PT modes was updated, as shown in Table F.16. Note that level 1 is referred to as the highest level, with level 3 being the lowest level.

Table F.16: Hierarchy of Transit Modes

Level	2040 PR LRTP	2045 PR LRTP
1	Público	Rail
2	Bus	Público
3	Rail	Bus

Sources: 2040 PR LRTP, SDG

The hierarchy of modes is important as it determines how linked trips are classified. That is, a trip using multiple PT modes will be classified based on the highest level mode used. Conceptually this means that for the 2045 PR LRTP bus is a feeder for Público and rail services, and Público services are a feeder for rail services. In practice this means that for bus based schemes the impacts on demand can easily be reported based on whether only the bus scheme was used, or whether the scheme was used as part of a longer linked trip.

Mode choice modelling of the peak and off-peak periods for each trip purpose

For the 2045 PR LRTP the mode choice model was improved to produce, for all trip purposes, mode shares for both peak and off-peak periods. This was done so that the differing congestion

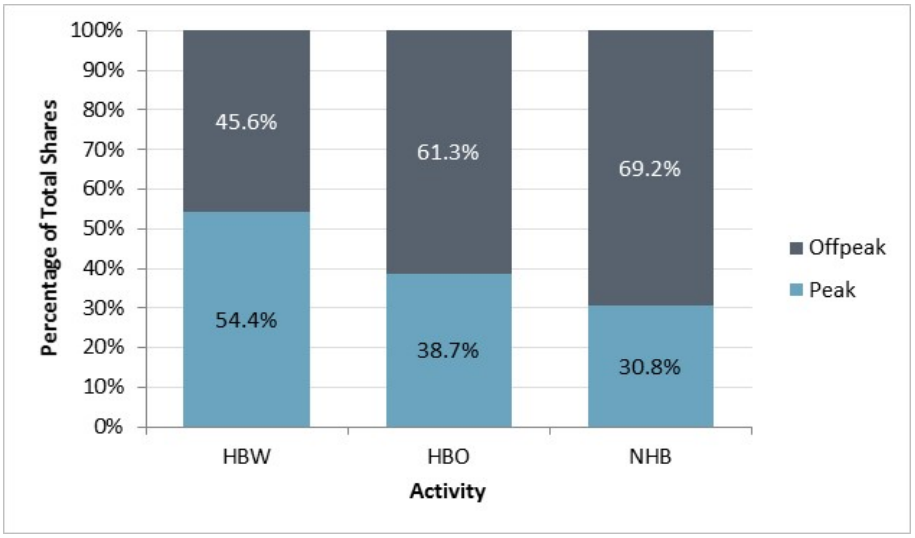
and transit availability during peak and off-peak periods would be accounted for. This is important for the following two reasons.

- To understand the current behavior; and
- To ensure that the attractiveness of future year interventions can be better understood.

The motivation for the above two reasons is discussed below.

Figure F.7 below demonstrates the significance of the time of day split on current behavior. In this figure the time of day split for three core trip purposes is shown.

Figure F.7: Time of Day Travel by Trip Purpose.



Source: SDG analysis of combined data set

From Figure F.7 it can be seen that there are generally more work purpose trips during the peak periods while there are more non-work trips in the off-peak periods. Moreover, there are different travel conditions during the peak and off-peak periods and different trip purposes respond differently to these conditions. By including a peak and off-peak mode choice into the PR LRTP model these differing impacts in the model have been captured.

Time of day also has implications for the future year forecasting. Individuals with different trip purposes have different perceptions of the travel options. This is because the components of the travel options vary by period, congestion and transit wait times for example. So, in order to understand the attractiveness of future year interventions it is important to be able to capture how the benefits of the different schemes vary across the day.

Previously for the 2040 PR LRTP the multi-modal model was developed with AM, Midday, PM, Night highway assignments and peak and off-peak transit assignments. The mode choice model however produced daily matrices for each trip purpose. Time of day disaggregation was then applied using fixed time of day factors. However, the generalized costs used in mode choice were based solely on trip purpose, with work trips assumed to be peak, and all other trip purposes assumed to be off-peak. As demonstrated above, trips are made in all time periods. For this

reason, the mode choice modelling was improved to forecast peak and off-peak mode shares for all trip purposes.

Revalidation for Base Year 2016

Following the re-estimation of the target mode shares and the model development, a revalidation of the mode choice model was undertaken. In this section the validation of both the mode choice model and the public transportation assignment is presented.

HIGHWAY PATH BUILDING AND ASSIGNMENT

Highway Assignment

The PR LRTP model incorporates a multiclass assignment combining the passenger trip tables with truck trip tables. For use in the highway assignment, vehicles were converted into Passenger Car Equivalents (PCEs[17]) using the following factors, commonly used in transportation modeling:

- Auto (SOV, HOV2, HOV3+): 1
- Commercial Vehicle: 1
- Medium truck: 1.5
- Heavy truck: 2

Travel times are estimated based on the volume-delay relationship, which is implemented through the volume-to-capacity (V/C) ratio on each link of the network. The PR LRTP model uses the traditional Bureau of Public Road (BPR) formula.

$$T_c = T_0 \times (1 + \alpha \times \left(\frac{V}{C}\right)^{\beta})$$

Where:

T_c: Link congested travel time

T_0: Link free-flow travel time

α, β: Alpha and Beta constants

V: Link volume in passenger car equivalents

C: Link capacity

Both Table F.17 and Figure F.8 show that the beta coefficient in the BPR formula was reduced on both limited access highways and other types of roadways when the V/C ratio exceeded 1.0.

Table F.17: Adopted Constants in LRTP Volume-Delay Function

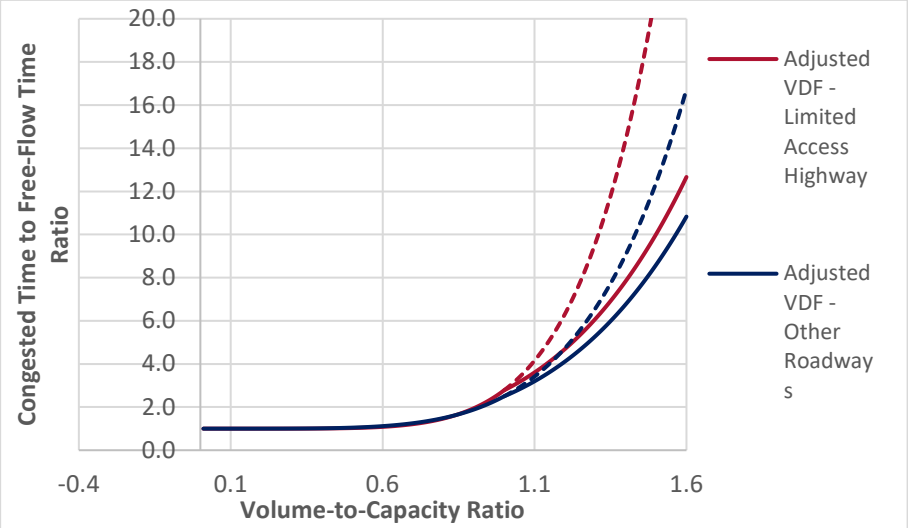
Road Type	Alpha	Beta (V/C <=1.0)	Beta (V/C >1.0)
Limited Access Highway	1.78	6.0	4.0

[17] PCEs are used in transportation modeling to reflect the greater amount of highway capacity utilized by trucks.

Road Type	Alpha	Beta (V/C <=1.0)	Beta (V/C >1.0)
Other Roads	1.5	5.0	5.0

Source: PR LRTP Model

Figure F.8: LRTP Volume-Delay Function



Source: SDG Analysis of LRTP Volume-Delay Function

CALIBRATION RESULTS

The calibration of highway assignment focused on the standard comparison of the modeled volumes to the observed counts by using various classifications and statistical measures of fit such as Percent Error (%Error) and Percent Root Mean Squared Errors (%RMSE) by volume group. Both %Error and %RMSE are commonly used to determine how closely estimated volumes replicate observed count data. The formula for the %Error and %RMSE terms are as follows:

$$\%Error = \frac{\sum \text{Model}_i}{\sum \text{Count}_i} - 1$$

$$\%RMSE = \left. 100 \times \sqrt{\frac{\sum_{i=1}^{n} (\text{Count}_i - \text{Model}_i)^2}{n}} \right/ \sum_{i=1}^{n} \text{Count}_i / n$$

Where

$Count_{i\ i}$: is the observed traffic count for link i;

$Model_i$: is the modeled traffic volume for link i; and

N is the number of links in the group of links including link i.

The overview highway assignment statistics were summarized in Table F.18 through Table F.22 to depict different aspects and levels of comparison, including:

- Volumes vs. counts by facility types;
- Volumes vs. counts by sub-regions (MPOs);
- Volumes vs. counts by area types;
- Volumes vs. counts on screenlines latter described; and
- Truck volumes vs counts by facility types.

The model calibration statistics by facility and by area type between the estimated and observed traffic are summarized in Table F.18 and Table F.19. In general, the PR LRTP model's estimated volumes in 2016 replicate the observed data reasonably well. The results indicate the overall the modeled volumes are within 1% of the observed data at a regional level. During peak and off-peak periods, the estimated volumes are 2.2% and 0.5% higher than the observed counts, respectively. In a more disaggregate level, the variations between estimated and observed data are more pronounced. The facility types and area types that have high deviation between modeled and observed data consistently have very limited observed data.

Table F.18: Estimated Volumes vs. Observed Counts by Facility During Peak and Off-peak Periods

Facility	Number of Counts	Peak				Off-Peak			
		Observed	Modeled	% Error	% RMSE	Observed	Modeled	% Error	% RMSE
Freeway/Toll	70	573,720	670,142	16.8%	59%	1,143,873	1,362,333	19.1%	56%
Expressways	139	959,061	930,153	(3.0%)	39%	2,141,450	2,024,012	(5.5%)	31%
Principal	57	167,567	182,888	9.1%	58%	344,872	370,117	7.3%	48%
Minor	95	289,831	260,359	-	58%	647,042	556,366	-	51%
Ramps	7	17,545	8,539	-	124%	36,010	22,322	-	132%
Total	368	2,007,724	2,052,081	2.2%	54%	4,313,245	4,335,151	0.5%	47%

Source: SDG Analysis of 2016 Model Calibration

Table F. 19: Estimated Volumes vs. Observed Counts by Area Type

Area Type	Number of Counts	Observed	Modeled	% Difference	%RMSE
High Density Urban Core	2	15,007	19,225	28.1%	37%
High Density Urban	77	1,540,255	1,559,781	1.3%	63%
Urban	74	1,546,260	1,387,902	(10.2%)	36%
Suburban Dense	67	1,190,151	1,177,445	(1.1%)	29%
Suburban	70	1,087,002	1,170,105	7.6%	34%
Exurban	43	641,277	754,652	17.7%	39%
Rural	35	301,017	318,121	5.7%	48%
Total	368	6,320,969	6,387,232	1.0%	45%

Source: SDG Analysis of 2016 Model Calibration

Table F.20 compares the volume by MPO between the PR LRTP model and available observed count data. The comparison at the MPO level shows that the estimated and observed ratios by MPO are in a reasonable range, from -13.5% to 6.4%. The ratios in most MPOs are within +/- 5.0% although the Southwest MPO is underestimated by 13.5% and San Juan MPO is overestimated by 6.4%.

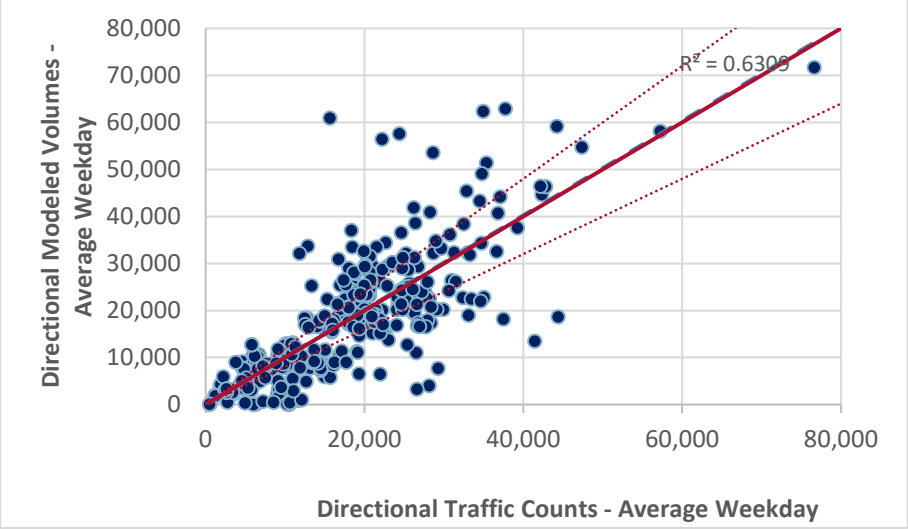
Table F.20: Estimated Volumes vs. Observed Counts by MPO

MPO	Number of	Observed	Modeled	% Difference	%RMSE
Aguadilla	69	1,009,846	950,667	(5.9%)	29%
East	3	50,358	49,354	(2.0%)	8%
North	30	235,535	247,258	5.0%	42%
San Juan	128	2,696,286	2,870,021	6.4%	51%
South	78	1,226,298	1,293,853	5.5%	38%
Southeast	9	135,026	139,355	3.2%	67%
Southwest	51	967,621	836,724	(13.5%)	33%
Total	**368**	**6,320,969**	**6,387,232**	**1.0%**	**45%**

Source: SDG Analysis of 2016 Model Calibration

Figure F.9 shows a scatter plot of the average weekday link volumes (directional), with observed counts plotted on the horizontal axis and modeled volumes plotted on the vertical axis. The grey dashed line is the linear regression trend and the red solid line indicates the desired line when the estimated volumes and counts are perfectly matched. The two red dashed lines demonstrate a range of volume to count ratio from -20% to +20%.

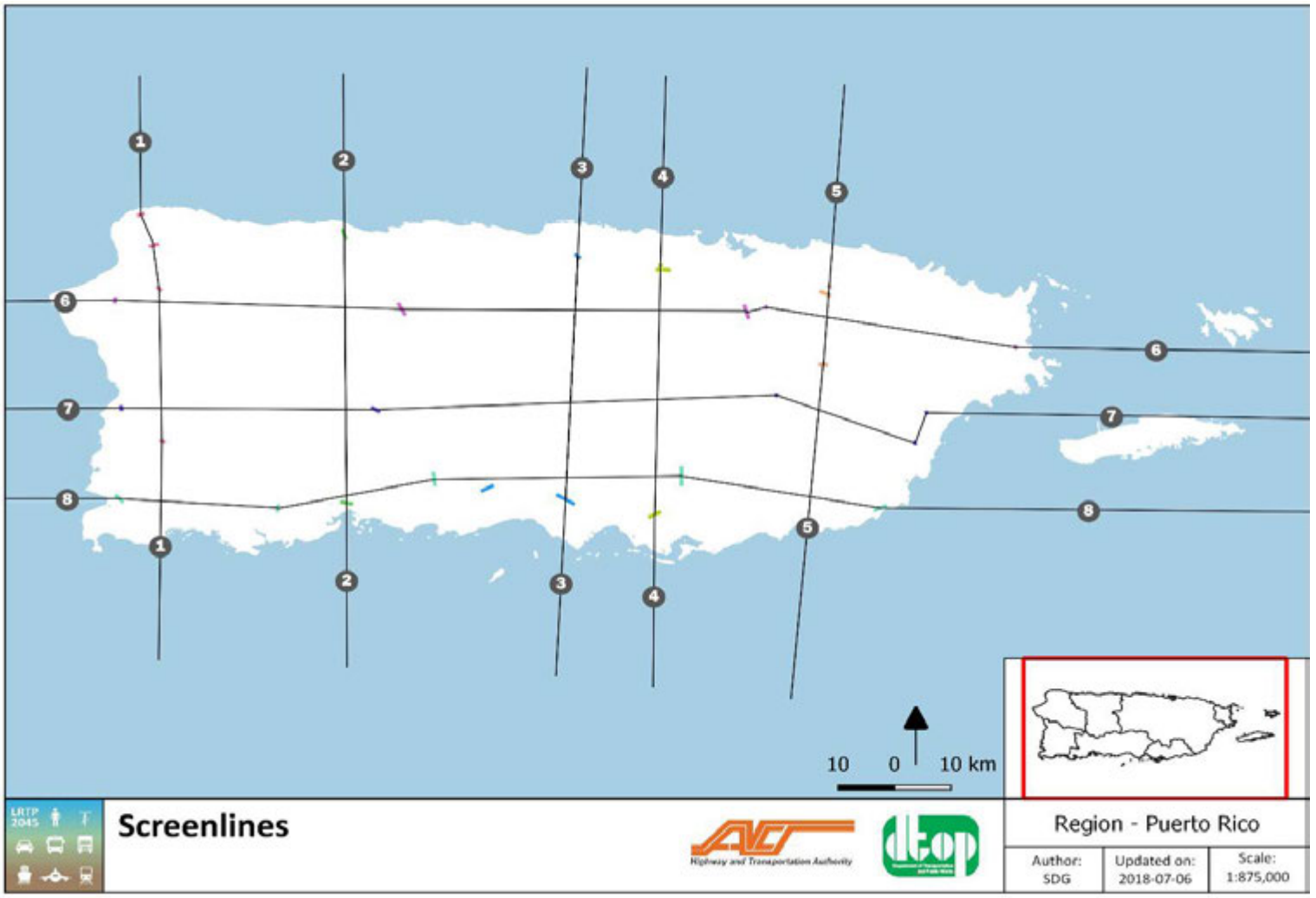
Figure F.9: Scatter Plot of Modeled Volumes vs Observed Counts



Source: SDG Analysis of 2016 Model Calibration

As part of model calibration efforts, the eight screenlines displayed in Figure F.10 were developed to capture major highway facilities and cross the most count locations. These screenlines helped gauge the traffic movement between regions and eventually adjust the distribution of trips.

Figure F.10: Screenline Locations



Source: SDG

Table F.21 provides the statistics of model performance in respect to estimated and observed total (autos and trucks) volumes on screenlines. The ratios of model volumes and observed counts are mostly within tolerance and the ratio of 8.9% at the combined regional level are generally reasonable.

Table F.21: Estimated Volumes vs. Observed Counts on Screenlines

Screenline	Number of	Observed	Modeled	% Difference	%RMSE
1	8	104,819	105,124	0.3%	12%
2	3	52,021	51,028	(1.9%)	25%
3	4	129,983	163,192	25.5%	31%
4	5	117,964	173,679	47.2%	55%
5	6	162,172	166,372	2.6%	17%
6	8	112,924	125,661	11.3%	37%
7	7	132,083	99,030	(25.0%)	40%
8	10	82,200	89,526	8.9%	26%
Total	**51**	**894,164**	**973,613**	**8.9%**	**35%**

Source: SDG Analysis of 2016 Model Calibration

The volume comparison by facility type of truck traffic is shown in Table F.22. This table provides the volume calibration in terms of the GEH statistics, which is another common measure calculated to determine how well estimated traffic matches observed counts. The GEH statistic is calculated using hourly volumes as:

$$GEH = \sqrt{\frac{(Model_i - Count_i)^2}{(Model_i + Count_i) * 0.5}}$$

Where:

$Count_i$ is the observed hourly traffic count for link i;

$Model_i$ is the modeled hourly traffic volume for link i.

GEH values less than 5 indicate a good fit of observed levels[18], while GEH values greater than 10 indicate that more attention may be needed on a specific location of the model. The statistics in this table show the truck assignment performs well at aggregated level by facility type.

Table F.22: Estimated Truck Volumes vs. Observed Truck Counts by Facility Type

Facility	Number of Counts	Medium Truck				Heavy Truck			
		Observed	Modeled	% Error	GEH	Observed	Modeled	% Error	GEH
Freeway/Toll	70	65,568	58,440	(11%)	5.8	20,293	18,961	(6.6%)	1.9
Expressways	139	132,113	123,680	(6%)	4.8	53,083	49,820	(6.1%)	2.9

[18] Wisconsin Department of Transportation Microsimulation Guidelines: Acceptance criteria for the model (http://www.wisdot.info/microsimulation/index.php?title=Model_Calibration)

Facility	Number of Counts	Medium Truck				Heavy Truck			
		Observed	Modeled	% Error	GEH	Observed	Modeled	% Error	GEH
Principal	57	19,762	16,228	(18%)	5.4	7,825	5,631	-	5.5
Minor	95	29,206	25,698	(12%)	4.3	6,665	8,769	31.6%	4.9
Ramps	7	2,152	1,009	(53%)	5.9	1,092	332	-	5.8
Total	**368**	**248,800**	**225,055**	**(10%)**	**10.0**	**88,958**	**83,514**	**(6.1%)**	**3.8**

Source: SDG Analysis of 2016 Model Calibration

Model Elasticity on Tolls

As part of the model validation, reasonableness check of the model elasticity of travel demand with respect to tolls was performed. The base toll rates in the 2016 scenario were increased by 100%, and compared the daily transactions to those in the base 2016 model. The results show that by doubling the highway toll, the daily transactions reduce by 43%, indicating a -0.43 elasticity, as seen in Table F.23. Research by the Victoria Transport Policy Institute[19] summarizes from various studies that the elasticity of traffic volumes to tolls ranges widely from -0.1 to -0.82. This proves that the toll elasticity of the 2045 PR LRTP model is within expected range.

Table F.23: Toll Elasticity

Scenario	Toll Rates	Transactions
Base Case	Original	599,073
Double Toll Case	Doubled	343,523
% Changes	100%	(43%)

Source: SDG Analysis of Model Elasticity

[19] http://www.vtpi.org/elasticities.pdf.

G APPENDIX G – MODEL NETWORK COMPARISON

COMPARISON 2040 MODEL NETWORK VS 2016 MODEL

Table G.1: Networks Comparison

FID	Lanes	Classification	Municipality	MPO Region
0	0			South MPO
1	2	TERTIARY NETWORK	Ponce	South MPO
2	1	PR-123	Adjuntas	North MPO
3	1	PRIMARY NETWORK		South MPO
4	1	TERTIARY NETWORK	Ponce	South MPO
5	1	PRIMARY NETWORK		South MPO
6	1	TERTIARY NETWORK	Ponce	South MPO
7	2	PRIMARY NETWORK		South MPO
8	2	PR-10	Utuado	North MPO
9	1	PR-123	Adjuntas	North MPO
10	0			North MPO
11	1		Barceloneta	North MPO
12	1		Arecibo	North MPO
13	2	PRIMARY NETWORK	Adjuntas	North MPO
14	2	TERTIARY NETWORK	Ponce	South MPO
15	0			South MPO
16	1		Arecibo	North MPO
17	3	PRIMARY NETWORK		South MPO
18	1		Arecibo	North MPO
19	1		Arecibo	North MPO
20	1	PR-123	Adjuntas	North MPO
21	3	PRIMARY NETWORK	Ponce	South MPO
22	0			North MPO
23	1	Cll 7	Arecibo	North MPO

FID	Lanes	Classification	Municipality	MPO Region
24	1	Cll 7	Arecibo	North MPO
25	2	PR-10	Utuado	North MPO
26	0			North MPO
27	3	PRIMARY NETWORK	Ponce	South MPO
28	2	PR-10	Utuado	North MPO
29	1		Arecibo	North MPO
30	1		Arecibo	North MPO
31	1	Tertiary	Orocovis	San Juan MPO
32	1		Arecibo	North MPO
33	1	Secondary	Orocovis	San Juan MPO
34	1	Tertiary	Orocovis	San Juan MPO
35	1	Tertiary	Orocovis	San Juan MPO
36	1	Secondary	Orocovis	San Juan MPO
37	1	Tertiary	Orocovis	San Juan MPO
38	1	Tertiary	Orocovis	San Juan MPO
39	2	PRIMARY NETWORK URB	Ponce	South MPO
40	1	Tertiary	Orocovis	San Juan MPO
41	1	Tertiary	Orocovis	San Juan MPO
42	1	PR-123	Adjuntas	North MPO
43	1	PR-140	Barceloneta	North MPO
44	1	Cll 7	Arecibo	North MPO
45	1	RAMPA-RP	Ponce	South MPO
46	0			South MPO
47	0			South MPO
48	0			South MPO
49	0			South MPO
50	3	PRIMARY NETWORK	Ponce	South MPO
51	1	TERTIARY NETWORK		South MPO
52	0			South MPO
53	1	Secondary	Orocovis	San Juan MPO
54	1	TERTIARY NETWORK		South MPO
55	1	Secondary	Orocovis	San Juan MPO
56	0			North MPO
57	2	Primary	Vega Baja	San Juan MPO
58	1		Arecibo	North MPO
59	1	Tertiary	Orocovis	San Juan MPO
60	2	PRIMARY NETWORK URB	Ponce	South MPO
61	2	Primary	Vega Baja	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
62	1		Utuado	North MPO
63	2	PR-10	Utuado	North MPO
64	1	Rampa-rp	Vega Baja	San Juan MPO
65	2	PR-10	Utuado	North MPO
66	2	Primary	Vega Baja	San Juan MPO
67	3	PRIMARY NETWORK	Ponce	South MPO
68	1	PR-682	Barceloneta	North MPO
69	2	Primary	Vega Baja	San Juan MPO
70	2	PRIMARY NETWORK	Ponce	South MPO
71	2	PRIMARY NETWORK	Ponce	South MPO
72	2	PRIMARY NETWORK URB	Ponce	South MPO
73	2	PRIMARY NETWORK	Ponce	South MPO
74	1	PR-123	Adjuntas	North MPO
75	1	PRIMARY NETWORK	Ponce	South MPO
76	1	PRIMARY NETWORK EN	Ponce	South MPO
77	2	PRIMARY NETWORK	Ponce	South MPO
78	2	PRIMARY NETWORK	Ponce	South MPO
79	2	PRIMARY NETWORK	Ponce	South MPO
80	1	PRIMARY NETWORK EN	Ponce	South MPO
81	1	PRIMARY NETWORK EN	Ponce	South MPO
82	1	PRIMARY NETWORK EN	Ponce	South MPO
83	2	PRIMARY NETWORK URB	Ponce	South MPO
84	2	PRIMARY NETWORK EN	Ponce	South MPO
85	2	PRIMARY NETWORK EN	Ponce	South MPO
86	1	PRIMARY NETWORK EN	Ponce	South MPO
87	1		Barceloneta	North MPO
88	1	PRIMARY NETWORK EN	Ponce	South MPO
89	1	PR-140	Barceloneta	North MPO
90	1		Barceloneta	North MPO
91	2	PRIMARY NETWORK URB	Ponce	South MPO
92	2	PRIMARY NETWORK URB	Ponce	South MPO
93	2	PRIMARY NETWORK URB	Ponce	South MPO
94	2	PRIMARY NETWORK URB	Ponce	South MPO
95	2	PRIMARY NETWORK	Ponce	South MPO
96	2	PRIMARY NETWORK URB	Ponce	South MPO
97	1	TERTIARY NETWORK	Ponce	South MPO
98	0			South MPO
99	2	PRIMARY NETWORK	Ponce	South MPO

FID	Lanes	Classification	Municipality	MPO Region
100	2	PRIMARY NETWORK	Ponce	South MPO
101	1	PRIMARY NETWORK EN	Ponce	South MPO
102	1	PRIMARY NETWORK EN	Ponce	South MPO
103	2	PRIMARY NETWORK	Ponce	South MPO
104	2	PRIMARY NETWORK	Adjuntas	North MPO
105	2	PRIMARY NETWORK	Ponce	South MPO
106	2	PRIMARY NETWORK	Adjuntas	North MPO
107	2	PRIMARY NETWORK	Adjuntas	North MPO
108	0			North MPO
109	2	PRIMARY NETWORK	Adjuntas	North MPO
110	1		Barceloneta	North MPO
111	1	PR-140	Barceloneta	North MPO
112	1	PR-140	Barceloneta	North MPO
113	2	PR-10	Utuado	North MPO
114	1		Utuado	North MPO
115	1		Utuado	North MPO
116	2	PR-10	Utuado	North MPO
117	1		Barceloneta	North MPO
118	1		Utuado	North MPO
119	1		Barceloneta	North MPO
120	2	PRIMARY NETWORK	Adjuntas	North MPO
121	1		Barceloneta	North MPO
122	1	PR-682	Barceloneta	North MPO
123	2	PR-10	Utuado	North MPO
124	1		Barceloneta	North MPO
125	1	PR-123	Adjuntas	North MPO
126	1		Barceloneta	North MPO
127	1		Barceloneta	North MPO
128	1	PR-123	Adjuntas	North MPO
129	1	PR-682	Barceloneta	North MPO
130	1		Barceloneta	North MPO
131	2	PRIMARY NETWORK	Adjuntas	North MPO
132	2	TERTIARY NETWORK	Coamo	South MPO
133	2	PRIMARY NETWORK	Adjuntas	North MPO
134	1		Barceloneta	North MPO
135	2	TERTIARY NETWORK		South MPO
136	1	Cll 7	Arecibo	North MPO
137	1	PR-123	Adjuntas	North MPO

FID	Lanes	Classification	Municipality	MPO Region
138	1	PR-123	Adjuntas	North MPO
139	1	TERTIARY NETWORK	Coamo	South MPO
140	2	PRIMARY NETWORK	Adjuntas	North MPO
141	2	PRIMARY NETWORK	Adjuntas	North MPO
142	1	PR-682	Barceloneta	North MPO
143	1	PR-123	Adjuntas	North MPO
144	1	PR-123	Adjuntas	North MPO
145	0			South MPO
146	1	TERTIARY NETWORK	Ponce	South MPO
147	2	PRIMARY NETWORK		South MPO
148	2	TERTIARY NETWORK	Ponce	South MPO
149	1	PRIMARY NETWORK		South MPO
150	1	PRIMARY NETWORK		South MPO
151	1	PRIMARY NETWORK		South MPO
152	2	PRIMARY NETWORK		South MPO
153	0			South MPO
154	1	TERTIARY NETWORK	Ponce	South MPO
155	1	PR-123	Adjuntas	North MPO
156	1	PRIMARY NETWORK		South MPO
157	1	TERTIARY NETWORK	Coamo	South MPO
158	1	PRIMARY NETWORK		South MPO
159	2	PRIMARY NETWORK		South MPO
160	1	PRIMARY NETWORK		South MPO
161	2	TERTIARY NETWORK	Ponce	South MPO
162	2	PRIMARY NETWORK		South MPO
163	0			North MPO
164	2	TERTIARY NETWORK	Ponce	South MPO
165	1	TERTIARY NETWORK		South MPO
166	2	PRIMARY NETWORK		South MPO
167	2	TERTIARY NETWORK	Ponce	South MPO
168	2	TERTIARY NETWORK		South MPO
169	2	PRIMARY NETWORK		South MPO
170	2	PRIMARY NETWORK		South MPO
171	2	TERTIARY NETWORK	Ponce	South MPO
172	3	PRIMARY NETWORK		South MPO
173	3	PRIMARY NETWORK		South MPO
174	3	PRIMARY NETWORK		South MPO
175	1	PRIMARY NETWORK		South MPO

FID	Lanes	Classification	Municipality	MPO Region
176	1	PRIMARY NETWORK		South MPO
177	1	PRIMARY NETWORK		South MPO
178	1	PRIMARY NETWORK		South MPO
179	1	PRIMARY NETWORK EN	Ponce	South MPO
180	2	TERTIARY NETWORK	Ponce	South MPO
181	2	PRIMARY NETWORK		South MPO
182	2	PRIMARY NETWORK		South MPO
183	2	PRIMARY NETWORK		South MPO
184	2	TERTIARY NETWORK	Ponce	South MPO
185	2	PRIMARY NETWORK		South MPO
186	2	TERTIARY NETWORK	Ponce	South MPO
187	2	PRIMARY NETWORK		South MPO
188	2	TERTIARY NETWORK	Ponce	South MPO
189	1	Rampa-rp	Vega Baja	San Juan MPO
190	2	PRIMARY NETWORK		South MPO
191	3	PRIMARY NETWORK		South MPO
192	2	PRIMARY NETWORK		South MPO
193	1	PRIMARY NETWORK		South MPO
194	1	TERTIARY NETWORK	Ponce	South MPO
195	1	TERTIARY NETWORK	Ponce	South MPO
196	2	PRIMARY NETWORK		South MPO
197	0			South MPO
198	1	PRIMARY NETWORK		South MPO
199	2	PRIMARY NETWORK URB	Ponce	South MPO
200	1	PRIMARY NETWORK		South MPO
201	1	PRIMARY NETWORK		South MPO
202	1	PRIMARY NETWORK		South MPO
203	1	TERTIARY NETWORK	Ponce	South MPO
204	1	PRIMARY NETWORK		South MPO
205	1	TERTIARY NETWORK	Ponce	South MPO
206	3	PRIMARY NETWORK		South MPO
207	2	TERTIARY NETWORK	Ponce	South MPO
208	3	PRIMARY NETWORK	Ponce	South MPO
209	3	PRIMARY NETWORK	Ponce	South MPO
210	1	TERTIARY NETWORK	Ponce	South MPO
211	1	TERTIARY NETWORK	Ponce	South MPO
212	3	PRIMARY NETWORK	Ponce	South MPO
213	2	TERTIARY NETWORK	Ponce	South MPO

FID	Lanes	Classification	Municipality	MPO Region
214	3	PRIMARY NETWORK	Ponce	South MPO
215	2	TERTIARY NETWORK	Ponce	South MPO
216	1	TERTIARY NETWORK		South MPO
217	1	TERTIARY NETWORK	Ponce	South MPO
218	2	TERTIARY NETWORK	Ponce	South MPO
219	1	TERTIARY NETWORK	Ponce	South MPO
220	2	PRIMARY NETWORK		South MPO
221	2	PRIMARY NETWORK		South MPO
222	0			South MPO
223	0			South MPO
224	2	PRIMARY NETWORK		South MPO
225	1	TERTIARY NETWORK	Ponce	South MPO
226	2	TERTIARY NETWORK	Ponce	South MPO
227	2	TERTIARY NETWORK	Coamo	South MPO
228	1		Ponce	South MPO
229	1	RAMPA-RP	Ponce	South MPO
230	3	PRIMARY NETWORK	Ponce	South MPO
231	3	PRIMARY NETWORK	Ponce	South MPO
232	1	RAMPA-RP	Ponce	South MPO
233	0			South MPO
234	2	PRIMARY NETWORK EN	Ponce	South MPO
235	2	PRIMARY NETWORK EN	Ponce	South MPO
236	3	PRIMARY NETWORK	Ponce	South MPO
237	2	TERTIARY NETWORK	Ponce	South MPO
238	2	TERTIARY NETWORK	Ponce	South MPO
239	2	TERTIARY NETWORK	Ponce	South MPO
240	1	PRIMARY NETWORK EN	Ponce	South MPO
241	2	PRIMARY NETWORK	Ponce	South MPO
242	1		Ponce	South MPO
243	2	PRIMARY NETWORK	Ponce	South MPO
244	1	RAMPA-RP	Ponce	South MPO
245	1		Ponce	South MPO
246	2	PRIMARY NETWORK		South MPO
247	1		Bayamón	San Juan MPO
248	1		Bayamón	San Juan MPO
249	3	Primary	Carolina	San Juan MPO
250	2	Primary	Cayey	San Juan MPO
251	2	Primary	San Juan	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
252	3	Primary	San Juan	San Juan MPO
253	3	Primary	Carolina	San Juan MPO
254	2	Primary	Naranjito	San Juan MPO
255	2	Tertiary	Carolina	San Juan MPO
256	2	Primary	Naranjito	San Juan MPO
257	2	Primary	Cayey	San Juan MPO
258	5		San Juan	San Juan MPO
259	3	Primary	Carolina	San Juan MPO
260	1	Tertiary	Carolina	San Juan MPO
261	2			San Juan MPO
262	3	Primary	Carolina	San Juan MPO
263	2		Carolina	San Juan MPO
264	2		Carolina	San Juan MPO
265	2		Carolina	San Juan MPO
266	2		Carolina	San Juan MPO
267	0			San Juan MPO
268	1	Secondary	Gurabo	San Juan MPO
269	2		Carolina	San Juan MPO
270	2			San Juan MPO
271	2	Primary	Bayamón	San Juan MPO
272	1	Tertiary	Bayamón	San Juan MPO
273	2	Primary	Bayamón	San Juan MPO
274	2	Primary	Bayamón	San Juan MPO
275	1	Tertiary	Bayamón	San Juan MPO
276	2	Primary	Bayamón	San Juan MPO
277	2			San Juan MPO
278	2			San Juan MPO
279	2	Primary	Bayamón	San Juan MPO
280	2	Primary	Bayamón	San Juan MPO
281	2	Primary	Bayamón	San Juan MPO
282	2			San Juan MPO
283	2	Primary	Bayamón	San Juan MPO
284	1		Bayamón	San Juan MPO
285	2	Secondary	Bayamón	San Juan MPO
286	0			San Juan MPO
287	0			San Juan MPO
288	0			San Juan MPO
289	2	Primary	Yabucoa	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
290	1		Bayamón	San Juan MPO
291	1		Bayamón	San Juan MPO
292	1	Tertiary	Bayamón	San Juan MPO
293	0			San Juan MPO
294	2			San Juan MPO
295	2	Primary	Bayamón	San Juan MPO
296	2	Primary	Bayamón	San Juan MPO
297	2	Primary	Bayamón	San Juan MPO
298	2			San Juan MPO
299	1	Tertiary	Aguas Buenas	San Juan MPO
300	1	Secondary		San Juan MPO
301	2	Primary	Cidra	San Juan MPO
302	2		Aguas Buenas	San Juan
303	1		Ceiba	East MPO
304	1		Ceiba	East MPO
305	2	Tertiary	Río Grande	San Juan MPO
306	1		Ceiba	East MPO
307	3	Primary	Río Grande	San Juan MPO
308	1		San Juan	San Juan MPO
309	1		San Juan	San Juan MPO
310	1		San Juan	San Juan MPO
311	1	Tertiary	Toa Baja	San Juan MPO
312	1	Tertiary	Toa Baja	San Juan MPO
313	1	Tertiary	Toa Baja	San Juan MPO
314	0			San Juan MPO
315	0			San Juan MPO
316	1	Tertiary	Toa Baja	San Juan MPO
317	1		Bayamón	San Juan MPO
318	0			San Juan MPO
319	2	Tertiary	Río Grande	San Juan MPO
320	2	Secondary	Río Grande	San Juan MPO
321	2	Secondary	Río Grande	San Juan MPO
322	2		San Juan	San Juan MPO
323	2		San Juan	San Juan MPO
324	1		San Juan	San Juan MPO
325	2		San Juan	San Juan MPO
326	2		San Juan	San Juan MPO
327	2		San Juan	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
328	1		Ceiba	East MPO
329	2		San Juan	San Juan MPO
330	1		Ceiba	East MPO
331	1		San Juan	San Juan MPO
332	2		Bayamón	San Juan MPO
333	1		San Juan	San Juan MPO
334	1	Tertiary	Río Grande	San Juan MPO
335	1		San Juan	San Juan MPO
336	1		San Juan	San Juan MPO
337	1		San Juan	San Juan MPO
338	2	Primary	Cayey	San Juan MPO
339	1		San Juan	San Juan MPO
340	1		San Juan	San Juan MPO
341	1		San Juan	San Juan MPO
342	1		San Juan	San Juan MPO
343	1		San Juan	San Juan MPO
344	2		San Juan	San Juan MPO
345	2		San Juan	San Juan MPO
346	1		San Juan	San Juan MPO
347	2		San Juan	San Juan MPO
348	4		San Juan	San Juan MPO
349	2		San Juan	San Juan MPO
350	2		San Juan	San Juan MPO
351	2		San Juan	San Juan MPO
352	2		San Juan	San Juan MPO
353	2		San Juan	San Juan MPO
354	2		San Juan	San Juan MPO
355	2		San Juan	San Juan MPO
356	1		San Juan	San Juan MPO
357	2		San Juan	San Juan MPO
358	2		San Juan	San Juan MPO
359	2		San Juan	San Juan MPO
360	2		San Juan	San Juan MPO
361	0			East MPO
362	2		San Juan	San Juan MPO
363	1	Primary	Canóvanas	San Juan MPO
364	2	Primary	Canóvanas	San Juan MPO
365	1	Tertiary	Río Grande	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
366	2	Primary	Canóvanas	San Juan MPO
367	1	Primary	Canóvanas	San Juan MPO
368	2	Tertiary	Río Grande	San Juan MPO
369	2	Primary	Canóvanas	San Juan MPO
370	1	Primary	Canóvanas	San Juan MPO
371	1	Primary	Canóvanas	San Juan MPO
372	1	Tertiary	Caguas	San Juan MPO
373	2	Primary	Canóvanas	San Juan MPO
374	1		Ceiba	East MPO
375	0		Caguas	San Juan MPO
376	2	Primary	Canóvanas	San Juan MPO
377	2	Primary	Canóvanas	San Juan MPO
378	1	Tertiary	Caguas	San Juan MPO
379	2		San Juan	San Juan MPO
380	3	Primary	Dorado	San Juan MPO
381	2		San Juan	San Juan MPO
382	3	Primary	Dorado	San Juan MPO
383	1	Secondary	Gurabo	San Juan MPO
384	2	Primary	Cayey	San Juan MPO
385	2	Secondary	Aguas Buenas	San Juan MPO
386	2		Aguas Buenas	San Juan
387	0			San Juan MPO
388	2	Primary	Canóvanas	San Juan MPO
389	2	Primary	Cidra	San Juan MPO
390	3		Guaynabo	San Juan MPO
391	2	Primary	Cidra	San Juan MPO
392	3		Guaynabo	San Juan MPO
393	3		Guaynabo	San Juan MPO
394	3		Guaynabo	San Juan MPO
395	3	Primary	San Juan	San Juan MPO
396	1		Bayamón	San Juan MPO
397	0			San Juan MPO
398	1		Bayamón	San Juan MPO
399	3		Guaynabo	San Juan MPO
400	3		Guaynabo	San Juan MPO
401	3		Guaynabo	San Juan MPO
402	3		Guaynabo	San Juan MPO
403	2		Luquillo	East MPO

FID	Lanes	Classification	Municipality	MPO Region
404	1	Primary	Canóvanas	San Juan MPO
405	2	Tertiary	Río Grande	San Juan MPO
406	0			San Juan MPO
407	3		Guaynabo	San Juan MPO
408	2	Tertiary	Río Grande	San Juan MPO
409	3		Guaynabo	San Juan MPO
410	3		Guaynabo	San Juan MPO
411	1		Guaynabo	San Juan MPO
412	3		Guaynabo	San Juan MPO
413	1		Guaynabo	San Juan MPO
414	3		Guaynabo	San Juan MPO
415	2	Rampa-rpu	San Juan	San Juan MPO
416	1		Guaynabo	San Juan MPO
417	3	Primary	San Juan	San Juan MPO
418	1		Guaynabo	San Juan MPO
419	1		Guaynabo	San Juan MPO
420	1		Guaynabo	San Juan MPO
421	0			San Juan MPO
422	1		Guaynabo	San Juan MPO
423	1		Cayey	San Juan MPO
424	1		Guaynabo	San Juan MPO
425	1		Luquillo	East MPO
426	1		Guaynabo	San Juan MPO
427	0			San Juan MPO
428	2	Secondary	Río Grande	San Juan MPO
429	3	Primary	San Juan	San Juan MPO
430	1	Tertiary	Caguas	San Juan MPO
431	1	Tertiary	Cidra	San Juan MPO
432	1	Tertiary	Caguas	San Juan MPO
433	1	Secondary		San Juan MPO
434	1	Tertiary	Cidra	San Juan MPO
435	1	Secondary	Aguas Buenas	San Juan MPO
436	0			San Juan MPO
437	1		Aguas Buenas	San Juan MPO
438	1	Secondary	Aguas Buenas	San Juan MPO
439	0			San Juan MPO
440	1	Secondary	Aguas Buenas	San Juan MPO
441	3		Guaynabo	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
442	0			San Juan MPO
443	1	Secondary	Río Grande	San Juan MPO
444	3		Luquillo	East MPO
445	1		Luquillo	East MPO
446	2		Luquillo	East MPO
447	2	Primary	Cayey	San Juan MPO
448	1		Luquillo	East MPO
449	1		Luquillo	East MPO
450	1		Cayey	San Juan MPO
451	1		San Juan	San Juan MPO
452	2	Primary	Cayey	San Juan MPO
453	2		Luquillo	East MPO
454	2	Primary	Cayey	San Juan MPO
455	2	Primary	Cayey	San Juan MPO
456	1		Cayey	San Juan MPO
457	1		Aguas Buenas	San Juan MPO
458	0			San Juan MPO
459	0			San Juan MPO
460	0			San Juan MPO
461	1	Proposed	Toa Alta	San Juan MPO
462	1			San Juan MPO
463	4		San Juan	San Juan MPO
464	5		San Juan	San Juan MPO
465	2		San Juan	San Juan MPO
466	1		San Juan	San Juan MPO
467	0			San Juan MPO
468	0			San Juan MPO
469	2		San Juan	San Juan MPO
470	2	Primary	San Juan	San Juan MPO
471	2		Bayamón	San Juan MPO
472	2		San Juan	San Juan MPO
473	3		Bayamón	San Juan MPO
474	2	Primary	Bayamón	San Juan MPO
475	3		Guaynabo	San Juan MPO
476	1	Tertiary	Cidra	San Juan MPO
477	1		Bayamón	San Juan MPO
478	3	Primary	San Juan	San Juan MPO
479	1			San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
480	2		San Juan	San Juan MPO
481	3		Bayamón	San Juan MPO
482	1		San Juan	San Juan MPO
483	1			San Juan MPO
484	3	Primary	Carolina	San Juan MPO
485	1	Tertiary	Río Grande	San Juan MPO
486	2		Bayamón	San Juan MPO
487	1		Bayamón	San Juan MPO
488	1		Ceiba	East MPO
489	1		Ceiba	East MPO
490	0			San Juan MPO
491	1		Ceiba	East MPO
492	1		Ceiba	East MPO
493	2		Carolina	San Juan MPO
494	1	Rampa-rp	Bayamón	San Juan MPO
495	0			San Juan MPO
496	1	Secondary		San Juan MPO
497	1			San Juan MPO
498	1	Secondary		San Juan MPO
499	2	Primary	Gurabo	San Juan MPO
500	1	Secondary	Aguas Buenas	San Juan MPO
501	0			San Juan MPO
502	1	Tertiary	Río Grande	San Juan MPO
503	1	Secondary	Aguas Buenas	San Juan MPO
504	1	Secondary	Aguas Buenas	San Juan MPO
505	1		Ceiba	East MPO
506	1		Ceiba	East MPO
507	1		Ceiba	East MPO
508	1		San Juan	San Juan MPO
509	0			San Juan MPO
510	1	Tertiary	Río Grande	San Juan MPO
511	1	Tertiary	Río Grande	San Juan MPO
512	0			San Juan MPO
513	2	Rampa-rpu	San Juan	San Juan MPO
514	1	Primary	Canóvanas	San Juan MPO
515	1	Rampa-rpu	San Juan	San Juan MPO
516	1	Tertiary	Río Grande	San Juan MPO
517	0			San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
518	2		San Juan	San Juan MPO
519	1	Tertiary	Río Grande	San Juan MPO
520	2		San Juan	San Juan MPO
521	1	Primary	Canóvanas	San Juan MPO
522	2		San Juan	San Juan MPO
523	0			San Juan MPO
524	2		San Juan	San Juan MPO
525	1	Secondary		San Juan MPO
526	0			San Juan MPO
527	2		San Juan	San Juan MPO
528	2		San Juan	San Juan MPO
529	0			San Juan MPO
530	0			San Juan MPO
531	1	Primary	San Juan	San Juan MPO
532	2		San Juan	San Juan MPO
533	1	Secondary		San Juan MPO
534	1	Tertiary	Río Grande	San Juan MPO
535	1	Primary	San Juan	San Juan MPO
536	3	Primary	Dorado	San Juan MPO
537	1		Ceiba	East MPO
538	2	Primary	San Juan	San Juan MPO
539	1	Secondary	San Juan	San Juan MPO
540	1		San Juan	San Juan MPO
541	2		San Juan	San Juan MPO
542	1		San Juan	San Juan MPO
543	1	Secondary	San Juan	San Juan MPO
544	2	Secondary	San Juan	San Juan MPO
545	3	Primary	San Juan	San Juan MPO
546	2	Rampa-rpu	San Juan	San Juan MPO
547	1		Ceiba	East MPO
548	1		Ceiba	East MPO
549	1		San Juan	San Juan MPO
550	1	Tertiary	Yabucoa	San Juan MPO
551	1	Tertiary	Yabucoa	San Juan MPO
552	1	Primary	Yabucoa	San Juan MPO
553	1	Tertiary	Yabucoa	San Juan MPO
554	2	Primary	Yabucoa	San Juan MPO
555	2	Primary	Yabucoa	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
556	2	Primary	Yabucoa	San Juan MPO
557	1	Tertiary	Yabucoa	San Juan MPO
558	2	Primary	Yabucoa	San Juan MPO
559	0			San Juan MPO
560	1	Primary	Yabucoa	San Juan MPO
561	1	Tertiary	Yabucoa	San Juan MPO
562	1	Tertiary	Gurabo	San Juan MPO
563	2	Tertiary	Gurabo	San Juan MPO
564	1	Tertiary	Gurabo	San Juan MPO
565	2	Primary	Gurabo	San Juan MPO
566	2	Primary	Gurabo	San Juan MPO
567	2	Tertiary	Gurabo	San Juan MPO
568	0			San Juan MPO
569	2		Bayamón	San Juan MPO
570	2	Secondary	Bayamón	San Juan MPO
571	0			San Juan MPO
572	2		Bayamón	San Juan MPO
573	3		Guaynabo	San Juan MPO
574	2		Bayamón	San Juan MPO
575	2		Bayamón	San Juan MPO
576	3		Guaynabo	San Juan MPO
577	0			San Juan MPO
578	2	Primary	Yabucoa	San Juan MPO
579	1	Tertiary	Yabucoa	San Juan MPO
580	2	Secondary	Bayamón	San Juan MPO
581	2	Primary	Yabucoa	San Juan MPO
582	2	Primary	Yabucoa	San Juan MPO
583	2	Primary	Yabucoa	San Juan MPO
584	1	Tertiary	Yabucoa	San Juan MPO
585	2	Primary	Yabucoa	San Juan MPO
586	2	Secondary	Bayamón	San Juan MPO
587	1	Primary	Yabucoa	San Juan MPO
588	1		Ceiba	East MPO
589	0			San Juan MPO
590	1	Tertiary	Yabucoa	San Juan MPO
591	1		Ceiba	East MPO
592	2	Tertiary	Carolina	San Juan MPO
593	1	Tertiary	Carolina	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
594	1		Guaynabo	San Juan MPO
595	2	Tertiary	Carolina	San Juan MPO
596	1		Guaynabo	San Juan MPO
597	1	Tertiary	Carolina	San Juan MPO
598	1		Ceiba	East MPO
599	3	Primary	Carolina	San Juan MPO
600	1		Ceiba	East MPO
601	0			San Juan MPO
602	1	Tertiary	Carolina	San Juan MPO
603	2	Tertiary	Carolina	San Juan MPO
604	1		Guaynabo	San Juan MPO
605	3	Primary	Carolina	San Juan MPO
606	1		Ceiba	East MPO
607	2		Bayamón	San Juan MPO
608	0			San Juan MPO
609	2	Secondary	Bayamón	San Juan MPO
610	1	Primary	San Juan	San Juan MPO
611	0			San Juan MPO
612	2	Primary	Canóvanas	San Juan MPO
613	2	Primary	Canóvanas	San Juan MPO
614	2	Primary	Canóvanas	San Juan MPO
615	1	Primary	Canóvanas	San Juan MPO
616	1	Primary	Canóvanas	San Juan MPO
617	1	Tertiary	Caguas	San Juan MPO
618	2	Primary	Canóvanas	San Juan MPO
619	2	Primary	Canóvanas	San Juan MPO
620	1	Tertiary	Río Grande	San Juan MPO
621	1	Primary	Canóvanas	San Juan MPO
622	0			San Juan MPO
623	1	Primary	Canóvanas	San Juan MPO
624	0			San Juan MPO
625	1		Guaynabo	San Juan MPO
626	0			San Juan MPO
627	1	Tertiary	Río Grande	San Juan MPO
628	1		Ceiba	East MPO
629	1	Tertiary	Río Grande	San Juan MPO
630	1	Tertiary	Río Grande	San Juan MPO
631	2	Primary	Canóvanas	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
632	1	Primary	Canóvanas	San Juan MPO
633	1		Ceiba	East MPO
634	1	Primary	Canóvanas	San Juan MPO
635	2	Primary	Canóvanas	San Juan MPO
636	1	Primary	Canóvanas	San Juan MPO
637	2	Primary	Canóvanas	San Juan MPO
638	2	Primary	Canóvanas	San Juan MPO
639	1	Primary	Canóvanas	San Juan MPO
640	2	Primary	Canóvanas	San Juan MPO
641	1	Primary	Canóvanas	San Juan MPO
642	2	Primary	Bayamón	San Juan MPO
643	2	Primary	Canóvanas	San Juan MPO
644	2	Primary	Canóvanas	San Juan MPO
645	2	Primary	Canóvanas	San Juan MPO
646	2	Primary	Canóvanas	San Juan MPO
647	2	Primary	Río Grande	San Juan MPO
648	4	Primary	Río Grande	San Juan MPO
649	0			San Juan MPO
650	1		San Juan	San Juan MPO
651	2	Primary	Canóvanas	San Juan MPO
652	2	Primary	Canóvanas	San Juan MPO
653	2	Primary	Canóvanas	San Juan MPO
654	1	Secondary	Gurabo	San Juan MPO
655	2	Tertiary	Gurabo	San Juan MPO
656	2	Tertiary	Gurabo	San Juan MPO
657	3	Primary	Dorado	San Juan MPO
658	1	Secondary	Gurabo	San Juan MPO
659	2	Primary	Cayey	San Juan MPO
660	2		Cayey	San Juan MPO
661	1		Cayey	San Juan MPO
662	2	Primary	Cayey	San Juan MPO
663	1		Cayey	San Juan MPO
664	1		Cayey	San Juan MPO
665	0			San Juan MPO
666	2		Cayey	San Juan MPO
667	2		Cayey	San Juan MPO
668	2		Cayey	San Juan MPO
669	1	Tertiary	Cidra	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
670	1		Bayamón	San Juan MPO
671	0			San Juan MPO
672	4	Primary	Río Grande	San Juan MPO
673	1	Tertiary	Caguas	San Juan MPO
674	0			San Juan MPO
675	0			San Juan MPO
676	1	Primary	Yabucoa	San Juan MPO
677	0			San Juan MPO
678	3	Primary	Carolina	San Juan MPO
679	3	Primary	Carolina	San Juan MPO
680	1	Secondary	Aguas Buenas	San Juan MPO
681	0			San Juan MPO
682	2	Rampa-rpu	San Juan	San Juan MPO
683	1	Primary	San Juan	San Juan MPO
684	1		San Juan	San Juan MPO
685	1		San Juan	San Juan MPO
686	1		Bayamón	San Juan MPO
687	0			San Juan MPO
688	2		San Juan	San Juan MPO
689	0			San Juan MPO
690	2		San Juan	San Juan MPO
691	1		Bayamón	San Juan MPO
692	2	Secondary	Aguas Buenas	San Juan MPO
693	1	Tertiary	Aguas Buenas	San Juan MPO
694	1		Bayamón	San Juan MPO
695	0			San Juan MPO
696	1	Tertiary	Río Grande	San Juan MPO
697	3		Guaynabo	San Juan MPO
698	3		Guaynabo	San Juan MPO
699	1	Tertiary	Toa Baja	San Juan MPO
700	0			San Juan MPO
701	1	Primary	Yabucoa	San Juan MPO
702	2	Secondary	San Juan	San Juan MPO
703	3	Primary	San Juan	San Juan MPO
704	1	Proposed	Toa Alta	San Juan MPO
705	0			San Juan MPO
706	1		Toa Alta	San Juan MPO
707	0			San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
708	3	Primary	Carolina	San Juan MPO
709	1	Tertiary	Bayamón	San Juan MPO
710	0			San Juan MPO
711	1		Ceiba	East MPO
712	1	Secondary	Aguas Buenas	San Juan MPO
713	0		Caguas	San Juan MPO
714	1		Ceiba	East MPO
715	3	Primary	Río Grande	San Juan MPO
716	2	Secondary	San Juan	San Juan MPO
717	2	Primary	Cidra	San Juan MPO
718	0			San Juan MPO
719	1		Bayamón	San Juan MPO
720	1		Bayamón	San Juan MPO
721	1		Ceiba	East MPO
722	1	Secondary	Río Grande	San Juan MPO
723	1	Secondary	Río Grande	San Juan MPO
724	1	Secondary	Río Grande	San Juan MPO
725	2	Secondary	Río Grande	San Juan MPO
726	1	Secondary	Río Grande	San Juan MPO
727	1		San Juan	San Juan MPO
728	2		San Juan	San Juan MPO
729	2		San Juan	San Juan MPO
730	3	Primary	San Juan	San Juan MPO
731	2	Rampa-rpu	San Juan	San Juan MPO
732	1	Secondary	San Juan	San Juan MPO
733	2	Primary	Río Grande	San Juan MPO
734	3	Primary	Río Grande	San Juan MPO
735	2		Aguas Buenas	San Juan
736	2	Secondary	San Juan	San Juan MPO
737	2		Aguas Buenas	San Juan
738	1	Secondary	Aguas Buenas	San Juan MPO
739	1	Rampa-rpu	San Juan	San Juan MPO
740	1	Secondary	Las Piedras	San Juan MPO
741	1		Bayamón	San Juan MPO
742	2	Secondary	San Juan	San Juan MPO
743	1		San Juan	San Juan MPO
744	3	Primary	San Juan	San Juan MPO
745	1	Tertiary	Maunabo	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
746	1	Tertiary	Bayamón	San Juan MPO
747	1	Tertiary	Bayamón	San Juan MPO
748	1		San Juan	San Juan MPO
749	1	Secondary	Las Piedras	San Juan MPO
750	1	Secondary	Río Grande	San Juan MPO
751	1		Bayamón	San Juan MPO
752	2	Primary	Gurabo	San Juan MPO
753	1	Tertiary	Gurabo	San Juan MPO
754	3		Guaynabo	San Juan MPO
755	3		Guaynabo	San Juan MPO
756	1	Tertiary	Maunabo	San Juan MPO
757	0			San Juan MPO
758	2		Bayamón	San Juan MPO
759	2	Primary	Canóvanas	San Juan MPO
760	2		Bayamón	San Juan MPO
761	2	Primary	Bayamón	San Juan MPO
762	1	Tertiary	Río Grande	San Juan MPO
763	2		Aguas Buenas	San Juan
764	1	Secondary	Aguas Buenas	San Juan MPO
765	2			
766	1	Secondary	Aguas Buenas	San Juan MPO
767	2	Secondary	Bayamón	San Juan MPO
768	1	Tertiary	Aguas Buenas	San Juan MPO
769	1	Tertiary	Aguas Buenas	San Juan MPO
770	0			East MPO
771	1	Secondary	Aguas Buenas	San Juan MPO
772	1		Guaynabo	San Juan MPO
773	2	Primary	Bayamón	San Juan MPO
774	1		Bayamón	San Juan MPO
775	2	Primary	Bayamón	San Juan MPO
776	2			San Juan MPO
777	2	Primary	Bayamón	San Juan MPO
778	2	Primary	Bayamón	San Juan MPO
779	2	Primary	Bayamón	San Juan MPO
780	2	Primary	Bayamón	San Juan MPO
781	1	Tertiary	Maunabo	San Juan MPO
782	2			San Juan MPO
783	2	Primary	Bayamón	San Juan MPO

FID	Lanes	Classification	Municipality	MPO Region
784	1	Primary	Yabucoa	San Juan MPO
785	2	Primary	Bayamón	San Juan MPO
786	3		Guaynabo	San Juan MPO
787	1	Tertiary	Maunabo	San Juan MPO
788	2	Primary	Bayamón	San Juan MPO
789	2			San Juan MPO
790	1	Tertiary	Gurabo	San Juan MPO
791	2	Primary	Naranjito	San Juan MPO
792	1	Tertiary	Toa Baja	San Juan MPO
793	2	Primary	Naranjito	San Juan MPO
794	2	Primary	Bayamón	San Juan MPO
795	2	Primary	Naranjito	San Juan MPO
796	2	Primary	Naranjito	San Juan MPO
797	2	Primary	Naranjito	San Juan MPO
798	1		Bayamón	San Juan MPO
799	1		Bayamón	San Juan MPO
800	2			San Juan MPO
801	2	Primary	Río Grande	San Juan MPO
802	1		Bayamón	San Juan MPO
803	1	Primary	Naranjito	San Juan MPO
804	1		Toa Alta	San Juan MPO
805	1		Bayamón	San Juan MPO
806	1		Bayamón	San Juan MPO
807	1		Aguada	Aguadilla MPO
808	1		Aguada	Aguadilla MPO
809	1		San Sebastián	Aguadilla MPO
810	2	PR-111	San Sebastián	Aguadilla MPO
811	2	PR-111	San Sebastián	Aguadilla MPO
812	0			Aguadilla MPO
813	1	Ave Luis Muñoz M	Hormigueros	Southwest MPO
814	2		Hormigueros	Southwest MPO
815	0			Aguadilla MPO
816	0			Aguadilla MPO
817	1		Las Marías	Aguadilla MPO
818	2	PR-111	San Sebastián	Aguadilla MPO
819	2	PR-111	San Sebastián	Aguadilla MPO
820	1	Blvd Garcia	Mayagüez	Southwest MPO
821	1		Lares	Aguadilla MPO

FID	Lanes	Classification	Municipality	MPO Region
822	1		San Sebastián	Aguadilla MPO
823	1		San Sebastián	Aguadilla MPO
824	2	PR-111	San Sebastián	Aguadilla MPO
825	1		Lares	Aguadilla MPO
826	2	PR-111	San Sebastián	Aguadilla MPO
827	1		Lares	Aguadilla MPO
828	1		Lares	Aguadilla MPO
829	1		Lares	Aguadilla MPO
830	1		Lares	Aguadilla MPO
831	1		Lares	Aguadilla MPO
832	2	PR-111	San Sebastián	Aguadilla MPO
833	1		Lares	Aguadilla MPO
834	0			Aguadilla MPO
835	1		Lares	Aguadilla MPO
836	2	PR-111	San Sebastián	Aguadilla MPO
837	2	PR-111	San Sebastián	Aguadilla MPO
838	2	PR-111	San Sebastián	Aguadilla MPO
839	1	Blvd Garcia	Mayagüez	Southwest MPO
840	1	PR-108	Mayagüez	Southwest MPO
841	2		Mayagüez	Southwest MPO
842	1	Blvd Garcia	Mayagüez	Southwest MPO
843	4	PR-2	Mayagüez	Southwest MPO
844	1		San Sebastián	Aguadilla MPO
845	1		San Sebastián	Aguadilla MPO
846	2	PR-111	San Sebastián	Aguadilla MPO
847	2		Hormigueros	Southwest MPO
848	2	PR-111	San Sebastián	Aguadilla MPO
849	2		Hormigueros	Southwest MPO
850	0			Aguadilla MPO
851	1		Las Marías	Aguadilla MPO
852	1			Southwest MPO
853	2		Hormigueros	Southwest MPO
854	1		Lares	Aguadilla MPO
855	1		Mayagüez	Southwest MPO
856	1	PR-111R	Lares	Aguadilla MPO
857	1		Lares	Aguadilla MPO
858	2			Southwest MPO
859	1		Lares	Aguadilla MPO

FID	Lanes	Classification	Municipality	MPO Region
860	1		San Sebastián	Aguadilla MPO
861	1	Cll Pilar Defill	Mayagüez	Southwest MPO
862	2	PR-111	San Sebastián	Aguadilla MPO
863	0			Southwest MPO
864	2			Southwest MPO
865	0			Southwest MPO
866	2			Southwest MPO
867	2			Southwest MPO
868	1			Southwest MPO
869	2			Southwest MPO
870	2			Southwest MPO
871	2			Southwest MPO
872	1			Southwest MPO
873	2			Southwest MPO
874	1		Lajas	Southwest MPO
875	2			Southwest MPO
876	2			Southwest MPO
877	2			Southwest MPO
878	2			Southwest MPO
879	2			Southwest MPO
880	2			Southwest MPO
881	1			Southwest MPO
882	1			Southwest MPO
883	1		Mayagüez	Southwest MPO
884	2	PR-111	San Sebastián	Aguadilla MPO
885	1	Cll Pilar Defill	Mayagüez	Southwest MPO
886	0			Aguadilla MPO
887	2			Southwest MPO
888	2	PR-111	San Sebastián	Aguadilla MPO
889	2		Hormigueros	Southwest MPO
890	2		Hormigueros	Southwest MPO
891	1		Hormigueros	Southwest MPO
892	1		Hormigueros	Southwest MPO
893	1			Southwest MPO
894	2		Hormigueros	Southwest MPO
895	1	Blvd Garcia	Mayagüez	Southwest MPO
896	1		Hormigueros	Southwest MPO
897	1		Hormigueros	Southwest MPO

FID	Lanes	Classification	Municipality	MPO Region
898	2			Southwest MPO
899	1	Cll Julio Perez	Hormigueros	Southwest MPO
900	1			Southwest MPO
901	2		Hormigueros	Southwest MPO
902	1			Southwest MPO
903	2			Southwest MPO
904	1		San Sebastián	Aguadilla MPO
905	1		Lares	Aguadilla MPO
906	1	Ave Luis Muñoz M	Hormigueros	Southwest MPO
907	2			Southwest MPO
908	1	PR-104	Mayagüez	Southwest MPO
909	1	Ave Luis Muñoz M	Hormigueros	Southwest MPO
910	2		Hormigueros	Southwest MPO
911	1	PR-347	San Germán	Southwest MPO
912	1			Southwest MPO
913	1			Southwest MPO
914	1		Aguada	Aguadilla MPO
915	1			Southwest MPO
916	2			Southwest MPO
917	1		Hormigueros	Southwest MPO
918	2	PR-111	San Sebastián	Aguadilla MPO
919	2	PR-111	San Sebastián	Aguadilla MPO
920	1	PR-111R	Lares	Aguadilla MPO
921	2	PR-111	San Sebastián	Aguadilla MPO
922	1		Lares	Aguadilla MPO
923	1		Lares	Aguadilla MPO
924	2	Cll Principal	San Germán	Southwest MPO
925	2		Hormigueros	Southwest MPO
926	2	Cll Principal	San Germán	Southwest MPO
927	2		Hormigueros	Southwest MPO
928	2	Cll Principal	San Germán	Southwest MPO
929	1	PR-360	San Germán	Southwest MPO
930	2	PR-2	Mayagüez	Southwest MPO
931	0			Southwest MPO
932	2		Hormigueros	Southwest MPO
933	1	PR-360	San Germán	Southwest MPO
934	1	PR-108	Mayagüez	Southwest MPO
935	0			Aguadilla MPO

FID	Lanes	Classification	Municipality	MPO Region
936	1	PR-360	San Germán	Southwest MPO
937	1			Southwest MPO
938	1	PR-347	San Germán	Southwest MPO
939	1			Southwest MPO
940	1	PR-347	San Germán	Southwest MPO
941	1	PR-119	San Germán	Southwest MPO
942	0			Aguadilla MPO
943	1	PR-119	San Germán	Southwest MPO
944	1	PR-119	San Germán	Southwest MPO
945	2		Mayagüez	Southwest MPO
946	1	PR-119	San Germán	Southwest MPO
947	2		Hormigueros	Southwest MPO
948	1	PR-119	San Germán	Southwest MPO
949	1		Mayagüez	Southwest MPO
950	1			Southwest MPO
951	1		San Germán	Southwest MPO
952	2			Southwest MPO
953	2			Southwest MPO
954	1	PR-358	San Germán	Southwest MPO
955	1			Southwest MPO
956	1			Southwest MPO
957	1	PR-347	San Germán	Southwest MPO
958	1			Southwest MPO
959	1	PR-347	San Germán	Southwest MPO
960	1			Southwest MPO
961	2	PR-2	Mayagüez	Southwest MPO
962	2	PR-2	Mayagüez	Southwest MPO
963	2	PR-2	Mayagüez	Southwest MPO
964	3	PR-2	Mayagüez	Southwest MPO
965	2	PR-2	Mayagüez	Southwest MPO
966	2		Hormigueros	Southwest MPO
967	2		Hormigueros	Southwest MPO
968	2		Hormigueros	Southwest MPO
969	2		Hormigueros	Southwest MPO
970	1	PR-116	Lajas	Southwest MPO
971	1	PR-347	San Germán	Southwest MPO
972	1	PR-347	San Germán	Southwest MPO
973	1		San Germán	Southwest MPO

FID	Lanes	Classification	Municipality	MPO Region
974	1	Ave Luis Muñoz M	Hormigueros	Southwest MPO
975	2	Cll Principal	San Germán	Southwest MPO
976	0			Southwest MPO
977	2	Cll Principal	San Germán	Southwest MPO
978	0			South MPO
979	2	Cll Principal	San Germán	Southwest MPO
980	0			Aguadilla MPO
981	1		Las Marías	Aguadilla MPO
982	1		Las Marías	Aguadilla MPO
983	1	Blvd Garcia	Mayagüez	Southwest MPO
984	2		Hormigueros	Southwest MPO
985	1			Southwest MPO
986	2		Hormigueros	Southwest MPO
987	2		Hormigueros	Southwest MPO
988	2	PR-2	Mayagüez	Southwest MPO
989	2		Hormigueros	Southwest MPO
990	1	PR-360	San Germán	Southwest MPO
991	1	PR-347	San Germán	Southwest MPO
992	1	PR-347	San Germán	Southwest MPO
993	1	Cll Pilar Defill	Mayagüez	Southwest MPO
994	1	PR-347	San Germán	Southwest MPO
995	1	Blvd Garcia	Mayagüez	Southwest MPO
996	1	Cll Pilar Defill	Mayagüez	Southwest MPO
997	1		Mayagüez	Southwest MPO
998	2			Southwest MPO
999	1		Mayagüez	Southwest MPO
1000	1	Blvd Garcia	Mayagüez	Southwest MPO
1001	1	Blvd Garcia	Mayagüez	Southwest MPO
1002	2		Mayagüez	Southwest MPO
1003	1	PR-104	Mayagüez	Southwest MPO
1004	1		Hormigueros	Southwest MPO
1005	2			Southwest MPO
1006	1		Mayagüez	Southwest MPO
1007	2		Mayagüez	Southwest MPO
1008	3	PR-2	Mayagüez	Southwest MPO
1009	3	PR-2	Mayagüez	Southwest MPO
1010	2		Hormigueros	Southwest MPO
1011	1		Aguada	Aguadilla MPO

FID	Lanes	Classification	Municipality	MPO Region
1012	2	PR-2	Mayagüez	Southwest MPO
1013	1		Lajas	Southwest MPO
1014	3	PR-2	Mayagüez	Southwest MPO
1015	3	PR-2	Mayagüez	Southwest MPO
1016	3	PR-2	Mayagüez	Southwest MPO
1017	1			Southwest MPO
1018	2		Hormigueros	Southwest MPO
1019	3	PR-2	Mayagüez	Southwest MPO
1020	3	PR-2	Mayagüez	Southwest MPO
1021	1	PR-347	San Germán	Southwest MPO
1022	2	PR-2	Mayagüez	Southwest MPO
1023	1	PR-347	San Germán	Southwest MPO
1024	0			South MPO
1025	1	Cll Julio Perez	Hormigueros	Southwest MPO
1026	2			Southwest MPO
1027	1	PR-347	San Germán	Southwest MPO
1028	1	PR-347	San Germán	Southwest MPO
1029	1	PR-347	San Germán	Southwest MPO
1030	1	PR-347	San Germán	Southwest MPO
1031	1		Hormigueros	Southwest MPO
1032	1		Lares	Aguadilla MPO
1033	2		Hormigueros	Southwest MPO
1034	2	Cll Principal	San Germán	Southwest MPO
1035	2			Southwest MPO
1036	1	PR-358	San Germán	Southwest MPO
1037	2			Southwest MPO
1038	1	PR-360	San Germán	Southwest MPO
1039	1	PR-119	San Germán	Southwest MPO
1040	2		Hormigueros	Southwest MPO
1041	1	PR-360	San Germán	Southwest MPO
1042	2	PR-2	Mayagüez	Southwest MPO
1043	2		Hormigueros	Southwest MPO
1044	2		Hormigueros	Southwest MPO
1045	1	PR-119	San Germán	Southwest MPO
1046	2			Southwest MPO
1047	2			Southwest MPO
1048	1	Cll Julio Perez	Hormigueros	Southwest MPO
1049	1		Lajas	Southwest MPO

FID	Lanes	Classification	Municipality	MPO Region
1050	2	Cll Principal	San Germán	Southwest MPO
1051	1		Lajas	Southwest MPO
1052	2		Hormigueros	Southwest MPO
1053	2	Cll Principal	San Germán	Southwest MPO
1054	2	Cll Principal	San Germán	Southwest MPO
1055	2	Cll Principal	San Germán	Southwest MPO
1056	2	Cll Principal	San Germán	Southwest MPO
1057	2	Cll Principal	San Germán	Southwest MPO
1058	1	PR-116	Lajas	Southwest MPO
1059	2	Cll Principal	San Germán	Southwest MPO
1060	2			Southwest MPO
1061	1		Hormigueros	Southwest MPO
1062	2		Hormigueros	Southwest MPO
1063	1	PR-119	San Germán	Southwest MPO
1064	2			Southwest MPO
1065	2		Hormigueros	Southwest MPO
1066	2			Southwest MPO
1067	1		San Sebastián	Aguadilla MPO
1068	2			Southwest MPO
1069	1		Mayagüez	Southwest MPO
1070	0			Aguadilla MPO
1071	2	Cll Comercio	Mayagüez	Southwest MPO
1072	0			Southwest MPO
1073	2	Cll Comercio	Mayagüez	Southwest MPO
1074	0			Southwest MPO
1075	0			Southwest MPO
1076	1	PR-311	Cabo Rojo	Southwest MPO
1077	0			Southwest MPO
1078	0			Southwest MPO
1079	1	PR-311	Cabo Rojo	Southwest MPO
1080	0			Southwest MPO

Source: SDG

H APPENDIX H – FINANCE AND PROJECT SELECTION

CONTEXT

As part of the 2045 LRTP financial analysis, lists of projects were defined and analyzed in order to determine who these will fit within the planning timeframe of the Plan. This appendix includes:

- Definition of lists of projects and the shortlisting process;
- Ranking methodology to give priorities to projects;
- Project Costing methodology; and
- Final project lists.

LISTS OF PROJECTS AND SHORTLISING

It is important to understand how projects are expected to be in a position to compete for funding based on the current financial situation in Puerto Rico.

- Short Term **2019-2023** – this periods funds are covered by the PRHTA Revised Fiscal Plan 2018-2023 as certified by the Financial Oversight and Management Board for Puerto Rico on June 29, 2018 (a copy of this plan is available in the PR Fiscal Agency and Financial Advisory Authority website http://www.aafaf.pr.gov/), including completion of current projects as listed in the STIP and CIP. This can be seen in Table H.1 to Table H.15.
- Short to Mid Term **2019-2028** – the Fiscal Plan recognizes the importance of improvements to pavements and bridges to state of good repair based on the Transportation Asset Management Plan (TAMP); based on this and considering the Fiscal Plan completion in 2023, the requirements of the TAMP then dominate the spending projections through to 2028; there is no specific lists of TAMP projects at this time but readers should refer to the latest version of this document for specific initiative lists. The Emergency projects are also expected to be completed in this period as well as PEMOC, “Abriendo Caminios” and EFLHD – a list of these projects is included in Table H.16 and Table H.24.
  Mid to Long Term **2029-2045** - From 2029 to 2045 the projections will remain cost-constrained, depending on the combination of future FHWA funding allocation and potential transfers from the Government of Puerto Rico. Also, continuous investments to maintain state of good repair will continue. In this period is where the list of projects received from various sources is analyzed and defined. The following section includes more detail about this list of projects.

Table H.1: CIP Summary

Projects Category	Construction Cost Estimate	2017-2018	2018-2019	2019-2020	2020-2021
New Construction - DTL	$148,136,274	$-	$74,491,933	$59,828,341	$13,816,000
New Construction - PR-66	$-	$-	$-	$-	$-
New Construction - Toll Road	$1,000,000	$200,000	$600,000	$200,000	$-
New Construction - Non-Toll Road	$75,746,552	$4,062,925	$21,168,014	$33,539,607	$16,976,006
Reconstruction - PR-66	$7,173,465	$717,347	$5,021,426	$1,434,693	$-
Reconstruction - Toll Roads	$125,068,423	$5,945,692	$65,687,763	$45,808,269	$7,626,698
Reconstruction - Non-Toll Roads	$293,171,232	$5,512,695	$90,218,030	$99,498,652	$97,941,855
Active Construction - Toll Roads	$17,380,877	$9,684,974	$7,358,003	$337,900	$-
Active Construction - Non-Toll Roads	$148,611,744	$70,268,329	$60,014,610	$12,328,805	$6,000,000
State Funds Projects - Toll Roads	$47,350,707	$8,707,837	$20,939,655	$-	$17,703,215
State Fund Projects - Non-Toll Roads	$154,982,378	$14,759,012	$35,500,000	$-	$104,723,367
Earmark Projects	$22,125,803	$-	$19,063,431	$3,062,372	$-
TOTAL	$1,040,747,454	$119,858,810	$400,062,864	$256,038,639	$264,787,142
FHWA Construction Expenses	$838,414,369	$96,391,961	$343,623,209	$256,038,639	$142,360,560
STATE Construction Expenses	$202,333,085	$23,466,849	$56,439,655	$0	$122,426,581

Source: PRHTA

Table H.2: CIP List of Construction Projects - San Juan TMA

AC No.	Federal Number	Project Description	Municipality	Revised Cost 1.18.18
1869	MP-18(13)	Rehabilitación del Pavimento PR-18, Desde Km. 0.00 Hasta Km. 6.20	San Juan	$4,428,449.00
3402	MP-34(6)	Extensión Avenida Degetau desde Avenida Luis Muñoz Marín PR-32 hasta PR-183	Caguas	$25,513,920.00
6638	MP-9999(226)	Construcción de Facilidades para el Cumplimiento de Leyes de Tránsito en Autopista PR-66	Carolina	$1,324,000.00
10161	LY-9999(131)	Extensión a la Avenida Caridad del Cobre	Bayamón	$3,934,832.38
10163	LY-9999(84)	Mejoras a Calle Luna, Desde Calle Norzagaray Hasta Calle Del Cristo (Proyecto Earmark)	San Juan	$3,227,132.12
15571	MP-155(10)	Rehabilitación De Pavimento Carretera PR-155, Desde el Kilómetro 55.8 Hasta el Kilómetro 57.2	Vega Baja	$2,438,508.04
15927	MP-159(2)	Rehabilitación de Pavimento PR-159, Desde Km. 7.50 Hasta Km. 18.0	Morovis-Corozal	$3,009,353.53
17416	MP-174(12)	Mitigación a Socavación P/S Rio Minillas Num 1107 PR-174 Km 4.50	Bayamón	$515,220.00
17418	PRTSC	Sistema de Semáforos PR-174 Intersección Accesos UPR y CESCO	Bayamón	$540,790.60
17519	ER-175(6)	Reconstrucción de PR-175, Kilómetros 5.2 @ 5.3 y 9.3 @ 9.5	Trujillo Alto	$2,011,532.20
18521	ER-185(9)	Reconstrucción De Carretera PR-185, Kilómetros 17.6, 18.3 y 18.5	Juncos	$1,598,589.50
18809	ZP-188(4)	Mejoras a Seguridad Carretera PR-188, Desde Kilómetro: 0.00 Hasta Kilómetro: 5.90 (PR-187)	Canóvanas-Loíza	$3,168,642.50
19150	MP-191(32)	Rehabilitación Del Pavimento Carretera PR-191 Desde Kilómetro 3.80 Hasta Kilómetro 12.80	Río Grande	$2,352,430.06
26123	MP-26(25)	Mejoras a la Seguridad Expreso Baldorioty de Castro, PR-26 desde PR-1 hasta PR-66	San Juan - Carolina	$12,547,127.00
61511	ZP-615(2)	Reemplazo P/S Rio Toro Negro Núm. 599 PR-615 Km 4.05 Bo. Pozas	Ciales	$3,755,601.20
86122	MP-861(4)	Rehabilitación Del Pavimento Carretera PR-861 Desde Kilómetro 7.00 Hasta Kilómetro 11.00	Toa Alta	$1,644,429.38
100218	LP-1(43)	Mejoras A Sistema De Semáforos Carretera PR-1 Desde Intersección PR-189 / PR-33 Hasta Intersección PR-3	Caguas-Guaynabo-San Juan	$5,039,672.74
200267	LP-2(60)	Sistema de Semáforos Carretera PR-2 Desde Comunidad Cantera Hasta Plaza Atenas	Manatí	$4,313,951.11
668504	LP-6685(1)	Rehabilitación y Reconstrucción del P/S Rio Grande de Manatí Núm. 321	Ciales	$4,092,661.48

AC No.	Federal Number	Project Description	Municipality	Revised Cost 1.18.18
800400	ER-31(23)	Corrección De Deslizamiento De Terreno Carretera PR-31 Kilómetro 11.80	Naguabo	$1,343,702.15
800467	MP-18(11)	Mejoras a la Intersección de las Carreteras PR-18 y PR-21	San Juan	$17,875,365.00
800470	MP-30(30)	Reemplazo P/S PR-189 Núm. 982	Gurabo	$11,452,039.00
800500	MP-9999(224)	Mejoras Geométricas en Intersección De Carreteras PR-853 y PR-858	Carolina	$275,413.05
800501	MP-9999(227)	Traffic Incident Management Field Devices	San Juan	$4,097,428.30
802271	MP-14(29)	Reemplazo Puente Núm. 178 Quebrada Toita	Cayey	$3,334,252.30
990101	MP-9999(116)	Suministro e Instalación de Atenuadores de Impacto Zona Metropolitana	San Juan	$5,157,794.55
5374	LY-53(6)	Extensión Autopista PR-53 Yabucoa - Maunabo, Rediseño a Intersección PR-53, PR-9914 y PR-901	Yabucoa	$4,666,864.12
520122	MP-52(39)	Construcción de Traffic Management Center (TMC) en PR-52,	Caguas	$5,375,000.00
520123	MP-52(38)	Preservación Del P/S PR-172 Núm. 909 Autopista Luis A. Ferre	Caguas	$2,190,545.00
520127	MP-52(37)	Rehabilitación De Los Puentes Número 1286 y 1287, Sobre Quebrada Beatriz PR-52 Km. 25.0 y Puentes Número 1275 y 1276 PR-52 Km. 26.7	Caguas	$6,432,800.00
301135	N/A	Reconstrucción de PR-3, Humacao - Yabucoa, Desde Km. 83.2 Hasta Km. 94.2	Humacao - Yabucoa	$2,450,990.30

Source: PRHTA

Table H.3: CIP List of Construction Projects - Aguadilla TMA

AC No.	Federal Number	Project Description	Municipality	Revised Cost 1.18.18
40409	ZP-404(1)	Reemplazo De La Superestructura Del Puente Núm. 2881 Sobre Quebrada Los Morones Carretera PR-404 (Off) Kilómetro 4.30	Moca	$175,330.42
13406	MP-134(4)	Rehabilitación De Pavimento PR-134, Desde el kilómetro 5.00 Hasta el Kilómetro 8.30	Hatillo-Lares	$913,969.00

Source: PRHTA

Table H.4: CIP List of Construction Projects - Other Urbanized Areas

AC No.	Federal Number	Project Description	Municipality	Revised Cost 1.18.18
212	ZP-546(1)	Ciclovía Y Paseo Peatonal Desde PR-153 Hasta Baños De Coamo	Coamo	$3,169,436.50
911	LP-9(6)	Construcción de Carretera PR-9, Desde PR-132 Hasta PR-123	Ponce	$41,474,154.19
915	MP-9(7)	Carretera PR-9 Desde Avenida Las Américas Hasta PR-132	Ponce	$45,781,555.80
10270	MP-102(18)	Rehabilitación del Pavimento Carretera PR-102 Desde Kilómetro 24.60 Hasta Kilómetro 29.30	Cabo Rojo	$1,879,372.85
12324	ER-123(12)	Corrección De Deslizamiento En Carretera PR-123 Kilómetro 26.9	Adjuntas	$334,962.10
13406	MP-134(4)	Rehabilitación De Pavimento PR-134, Desde el kilómetro 5.00 Hasta el Kilómetro 8.30	Hatillo-Lares	$913,969.00
14979	MP-149(18)	Rehabilitación De Pavimento Carretera PR-149, Desde el Km. 57.20 Hasta el Km. 74.40	Villalba-Juana Diaz	$5,736,032.40
48506	LP-485(1)	Paseo Ciclista Adyacente a PR-485	Camuy	$2,746,799.54
70406	MP-9999(233)	Rehabilitación Pavimento PR-704, Desde Kilómetro 3.50 Hasta Kilómetro 6.40, Coamo; PR-132 Desde Kilómetro 5.40 Hasta Kilómetro 10.10	Coamo-Peñuelas	$2,595,372.58
75206	ZP-752(1)	Rehabilitación y Mitigación a la Socavación En EL Puente Núm. 672 Sobre Quebrada Jácana, Carretera PR-752 Kilómetro 0.80	Arroyo	$279,396.00
100085	MP-10(75)	Mejoras A La Seguridad Carretera PR-10 Desde el kilómetro 56.00 hasta el Kilómetro 85.5	Arecibo - Utuado	$6,079,127.76
100087	MP-10(76)	Rehabilitación De Pavimento Y Mejoras a La Seguridad Carretera PR-10, Desde El Kilómetro 1.83 Hasta El Kilómetro 14.90, en los Municipios de Adjuntas y Ponce.	Adjuntas - Ponce	$7,339,302.04
129100	MP-129(12)	Mejoras A La Seguridad Corredor PR-129	Arecibo-Lares	$3,784,018.26
200266	MP-2(62)	Mejoras Geométricas Y Seguridad Carretera PR-2, Desde Kilómetro 102.4 Hasta Kilómetro 106.2	Quebradillas - Isabela	$7,831,141.38
200287	MP-2(72)	Rehabilitación Del Pavimento Carretera PR-2 Desde Kilómetro 160.00 Hasta el Kilómetro 163.00	Hormigueros	$1,487,712.33
200290	MP-2(68)	Mejoras Geométricas Intersección Carreteras PR-2 y PR-4491	Hatillo	$425,148.17
200291	MP-2(70)	Mejoras al Sistema De Semáforos Carretera PR-2, Desde El Kilómetro 76.1 (PR-10) Hasta El Kilómetro 82.4 (PR-493)	Arecibo	$2,225,378.00

AC No.	Federal Number	Project Description	Municipality	Revised Cost 1.18.18
333605	PW-00326	Reemplazo del P/S Rio Guayanilla Núm. 1496 [FEMA]	Guayanilla	$4,234,664.87
800499	MP-9999(223)	Construcción de Rotonda En Intersección de Carreteras PR-153 y PR-14	Coamo	$1,614,502.84
800505	MP-9999(229)	Rehabilitación Del Pavimento Carretera PR-151 Desde Kilómetro 0.00 hasta Kilómetro 7.00	Villalba	$1,364,077.00
800506	MP-9999(230)	Rehabilitación Del Pavimento Carreteras: PR-710 Desde Km. 0.00 Hasta Km. 2.00; PR-753 Desde Km. 0.00 Hasta Km. 5.80 y PR-712 Desde Km. 0.00 Hasta Km. 5.70 en los municipios de Guayama, Arroyo y Salinas.	Guayama-Arroyo-Salinas	$2,819,991.34
800466	N/A	Control Permanente de Inundaciones Intersección PR-3, PR-53 y PR-194	Fajardo	$17,211,483.42

Source: PRHTA

Table H.5: CIP List of Construction Projects - Islandwide

AC No.	Federal Number	Project Description	Revised Cost 1.18.18
255	MP-9999(152)	Instalación de Rotulación Delimitando Pesos Máximos de Vehículos Sobre Puentes a lo Largo de Toda la Isla	$82,045.00
800329	LP-9999(147)	Suministro e Instalación de Postes Kilométricos y Hectométricos	$3,229,514.80
800330	MP-9999(211)	Suministro e Instalación de Postes Kilométricos y Hectométricos en varios Municipios Región Este.	$1,700,326.00
10200	MP-9999(217)	Suministro e Instalación De Dispositivos De Seguridad Y Señalización En Plazas De Peaje PR-66	$5,810,642.09
10200	MP-9999(217)	Suministro e Instalación De Dispositivos De Seguridad Y Señalización En Plazas De Peaje PR-20, PR-52, PR-53	$5,810,642.09

Source: PRHTA

Table H.6: State Funds State of Good Repair projects - San Juan TMA

AC Code Num.	Project Description	Municipality	Federal Fiscal Year (STIP)	Total Est Project Cost
PR-66				
	GENERAL RECONSTRUCTION CAPEX APPROPRIATION	Carolina-Rio Grande	2017-2018	$ -
	Pavement General	Carolina-Rio Grande	2020-2021	$ -
	Bridge General	Carolina-Rio Grande	2020-2021	$ -
	Safety General	Carolina-Rio Grande	2020-2021	$ -
OTHER TOLL ROADS				
	PR-52 Reconstruction From PR-184 to Cayey	Cayey	2020-21	$ 10,000,000

Source: PRHTA

Table H.7: State Funds State of Good Repair projects - Island-wide

AC Code Num.	Project Description	Municipality	Federal Fiscal Year (STIP)	Total Est Project Cost
OTHER TOLL ROADS				
	GENERAL RECONSTRUCTION CAPEX APPROPRIATION	Island-wide	2017-2018	$ 25,000,000
	Pavement General	Island-wide	2020-2021	$ 709,167
	Bridge General	Island-wide	2020-2021	$ 4,449,390
	Safety General	Island-wide	2020-2021	$ 2,544,658
NON-TOLL ROADS				
	GENERAL RECONSTRUCTION CAPEX APPROPRIATION	Island-wide	2017-2018	$ 50,000,000
	Pavement General	Island-wide	2020-2021	$ 63,276,015
	Traffic Signal	Island-wide	2020-2021	$ 6,469,111
	Bridge General	Island-wide	2020-2021	$ 14,372,032
	Safety General	Island-wide	2020-2021	$ 20,606,208

Source: PRHTA

Table H.8: CIP Earmark Projects – San Juan TMA

Category	Earmark Number	Description
Earmark	PR-003	Construction of unfinished PR-9030 exit ramp towards eastbound direction of PR-30.
Earmark	PR-005	Reconstruction of 6.5 kilometers of PR-917 and 4.1 kilometers of PR-921, including pavement reconstruction, application of pavement markings, construction of concrete sidewalks and curbs, installation of guardrails, level adjustment of utility valves and manhole covers, and other miscellaneous work.
Earmark	PR-011	Reconstruction and improvements of pavement to approximately 5.9 kilometers of PR-835.
Earmark	PR-013	Reconstruction and improvements of pavement to approximately 2.3 kilometers of PR-8834. Geometric improvements to PR-177 intersection with Juan Martínez Avenue.
Earmark	PR-017	Construction of a new pedestrian and bicycle connection between existing Bayamón River Recreational Trail to PR-165

Source: PRHTA

Table H.9: CIP Earmark Projects – Aguadilla TMA

Category	Earmark Number	Description
Earmark	PR-006	Reconstruction of approximately 20.0 kilometers or PR-111, considering pavement preservation and/or reconstruction, signage improvement, replacement of pavement markings, upgrade to roadway safety system elements and bridge preservation.

Source: PRHTA

Table H.10: CIP Earmark Projects – Other Urbanized Areas

Category	Earmark Number	Description
Earmark	PR-009	Reconstruction of approximately 12.0 kilometers of PR-123, considering pavement preservation and/or reconstruction, signage improvement, replacement of pavement markings, upgrade to roadway safety system elements and bridge preservation.
Earmark	PR-006	Reconstruction of approximately 20.0 kilometers or PR-111, considering pavement preservation and/or reconstruction, signage improvement, replacement of pavement markings, upgrade to roadway safety system elements and bridge preservation.

Source: PRHTA

Table H.11: STIP 2017-2020 Rev Feb 2018 – San Juan TMA

STIP FY 2017				
Code	**AC #**	**Description**	**Municipality**	**Total Amount**
ZP-10	520130	DTL Phase 1	San Juan / Trujillo Alto / Caguas	$8,774,368
	800480	NEPA Studies (AC-918101)	San Lorenzo	$478,149
	18760	Feasibility Study PR-187 Bypass	Loíza	$494,103
	19143	Puente #194	Naguabo	$7,289,814
ZP-20	301133	Additional Funds - Rio Grande - Fajardo Corridor	Río Grande / Fajardo	$764,169
	520130	DTL Phase 1	San Juan / Trujillo Alto / Caguas	$19,543,848
	800523	Noise Barriers	Bayamón / Toa Alta	$1,345,496
	259	Los Almendros	Bayamón	$787,750
	15802	Parque Tecnológico - Phase 2	Cayey	$506,583
	533	Environmental Study PR-5 Extension	Bayamón	$1,076,369
ZP-30	520130	DTL Phase 1	San Juan / Trujillo Alto / Caguas	$4,051,316
Total				**$45,111,965**
STIP FY 2018				
ZP-10	800508	DTL Phase 4	San Juan / Trujillo Alto / Caguas	$7,715,358
ZP-20	800508	DTL Phase 4	San Juan / Trujillo Alto / Caguas	$9,889,942
ZP-30	800508	DTL Phase 4	San Juan / Trujillo Alto / Caguas	$10,434,529
Total				**$28,039,829**
STIP FY 2019				
ZP-10	300124	DTL Phase 5	San Juan / Trujillo Alto / Caguas	$5,745,324
	17242	Connector	Cidra	$3,000,000
	18760	Design PR-187 Bypass	Loíza	$1,000,000
	20802	Aguas Buenas Bypass	Aguas Buenas	$2,275,000
	10194	Barranquitas South Bypass	Barranquitas	$300,000
ZP-20	800509	DTL - ITS	San Juan / Trujillo Alto / Caguas	$11,736,421
	800510	DTL - Noise Barriers	San Juan / Trujillo Alto / Caguas	$5,375,345
	15801	Parque Tecnológico Phase 1	Cayey	$13,000,000
	15802	Parque Tecnológico - Phase 2	Cayey	$800,000
	10166	Recreational Trail	Toa Baja	$1,000,000
ZP-30	300124	DTL Phase 5	San Juan / Trujillo Alto / Caguas	$1,776,316
Total				**$46,008,406**

STIP FY 2020				
ZP-10	84511	Widening PR-845	San Juan / Trujillo Alto	$375,000
ZP-20	800497	Cancer Center	San Juan	$24,525,750
	800523	Noise Barriers	Bayamón / Toa Alta	$2,000,000
	533	Environmental Study PR-5 Extension	Bayamón	$1,000,000
Total				**$27,900,750**

Source: STIP 2017-2020; Feb 2018

Table H.12: STIP 2017-2020 Rev Feb 2018 – Aguadilla TMA

STIP FY 2017				
Code	AC #	Description	Municipality	Total Amount
ZP-10	411901	Connector	Las Marías	$1,640,250
ZP-20	213	Additional Funds - Aguadilla-Mayagüez Corridor	Aguadilla / Mayagüez	$380,000
Total				**$2,020,250**
STIP FY 2018				
ZP-10	11191	Relocation PR-111	San Sebastián / Lares	$500,000
Total				**$500,000**
STIP FY 2019				
ZP-10	411901	Connector	Las Marías	$3,000,000
	500023	Pedestrian Route	Rincón	$5,175,954
Total				**$8,175,954**
STIP FY 2020				
ZP-10	11213	Improvements to PR-112 & PR-4494	Isabela	$125,000
	11191	Relocation PR-111	San Sebastián / Lares	$2,000,000
ZP-20	218	Aguadilla Airport	Aguadilla	$1,000,000
Total				**$3,125,000**

Source: STIP 2017-2020; Feb 2018

Table H.13: STIP 2017-2020 Rev Feb 2018 – Other Urbanized Areas

STIP FY 2017				
Code	**AC #**	**Description**	**Municipality**	**Total Amount**
ZP-10	54509	Widening of PR-545 (Gabia)	Coamo	$1,620,475
ZP-20	100081	ER - PR10	Utuado / Adjuntas	$304,852
ZP-20	301133	Additional Funds - Rio Grande - Fajardo Corridor	Río Grande / Fajardo	$764,169
ZP-20	213	Additional Funds - Aguadilla-Mayagüez Corridor	Aguadilla / Mayagüez	$380,000
Total				**$3,069,496**
STIP FY 2018				
ZP-10	800356	Reconstruction of PR-135 km. 78.5	Adjuntas	$360,000
	556103	Villalba Bypass	Villalba	$500,000

	65403	Puente Victor Rojas	Arecibo	$689,500
ZP-20	100081	ER - PR10	Utuado / Adjuntas	$7,458,859
Total				**$9,008,359**
STIP FY 2019				
ZP-20	100076	PR-10	Adjuntas	$8,500,000
	200248	Lavadero Ward (Conv. a Expreso)	Hormigueros	$13,750,413
	520129	Truck Weigh Station	Juana Díaz	$1,000,000
Total				**$23,250,413**
STIP FY 2020				
ZP-20	200200	Overpass	Mayagüez	$2,000,000
	200241	Intersección PR-2/Post/Llorens (La Vita)	Mayagüez	$2,000,000
	10029	Widening PR-100	Cabo Rojo	$300,000
	12201	Connector Phase II	Lajas / San Germán	$625,000
Total				**$4,925,000**

Source: STIP 2017-2020; Feb 2018

Table H.14: STIP 2017-2020 Rev Feb 2018 – Island-wide

STIP FY 2017				
Code	**AC #**	**Description**	**Municipality**	**Total Amount**
ZP-10	800474	Bridge Rehabilitation	Island-wide	$116,875
	800477	Pavement	Island-wide	$7,157,458
	900123	SPR	Island-wide	$6,000,000
	900124	Bridge Critical Findings	Island-wide	$55,614
	990133	ITS	Island-wide	$900,000
ZP-20	800474	Bridge Rehabilitation	Island-wide	$13,225,001
	800475	Bridge Preservation	Island-wide	$1,301,258
	800477	Pavement	Island-wide	$25,015,524
	900124	Bridge Critical Findings	Island-wide	$523,820
	992477	NBIS	Island-wide	$1,874,961
ZP-30	800492	SHSP	Island-wide	$0
	990134	Upgrade of Safety Devices	Island-wide	$7,173,465
	990135	Geometric Safety Improvements	Island-wide	$27,431,780
ZP-40	990151	Section 154 & 164 Penalty	Island-wide	$0
ZP-50	990151	Section 154 & 164 Penalty	Island-wide	$0
Total				**$90,775,756**
STIP FY 2018				
ZP-10	800485	Pavement	Island-wide	$4,480,668
	800486	Bridge Rehabilitation	Island-wide	$8,271,000
	900128	SPR	Island-wide	$6,000,000
	900129	Bridge Critical Findings	Island-wide	$6,194,000
	990146	ITS	Island-wide	$500,000
ZP-20	800485	Pavement	Island-wide	$45,730,419
	800486	Bridge Rehabilitation	Island-wide	$1,045,000
	800487	Bridge Preservation	Island-wide	$3,094,000
	900129	Bridge Critical Findings	Island-wide	$74,000
	990146	ITS	Island-wide	$1,875,000
	992478	NBIS	Island-wide	$1,791,141
ZP-30	800493	SHSP	Island-wide	$2,500,000
	990144	Upgrade of Safety Devices	Island-wide	$14,356,261
	990145	Geometric Safety Improvements	Island-wide	$6,459,210
ZP-40	990152	Section 154 & 164 Penalty	Island-wide	$1,900,000

ZP-50	990152	Section 154 & 164 Penalty	Island-wide	$1,900,000
Total				**$106,170,699**
STIP FY 2019				
ZP-10	800511	Pavement	Island-wide	$4,383,985
	800512	Bridge Rehabilitation	Island-wide	$2,500,000
	900132	SPR	Island-wide	$6,000,000
	990153	ITS	Island-wide	$1,500,000
ZP-20	800511	Pavement	Island-wide	$10,436,084
	800512	Bridge Rehabilitation	Island-wide	$10,807,000
	900133	Bridge Critical Findings	Island-wide	$2,800,000
	990153	ITS	Island-wide	$1,900,000
	992479	NBIS	Island-wide	$1,750,000
ZP-30	800514	Geometric Safety Improvements	Island-wide	$12,519,684
	800515	SHSP	Island-wide	$6,000,000
	990155	Upgrade of Safety Devices	Island-wide	$13,454,000
ZP-40	990154	Section 154 & 164 Penalty	Island-wide	$1,900,000
ZP-50	990154	Section 154 & 164 Penalty	Island-wide	$1,900,000
Total				**$77,850,753**
STIP FY 2020				
ZP-10	800516	Bridge Rehabilitation	Island-wide	$3,875,000
	800518	Pavement	Island-wide	$15,136,263
	900134	SPR	Island-wide	$6,000,000
	900135	Bridge Critical Findings	Island-wide	$3,594,000
	990156	ITS	Island-wide	$4,000,000
	800516	Bridge Rehabilitation	Island-wide	$8,615,000
	800518	Pavement	Island-wide	$24,971,093
	990156	ITS	Island-wide	$1,736,842
ZP-20	TBD	NBIS	Island-wide	$2,000,000
ZP-30	800519	Upgrade of Safety Devices	Island-wide	$5,000,000
	800520	SHSP	Island-wide	$3,801,628
	800521	Geometric Safety Improvements	Island-wide	$24,948,372
ZP-40	990157	Section 154 & 164 Penalty	Island-wide	$1,900,000
ZP-50	990157	Section 154 & 164 Penalty	Island-wide	$1,900,000
Total				**$107,478,198**

Source: STIP 2017-2020; Feb 2018

Table H.15: STIP 2017-2020 Rev Feb 2018 – Others

STIP FY 2017				
ZP-20				$1,000,000

Source: STIP 2017-2020; Feb 2018

Short-Mid Term Projects

TAMP projects and emergency projects are expected to be completed in this period (FHWA ER Table H.16 to Table H.20).

There is also a series of projects identified to be considered for CDBG-DR funding that will potentially have access to additional funds in the short to mid-term; these are:

- PR-10 (AC-100069, AC-100071, AC-100055, AC-100076) Adjuntas-Utuado;
- San Lorenzo South Bypass, from PR-183/ PR-181 to PR-745 (AC-918101) San Lorenzo;
- Aguas Buenas North Bypass, from PR-156 East to PR-156 West (AC-020802, AC-020803) Aguas Buenas;
- PR-158 Connector, Phase I and Phase II from PR-52 to PR-1, (AC-015802) Cayey;
- PR-122, Lajas-San German Connector from PR-321 to PR-166, (AC-012201) Lajas-San German;
- PR-18N to PR-21E ramp and Medical Center Connector San Juan;
- Extension PR-5, from PR-199 to PR-167, Bayamón-Toa Alta;
- Isabela Connector, from PR-472 to PR-112 (AC-047205) Isabela;
- Expressway Conversion of PR-2 Ponce-Mayagüez;
- Higuilar Avenue from PR-696 to PR-22/PR-694 Dorado;
- PR-22 extension, Hatillo- Aguadilla from PR-22/PR-2 to PR-2/PR-111 Hatillo-Aguadilla;
- Cidra Connector, from Avenida Industrial to PR-184 (AC-017242, AC-017246, AC-017247) Cidra;
- Relocation of PR-111 from PR-111/PR-448 to PR-111/PR-111R San Sebastián-Lares;
- Barranquitas Bypass from PR-156 to PR-759 (AC-010194) Barranquitas;
- Villalba Bypass, from PR-151 to PR-150, (AC-556103) Villalba;
- Improvements to Aguadilla's Airport Access, from PR-110 to PR-107, includes Burns Street Connector (AC-000218) Aguadilla;
- Loiza Bypass, from PR-188 to PR-187, (AC-018760) Loiza;
- Widening PR-845, from PR-844 to PR-199, (AC-084511) San Juan-Trujillo Alto;
- Widening PR-545, from PR-52 to PR-14, Coamo; and
- Peñuelas South Bypass (PR-3132) from its intersection with PR-3132 (Northwest limit) to existing PR-3121 (Northeast Limit) Peñuelas.

There are initiatives underway for repair work in the entire Island road network such as the State Road Modernization Program (PEMOC – in spanish Programa Estatal de Modernización de Carreteras) and "Abriendo Caminos"; the full list of projects under these two initives are included in Table H.21 to Table H.23.

Other agencies such as the Eastern Federal Lands Highway Division (EFLHD) develop improvements programs including transportation infrastructure within their boundaries (el Yunque for the EFLHD case). Table H.24 includes the (FY 2019-2022) EFLHD Transportation Improvement Program for Puerto Rico.

Table H.16: List of FHWA ER Inspections Projects

Source: PRHTA

Table H.17: List of FHWA ER Inspections - San Juan TMA

Municipality	Road	Km	Damage Description	Total Cost	FHWA Comments
Guaynabo	PR-1	21.0-32.0	Road Damage	$ 60,570.00	Signed by C. Figueroa on 6/6/18.
Manatí	PR-149	0.0-12.9	Road Damage	$ 69,300.00	1. Comments sent by C. Figueroa to L. Santos & Zmarin on 5/7/18.
Corozal	PR-159	14.85	Landslide	$ 270,558.75	L. Santos confirmed on 5/24/18 that DDIR won't be submitted by PRHTA.
San Juan	PR-2	2.1	Road Damage	$ 658,363.86	Signed Ineligible by C. Figueroa 6/5/18.
Guaynabo	PR-20	0.0-10.0	Road Damage	$ 318,655.80	Signed Eligible by C. Figueroa on 6/5/18
Toa Baja	PR-865	0.9	Road Damage	$ 138,352.77	signed on 3/6/18
Toa Baja	PR-865	13	Road Damage	$ 78,853.85	Singed Eligible by C. Figueroa on 6/5/18.
Cataño	PR-869	0.5	Road Damage	$ 357,673.24	signed not eligible 3/6/18
Toa Baja	PR-870	0.8	Road Erosion	$ 241,676.13	signed correct km is 1.8
Canóvanas	PR-951	2.3	Landslide	$ 92,266.08	signed km 2.3 to 2.4 on 2/9/18
Canóvanas	PR-951	3.1	Landslide	$ 32,613.55	Signed by C. Figueroa on 5/22/18
Canóvanas	PR-951	5	Landslide	$ 222,456.55	signed on 2/1/18
Las Piedras	PR-9936	0.7		$ 155,520.40	L Santos confirmed on 5/24/18 that DDIR won't be submitted by PRHTA
Canóvanas	PR-185	2.8	Landslide	$ 237,145.70	Received comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and follow up 6/4/18
Corozal	PR-5568	0.7	Road Damage	$ 218,096.78	Field Visit needed, PRHTA already assigned a to repair the area. Comments sent on 5-16-18
Trujillo Alto	PR-175	12	Structure Damage	$ 44,121.00	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18, follow up 6/4/18
Toa Baja	PR-865	1	Landslide	$ 62,121.68	This DDIR is a duplicate of the one labeled PR km 0.9 already signed. Comments sent to Zmarin and L Santos and Jacevedo on 5/7/18
Canóvanas	PR-951	1	Landslide	$ 67,800.70	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/18 and 6/5/18
San Juan - Salinas	PR-52	0-65.5	Lightning	$1,608,010.80	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/19
San Juan	PR-18	0-6.0	Lightning	$ 327,987.00	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/20
Carolina-Canóvanas	PR-66	0-20	Lightning	$ 96,426.00	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/21
San Juan	PR-26	0-2.0	Lightning	$ 321,930.00	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/23
Caguas - Humacao	PR-30	0-30.6	Lightning	$ 171,141.00	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/24
Guaynabo	PR-1	21.5	Landslide	$ 102,639.00	Signed Ineligible by C. Figueroa on 5/9/18.
Guaynabo	PR-1	23	Landslide	$ 60,771.87	Signed by C. Figueroa Eligible on 6/5/18.
Guaynabo	PR-1	23.7	Landslide	$ 37,329.00	Singed Eligible by C. Figueroa on 6/5/18.
Guaynabo	PR-1	24.5	Landslide	$ 65,172.00	Signed Ineligible by C. Figueroa on 5/9/18.
Guaynabo	PR-1	24.8 northbound	Landslide	$ 79,117.00	Signed Ineligible by C. Figueroa on 5/9/18.
Guaynabo	PR-1	24.8 southbound	Landslide	$ 128,247.00	Signed eligible by C. Figueroa, email sent to Zmarin, Jacevedo & L. Santos - 5/7/18
Guaynabo	PR-1	25.4	Landslide	$ 103,431.00	Signed Eligible by C. Figueroa on 6/5/18
Manatí	PR-149	0.0-12.9	Accelerated Program Project	$ 82,857.50	1.Reviwed. Comments sent on 5/7/18 2. Response received on 5/20/18
Guaynabo	PR-1	21.0-32.0	Luminaria	$ 63,330.50	Signed by C. Figueroa on 6/6/18.
Guaynabo	PR-20	0.0-10.0	Accelerated Program Project	$ 318,655.80	1.Reviwed. Comments sent on 5/7/22
Cayey	PR-15	17.95	Landslide	$ 86,635.80	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
Cayey	PR-15	21.15	Landslide	$ 66,180.12	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
Cayey	PR-15	23.3	Landslide	$ 98,631.49	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
Cayey	Cayey	23.6	Landslide	$ 115,176.10	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
Cayey	PR-15	14.3	Landslide	$ 87,363.18	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility
Cayey	PR-15	16.15	Landslide	$ 56,612.74	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility
Cayey	PR-15	17.45	Landslide	$ 61,543.89	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility

Municipality	Road	Km	Damage Description	Total Cost	FHWA Comments
Cayey	PR-15	18.05	Landslide	$ 47,954.89	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility

Source: PRHTA

Table H.18: Table H.7: List of FHWA ER Inspections – Aguadilla TMA

Municipality	Road	Km	Damage Description	Total Cost	FHWA Comments
Moca	PR-111	0.0-10.0	Road Damage	$ 166,825.00	Signed by C. Figueroa on 6/6/18.
Moca	PR-111	10.0-20.0	Road Damage	$ 162,025.00	Signed by C. Figueroa eligible on 6/5/18.
Aguada	PR-2	140.2	Landslide	$1,243,563.54	Signed eligible contingent the works on the slope are within PRHTA ROW 5/7/18
San Sebastián	PR-119	20.4	Landslide		L. Santos confirmed with C. Figueroa on 6/7/18 that PRHTA will not be submitting a DDIR for this site.
San Sebastián	PR-119	20.9-21.1	Landslide	$7,798,341.27	signed eligible by J. Nuñez on 11/1/17
Rincón	PR-115	16.94	Landslide	$ 27,834.00	Signed ineligible by C. Figueroa on 5/7/18.
Moca	PR-111	0.00-10.0	Accelerated Program Project	$ 46,201.25	1.Reviwed. Comments sent on 5/7/19
San Sebastián	PR-111	10.0-20.0	Accelerated Program Project	$ 53,676.25	1.Reviwed. Comments sent on 5/7/20

Source: PRHTA

Table H.19: Table H.7: List of FHWA ER Inspections – Other Urbanized Areas

Municipality	Road	Km	Damage Description	Total Cost	FHWA Comments
San Juan - Salinas	PR-52	0-65.5	Lightning	$1,608,010.80	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/19
Utuado	PR-10	41.6	Downslope Landslide	$2,778,814.75	Received signed by Eng. Ray Morales, signed by FHWA on 4/12/18, quantity differ to the one in this table
Utuado	PR-10	41.9	Downslope Landslide	$5,596,879.51	Received signed by Eng. Ray Morales, signed by FHWA on 4/12/18, quantity differ to the one in this table
Utuado	PR-10	44.7	Downslope Landslide	$4,251,669.59	Received revised to include km 44.7,44.9,45.0 and 45.1 signed by Eng. Ray Morales signed by FHWA on 4/12/18. The original for Km 44.9 and 45.0 were signed on 2/16/18 for a quantity of $14,113.00 respectively corresponding only to the emergency repairs, permanent are non-eligible since this was a preexisting condition
Utuado	PR-10	50.3	Topples Landslide	$ 6,655.00	L. Santos confirmed on 5/24/18 that this DDIR will not be submitted. Delete.
Utuado	PR-111	56.45	Landslide	$ 111,022.56	L. Santos confirmed on 5/24/18 that this DDIR is the same as the DDIR for PR-111, KM 56.46 which was signed eligible.
Utuado	PR-111	65.3		$ 116,651.04	L. Santos confirmed on 5/24/18 that this DDIR is the same as the DDIR for PR-111, KM 65.356, which was signed eligible.
Adjuntas	PR-135	10.9	Landslide	$ 111,101.16	signed 2/28/18
Adjuntas	PR-135	5.5-23.2		$1,138,753.37	FHWA requested to Eng Jackeline Narvaez to divide it by sites, some of the sites are not eligible or do not have enough information for the evaluation
Ponce	PR-139	19.05	Topples Landslide	$ 36,685.00	L. Santos confirmed on 5/24/18 that this DDIR is the same as the DDIR for PR-139, KM 19.1, which was signed eligible.
Jayuya	PR-140	11.15		$ 41,036.20	signed on 11/10/2017
Jayuya	PR-141	18.05	Road Damage	$ 8,236.53	Signed as Ineligible on 4/18/18
Yauco, Guayanilla	PR-335	1		$ 107,050.11	Evaluated comments sent on 5/7/2018, pending clarification of the site, field visit needed
Salinas	PR-52	49.0-52.30	Road Damage	$ 56,637.50	signed on 6/4/18
Salinas	PR-52	55.30-61.00		$ 171,476.50	signed on 6/4/18
Barceloneta	PR-685	1	Road Damage	$ 62,121.68	The DDIR that we received indicated that the correct road is the PR-865, email sent on 5/7/17. this correspond to the PR-865 km 0.9 signed as eligible
Utuado	PR-10	45.2	Landslide	$6,400,000.00	2nd Revision DDIR original approved on 2/2/18 and 2/16/18, signed on 4/12/18
Jayuya	PR-5141	1.5	Landslide	$ 405,955.41	Received. C. Figueroa sent comments to H. Cosme + J. Narvaez to revise DDIR on 5.18.18. 2. signed on 5/21/18
Ponce	PR-132	19.4	Landslide	$ 142,205.16	signed eligible 5-16-18
Guayama	PR-15	1.82	Landslide	$ 187,796.90	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
Guayama	PR-15	8.3	Landslide	$ 39,059.60	Signed on 1/23/18
Guayama	PR-15	9.7-11.3	road damage	$ 373,607.00	Comments provided during meeting with Mrs. Grissette Felix
Patillas	PR-53		Bridge-Lightning	$ 161,850.00	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/22
Fajardo - Yabucoa	PR-53		Lightning	$ 387,720.00	Received. Comments sent to PRHTA, Eng. Marin and Eng. Santos on 4/2/18 and 5/7/25
Guayama	PR-15	1.2	Landslide	$ 187,796.90	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
Guayama	PR-15	4.4-4.5	Landslide	$ 170,075.58	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
Guayama	PR-15	8.8	Landslide	$ 170,962.98	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
Guayama	PR-179	5.65	Landslide		Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others

Municipality	Road	Km	Damage Description	Total Cost	FHWA Comments
Guayama	PR-15	7.3	Landslide	$ 52,325.14	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility
Guayama	PR-15	10.8	Landslide	$ 97,013.55	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility
Guayama	PR-179	7.6	Landslide	$ 85,140.89	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility
Ponce	PR-501	0.7-4.65	Landslide	$ 627,236.84	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility
Yauco	PR-335	0-6.35	Landslide	$ 63,060.03	6.5.16 Status: J. Narvaez (PRHTA South Region) to confirm whether the signs on this DDIR were included or not in other DDIR(s). Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility

Source: PRHTA

Table H.20: List of FHWA ER Inspections – Islandwide

Road	Km	Damage Description	Total Cost	FHWA Comments
PR-135	23.2	Landslide		Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others
PR-179	10.7	Landslide	$ 113,587.26	Comments provided to Mrs. G. Felix and email sent on 6/4/18 to Mrs. Marín, Mr. Santos, Mr. Ruiz and others. Field visit needed to determine eligibility

Source: PRHTA

Table H.21: PEMOC List Phase 1 Round 1

PRHTA Code	Bid Package	Municipality	PRHTA Region	Road (PR)	From Kmts.	To Kms.	From Kmts.	To Kms.	From Kmts.	To Kms.	From Kmts.	To Kms.	Total Lenght (Kmts.)
R010000269 / AC-001269	Formal Bid (WTBP) East Region Unit 1	Canóvanas	Este	951	0.0	1.9	-	-	-	-	-	-	1.9
R010000269 / AC-001269	Formal Bid (WTBP) East Region Unit 1	Canóvanas	Este	874	3.7	5.6	-	-	-	-	-	-	1.9
R010000269 / AC-001269	Formal Bid (WTBP) East Region Unit 1	Canóvanas	Este	8874	0.0	0.9	-	-	-	-	-	-	0.9
R010000269 / AC-001269	Formal Bid (WTBP) East Region Unit 1	Ceiba	Este	975	0.0	5.0	-	-	-	-	-	-	5.0
R010000269 / AC-001269	Formal Bid (WTBP) East Region Unit 1	Fajardo	Este	194	0.0	5.0	-	-	-	-	-	-	5.0
R020000269 / AC-002269	Formal Bid (WTBP) East Region Unit 2	Cidra	Este	173	13.7	17.1	-	-	-	-	-	-	3.4
R020000269 / AC-002269	Formal Bid (WTBP) East Region Unit 2	Cidra	Este	173	10.4	11.7	-	-	-	-	-	-	1.3
R020000269 / AC-002269	Formal Bid (WTBP) East Region Unit 2	Gurabo	Este	941	0.0	4.0	-	-	-	-	-	-	4.0
R020000269 / AC-002269	Formal Bid (WTBP) East Region Unit 2	Yabucoa	Este	3	95.1	96.2	96.9	97.9	-	-	-	-	2.1
R020000269 / AC-002269	Formal Bid (WTBP) East Region Unit 2	Naguabo	Este	192	0.0	3.2	-	-	-	-	-	-	2.1
R030000269 / AC-003269	Formal Bid (WTBP) East Region Unit 3	Luquillo	Este	992	ASD	ASD	-	-	-	-	-	-	1.3
R030000269 / AC-003269	Formal Bid (WTBP) East Region Unit 3	Luquillo	Este	991	ASD	ASD	-	-	-	-	-	-	1.5
R030000269 / AC-003269	Formal Bid (WTBP) East Region Unit 3	Luquillo	Este	983	ASD	ASD	-	-	-	-	-	-	3.9
R030000269 / AC-003269	Formal Bid (WTBP) East Region Unit 3	Luquillo	Este	988	ASD	ASD	-	-	-	-	-	-	3.8
R030000269 / AC-003269	Formal Bid (WTBP) East Region Unit 3	Aguas Buenas	Este	790	0.0	3.0	-	-	-	-	-	-	3.8
R030000269 / AC-003269	Formal Bid (WTBP) East Region Unit 3	Aguas Buenas	Este	792	0.0	2.0	-	-	-	-	-	-	3.8
R030000269 / AC-003269	Formal Bid (WTBP) East Region Unit 3	Las Piedras	Este	936	0.0	1.7	1.7	3.7	3.7	4.3	5.7	6.4	5.0
R010000270 / AC-001270	Formal Bid (WTBP) South Region Unit 1	Adjuntas	Sur	518	0.0	9.5	-	-	-	-	-	-	9.5
R010000270 / AC-001270	Formal Bid (WTBP) South Region Unit 1	Jayuya	Sur	140	0	6.1	-	-	-	-	-	-	6.1
R010000270 / AC-001270	Formal Bid (WTBP) South Region Unit 1	Ponce	Sur	139	0.0	1.1	-	-	-	-	-	-	1.1

R010000270 / AC-001270	Formal Bid (WTBP) South Region Unit 1	Ponce	Sur	503	0.3	1.3	-	-	-	-	-	-	1.0
R010000270 / AC-001270	Formal Bid (WTBP) South Region Unit 1	Ponce	Sur	503	2.0	3.4	-	-	-	-	-	-	1.4
R010000270 / AC-001270	Formal Bid (WTBP) South Region Unit 1	Ponce	Sur	504	0.1	3.0	-	-	-	-	-	-	2.9
R010000270 / AC-001270	Formal Bid (WTBP) South Region Unit 1	Yauco	Sur	375	0.0	3.4	-	-	-	-	-	-	3.4
R010000270 / AC-002270	Formal Bid (WTBP) South Region Unit 2	Aibonito	Sur	7725	4.2	6.8	-	-	-	-	-	-	2.6
R010000270 / AC-002270	Formal Bid (WTBP) South Region Unit 2	Arroyo	Sur	53	0	2	-	-	-	-	-	-	2.0
R010000270 / AC-002270	Formal Bid (WTBP) South Region Unit 2	Coamo	Sur	153	11.41	12.04	12.2	12.6	-	-	-	-	1.0
R010000270 / AC-002270	Formal Bid (WTBP) South Region Unit 2	Coamo	Sur	702	0.4	0.63	0.9	1.5	2.4	3.3	-	-	1.7
R010000270 / AC-002270	Formal Bid (WTBP) South Region Unit 2	Guayama	Sur	712	10.1	14.1	-	-	-	-	-	-	4.0
R010000270 / AC-002270	Formal Bid (WTBP) South Region Unit 2	Juana Diaz	Sur	510	1.4	2.9	-	-	-	-	-	-	1.5
R010000270 / AC-002270	Formal Bid (WTBP) South Region Unit 2	Santa Isabel	Sur	536	0.0	2.0	-	-	-	-	-	-	2.0
R010000270 / AC-002270	Formal Bid (WTBP) South Region Unit 2	Santa Isabel	Sur	543	0.0	2.0	-	-	-	-	-	-	2.0
R010000271 / AC-001271	Formal Bid (WTBP) North Region Unit 1	Barranquitas	Norte	773	0.0	3.4	-	-	-	-	-	-	3.4
R010000271 / AC-001271	Formal Bid (WTBP) North Region Unit 1	Ciales	Norte	146	-	-	-	-	-	-	-	-	2.5
R010000271 / AC-001271	Formal Bid (WTBP) North Region Unit 1	Ciales	Norte	149	-	-	-	-	-	-	-	-	5.0
R010000271 / AC-001271	Formal Bid (WTBP) North Region Unit 1	Lares	Norte	453	0.0	3.4	8.4	10.4	-	-	-	-	5.4
R010000271 / AC-001271	Formal Bid (WTBP) North Region Unit 1	Orocovis	Norte	568	0.0	5.0	-	-	-	-	-	-	5.0
R010000271 / AC-001271	Open Bid - North Region Unit 2	Barceloneta	Norte	681	13	15.9	17.5	18.5	-	-	-	-	3.9
R010000271 / AC-001271	Open Bid - North Region Unit 2	Arecibo	Norte	635	0.0	2.2	3.4	4.6	7.9	9.3	10.1	10.8	5.5
R010000271 / AC-001271	Open Bid - North Region Unit 2	Camuy	Norte	119	5.9	12.6	-	-	-	-	-	-	6.7
R010000271 / AC-001271	Open Bid - North Region Unit 2	Manatí	Norte	149	0.0	2.0	-	-	-	-	-	-	2.0
R010000271 / AC-001271	Open Bid - North Region Unit 2	Utuado	Norte	111	43.3	44.5	44.7	46.5	49.5	50.2			3.7
R010000271 / AC-001271	Open Bid - North Region Unit 3	Manatí	Norte	6685	1.5	2.5	3.3	6.1	6.4	7.0	8.0	8.6	5.0
R010000271 / AC-001271	Open Bid - North Region Unit 3	Florida	Norte	665	0.0	4.4	-	-	-	-	-	-	4.4
R010000271 / AC-001271	Open Bid - North Region Unit 3	Naranjito	Norte	164	0.1	3.1	3.7	5.8	-	-	-	-	3.0
R010000271 / AC-001271	Open Bid - North Region Unit 3	Toa Baja	Norte	819	0.2	0.8	1.1	1.2	3.0	3.5	4.2	4.3	1.3
R000000272/AC-000272	Open Bid - Metropolitan Region	Bayamon	Metro	168	0.0	1.7	-	-	-	-	-	-	1.7
R000000272/AC-000272	Open Bid - Metropolitan Region	Cataño	Metro	869	0.0	4.0	-	-	-	-	-	-	4.0
R000000272/AC-000272	Open Bid - Metropolitan Region	Trujillo Alto	Metro	851	0	3.6	-	-	-	-	-	-	3.6
R010000273/AC-001273	Open Bid - West Region Unit 1	Aguada	Oeste	417	0.0	3.0	-	-	-	-	-	-	3.0
R010000273/AC-001273	Open Bid - West Region Unit 1	Aguada	Oeste	115	0.7	5.1	8.8	11.0	-	-	-	-	6.6
R010000273/AC-001273	Open Bid - West Region Unit 1	Aguada	Oeste	4417	0.0	2.0			-	-	-	-	2.0
R010000273/AC-001273	Open Bid - West Region Unit 1	Aguadilla	Oeste	443	5.7	6.7	0.0	2.2	-	-	-	-	3.2
R010000273/AC-001273	Open Bid - West Region Unit 1	Aguadilla	Oeste	460	0.0	1.4	-	-	-	-	-	-	1.4
R010000273/AC-001273	Open Bid - West Region Unit 1	Moca	Oeste	444	2.0	7.8	-	-	-	-	-	-	5.8
R010000273/AC-001273	Open Bid - West Region Unit 1	San Sebastián	Oeste	119	18.9	25.8	-	-	-	-	-	-	6.9
R010000273/AC-002273	Open Bid - West Region Unit 2	Guánica	Oeste	333	0.0	1.8	-	-	-	-	-	-	1.8
R010000273/AC-002273	Open Bid - West Region Unit 2	Guánica	Oeste	3116	3.5	5.0	-	-	-	-	-	-	1.5

R010000273/AC-002273	Open Bid - West Region Unit 2	Lajas	Oeste	303	2.4	4.4	-	-	-	-	-	-	2.0
R010000273/AC-002273	Open Bid - West Region Unit 2	Las Marías	Oeste	120	26.9	32.2	-	-	-	-	-	-	5.3
R010000273/AC-002273	Open Bid - West Region Unit 2	Maricao	Oeste	105	25.2	30.2	-	-	-	-	-	-	5.0

Source: PRHTA

Table H.22: PEMOC List Phase 1 Round 2

Paquete de Subasta	Municipio	Region	No. Carretera (PR)	Tramo No 1 Desde Kms.	Tramo No 1 Hasta Kms.	Tramo No 2 Desde Kms.	Tramo No 2 Hasta Kms.	Tramo No 3 Desde Kms.	Tramo No 3 Hasta Kms.	Tramo No 4 Desde Kms.	Tramo No 4 Hasta Kms.	Longitud Total (Kms.)
Reconstrucción de Carreteras Region Oeste Unidad 3	Aguadilla	Oeste	1107	4.67	6.2	0.0	0.7	0.0	0.3	0.0	0.2	2.7
Reconstrucción de Carreteras Region Oeste Unidad 3	Aguadilla	Oeste	107	0	4.5			-	-	-	-	4.5
Reconstrucción de Carreteras Region Oeste Unidad 3	Aguadilla	Oeste	467	0	2.92							2.9
Reconstrucción de Carreteras Region Oeste Unidad 3	Maricao	Oeste	128	25.2	30.2	-	-	-	-	-	-	5.0
Reconstrucción de Carreteras Region Oeste Unidad 3	San Sebastian	Oeste	119	25.8	29.1	-	-	-	-	-	-	3.3
Reconstrucción de Carreteras Region Oeste Unidad 3	Las Marias	Oeste	409	0	5	-	-	-	-	-	-	5.0
Reconstrucción de Carreteras Region Oeste Unidad 3	San German	Oeste	347	0	4.7	-	-	-	-	-	-	4.7
Reconstrucción de Carreteras Region Oeste Unidad 3	Aguada	Oeste	441	0	2.81	-	-	-	-	-	-	2.8
Reconstrucción de Carreteras Region Oeste Unidad 3	Isabela	Oeste	459	10.3	16.2							5.9
Reconstrucción de Carreteras Region Sur Unidad 3	Guanica	Sur	389	0	1.7							0.5
Reconstrucción de Carreteras Region Sur Unidad 3	Yauco	Sur	359	0	2.3	-	-	-	-	-	-	2.3
Reconstrucción de Carreteras Region Sur Unidad 3	Yauco	Sur	368	8.1	13.47	-	-	-	-	-	-	5.4
Reconstrucción de Carreteras Region Sur Unidad 3	Santa Isabel	Sur	542	0	2	-	-	-	-	-	-	2.0
Reconstrucción de Carreteras Region Sur Unidad 3	Santa Isabel	Sur	543	2	3.1							1.1
Reconstrucción de Carreteras Region Sur Unidad 3	Ponce	Sur	163	0	4.5	-	-	-	-	-	-	4.5
Reconstrucción de Carreteras Region Sur Unidad 3	Guayanilla	Sur	378	0	5.1							5.1
Reconstrucción de Carreteras Region Sur Unidad 3	Villalba	Sur	151	7.7	12.7	-	-	-	-	-	-	5.0
Reconstrucción de Carreteras Region Sur Unidad 3	Guayama	Sur	712	14.1	17	-	-	-	-	-	-	2.9
Reconstrucción de Carreteras Region Sur Unidad 3	Juana Diaz	Sur	510	2.9	5.2							2.3
Reconstrucción de Carreteras Region Sur Unidad 3	Santa Isabel	Sur	536	4	5.8							1.8
Reconstrucción de Carreteras Region Norte Unidad 4	Vega Baja	Norte	160	0	4.3	-	-	-	-	-	-	4.3
Reconstrucción de Carreteras Region Norte Unidad 4	Toa Baja	Norte	866	0	3.6	4.40	7.50	-	-	-	-	6.7
Reconstrucción de Carreteras Region Norte Unidad 4	Arecibo	Norte	682	4.63	13.1			-	-	-	-	8.5
Reconstrucción de Carreteras Region Norte Unidad 4	Naranjito	Norte	811	0	5.9							5.9
Reconstrucción de Carreteras Region Norte Unidad 4	Dorado	Norte	165	18.6	19.3	22.0	22.8	23.0	25.6			4.1
Reconstrucción de Carreteras Región Este Unidad 4	Fajardo	Este	985	0	4.3	-	-	-	-	-	-	4.3
Reconstrucción de Carreteras Región Este Unidad 4	Rio Grande	Este	191	0	5	-	-	-	-	-	-	5.0
Reconstrucción de Carreteras Región Este Unidad 4	Cidra	Este	734	0	3.5	-	-	-	-	-	-	3.5
Reconstrucción de Carreteras Región Este Unidad 4	Cidra	Este	735	0	1.5							1.5
Reconstrucción de Carreteras Región Este Unidad 4	Gurabo	Este	941	7.8	11.8	-	-	-	-	-	-	4.0
Reconstrucción de Carreteras Región Este Unidad 4	Las Piedras	Este	926	0	3.8			-	-	-	-	3.8

Reconstrucción de Carreteras Region Este Unidad 5	Culebra	Este	250	0	1.7							1.7
Reconstrucción de Carreteras Region Metro Unidad 2	Guaynabo	Metro	837	0	4.8	-	-	-	-	-	-	4.8
Reconstrucción de Carreteras Region Metro Unidad 2	Guaynabo	Metro	174	13.2	16.8							3.6

Source: PRHTA

Table H.23: List of Project "Abriendo Caminnos"

AC Code	Description	Internal Bid Opening Date	Internal Updated Bid Date	Programmed Bid Opening Date	Notice to Proceed	End Date	Contractor	Budget	Empleos	Inspection Firm
AC-001266	Abriendo Caminos - Primarias Región Metro 1	10-May-18	15-May-18	10-May-18	15-May-18	11-Nov-18	Ferrovial Agroman	$ 7,463,425.00	187	FDDS Eng.
AC-001267	Abriendo Caminos - Primarias Región Sur 1	22-Jun-18	29-Jun-18	22-Jun-18	29-Jun-18	26-Dec-18	Del Valle Group	$ 6,114,740.00	153	MD Eng.
AC-001275	Abriendo Caminos - Primarias Región Norte 1	27-Jun-18	27-Jun-18	27-Jun-18	27-Jun-18	24-Dec-18	Del Valle Group	$ 6,026,000.00	151	Mendeg Eng.
AC-001276	Abriendo Caminos - Primarias Región Este 1	11-Jul-18	9-Jul-18	11-Jul-18	9-Jul-18	5-Jan-19	Harry Auto Kool	$ 5,978,712.50	149	FDDS Eng.
AC-001277	Abriendo Caminos - Primarias Región Oeste 1	13-Jul-18	13-Jul-18	13-Jul-18	13-Jul-18	9-Jan-19	Transporte Rodríguez Asfalto	$ 5,099,750.00	127	C & R Eng.
AC-002266	Abriendo Caminos - Secundarias y Terciarias Región Metro 1	22-Aug-18	22-Aug-18	21-Sep-18	22-Aug-18	18-Feb-19	Super Asphalt Pavement	$ 2,989,475.00	75	FDDS Eng.
AC-002267	Abriendo Caminos - Secundarias y Terciarias Región Sur 1	23-Aug-18	23-Aug-18	22-Sep-18	23-Aug-18	19-Feb-19	Lujani General Contractor	$ 5,943,709.60	149	VPC Management
AC-002275	Abriendo Caminos - Secundarias y Terciarias Región Norte 1	27-Aug-18	27-Aug-18	26-Sep-18	27-Aug-18	23-Feb-19	Lujani General Contractor	$ 4,643,122.00	116	VPC Management
AC-002276	Abriendo Caminos - Secundarias y Terciarias Región Este 1	30-Aug-18	30-Aug-18	29-Sep-18	30-Aug-18	26-Feb-19	Cidra Excavation	$ 3,582,550.00	90	Ortiz Nolasco
AC-002277	Abriendo Caminos - Secundarias y Terciarias Región Oeste 1	4-Sep-18	4-Sep-18	4-Oct-18	24-Sep-18	23-Mar-19	Nieves & Nieves, Engineers and Contractors, Inc.	$ 3,418,125.00	85	C & R Eng.
AC-003266	Abriendo Caminos - Primarias Región Metro 2	5-Sep-18	11-Sep-18	5-Oct-18	20-Sep-18	19-Mar-19	Ferrovial Agromán LLC	$ 4,662,255.00	117	MD Eng.
AC-003267	Abriendo Caminos - Primarias Región Sur 2	6-Sep-18	6-Sep-18	6-Oct-18	6-Sep-18	5-Mar-19	Robles Asphalt Corp	$ 4,437,000.00	111	MD Eng.
AC-003275	Abriendo Caminos - Primarias Región Norte 2	11-Sep-18		11-Oct-18	11-Sep-18	10-Mar-19	Del Valle Group SP	$ 4,619,000.00	115	Mendeg Eng.
AC-003276	Abriendo Caminos - Primarias Región Este 2	13-Sep-18		13-Oct-18	2-Oct-18	31-Mar-19	Del Valle Group SP	$ 4,662,000.00	117	Mendeg Eng.
AC-003277	Abriendo Caminos - Primarias Región Oeste 2	18-Sep-18		18-Oct-18			ASD	$ 2,437,156.80	61	C & R Eng.

Source: PRHTA

Table H.24: EFLHD Puerto Rico Fiscal Year 2019-2022

PROJECT	PROGRAM FISCAL YEAR	STATE	COUNTY	PARK, REFUGE, FOREST OR OTHER PARTNER/AGENCY	DESCRIPTION	TYPE OF WORK	PRIMARY FUND SOURCE	TOTAL PROGRAMMED AMOUNT	FUNDS FROM TITLE	DELIVERED BY	STATUS	CONGRESSIONAL DISTRICT	FLMA REGION
Puerto Rico													
PR ERFO FS 2017-1(1) LC	2018	PR	El Yunque National Forest	El Yunque National Forest	Emergency landslide repairs	3RH	ERFO	$2,000,000.00	Title 23	EFLHD	Under Construction	PR-AtLarge	USFS_R8
PR ERFO FS 2017-1(2) LC	2018	PR	El Yunque National Forest	El Yunque National Forest	Emergency repairs at PR-930, El Yunque NF.	MISC	ERFO	$2,200,000.00	Title 23	EFLHD	Under Construction	PR-AtLarge	USFS_R8
PR FEMA 2017-1(10)	2018	PR	Territory of Puerto Rico	Puerto Rico Highway Transportation Authority (PRHTA)	FEMA Branch 3 - Contract 1	3RH	REIMB	$5,000,000.00	Other	EFLHD	Under Construction	PR-AtLarge	X_NA_OTH
PR FEMA 2017-1(12)	2018	PR	Territory of Puerto Rico	Puerto Rico Highway Transportation Authority (PRHTA)	FEMA Branch 4 - Contract 2	3RH	REIMB	$5,000,000.00	Other	EFLHD	Under Construction	PR-AtLarge	X_NA_OTH
PR FEMA 2017-1(14)	2018	PR	Territory of Puerto Rico	Puerto Rico Highway Transportation Authority (PRHTA)	FEMA Branch 2 - Contract 3	3RH	REIMB	$4,000,000.00	Other	EFLHD	Under Construction	PR-AtLarge	X_NA_OTH
PR FEMA 2017-1(16)	2018	PR	Territory of Puerto Rico	Puerto Rico Highway Transportation Authority (PRHTA)	FEMA Branch 4 - Contract 3	3RH	REIMB	$4,000,000.00	Other	EFLHD	Under Construction	PR-AtLarge	X_NA_OTH
PR FEMA 2017-1(8)	2018	PR	Territory of Puerto Rico	Puerto Rico Highway Transportation Authority (PRHTA)	FEMA Branch 2 - Contract 1	3RH	REIMB	$5,000,000.00	Other	EFLHD	Under Construction	PR-AtLarge	X_NA_OTH
PR_FLAP_LAJAS_LCA(1)	2018	PR	Los Llanos	USFWS, Laguna Cartagena National Wildlife Refuge	Rehabilitate the only vehicular entrance to Laguna Cartagena NWR & replace a section of guardrail.	3RL	FLAP	$125,000.00	Title 23	FWS	In Design	PR-AtLarge	FWS_R4
PR FS Route 10 Storm Damage	2019	PR	Rio Grande	El Yunque National Forest	Pavement and drainage repair 0.5 miles from the intersection with PR-191 to an existing observation	3RH_3RL	REIMB	$1,500,000.00	Other	EFLHD	In Design	PR-AtLarge	X_NA_OTH
PR FS Route 27 StormDamage FAA	2019	PR	Rio Grande	El Yunque National Forest	Landslide and culvert repairs starting at the intersection with FS Route 930 to 3.2 miles southeast.	LSR_3RH	REIMB	$130,000.00	Other	EFLHD	In Design	PR-AtLarge	USFS_R8
PR ST FEMA PR(1)	2019	PR	Multiple	Multiple	Design of Permanent Repairs in Puerto Rico funded by FEMA	MISC	REIMB	$36,000,000.00	Other	EFLHD	In Design	PR-AtLarge	X_NA_OTH
PR ERFO FS 2017-1(3)	2020	PR	Rio Grande	El Yunque National Forest	Repair storm damage at 43 sites on PR-191 & 3 sites on PR-9938	LSR_3RL	ERFO	$10,000,000.00	Title 23	EFLHD	In Design	PR-AtLarge	USFS_R8

Mid to Long Term List of Projects

The original long list of projects to be considered for inclusion in the 2045 LRTP was compiled during the meetings with different committees primarily:

- Meeting with the MPO - All Municipalities were provided an excel form to compile and meetings with the MPO members was held April 2018 to allow Municipalities to present their proposal and guide those Municipalities that did not completed the excel form. The resulting Municipalities that responded is included in Table H.25 to Table H.27;
- Freight Advisory Committee in individual meetings with industry cargo mover provided insight on improvements to specific existing roads as shown in the main documents Chapter 6; as well as the completion of the expressway circuit in the Island such as PR-5 extension; the Hatillo-Aguadilla corridor; improvements to the Aguadilla-Mayaguez corridor; completion of PR-53 and PR-10;
- Lists of projects within the STIP 2017-2020 that will not reach completion within the STIP timeframe; and
- Technical Committee meetings where the lists of projects were discussed in detail.

Projects falling within the following classifications were compiled a list of projects that will be candidates for funding under their respective funding allocations; these list should be flexible enough to allow for changes based on needs/priorities changes:

- Preservation, as seen in Table H.28 to Table H.30;
- Safety, as seen inTable H.31 to Table H.33;
- Reconstruction, as seen in Table H.34 to Table H.35;
- Bridges, as seen in Table H.36 to Table H.38 – also this project list can change depending on critical findings – this list could change based and any bridge on the bridges inventory of PR could be put up for funding for bridges as needed (Table H.39);
- Transit, as seen in Table H.40 to Table H.42; and
- ITS, as seen in Table H.43 to Table H.45.

Additionally, list of vulnerable roads and cycling safety projects are included (refer to Appendix I and Appendix C respectively) as additional lists as these projects can be apportioned as part of other preservation, safety or reconstruction projects.

The rest of the projects were considered within the main list of projects which were ranked based on the how these responded to the 2045LRTP Goals and Objectives. This list of ranked projects was discussed thoroughly with the PRHTA technical Committee to eliminate those projects already considered as part of other streams of funds such as:

- under construction or will be within the next 5 years as defined in the STIP or the pipeline of the PRHTA; and
- considered within emergency funding such as the FHWA Emergency funding, Detailed Damage Inspection Reports (DDIR lists); Table H.16 and Table H.20.

Projects requiring feasibility studies were also identified. The shortlist of projects is included in Table H.46 to Table H.49. This list underwent a final ranking and a cost estimation process

explained in the following sections. Those projescts that could not be fit within the 2045 LRTP are included inTable H.50 to Table H.51.

Table H.25: List of Municipalities Responded to 2045 LRTP Project List Request – San Juan TMA

ID	Municipality	Response		Attended Meeting 4-4-18	Comment received
		Sent Table	Presentation		
3	Barranquitas	x		x	
4	Bayamón	x		x	
6	Canóvanas	x		x	
7	Carolina	x		x	
8	Cataño	x			
9	Corozal			x	
10	Dorado	x	x	x	
12	Gurabo	x			
13	Humacao	x			
15	Juncos				x
17	Las Piedras	x		x	
18	Loíza	x			x
19	Manatí	x			
23	Morovis	x		x	
24	Naguabo	x			
25	Naranjito	x			
30	Río Grande	x	x		
32	San Juan	x		x	
33	San Lorenzo				x
35	Toa Baja	x		x	
36	Trujillo Alto	x		x	
37	Vega Baja	x	x	x	
TOTAL		**19**	**3**	**12**	**3**

Source: PRHTA with support SDG

Table H.26: List of Municipalities Responded to 2045 LRTP Project List Request – Aguadilla TMA

ID	Municipality	Response		Attended Meeting 4-4-18	Comment received
		Sent Table	Presentation		
1	Aguada	x			
14	Isabela	x			
16	Las Marías	x		x	
22	Moca	x	x	x	
29	Rincón	x	x	x	
34	San Sebastián	x			
TOTAL		**6**	**2**	**3**	**0**

Source: PRHTA with support SDG

Table H.27: List of Municipalities Responded to 2045 LRTP Project List Request – Other Urbanized Areas

ID	Municipality	Response		Attended Meeting 4-4-18	Comment received
		Sent Table	Presentation		
2	Barceloneta	x	x	x	
5	Camuy	x	x	x	
11	Guayanilla			x	
20	Maricao	x			
21	Mayagüez	x			
26	Peñuelas	x		x	
27	Ponce	x		x	
28	Quebradillas	x			
31	Salinas			x	
TOTAL		**7**	**2**	**6**	**0**

Source: PRHTA with support SDG

Table H.28: List of Preservation Projects - San Juan TMA

Project	Municipality
PR-26 (Preservation from PR-26 to Fragoso Avenue Ramp)	Carolina
Preservation several main routes	San Juan
PR-848 San Antón to Trujillo Alto (Preservation)	Carolina
PR-187 Los Gobernadores Avenue (Preservation)	Carolina
PR-190 (Preservation)	Carolina
Preservation several local routes	San Juan
Preservation for roads and streets - all over the municipality	Río Grande

Source: PRHTA technical team with SDG support

Table H.29: List of Preservation Projects – Aguadilla TMA

Project	Municipality
PR-110, Highway 110 Km 6 Hm 8 (Preservation Road Bo. Marías, Moca)	Aguada

Table H.30: List of Preservation Projects - Other Urbanized Areas

Project	Municipality
PR-496 Road (Preservation from road intersection PR-486 at Piedra Gorda, to intersection of road PR-119)	Camuy

Source: PRHTA technical team with SDG support

Table H.31: List of Safety Projects – San Juan TMA

Project	Municipality
PR-1 (Muñoz Rivera) and Universidad Avenue Intersection Safety crossing	San Juan
San Patricio Avenue (Traffic calming)	San Juan
PR-2 (80 Street Light Poles- Improvement of street lighting)	Bayamón
PR-5 (116's Street Light Poles- Improvement of street lighting)	Bayamón
PR-165 Camino del Mar to PR-2	Dorado
Gandara Avenue and Cupey Safety crossing intersection	San Juan

Project	Municipality
PR-6 Villa España (79 Street Light Poles- Improvement of street lighting)	Bayamón
PR-165, PR-865, PR-866 and PR-867 (Marked pavement of the road)	Toa Baja
Road (safety in the road)	Canóvanas
PR-199 (138 Street Light Poles- Improvement of street lighting)	Bayamón
PR-167 Ramon Luis Rivera Avenue (389's Street Light Poles- Improvement of street lighting)	Bayamón
PR-174 (153 Street Light Poles- Improvement of street lighting)	Bayamón
PR-165 & PR6165 Intersection safety improvement	Dorado
PR-164 (safety Improvements)	Naranjito
PR-199 km 2.7-4.6 safety improvements	Bayamón
PR-2 and PR-165 (Improvements at intersections PR-2 and PR-165)	Dorado
PR-142 km 0-8.2 Improvements	Dorado, Toa Alta, Corozal
PR-172 km 13.2-28.3 Improvements	Caguas, Cidra
PR-901 km 3.2-12.2 Improvements	Yabucoa, Maunabo
PR-14 KM 50.1-69.8 Improvements	Cayey, Aibonito
PR-861 KM 0-10.9 Improvements	Toa Alta, Bayamón
PR-155 KM 28-45.7 Improvements	Morovis, Orocovis
PR-936 repair including pavement and guard rails	Las Piedras
PR-25 and PR-35 (Ponce de León Avenue-Fernández Juncos Avenue) Bikeways Circuit	San Juan
PR-23 (FD Roosevelt Avenue) Pedestrian Access improvement	San Juan
Ashford Avenue (Pedestrian mobility)	San Juan
Old San Juan Closure	San Juan
No-motorized paths for Parks	San Juan
PR-5 (Hawk pedestrian crossing and access ramp to Tren Urbano Station)	Bayamón
PR-152 (Improvements to the lineal walk)	Barranquitas
PR-23 (FD Roosevelt Avenue) Improvements	San Juan
Calaf and Chardón streets Improvements	San Juan
PR-25 ans PR-1 (Ponce de León Avenue and Muñoz Rivera Avenue) intervention	San Juan

Source: PRHTA technical team with SDG support

Table H.32: List of Safety Projects – Aguadilla TMA

Project	Municipality
PR-115 (Safety in the PR-115)	Rincón
PR-420 (Safety Projects: AC-800520 SHSP FUNDS. Safety Corridor PR-420 Km. 0 hasta Km 9)	Moca
PR-120 km 28-33.8 Improvements	Las Marías
PR-115 (There will be sidewalks that lead from the Rincon spa to the sport complex, along the PR-115)	Rincón
Sidewalk on the principal roads	Las Marías

Source: PRHTA technical team with SDG support

Table H.33: List of Safety Projects – Other Urbanized Areas

Project	Municipality
School zones improvements	Vieques-Culebra- Ceiba-Naguabo
PR-143 KM 0-58.2 Improvements	Adjuntas, Utuado. Ponce, Jayuya, Juana Díaz, Villalba, Orocovis, Coamo, Barranquitas
PR-140 km 0-8.9 Improvements	Jayuya, Utuado
PR-119 Road (Geometric improvements and repaving from intersection road PR-486 to intersection road PR-113 at Barrio Piedra Gorda)	Camuy
PR-106 km 0-19 Improvements	Mayagüez, Las Marías
PR-129 KM 15.6-43 Improvements	Arecibo, Hatillos, Camuy, Lares
Feasibility study PR-7741, KM 3.4 improvements	Guayama
PR-144 km 0-4.7 General improvements	Jayuya
PR-200 km 3-4.7 General improvements for a key touristic and intermodal connector	Vieques
PR-106 (Principal Improvement access of Municipality of Maricao PR-106)	Maricao

Source: PRHTA technical team with SDG support

Table H.34: List of Reconstruction Projects - San Juan TMA

Project	Municipality
PR-567 (Repair of road and bridge replacement)	Morovis
PR-155 (Repair of the road)	Morovis
PR-861 KM 0-10.9	Toa Alta, Bayamón

Source: PRHTA technical team with SDG support

Table H.35: List of Reconstruction Projects – Other Urbanized Areas

Project	Municipality
PR-142 Reconstruction (8.2km)	Corozal
PR-4491 (Rebuilding a Frenchmen on the road bridge, where it passes the Camuy River)	Camuy
PR-656 KM 2.3 reconstruction	Florida

Source: PRHTA technical team with SDG support

Table H.36: List of Bridge Projects – San Juan TMA

Project	Municipality
Río Grande Municipality (East entrance improvements-Puente and Marginal Wilfredo Mercado Ortiz)	Río Grande
PR-26 Bridge 2458 (Los Angeles) improvement	Carolina
Palo Seco sector and Isla de Cabra sector (Development of bridge from Palo Seco to Isla de Cabra)	Toa Baja
PR-856, Sector Cuesta Los Flacos KM 0.2 Bridge Re-construction 1057	Carolina

Source: PRHTA technical team with SDG support

Table H.37: List of Bridge Projects – Aguadilla TMA

Project	Municipality
PR-495 Moca (Replacement of bridge 1043 in Quebrada Los Morones in PR-495 km 3.0 up to the km 3.5)	Moca
PR-4466 km 2.5 Bo. Bajuras (Replace Bridge)	Isabela

Source: PRHTA technical team with SDG support

Table H.38: List of Bridge Projects – Other Urbanized Areas

Project	Municipality
PR-601 bridge 4702 improvements 4702	Arecibo
Rehabilitation of Bridge 1199, Highway PR-623 km. 1.8	Arecibo
Replacement of Bridge 631 over Cofresi Crrek PR-200R km. 0.1 and N0. 1133 Unknown Creek Progreso ST. PR-200	Vieques
Rehabilitation and Scour Mitigation of Bridge 1355, Highway PR-132	Adjuntas

Source: PRHTA technical team with SDG support

Table H.39: Puerto Rico Bridge Database

Bridge Number	Road	Kilometer	Intercepted Road	Municipality
3	CITY STREET	0.00	PIEDRAS RIVER	SAN JUAN
4	PR 873	0.80	FRAILES CREEK	SAN JUAN
5	PR 798	4.40	ARENAS CREEK	CAGUAS
6	PR 798	1.00	CA¥AS RIVER	CAGUAS
8	PR 1	32.90	BAIROA RIVER	CAGUAS
12	PR 1	52.40	BEATRIZ CREEK	CAYEY
13	PR 1	54.10	LA PLATA RIVER	CAYEY
14	PR 1	55.10	PRIETA CREEK	CAYEY
15	PR 1	61.10	MATON RIVER	CAYEY
16	PR 1	61.20	MATON RIVER	CAYEY
17	PR 1	67.20	JUAN ORRACA CREEK	CAYEY
18	PR 1	75.50	DEPRESSION	SALINAS
19	PR 1	78.80	LAPA RIVER	SALINAS
21	PR 1	91.18	NIGUA RIVER	SALINAS
22	PR 1	92.60	ARENALES CHANNEL	SALINAS
23	PR 1	107.90	DESCALABRADO RIVER	JUANA DIAZ
25	PR 1	119.40	INABON RIVER	PONCE

34	PR 2	11.10	HONDO RIVER	BAYAMON
35	PR 2	11.90	SANTA CATALINA CREEK	BAYAMON
36	PR 2	15.90	HONDO RIVER	BAYAMON
37	PR 2	22.40	LA PLATA RIVER	TOA BAJA
38	PR 2	22.80	LA PLATA RIVER	TOA BAJA
39	PR 2	36.98	CIBUCO RIVER	VEGA BAJA
40	PR 2	50.30	WATERWAY	MANATI
43	PR 2	72.10	DIRT ROAD	ARECIBO
55	PR 4491	0.40	CAMUY RIVER	HATILLO
58	OFF PR 439	0.50	MADRE VIEJA CHANNEL	AGUADILLA
62	PR 115	17.80	GRANDE RIVER	AGUADA
63	PR 115	0.60	LA PUENTE CHANNEL	ANASCO
69	PR-239	2.30	LA SALUD CREEK	MAYAGÜEZ
70	PR 114	3.70	ABANDONED RAILROAD	HORMIGUEROS
74	PR 114	12.10	VIEJO RIVER	SAN GERMAN
81	PR 127	10.00	GUAYANILLA RIVER	GUAYANILLA
83	PR 127	18.30	TALLABOA RIVER	PEÑUELAS
97	PR 9959	0.30	BOCA FORMA CREEK	CANOVANAS
105	PR 955	2.00	JUAN GONZALEZ CREEK	RIO GRANDE
109	PR 940	0.90	PITAHAYA RIVER	LUQUILLO
110	PR 940	2.97	JUAN MARTIN RIVER	LUQUILLO
111	PR 940	3.30	LA BURRA CREEK	LUQUILLO
113	PR 194	1.60	LINEA CREEK	FAJARDO
115	PR 3	51.60	DEMAJAGUA RIVER	FAJARDO
116	PR 3	53.60	CEIBA CREEK	CEIBA
117	PR 979	1.50	EL CA¥O CREEK	CEIBA
119	PR 3	57.80	SECA CREEK	CEIBA

120	PR-3	59.80	DAGUAO RIVER	CEIBA
121	PR 3	61.50	PALMAS CREEK	NAGUABO
122	PR 3	68.10	SANTIAGO RIVER	NAGUABO
127	PR 3	84.20	CATAÑO CREEK	HUMACAO
128	PR 3	88.60	CANDELERO RIVER	HUMACAO
129	PR 3	90.80	AGUACATE CREEK	YABUCOA
130	PR 3	91.30	CORTADORA CREEK	YABUCOA
131	PR 3	91.40	INGENIO RIVER	YABUCOA
132	PR 3	92.30	POLLALITO CREEK	YABUCOA
133	PR 3	94.80	GUAYANES RIVER	YABUCOA
134	PR 9910	0.40	SANTIAGO CHANNEL	YABUCOA
135	PR 3	106.40	MAUNABO RIVER	MAUNABO
136	PR 3	116.10	JACABOA RIVER	PATILLAS
139	PR 150	18.60	LA MINA RIVER	COAMO
140	PR 103	0.30	VIEJO RIVER	CABO ROJO
141	PR 103	12.90	BOQUERON CREEK	CABO ROJO
142	PR 110	4.10	PR 459	AGUADILLA
143	PR 123	0.20	TIDAL WATERS CHANNEL	PONCE
144	PR 9937	1.00	PR 30	LAS PIEDRAS
145	PR 10	2.95	PORTUGUES RIVER	PONCE
148	PR 123	31.50	SALTILLO CREEK	ADJUNTAS
149	PR 123	31.65	SALTILLO CREEK	ADJUNTAS
152	PR 123	48.20	PELLEJAS RIVER	UTUADO
153	PR 123	53.00	ARENAS CREEK	UTUADO
155	PR 123	56.00	CAMBALACHE CREEK	UTUADO
156	PR 123	56.20	SALTO ABAJO CREEK	UTUADO
157	PR 123	59.10	EL MUERTO CREEK	UTUADO

158	PR 123	59.30	DEPRESSION	UTUADO
161	PR 123	65.20	DEPRESSION	ARECIBO
162	PR 123	66.70	EL JOBO CREEK	ARECIBO
165	PR 10	86.10	SANTIAGO CHANNEL	ARECIBO
172	PR 14	23.85	DESCALABRADO RIVER	COAMO
173	PR 14	30.00	LA MINA RIVER	COAMO
175	PR 14	39.27	CUYON RIVER	COAMO
176	PR 14	57.25	HONDA CREEK	AIBONITO
177	PR 14	63.30	MATON RIVER	CAYEY
178	PR 14	65.60	TOITA CREEK	CAYEY
179	PR 14 EASTBOUND	70.40	SANTO DOMINGO CREEK	CAYEY
180	PR 14 WESTBOUND	20.30	SANTO DOMINGO CREEK	CAYEY
181	PR 15	1.04	GUAMANI RIVER	GUAYAMA
182	PR-169	8.80	CAMARONES CREEK	GUAYNABO
185	PR 25	8.00	MARTIN PE¥A CHANNEL	SAN JUAN
190	PR 31	24.40	LA MINA CREEK	JUNCOS
191	PR 31	23.00	GURABO RIVER	JUNCOS
194	PR 31	8.80	BLANCO RIVER	NAGUABO
195	PR 31	2.90	SANTIAGO RIVER	NAGUABO
197	PR 41	0.20	DE LOS MUERTOS CREEK	SAN JUAN
203	PR 102	9.50	UNNAMED CREEK	CABO ROJO
204	PR 102	9.70	UNNAMED CREEK	CABO ROJO
205	PR 102	10.10	IRIZARRY CREEK	CABO ROJO
207	PR 102	20.00	MENDOZA CREEK	CABO ROJO
209	PR 105	2.70	CARICOSA CREEK	MAYAGÜEZ
210	PR 105	16.80	MARICAO RIVER	MARICAO
211	PR 105	25.80	MARICAO RIVER	MARICAO

212	PR 105	28.30	DEPRESSION	MARICAO
212	PR 105	28.30	DEPRESSION	MARICAO
213	PR 105	29.90	LAJAS RIVER	MARICAO
214	PR 105	30.30	GUAYABA RIVER	MARICAO
216	PR 106	1.10	LA CUCHILLA CREEK	MAYAGÜEZ
217	PR 106	2.50	GANDEL CREEK	MAYAGÜEZ
220	PR 109	6.40	ESPINO CREEK	ANASCO
221	PR 109	7.90	HUMATA RIVER	ANASCO
222	PR 109	12.10	CERCADA CREEK	ANASCO
223	PR 109	12.20	MIRAFLORES CREEK	ANASCO
224	PR 109	14.12	CERRO GORDO CREEK	ANASCO
225	PR 109	14.90	UNNAMED WATERWAY	ANASCO
226	PR 109	15.30	CORCOVADA CREEK	ANASCO
227	PR 109	25.80	SONADOR RIVER	SAN SEBASTIÁN
228	PR 109	28.30	LARGA CREEK	SAN SEBASTIÁN
229	PR 109	28.90	CULEBRINA RIVER	SAN SEBASTIÁN
230	PR 125	7.00	GRANDE CREEK	MOCA
231	PR 125	14.90	EL SALTO CREEK	SAN SEBASTIÁN
233	PR 125	20.00	GUATEMALA RIVER	SAN SEBASTIÁN
234	PR 125	20.30	GUATEMALA RIVER	SAN SEBASTIÁN
237	PR 108	14.15	CASEI RIVER	LAS MARIAS
238	PR 111	18.80	CAMUY RIVER	LARES
239	PR 111	18.50	CRIMINALES RIVER	UTUADO
240	PR 111	13.10	TANAMA RIVER	UTUADO
241	PR 6111	2.10	MATADERO CREEK	UTUADO
242	PR 111	3.20	SALTO ARRIBA CREEK	UTUADO
243	PR 111	3.80	VIVI RIVER	UTUADO

245	PR 116R	6.20	LOCO RIVER	Guánica
250	PR 119	3.70	HOCONUCO RIVER	SAN GERMAN
251	PR 119	7.20	NUEVE PASOS RIVER	SAN GERMAN
252	PR 119	18.40	CASEI RIVER	LAS MARIAS
253	PR 119	23.60	ARENAS RIVER	LAS MARIAS
255	PR 119	39.30	SONADOR RIVER	SAN SEBASTIÁN
256	PR 119	35.20	CULEBRINAS RIVER	SAN SEBASTIÁN
258	PR 124	1.50	MAYAGUECILLA RIVER	LAS MARIAS
260	PR 128	29.10	INDIERA RIVER	MARICAO
261	PR 128	32.60	PRIETO RIVER	MARICAO
262	PR 128	49.40	BLANCO RIVER	LARES
263	PR 128	44.90	DE LOS PLATANOS CREEK	LARES
264	PR 128	37.80	ANON CREEK	LARES
265	PR 131	8.40	UNNAMED STREAM	ADJUNTAS
266	PR 131	7.50	LA SIETE CREEK	ADJUNTAS
267	PR 131	7.40	GUILARTE RIVER	ADJUNTAS
268	PR 131	6.60	UNNAMED CREEK	ADJUNTAS
269	PR 131	6.30	DEPRESSION	ADJUNTAS
270	PR 131	5.10	UNNAMED CREEK	ADJUNTAS
271	PR 132	5.40	MACANA RIVER	PEÑUELAS
273	PR 132	21.30	PASTILLO RIVER	PONCE
275	PR 585	2.00	PORTUGUES RIVER	PONCE
277	PR 135	5.62	GUAYO RIVER	ADJUNTAS
279	PR 135	22.10	VACAS RIVER	ADJUNTAS
284	PR 139	22.80	DEPRESSION	PONCE
285	PR 139	26.10	DEPRESSION	PONCE
286	PR 140	5.70	JAUCA RIVER	JAYUYA

287	PR 140	7.15	PEQUE%A CREEK	JAYUYA
288	PR 140	7.30	COLLORES CREEK	JAYUYA
289	PR 140	8.10	MONTANA CREEK	JAYUYA
290	PR 140	8.68	COLLORES CREEK	JAYUYA
291	PR 140	8.90	COLLORES CREEK	JAYUYA
292	PR 140	9.60	DOMINGA CREEK	JAYUYA
293	PR 140	15.05	JAUCA RIVER	UTUADO
294	PR 140	37.80	Depression	UTUADO
295	PR 140	28.25	CAONILLAS DAM	UTUADO
296	PR 140	41.10	LA VENTA RIVER	UTUADO
297	PR 140	45.60	YUNES RIVER	UTUADO
298	PR 140	48.30	DEPRESION	CIALES
299	PR 140	49.20	DEPRESSION	FLORIDA
301	PR 141	1.60	RIACHUELO CREEK	JAYUYA
304	PR 144	1.90	GONZALEZ CREEK	JAYUYA
306	PR 144	5.50	CARICABOA RIVER	JAYUYA
307	PR 146	0.65	GRANDE DE ARECIBO RIVER	ARECIBO
308	PR 149	67.80	GUANABANA CREEK	JUANA DIAZ
309	PR 149	62.60	GUAYABAL RIVER	VILLALBA
312	PR 149	53.60	ACHIOTE CREEK	VILLALBA
313	PR 149	46.90	CUESTA PASTO CREEK	VILLALBA
314	PR 149	42.35	SMALL STREAM	CIALES
315	PR 149	42.10	DOÑA JUANA CREEK	CIALES
316	PR 149	40.20	TORO NEGRO RIVER	CIALES
317	PR 149	39.30	CREEK	CIALES
318	PR 149	38.20	RALAT CREEK	CIALES
319	PR 149	37.50	CINTRON CREEK	CIALES

321	PR 6685	9.70	GRANDE DE MANATI RIVER	CIALES
322	PR 6685	8.40	TOYO CREEK	MANATI
325	PR 157	7.30	MATRULLAS RIVER	OROCOVIS
326	PR 314	0.40	MERCADO CREEK	SAN GERMAN
328	PR 155	12.40	DEPRESSION	COAMO
329	PR 155	14.10	TOA VACA RIVER	COAMO
330	PR 155	17.90	BAUTA RIVER	OROCOVIS
331	PR 155	18.30	EL CHORRO CREEK	OROCOVIS
332	PR 155	27.80	OROCOVIS RIVER	OROCOVIS
333	PR 762	0.90	ARRIBA CREEK	PATILLAS
334	PR 155	46.70	MOROVIS RIVER	MOROVIS
335	PR 155	49.60	MOROVIS RIVER	MOROVIS
336	PR 156	9.50	BOTIJAS RIVER	BARRANQUITAS
337	PR 156	15.20	BARRANQUITAS RIVER	BARRANQUITAS
338	PR 156	16.57	BARRANQUITAS RIVER	BARRANQUITAS
345	PR 156	45.00	BAYAMON CREEK	AGUAS BUENAS
346	PR 156	45.80	JACANA CREEK	AGUAS BUENAS
347	PR 156	47.05	MULA CREEK	AGUAS BUENAS
348	PR 777	0.10	CAGUITAS RIVER	CAGUAS
351	PR 159	5.00	UNIBON RIVER	MOROVIS
352	PR 159	8.70	CIBUCO RIVER	COROZAL
353	PR 891	0.30	COROZAL RIVER	COROZAL
354	PR 159	10.00	MAVILLA RIVER	COROZAL
355	PR 160	7.10	MUERE SOLO CREEK	VEGA BAJA
358	PR 162	5.50	USABON RIVER	BARRANQUITAS
359	PR 164	12.50	MAVILLA RIVER	COROZAL
360	PR 164	12.30	DEPRESSION SMALL STREAM	COROZAL

361	PR 164	9.70	CA%AS RIVER	NARANJITO
362	PR 164	6.60	GUADIANA RIVER	NARANJITO
363	PR 164	4.10	ANONES CREEK	NARANJITO
366	PR 854	5.20	COCAL RIVER	TOA BAJA
371	PR 888	1.70	MALARIA CHANNEL	CATANO
373	PR 167	0.10	MULA CREEK	NARANJITO
376	PR 167	13.70	CANCEL CREEK	BAYAMON
377	PR 839	2.30	CERRO GORDO CREEK	BAYAMON
382	PR 7731	0.85	LA PLATA RIVER	CAYEY
383	PR 172	0.70	NARANJITO CREEK	COMERIO
384	PR 172	8.80	EL CHORRO CREEK	CIDRA
385	PR 172	9.00	LA JOYUELA CREEK	CIDRA
386	PR 172	13.70	SABANA RIVER	CIDRA
387	PR 787	2.30	BAYAMON RIVER	CIDRA
389	PR 173	11.60	ARROYATA RIVER	CIDRA
390	PR 173	4.50	BAYAMON RIVER	CIDRA
392	PR 173	8.00	GUAYNABO RIVER	GUAYNABO
393	PR 173	9.00	ARENAS CREEK	GUAYNABO
395	PR 176	11.50	CARRAIZO CREEK	SAN JUAN
396	PR 176	10.97	NEGRITA CREEK	SAN JUAN
397	PR 176	10.90	CHORROS CREEK	SAN JUAN
398	PR 176	10.50	DEPRESSION	SAN JUAN
399	PR 176	6.50	LAS CURÍAS CREEK	SAN JUAN
405	PR 181	29.90	MARIN CREEK	PATILLAS
406	PR 181 (km 62.7)	28.30	COQUI CREEK	PATILLAS
407	PR 181 (km 62.6)	28.30	COQUI NO 2 CREEK	PATILLAS
408	PR 181	25.17	DEPRESSION	PATILLAS

409	PR 181	22.20	CAMPO AZUL CREEK	YABUCOA
410	PR 181	21.60	PRIETO RIVER	YABUCOA
411	PR 181	20.70	GUAYABOTA CREEK	YABUCOA
412	PR 181	19.60	SANCHEZ CREEK	YABUCOA
413	PR 181	19.30	PRIETO RIVER	YABUCOA
414	PR 181	17.60	GRANDE DE LOIZA RIVER	SAN LORENZO
415	PR 181	16.35	UNKNOWN CREEK	SAN LORENZO
416	PR 181	15.56	BERRACO CREEK	SAN LORENZO
417	PR 181	13.70	LAJAS CREEK	SAN LORENZO
418	PR 181	12.30	EMAJAGUA CREEK	SAN LORENZO
419	PR 181	11.30	HONDA CREEK	SAN LORENZO
420	PR 181	10.20	HONDA CREEK	SAN LORENZO
421	PR 181	7.30	BLANCA CREEK	SAN LORENZO
422	PR 181	4.40	SALVA TIERRA CREEK	SAN LORENZO
423	PR 181	3.60	WATERWAY	SAN LORENZO
424	PR 181	2.50	HATO QUEMADO CREEK	SAN LORENZO
425	PR 3	12.20	CHICO RIVER	PATILLAS
426	PR 181	9.50	INFIERNO CREEK	TRUJILLO ALTO
429	PR 182	0.90	SANTIAGO CHANNEL	YABUCOA
430	PR 182	0.80	AGUAS LARGAS CREEK	YABUCOA
434	PR 183	3.00	JANER CREEK	CAGUAS
435	PR 183	8.10	HATO CREEK	SAN LORENZO
437	PR 183	17.60	VALENCIANO RIVER	LAS PIEDRAS
439	PR 186	3.00	GARCIA CREEK	CANOVANAS
442	PR 951	3.40	CARRASCO CHANNEL	CANOVANAS
443	PR 951	4.90	ZEQUEIRA CHANNEL	LOIZA
444	PR 951	6.60	GALLARDO CHANNEL	LOIZA

445	PR 186	7.40	CUBUY RIVER	CANOVANAS
446	PR 186	14.40	GRANDE RIVER	RIO GRANDE
447	PR 186	15.60	GRANDE CREEK	RIO GRANDE
448	PR 186	18.80	ESPIRITU SANTO RIVER	RIO GRANDE
449	PR 186	17.60	SONADORA CREEK	RIO GRANDE
453	PR 187	1.90	CASTA%ON CHANNEL	RIO GRANDE
454	PR 191	28.60	JOBA CREEK	NAGUABO
456	PR 191	26.10	BLANCO RIVER	NAGUABO
457	PR 191	25.10	CUBUY RIVER	NAGUABO
459	PR 191	8.30	EL SALTO CREEK	RIO GRANDE
460	PR 191	6.60	DEPRESSION	RIO GRANDE
463	PR 318	1.60	MARESUA CREEK	SAN GERMAN
464	PR 329	2.40	PANCHOLO CREEK	SAN GERMAN
465	PR 329	1.20	RAILROAD TRACK	SAN GERMAN
469	PR 348	14.80	DEL NARANJO CREEK	SAN GERMAN
474	PR 386	3.00	HOYO FRIO CREEK	PEÑUELAS
478	PR 402	2.20	HONDO RIVER	ANASCO
479	PR 405	1.60	CERRO GORDO CREEK	ANASCO
481	PR 411	0.10	GRANDE DE CALVACHE CREEK	RINCóN
482	PR 411	5.80	INGENIO RIVER	AGUADA
484	PR 417	4.00	CA¥AS RIVER	AGUADA
487	PR 458	1.50	PLAYUELA CHANNEL	AGUADILLA
488	PR 466	2.30	ISABELA IRRIGATION CHAN.	AGUADILLA
489	PR 501	0.07	CA%AS RIVER	PONCE
490	PR 503	12.28	PORTUGUES RIVER	PONCE
493	PR 518	0.05	SALTILLO RIVER	ADJUNTAS
494	PR 524	4.00	PELLEJAS RIVER	ADJUNTAS

495	PR 533	1.10	AMARGURA CREEK	CIALES
496	PR 535	2.10	CAIMITO RIVER	JUANA DIAZ
497	PR 556	0.10	COAMO RIVER	COAMO
498	PR 157	22.70	SANA MUERTOS RIVER	OROCOVIS
499	PR 567	15.10	GRANDE CREEK	MOROVIS
500	PR 568	2.70	BOTIJAS RIVER	OROCOVIS
501	PR 568	13.30	SALTO GRANDE CREEK	COROZAL
502	PR 568	14.90	GRANDE CREEK	COROZAL
503	PR 568	15.45	RIACHUELO RIVER	COROZAL
504	PR 568	19.45	GRANDE DE MANATI RIVER	COROZAL
505	PR 603	0.07	GRANDE DE ARECIBO RIVER	UTUADO
506	PR 605	5.80	VIVI RIVER	UTUADO
507	PR 611	0.10	VIVI RIVER	UTUADO
508	PR 612	0.10	CAONILLAS RIVER	UTUADO
511	PR 647	8.20	CIBUCO RIVER	VEGA ALTA
512	PR 676	7.10	CIBUCO RIVER	VEGA BAJA
513	PR 676	7.33	DEPRESSION	VEGA BAJA
517	PR 693	0.10	NUEVO RIVER	DORADO
518	PR 693	5.50	COCAL RIVER	DORADO
519	PR 722	7.20	AIBONITO RIVER	AIBONITO
520	PR 723	3.40	AGUAS LARGAS CREEK	COAMO
521	PR 725	0.30	AIBONITO RIVER	AIBONITO
522	PR 738	0.20	PRIETA CREEK	CAYEY
523	PR 738	3.20	DE CEDRO CREEK	CAYEY
524	PR 179	1.70	GUAMANI RIVER	GUAYAMA
525	PR 179	4.10	GUAMANI RIVER	GUAYAMA
526	PR 748	0.30	EL CORAZON CREEK	GUAYAMA

527	PR 753	1.80	IRRIGATION CHANNEL	ARROYO
529	PR 184	2.50	IRRIGATION CHANNEL	PATILLAS
530	PR 759	2.80	DE LOS CHINOS CREEK	MAUNABO
534	PR 765	3.95	TURABO RIVER	CAGUAS
535	PR 765	6.10	ANON CREEK	CAGUAS
536	PR 771	4.38	BARRANCAS CREEK	BARRANQUITAS
537	PR 771	4.90	BARRANCAS CREEK	BARRANQUITAS
538	PR 771	5.29	BARRANCAS CREEK	BARRANQUITAS
539	PR 775	0.50	Piñas Creek	COMERIO
541	PR 7776	0.05	HONDO RIVER	COMERIO
542	PR 172	11.40	BAYAMON RIVER	CIDRA
543	PR 784	2.40	CA¥ABONCITO RIVER	CAGUAS
545	PR 816	1.10	CUESTA ARRIBA RIVER	BAYAMON
546	PR 818	2.10	CIBUCO RIVER	COROZAL
547	PR 824	2.80	CRUZ CREEK	TOA ALTA
548	RURAL LOCAL ROAD	2.40	YAUCO RIVER	GUAYANILLA
549	PR 825	0.10	GUADIANA RIVER	NARANJITO
551	PR 831	2.40	MINILLAS RIVER	BAYAMON
553	PR 834	0.02	GUAYNABO RIVER	GUAYNABO
555	PR 853	5.10	PASTRANA CREEK	CAROLINA
557	PR 855	1.20	HONDO RIVER	BAYAMON
566	PR 919	0.70	DEPRESSION	JUNCOS
567	PR 919	0.65	SANTA CREEK	JUNCOS
569	PR 924	4.40	MAMBICHE CREEK	HUMACAO
571	PR 928	0.50	DO¥A DOLORES CREEK	JUNCOS
572	PR 936	1.87	ARENAS CREEK	LAS PIEDRAS
574	PR 971	17.30	SANTIAGO RIVER	NAGUABO

576	PR 447	2.30	GUATEMALA RIVER	SAN SEBASTIÁN
577	PR 983	1.40	PITAHAYA RIVER	LUQUILLO
578	PR 983	0.72	PITAHAYA RIVER	LUQUILLO
581	PR 115	27.65	MADRE VIEJA CHANNEL	AGUADILLA
582	PR 115	27.10	CULEBRINAS RIVER	AGUADA
584	PR 2	227.30	PORTUGUES RIVER	PONCE
586	PR 23	3.40	PIEDRAS RIVER	SAN JUAN
587	PR 23 WESTBOUND	3.40	PIEDRAS RIVER	SAN JUAN
589	PR 102	7.40	GUANAJIBO RIVER	MAYAGÜEZ
590	PR 125	22.00	SALADA CREEK	SAN SEBASTIÁN
591	PR 124	10.20	GUABA RIVER	LAS MARIAS
592	PR 144	10.20	SALIENTE RIVER	JAYUYA
594	PR 167	20.40	CERRO GORDO CREEK	BAYAMON
595	PR 175	0.40	ARENAS CREEK	CAGUAS
598	PR 3306	0.80	PARIS CREEK	LAJAS
599	PR 615	4.05	TORO NEGRO RIVER	CIALES
601	SICILIA STREET	0.70	JUAN MENDEZ CREEK	SAN JUAN
602	BELMONTE STREET	0.40	JUAN MENDEZ CREEK	SAN JUAN
603	RAMON B. LOPEZ ST	0.15	JUAN MENDEZ CREEK	SAN JUAN
605	PR 917	0.16	SERRANA CREEK	LAS PIEDRAS
606	PR 962	1.60	CANOVANAS RIVER	CANOVANAS
607	PR 927	1.25	VACA RIVER	NAGUABO
610	PR 528	1.00	ZAMAS RIVER	JAYUYA
611	PR 522	0.40	VACAS RIVER	ADJUNTAS
612	PR 536	6.50	DESCALABRADO RIVER	SANTA ISABEL
614	FERNANDEZ GARCIA	0.40	SANTO DOMINGO CREEK	CAYEY
615	PR 7729	0.10	LA PLATA RIVER	CAYEY

616	PR 746	1.10	GRANDE DE CARITE RIVER	GUAYAMA
618	PR 824	0.70	LA PLATA RIVER	TOA ALTA
619	PR 833	0.80	DAMIAN CREEK	GUAYNABO
622	PR 743	0.20	LA PLATA RIVER	CAYEY
623	PR 378	7.40	GUAYANILLA RIVER	GUAYANILLA
625	PR 14	13.50	JACAGUAS RIVER	JUANA DIAZ
629	PR 988	12.10	PITAHAYA CREEK	LUQUILLO
630	PR 991	0.09	SABANA RIVER	LUQUILLO
631	PR 200R	0.10	COFRESI CREEK	VIEQUES
634	G. WASHINGTON ST.	0.20	LAS BAMBUAS CREEK	CAGUAS
635	PR 165	25.40	COCAL RIVER	TOA BAJA
636	PR 165	25.30	COCAL RIVER	TOA BAJA
637	PR 119	34.80	SALADA CREEK	SAN SEBASTIÁN
640	PR 645	4.80	INDIO RIVER	VEGA BAJA
641	PR 102	4.20	MAJAGUAL CHANNEL	MAYAGÜEZ
642	PR 102	5.70	CORAZONES CHANNEL	MAYAGÜEZ
643	PR 106	0.06	YAGUEZ RIVER	MAYAGÜEZ
645	PR 914	0.10	HUMACAO RIVER	HUMACAO
646	PR 807	0.10	DE LOS NEGROS RIVER	COROZAL
647	PR 102	28.20	MERCADO CREEK	SAN GERMAN
648	PR 634	3.40	GRANDE DE MOROVIS CREEK	MOROVIS
650	PR 675	0.30	CIBUCO RIVER	VEGA ALTA
652	PR 363	1.60	CRUCES RIVER	SABANA GRANDE
653	PR 957	0.10	CANOVANAS RIVER	CANOVANAS
654	PR 128	10.10	LUCHETTI LAKE DAM	YAUCO
655	PR 128	11.50	GRANDE CREEK	YAUCO
657	PR 381	0.80	HONDA CREEK	GUAYANILLA

658	PR 3	6.40	SAN ANTON CREEK	CAROLINA
659	PR 3	8.60	BLASINA CREEK	CAROLINA
661	PR 1	28.40	CA¥AS RIVER	CAGUAS
662	PR 1	34.50	CAGUITAS RIVER	CAGUAS
664	PR 702	3.65	UNKNOWN CREEK	COAMO
666	PR 904	0.50	LIMONES RIVER	YABUCOA
667	PR 830	2.40	UNKNOWN CREEK	BAYAMON
668	PR 853	9.20	MARACUTO CREEK	CAROLINA
670	PR 654	0.02	GRANDE DE ARECIBO RIVER	ARECIBO
671	PR 974	0.20	DAGUAO RIVER	CEIBA
672	PR 752	0.80	JACANAS CREEK	ARROYO
673	PR 185	12.80	CEDRO CREEK	CAROLINA
674	PR 185	11.24	CANOVANILLAS RIVER	CAROLINA
675	PR 1	7.85	MARTIN PE¥A CHANNEL	SAN JUAN
676	PR 347	3.90	GUANAJIBO RIVER	SAN GERMAN
677	PR 368	13.20	BERRENCHIN CREEK	YAUCO
678	PR 921	1.10	HUMACAO RIVER	LAS PIEDRAS
679	PR 404	4.10	CULEBRINAS RIVER	MOCA
681	PR 175	6.00	CARRAIZO CREEK	TRUJILLO ALTO
683	PR 176	0.90	PIEDRAS RIVER	SAN JUAN
684	PR 976	8.60	JUAN DIEGO CREEK	CEIBA
685	PR 378	5.10	GUAYANILLA RIVER	GUAYANILLA
686	PR 7757	0.20	CHICO RIVER	PATILLAS
687	PR 667	0.80	DEPRESSION	BARCELONETA
689	PR 1	5.00	PR 39	SAN JUAN
690	PR 2	0.90	MARTIN PE¥A CHANNEL & RD	SAN JUAN
691	PR 1	21.50	GUAYNABO RIVER	GUAYNABO

692	PR 1	22.80	GUAYNABO RIVER & PR 834	GUAYNABO
694	PR 620	0.13	CIBUCO RIVER	VEGA ALTA
695	PR 971	15.50	SANTIAGO RIVER	NAGUABO
696	PR 603	1.60	GUANICO RIVER	UTUADO
697	PR 174	17.10	BAYAMON RIVER	AGUAS BUENAS
698	PR 184	10.40	GRANDE DE PATILLAS RIVER	PATILLAS
699	PR 900	4.80	GUAYABO CREEK	YABUCOA
700	PR 140	36.15	LIMON RIVER	UTUADO
702	PR 681	2.00	TIBURONES CHANNEL	ARECIBO
703	PR 836	4.10	GUAYNABO RIVER	GUAYNABO
706	PR 185	0.50	PR 3	CANOVANAS
710	PR 3	20.60	ANGELA CREEK	RIO GRANDE
711	PR 3	20.90	HERRERA RIVER	RIO GRANDE
726	PR 3	45.75	IGUALDAD STREET	FAJARDO
728	PR 3	46.50	FAJARDO RIVER	FAJARDO
729	PR 2	153.90	YAGUEZ RIVER & URBAN ST	MAYAGÜEZ
730	PR 2	157.10	MAJAGUAL CHANNEL	MAYAGÜEZ
732	PR 110	10.05	CULEBRINAS RIVER	MOCA
734	PR 336	0.68	LA MANUELA CREEK	GUAYANILLA
735	PR 185	20.50	GURABO RIVER	JUNCOS
736	PR 157	14.70	BAUTA RIVER	OROCOVIS
737	PR 152	13.90	MAVILLA RIVER	NARANJITO
738	PR 901	4.10	CAMINO NUEVO CREEK	YABUCOA
740	PR 174	13.30	BAYAMON RIVER	BAYAMON
741	PR 181	8.10	GRANDE DE LOIZA RIVER	SAN LORENZO
744	PR 1	3.40	PR 35	SAN JUAN
746	PR 3	0.10	PR 1	SAN JUAN

747	PR 3	0.30	STREET # 1	SAN JUAN
749	PR 25	3.50	PR 1	SAN JUAN
750	PR 26	0.05	PR 1	SAN JUAN
751	PR 26	0.10	PR 25 (PONCE DE LEON AV)	SAN JUAN
752	PR 953	1.60	CANOVANILLAS RIVER	CANOVANAS
753	PR 26	1.50	ROBERTO H TODD AVENUE	SAN JUAN
754	PR 26	2.00	CANALS STREET	SAN JUAN
759	PR 684	2.80	BOCAS CHANNEL	BARCELONETA
760	PR 165	7.20	AGUAS FRIAS CHANNEL	CATANO
767	PR 150	15.80	DESCALABRADO RIVER	COAMO
768	PR 152	18.20	GUADIANA RIVER	NARANJITO
769	PR 354	2.20	CA%AS RIVER	MAYAGÜEZ
770	PR 502	1.45	PASTILLO RIVER	PONCE
773	PR 988	6.50	SABANA RIVER	LUQUILLO
775	PR 2	144.60	IRRIGATION DITCH	ANASCO
776	PR 2	144.70	HONDO CREEK	ANASCO
777	PR 2	149.00	DITCH	MAYAGÜEZ
778	PR 2	157.10	SABALO CREEK	MAYAGÜEZ
780	PR 143	36.00	MATRULLAS RIVER	OROCOVIS
781	PR 975	6.70	RIO ABAJO CREEK	CEIBA
782	PR 165	17.90	COCAL RIVER	DORADO
783	PR 378	3.80	GRANDE CREEK	GUAYANILLA
784	PR 2	153.20	DE ORO CREEK	MAYAGÜEZ
785	PR 2	158.60	HONDO RIVER	MAYAGÜEZ
786	PR 2	163.30	GRANDE CREEK	HORMIGUEROS
788	PR 2	131.30	DIRT ROAD	AGUADA
789	PR 996	1.20	LA MINA CREEK	VIEQUES

790	PR 2	166.80	ROSARIO RIVER	HORMIGUEROS
792	PR 2	173.00	CAIN RIVER	SAN GERMAN
793	PR 2	173.40	TORUNO CREEK	SAN GERMAN
794	PR 2	177.50	CUPEYES RIVER	SAN GERMAN
796	PR 127	12.50	PR 2	GUAYANILLA
797	URDIALES STREET	0.35	JUAN MENDEZ CREEK	SAN JUAN
798	PR 26	8.30	DRAINAGE CHANNEL	CAROLINA
799	PR 165	19.60	UNNAMED CREEK	DORADO
800	PR 188	4.80	GALLARDO CHANNEL	LOIZA
804	PR 724	1.36	AIBONITO RIVER	AIBONITO
805	PR 927	8.80	BLANCO RIVER	NAGUABO
806	PR 157	1.70	TORO NEGRO RIVER	CIALES
807	PR 3	93.20	UNNAMED CREEK	YABUCOA
808	PR 348	1.00	GRANDE CREEK	MAYAGÜEZ
809	PR 348	17.20	NUEVE PASOS RIVER	SAN GERMAN
810	PR 778	0.01	LA PLATA RIVER	COMERIO
811	PR 352	3.20	CA%AS RIVER	MAYAGÜEZ
812	URBAN LOCAL ROAD	1.00	PR 30	LAS PIEDRAS
813	PR 971	10.30	FAJARDO RIVER	CEIBA
815	PR 184	17.70	GRANDE DE PATILLAS RIVER	PATILLAS
816	URBAN LOCAL ROAD	0.15	PR 30	JUNCOS
817	PR 165	18.00	UNNAMED CHANNEL	DORADO
818	PR 969	1.20	CREEK	NAGUABO
820	PR 525	3.60	YAHUECAS RIVER	ADJUNTAS
821	PR 512	6.30	GUAYO RIVER	JUANA DIAZ
822	PR 512	7.40	GUAYO RIVER	JUANA DIAZ
823	URBAN LOCAL ROAD	0.20	PR 30	JUNCOS

825	PR 934	0.40	PR 30	JUNCOS
826	PR 958	3.80	HERRERA RIVER	RIO GRANDE
827	PR 364	3.40	GRANDE RIVER	SABANA GRANDE
828	PR 686	6.80	TORTUGUERO CHANNEL	MANATI
829	PR 3	81.90	HUMACAO RIVER	HUMACAO
830	PR 485	3.70	BELLACA CREEK	QUEBRADILLAS
831	PR 186	22.70	ESPIRITU SANTO RIVER	RIO GRANDE
832	PR 116	21.30	LOCO RIVER	Guánica
833	PR 116	25.20	LOCO RIVER	Guánica
835	PR 2 WESTBOUND	225.10	MATILDE RIVER	PONCE
836	PR 2	224.40	DEL AGUA CREEK	PONCE
837	PR 2	4.96	ACCESS PR 23 TO PR 2	GUAYNABO
838	RAMP PR 23 TO PR 2	6.40	MARGARITA CREEK	GUAYNABO
839	PR 2 EASTBOUND	5.06	PR 23 (ROOSEVELT AV.)	GUAYNABO
840	PR 2 WESTBOUND	5.06	PR 23 (ROOSEVELT AV.)	GUAYNABO
841	PR 23	6.20	MARGARITA CREEK	GUAYNABO
843	PR 2	5.20	ACCESS PR 2 TO PR 23	GUAYNABO
844	PR 2	5.70	PR 20 (MRTNZ. NADAL EXP)	GUAYNABO
845	PR 23	2.60	MARGARITA CREEK	GUAYNABO
848	PR 836	3.15	CAMARONES CREEK	GUAYNABO
849	PR 842	7.50	ARENAS CREEK	SAN JUAN
850	PR 912	5.50	ARENAS CREEK	SAN LORENZO
851	PR 765	1.10	BEATRIZ CREEK	CAGUAS
853	PR 902	4.20	LIMONES RIVER	YABUCOA
855	PR 116	20.80	ACCESS TO PR 116R	GUANICA
856	PR 52	15.80	PR 1 RAMAL	CAGUAS
857	PR 52	16.50	64 A STREET	CAGUAS

858	PR 52	16.80	BAIROA RIVER	CAGUAS
859	PR 52	17.10	LOCAL CITY STREET	CAGUAS
860	PR 52	18.90	CAGUITAS RIVER	CAGUAS
861	PR 52	19.40	PR 156	CAGUAS
862	PR 111R	2.20	PR 111	LARES
863	PR 177 WESTBOUND	0.70	BAYAMON RIVER	BAYAMON
864	PR 111	3.80	GUAJATACA RIVER	LARES
865	PR 921	2.00	PR 30	LAS PIEDRAS
866	PR 30 WESTBOUND	21.90	PR 183	LAS PIEDRAS
867	PR 30 EASTBOUND	22.70	HUMACAO RIVER	LAS PIEDRAS
868	PR 716	1.10	CUYON RIVER	AIBONITO
869	PR 383	0.90	CEDRO CREEK	PEÑUELAS
870	PR 116	1.20	IRRIGATION CHANNEL	LAJAS
871	PR 116	4.80	CHANNEL	LAJAS
872	PR 857	10.10	CANOVANILLAS RIVER	CAROLINA
873	RAMP PR 2 TO PR 1	0.10	PR 2	SAN JUAN
875	PR 2 EASTBOUND	225.10	MATILDE RIVER	PONCE
876	PR 2 EASTBOUND	224.30	DEL AGUA CREEK	PONCE
877	PR 111	0.15	GRANDE DE ARECIBO RIVER	UTUADO
878	PR 111	3.20	VIVI RIVER	UTUADO
879	PR 111	1.55	UTUADO CREEK	UTUADO
880	PR 614	0.90	CIALITOS RIVER	CIALES
881	PR 497	2.70	SONADORA CREEK	SAN SEBASTIÁN
883	ESPIRITU SANTO ST.	0.07	RIO HONDO CHANNEL	BAYAMON
884	PR 748	1.30	CAIMITAL CREEK	GUAYAMA
885	PR 730	2.50	MATON RIVER	CAYEY
886	ESPIRITU SANTO ST.	0.02	DRAINAGE CHANNEL	BAYAMON

887	PR 770	4.00	UNKNOWN CREEK	BARRANQUITAS
888	PR 22 WESTBOUND	3.20	PIEDRAS RIVER	SAN JUAN
889	PR 22 EASTBOUND	3.20	PIEDRAS RIVER	SAN JUAN
892	PR 22 EASTBOUND	4.80	DE DIEGO AVENUE	SAN JUAN
893	PR 22 WESTBOUND	4.60	DE DIEGO AVENUE	SAN JUAN
894	PR 22 EASTBOUND	5.30	MARGARITA CREEK	SAN JUAN
896	PR 22 WESTBOUND	5.85	PR 2	GUAYNABO
897	PR 22 EASTBOUND	5.85	PR 2	GUAYNABO
900	PR 901	6.20	JUAN MARTIN CREEK	YABUCOA
901	PR 110R	12.80	PR 111	MOCA
902	PR 902	5.50	CAYAGUAS RIVER	SAN LORENZO
903	PR 738	4.40	EL CEDRO CREEK	CAYEY
904	PR 725	4.20	AIBONITO RIVER	AIBONITO
905	PR 553	3.36	TOA VACA RIVER	VILLALBA
906	PR 906	5.30	DITCH	HUMACAO
907	PR 52	20.50	PR 34 (DEGETAU STREET)	CAGUAS
909	PR 52 SOUTHBOUND	21.40	PR 172	CAGUAS
911	PR 1	6.00	CONCEPCION STREET	SAN JUAN
912	PR 121	11.60	LOCO RIVER	SABANA GRANDE
913	PR 22	1.45	PR 1	SAN JUAN
914	PR 368	10.00	LOCO RIVER	YAUCO
916	PR 6617	2.06	MONTE LLANO CREEK	MOROVIS
917	PR 1	6.83	LOS ANGELES STREET	SAN JUAN
920	PR 1 SOUTHBOUND	7.42	SAGRADO CORAZON STREET	SAN JUAN
927	PR 52	17.50	URBAN CITY STREET	CAGUAS
931	PR 30 WESTBOUND	22.70	HUMACAO RIVER	LAS PIEDRAS
932	PR 30 EASTBOUND	21.90	PR 183	LAS PIEDRAS

934	PR 60 EASTBOUND	0.65	PR 198 & HUMACAO RIVER	HUMACAO
935	PR 60 WESTBOUND	0.65	PR 198 & HUMACAO RIVER	HUMACAO
936	PR 989	0.09		VIEQUES
937	PR 30 WESTBOUND	25.70	PR 914	HUMACAO
938	PR 30 EASTBOUND	25.70	PR 914	HUMACAO
940	OFF PR 164	0.10	GUADIANA RIVER	NARANJITO
941	PR 2 WESTBOUND	212.80	PR 385	PEÑUELAS
942	PR 2 EASTBOUND	212.80	PR 385	PEÑUELAS
943	PR 127	11.50	PR 2	GUAYANILLA
944	PR 2 EASTBOUND	208.70	WATERWAY	GUAYANILLA
945	PR 2 WESTBOUND	208.70	WATERWAY	GUAYANILLA
946	PR 2 EASTBOUND	211.90	PR 384	PEÑUELAS
947	PR 2 WESTBOUND	211.90	PR 384	PEÑUELAS
948	PR 2	212.40	TALLABOA RIVER	PEÑUELAS
950	PR 149	59.30	JAGUEYES CREEK	VILLALBA
951	PR 149 R	56.80	ACHIOTE CREEK	VILLALBA
952	PR 902	0.02	GRANDE DE LOIZA RIVER	SAN LORENZO
953	PR 1 NORTHBOUND	15.70	SAN ROBERTO STREET	SAN JUAN
954	PR 1 SOUTHBOUND	15.70	SAN ROBERTO STREET	SAN JUAN
957	PR 18	5.00	RAMP FROM PR 21	SAN JUAN
958	PR 18 NORTHBOUND	0.93	PR 21	SAN JUAN
959	PR 18 SOUTHBOUND	5.00	PR 21	SAN JUAN
961	PR 1	40.80	QUEBRADILLA CREEK	CAGUAS
962	PR 988	2.70	MAMEYES RIVER	LUQUILLO
963	PR 3363	0.50	PR 2	SAN GERMAN
964	PR 2	178.90	LOCAL ROAD	SAN GERMAN
965	RURAL LOCAL ROAD	3.20	PR 2	SAN GERMAN

966	PR 2	178.90	PR 102	SABANA GRANDE
967	PR 2	180.40	CRUCES RIVER	SABANA GRANDE
968	PR 2	180.80	FLORES RIVER	SABANA GRANDE
969	LOCAL ROAD	0.10	PR 2	SABANA GRANDE
970	LOCAL CITY STREET	0.20	PR 2	SABANA GRANDE
971	PR 712	6.05	JAJOME CREEK	SALINAS
974	ACCESS PR 181 & 30	0.01	PR 30	GURABO
975	ACCESS PR 181 & 30	0.01	PR 30	GURABO
976	PR 30 EASTBOUND	6.70	PR 932	GURABO
977	PR 30 WESTBOUND	6.70	PR 932	GURABO
978	PR 30	5.76	DIRT ROAD	GURABO
980	PR 30 EASTBOUND	4.70	PR 931	GURABO
982	PR 30 WESTBOUND	4.03	PR 189	GURABO
984	PR 30 WESTBOUND	3.70	DIRT ROAD	CAGUAS
986	PR 30	3.30	GRANDE DE LOIZA RIVER	CAGUAS
990	PR 30 EASTBOUND	2.20	CAGUITAS RIVER	CAGUAS
992	PR 30	1.40	BAIROA RIVER	CAGUAS
994	PR 30 EASTBOUND	1.30	PR 796	CAGUAS
995	PR 30	0.50	PR 1	CAGUAS
996	PR 966	3.50	JIMENEZ CREEK	RIO GRANDE
997	PR 26 EASTBOUND	11.00	SUAREZ CHANNEL & PR 190	CAROLINA
998	PR 26 WESTBOUND	11.00	SUAREZ CHANNEL & PR 190	CAROLINA
999	CAMPO RICO AVENUE	2.60	PR 26	CAROLINA
1000	MONSERRATE AVENUE	2.60	PR 26 LOIZA EXPRESSWAY	CAROLINA
1005	AMERICO MIRANDA	2.40	PR 18 (LAS AMERICAS EXP)	SAN JUAN
1006	RAMP PR18 TO PR17	0.10	PIEDRAS RIVER	SAN JUAN
1008	PR 18	2.60	PR 17 (PI¥ERO AVENUE)	SAN JUAN

1009	RAMP PR18 TO PR17	0.10	PIEDRAS RIVER	SAN JUAN
1010	PR 18	2.90	PIEDRAS RIVER	SAN JUAN
1012	PR 18	2.60	DOMENECH STREET	SAN JUAN
1016	PR 18	3.30	PR 23 (ROOSEVELT AV.)	SAN JUAN
1017	PR 905	3.30	CREEK	YABUCOA
1018	PR 984	0.80	NARANJO CREEK	FAJARDO
1019	PR 950	7.80	PE¥A POBRE CREEK	NAGUABO
1020	PR 7755	0.30	JACABOA RIVER	PATILLAS
1021	PR 22 NORTHBOUND	1.70	MARTIN PE¥A CHANNEL	SAN JUAN
1023	PR 30	12.70	CITY STREET	JUNCOS
1024	URBAN LOCAL	0.01	PR 30	JUNCOS
1025	PR 30	10.47	PR 933	GURABO
1026	PR 30	9.05	URBAN CITY STREET	GURABO
1027	PR 375	0.25	GRANDE CREEK	GUAYANILLA
1028	PR 7757	1.60	LOS POLLOS CREEK	PATILLAS
1029	PR 101	12.70	LOS LLANOS CREEK	CABO ROJO
1030	PR 181 NORTHBOUND	25.30	PR 30	GURABO
1031	PR 181 SOUTHBOUND	25.30	PR 30	GURABO
1034	PR 924	0.50	MABU CREEK	HUMACAO
1037	PR 974	1.40	CREEK	NAGUABO
1038	PR 2	74.40	GRANDE DE ARECIBO RIVER	ARECIBO
1041	PR 851	4.10	INFIERNO CREEK	TRUJILLO ALTO
1042	OFF PR 375 KM. 2.1	0.10	GRANDE CREEK	GUAYANILLA
1043	PR 495	2.80	LOS MORONES CREEK	MOCA
1046	PR 3376	0.28	GUAYO RIVER Camino Los Pagan	ADJUNTAS
1048	PR 2 EASTBOUND	53.20	GRANDE DE MANATI RIVER	MANATI

1049	PR 2 WESTBOUND	53.20	GRANDE DE MANATI RIVER	MANATI
1051	PR 927	7.90	BLANCO RIVER	NAGUABO
1052	PR 630	1.64	CIBUCO RIVER	VEGA ALTA
1053	PR 649	1.00	CIALITOS RIVER	CIALES
1054	PR 383	0.30	MAGAS CREEK	GUAYANILLA
1056	PR 386	0.30	GUAYANES RIVER	PEÑUELAS
1057	PR 858	0.20	MARACUTO CREEK	CAROLINA
1058	PR 9912	0.10	GRANDE DE LOIZA RIVER	SAN LORENZO
1059	PR 646	4.80	INDIO RIVER	VEGA BAJA
1061	PR 9912	2.90	CAYAGUAS RIVER	SAN LORENZO
1062	PR 717	4.10	CUYON RIVER	COAMO
1063	PR 743	4.14	WATERWAY	CAYEY
1065	PR 335	7.40	YAUCO RIVER	YAUCO
1066	PR 9921	0.50	HUMACAO RIVER	LAS PIEDRAS
1067	PR 52 NORTHBOUND	98.65	DIRT ROAD	PONCE
1068	PR 52 SOUTHBOUND	98.65	DIRT ROAD	PONCE
1069	PR 52 SOUTHBOUND	97.90	PR 10	PONCE
1070	PR 52 NORTHBOUND	97.90	PR 10	PONCE
1071	PR 52 NORTHBOUND	96.80	FARM ROAD	PONCE
1072	PR 52 SOUTHBOUND	96.80	FARM ROAD	PONCE
1073	PR 52 NORTHBOUND	95.20	PR 506 KM 1.5	PONCE
1074	PR 52 SOUTHBOUND	95.20	PR 506 KM 1.5	PONCE
1075	PR 52 NORTHBOUND	94.30	FARM ROAD	JUANA DIAZ
1076	PR 52 SOUTHBOUND	94.30	FARM ROAD	JUANA DIAZ
1077	PR 52 NORTHBOUND	93.90	INABON RIVER	JUANA DIAZ
1078	PR 52 SOUTHBOUND	93.90	INABON RIVER	JUANA DIAZ
1079	PR 52 NORTHBOUND	93.30	PR 574 KM 1.0	JUANA DIAZ

1080	PR 52 SOUTHBOUND	93.30	PR 574 KM 1.0	JUANA DIAZ
1081	PR 183	11.00	GRANDE DE LOIZA RIVER	SAN LORENZO
1082	PR 935	3.80	LOS CHINOS CREEK	JUNCOS
1083	PR 30	10.80	EL MAMEY CREEK	JUNCOS
1084	PR 307	8.20	BOQUERON RIVER	CABO ROJO
1085	PR 163 WESTBOUND	1.30	PORTUGUES RIVER	PONCE
1086	PR 163 EASTBOUND	1.30	PORTUGUES RIVER	PONCE
1087	PR 200R	0.20	WATERWAY	VIEQUES
1091	RURAL LOCAL ROAD	2.10	TURUNO CREEK	SAN GERMAN
1092	PR 177	8.00	PR 1	SAN JUAN
1093	PR 2 WESTBOUND	9.40	BAYAMON RIVER	BAYAMON
1094	PR 7718	2.10	WATERWAY	AIBONITO
1096	PR 102	35.40	GUANAJIBO RIVER	SAN GERMAN
1098	PR 5	2.60	CHANNEL	BAYAMON
1099	PR 30 EASTBOUND	14.70	PR 31	JUNCOS
1100	PR 30 WESTBOUND	14.60	PR 31	JUNCOS
1101	PR 30 EASTBOUND	14.30	VALENCIANO RV. & L. ROAD	JUNCOS
1102	PR 30 WESTBOUND	14.30	VALENCIANO RIVER L ROAD	JUNCOS
1103	PR 30 EASTBOUND	23.66	PR 189	JUNCOS
1104	PR 30 WESTBOUND	23.66	PR 189	JUNCOS
1105	PR 30 EASTBOUND	13.10	PR 185	JUNCOS
1106	PR 30 WESTBOUND	13.10	PR 185	JUNCOS
1107	PR 174	4.50	MINILLAS RIVER	BAYAMON
1108	PR 794	1.70	CAGUITAS RIVER	AGUAS BUENAS
1109	PR 7729	1.30	CAÑA CREEK	CAYEY
1110	PR 328	5.70	IRRIGATION CHANNEL	SABANA GRANDE
1111	PR 52	95.20	UNNAMED CREEK	JUANA DIAZ

1112	OFF PR 4484	0.20	DEPRESSION	QUEBRADILLAS
1113	PR 132	0.20	PR 2	GUAYANILLA
1114	PR 2 EASTBOUND	204.00	GUAYANILLA RIVER, L ROAD	GUAYANILLA
1115	PR 2 WESTBOUND	204.00	GUAYANILLA RIVER, L ROAD	GUAYANILLA
1118	PR 377	0.10	CONSEJO CREEK	GUAYANILLA
1119	PR 2	202.20	WATERWAY	GUAYANILLA
1120	PR 127	6.00	PR 2	GUAYANILLA
1123	PR 359	0.30	PR 2	YAUCO
1124	PR 890	0.04	HONDO RIVER	BAYAMON
1125	OFF PR 372	0.30	DUEY RIVER	YAUCO
1126	PR 184	33.30	BEATRIZ CREEK	CIDRA
1127	PR 970	5.55	GRANDE CREEK	NAGUABO
1128	PR 493	1.80	SECA CREEK	HATILLO
1129	PR 184	28.20	GUAVATE CREEK	CAYEY
1130	PR 145	1.00	GRANDE DE MANATI RIVER	CIALES
1131	PR 29 EASTBOUND	1.40	HONDO RIVER	BAYAMON
1132	PR 29 WESTBOUND	1.40	HONDO RIVER	BAYAMON
1133	OFF PR 200	0.01	CREEK	VIEQUES
1134	PR 165	36.80	PR 24	GUAYNABO
1136	PR 165	34.80	PR 5	CATANO
1138	PR 30	5.97	CREEK	GURABO
1139	PR 30	7.10	UNNAMED CREEK	GURABO
1140	PR 52 NORTHBOUND	92.40	JACAGUAS RIVER	JUANA DIAZ
1141	PR 52 SOUTHBOUND	92.40	JACAGUAS RIVER	JUANA DIAZ
1142	PR 418	0.50	CULEBRINAS RIVER	AGUADILLA
1143	OFF PR 115	0.80	GUAMA CREEK	AGUADILLA
1144	PR 52 NORTHBOUND	91.10	PR 149	JUANA DIAZ

1145	PR 52 SOUTHBOUND	91.10	PR 149	JUANA DIAZ
1146	PR 52 NORTHBOUND	90.70	PR 592	JUANA DIAZ
1147	PR 52 SOUTHBOUND	90.60	PR 592	JUANA DIAZ
1148	PR 52 NORTHBOUND	89.70	PR 510 KM.3.9	JUANA DIAZ
1149	PR 52 SOUTHBOUND	89.70	PR 510 KM.3.9	JUANA DIAZ
1150	PR 52 NORTHBOUND	89.10	DIRT ROAD	JUANA DIAZ
1151	PR 52 SOUTHBOUND	89.10	DIRT ROAD	JUANA DIAZ
1152	PR 52 NORTHBOUND	88.00	DIRT ROAD	JUANA DIAZ
1153	PR 52 SOUTHBOUND	88.00	DIRT ROAD	JUANA DIAZ
1154	PR 52 NORTHBOUND	87.70	IRRIGATION CHANNEL	JUANA DIAZ
1155	PR 52 SOUTHBOUND	87.70	IRRIGATION CHANNEL	JUANA DIAZ
1157	PR 558	0.20	USABON RIVER	BARRANQUITAS
1158	PR 7774	0.20	Piñas Creek	COMERIO
1159	PR 7774	3.40	ARROYATA RIVER	COMERIO
1160	PR 52 NORTHBOUND	81.20	PR 536	SANTA ISABEL
1161	PR 52 SOUTHBOUND	81.20	PR 536	SANTA ISABEL
1162	PR 52 NORTHBOUND	77.60	COAMO RIVER & PR 545	SANTA ISABEL
1163	PR 52 SOUTHBOUND	77.60	COAMO RIVER & PR 545	SANTA ISABEL
1164	PR 3	24.70	GRANDE RIVER	RIO GRANDE
1165	PR 3	26.00	ESPIRITU SANTO RIVER	RIO GRANDE
1166	PR 3	27.20	JUAN GONZALEZ CREEK	RIO GRANDE
1167	RAMP PR 26 TO PR22	2.00	CANALS STREET	SAN JUAN
1168	PR 26	2.00	PR 22 (DE DIEGO EXP.)	SAN JUAN
1169	PR 165	5.60	LA MALARIA CHANNEL	CATANO
1170	PR 556	3.50	MONTERIA CREEK	COAMO
1171	PR 5 NORTHBOUND	2.50	BAYAMON RIVER	BAYAMON
1172	PR 5 SOUTHBOUND	2.50	BAYAMON RIVER	BAYAMON

1173	PR 738	6.80	EL CEDRO CREEK	CAYEY
1174	LOCAL ROAD	0.10	EL CEDRO CREEK	CAYEY
1175	RAMP FROM PR 26	2.10	PR 22 RAMP	SAN JUAN
1176	PR 22	6.90	PR 165	GUAYNABO
1177	PR 22	7.55	PR 28	GUAYNABO
1178	PR 22	8.95	MALARIA CREEK	CATANO
1179	PR 22	9.10	OIL PIPE LINES	CATANO
1180	PR 22	9.20	DRAINAGE DITCH	CATANO
1181	PR 22	9.65	DRAINAGE DITCH	CATANO
1182	PR 22	10.20	PR 5	CATANO
1183	RAMP PR 22 TO PR 5	10.20	PR 5	CATANO
1184	RAMP PR 22 TO PR 5	0.10	PR 22	CATANO
1185	PR 22	10.90	PR 869	CATANO
1186	PR 708	5.10	CREEK	CAYEY
1187	PR 414	3.40	GRANDE RIVER	AGUADA
1188	PR 52 NORTHBOUND	76.80	PR 153	SANTA ISABEL
1189	PR 52 SOUTHBOUND	76.80	PR 153	SANTA ISABEL
1190	PR 52 NORTHBOUND	74.80	DIRT ROAD	SANTA ISABEL
1191	PR 52 SOUTHBOUND	74.80	DIRT ROAD	SANTA ISABEL
1192	PR 52 NORTHBOUND	71.40	PR 543 AND JUEYES RIVER	SANTA ISABEL
1193	PR 52 SOUTHBOUND	71.40	PR 543 AND JUEYES RIVER	SANTA ISABEL
1194	PR 102	1.80	YAGUEZ RIVER	MAYAGÜEZ
1195	PR 950	6.20	SONADORA CREEK	NAGUABO
1196	PR 9973	1.40	UNKNOWN CREEK	NAGUABO
1197	PR 553	1.30	DESCALABRADO RIVER	COAMO
1199	PR 623	1.80	TANANA RIVER	ARECIBO
1200	PR 3	10.80	GRANDE DE LOIZA RIVER	CAROLINA

1201	PR 920	0.40	WATERWAY	YABUCOA
1202	PR 17 (PI¥ERO AVE)	3.80	JOSEFINA CREEK	SAN JUAN
1203	PR 17 EASTBOUND	4.00	PIEDRAS RIVER	SAN JUAN
1204	PR 17 WESTBOUND	4.00	PIEDRAS RIVER	SAN JUAN
1205	PR 52 SOUTHBOUND	86.30	PR 535	JUANA DIAZ
1206	PR 52 NORTHBOUND	86.20	PR 535	JUANA DIAZ
1207	PR 52 SOUTHBOUND	85.90	CA¥AS RIVER	JUANA DIAZ
1208	PR 52 NORTHBOUND	85.90	CA¥AS RIVER	JUANA DIAZ
1209	PR 52 SOUTHBOUND	84.05	FUTURE ROAD(DIRT ROAD)	JUANA DIAZ
1210	PR 52 NORTHBOUND	84.05	FUTURE ROAD(DIRT ROAD)	JUANA DIAZ
1211	PR 52 SOUTHBOUND	81.20	DESCALABRADO RIVER	JUANA DIAZ
1212	PR 52 NORTHBOUND	81.60	DESCALABRADO RIVER	JUANA DIAZ
1213	PR 123	16.35	WATERWAY	PONCE
1214	PR 150	5.10	TOA VACA DAM	VILLALBA
1215	PR 123	62.20	WATERWAY	UTUADO
1216	PR 123	65.70	DEPRESSION	ARECIBO
1217	PR 819	2.10	BUCARABONES RIVER	TOA ALTA
1218	PR 9905	0.30	SAN INGENIO RIVER	YABUCOA
1220	PR 7765	0.10	SAN SALVADOR CREEK	CAGUAS
1221	PR 52 NORTHBOUND	67.85	GRAVEL ROAD	SALINAS
1222	PR 52 SOUTHBOUND	67.85	GRAVEL ROAD	SALINAS
1223	PR 52 NORTHBOUND	67.75	HONDA CREEK	SALINAS
1224	PR 52 SOUTHBOUND	67.75	HONDA CREEK	SALINAS
1225	PR 52 NORTHBOUND	67.00	LOCAL ACCESS ROAD	SALINAS
1226	PR 52 SOUTHBOUND	67.10	DIRT ROAD	SALINAS
1227	PR 52 NORTHBOUND	66.60	NIGUA RIVER	SALINAS
1228	PR 52 SOUTHBOUND	66.60	NIGUA RIVER	SALINAS

1229	PR 1	125.00	BUCANA RIVER	PONCE
1230	PR 123	66.30	WATERWAY	ARECIBO
1231	PR 123	67.10	WATERWAY	ARECIBO
1232	PR 52 NORTHBOUND	66.20	PR 1	SALINAS
1233	PR 52 SOUTHBOUND	66.20	PR 1	SALINAS
1234	PR 52 NORTHBOUND	65.50	RURAL LOCAL ROAD	SALINAS
1235	PR 52 SOUTHBOUND	65.50	RURAL LOCAL ROAD	SALINAS
1236	PR 52 NORTHBOUND	63.70	DIRT ROAD	SALINAS
1237	PR 52 SOUTHBOUND	63.70	DIRT ROAD	SALINAS
1238	PR 52 NORTHBOUND	62.25	LOCAL ROAD	SALINAS
1239	PR 52 SOUTHBOUND	62.25	DIRT ROAD	SALINAS
1240	PR 52 NORTHBOUND	61.00	BRIDGE 1241	SALINAS
1241	PR 53	94.20	PR 52	SALINAS
1242	PR 52 NORTHBOUND	60.30	LOCAL ROAD	SALINAS
1243	PR 52 SOUTHBOUND	60.30	LOCAL ROAD	SALINAS
1244	PR 30R	26.40	PR 60	HUMACAO
1245	PR 30R	0.70	CATTLE PASS	HUMACAO
1246	PR 30R	27.80	PR 908	HUMACAO
1247	PR 30	28.25	MARIANA CREEK	HUMACAO
1248	PR 30R	28.50	PR 909	HUMACAO
1249	CONNECTOR TO PR121	0.10	PR 2	SABANA GRANDE
1250	PR 52 NORTHBOUND	1.00	PR 177	SAN JUAN
1251	PR 52 SOUTHBOUND	1.00	PR 177	SAN JUAN
1252	PR 52 NORTHBOUND	2.00	PR 199	SAN JUAN
1253	PR 52 SOUTHBOUND	2.00	PR 199	SAN JUAN
1254	PR 3	14.95	CANOVANILLAS RIVER	CANOVANAS
1255	Off PR 200 @ Km 3.29	0.01		VIEQUES

1256	PR 200	2.86		VIEQUES
1257	PR 1	15.10	PR 18 (LAS AMERICAS EXP)	SAN JUAN
1258	PR 1	15.10	PR 18 (LAS AMERICAS EXP)	SAN JUAN
1259	PR 1	15.10	PR 52	SAN JUAN
1260	PR 838	0.90	PR 52	SAN JUAN
1261	PR 52 SOUTHBOUND	3.20	LOCAL ROAD	SAN JUAN
1262	PR 52 NORTHBOUND	3.20	LOCAL ROAD	SAN JUAN
1263	PR 52 SOUTHBOUND	4.30	MONTEHIEDRA AVENUE	SAN JUAN
1264	PR 52 NORTHBOUND	4.30	MONTEHIEDRA AVENUE	SAN JUAN
1265	PR 920	0.20	LIMONES RIVER	YABUCOA
1267	PR 52 SOUTHBOUND	5.00	LUCIANO VAZQUEZ ROAD	SAN JUAN
1268	PR 52 NORTHBOUND	5.00	LUCIANO VAZQUEZ ROAD	SAN JUAN
1269	PR 52 SOUTHBOUND	6.50	PEDRO VIARA ROAD	SAN JUAN
1270	PR 52 NORTHBOUND	6.50	LOCAL ROAD	SAN JUAN
1271	PR 52 SOUTHBOUND	7.30	LOCAL ROAD	SAN JUAN
1272	PR 52 NORTHBOUND	7.30	LOCAL ROAD	SAN JUAN
1273	PR 52 SOUTHBOUND	8.70	LOCAL ROAD	SAN JUAN
1274	PR 52 NORTHBOUND	8.70	LOCAL ROAD	SAN JUAN
1275	PR 52 NORTHBOUND	26.70	SONADORA CREEK	CAGUAS
1276	PR 52 SOUTHBOUND	26.65	SONADORA CREEK	CAGUAS
1277	PR 7787	0.08	PR 52	CAYEY
1278	PR 52 NORTHBOUND	32.20	PR 184	CAYEY
1279	PR 52 SOUTHBOUND	32.20	PR 184	CAYEY
1280	PR 52 NORTHBOUND	31.50	PR 7786	CAYEY
1281	PR 52 SOUTHBOUND	31.50	PR 7786	CAYEY
1282	PR 52 NORTHBOUND	23.90	QUEBRADILLAS CREEK	CAGUAS
1283	PR 52 SOUTHBOUND	23.90	QUEBRADILLAS CREEK	CAGUAS

1284	PR 1 RAMAL	23.10	PR 52	CAGUAS
1285	PR 1	37.80	PR 52	CAGUAS
1286	PR 52 NORTHBOUND	25.00	PR 765 & BEATRIZ CREEK	CAGUAS
1287	PR 52 SOUTHBOUND	25.00	PR 765 & BEATRIZ CREEK	CAGUAS
1288	PR 924	5.20	MAMBICHE BLANCO CREEK	HUMACAO
1289	PR 2R	0.80	YAGUEZ RIVER	MAYAGÜEZ
1290	PR 108	0.10	YAGUEZ RIVER	MAYAGÜEZ
1291	PR 64	2.10	ALGARROBO CREEK	MAYAGÜEZ
1293	PR 391	5.80	LOS JOBOS RIVER	PEÑUELAS
1294	PR5144	0.60	GRANDE DE JAYUYA RIVER	JAYUYA
1295	RAMP PR30 TO PR 52	0.50	URBAN CITY STREET	CAGUAS
1296	PR 4466	1.80	CREEK	ISABELA
1297	PR 4417	1.15	MAMEY CREEK	AGUADA
1298	PR 977	4.50	FAJARDO RIVER	FAJARDO
1299	PR 18	0.65	KALAF STREET	SAN JUAN
1300	PR 348	12.40	LOS VAZQUEZ CREEK	SAN GERMAN
1308	PR 874	0.90	GRANDE DE LOIZA RIVER	CAROLINA
1309	PR 3	17.30	CANOVANAS RIVER	CANOVANAS
1310	RAMP TO PR 26 & 22	0.10	RAMP FROM PR 26 TO PR 22	SAN JUAN
1311	EUGENIO ASTOR AV.	1.20	BAIROA RIVER	CAGUAS
1312	BAIROA AVENUE	0.20	BAIROA RIVER	CAGUAS
1313	PR 948	4.31	GURABO RIVER	LAS PIEDRAS
1316	LOCAL ROAD	0.10	EMAJAGUA RIVER	SAN LORENZO
1317	RURAL LOCAL ROAD	0.00	EMAJAGUA RIVER	SAN LORENZO
1318	PR 127	13.70	TIDAL INLET	GUAYANILLA
1320	LOCAL ROAD	0.10	PATILLAS RIVER	PATILLAS
1321	PR 528	3.30	DOROTEO RIVER	JAYUYA

1322	OFF PR 759 AT 6.70	0.10	CREEK	MAUNABO
1324	OFF PR 757 AT K2.8	0.20	DE APEADERO RIVER	PATILLAS
1325	PR 757	4.00	DEL APEADERO RIVER	PATILLAS
1326	LOCAL ROAD	0.10	MAJAGUAL CREEK	ARROYO
1327	PR 977	2.85	CREEK	CEIBA
1328	LOCAL ROAD	0.19	GUAMANI RIVER	GUAYAMA
1330	PR 984	1.00	JUAN MARTIN RIVER	FAJARDO
1331	OFF PR 958	0.01	HERRERAS RIVER	RIO GRANDE
1332	LOCAL ROAD	0.10	DEPRESSION	RIO GRANDE
1334	PR 109	13.60	UNNAMED CREEK	ANASCO
1336	PR 14	20.35	SANTO DOMINGO CREEK	CAYEY
1337	PR 1	40.30	UNKOWN CREEK	CAGUAS
1338	PR 1	41.50	DEPRESSION	CAGUAS
1339	PR 1	41.90	DEPRESSION	CAGUAS
1340	PR 1	42.80	DEPRESSION	CAGUAS
1341	PR 1	43.00	DEPRESSION	CAGUAS
1342	PR 1	43.70	DEPRESSION	CAGUAS
1343	LOCAL ROAD	0.20	EMAJAGUA RIVER	SAN LORENZO
1344	MARGINAL STREET	0.10	SUAREZ CHANNEL	CAROLINA
1345	OFF PR 759 AT 2.45	0.10	MAUNABO RIVER	MAUNABO
1347	PR 872	1.70	HONDO RIVER	BAYAMON
1348	PR 777	2.30	CREEK	AGUAS BUENAS
1350	OFF PR 185	0.20	CUBUY RIVER	CANOVANAS
1351	LOCAL ROAD	0.05	CUBUY RIVER	CANOVANAS
1352	PR 146	12.10 (New 28.0)	CIALITOS RIVER	CIALES
1353	PR 765	2.80	TURABO RIVER	CAGUAS
1354	PR 7730	0.10	LA PLATA RIVER	CIDRA

1355	OFF PR 123 AT 47.17	0.17	GRANDE DE ARECIBO RIVER	UTUADO
1356	PR 103	4.50	PIEDRA CREEK	CABO ROJO
1357	PR 190	0.10	SUAREZ CHANNEL	CAROLINA
1358	PR 777	1.70	CREEK	AGUAS BUENAS
1359	PR 127	17.32	DISCHARGE FROM PLANT	PEÑUELAS
1361	PR 535	5.90	DESCALABRADO RIVER	JUANA DIAZ
1362	PR 9936	0.15	ARENAS CREEK	LAS PIEDRAS
1364	PR 5527	0.20	CARICABOA CREEK	JAYUYA
1365	PR 102	1.00	BOCA MORENA CREEK	MAYAGÜEZ
1366	PR 3342	0.86	BOCA MORENA CHANNEL	MAYAGÜEZ
1367	PR 2	184.50	LOCAL ROAD	SABANA GRANDE
1368	PR 954	3.40	CANOVANILLAS RIVER	CANOVANAS
1369	PR 184	29.60	SANTANA CREEK	CAYEY
1370	PR 555	3.90	COAMO RIVER	COAMO
1371	PR 455	9.90	SOLLER CREEK	CAMUY
1372	PR 958	5.80	CREEK	RIO GRANDE
1373	PR 132	25.00	CA¥AS RIVER	PONCE
1374	PR 149	12.40	GRANDE DE MANATI RIVER	CIALES
1377	RURAL LOCAL ROAD	0.01	CUBUY RIVER	CANOVANAS
1379	PR 651	0.85	CREEK	ARECIBO
1380	LOCAL ROAD	0.20	EMAJAGUA RIVER	SAN LORENZO
1381	PR 103	3.60	CHANNEL	CABO ROJO
1382	PR 140	43.95	WATERWAY	UTUADO
1384	OFF PR 948	0.10	GURABO RIVER	LAS PIEDRAS
1385	PR 476	0.50	GUAJATACA RIVER	QUEBRADILLAS
1386	PR 140	44.05	UNNAMED CREEK	UTUADO
1387	OFF PR 375 AT 0.85	0.05	GRANDE CREEK	GUAYANILLA

1389	PR 140	44.25	WATERWAY	UTUADO
1390	PR 303	0.10	PLANTINA CREEK	LAJAS
1391	PR 140	44.19	WATERWAY	UTUADO
1392	PR 6623	47.60 (Km .4)	CREEK	MOROVIS
1393	PR 988	10.00	CHIQUITO RIVER	LUQUILLO
1394	PR 119	15.10	SAN JOSE CREEK	LAS MARIAS
1395	PR 7042	3.20	FARALLON RIVER	GUAYAMA
1397	PR 501	0.30	CA¥AS RIVER	PONCE
1398	PR 155	45.95	CREEK	MOROVIS
1399	PR 155	44.70	DEPRESSION	MOROVIS
1402	PR 22	12.70	PR 167	BAYAMON
1403	PR 22	14.10	PR 872	BAYAMON
1404	PR 455	1.10	GUAJATACA RIVER	SAN SEBASTIÁN
1405	PR 155	58.00	HICOTEA CREEK	VEGA BAJA
1407	PR 22	0.70	PR 25 (FDEZ JUNCOS AV.)	SAN JUAN
1408	LOCAL ROAD	0.00	PR 2	YAUCO
1409	PR 2	195.40	PR 116	GUANICA
1410	PR 2	195.20	LOCO RIVER	Guánica
1411	PR 3332	0.30	PR 2	GUANICA
1412	PR 2	194.50	IRRIGATION CHANNEL	Guánica
1413	PR 116	26.60	PR 2	GUANICA
1414	PR 116R	4.90	CHANNEL	Guánica
1415	PR 731	0.10	SANTO DOMINGO CREEK	CAYEY
1416	PR 52	6.28	PIEDRAS RIVER	SAN JUAN
1417	LOCAL ROAD	0.00	DUEY RIVER	SAN GERMAN
1420	PR 149	9.70	TOYO CREEK	MANATI
1421	PR 7759	0.30	LOS BARROS RIVER	PATILLAS

1423	PR 504	2.30	CHIQUITO RIVER	PONCE
1424	PR 1	105.60	COAMO RIVER & LOCAL ROAD	SANTA ISABEL
1426	PR 129	27.40	PR 111	LARES
1427	PR 111	18.30	GUATEMALA RIVER	SAN SEBASTIÁN
1430	PR 6	10.90	PR 5	BAYAMON
1431	PR 5	1.60	PR 28	BAYAMON
1432	PR 5	1.60	PR 28	BAYAMON
1433	PR 14	5.40	BUCANA RIVER	PONCE
1434	PR 102	1.00	BOCA MORENA CREEK	MAYAGÜEZ
1438	PR 568	18.30	CREEK	COROZAL
1439	PR 568	15.90	UNKNOWN CREEK	COROZAL
1440	PR 409	3.10	LAS JOSEFAS CREEK	LAS MARIAS
1441	RAMP PR18 TO PR22	0.20	PR 18	SAN JUAN
1442	RAMP PR18 TO PR22	0.10	PR 22	SAN JUAN
1443	PR 368	8.00	CA¥AS RIVER	SABANA GRANDE
1444	PR 22 WESTBOUND	67.00	PR 661	ARECIBO
1445	PR 22 EASTBOUND	67.00	PR 661	ARECIBO
1446	PR 22 WESTBOUND	69.55	PR 658	ARECIBO
1447	PR 22 EASTBOUND	69.55	PR 658	ARECIBO
1448	PR 22 WESTBOUND	70.40	PR 638	ARECIBO
1449	PR 22 EASTBOUND	70.40	PR 638	ARECIBO
1450	PR 22 WESTBOUND	71.00	ACCESS ROAD	ARECIBO
1451	PR 22 EASTBOUND	71.00	ACCESS ROAD	ARECIBO
1452	PR 123	35.20	CIDRA RIVER	ADJUNTAS
1453	MARGINAL STREET	0.60	BAIROA RIVER	CAGUAS
1454	PR 108	6.40	CA%AS RIVER	MAYAGÜEZ
1455	PR 384	3.10	TALLABOA RIVER	PEÑUELAS

1457	PR 52 SOUTHBOUND	10.90	PR 175	CAGUAS
1458	PR 52 NORTHBOUND	10.90	PR 175	CAGUAS
1459	PR 183	1.20	TURABO RIVER	CAGUAS
1460	ACCESS PARKING LOT	0.00	PR 22	SAN JUAN
1461	CITY STREET	0.00	PR 22	SAN JUAN
1462	PR 567	11.70	GRANDE DE MANATI RIVER	MOROVIS
1463	PR 765	5.40	TURABO RIVER	CAGUAS
1464	PR 22	2.70	PR 18	SAN JUAN
1465	PR 150	0.20	JACAGUAS RIVER	VILLALBA
1466	PR 510	5.00	JACAGUAS RIVER	JUANA DIAZ
1467	PR 528	3.50	CREEK	JAYUYA
1468	PR 3	68.20	BLANCO RIVER	NAGUABO
1469	PR 506	1.20	UNNAMED CREEK	PONCE
1470	PR 22 WESTBOUND	68.45	LOCAL ROAD	ARECIBO
1471	PR 100	0.80	GUANAJIBO RIVER	HORMIGUEROS
1472	PR 22 EASTBOUND	68.45	LOCAL ROAD	ARECIBO
1473	PR 100	0.60	PR 114	HORMIGUEROS
1474	PR 568	14.90	CREEK	COROZAL
1476	PR 2	183.20	GUANAJIBO RIVER & PR 328	SABANA GRANDE
1477	PR 2	198.30	DIRT ROAD	YAUCO
1479	PR 100	0.01	PR 2	HORMIGUEROS
1480	PR 3375	0.20	DUEY RIVER	YAUCO
1482	PR 2	186.00	PR 117 & WATERWAY	SABANA GRANDE
1483	PR 568	13.20	CREEK	COROZAL
1484	PR 568	12.40	CREEK	COROZAL
1485	PR 802	5.05	GRANDE DE MANATI RIVER	NARANJITO
1486	PR 115	1.30	UNKNOWN CREEK	ANASCO

1489	PR 486	11.85	ABRA HONDA CREEK	CAMUY
1490	PR 3	69.70	ANTON RUIZ RIVER	HUMACAO
1492	OFF PR 110	0.30	CREEK	MOCA
1495	OFF PR 818	0.20	COROZAL RIVER	COROZAL
1496	PR 3336	1.00		GUAYANILLA
1497	PR 826	3.00	GUADIANA RIVER	NARANJITO
1499	OFF PR 123 KM 61.7	0.03	GRANDE DE ARECIBO RIVER	UTUADO
1500	PALMA STREET	0.08	VIVI RIVER	UTUADO
1512	PR 823	3.70	UNNAMED CREEK	TOA ALTA
1517	PR 171	4.25	CREEK	CIDRA
1518	PR 171	1.10	EL CABRO CREEK	CIDRA
1519	PR 171	0.55	ARROYATA CREEK	CIDRA
1520	OFF PR759 AT K2.45	1.00	TUMBAO CREEK	MAUNABO
1521	PR 177	4.30	PR 20 (MRTNZ. NADAL EXP)	GUAYNABO
1522	PR 123	60.70	CAGUANITAS RIVER	UTUADO
1523	PR 144	0.80	GRANDE DE JAYUYA RIVER	JAYUYA
1524	A STREET	0.60	CHIQUITO RIVER	PONCE
1525	UNION STREET	0.05	LOS PAJAROS CREEK	HUMACAO
1527	PR 7775	4.30	ARROYATA RIVER	CIDRA
1528	PR 612	3.00	DISCHARGE CHANNEL AEE	UTUADO
1529	Off PR 146 @ Km 8.20	0.20	LIMON RIVER	UTUADO
1530	LOCAL ROAD	0.01	SAN ANTONIO RIVER	MARICAO
1531	PR 141	10.00	CREEK	JAYUYA
1532	PR 175	11.80	CREEK	TRUJILLO ALTO
1533	PR 597	0.10	OROCOVIS RIVER	OROCOVIS
1536	Camino Maximino Barbosa	6.20	CAMINO DEL GUAYO CREEK	MAYAGÜEZ
1537	PR 18	0.30	LOS MUERTOS CREEK	SAN JUAN

1538	PR 18	0.10	LOS MUERTOS CREEK	SAN JUAN
1539	RAMP PR 22 - PR 18	0.20	LOS MUERTOS CREEK	SAN JUAN
1542	PR 781	0.10	BAYAMON RIVER	AGUAS BUENAS
1546	PR 181	9.10	CREEK	SAN LORENZO
1547	PR 181	11.90	CREEK	SAN LORENZO
1549	PR 7757	0.80	CREEK	PATILLAS
1552	PR 9931	0.09	CREEK	SAN LORENZO
1553	PR 368	12.00	SUSUA CREEK	YAUCO
1554	PR 368	3.30	MACHUCHAL CREEK	SABANA GRANDE
1555	OFF PR 525	0.01	YAHUECAS RIVER	ADJUNTAS
1556	OFF PR-402 AT 3.09	3.09	GUABA RIVER	LAS MARIAS
1557	OFF 409 AT 3.09	3.09	LA MONSERRATE CREEK	LAS MARIAS
1558	PR 2	9.40	BAYAMON RIVER	BAYAMON
1562	PR 171	6.70	CREEK	CAYEY
1564	RURAL LOCAL ROAD	0.10	CHIQUITO DE MATON RIVER	CAYEY
1573	PR 971	9.68	CREEK	CEIBA
1575	PR 827	2.60	CREEK	TOA ALTA
1576	PR 871	1.60	PR 22 KM.15.1	TOA BAJA
1577	PR 22	15.20	RIO HONDO CHANNEL	TOA BAJA
1583	OFF PR 123 @ KM 52	0.06	GRANDE DE ARECIBO RIVER	UTUADO
1587	Camino La Zarza Off PR 588 , Sector Brasa del Monte	0.24	PORTUGUES RIVER	PONCE
1590	PR 149R	0.03	JACAGUAS RIVER	VILLALBA
1593	OFF PR 391	0.10	TALLABOA RIVER	PEÑUELAS
1594	PR 2	228.60	PORTUGUES RIVER	PONCE
1596	PR 111	0.10	GUAJATACA RIVER	LARES
1597	LOCAL ROAD	0.10	JOBITOS CREEK	VILLALBA

1598	LOCAL ROAD	0.05	CARICABOA RIVER	JAYUYA
1601	PR 52	12.40	CREEK	CAGUAS
1602	PR 191	0.30	CREEK	RIO GRANDE
1603	PR 866	0.02	CREEK	BAYAMON
1604	PR 5513	0.20	CREEK	JUANA DIAZ
1606	OFF PR 149	0.05	JAGUEYES CREEK	VILLALBA
1607	PR 420	3.20	CULEBRINAS RIVER	MOCA
1608	PR 348	8.50	ROSARIO RIVER	MAYAGÜEZ
1609	PR 360	0.60	GUANAJIBO RIVER	SAN GERMAN
1611	PR 308	5.70	LAS PI¥AS CREEK	CABO ROJO
1612	PR 389	0.50	LOCO RIVER	Guánica
1617	PR 32	6.20	CAGUITAS RIVER	CAGUAS
1618	RAFAEL CORDERO AVE	0.01	PR 30	CAGUAS
1619	PR 111	5.30	CREEK	UTUADO
1620	PR 115	19.50	SANTI PONCE RIVER	AGUADA
1621	PR 187	0.10	LA VEGA CREEK	RIO GRANDE
1622	LOCAL ROAD	0.20	CREEK	CAROLINA
1623	CARRION MADURO ST.	0.60	SANTO DOMINGO CREEK	CAYEY
1624	PR 3	54.00	EL CA¥O CREEK	CEIBA
1625	LOCAL ROAD	0.10	GUAYANILLA RIVER	GUAYANILLA
1626	OFF PR 378	0.10	GUAYANILLA RIVER	GUAYANILLA
1629	PR 784	4.10	CA¥ABONCITO RIVER	CAGUAS
1630	PR 784	4.80	CREEK	CAGUAS
1636	PR 505	5.50	YUCA RIVER	PONCE
1637	OFF PR 125	0.30	CULEBRINAS RIVER	SAN SEBASTIÁN
1638	VICTOR ROJAS AVE.	0.10	GRANDE DE ARECIBO RIVER	ARECIBO
1639	PR 7793	0.05	DON BARO CREEK	GUAYNABO

1641	LOCAL ROAD	0.10	AGUAS CLARAS CREEK	CEIBA
1642	PR 167	26.00	HONDO RIVER	BAYAMON
1643	PR 22 WESTBOUND	74.80	PR 10	ARECIBO
1644	PR 22 EASTBOUND	74.80	PR 10	ARECIBO
1645	PR 22 WESTBOUND	78.00	PR 129	ARECIBO
1646	PR 22 EASTBOUND	78.00	PR 129	ARECIBO
1647	PR 108	21.80	GRANDE DE A¥ASCO RIVER	ANASCO
1648	PR 124	8.00	GRANDE DE ANASCO RIVER	LARES
1649	PR 102	39.40	CRUCES RIVER	SABANA GRANDE
1650	PR 14	11.10	GUAYO RIVER & LOCAL ROAD	JUANA DIAZ
1651	PR 31	18.06	GURABO RIVER	LAS PIEDRAS
1652	PR 119	44.70	GRANDE DE A%ASCO RIVER	SAN SEBASTIÁN
1653	RAMP PR2 TO PR117	0.00	IRRIGATION CHANNEL	SABANA GRANDE
1654	RAMP PR117 TO PR2	186.00	IRRIGATION CHANNEL	SABANA GRANDE
1655	PR 608	10.43	CIALITOS RIVER	CIALES
1656	PR 3	35.00	ACCESS TO LUQUILLO BEACH	LUQUILLO
1657	PR 861	11.00	LA PLATA RIVER	TOA ALTA
1658	PR 372	0.50	YAUCO RIVER	YAUCO
1659	PR 2	186.55	CATTLE PASS	SABANA GRANDE
1660	PR 2	186.95	CREEK	SABANA GRANDE
1661	PR 2	187.10	FUTURE ROAD & CHANNEL	GUANICA
1662	UNNUMBERED ROAD	0.00	PR 2	GUANICA
1663	PR 2	188.00	MAGINA CREEK	Guánica
1664	ACCESS TO A FARM	0.00	PR 2	GUANICA
1665	PR 2	189.30	CRISTAL CREEK	Guánica
1666	PR 2	190.20	DIRT ROAD	GUANICA
1667	ACCESS ROAD	0.00	PR 2	GUANICA

1668	PR 2	191.80	CREEK	Guánica
1669	LOCAL ROAD	5.10	PR 2	GUANICA
1670	PR 2	192.80	DIRT ROAD	GUANICA
1671	OFF PR 135 KM 75.4	0.05	GUILARTE RIVER	ADJUNTAS
1672	PR 22 WESTBOUND	75.70	SANTIAGO RIVER & L ROAD	ARECIBO
1673	PR 22 EASTBOUND	75.70	SANTIAGO RIVER & L ROAD	ARECIBO
1674	PR 21	4.20	JOSEFINA CREEK	SAN JUAN
1678	RAMP PR 22 TO PR 1	0.00	NATURAL SOIL DEPRESSION	SAN JUAN
1679	RAMP PR 1 TO PR 22	0.20	DEPRESSION	SAN JUAN
1680	PR 605	12.20	VIVI RIVER	UTUADO
1683	OFF PR 603 KM 5.7	0.01	GUAONICA RIVER	UTUADO
1684	OFF PR 111 AT KM 14	0.60	CHIQUITO RIVER	UTUADO
1685	PR 22 WESTBOUND	77.10	PR 651	ARECIBO
1686	PR 22 EASTBOUND	77.10	PR 651	ARECIBO
1687	PR 22 WESTBOUND	79.30	MUNICIPAL ROAD	ARECIBO
1688	PR 22 EASTBOUND	79.30	MUNICIPAL ROAD	ARECIBO
1689	PR 493	2.90	PR 22	HATILLO
1690	URBAN LOCAL ROAD	0.60	PR 22	HATILLO
1691	PR 156	32.70	CONVENTO CREEK	COMERIO
1692	PR 189	2.90	GRANDE DE LOIZA RIVER	CAGUAS
1693	PR 159	1.70	COROZAL RIVER	COROZAL
1695	PR 123	55.10	GRANDE DE ARECIBO RIVER	UTUADO
1696	PR 357	0.70	MARICAO RIVER	MARICAO
1698	FELIX AVENUE	0.20	COROZAL RIVER	COROZAL
1699	MODESTA STREET	0.24	SABANA LLANA CREEK	SAN JUAN
1703	PR 975	10.60	CREEK	CEIBA
1704	CITY STREET	0.01	OROCOVIS RIVER	OROCOVIS

1705	PR 907	2.90	CANOVANAS RIVER	CANOVANAS
1706	PR 147	0.10	GUADIANA RIVER	NARANJITO
1709	PR 141R	0.10	GONZALEZ CREEK	JAYUYA
1710	ULTIMO BRINCO ST	0.20	GRANDE CREEK	RINCóN
1711	QUEBRADA CEIBA ST.	0.20	GUAYANES RIVER	PEÑUELAS
1712	CITY STREET	0.30	GUAYANES RIVER	PEÑUELAS
1714	OFF PR 330	0.10	DUEY RIVER	SAN GERMAN
1716	PR 22	83.90	PR 2	HATILLO
1717	PR 25 & PARKING	5.49	PR 22 (MINILLAS TUNNEL)	SAN JUAN
1718	PR 111	15.00	AGUAS SALADAS CREEK	SAN SEBASTIÁN
1719	PR 22	22.30	PR 165	TOA BAJA
1720	PR 165	14.70	PR 2	TOA BAJA
1721	PR 22	17.40	PR 865	TOA BAJA
1722	LOCAL ROAD	0.10	PR 22	TOA BAJA
1723	PR 955	6.20	MAMEYES CREEK	RIO GRANDE
1724	PR 852	0.05	DOS BOCAS CREEK	TRUJILLO ALTO
1725	PR 855	1.40	SANTA CATALINA CREEK	BAYAMON
1726	PR 22	15.60	PR 866	TOA BAJA
1727	PR 22	16.10	LOCAL ROAD	TOA BAJA
1728	PR 358	2.80	HOCONUCO RIVER	SAN GERMAN
1729	PR 396	3.20	CAIN RIVER	SAN GERMAN
1730	LOCAL ROAD	0.30	DESCALABRADO RIVER	COAMO
1731	PR 750	1.50	TALANTE CREEK	MAUNABO
1732	PR 997	6.85	LA MINA CREEK	VIEQUES
1733	PR 111	13.10	EL SALTO CREEK	SAN SEBASTIÁN
1734	PR 561	0.01	JACAGUAS RIVER	VILLALBA
1737	PR 3	130.70	NIGUA RIVER	ARROYO

1740	LOCAL ROAD	0.50	GRANDE DE MAUNABO RIVER	MAUNABO
1741	PR 808	1.40	MAVILLA RIVER	COROZAL
1742	CIPRESES STREET	0.56	SABANA LLANA CREEK	SAN JUAN
1747	PR 17	7.00	JUAN MENDEZ CREEK	SAN JUAN
1751	PR 404	0.90	YAGRUMA CREEK	MOCA
1752	PR 111	16.40	WATERWAY	SAN SEBASTIÁN
1753	PR 173	0.40	BAIROA RIVER	AGUAS BUENAS
1754	PR 189	0.00	VELENCIANO RIVER,MU¥OZ R	JUNCOS
1755	PR 909	0.50	MARIANA CREEK	HUMACAO
1756	PR 690	0.60	HONDA CREEK	VEGA ALTA
1757	PR 690	0.01	WATERWAY	VEGA ALTA
1758	PR 22	22.10	CREEK	TOA BAJA
1759	PR 867	5.75	CHANNEL	TOA BAJA
1760	PR 867	7.00	CHANNEL	TOA BAJA
1761	ROBLES STREET	0.30	URBAN CITY STREET	SAN JUAN
1764	PR 21 WESTBOUND	0.60	BUENA VISTA CREEK	SAN JUAN
1766	7 STREET	0.30	CHANNEL	CAROLINA
1768	PR 193	1.30	MATA DE PLATANO CREEK	LUQUILLO
1769	PR 152R	1.40	PADILLA CREEK	BARRANQUITAS
1771	PR 3	31.30	MAMEYES RIVER	LUQUILLO
1772	PR 167	9.10	LA PLATA RIVER	BAYAMON
1773	PR 827	1.70	CANCEL CREEK	TOA ALTA
1775	LOS GALGOS STREET	0.10	COROZAL RIVER	COROZAL
1777	PR 155	55.90	FRANQUEZ CREEK	MOROVIS
1778	HYDRA STREET	0.10	CHANNEL	CAROLINA
1780	PR 112	3.70	IRRIGATION CHANNEL	ISABELA
1783	LOCAL ROAD	0.02	HONDO RIVER	BAYAMON

1784	PR 588	1.00	CHIQUITO RIVER	PONCE
1786	LOCAL ROAD	0.01	GUILARTE RIVER	ADJUNTAS
1789	FCO. DEGETAU ST.	0.10	WATERWAY	AIBONITO
1792	PR 984	0.60	WATERWAY	FAJARDO
1793	PR 301	1.20	WATERWAY	CABO ROJO
1794	PR 301	2.05	WATERWAY	CABO ROJO
1795	PR 301	2.10	WATERWAY	CABO ROJO
1796	PR 693	0.50	NUEVO RIVER	DORADO
1798	RAMP TO PARKING	0.00	MUNOZ RIVERA STREET	AGUADILLA
1799	PR 115	0.70	IRRIGATION CHANNEL	ANASCO
1800	PR 10	78.50	PR 123	ARECIBO
1801	PR 20	0.40	GONZALEZ GIUSTY AVE.	GUAYNABO
1802	CAMPOS STREET	0.10	PORTUGUES RIVER	PONCE
1804	LOCAL ROAD	0.20	GUARACANAL CREEK	SAN JUAN
1806	PR 103	6.00	LAS TUNAS CREEK	CABO ROJO
1807	RAMON RODZ AVENUE	0.40	HONDO RIVER	BAYAMON
1808	BETANCES AVENUE	0.50	SANTA CATALINA CREEK	BAYAMON
1809	SAN IGNACIO STREET	0.10	GUAYNABO RIVER	GUAYNABO
1810	PR 943	1.50	GURABO RIVER	GURABO
1811	PR 908	0.10	MARIANA CREEK	HUMACAO
1812	PR 14	34.20	COAMO RIVER	COAMO
1814	PR 3	36.10	MATA DE PLATANO CREEK	LUQUILLO
1815	PR 3	37.10	PR 992	LUQUILLO
1816	PR 3	37.50	SABANA RIVER	LUQUILLO
1817	PR 3	39.40	PITAHAYA RIVER	LUQUILLO
1818	PR 3	39.80	PR 940	LUQUILLO
1819	PR 181	5.50	GRANDE DE LOIZA RIVER	TRUJILLO ALTO

1820	LOCAL ROAD	0.04	UNNAMED CREEK	CATANO
1822	LOCAL ROAD	0.20	RAYO MINILLAS RIVER	SABANA GRANDE
1823	VICENT STREET	0.00	GRANDE DE JAYUYA RIVER	JAYUYA
1825	PR 187	17.10	GRANDE DE LOIZA RIVER	LOIZA
1826	RAMP PR30 TO PR198	0.10	HUMACAO RIVER	HUMACAO
1829	PR 194	0.90	FAJARDO CREEK	FAJARDO
1830	PR 712	5.00	MAJADA RIVER	SALINAS
1831	13 STREET	0.80	SANTA CATALINA CREEK	BAYAMON
1832	PR 131	1.20	GUILARTE RIVER	ADJUNTAS
1833	RURAL LOCAL ROAD	0.15	GUILARTE RIVER	ADJUNTAS
1837	OFF PR 348	0.10	NUEVE PASOS RIVER	SAN GERMAN
1838	OFF PR 330	0.05	DUEY RIVER	SAN GERMAN
1840	PR 423	5.30	GRANDE CREEK	MOCA
1841	URUGUAY STREET	0.10	BLASINA CREEK	CAROLINA
1842	10 STREET	0.40	SIERRA LINDA CREEK	BAYAMON
1843	10 STREET	0.50	SANTA CATALINA CREEK	BAYAMON
1845	11 STREET	0.40	FAJARDO CREEK	FAJARDO
1846	PR 833	12.10	GUAYNABO RIVER	GUAYNABO
1847	PR 22 WESTBOUND	22.70	LA PLATA RIVER & PR 693	TOA BAJA
1848	SAN IGNACIO AVENUE	0.50	PR 20 (MRTNZ. NADAL EXP)	GUAYNABO
1849	PERIFERAL ST.	0.40	PR 20 (MRTNZ. NADAL EXP)	GUAYNABO
1851	PR 9929	0.10	CREEK	SAN LORENZO
1852	PR 14	2.20	PORTUGUES RIVER	PONCE
1853	PR 3336	0.90	WATERWAY	GUAYANILLA
1854	PR 156	34.70	HIGUERO CREEK	COMERIO
1855	PR 2	145.70	GRANDE DE AÑASCO RIVER	ANASCO
1856	PR 133	0.60	PORTUGUES RIVER	PONCE

1857	OFF PR 5 at Km .3	0.30	WATERWAY	NARANJITO
1858	PR 840	0.10	CERRO GORDO CREEK	BAYAMON
1859	PR 139	1.20	BAYAGAN RIVER	PONCE
1860	LOCAL ROAD	0.10	PI%ONA RIVER	BARRANQUITAS
1863	PR 368	0.50	GUANAJIBO RIVER	SABANA GRANDE
1864	PR 60 NORTH BYPASS	3.20	LOS SAUCES STREET	HUMACAO
1865	PR 60 NORTH BYPASS	2.70	PR 924	HUMACAO
1866	INT N MARTINEZ AVE	0.30	WATERWAY	BAYAMON
1867	PR 380	0.50	HONDO RIVER	MAYAGÜEZ
1868	PR 3R	0.50	IRRIGATION CHANNEL	PATILLAS
1869	PR 332	1.70	LOCO RIVER	Guánica
1871	PR 2	88.90	CAMUY RIVER & LOCAL ROAD	HATILLO
1872	PR 60 NORTH BYPASS	2.20	ATANASIO CUADRA STREET	HUMACAO
1873	PR 378	0.70	GUAYANILLA RIVER	GUAYANILLA
1874	PR 20 SOUTHBOUND	4.40	PR 169 & FRAILES CREEK	GUAYNABO
1875	PR 20 NORTHBOUND	4.40	PR 169 & FRAILES CREEK	GUAYNABO
1876	PR 20 SOUTHBOUND	5.00	PR 199	GUAYNABO
1877	PR 20 NORTHBOUND	5.20	PR 199	GUAYNABO
1878	PR 5	0.75	SANTA JUANITA CREEK	BAYAMON
1880	OFF PR 411	0.80	INGENIO RIVER	AGUADA
1881	OFF PR 411	0.50	INGENIO RIVER	AGUADA
1883	PR 114	4.00	GUANAJIBO RIVER	HORMIGUEROS
1884	MONSERRATE AVENUE	2.00	BLASINA CHANNEL	CAROLINA
1885	ALMENDRO STREET	0.20	LAJAS RIVER	DORADO
1890	PARQUE DE NI¥OS ST	0.20	FRAILES CREEK	GUAYNABO
1891	PR 14 MALECON AVE.	3.40	PR 2	PONCE
1892	PR 14 MALECON AVE.	3.85	PORTUGUES RIVER	PONCE

1893	PR 14 MALECON AVE.	4.30	PR 163	PONCE
1894	PR 178	0.80	NIGUA RIVER	ARROYO
1895	PR 645	0.10	HICOTEA CREEK	VEGA BAJA
1896	OFF PR 561	0.10	PULGA CREEK	VILLALBA
1898	PR 177	9.50	PIEDRAS RIVER	SAN JUAN
1899	PR 199	10.50	LOS FRAILES CREEK	GUAYNABO
1900	PR 20	1.20	PR 17 (PI%ERO AVENUE)	GUAYNABO
1901	PR 9959	1.80	CANOVANAS RIVER	CANOVANAS
1902	PR 21 EASTBOUND	0.06	BUENA VISTA CREEK	SAN JUAN
1903	OFF PR 378 AT 3.30	0.01	GUAYANILLA RIVER	GUAYANILLA
1904	ACCESS STREET	0.01	UNNAMED CREEK	AIBONITO
1905	PR 119	5.40	PR 2	CAMUY
1906	PR 199	12.60	PIEDRAS RIVER	SAN JUAN
1907	PR 799	1.30	GRANDE DE PATILLAS RIVER	PATILLAS
1908	PR 960	0.14	GRANDE RIVER	RIO GRANDE
1909	PR 925	6.70	FRONTERA CREEK	HUMACAO
1910	PR 199	11.20	PR 1	SAN JUAN
1911	PR 144	5.10	CARICABOA RIVER	JAYUYA
1912	PR 144	5.00	GRANDE DE JAYUYA RIVER	JAYUYA
1913	PR 9957	2.70	CANOVANAS RIVER	CANOVANAS
1914	PR 3	41.40	JUAN MARTIN RIVER	LUQUILLO
1915	PR 195	0.01	PR 3	FAJARDO
1916	RAMP PENITENTIARY	0.00	PR 18 (LAS AMERICAS EXP)	SAN JUAN
1917	PR 627	1.00	GRANDE DE ARECIBO RIVER	ARECIBO
1918	PR 838	1.50	UNNAMED CREEK	GUAYNABO
1919	PR 3	46.20	UNNAMED CREEK	FAJARDO

1920	Offf end of PR-598 @ Km 28.48 on Camino Dr. Umpierre	0.09	SALTOS CREEK,UMPIERRE ST	OROCOVIS
1921	PR 704	3.50	OBISPO CREEK	COAMO
1922	PR 1	127.00	PORTUGUES RIVER	PONCE
1928	UNNUMBERED CITY ST	0.20	CA¥ABONCITO RIVER	CAGUAS
1929	PR 199	19.10	GUANO RIVER	SAN JUAN
1930	PR 3	75.30	BOCA PRIETA CHANNEL	HUMACAO
1931	PR 923	2.10	HUMACAO RIVER	HUMACAO
1932	PR 60	1.70	LOCAL ROAD & MABU CREEK	HUMACAO
1933	PR 60	1.50	LOCAL ROAD	HUMACAO
1936	PR 114	10.10	GUANAJIBO RIVER	SAN GERMAN
1937	PR 153	14.00	COAMO RIVER	COAMO
1938	OFF PR 866	0.05	CREEK	TOA BAJA
1939	OFF PR 1	0.00	UNNAMED CREEK	CAYEY
1940	PR 397	3.00	CA%AS RIVER	LAS MARIAS
1941	PR 52 SOUTHBOUND	100.50	PR 1	PONCE
1942	PR 52 NORTHBOUND	100.50	PR 1	PONCE
1943	ZORZAL STREET	0.10	CA¥ABONCITO RIVER	CAGUAS
1944	OFF PR 157 AT 3.80	0.10	DE CACAOS CREEK	OROCOVIS
1945	PR 114	5.60	GUANAJIBO RIVER	HORMIGUEROS
1946	PR 22 WESTBOUND	32.40	PR 2, PR 676 & WATERWAY	VEGA ALTA
1947	PR 22 EASTBOUND	32.40	PR 2, PR 676 & WATERWAY	VEGA ALTA
1948	PR 704	2.10	LOS CANALITOS CREEK	COAMO
1949	OFF PR 704	0.50	OBISPO CREEK	COAMO
1950	OFF PR 704	0.80	OBISPO CREEK	COAMO
1951	OFF PR 704	2.00	OBISPO CREEK	COAMO
1952	PR 22 EASTBOUND	23.80	LA PLATA RIVER & PR 693	TOA BAJA

1953	JOSE DE DIEGO AVE.	0.10	GUARALCANAL CREEK	SAN JUAN
1954	PR 53 EASTBOUND	92.85	HUCAR CREEK	SALINAS
1955	PR 53 WESTBOUND	92.85	HUCAR CREEK	SALINAS
1956	PR 53 EASTBOUND	90.80	PR 706	SALINAS
1957	PR 53 WESTBOUND	90.80	PR 706	SALINAS
1958	PR 156	35.70	ARROYATA RIVER	COMERIO
1959	PR 156	35.60	LA PLATA RIVER	COMERIO
1960	PRUDENCIO RIVERA	0.20	AQUA EXPRESO CHANNEL	SAN JUAN
1961	PR 101	17.70	CREEK	CABO ROJO
1962	PR 151	0.17	JACAGUAS RIVER	VILLALBA
1963	PR 187	5.70	HERRERA RIVER	RIO GRANDE
1964	OFF PR 796	0.20	BAIROA RIVER	CAGUAS
1965	PROVIDENCIA AVENUE	0.00	ESCARCHA CREEK	TOA ALTA
1966	OFF PR 777	0.10	CAGUITAS RIVER	AGUAS BUENAS
1967	LOCAL ROAD	0.01	PR 177	GUAYNABO
1968	PR 169	2.00	FRAILES CREEK	GUAYNABO
1969	PR 35	3.80	PR 1	SAN JUAN
1970	RAMP TO PR 52	0.30	PIEDRAS RIVER	SAN JUAN
1971	PR 22 EASTBOUND	64.90	PR 2	ARECIBO
1972	PR 22 WESTBOUND	64.50	PR 2	ARECIBO
1973	PR 761	0.10	NARANJITO CREEK	CAGUAS
1974	OFF PR 330	0.03	DUEY RIVER	SAN GERMAN
1975	PR 10	68.50	JOBOS CREEK & PR 621	UTUADO
1976	OFF PR 377	0.10	CONSEJO CREEK	GUAYANILLA
1977	KENNEDY STREET	0.10	SANTA CLARA CREEK	JAYUYA
1978	COLLING STREET	0.10	SANTA CLARA CREEK	JAYUYA
1979	SOL STREET	0.30	SANTA CATALINA CREEK	JAYUYA

1980	OFF SOL STREET	0.00	SANTA CATALINA CREEK	JAYUYA
1981	PR 406	0.15	GRANDE DE A¥ASCO RIVER	ANASCO
1982	PR 10	58.40	CAGUANAS RIVER	UTUADO
1983	PR 784	1.20	CAGUITAS RIVER	CAGUAS
1985	PR 30	6.50	CREEK	GURABO
1986	PR 15	0.10	WATERWAY	CAYEY
1987	PR 14	66.10	WATERWAY	CAYEY
1988	PR 132	21.60	DRAINAGE SYSTEM	PONCE
1993	PR 823	5.50	UNNAMED CREEK	TOA ALTA
1997	PR 330	6.00	UNKNOWN CREEK	SAN GERMAN
1998	PR 1	5.40	PR 2	SAN JUAN
1999	PR 418	0.40	CHANNEL	AGUADILLA
2000	PR 832	0.00	BAYAMON RIVER	BAYAMON
2001	PR 22 WESTBOUND	11.60	BAYAMON & HONDO RIVERS	CATANO
2003	PR 111	2.68	ANON CREEK	LARES
2006	PR 9920	0.20	GRANDE DE LOIZA RIVER	SAN LORENZO
2007	PR 510	4.60	IRRIGATION CHANNEL	JUANA DIAZ
2008	PR 613	12.00	WATERWAY	JAYUYA
2009	PR 362	4.10	TORUNO CREEK	SAN GERMAN
2010	PR 9920	1.60	ARENAS CREEK	SAN LORENZO
2012	PR 18	4.70	CHARDON STREET	SAN JUAN
2013	PR 1	12.50	PIEDRAS RIVER	SAN JUAN
2014	PR 52 SOUTHBOUND	33.30	RURAL LOCAL	CAYEY
2015	PR 52 NORTHBOUND	33.30	RURAL LOCAL	CAYEY
2016	PR 52 SOUTHBOUND	34.60	HUCAR ST.	CAYEY
2017	PR 52 NORTHBOUND	34.60	HUCAR STREET	CAYEY
2018	PR 52 SOUTHBOUND	35.10	GUAVATE RIVER	CAYEY

2019	PR 52 NORTHBOUND	35.10	GUAVATE RIVER	CAYEY
2020	PR 52 SOUTHBOUND	35.45	CATTLE PASS	CAYEY
2021	PR 52 NORTHBOUND	35.45	CATTLE PASS	CAYEY
2022	PR 52 SOUTHBOUND	36.10	LA PLATA RIVER	CAYEY
2023	PR 52 NORTHBOUND	36.15	LA PLATA RIVER	CAYEY
2024	PR 52 SOUTHBOUND	36.55	PR 738	CAYEY
2025	PR 52 NORTHBOUND	36.50	PR 738	CAYEY
2026	PR 52	38.10	LA LEY STREET	CAYEY
2027	PR 52 SOUTHBOUND	38.10	LA LEY STREET	CAYEY
2028	PR 52 NORTHBOUND	38.80	ACCESS ROAD TO PR 1	CAYEY
2029	PR 52 SOUTHBOUND	38.75	ACCESS ROAD TO PR 1	CAYEY
2030	PR 52 NORTHBOUND	40.40	PR 15	CAYEY
2031	PR 52 SOUTHBOUND	40.40	PR 15	CAYEY
2032	PR 2	197.80	PR 128	YAUCO
2035	PR 887	1.93	BLASINA CREEK	CAROLINA
2036	PR 52 SOUTHBOUND	48.70	DEPRESSION	CAYEY
2037	PR 52 NORTHBOUND	48.70	DEPRESSION	CAYEY
2038	PR 52 NORTHBOUND	49.50	PR 714 & LA PALMA CREEK	SALINAS
2039	PR 52 SOUTHBOUND	49.50	PR 714 & LA PALMA CREEK	SALINAS
2040	PR 52 SOUTHBOUND	45.80	LAPAS RIVER & LOCAL ROAD	CAYEY
2041	PR 52 NORTHBOUND	45.80	LAPAS RIVER & LOCAL ROAD	CAYEY
2042	PR 52 SOUTHBOUND	46.50	DEPRESSION	CAYEY
2043	PR 52 NORTHBOUND	46.50	DEPRESSION	CAYEY
2044	PR 52 SOUTHBOUND	47.30	CATTLE PASS	CAYEY
2045	PR 52 NORTHBOUND	47.30	CATTLE PASS	CAYEY
2046	PR 3	96.28	SANTIAGO CHANNEL	YABUCOA
2047	PR 121	5.90	MAGINA CREEK	SABANA GRANDE

2048	PR 681	16.50	CA¥O TIBURONES	BARCELONETA
2049	PR 52 NORTHBOUND	43.10	PR 715	CAYEY
2050	PR 52 SOUTHBOUND	43.10	PR 715	CAYEY
2051	PR 52 NORTHBOUND	43.60	MATON RIVER	CAYEY
2052	PR 52 SOUTHBOUND	43.60	MATON RIVER	CAYEY
2053	PR 777	0.50	CAGUITAS RIVER	AGUAS BUENAS
2054	PR 52 NORTHBOUND	41.10	S. DOMINGO CREEK, ROAD	CAYEY
2055	PR 52 SOUTHBOUND	41.10	SANTO DOMINGO CREEK,ROAD	CAYEY
2056	PR 52 SOUTHBOUND	57.40	MAJADAS RIVER & PR 712	SALINAS
2057	PR 22 WESTBOUND	72.70	GRANDE DE ARECIBO RIVER	ARECIBO
2058	PR 22 EASTBOUND	72.70	GRANDE DE ARECIBO RIVER	ARECIBO
2059	PR 52 NORTHBOUND	57.40	MAJADAS RIVER & PR 712	SALINAS
2060	PR 52 NORTHBOUND	12.10	CA¥AS RIVER & LOCAL ROAD	CAGUAS
2061	PR 52 SOUTHBOUND	12.70	CA¥AS RIVER & LOCAL ROAD	CAGUAS
2062	PR 52 NORTHBOUND	12.50	PR 700	CAGUAS
2063	PR 52 SOUTHBOUND	12.50	PR 700	CAGUAS
2064	PR 52 NORTHBOUND	13.80	PR 796	CAGUAS
2065	PR 52 SOUTHBOUND	13.80	PR 796	CAGUAS
2066	RAMP PR 52 TO PR 1	13.90	PR 1	CAGUAS
2067	PR 510	3.40	GUANABANA CREEK	JUANA DIAZ
2069	LOCAL ROAD	0.00	YAGUEZ RIVER	MAYAGÜEZ
2070	Off PR 599	0.10	OROCOVIS RIVER	OROCOVIS
2071	RAMP TO PR 26 & AV	15.10	RAMP PR 3 TO PR 26	CAROLINA
2072	PR 26	14.84	FRAGOSO AVENUE	CAROLINA
2073	DR SANCHEZ CASTANO	0.40	BLASINA CREEK	CAROLINA
2074	FRAGOSO AVENUE	0.70	BLASINA CREEK	CAROLINA
2075	OFF PR 527	0.60	JAYUYA RIVER	JAYUYA

2076	OFF PR 144	0.30	CREEK	JAYUYA
2078	OFF PR 176	0.60	PIEDRAS RIVER	SAN JUAN
2079	PR 2	104.10	GUAJATACA RIVER,LOCAL RD	QUEBRADILLAS
2080	PR 37	0.90	PR 26	SAN JUAN
2081	DEL PARQUE STREET	0.70	PR 26	SAN JUAN
2082	SAN JORGE STREET	0.70	PR 26	SAN JUAN
2083	LOCAL ROAD	0.60	GRANDE CREEK	RIO GRANDE
2084	PR 165	11.30	LAJAS RIVER	TOA ALTA
2085	PR 177 EASTBOUND	1.20	BAYAMON RIVER	BAYAMON
2086	PR 121	1.2	GUANAJIBO RIVER	SABANA GRANDE
2088	PR 22 SOUTHBOUND	1.90	MARTIN PE¥A CHANNEL,PR 1	SAN JUAN
2089	RAMP PR 1 TO PR 22	0.20	PR 22	SAN JUAN
2090	RAMP PR 1 TO PR 22	0.10	RAMP MARGINAL ST TO PR 1	SAN JUAN
2091	RAMP PR 22 TO PR 1	0.10	RAMP PR 1 TO L A STREET	SAN JUAN
2092	PR 10	80.80	TANAMA RIVER	ARECIBO
2093	PR 10	79.00	LOCAL ROAD	ARECIBO
2094	PR 3	29.40	DIRT ROAD	RIO GRANDE
2095	PR 3	29.90	CATTLE PASS	RIO GRANDE
2096	PR 3	31.20	MAMEYES CREEK	LUQUILLO
2097	PR 409	1.80	BUCARABONES RIVER	LAS MARIAS
2098	PR 409	6.50	GUABA RIVER	LAS MARIAS
2099	PR 431	4.80	PRIETO RIVER	LARES
2100	MONSERRATE AVENUE	2.00	BLASINA CHANNEL	CAROLINA
2101	CAMPO RICO AVENUE	1.80	SAN ANTON CHANNEL	CAROLINA
2102	MANUEL F. ROSSI ST	0.02	HONDO RIVER	BAYAMON
2103	AMERICO MIRANDA	2.60	BUENA VISTA CREEK	SAN JUAN
2104	AMERICO MIRANDA	2.20	JOSEFINA CREEK	SAN JUAN

2105	AMERICO MIRANDA	1.65	DOÑA ANA CREEK	SAN JUAN
2106	DE DIEGO AVENUE	2.40	DO%A ANA CREEK	SAN JUAN
2108	JOSE DE DIEGO ST.	0.02	LEVITTOWN CHANNEL	TOA BAJA
2110	LOS DOMINICOS AVE.	0.40	LEVITTOWN CHANNEL	TOA BAJA
2111	LOS DOMINICOS AVE.	0.40	LEVITTOWN CHANNEL	TOA BAJA
2112	BETANCES STREET	0.45	HONDO RIVER	BAYAMON
2113	LOS MILLONES ST.	0.20	CERRO GORDO CREEK	BAYAMON
2114	MAGNOLIA STREET	0.20	CERRO GORDO CREEK	BAYAMON
2116	CASTIGLIONI AVENUE	0.16	DRAINAGE CHANNEL	BAYAMON
2117	PR 849	2.50	SANTO DOMINGO CREEK	SAN JUAN
2118	CRISTOBAL COLON ST	0.10	WATERWAY	CAGUAS
2119	CONCHA CAMARON ST.	0.10	CHANNEL	TOA BAJA
2120	11 S.W. STREET	0.00	DO%A ANA CREEK	SAN JUAN
2121	VERGEL STREET	0.60	JUAN MENDEZ CREEK	SAN JUAN
2122	10 STREET	0.10	BUENA VISTA CREEK	SAN JUAN
2123	4 STREET	0.10	BUENA VISTA CREEK	SAN JUAN
2124	6 TH STREET	0.10	BUENA VISTA CREEK	SAN JUAN
2125	16 STREET	0.10	BUENA VISTA CREEK	SAN JUAN
2126	ANDALUCIA STREET	0.10	JOSEFINA CREEK	SAN JUAN
2127	SAN JOAQUIN STREET	0.50	MUERTO CREEK	ADJUNTAS
2128	OFF PR 123	0.10	CA¥AS RIVER	PONCE
2130	GALILEO STREET	0.30	BUENA VISTA CREEK	SAN JUAN
2131	9 S.E. STREET	0.00	JOSEFINA CREEK	SAN JUAN
2132	OLOT STREET	0.40	JUAN MENDEZ CREEK	SAN JUAN
2138	JULIAN BENGOCHEA	0.10	SANTO DOMINGO CREEK	SAN JUAN
2139	21 STREET	0.01	JOSEFINA CREEK	SAN JUAN
2140	13 STREET	0.10	DO¥A ANA CREEK	SAN JUAN

2141	21 STREET	0.10	DO¥A ANA CREEK	SAN JUAN
2142	54 S.E. STREET	0.05	JOSEFINA CREEK	SAN JUAN
2143	29 STREET S.E.	0.10	DO¥A ANA CREEK	SAN JUAN
2144	31 S.E. STREET	0.05	JOSEFINA CREEK	SAN JUAN
2145	NOTRE DAME STREET	0.10	PIEDRAS RIVER	SAN JUAN
2146	WINSTON CHURCHILL	0.46	PIEDRAS RIVER	SAN JUAN
2150	ACUARIO STREET	0.01	SAN JOSE LAGOON CHANNEL	CAROLINA
2151	LUNA STREET	0.01	SAN JOSE LAGOON CHANNEL	CAROLINA
2152	ITURREGUI AVENUE	2.20	CHANNEL	CAROLINA
2153	259 STREET	0.80	CHANNEL	CAROLINA
2154	CAMPO RICO AVENUE	2.30	CREEK	CAROLINA
2155	CAMPO RICO AVENUE	2.80	CREEK	CAROLINA
2156	ITURREGUI AVENUE	0.20	ITURREGUI CHANNEL	CAROLINA
2157	ITURREGUI AVENUE	1.30	SAN JOSE LAGOON CHANNEL	CAROLINA
2158	NORTH MAIN STREET	0.10	PASTILLO RIVER	PONCE
2160	ROAD IN CAAM CAMPU	0.10	WATERWAY	MAYAGÜEZ
2161	PR 114	2.20	WATERWAY	MAYAGÜEZ
2162	CONSTITUCION AVE.	0.50	CHANNEL	ARECIBO
2163	CONSTITUCION AVE.	1.00	CHANNEL	ARECIBO
2164	ALPIERRE STREET	0.80	GUAYNABO RIVER	GUAYNABO
2165	14 STREET	0.01	CERRO GORDO CREEK	BAYAMON
2166	NELSON MARTINEZ	0.75	DRAINAGE DITCH	BAYAMON
2167	SONIA STREET	0.20	CATALINA CREEK	BAYAMON
2170	8 STREET	0.10	CREEK	BAYAMON
2171	ECUADOR STREET	0.01	CERRO GORDO CREEK	BAYAMON
2173	LIBERTAD STREET	0.00	JUAN MENDEZ CREEK	SAN JUAN
2174	SABANA SECA AVENUE	0.60	LEVITTOWN CHANNEL	TOA BAJA

2176	4th STREET	0.30	LOS MUERTOS CREEK	HUMACAO
2178	SANTA ELENA STREET	0.10	CREEK	YABUCOA
2179	FLO. ROMERO ST.	0.00	CREEK	CAGUAS
2180	VEGA PUIG STREET	0.00	ADJUNTAS RIVER	ADJUNTAS
2182	OFF PR 139	2.20	AUSUBO CREEK	PONCE
2184	CAMPO RICO AVENUE	3.36	BLASINA CHANNEL	CAROLINA
2187	NICOLAS AGUAYO ST.	0.10	SAN ANTON CHANNEL	CAROLINA
2191	CASILLAS STREET	0.05	LOS MUERTOS CREEK	HUMACAO
2192	CASILLAS STREET	0.05	LOS MUERTOS CREEK	HUMACAO
2195	PR 837	0.30	GUAYNABO RIVER	GUAYNABO
2198	SICILIA STREET	0.01	JUAN MENDEZ CREEK	SAN JUAN
2199	VERGEL STREET	0.10	JUAN MENDEZ CREEK	SAN JUAN
2200	PR 250	0.10	ENSENADA CHANNEL	CULEBRA
2201	PR 2	88.00	UNNAMED CREEK	HATILLO
2202	PR 130	0.40	DEPRESSION	HATILLO
2204	PR 14	9.60	INABON RIVER	PONCE
2205	PR 139	11.70	MARAGUEZ RIVER	PONCE
2206	GUADALUPE ST.	0.60	PORTUGUES RIVER	PONCE
2207	PR 149	56.80	ACHIOTE CREEK	VILLALBA
2208	CONN PR 120 TO 357	0.01	MARICAO RIVER	MARICAO
2209	PR 5516	0.60	WATERWAY	ADJUNTAS
2211	PR 730	3.90	MATON ARRIBA CREEK	CAYEY
2212	RAMP PR 22 TO PR 2	32.40	UNKNOWN CREEK	VEGA ALTA
2213	RAMP PR 2 TO PR 22	37.40	UNKNOWN CREEK	VEGA ALTA
2214	PR 727	0.10	HONDA RIVER	AIBONITO
2215	PR 753	2.90	NIGUAS RIVER	ARROYO
2216	PR 706	1.40	WATERWAY	SALINAS

2217	OFF PR 694 AT 1.0	0.30	PR 22	DORADO
2218	PR 22 WESTBOUND	29.10	LOCAL ROAD	VEGA ALTA
2219	PR 22 EASTBOUND	29.10	LOCAL ROAD	VEGA ALTA
2220	PR 22 WESTBOUND	30.60	DIRT ROAD	VEGA ALTA
2221	PR 22 EASTBOUND	30.60	DIRT ROAD	VEGA ALTA
2222	PR 22 WESTBOUND	31.90	PR 690	VEGA ALTA
2223	PR 22 EASTBOUND	31.90	PR 690	VEGA ALTA
2224	PR 22 WESTBOUND	27.50	PR 694	DORADO
2225	PR 22 EASTBOUND	27.50	PR 694	DORADO
2226	PR 22 WESTBOUND	25.50	PR 659	DORADO
2227	PR 22 EASTBOUND	25.60	PR 659	DORADO
2228	ESMERALDA AVENUE	0.60	PR 20	GUAYNABO
2229	PR 2	130.12	PR 111	AGUADILLA
2230	PR 30	29.20	PR 3	HUMACAO
2231	PR 125	17.00	SALADA CREEK	SAN SEBASTIÁN
2232	PR 30	29.50	DIRT ROAD	HUMACAO
2233	PR 906	12.00	WATERWAY	HUMACAO
2234	PR 30	30.10	DIRT ROAD & WATERWAY	HUMACAO
2235	PR 402	3.10	LARGA CREEK	ANASCO
2236	PR 905	0.50	LOS SUSPIROS DITCH	YABUCOA
2237	PR 127	3.00	YAUCO RIVER	YAUCO
2238	LUCIANO VAZQUEZ RD	7.50	PIEDRAS RIVER	SAN JUAN
2239	PR 905	0.30	DITCH	YABUCOA
2240	PR 22	62.30	LOCAL ROAD	ARECIBO
2241	PR 22	63.70	LOCAL ROAD	ARECIBO
2241	PR 22	63.70	LOCAL ROAD	ARECIBO
2242	PR 704	3.60	CUYON RIVER	COAMO

2243	PR 192	1.80	SANTIAGO RIVER	NAGUABO
2244	OFF PR 902	0.20	CAPELES CREEK	SAN LORENZO
2245	PR 53	35.40	PR 906	HUMACAO
2246	PR 2 WESTBOUND	214.10	CONNECTOR PR 2 TO PR 127	PEÑUELAS
2247	PR 2 EASTBOUND	214.10	PR 127	PEÑUELAS
2248	PR 504	0.60	PORTUGUES RIVER	PONCE
2249	PR 149	67.50	LA JOYA CREEK	JUANA DIAZ
2250	PR 53 WESTBOUND	84.40	DIRT ROAD	GUAYAMA
2251	PR 53 EASTBOUND	84.40	DIRT ROAD	GUAYAMA
2252	PR 53 WESTBOUND	83.60	PR 7710	GUAYAMA
2253	PR 53 EASTBOUND	83.60	PR 7710	GUAYAMA
2254	OFF PR 173	0.10	HONDA CREEK	AIBONITO
2255	PR 53 EASTBOUND	85.50	SECO RIVER	GUAYAMA
2256	PR 53 WESTBOUND	85.30	SECO RIVER	GUAYAMA
2257	PR 119	3.16	CAMUY RIVER	CAMUY
2258	PR 27 (BARBOSA AV)	3.00	PR 17 (PI¥ERO AVENUE)	SAN JUAN
2259	U.P.R. LOCAL ROAD	0.00	PR 17 (PIÑERO AVENUE)	SAN JUAN
2260	PR 25	10.00	PR 17 (PI¥ERO AVENUE)	SAN JUAN
2261	PR 1 (MU¥OZ RIV.)	10.20	PR 17 (PI¥ERO AVENUE)	SAN JUAN
2262	PR 119	32.60	RIO GRANDE DE A¥ASCO	LAS MARIAS
2263	LA PLATA STREET	0.01	CHIQUITO RIVER	PONCE
2264	PR 144	3.60	SANTA CATALINA CREEK	JAYUYA
2265	PR 504	0.20	PORTUGUES RIVER	PONCE
2266	PR 54	1.40	GUAMANI RIVER	GUAYAMA
2267	PR 52 WESTBOUND	106.80	PR 585	PONCE
2268	PR 52 EASTBOUND	106.80	PR 585	PONCE
2269	PR 52	106.10	PORTUGUES RIVER	PONCE

2270	RAMP PR 29 TO PR 5	3.13	WATERWAY	BAYAMON
2271	PR 52 WESTBOUND	105.60	PR 10	PONCE
2272	PR 52 EASTBOUND	105.60	PR 123	PONCE
2273	PR 52	106.60	UNKNOWN CREEK	PONCE
2275	PR 26	3.80	TAPIA & DEGETAU STREET	SAN JUAN
2276	PR 26	4.30	PROVIDENCIA STREET	SAN JUAN
2278	PR 5558	0.10	PR 5556 & CUYON RIVER	COAMO
2279	PR 53 EASTBOUND	86.60	PR 713 & CIMARRONA CREEK	GUAYAMA
2280	PR 53 WESTBOUND	86.60	PR 713 & CIMARRONA CREEK	GUAYAMA
2281	PR 22	59.30	STREET 3	BARCELONETA
2282	PR 22	59.10	RURAL LOCAL ROAD	BARCELONETA
2283	PR 22 EASTBOUND	52.30	MANATI RIVER,PR 204 &140	BARCELONETA
2284	PR 22 WESTBOUND	52.30	MANATI RIVER,PR 204 &140	BARCELONETA
2285	PR 22	55.90	PAJUIL STREET	BARCELONETA
2286	PR 22	57.00	PR 140	BARCELONETA
2287	CAMINO LOS ROMEROS	0.10	RIO PIEDRAS CREEK	SAN JUAN
2288	PR 31	19.50	PINERO CREEK	JUNCOS
2289	PR 189	10.40	MAMEY CREEK	JUNCOS
2290	PR 966	0.80	ESPIRITU SANTO RIVER	RIO GRANDE
2291	PR 187	4.00	BOCA DE CANGREJO CHANNEL	LOIZA
2292	OFF PR 184	0.02	GRANDE DE PATILLAS RIVER	PATILLAS
2293	PR 341	0.60	BOQUILLA CHANNEL	MAYAGÜEZ
2294	PR 5556	0.50	CUYON RIVER	COAMO
2295	PR 115	12.40	CHANNEL	RINCóN
2296	OFF PR 115 (2.30)	0.10	UNKNOWN CHANNEL	RINCóN
2297	OFF PR 115 KM. 0.1	0.10	CHANNEL	RINCóN
2298	PR 53	0.80	MATA REDONDA CREEK	FAJARDO

2299	PR 53	3.55	AGUAS CLARAS CREEK	CEIBA
2300	PR 53	1.80	CONNECTOR TO PR 3	FAJARDO
2301	PR 53	9.50	QUEBRADA SECA CREEK	CEIBA
2302	PR 53 SOUTHBOUND	2.80	FUTURE ROAD	FAJARDO
2303	PR 53 NORTHBOUND	2.80	FUTURE ROAD	FAJARDO
2304	PR 53	3.30	PR 982	FAJARDO
2305	RAMP PR10 TO PR14	13.80	BUCANA RIVER	PONCE
2306	PR 53	3.60	DIRT ROAD	CEIBA
2307	PR 10	0.50	WATERWAY	PONCE
2308	PR 53	4.80	CEIBA CREEK & PR 975	CEIBA
2309	CAMBALACHE STREET	0.20	CAMBALACHE CREEK	RIO GRANDE
2310	PR 975	0.50	CEIBA CREEK	CEIBA
2311	RAMP PR 975- PR53	0.10	CEIBA CREEK	CEIBA
2312	PR 53	5.90	PR 978	CEIBA
2313	PR 53	26.50	COLLORES CREEK	HUMACAO
2314	OFF PR 902	0.10	CAYAGUAS RIVER	SAN LORENZO
2315	PR 53	66.50	GRANDE DE PATILLAS RIVER	PATILLAS
2316	PR 513	3.90	INDALECIA CREEK	JUANA DIAZ
2318	PR 53 EASTBOUND	82.65	DEPRESSION	GUAYAMA
2319	PR 53 WESTBOUND	82.65	DEPRESION	GUAYAMA
2320	PR 174	9.00	SANTA OLAYA CREEK	BAYAMON
2321	PR 500	1.10	CA¥AS RIVER	PONCE
2322	PR 500	1.20	PASTILLO RIVER	PONCE
2323	PR 102	21.30	PIEDRA CREEK	CABO ROJO
2324	OFF PR 185	0.15	CANOVANILLAS RIVER	CAROLINA
2325	PR 8860	0.30	CREEK	TRUJILLO ALTO
2326	PR 10	7.70	PORTUGUES RIVER	PONCE

2328	PR 933	1.68	UNKNOWN CREEK	JUNCOS
2329	LOCAL CITY STREET	0.10	SANTO DOMINGO CREEK	CAYEY
2330	OFF PR 140	0.10	CREEK	UTUADO
2331	PR 17 (PIÑERO AVE)	13.00	PR 26 (BALDORIOTY AVE.)	CAROLINA
2332	PR 17 (PI¥ERO AV.)	10.00	PR 8, SAN JOSE LAGOON	CAROLINA
2333	RAMP PR 8 TO PR 17	0.10	RAMP PR 17 TO PR 8	SAN JUAN
2334	LOCAL ROAD	0.10	CHANNEL	SAN JUAN
2335	PR 52	103.40	BUCANA RIVER	PONCE
2337	PR 22	43.90	LOCAL ROAD	MANATI
2338	PR 22	46.35	PR 686	MANATI
2339	PR 22	47.70	PR 149	MANATI
2340	PR 22	48.40	PR 604	MANATI
2341	PR 22	50.30	PR 685	MANATI
2342	PR 149	0.60	PR 668	MANATI
2343	PR 702	2.80	UNKNOWN CREEK	COAMO
2344	PR 22	50.95	RURAL LOCAL ROAD	MANATI
2345	PR 22	35.80	PR 160	VEGA BAJA
2346	PR 22 WESTBOUND	33.75	DEPRESSION	VEGA BAJA
2347	PR 22 EASTBOUND	33.40	DEPRESION	VEGA BAJA
2348	PR 52	105.60	PR 12	PONCE
2349	PR 53	84.60	UNKNOWN CREEK	GUAYAMA
2350	PR 7707	3.04	IRRIGATION CHANNEL	GUAYAMA
2352	PR 416	1.80	CULEBRA RIVER	AGUADA
2353	PR 22 WESTBOUND	36.60	PR 674 & INDIO RIVER	VEGA BAJA
2354	PR 22 EASTBOUND	36.60	PR 674 & INDIO RIVER	VEGA BAJA
2356	PR 22	38.00	VISTA VERDE AVENUE	VEGA BAJA
2357	PR 22	39.90	PR 155	VEGA BAJA

2358	PR 22	40.60	LOCAL ROAD	VEGA BAJA
2359	PR 22	41.70	PR 137	VEGA BAJA
2360	PR 22	42.00	WATERWAY	VEGA BAJA
2361	PR 22	42.50	LOCAL ROAD	VEGA BAJA
2362	PR 22	42.90	PR 2	VEGA BAJA
2363	PR 123	74.20	GRANDE DE ARECIBO RIVER	ARECIBO
2364	PR 8	0.10	CHANNEL	SAN JUAN
2365	RAMP PR 17 TO PR 8	0.01	CHANNEL	SAN JUAN
2366	PR 165R	0.10	LA PLATA RIVER	TOA BAJA
2367	PR 165R	0.08	WATERWAY PLUVIAL CONTROL	DORADO
2368	PR 52	103.00	DIRT ROAD	PONCE
2369	PR 52	102.30	DIRT ROAD	PONCE
2370	PR 52 SOUTHBOUND	101.00	LOCAL ROAD	PONCE
2371	PR 52 NORTHBOUND	101.00	LOCAL ROAD	PONCE
2372	PR 187	0.01	PR 26	CAROLINA
2373	RAMP 177 TO PR 20	1.60	LOCAL ROAD, URBAN TRAIN	SAN JUAN
2374	PR 20	1.90	PR 21 & RAILROAD	SAN JUAN
2375	RAMP PR 20 TO STH	1.90	PR 19 & RAILROAD	SAN JUAN
2376	RAMP FROM PR 20 N	1.80	PR 21	SAN JUAN
2377	PR 20	2.20	PR 21	SAN JUAN
2378	RAMP FROM PR 20 S	0.60	PR 21	SAN JUAN
2379	PR 951	1.90	CHIQUITO RIVER	CANOVANAS
2380	PR 53	30.80	FRONTERAS CREEK	HUMACAO
2381	PR 53 SOUTHBOUND	31.10	PR 3	HUMACAO
2382	PR 53 NORTHBOUND	31.10	PR 3	HUMACAO
2383	PR 53 SOUTHBOUND	31.70	PR 923, HUM.RIVER, CREEK	HUMACAO
2384	PR 53 NORTHBOUND	31.70	PR 923, HUM.RIVER, CREEK	HUMACAO

2385	PR 53 SOUTHBOUND	33.40	DIRT ROAD	HUMACAO
2386	PR 53 NORTHBOUND	33.40	DIRT ROAD	HUMACAO
2387	PR 30	30.60	PR 53	HUMACAO
2388	PR 53	30.40	FRONTERAS CREEK	HUMACAO
2389	PR 53 SOUTHBOUND	30.00	PR 925	HUMACAO
2390	PR 53 NORTHBOUND	30.00	PR 925	HUMACAO
2391	OFF PR 125	0.60	CULEBRINAS RIVER	SAN SEBASTIÁN
2392	OFF PR 191	1.10	WATERWAY	NAGUABO
2393	LOCAL ROAD OFF 383	0.50	CEDRO CREEK	PEÑUELAS
2394	OFF PR 173	0.30	GRANDE CREEK	AIBONITO
2395	PR 12	4.70	PR 1 AND PR 133	PONCE
2396	PEDRO ALBIZU ST.	0.10	UNKNOWN WATERWAY	SAN SEBASTIÁN
2397	OFF PR 371	0.30	UNKNOWN WATERWAY	YAUCO
2398	OFF PR 371	0.40	UNKNOWN WATERWAY	YAUCO
2399	CENTRAL AVENUE	0.10	UNNAMED CREEK	CAYEY
2400	OFF PR 183	1.00	LAS BAMBUAS CREEK	CAGUAS
2401	PR 127	9.10	GUAYANILLA RIVER	GUAYANILLA
2402	PR 53 SOUTHBOUND	35.90	CHANNEL	HUMACAO
2403	PR 53 NORTHBOUND	35.90	CHANNEL	HUMACAO
2404	PR 53 EASTBOUND	37.00	CANDELERO RIVE-DIRT ROAD	HUMACAO
2405	PR 53 NORTHBOUND	37.00	CANDELERO RIVE-DIRT ROAD	HUMACAO
2406	PR 53	39.40	LOS PINOS ROAD	YABUCOA
2410	PR 3	48.70	MATA REDONDA CREEK	FAJARDO
2411	PR 980	0.50	GRANDE DE LOIZA RIVER	SAN LORENZO
2412	PR 906	10.60	CANDELERO RIVER	HUMACAO
2413	RAMP PR187 TO PR26	0.20	URBAN CITY STREET	CAROLINA
2414	BARAMAYA STREET	0.20	DEL AGUA CREEK	PONCE

2415	PR 52	108.20	DEL AGUA CREEK	PONCE
2416	PR 52 EASTBOUND	107.50	BARAMAYA ST.& MATILDE RV	PONCE
2417	RAMP PR 52 - PR 2	107.50	PR 2, MATILDE RV,CREEK	PONCE
2418	BARAMAYA STREET	0.30	PR 2	PONCE
2419	PR 135	13.53	LIMANI (BLANCO) RIVER	ADJUNTAS
2420	OFF PR 759 AT 8.00	0.01	WATERWAY	MAUNABO
2422	PR 198	1.43	CHANNEL	JUNCOS
2423	PR 402	3.70	ABAD CREEK	ANASCO
2424	PR 2	142.70	ABAD CREEK	ANASCO
2425	PR 30	14.70	CHANNEL	JUNCOS
2426	RAMP PR25 TO PR17	0.05	RAMP FROM PR 17 TO PR 1	SAN JUAN
2427	PR 22	44.40	DEPRESSION	MANATI
2428	PR 53	27.10	ANTON RUIZ RIVER	HUMACAO
2429	PR 53	25.90	PR 927	HUMACAO
2430	PR 53	24.70	PR 927	HUMACAO
2431	PR 2	10.80	PR-5 AND RROAD OVER PR-2	BAYAMON
2432	OFF PR 380	0.10	HONDO RIVER	MAYAGÜEZ
2434	PR 53	28.70	LOCAL ROAD	HUMACAO
2435	AUSTRAL STREET	0.03	CHANNEL	CAROLINA
2436	PR 53	27.75	UNNAMED CREEK	HUMACAO
2437	LOS ANGELES AVE.	0.30	CHANNEL	CAROLINA
2438	PR 6693	0.53	CREEK	DORADO
2439	RAMP PR26 TO PR37	0.01	PR 26	CAROLINA
2440	PR 8	3.90	SAN ANTON CREEK	CAROLINA
2441	CruzOrtizStella ST	0.10	LOS MUERTOS CREEK	HUMACAO
2442	LOCAL ROAD	0.20	HUMACAO RIVER	HUMACAO
2443	PR 137	10.35	GRANDE CREEK	MOROVIS

2444	PR 29	3.13	PR 5	BAYAMON
2445	PR 53	6.50	PR 3	CEIBA
2446	PR 53	10.30	PR 3	CEIBA
2447	PR 53 SOUTHBOUND	17.00	PR 971 & UNKNOWN CREEK	NAGUABO
2448	PR 53	17.00	PR 971 & UNKNOWN CREEK	NAGUABO
2449	PR 53	16.40	LOCAL ROAD	NAGUABO
2450	PR 53 W	15.30	BOTIJA CREEK & LOCAL RD	NAGUABO
2451	PR 53 EASTBOUND	15.30	BOTIJA CREEK & LOCAL RD	NAGUABO
2452	PR 53	14.00	LOCAL ROAD	NAGUABO
2453	PR 53	13.00	PR 973 & PALMAS CREEK	NAGUABO
2454	LOCAL ROAD	0.10	PR 53	CEIBA
2455	PR 53	11.50	PR 974 AND DAGUAO RIVER	CEIBA
2456	OFF PR 111	0.48	CULEBRINA RIVER	SAN SEBASTIÁN
2457	LOS ANGELES AVENUE	0.20	LAS FLORES STREET	CAROLINA
2458	PR 26	9.00	LOS ANGELES AVENUE	CAROLINA
2459	PR 53	6.60	SECA CREEK	CEIBA
2460	PR 53	7.90	WATERWAY	CEIBA
2461	PR 53	9.30	SECA CREEK	CEIBA
2462	PR 3	57.80	AGUAS CLARAS CREEK	CEIBA
2463	OFF PR 179 AT K1.5	0.10	GUAMANI RIVER	GUAYAMA
2464	OFF PR 747 AT K0.2	0.10	TRINIDAD CREEK	GUAYAMA
2465	OFF PR 7755	0.10	JACABOA RIVER	PATILLAS
2467	PR 740	0.00	LA PLATA RIVER	COMERIO
2468	OFF PR 110	0.12	UNKNOWN CREEK	MOCA
2469	PR 8	5.90	PR 3	CAROLINA
2470	PR 5	3.30	WATERWAY	BAYAMON
2471	PR 2	131.00	CULEBRINAS RIVER	AGUADILLA

2472	PR 2	197.30	BERRENCHIN CREEK	YAUCO
2473	PR 8855	0.80	HONDO RIVER	BAYAMON
2474	PR 2	157.90	SABALOS CHANNEL	MAYAGÜEZ
2475	PR 114	0.20	SABALOS CHANNEL	MAYAGÜEZ
2476	OFF PR 348	0.01	GRANDE CREEK	MAYAGÜEZ
2478	KALAF STREET	0.20	PR 22	SAN JUAN
2479	PR 174	14.00	SONADORA CREEK	BAYAMON
2480	OFF PR 368	0.60	UNKNOWN CREEK	YAUCO
2481	PR 3	21.90	LAS LAJAS CREEK	RIO GRANDE
2482	OFF PR 335	0.90	YAUCO RIVER	YAUCO
2483	PR 375	1.60	YAUCO RIVER	YAUCO
2484	PR 8874	0.01	GRANDE DE LOIZA RV,PR951	CANOVANAS
2485	PR 827	7.00	PINAS CREEK	TOA ALTA
2486	WILSON STREET	0.40	LAS BAMBUAS CREEK	CAGUAS
2487	PR 735	0.70	BEATRIZ CREEK	CAYEY
2488	PR 9936	3.40	GURABO RIVER	LAS PIEDRAS
2489	PR 10	14.50	RIO BUCANA	PONCE
2490	LA COROSA STREET	0.01	WATERWAY CHANNEL	PONCE
2491	SERRALLES STREET	0.00	PR 10	PONCE
2492	PR 754	0.50	GRANDE DE PATILLAS RIVER	PATILLAS
2493	OFF PR 361 AT 4.2	0.00	CAIN RIVER	SAN GERMAN
2494	PR 53	24.80	UNKNOWN CREEK	HUMACAO
2495	PR 5	21.00	GUADIANA RIVER	NARANJITO
2497	PR 2	131.00	CULEBRINAS RIVER	AGUADILLA
2498	LOS MILLONES ST.	6.10	CREEK	CEIBA
2499	OFF PR 156	0.10	NARAJOS CREEK	AGUAS BUENAS
2500	PR 165R	0.10	LA PLATA RIVER	DORADO

2501	OFF PR 181	0.20	PRIETA CREEK	SAN LORENZO
2502	PR 203	0.00	PR 30	GURABO
2503	PR 932	0.30	PR 203	SAN LORENZO
2504	PR 203	3.50	NAVARRO CREEK	GURABO
2505	PR 203	5.80	GDE. DE LOIZA RV.&PR9931	SAN LORENZO
2506	LOCAL ROAD	0.20	CANAS RIVER	AGUADA
2507	OFF PR 636	0.01	TANAMA RIVER	ARECIBO
2508	PR 913	1.10	HONDA CREEK	SAN LORENZO
2510	PR 753	5.00	NIGUAS RIVER	ARROYO
2511	PR 9916	0.02	UNKNOWN CREEK	SAN LORENZO
2512	CATALINA AVENUE	0.50	CAGUITAS RIVER	CAGUAS
2513	PR 102	39.80	FLORES RIVER	SABANA GRANDE
2514	LAREDO STREET	0.30	INABON RIVER	PONCE
2515	PR 1	111.40	IRRIGATION CHANNEL	JUANA DIAZ
2516	PR 204	0.99	PR 30	LAS PIEDRAS
2517	PR 182	3.40	ROSA SANCHEZ CHANNEL	YABUCOA
2518	OFF PR 182	0.60	ROSA SANCHEZ CHANNEL	YABUCOA
2519	OFF PR 9921	0.10	HUMACAO RIVER	LAS PIEDRAS
2520	OFF PR 9921	0.16	HUMACAO RIVER	LAS PIEDRAS
2521	PR 430	0.10	ANASCO RIVER	ANASCO
2522	PR 941	2.10	GURABO RIVER	GURABO
2523	PR 1	117.30	JACAGUAS RIVER	JUANA DIAZ
2524	PR 53	39.90	PR 906	YABUCOA
2525	PR 53	40.20	GUAYANES RIVER	YABUCOA
2526	PR 53	43.10	SUN OIL UTILITIES	YABUCOA
2527	PR 53 SOUTHBOUND	18.30	CONNECTOR PR 53 TO PR 31	NAGUABO
2528	PR 53 NORTHBOUND	18.30	CONNECTOR PR 53 TO PR 31	NAGUABO

2529	PR 53 SOUTHBOUND	18.90	CECILIA STREET	NAGUABO
2530	PR 53 NORTHTHBOUND	18.90	CECILIA STREET	NAGUABO
2531	PR 53 SOUTHBOUND	19.60	DIRT ROAD	NAGUABO
2532	PR 53 NORTHBOUND	19.60	DIRT ROAD	NAGUABO
2533	PR 53	20.60	MAIZALES CREEK	NAGUABO
2534	PR 53	20.60	MAIZALES CREEK	NAGUABO
2535	RAMP PR53 TO PR970	20.60	MAIZALES CREEK	NAGUABO
2536	RAMP PR970 TO PR53	20.60	MAIZALES CREEK	NAGUABO
2537	PR 53	20.75	PR 970	NAGUABO
2538	PR 53	20.75	PR 970	NAGUABO
2539	PR 53	21.00	VACA CREEK	NAGUABO
2540	PR 53	21.00	VACA CREEK	NAGUABO
2541	RAMP PR970 TO PR53	21.00	VACA CREEK	NAGUABO
2542	RAMP PR53 TO PR970	21.00	VACA CREEK	NAGUABO
2543	PR 53 SOUTHBOUND	21.50	CHANNEL	NAGUABO
2544	PR 53	21.50	CHANNEL	NAGUABO
2545	PR 53	22.10	BLANCO RIVER & PR 31	NAGUABO
2546	PR 642	0.01	GRANDE DE MANATI RIVER	MANATI
2547	PR-239	4.70	WATERWAY CHANNEL	MAYAGÜEZ
2548	OFF PR 9921	1.60	WATERWAY CHANNEL	LAS PIEDRAS
2550	OFF PR 535	0.10	CA¥AS RIVER	JUANA DIAZ
2551	PR 156	57.00	CAGUITAS RIVER	CAGUAS
2552	PR 156	54.00	CAGUITAS RIVER	AGUAS BUENAS
2553	OFF PR 765	0.16	BLANCA CREEK	SAN LORENZO
2554	PR 53	22.10	BLANCO RIVER & PR 31	NAGUABO
2555	PR 53	23.10	DIRT ROAD & CHANNEL	NAGUABO
2556	PR 53	23.10	DIRT ROAD & CHANNEL	NAGUABO

2557	PR 167	5.60	MULA CREEK	NARANJITO
2558	OFF PR 123	0.10	CREEK	ARECIBO
2559	PR 10	14.70	PORTUGUES RIVER	PONCE
2560	OFF PR 757 @ K3.8	0.10	DE APEADERO RIVER	PATILLAS
2561	PR 9905	3.60	LIMONES RIVER	YABUCOA
2562	PR 152R	1.60	PI%ONA RIVER	BARRANQUITAS
2563	LA HACIENDA ST.	0.10	PI%ONAS RIVER	BARRANQUITAS
2564	PR 5553	0.90	CAONILLAS RIVER	VILLALBA
2565	PR 5553	1.30	CREEK	VILLALBA
2568	OFF PR 812	1.30	RIITO RIVER	BAYAMON
2569	PR 199	8.40	GUAYNABO RIVER	GUAYNABO
2570	SAN IGNACIO AVENUE	0.30	GUAYNABO RIVER	GUAYNABO
2571	PR 173	2.40	LA PLATA RIVER	AIBONITO
2572	OFF PR 372	1.00	DUEY RIVER	YAUCO
2573	OFF PR 372	0.20	DUEY RIVER	YAUCO
2574	OFF PR 428	0.05	PRIETO RIVER	MARICAO
2577	OFF PR 127	0.10	CONSEJO CREEK	GUAYANILLA
2578	OFF PR 182@14.2	0.01	GUAYANES RIVER	YABUCOA
2579	OFF PR 182	0.20	GUAYANES RIVER	YABUCOA
2580	OFF PR 182	0.20	GUAYANES RIVER	YABUCOA
2581	PR 613	10.60	PALMAREJO RIVER	UTUADO
2582	OFF PR 924	0.40	COLLORES CREEK	HUMACAO
2583	PR 699	0.01	CREEK	DORADO
2584	OFF PR 375 AT 0.8	0.10	GRANDE CREEK	GUAYANILLA
2585	PR 2	225.90	UNKNOWN CREEK	PONCE
2586	LOCAL ROAD	0.10	UNKNOWN CREEK	PONCE
2588	OFF PR 184	0.10	GRANDE DE PATILLAS RIVER	PATILLAS

2589	PR 4411	0.50	CULEBRAS RIVER	AGUADA
2590	PR 156	39.20	NARANJOS CREEK	COMERIO
2591	PR-326	3.90	LOCO RIVER	YAUCO
2592	RAMP PR 2 TO PR 22	4.30	RAMP PR 22 TO PR 2	SAN JUAN
2593	PR 28	6.20	PR 2	GUAYNABO
2594	MARG. MENDEZ VIGO	0.02	YAGUEZ RIVER	MAYAGÜEZ
2595	PLAZA ESCORIAL ST.	0.02	SAN ANTON CREEK	CAROLINA
2596	PR 10	12.90	PORTUGUEZ RIVER	PONCE
2597	OFF PR 834	0.20	DON VARO CREEK	GUAYNABO
2598	OFF PR 838	0.20	LOS FRAILES CREEK	GUAYNABO
2599	ISABEL SEGUNDA ST	0.20	HONDO RIVER	BAYAMON
2600	PR 5	14.50	RAMON RODRIGUEZ AVENUE	BAYAMON
2601	PR 167	24.10	SANTA CATALINA CREEK	BAYAMON
2602	PR 20	9.10	PR 1	GUAYNABO
2603	PR 171	6.00	LA PLATA RIVER	CIDRA
2606	PR 115	9.90	QUEBRADA GRANDE	RINCóN
2607	PR 115	9.90	QUEBRADA GRANDE	RINCóN
2608	OFF PR 348	0.90	GRANDE CREEK	MAYAGÜEZ
2609	OFF PR 836	0.10	GUAYNABO RV,CAMARONES CK	GUAYNABO
2610	PR 167	1.70	DO¥A ELENA CREEK	COMERIO
2611	OFF PR 913	0.01	HONDA CREEK	SAN LORENZO
2612	PR 183	1.50	LAS BAMBUAS CREEK	CAGUAS
2613	PR 142	2.80	CREEK	DORADO
2615	PR 814	5.30	ANONES CREEK	NARANJITO
2616	LOCAL ROAD	0.00	PR 693	DORADO
2617	OFF PR 149	0.01	JACAGUAS RIVER	VILLALBA

2618	PR 423	2.30	CULEBRINAS RIVER	SAN SEBASTIÁN
2619	PR 183	11.40	LOS PUERCOS CREEK	SAN LORENZO
2620	PR 376	0.50	BARRANCHIN CREEK	YAUCO
2621	OFF PR 376	0.30	BARRANCHIN CREEK	YAUCO
2622	PR 20	7.30	LOCAL ROAD	GUAYNABO
2623	PR-20	7.30	LOCAL ROAD	GUAYNABO
2624	PR.20	9.60	PR.169 & GUAYNABO RIVER	GUAYNABO
2625	PR 116	25.10	LOCO RIVER	Guánica
2626	PR 853	2.20	MARACUTO CREEK	CAROLINA
2627	OFF PR 788	0.10	UNKNOWN CREEK	SAN LORENZO
2628	OFF PR 788	0.10	UNKNOWN CREEK	SAN LORENZO
2629	OFF PR 183	0.30	UNNAMED CREEK	SAN LORENZO
2630	OFF PR 183	0.40	UNNAMED CREEK	SAN LORENZO
2631	OFF PR 123	0.20	ADJUNTAS RIVER	UTUADO
2632	OFF PR 330	0.07	DUEY RIVER	HORMIGUEROS
2633	OFF PR 750@KM0.4	0.04	WATERWAY	MAUNABO
2634	OFF PR 759	0.10	MAUNABO RIVER	MAUNABO
2635	PR 142	6.70	LOCAL ROAD	COROZAL
2636	PR 142	5.80	MAVILLA RIVER	COROZAL
2637	RAMP PR 25 TO PR 1	7.70	PR 35	SAN JUAN
2638	PR 167	13.70	CANCEL CREEK	BAYAMON
2639	PUERTO VIEJO ST.	0.15	CHANNEL	PONCE
2640	PR 1	7.40	SAGRADO CORAZON ST.	SAN JUAN
2641	OFF PR 3	0.50	UNNAMED CREEK	RIO GRANDE
2642	PR 5	11.40	SANTA JUANITA AVENUE	BAYAMON
2643	PR 5	10.80	SOFIA STREET	BAYAMON
2644	OFF PR 764	0.00	BLANCA CREEK	SAN LORENZO

2645	OFF PR 784	0.80	CA¥ABONCITO RIVER	CAGUAS
2646	OFF PR 784	34.00	CANABONCITO RIVER	HUMACAO
2647	PRINCIPAL STREET	0.40	NIGUA RIVER	ARROYO
2648	PR 142	0.10	PR 2	DORADO
2649	PR 142	8.18	CATTLE PASS	COROZAL
2649	PR 142	7.60	CATTLE PASS	COROZAL
2650	PR 54	5.30	PATILLAS CHANNEL	ARROYO
2651	PR 34	1.20	PR 52	CAGUAS
2652	PR 181	24.40	GURABO RIVER	GURABO
2653	PR 358	0.40	HONUCO RIVER	SAN GERMAN
2654	PR-138 KM 1.6	1.60	DIRT ROAD	COAMO
2655	PR 857	4.90	LAJAS CREEK	CAROLINA
2656	PR 2	2.00	MARGINAL PR 2	SAN JUAN
2657	OFF PR 132	0.10	TALLABOA RIVER	PEÑUELAS
2658	STREET A	0.10	CREEK	CAYEY
2659	PR 901	1.30	ARENAS CREEK	MAUNABO
2660	SOFIA STREET	0.30	HONDO RIVER	BAYAMON
2661	PR 5155	0.01	OROCOVIS RIVER	OROCOVIS
2662	OFF PR 834	0.45	FUTURE PR 20	SAN JUAN
2663	PR-834	0.01	WATERWAY	GUAYNABO
2664	Local Road	0.40	PR 834	GUAYNABO
2666	OFF PR 164	0.10	GUADIANA RIVER	NARANJITO
2667	RUIZ SOLER AVE.	0.40	RAILROAD	BAYAMON
2668	PR 880	0.60	RAILROAD	GUAYNABO
2669	OFF PR 155	1.00	HOYA HONDA CREEK	OROCOVIS
2670	PR 978	2.20	SARDINERA CHANNEL	FAJARDO
2671	PR 10	4.50	PORTUGUEZ RV,PR503,PR504	PONCE

2672	PR 29	2.40	UNNAMED CREEK	BAYAMON
2673	PR 5	8.10	BUCHANNAN CHANNEL	CATANO
2674	PR 156	28.95	HONDO RIVER	COMERIO
2675	PR 446	1.70	GUATEMALA RIVER	SAN SEBASTIÁN
2676	DESVIO SUR ST.	0.85	UNNAME CREEK	AGUADA
2677	PR 411	1.00	CULEBRAS RIVER	AGUADA
2678	OFF PR 361 AT 4.4	0.80	CAIN RIVER	SAN GERMAN
2679	CONNECT PR123 @518	0.05	CIDRA RIVER	ADJUNTAS
2680	OFF PR 368 AT 12.0	0.90	UNKNOWN CREEK	YAUCO
2681	PR 555	9.30	COAMO RIVER	COAMO
2683	PR 555	9.30	COAMO RIVER	COAMO
2684	PR 569	3.60	WATERWAY	OROCOVIS
2685	PR 123	37.00	CIDRA RIVER	ADJUNTAS
2686	PR 1 KM.81.3	81.30	MAJADA RIVER	SALINAS
2687	PR 127	8.00	GUAYANILLA RIVER	GUAYANILLA
2688	PR 3	124.70	GRANDE DE PATILLAS RIVER	PATILLAS
2690	LOCAL ROAD	0.30	UNNAMED CREEK	TRUJILLO ALTO
2691	LOCAL ROAD	0.30	UNKNOWN CREEK	TRUJILLO ALTO
2692	CONNECTOR ROAD 0.2	0.20	DIRT ROAD	CABO ROJO
2693	PR 688	2.80	CIBUCO RIVER	VEGA BAJA
2694	PR 646	0.10	HICOTEA CREEK	VEGA BAJA
2695	PR-7711	0.40	GUAMANI RIVER	GUAYAMA
2696	RAMP F.PR22 TO PR2	5.90	CONNECTOR	GUAYNABO
2697	OFF PR 852	0.60	UNKNOWN CREEK	TRUJILLO ALTO
2698	RURAL LOCAL ROAD	0.30	CULEBRA CREEK	RIO GRANDE
2699	CORUJO COLLECTOR	0.20	HONDO RIVER	TOA BAJA
2700	PR 3	132.70	QUEBRADA CORAZON	GUAYAMA

2701	PR 111	26.70	SALTO COLLAZO CREEK	SAN SEBASTIÁN
2702	PR 1	3.80	SAN ANTONIO CHANNEL	SAN JUAN
2703	PR 511	10.60	INABON RIVER	PONCE
2704	PR 429	1.55	GRANDE CREEK	RINCóN
2705	PR 916	3.90	QUEBRADA GRANDE CREEK	SAN LORENZO
2706	PR-2	198.70	YAUCO RIVER & PR-335	YAUCO
2707	PR 3	132.00	NIGUA RIVER	ARROYO
2709	OFF 348 @ KM 1.2	1.20	BRUJO RIVER	SAN GERMAN
2710	R. PR-5 TO PR 22	0.10	PR-5 KM 7.20	BAYAMON
2711	PR 3	127.40	YAUREL CREEK	ARROYO
2712	PR 319	1.10	ROSARIO RIVER	HORMIGUEROS
2713	OFF PR-744	0.01	IRRIGATION CHANNEL	GUAYAMA
2714	PR 54	3.30	UNKNOWN CREEK	GUAYAMA
2715	OFF PR-561	0.30	UNKNOWN CREEK	VILLALBA
2716	PR 191	28.10	BLANCO RIVER	NAGUABO
2721	PR 31	6.40	LOS RABANOS CREEK	LAS PIEDRAS
2722	PR-182	2.80	GUAYANES RIVER	YABUCOA
2723	PR-10 KM 4.55	4.55	PR-14 KM 4.10	PONCE
2724	PR 3132	0.30	QEBRADA SANTO DOMINGO	PEÑUELAS
2725	PR 375	9.84	GRANDE CREEK	YAUCO
2726	PR 375	9.74	GRANDE CREEK	YAUCO
2727	PR 375	9.50	GRANDE CREEK	YAUCO
2728	LOCAL ROAD	0.70	PR 5	NARANJITO
2729	PR 123	75.10	GRANDE DE ARECIBO	ARECIBO
2731	OFF PR 381	0.01	HONDA CREEK	GUAYANILLA
2732	PR 375	9.40	GRANDE CREEK	YAUCO
2733	PR 448	1.12	SALTO COLLAZO CREEK	SAN SEBASTIÁN

2734	PR 165	30.00	BAYAMON & HONDO RIVERS	CATANO
2735	PR 156	59.30	CAGUITAS RIVER	CAGUAS
2736	PR 7736	0.10	PLATA CREEK	CAYEY
2737	PR 867	0.80	UNNAMED CREEK	TOA BAJA
2738	PR 431	4.10	BLANCO RIVER	LARES
2739	PR 540	1.20	Cañas River	JUANA DIAZ
2740	PR 102	13.60	LAGUNA CHANNEL	CABO ROJO
2741	Local Road	0.30	Chardon Avenue	SAN JUAN
2742	PR 450	1.76	UNKNOWN CREEK	SAN SEBASTIÁN
2743	PR 115	21.00	GUAYABO RIVER	AGUADA
2744	PR 844	13.70	PR 199	SAN JUAN
2745	PR 512	3.80	GUAYO RIVER	JUANA DIAZ
2746	PR 2	203.60	PR 377	GUAYANILLA
2747	LOCAL ROAD	14.30	CELBA CREEK	PEÑUELAS
2748	LOCAL ROAD	0.30	MATON RIVER	CAYEY
2749	LOCAL ROAD	1.28	MATON RIVER	CAYEY
2750	LOCAL ROAD	0.01	MATON RIVER	CAYEY
2751	LOCAL ROAD KM 2.8	1.80	MATON RIVER	CAYEY
2752	LOCAL ROAD	0.10	GRANDE RIVER	JAYUYA
2753	OFF PR 539 @ K 0.7	0.40	SALIENTE RIVER	JAYUYA
2754	LOCAL ROAD	0.10	SALIENTE RIVER	JAYUYA
2755	Local Road	0.10	Rio Guanajibo	SAN GERMAN
2756	OFF PR 203	0.30	GRANDE DE LOIZA RIVER	SAN LORENZO
2757	LOCAL ROAD	0.30	PR 5	NARANJITO
2758	PR-828	0.40	DIRT ROAD (FUTURE PR-5)	TOA ALTA
2759	PR 116	21.30	LOCO RIVER	Guánica
2760	PR 2	75.80	GRANDE DE ARECIBO RIVER	ARECIBO

2761	PR 160	1.60	INDIO RIVER	VEGA BAJA
2762	PR 156	29.30	CAGUITAS RIVER	CAGUAS
2763	OFF PR-332	0.30	LOCO RIVER	Guánica
2764	URBAN LOCAL ROAD	0.15	CAGUITAS RIVER	CAGUAS
2765	Local Road	1.10	Chiclana Creek	SAN JUAN
2766	Ave Peñoncillo	1.00	INABON RIVER	JUANA DIAZ
2770	PR 861	5.40	BUCARABONES RIVER	TOA ALTA
2771	PR 829 km 0.01	5.40	Unknown Creek	TOA ALTA
2772	PR 735	1.30	LA PLATA RIVER	CAYEY
2773	ACCESS TO URB.	0.80	CIDRA LAKE	CIDRA
2774	PR 22	0.20	MARGARITA CREEK	SAN JUAN
2775	URBAN LOCAL ROAD	0.30	MABU CREEK	HUMACAO
2776	PR 140	45.30	WATERWAY	UTUADO
2777	PR 5557	0.60	CUYON RIVER	COAMO
2782	RAMP FROM PR18	0.02	PR-18,PR-22 ,Creek	SAN JUAN
2783	PR 5561	0.10	Jacaguax River	VILLALBA
2784	PR-5561 KM 1.75	1.75	PR-150 KM 1.50	VILLALBA
2785	PR-2	3.30	PUERTO NUEVO RIVER	SAN JUAN
2786	PR 194	4.20	FAJARDO RIVER	FAJARDO
2787	DE DIEGO AVENUE	0.40	PR 18 (LAS AMERICAS EXP)	SAN JUAN
2788	PR 924	4.20	COLLORES CREEK	HUMACAO
2789	PR 3132	0.20	TALLABOA RIVER	PEÑUELAS
2791	PR 66	4.20	GRANDE DE LOIZA RIVER	CAROLINA
2792	RAMP TO PR 330	0.01	PR 2	SAN GERMAN
2793	PR 25	3.40	SAN ANTONIO CHANNEL	SAN JUAN
2794	PR 617	0.20	MOROVIS RIVER	MOROVIS
2795	ARCHILLA STREET	0.01	VIVI RIVER	UTUADO

2796	PR 380	1.50	CAMINO DEL GUAYO CREEK	MAYAGÜEZ
2797	PR 861	4.00	WATERWAY	TOA ALTA
2798	OFF PR 755	0.30	IRRIGATION CHANNEL	ARROYO
2799	RAMP PR-2 TO PR-23	0.03	PR-20 (Martinez Nadal)	GUAYNABO
2800	PR 3362	0.20	PR 2	SAN GERMAN
2801	PR 121	13.20	CREEK	YAUCO
2802	PR 368	1.79	COCOS RIVER	SABANA GRANDE
2804	PR 5	5.70	Los Millones Ave	BAYAMON
2805	PR-5 KM 5.70	5.70	Los Millones Ave.	BAYAMON
2806	PR 2	216.40	UNNAMED CREEK	PONCE
2807	PR 27	0.75	Waterway Local Road	SAN JUAN
2808	PR 488	3.30	CAMUY RIVER	HATILLO
2809	PR 184	8.80	UNNAMED CREEK	PATILLAS
2810	PR 184	8.85	QUEBRADA ARRIBA CREEK	PATILLAS
2811	RAMP PR 2 AND PR 3	0.20	PR 3	CAROLINA
2812	PR 66	0.20	PR 3	CAROLINA
2813	R PR 26 TO PR 887	0.40	RAMP 3 TO PR 26	CAROLINA
2814	PR-66	0.40	Ramp To PR-3	CAROLINA
2815	PR-858	0.66	PR-66	CAROLINA
2816	PR 66	4.60	WATERWAY	CAROLINA
2817	PR-66 KM. 4.90	4.90	PR-853 KM. 2.00	CAROLINA
2818	PR 859	0.70	PR 66	CAROLINA
2819	Off PR 859 At 1.45	1.00	PR 66 KM 7.0	CAROLINA
2820	PR-66	7.80	Local Road	CAROLINA
2821	PR-66	8.40	Local Road	CAROLINA
2822	PR 66	8.90	CANOVANILLAS RIVER	CAROLINA
2823	PR-66	9.30	Turpial Street	CANOVANAS

2824	PR-66	10.82	PR-185	CANOVANAS
2825	PR-66	11.73	URBAN LOCAL ROAD	CANOVANAS
2826	PR 66	12.10	PR 962 & CANOVANAS RIVER	CANOVANAS
2828	PR-181	1.20	PR-3	SAN JUAN
2829	PR 204	1.48	CEIBA NORTE CREEK	LAS PIEDRAS
2830	CONN. PR181 TO 175	0.15	RIO GRANDE DE LOIZA	TRUJILLO ALTO
2831	PR-12	2.10	Highway, Caribe Ave.	PONCE
2832	Contreras Ave.	0.90	PR-12	PONCE
2833	PR-3	11.10	PR-853	CAROLINA
2834	PR 14	4.60	DITCH	PONCE
2835	PR 155	42.40	GRANDE DE MANATI RIVER	MOROVIS
2836	PR 100	1.00	GUANAJIBO RIVER	HORMIGUEROS
2837	PR-66 KM 2.40	2.90	PR-887 KM 2.0	CAROLINA
2838	PR 66	0.90	Blasina Creek	CAROLINA
2839	PR 66	1.40	PR 887	CAROLINA
2840	OFF PR957 KM. 0.15	0.03	UNKNOWN CREEK	CANOVANAS
2841	OFF PR 913 @ Km 4.5	0.01	Waterway	SAN LORENZO
2842	OFF PR 512 at KM 4.3	0.01	GUAYO RIVER	JUANA DIAZ
2843	PR-2	174.50	PR-122	SAN GERMAN
2844	PR-4494	1.50	DEPRESSION	ISABELA
2845	PR 4494	1.10	WATERWAY	ISABELA
2846	PR 4494	0.40	WATERWAY	ISABELA
2847	OFF PR-1	0.01	PR-8834	GUAYNABO
2848	OFF PR-165 AT KM.	0.20	PR-5	TOA ALTA
2849	PR-827	0.10	PR-5	TOA ALTA
2850	PR 375	9.06	GRANDE CREEK	YAUCO
2851	PR 994	1.30	KIANI LAGOON	VIEQUES

2852	PR 994	2.10	KIANI LAGOON	VIEQUES
2853	PR 102	1.70	Yaguez River & San Pablo	MAYAGÜEZ
2854	PR 102 Km.2.5	2.50	Llavat Channel	MAYAGÜEZ
2855	PR 102	2.85	CHANNEL	MAYAGÜEZ
2856	PR 576	0.10	Waterway	COAMO
2857	PR2	221.60	RUNOFF DRAINAGE OF PR 2	PONCE
2858	PR-2	222.00	Drain Channel Collector	PONCE
2860	LAS LOZAS STREET	0.20	CAMUY RIVER	UTUADO
2861	Highway	0.80	Creek	VILLALBA
2862	Los Millones Ave.	0.20	Santa Juanita Creek	BAYAMON
2863	PR-5567	1.60	BAUTA RIVER	MOROVIS
2864	PR 936	5.70	BOQUERON CREEK	LAS PIEDRAS
2865	CONNECTOR	169.80	PR-2	SAN GERMAN
2866	C. PR-185 T0 PR-31	0.90	GURABO RIVER	JUNCOS
2867	LOCAL ROAD	0.10	WATERWAY	NAGUABO
2868	PR 21	0.60	BUENA VISTA CREEK	SAN JUAN
2869	PR 181	34.10	IRRIGATION CHANNEL	PATILLAS
2870	OFF PR 185 AT 4.5	4.50	WATERWAY	CANOVANAS
2871	PR 907	1.60	Cubuy River	CANOVANAS
2873	PR 3132	0.30	COTTO QUEBRADAS RIVER	PEÑUELAS
2874	OFF PR-5139 (2.10)	0.10	CERRILLO RIVER	PONCE
2876	RAMP TO PR-2	0.01	PR-2	HORMIGUEROS
2877	PR-2	162.85	PR-319	HORMIGUEROS
2878	PR 615	14.50	TORO NEGRO RIVER	CIALES
2879	PR 203 Km. 1.10	1.10	Local Road Km. 0.01	GURABO
2880	RAMP CHAR TO SJU	0.30	CALLE KALAF	SAN JUAN
2881	OFF PR404 KM. 4.3	0.30	LOS MORONES CREEK	MOCA

2882	LOCAL ROAD	0.10	GRANDE DE MANATI RIVER	COROZAL
2883	LOCAL ROAD	0.01	GUATEMALA RIVER	SAN SEBASTIÁN
2884	CITY STREET	2.05	WATERWAY	MOCA
2885	PR-100	0.60	PR-114	HORMIGUEROS
2886	PR 375	9.46	WATERWAY	YAUCO
2887	PR 375	9.36	WATERWAY	YAUCO
2888	PR-9	0.63	STREET # 1 LA LULA URBAN	PONCE
2889	PR-9	0.10	PR-10	PONCE
2891	PR 778	1.90	WATERWAY	COMERIO
2892	OFF PR-115	0.10	UNNAMED CREEK	AGUADA
2893	PR 2	216.10	RAMPS TO PR 2	PONCE
2894	PR 2	221.10	CONNECTOR PR 591 & HOTEL	PONCE
2895	Off PR-135 km 0.05	0.05	Guayo River	LARES
2896	OffPR-135 km 0.12	0.12	Guayo River	LARES
2897	PR 206	1.10	Local Road & Creek	CAYEY
2898	PR 172	12.90	SABANA RIVER	CIDRA
2899	PR 2	173.65	HOSP CONCEPSION ACCESS	SAN GERMAN
2900	PR 119	0.01	PR 2	SAN GERMAN
2901	PR 901	9.00	PR 53	MAUNABO
2902	PR 53	49.70	UNNAMED CREEK	MAUNABO
2903	PR 53	49.70	EMAJAGUA CREEK	MAUNABO
2904	PR 53 KM 50.45	50.45	Unnamed Creek	MAUNABO
2905	PR-53 KM 50.45	50.45	Unnamed Creek	MAUNABO
2906	PR 53 EASTBOUND	50.55	SOMBRERITO CREEK	MAUNABO
2907	PR 53 WESTBOUND	50.55	SOMBRERITO CREEK	MAUNABO
2908	PR 53 EASTBOUND	51.35	LOCAL ROAD OFF PR 901	MAUNABO
2909	PR 53 WESTBOUND	51.35	LOCAL ROAD OFF PR 901	MAUNABO

2910	PR 53 KM 51.0	51.40	Waterway	MAUNABO
2911	_	0.00	PR 53	MAUNABO
2912	_	0.00	PR 53	MAUNABO
2913	PR 5139	0.00	CERILLO RIVER	PONCE
2914	OFF PR-588 AT 0.30	1.00	CHIQUITO RIVER	PONCE
2915	PR 700	1.00	LA BARRA CREEK	CAGUAS
2918	PR 2 Km.162.0	162.00	Unnamed Creek	HORMIGUEROS
2919	LOCAL ROAD	0.10	UNNAMED CREEK	MAUNABO
2920	OFF PR-149 AT KM.	0.10	LAS BRUJAS CREEK	JUANA DIAZ
2921	PR 751	0.01	Pitahaya Creek	ARROYO
2922	PR 5561R	0.30	JACAGUAS RIVER	VILLALBA
2924	PR-10	52.13	UNNAMED CREEK	UTUADO
2925	PR-10	51.20	DIRT ROAD	UTUADO
2926	PR-10	50.47	PR123 & RIO GDE. ARECIBO	UTUADO
2927	PR-139	1.70	WATERWAY	PONCE
2928	PR-3	123.80	IRRIGATION CHANNEL	PATILLAS
2929	LOCAL ROAD	0.10	Barrancas Creek	BAYAMON
2930	PR 128	0.00	WATERWAY	LARES
2931	PR-789	1.70	LA BAMBUAS CREEK	CAGUAS
2932	PR-2	222.75	CONNECTOR TO PR-591	PONCE
2933	PR 2	168.20	DUEY RIVER	SAN GERMAN
2934	PR 345	1.60	PR 2	HORMIGUEROS
2935	OFF PR-172 AT 13.3	1.10	CIDRA RESERVOIR DAM	CIDRA
2937	LOCAL ROAD	0.10	GRANDE DE PATILLAS RIVER	SAN LORENZO
2938	OFF PR 184 @ 11.6	0.54	GRANDE DE PATILLAS RIVER	PATILLAS
2939	PR-188	13.10	PR-66	CANOVANAS
2940	Off PR-511 Km.12.7	11.30	Inabon River	PONCE

2941	LOCAL RD	0.03	HONDA CREEK	SABANA GRANDE
2942	PR-511	11.70	Inabon River	PONCE
2943	PR 511 OFF Km12.65	12.65	Inabon River	PONCE
2944	Off PR-511 At 12.7	12.70	Inabon River	PONCE
2945	PR 511	11.30	INABON RIVER	PONCE
2946	PR-10	52.90	PR-603 & WATERWAY	UTUADO
2947	PR-10	52.20	OFF PR-123 AT KM. 52.0	UTUADO
2948	OFF PR-966 AT 2.60	0.10	LA GRANDE CREEK	RIO GRANDE
2949	PR 187	3.30	San Luis Channel	RIO GRANDE
2950	ASHFORD AVE.	0.10	CONDADO LAGOON	SAN JUAN
2951	0FF PR-156 AT13.50	0.01	TRES CRUCES RIVER	BARRANQUITAS
2952	OFF PR-157 AT 2.20	0.48	RIACHUELOS RIVER	OROCOVIS
2953	OFF PR-716 AT 1.20	0.10	CUYON RIVER	AIBONITO
2954	Local Road	0.85	CIDRA LAKE	CIDRA
2955	AR Ramos Street	0.10	MATADERO CREEK	UTUADO
2956	PR 3	81.00	MABÚ CREEK	HUMACAO
2957	OFF PR 506 @ 0.95	0.01	UNNAMED CREEK	PONCE
2958	LOCAL ROAD OFF 506	0.47	UNNAMED CREEK	PONCE
2959	OFF PR 335	0.33	YAUCO RIVER	YAUCO
2961	PR-2	127.40	ACESS TO PR-2	AGUADILLA
2962	PR 372	16.50	DUEY RIVER	YAUCO
2963	OFF PR-612 AT 3.12	0.02	CAONILLAS RIVER	UTUADO
2964	PR 116	1.20	IRRIGATION CHANNEL	LAJAS
2965	PR-66	13.70	PR-956	RIO GRANDE
2966	PR-66	19.50	PR-3 Km. 19.50	RIO GRANDE
2967	PR-122	0.80	GUANAJIBO RIVER	SAN GERMAN
2968	PR-3	141.00	GUAMANI RIVER	GUAYAMA

2969	PR-66 (WEST BOUND)	14.10	DIRT RD & CALDERON CREEK	CANOVANAS
2970	PR-66 EASTBOUND	13.80	DIRT RD & CALDERON CREEK	#N/A
2971	PR-66 EASTBOUND	14.30	Cambalache River	CANOVANAS
2972	PR-958	1.30	PR-66	RIO GRANDE
2973	PR-66	15.10	ANGOLA CREEK	RIO GRANDE
2974	PR 66	16.10	HERRERAS RIVER & CREEK	RIO GRANDE
2975	PR 66	16.10	HERRERAS RIVER & CREEK	RIO GRANDE
2976	PR-959	1.15	PR-66	RIO GRANDE
2977	PR 66	16.50	Las Lajas River	RIO GRANDE
2978	PR-66	17.50	Dirt Road	RIO GRANDE
2979	METRO URBANO ROAD	0.00	PR 22	TOA BAJA
2980	RAMP	0.00	PR 5, PR 22	BAYAMON
2981	OFF PR 900 AT K0.7	0.10	LA YUCA CREEK	YABUCOA
2982	OFF PR 900 AT K0.6	0.01	LA YUCA CREEK	YABUCOA
2983	PR 9901	0.20	CAMINO NUEVO CREEK	YABUCOA
2985	PR-2	223.75	PUNTO DE ORO AVENUE	PONCE
2987	PR-66 WESTBOUND	14.30	CAMBALACHE RIVER	CANOVANAS
2988	PR 66	15.10	ANGOLA CREEK	RIO GRANDE
2989	PR 66	16.50	Las Lajas River	RIO GRANDE
2990	PR-66	17.50	Dirt Road	RIO GRANDE
2991	OFF PR-128 KM 31.7	2.59	UNNAMED CREEK	MARICAO
2992	CALVE STREET	0.01	UNNAMED CREEK	SAN JUAN
2993	OFF PR-128 KM 31.7	0.41	UNNAMED CREEK	MARICAO
2994	D STREET	0.10	CIDRAS RIVER	ADJUNTAS
2995	PR-21	0.60	BUENA VISTA CREEK	SAN JUAN
2999	PR-7721 Ramal	0.01	WATERWAY	AIBONITO
3000	PR 5	18.75	LA PLATA RIVER	NARANJITO

3001	PR 181	0.20	PR181 & PR17 Interch	SAN JUAN
3002	Ramp PR181 to PR17	0.10	PR 17	SAN JUAN
3003	RAMP PR17>PR181	0.20	PR-17	SAN JUAN
3004	OFF PR 997 AT 3.15	3.50	UNNAMED CREEK	VIEQUES
3005	PR 2 WESTBOUND	200.70	DIRT ROAD	YAUCO
3006	PR 2 EASTBOUND	200.70	DIRT ROAD	YAUCO
3007	Off PR834 at 5.6Km	0.00	Unknown Creek	GUAYNABO
3008	PR 1 KM. 91.5	10000.00	Río Nigua	SALINAS
3009	Aldea Vazquez St.	0.70	Los Negros River	COROZAL
3010	COLISEUM STREET	0.10	CULEBRA RIVER	AGUADA
3012	Cam. Carrasco Km.	0.00	Waterway	SAN LORENZO
3013	PR 3	152.70	Unnamed Creek	SALINAS
3014	Off PR-3 Km.153	0.70	Unnamed Creek	SALINAS
3015	Off PR-3 Km.153.20	1.00	Unnamed Creek	SALINAS
3016	Hostos St. Km.0.2	0.20	Unnamed Creek	SALINAS
3018	Off PR 119 Km38.42	0.00	Unnamed Creek	SAN SEBASTIÁN
3022	Ramp PR17 to PR8	0.00	Access to Mall of SJ	SAN JUAN
3026	PR 368	10.25	LOCO RIVER	YAUCO
3027	OFF PR 780 @ K 1.0	0.30	DOÑA ELENA CREEK	COMERIO
3028	PR 3R	0.01	Mabú Creek	HUMACAO
3029	OFF PR-1 @ KM 51.5	0.10	Beatriz Creek	CIDRA
3030	Off PR 1 Km.51.5	10000.00	Watrerway	CAYEY
3038	PR-14	38.30	Descalabrado River	COAMO
3043	PR-802 OFF	0.60	Waterway	
3044	PR-9920 Km.4.30	4.30	Waterway Unname Creek	SAN LORENZO
3048	PR 111	10.40		MOCA
3049	Calle 2			GUAYNABO

3051	Off PR-149 @ Km 42.3			Ciales
3052	Off PR-372 @ Km 9.1			Yauco
3053	Off PR-372 @ Km 9.2			Yauco
3054	Off PR-2 @ Km 137.2			Aguada
3055	Off PR-135 @ Km 4.6			Lares
3056	Off PR-140 @ Km 15			Utuado
3057	PR-157	1.65		OROCOVIS
3058	Camino Los Lazos Off PR 105			MAYAGÜEZ
3059	Camino Charluisant Off PR 106			MAYAGÜEZ
3061	Off PR 149 @ Km 59.1			VILLALBA
3024 (1828)	PR 140	0.01	CREEK	BARCELONETA

Source: PRHTA

Table H.40: List of Transit Projects – San Juan TMA

Project	Municipality
Real time transit information - Metro Area	San Juan-Guaynabo-Carolina-Bayamón-Cataño-Toa Baja-Caguas
Travel Planner - Metro Area	San Juan-Guaynabo-Carolina-Bayamón-Cataño-Toa Baja-Caguas
Público transportation-new routes	San Juan
Botanic Garden Transit Route	San Juan
Increase in the frequency of connection of network routes	San Juan
Humacao, Yabucoa, Maunabo, Patillas (Provide a Público transport system that can communicate or connect between those municipalities)	Humacao
Improvement marked pavement routes SITUR	Canóvanas
Terminal trucks multi-use (SITUR) repair	Canóvanas
Construction transfer center Bo. Hato Puerco (Campo Rico)	Canóvanas
Construction of maintenance workshop	1qa
Municipality of Naranjito (Transportation System)	Naranjito

Project	Municipality
Terminal Público cars expansion/mixed-use	Loíza
Trujillo Alto (Premium Transit Corridor BRT in Trujillo Alto)	Trujillo Alto
transit System	Gurabo
Connection of rural and town areas with the metro urbano	Dorado
Transportation System Municipal TransTA	Trujillo Alto

Source: PRHTA technical team with SDG support

Table H.41: List of Transit Projects Aguadilla TMA

Project	Municipality
Público cars terminal rehabilitation	Aguada
Expansion of Público transportation system	Rincón
Acquisition of One (11) Passengers Paratransit Van f	Moca
PR-411 (There will be stops (bus shelter) in different points along the PR-411 and municipal roads in the Bo. Atalaya, Cruces and Calvache)	Rincón

Source: PRHTA technical team with SDG support

Table H.42: List of Transit Projects – Other Urbanized Areas

Project	Municipality
PR-52, PR-1 and PR-14 (High speed bus to replace the current buses that travel those highways)	Ponce
Construction of these centers will create a transit system 3 Municipalities	Ponce
SITRAS service expansion to nearby municipalities	Ponce
SITRAS Bo. La Playa of Ponce	Ponce
Traditional Urban Centers (CUT)- Reduce vehicular access to CUT. Expansion of network of existing Público transport, expansion of roads in the CUT, construction of parking lots in the CUT and installation of facilities as sheds at the trolley stops, enlarge the transportation service to the HIV patients, seniors, disabled, etc.	Mayagüez
Construction of ramps, sidewalks and bus stops	Peñuelas
Mechanical workshop (Público work)	Peñuelas
Bus Transfer Center - Prepare the design and comply with NEPA	Ponce

Source: PRHTA technical team with SDG support

Table H.43: List of ITS Projects – San Juan TMA

Project	Municipality
Installation of ITS Devices for TIM and ATIS on PR-66	Carolina-Canóvanas-Rio Grande
Installation of ITS Devices for TIM and ATIS on Expressways PR-1, PR-2, and PR-20	San Juan-Guaynabo
Installation of ITS Devices for TIM and ATIS on PR-52	Caguas-Cayey-Salinas-Santa Isabel-Juana Díaz-Ponce
Installation of ITS Devices for TIM and ATIS on PR-30	(Gurabo-Juncos-Las Piedras-Humacao
PR-167 Ramon Luis Rivera Avenue (Smart Traffic Signals Intersection Improvements)	San Juan (TMA)
PR-2 (Improvements for 15 intersection's traffic lighting)	San Juan (TMA)

Source: PRHTA technical team with SDG support

Table H.44: List of ITS Projects – Other Urbanized Areas

Project	Municipality
Installation of ITS Devices for TIM and ATIS on PR-53	Fajardo-Ceiba-Naguabo-Humacao-Yabucoa-Guayama-Salinas

Source: PRHTA technical team with SDG support

Table H.45: List of ITS Projects – Island-wide

Project	Municipality
Development of Islandwide ITS Architecture	Islandwide
Improvement to ATIS website to provide Public Transportation Information	Islandwide
Evaluation of existing communication systems for traffic signal performance measurement	Islandwide
Improvement of existing communication systems for traffic signal performance measurement	Islandwide
Implementation of Advanced Traffic Signals Systems (PR-3, PR-17, PR-167, PR-177)	Islandwide
Highway Safety Patrols (SEGURO) Program (including expansion to other Interstate sections)	Islandwide
Traffic Management Center Operations (24/7 Operations)	Islandwide
Preventive Maintenance of ITS Infrastructure	Islandwide

Source: PRHTA technical team with SDG support

Table H.46: Shortlist of Projects – San Juan TMA

Reviewed name Project	Municipality
Feasibility Study PR-5 and PR-24 (Improvements at intersection of PR-5 with PR-24)	Cataño
Route Location and NEPA Compliance Higuillar Avenue extension to PR-22	Dorado
Feasibility Study Collector PR-30 - widening	Gurabo
Feasibility and Update Environmental Study South Bypass from PR-188 to Medianía Baja (PR-187) (CFHWA)	Loíza
Feasibility Study, Capacity Increase of PR-181	Trujillo Alto
ROW and Construction, Widening PR-845 from Pasternak Street to Int. PR-199 (AC-084511)	Trujillo Alto
Study to evaluate evacuation route to the Húcares Community (detour from the Húcares Parcelas to PR-3)	Naguabo
Feasibility Study, new construction of PR-183 to PR181 Int. PR-9912	San Lorenzo
Feasibility Study, PR-865 and PR-2 Elevated intersection	Toa Baja
Constructino of Ramp PR-22 and Avenue Trio Vegabajeño (Ramps side west for the PR-22 with the Avenue Trio Vegabajeño)	Vega Baja
ROW and Construction, Barranquitas South Bypass (From PR-156 to PR-719) (AC-010194)	Barranquitas
Feasibility Study, PR-28 km 0-6 Improvements to heavy traffic mobiliy	Bayamón, Guaynabo, San Juan
Feasibility Study, PR-37 to manage cargo	San Juan
Reconstruction, PR-15 KM 24.9-25.7	Cayey
Competion of Cidra connector from PR-734 to PR-1 and PR-7787 Phase II	Cidra
Completion of Cidra connector from PR-734 to PR-1 and PR-7788 Phase III;	Cidra, Cayey
Route Location and NEPA Compliance Study, PR-9187, Rio Grande; Int PR-3 with PR-187 and PR-956 to PR-3	Río Grande
Tunel Minillas conditions assessment	San Juan
Feasibility study and reconstruction to elevate pedestrian bridge over PR-18	San Juan
Construction Cidra East Connector form #2 Street (Industrial Avenue) to PR-734 (Phase 1) Length 1.38 (AC-017242)	Cidra
Construction, Aguas Buenas Bypass from PR-156, km 53 to PR-173, Length 3.1 km (AC-020802)	Aguas Buenas
Construction, Cayey Conector, Connector PR-15, phase II (from Parque Técnológico PR-1, Cayey Connector PR-158) (AC-015802)	Cayey
Environmental Study/ROW/Design/Construction start-up, Extension PR-5 From PR-199 to PR-167 (AC-000533)	Bayamon
ROW and Construction, Isabela Connector from PR-472 to PR-113 (AC-100055)	San Juan
PR-10 relocation from STA. 37+80.00 to STA. 57+00.00, SEC. II, length 0.41 km	San Juan
Feasibility Study, Access Ramp to Country Estate, PR-167	Bayamon
Feasibility Study, Access/Exit Ramps to/from AEMEAD to/from PR-6	Bayamon
Feasibility Study, PR-203 Extension	San Lorenzo
Yabucoa Connector (completing the connector between Calle Cataina Morales and Avenida Los Veteranos)	Yabucoa

Source: PRHTA technical team with SDG support

Table H.47: Shortlist of Projects – Aguadilla TMA

Reviewed name Project	Municipality
Design, ROW, and Construction of Isabela connector PR-112 to PR-472 (AC-047205)	Isabela
Improvements to PR-112 and Connector to PR-4494- access to the Industrial Zone to the Isabela Connector, it also includes improvements to the PR-112. This project will be known as the Cano Rosa Connector (AC-011213)	Isabela

Reviewed name Project	Municipality
Feasibility study, PR-113 Connector of the beach area	Isabela
Construction Las Marías Connector, from PR-119 to Ramón Rivera street (AC-411901)	Las Marías
Feasibility Study, PR-404 by-pass	Moca
Construction, Relocation of PR-111 km. 27.9 a km. 34.0 (AC-011191)	San Sebastian/Lares
Additional Funds for Feasibility Study, Improvements to Aguadilla Airport access through PR-100, PR-107and connector to Burn street (AC-000228)	Aguadilla
Reconstruction, PR-459 from km 9 to 15 (Bo. Jobos/Bo. Bejucos); potentially including, scarification, pavement, marking and road sign	Isabela
Opertaional Traffic Study, PR-2 KM 111.5 (Intersection KFC) Operational traffic study to determine if the traffic signals to control traffic method in the intersection is the right one to avoid accident	Isabela
Study,Design, permit process and reconstruction, PR-4466 km 3 Bo. Bajuras (study, Design, permit process and construction of pluvial, safety guard and Signalization)	Isabela
Recontruction, considering safety and security, PR-466 km 7.2 & PR-466 km 6.5.	Isabela
Reconstruction, incluiding general improvements PR-4455 from km 0 to 2.5 (scarification, pavement, marking and road sign)	Isabela

Source: PRHTA technical team with SDG support

Table H.48: Shortlist of Projects – Other Urbanized Areas

Reviewed name Project	Municipality
Feasibility Study, Connector from Highway PR-140 to PR-681	Barceloneta
Feasibility and Environmental Study, PR-2 km 145to km 152 road improvements and congestion management	Mayagüez
ROW and Construction, overpass at the intersection of PR-2 with PR-114, includes the channelization of Merle and Pulida Creek and the construction of a North - South Frontage Road at PR-114 (AC-200200)	Mayagüez
Route Study, Connector of Industrial park and Merceditas	Ponce
Feasibility Study, PR-3132 South solution to road closure issues	Peñuelas
Feasibility Study, Ponce By-Pass from PR-14 to Rio Matilde	Ponce
Feasibility Study, PR-7751 connector de Arroyo from PR-753 to PR-3, KM 132.4	Arroyo
Construction, PR-545 Widening from PR-52 (Km. 1.03) to PR-14 (km. 6.03) (AC-054509)	Coamo
ROW, Lajas San German Connector Phase II, PR-321 to PR-122 (AC-012201)	Lajas/San German
Construction, Widening of PR-100 From PR-308 to PR-101 (AC-010029)	Cabo Rojo
Access Request Analysis and Preliminary Design of Geometric Improvements to PR-2 (Entrance RUM, La Vita) (AC-200241)	Mayagüez
ROW and Construction, Villalba Bypass - From PR-560 to PR-151 (STA. 24+82 to STA. 31+64) Length 0.68 (AC-556103)	Villalba
Construction, PR-10 relocation from STA. 37+80.00 to STA. 57+00.00, SEC. II, length 0.41 km (AC-100069)	Utuado/Adjuntas
Feasibility Study, PR-681 & PR-2 (conenctor from PR-681 (Islote) to Carretera PR-2)	Arecibo
Feasibility Study, road widening for PR-681 & PR-6681	Arecibo

Source: PRHTA technical team with SDG support

Table H.49: Shortlist of Projects – Island-wide

Reviewed name Project	Municipality
Vulnerability Study Islandwide	Islandwide

Source: PRHTA technical team with SDG support

Table H.50: Projects NOT included in the shortlist of the LRTP; San Juan TMA

Project	Final Rank	Municipality
PR-931 (Widening)	127	Gurabo
PR-47 (De Diego Avenue) Improvements	136	San Juan
PR-693 and PR-6165 (Improvement of intersections PR-693 and PR-6165)	156	Dorado
Guayama street's Corridor improvements	170	San Juan
Rio Píedras (Intervention Area) improvements	171	San Juan
Paraná Street's Corridor improvements	172	San Juan
Haydee Rexach Street's Extension	173	San Juan
Américo Miranda Avenue (Parking Improvements)	174	San Juan
PR-9914 KM 0-2 Improvements	186	Bayamón
PR-866 Los Dominicos Avenue (Geometric and traffic control measures)	188	Bayamón
PR-839 km 0-2.7 Improvements	189	Bayamón
PR-686 (Widening)	207	Vega Baja
Scenic routes	216	Canóvanas
Access Urb. Alturas of Río Grande and Urb. Jardines of Río Grande	232	Río Grande
PR-876 North (Widening of 2 or 4 lanes of the road)	247	Trujillo Alto
PR-846 (Widening of 2 or 4 lanes of the road)	248	Trujillo Alto
Mameyal (Intersection improvement of Mameyal)	258	Dorado
Maguayo (Intersection Improvement of Maguayo)	259	Dorado
Old San Juan Intelligence parking system	279	San Juan
Old San Juan (Parking management)	280	San Juan
Accessibility improvements Venezuela/Buen Consejo	281	San Juan
pr-865 extension to residential/commercial areas	301	Toa Baja
Peripheral street construction, parallel at the street A	304	Canóvanas

Project	Final Rank	Municipality
Designated parking areas	306	Canóvanas
PR-9902 KM 1.4 repairs	310	Yabucoa
PR-931 (Construction of access road from PR-931 in Navarro ward to the University of Turabo Campus in Rincón ward)	335	Gurabo
PR-189 (Urban center modification)	336	Gurabo
PR-189 and PR-9944 (Geometric Improvements at Intersection of PR-189 and PR-9944)	337	Gurabo
Main city Intersections (Implementation of system of security cameras)	346	Manatí
PR-199 West Las Cumbres Avenue (Geometric and traffic control measures)	137	Bayamón
Feasibility study PR-30, PR-203 and PR-9944 (Widening of PR-30 expressway by adding a right lane on eastbound direction between PR-203 and PR-9944)	123	Gurabo

Source: PRHTA technical team with SDG support

Table H.51: Projects NOT included in the shortlist of the LRTP; Other UZAs

Project	Final Rank	Municipality	TPR
Membrillo Expansion (Geometric improvement and development marginal at North of Plan Membrillo Expansion)	107	Camuy	NTPR
Fagot Avenue (Traffic light, Fagot Avenue, intersection Street Navarra)	177	Ponce	STPR
PR-1 extension with frontage roads and widening of rural roads for heavy traffic	178	Ponce	STPR
Avenida SanCristóbal -Improvements	179	Ponce	STPR
PR-12 (Relocation of the PR-12 to provide access to La Guancha sector from the existing Santiago de los Caballeros Avenue)	182	Ponce	STPR
Industrial Avenue (Industrial Avenue Collector from PLA to Los Parques Vayas Torres and Merceditas)	184	Ponce	STPR
PR-239 -Improvements	191	Mayagüez	SWTPR
Seboruco Sector (Improvement to intersection)	235	Barceloneta	NTPR
PR-666 Road (Expansion, repaving and geometric improvements)	237	Barceloneta	NTPR
Fagot Avenue (Traffic light, Fagot Avenue, entrance Res. Jose Tormos Diego)	284	Ponce	STPR
PR-65 km 0-1 Improvements	291	Mayagüez	SWTPR
PR-484 and PR-485 (Connection Bo. Cocos with the Bo. San José PR-484, from Callejón Los Paganes to PR-485 street Mena)	318	Quebradillas	NTPR
Cacao, Terranova- Quebradillas (Connection Bo. Cacao with the Bo. Terranova; Bo. Cacao, from Sector Las Talas street 17 to Bo. Terranova, street Socorro)	319	Quebradillas	NTPR
PR-988 KM 9.7 improvements	340	Luquillo	ETPR
PR-52 new interchange with Ponce Playa	181	Ponce	STPR
PR-1 and HOTEL HOWARD JOHNSON intersection improvements	285	Ponce	STPR
Feasibility Assessment of Terranova, San José- Quebradillas (Reopen the Puente Blanco Bridge Bo. Terranova, Street La Estación to Bo. San José Panoramic Street)	228	Quebradillas	NTPR

Source: PRHTA technical team with SDG support

CAPITAL COST ESTIMATES

Approach

Capital costs were calculated for each individual investment being considered, reflecting the key project characteristics regarding the scope and scale of the project (for example, the extent and length of highway widening).

The project phasing was based on the combination of rankings with the expected availability of funds, and the combination of anticipated construction periods and assumed spread of costs by construction year. Projects were added up to the level of funding assumed be available in each year.

Source Data

Project Details

A wide range of projects have been included in the LRTP, covering investments in the following categories:

- Safety;
- Operations;
- Reconstruction;
- Technologies;
- Improvements;
- Capacity Increases;
- New Construction;
- Congestion Management; and
- Preservation.

In each case, information is provided including a description of the project, and key statistics regarding the scale and scope of the project.

Costs

Estimated costs associated with the project metrics have been developed based on:

- Estimates of capital costs associated with projects included within the PRHTA Capital Improvement Program (CIP) database, June 2017;
- Costs associated with project metrics included within the PRHTA Initial Transportation Asset Management Plan (TAMP), April 2018;
- Unit costs associated with project metrics included within the PRHTA 2019-2028 Capital Improvement Program Validation report, June 22, 2018;
- Estimates of capital costs associated with projects included within the State-wide Transportation Improvement Program (STIP), Fiscal Years 2017-2020, Amendment #2 report, February 23, 2018.

The reference costs are intended to reflect latest estimates at 2018 prices, allowing for 20% cost inflation, post Hurricane María, which reflects the combination of a relatively small Island, limited construction community and rapid increase in demand for services. Projects that already have

mid-term funding estimations in the STIP but fell out of the STIP timeframe to complete were given costs based on STIP estimations increased by 20%. Full project cost tables are included on Table H.52. These total $512.11 Millions of dollars in a total of 56 projects. These projects were distributed in time considering the funding available and their rank amongst other projects; ranking methodology is explained in the following section.

Table H.52: Shortlist of Projects – San Juan TMA

Reviewed Name Project	Reference Cost (inflated by 20%)	Municipality	Region
Feasibility Study, Improvements at intersection of PR-5 with PR-24	$900,000.00	Cataño	San Juan (TMA)
Route Location and NEPA Process Compliance, Higuillar Avenue extension to PR-22	$2,000,000.00	Dorado	San Juan (TMA)
Feasibility Study, Collector PR-30 - widening	$900,000.00	Gurabo	San Juan (TMA)
Feasibility and Update Environmental Study, South Bypass from PR-188 to Mediania Baja (PR-187) (CFHWA) (AC-018760)	$10,650,000.00	Loíza	San Juan (TMA)
Feasibility Study, Capacity Increase of PR-181	$400,000.00	Trujillo Alto	San Juan (TMA)
ROW and Construction, Widening PR-845 from Pasternak Street to Int. PR-199 (AC-084511)	$4,650,000.00	Trujillo Alto	San Juan (TMA)
Study to evaluate evacuation route to the Húcares Community (detour from the Húcares Parcelas to PR-3)	$208,164.63	Naguabo	San Juan (TMA)
Feasibility Study, new construction of PR-183 to PR181 Int. PR-9912	$2,000,000.00	San Lorenzo	San Juan (TMA)
Feasibility Study, PR-865 and PR-2 Elevated intersection	$1,000,000.00	Toa Baja	San Juan (TMA)
Constructino of Ramp PR-22 and Avenue Trio Vegabajeño (Ramps side west for the PR-22 with the Avenue Trio Vegabajeño)	$1,500,000.00	Vega Baja	San Juan (TMA)
ROW and Construction, Barranquitas South Bypass (From PR-156 to PR-719) (AC-010194)	$12,600,000.00	Barranquitas	San Juan (TMA)
Feasibility Study, PR-28 km 0-6 Improvements to heavy traffic mobiliy	$900,000.00	Bayamón, Guaynabo, San Juan	San Juan (TMA)
Feasibility Study, PR-37 to manage cargo	$900,000.00	San Juan	San Juan (TMA)
Reconstruction, PR-15 KM 24.9-25.7	$531,589.13	Cayey	San Juan (TMA)
Competion of Cidra connector from PR-734 to PR-1 and PR-7787 Phase II	$666,126.80	Cidra	San Juan (TMA)
Completion of Cidra connector from PR-734 to PR-1 and PR-7788 Phase III;	$395,512.79	Cidra, Cayey	San Juan (TMA)
Route Location and NEPA Compliance Study, PR-9187, Rio Grande; Int PR-3 with PR-187 and PR-956 to PR-3	$1,000,000.00	Río Grande	San Juan (TMA)
Tunel Minillas conditions assessment	$1,000,000.00	San Juan	San Juan (TMA)
Feasibility study and reconstruction to elevate pedestrian bridge over PR-18	$2,000,000.00	San Juan	San Juan (TMA)
Construction Cidra East Connector form #2 Street (Industrial Avenue) to PR-734 (Phase 1) Length 1.38 (AC-017242)	$18,000,000.00	Cidra	San Juan (TMA)
Construction, Aguas Buenas Bypass from PR-156, km 53 to PR-173, Length 3.1 km (AC-020802)	$36,000,000.00	Aguas Buenas	San Juan (TMA)
Construction, Cayey Conector, Connector PR-15, phase II (from Parque Técnológico PR-1, Cayey Connector PR-158) (AC-015802)	$12,000,000.00	Cayey	San Juan (TMA)

Reviewed Name Project	Reference Cost (inflated by 20%)	Municipality	Region
Environmental Study/ROW/Design/Construction start-up, Extension PR-5 From PR-199 to PR-167 (AC-000533)	$82,400,000.00	Bayamon	San Juan (TMA)
ROW and Construction, Isabela Connector from PR-472 to PR-113 (AC-100055)	$42,195,000.00	San Juan	San Juan (TMA)
Feasibility Study, Access Ramp to Country Estate, PR-167	$900,000.00	Bayamon	San Juan (TMA)
Feasibility Study, Access/Exit Ramps to/from AEMEAD to/from PR-6	$900,000.00	Bayamon	San Juan (TMA)
Feasibility Study, PR-203 Extension	$900,000.00	San Lorenzo	San Juan (TMA)
Yabucoa Connector (completing the connector between Calle Cataina Morales and Avenida Los Veteranos)	$208,164.63	Yabucoa	San Juan (TMA)

Source: PRHTA technical team with SDG support

Table H.53: Shortlist of Projects – Aguadilla TMA

Reviewed name Project	Reference Cost (inflated by 20%)	Municipality	Region
Design, ROW, and Construction of Isabela connector PR-112 to PR-472 (AC-047205)	$7,174,041.60	Isabela	Aguadilla (TMA)
Improvements to PR-112 and Connector to PR-4494- access to the Industrial Zone to the Isabela Connector, it also includes improvements to the PR-112. This project will be known as the Cano Rosa Connector (AC-011213)	$4,350,000.00	Isabela	Aguadilla (TMA)
Feasibility study, PR-113 Connector of the beach area	$900,000.00	Isabela	Aguadilla (TMA)
Construction Las Marías Connector, from PR-119 to Ramón Rivera street (AC-411901)	$3,600,000.00	Las Marías	Aguadilla (TMA)
Feasibility Study, PR-404 by-pass	$900,000.00	Moca	Aguadilla (TMA)
Construction, Relocation of PR-111 km. 27.9 a km. 34.0 (AC-011191)	$43,200,000.00	San Sebastian/Lares	Aguadilla (TMA)
Additional Funds for Feasibility Study, Improvements to Aguadilla Airport access through PR-100, PR-107and connector to Burn street (AC-000228)	$7,200,000.00	Aguadilla	Aguadilla (TMA)
Reconstruction, PR-459 from km 9 to 15 (Bo. Jobos/Bo. Bejucos); potentially including, scarification, pavement, marking and road sign	$3,000,000.00	Isabela	Aguadilla (TMA)
Opertaional Traffic Study, PR-2 KM 111.5 (Intersection KFC) Operational traffic study to determine if the traffic signals to control traffic method in the intersection is the right one to avoid accident	$204,130.51	Isabela	Aguadilla (TMA)
Study,Design, permit process and reconstruction, PR-4466 km 3 Bo. Bajuras (study, Design, permit process and construction of pluvial, safety guard and Signalization)	$900,000.00	Isabela	Aguadilla (TMA)
Recontruction, considering safety and security, PR-466 km 7.2 & PR-466 km 6.5.	$664,486.42	Isabela	Aguadilla (TMA)
Reconstruction, incluiding general improvements PR-4455 from km 0 to 2.5 (scarification, pavement, marking and road sign)	$4,596,989.28	Isabela	Aguadilla (TMA)

Source: PRHTA technical team with SDG support

Table H.54: Shortlist of Projects – Other Urbanized Areas

Reviewed name Project	Reference Cost (inflated by 20%)	Municipality	Region
Feasibility Study, Connector from Highway PR-140 to PR-681	$900,000.00	Barceloneta	Other Urbanized Areas
Feasibility and Environmental Study, PR-2 km 145to km 152 road improvements and congestion management	$60,000,000.00	Mayagüez	Other Urbanized Areas
ROW and Construction, overpass at the intersection of PR-2 with PR-114, includes the channelization of Merle and Pulida Creek and the construction of a North - South Frontage Road at PR-114 (AC-200200)	$28,620,000.00	Mayagüez	Other Urbanized Areas
Route Study, Connector of Industrial park and Merceditas	$1,000,000.00	Ponce	Other Urbanized Areas
Feasibility Study, PR-3132 South solution to road closure issues	$416,329.25	Peñuelas	Other Urbanized Areas
Feasibility Study, Ponce By-Pass from PR-14 to Rio Matilde	$900,000.00	Ponce	Other Urbanized Areas
Feasibility Study, PR-7751 connector de Arroyo from PR-753 to PR-3, KM 132.4	$900,000.00	Arroyo	Other Urbanized Areas
Construction, PR-545 Widening from PR-52 (Km. 1.03) to PR-14 (km. 6.03) (AC-054509)	$6,000,000.00	Coamo	Other Urbanized Areas
ROW, Lajas San German Connector Phase II, PR-321 to PR-122 (AC-012201)	$2,250,000.00	Lajas/San German	Other Urbanized Areas
Construction, Widening of PR-100 From PR-308 to PR-101 (AC-010029)	$12,000,000.00	Cabo Rojo	Other Urbanized Areas
Access Request Analysis and Preliminary Design of Geometric Improvements to PR-2 (Entrance RUM, La Vita) (AC-200241)	$25,200,000.00	Mayagüez	Other Urbanized Areas
ROW and Construction, Villalba Bypass - From PR-560 to PR-151 (STA. 24+82 to STA. 31+64) Length 0.68 (AC-556103)	$27,300,000.00	Villalba	Other Urbanized Areas
Construction, PR-10 relocation from STA. 37+80.00 to STA. 57+00.00, SEC. II, length 0.41 km (AC-100069)	$29,430,900.00	Utuado/Adjuntas	Other Urbanized Areas
Feasibility Study, PR-681 & PR-2 (conenctor from PR-681 (Islote) to Carretera PR-2)	$900,000.00	Arecibo	Other Urbanized Areas
Feasibility Study, road widening for PR-681 & PR-6681	$900,000.00	Arecibo	Other Urbanized Areas

Source: PRHTA technical team with SDG support

Table H.55: Shortlist of Projects – Island-wide

Reviewed Name Project	Reference Cost (inflated by 20%)	Municipality	Region
Vulnerability Study Islandwide	$1,000,000.00	Islandwide	Islandwide

Source: PRHTA technical team with SDG support

PROJECT PRIORITIZATION METHODOLOGY

Goals and Objectives

To prioritize the focus of the LRTP 2045, it is important to guarantee that the projects with high impact on goals and objectives are ranked first. However, first we need to differentiate between goals and objectives and identify which are more relevant to the stakeholders than others.

To assign a priority level to each goal, three different focus groups were surveyed: citizens (Open Houses and INSEC meeting), municipal authorities and advisory committee. Everyone in the focus group ranked the goals from 1 to 4, where 1 is highest priority and 4 is the lowest (Table H.56). To get the final priority for each goal the following equation was used:

$$Priority\ level\ of\ goal\ k = \sum_{i=\{1,4\}} {v_{Pi}}^{k} * w_{Pi}$$

Where

$\boldsymbol{{v_{Pi}}^{k}}$ is the number of votes that goal $\boldsymbol{k}$ got for priority **"$\boldsymbol{i}$"** and $\boldsymbol{w_{Pi}}$ is a weight given for each priority level as described in Table H.48

Table H.56: Weights for Priority Level

Priority level	Weight
Priority 1 (P1)	4
Priority 2 (P2)	3
Priority 3 (P3)	2
Priority 4 (P4)	1

Source: SDG

Each focus group resulted in a different goal prioritization therefore, a final rank was obtained using the abovementioned methodology but counting each focus group as one vote. The resulting priority level for goals is shown in Table H.57.

Table H.57: Priority Level for Goals

Goal	Priority level
Goal A: Improve transportation system performance	10
Goal B: Promote environmental sustainability	8.5
Goal C: Improve transportation mobility and access for people and freight	8
Goal D: Reinforce economic vitality	3.5

Source: SDG

Once the goals had been assigned certain priority level, the next step is to do the same for the objectives. Since most are not easily compared to objectives from other goals, the prioritization was carried out within each Goal. We assigned a local priority level Table H.58 to Table H.61, are weights relative to each Goal, and are not meant to be compared with objectives from other Goals.

The same methodology was used for objectives prioritization, except that the number of priority levels was 5 (for objectives in Goals A, B, and C) and 3 (for objectives in Goal D) instead of 4. The resulting local priority levels are shown in Table H.58 to Table H.60..

Table H.58: Priority Level for Objectives of Goal A

Objective	Local priority level
Reduce congestion	14
Optimize	8
Maintain	11
Improve efficiency	4
Improve safety and security	8

Source: SDG

Table H.59: Priority Level for Objectives of Goal B

Objective	Local priority level
Minimize adverse impacts to the environments	10
Reduce gas emissions	11.5
Support the integration of land use plans	9
Improve strategies in alternative ways	5.5
Reduce the vulnerability of the transportation infrastructure	9

Source: SDG

Table H.60: Priority Level for Objectives of Goal C

Objective	Local priority level
Improve connectivity between primary activity centers	13
Improve the integration of the system	10
Increase travel options for residents	7
Concentrate investments in the areas of greatest benefit	6
Facilitate access to transportation.	9

Source: SDG

Table H.61: Priority Level for Objectives of Goal D

Objective	Local priority level
Improve economic competitiveness	7
Generate the possibility of public-private opportunities	4
Provide strategic connectivity	7

Source: SDG

Project Prioritization

From the input received at the workshops a priority level for each goal was developed, as well as a priority level for each objective. The latter is a measure of the priority within the goal group, but not a priority relative to the objectives of other goals. For this reason, it is necessary to calculate a

global priority level for each objective, weighting each local priority with the priority level of the goal group it belongs to.

The global priority level of objective i that belongs to Goal K is:

$$w_i^K = \frac{l_i}{\sum_{j \in K} l_j} * P_K$$

Where, l_i is the local priority level of objective i and P_K is the priority level of Goal K. The resulting global priority level is in Table H.62.

Table H.62: Global Priority Level for Objectives

Objective	Global priority level
Reduce congestion and Travel time	3.11
Keep transportation assets in good condition	2.44
Improve connectivity between primary activity centers	2.31
Reduce gas emissions	2.17
Minimize adverse impacts to the environments	1.89
Optimize the use of transportation assets	1.78
Improve the security and protection of the system	1.78
Improve the integration of the system	1.78
Support the integration of land use plans	1.70
Reduce the vulnerability of the transportation infrastructure	1.70
Facilitate access to transportation	1.60
Improve economic competitiveness	1.36
Provide strategic connectivity	1.36
Increase travel options for residents	1.24
Concentrate investments in the areas of greatest benefit	1.07
Improve strategies in alternative ways	1.04
Improve efficiency in administration costs	0.89
Generate the possibility of public-private opportunities	0.78

Source: SDG

Once each objective has its priority level, the next step is to identify for the objectives addressed by each project. At a high level the more objectives a project impacts, the more important it becomes. However, since each objective has a priority level a weighted prioritization is more appropriate.

Using the identified objectives per project, a ranking for each objective is defined sorting the projects depending on whether they impact the objective or not. Then, a weighted ranking aggregation is used to properly combined the rankings for each objective into a final ranking per objective.

Three different algorithms were used for ranking aggregation: Cross-entropy Monte Carlo using Spearman distance measure, Cross-entropy Monte Carlo using Kendall distance and a genetic algorithm using Spearman distance. Since none of these are exact methods, a final combination of the three rankings are accepted as the final ranking of projects.

The final ranking for the projects together with their assign costs and start-up year are included in Table H.63 to Table H.66.

Table H.63: List of Projects and Timeframe – San Juan TMA

Reviewed name Project	Final Rank	Reference Cost (inflated by 20%)	Municipality	Start Date
Feasibility Study, Capacity Increase of PR-181	1	$ 400,000	Trujillo Alto	2025
Constructino of Ramp PR-22 and Avenue Trio Vegabajeño (Ramps side west for the PR-22 with the Avenue Trio Vegabajeño)	4	$ 1,500,000	Vega Baja	2029
Feasibility Study, PR-28 km 0-6 Improvements to heavy traffic mobility	13	$ 900,000	Bayamón, Guaynabo, San Juan	2029
Feasibility Study, PR-37 to manage cargo	11	$ 900,000	San Juan	2029
Reconstruction, PR-15 KM 24.9-25.7	5	$ 531,589	Cayey	2029
Feasibility study and reconstruction to elevate pedestrian bridge over PR-18	41	$ 2,000,000	San Juan	2029
Environmental Study/ROW/Design/Construction start-up, Extension PR-5 From PR-199 to PR-167 (AC-000533)	30	$ 82,400,000	Bayamon	2029
Feasibility and Update Environmental Study, South Bypass from PR-188 to Mediania Baja (PR-187) (CFHWA) (AC-018760)	22	$ 10,650,000	Loíza	2034
Construction Cidra East Connector form #2 Street (Industrial Avenue) to PR-734 (Phase 1) Length 1.38 (AC-017242)	21	$ 18,000,000	Cidra	2034
Feasibility Study, Improvements at intersection of PR-5 with PR-24	6	$ 900,000	Cataño	2036
Route Location and NEPA Process Compliance, Higuillar Avenue extension to PR-22	28	$ 2,000,000	Dorado	2036
Feasibility Study, PR-865 and PR-2 Elevated intersection	35	$ 1,000,000	Toa Baja	2036
Competion of Cidra connector from PR-734 to PR-1 and PR-7787 Phase II	27	$ 666,127	Cidra	2036
Completion of Cidra connector from PR-734 to PR-1 and PR-7788 Phase III;	26	$ 395,513	Cidra, Cayey	2036
Tunel Minillas conditions assessment	29	$ 1,000,000	San Juan	2036
Construction, Cayey Connector, Connector PR-15, phase II (from Parque Tecnológico PR-1, Cayey Connector PR-158) (AC-015802)	34	$ 12,000,000	Cayey	2036
Study to evaluate evacuation route to the Húcares Community (detour from the Húcares Parcelas to PR-3)	37	$ 208,165	Naguabo	2037
ROW and Construction, Barranquitas South Bypass (From PR-156 to PR-719) (AC-010194)	36	$ 12,600,000	Barranquitas	2037
ROW and Construction, Isabela Connector from PR-472 to PR-113 (AC-100055)	39	$ 42,195,000	San Juan	2037
Feasibility Study, Collector PR-30 - widening	7	$ 900,000	Gurabo	2038
Route Location and NEPA Compliance Study, PR-9187, Rio Grande; Int PR-3 with PR-187 and PR-956 to PR-3	51	$ 1,000,000	Río Grande	2041
Construction, Aguas Buenas Bypass from PR-156, km 53 to PR-173, Length 3.1 km (AC-020802)	47	$ 36,000,000	Aguas Buenas	2041
Feasibility Study, PR-203 Extension	46	$ 900,000	San Lorenzo	2041
ROW and Construction, Widening PR-845 from Pasternak Street to Int. PR-199 (AC-084511)	52	$ 4,650,000	Trujillo Alto	2045
Feasibility Study, new construction of PR-183 to PR181 Int. PR-9912	56	$ 2,000,000	San Lorenzo	2045
Feasibility Study, Access Ramp to Country Estate, PR-167	54	$ 900,000	Bayamon	2045
Feasibility Study, Access/Exit Ramps to/from AEMEAD to/from PR-6	53	$ 900,000	Bayamon	2045
Yabucoa Connector (completing the connector between Calle Cataina Morales and Avenida Los Veteranos)	57	$ 208,165	Yabucoa	2045

Source: PRHTA technical team with SDG support

Table H.64: List of Projects and Timeframe – Aguadilla TMA

Reviewed name Project	Final Rank	Reference Cost (inflated by 20%)	Municipality	Start Date
Improvements to PR-112 and Connector to PR-4494- access to the Industrial Zone to the Isabela Connector, it also includes improvements to the PR-112. This project will be known as the Cano Rosa Connector (AC-011213)	3	$4,350,000.00	Isabela	2028
Construction Las Marías Connector, from PR-119 to Ramón Rivera street (AC-411901)	14	$3,600,000.00	Las Marías	2030
Operational Traffic Study, PR-2 KM 111.5 (Intersection KFC) Operational traffic study to determine if the traffic signals to control traffic method in the intersection is the right one to avoid accident	18	$ 204,130.51	Isabela	2030

Reconstruction, considering safety and security, PR-466 km 7.2 & PR-466 km 6.5.	17	$ 664,486.42	Isabela	2030
Design, ROW, and Construction of Isabela connector PR-112 to PR-472 (AC-047205)	24	$7,174,041.60	Isabela	2034
Feasibility Study, PR-404 by-pass	25	$ 900,000.00	Moca	2036
Additional Funds for Feasibility Study, Improvements to Aguadilla Airport access through PR-100, PR-107and connector to Burn street (AC-000228)	31	$7,200,000.00	Aguadilla	2036
Study, Design, permit process and reconstruction, PR-4466 km 3 Bo. Bajuras (study, Design, permit process and construction of pluvial, safety guard and Signalization)	32	$ 900,000.00	Isabela	2036
Reconstruction, including general improvements PR-4455 from km 0 to 2.5 (scarification, pavement, marking and road sign)	33	$4,596,989.28	Isabela	2036
Reconstruction, PR-459 from km 9 to 15 (Bo. Jobos/Bo. Bejucos); potentially including, scarification, pavement, marking and road sign	43	$3,000,000.00	Isabela	2038
Construction, Relocation of PR-111 km. 27.9 a km. 34.0 (AC-011191)	44	$ 43,200,000.00	San Sebastian/Lares	2040
Feasibility study, PR-113 Connector of the beach area	15	$ 900,000.00	Isabela	2045

Source: PRHTA technical team with SDG support

Table H.65: List of Projects and Timeframe – Other Urbanized Areas

Reviewed name Project	Final Rank	Reference Cost (inflated by 20%)	Municipality	Start Date	TPR
Feasibility Study, Connector from Highway PR-140 to PR-681	16	$ 900,000	Barceloneta	2045	NTPR
Feasibility and Environmental Study, PR-2 km 145to km 152 road improvements and congestion management	2	$ 60,000,000	Mayagüez	2025	SWTPR
ROW and Construction, overpass at the intersection of PR-2 with PR-114, includes the channelization of Merle and Pulida Creek and the construction of a North - South Frontage Road at PR-114 (AC-200200)	49	$ 28,620,000	Mayagüez	2044	SWTPR
Route Study, Connector of Industrial park and Merceditas	12	$ 1,000,000	Ponce	2029	STPR
Feasibility Study, PR-3132 South solution to road closure issues	50	$ 416,329	Peñuelas	2041	STPR
Feasibility Study, Ponce By-Pass from PR-14 to Rio Matilde	23	$ 900,000	Ponce	2034	STPR
Feasibility Study, PR-7751 connector de Arroyo from PR-753 to PR-3, KM 132.4	38	$ 900,000	Arroyo	2037	SETPR
Construction, PR-545 Widening from PR-52 (Km. 1.03) to PR-14 (km. 6.03) (AC-054509)	45	$ 6,000,000	Coamo	2041	STPR
ROW, Lajas San German Connector Phase II, PR-321 to PR-122 (AC-012201)	55	$ 2,250,000	Lajas/San German	2045	SWTPR
Construction, Widening of PR-100 From PR-308 to PR-101 (AC-010029)	19	$ 12,000,000	Cabo Rojo	2030	SWTPR
Access Request Analysis and Preliminary Design of Geometric Improvements to PR-2 (Entrance RUM, La Vita) (AC-200241)	42	$ 25,200,000	Mayagüez	2038	SWTPR
ROW and Construction, Villalba Bypass - From PR-560 to PR-151 (STA. 24+82 to STA. 31+64) Length 0.68 (AC-556103)	48	$ 27,300,000	Villalba	2043	STPR
Construction, PR-10 relocation from STA. 37+80.00 to STA. 57+00.00, SEC. II, length 0.41 km (AC-100069)	20	$ 29,430,900	Utuado/Adjuntas	2033	NTPR
Feasibility Study, PR-681 & PR-2 (conenctor from PR-681 (Islote) to Carretera PR-2)	8	$ 900,000	Arecibo	2029	NTPR
Feasibility Study, road widening for PR-681 & PR-6681	9	$ 900,000	Arecibo	2029	NTPR

Source: PRHTA technical team with SDG support

Table H.66: List of Projects and Timeframe – Island-wide

Reviewed name Project	Final Rank	Reference Cost (inflated by 20%)	Municipality	Start Date
Vulnerability Study, Islandwide	10	$ 1,000,000	Islandwide	2029

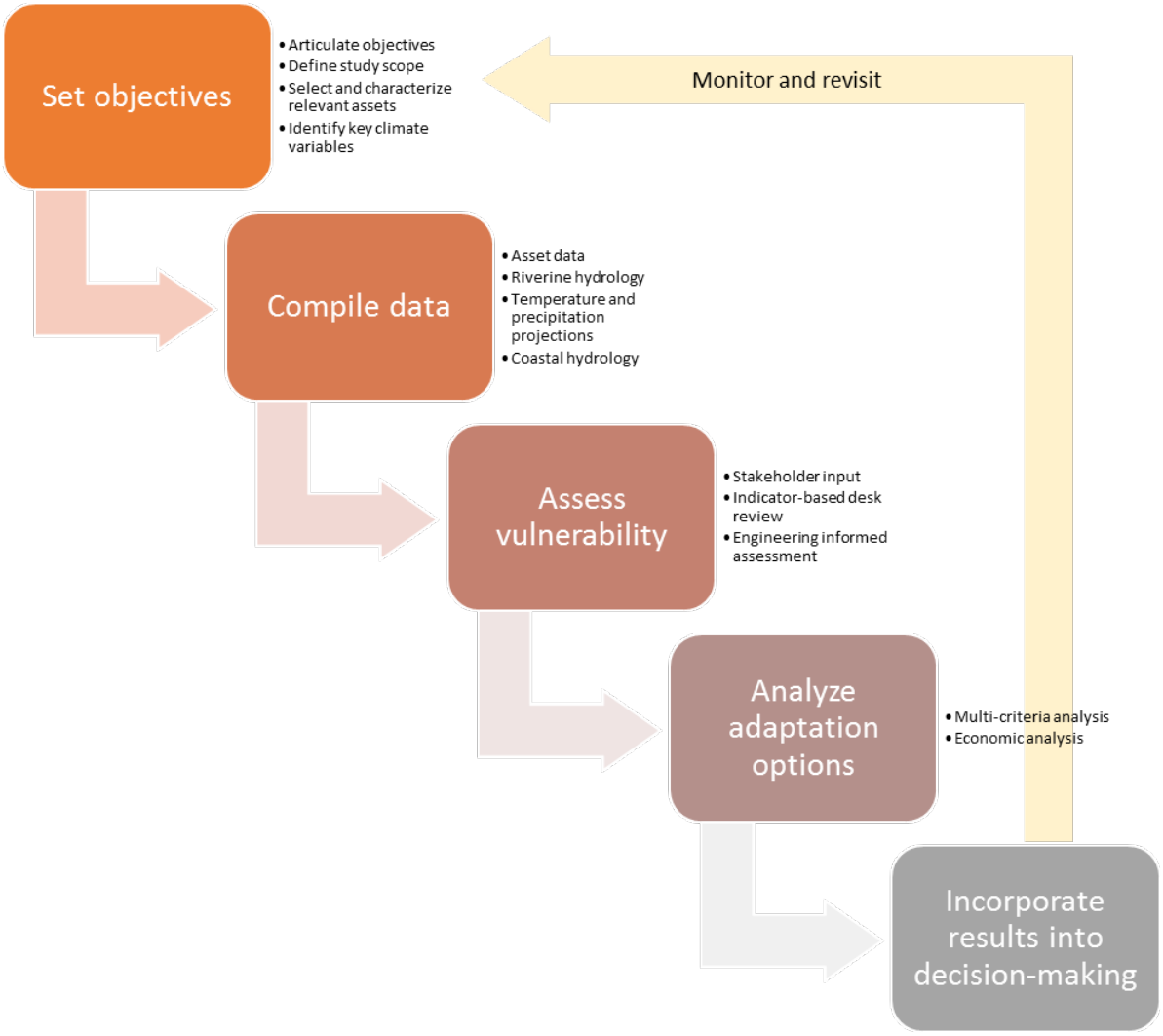
Source: PRHTA technical team with SDG support

I APPENDIX I - RESILIENCE COMPONENT FOR THE LONG-RANGE TRANSPORTATION PLAN

VULNERABILITY ASSESSMENT AND ADAPTATION FRAMEWORK

Federal Highway Administration developed a manual to conduct vulnerability analysis to transportation systems and incorporate actions into decision making. This section presents a brief description of each step of the framework and is summarized in Figure I.1. For a complete explanation and examples please refer to The Framework's document in (Federal Highway Administration, 2017).

Figure I.1: Steps of the Vulnerability Assessment and Adaptation Framework



Source: SDG based on (Federal Highway Administration, 2017)

Set Objectives

The first step of the framework is to define the objectives and scope of the vulnerability analysis. The analysis' scope may be defined in terms of (Federal Highway Administration, 2017):

- Level of detail required for decision-making: A vulnerability assessment is usually developed to support certain action over assets. This can be as general as to define annual budget for maintenance of the transportation system, or as granular as to define the best cost-benefit reinforcement alternative for a bridge. Depending on the level of granularity of the decision, is the level of detail required for the vulnerability analysis.
- Motivation for the study: If there is a particular reason why the vulnerability analysis is needed, or required by an authority, then this will set the parameters for the assessment. For example, in Puerto Rico, Hurricane María unveiled the need for greater vulnerability

examination. Therefore, hurricane hazard should define the scope of the study, in terms of climate variables included.

- Constraints: If there are any constraints in terms of time, resources, range of expertise, availability of data, or any other; these would directly impact the scope of the vulnerability assessment.

Including other considerations such as previous studies in the area or analysis conducted by other agencies, may also expand or limit the scope of the vulnerability assessment.

The output of this first step should at least include:

- Relevant assets and define which characteristics of such assets will be included in the assessment; and
- Key climate variables to study.

For this study 49 critical segments were identified by stakeholders and the climate variables focused on rainfall, landslides and floods. In the next chapter this is explained in detail.

Compile Data

Once the scope of the study is clear, the next step is to gather the required data of the assets and the key climate variables. The type of data collected should be consistent with the level of detail and scope defined in the previous step. This might be a challenging task since usually different pieces of information are hold by different agencies and therefore, they differ in scale, age, quality and extent (Federal Highway Administration, 2017).

To gather the appropriate amount of data, it is required to start collecting it from the beginning of the study. Common sources are:

- Local government;
- Agencies (including operations, maintenance, planning, etc.);
- Universities;
- Existing data; and
- If resources are available, collect regarding data on the field.

Finally, it is a good practice to use Geographic Information Systems (GIS) to collect, share and analyze data. This practice facilitates discussions with different experts, doing multi-layer analysis and reporting.

For this analysis data was collected regarding hazards (landslides and floods) and the infrastructure from different agencies (e.g., National Weather Service, Highway and Transportation Authority, FEMA, NOOA and Puerto Rico main stakeholders). In the next chapter the gathered information is presented, most of it in GIS format.

Assess Vulnerability

According to (Federal Highway Administration, 2017) vulnerability in transportation analysis depends on system's Exposure to climate events, Sensitivity to disruption due to climate and Adaptive Capacity of the system. Exposure is defined in terms of the intensity of the previously defined climate variables on the location of the asset (or system) being evaluated. On the other

hand, Sensitivity is related to the magnitude of disruption (if any) when the asset (or system) is exposed to climate change events. Finally, Adaptive Capacity is a systems' level measure; it represents how the system as a unity is affected by a disruption.

The framework is flexible to the level of detail for the vulnerability assessment and the resources available, with three different approaches for assessing vulnerability:

- Stakeholder input approach: This is a qualitative analysis based on practitioners' knowledge. It is developed through workshops and surveys, where experts are asked to identify climate variables, Exposure, Sensitivity and Adaptive Capacity based on the knowledge they have regarding the asset (or system) in maintenance, operations, emergency management and/or engineering. This approach is recommended for analysis of assets that have not been previously assessed.
- Indicator-based desk review approach: This is a data-driven approach, where data is used to develop models and score each of the components of vulnerability. Therefore, data from climate variables are used to create climate projections and measure Exposure. Then, data regarding the asset is collected to measure Sensitivity; and data regarding system's behavior before and after a disruption is used to measure Adaptive Capacity. Finally, vulnerability is quantified as a combination of previous scores. Even though this is a data-driven analysis, stakeholders from different fields should be involved during the process, due to uncertainties within models and lack of data that might not represent the conditions for every asset. This approach is recommended as a scanning tool, to identify system-wide vulnerabilities and support system's level decision-making.
- Engineering informed assessments: This is a quantitative, asset-specific analysis. This type of analysis provides a better insight of specific assets' vulnerabilities than the indicator-based one. It can be used to measure effectiveness of different type of mitigation strategies, and can be incorporated into a cost-benefit analysis. This approach requires (Federal Highway Administration, 2017):
    - Understand site context and future climate;
    - Test the asset against future climate scenarios;
    - Develop, evaluate, and select adaptation measures;
    - Review additional considerations; and
    - Monitor and revisit as needed.

For this study, a combined approach was selected joining the "Stakeholder input approach" d with data-based analysis, since enough information regarding climate variables was available. A thorough explanation in exposed in the next chapter.

Analyze Adaptation Options

Once vulnerabilities are identified, the next step is to recognize, analyze, and prioritize adaptation options. The adaptation or mitigation activities can be natural, structural, or policy-based, depending on which type of approach was developed in the previous step (site-specific or system-wide). The Framework proposes two approaches:

- Multi-criteria analysis (MCA): Comparison of adaptation options across qualitative and quantitative criteria; and

- Economic analysis: Cost-benefit evaluation that allows to analyze long-term benefits of each adaptation option.

A stakeholder approach is used in this study, since a detailed financial analysis for vulnerability mitigation was outside of the scope of the Lon Range Transportation Plan.

Incorporate Results into Decision-Making

The framework considers this additional step, where the vulnerability analysis is incorporated into transportation programs. The data collected during this type of analysis and conclusions might enrich other processes that are part of transportation engineering. The framework identifies the following processes where vulnerability results might be considered:

- Transportation planning;
- Project development and environmental review;
- Project level design and engineering;
- Transportation systems management, operations, and emergency management; and
- Asset management

Finally, it is important to define policies for re-assessment and monitor relevant climate variables and assets identified during the vulnerability assessment.

This step was not included in this analysis because it is outside the scope of this analysis.

OBJECTIVES AND SCOPE OF THE ANALYSIS

Key Climate Variables

The incorporation of resilience and vulnerability analysis into transportation planning is a relatively new task, fostered by awareness of climate change and the consequences it might have to transportation infrastructure. Therefore, many municipalities are beginning to incorporate it into their studies. This is the case of Puerto Rico, where there is not a previous system-wide vulnerability assessment of transportation infrastructure for system planning. However, awareness of climate change has been part of planning in the island due to regular hurricanes impacting it. This is noticeable by the several weather stations installed throughout the island, storm surge NOAA analysis, landslide susceptibility map, flood susceptibility map, among other data related to climate change that is currently available.

The key climate variables identified for this analysis are:

- Landslides in Hurricane María;
- Flooding data;
- Weather stations;
- Rainfall historic data;
- Slope;
- River map;
- Land use;
- Susceptibility to landslides;

- Infrastructure damage due to Hurricane María; and
- Coastal floods.

Relevant Assets

Data availability of transportation assets' Sensitivity is not as structured as weather historical conditions; however, practitioners in operations and maintenance of transportation infrastructure hold valuable knowledge regarding these assets and their Sensitivity to the climate variables.

Additionally, the last event revealed vulnerabilities of the transportation system that current practitioners might have not seen before. Therefore, the relevant assets were identified throughout a series of workshops with stakeholders.

Stakeholders from different areas of expertise and regions were selected to be part of the identification task. The attendees included members of:

- Highway and Transportation Authority:
  - Environmental studies;
  - Soil engineering; and
  - Emergency planning.
- Multimodal Transportation Planning;
- Federal Highway Administration;
- Emergency interagency branch – South region;
- Transportation agency – East region;
- Transportation agency – Metropolitan;
- Transportation agency – Mayaguez region; and
- Transportation agency – North region.

The identification of relevant assets was developed in three stages:

Introduction to the Vulnerability Assessment and Adaptation Framework. This meeting was held on February 7th, 2018. The Framework was explained by the Federal Highway Administration focused on the indicator-based approach and the VAST tool. Later, the consultancy team explained the scope of the study and the survey sent to stakeholders.
Survey for identification of relevant assets. A survey regarding asset characteristics was sent to each participant agency, the objective was that each identified at least five relevant assets for each hazard (landslides and floods). For each asset included in the list, the stakeholders were asked the following questions:

- Name of the asset;
- Municipality;
- Location;
- Length;
- Is it a coastal road?;
- Type of facility:
  - State road;
  - Municipality road;
  - Bridge;
  - Tunnel;

  - Viaduct;
  - Recreative road; and
  - Other.
- Relevance of the asset:
  - Important connection;
  - High demand;
  - Evacuation route; and
  - Other.
- Land use near asset:
  - Residential;
  - Services;
  - Commercial;
  - Industrial;
  - Agriculture;
  - Cattle raising;
  - Protected area; and
  - Other.
- Type of disruptive climate events – landslide:
  - Erosion;
  - Scouring; and
  - Other.
- Type of disruptive climate events – flood:
  - Overflow of water body;
  - Surge;
  - Rainfall;
  - Urban flood; and
  - Other.
- Frequency of disruptive climate events:
  - Rarely;
  - Sometimes;
  - Often; and
  - Usually.
- Magnitude of disruption:
  - Total failure;
  - Temporary closure; and
  - Reduction of capacity (without closure).
- Asset age;
- Remnant lifespan;
- Elevation;
- Number of repairs per year;
- Type of regular repair:
  - Temporary repair;
  - Definite repair; and
  - Other.

- Approximate cost of repair;
- Year of last repair;
- What are the mitigation actions usually implemented for this type of climate event; and
- Additional comments.

Revision of identified segments: A total of 19 segments were identified by the stakeholders before the last workshop. The information and location of each asset were consolidated and the results shown in a third workshop. In this meeting there was a discussion of relevance and state of each segment. As a result, the location of some of the identified segment was rectified and new segments were included, for a total of 49 segments for the analysis.

DATA COMPILATION

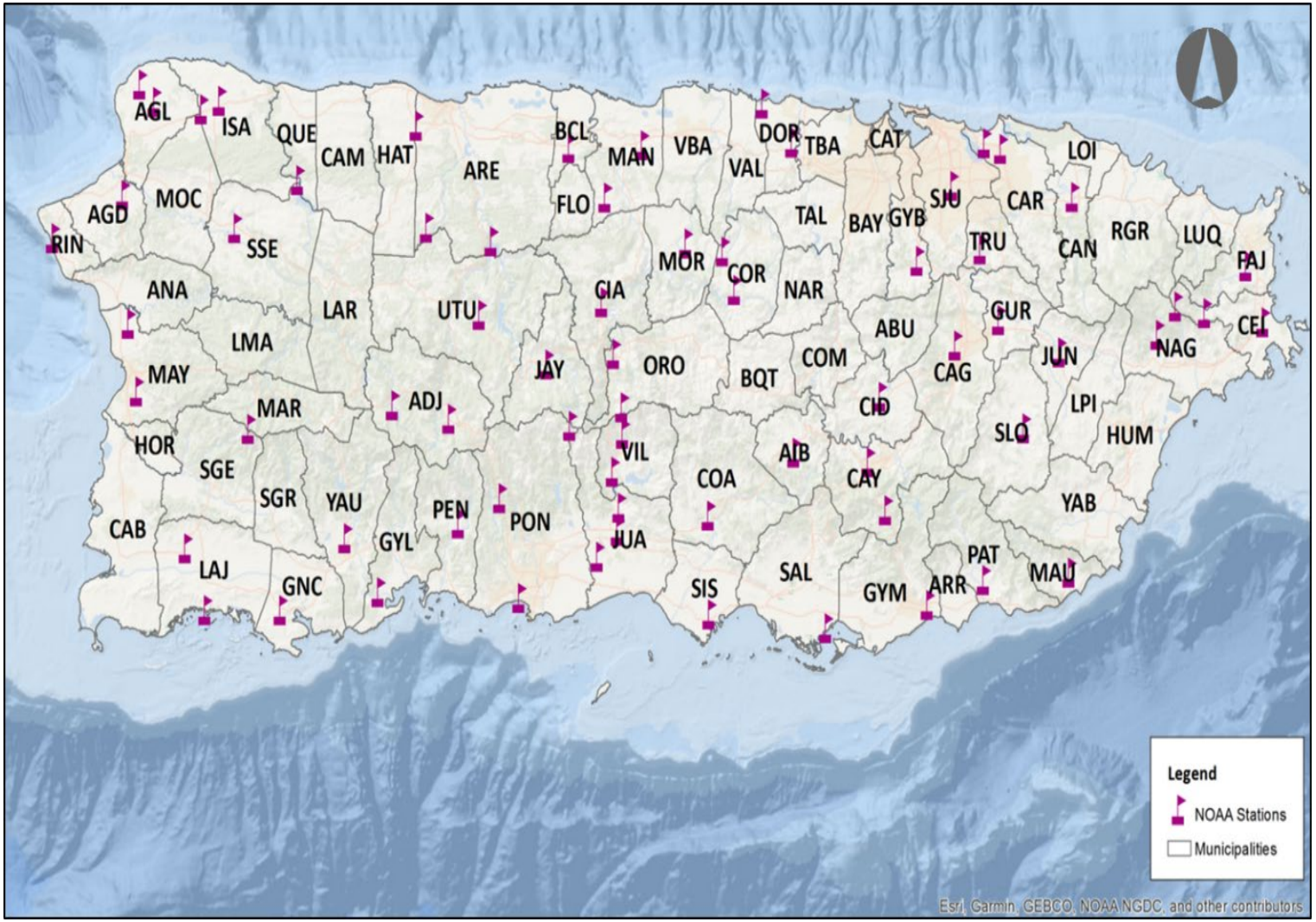
Hazard

Flooding and landslide have rainfall as common trigger, therefore gathering information regarding historical records for precipitation levels becomes paramount for hazard analysis in the Long-Range Transportation Plan.

The National Weather Service gathers and maintain 135 weather stations in Puerto Rico and the data collected is available online in (National Weather Service, 2017). For this study, we gathered the historical annual and monthly mean precipitation data from 1981 to 2010 for all the weather stations. Also, the National Weather Service published online the estimated rainfall data during Hurricane María.

The data is available in text format. However, as the Framework recommends, it is better to manage data in GIS format. For this reason, each weather station was geo-referenced and then, the historical precipitation data was assign to each station location. After this adjustment, only 91 out of 135 stations have enough historical data and those were selected to represent rainfall behavior on the island (see Figure I.2 below).

Figure I.1: 91 Weather Stations of the National Weather Service



Source: SDG based on locations available

Floods

The Federal Emergency Management Agency (FEMA) has dedicated their efforts to map the flood hazard from statistical information, including data of river flow, storm tides, hydrologic/hydraulic analyses, rainfall and land surveys. Their results are the basis of the National Flood Insurance Program (NFIP) and flood insurance requirements, being the most accurate source to guide mitigation actions and hazard analysis studies (FEMA, 2018). For this reason, this information is known as Flood Insurance Rate Map (FIRM) and define the areas subject to inundation by the 1% annual chance flood (100-year flood or base flood), classified on these types of zones (FEMA, 2017):

- Zone A: No base flood elevation determined;
- Zone A99: Areas that will be protected by a Federal flood control system where construction has reached specified legal requirements;
- Zone AE: Base flood elevation determined;
- Zone AH: Flood depths with an average depth ranging from one to three feet (usually areas of ponding); Base flood elevation determined;
- Zone AO: River or stream flood hazard areas with an average depth ranging from one to three feet; and
- Zone VE: Coastal flood zone with velocity hazard (wave action); base flood elevation determined.

The FIRM map for Puerto Rico can be obtained from the Planning Board page (Junta de Planeación, 2017). Due to the level of detail for the construction of this map, and the level of detail needed in the vulnerability assessment, this data was selected to represent the flood hazard. Similarly, for coastal floods, the coastal flood frequency by the National Oceanic and Atmospheric Administration (NOAA, 2017) was used as shown in Figure I.3.

Figure I.3: Coastal Flood Hazard Map

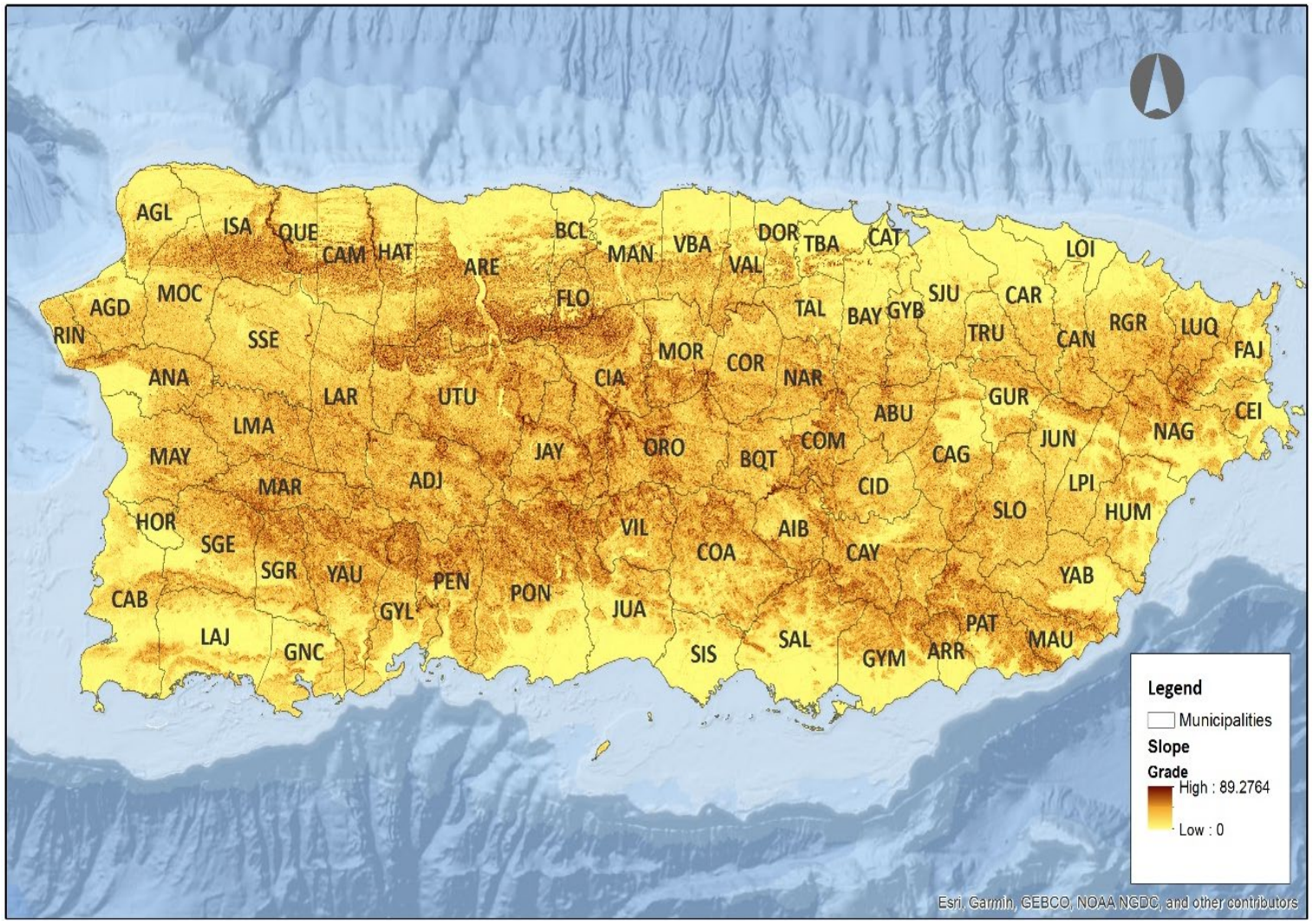
Source: SDG based on information from (NOAA, 2017).

Landslides

Analysis of landslides required further information due to the complexity of this hazard in which many triggers are involved. The data gathered for this analysis was:

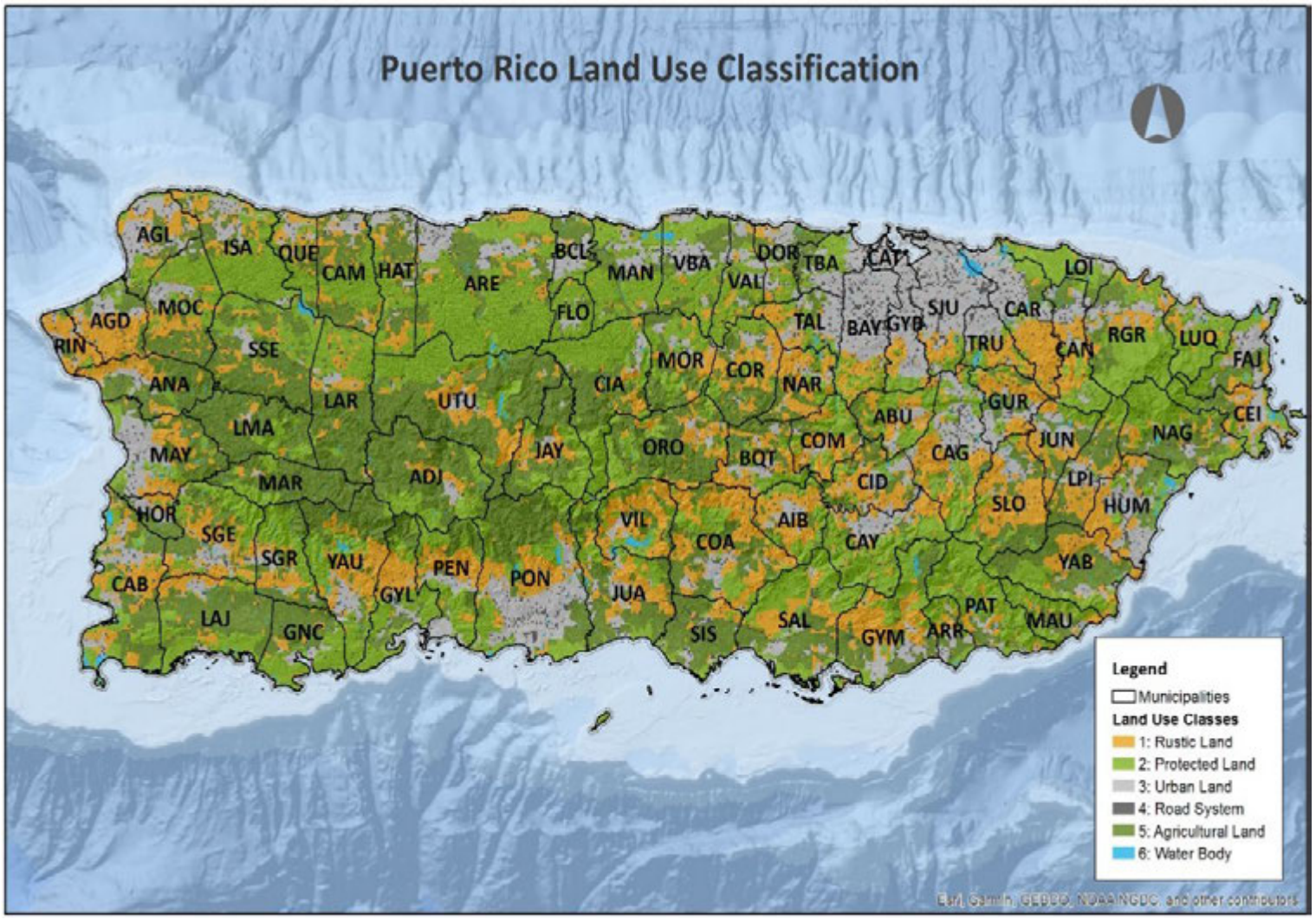
- Digital Elevation Model (DEM) of Puerto Rico obtained from Highway and Transportation Authority (raster with spatial resolution of 7m x 7m) (see Figure I.4);
- Land use data in shapefile format from the Highway and Transportation Authority (geographical layer) (see Figure I.5);
- The landslide susceptible zones from the Planning Board (geographical layer) (see Figure I.6);
- A shapefile with all the hydrologic system pathways information (geographical layer) (see Figure I.7); and
- A map of concentration of landslides caused by Hurricane María from the National Weather Service page: (National Weather Service, 2017) (PDF file) (see Figure I.8).

Figure I.4: Digital Elevation Model



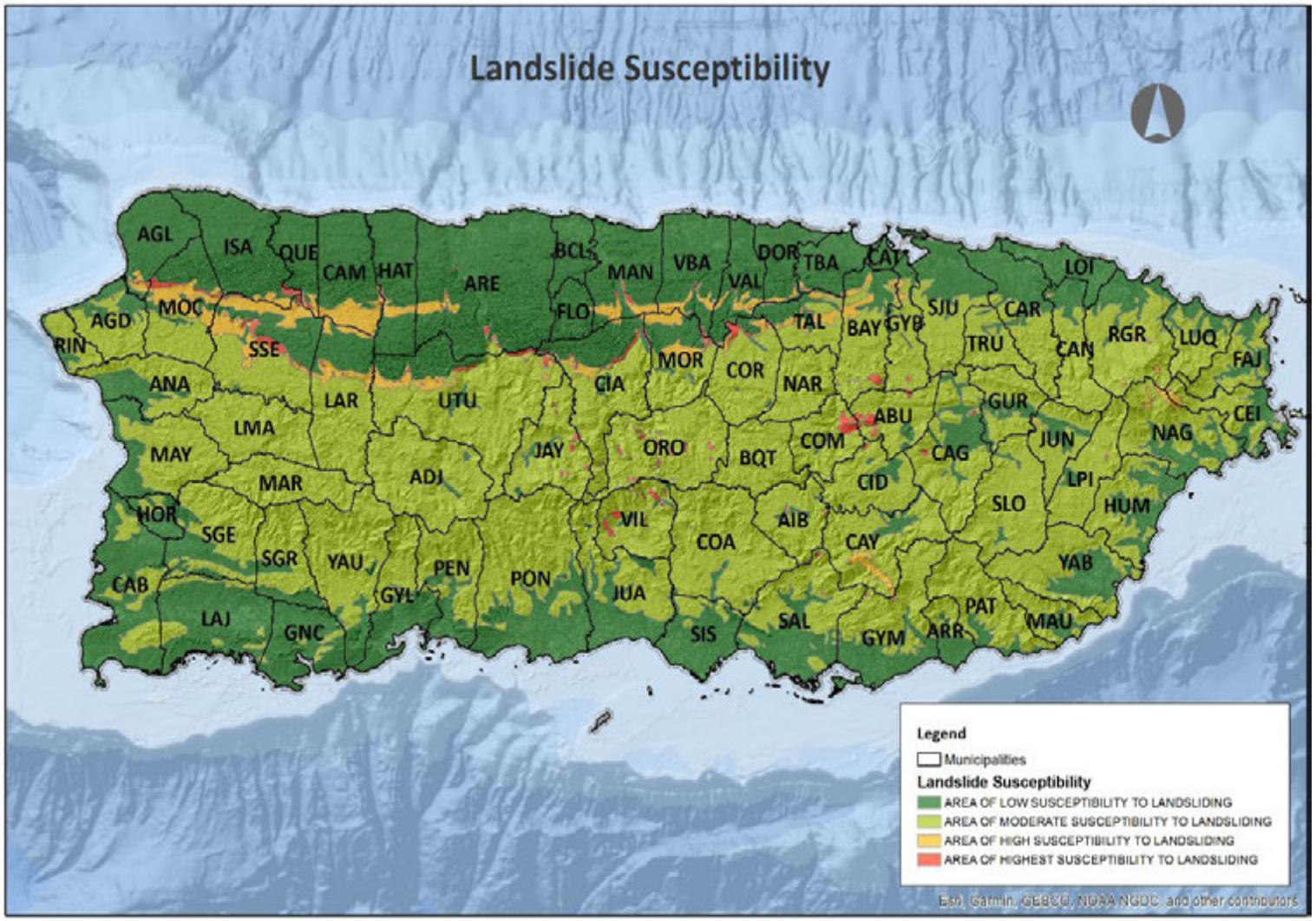
Source: SDG based on information given by Highway and Transportation Authority

Figure I.5: Land Use in Puerto Rico



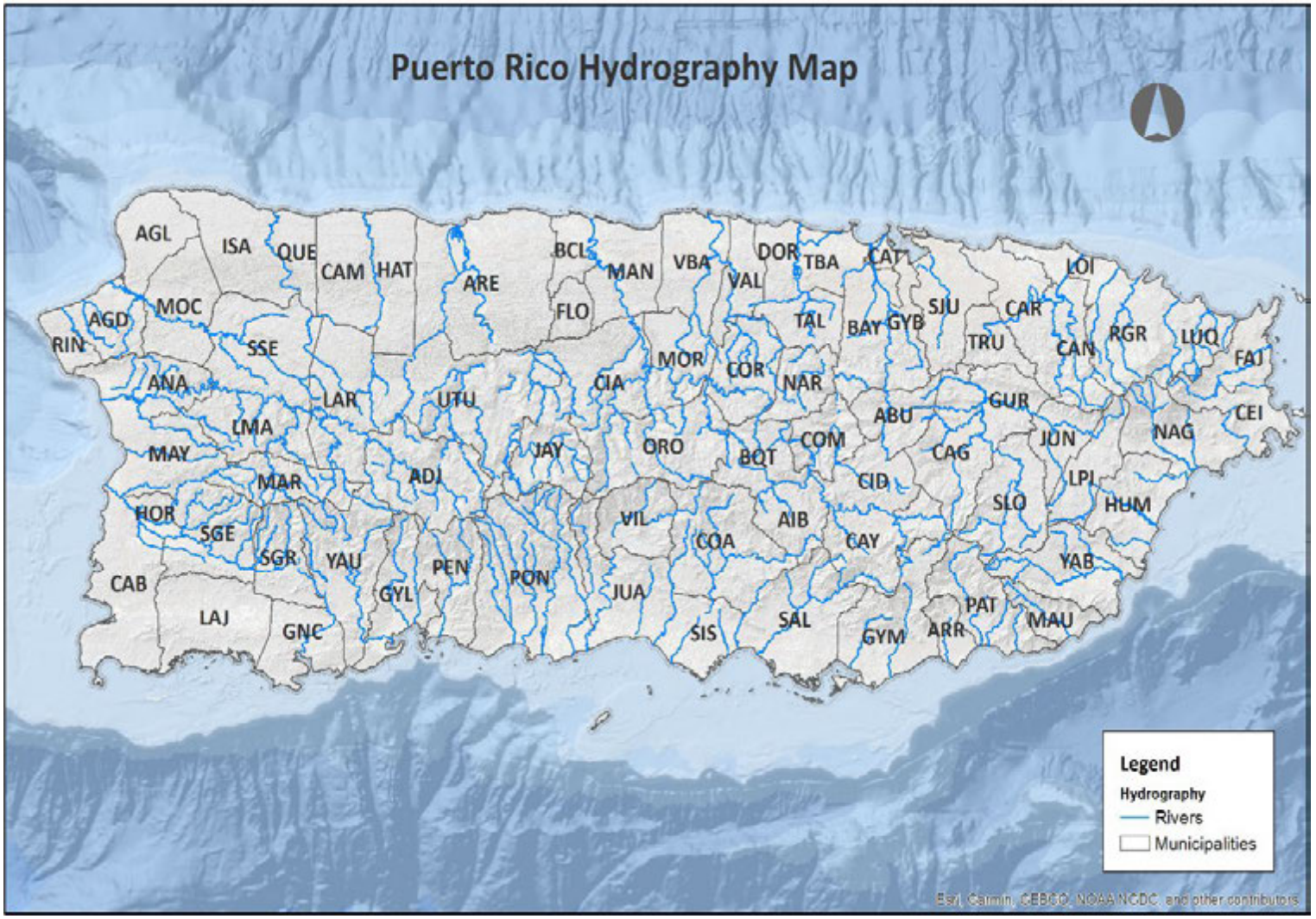
Source: SDG based on information given by Highway and Transportation Authority

Figure I.6: Landslide Susceptibility



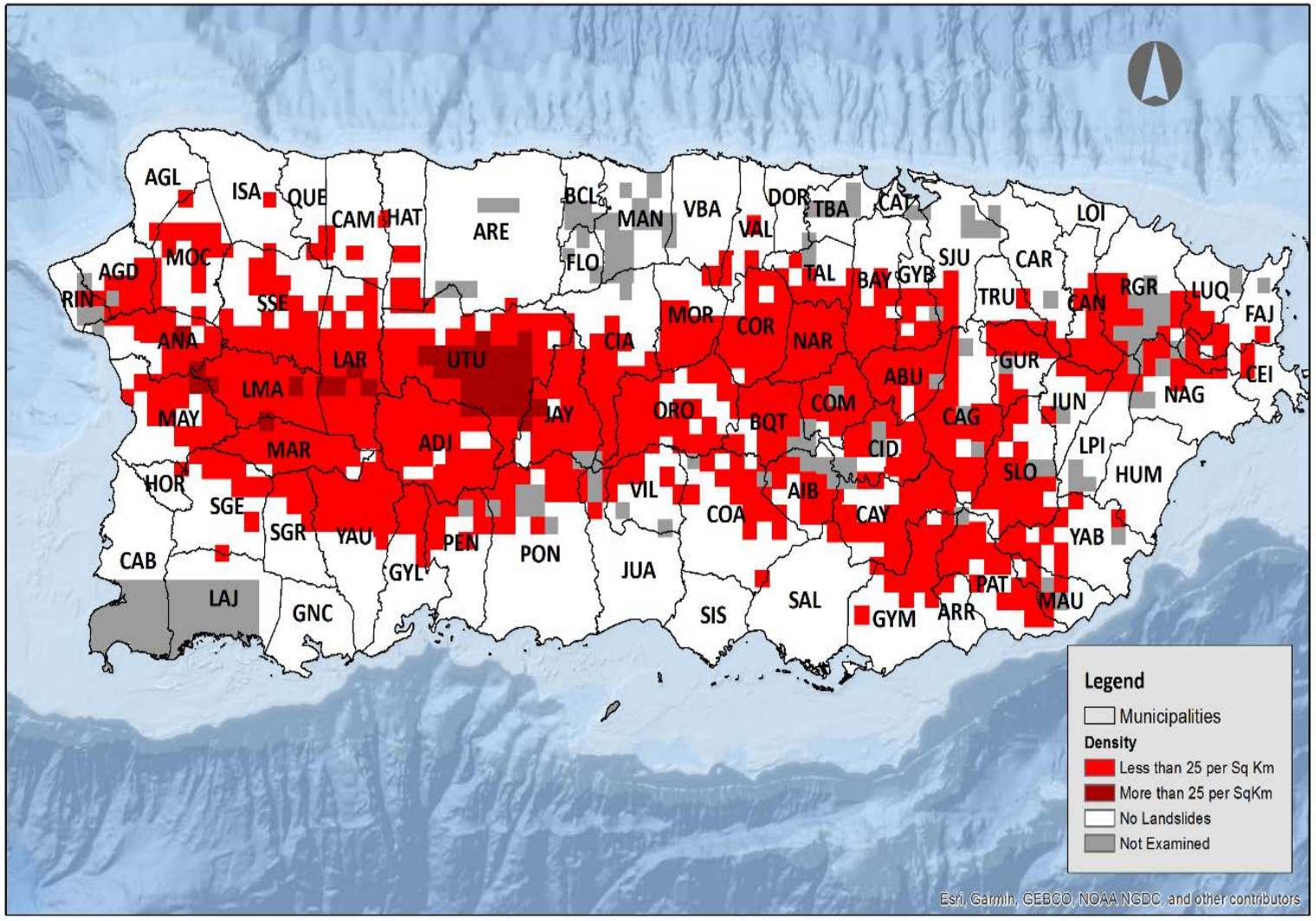
Source: SDG based on information given by the Planning Board

Figure I.7: Hydrology System Pathways



Source: SDG based on information given by Highway and Transportation Authority

Figure I.8: Concentration of Landslides During Hurricane María



Source: (National Weather Service, 2017)

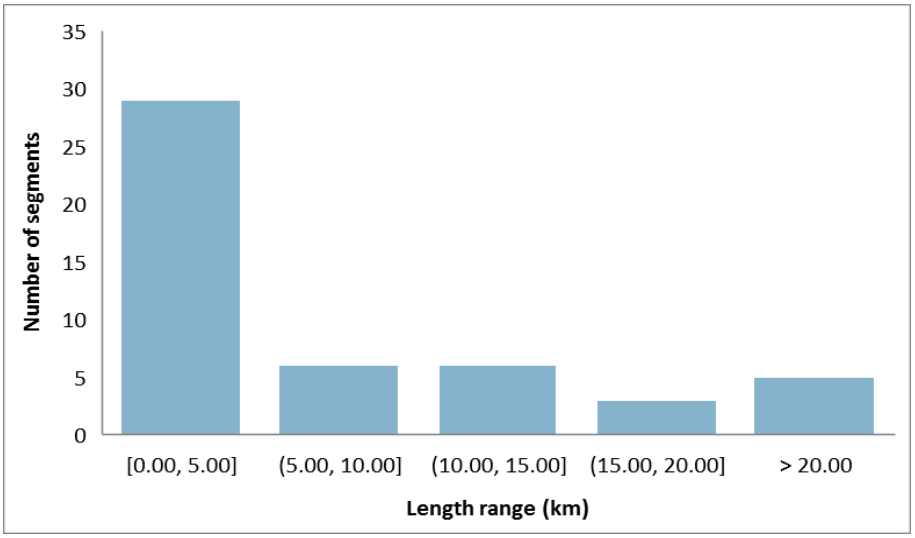
Infrastructure

Asset data was collected by two different means: first, through the Stakeholders survey, which included information regarding the specific asset (i.e., length, location, resistance, etc.) and information regarding how hazard interacts with the infrastructure such as, type of hazard, frequency of disruption, common repairs, etc. Second, data related to the functionality of such asset such as volumes, speed (free-flow and congested), capacity and number of lanes were obtained from the existing transportation model. The following sections show a summary of the data collected for the relevant assets identified.

Stakeholders Input

As it shown in Figure I.9 below, most of the segments were less than 5 km long. These segments correspond to specific problems that are presented when the reported hazard interacts with the conditions of the asset. For these types of problems an adaptation option should be defined. On the other hand, in segments whose length is greater than 5 km, the interaction between hazard and asset is less specific and it might reflect in any part of it. These segments might need additional data gathering to identify the problem and find the best mitigation strategies.

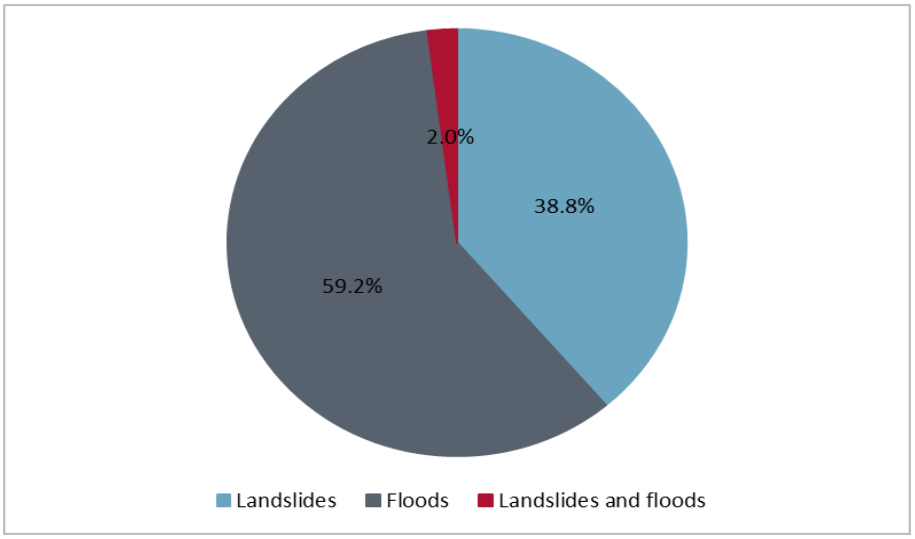
Figure I.9: Length of Segment



Source: SDG based on Stakeholders' survey

According to the reported segments, it can be concluded that transportation infrastructure in Puerto Rico is more exposed to floods than it is to landslides. Even though most segments are highly exposed to floods, landslides can have higher impact in the infrastructure; and therefore, have higher vulnerability, as it can be seen in Figure I.10**.**

Figure I.10: Type of Hazard Reported

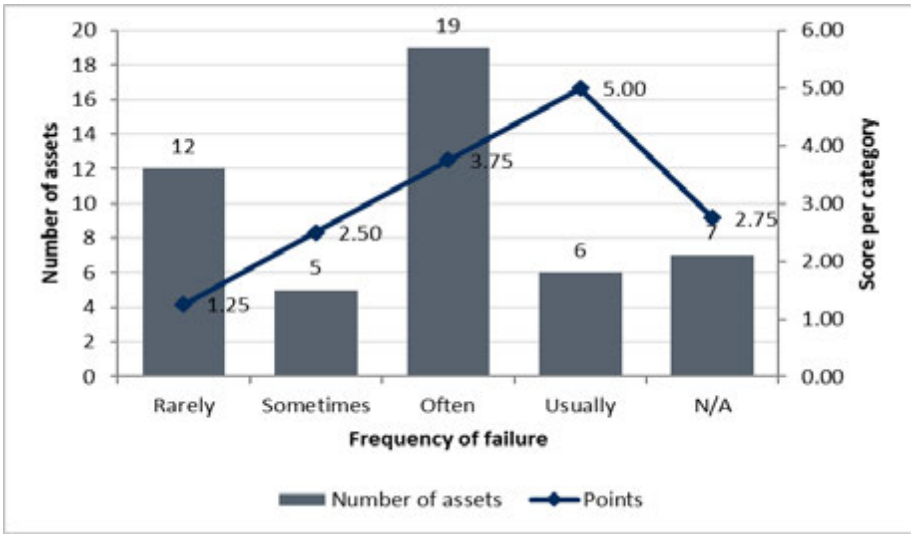


Source: SDG based on Stakeholders' survey

In terms of frequency of disruption by climate change, most of the relevant assets often present this event (2-4 times per year), i.e., often occurrence (see Figure I.11). This frequency might be related to heavy precipitations that occur during hurricane season and during rainy season; or it might be related with a particular condition of the asset which makes it more sensible to its main hazard.

Another interesting result is the 12 segments where disruption events are not frequent. However, since stakeholders selected them as relevant, these might be segments that are either important because of its connectivity and demand or for being connectors that were highly affected by Hurricane María but have not previously failed.

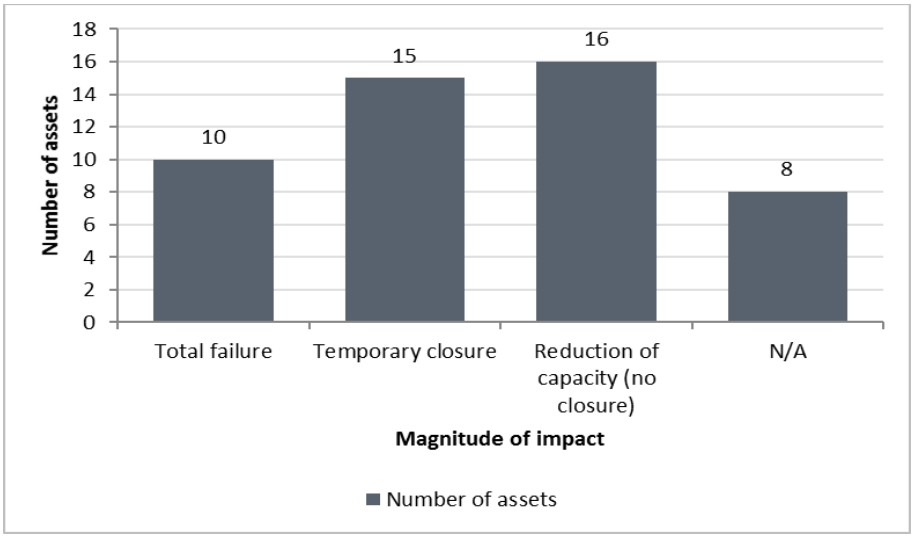
Figure I.11: Frequency of Failure



Source: SDG based on Stakeholders' survey

As it can be seen in Figure I.12, the distribution for magnitude of failure is almost uniform. This distribution reflects different conditions of assets (i.e., different level of Sensitivity). The fact that most of the assets do not present total failure is an indication that in general, the most relevant ones are quite resistant to the hazards under study.

Figure I.12: Magnitude of Failure



Source: SDG based on Stakeholders' survey

Transportation Model

The data extracted from the transportation model give us information regarding the normal condition of the transportation system, i.e., before Hurricane María. This information is important to measure Adaptive Capacity since it serves to understand how the system is affected by disruption of a segment and can be expressed in terms of how this segment manages the demand of vehicles. In the same way, an index for criticality[20] (a component of Sensitivity) can be defined in terms of volume and capacity in normal state.

The information extracted from the transportation model is:

- Distance;
- Facility Type;
- Number of Lanes;
- National Functional Class Code (NFC);
- Traffic Assignment Zone (TAZ);
- Terrain;
- Capacity;
- Free-Flow speed;
- Congested speed; and

[20] A critical element can be defined as such whose removal would result in significant losses to the area of study and it is measured in terms of the objectives of the study. (ICF International, 2014).

- Total assignment volume;

The period of highest demand (i.e., AM) is selected for this analysis, since it represents the most critical state of the transportation system in terms of demand.

VULNERATIVE ASSESSMENT

In the following sections the detailed analysis for each of the components of vulnerability is presented.

Exposure

Rainfall

The precipitation data for each weather station was collected in an Excel file, in which a filter was made to work only with stations that had valid values in the study period (other than zero). Having this information, each station and their corresponding precipitation information was georeferenced in ArcGIS, obtained a point shapefile.

As this information was obtained from point based data, corresponding to the weather stations records, it was necessary to interpolate this information to the entire island using an inverse distance weighted (IDW) process, in ArcGIS software tool. This process was developed for all three seasons, however, to have comparable results for the different precipitation levels, it was necessary to estimate the daily precipitation level for each category.

This process was done using these mathematical equations:

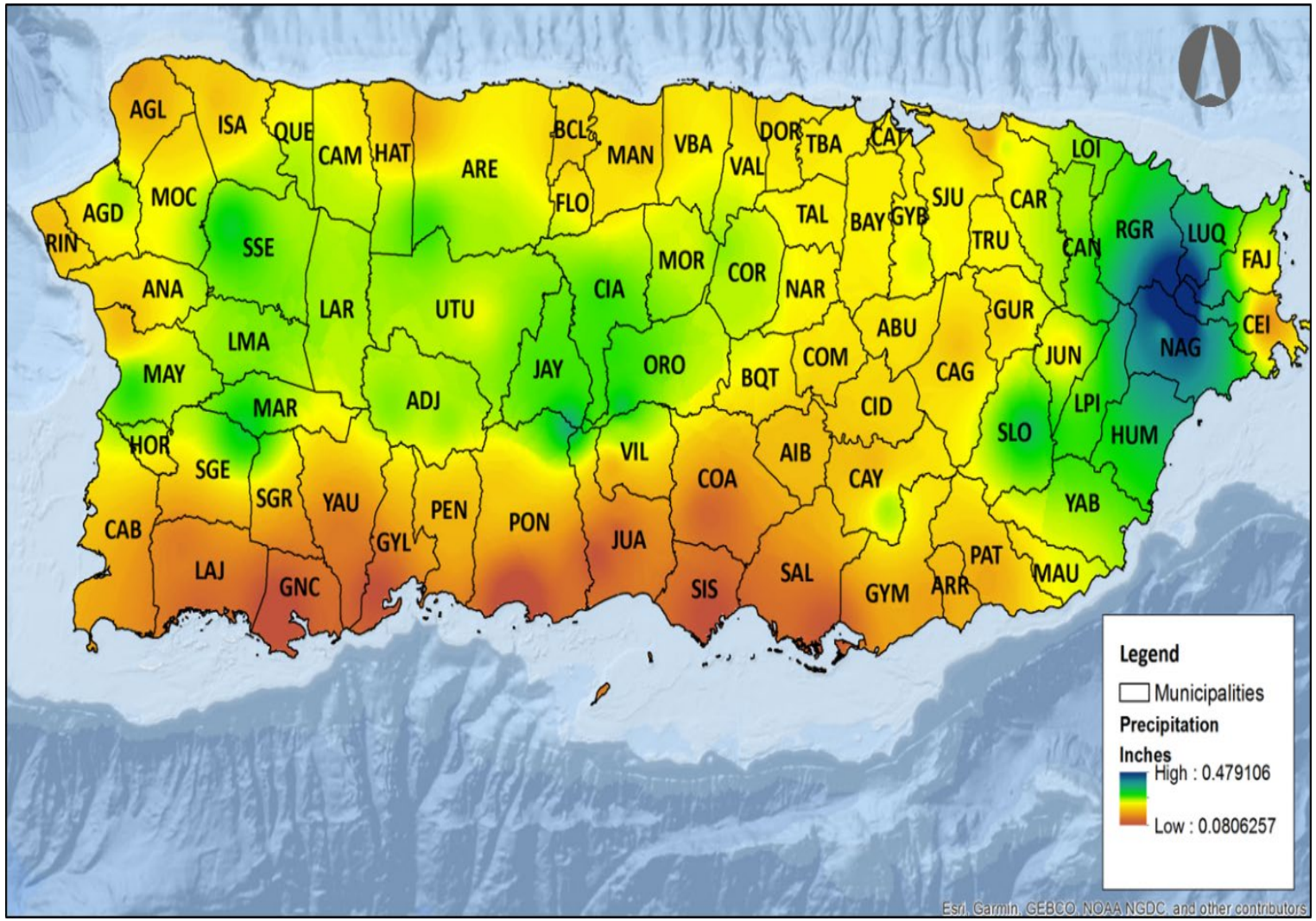
$$Average\ Daily\ Precipitation = \frac{\left(\frac{\mathrm{IDW}_{Average\ season}}{12}\right)}{30} \qquad \left[\frac{Inches}{day}\right]$$

$$Hurricane\ season\ daily\ precipitation = \frac{\left(\frac{IDW_{Hurricane\ season}}{3}\right)}{30} \qquad \left[\frac{Inches}{day}\right]$$

$$Hurricane\ Maria\ Daily\ Precipitation = \frac{(IDW_{Hurricane\ Maria})}{2} \qquad \left[\frac{Inches}{day}\right]$$

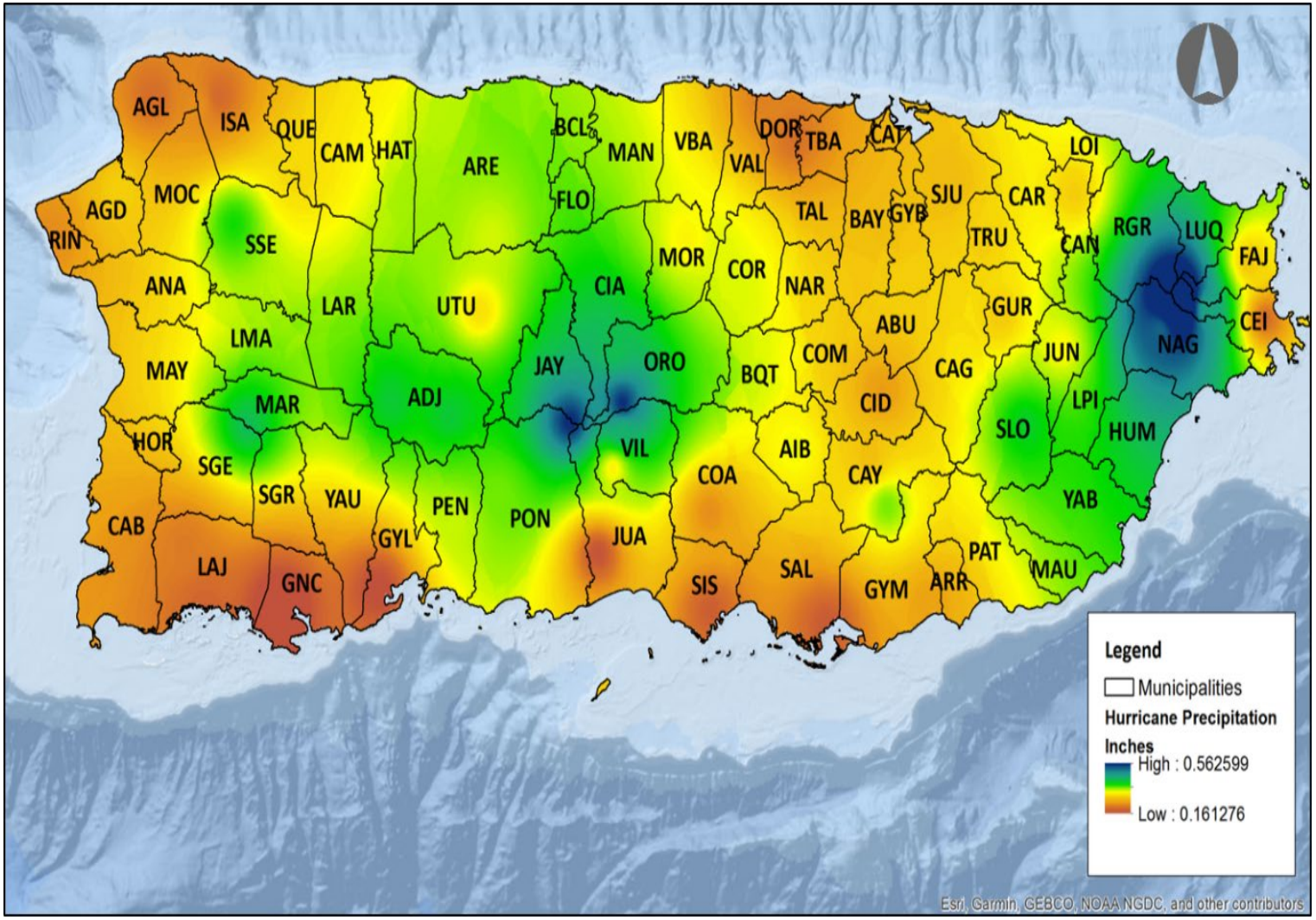
The resulting maps are shown in Figures I.13 through I.15; note that the scale is different in each map and therefore colors do not represent the same rain intensity. The units are shown in inches per day.

Figure I.13: Average Daily Precipitation



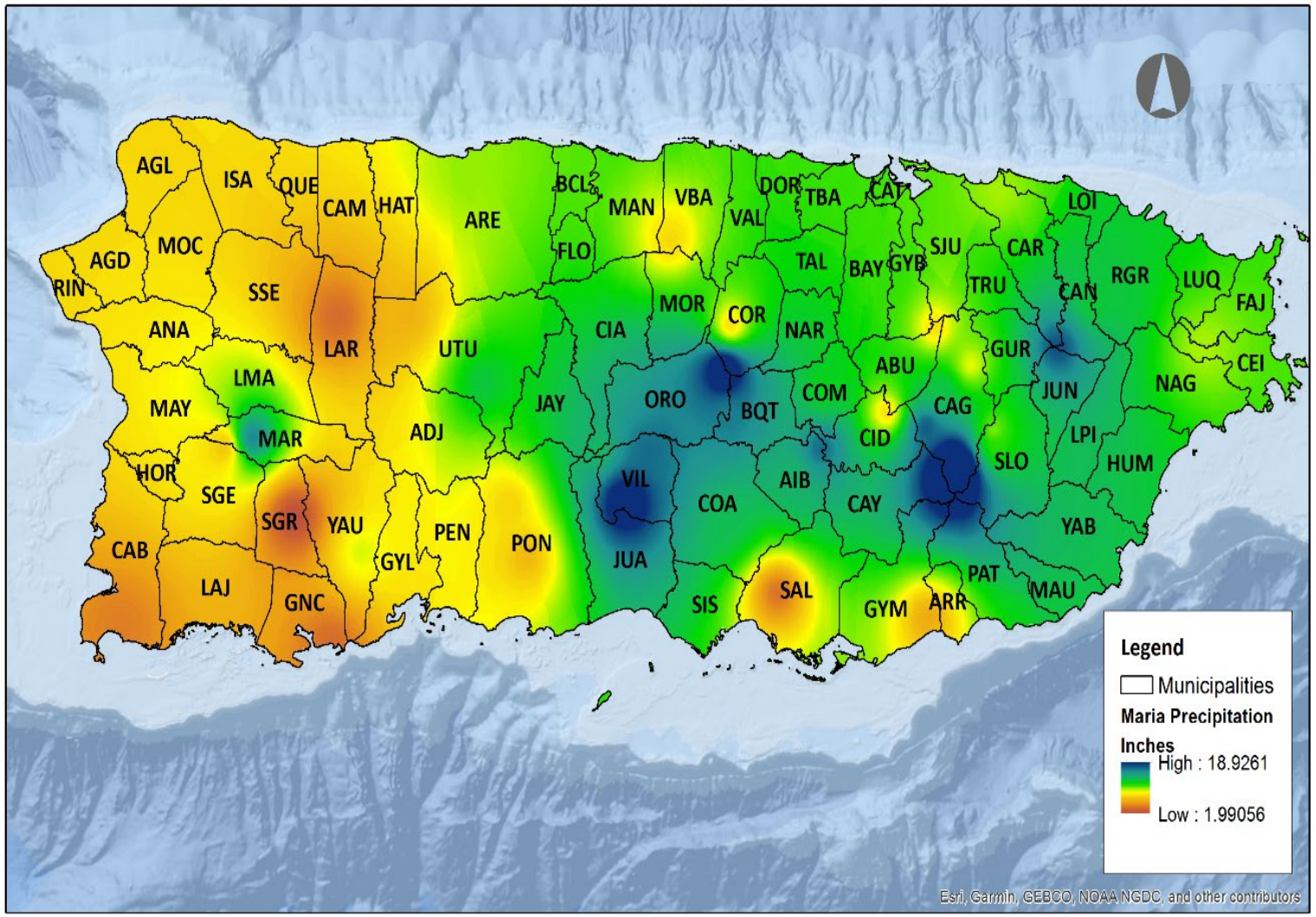
Source: SDG based on information from the National Weather Service.

Figure I.14: Hurricane Season Average Daily Precipitation



Source: SDG based on information from the National Weather Service.

Figure I.15: Hurricane María Average Daily Precipitation



Source: SDG based on information from the National Weather Service

After obtaining daily precipitation levels, it was evident that the rainfall occurred during Hurricane Maria Season is an extreme event that is difficult to compare with the other periods of study. For this reason, a normalization process was necessary, and so all precipitation levels were divided by the maximum value of the Hurricane Season Daily precipitation (0.57 inches/day). After this, the Average season represents the lowest level of precipitation, Hurricane season represents a medium and Hurricane María season the maximum effect.

Flood Hazard

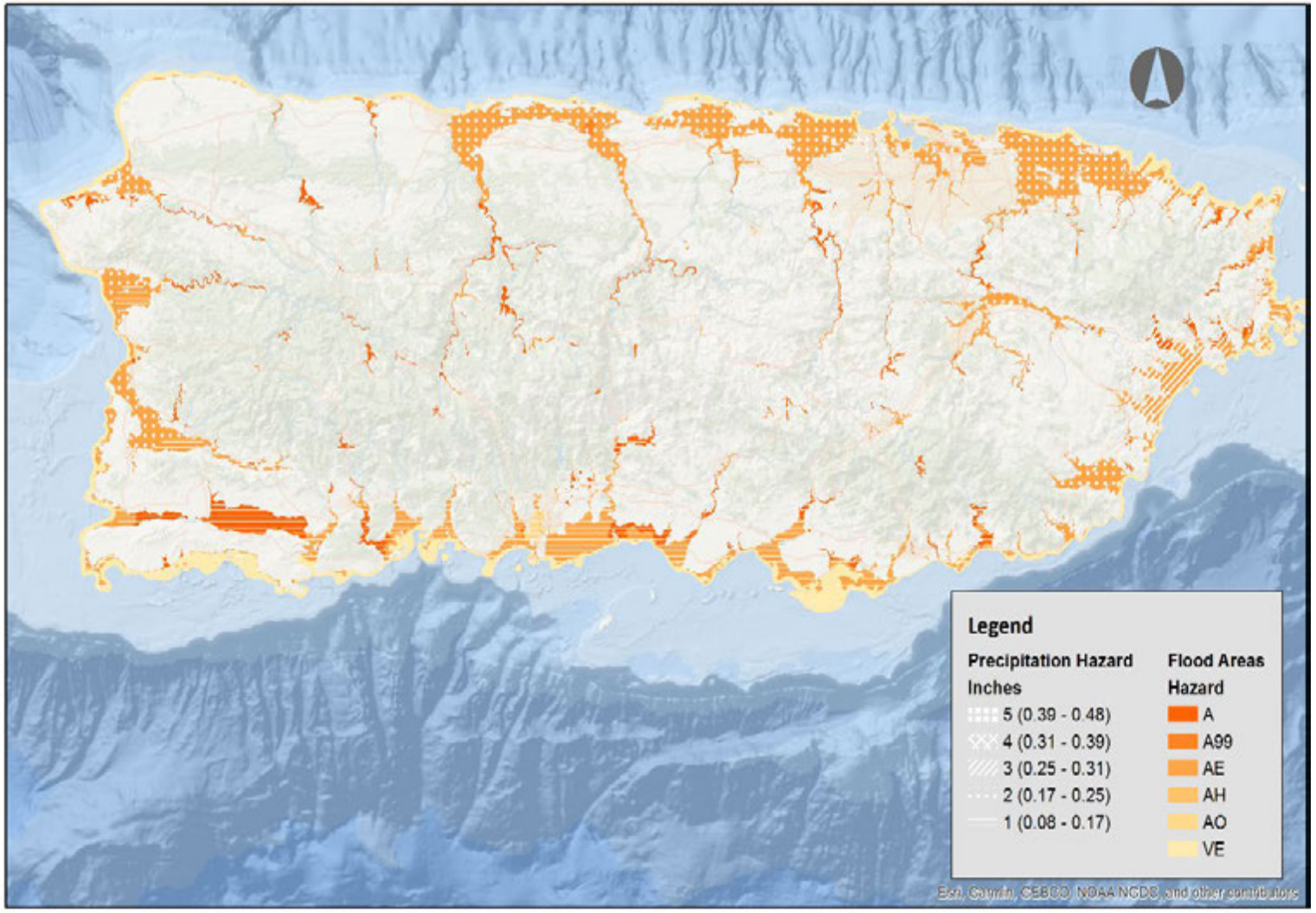
The flood zones identified by FEMA as Flood Insurance Rate Map (FIRM), shown in the previous section, is intersected with the rainfall maps, creating three scenarios of flooding. It was possible to create a standard scale between all three periods of study; however, even the minimum scale for the Hurricane María season was higher than any value in the other periods of study. This condition accentuates the amount of rain withstood by all the areas of the island, even those that are usually dry and whose infrastructure might not be prepared to these extreme events.

Furthermore, this extreme situation has ranges that cannot be compared with the Hurricane or the Average season. The result of this process was a level of hazard according to the precipitation levels in each season, where “1” corresponds to the areas with the lower probability of occurrence and “5” the areas with higher probability of being affected by high precipitation levels.

As it was discussed before, the flood hazard was not defined solely by the precipitation levels, but as a conjunction with the FIRM map. Accordingly, a map was created to join the hazard level of precipitation created by this study with the flood areas defined by FEMA.

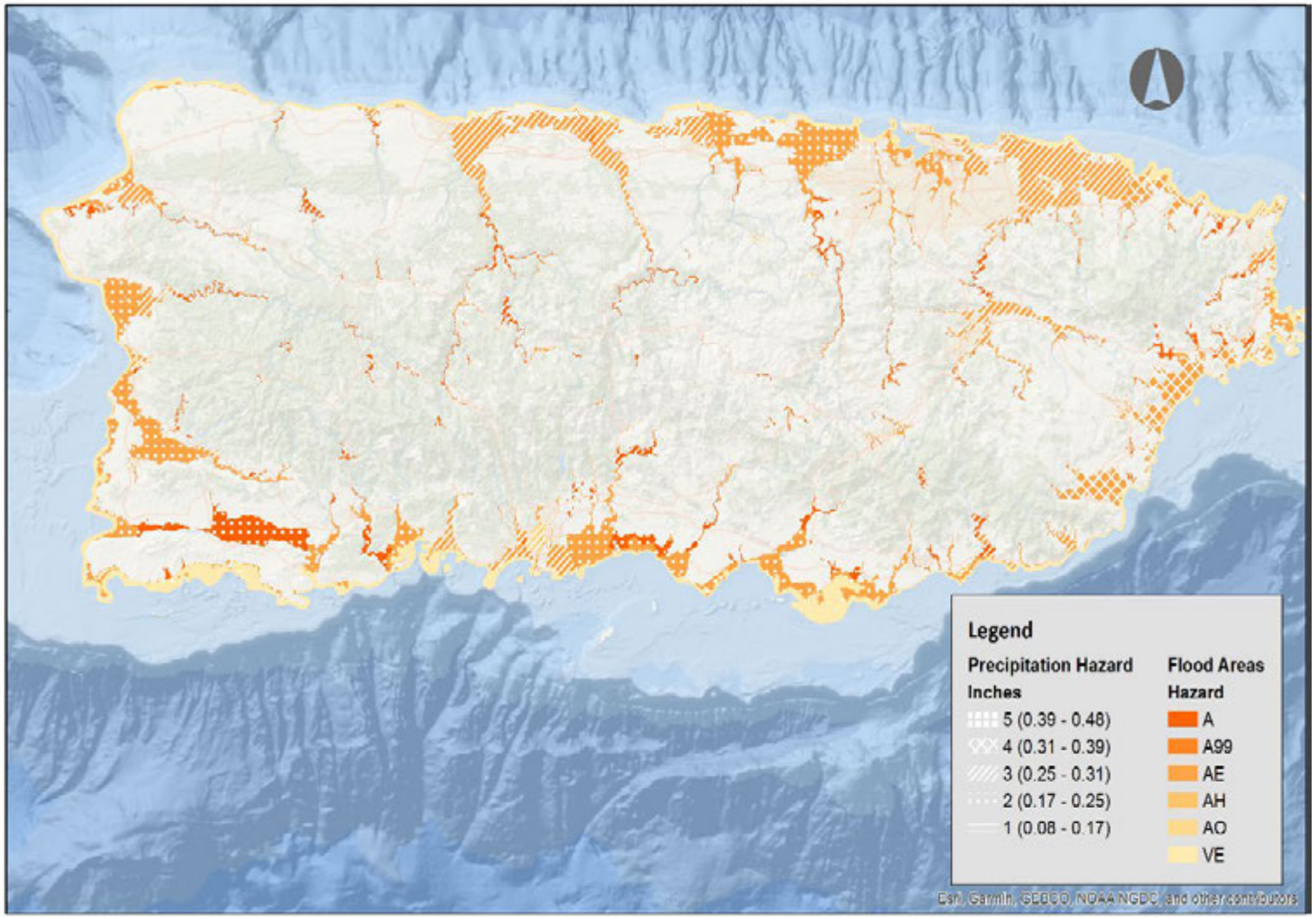
The corresponding maps for each period of study are shown in Figures I.16 through I.18.

Figure I.16: Average Flood Hazard



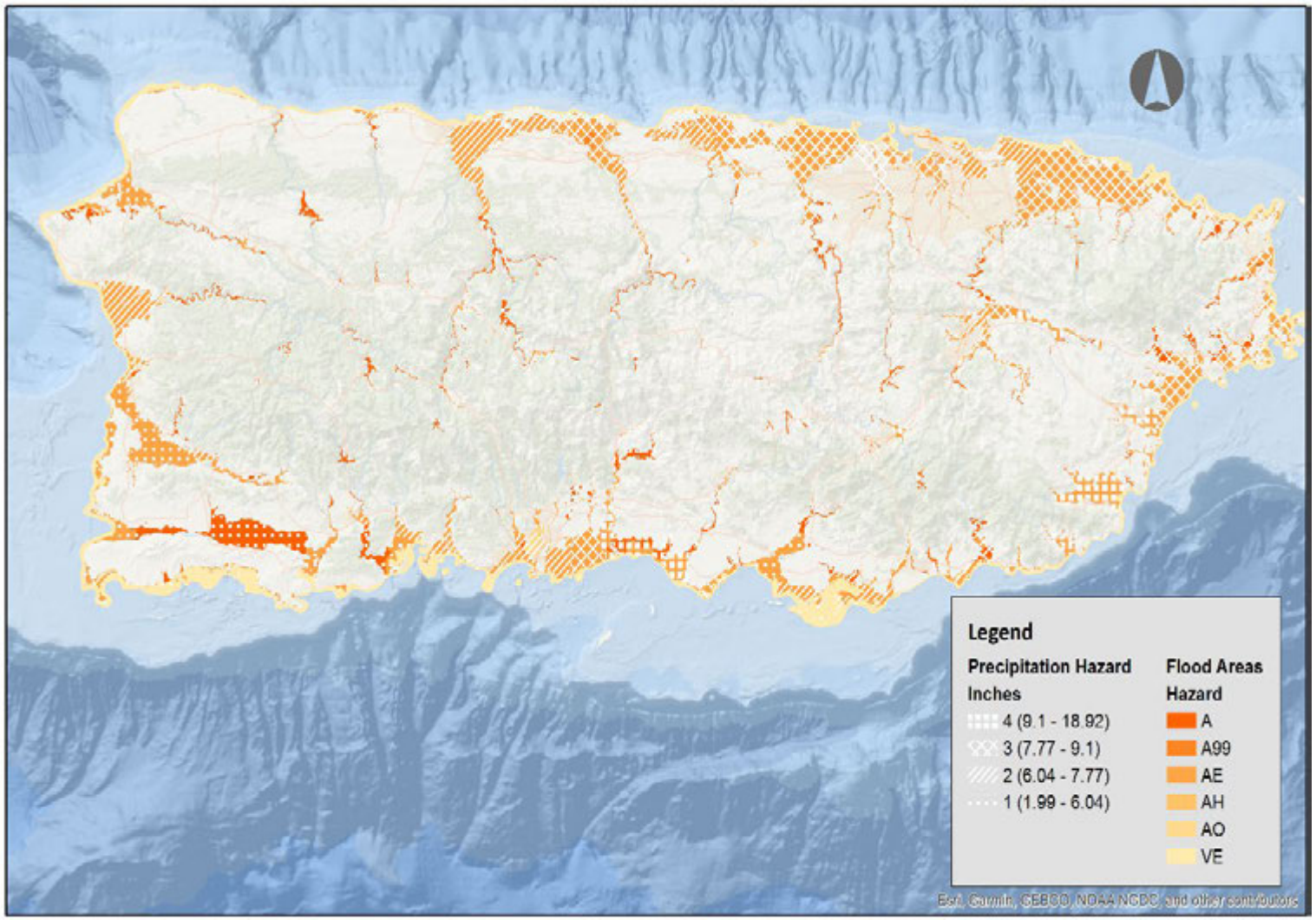
Source: SDG based on information from the National Weather Service and FEMA.

Figure I.17: Hurricane Season Average Flood Hazard



Source: SDG based on information from the National Weather Service and FEMA.

Figure I.18: Hurricane María Average Flood Hazard



Source: SDG based on information from the National Weather Service and FEMA.

Landslide Hazard

For the regression analysis, the entire island of Puerto Rico was divided into cells with an area of 100x100 meters, being each cell the unit of study that includes the information of the variables contained. For this reason, the Hurricane María Landslides data, obtained from the National Weather Service and used in this study as the observed landslides occurred by this event, were georeferenced to create a shapefile in raster format (see Figure I.8 from the Data Compilation section).

Similar to the flood hazard analysis, the one for landslides was based on two periods of study: Hurricane María season and the Average season, where the only variable that varies between them is the precipitation levels (the same used for the flood hazard analysis). The remaining triggering variables depends on characteristics of the terrain that were constant during the period of study.

The first step of this process was the preparation of the input data for the model. The slope indicators were obtained from the processing of the Digital Elevation Model (DEM) of Puerto Rico. This variable was created from the entire island in degree units ranging from 0° to 89.3°. On the other hand, the proximity to rivers was obtained by a spatial process that determines if a cell (unit of analysis) is intersected by a flowing body of water. Finally, the Landslide susceptible zones and the Land Use data were rasterized, to have all the variables in the same format of 100x100 meters cells.

The shapefile with the Land use information has a classification methodology that summarizes land uses into 17 categories. For this reason, it was necessary to simplify data to the level of detail needed to represent landslide hazard. Therefore, six classes were obtained, in which the higher value is a more vulnerable land use (for landslides) and the smallest value is a less vulnerable land use (see Table I.1.)

Table I.1: Reclassified Land Use Values

Reclassification value	Normalized Land Use Classes	Data base Land Use Classes
1	Common Rustic Land	7. Common Rustic Land
2	Protected Land	Specially protected rustic land Rustic ground specially protected from landscape Specially protected ecologically protected rustic Land Rustic ground specially protected ecological and hydric Specially protected rustic ecological and landscape land Specially protected rustic water land
3	Urban Land	Urban Land Land for development not programmed Programmable land for development
4	Road System	Road System
5	Agricultural Land	Specially protected rustic agricultural land Rustic land specially protected for agriculture and water Rustic land specially protected for agriculture and landscape Rustic land specially protected for agriculture and ecology Rustic land specially protected ecologically and agriculturally

Reclassification value	Normalized Land Use Classes	Data base Land Use Classes
6	Water Body	Water Body

Source: SDG

Finally, all the triggering data defined in terms of different categories, depending on the level of criticality that each of them represent in terms of landslide. The variable, classification, rank value and source are summarized in the Table I.2 below.

Table I.2: Variables Summary

Variable		Rank Values	Classes	Data Source
Dependent	Hurricane María Landslides	1 2 3	No Landslides Less than 25 per Sq Km More than 25 per Sq Km	National Weather Service
Topology	Slope	1 2 3 4 5	Very gentle slopes (< 5°) Gentle slopes (5° - 15°) Moderately steep slopes (15° - 30°) Steep slopes (30° - 45°) Escarpments (> 45°)	DEM provided by Highway and Transportation Authority
Geology	Landslide Susceptibility	1 2 3 4	Area of low susceptibility to land sliding Area of moderate susceptibility to land sliding Area of high susceptibility to land sliding Area of highest susceptibility to land sliding	Landslide Susceptibility from the Planning Board
Hydrology	Proximity to rivers	0 1	Not close to a river Close to river	Flow River shapefile provided by Highway and Transportation Authority
Land Cover	Land use	1 2 3 4 5 6	Common Rustic Lands Protected Land Urban Land Road system Agricultural Land Water body	Lands Use from the client
Climate	Precipitation for Hurricane María (inches/day)		Min: 1.99 Max: 18.93	National Weather Service

Variable		Rank Values	Classes	Data Source
	Precipitation for Average Season (inches/day)		Min: 0.081 Max: 0.48	National Weather Service

Source: SDG

The data collected could be divided in two groups: evidence (concentration of landslides during Hurricane María) and triggers (i.e., topology, geology, hydrology, land cover and climate). Therefore, it was possible to create a model under the conditions of Hurricane María and use it to predict the resulting landslides for other seasons.

For this analysis, the landslide variables were divided into two groups: training data for the construction of the model and testing data for accuracy evaluation. The prediction model was estimated using a binomial logistic regression for the Hurricane María Season to extract the coefficients of all causative variables for each class of the observed landslide in this period of study. Accordingly, a model for each respond in the Hurricane María Season ("No landslides", "Less than 25 per Sq Km", and "More than 25 per Sq Km") was created. The result of each model indicates de probability of being in the corresponding class, as the following equation indicates:

$$p = \frac{1}{1 + e^{-z}}$$

where z is a linear combination of independent variables using the estimated coefficient for each model.

The model for the "No landslides" class is the following:

$$p_1(x_1, \dots, x_6) = \frac{1}{1 + e^{\sum_i (w_{1i} x_i) + b_1}}$$

The model for the "Less than 25 per Sq Km" class is the following:

$$p_2(x_1, \dots, x_6) = \frac{1}{1 + e^{\sum_i (w_{2i} x_i) + b_2}}$$

The model for the "More than 25 per Sq Km" class is the following:

$$p_3(x_1, \dots, x_6) = \frac{1}{1 + e^{\sum_i (w_{3i} x_i) + b_3}}$$

The corresponding weights for each model are shown in Table I.3.

Table I.3: Logistic Regression Models' Coefficients

Related variable	Coefficients for model "No landslides"	Coefficients for model "Less than 25 per Sq Km"	Coefficients for model "More than 25 per Sq Km"
Intercept (b)	5.87059	(5.72394)	(6.91072)
Slope	(3.02466)	2.76992	2.36195
Landslide Susceptibility	(6.20830)	0.81184	2.60127
Proximity to rivers	(0.38143)	0.35103	0.26701
Land use	(1.00084)	0.81184	1.90019

Related variable	Coefficients for model "No landslides"	Coefficients for model "Less than 25 per Sq Km"	Coefficients for model "More than 25 per Sq Km"
Precipitation for Hurricane María (inches)	(1.96749)	2.14350	(1.02239)

Source: SDG

The misclassification error of each model was evaluated comparing the quantity of predicted values within the class and the quantity of observed values in the corresponding class defined as:

$$Error_i = 1 - \frac{\sum_{j \in N}\left[1_{p>0.5}(p_i(x_j))\right]}{N}$$

where N is the number of observations and p_i is the regression model for class i.

The misclassification error was calculated for training data and for testing data. The former is known as the training error and represents how well the model adjusts to the data given to construct the model. The latter is known as the generalization error and represents how well the model can classify new given data.

The results for the misclassification error for each model show their ability to explain the areas classified as "Less than 25 per Sq Km" and the areas classified as "No landslides"; however, due to the extreme events during Hurricane María, the current variables are not sufficient to explain all the conditions that lead to "More than 25 per Sq Km" class and it was not possible to have an acceptable accuracy for this category. See Table I.4.

Table I.4: Misclassification Error for Each Landslide Model

Landslide class	Training Error	Generalization Error
No Landslides	0.2737	0.2733
Less than 25 per Sq Km	0.2863	0.2875
More than 25 per Sq Km	1	1

Source: SDG

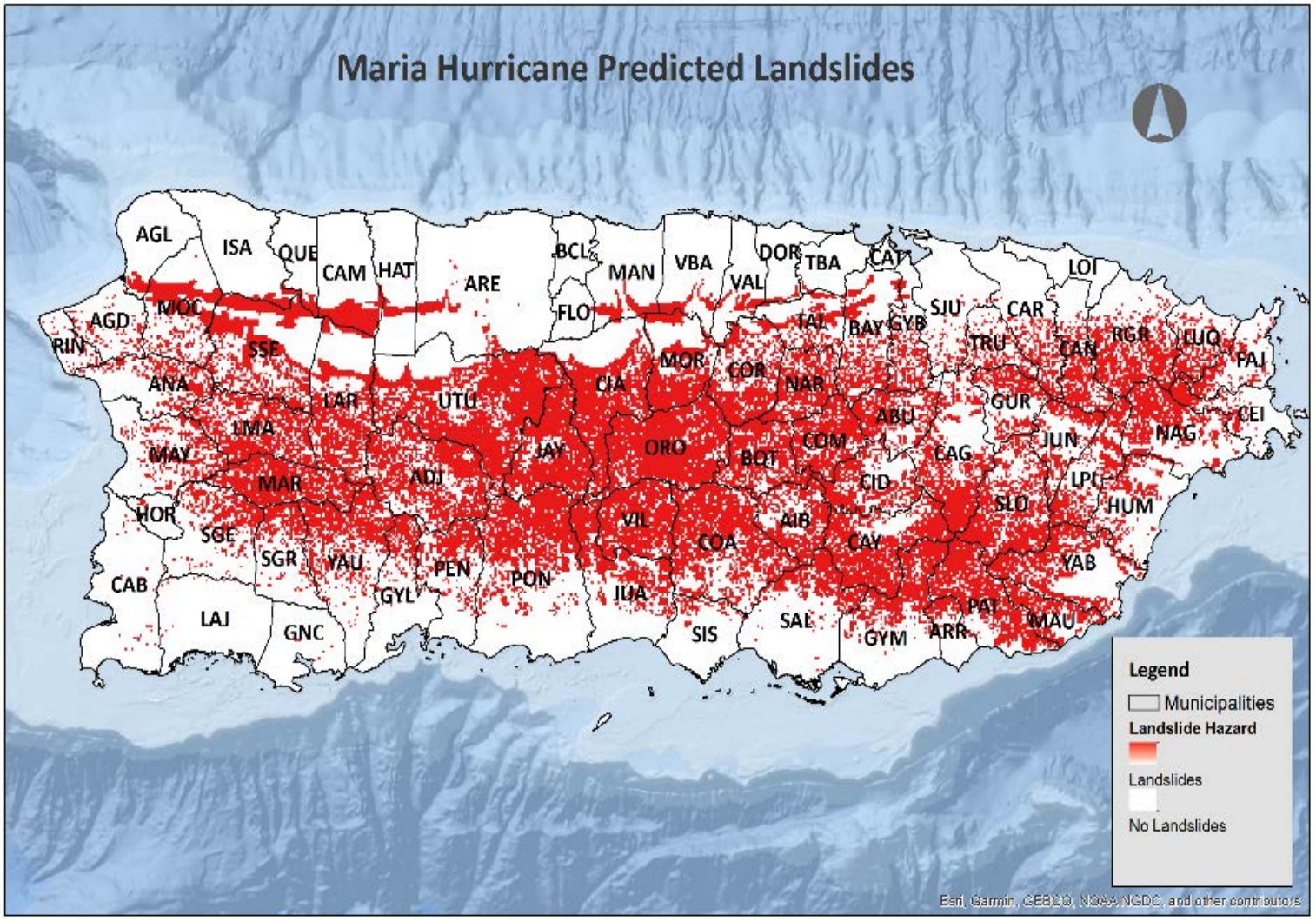
The multiclass model is a combination of the previous models, as the class with the higher probability given the vectors of each independent variable $(x_1, \dots, x_6)$:

$$p_{combined} = argmax(p_1, p_2, p_3)$$

Once the prediction model was obtained, the testing data was input to the model. Where, the resulting landslide class of each cell was the one with the maximum probability comparing the results from the three models. With these results an accuracy of 0.741 was obtained.

The predicted hazard map for Hurricane María is shown in Figure I.19 below. As it can be seen, this map differs from the original data gathered for the actual landslides occurred shown in Figure I.8. This classification errors might be due to the lack of explanatory variables or very specific conditions that occur during Hurricane María. For the scope of this study, that is a screening level, the accuracy given by the prediction model is believed to be sufficient and appropriate.

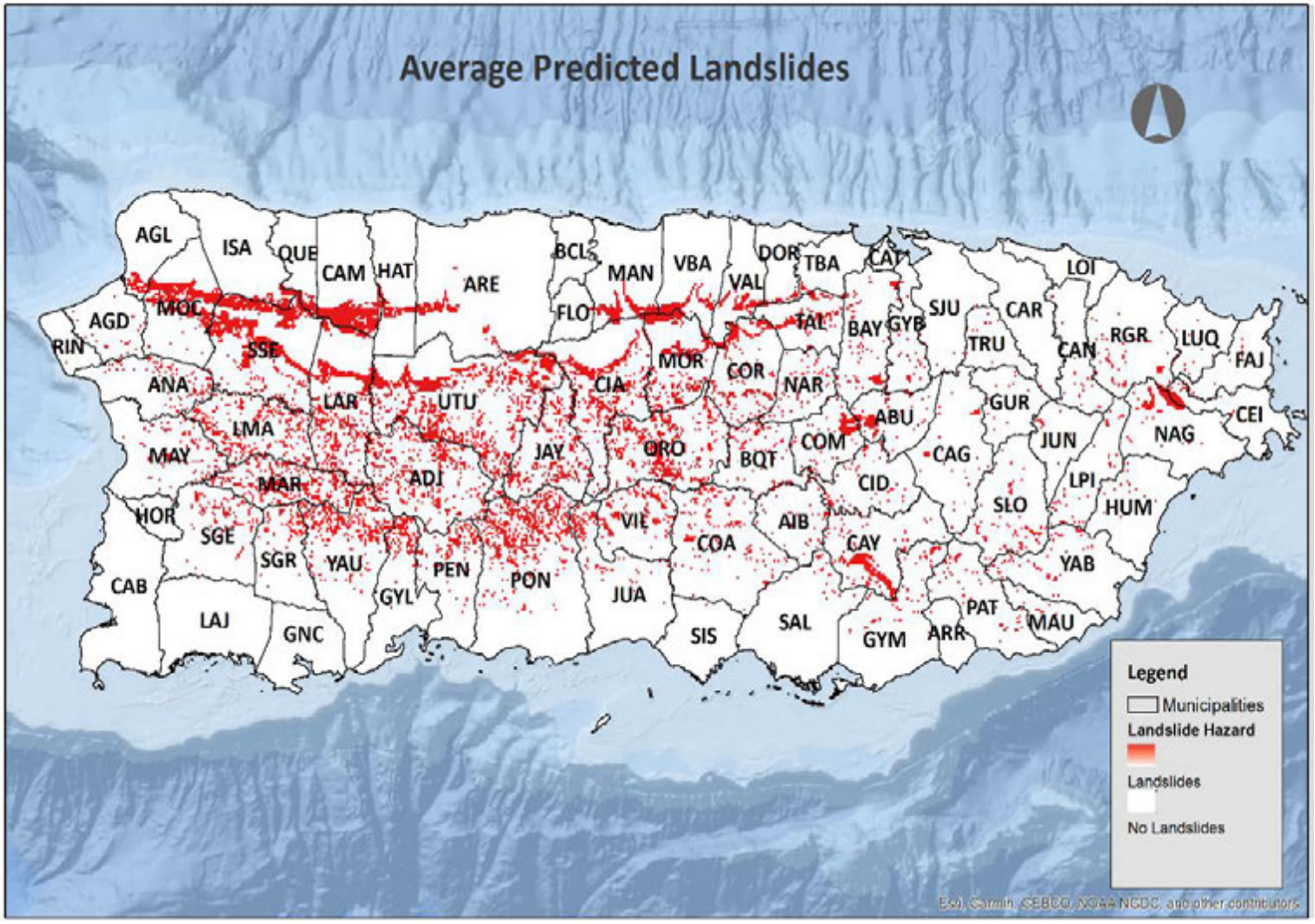
Figure I.19: Hurricane María Predicted Landslides



Source: SDG

Once the classification model is built, it is possible to estimate the landslides for the Average season, changing the data for precipitation levels for its corresponding study period. The remaining variables were the same to the Hurricane María Season as they do not change with time (under the period considered). The resulted map is shown in Figure I.20.

Figure I.20: Average Predicted Landslides



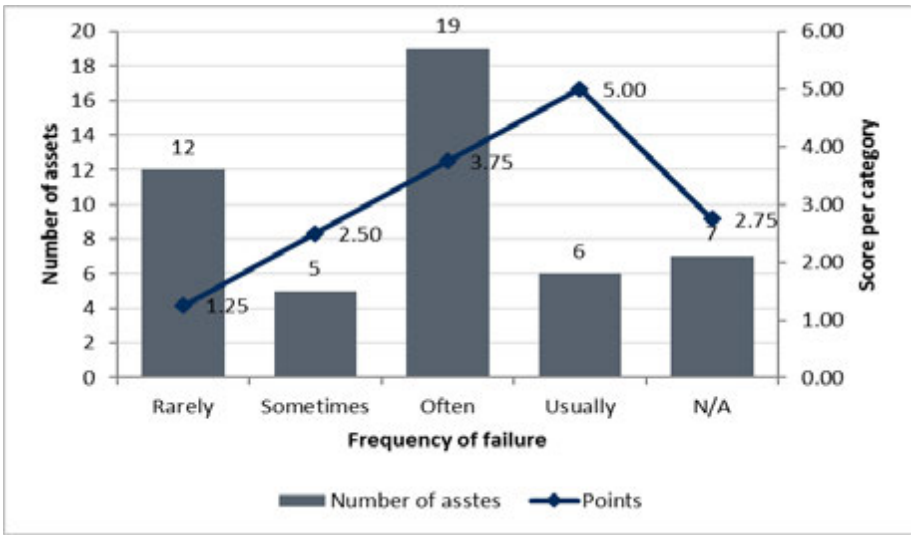
Source: SDG

Sensitivity

Asset State

As mentioned before, the results of frequency of failure were used as a measure of the state of the asset and each category were given a score for measuring how "sensitive" is the asset to the identified hazard. Four different categories were identified from the answers provided by the stakeholders (rarely, sometimes, often and usually), therefore a scale from 1 to 5 was divided into these categories. Assets with highest frequency were given a score of "5", while the lowest frequency was given a score of "1.25". An additional intermediate score was given to segments which frequency of failure was uncertain or not provided by stakeholders (i.e., N/A), as shown in the Figure I.21 below.

Figure I.21: Frequency of Failure

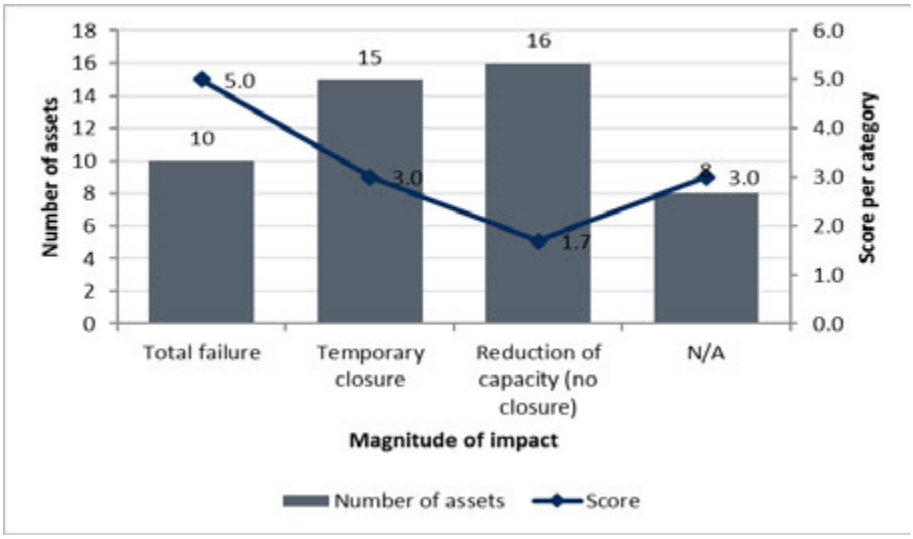


Source: SDG based on results from Stakeholders' survey.

Reduction Input

The magnitude of failure was used as a measure of the reduction of asset's functionality when affected by a hazard. Like the asset state, for each category of magnitude of failure a score from 1 to 5 was given. In this case, the uncertainty (i.e., N/A) was given an intermediate score of "3", since there were only three categories, and assigning a different value might result on underestimate or overestimate uncertainty. See Figure I.22.

Figure I.22: Magnitude of Failure



Source: SDG based on results from Stakeholders' survey.

Criticality Index

A criticality analysis is used to identify the most relevant assets in an infrastructure system. This criticality analysis can be developed from any perspective: supply, demand, risk, vulnerability, connectivity, etc. For this analysis the criticality index aims at representing the transportation model information (e.g., capacity, volume, free-flow speed and congested speed) as part of the Sensitivity and the Adaptive Capacity measure.

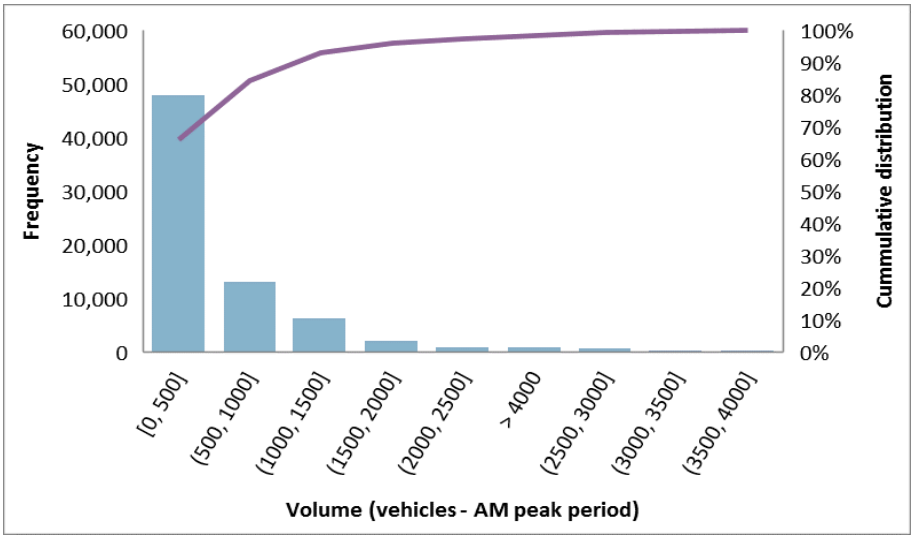
Even though the criticality analysis is used to help practitioners identify the most critical assets to perform the vulnerability analysis (Federal Highway Administration, 2017) it can also be used to complement the vulnerability analysis, especially when there is not enough information gathered about g the asset state and/or when the identified assets are not easily comparable. In this case, the identified segments have different characteristics (i.e., length, location, type of mitigation strategies, etc.) and the calibrated transportation model can provide additional and comparable input regarding the Sensitivity of each asset.

Conceptually, the criticality index should highlight those segments of the network that are part of most of the users' trips, i.e., highly demanded segments. Because this model represents a period (AM peak), the volume in each segment is not the only measure of high demand. The conditions to be considered as a critical segment are any of the following:

- High volume of vehicles (>95% of segments)
- Critical volume/capacity ratio (>1) in conjunction with low speed (compared to free-flow speed), which means congestion

To define an index able to capture the above concept, first it is necessary to characterize the current conditions of the links. The distribution of total volume assigned to each in the transportation model is shown in the following Figure I.23. By analyzing the results, only 5% of the links have a traffic volume above 2,500 vehicles during the AM peak (7:00 – 9:00).

Figure I.23: Distribution of Total Assignment Volume in Transportation Model



Source: SDG

With the above analysis, the criticality index was defined as:

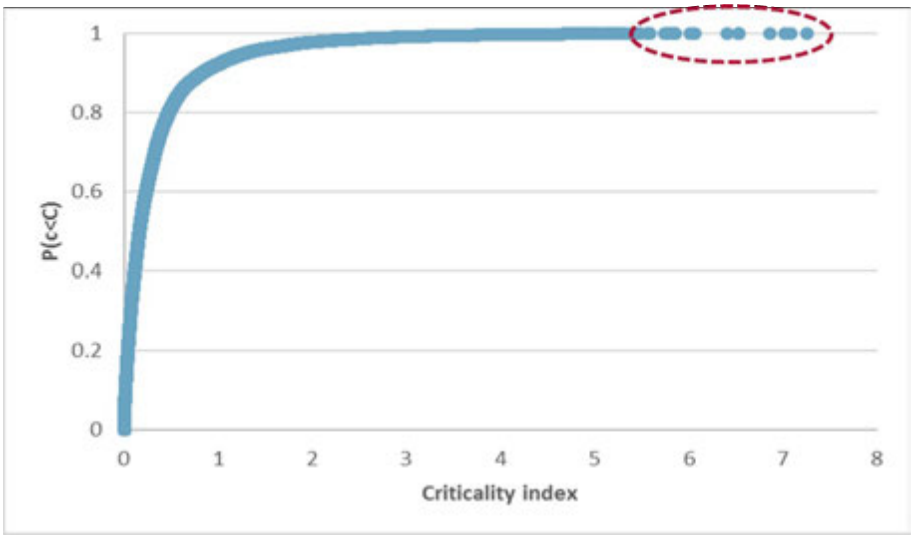
$$w = \frac{V}{2500} + \left(\frac{V}{C}\right)\left(1 - \frac{s_{cong}}{s_{FF}}\right)$$

where V is the total traffic volume of a link (in vehicles during the AM peak), C is the total capacity of the link (in vehicles for AM peak period), s_{cong} is the congested speed (in mph) and s_{FF} is the free-flow speed (in mph).

With this equation, critical links obtain the highest score. The resulting distribution for the criticality index is shown in the Figure I.24 below. As it can be seen, the criticality index ranges between 0 and 8, where “0” is the least critical links and “8” is the most. Also, in the figure the top critical links are highlighted in the dashed-circle.

Also by the shape of the cumulative distribution, it is noticeable that most of the links have low criticality index (below “1”) and only few have high criticality index. This characteristic is highly expected by this type of measure, since the decision-maker need it to identify only the most critical and the criticality measure should be able to differentiate the top critical segment from the rest.

Figure I.24: Cumulative Distribution of Criticality Index



Source: SDG

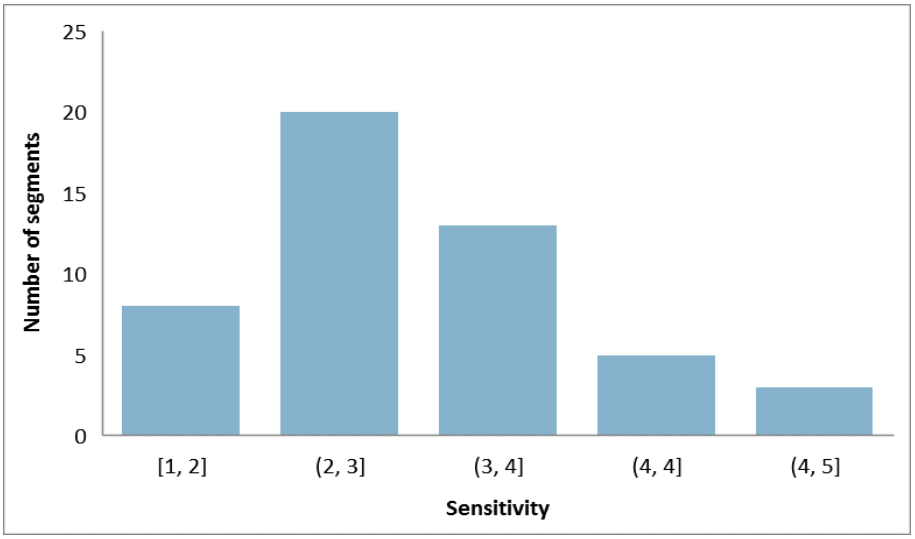
Finally, to compare this measure with the rest of the Sensitivity, the criticality index is normalized to fit a scale between 1 to 5.

Sensitivity Measure

The final measure for Sensitivity is a combination of the three components: asset state, reduction input and criticality index. Since the three measures are equally important and complement one another, the Sensitivity was defined as the average. The distribution for the identified segments are shown in the following Figure I.25.

Most of the selected segments scores a medium-low Sensitivity measure (i.e., '2') which supports the previous findings regarding low magnitude of failure and only few critical segments. These results show that there are few segments which are less likely to be able to withstand a future hazard.

Figure I.25: Distribution for Sensitivity



Source: SDG

Adaptive Capacity

The final component of the vulnerability analysis is the Adaptive Capacity. This is a system-level measure and aims at measuring how a failure in one element of the system reflects in the overall performance. There are two possible approaches for this measure:

- Direct: Using the transportation model, each segment is removed from the network and the model demand is assigned again. Using performance statistics of the transportation model (e.g. average volume/capacity ratio), the effect of the removal of such link is measured.
- Indirect: Using graph theory, the transportation model is represented by a weighted-directed graph and a centrality statistic (before and after removal) is used to measure the effect of a link failure in the system.

The direct measure solves the assignment optimization problem and gives the distribution of traffic volume in each link of the network. Even though this is as exact as it can be possible with a computational modelling tool, the results of the general performance are not easily captured, and the effect of a link removal might only be reflected locally, but in a general measure it can be hidden. Also, since this is an exact measure, every assignment of the transportation model is a time-consuming task.

On the other hand, the indirect measure is a simplification of the transportation model; it runs all the possible shortest paths, but it does not consider users decision problem or even the number of trips for each OD pair. Therefore, the weighted value assigned to each link should already consider traffic. However, it is a fast methodology for high-level decision-making and the centrality measures successfully captures the global effect of a change in the network topology (e.g., removal of a link). Considering the abovementioned conditions, it was decided to use graph theory to capture the effect in the system given by the failure of a segment of the network.

Several statistics of a node have been defined for measuring the relevance of a link in graph theory, among the most used ones are:

- Degree: number of adjacent nodes, i.e. sum of links connected to it Cesar Ducruet, 2017
- Closeness: it is a measure of how close is this node to the rest of the nodes, i.e. the sum of the length (or weight) of the shortest paths between the node and all other nodes in the graph (Bavelas, 1950) Cesar Ducruet, 2017
- Betweenness: "measure of accessibility that is the number of times a node is crossed by shortest paths in the graph"[21] Cesar Ducruet, 2017
- Eigencentrality: It is a measure of the importance of the node relative to the network, and it depends on the number of connected components and the relative importance of them Cesar Ducruet, 2017 and
- PageRank: is a variation of eigencentrality, used by Google search engine to rank the pages in a web search, by representing them as nodes and its references to other pages as links.

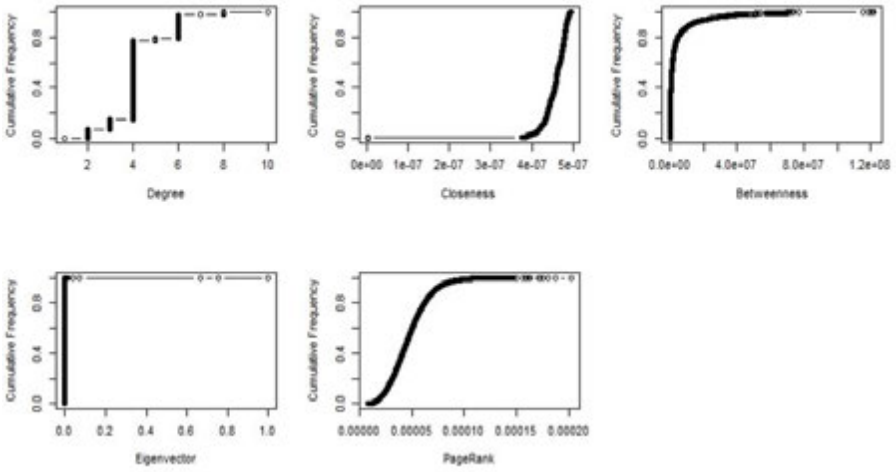
A summary of cumulative distribution of possible centrality measures for the network are shown in the Figure I.26 below. As mentioned before, it is ideal to have an index that highlights the most important elements of the network, so that when the network topology is changed, it reflects it.

From the merely connectivity standpoint, in the degree distribution graph most of the nodes in the network have four or less connections. This behavior is usually presented in transportation networks since most of intersections only connect two different roads. However, nearly 20% of the nodes have more than six connections, which makes them stand from the rest. On the other hand, closeness measure for Puerto Rico's transportation system shows an even distribution of links' length in combination of similar degree, since most of the links have a measure between $4 * 10^{-7}$ and $5 * 10^{-7}$. The eigencentrality measure shows that only five nodes present a relative importance (measured from its eigenvalues) that is significantly higher than the rest. These nodes are principally very congested intersections in the metropolitan area.

The betweenness and Page-rank measures show a more gradual distribution, where the elements of the network can be differentiated, i.e., there are few nodes with high centrality and the rest of them with smaller centrality value. However, the behavior shown by betweenness centrality measure is the one that best fits what we look for: highlight the most critical elements of the network.

[21] Cesar Ducruet, 2017.

Figure I.26: Centrality Measure for Puerto Rico Transportation Network

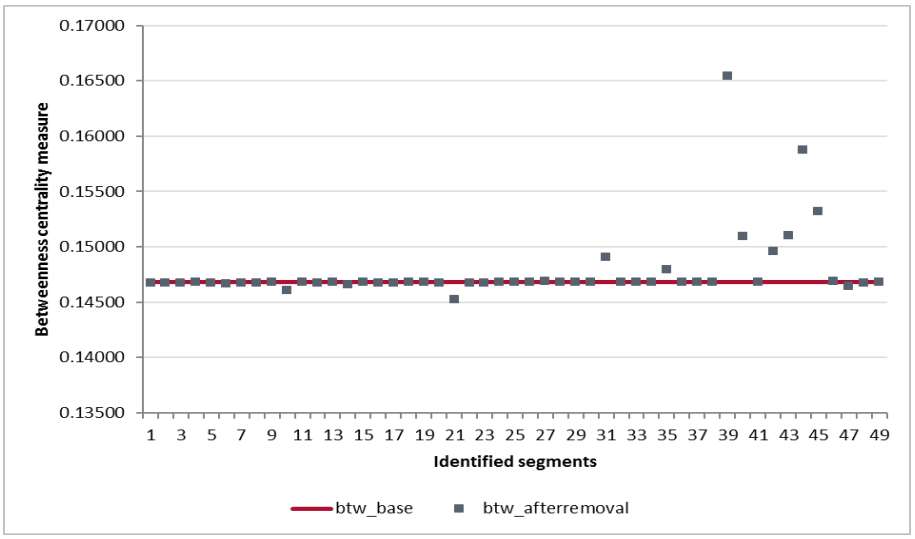


Source: SDG

Once the centrality measure is selected, it is calculated for the whole network as the baseline to compare. Then, for each identified segment, the corresponding links were removed and the centrality measure is again estimated. According to the difference obtained, all the segments that caused a reduction in betweenness centrality (i.e., they caused a negative effect system-wise) are assigned a score of "5", while all the segments that caused an increment or no change in the betweenness centrality (i.e., they are not as relevant in a system-level) are assigned a score of "1".

The Figure I.27 below shows the results for all identified segments.

Figure I.27: Betweenness Centrality After Removal



Source: SDG

J APPENDIX J – ILLUSTRATIVE PROJECTS

There are a list of projects under the PRHTA backlog that will be developed using alternative source of funding such as federal loans, P3 deals, project phasing strategies, amongst others. These projects have been discussed and validated with the different committees along the development of this project:

- PR-22 Extension[22];
- PR-5 extension[22];
- Congestion relieve projects on grade separated intersections (flyovers)[22];
- PR-2 expressway segments between Aguadilla and Mayagüez;
- PR-53 completion; and
- PR-10 completion.

[22] Mentioned in the PRHTA Fiscal Plan

K APPENDIX K – BOTTLENECK ANALYSIS

INTRODUCTION

As part of the "2045 Long Range Transportation Plan" that seeks to present the current conditions of the transportation routes in the country, an island-wide transit study (bottleneck analysis) was required to identify the areas of greatest problems. This study focuses on the delay times on the roads of Puerto Rico. The study considers each region individually, analyzing the data compiled for each one. It will give details of the months and the years that were selected, the periods of study and the averages of delay. The planning factors include the priority of supporting the economic vitality, especially by enabling global competitiveness, productivity, and efficiency as well as promoting efficient system management and operation. Congestion management and reduction is an important factor to consider within this 2045LRTP

Typically, road congestion is associated with traffic volume, level of service (LOS), and speed. These indicators can be measured considering the following Key performance indicators (KPIs): delay, queue, LOS, volume to capacity ratio (V/C), speed, travel time or density.

As part of the 2045 LRTP, a bottleneck analysis based on delays identification was performed for the NHS. For this analysis, data from NPMRDS corresponding to years 2016-2018 was utilized for extracting speed and distance of TMC coded segments, in order to calculate travel time. The variable delay was obtained through comparing travel time at reference speed and travel time at traffic speed, to assess the time of delay for all segments, per period of day.

Travel Time Reliability

Generally, urban areas face congestion during peak hours. As a result, citizens are required to adjust the travel time to account for the estimated delay and ensure arriving at their destination on time. The reliability of this travel time adjustment influences user's decision on whether to leave early to account for that delay or risk being late to their destination. Travel time dependability affects citizen's everyday life factors such as value of time, quality of life and well-being.

Bottleneck Analysis

According to FHWA, bottlenecks are recurring congestion events, and considered "active if traffic is detected to be queued upstream of the location and unqueued downstream (page 106)".[23] As opposed to nonrecurring events of congestion attributed to traffic anomalies such as car accidents, bottlenecks are predictable in cause, location, time of day and approximate duration. This specific bottleneck analysis focuses on identifying segments with major delays along the NHS in Puerto Rico. By identifying these segments, there can be a determination of: specific locations where congestion is highest along a road and the daily period of occurrence.

Methodology

Segment Identification

To identify possible bottlenecks, it is necessary to consider segments with travel times higher than the expected at reference speed for a road segment or TMC. For doing so, a table was created which relates the traffic database with speed data for 24 hours and 7 days a week (for months between September 2016 – April 2018, with exception of months between September-December 2017) to a unique list of TMC codes with information on road names and miles. The miles field was then used to calculate the average travel time and reference travel time, given by average speed/miles and reference speed/miles. The travel time, initially calculated in hours, was converted to minutes and saved in new fields as avg_TT_min and ref_TT_min.
Subsequently, delay of vehicles per segment was obtained in minutes by subtracting the average travel and reference travel time. By measuring delay, possible bottleneck segments and roads can be identified as those with higher delays on traveling time.
To conduct the Bottleneck Analysis per region, geospatial information of MPO Regions (polygon features) was used to clip road segments according to their location within each selected metropolitan region (7 regions in total) using ESRI´s GIS software ArcMap 10.2. This resulted in seven shapefiles containing road segments per each region, saved also as comma delimited (.csv) files.
A unique list of TMCs per region was used to query the traffic database, selecting only segments belonging to each separate MPO region and thus generating new worksheets with information per week day, for a specific month, year and region.[24] .
The resulting Monday through Sunday worksheets with information on TMC, road name, miles, average speed, reference speed, average travel time, reference travel time and delay, is compiled in one excel worksheet per month for a specific year and region. (
Accordingly, each region has a total of sixteen (16) worksheets representing sixteen (16) months throughout the period of September 2016 – April 2018, with the information specified above (refer to Appendix K for more detail information).
Once all the regions were analyzed by period, a recurrence assessment was made for the same months to identify the top ten (10) worst segments in terms of delays. The ten (10) segments

[23] Daganzo, C.F. (1999). "Remarks on Traffic Flow Modeling and its Applications," Traffic and Mobility, 105–115, Springer Berlin Heidelberg, Berlin, Germany.

[24] Information available in Appendix K.

(TMC) with the highest recurrence were the TMC selected for the analysis of the average delays per region per period, presented in the following section.

SAN JUAN TMA

In the San Juan TMA, the data used in the in the preparation of the graphs are the routes with the most problems.

The top 10 worse roads are shown in Table K.1 to Table K.4.

Table K.1: Night Period (NT)

TCM	Road name
832+04434	PR-2
832+04432	PR-2
832+04430	PR-2
832-04433	PR-2
832+04454	PR-901
832+04453	PR-901
832+04338	Ave. Jesús T. Piñero
832+04177	PR-52 E
832+04479	PR-3
832-04338	Ave. Jesús T. Piñero

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.2: Morning Period (AM)

TCM	Road name
832+04434	PR-2
832+04434	PR-2
832+04454	PR-901
832+04509	PR-3
832+04430	PR-2
832-04186	PR-52 O
832+04432	PR-2
832-04453	PR-901
832+04479	PR-3
832+04339	Ave. Jesús T. Piñero

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.3: Midday Period (MD)

TCM	Road name
832-04433	PR-2
832+04430	PR-2

832+04432	PR-2
832+04434	PR-2
832+04177	PR-52 E
832+04509	PR-3
832+04454	PR-901
832-04453	PR-901
832+04480	PR-3
832+04479	PR-3

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.4: Past-midday Period (PM)

TCM	Road name
832-04433	PR-2
832+04434	PR-2
832+04430	PR-2
832+04432	PR-2
832+04509	PR-3
832+04454	PR-901
832-04453	PR-901
832+04479	PR-3
832-04186	PR-52 O
832+04339	Ave. Jesús T. Piñero

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.5 shows months and years selected.

Table K.5: The Months and Years Selected

2016	2017	2018
September	January	January
October	February	February
November	March	March
December	April	April
	May	
	June	
	July	
	August	

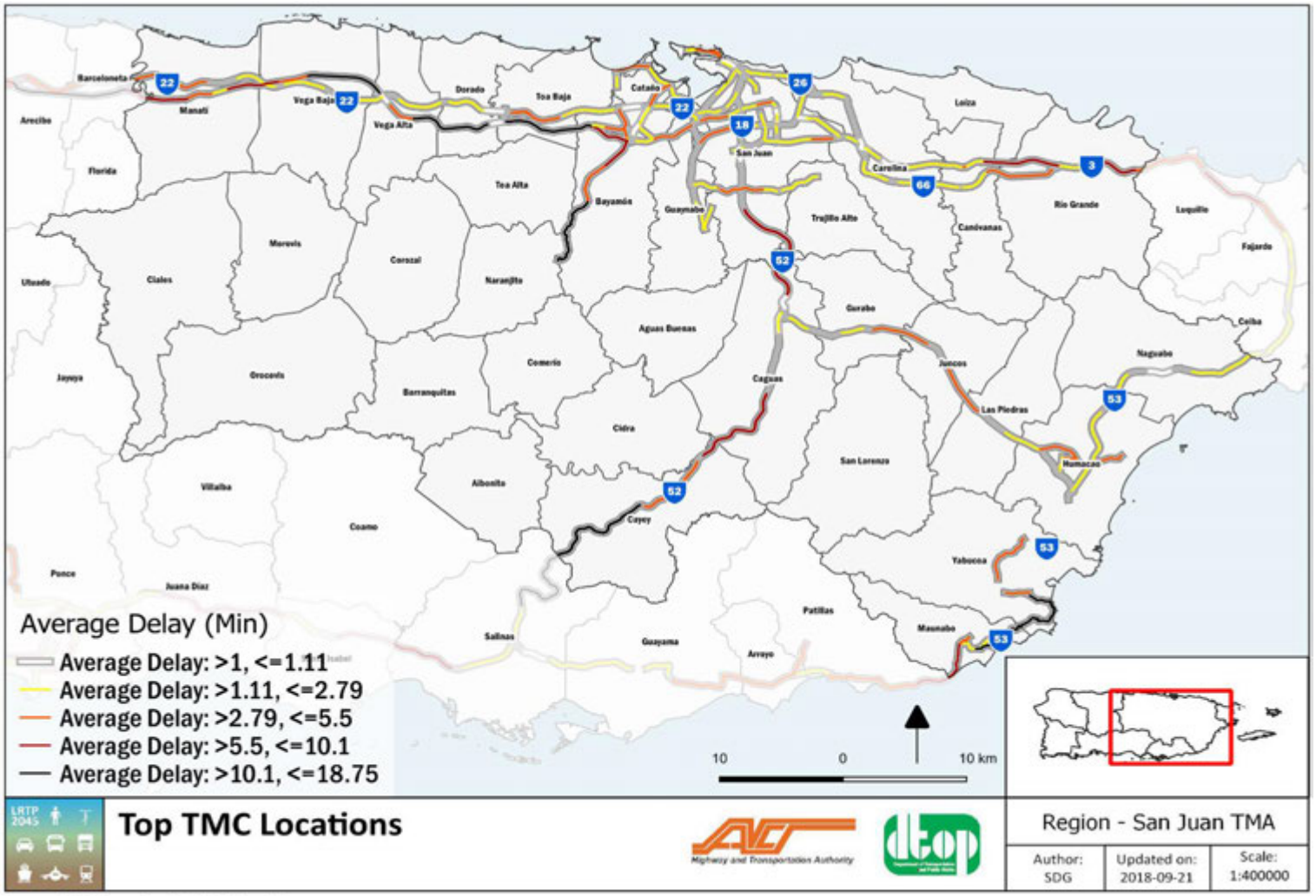
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Bottleneck Analysis

Night Period (NT)

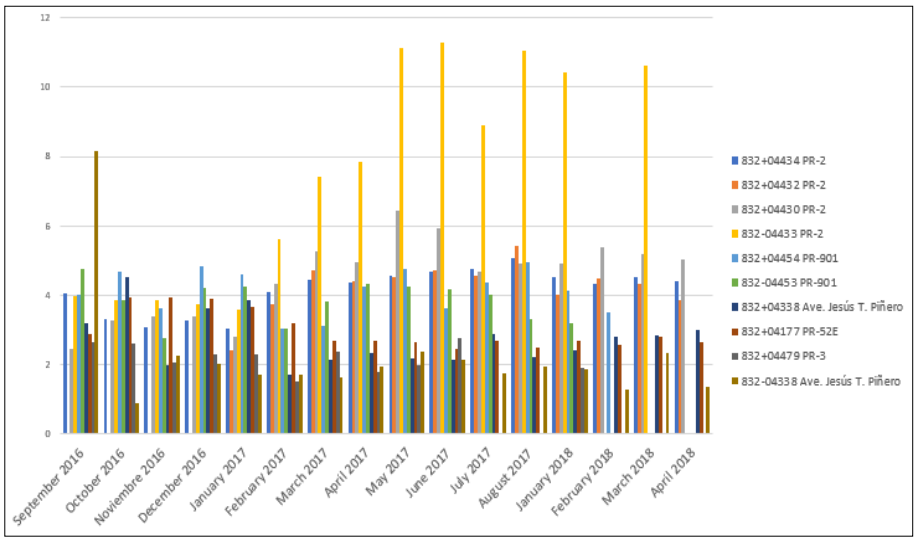
For the night period (NT), from 18:00 p.m.-7:00 a. m., segments averaged a delay between 1.0 – 1.5 minutes, with segments along 65 de Infantería Avenue, Jesús T. Piñero Avenue, Franklin Delano Roosevelt Avenue, and Barbosa Avenue ranking above average with delays between 3.0 – 5.0 minutes. See Figure K.1 and Figure K.2.

Figure K.1: San Juan TMA Location, NT Period



Source: SDG, based on NPMRDS Analytics

Figure K.2: Average Delays, San Juan TMA, NT Period



Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Night Period (NT) -Weekly

For the last four months of 2016, the average delay during night period in San Juan was 5.0 minutes. However, months varied with segments 832-04338 in Ave. Jesús T. Piñero and 832+04338 in Ave. Jesús T. Piñero ranking higher than the average, ranging between 1.0 – 22.0 minutes delay.

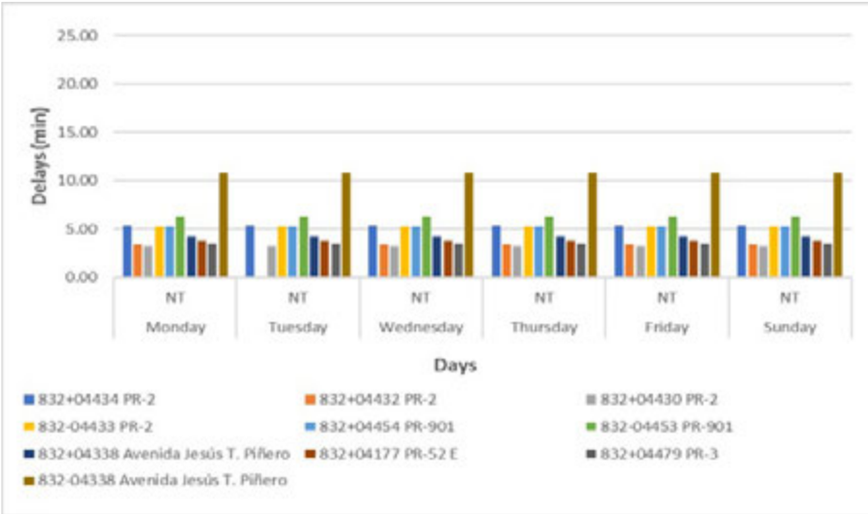
For September 2016, the highest-ranking segments had peaks on Monday, Tuesday, Wednesday, Thursdays, Friday, Saturday and Sunday, with 832-04338 in Ave. Jesús T. Piñero recording 11.0 minutes delay.

For October 2016, 832+04338 in Ave. Jesús T. Piñero had a peak on Thursday of 14.0 minutes delay.

For November, the highest-ranking segment were 832-04453 in PR-901 and 832+04454 in PR-901, both on Sunday with delays ranging from 17.0 – 22.0 minutes.

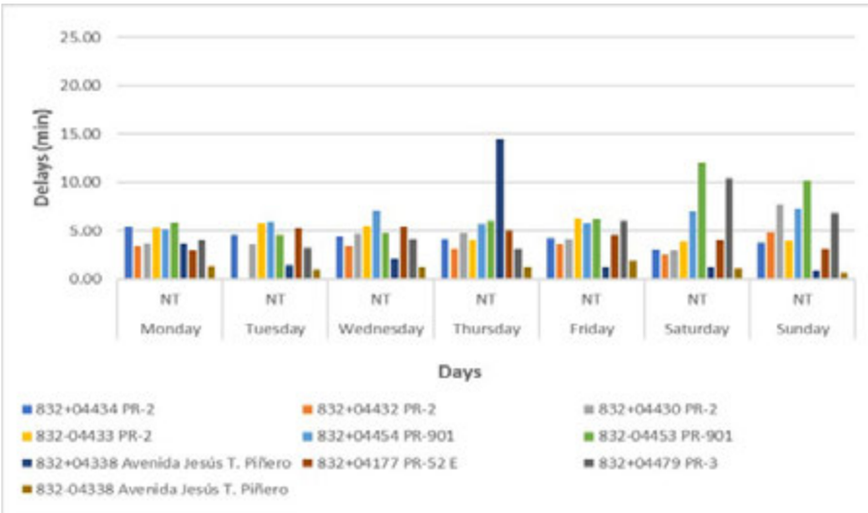
For December, most segments had delays around 5.0 minutes, and the highest-ranking segments were 832+04479 in PR-3 and 832+04338 in Ave. Jesús T. Piñero ranging between 11.0 – 14.0 minutes on Thursday and Saturday (Figure K.3 to Figure K.6).

Figure K.3: September 2016, TMC, San Juan TMA, (NT)



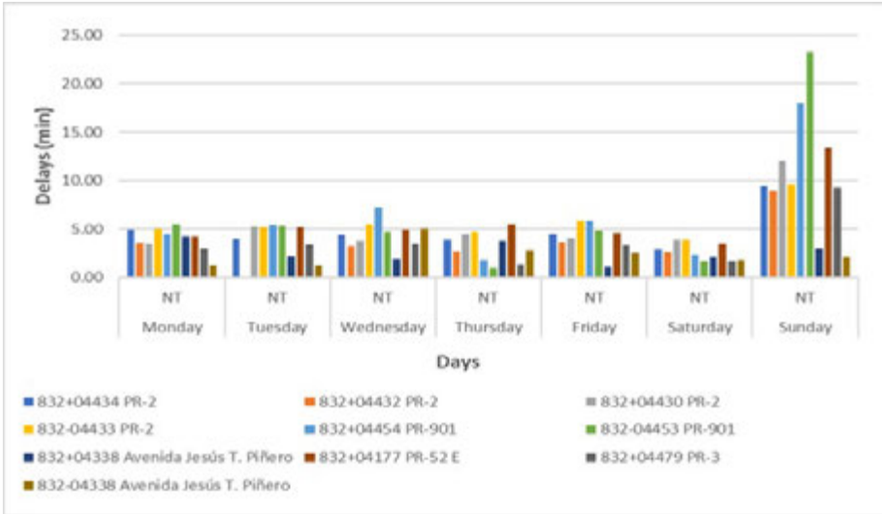
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.4: October 2016, TMC, San Juan TMA, (NT)



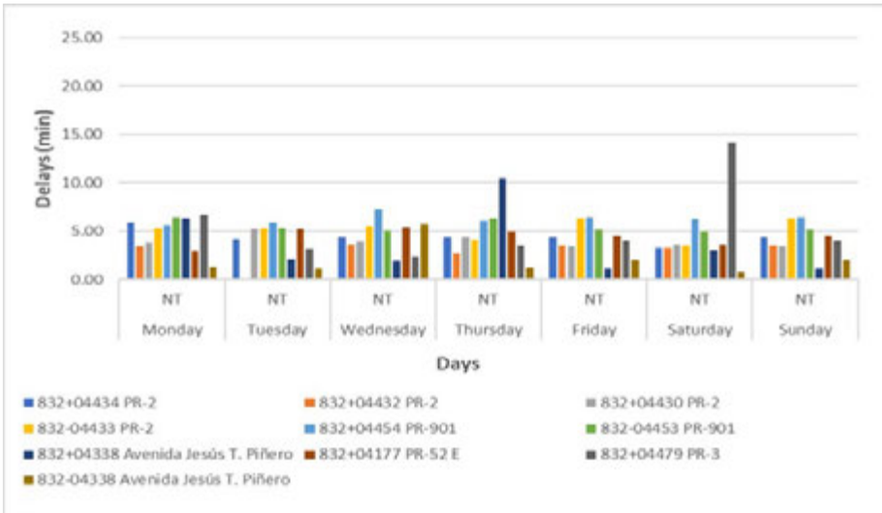
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.5: November 2016, TMC, San Juan TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.6: December 2016, TMC, San Juan TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months of 2017, between January and April, the average delay for most segments was around 5.0 minutes.

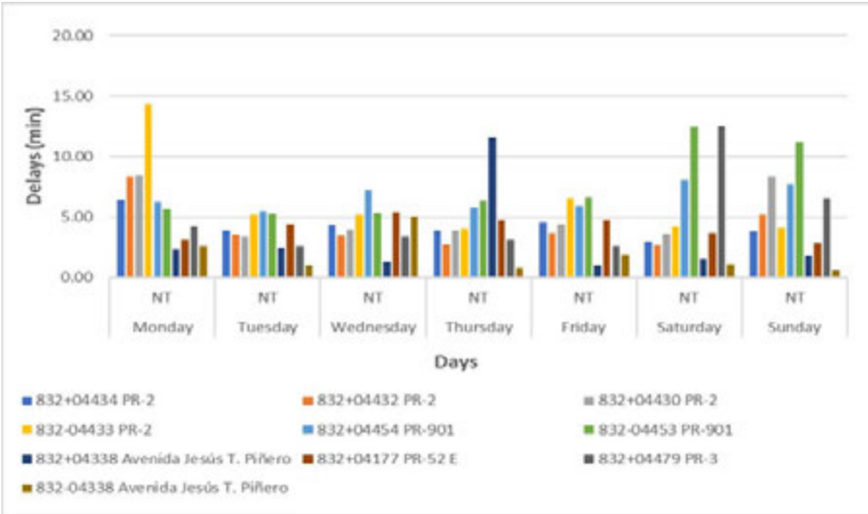
For January, the highest delay happened on Monday with an average of 14.0 minutes. The segment of the highest-ranking was 832-04433 in PR-2.

For February, the highest-ranking segment was 832-04433 in PR-2 with a peak on Friday of 14.5 minutes. The rest had an average delay ranging between 5.0 – 10.0 minutes.

For March, most segments were below 10.0 minutes delay. Only segment 832-04433 in PR-2 was higher on Monday, Wednesday, Thursday, Friday, Saturday and Sunday with an average of 13.0 minutes.

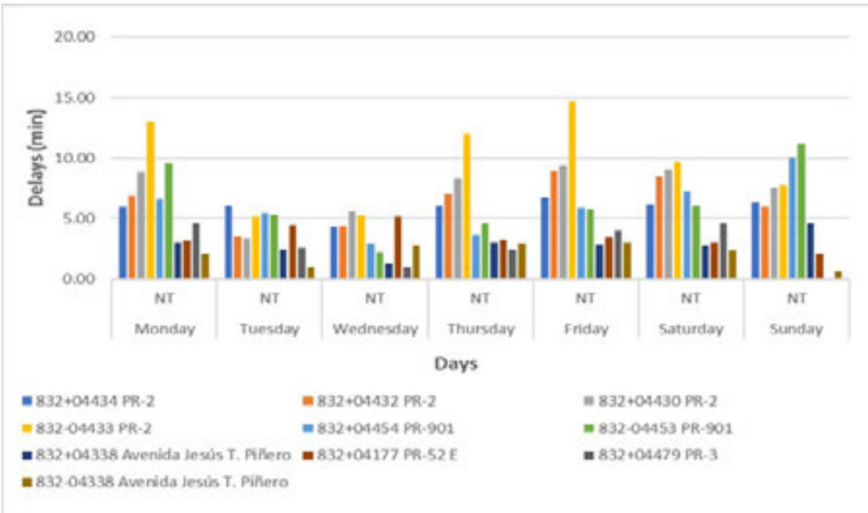
For April, most segments were below 10.0 minutes delay. Only segments 832-04433 in PR-2, 832-04453 in PR-901 and 832+04479 in PR-3 had a higher ranking ranging from 13.0 – 15.0 minutes (Figure K.7 to Figure K.10).

Figure K.7: January 2017, TMC, San Juan TMA, (NT)



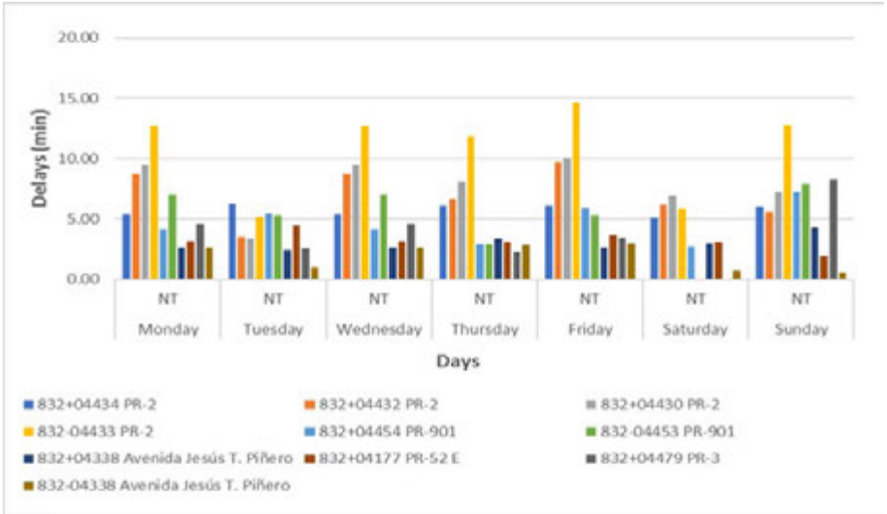
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.8: February 2017, TMC, San Juan TMA, (NT)



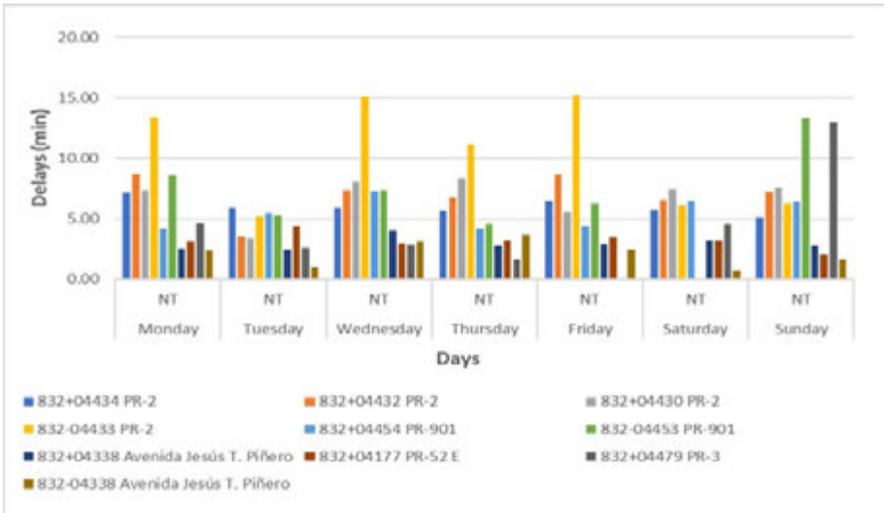
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.9: March 2017, TMC, San Juan TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

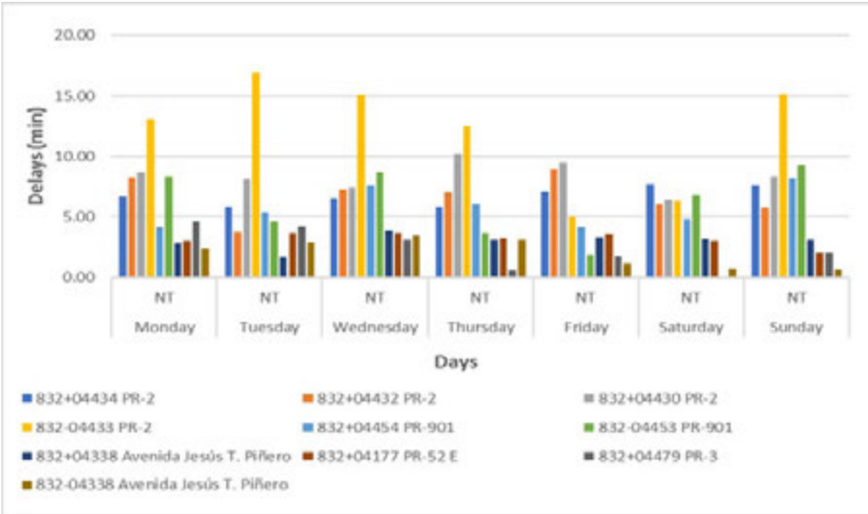
Figure K.10: April 2017, TMC, San Juan TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

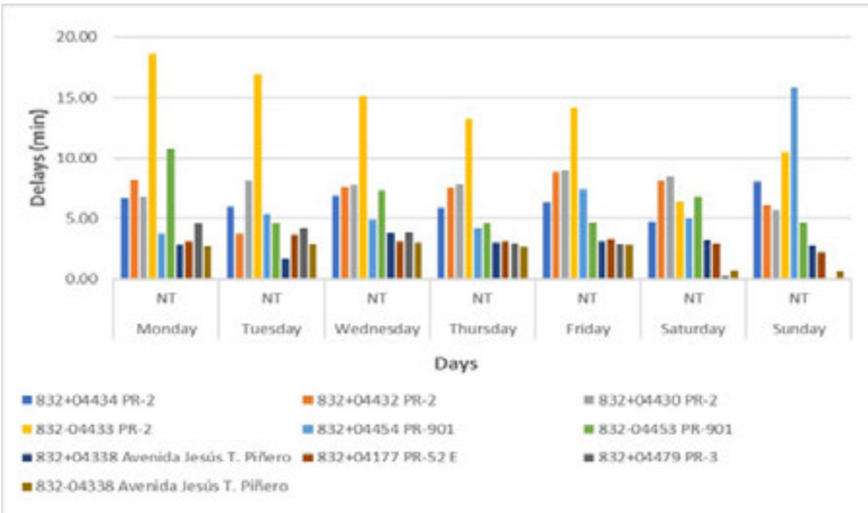
From May to August 2017, the highest-ranking segment was 832-04433 in PR-2 with average delays ranging between 5.0– 18.0 minutes (Figure K.11 to Figure K.14).

Figure K.11: May 2017, TMC, San Juan TMA, (NT)



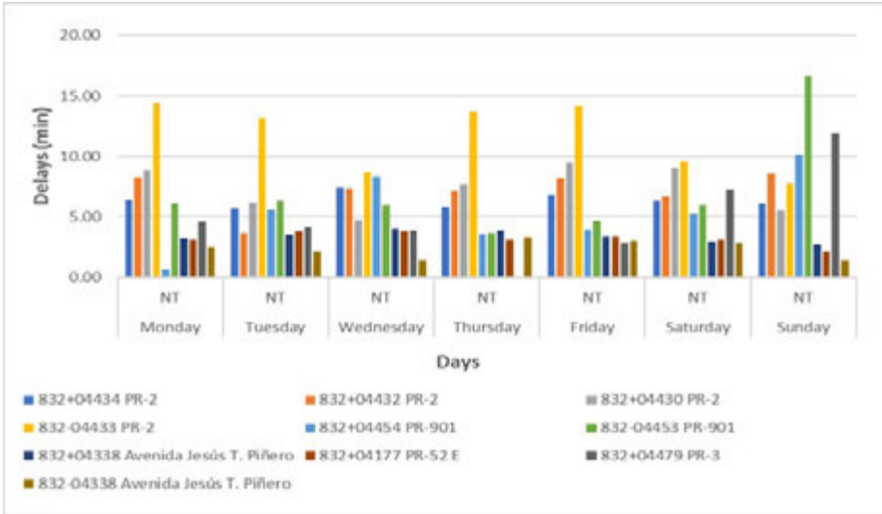
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.12: June 2017, TMC, San Juan TMA, (NT)



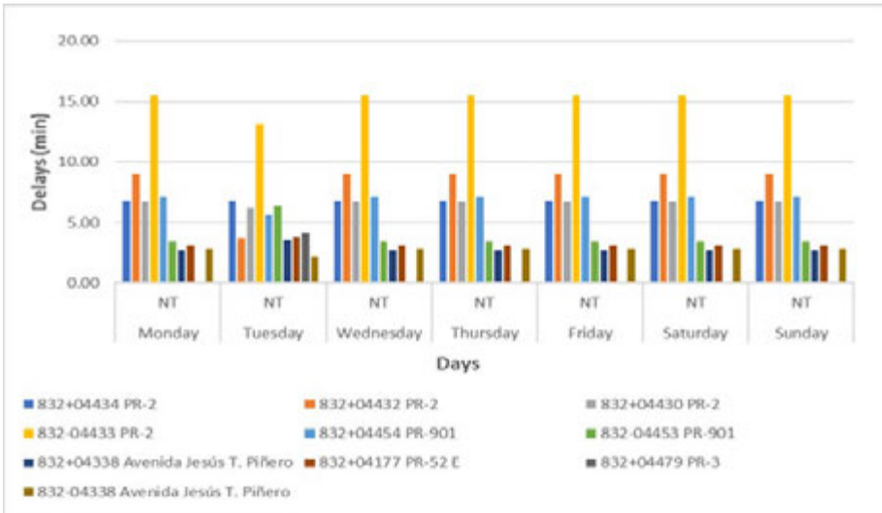
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.13: July 2017, TMC, San Juan TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

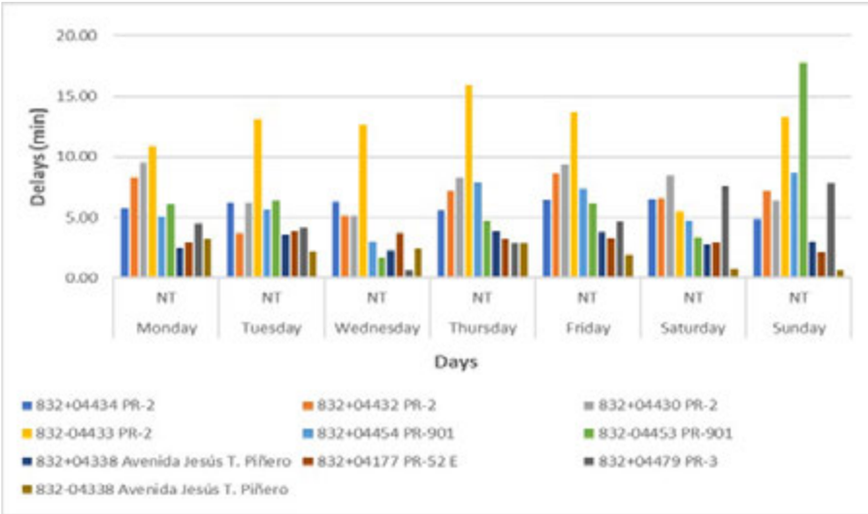
Figure K.14: August 2017, TMC, San Juan TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

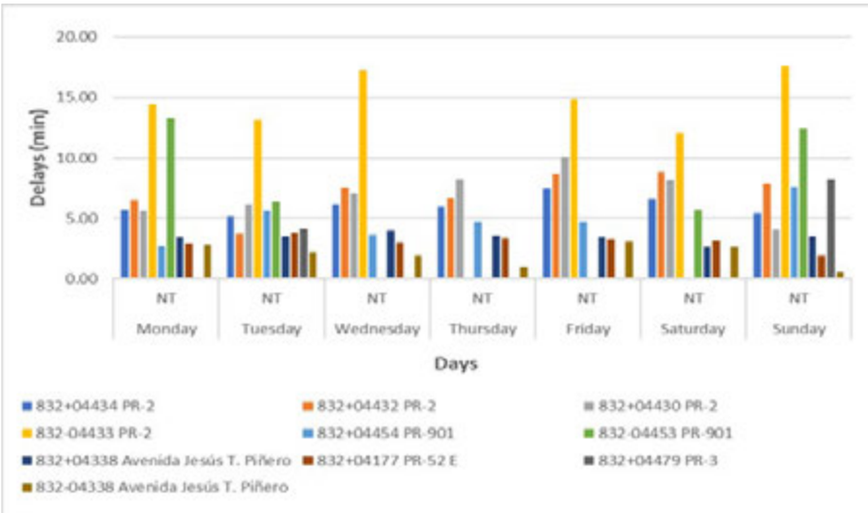
For the first four months between January and April 2018, average delay of segments was below 10.0 minutes, with highest ranking segments being 832-04453 in PR-901 and 832+04434 in PR-2 with average delay raging between 3.0 and 18 minutes (Figure K.15 to Figure K.18).

Figure K.15: January 2018, TMC, San Juan TMA, (NT)



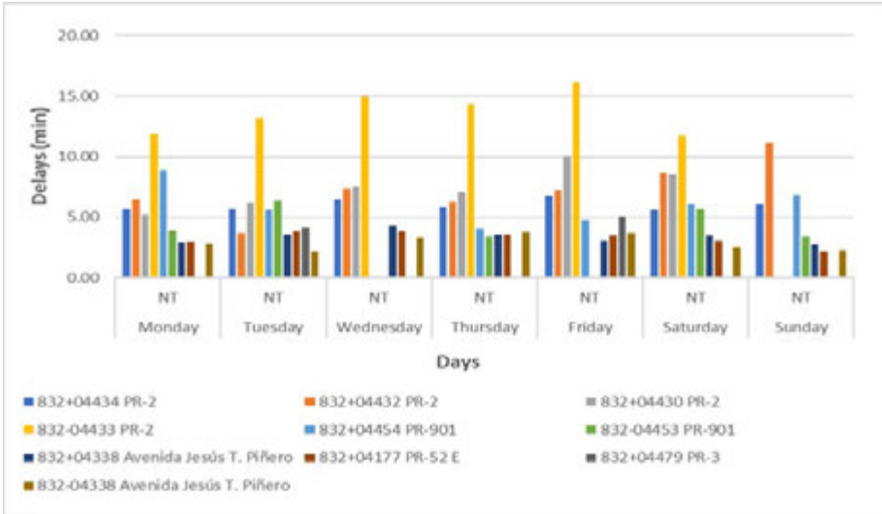
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.16: February 2018, TMC, San Juan TMA, (NT)



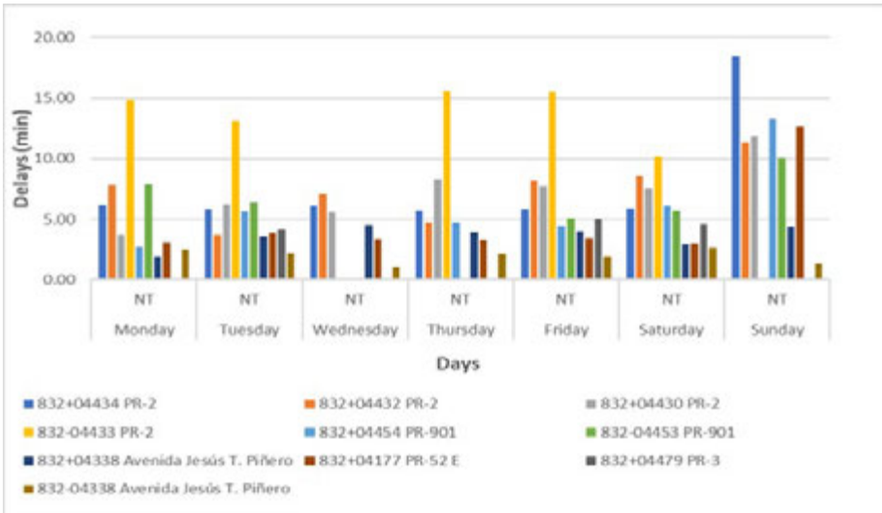
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.17: March 2018, TMC, San Juan TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.18: April 2018, TMC, San Juan TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM)

Segments average delay was about 2.0 minutes for the morning period (AM), from 7:00-9:00 a.m., for the last four months of 2016 through February 2017. From March 2017 and subsequently, average delay dropped to 0.7 minutes. Before March 2017, TMC along PR-17 had average delays of 5.9 minutes, dropping to 1.8 in later months.

For later months, segments for roads PR-23 and PR-8 ranked the highest with an average of 2.0 minutes delay. Figure K.19 and Figure K.20.

Figure K.19: San Juan TMA Location, AM Period

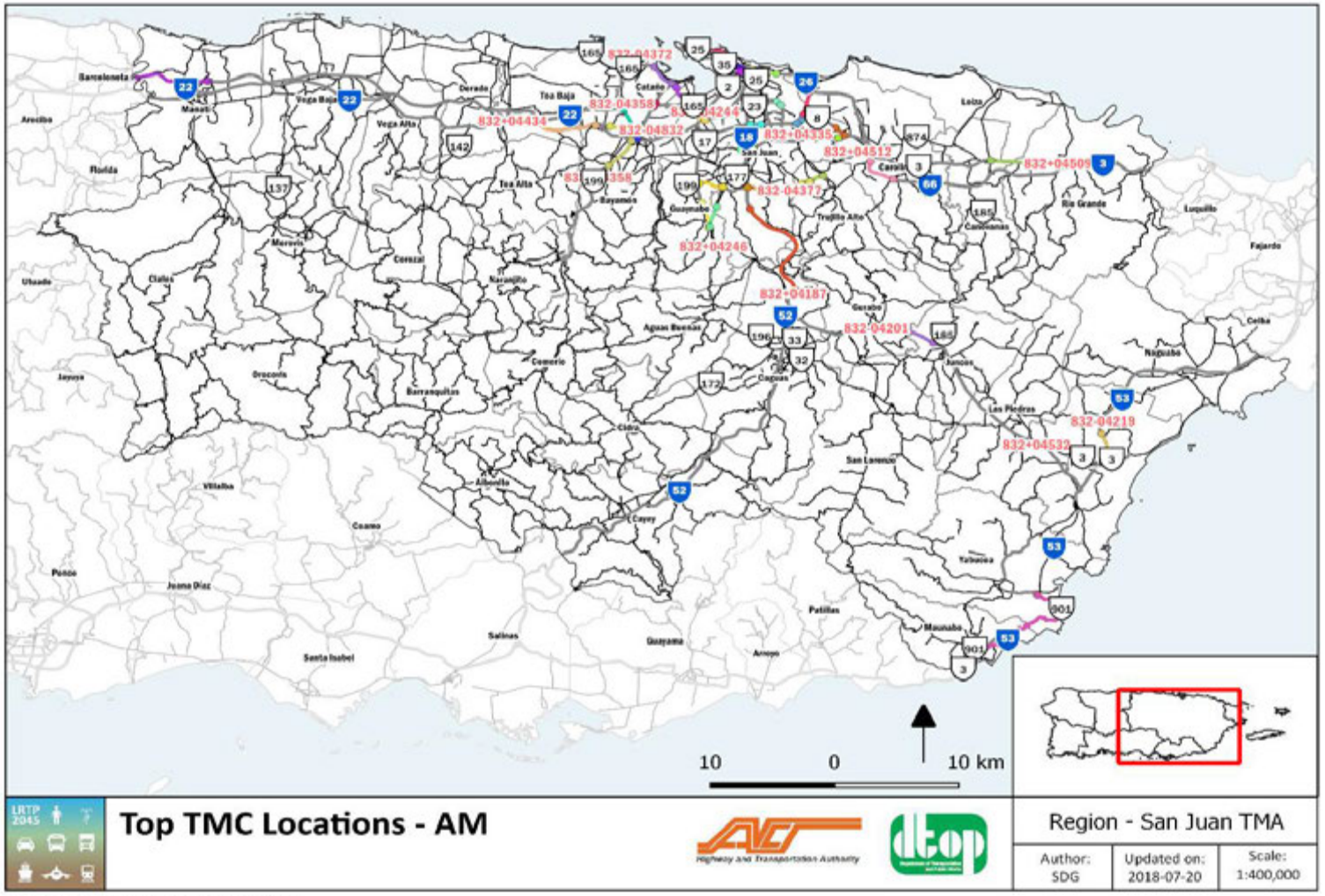
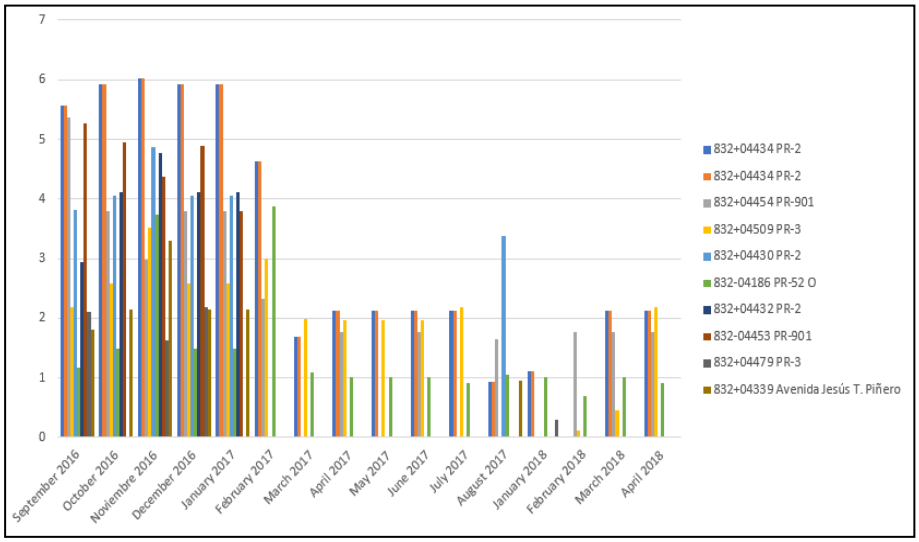


Figure K.20: Average Delays, San Juan TMA, AM Period

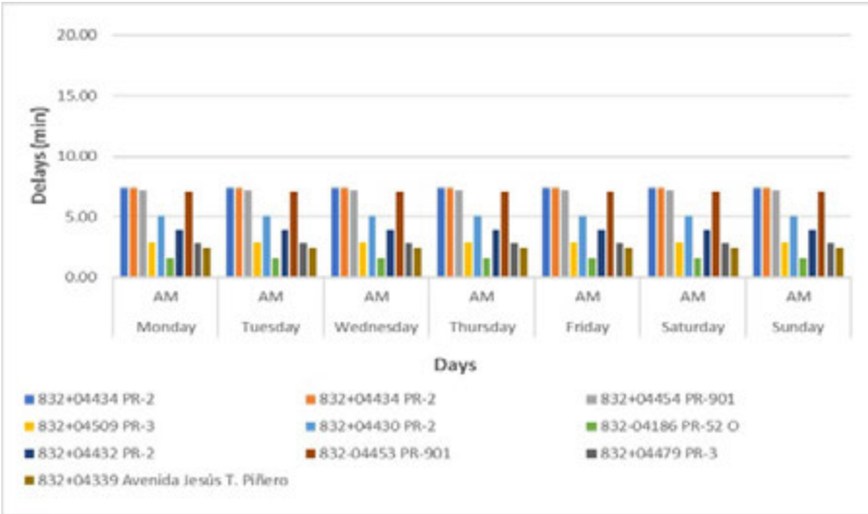


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM) - Weekly

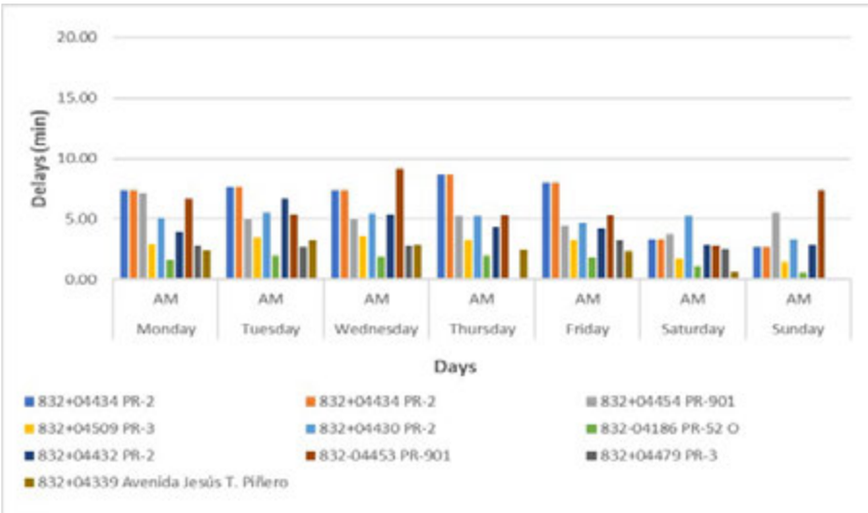
For the last four months of 2016, the average delay for the morning period in San Juan TMA was below 10.0 minutes every day for most segments. Some of the highest-ranking segments were 832+04453 in PR-901 with an average delay between 3.0 – 18.0 minutes, followed by 832+04454 in PR-901 with a peak of 16.0 minutes on Sunday (Figure K.21 to Figure K.24)

Figure K.21: September 2016, TMC, San Juan TMA, (AM)



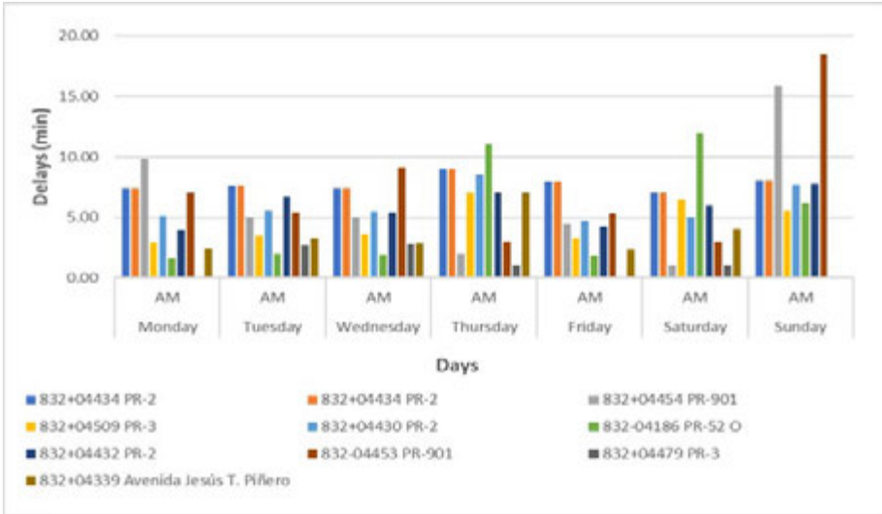
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.22: October 2016, TMC, San Juan TMA, (AM)



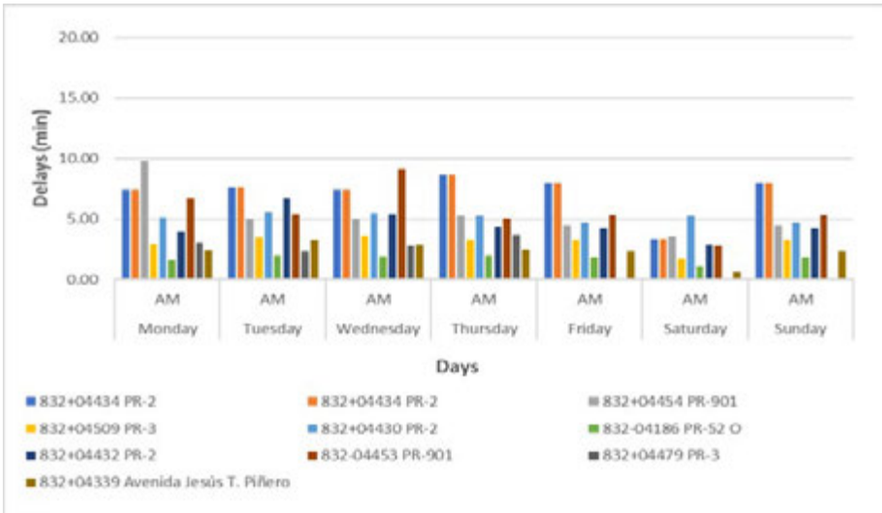
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.23: November 2016, TMC, San Juan TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.24: December 2016, TMC, San Juan TMA, (AM)

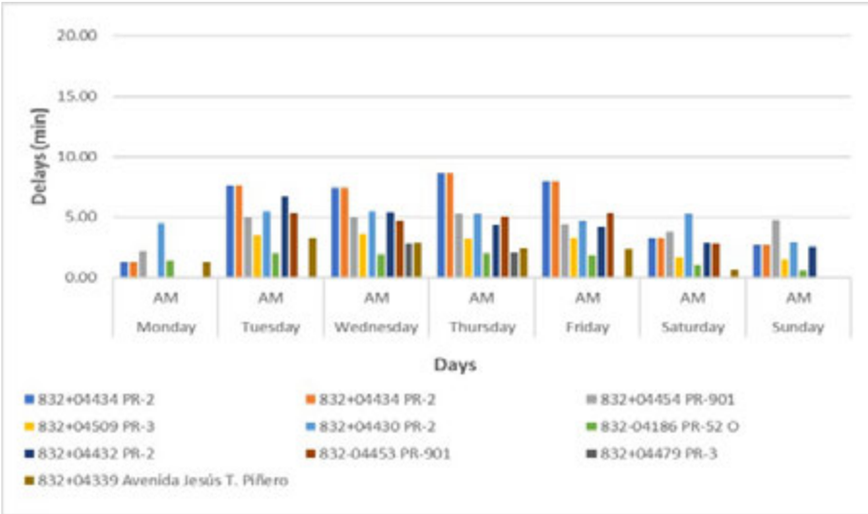


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, most segments delays were below 5.0 minutes, with the highest-ranking segments ranging between 5.0 – 20.0 minutes on Tuesday.

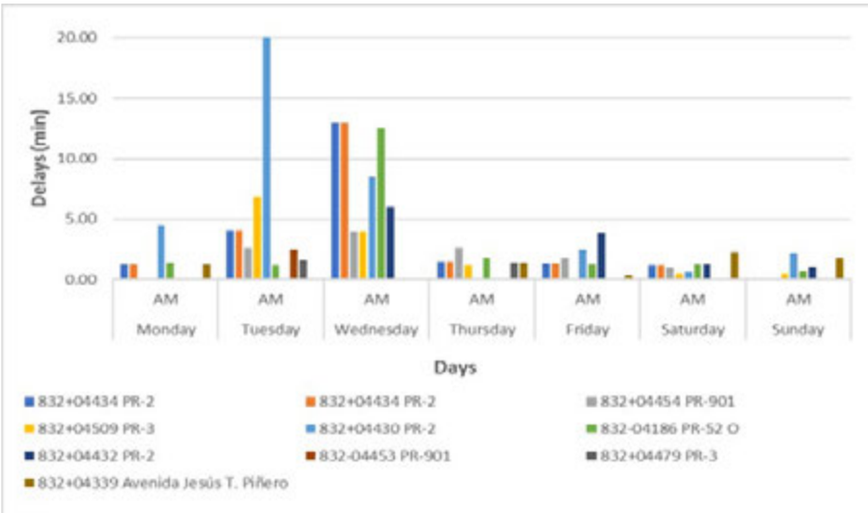
Among the segments ranking higher was 832+04430 in PR-2, 832+04434 in PR-2 and 832+04432 in PR-2 with an average delay reaching 20.0 minutes on February and April (Figure K.25 to Figure K.28).

Figure K.25: January 2017, TMC, San Jan TMA, (AM)



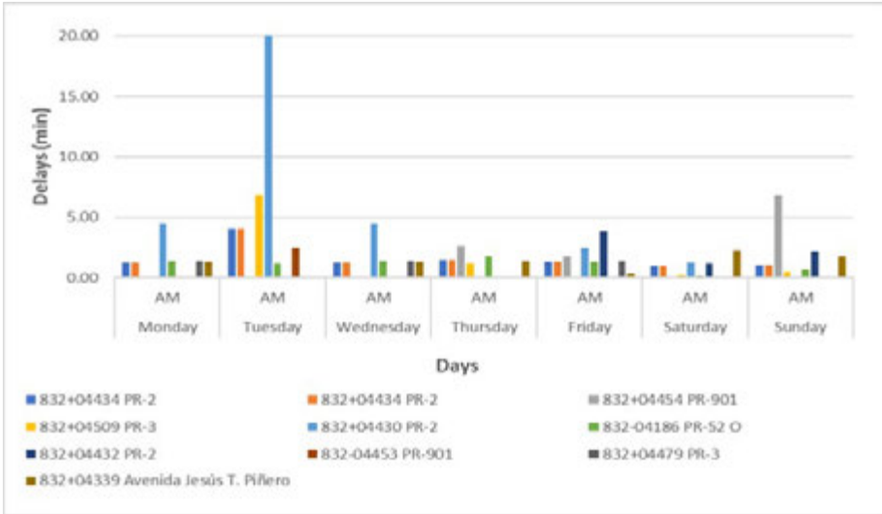
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.26: February 2017, TMC, San Jan TMA, (AM)



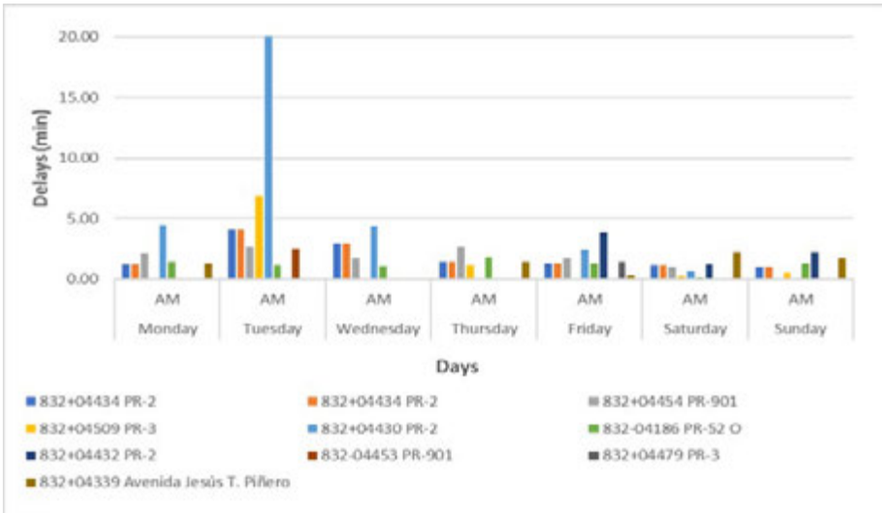
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.27: March 2017, TMC, San Jan TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

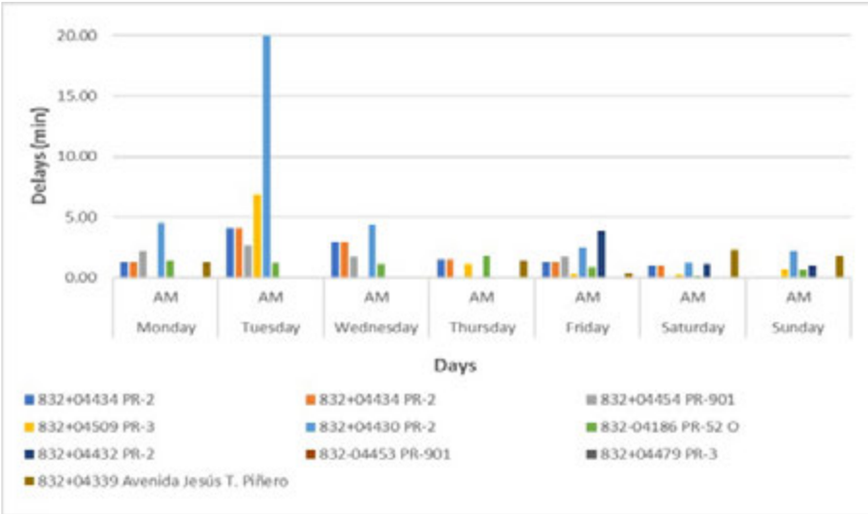
Figure K.28: April 2017, TMC, San Jan TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

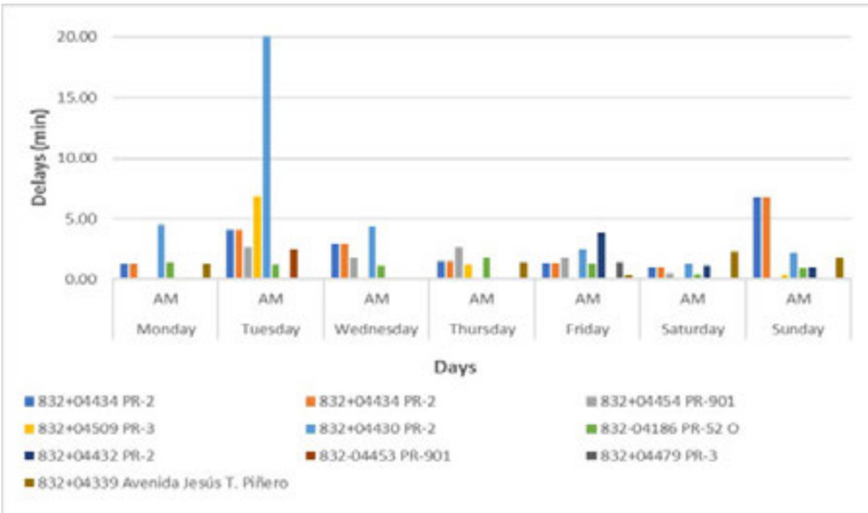
From May to August 2017, the average delay for most segments was below 5.0 minutes, with the highest-ranking segments 832+04430 in PR-2, 832+04434 in PR-2, 832+04432 in PR-2 and 832+04454 in PR-901 recording average delays between 1.0 – 20.0 minutes delay (Figure K.29 to Figure K.32).

Figure K.29: May 2017, TMC, San Jan TMA, (AM)



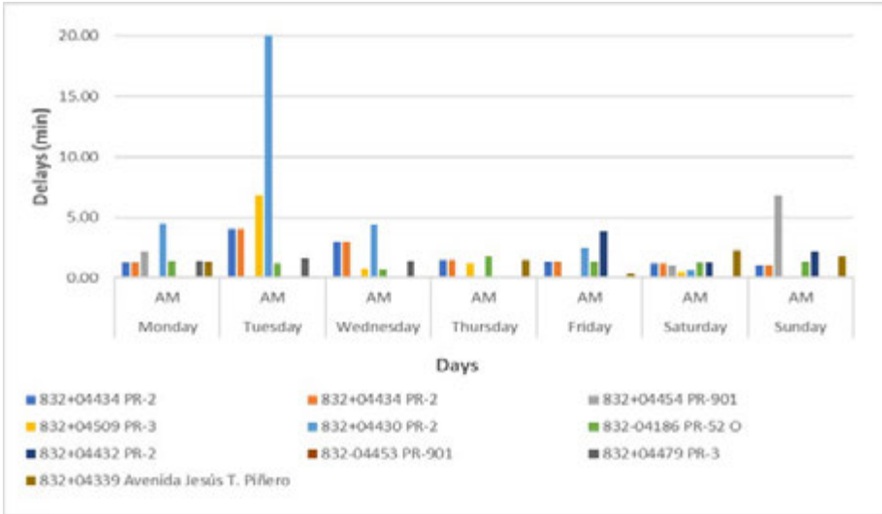
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.30: June 2017, TMC, San Jan TMA, (AM)



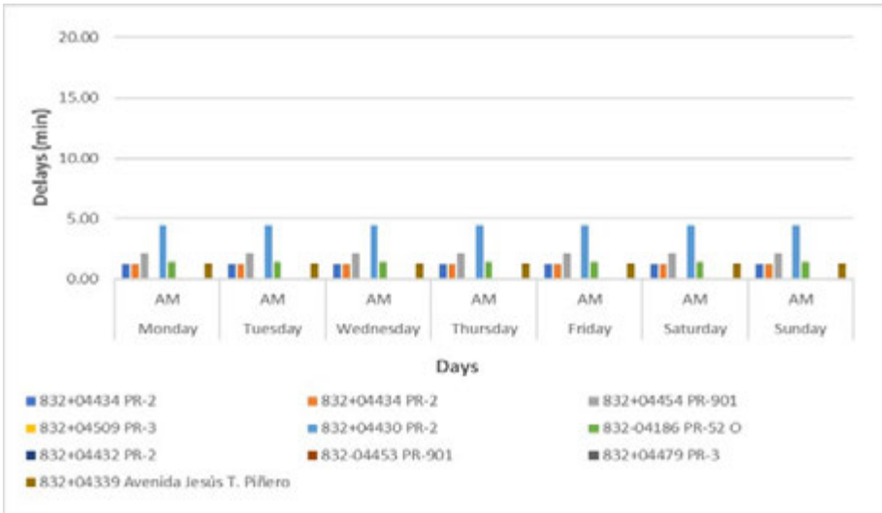
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.31: July 2017, TMC, San Jan TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

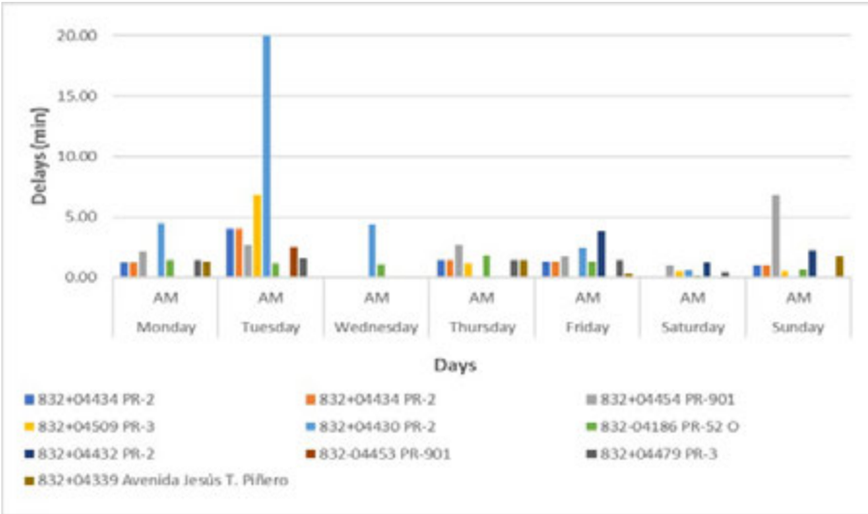
Figure K.32: August 2017, TMC, San Jan TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

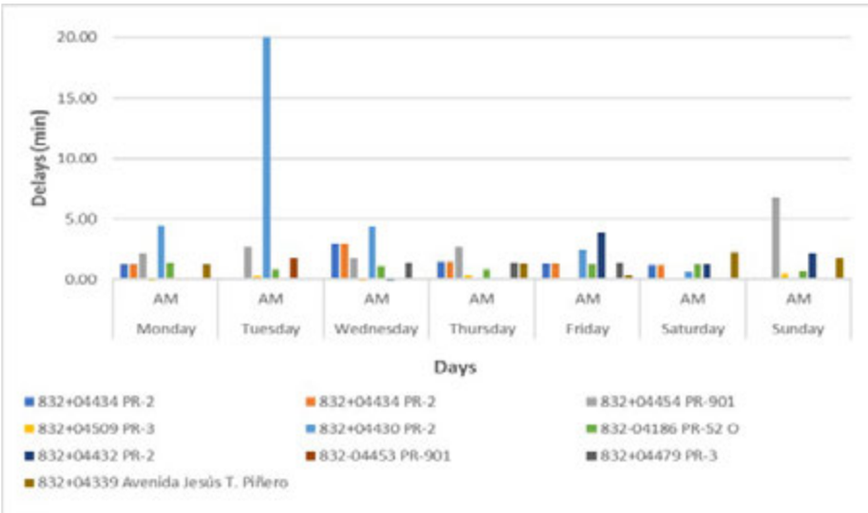
For the first four months between January and April 2018, average delay for most segments was below 5.0 minutes, with the highest-ranking segment 832+04430 in PR-2 recording average delays between 2.0 – 20.0 minutes delay (Figure K.33 to Figure K.36).

Figure K.33: January 2018, TMC, San Juan TMA, (AM)



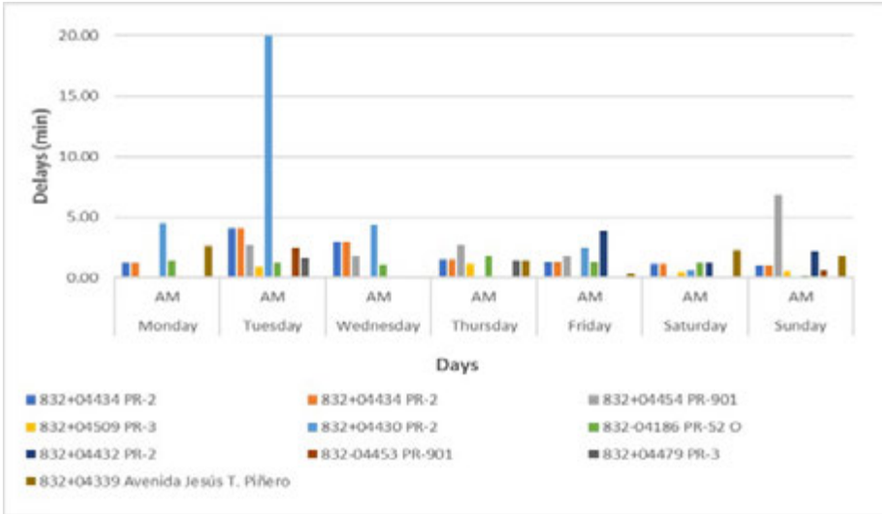
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.34: February 2018, TMC, San Juan TMA, (AM)



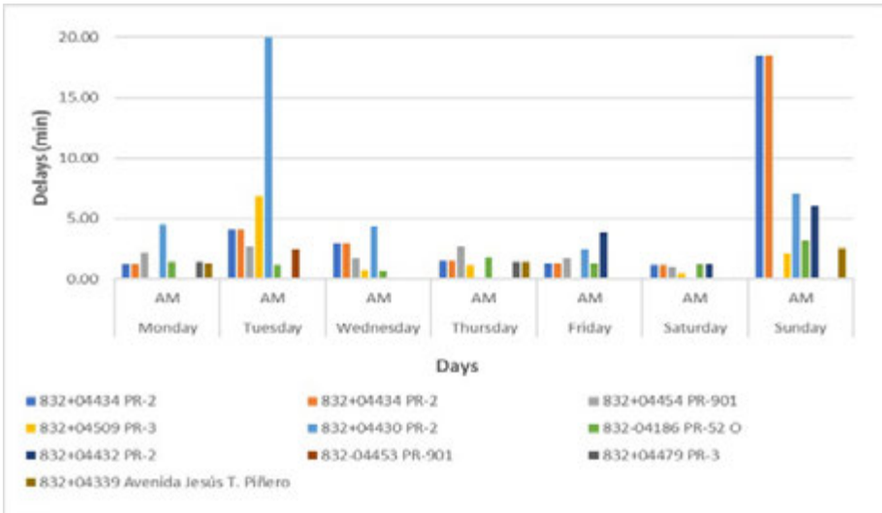
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.35: March 2018, TMC, San Juan TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.36: April 2018, TMC, San Juan TMA, (AM)

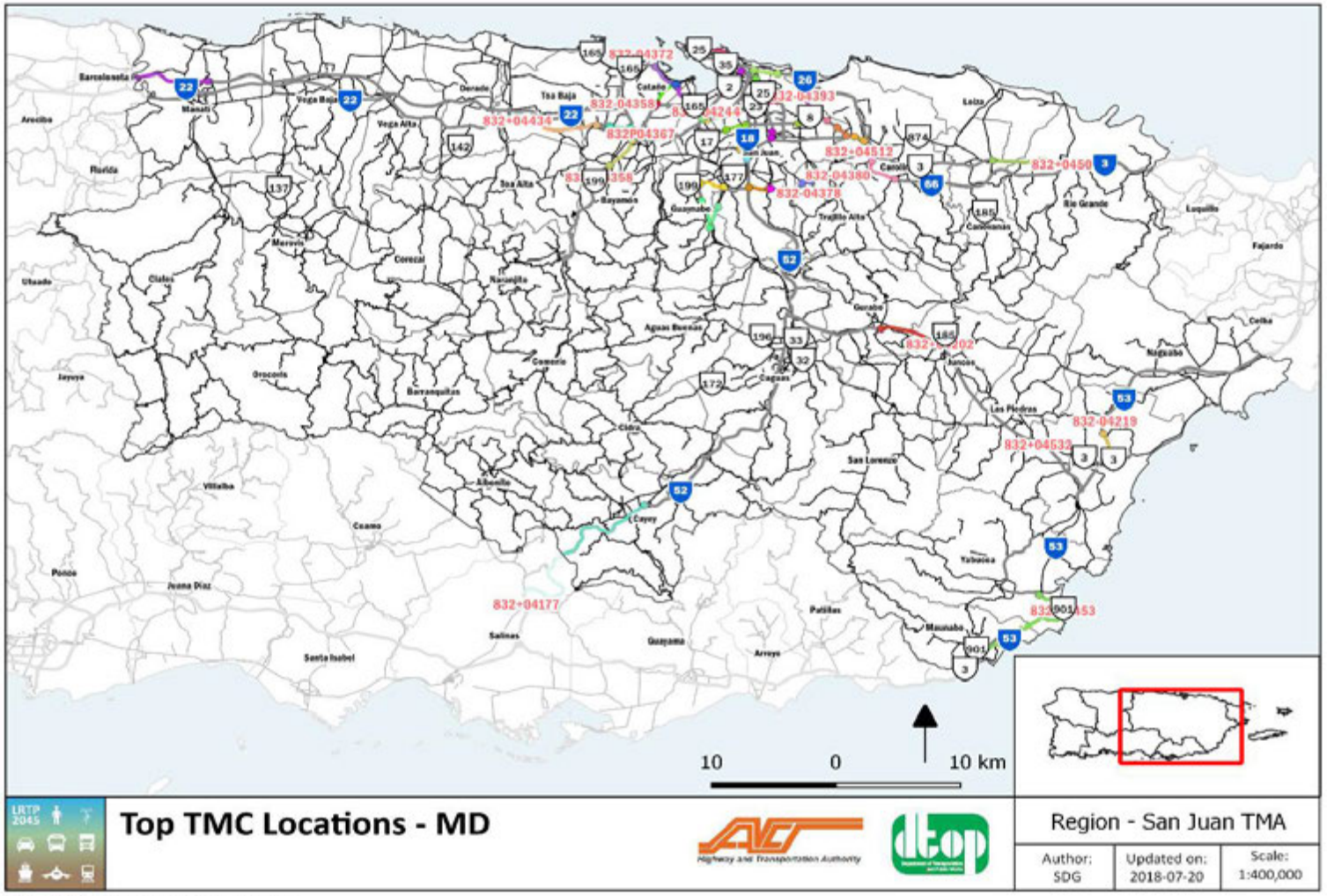


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD)

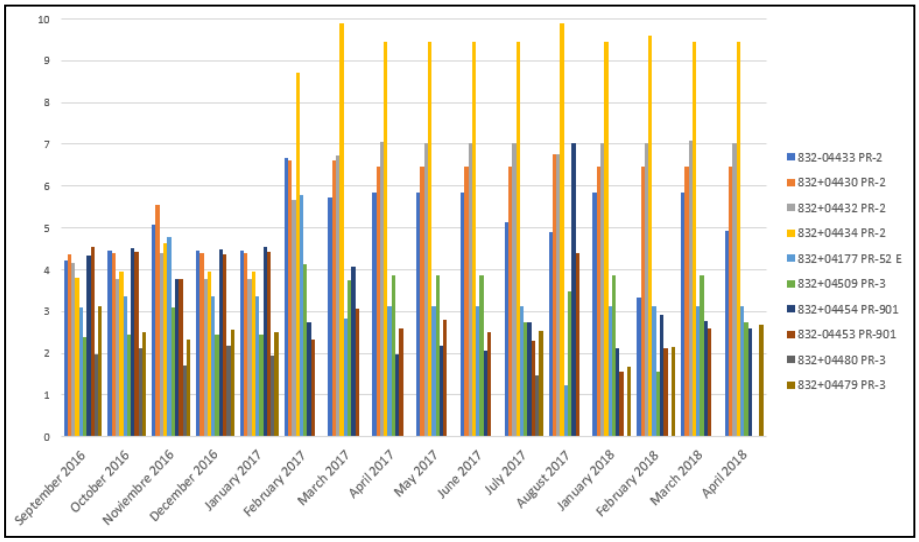
Segments average delay was about 1.0-minute for the mid-day period, from 9:00 a.m. – 15:00 p.m., for the last four months of 2016 through January 2017. From February 2017 and subsequently, average delay increased about 2.0 minutes on average. Most segments ranking highest had average delays between 2.0 – 4.0 minutes, except for TMC 832+04434 along PR-2 with average delays of 9.0 minutes from February 2017 and subsequently. See Figure K.37 and Figure K.38.

Figure K.37: San Juan TMA Location, MD Period



Source: SDG, based on NPMRDS Analytics

Figure K.38: Average Delays, San Juan TMA, MD Period

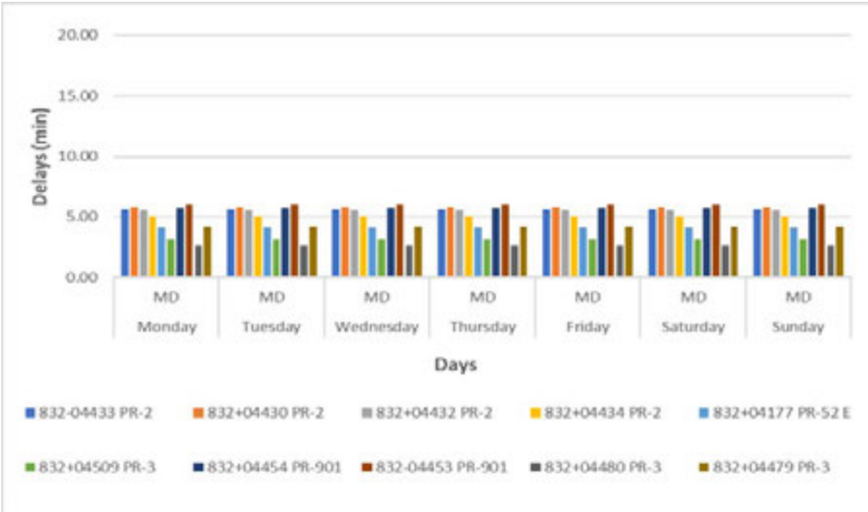


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD) – Weekly

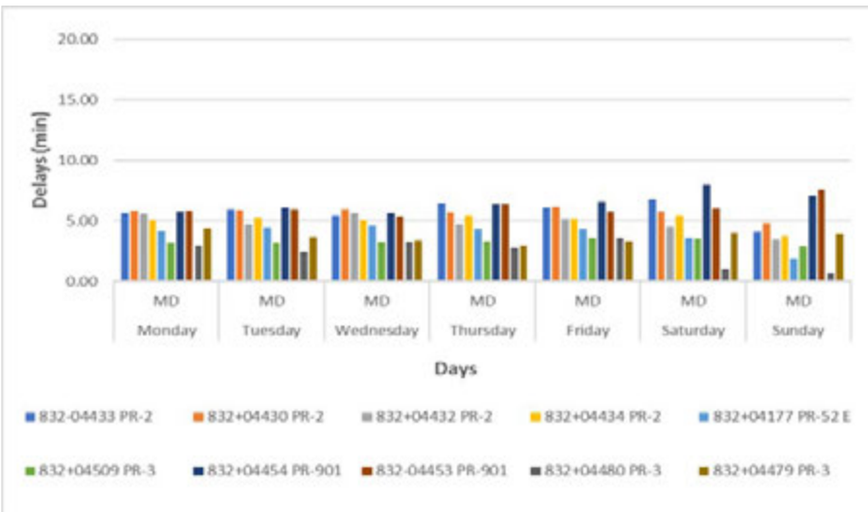
For the last four months of 2016, the average delay for the mid-day period in San Juan TMA was below 10.0 minutes for most segments. Some of the highest-ranking segments were 832+04454 in PR-901 and 832-04453 in PR-901 with average delays ranging from 3.0 –18.0 minute on November on a Sunday (Figure K.39 to Figure K.42).

Figure K.39: September 2016, TMC, San Juan TMA, (MD)



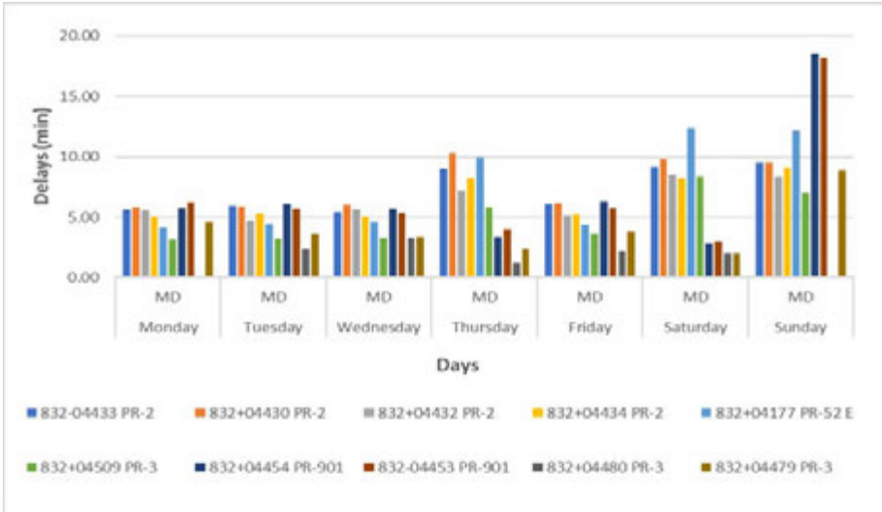
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.40: October 2016, TMC, San Juan TMA, (MD)



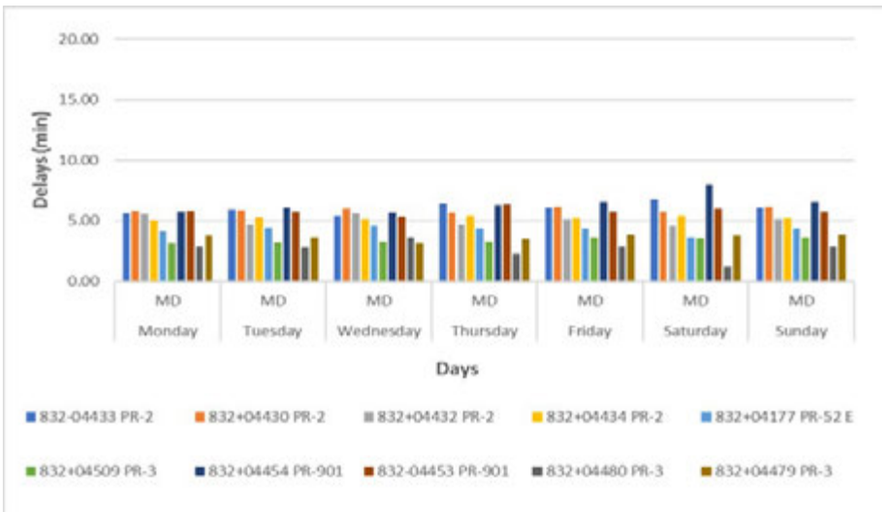
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.41: November 2016, TMC, San Juan TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

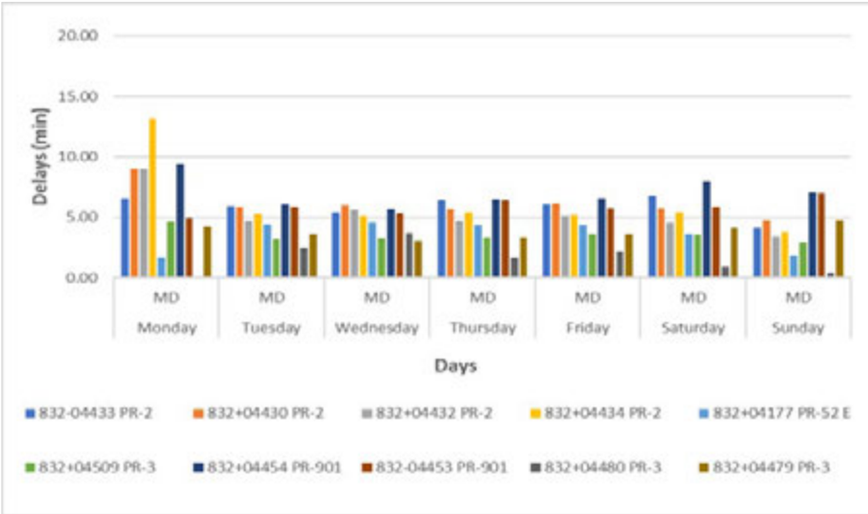
Figure K.42: December 2016, TMC, San Juan TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

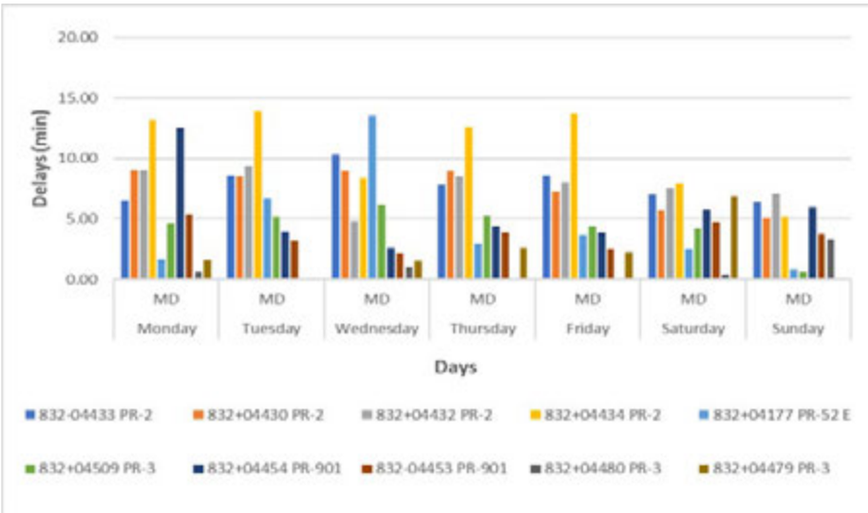
For the first months between January and April 2017, most segments had average delays below 10.0 minutes, with peaks of 14.0 minutes almost every day. The highest-ranking segments 832+04434 in PR-2 and 832+04177 in PR-52 E (Figure K.43 to Figure K.46).

Figure K.43: January 2017, TMC, San Juan TMA, (MD)



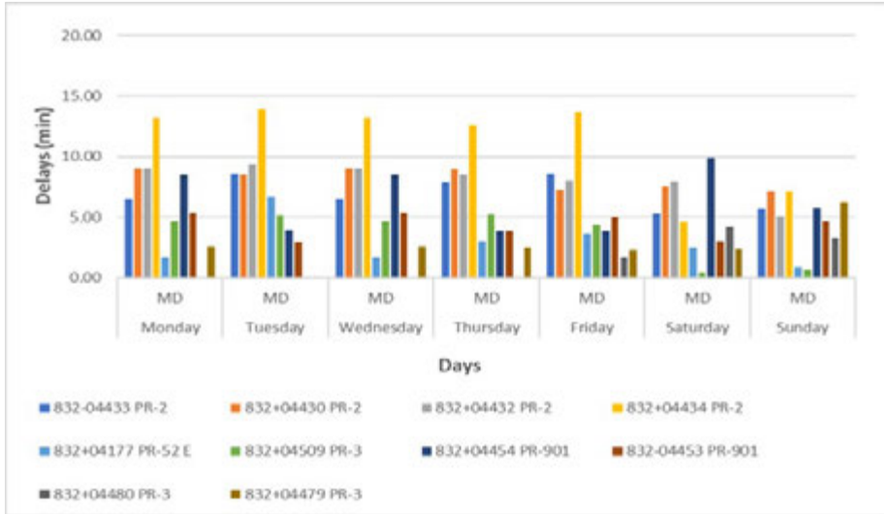
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.44: February 2017, TMC, San Juan TMA, (MD)



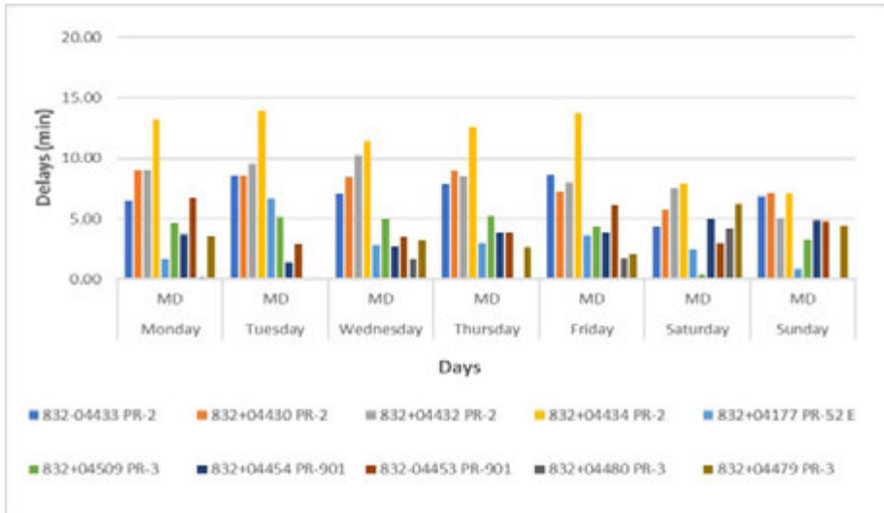
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.45: March 2017, TMC, San Juan TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

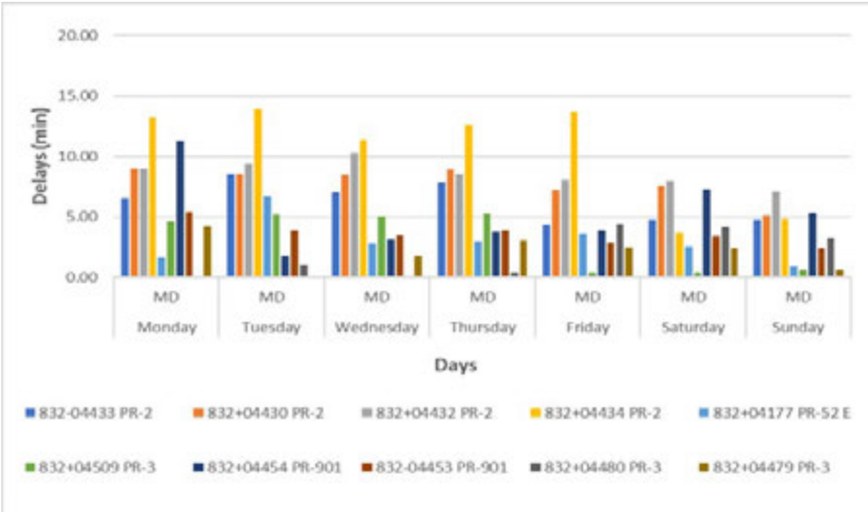
Figure K.46: April 2017, TMC, San Juan TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

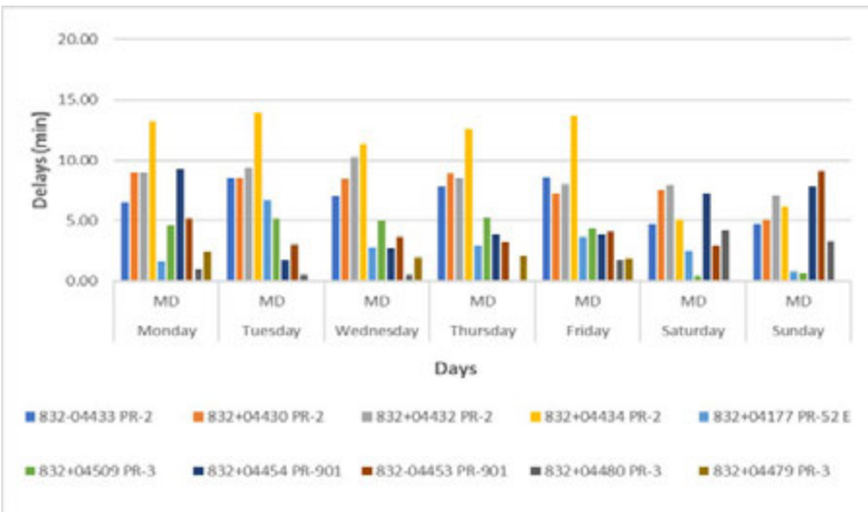
From May to August 2017, the average delay for most segments was below 10.0 minutes. The highest-ranking segments 832+04434 in PR-2 and 832+04454 in PR-901, recording average delays between 3.0 – 13.0 minutes (Figure K.47 to Figure K.50).

Figure K.47: May 2017, TMC, San Juan TMA, (MD)



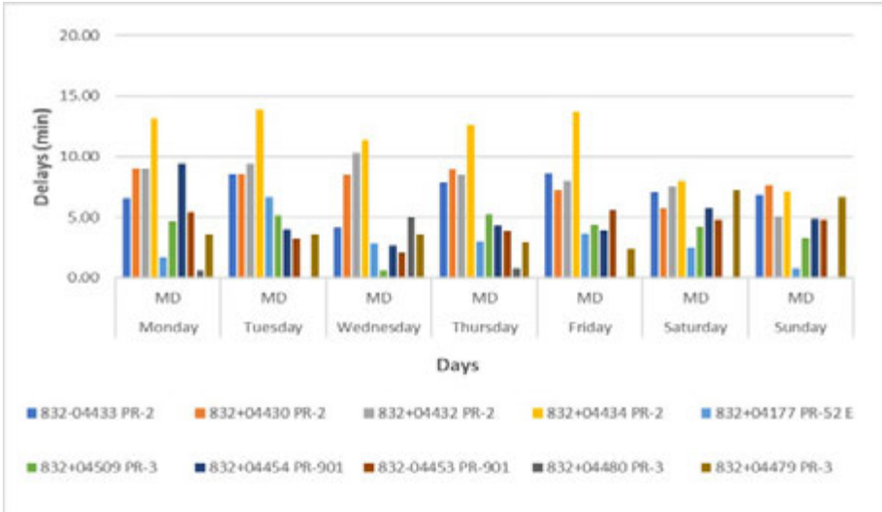
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.48: June 2017, TMC, San Juan TMA, (MD)



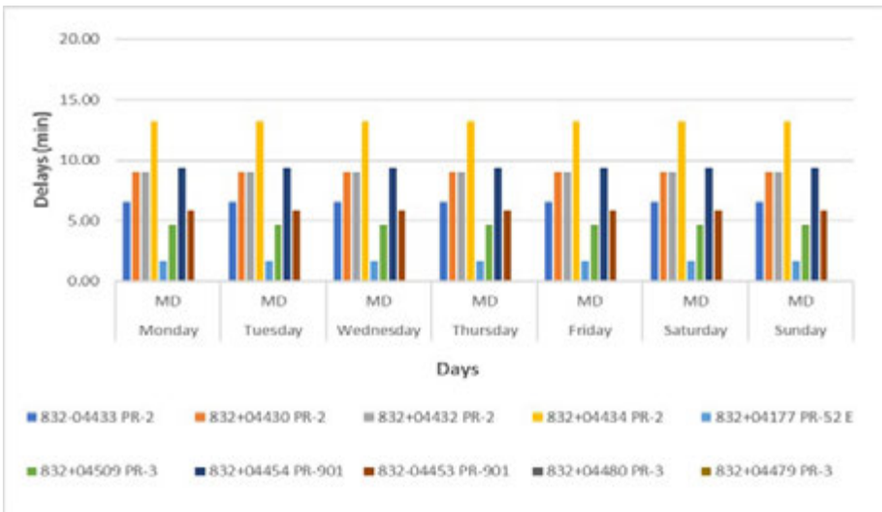
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.49: July 2017, TMC, San Juan TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

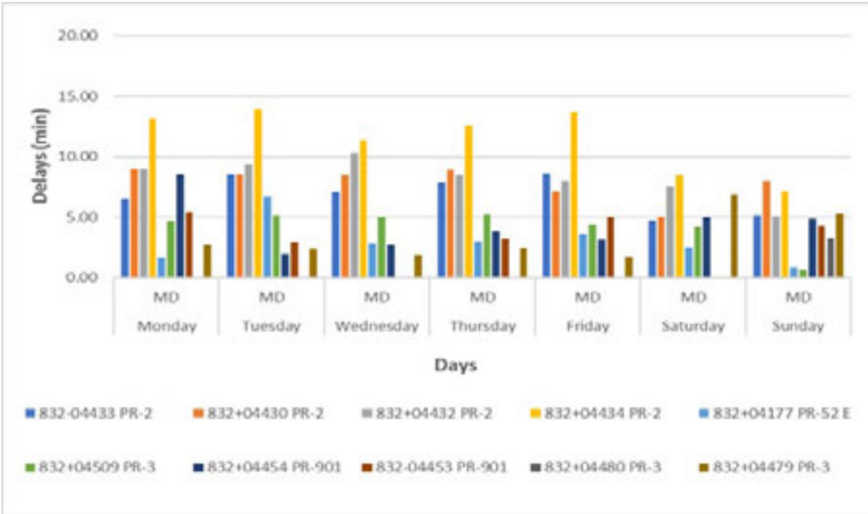
Figure K.50: August 2017, TMC, San Juan TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

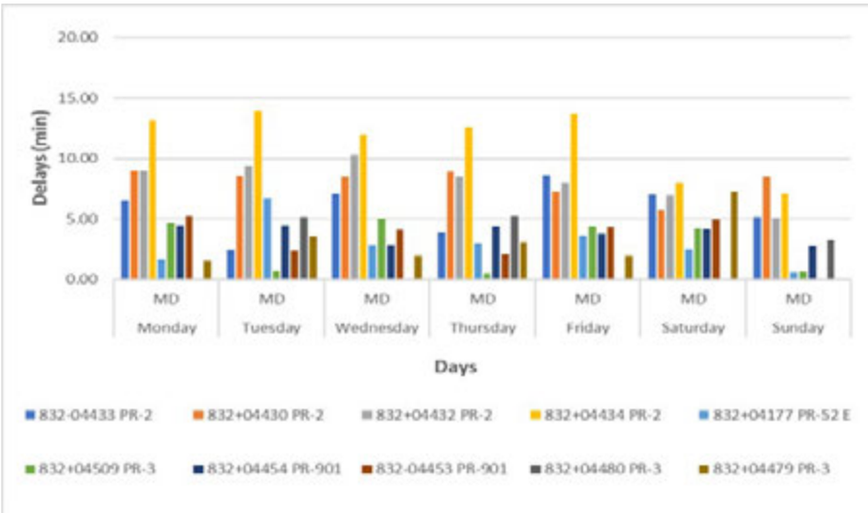
For the first four months between January and April 2018, the average delay for most segments was below 15.0 minutes, with peaks on Sunday for the highest-ranking segments 832-04433 in PR-2 and 832+04434 in PR-2, recording average delays between 3.0 – 17.0 minutes (Figure K.51 to Figure K.54).

Figure K.51: January 2018, TMC, San Juan TMA, (MD)



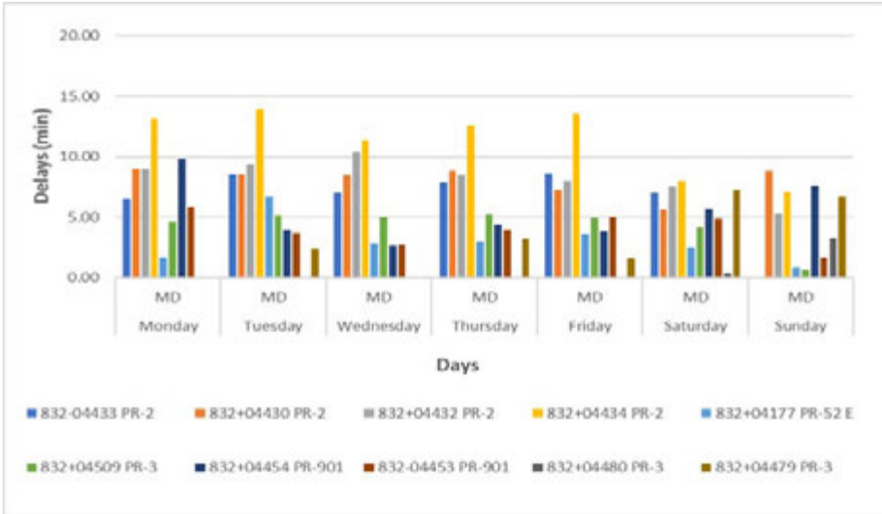
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.1: February 2018, TMC, San Juan TMA, (MD)



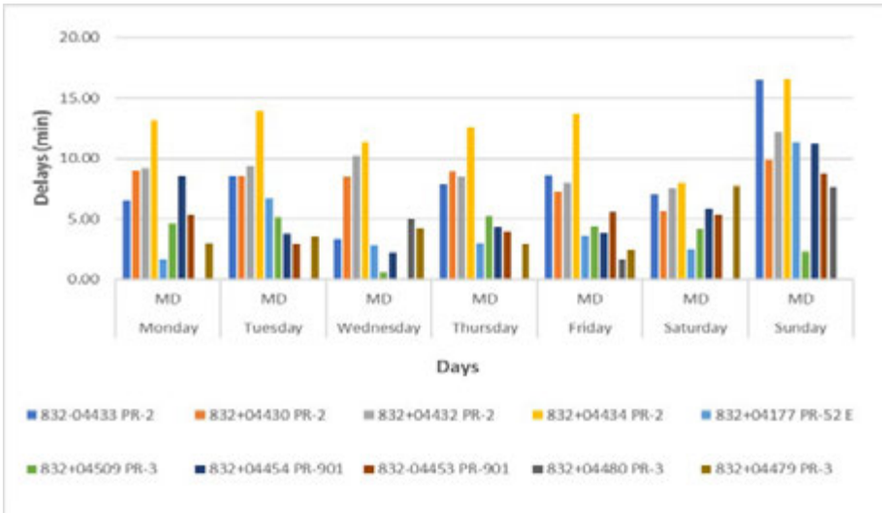
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.2: March 2018, TMC, San Juan TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.3: April 2018, TMC, San Juan TMA, (MD)

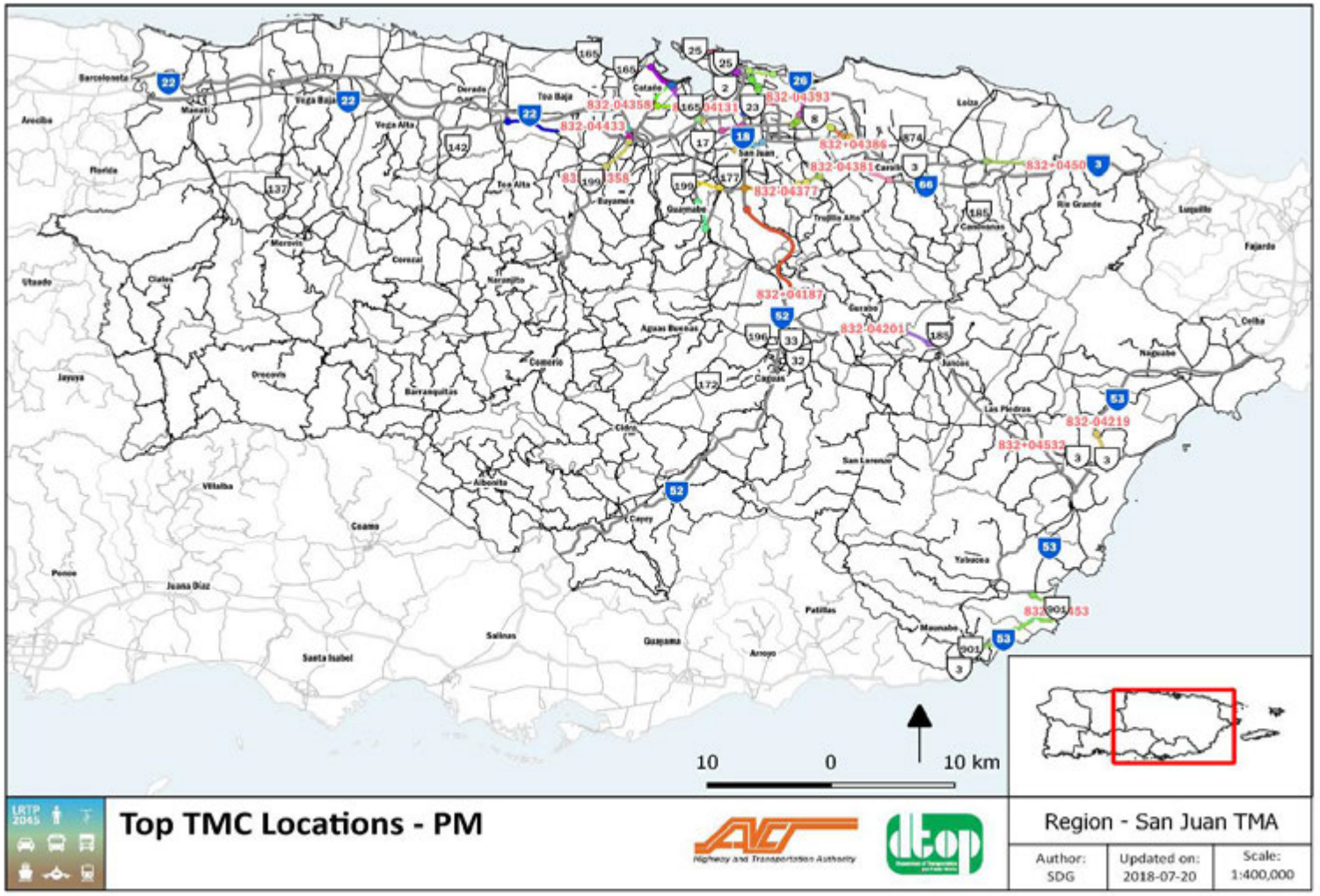


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM)

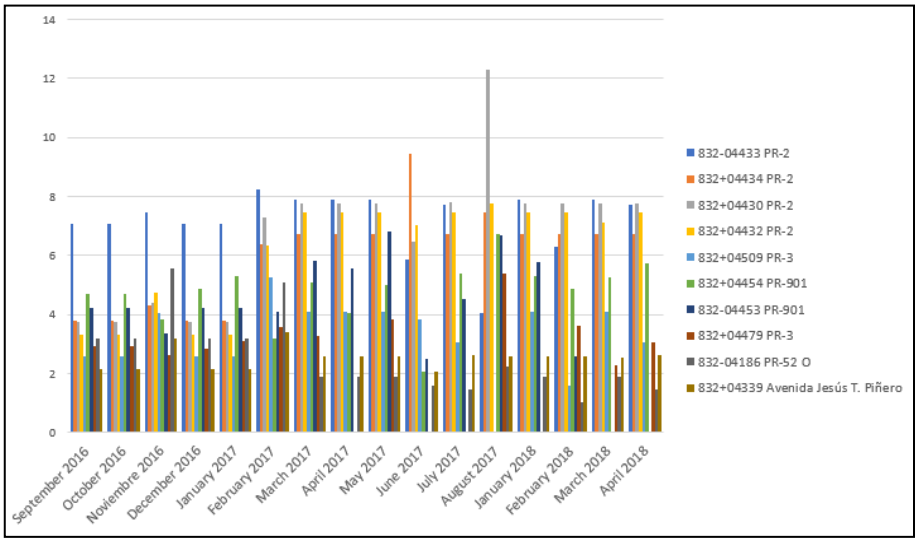
Most segments maintained average delays below 3.0 minutes for the afternoon period, from 15:00 to 18:00 p.m., except for TMC 832+04434 in PR-2 and 832-04453 in PR-901, with average delays between 5.0 – 6.5 minutes for the months between February 2017 through April 2018. See Figure K.55 and Figure K.56.

Figure K.55: San Juan TMA Location, PM Period



Source: SDG, based on NPMRDS Analytics

Figure K.56: Average Delays, San Juan TMA, PM Period



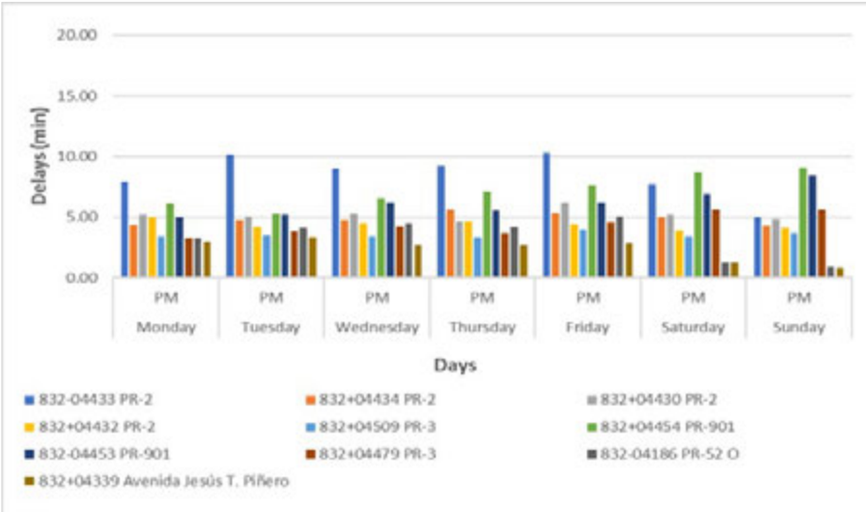
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM) – Weekly

For the last four months of 2016, most segments had average delays below 10.0 minutes. Some of the highest-ranking segments were 832+04454 in PR-2 and 832-04453 in PR-901 with average delays ranging from 2.0 – 20.0 minutes.

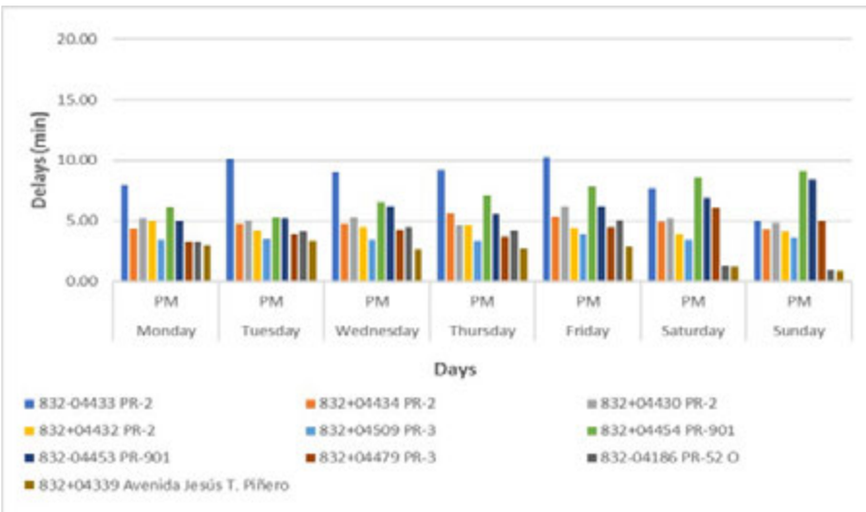
The month of September had delays ranging from 2.0 – 10.0 minutes for the highest-ranking segment, being 832-04433 in PR-2 (Figure K.57 to Figure K.60).

Figure K.57: September 2016, TMC, San Juan TMA, (PM)



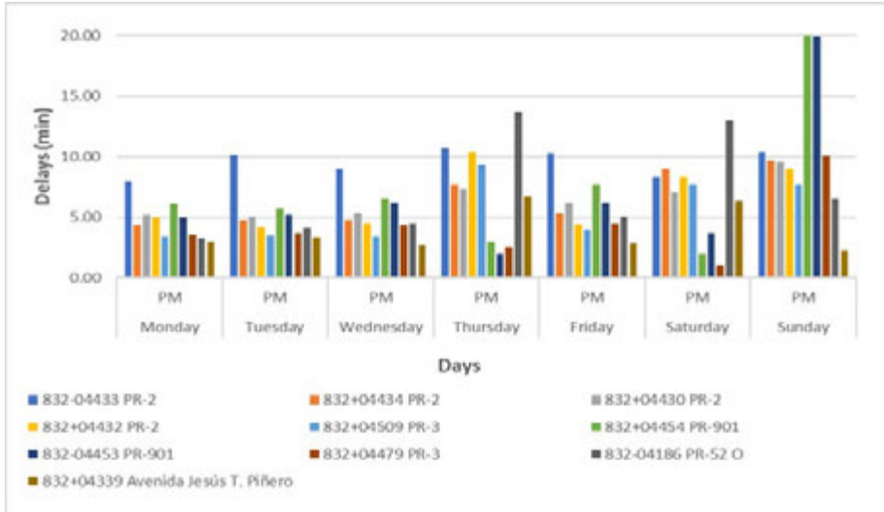
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.58: October 2016, TMC, San Juan TMA, (PM)



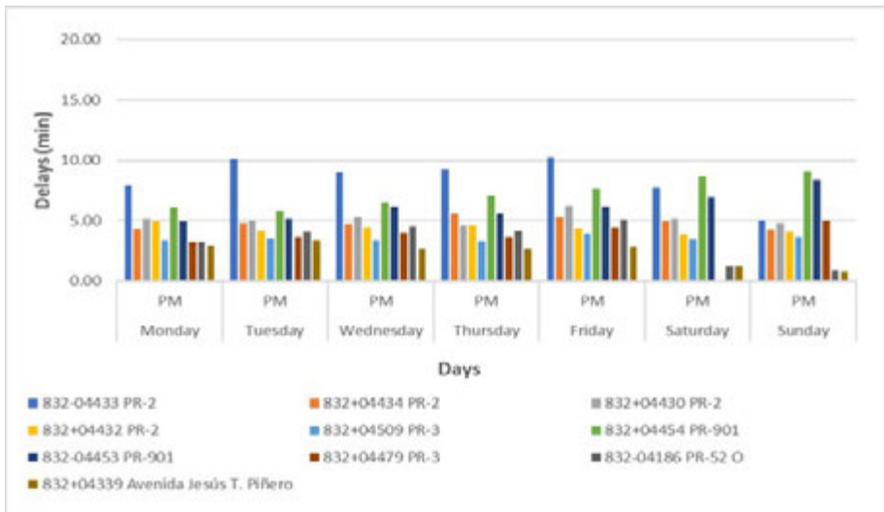
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.59: November 2016, TMC, San Juan TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.60: December 2016, TMC, San Juan TMA, (PM)

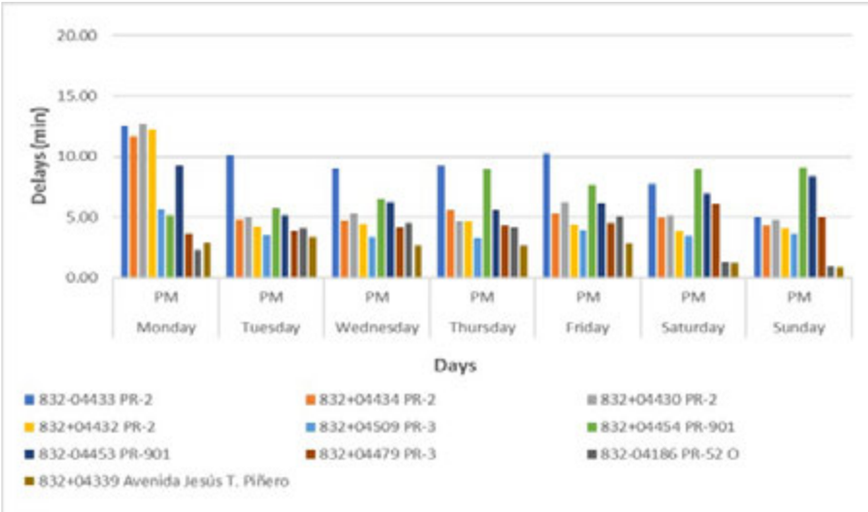


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, the average delay was around 10.0 minutes, with variation among the highest-ranking segments.

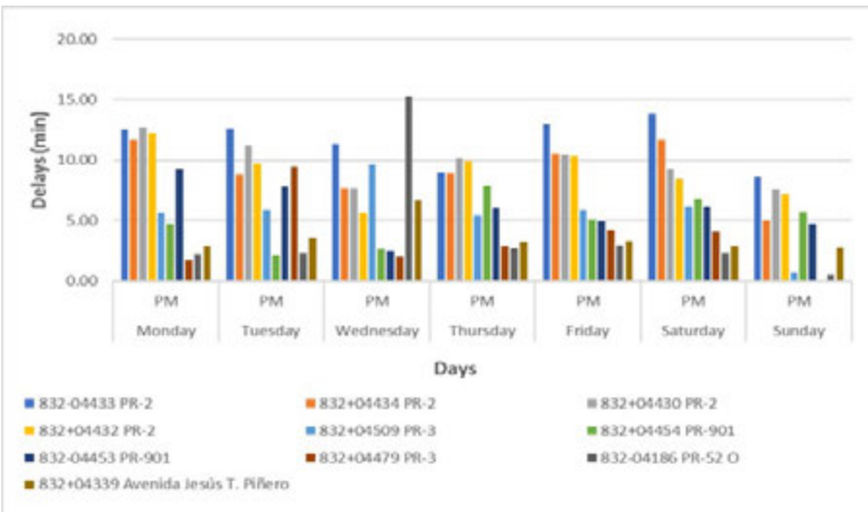
For January, the highest-ranking delays were 832+04430 in PR-2 and 832-04433 in PR-2 with average delays of 13.0 minutes (Figure K.61 to Figure K.64).

Figure K.61: January 2017, TMC, San Juan TMA, (PM)



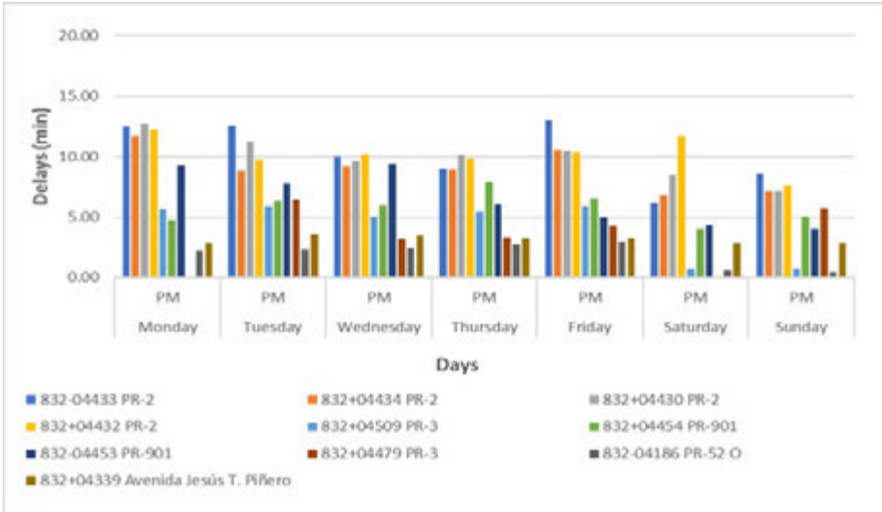
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.62: February 2017, TMC, San Juan TMA, (PM)



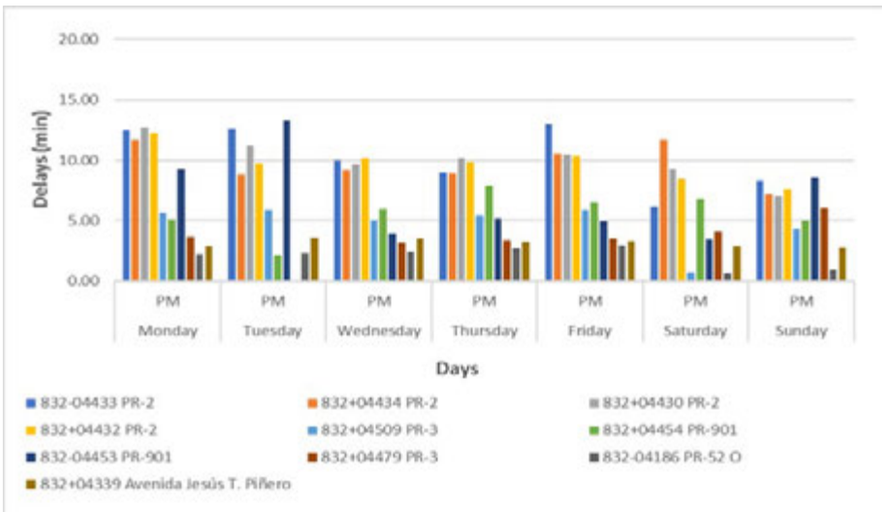
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.63: March 2017, TMC, San Juan TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.64: April 2017, TMC, San Juan TMA, (PM)

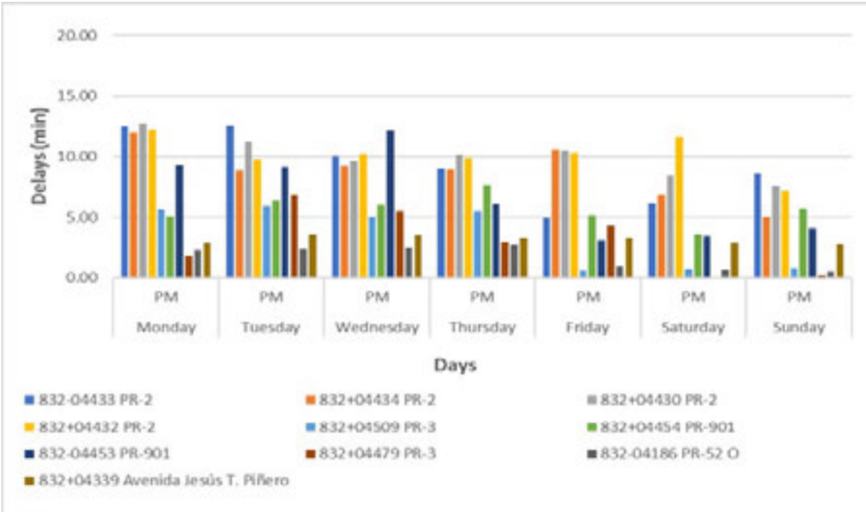


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was below 10.0 minutes. The segment with the highest average delay was 832+04430 in PR-2 with an average delay of 18.0 minutes.

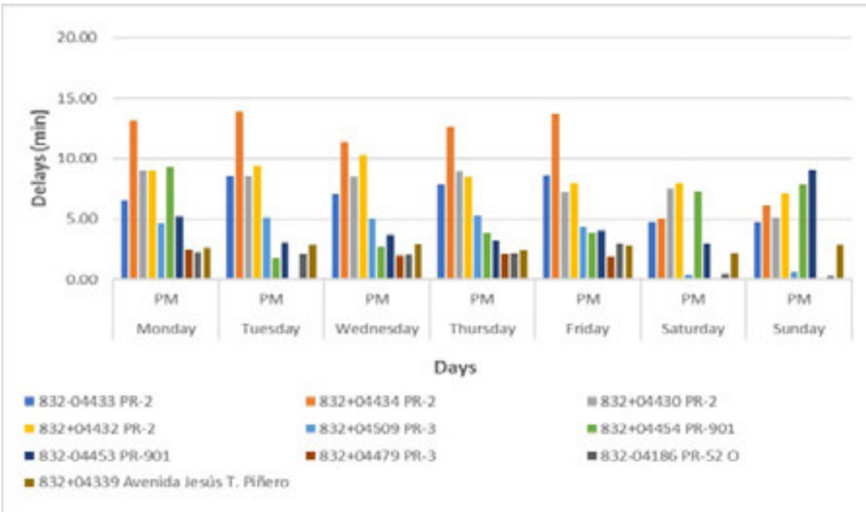
Segments with high delays for all months and throughout the week days were 832+04430 in PR-2, 832-04433 in PR-2 and 832+04434 in PR-2 (Figure K.65 to Figure K.68).

Figure K.65: May 2017, TMC, San Juan TMA, (PM)



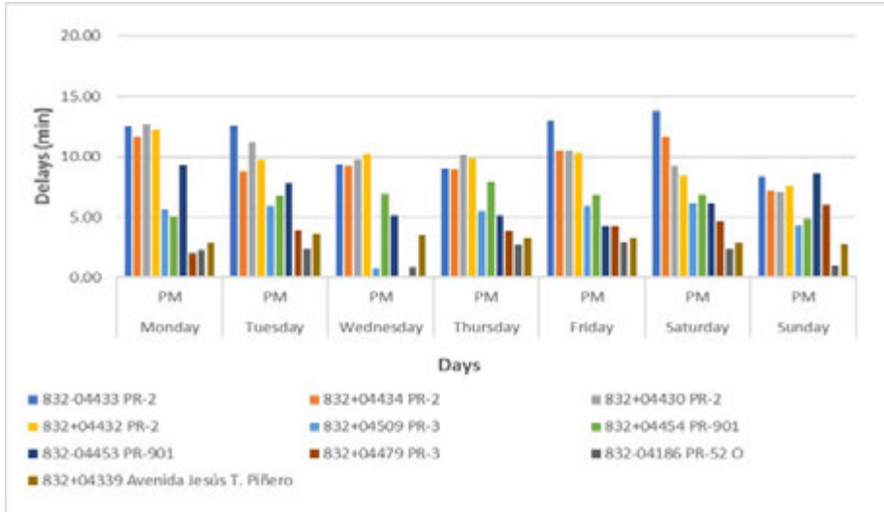
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.66: June 2017, TMC, San Juan TMA, (PM)



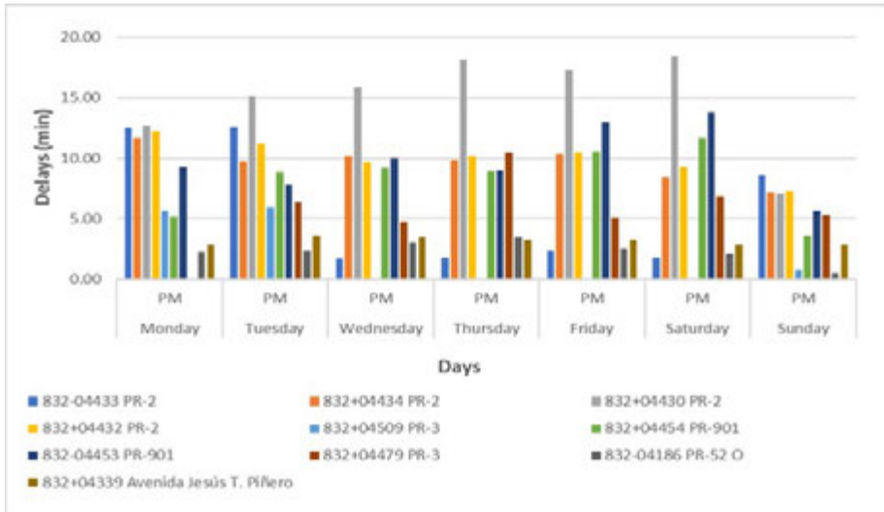
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.67: July 2017, TMC, San Juan TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

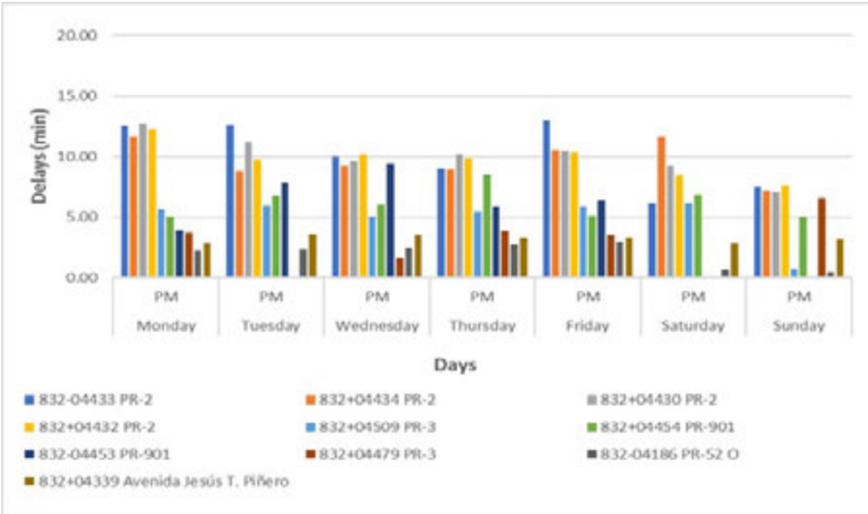
Figure K.68: Auguts 2017, TMC, San Juan TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

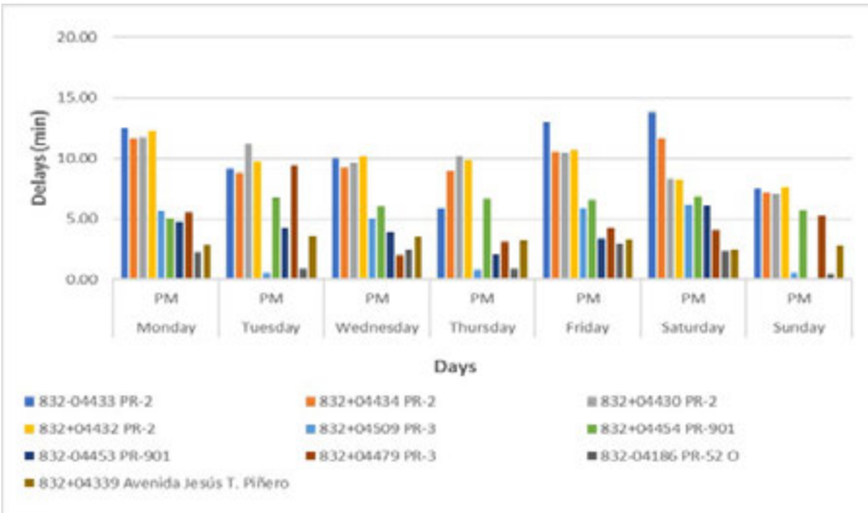
For the first four months between January and April 2018, average delay of segments was below 10.0 minutes, with segment 832-04433 in PR-2 recording average delays of 20.0 minutes (Figure K.69 to Figure K.72).

Figure K.69: January 2018, TMC, San Juan TMA, (PM)



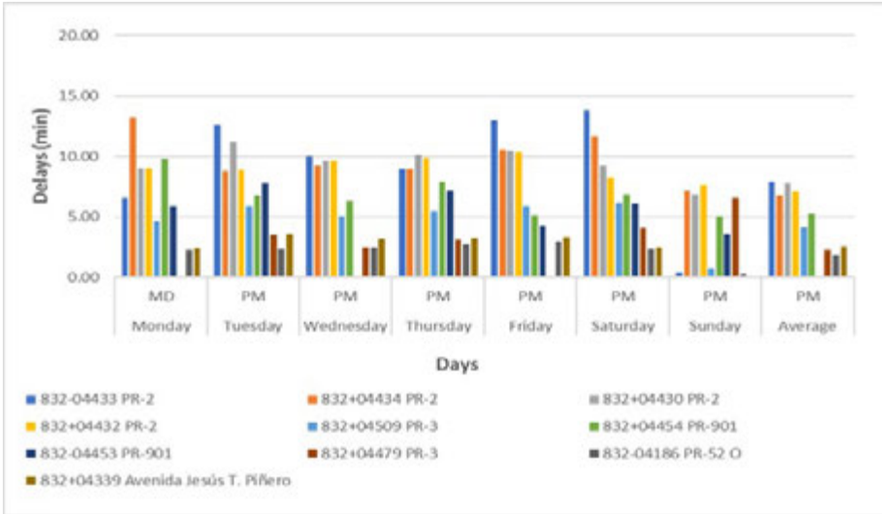
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.70: February 2018, TMC, San Juan TMA, (PM)



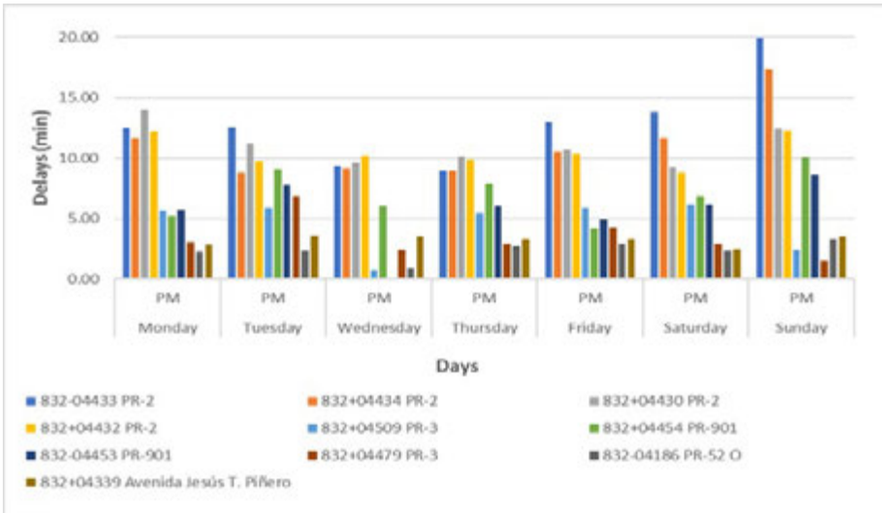
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.71: March 2018, TMC, San Juan TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.72: April 2018, TMC, San Juan TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Results for San Juan TMA bottlenecks Past-Midday (PM) - Weekly

Throughout the period of study, the top 10 segments with worst delays were identified along PR-2, PR-901, Avenida Jesús T. Piñero, PR-52E, and PR-3. The road with most bottleneck segments and worst delays was PR-2, ranking the highest for all periods of the day and throughout all months of the period studied:

- For the morning period, the average delay for worst segments was between 4.0-4.5 minutes, found along PR-2 in segments 832+04434 and 832+04432 in Vega Alta and Candelaria with direction towards Bayamón. Also, along PR-901 in segment 832+04454 around Mario beach, and 832-04453 in between Emajagua and Puerto Yabucoa.
- For the mid-day period, the average delay for worst segments ranked between 5.7 to 9.5 minutes, with the highest delays along PR-2 in segments 832+04434, 832+04432, 832+04430, and 832-04433 accordingly, found in Calendaria, Vega Alta and Vega Baja.
- For the afternoon period, the average delay for worst segments ranked between 7.0-7.9 minutes, and occurred along PR-2 in segments 832+04430, 832-04433, 832+04432, and 832+04434, in similar areas as the mid-day period.
- For the night period, the average delay for worst segments was between 4.5-5.0 minutes for the same segments as mid-day and past-midday periods along PR-2, except for segment 832-04433 with average delays between 8.0-11.0 minutes.

Thus, overall, the four segments identified along PR-2 had the highest recurrence of worst delays for all periods and months studied.

AGUADILLA TMA

In the Aguadilla TMA, the data used in the preparation of the graphs are from the roads PR-2, PR-3 and PR-4.

Table K.6 to Table K.8 shows roads, months and years selected and the studied periods.

Table K.1: Roads

TCM	Road name
832-04408	PR-2
832-04412	PR-2
832+04409	PR-2
832+04413	PR-2
832-04534	PR-2
832-04413	PR-2
832+04415	PR-2
832+04414	PR-2
832+04416	PR-3
832-04407	PR-4

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.2: The Months and Years Selected

2016	2017	2018
September	January	January
October	February	February
November	March	March
December	April	April
	May	
	June	
	July	
	August	

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.3: Studied Periods

Night Period (NT)	Morning Period (AM)
Midday Period (MD)	Past-midday Period (PM)

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Bottleneck Analysis

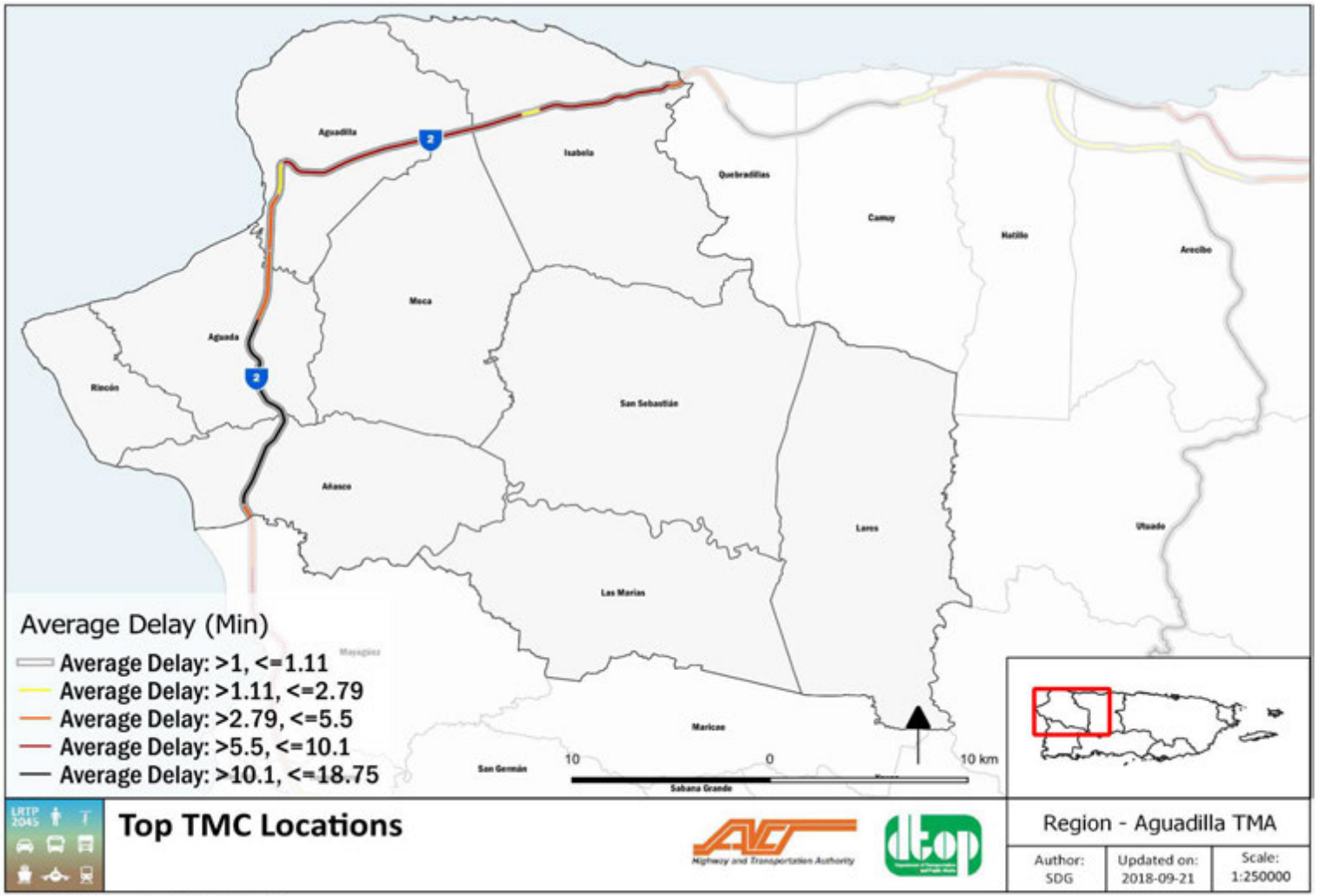
Night Period (NT)

For the Aguadilla TMA, only segments along road PR-2 are available for analysis in the highway network dataset.

Segments added on average a delay of 1.9 minutes to the reference travel time for the night period (NT), from 18:00-7:00 p.m., during the September-December 2016 interval. For the following months: (1) January through August 2017 and (2) January through April 2018, the average delay was 3.5 minutes. This is almost double the reported delay throughout the last four months of 2016.

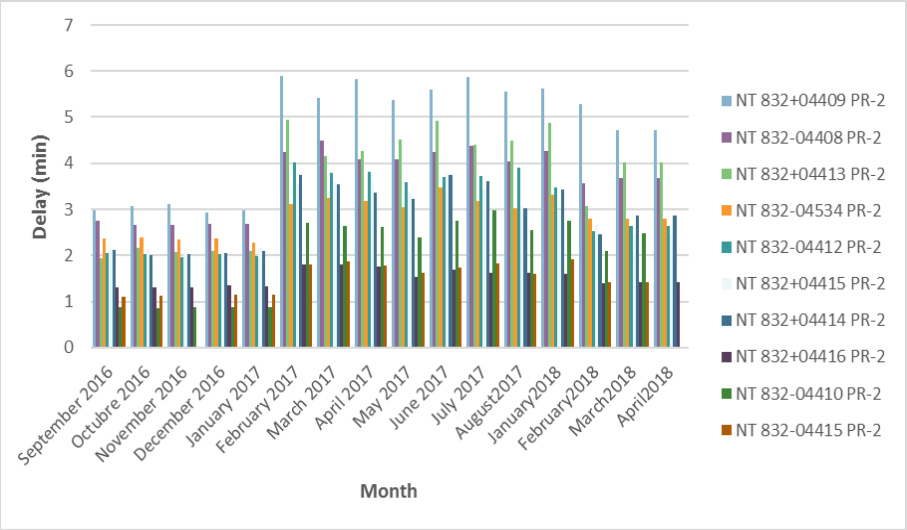
832+04409, with North direction, is the highest ranking TMC, located near the intersection between roads PR-2 and PR-417, better known as the Luyando neighborhood in Aguada. Other high ranking TMCs for the Aguadilla TMA include 832+04413, with East direction (around Corrales) and 832-04408, with South direction, covering a long segment between intersection PR-2 and PR-4416, all the way south to the intersection between PR-2 and PR-115. See Figure K.73 and Figure K.74 below.

Figure K.73: Aguadilla TMA Location



Source: SDG, based on NPMRDS Analytics

Table K.74: Average Delays, Aguadilla TMA, NT Period



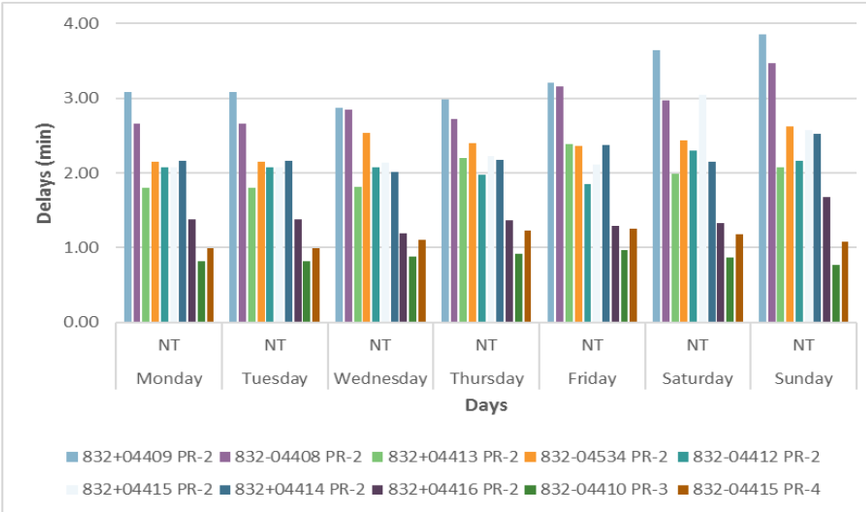
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Night Period (NT) - Weekly

For the night period in Aguadilla, the highest ranking TMC were below 4.0 minutes on average delay for the last four months of 2016. There was slight variation amongst the studied months, as the overall trend shows that the average delay increases gradually from Monday to Sunday for the segments, having the highest delays during the weekend.

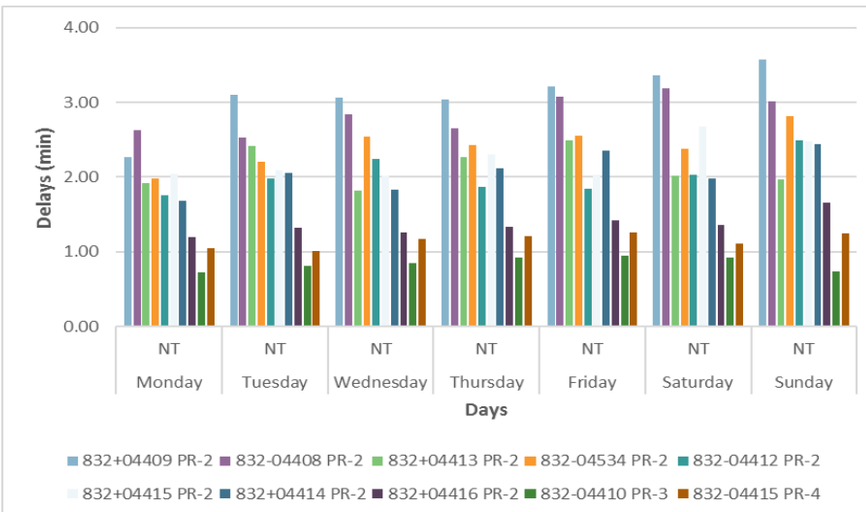
The highest ranking TMC throughout the week were 832+4409 and 832-0448 along PR-2 with average delays ranging between 2.2 to 3.8 minutes (Figure K.75 to Figure K.78).

Figure K.75: September 2016, TMC, Aguadilla TMA, (NT)



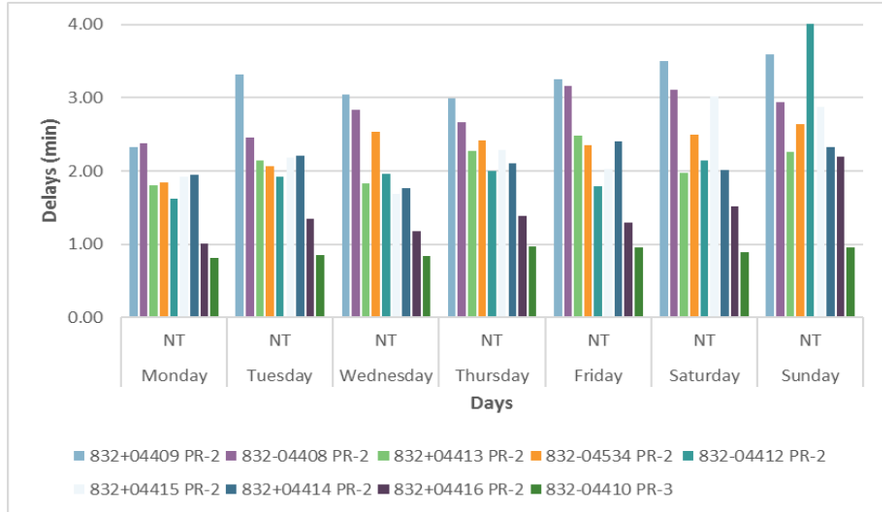
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.76: October 2016, TMC, Aguadilla TMA, (NT)



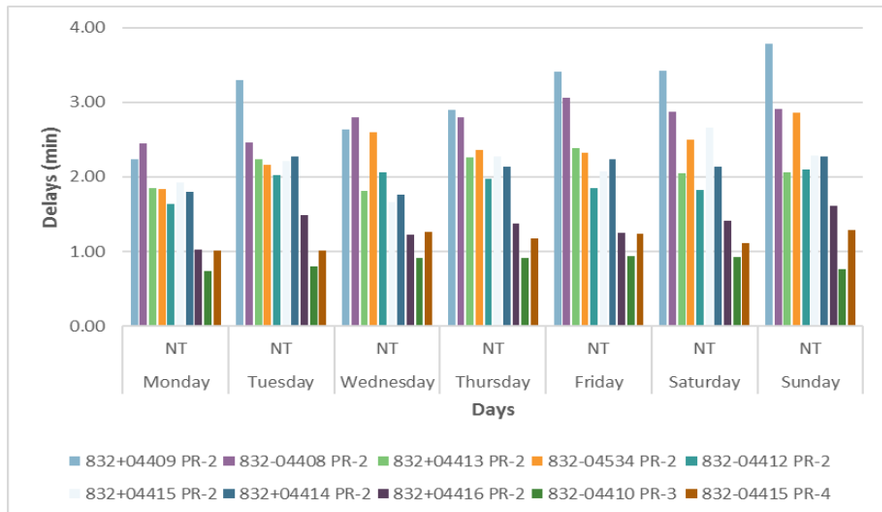
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.77: November 2016, TMC, Aguadilla TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.78: December 2016, TMC, Aguadilla TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, there were more variations on average delays throughout the week, with the average delay ranging from 2.0 minutes during January, and 3.5 minutes from February to April 2017.

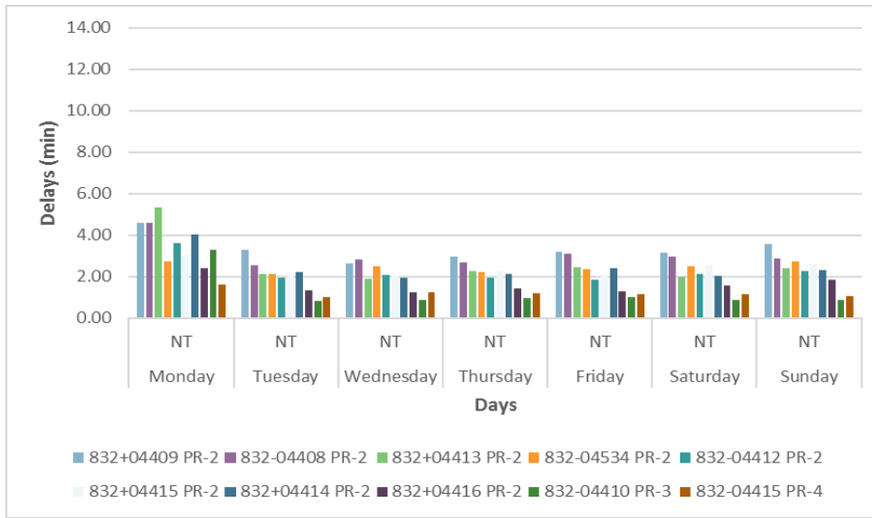
For January, the highest delay happened on Monday with an average of 3.5 minutes, and the highest ranking TMC were 832+04413, 832-04408 and 832+04409 along PR-2- with delays ranging from 2.0 – 3.0 minutes.

For February, the highest delay happened on Sunday with an average of 4.8 minutes and highest ranking TMC reaching delays between 7.0 – 8.0 minutes in segments 832+04409, 832-04408, and 832+04413 along PR-2.

For March, the highest delay happened on Friday with an average of 8.0 minutes delay, with 5.0 minutes above average and highest ranking TMC reaching delays ranking from 8.0 – 13.0 minutes in segments 832+04409, 832-04408, 832+04413, 832-04534, 832+04414 along PR-2.

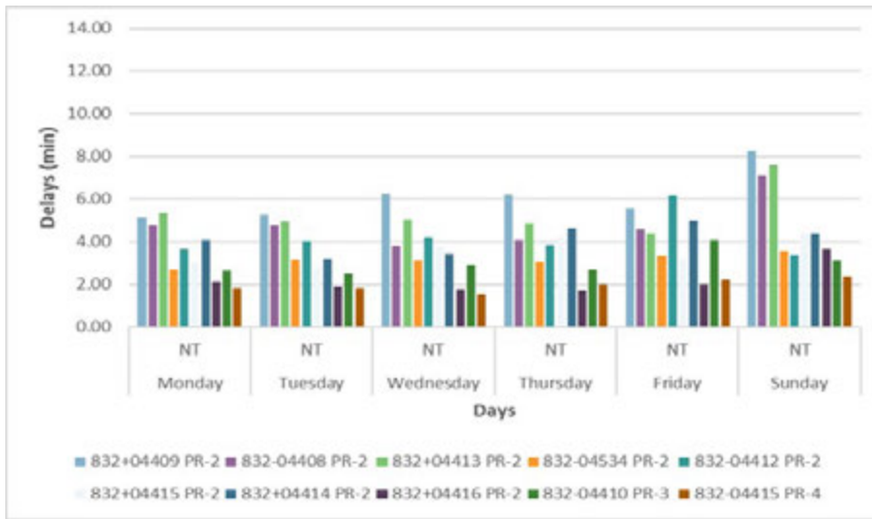
For April, average delays were higher from Friday through Sunday, with segment 832+04409 ranking the highest with average delays between 5.0 – 9.0 minutes (Figure K.79 to Figure K.82).

Figure K.79: January 2017, TMC, Aguadilla TMA, (NT)



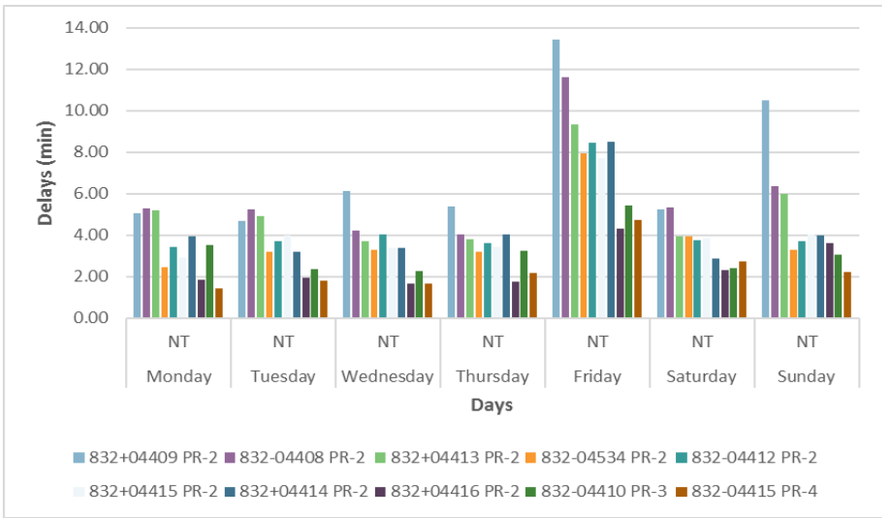
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.80: February 2017, TMC, Aguadilla TMA, (NT)



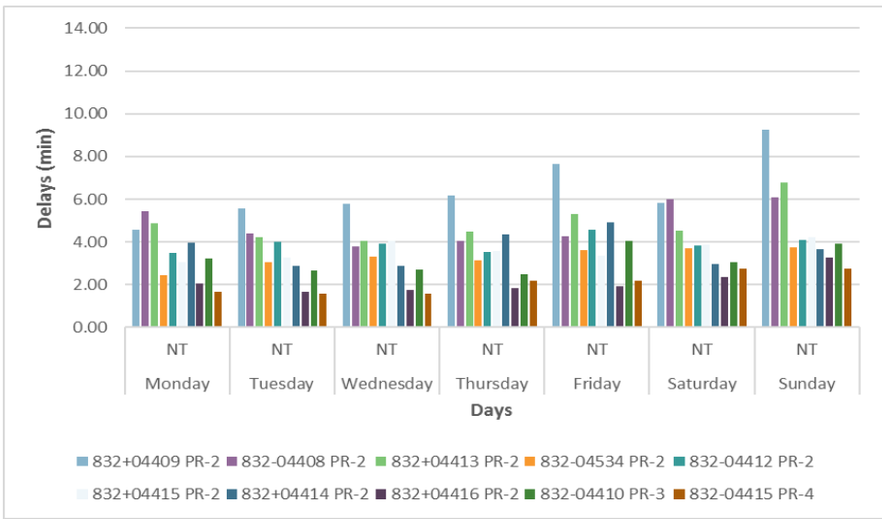
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.81: March 2017, TMC, Aguadilla TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

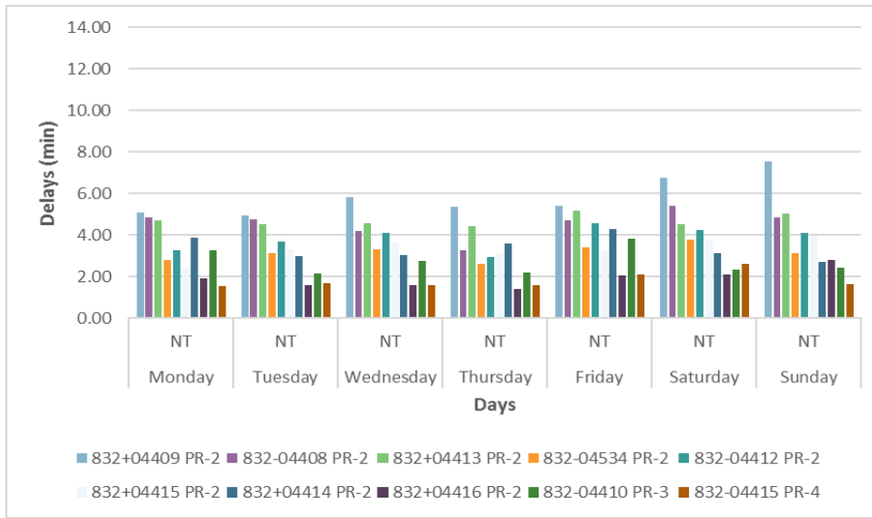
Figure K.82: April 2017, TMC, Aguadilla TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

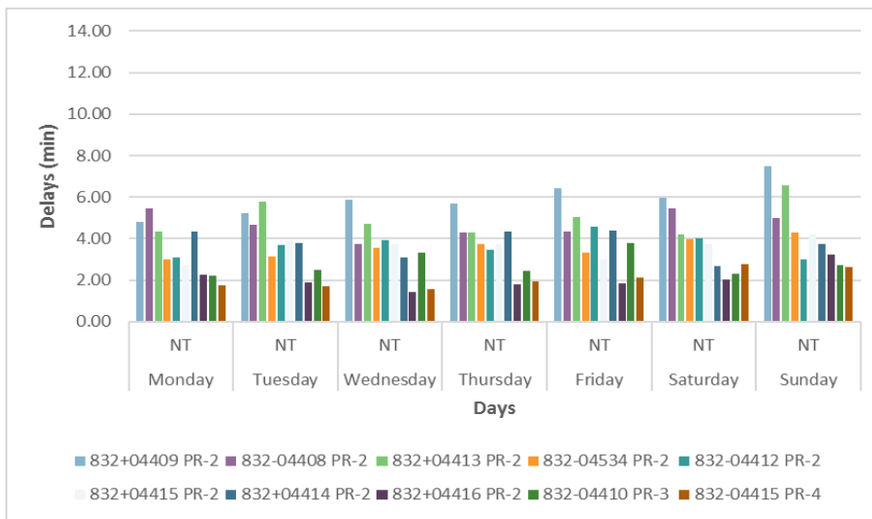
From May to August 2017, the average delay throughout the week was of 3.2 for May and August and 3.5 minutes for June and July. The highest-ranking segment was 832+04409, doubling the average delay for segments, and Sunday being the day of the week with the highest delay (Figure K.83 to Figure K.86).

Figure K.83: May 2017, TMC, Aguadilla TMA, (NT)



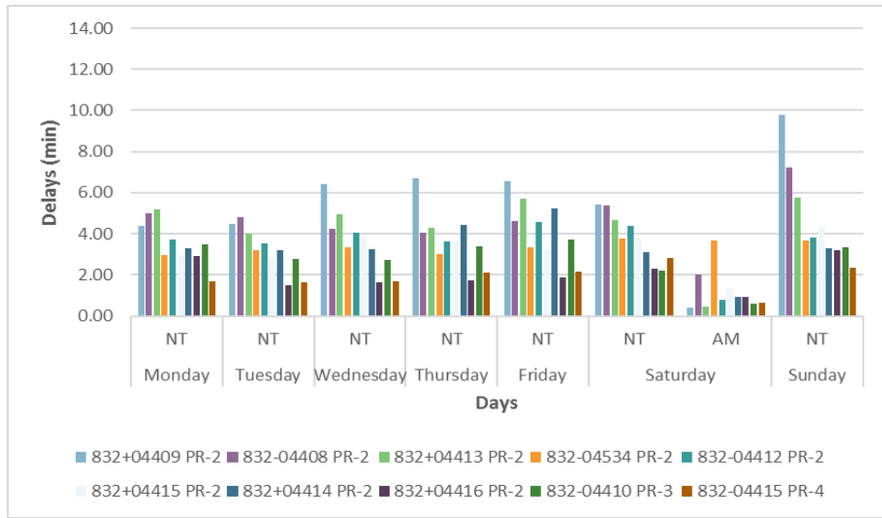
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.84: June 2017, TMC, Aguadilla TMA, (NT)



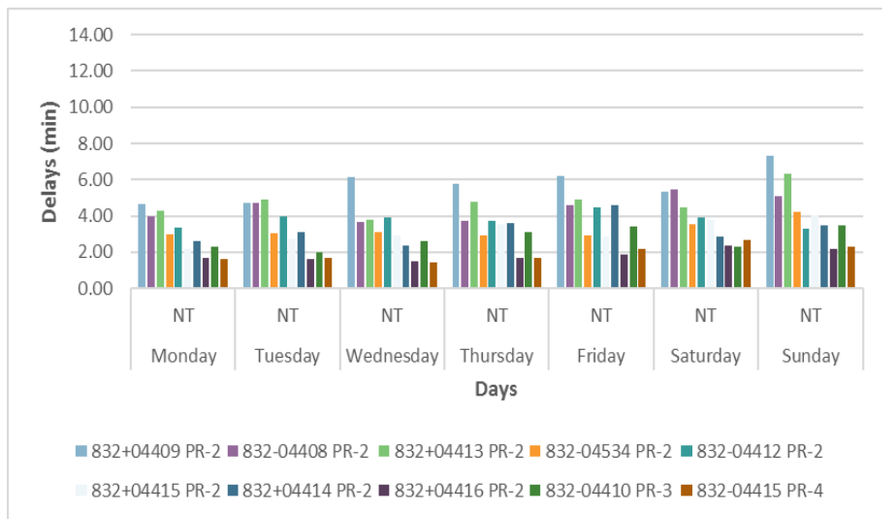
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.85: July 2017, TMC, Aguadilla TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.86: August 2017, TMC, Aguadilla TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

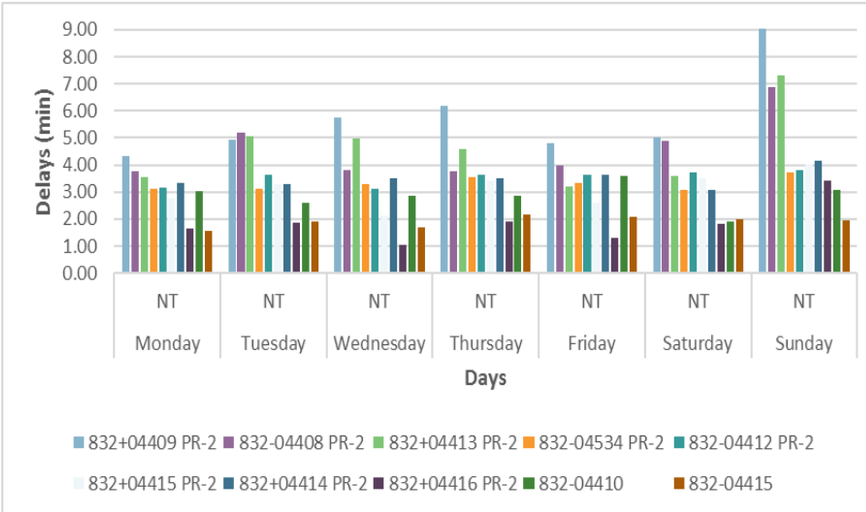
For the first four months between January and April 2018, average delay of segments was of 2.8 minutes. Average delays were mostly higher on weekends with peaks on segment 832+04409.

For January, the highest delay happened on Sunday, with peaks for 832+04409, 832-04408, and 832+04413 with delays ranging between 7.0 – 9.0 minutes.

For February, highest delay happened on Saturday, mostly due to peaks on 832+04409 and 832-04408. However, 832+4409 also registered peaks on Wednesday and Thursday with delays of 5.0 – 6.0 minutes.

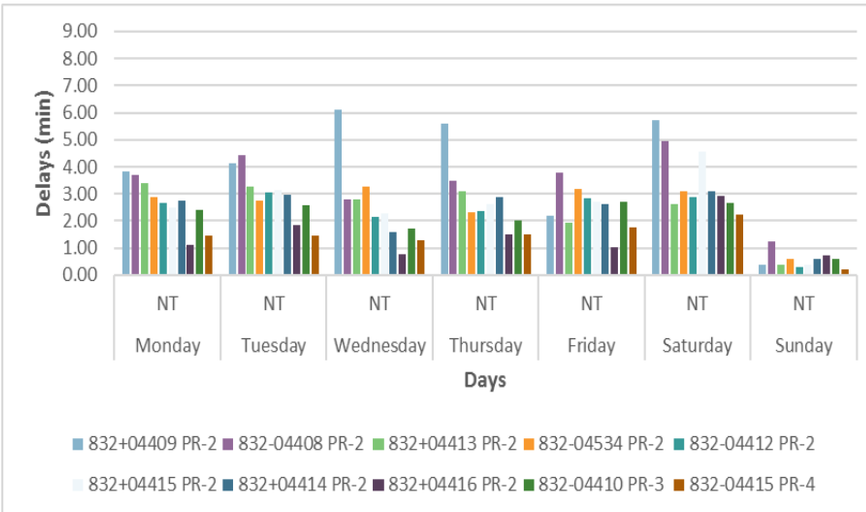
From March to April 2018, highest delay happened on Sunday with an average of 4.3 minutes, with a peak of 8.5 minutes of average delay for segment 832+04409 (Figure K.87 to Figure K.90).

Figure K.87: January 2018, TMC, Aguadilla TMA, (NT)



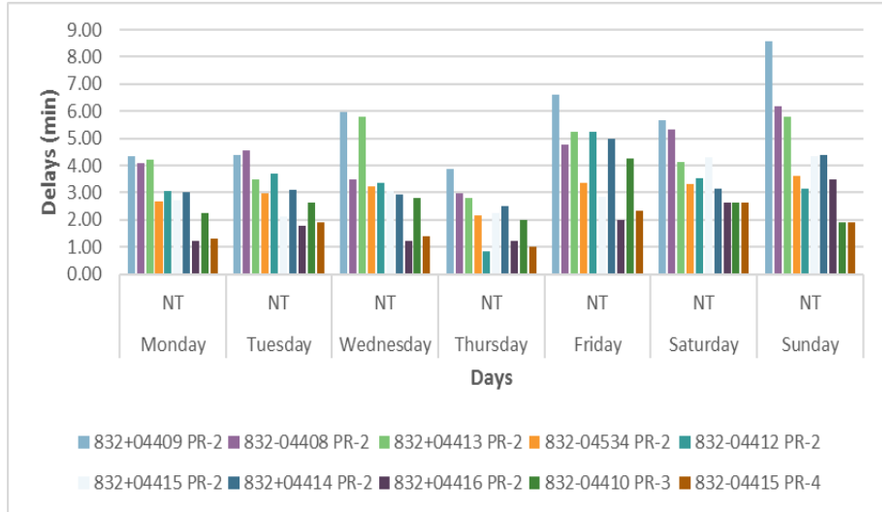
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.88: February 2018, TMC, Aguadilla TMA, (NT)



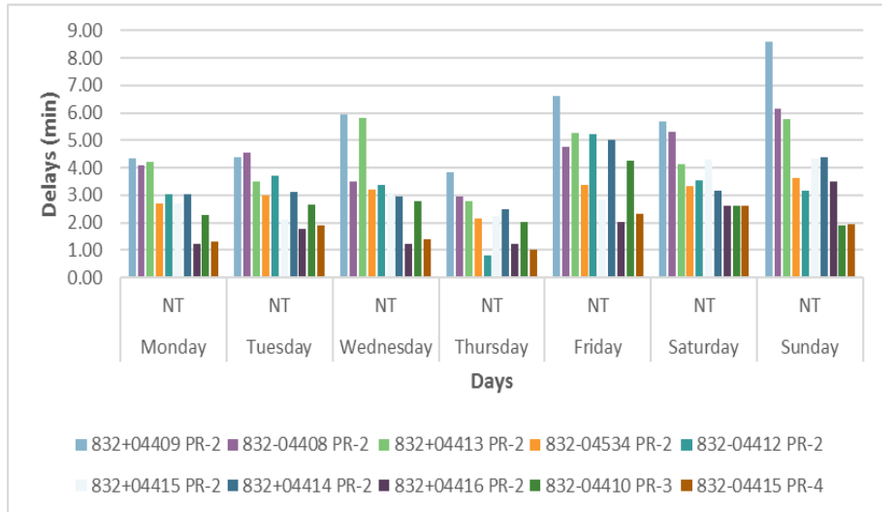
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.89: March 2018, TMC, Aguadilla TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.90: April 2018, TMC, Aguadilla TMA, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM)

There are three distinct variations throughout the studied morning period (AM), from 7:00-9:00 a.m., divided into three spans: (1) from September 2016 to January 2017; (2) from February 2017 to August 2017 and January 2018; (3) February to April 2018.

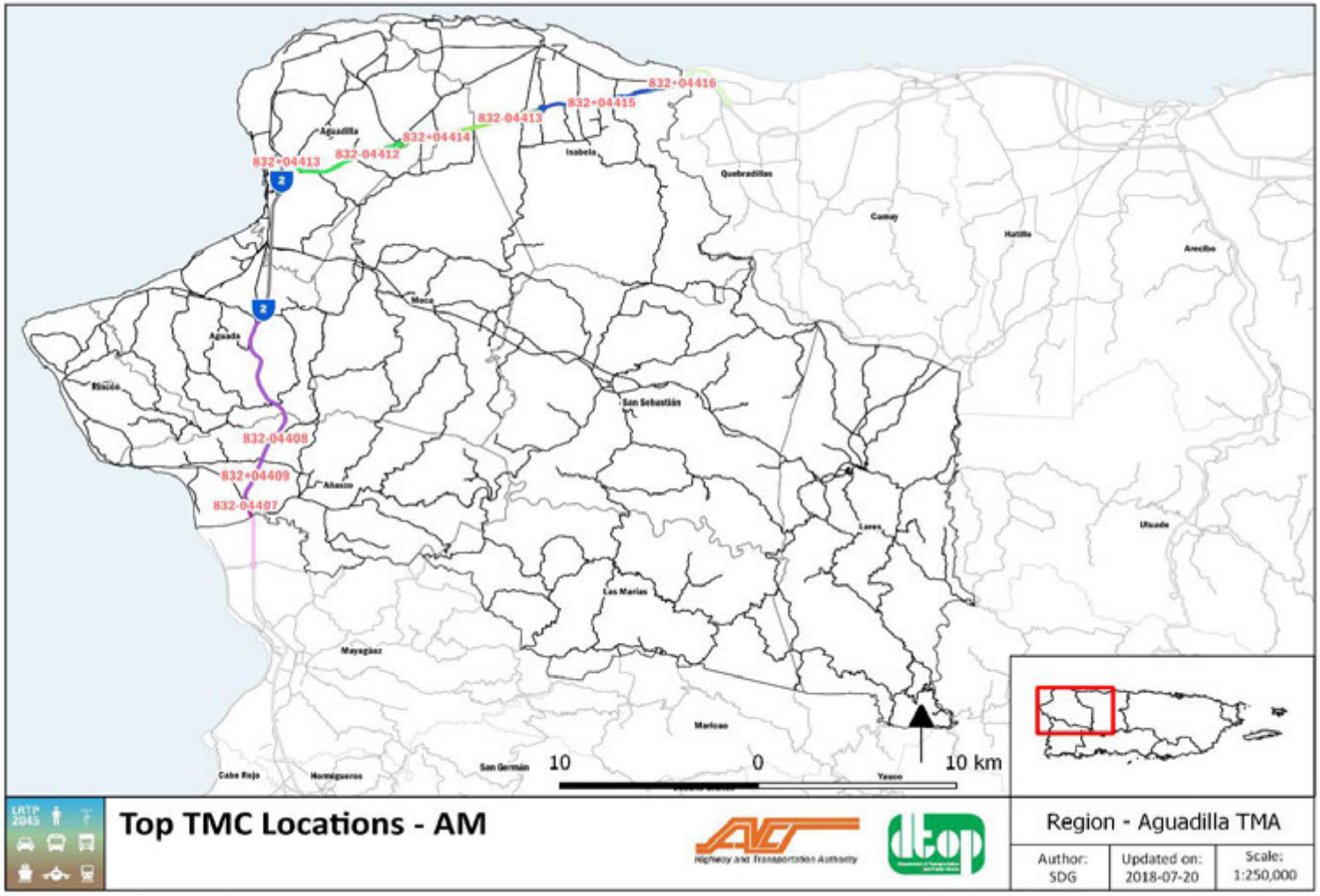
Segments added on average a delay of 2.6 minutes to the reference travel time from September through January 2017. In these months, TMC 832-04408, with South direction, had the highest average delay with 4.2 minutes, 1.6 minutes above the average of the top 10 TMC.

The average delay for the top 10 segments was 1.4 minutes from February through August 2017, and January 2018, half of the reported numbers throughout the last four months of 2016. During this period, TMC 832-4408 had a drastic decrease in average delay from 4.2 to 1.7 minutes.

TMC 832-04534, with West direction, a segment between intersection PR-113 and PR-4470 with PR-2 (from Isabela to Mora), ranked the highest during these months with an increase on average delay from 2.8 to 3.4 minutes. This is almost double the average delay for the top 10 TMCs along PR-2 during this period.

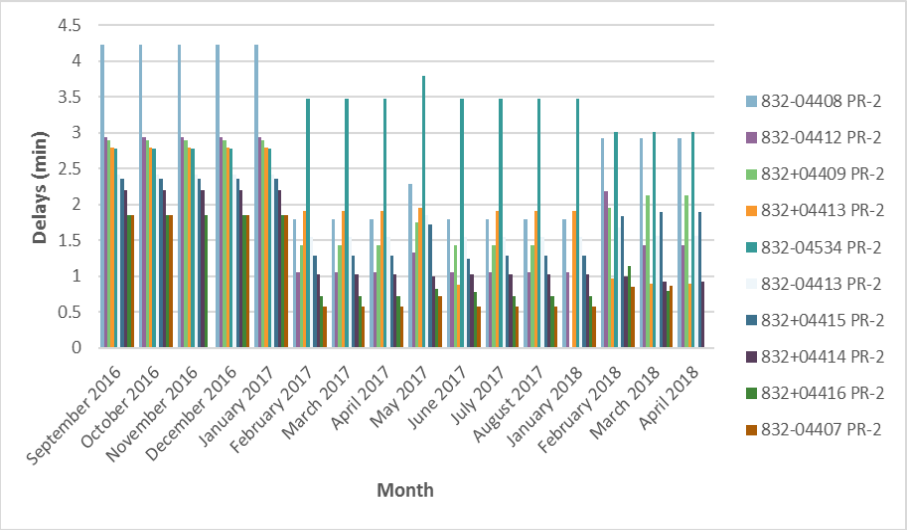
Finally, segments average delay increased to 1.7 minutes from February to April 2018, with both TMCs 832-4408 and 832-04534 averaging 3.0 minutes. See Figure K.91 and Figure K.92 below.

Figure K.91: Aguadilla TMA Location, AM Period



Source: SDG, based on NPMRDS Analytics

Figure K.92: Average Delays, Aguadilla TMA, AM Period



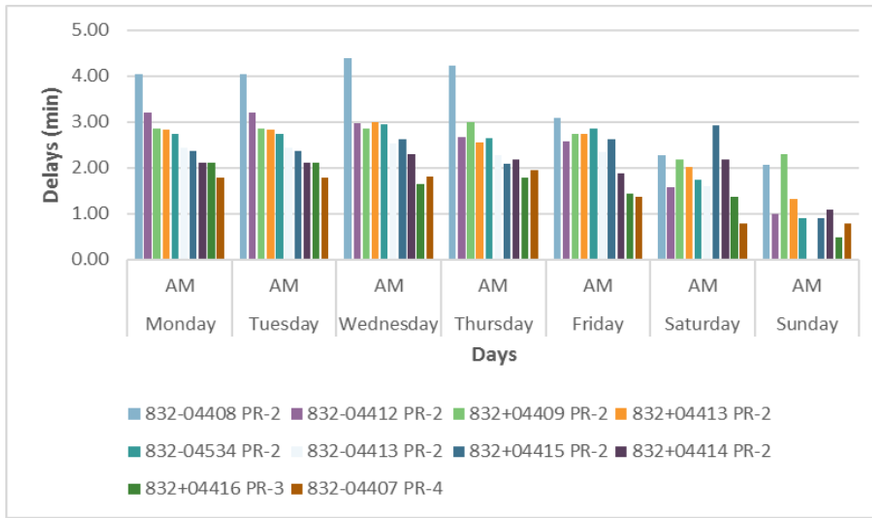
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM) - Weekly

For the last four months of 2016, the average delay for segments was 2.5 minutes. For the morning period, the highest delays were recorded during working days, from Monday to Thursday, and decreasing from Friday to Sunday.

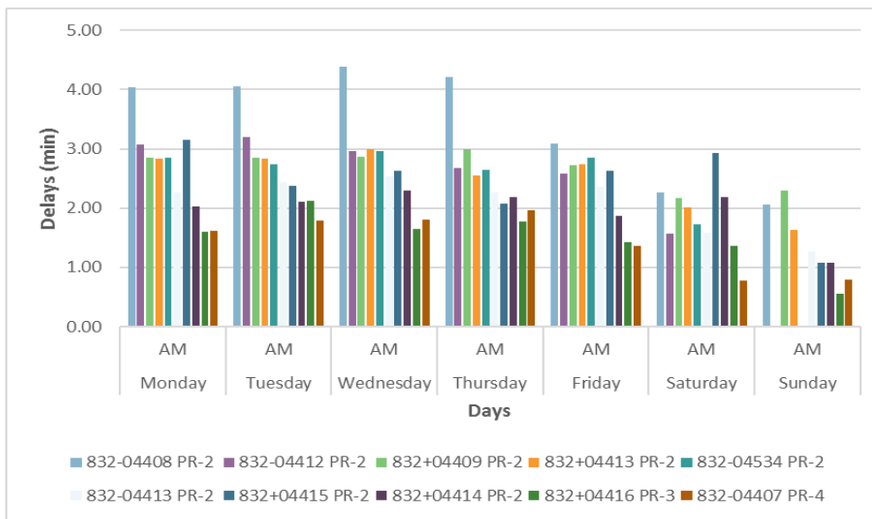
The segment with the highest delay throughout the months was 832-04408 with an average of 4.0 minutes Other segments with high delays were 832+04409, 832+04413, 832-04534, 832-04412, and 832+04415, with delays ranging from 2.5-3.0 minutes (Figure K.93 to Figure K.96).

Figure K.93: September 2016, TMC, Aguadilla TMA, (AM)



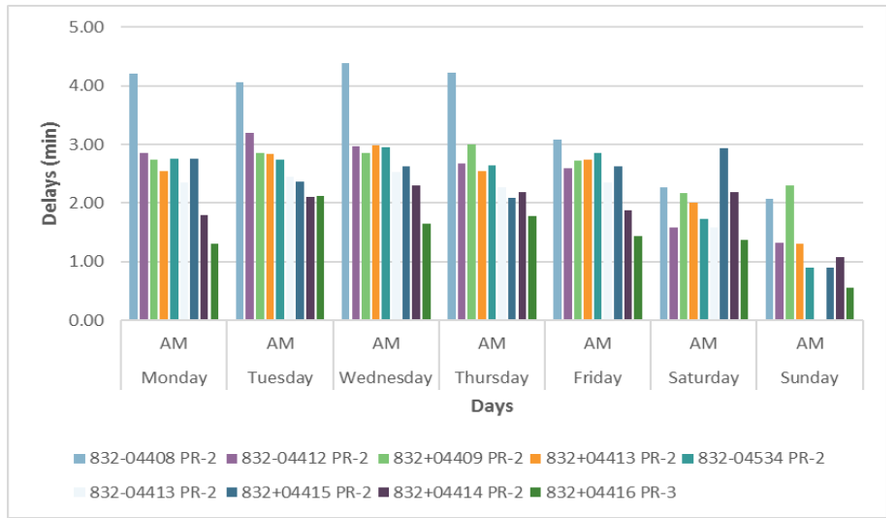
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.94: October 2016, TMC, Aguadilla TMA, (AM)



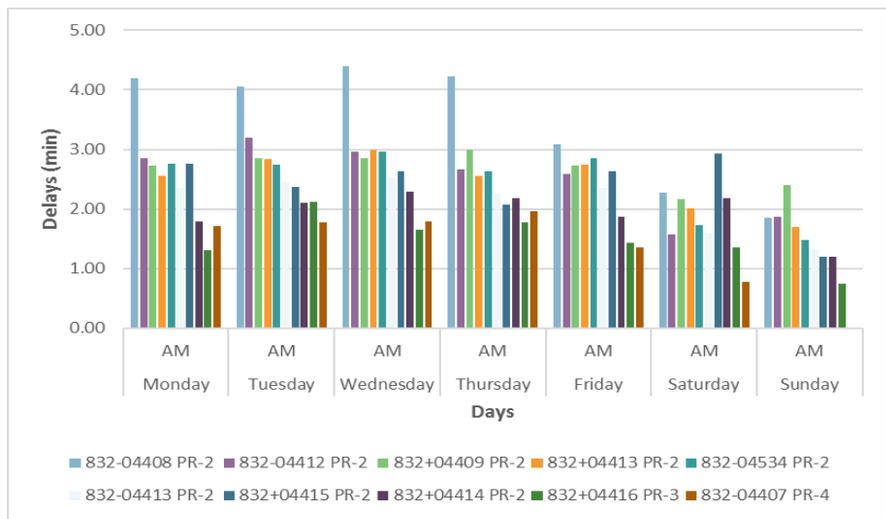
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.95: November 2016, TMC, Aguadilla TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.96: December 2016, TMC, Aguadilla TMA, (AM)

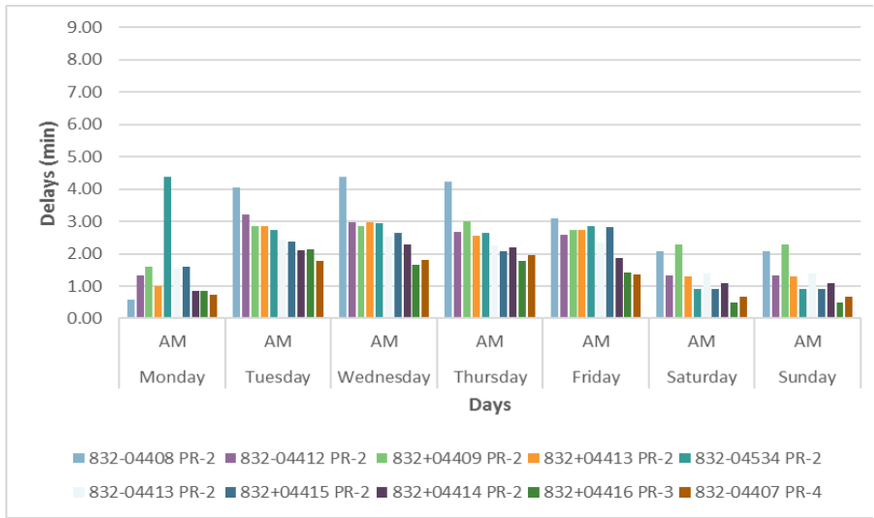


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, segments had an average delay of 1.5 minutes. The segment with the highest delay was 832-04534, with average delays ranging between 4.0-9.0 minutes, mostly on Monday, Wednesday, Friday, Saturday and Sunday.

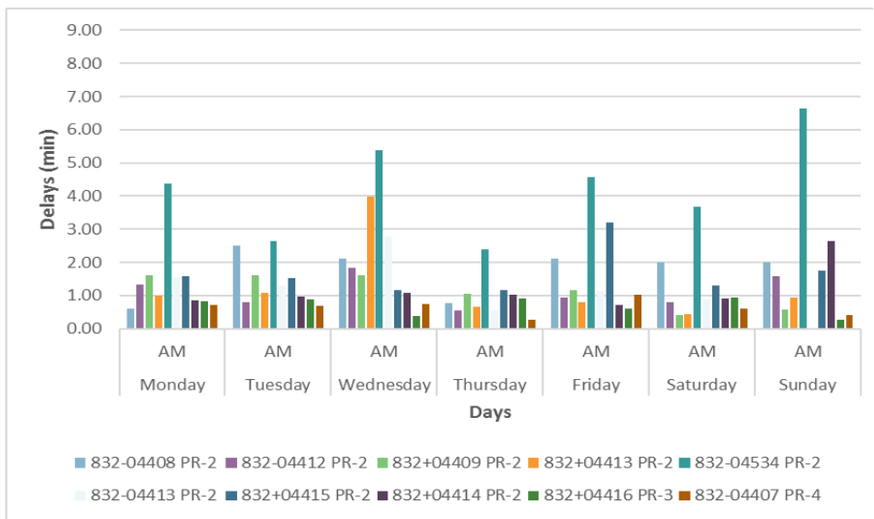
Other segments with high delays were 832+04413 with peaks on Wednesday, Friday and Sunday; and 832+04409, 832-04406 with a peak of 8.0-9.0 minutes for Friday in March 2017 (Figure K.97 to Figure K.100).

Figure K.97: January 2017, TMC, Aguadilla TMA, (AM)



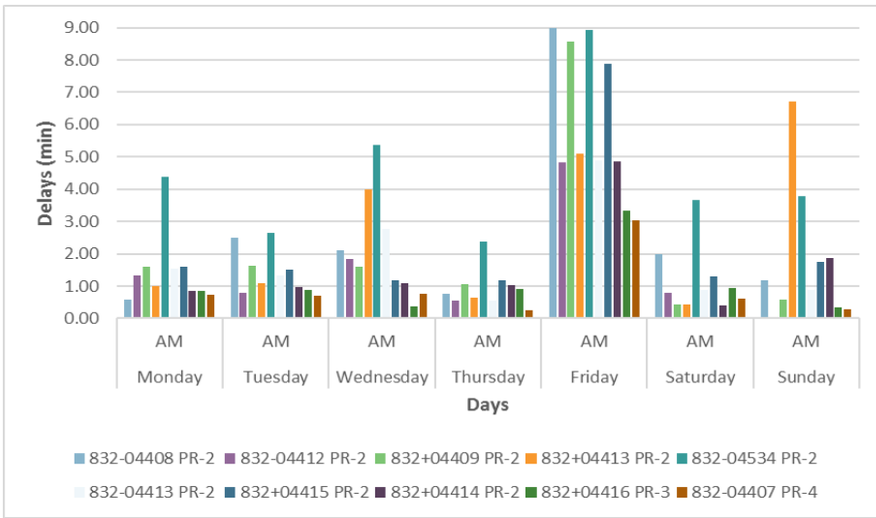
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.98: February 2017, TMC, Aguadilla TMA, (AM)



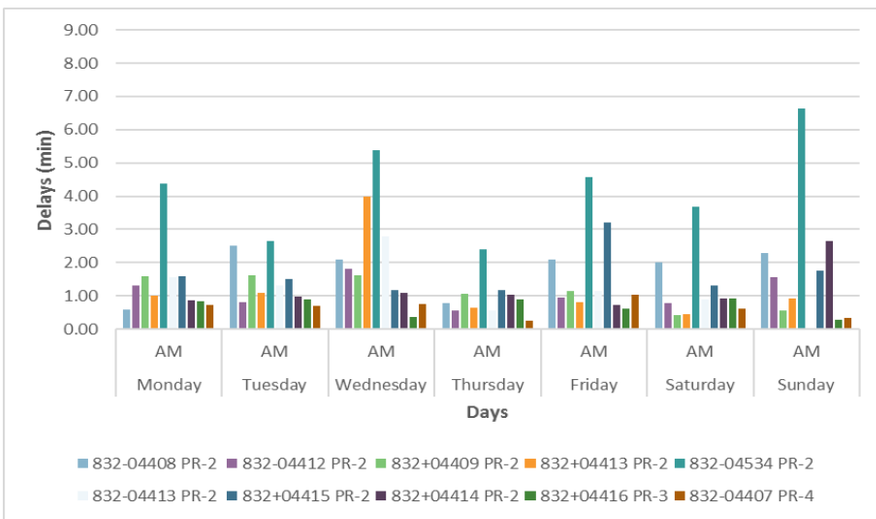
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.99: March 2017, TMC, Aguadilla TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.100: April 2017, TMC, Aguadilla TMA, (AM)

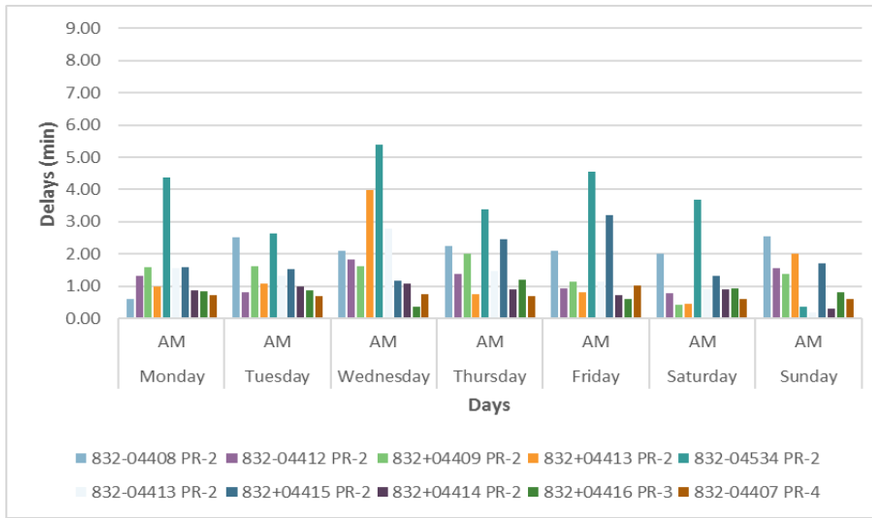


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was of 1.5 minutes. The highest-ranking segment was 832+04534, with values ranging between 4.0-5.0 on average, and higher delays on Monday, Wednesday, Friday and Saturday.

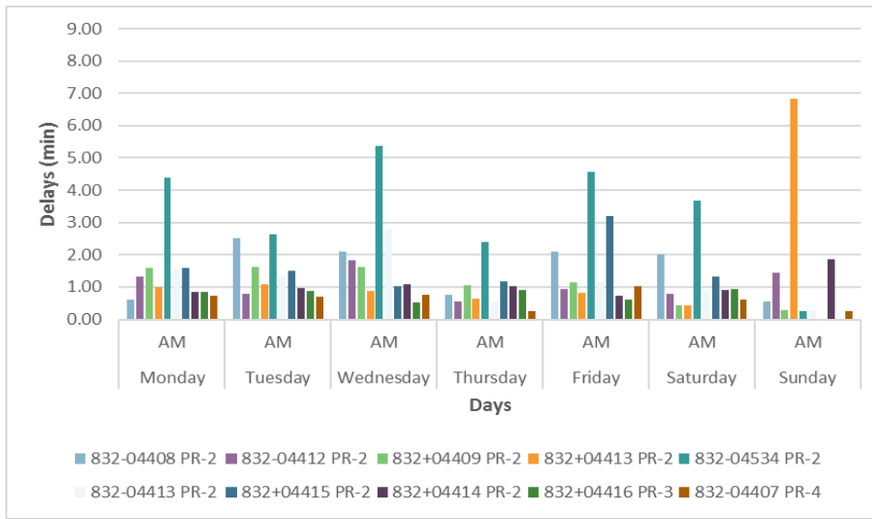
Other segments with high delays included 832+04413 with peaks on Wednesday and Sunday between 4.0-7.0 minutes (Figure K.101 to Figure K.104).

Figure K.101: May 2017, TMC, Aguadilla TMA, (AM)



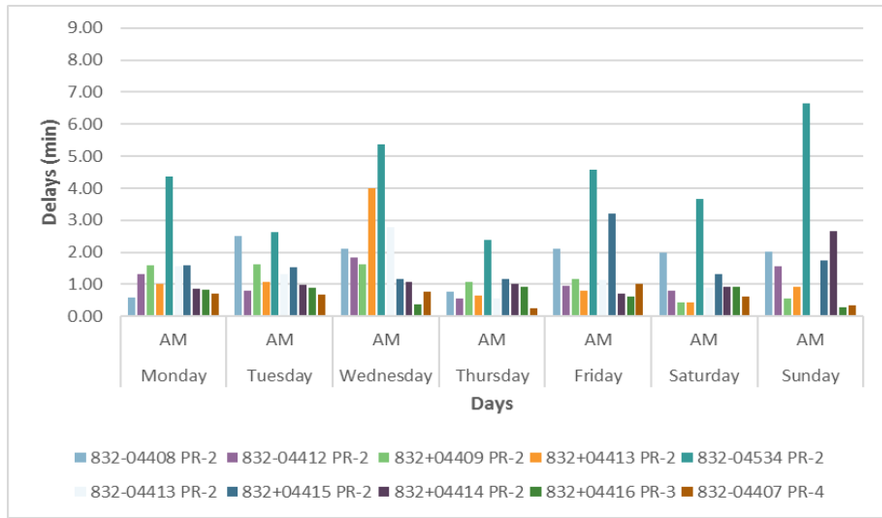
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.102: June 2017, TMC, Aguadilla TMA, (AM)



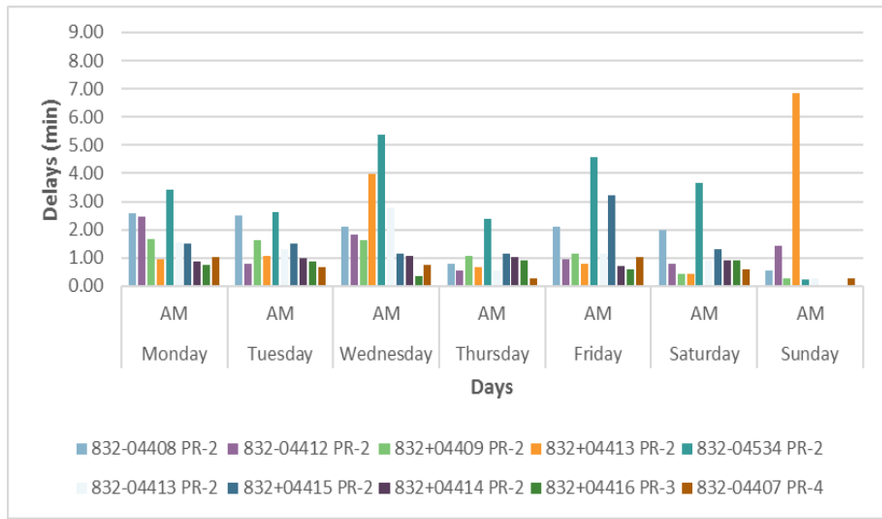
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.103: July 2017, TMC, Aguadilla TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

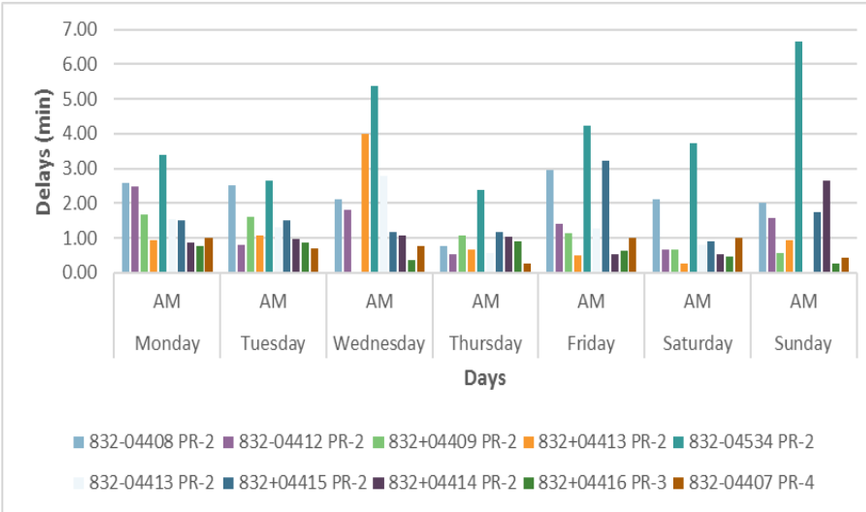
Figure K.104: August 2017, TMC, Aguadilla TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

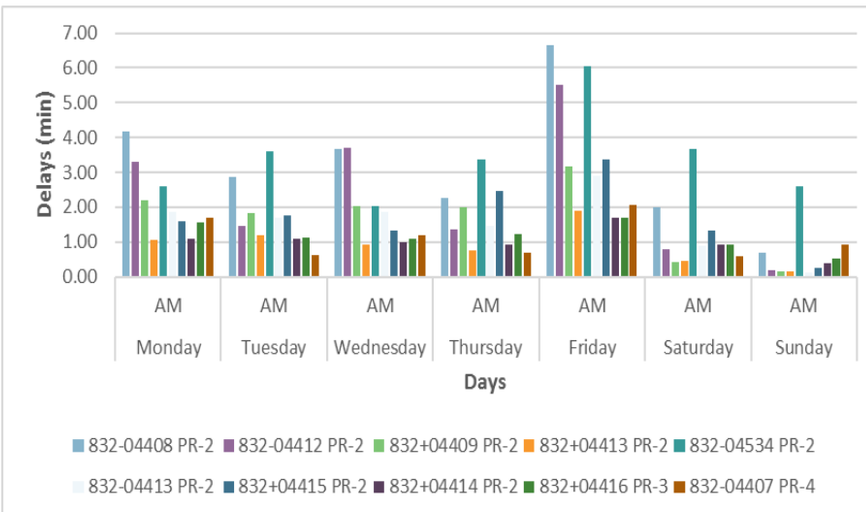
For the first four months between January and April 2018, average delay of segments was of 1.7 minutes. The segment with the highest delay was 832-04534 with average delays ranging between 3.0-4.0 minutes, with highest delays on Friday. Other segments with high delays were 832+04409 and 832-04408 with average delays of 2.0 minutes (Figure K.105 to Figure K.108).

Figure K.105: January 2018, TMC, Aguadilla TMA, (AM)



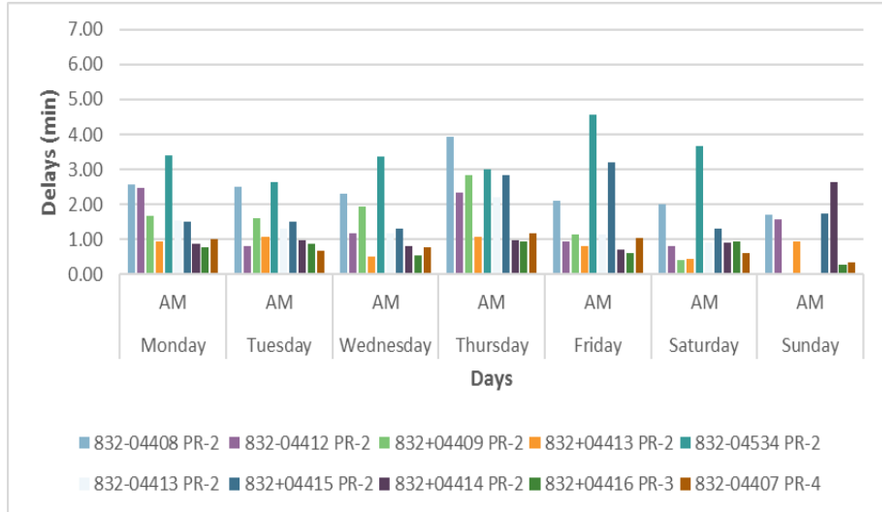
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.106: February 2018, TMC, Aguadilla TMA, (AM)



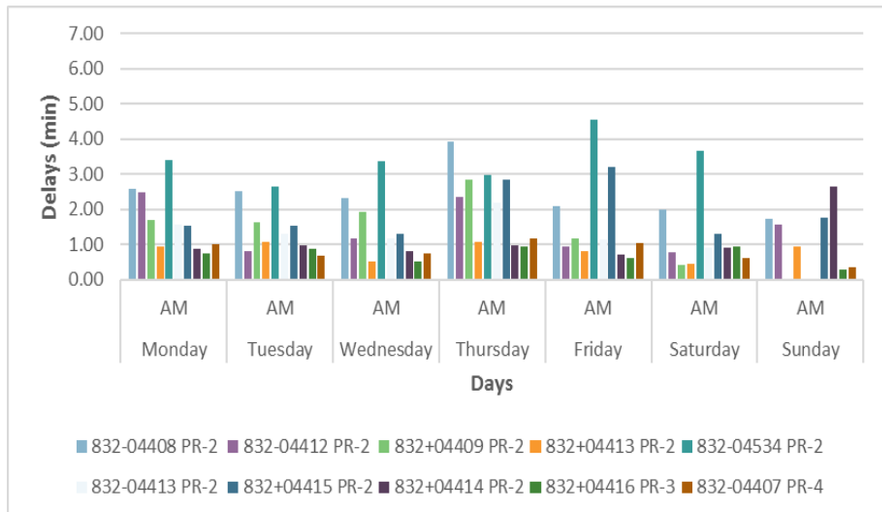
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.107: March 2018, TMC, Aguadilla TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.108: April 2018, TMC, Aguadilla TMA, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

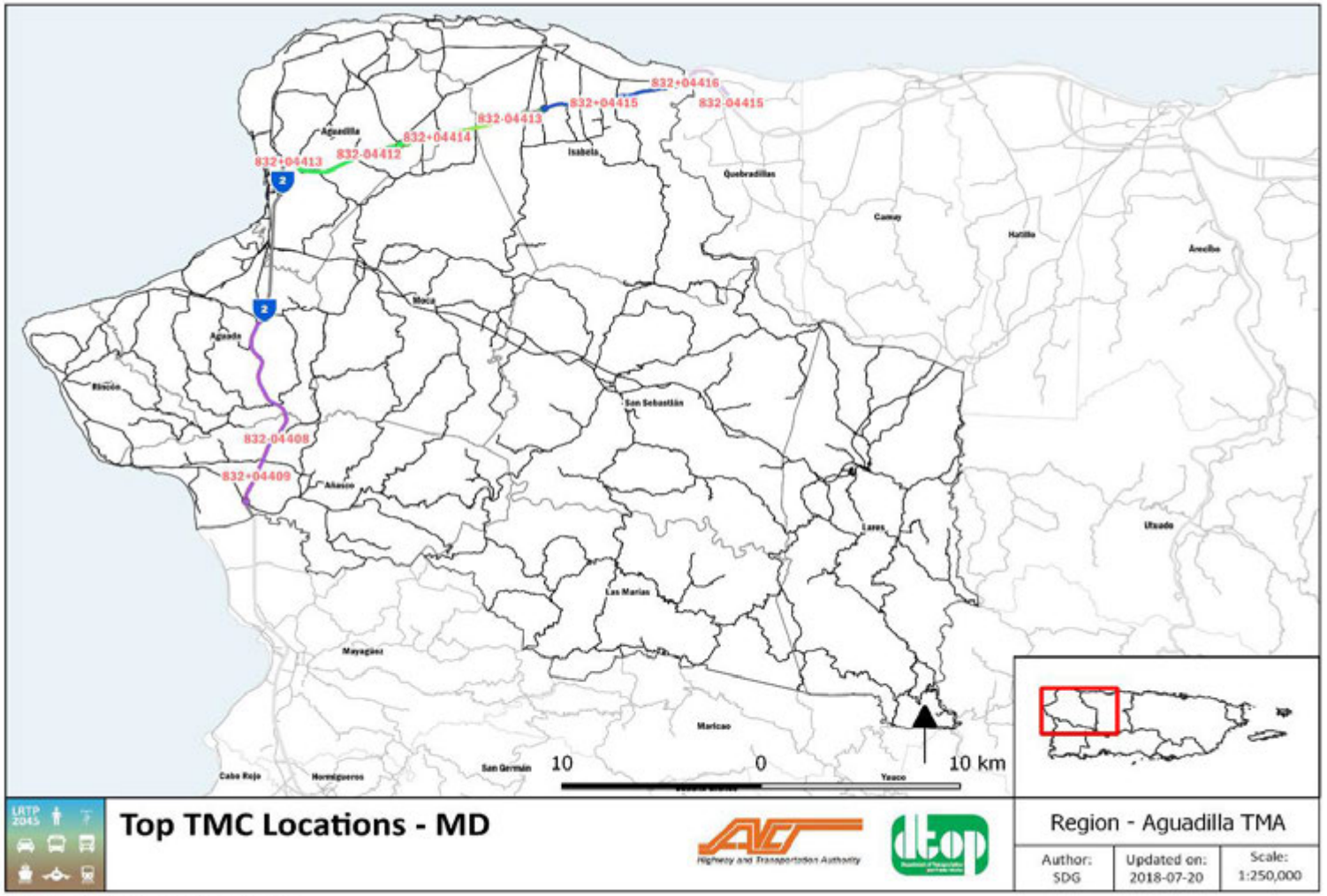
Mid-Day Period (MD)

Segments added on average a delay of 2.7 minutes to the reference travel time for the mid-day period (MD), during the months of September through January 2017.

The average delay of segments increased to 3.7 minutes from February 2017 to April 2018. TMC 832-04408, with South direction, ranked the highest during this period, with a 7.0 minutes delay, 3.3 minutes above average. This segment has a similar historic pattern to the NT period, and dissimilar to the AM period which shows a decrease on its average delay from February 2017 onward.

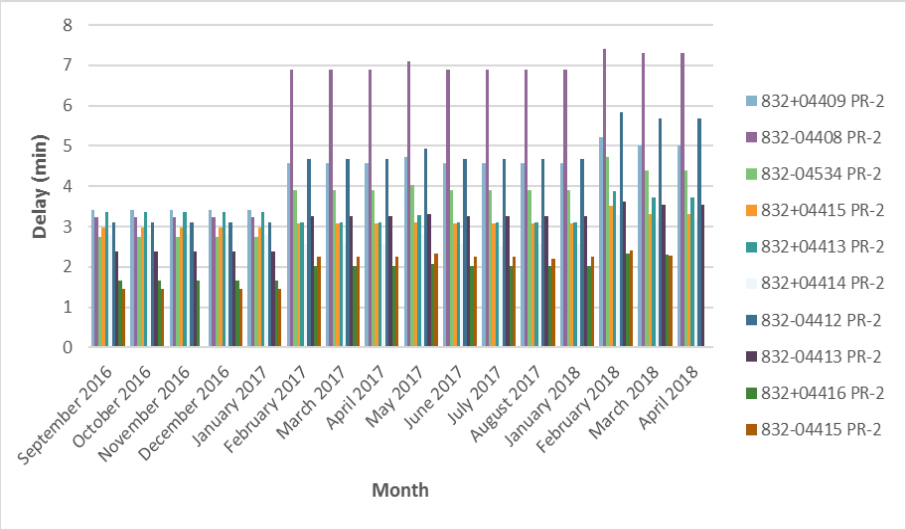
TMC 823-04412, with West direction (San Rafael Street from intersection of PR-110 to PR-107 with PR-2 around Cabán neighborhood in Aguadilla) is the next in ranking, with an average delay of 5.0 minutes. During the MD period, this TMC doubles its average delay in comparison to its NT and AM period averages. See Figure K.109 and Figure K.110 below.

Figure K.109: Aguadilla TMA Location, MD Period



Source: SDG, based on NPMRDS Analytics

Figure K.110: Average Delays, Aguadilla TMA, MD Period

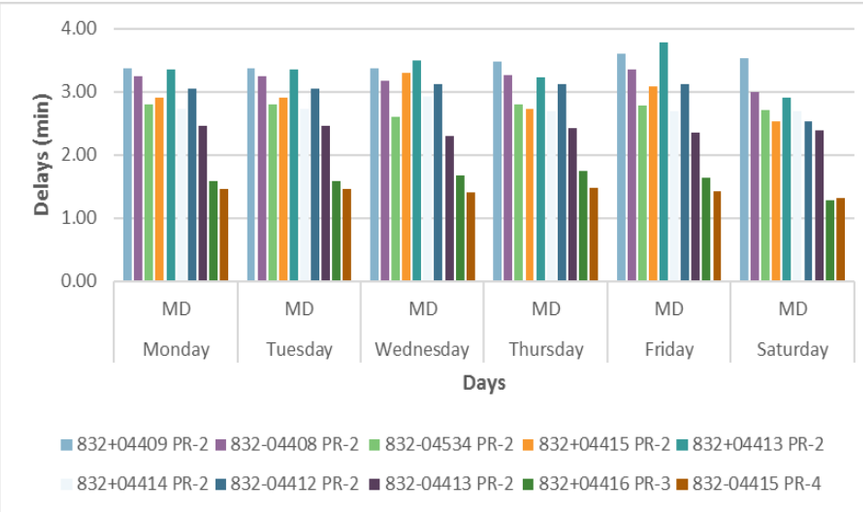


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD) – Weekly

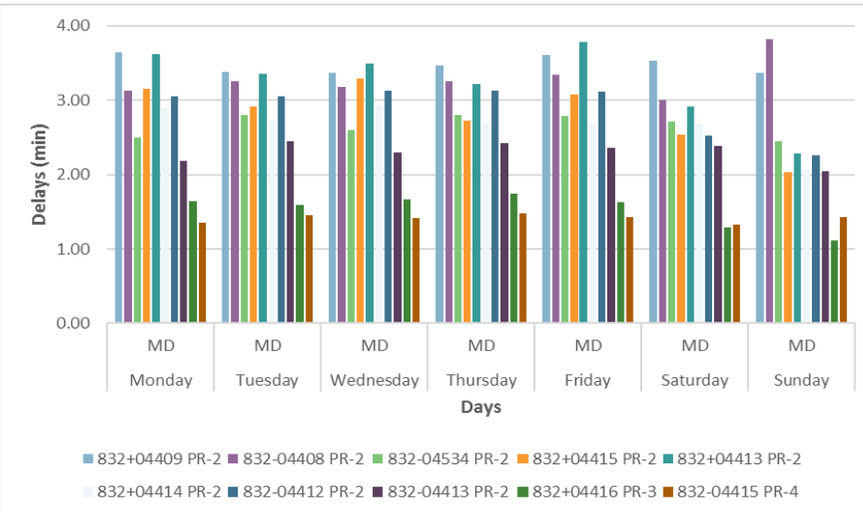
For the last four months of 2016, the average delay for segments was 2.6 minutes. The highest delays were recorded by segments 832+04413, 832+04409, 832-04408, 832-04534, 832-04412, 832+04415, and 832+04414 with delays ranging from 2.5-3.5 minutes (Figure K.111 to Figure K.114).

Figure K.111: September 2016, TMC, Aguadilla TMA, (MD)



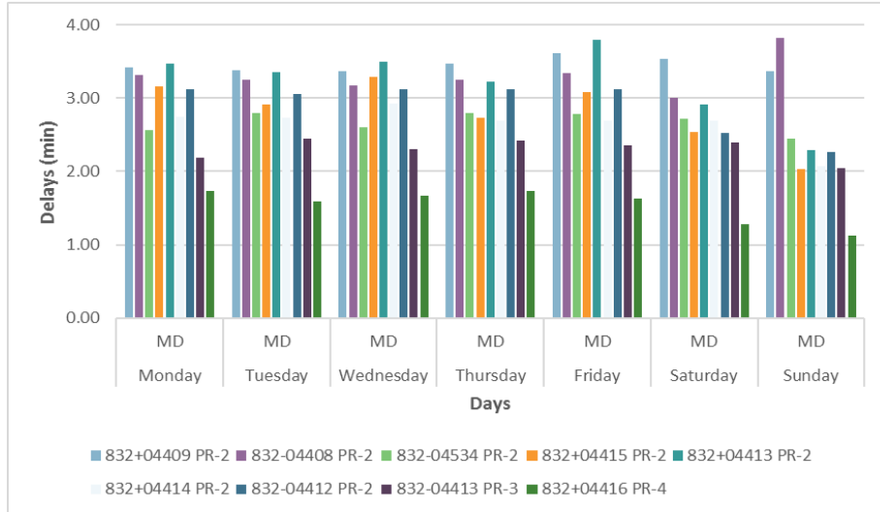
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.112: October 2016, TMC, Aguadilla TMA, (MD)



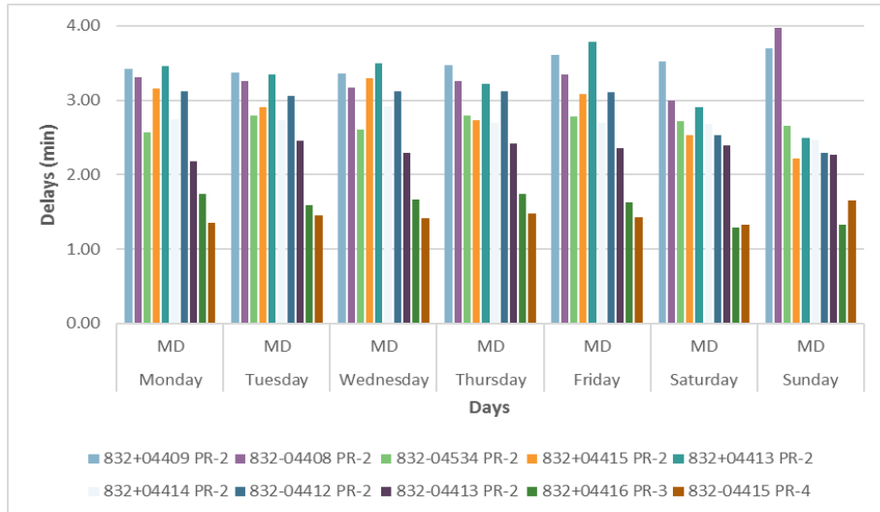
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.113: November 2016, TMC, Aguadilla TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.114: December 2016, TMC, Aguadilla TMA, (MD)

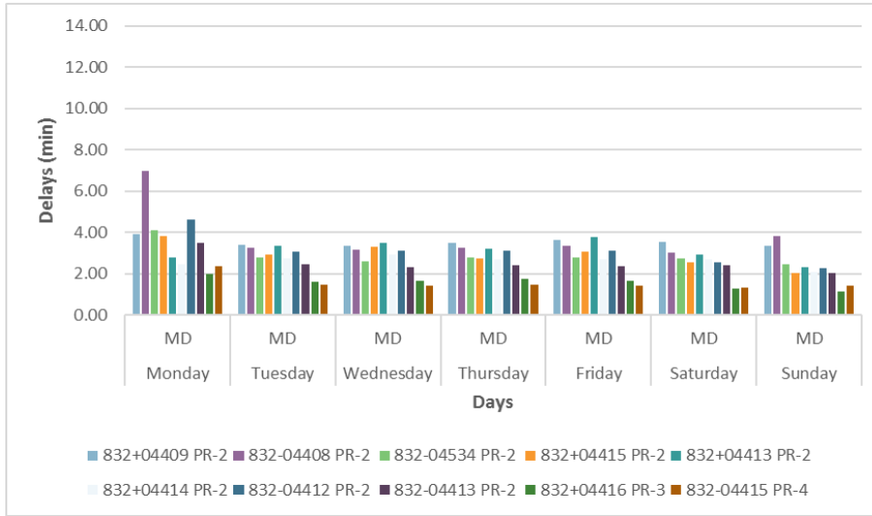


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, segments had an average delay of 3.4 minutes, with highest delays on segments 832+04408, with an average delay of 7.0 minutes from February to April 2017.

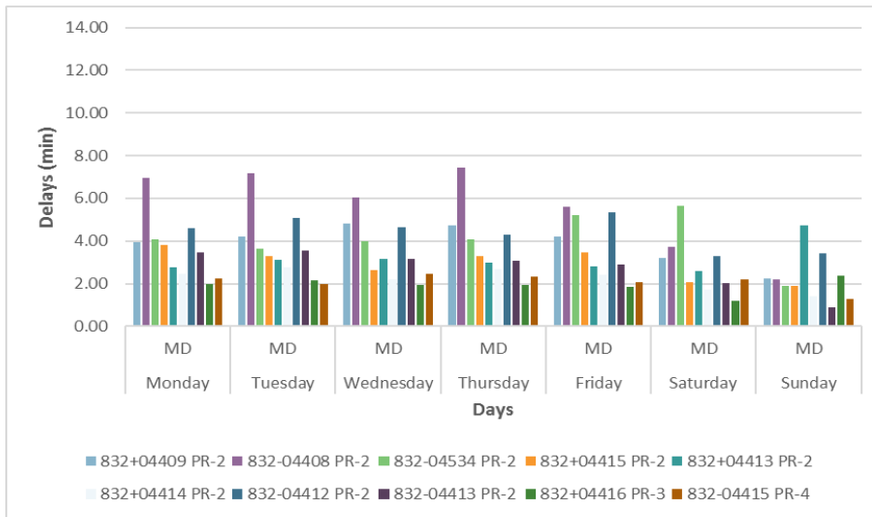
Other segments with delays above average were 832-04412, with delays ranging from 4.0-5.0 minutes for working days, and 832-04409, with an average of 4.0 minutes during working days (Figure K.115 to Figure K.118).

Figure K.115: January 2017, TMC, Aguadilla TMA, (MD)



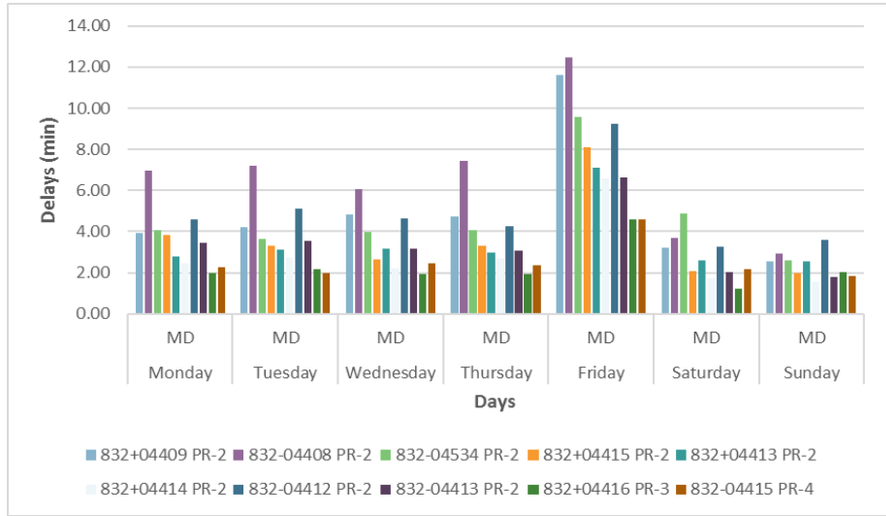
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.116: February 2017, TMC, Aguadilla TMA, (MD)



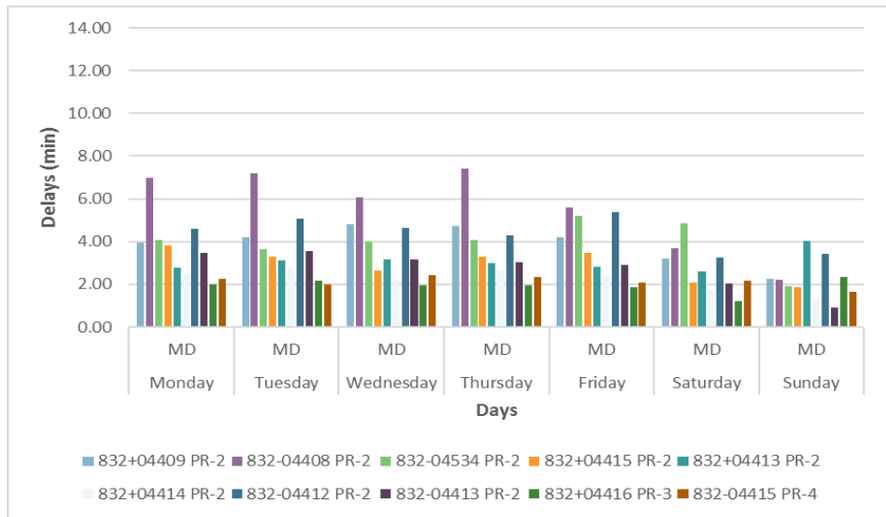
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.117: March 2017, TMC, Aguadilla TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.118: April 2017, TMC, Aguadilla TMA, (MD)

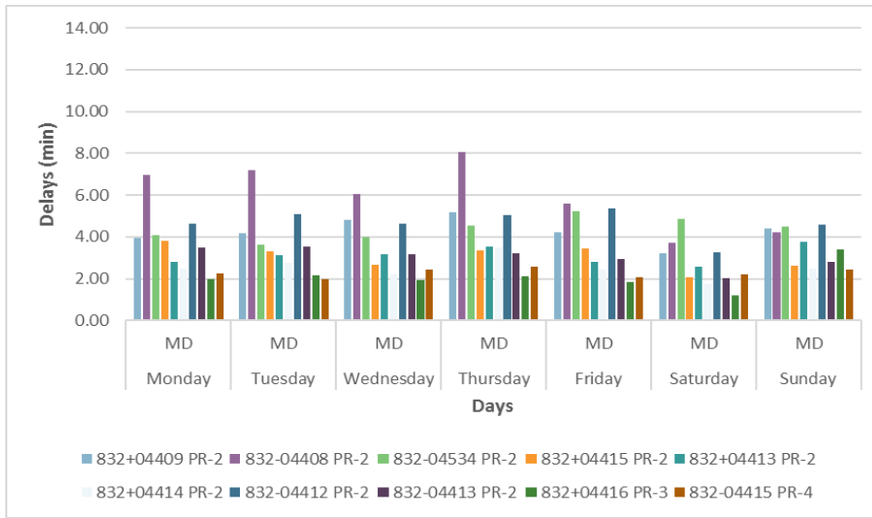


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was of 3.4 minutes. The segment with highest delays was 832-04408 with an average delay ranging between 6.0-7.-0 minutes, mostly during working days from Monday to Friday, decreasing during weekends.

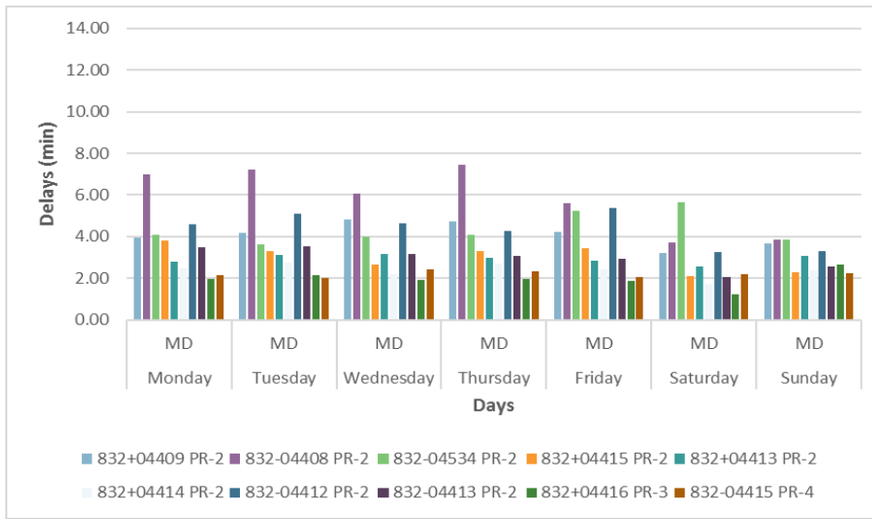
Other segments with delays above average were 832+04409, 832-04534, and 832-04412 with average delays of about 4.0 minutes (Figure K.119 to Figure K.122).

Figure K.119: May 2017, TMC, Aguadilla TMA, (MD)



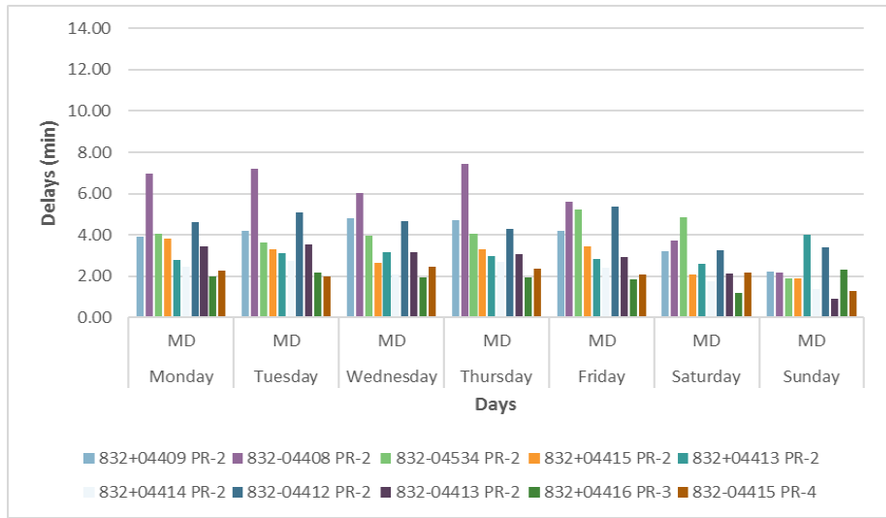
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.120: June 2017, TMC, Aguadilla TMA, (MD)



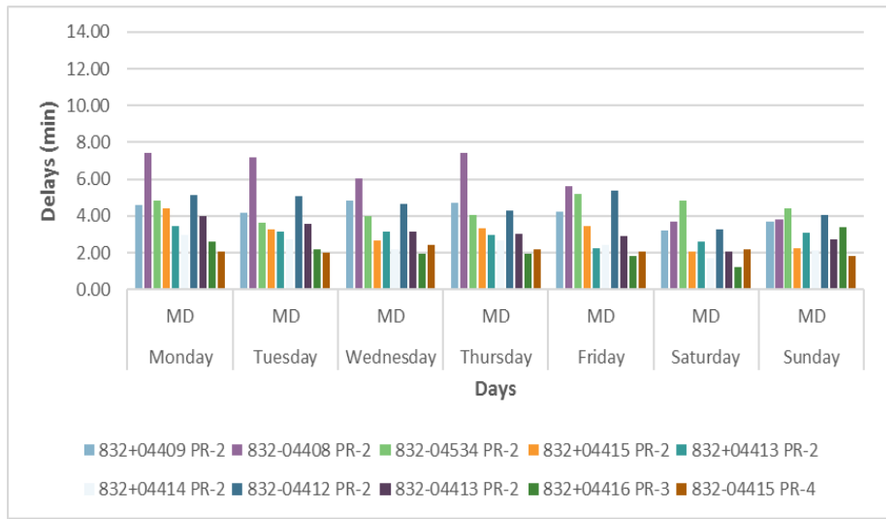
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.121: July 2017, TMC, Aguadilla TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.122: August 2017, TMC, Aguadilla TMA, (MD)

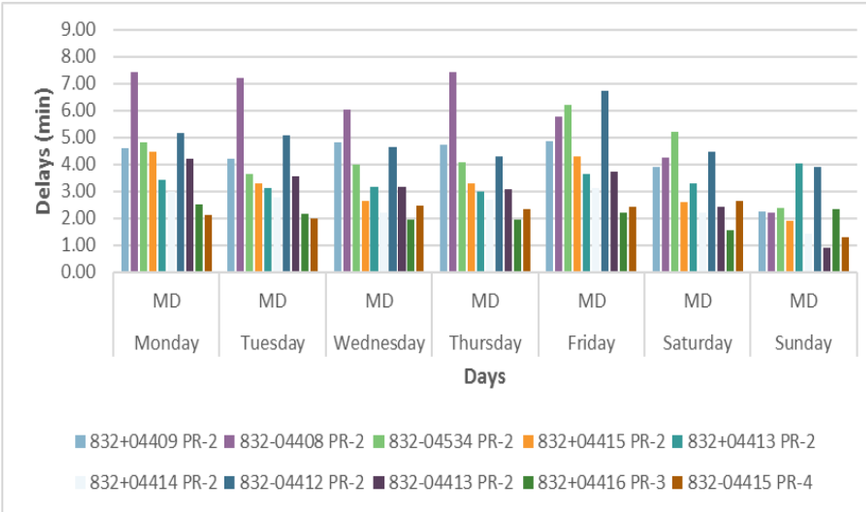


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months between January and April 2018, average delay of segments was of 3.8 minutes. The segment with highest delays was 832-04408 with an average delay ranging between 6.0-7.-0 minutes, mostly during working days from Monday to Friday, decreasing during weekends.

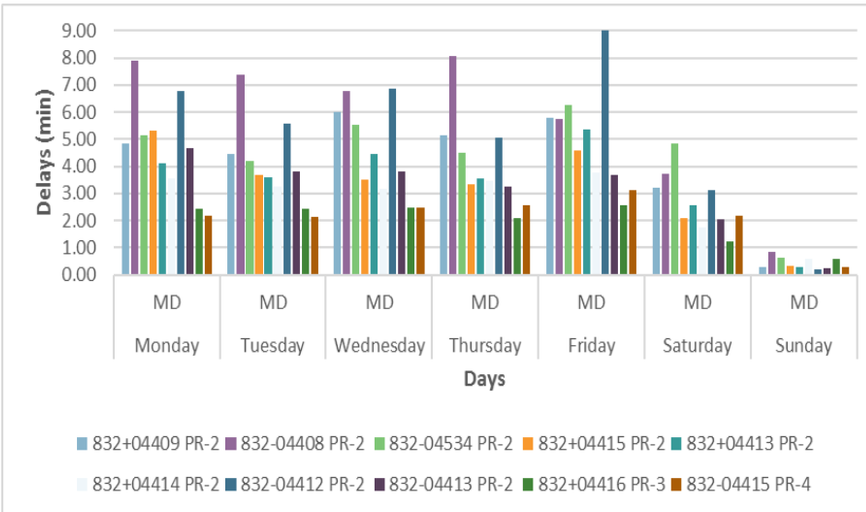
Other segments with delays above average were, segment 832-04412 had an average of 5.6 minutes during working days, and 832-04534 with an average of 4.5 minutes (Figure K.123 to Figure K.126).

Figure K.123: January 2018, TMC, Aguadilla TMA, (MD)



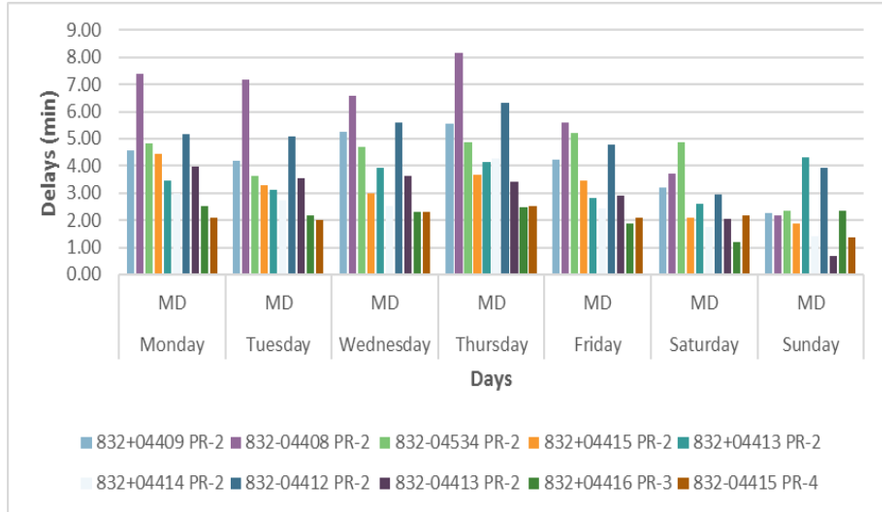
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.124: February 2018, TMC, Aguadilla TMA, (MD)



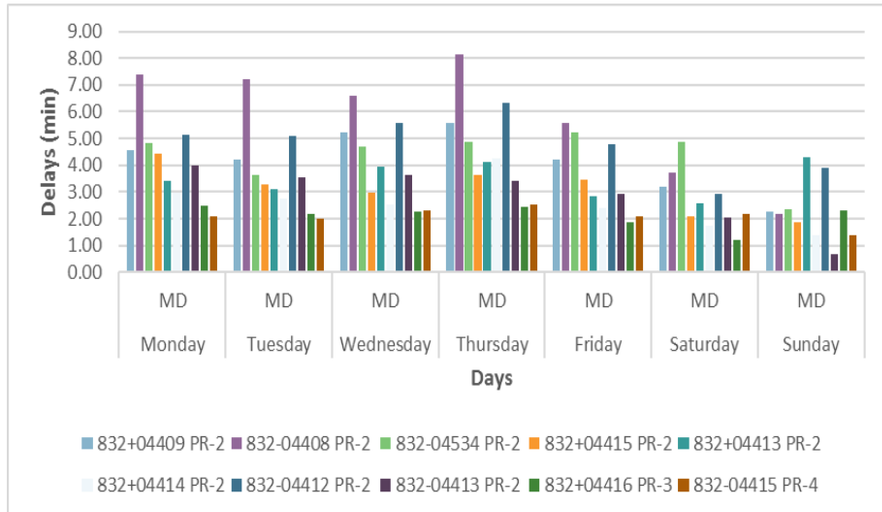
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.125: March 2018, TMC, Aguadilla TMA, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.126: April 2018, TMC, Aguadilla TMA, (MD)



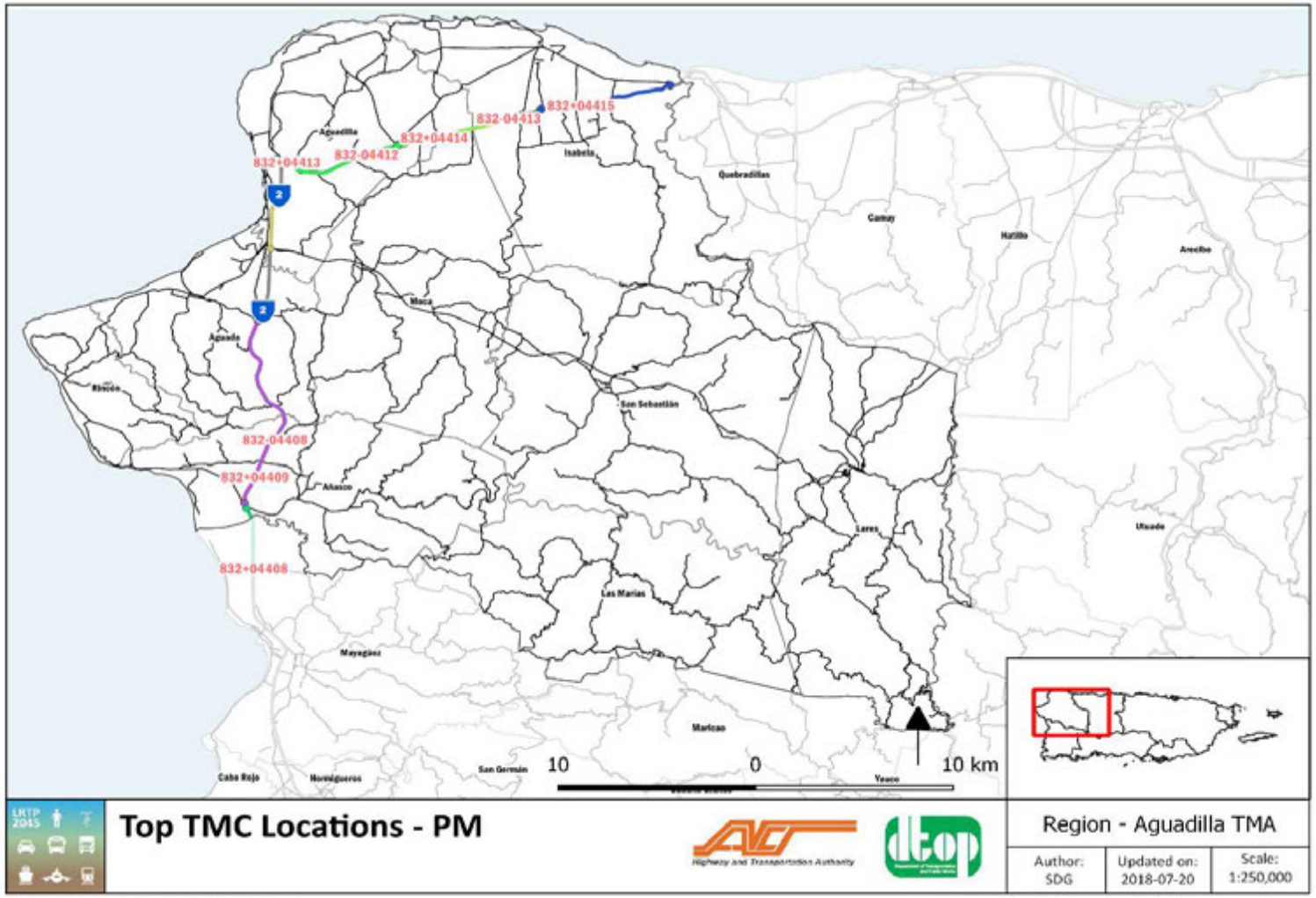
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM)

Similar to NT and MD patterns, segments had a lower average delay than months after February 2017 for the past-midday period (PM), specifically during the months of September through January 2017. Segments added on average a delay of 2.6 minutes to the reference travel time in the last months of 2016 and January 2017. From February 2017 to April 2018, the average delay increased to 4.8 minutes

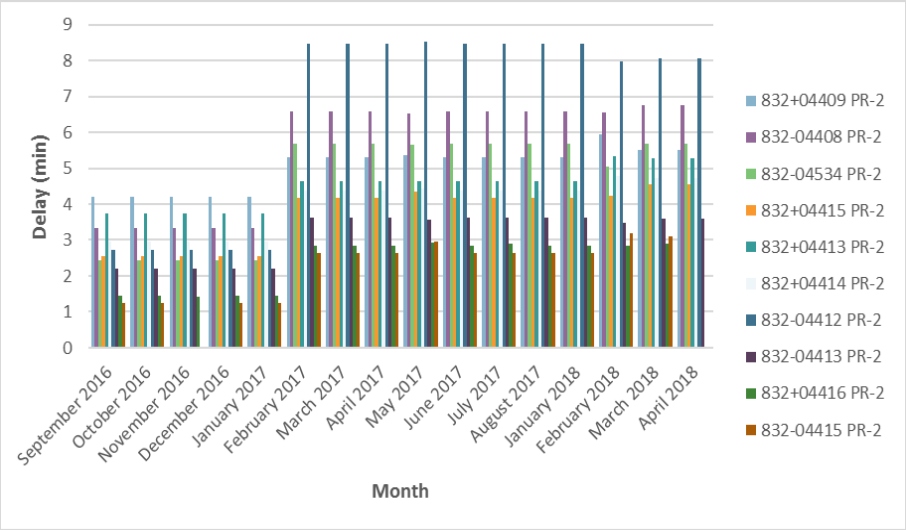
TMC 823-04412 and 832-04408 ranked highest among the top 10 segments. TMC 823-04412, with West direction, increased its average delay from 2.7 to 8.4 minutes. TMC 832-04408, with South direction, doubled its average delay from 3.3 to 6.6 minutes. See Figure K.127 and Figure K.128 below.

Figure K.127: Aguadilla TMA Location, PM Period



Source: SDG, based on NPMRDS Analytics

Figure K.128: Average Delays, Aguadilla TMA, PM Period

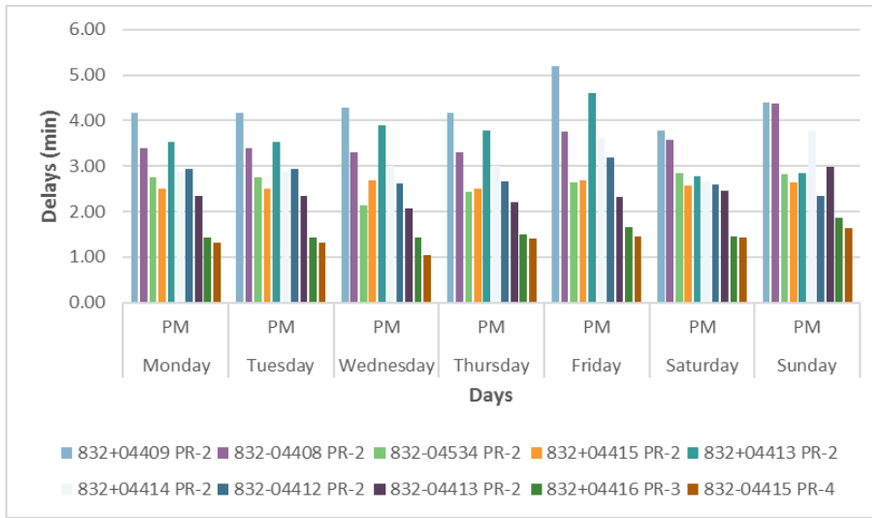


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM) - Weekly

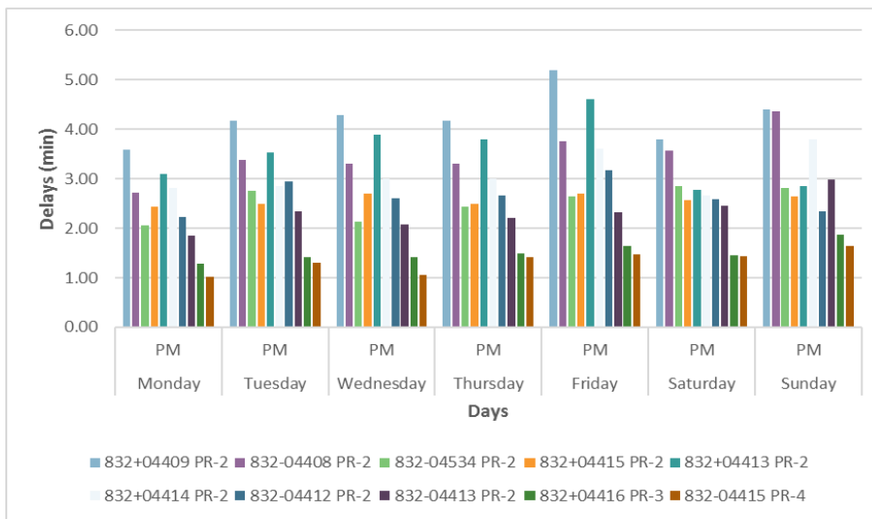
For the last four months of 2016, average delays of segments for the afternoon period was 2.8 minutes. Segments with delays above average were 832+04409, 832+04413, and 83-04408 with average delays ranging between 3.0-5.0 minutes. Friday and Sunday had the highest delays for segments (Figure K.129 to Figure K.132).

Figure K.129: September 2016, TMC, Aguadilla TMA, (PM)



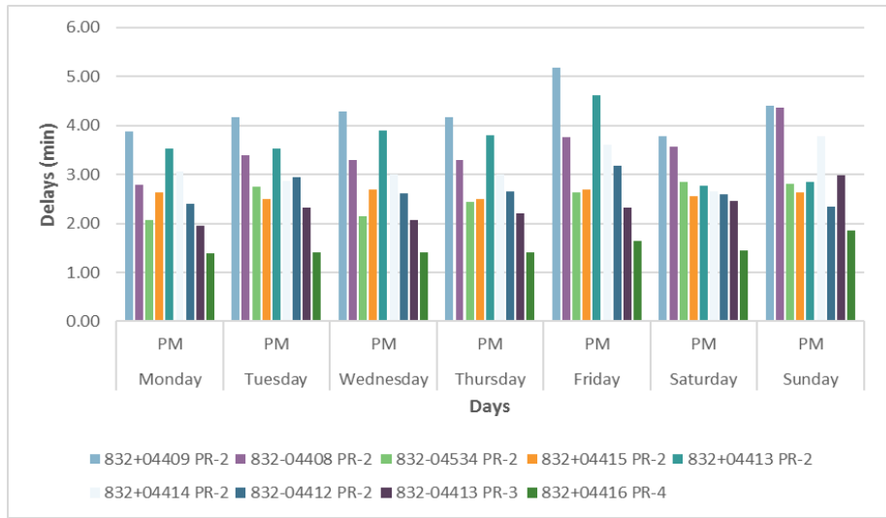
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.130: October 2016, TMC, Aguadilla TMA, (PM)



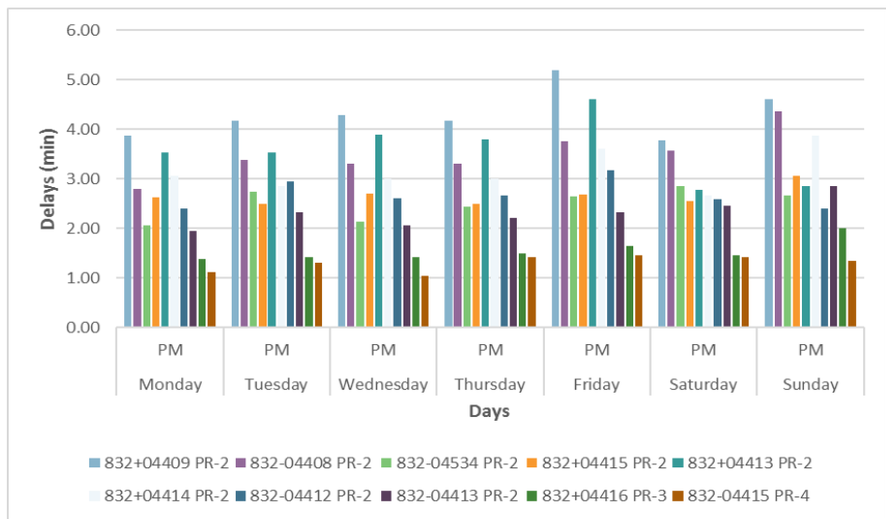
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.131: November 2016, TMC, Aguadilla TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.132: December 2016, TMC, Aguadilla TMA, (PM)

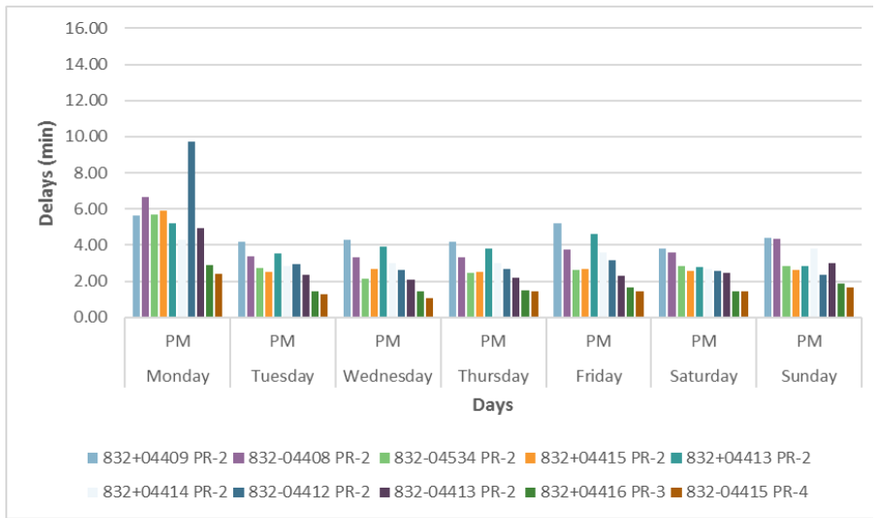


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, average delay for segments was 4.8 minutes, except for January 2017 with an average of 2.7 minutes. The highest delays occurred on Friday, and the segment with the highest delay was 832-04412 with delays ranging between 8.0-12.0 minutes.

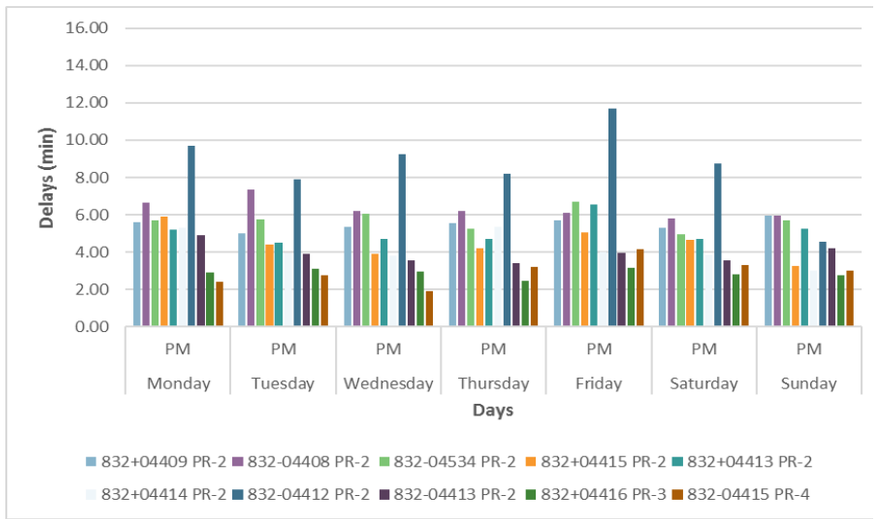
Other segments with delays above average were 832-04408, 832+04409, 832+04413, and 832-04534 with average delays ranging from 4.0-6.0 minutes (Figure K.133 to Figure K.136).

Figure K.133: January 2017, TMC, Aguadilla TMA, (PM)



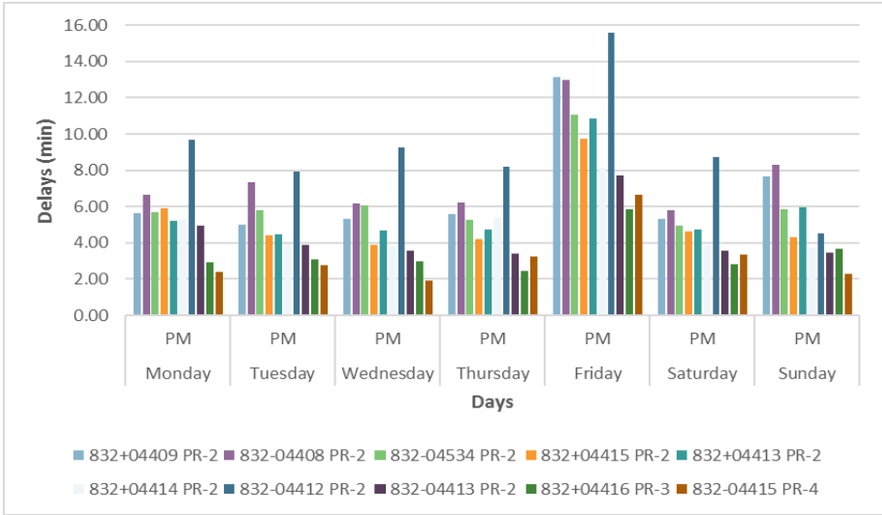
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.134: February 2017, TMC, Aguadilla TMA, (PM)



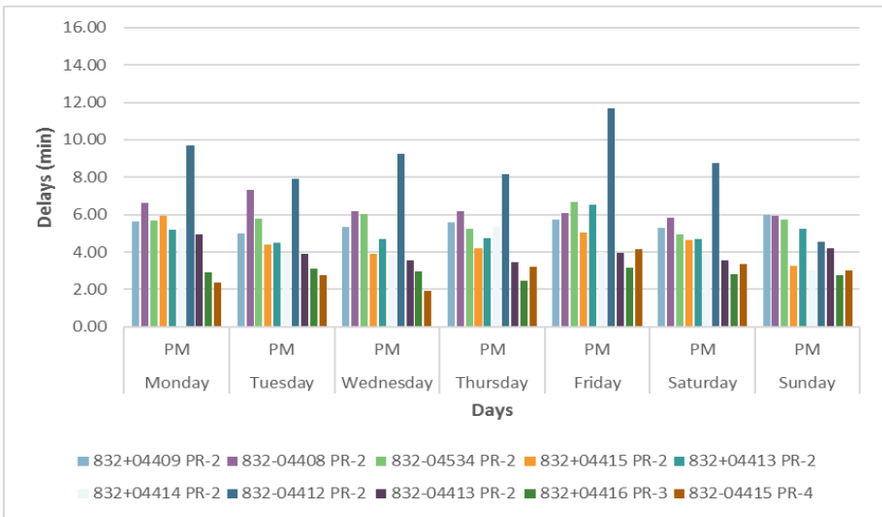
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.135: March 2017, TMC, Aguadilla TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.136: April 2017, TMC, Aguadilla TMA, (PM)

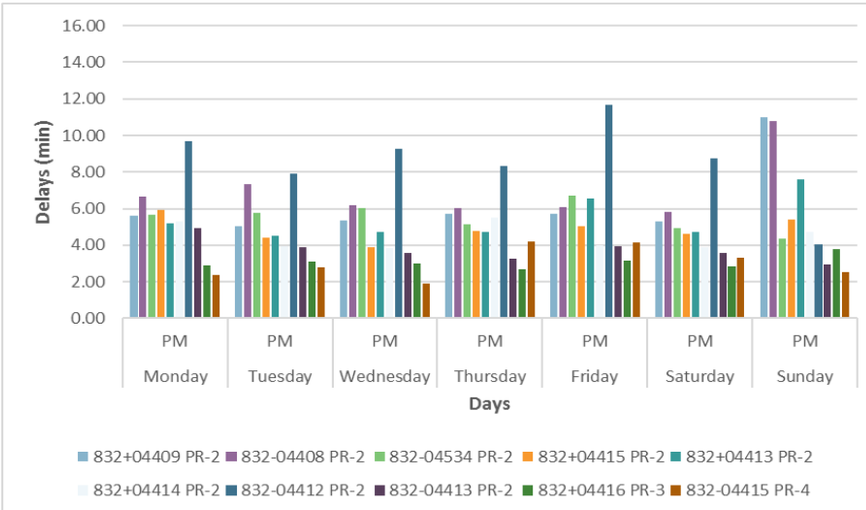


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was of 4.8 minutes. The highest delays occurred on Friday, and the segment with the highest delay was 832-04412 with delays ranging between 8.0-12.0 minutes.

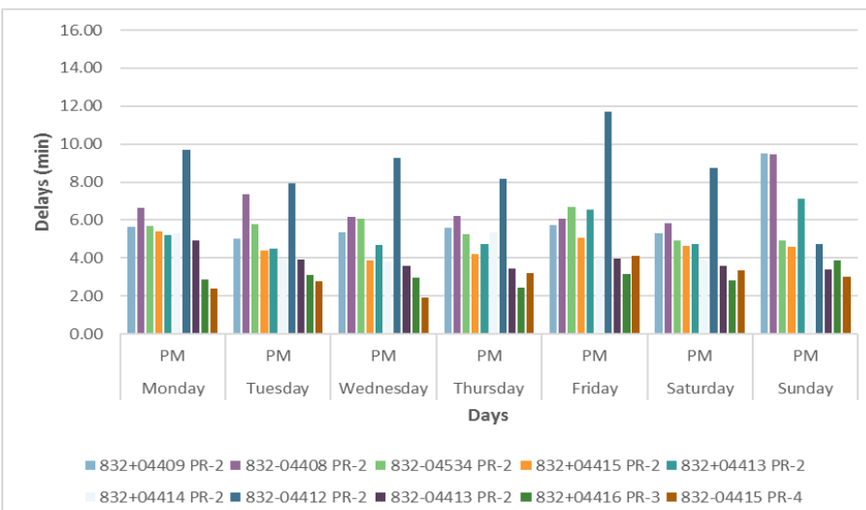
Other segments with delays above average were 832-04408, 832+04409, 832+04413, and 832-04534 with average delays ranging from 4.0-6.0 minutes (Figure K.137 to Figure K.140).

Figure K.137: May 2017, TMC, Aguadilla TMA, (PM)



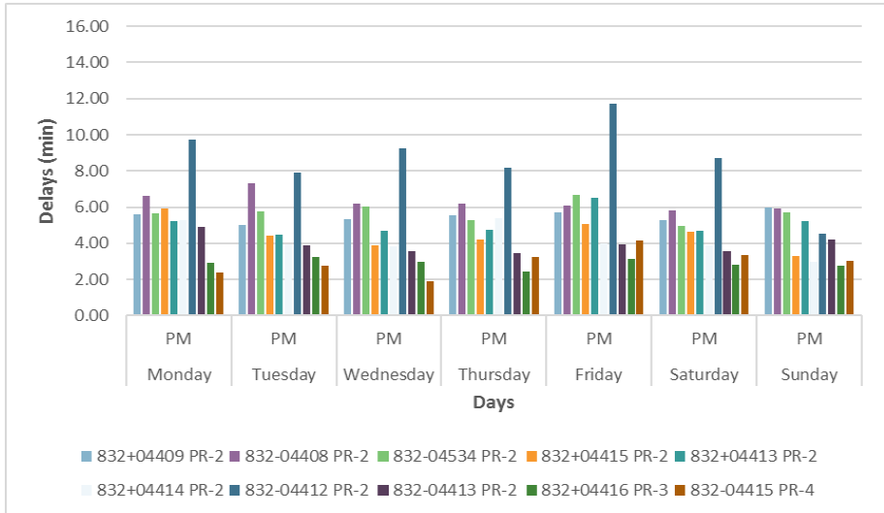
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.138: June 2017, TMC, Aguadilla TMA, (PM)



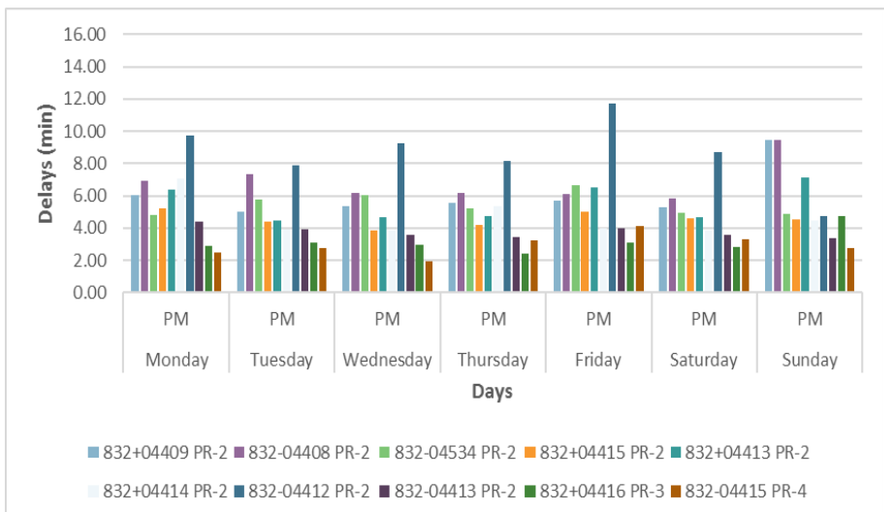
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.139: July 2017, TMC, Aguadilla TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.140: August 2017, TMC, Aguadilla TMA, (PM)

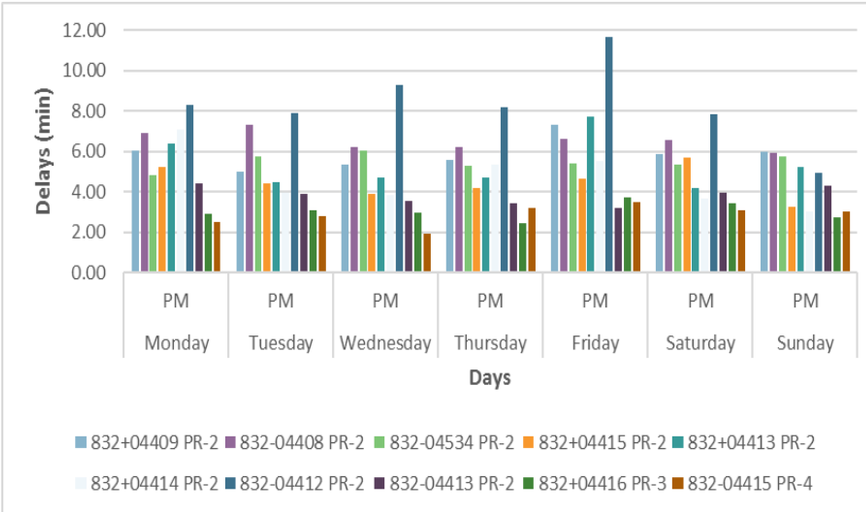


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months between January and April 2018, the average delay throughout the week was of 5.0 minutes. The highest delays occurred on Friday, and the segment with the highest delay was 832-04412 with delays ranging between 8.0-12.0 minutes during working days.

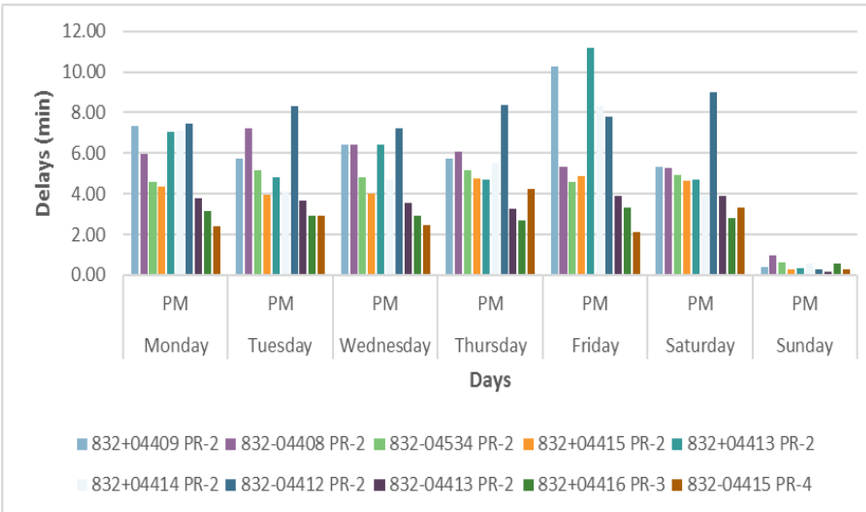
Other segments with delays above average were 832-04408, 832+04409, 832+04413, and 832-04534 with average delays ranging from 4.0-6.0 minutes (Figure K.141 to Figure K.144).

Figure K.141: January 2018, TMC, Aguadilla TMA, (PM)



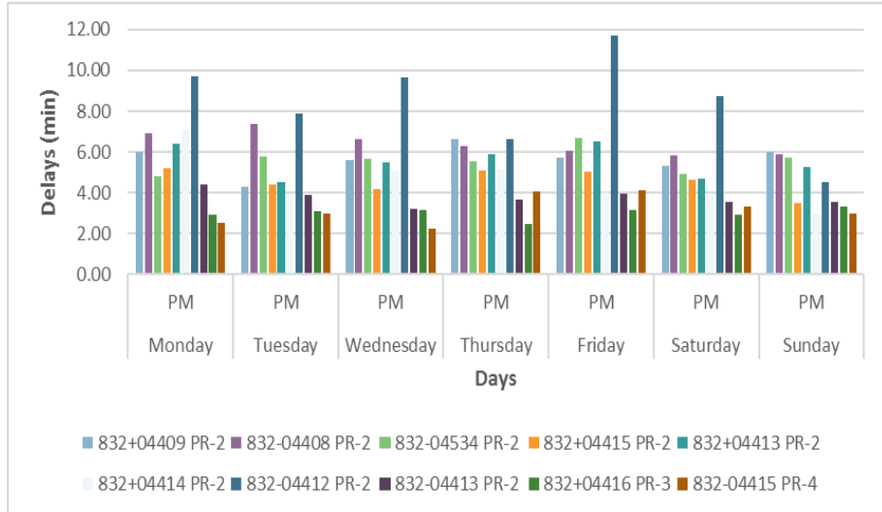
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.142: February 2018, TMC, Aguadilla TMA, (PM)



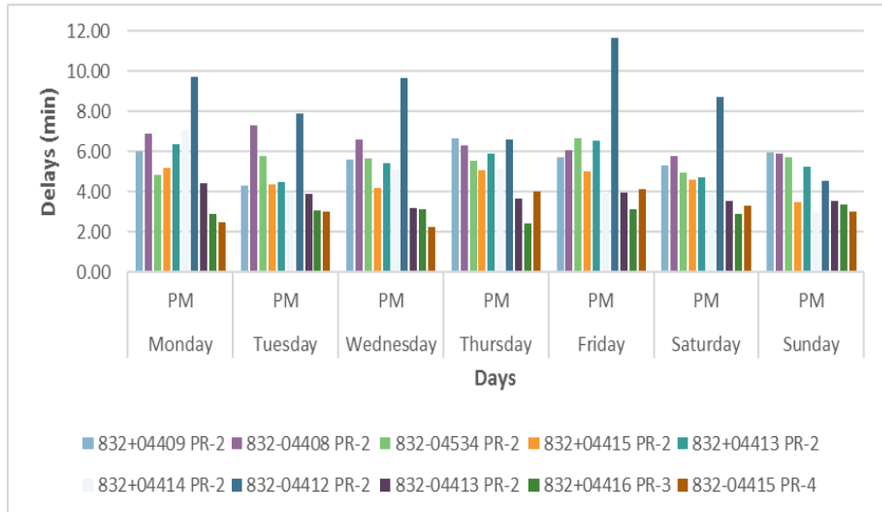
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.143: March 2018, TMC, Aguadilla TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.144: April 2018, TMC, Aguadilla TMA, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Results for Aguadilla TMA bottlenecks

For Aguadilla, all TMC segments studied were located along PR-2. The top 10 TMC segments with the worst delays recorded values between 1.0-9.0 minutes on average per month. The past-midday period had the highest delay on average throughout the period of study with 4.6 minutes, in comparison to mid-day period with 3.8 minutes, night period with 3.2 minutes, and morning period with 2.0 minutes on average.

- For the morning period, segments with the worst delay were: 832-04534 with 3.2 minutes in Isabela county between intersection PR-2 with 474 and Cara del Indio site; segment 832-04408 with 2.8 minutes delay along PR-2 from Luyando community in Aguada and intersection with 109 in Añasco. Other segments with delays between 1.5 to 2.0 minutes were 832+04413, 832-04413, 832-04412 in PR-2 section between Aguadilla and Isabela, from Cabán to Isabela communities.
- For the mid-day period, segments with the worst delay were: 832-04408 with values ranging between 6.0-7.0 minutes in PR-2 section between Aguada and Añasco southbound; 832-+04409 and 832-04412 with 4.3 minutes delay on average, the first located in PR-2 section between Aguada and Añasco northbound, and second along PR-2 westbound between Cabán and intersection with 110 from Arenales. Other segments with delays ranging between 3.0-3.6 minutes were 832-04534, 832+04413, and 832+04415 located along PR-2 section between Aguadilla and Isabela counties.
- For the past-midday period, segments with the worst delays were: 832-04412 with 6.6 minutes on average, along PR-2 westbound between Cabán and intersection with 110; 832-04408 and 832+04409 with delays between 5.0-6.0 minutes, located between Aguada and Añasco both north and southbound. Other segments with high delays, between 4.0 and 4.6 minutes, were 832-04534, 832+04413, 832+04414 between Cabán and intersection with 110.
- For the night period, segments with the worst delays were: 832+04409 with 5.0-6.0 minutes delay, 832+04413 with 4.5 minutes delay on average, and other segments with delays between 3.0-3.8 minutes such as 832-04408, 832-04534, 832-04412, and 832+04414.

Thus, overall, segments with highest recurrence of delays throughout periods of the day were 832+04409, 832-04408, and 832-04412, located in areas between Aguada and Añasco, and Aguadilla from Cabán to intersection with 110.

NORTH

In the North, the data used in the preparation of the graphs are from the roads PR-2 and PR-10.

Table K.9 to Table K.11 shows roads, months and years selected and the studied periods.

Table K.9: Roads

TCM	Road name
832+04417	PR-2
832+04425	PR-2

832-04424	PR-2
832-04416	PR-2
832-04420	PR-2
832+04421	PR-2
832-04450	PR-10
832-04423	PR-2
832+04424	PR-2
832+04451	PR-10

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.10: Months and Years Selected

2016	2017	2018
September	January	January
October	February	February
November	March	March
December	April	April
	May	
	June	
	July	
	August	

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.11: Studied Periods

Night Period (NT)	Morning Period (AM)
Midday Period (MD)	Past-midday Period (PM)

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Bottleneck Analysis

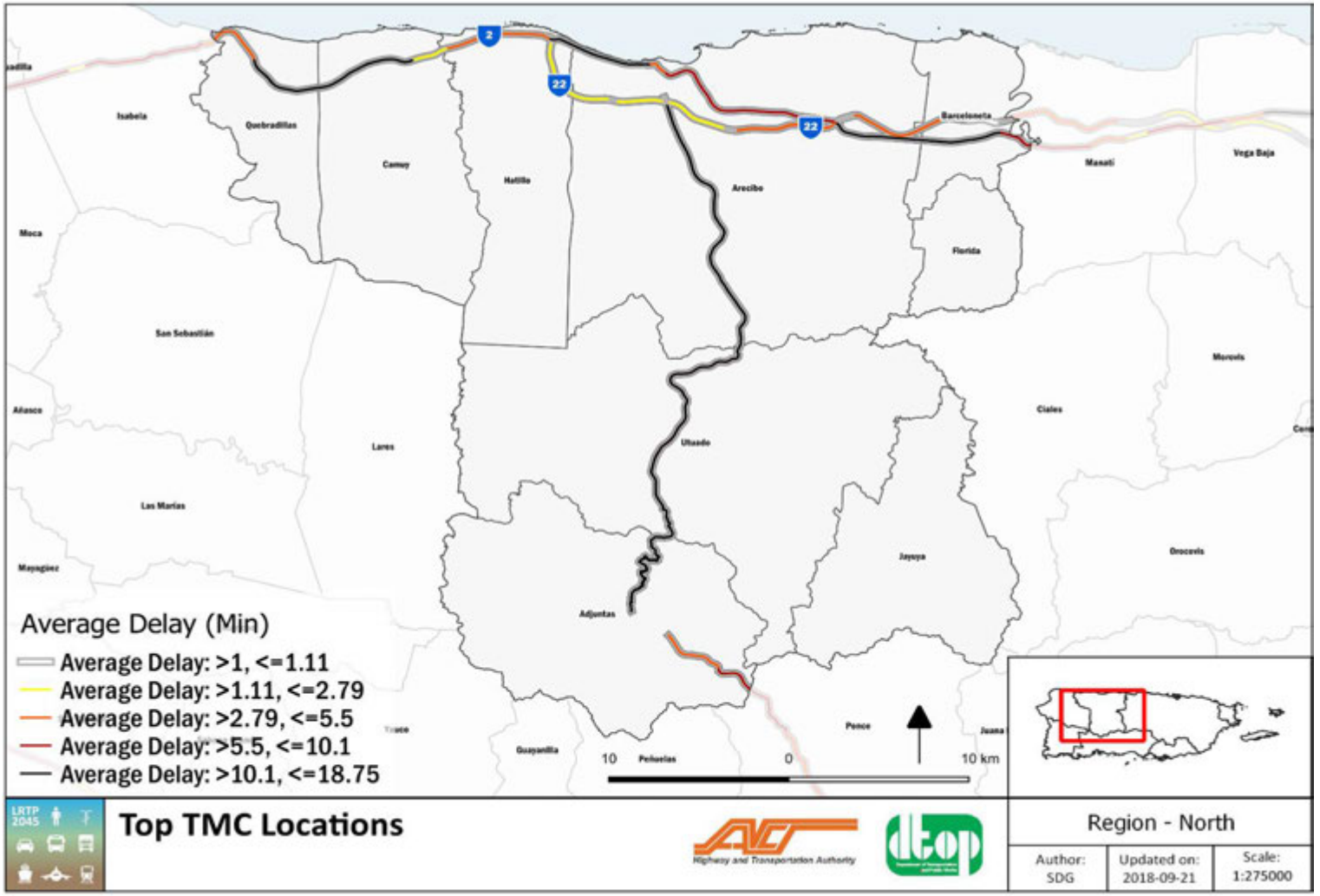
Night Period (NT) – Monthly

Segments average delay was 5.4 minutes added to the reference travel time for the night period (NT), from 18:00-7:00.

The average delay of segments from September 2016 to January 2017 was 4.0 minutes. From February to August 2017, average delay of segments increased to 6.7 minutes.

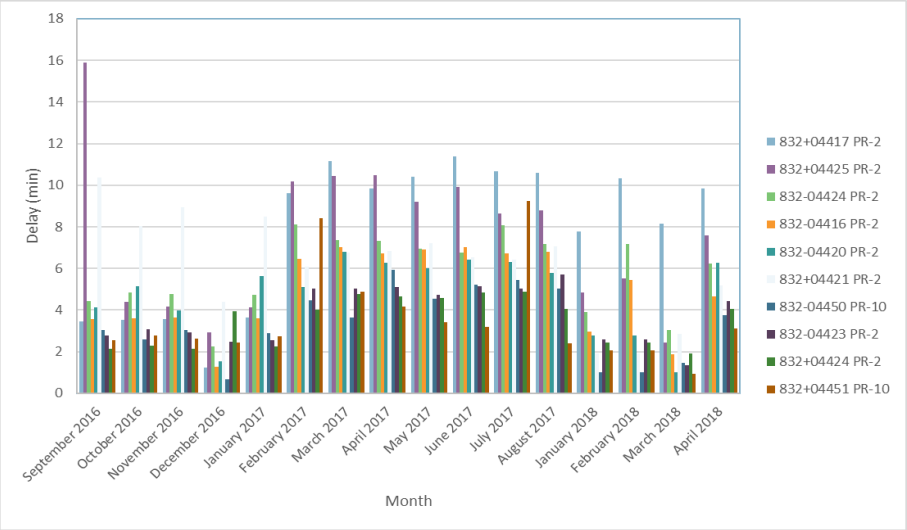
The highest ranking TMCs from February through August 2017 were 832+04417, with an average delay of 10.5 minutes and 832+04425, with an average delay of 9.6 minutes, as seen in Figure K.145 and Figure K.146 below.

Figure K.145: North Location



Source: SDG, based on NPMRDS Analytics

Figure K.146: Average Delays, North TPR, NT Period

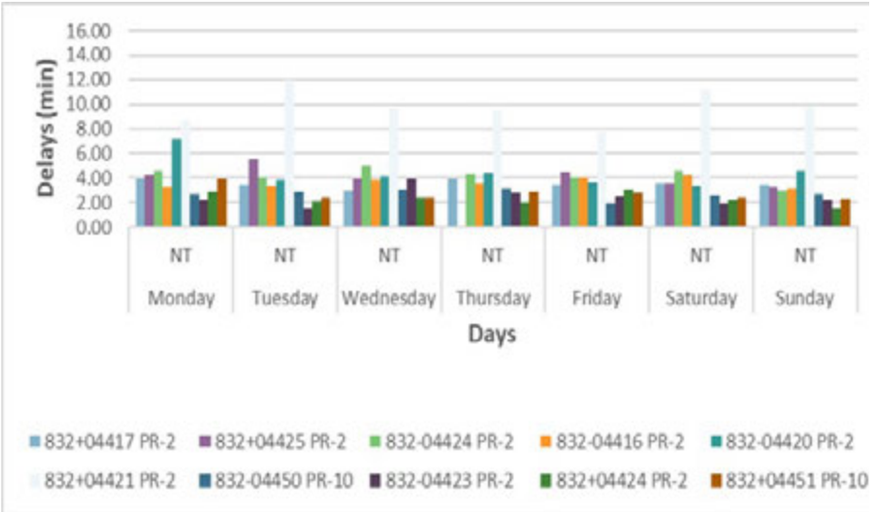


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Night Period (NT) – Weekly

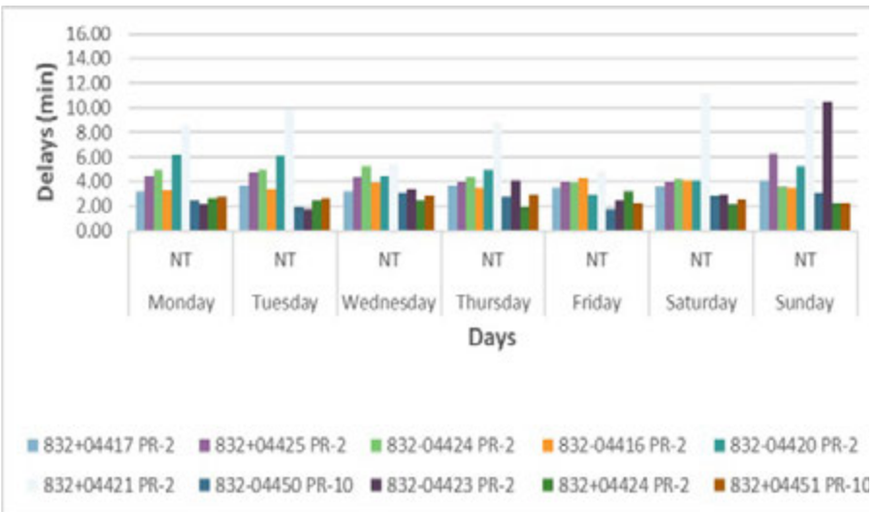
For the night period in the North Region, average delay of segments was below 6.0 minutes from September to December 2016. The segments with delays above average were 832+04421 in PR-2 with 12.0 minutes, 832-04423 in PR-2 with delays of 16.0 minutes (Figure K.147 to Figure K.150).

Figure K.147: September 2016, TMC, North Region, (NT)



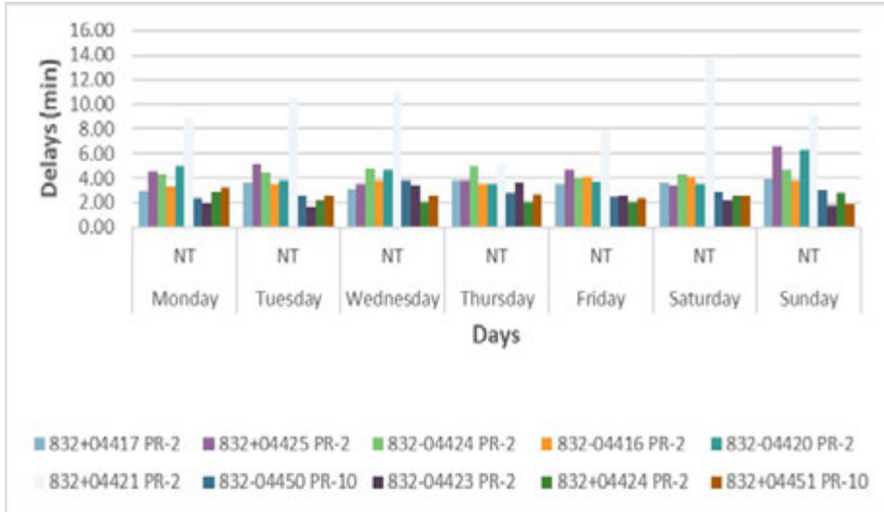
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.148: October 2016, TMC, North Region, (NT)



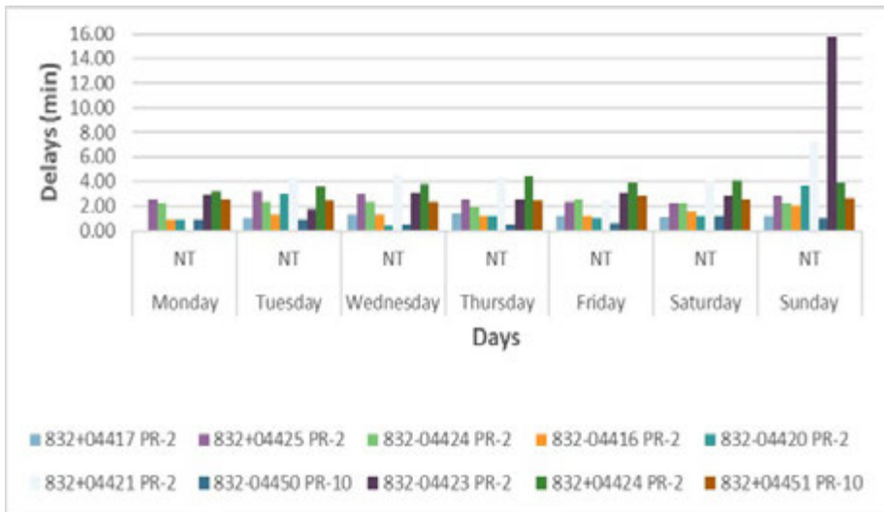
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.149: November 2016, TMC, North Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.150: December 2016, TMC, North Region, (NT)



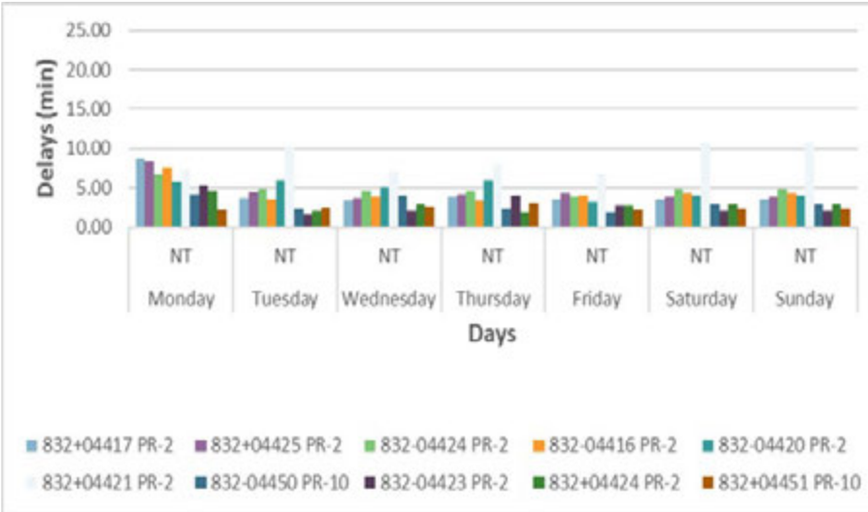
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, the average delay for segments was of 6.0 minutes, double the average for the previous year during the night period.

The days with higher average delays were from Tuesday to Saturday, having Sundays and Mondays with the lowest average delays for segments.

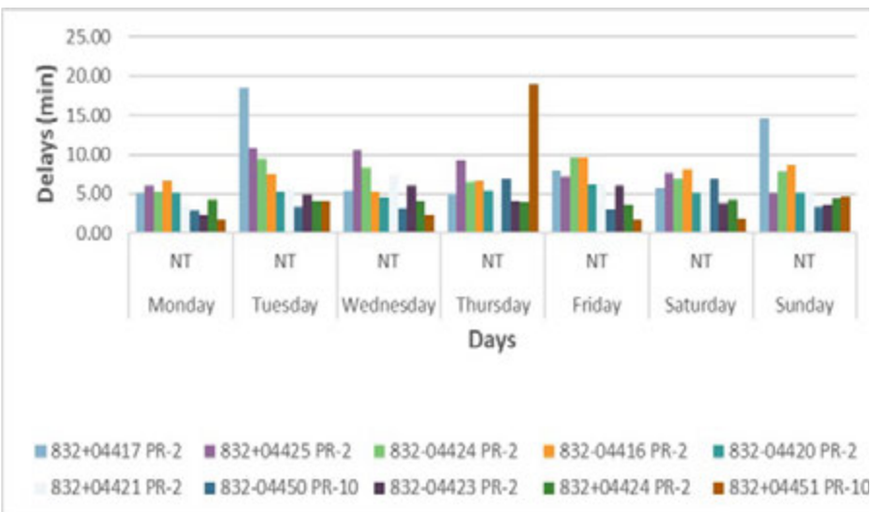
Segments with delays above average were: 832+04421 with an average delay of 8.6 minutes for January 2017; 832+04417 with peaks on delay on Tuesday and Sunday with delays ranging from 10.0 – 20.0 minutes throughout February and April 2017; 832+04425 with peaks from Tuesday through Thursday with an average delay of 9.8 minutes throughout February to April. 2017 (Figure K.151 to Figure K.154).

Figure K.151: January 2017, TMC, North Region, (NT)



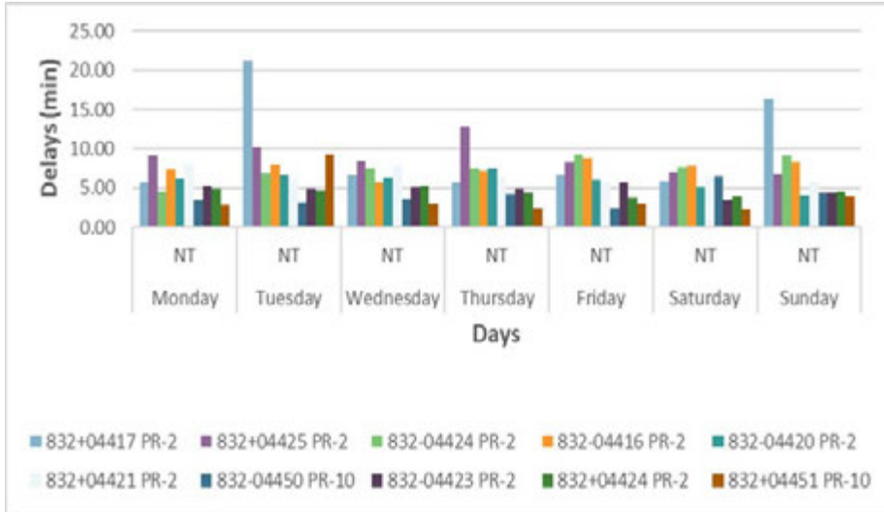
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.152: February 2017, TMC, North Region, (NT)



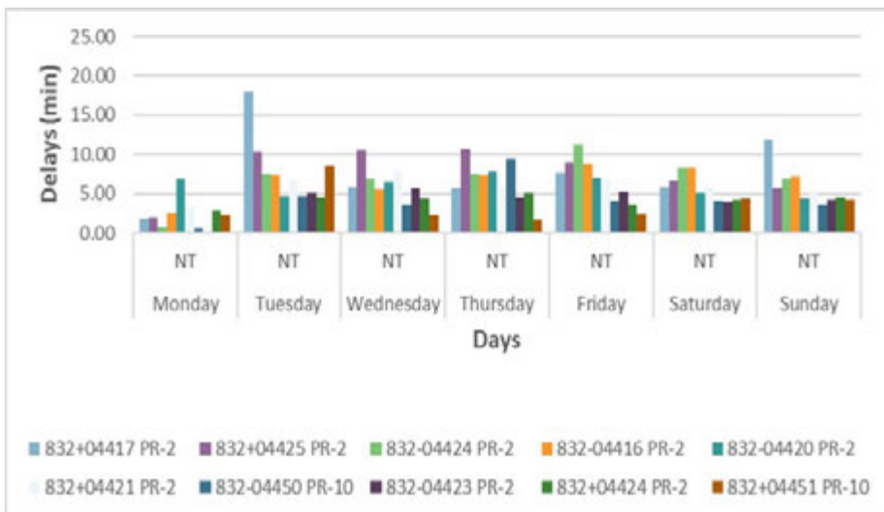
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.153: March 2017, TMC, North Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

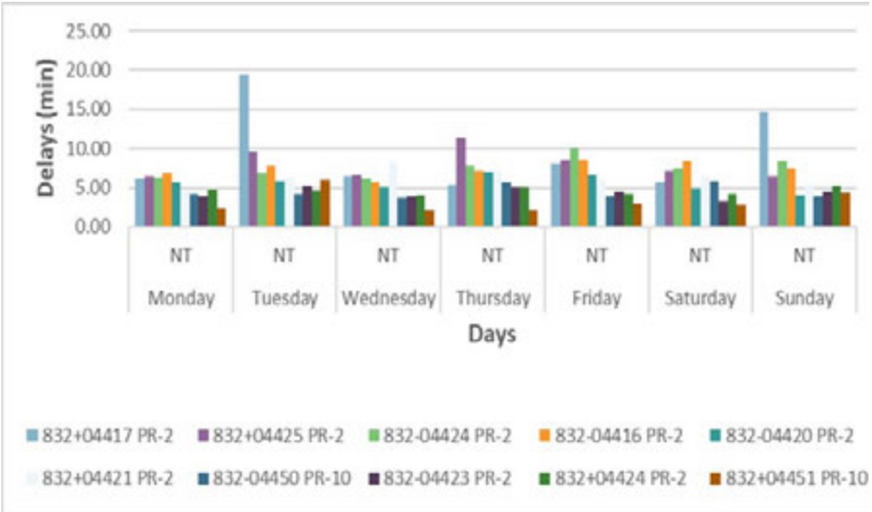
Figure K.154: April 2017, TMC, North Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

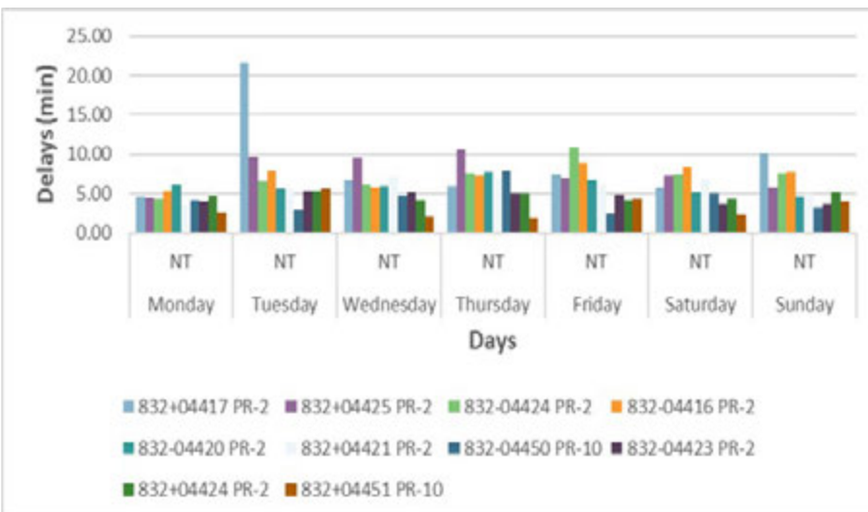
From May to August 2017, the average delay throughout the week was 5.0 minutes. Segments above average were: 832+04417 in PR-2 with peaks on Tuesday of about 20 minutes; and 832+04425 with peaks from Tuesday to Thursday of average delay values ranging from 5.0 – 10.0 minutes (Figure K.155 to Figure K.158).

Figure K.155: May 2017, TMC, North Region, (NT)



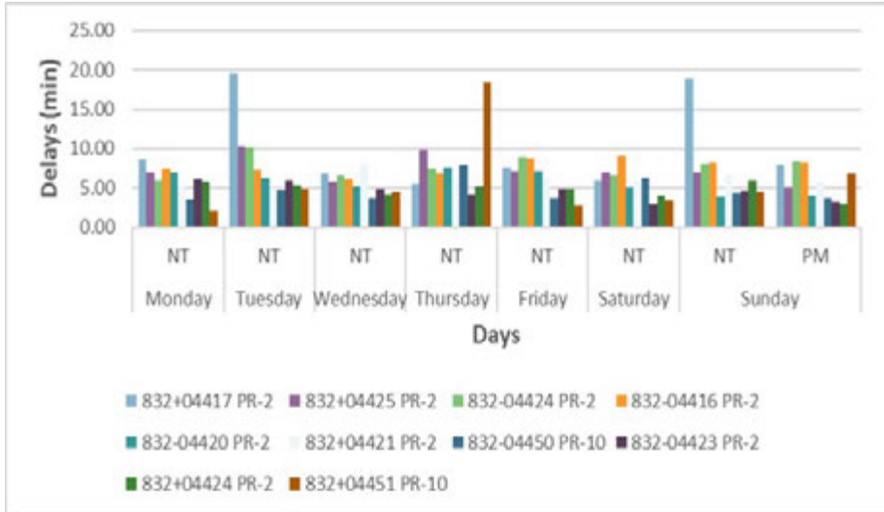
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.156: June 2017, TMC, North Region, (NT)



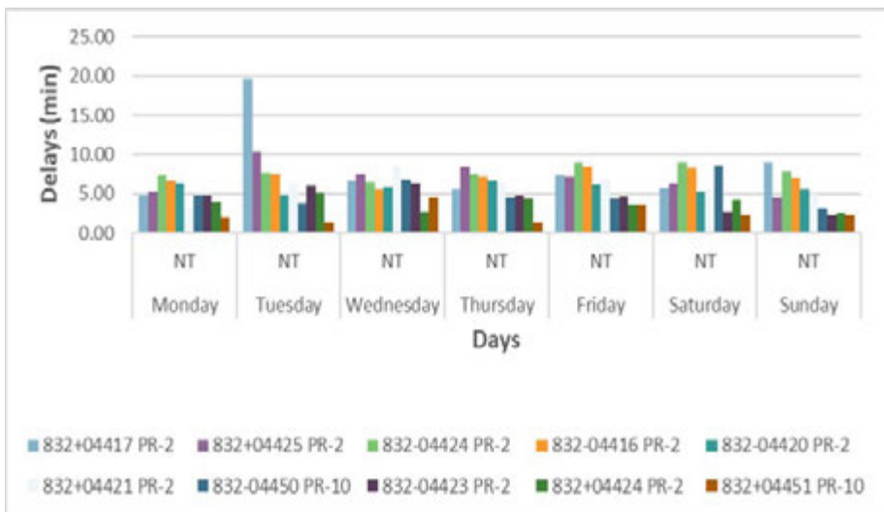
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.157: July 2017, TMC, North Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.158: August 2017, TMC, North Region, (NT)

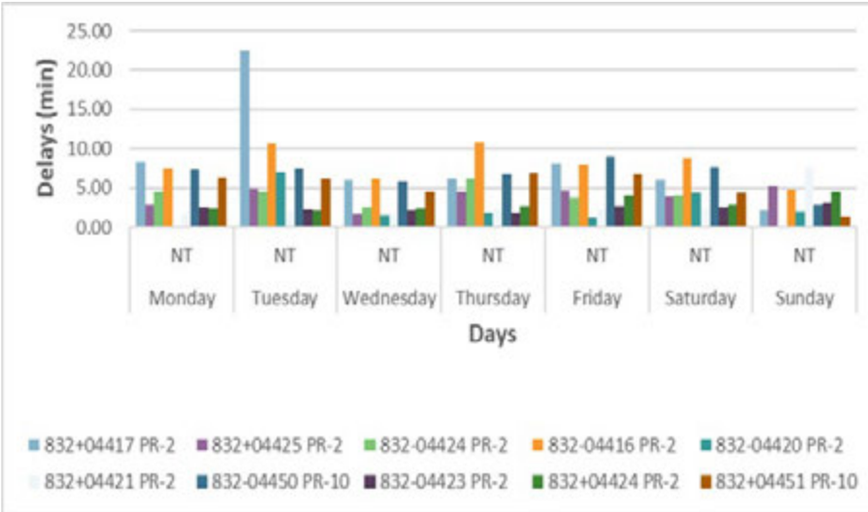


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months between January and April 2018, average delay of segments was of 5.0 minutes. Segments with delays above average and ranging between 5.0 – 10.0 minutes were: 832+04425, 832-04424, 832-04424, and 832-04416.

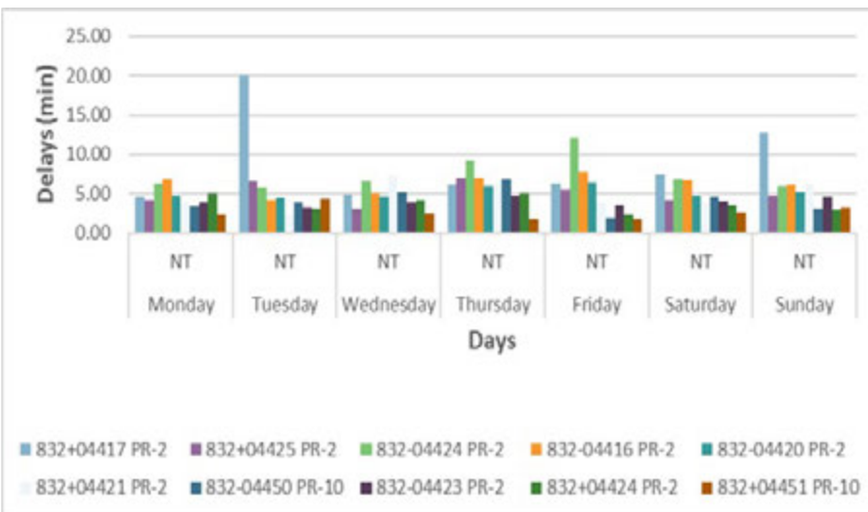
Segment 832+04417 in PR-2 had peaks on Tuesdays with average delay above 15 minutes (Figure K.159 to Figure K.162).

Figure K.159: January 2018, TMC, North Region, (NT)



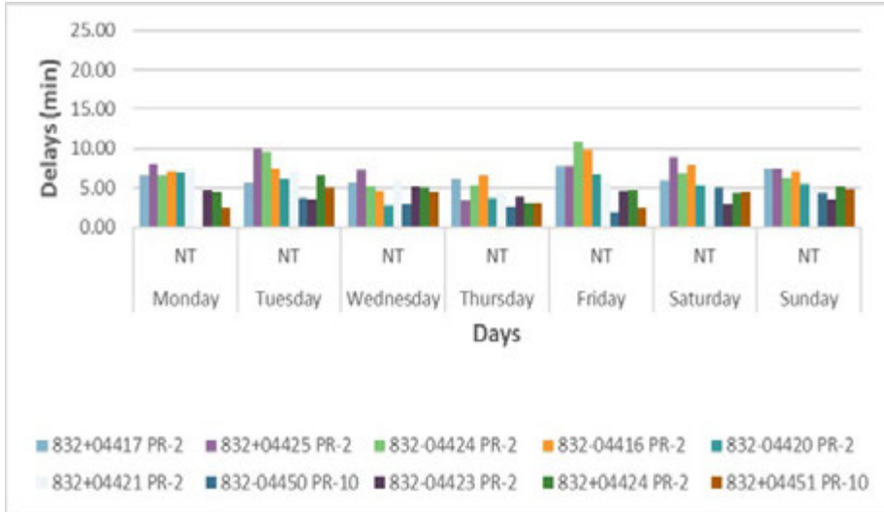
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.160: February 2018, TMC, North Region, (NT)



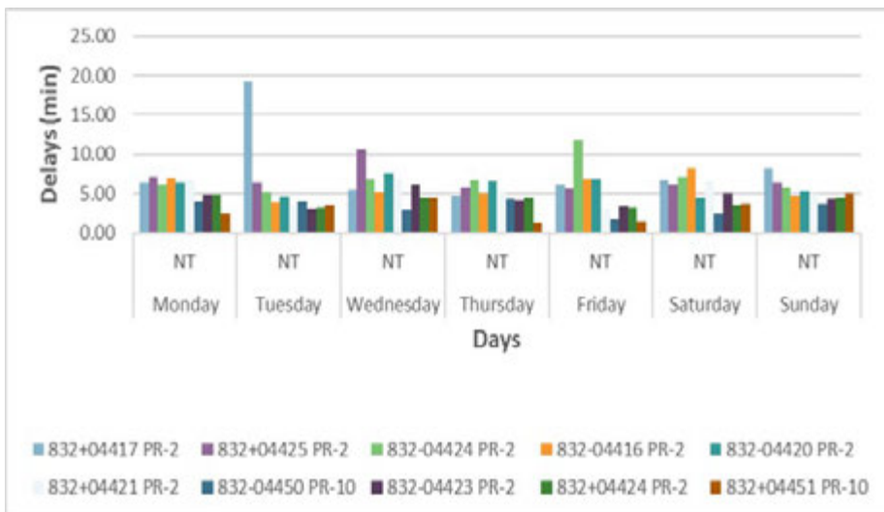
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.161: March 2018, TMC, North Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.162: April 2018, TMC, North Region, (NT)



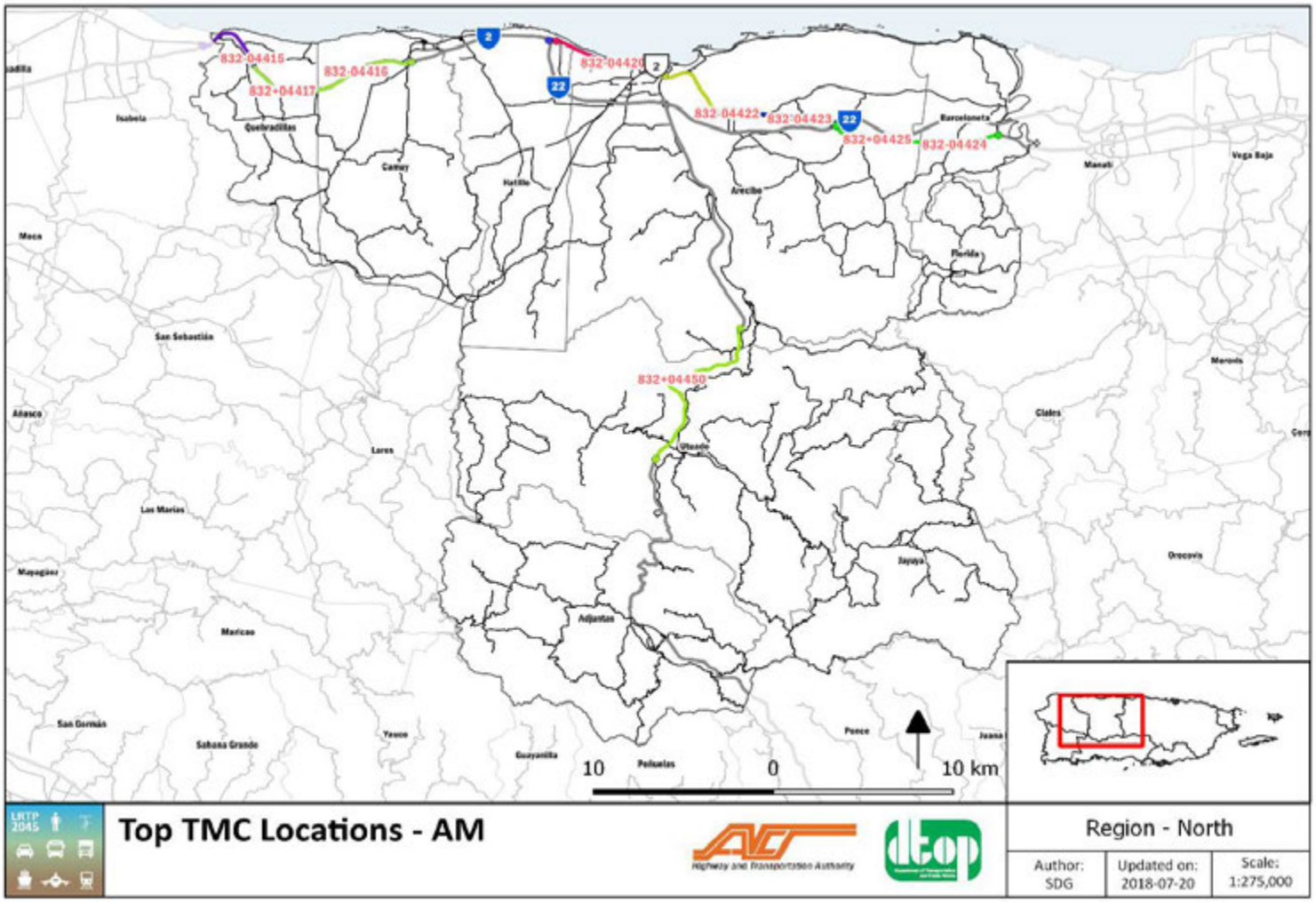
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM) - Monthly

Last four months of 2016 had top five (5) TMC recording delays for the morning period (AM), from 7:00-9:00 a. m., averaging between 4.0 – 4.5 minutes. During 2017 most TMCs dropped to average delays between 1.5-2.8 minutes.

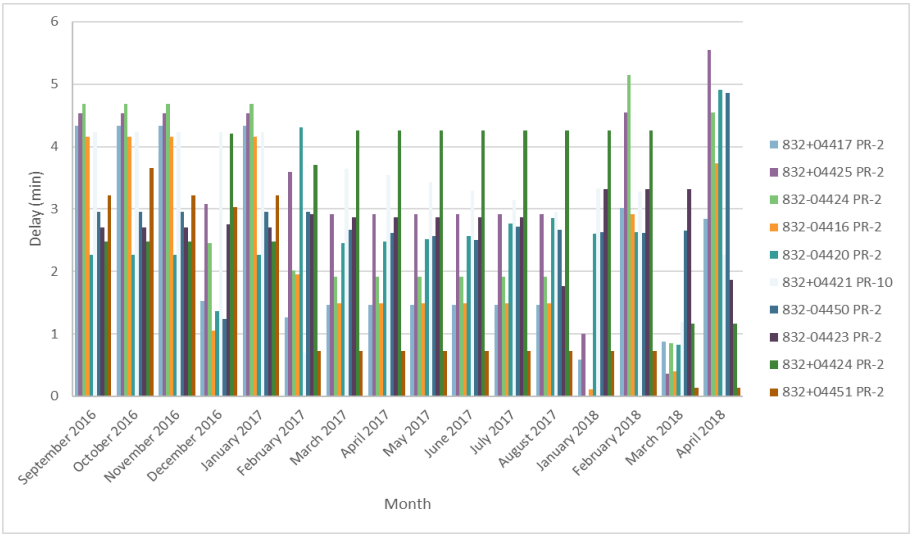
The highest ranking TMCs were 832+04425, with an average delay of 4.2 minutes during 2016 and a maximum of 5.5 minutes during April 2018; 832-04424, with an average delay of 4.1 minutes in 2016 and maximum of 5.1 minutes, as seen in Figure K.163 and Figure K.164 below.

Figure K.163: North Location, AM Period



Source: SDG, based on NPMRDS Analytics

Figure K.164: Average Delays, North TPR, AM Period



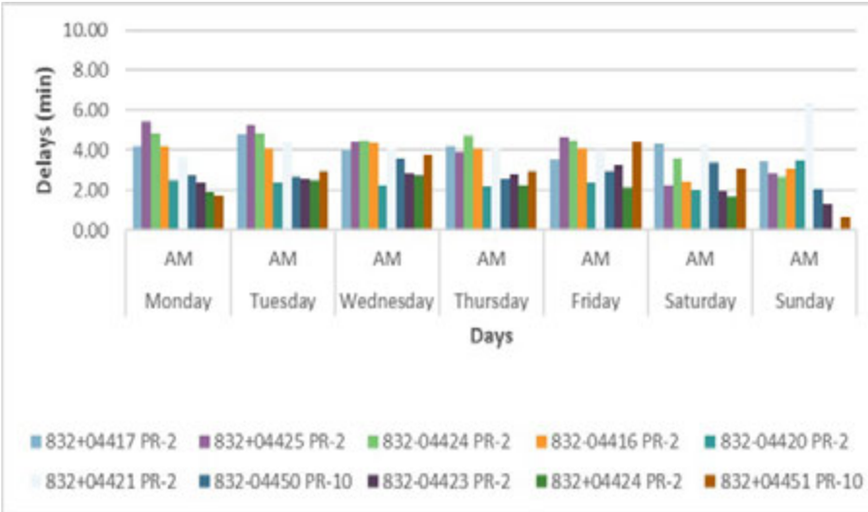
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM) - Weekly

For the morning period in the North Region, average delay of segments was 3.0 minutes, except for December 2016 with a lower average of 2.0 minutes for segments.

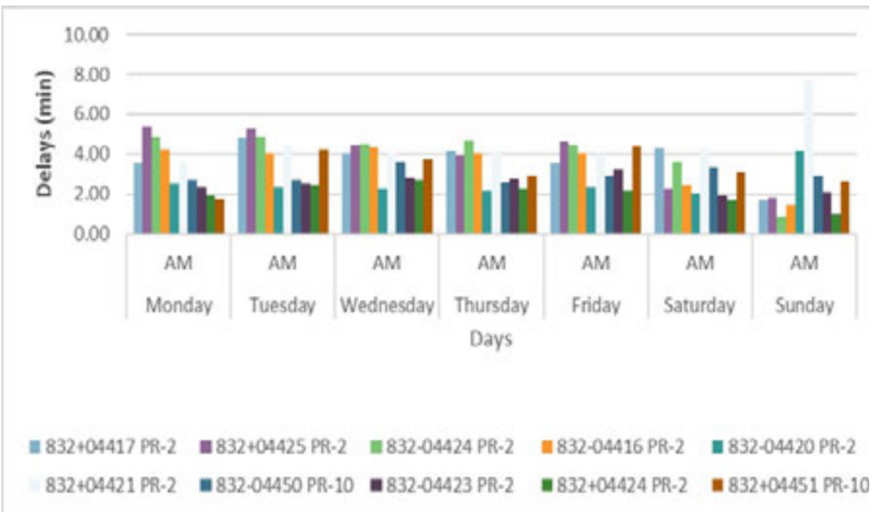
Segments with delays above average were: 832+04425 with an average delay of 4.0 minutes; 832+04421 with an average of 4.0 minutes; and segments 832+04417, 832-04424, and 832-04416 with average delays of 3.8 minutes from September to November 2016, and delays below 1.0 minute for December 2016 (Figure K.165 to Figure K.168).

Figure K.165: September 2016, TMC, North Region, (AM)



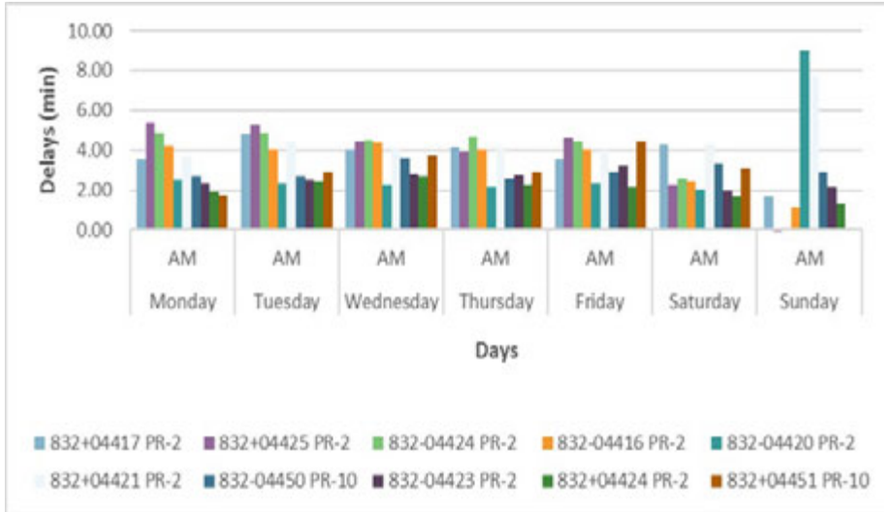
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.166: October 2016, TMC, North Region, (AM)



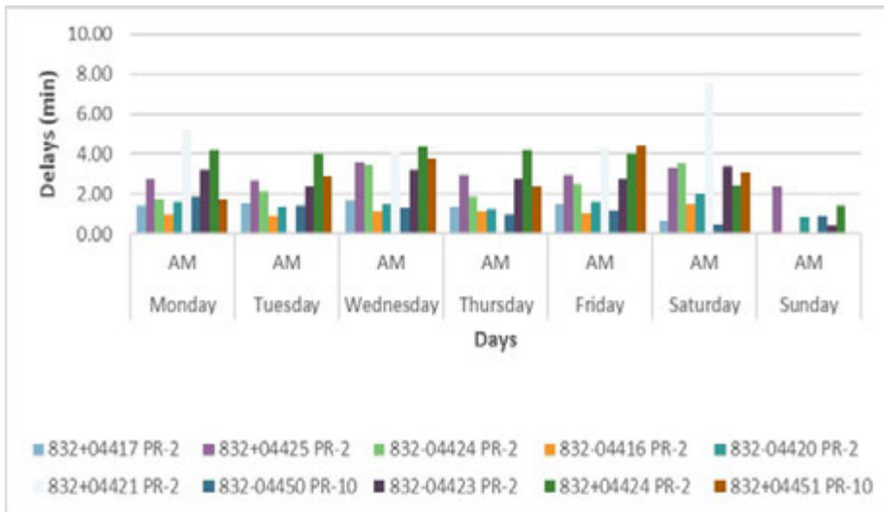
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.167: November 2016, TMC, North Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.168: December 2016, TMC, North Region, (AM)

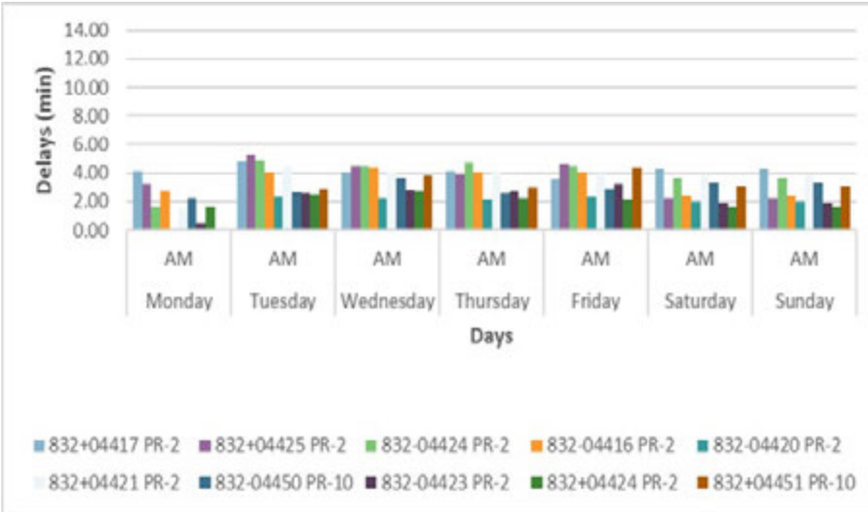


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, the average delay for segments was 2.8 minutes.

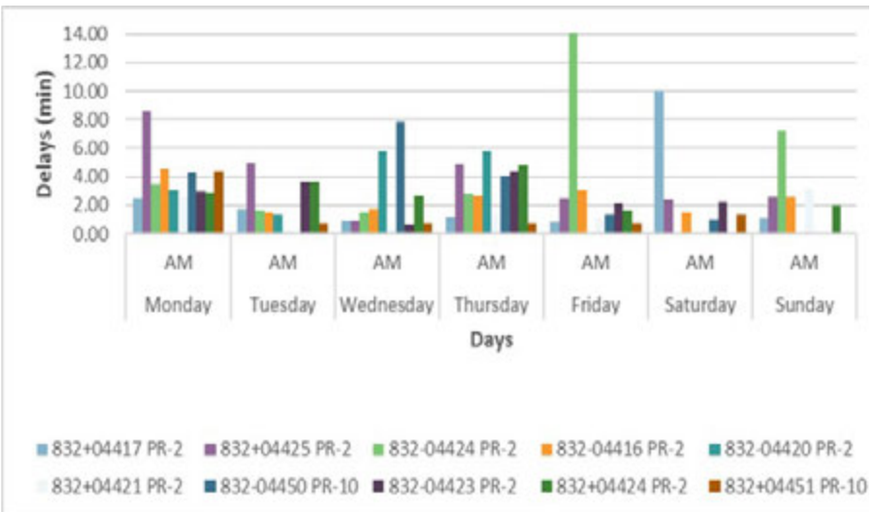
Segments above average delay were: 832+04424 with peaks of 14.0-minute delay on Fridays, 832+04417 with peaks of 10.0-minute delay on Saturdays;832-04420, and 832-04450 with delays on Wednesdays between 6.0 – 8.0 minutes (Figure K.169 to Figure K.172).

Figure K.169: January 2017, TMC, North Region, (AM)



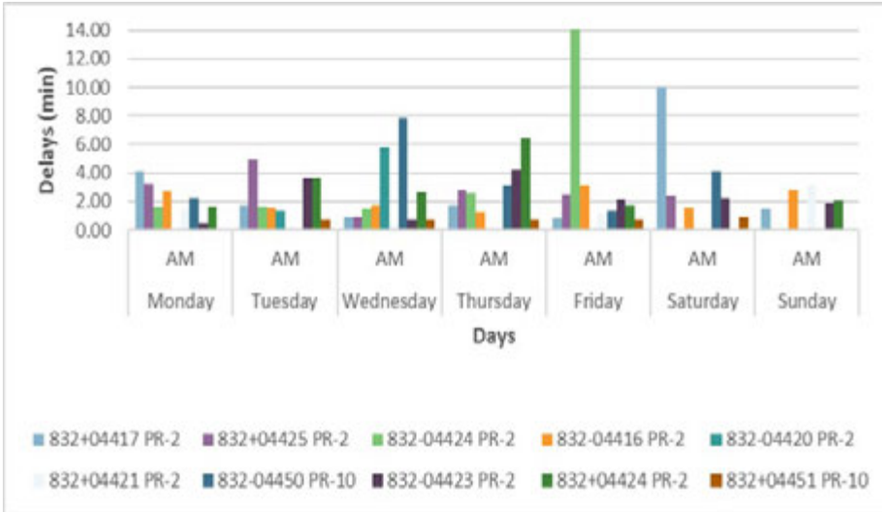
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.170: February 2017, TMC, North Region, (AM)



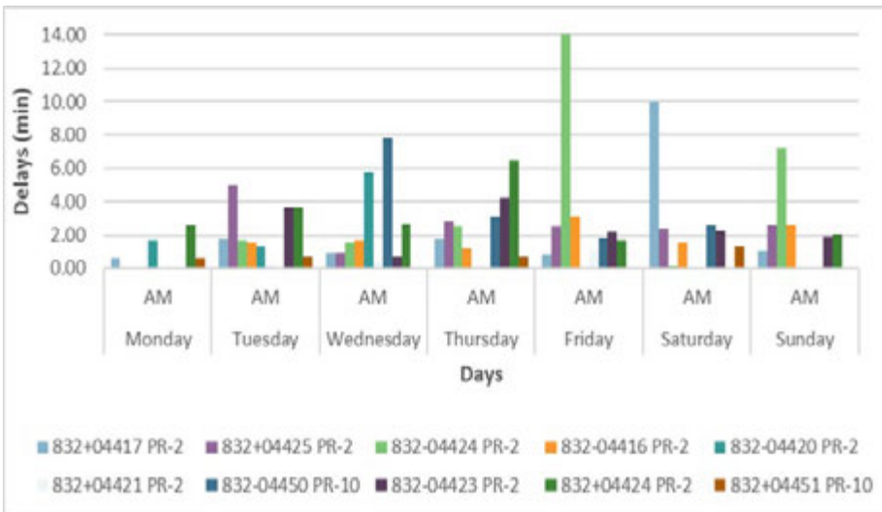
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.171: March 2017, TMC, North Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.172: April 2017, TMC, North Region, (AM)

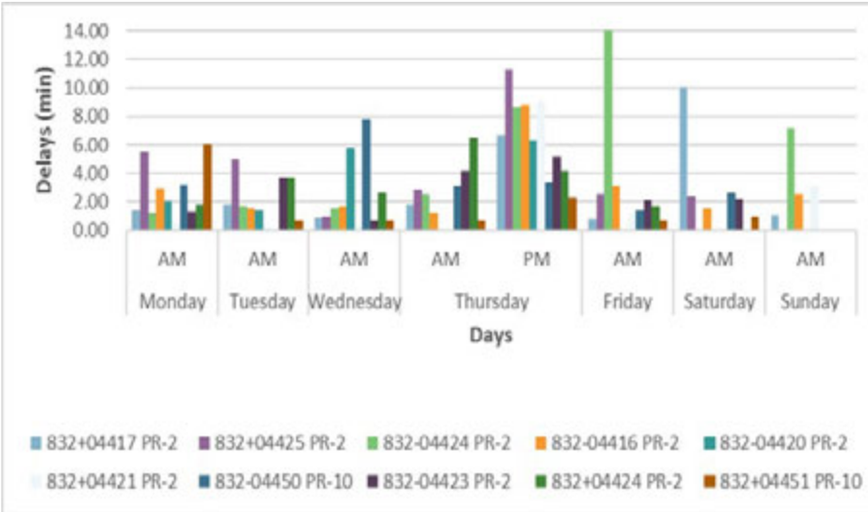


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was of 2.0 minutes. Days with higher delays were Wednesday, Friday and Saturday, with values ranging from 8.0-14.0 minutes on average delay.

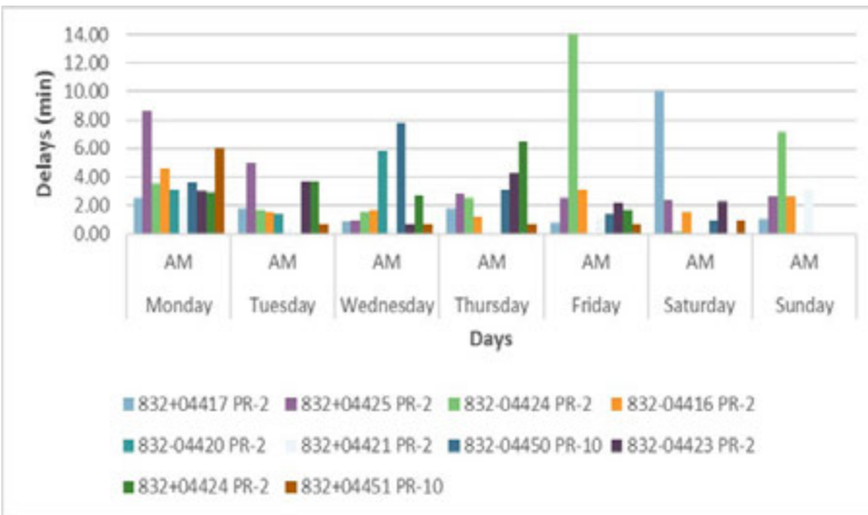
Segments with delays above average were 832-04424, 832-04420, 832+04417, 832-04450, and 832+04425 with an average of 6.0 minutes delay for these segments (Figure K.173 to Figure K.176).

Figure K.173: May 2017, TMC, North Region, (AM)



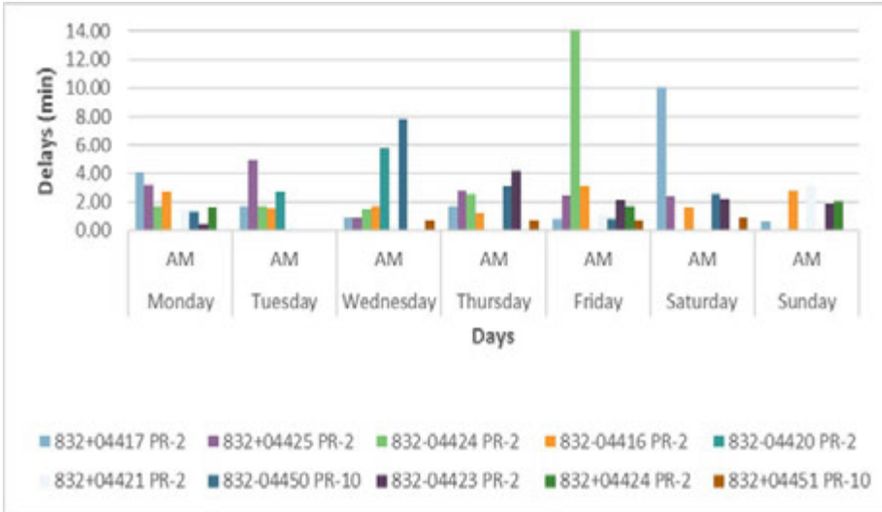
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.174: June 2017, TMC, North Region, (AM)



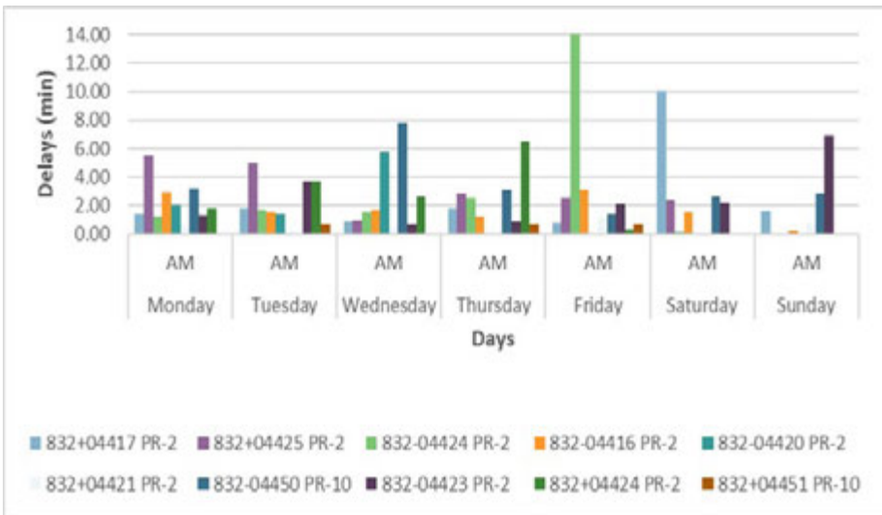
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.175: July 2017, TMC, North Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.176: August 2017, TMC, North Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

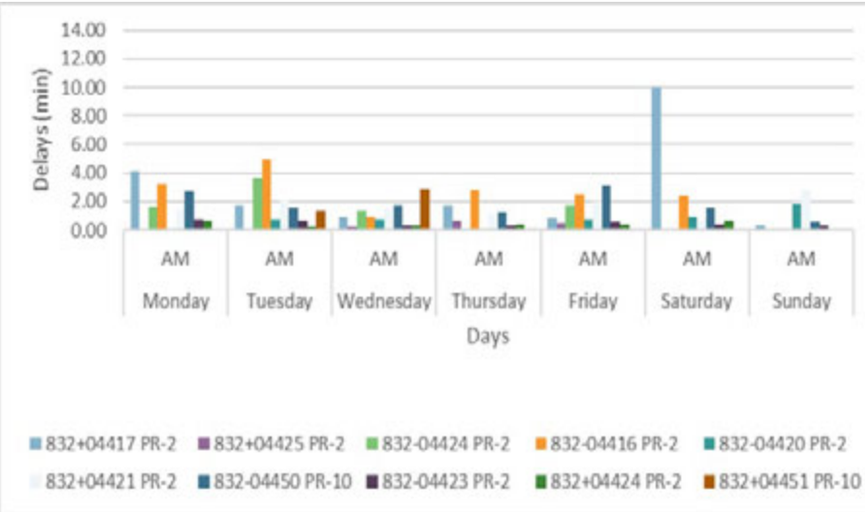
For the first four months between January and April 2018, average delay of segments ranged between 2.0 – 3.0 minutes.

January had low delays, with most segments ranging below 1.0 minute on average delay. Segments like 832-04416 and 832+04417 had peaks on delay on Tuesday and Saturday with 5.0 and 10.0 minutes accordingly.

February and April had similar dynamics on average delay for segments, with higher delays on Tuesday and Friday, with values ranging from 4.0-6.0 minutes, mostly for segments 832+04425, 832+04417, 832-04424, 832-04420, and 832-04450.

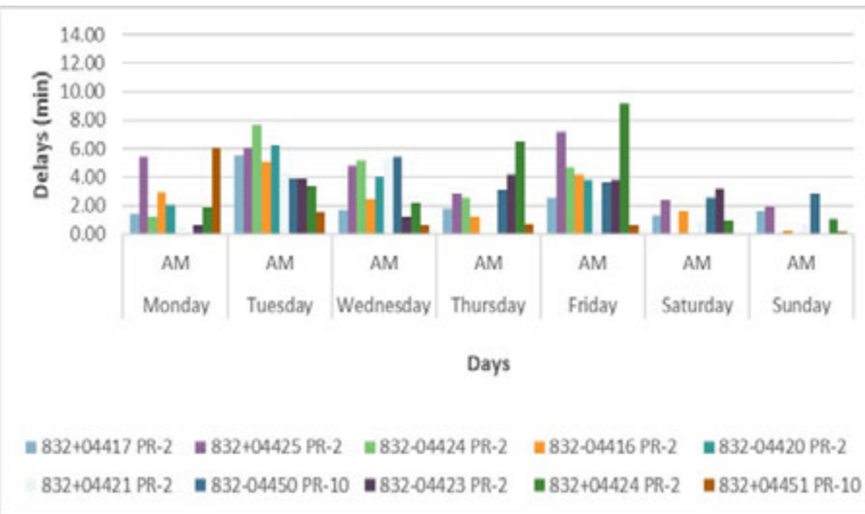
March had average delays below 2.0, with peaks on Wednesday, Friday, Saturday and Sunday for the following segments: 832-04420 with 6.0 minutes, 832-04450 with 8.0 minutes, 832-04424 with 14 minutes, 832+04417 with 10.0 minutes, and 832+04425 with 9.2 minutes (Figure K.177 to Figure K.180).

Figure K.177: January 2018, TMC, North Region, (AM)



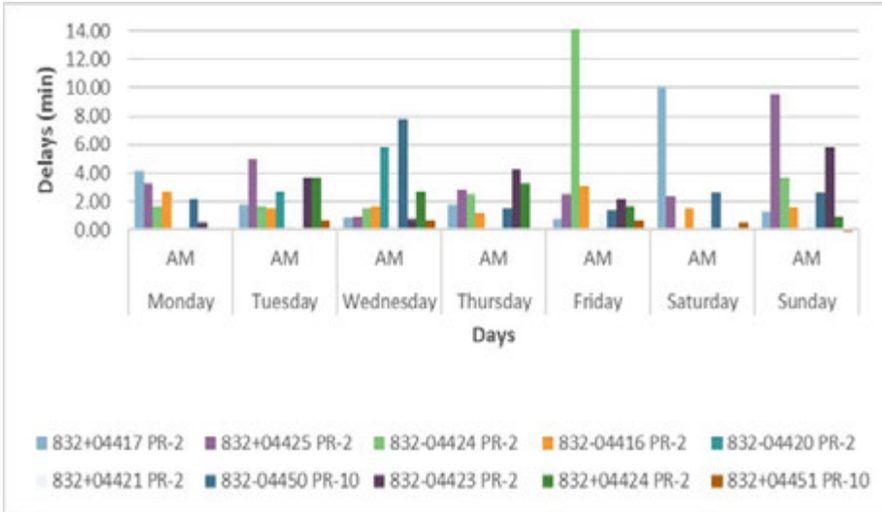
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.178: February 2018, TMC, North Region, (AM)



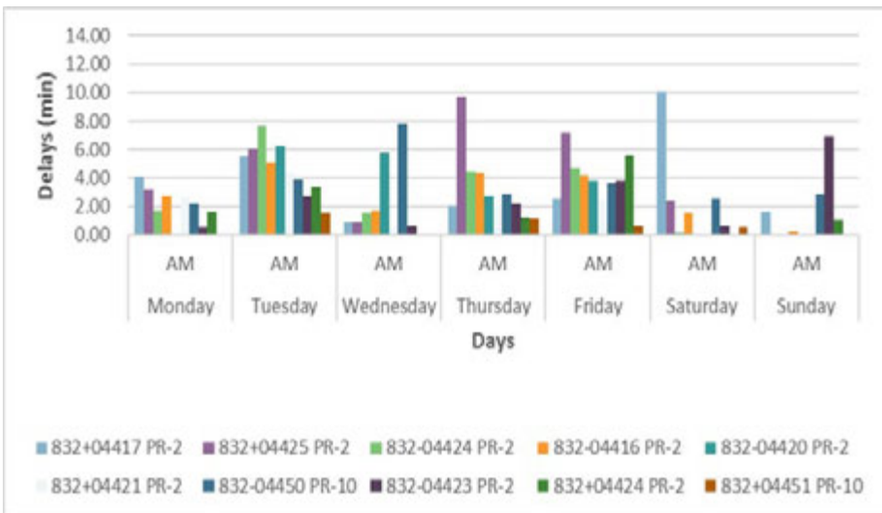
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.179: March 2018, TMC, North Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.180: April 2018, TMC, North Region, (AM)



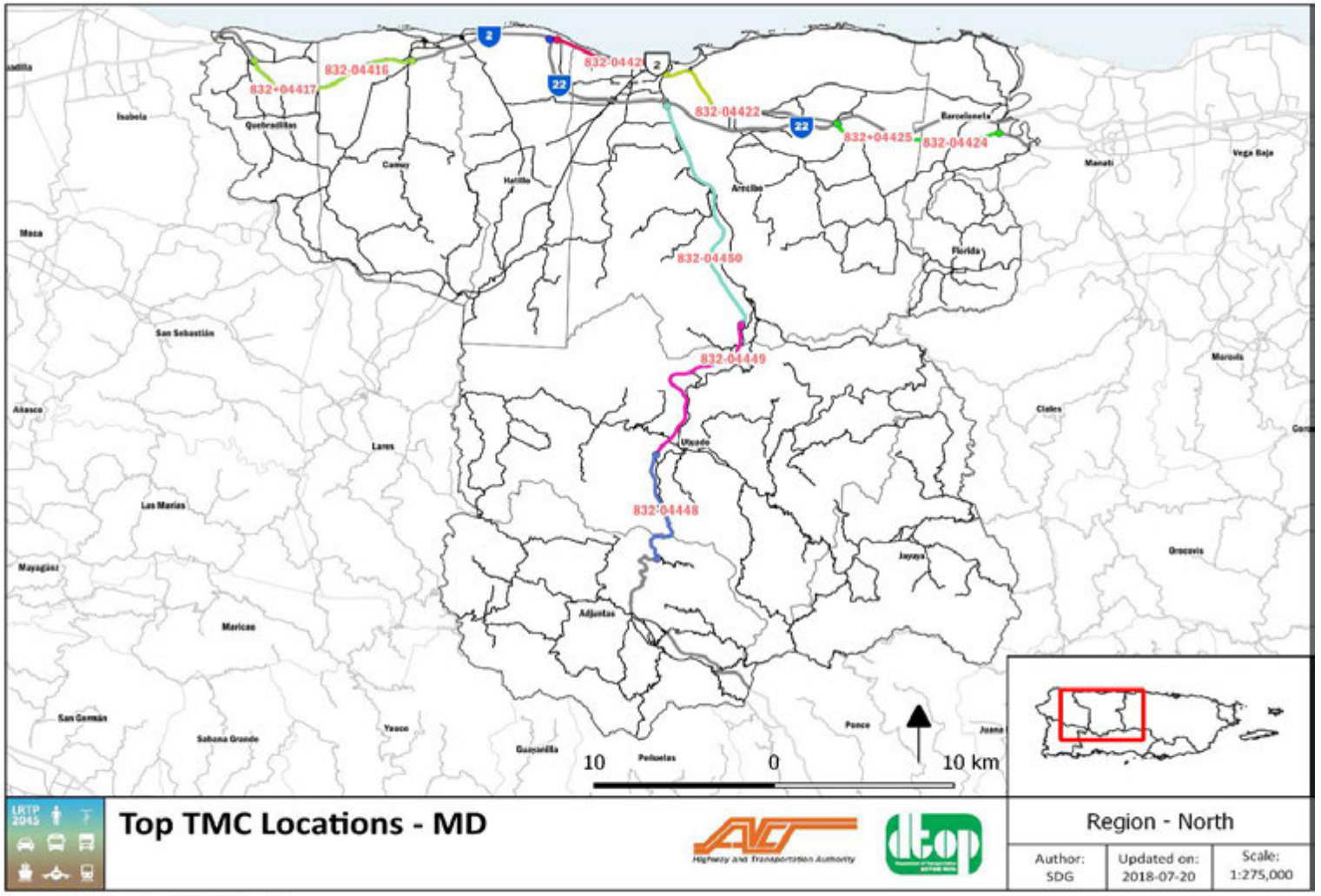
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD) - Monthly

Segments average delay was 3.6 minutes for the last four months of 2016, specifically for the mid-day (MD), from 9:00-15:00. From February to August 2017, segments average delay increased to 5.6 minutes.

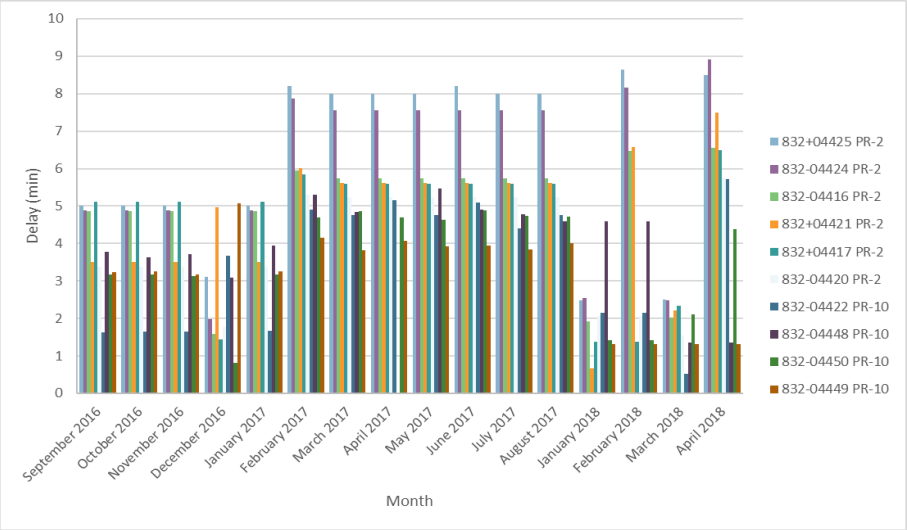
The highest ranking TMCs were 832+04425, with an average delay of 7.7 minutes during 2017 and 832-04424, with an average delay of 7.6 minutes in 2017, as seen in Figure K.181 and Figure K.182 below.

Figure K.181: North Location, MD Period



Source: SDG, based on NPMRDS Analytics

Figure K.182: Average Delays, North TPR, MD Period



Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

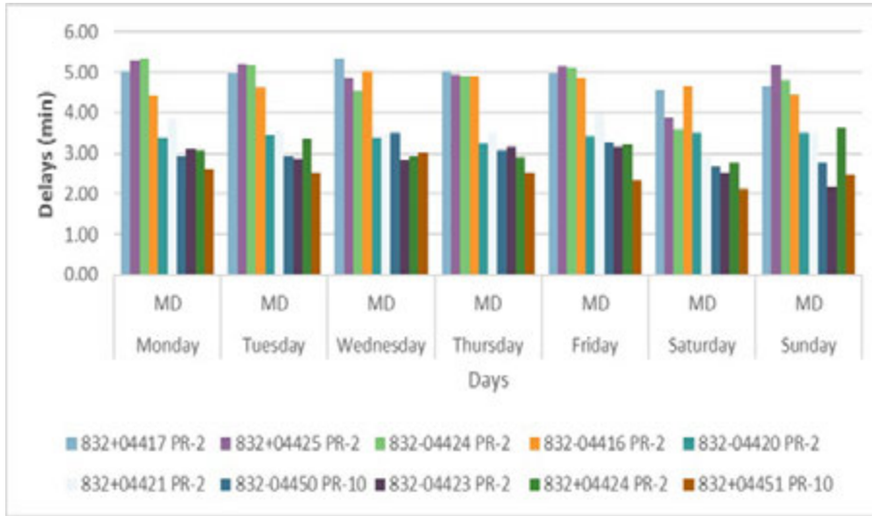
Mid-Day Period (MD) - Weekly

For the last four months of 2016, from September to December, average delay of segments was 3.0 minutes, except for December when average delay dropped to 2.0 minutes.

Segments with delays above average were: 832+04417, 832+04425, 832-04424, and 832-04416 with average values ranging from 4.0 to 5.2 minutes.

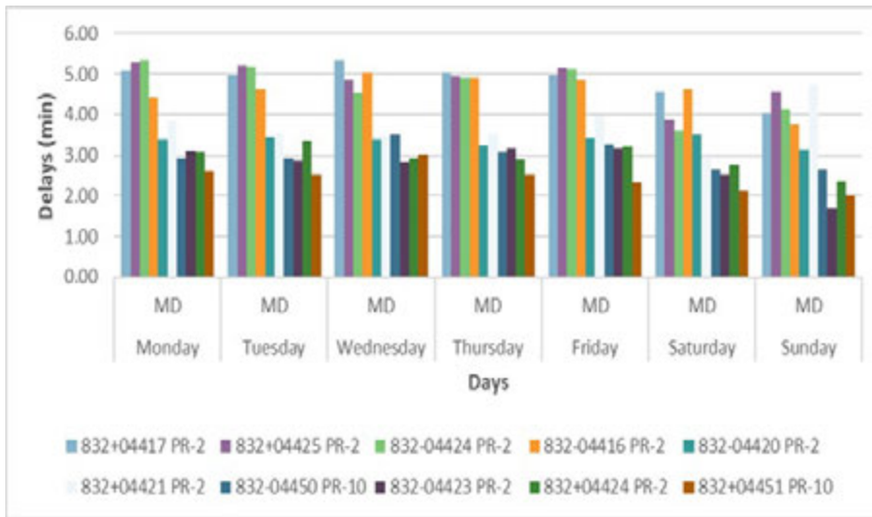
For December 2016, segments with delays above average were 832+04425, 832-04423, and 832+04424 with delays ranging between 3.0 – 5.0 minutes (Figure K.183 to Figure K.186).

Figure K.183: September 2016, TMC, North Region, (MD)



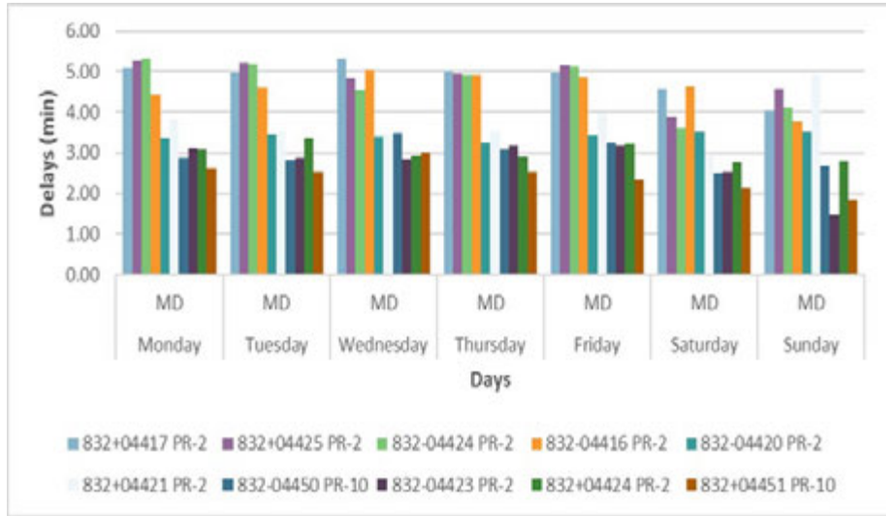
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.184: October 2016, TMC, North Region, (MD)



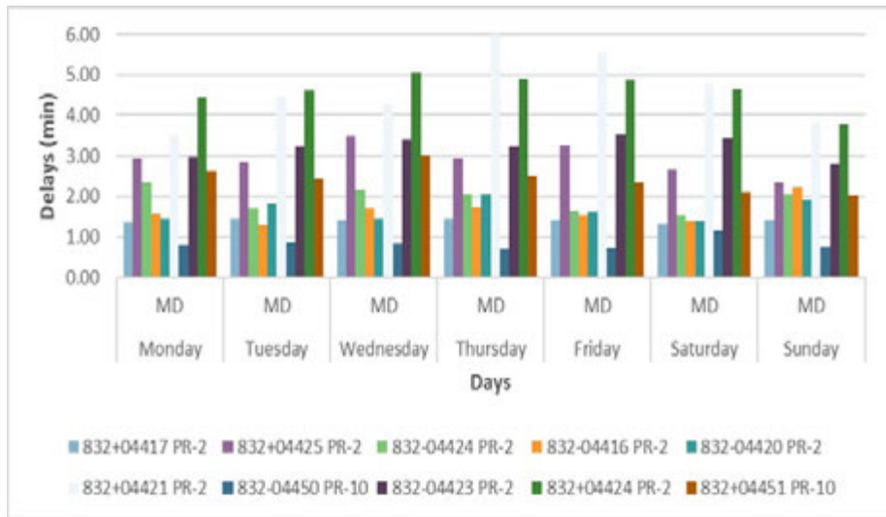
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.185: November 2016, TMC, North Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.186: December 2016, TMC, North Region, (MD)

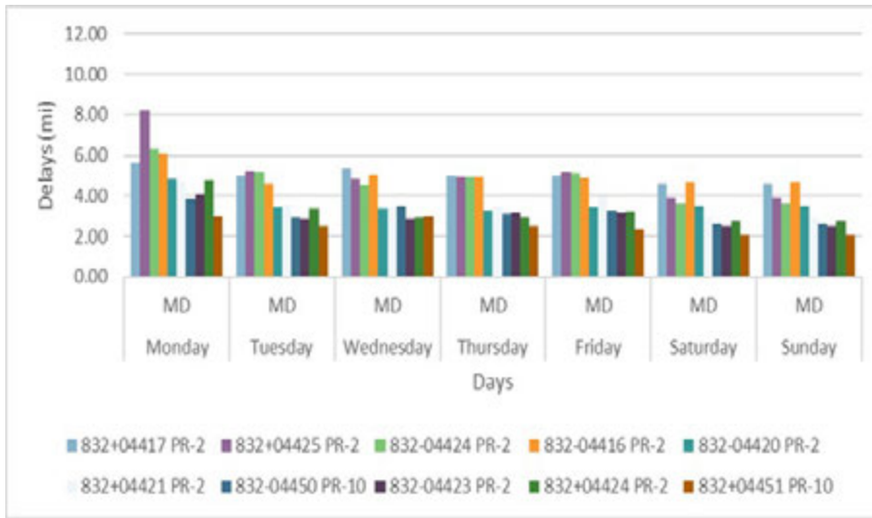


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months of 2017, from January to April, average delay of segments was 4.0 minutes. Segments with delays above average were: 832+04417, 832+04425, 832-04424, and 832-04416 with average values ranging from 4.0 to 8.0 minutes.

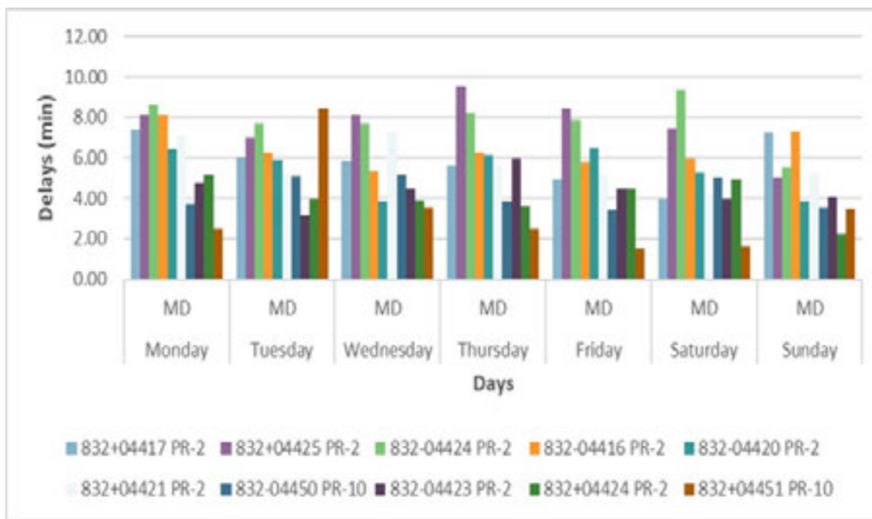
Segment 832+04425 in PR-2 had peaks on Wednesday with average delay ranging between 7.0-10.0 minutes (Figure K.187 to Figure K.190).

Figure K.187: January 2017, TMC, North Region, (MD)



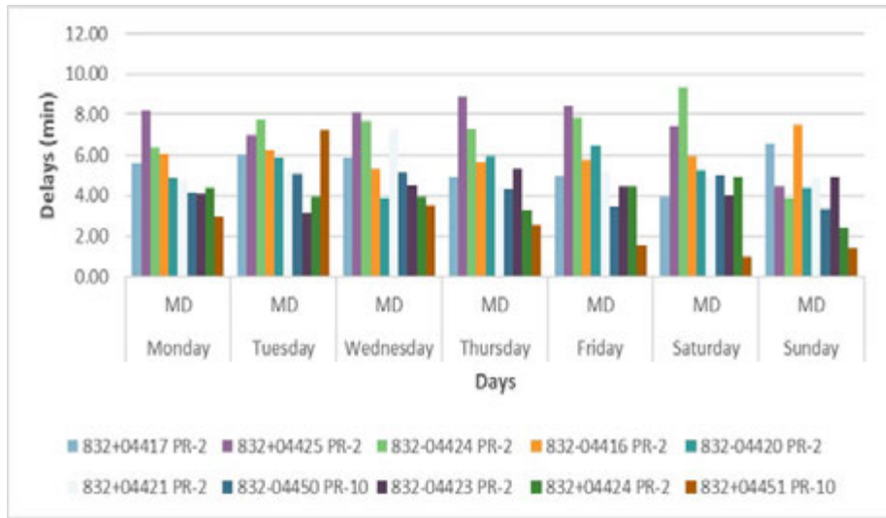
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.188: February 2017, TMC, North Region, (MD)



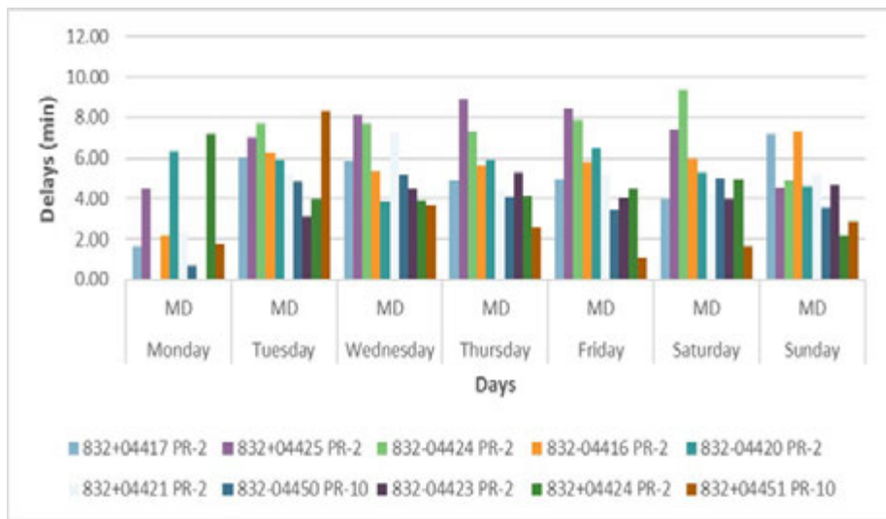
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.189: March 2017, TMC, North Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

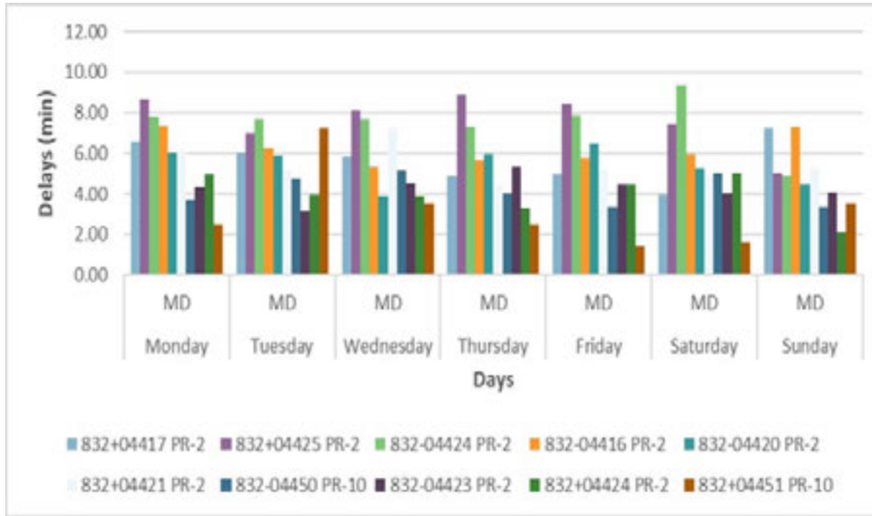
Figure K.190: April 2017, TMC, North Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

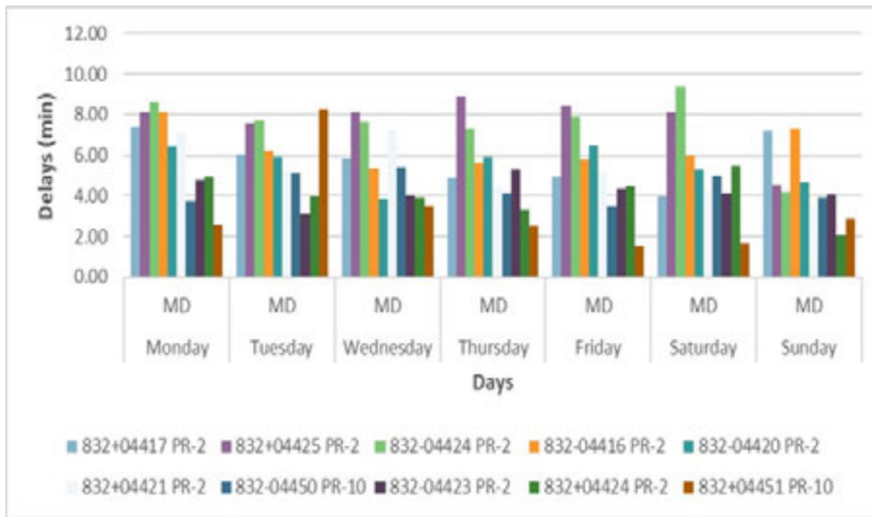
From May to August 2017, the average delay throughout the week was of 5.0 minutes. Segments with delays significantly above average were: 832+04425, and 832-04424 with average delay ranging from 6.0-9.0 minutes, mostly during week days (Figure K.191 to Figure K.194).

Figure K.191: May 2017, TMC, North Region, (MD)



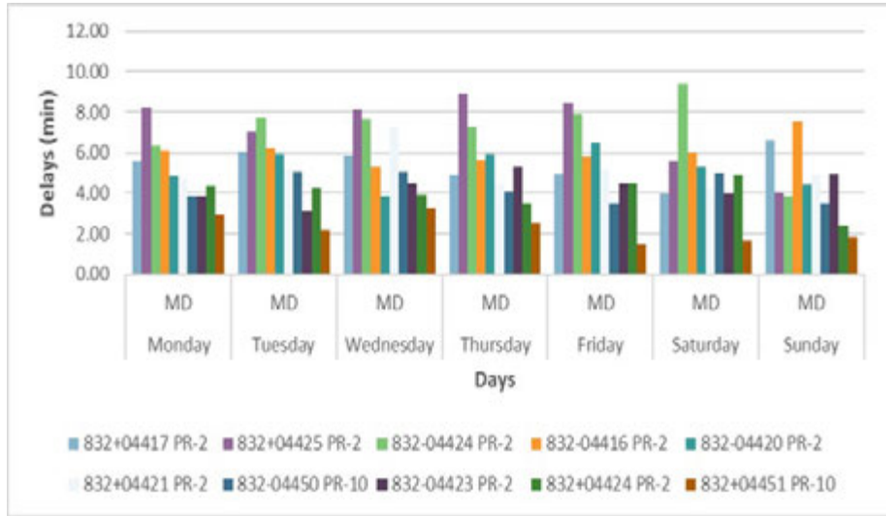
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.192: June 2017, TMC, North Region, (MD)



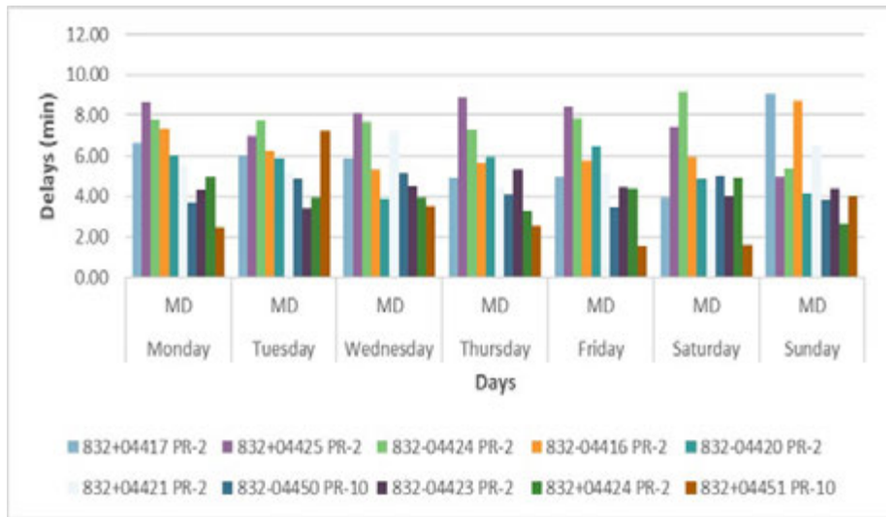
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.193: July 2017, TMC, North Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.194: August 2017, TMC, North Region, (MD)



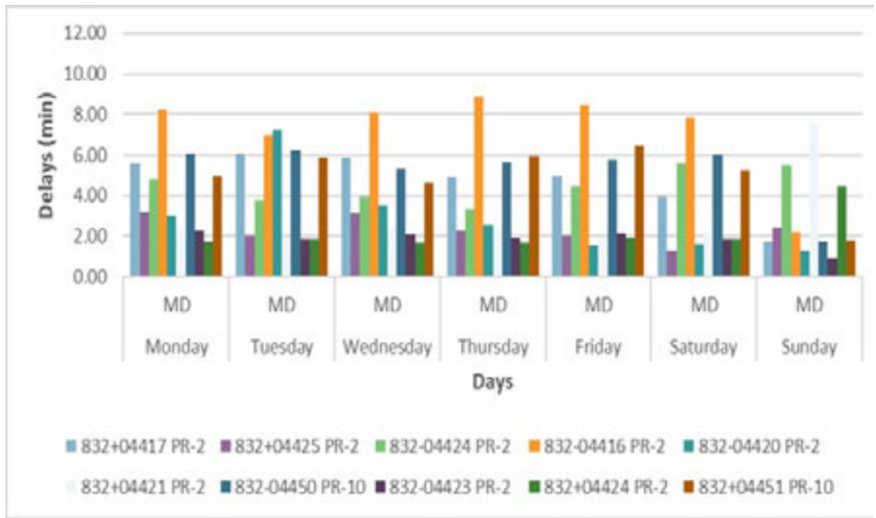
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months between January and April 2018, average delay of segments was of 4.5 minutes, except for January 2018 with an average of 2.5 minutes.

For January, segments above average were 832+04416 with values between 7.0-9.0 minutes from Monday to Saturday, and segments 832+04417, 832-04450, 832+04417, and 832+04451 with values between 4.5 to 6.0 minutes.

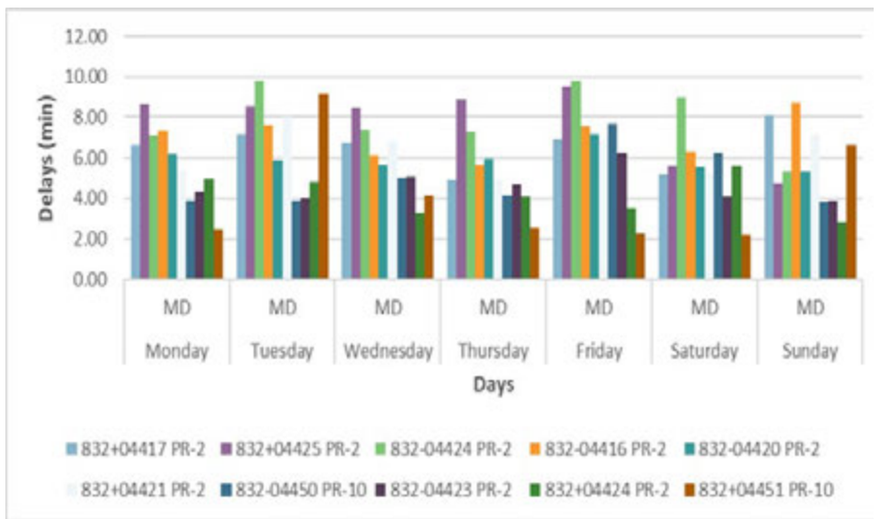
From February to April 2018, segments with delays above average were 832+04425, 832-04424, 832-04424with average delays between 6.0-10.0 minutes (Figure K.195 to Figure K.198).

Figure K.195: January 2018, TMC, North Region, (MD)



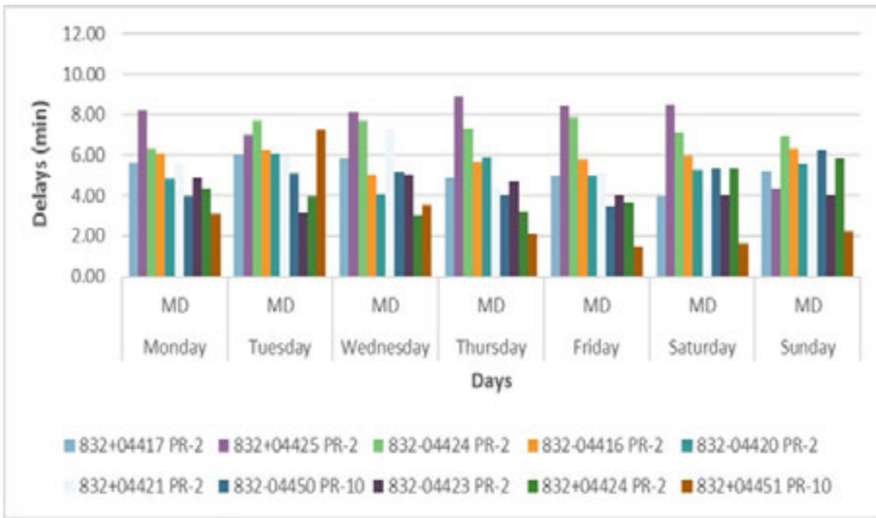
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.196: February 2018, TMC, North Region, (MD)



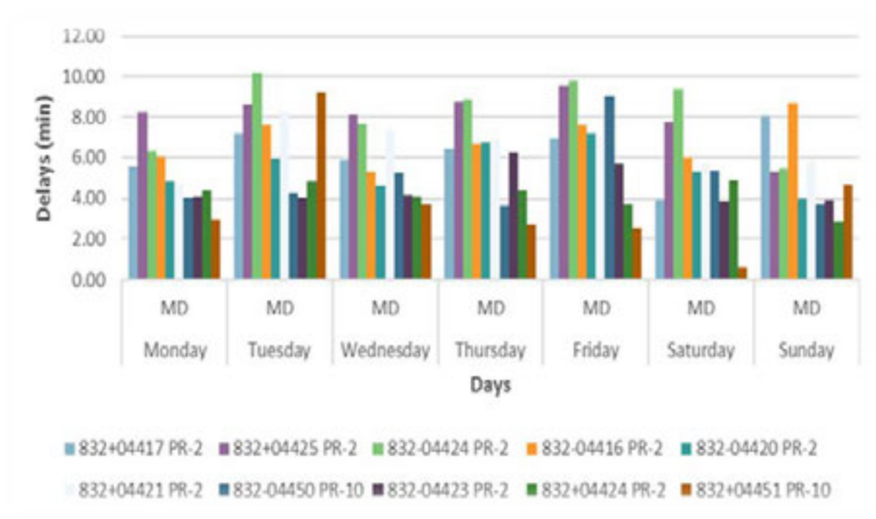
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.197: March 2018, TMC, North Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.198: April 2018, TMC, North Region, (MD)



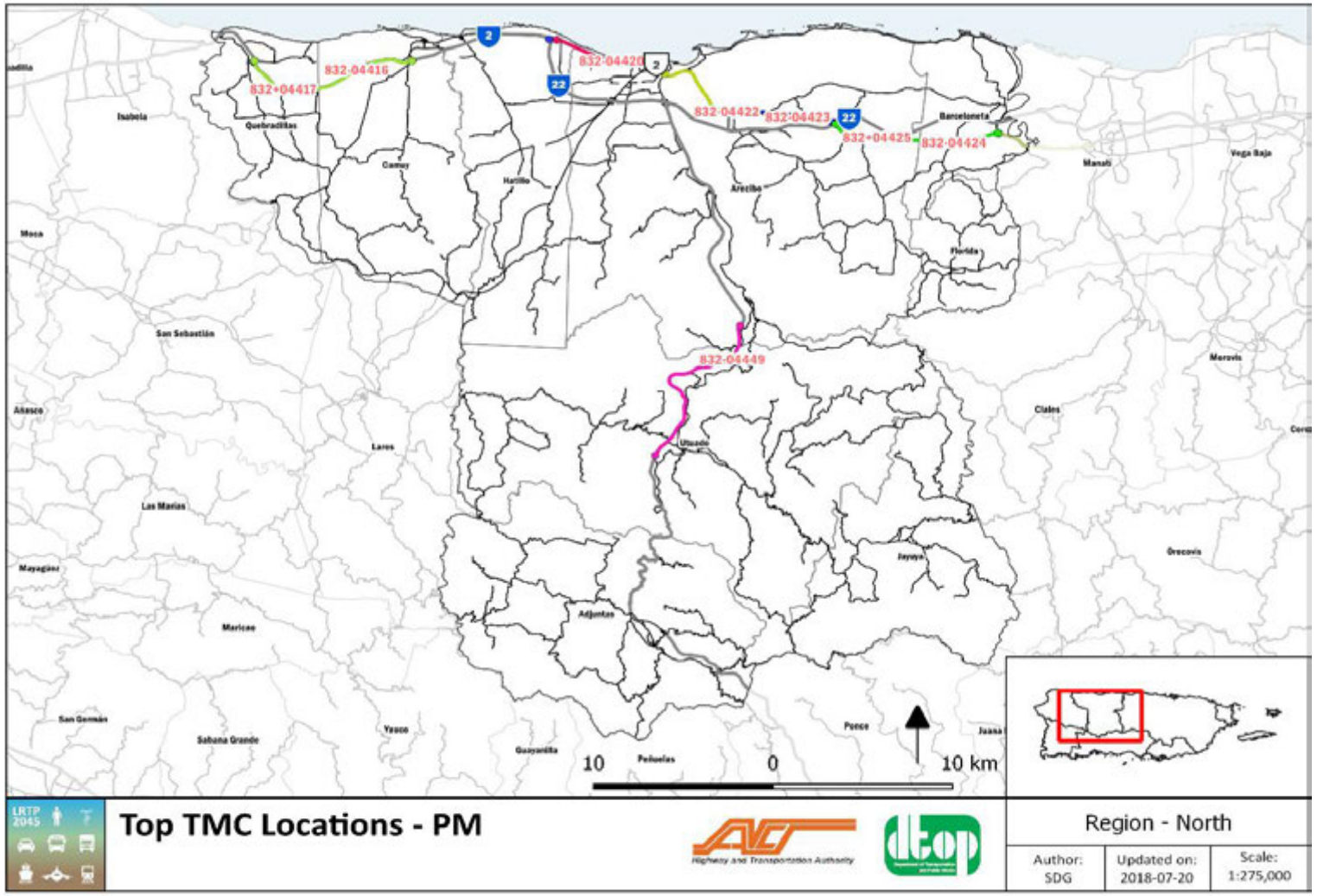
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM) - Monthly

During September 2016 through April 2018, segments added on average a delay of 3.7 minutes to the reference travel time, for the afternoon period (PM). Between February through August 2017, the average delay was 6.6 minutes.

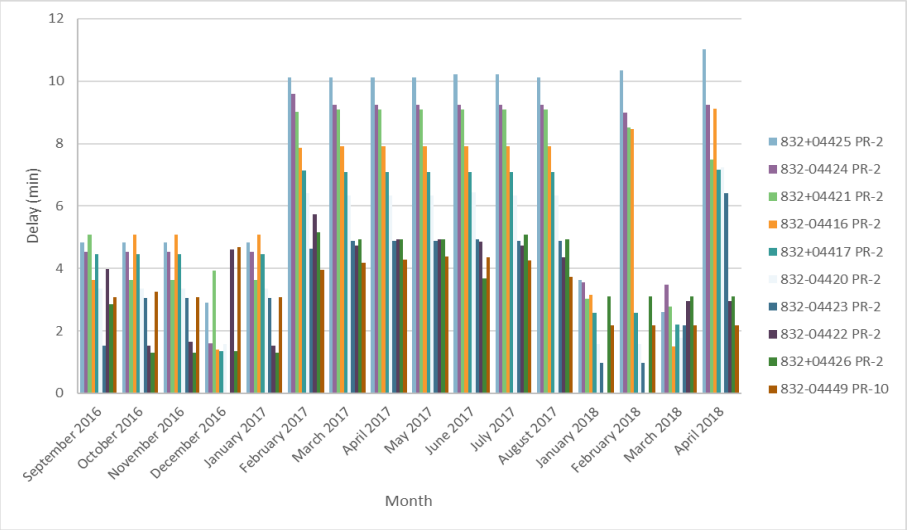
The highest ranked TMCs were 832+04425, with an average delay of 10.1 minutes between 2017 and 2018; 832-04424 and 832+04421, with an average delay of 9.0 minutes; 832-04416 and 832+4417, averaging a delay of 7.0-8.0 minutes. See Figure K.199 and Figure K.200 below.

Figure K.199: North Location, PM Period



Source: SDG, based on NPMRDS Analytics

Figure K.200: Average Delays, North TPR, PM Period



Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

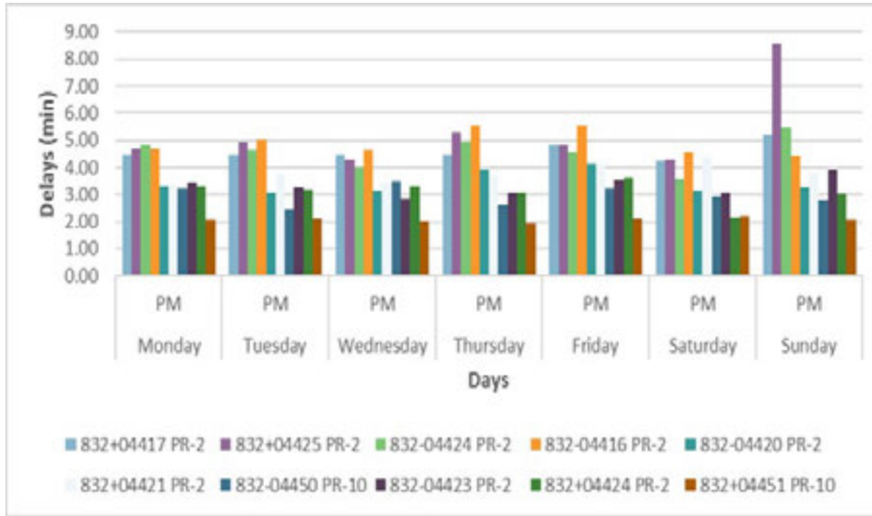
Past-Midday Period (PM) - Weekly

For the last four months of 2016, from September to December, average delay of segments was 3.0 minutes, except for December 2016 which had an average delay of 1.7 minutes for most segments.

From September to November 2016, segments with delays above average were 832+04417, 832+04425, 832-04424, and 832-04416 with average values ranging from 4.0-5.0 minutes.

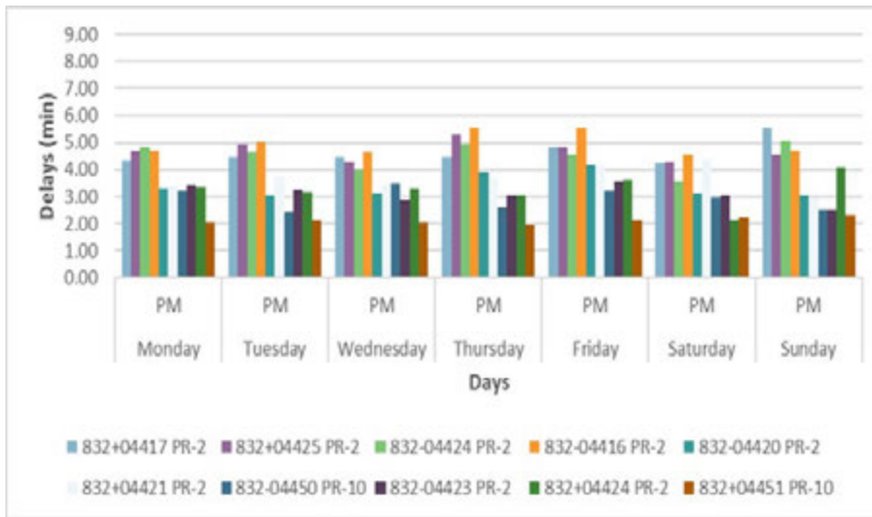
For December, segments 832+04424 with 4.0-5.0-minute delays, 832+04425 and 832-04423 with 3.0-minute delays on average had the highest delays (Figure K.201 to Figure K.204).

Figure K.201: September 2016, TMC, North Region, (PM)



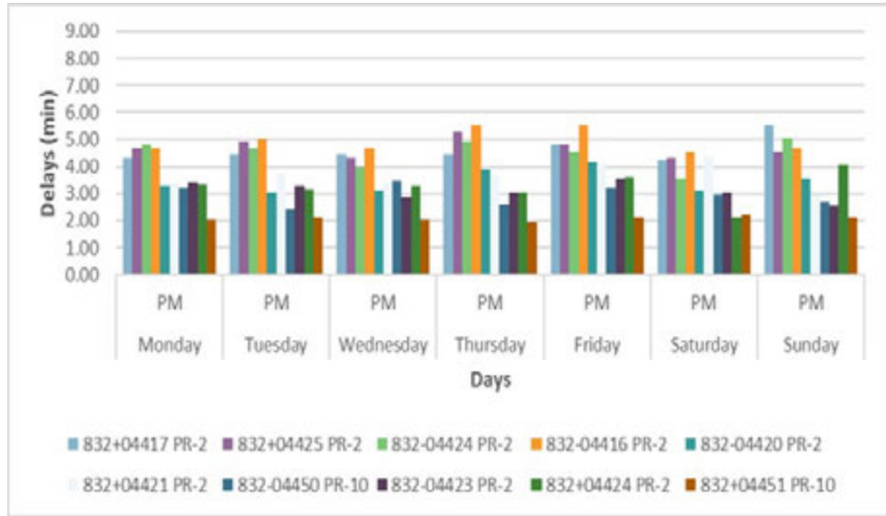
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.202: October 2016, TMC, North Region, (PM)



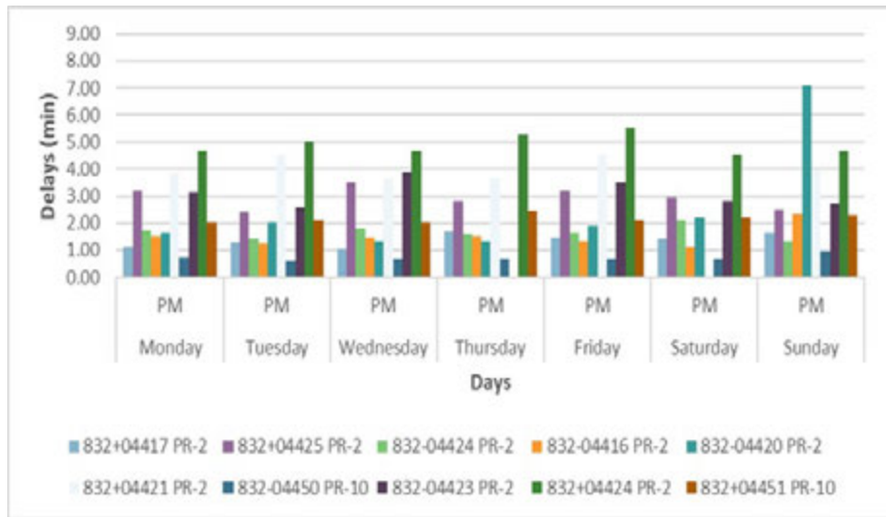
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.203: November 2016, TMC, North Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

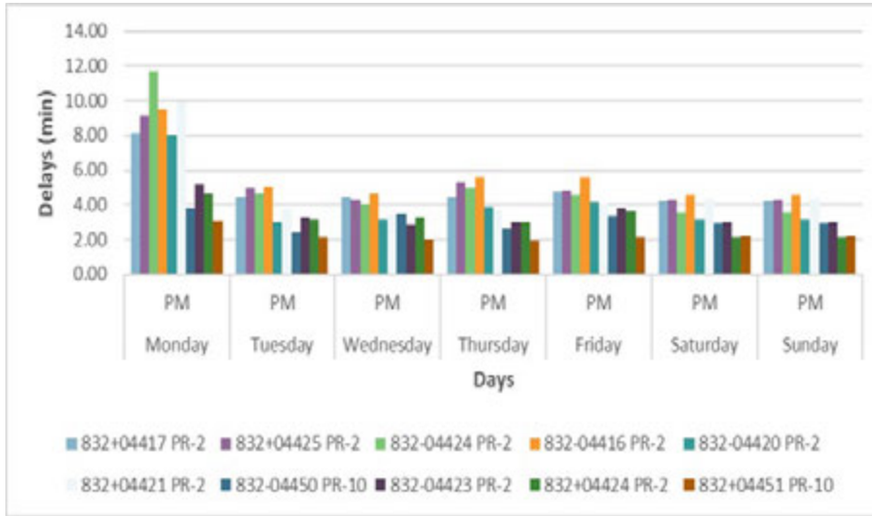
Figure K.204: December 2016, TMC, North Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

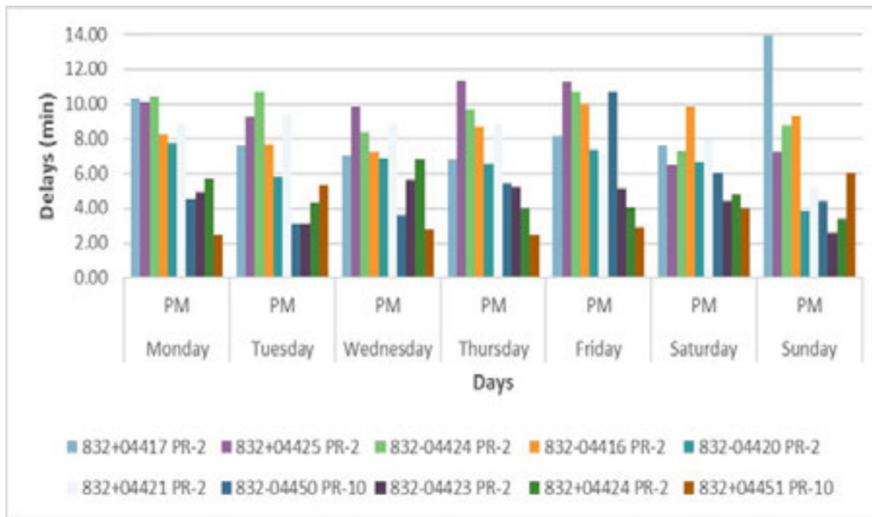
For the first four months of 2017, from January to April, average delay of segments was 5.0 minutes. Segments with delays above average were: 832+04417, 832+04425, 832-04424, and 832-04416, and 832+04424 with values ranging between 6.0-10.0 minutes (Figure K.205 to Figure K.208).

Figure K.205: January 2017, TMC, North Region, (PM)



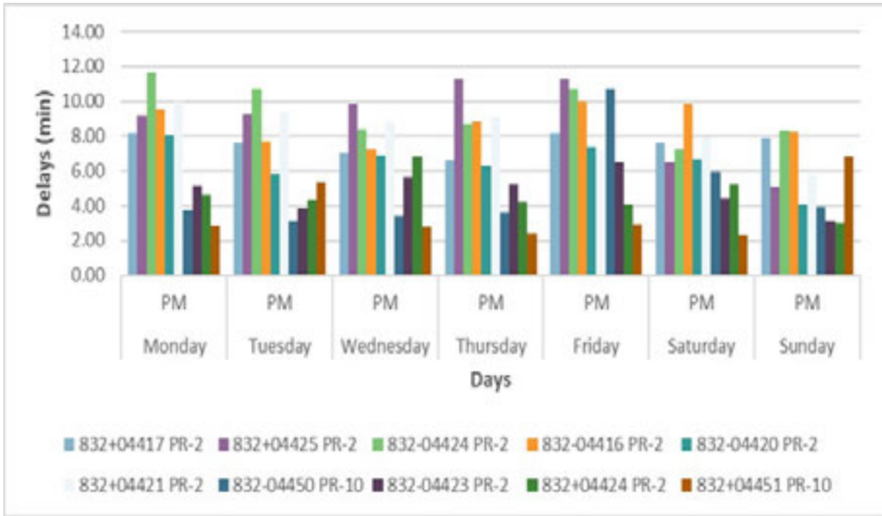
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.206: February 2017, TMC, North Region, (PM)



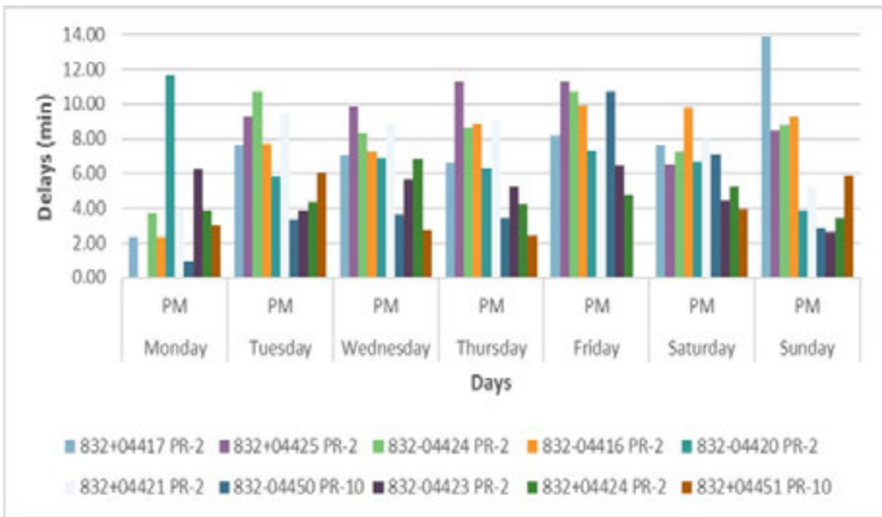
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.207: March 2017, TMC, North Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

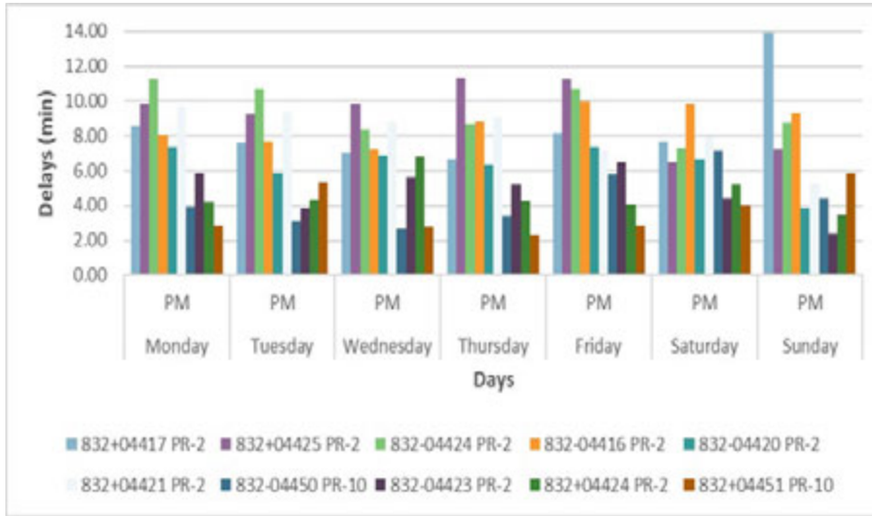
Figure K.208: April 2017, TMC, North Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

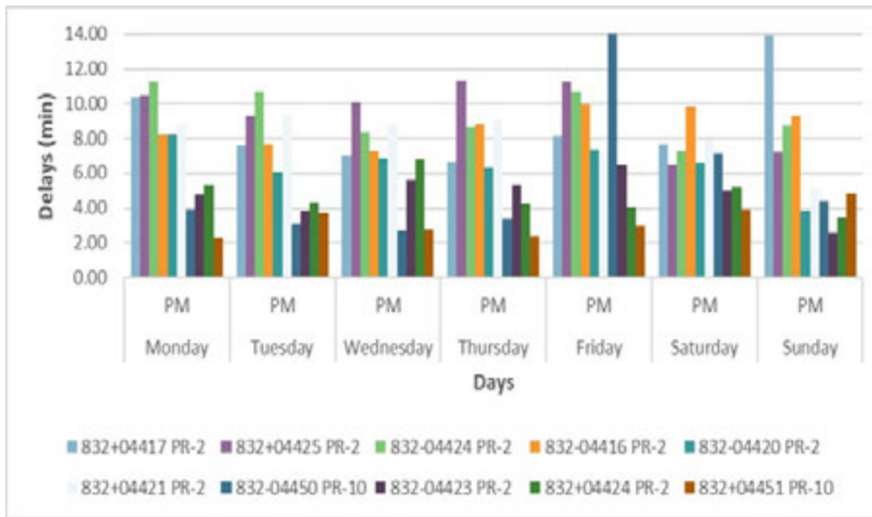
From May to August 2017, the average delay throughout the week was of 5.7 minutes. Segments with delays above average were: 832+04417, 832+04425, 832-04424, and 832-04416 with values ranging between 6.0-10.0 minutes (Figure K.209 to Figure K.212).

Figure K.209: May 2017, TMC, North Region, (PM)



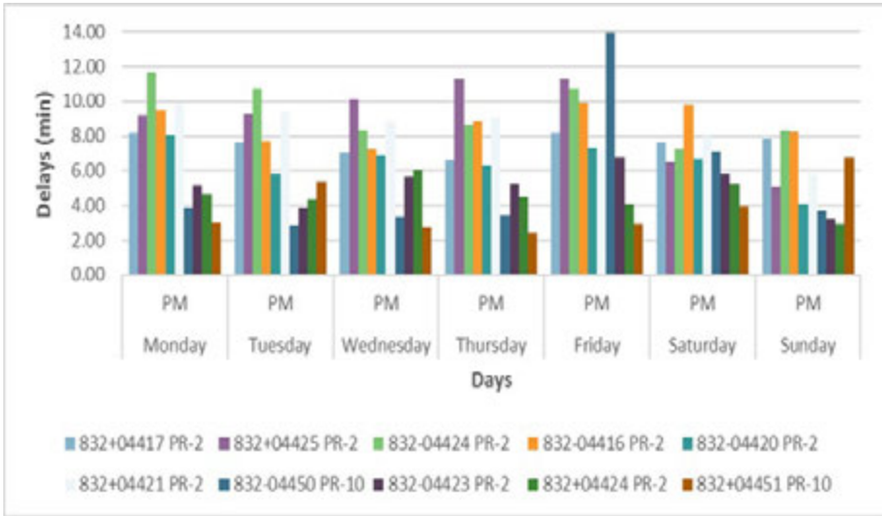
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.210: June 2017, TMC, North Region, (PM)



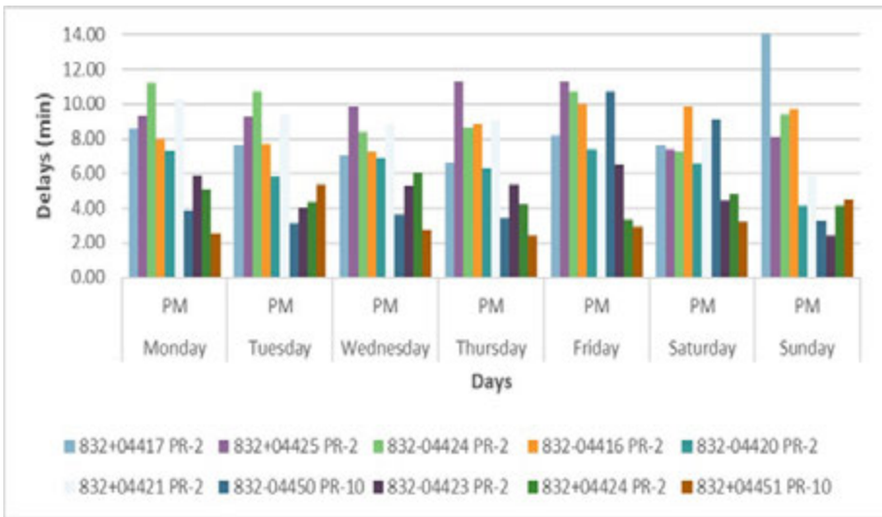
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.211: July 2017, TMC, North Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.212: August 2017, TMC, North Region, (PM)

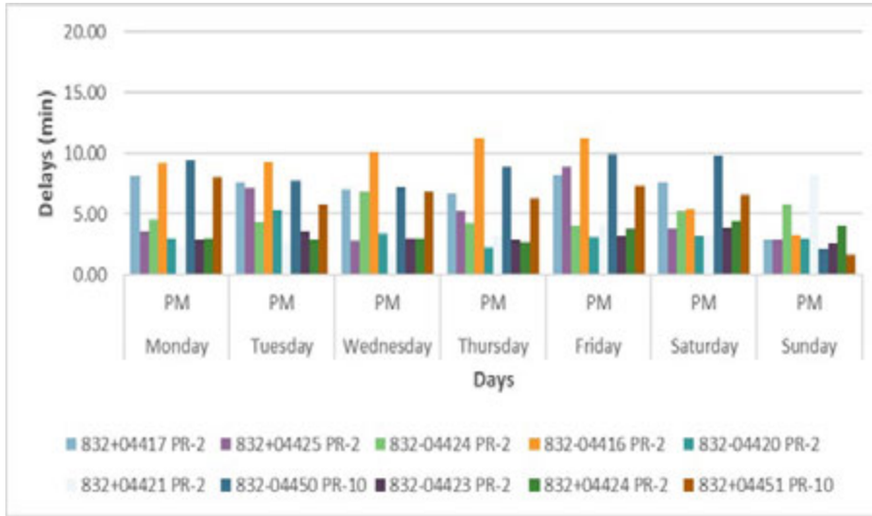


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months between January and April 2018, average delay of segments was of 5.6 minutes. Segments with delays above average were: 832+04417, 832+04425, 832-04424, and 832-04416 with values ranging between 7.0-10.0 minutes.

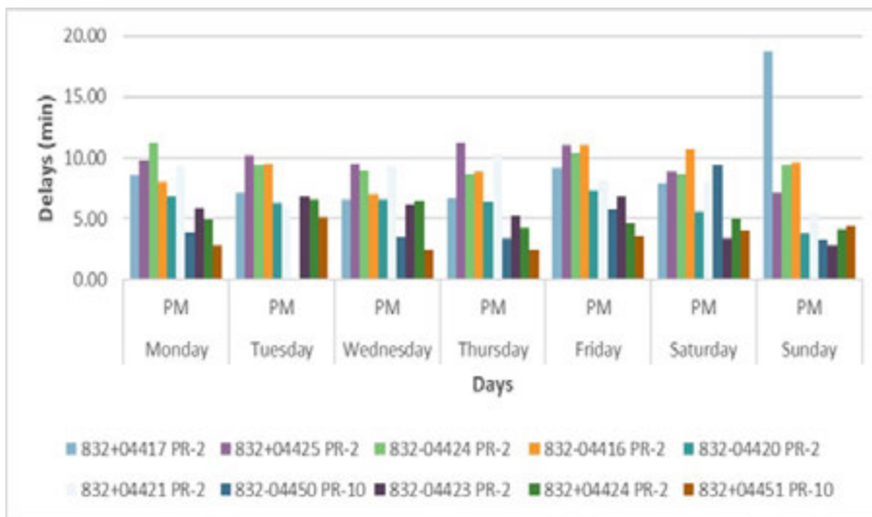
For January, segments with delays above average were 832+04417, 832-04416, 832-04420 with values between 7.0-10.0 minute (Figure K.213 to Figure K.216).

Figure K.213: January 2018, TMC, North Region, (PM)



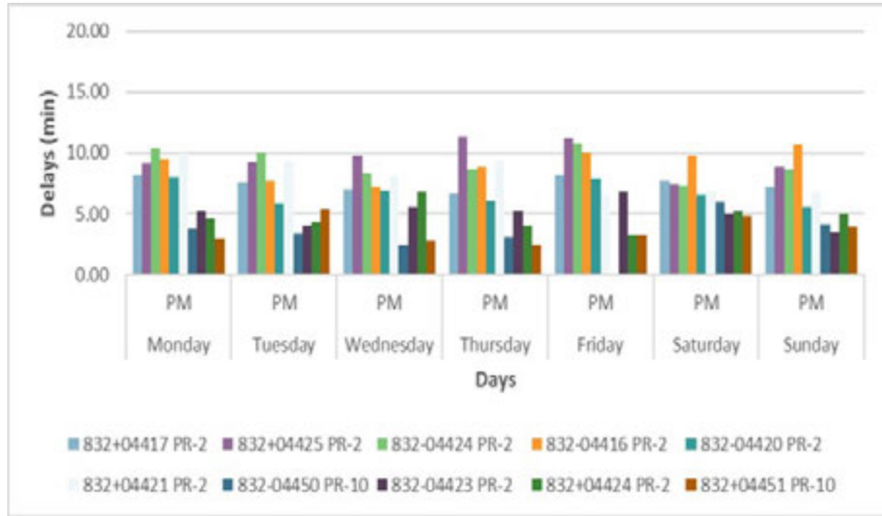
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.214: February 2018, TMC, North Region, (PM)



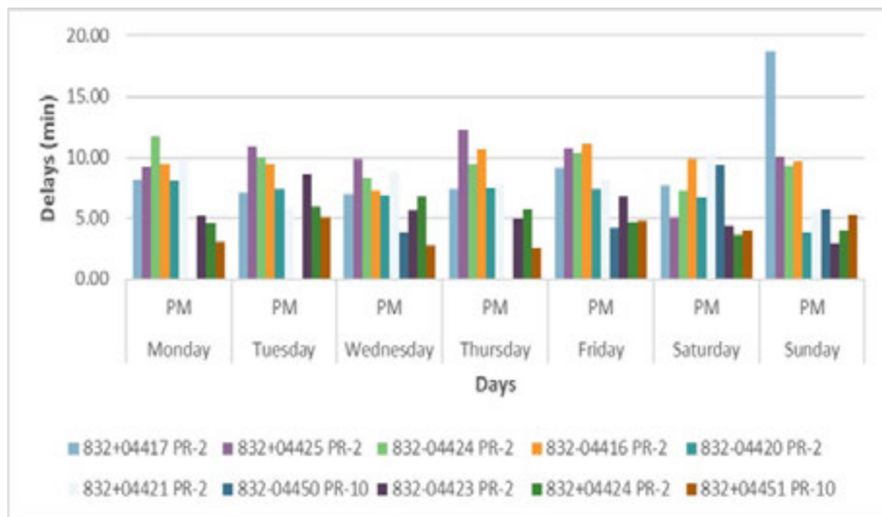
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.215: March 2018, TMC, North Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.216: April 2018, TMC, North Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Results for North Region bottlenecks

For the North region, all TMC segments studied were located along PR-2, PR-22 and PR-10. The top 10 TMC segments with the worst delays were along PR-2 and PR-10, with delay values ranging between 2.0-8.0 minutes on average per month. The periods of the day with the highest delays were past-midday period with 5.6 minutes, night period with 5.4 minutes, and mid-day period with 4.8 minutes. The morning period reported a lower average of 2.7 minutes delay.

- For the morning period, segments with delays above average, ranging between 6.0-8.0 minutes were: 832+04417 eastbound located in section of PR-2 between Quebradillas and Camuy; 832+04425 eastbound and 832-04424 westbound, both located along PR-2 section between Arecibo and Barceloneta counties; and 832+04421 eastbound along PR-2 section between Arecibo and Hatillo.
- For the mid-day period, segments with delays above average, ranging around 3.0 minutes were: 832+04425, 832+04421 eastbound, first one located along PR-2 in section between Arecibo and Hatillo, and second in section along Barceloneta county; 832-04424 westbound, 832+04424 eastbound along PR-2, first one in section at central Arecibo, and second between Arecibo and Barceloneta counties.
- For the past-midday period, segments with delays above average, ranging between 5.0-7.0 minutes were: 832+04417, 832+04425, 832-04424, and 832-04416. Segment 832-04416 is located westbound along PR-2 in section between Quebradillas and Camuy counties.
- For the night period, segments with delays above average, ranging between 6.0-8.0 minutes were the same as the mid-day period, adding also segment 832+04421, also present in night and morning period as segment with delay above average.

Thus, overall, segments with highest recurrence of delays throughout periods of the day were 832+04417, 832+04425, 832-04424, and 832+04421, located in three sections of PR-2: between Quebradillas and Camuy, between Hatillo and Arecibo, and between Arecibo and Barceloneta counties.

SOUTH

In the South, the data used in the preparation of the graphs are from the roads PR-2, PR-2 E, PR-2 O, PR-52 O and Ave. Tito Castro.

Table K.12 to Table K.14 shows roads, months and years selected and the studied periods.

Table K.12: Roads

TCM	Road name
832-04299	PR-2 E
832-04298	PR-2
832-04819	Avenida Tito Castro
832+04820	Avenida Tito Castro
832+04300	PR-2 O
832-04173	PR-52 O

832-04170	PR-52 O
832-04297	PR-2
832+04174	PR-52 E
832+04236	PR-2 O

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.13: Months and years selected

2016	2017	2018
September	January	January
October	February	February
November	March	March
December	April	April
	May	
	June	
	July	
	August	

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.14: Studied Periods

Night Period (NT)	Morning Period (AM)
Midday Period (MD)	Past-midday Period (PM)

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Bottleneck Analysis

Night Period (NT)

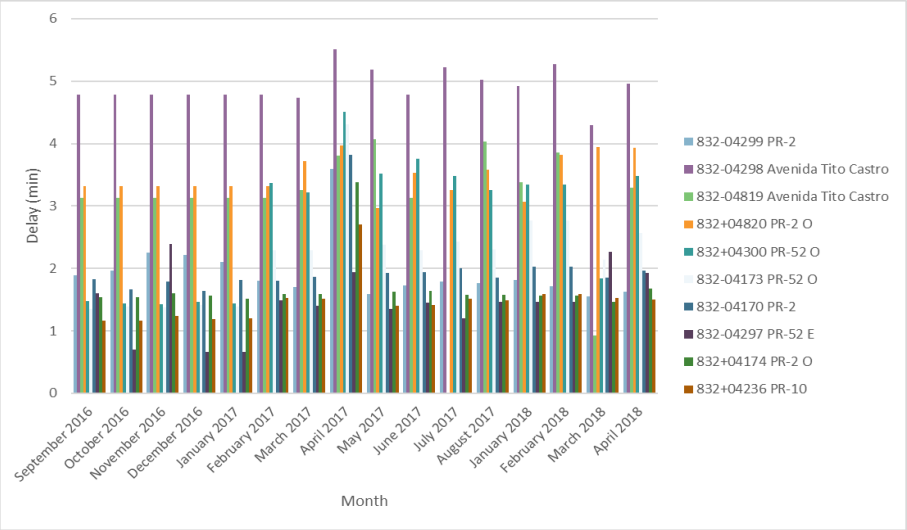
Segments average delay was of 1.5 minutes added to the reference travel time for the night period (NT), from 18:00-7:00.

Between February and August 2017, some segments increased and doubled their average delay with 3.2 minutes. Some examples of this increase are TMC 832+04820 and 832+04300, as well as the highest ranking TMC 832-04298 for Tito Castro Avenue with an average delay of 5.0 minutes, as seen in Figure K.217 and Figure K.218 below.

Figure K.217: South Location

Source: SDG, based on NPMRDS Analytics

Figure K.218: Average Delays, South TPR, NT Period



Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Night Period (NT) – Weekly

For the last four months of 2016, the average delay during night period in the South region was between 2.0 and 3.0 minutes. However, months varied with segments 832-04297 in PR-2 ranking higher than the average, ranging between 4.0 – 6.0 minutes delay.

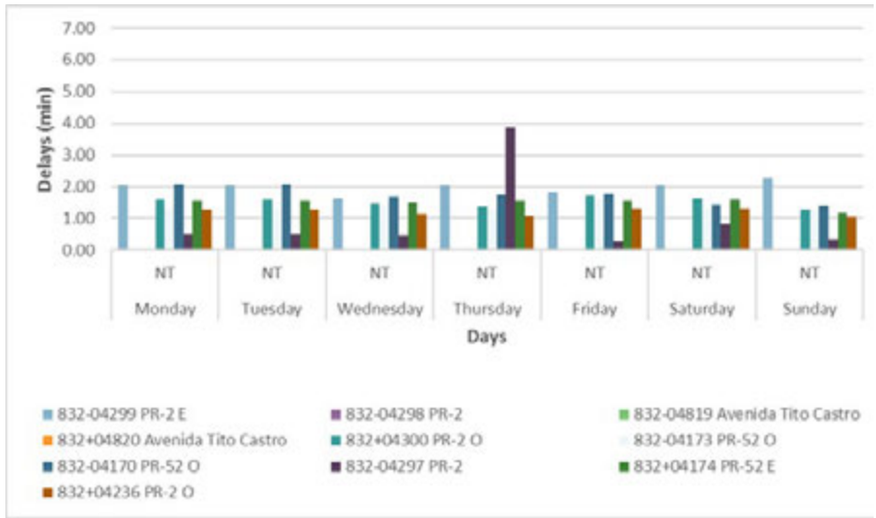
For September 2016, the highest-ranking segments had peaks on Thursday, with 832-04297 in PR-2 recording 4.0 minutes delay.

For October 2016, the delays throughout the week remained below 2.0 minutes.

For November, the highest-ranking segment was 832-04297 in PR-2, on Thursday through a delay of 6.0 minutes.

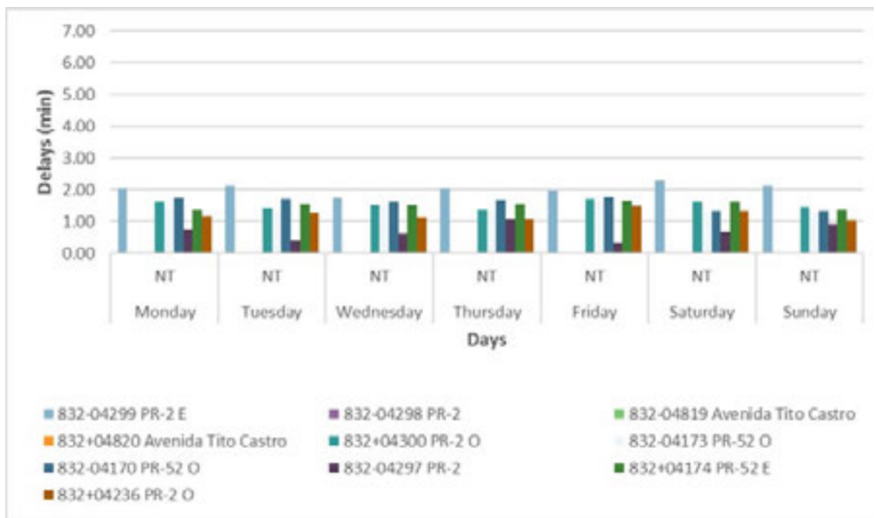
For December, all segments had delays below 3.0 minutes the entire week (Figure K.219 to Figure K.222).

Figure K.219: September 2016, TMC, South Region, (NT)



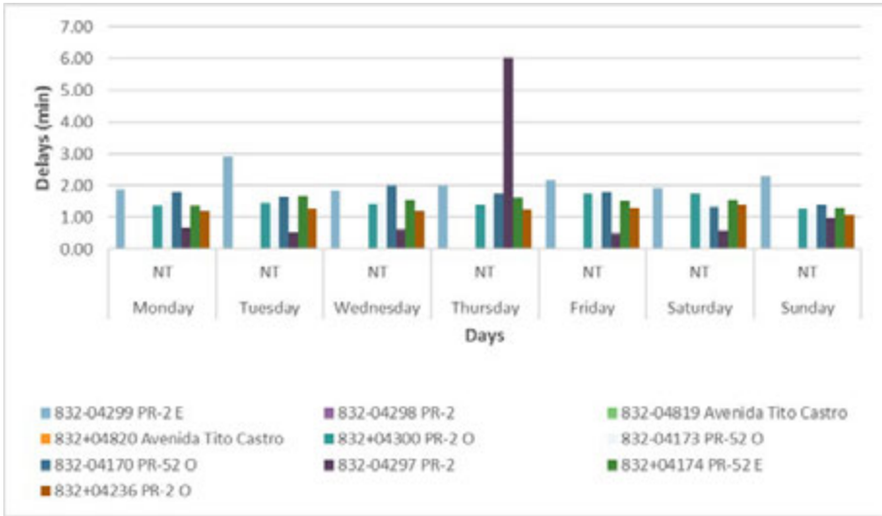
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.220: October 2016, TMC, South Region, (NT)



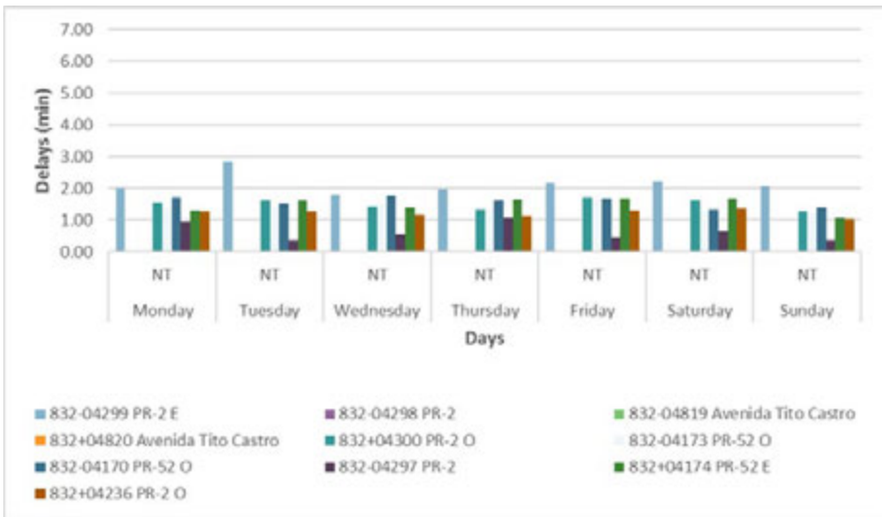
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.221: November 2016, TMC, South Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.222: December 2016, TMC, South Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months of 2017, between January and April, the average delay for most segments was below 4.0 minutes. Segments 832-04298 in PR-2, 832+04300 in PR-2 O, 832+04174 in PR-52 E and 832-04173 in PR-52 O ranked above the average, ranging between 4.0– 10.0 minutes delay.

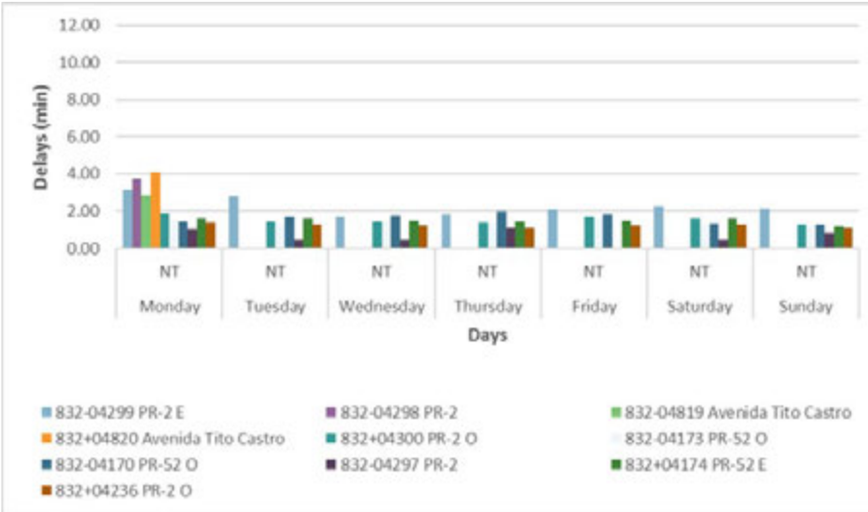
For January, the highest delay happened on Monday with an average of 4.0 minutes. The rest of the week the delays remained constant below 4.0 minutes.

For February, the highest-ranking segments were 832-04298 in PR-2 and 832+04300 in PR-2 O with an average of 4.0 minutes and a peak on Wednesday and Saturday of almost 6.0 minutes.

For March, the highest-ranking segment was 832+04300 in PR-2 with an average of 6.0 minutes delay on Saturday.

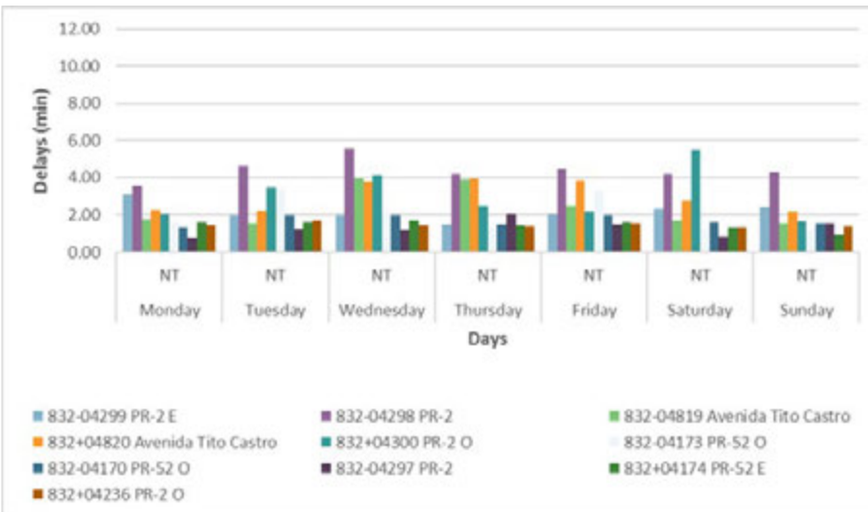
For April, the highest-ranking segments were 832-04299 in PR-2 E, 832-04298 in PR-2, 832+04300 in PR-2 O, 832-04173 in PR-52 O and 832-04170 in PR-52 O reaching a delay of almost 10 minutes on Tuesday (Figure K.223 to Figure K.226).

Figure K.223: January 2017, TMC, South Region, (NT)



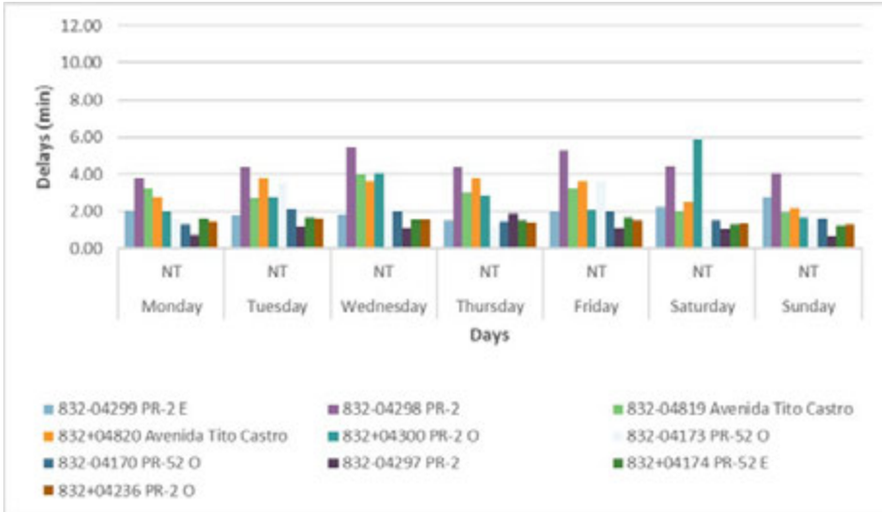
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.224: February 2017, TMC, South Region, (NT)



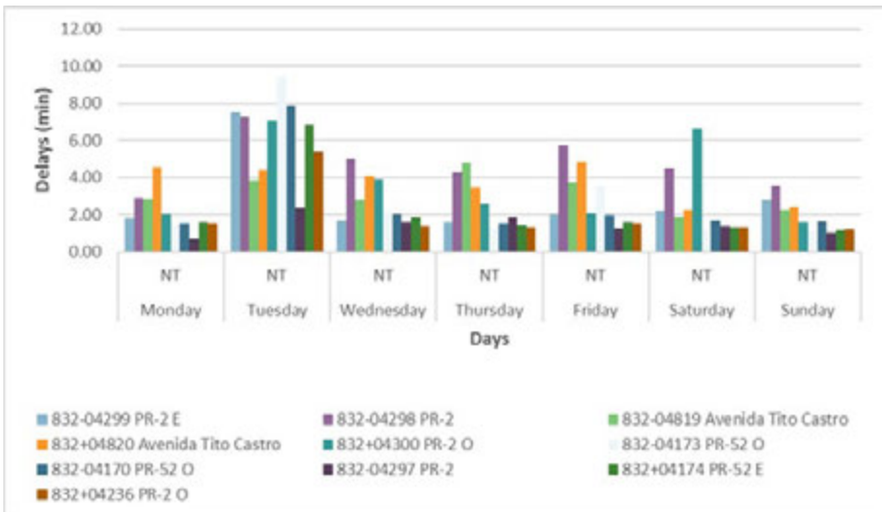
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.225: March 2017, TMC, South Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

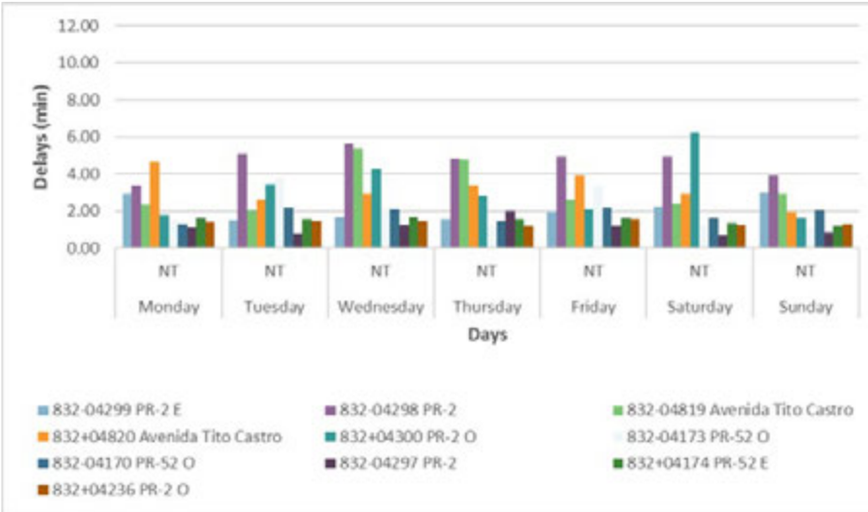
Figure K.226: April 2017, TMC, South Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

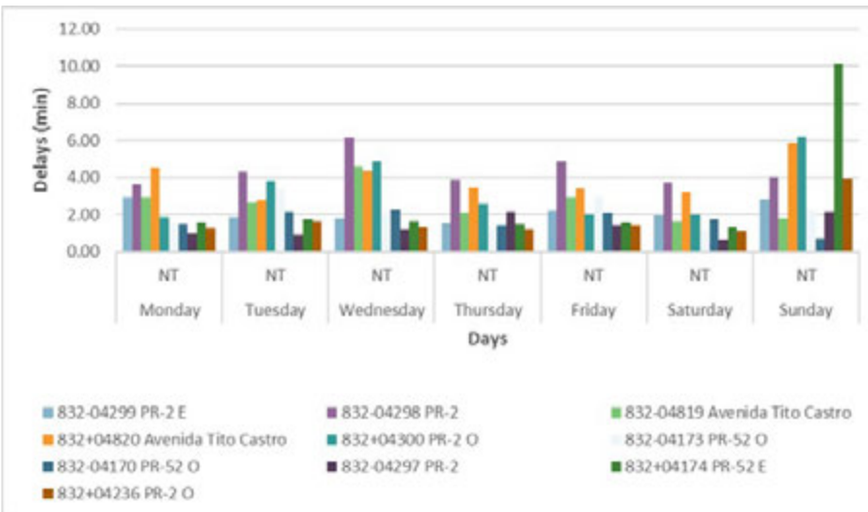
From May to August 2017, the average delay was below 6.0 minutes. The highest-ranking segments were 832+04174 in PR-52 E and 832+04300 in PR-2 O with average delays ranging between 6.5 – 10 minutes (Figure K.227 to Figure K.230).

Figure K.227: May 2017, TMC, South Region, (NT)



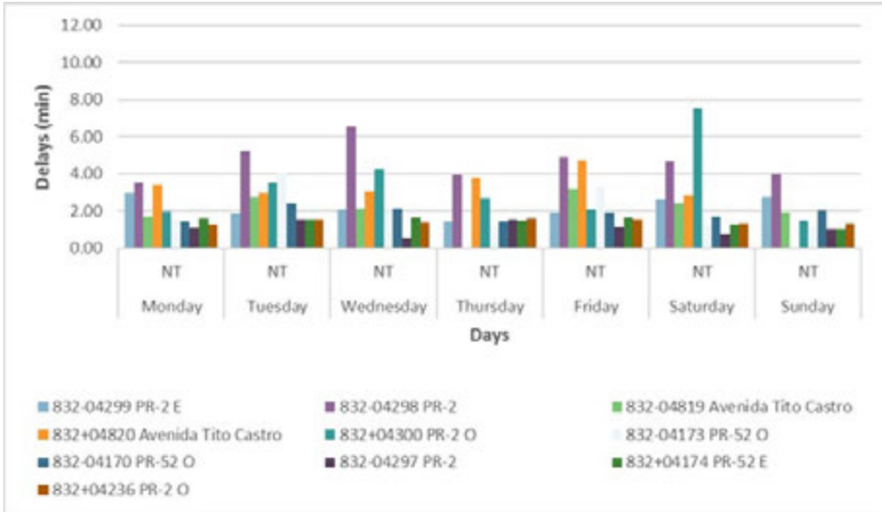
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.228: June 2017, TMC, South Region, (NT)



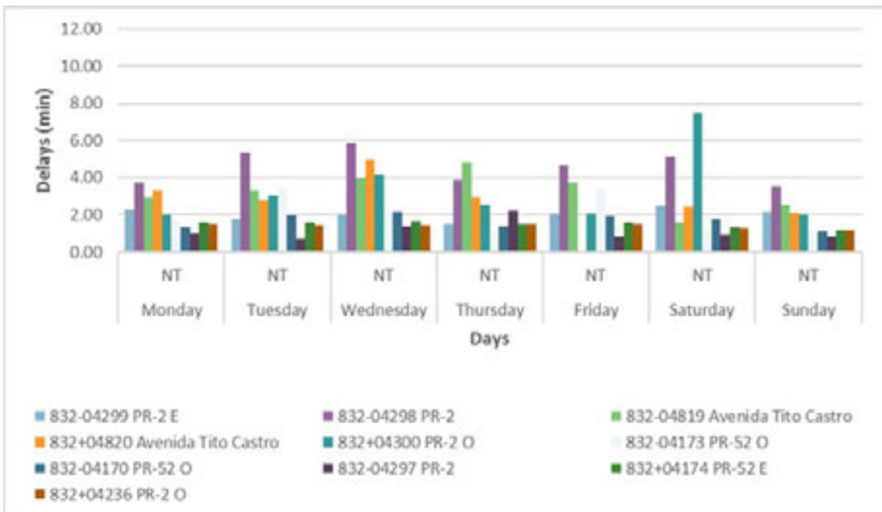
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.229: July 2017, TMC, South Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

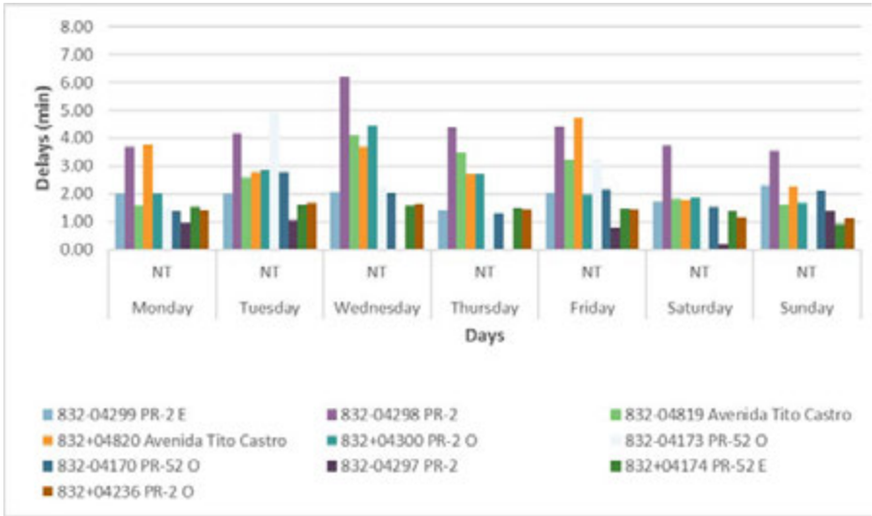
Figure K.230: August 2017, TMC, South Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

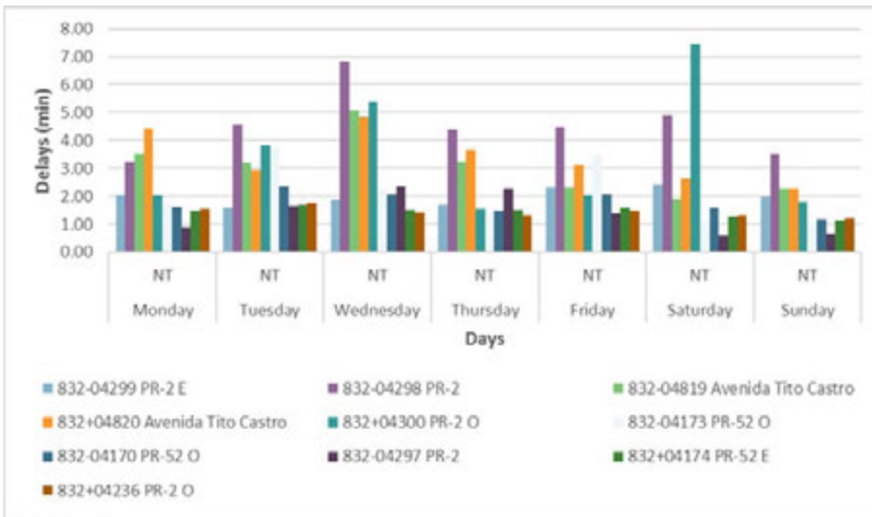
For the first four months between January and April 2018, average delay of segments was below 5.0 minutes, with highest ranking segments being 832+04298 in PR-2 and 832+04300 in PR-2 O with an average ranging from 6.0 -7.0 minutes (Figure K.231 to Figure K.234).

Figure K.231: January 2018, TMC, South Region, (NT)



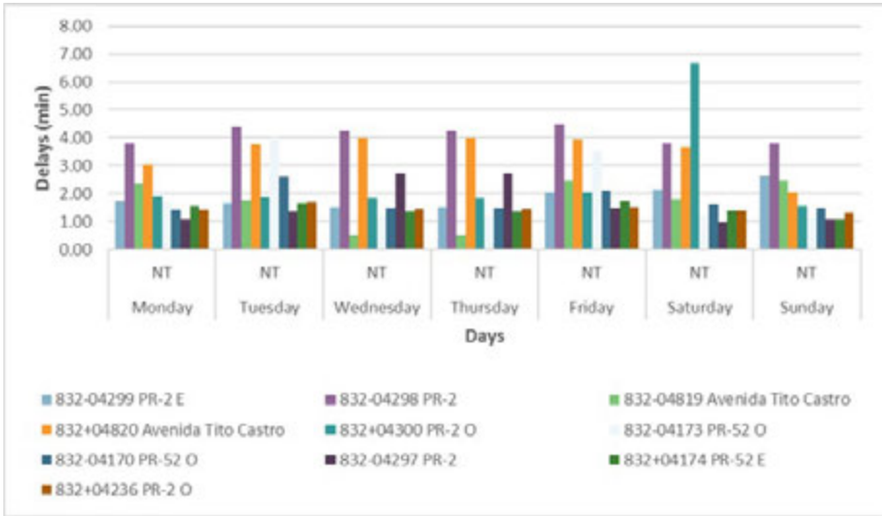
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.232: February 2018, TMC, South Region, (NT)



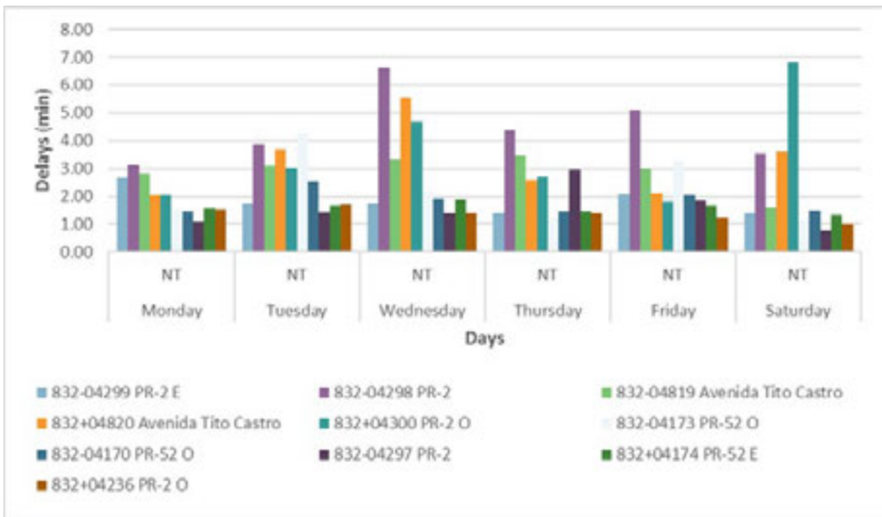
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.233: March 2018, TMC, South Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.234: April 2018, TMC, South Region, (NT)

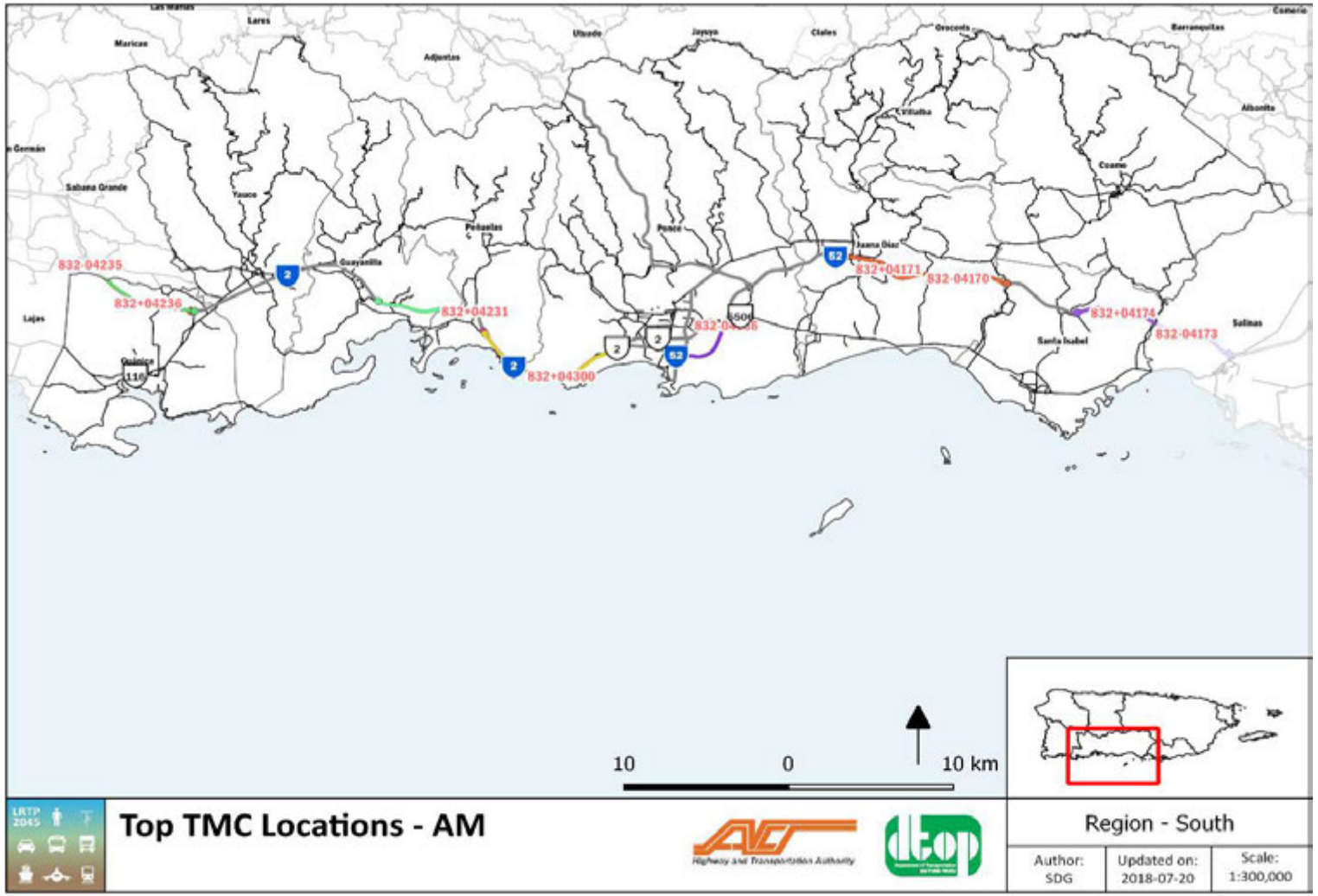


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM)

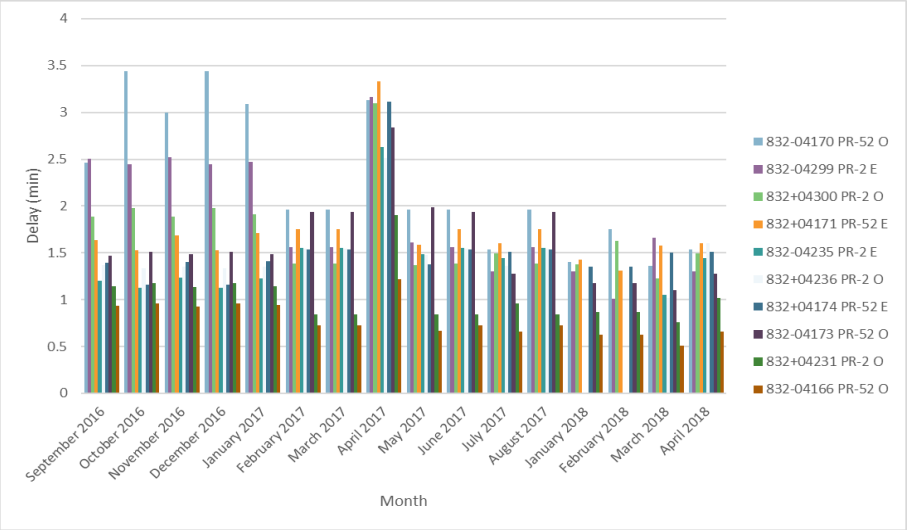
Most segments had average delays of 1.5 minutes for the morning period (AM), from 7:00-9:00 a.m. There are some exceptions such as TMCs 832-04170 and 832-04299, between October 2016 and January 2017, ranking higher with 3.2 minutes and 2.45 minutes respectively. For subsequent months, all TMC recorded delays are lower than 2.0 minutes, except for April 2017, when the average delay increased to 3.0 minutes, as seen in Figure K.235 and Figure K.236 below.

Figure K.235: South Location, AM Period



Source: SDG, based on NPMRDS Analytics

Figure K.236: Average Delays, South TPR, AM Period

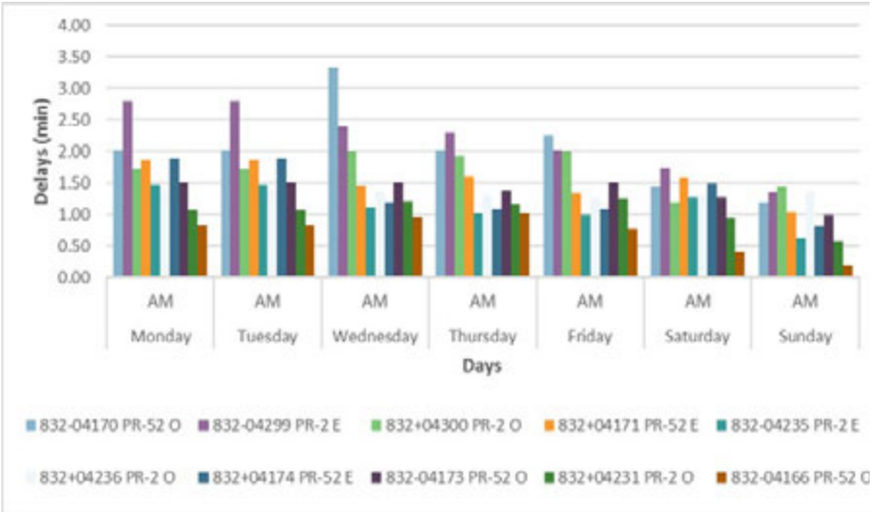


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM) - Weekly

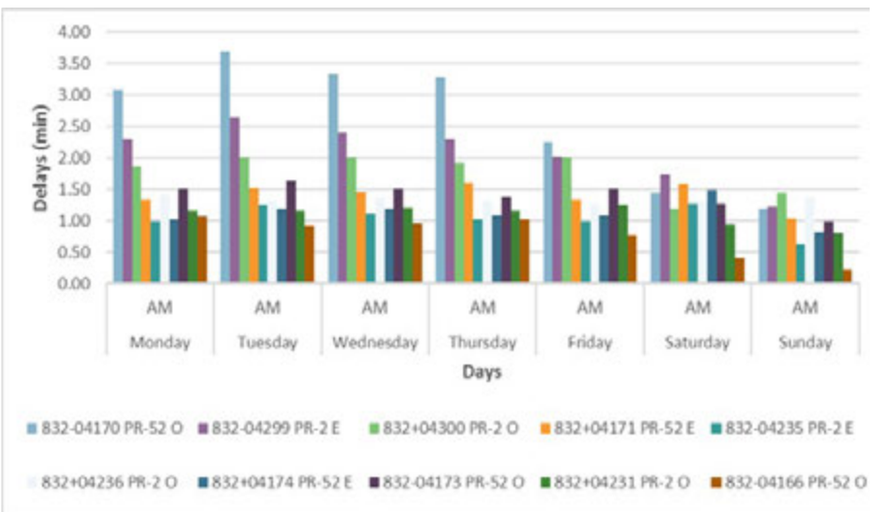
For the last four months of 2016, the average delay for the morning period in the South region was 2.0 minutes for most segments. Some of the highest-ranking segments were 832-04170 in PR-52 O with an average delay above 3.0 minutes, followed by 832-04299 in PR-2 E with an average delay ranging from 2.0 – 2.5 minutes (Figure K.237 to Figure K.240).

Figure K.237: September 2016, TMC, South Region, (AM)



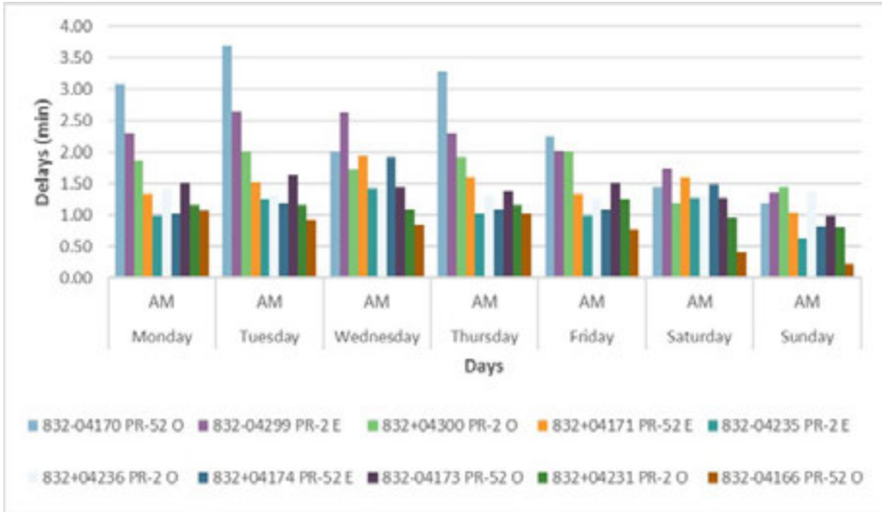
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.238: October 2016, TMC, South Region, (AM)



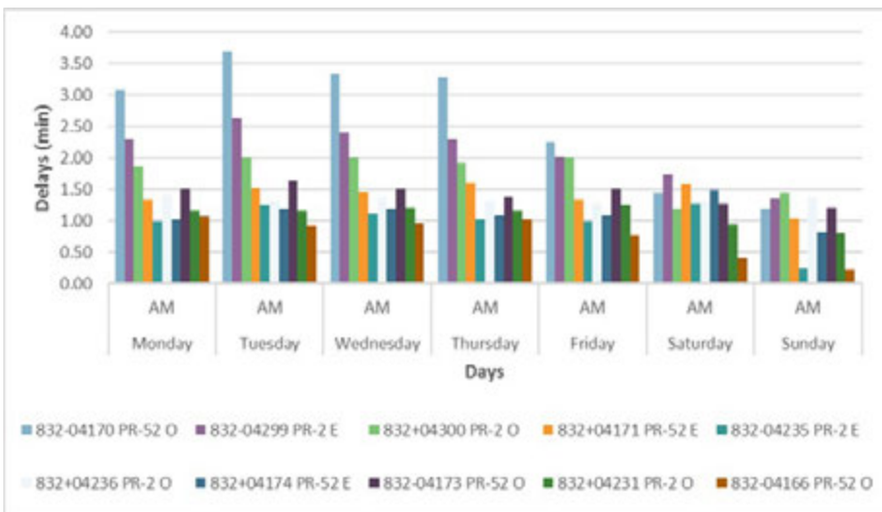
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.239: November 2016, TMC, South Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.240: December 2016, TMC, South Region, (AM)



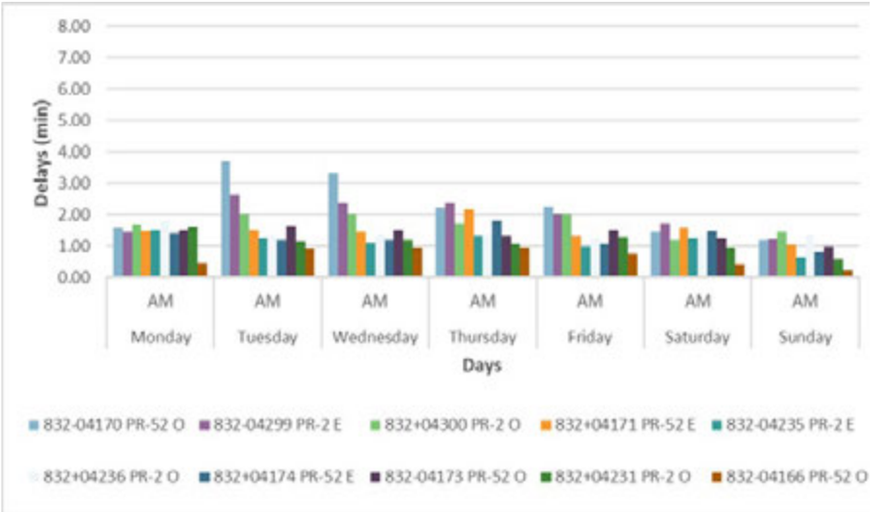
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, most segments delays were below 2.0 minutes, with the highest-ranking segments ranging between 1.0 – 7.2.0 minutes on April.

Among the segments ranking higher was 832+04300 in PR-2 O, with average delays ranging between 2.0 – 7.0 minutes during April, and below 3.0 minutes for January, February and March 2017.

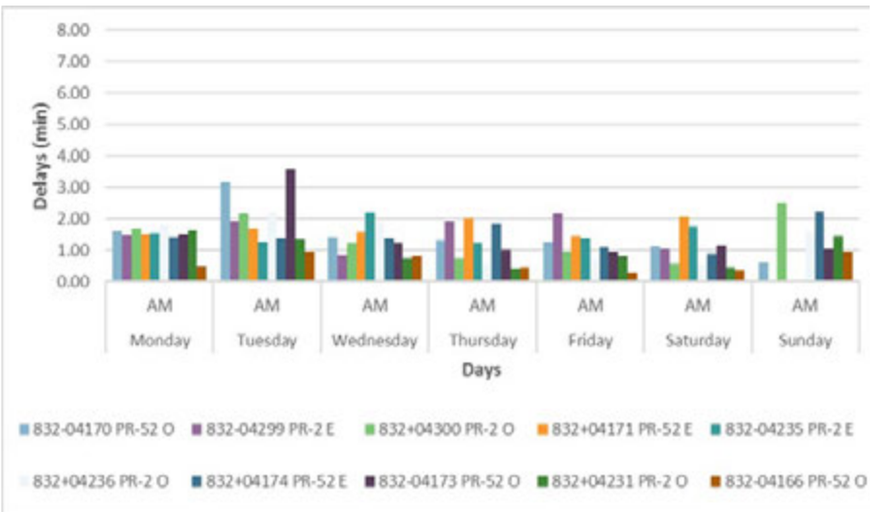
Segment 832-04173 in PR-52 O had average delays ranging between 1.0 – 6.0 minutes from January through April 2017 (Figure K.241 to Figure K.244).

Figure K.241: January 2017, TMC, South Region, (AM)



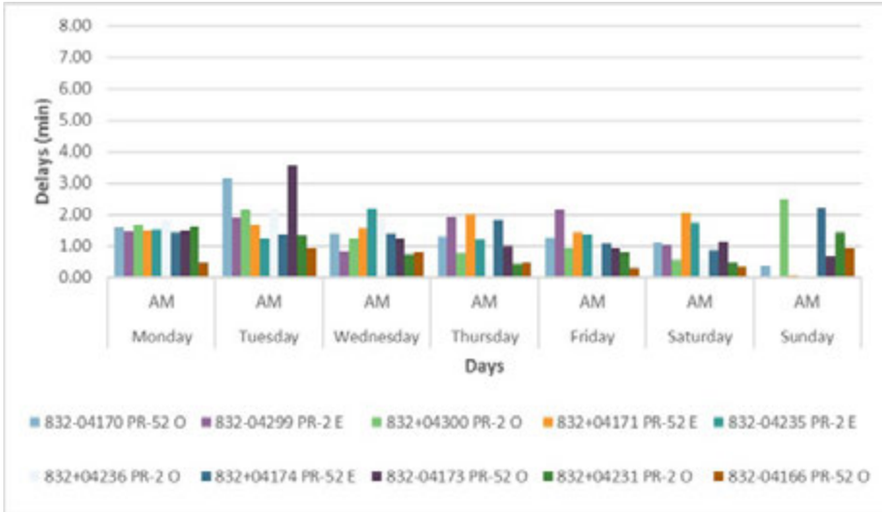
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.242: February 2017, TMC, South Region, (AM)



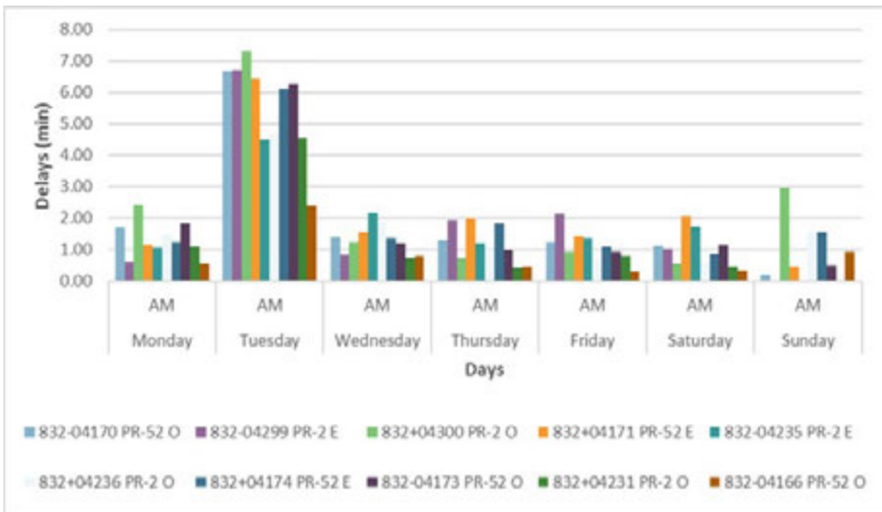
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.243: March 2017, TMC, South Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

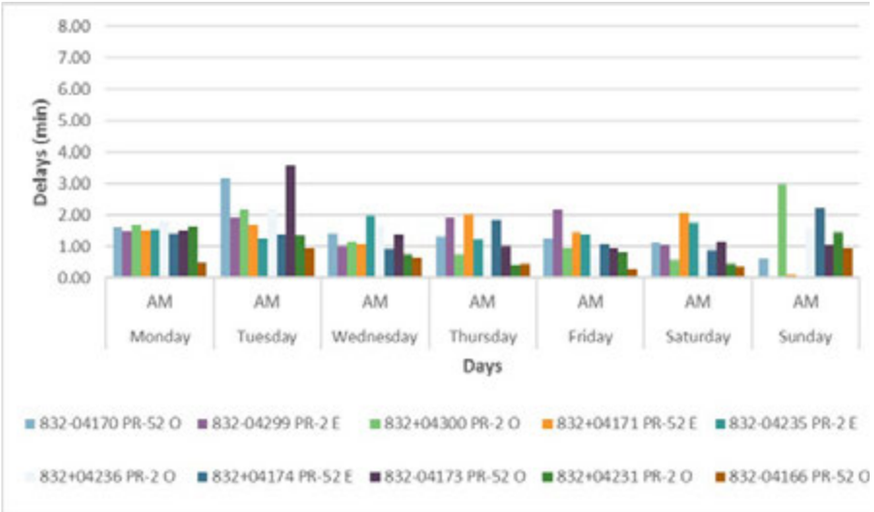
Figure K.244: April 2017, TMC, South Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

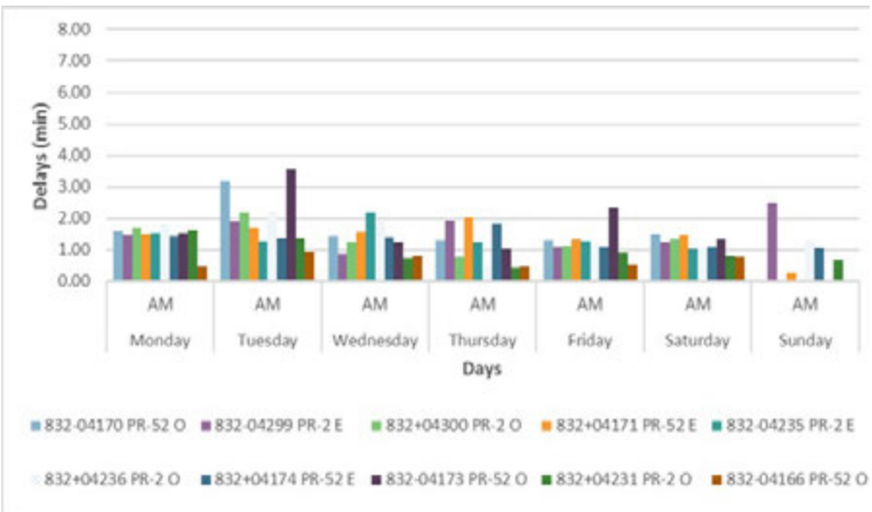
From May to August 2017, the average delay for most segments was below 2.0 minutes, with the highest-ranking segments 832-04173 in PR-52 O and 832-04170 in PR-52 O recording average delays between 0.5 – 3.5 minutes delay on Tuesday (Figure K.245 to Figure K.248).

Figure K.245: May 2017, TMC, South Region, (AM)



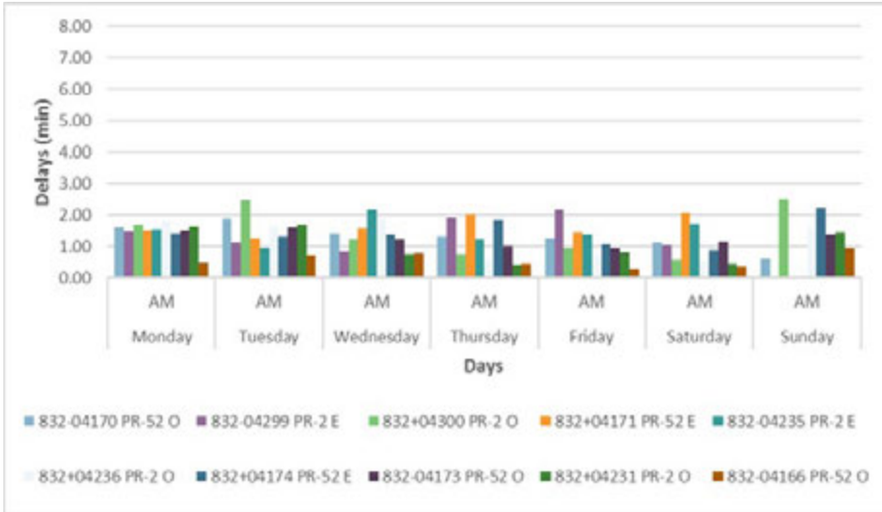
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.246: June 2017, TMC, South Region, (AM)



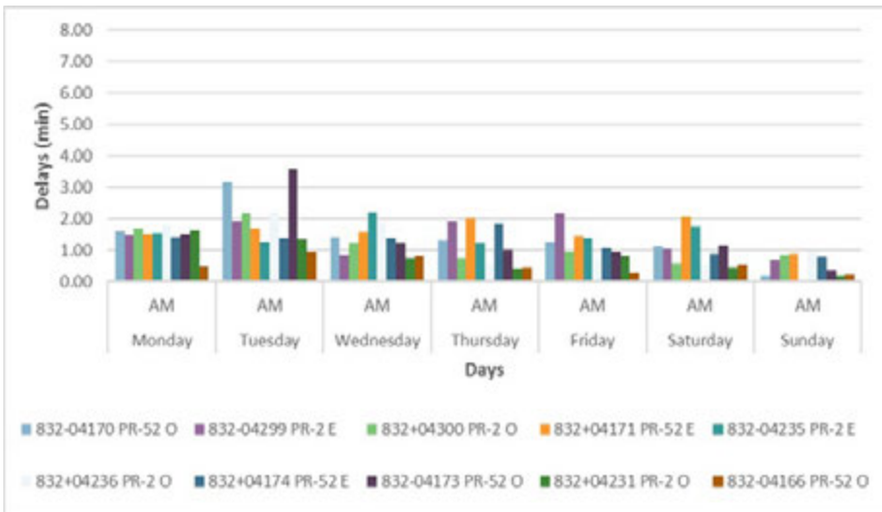
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.247: July 2017, TMC, South Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

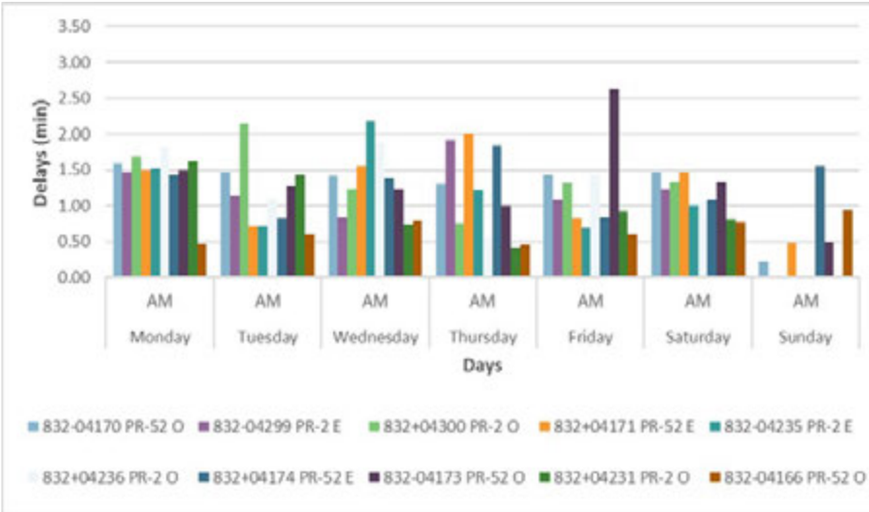
Figure K.248: August 2017, TMC, South Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

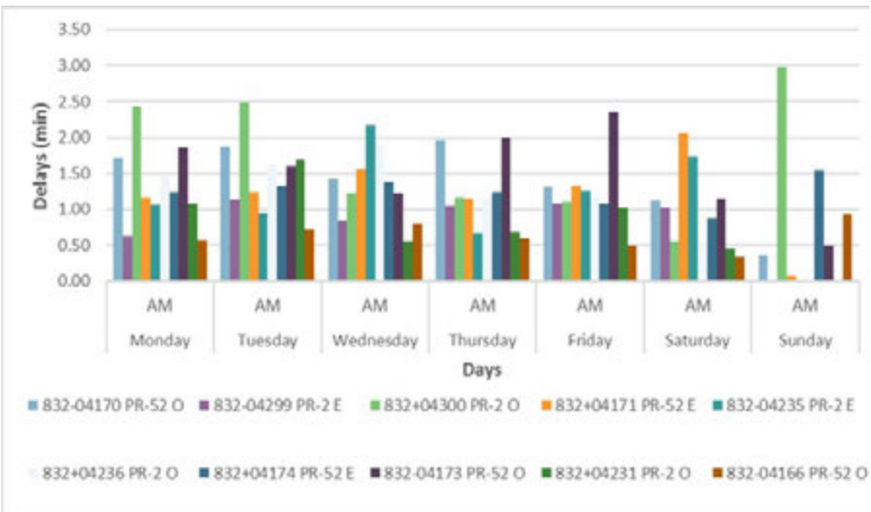
For the first four months between January and April 2018, average delay for most segments was below 2.5 minutes, with the highest-ranking segment 832+04300 in PR-2 O recording average delays between 0.5 – 3.0 minutes delay from Monday, Tuesday and Sunday (Figure K.249 to Figure K.252).

Figure K.249: January 2018, TMC, South Region, (AM)



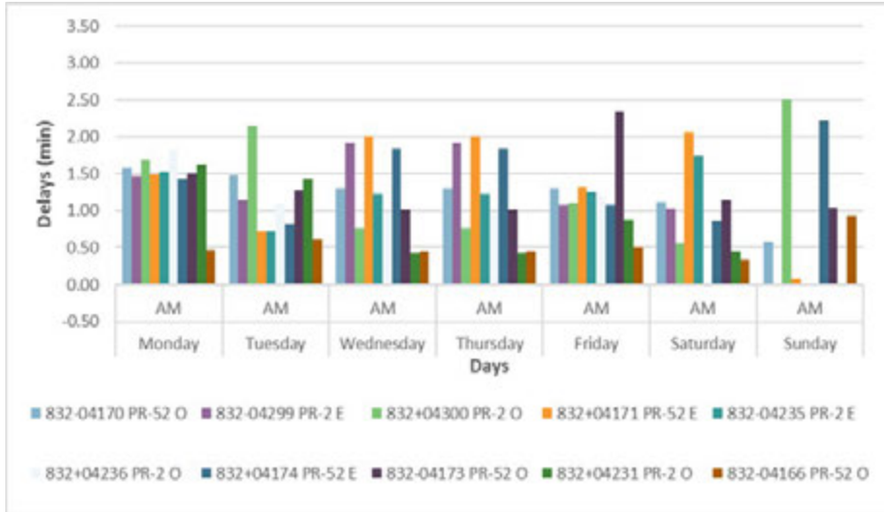
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.250: February 2018, TMC, South Region, (AM)



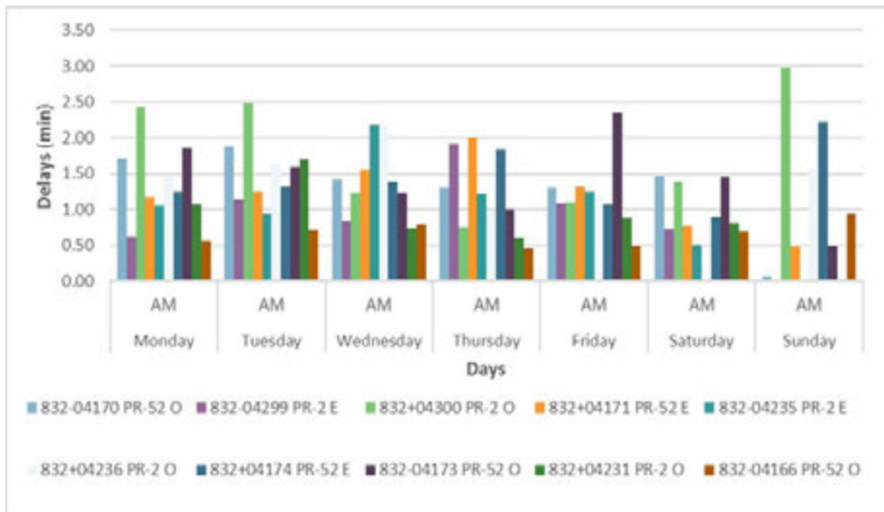
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.251: March 2018, TMC, South Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.252: April 2018, TMC, South Region, (AM)

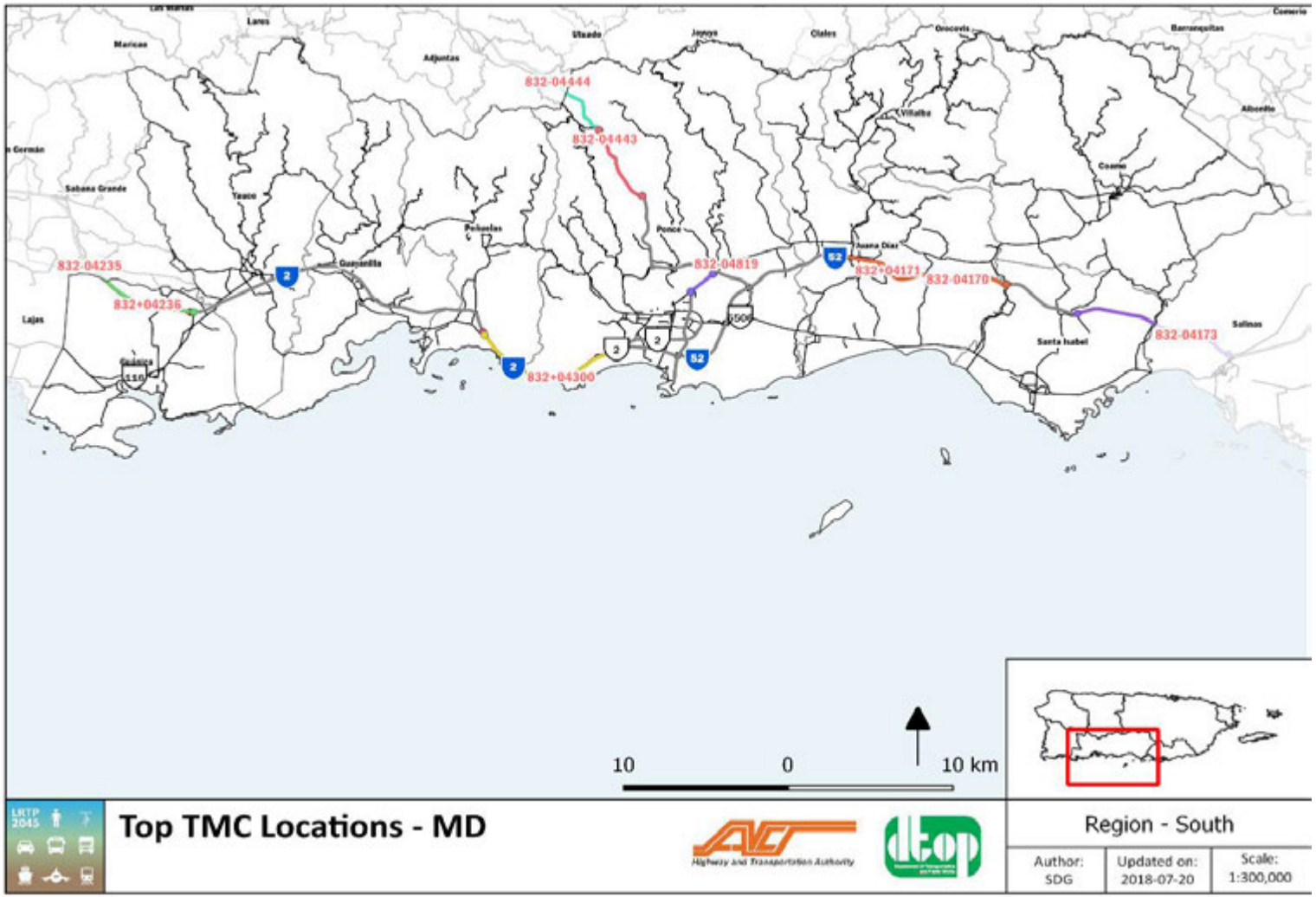


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD)

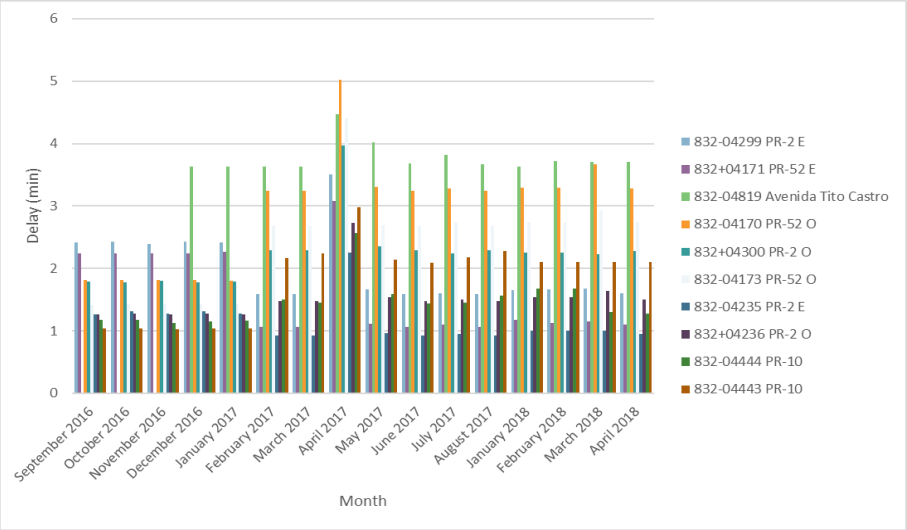
Segments averaged delays between 1.0 – 2.0 minutes for the mid-day (MD), from 9:00-15:00. TMC 832-04299 and 832+04171 ranked the highest for the last four months of 2016, averaging a delay of 2.2 minutes. TMC 832-04819 and 832-04170 were the higher ranking TMCs from February 2017 to August 2017, averaging delays of 3.0 – 4.0 minutes, as seen in Figure K.253 and Figure K.254 below.

Figure K.253: South Location, MD Period



Source: SDG, based on NPMRDS Analytics

Figure K.254: Average Delays, South TPR, MD Period

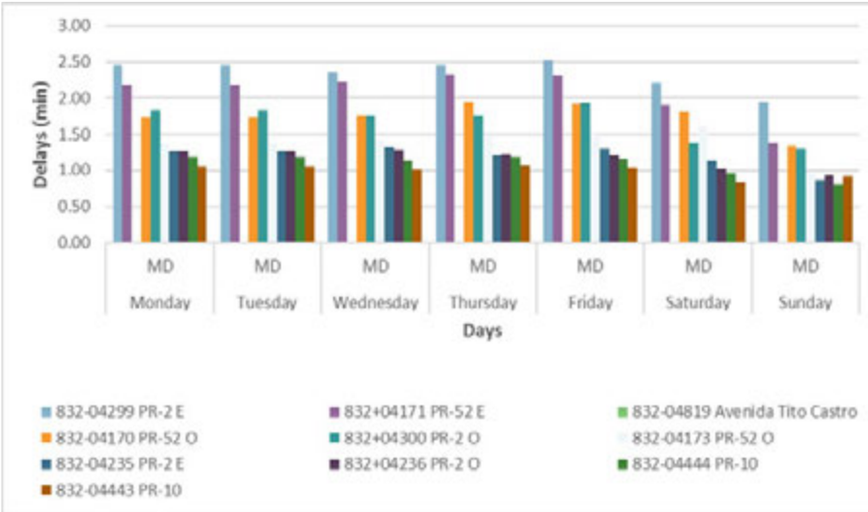


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD) - Weekly

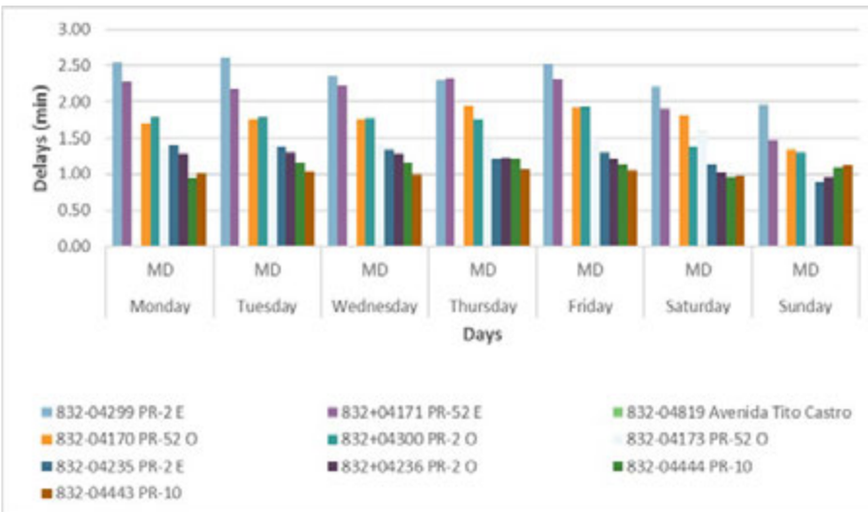
For the last four months of 2016, the average delay for the mid-day period in the South region was 1.5 minutes for most segments. Some of the highest-ranking segments were 832-04299 in PR-2 E and 832+04171 in PR- 52 E with average delays ranging from 0.7– 2.5 minute, from Monday to Sunday (Figure K.255 to Figure K.258).

Figure K.255: September 2016, TMC, South Region, (MD)



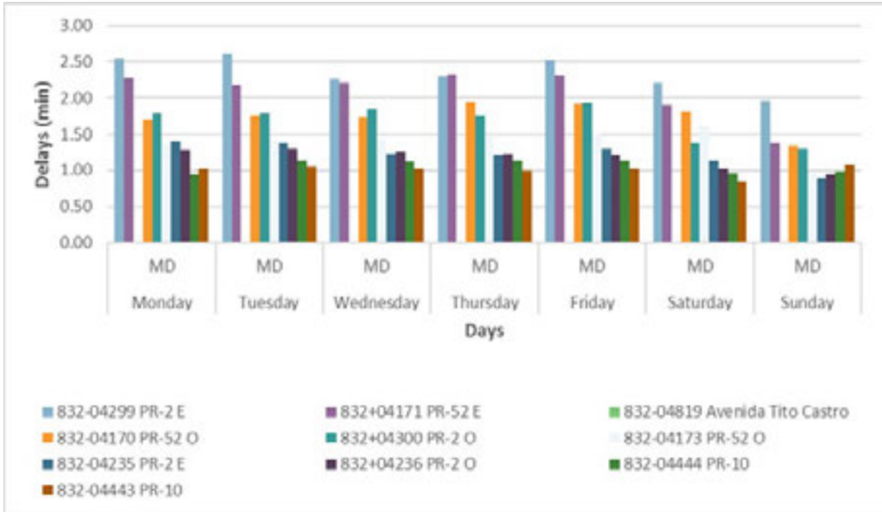
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.256: October 2016, TMC, South Region, (MD)



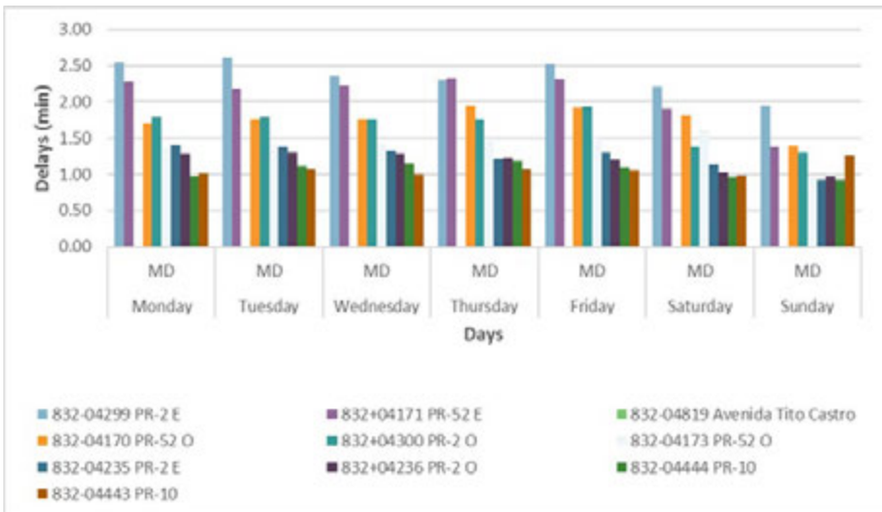
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.257: November 2016, TMC, South Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

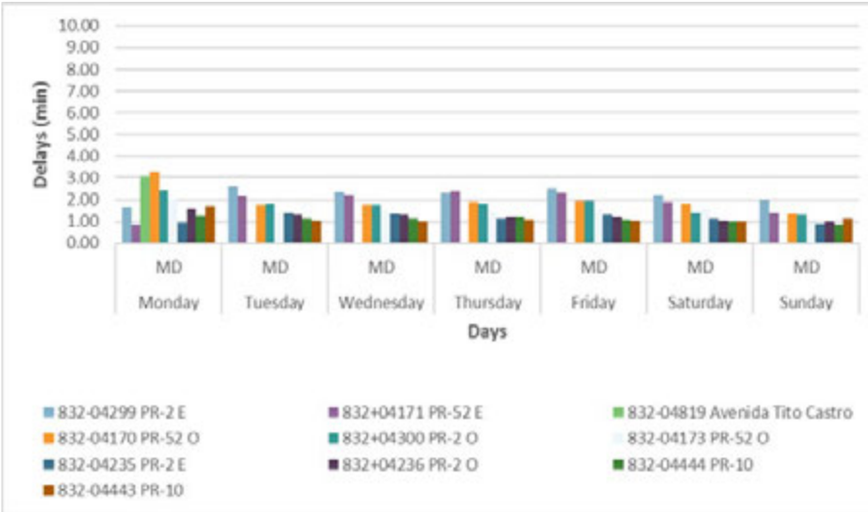
Figure K.258: December 2016, TMC, South Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

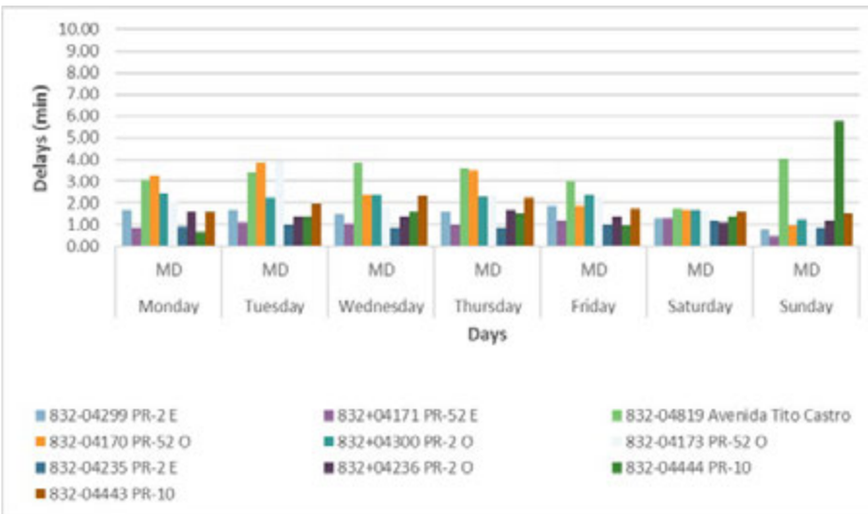
For the first months between January and April 2017, most segments had average delays below 4.0 minutes, with peaks on Tuesday and Sunday for the highest-ranking segments 832-04170 in PR-52 O, and 832-04299 PR-2 E, recording average delays between 0.5 – 9.0 minutes (Figure K.259 to Figure K.262).

Figure K.259: January 2017, TMC, South Region, (MD)



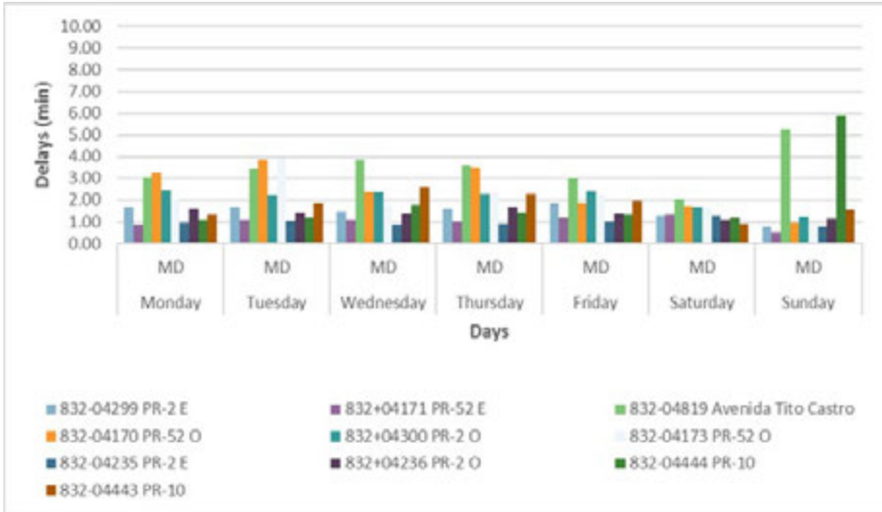
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.260: February 2017, TMC, South Region, (MD)



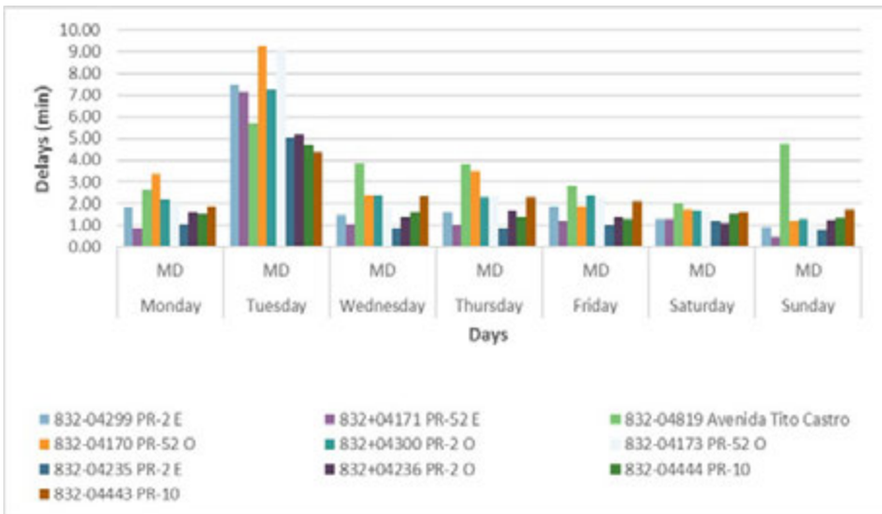
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.261: March 2017, TMC, South Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

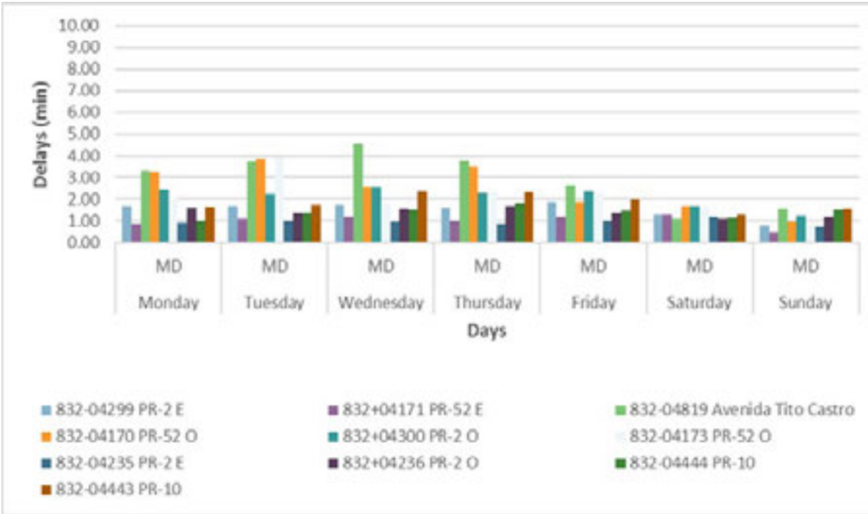
Figure K.262: April 2017, TMC, South Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

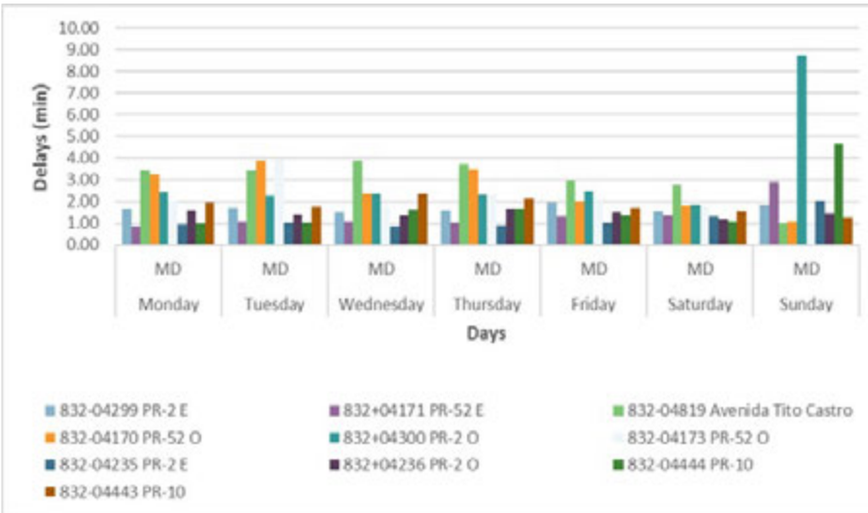
From May to August 2017, the average delay for most segments was below 3.0 minutes, with peaks on Wednesday and Sunday for the highest-ranking segments 832+04300 in PR-2 O, and 832+04444 in PR-10, recording average delays between 1.0 – 9.0 minutes (Figure K.263 to Figure K.266).

Figure K.263: May 2017, TMC, South Region, (MD)



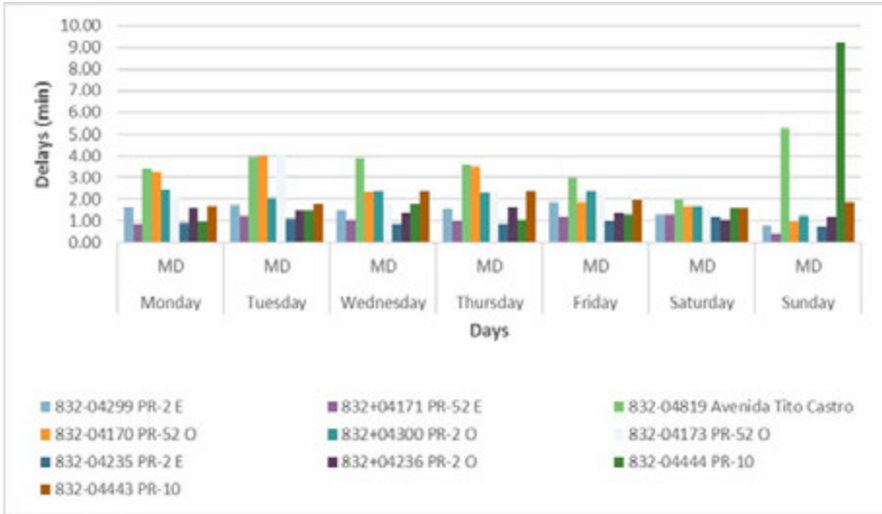
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.264: June 2017, TMC, South Region, (MD)



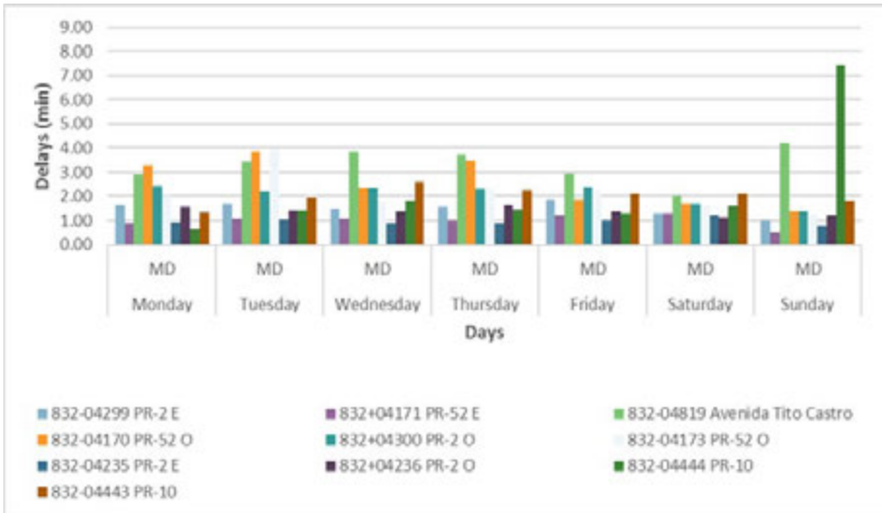
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.265: July 2017, TMC, South Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

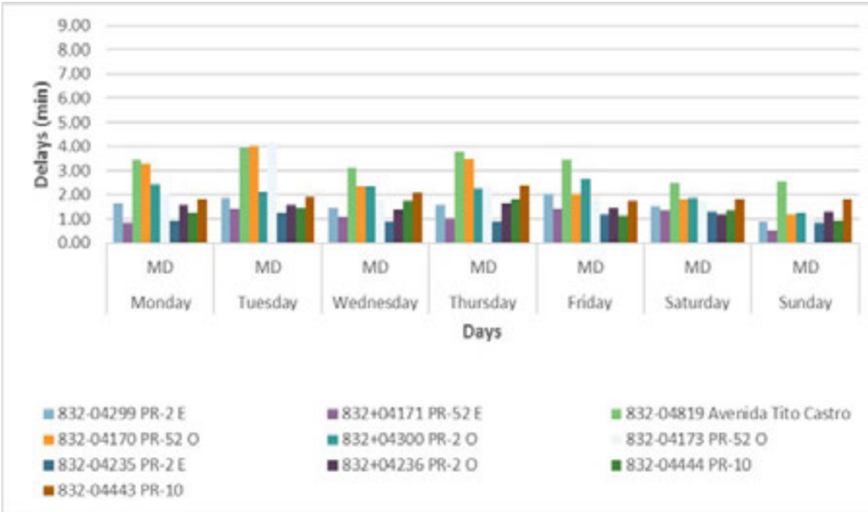
Figure K.266: August 2017, TMC, South Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

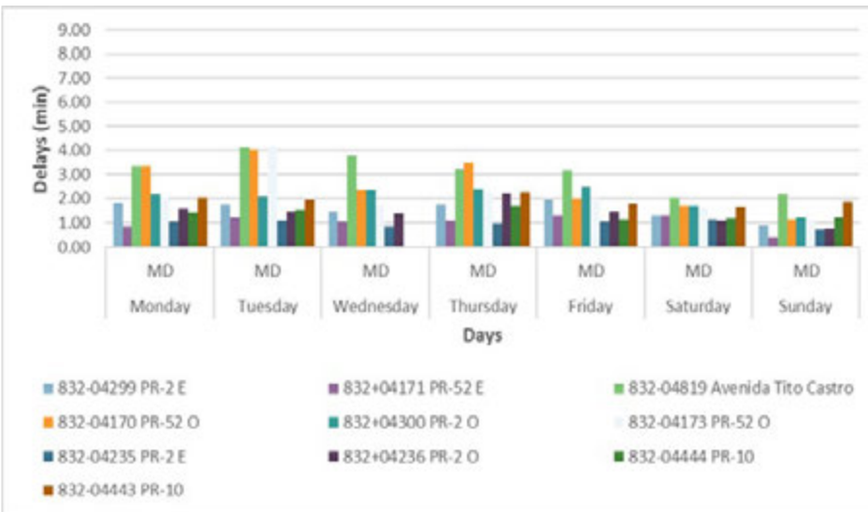
For the first four months between January and April 2018, the average delay for most segments was below 4.0 minutes, with peaks on Sunday for the highest-ranking segments 832-04819 in Ave. Tito Castro, recording average delays between 2.0 – 9.0 minutes (Figure K.267 to Figure K.270).

Figure K.267: January 2018, TMC, South Region, (MD)



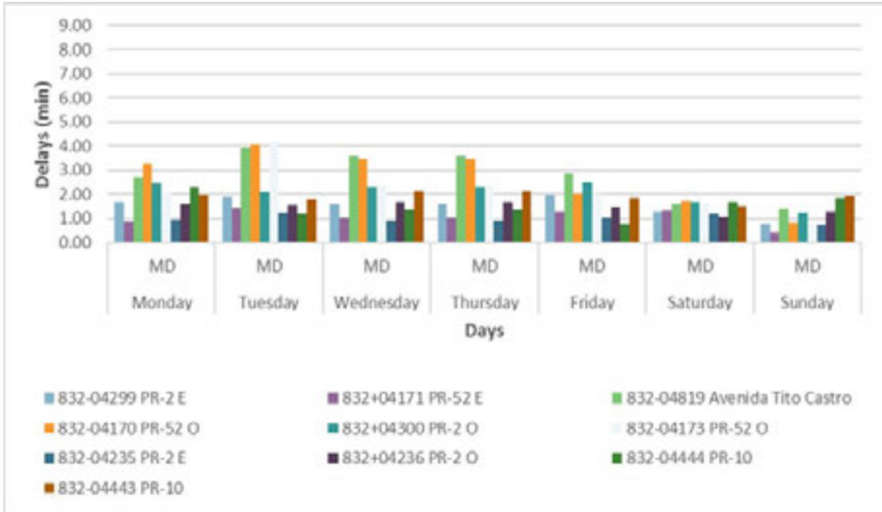
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.268: February 2018, TMC, South Region, (MD)



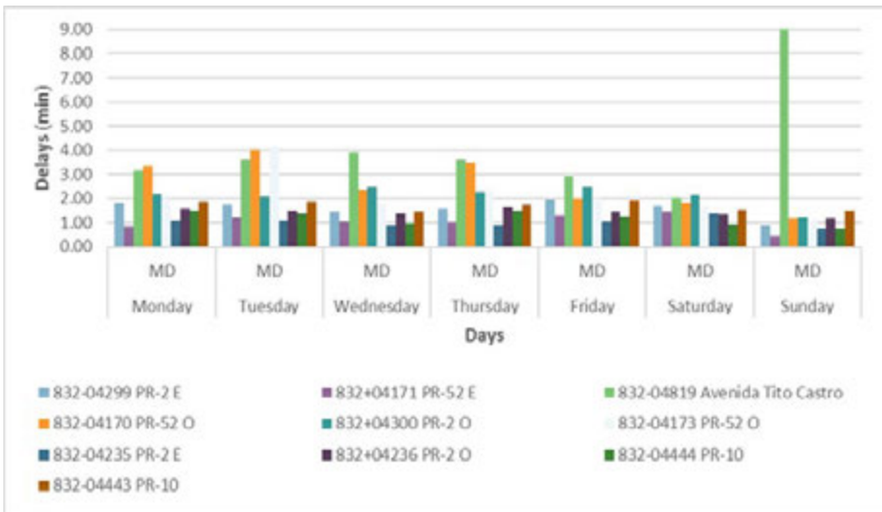
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.269: March 2018, TMC, South Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.270: April 2018, TMC, South Region, (MD)



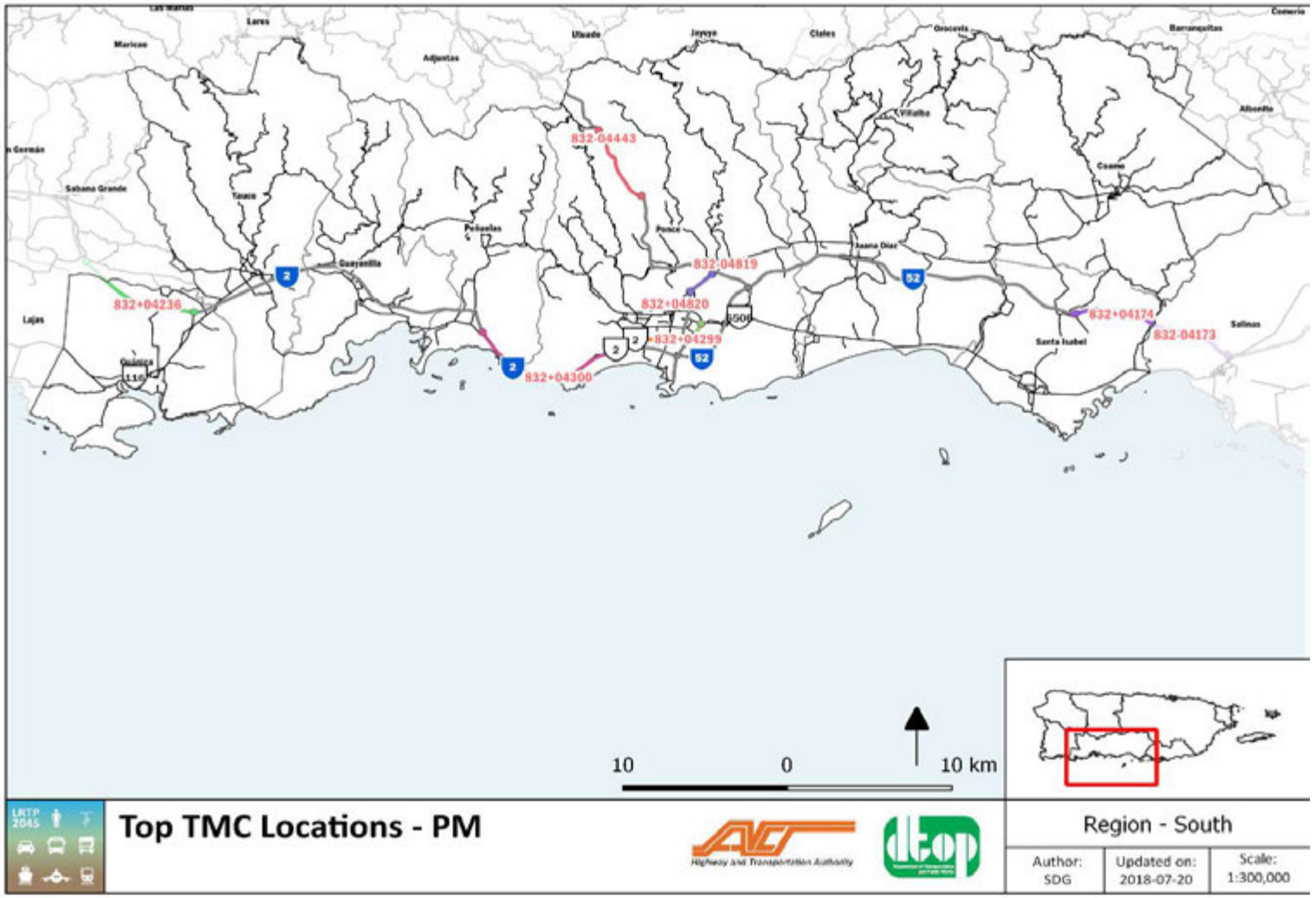
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM)

The average delay for segments was 1.4 minutes from September 2016 to January 2017, for the afternoon period (PM). After February 2017, the average delay increased to 2.6 minutes.

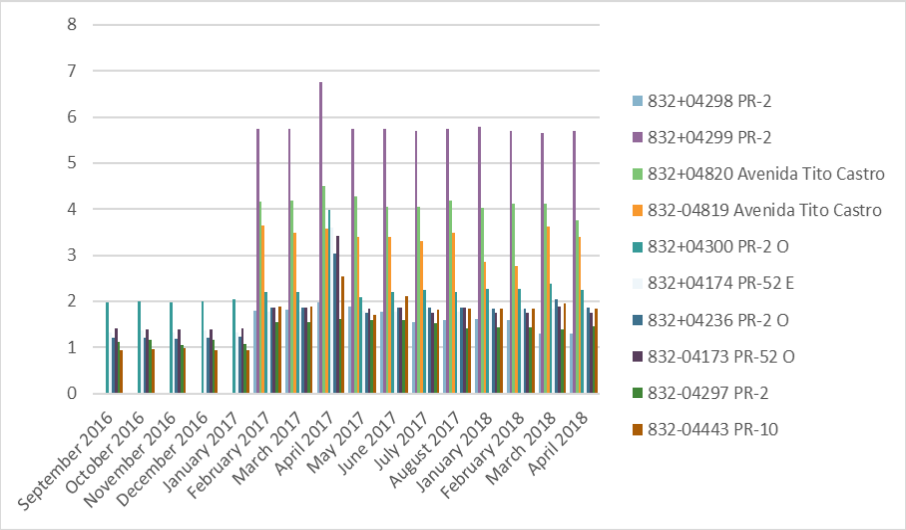
The highest ranked TMCs were 832+04299, with an average delay of 5.7 minutes; 832+04820, with an average delay of 4.1 minutes and 832-04819, with an average delay of 3.4 minutes throughout 2017, as seen in Figure K.271 and Figure K.272 below.

Figure K.271: South Location, PM Period



Source: SDG, based on NPMRDS Analytics

Figure K.272: Average Delays, South TPR, PM Period



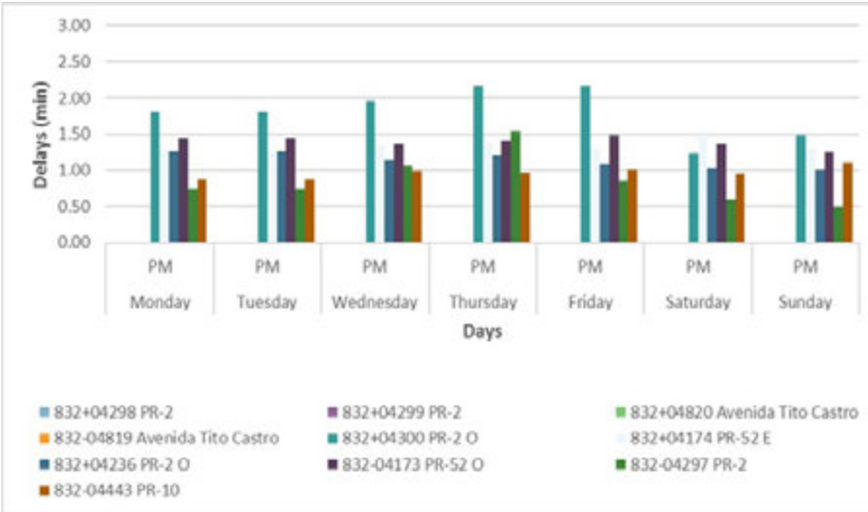
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM) - Weekly

For the last four months of 2016, most segments had average delays below 2.0 minutes. Some of the highest-ranking segments were 832+04300 in PR-2 O and 832+04174 PR-52 E with average delays ranging from 1.5 – 2.2 minutes, increasing gradually towards Friday.

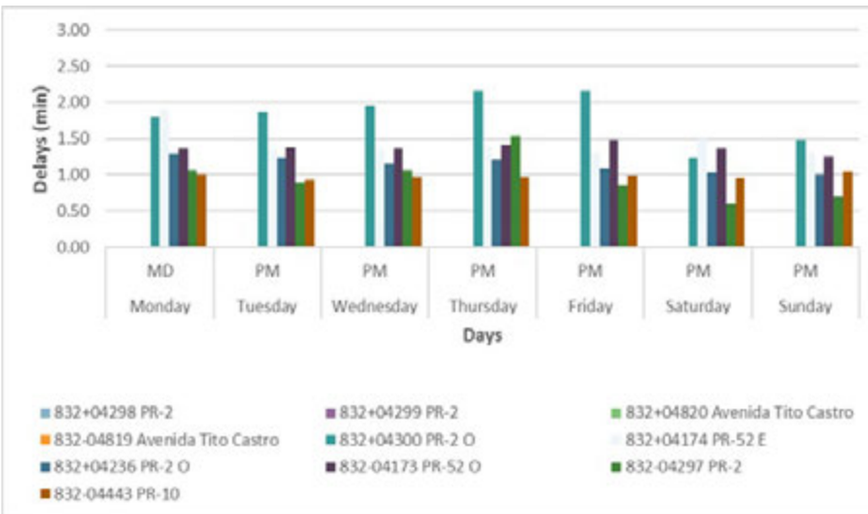
The month of September had almost the same delays than the rest of the months, with delays reaching 2.2 minutes Monday to Friday (Figure K.273 to Figure K.276).

Figure K.273: September 2016, TMC, South Region, (PM)



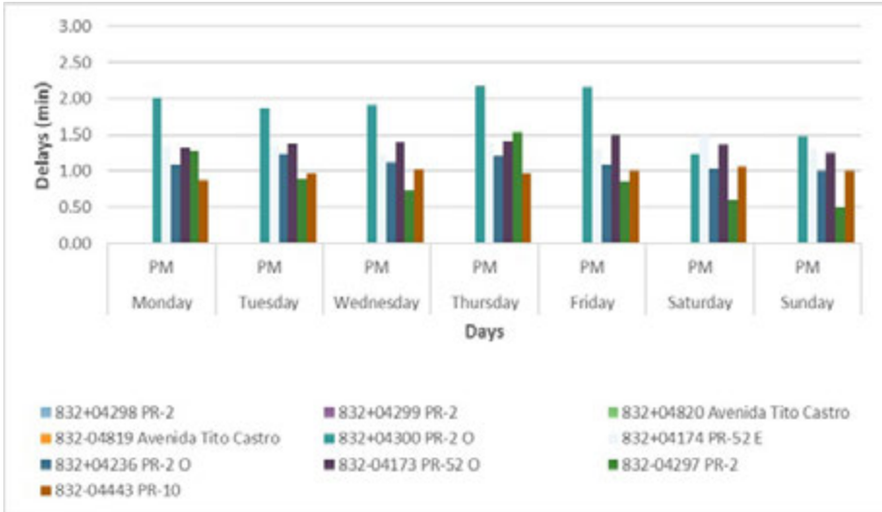
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.274: October 2016, TMC, South, (PM)



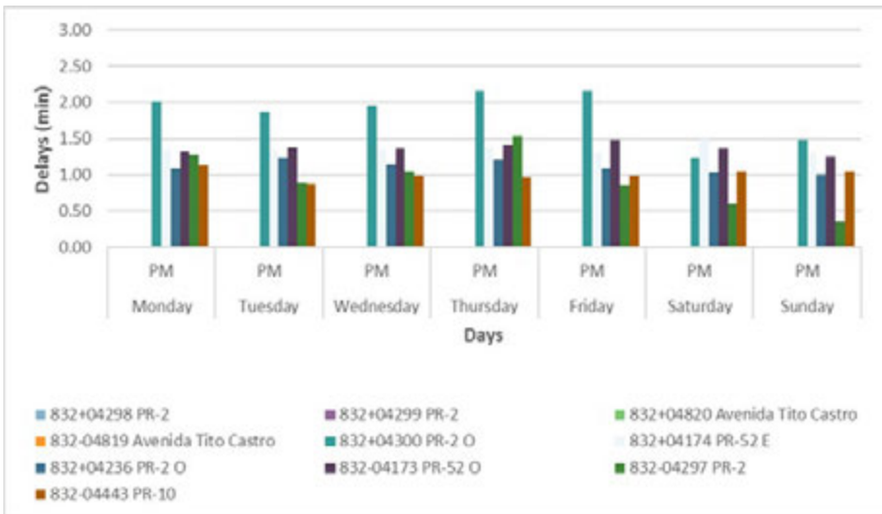
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.275: November 2016, TMC, South, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.276: December 2016, TMC, South, (PM)



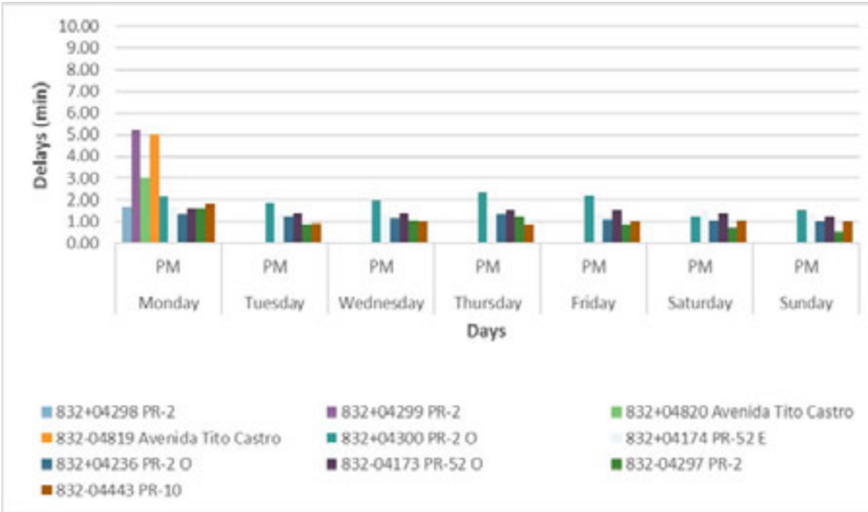
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, the average delay was 2.0 minutes, with variation among the highest-ranking segments.

For January, Monday had the highest delays for all segments with an average of 5.2 minutes. The highest-ranking delays were 832+04299 in PR-2 and 832-04819 in Ave. Tito Castro with average delays of 5.0 minutes.

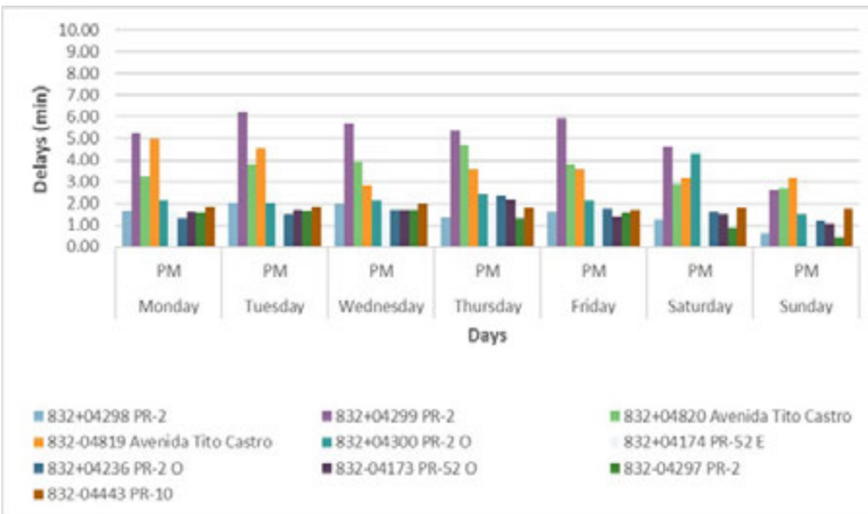
From February to April, between Monday and Friday, the highest-ranking segments were 832-04299 PR-2, 832+04300 in PR-2 O and 832-04819 in Ave. Tito Castro, with average delays between 2.0-9.0 minutes (Figure K.277 to Figure K.280).

Figure K.277: January 2017, TMC, South Region, (PM)



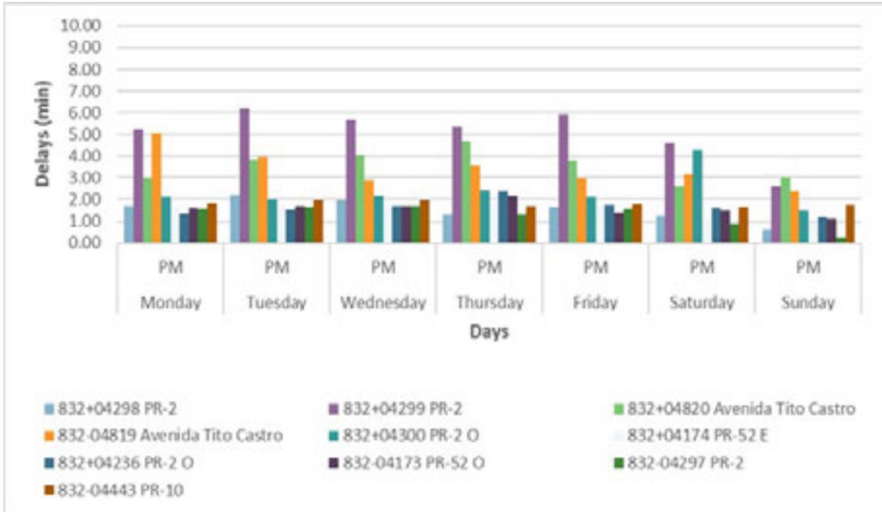
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.278: February 2017, TMC, South Region, (PM)



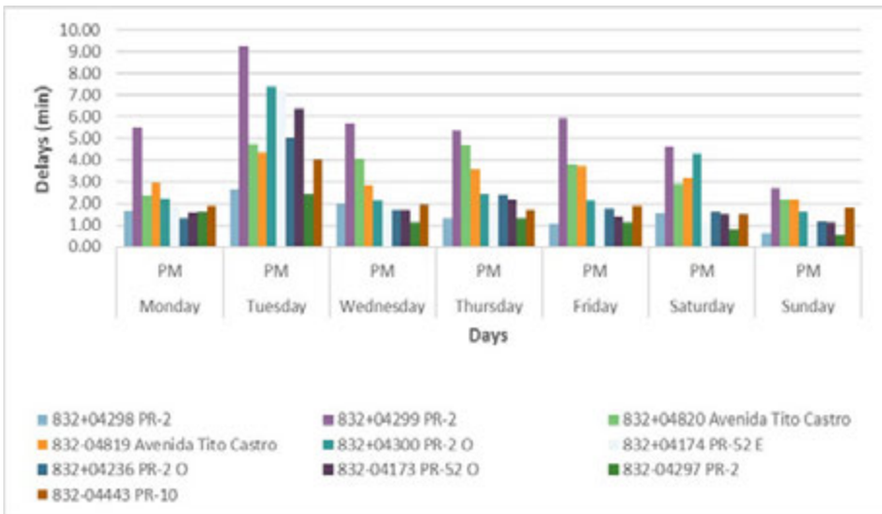
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.279: March 2017, TMC, South Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.280: April 2017, TMC, South Region, (PM)



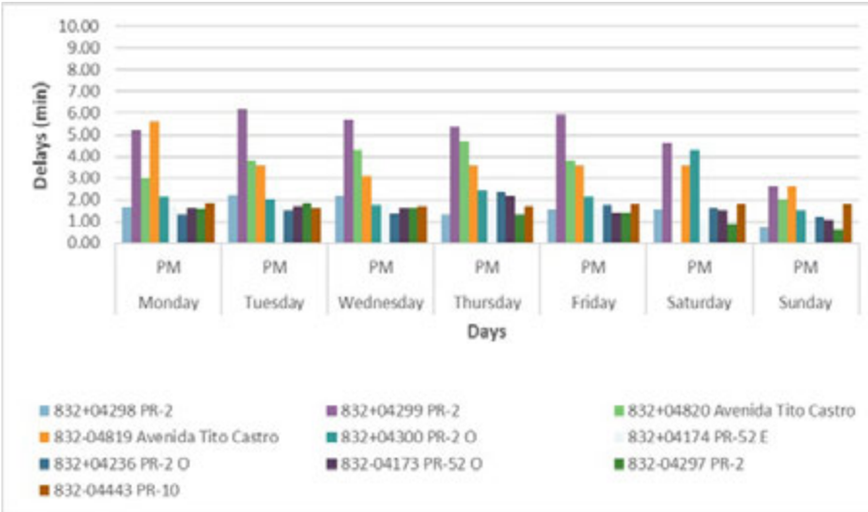
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was of 2.2 minutes. The segment with the highest average delay throughout the week was 832+04299 in PR-2 with an average delay of 6.0 minutes.

The segments with highest delays for all months and throughout the week days was 832+04174 PR-52 E with a delay above 10.0 minutes.

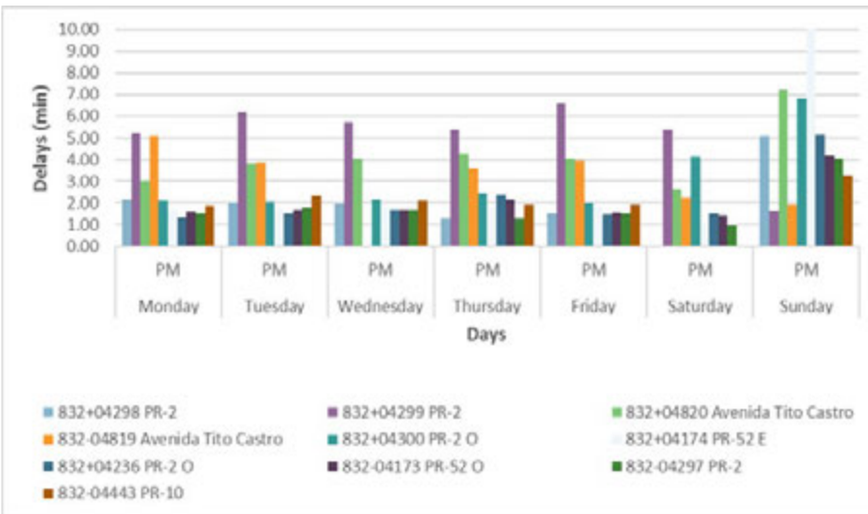
Other segments with higher delays were 832+04820 in Ave. Tito Castro, 832+04300 in PR-2 O and 832-04819 in Ave, Tito Castro, ranking high mostly throughout the week with delays ranging from2.0 – 7.0 minutes (Figure K.281 to Figure K.284).

Figure K.281: May 2017, TMC, South Region, (PM)



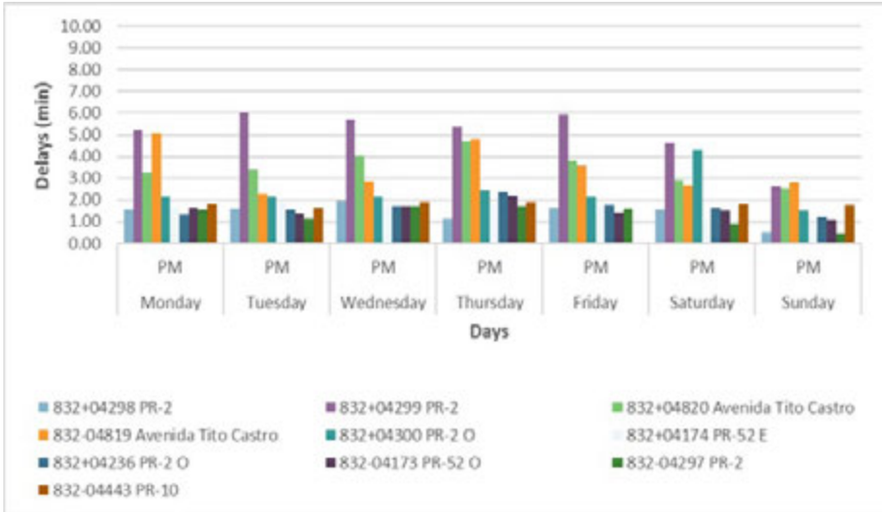
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.282: June 2017, TMC, South Region, (PM)



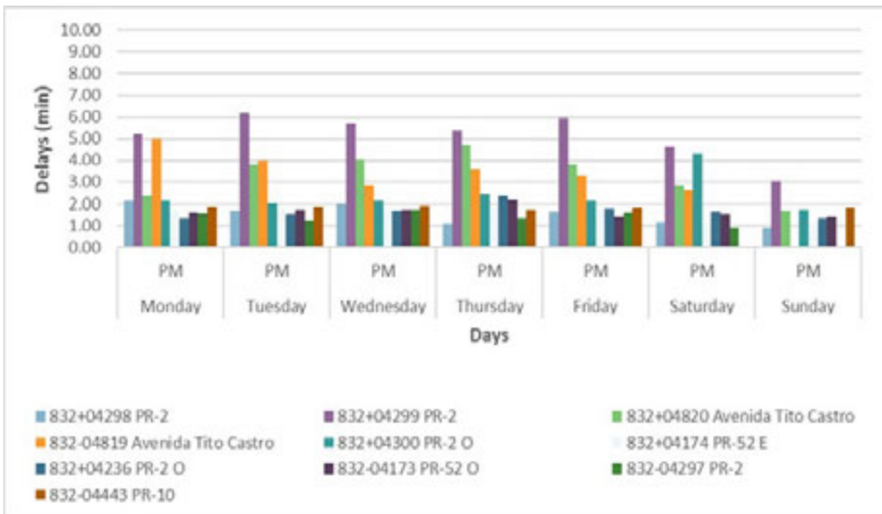
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.283: July 2017, TMC, South Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

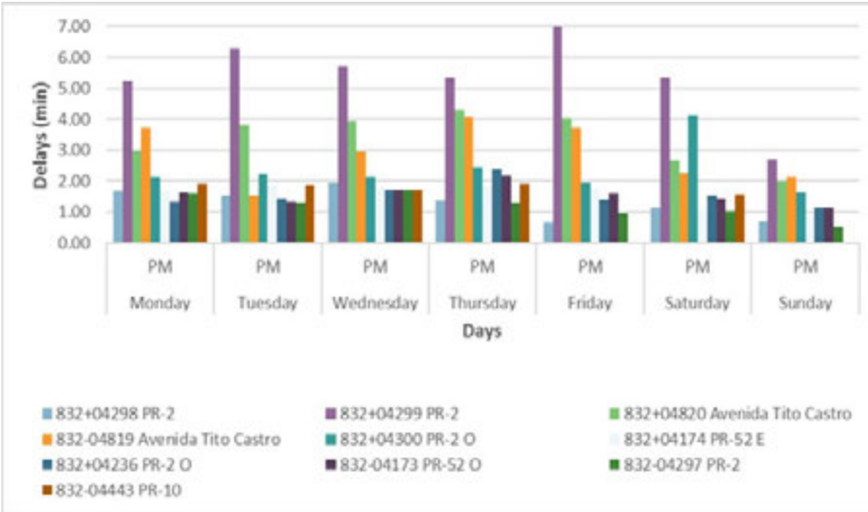
Figure K.284: August 2017, TMC, South Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

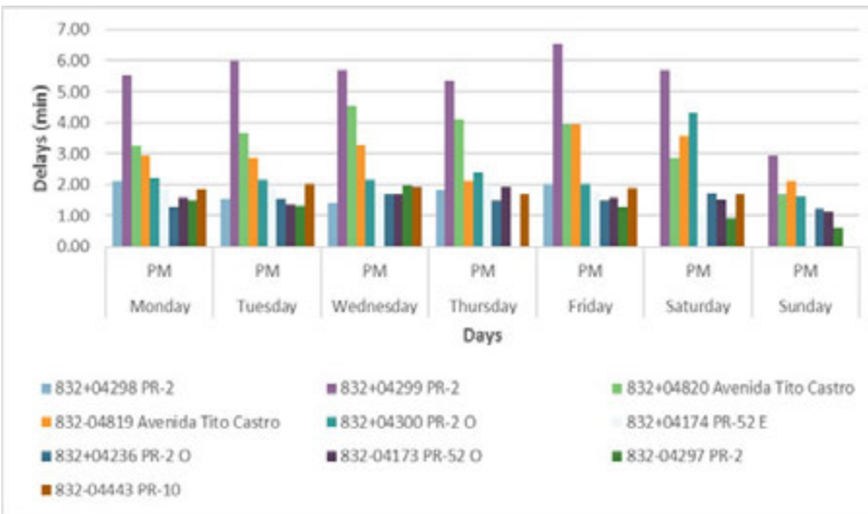
For the first four months between January and April 2018, average delay of segments was below 3.0 minutes, with segments 832+04299 PR-2, recording average delays ranging between 2.5 – 7.0 minutes, and 832+04300 in PR-2 O recording average delays ranging between 1.5 – 4.1 minutes (Figure K.285 to Figure K.288).

Figure K.285: January 2018, TMC, South Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.286: February 2018, TMC, South Region, (PM)

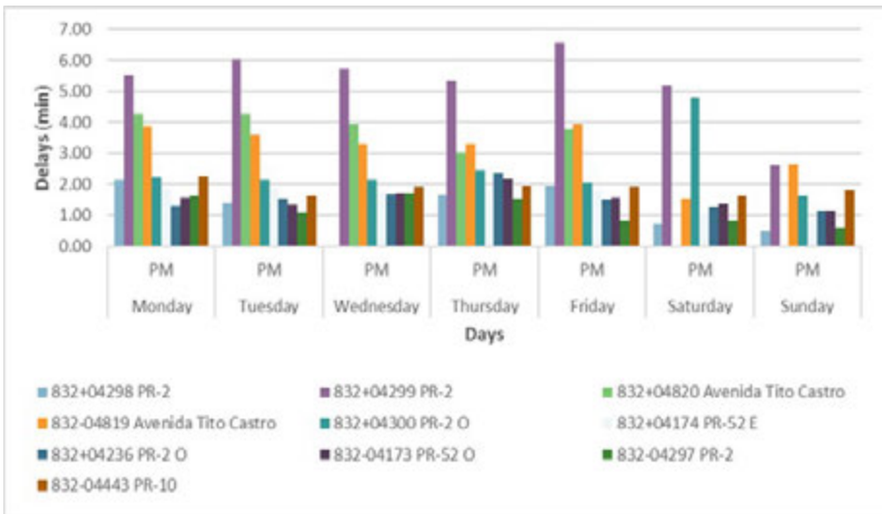


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.287: March 2018, TMC, South Region, (PM)

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.288: April 2018, TMC, South Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Results for South Region bottlenecks

For the South region, all TMC segments studied were located along PR-2, PR-52, PR-10 and Avenida Tito Castro. The top 10 TMC segments with the worst delays were along PR-2, PR-52, and Avenida Tito Castro with delay values ranging between 1.7-5.8 minutes on average per month. The periods of the day with the highest average delay were night-period with 2.5 minutes, past-midday period with 2.4 minutes, mid-day period with 2.0 minutes, and morning period with 1.5 minutes.

- For the morning period, segments with delays above average, ranging between 1.5-2.2 minutes were: 832-04170 westbound in PR-52 O in central section of Juana Diaz county; 832-04299 eastbound in PR-2 E and 832+04300 westbound, both in section between Ponce and Peñuelas; and 832+04171 in PR-52 O in Santa Isabel county, around Las Ollas.
- For the mid-day period, segments with delays above average, ranging between 2.5-3.8 minutes were: 832-04819 westbound in Avenida Tito Castro in Ponce; 832-04170 westbound in PR-52 O in central section of Juana Diaz county; 832+04300 westbound in PR-2 O section between Peñuelas and Ponce; 832-04173 westbound in PR-52 O section between Santa Isabel and Salinas.
- For the past-midday period, segments with delays above average, ranging between 2.4-6.0 minutes were 832-04299 eastbound in PR-2 E and 832+04300 westbound, both in section between Ponce and Peñuelas; and 832-04819 westbound and 832+04820 eastbound in Avenida Tito Castro in Ponce, in front of Episcopal San Lucas Hospital.
- For the night period, segments with delays above average, ranging between 2.5-3.5 minutes were: 832-04819 westbound and 832+04820 eastbound in Avenida Tito Castro in Ponce, in front of Episcopal San Lucas Hospital; 832+04300 westbound in PR-2 O section between Peñuelas and Ponce; and 832-04173 westbound in PR-52 O section between Santa Isabel and Salinas.

Thus, overall, segments with highest recurrence of delays throughout periods of the day were located in PR-2 between Ponce and Peñuelas, Avenida Tito Castro in Ponce, central Juana Diaz county and between Santa Isabel and Salinas.

EAST

In the East, the data used in the preparation of the graphs are from the road PR-3.

Table K.15 to Table K.17 shows roads, months and years selected and the studied periods.

Table K.15: Roads

TCM	Road name
832+04503	PR-3
832+04504	PR-3
832+04505	PR-3
832+04506	PR-3
832-04502	PR-3

832-04503	PR-3
832-04504	PR-3
832-04505	PR-3

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.16: Months and Years Selected

2016	2017	2018
September	January	January
October	February	February
November	March	March
December	April	April
	May	
	June	
	July	
	August	

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.17: Studied Period

Night Period (NT)	Morning Period (AM)
Midday Period (MD)	Past-midday Period (PM)

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Bottleneck Analysis

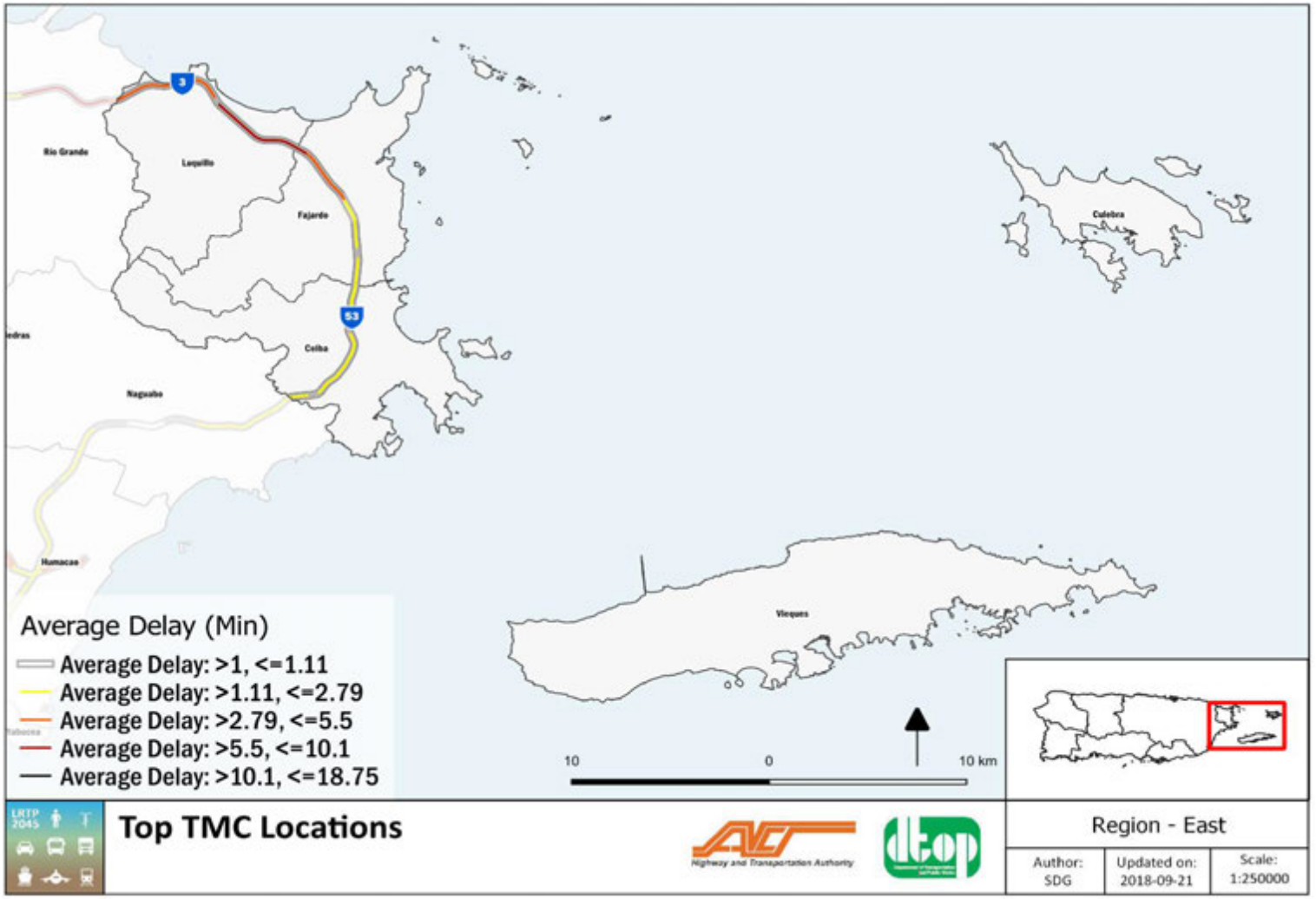
Night Period (NT)

For the East TPR, only segments along road PR-3 are available for analysis in the highway network dataset.

Segments averaged delay was of 1.4 minutes added to the reference travel time for the night period (NT), from 18:00-7: 00.

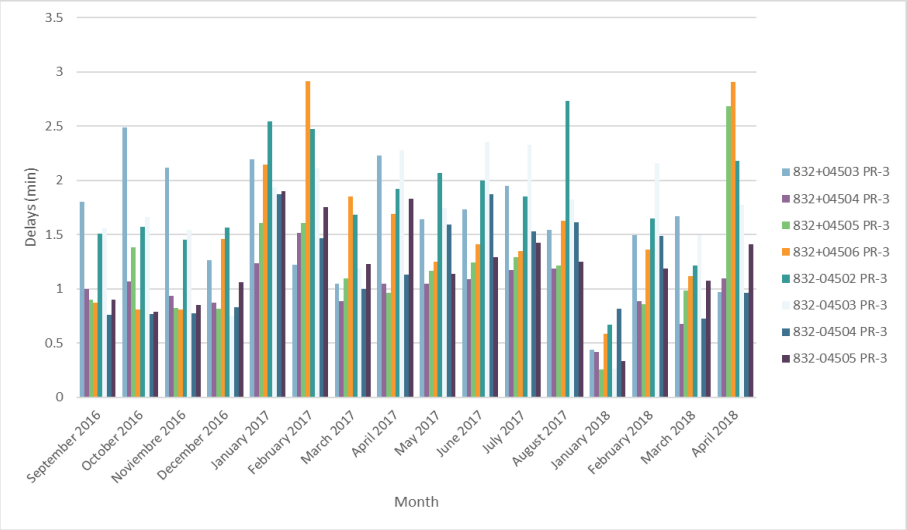
The highest ranking TMCs were 832+04503, with an average delay of 1.7 minutes; 832-04502 with an average delay of 1.8 minutes and 832+04506, with an average delay of 1.5 minutes and a maximum delay of 2.9 minutes for February 2017 and April 2018, as seen in Figure K.289 and Figure K.290 below.

Figure K.289: East Location



Source: SDG, based on NPMRDS Analytics

Figure K.290: Average Delays, East TPR, NT Period

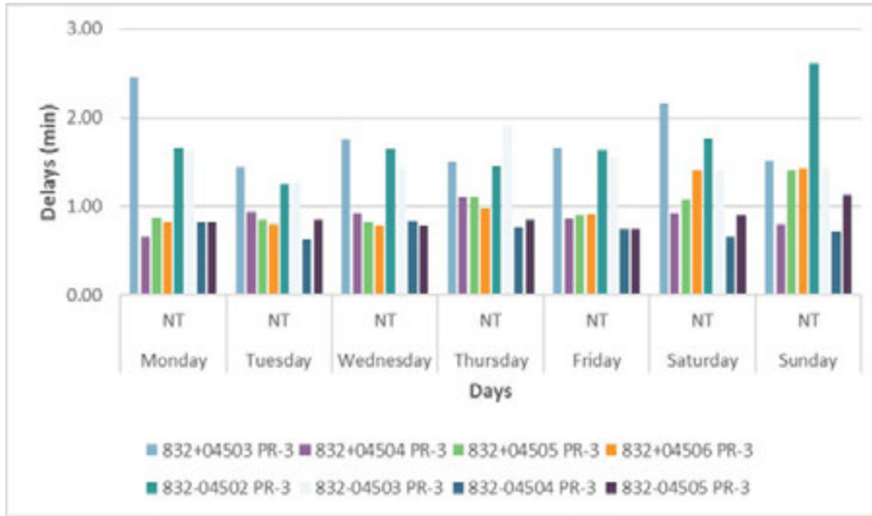


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Night Period (NT) – Weekly

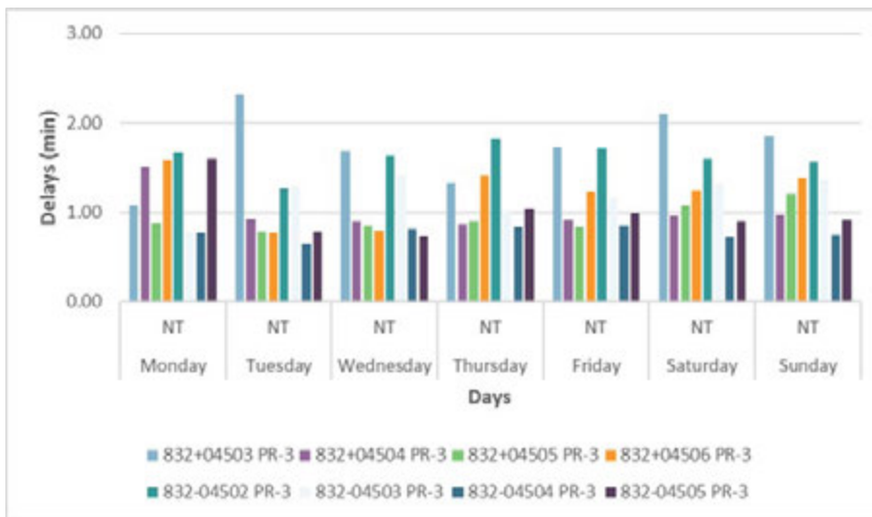
For the night period in East Region, average delay of segments was below 1.0 minute for the last four months of 2016. The segments with delays above average were 832+04503 and 832-04502 in PR-3, ranging between 1.5-2.8 minutes on average delay (Figure K.291 to Figure K.294).

Figure K.291: September 2016, TMC, East Region, (NT)



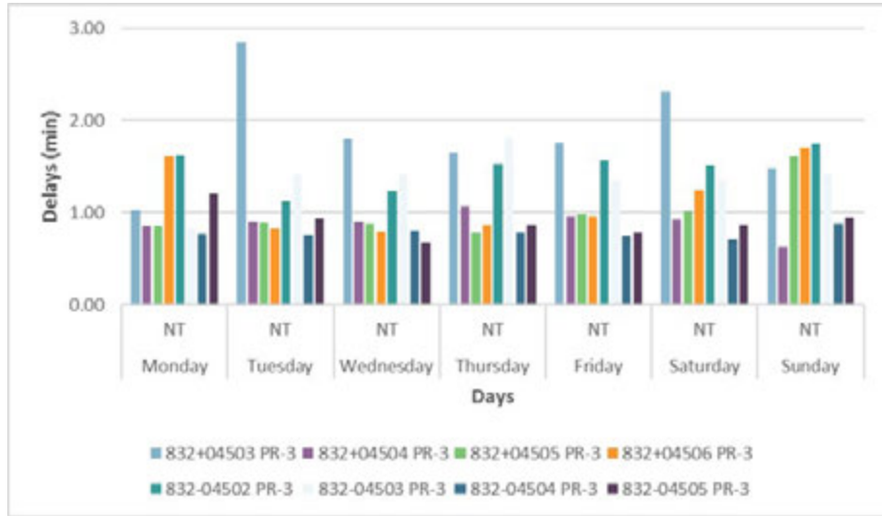
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.292: October 2016, TMC, East Region, (NT)



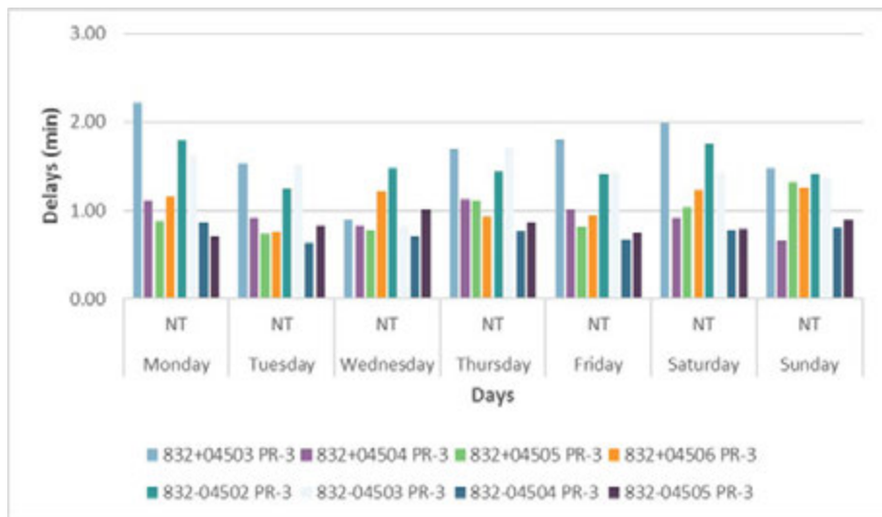
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.293: November 2016, TMC, East Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.294: December 2016, TMC, East Region, (NT)

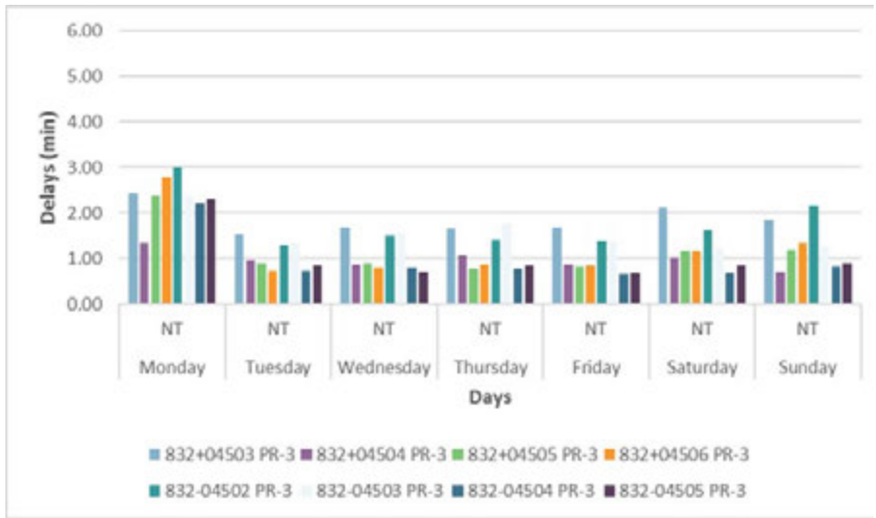


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, the average delay for segments increased from 1.0 to 2.0 minutes on average mostly from February to April 2017.

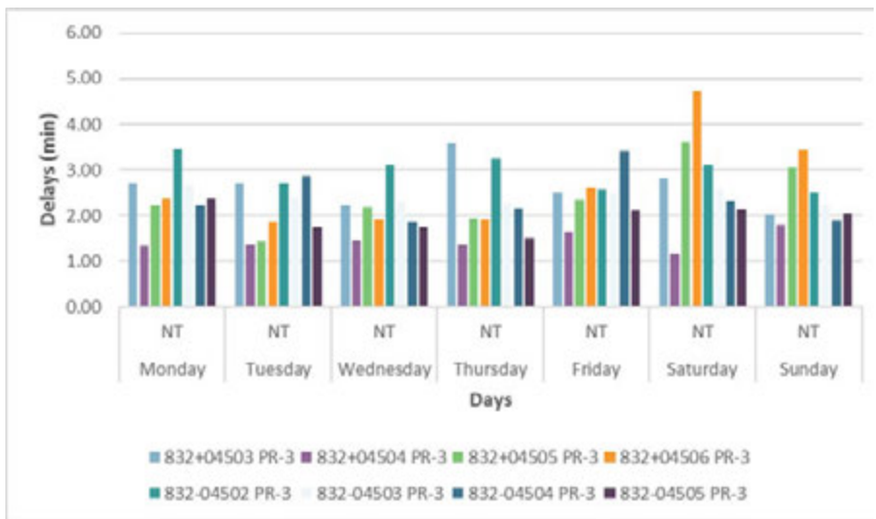
Segments above average delay were 832+04503 and 832-04502 in PR-3 with delays ranging from 2.5 – 3.0 minutes. In addition, segment 832+04506 in PR-3 increased average delays, mostly during the weekend with values ranging from 2.5 – 5.0 minutes between February and April (Figure K.295 to Figure K.298).

Figure K.295: January 2017, TMC, East Region, (NT)



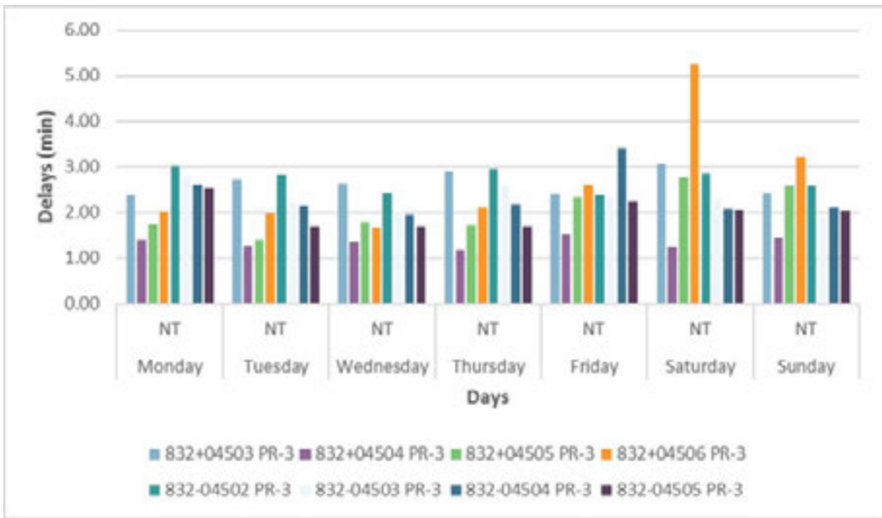
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.296: February 2017, TMC, East Region, (NT)



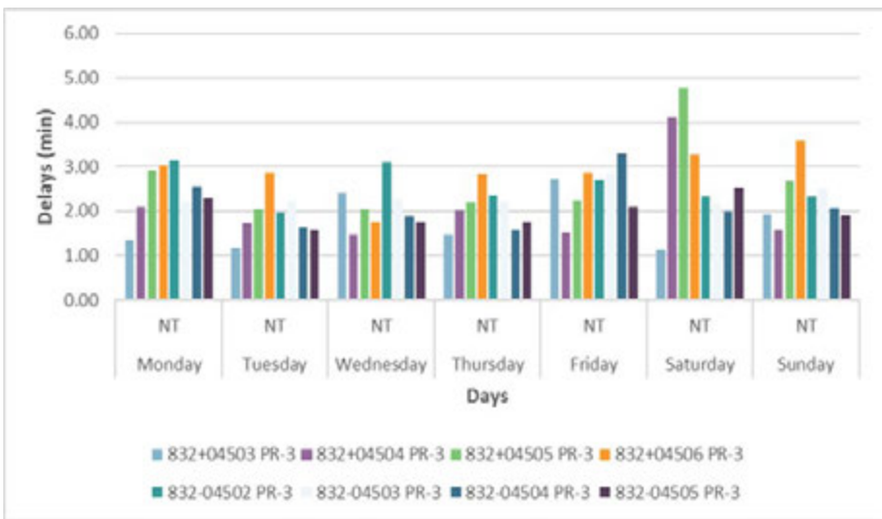
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.297: March 2017, TMC, East Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

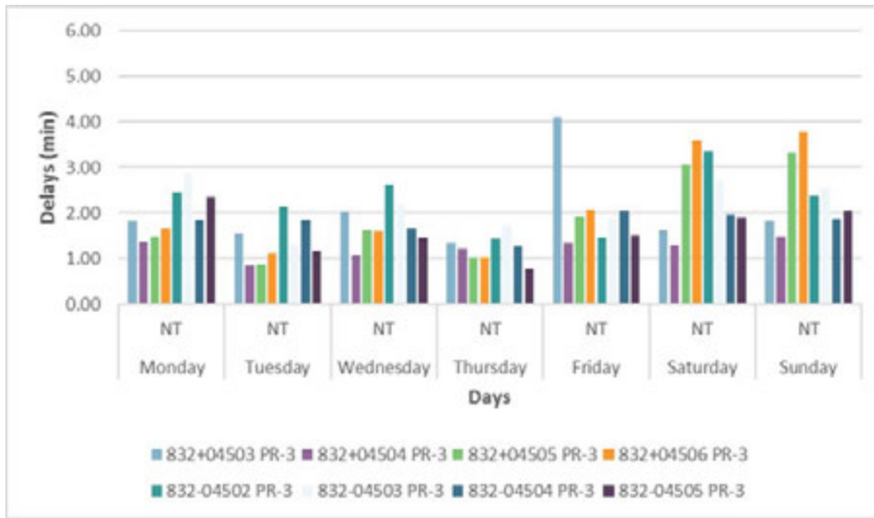
Figure K.298: April 2017, TMC, East Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

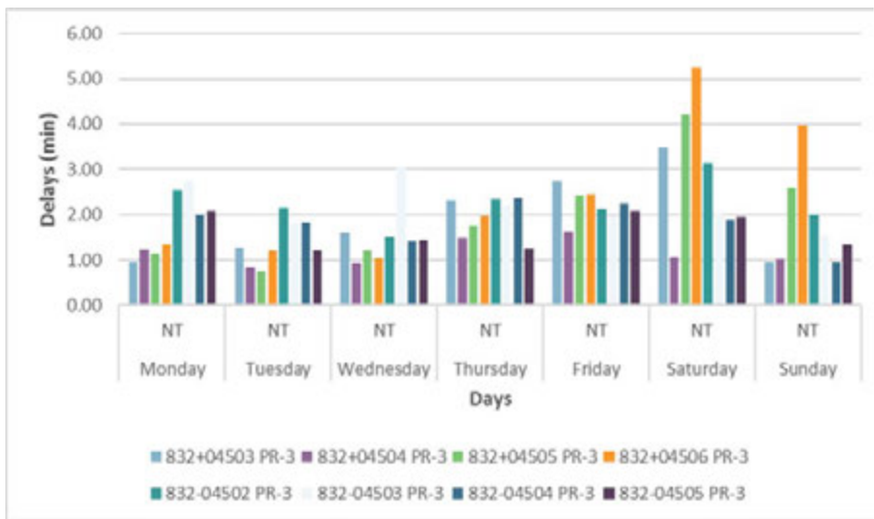
From May to August 2017, the average delay throughout the week was 1.6 minutes. Segments above average were: 832+04503 with average values of 2.0 and peaks on Friday of about 4.0 minutes delay; 832-04503 with average values of 2.0 minutes delay; 832-04502 with average values ranging between 1.5-2.5 minutes delay; and 832+04506 with average values of 1.5 minutes delay (Figure K.299 to Figure K.302).

Figure K.299: May 2017, TMC, East Region, (NT)



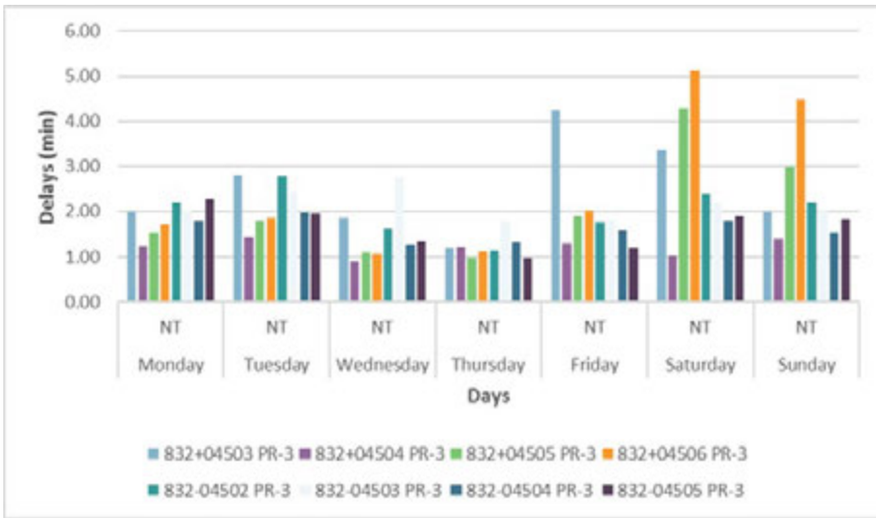
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.300: June 2017, TMC, East Region, (NT)



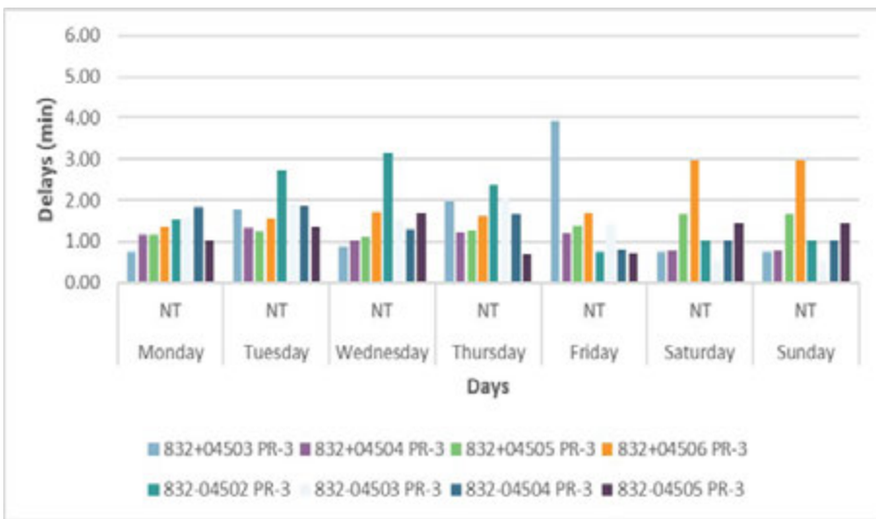
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.301: July 2017, TMC, East Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

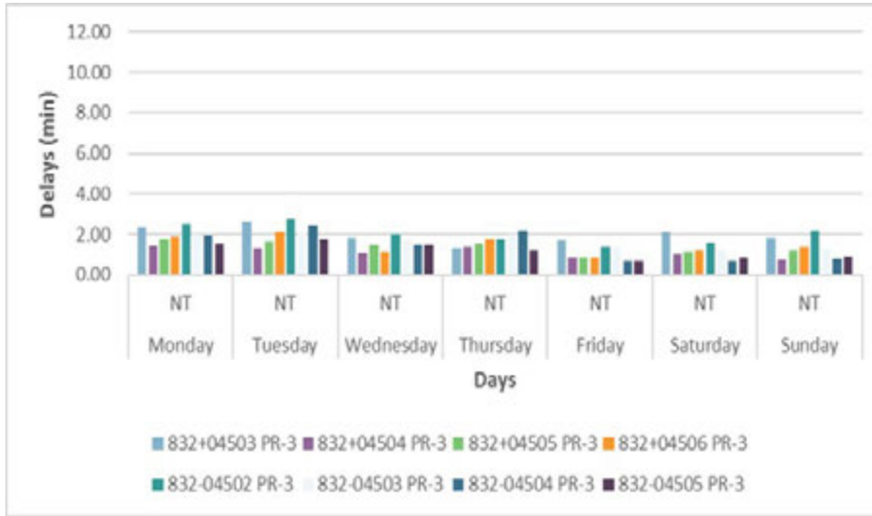
Figure K.302: August 2017, TMC, East Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

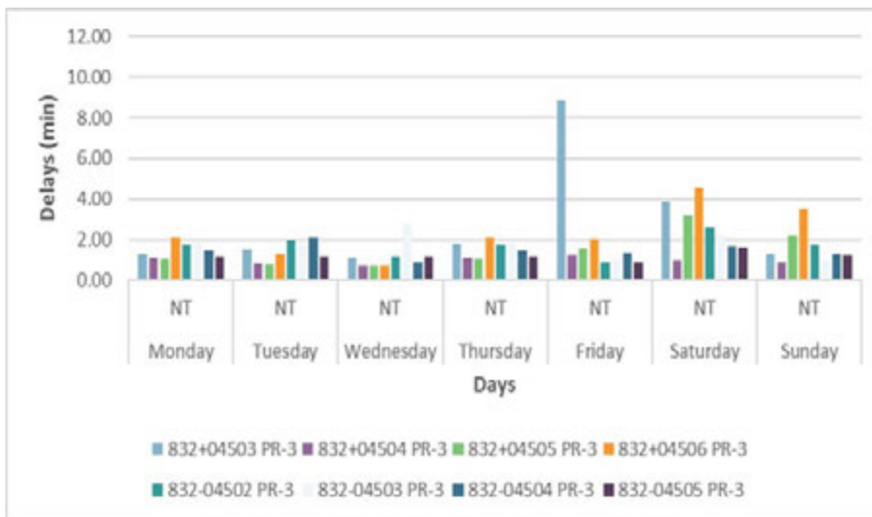
For the first four months between January and April 2018, average delay of segments was of 1.5 minutes, Segments with average delays above average were 832+04503, 832-04502, and 832+04505 in PR-3, all with values ranging between 1.5-3.0 minutes, and peaks of 11 minutes for 832+04503 on Fridays of February and March 2018 (Figure K.303 to Figure K.306).

Figure K.303: January 2018, TMC, East Region, (NT)



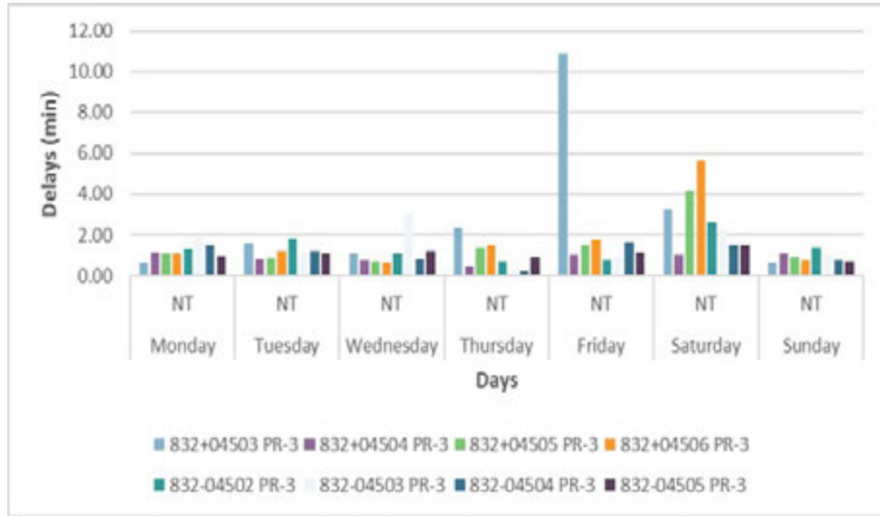
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.304: February 2018, TMC, East Region, (NT)



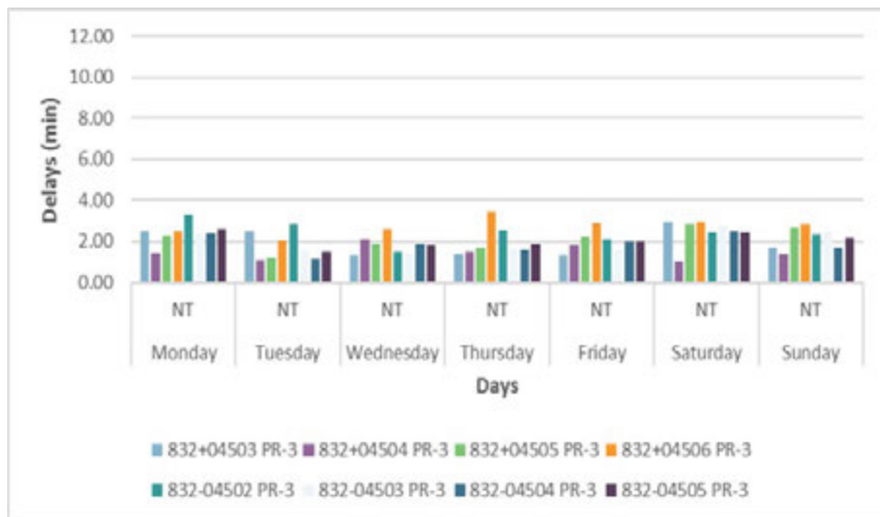
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.305: March 2018, TMC, East Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.306: April 2018, TMC, East Region, (NT)

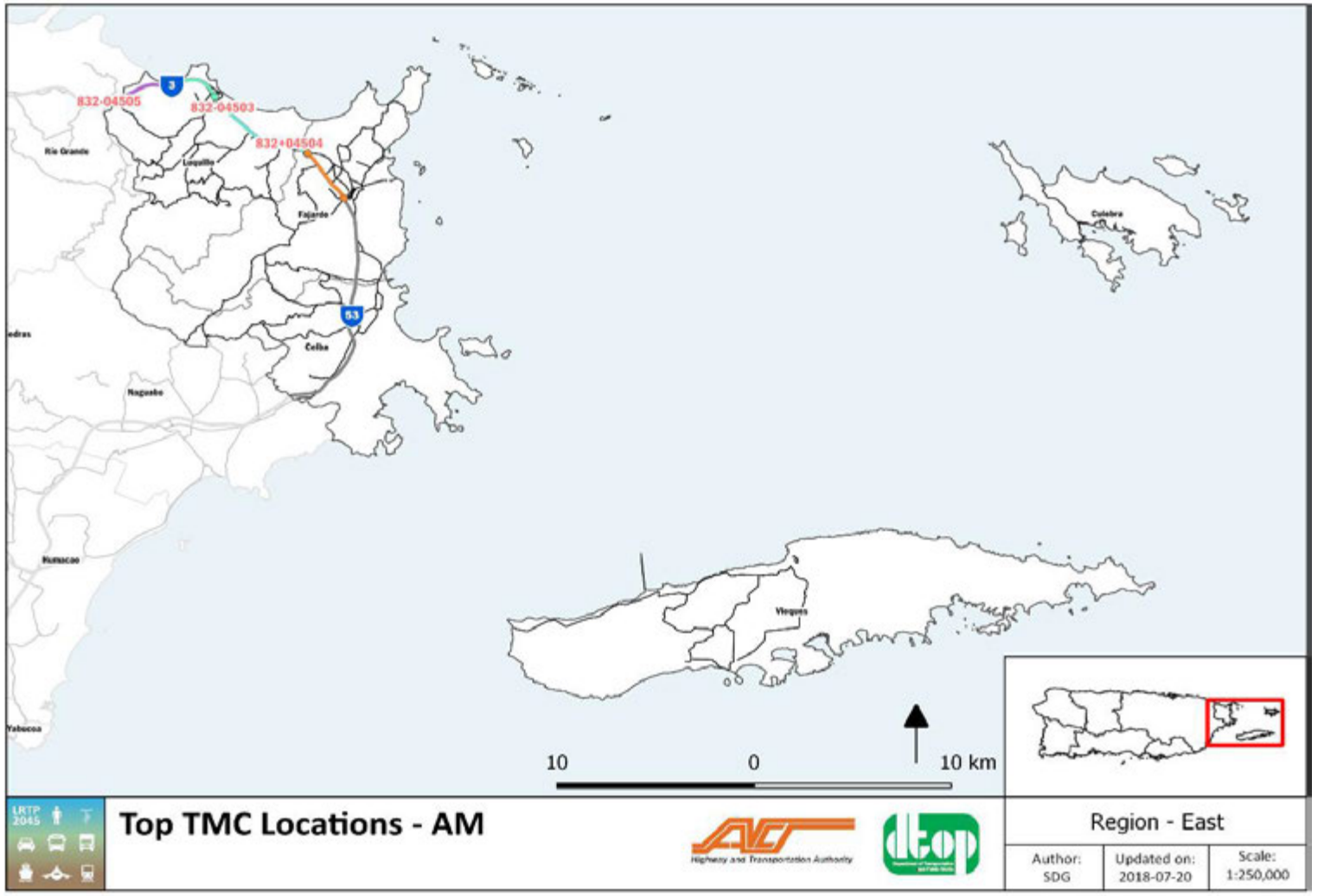


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM)

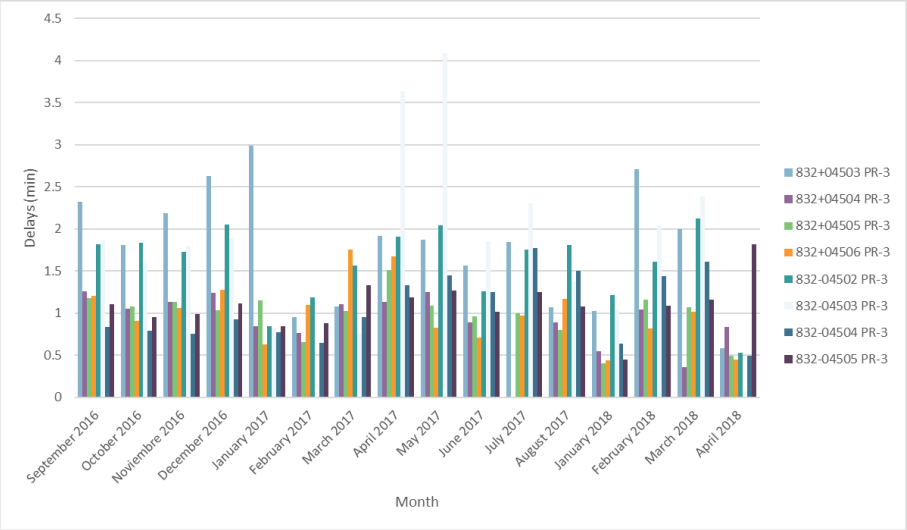
Segments added an average delay of 1.2 minutes to the reference travel time for the morning period (AM), from 7:00-9:00 a.m. The highest ranking TMCs were 832+04503, with an average delay of 1.8 minutes; 832-04502 with an average delay of 1.6 minutes and 832-04503, with an average delay of 1.8 minutes and a maximum delay of 3.6 minutes for April 2017 and other of 4.1 minutes for May 2017, as seen in Figure K.307 and Figure K.308 below.

Figure K.307: East Location, AM Period



Source: SDG, based on NPMRDS Analytics

Figure K.308: Average Delays, East TPR, AM Period

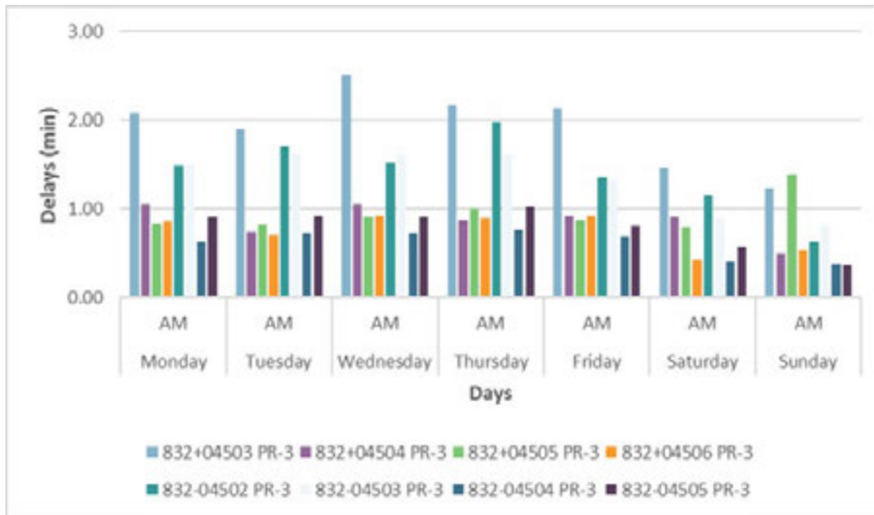


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM) - Weekly

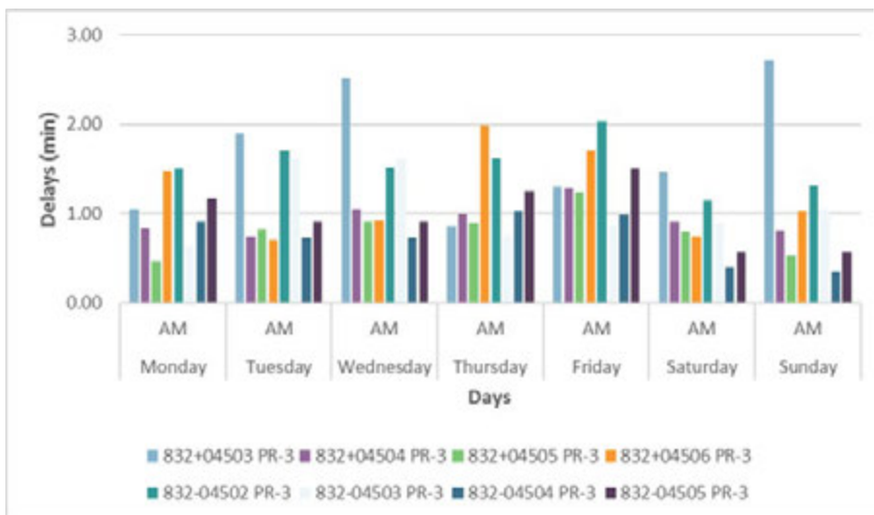
In terms of variation per week day for morning period (AM), for the morning period in East Region, average delay of segments was below 1.0 minute for the last four months of 2016. The segments with delays above average were 832+04503 and 832-04502 in PR-3, ranging between 1.0-2.5 minutes on average delay (Figure K.309 to Figure K.312).

Figure K.309: September 2016, TMC, East Region, (AM)



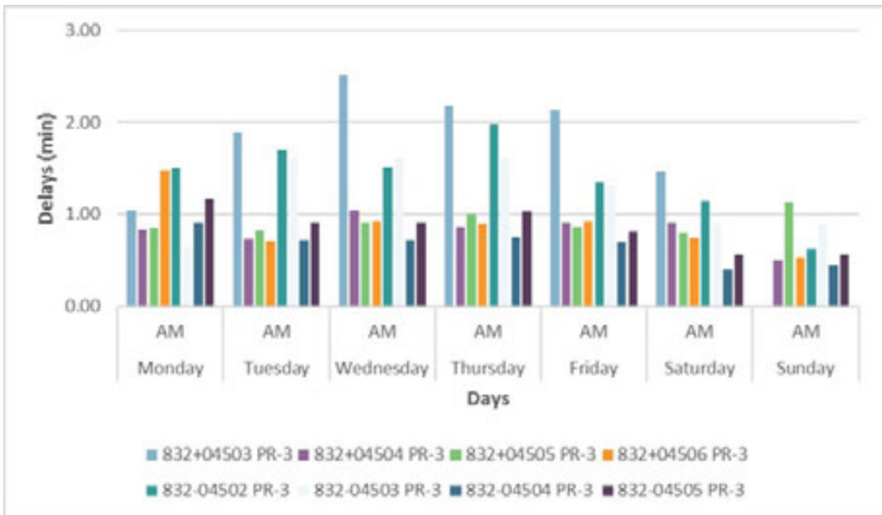
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.310: October 2016, TMC, East Region, (AM)



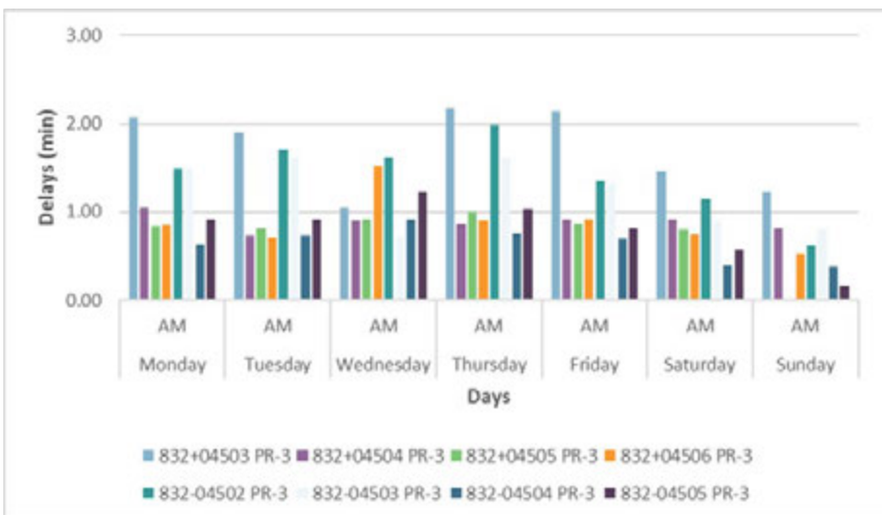
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.311: November 2016, TMC, East Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.312: December 2016, TMC, East Region, (AM)

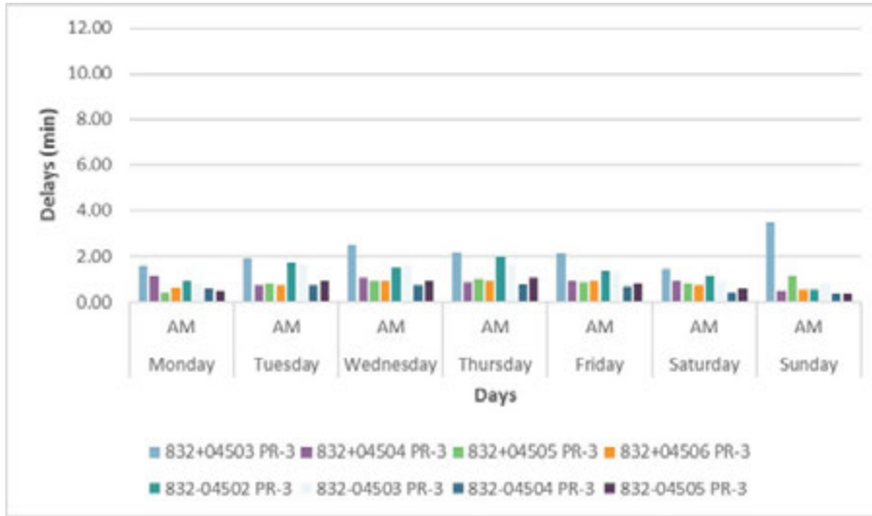


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, the average delay for segments was 0.8 minutes.

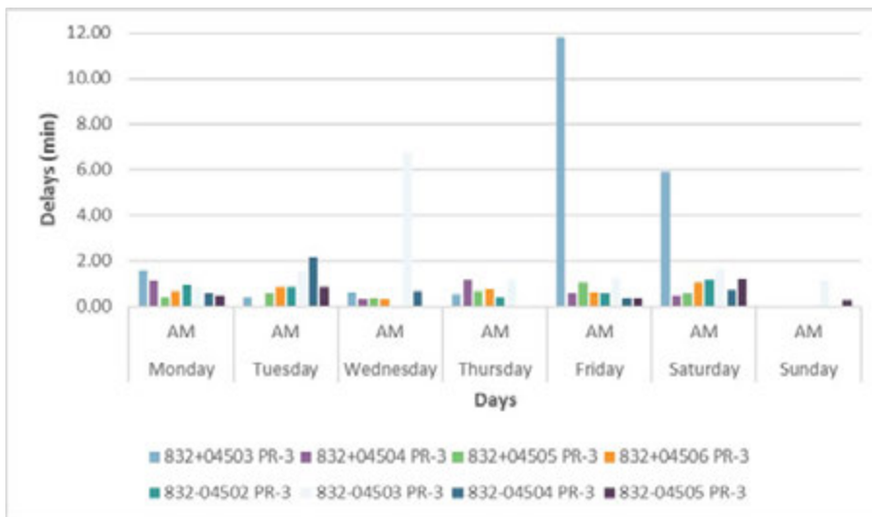
Segments above average delay were: 832+04503 with an average delay of 1.0 minute and peaks for Friday and Saturday between 6.0 – 11.0 minutes; and 832-04502 with an average delay of 1.0 minute (Figure K.313 to Figure K.316).

Figure K.313: January 2017, TMC, East Region, (AM)



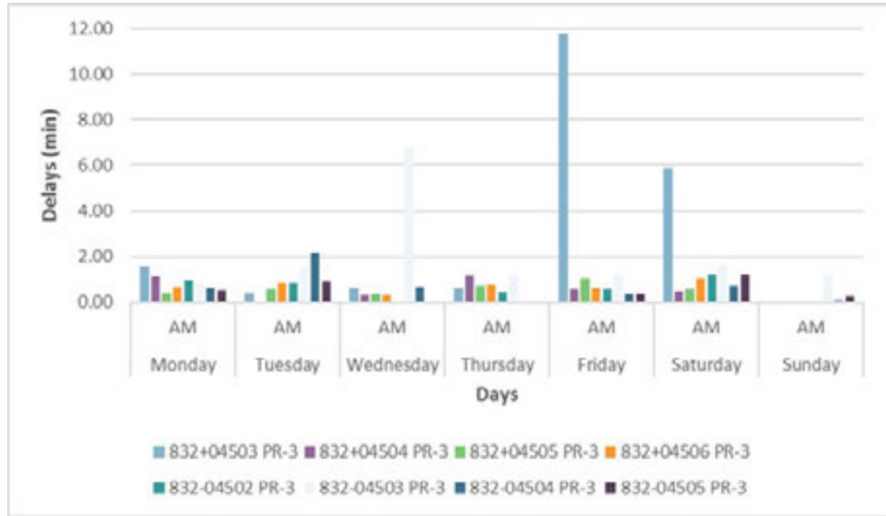
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.314: February 2017, TMC, East Region, (AM)



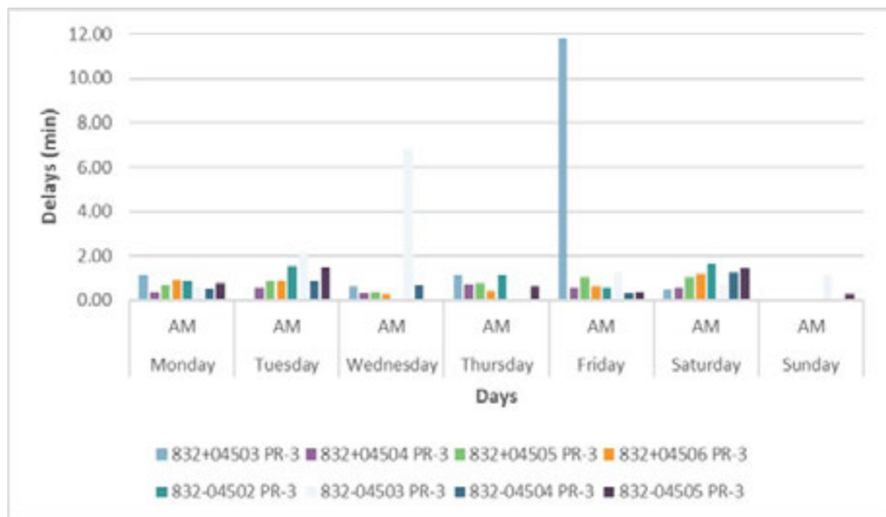
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.315: March 2017, TMC, East Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

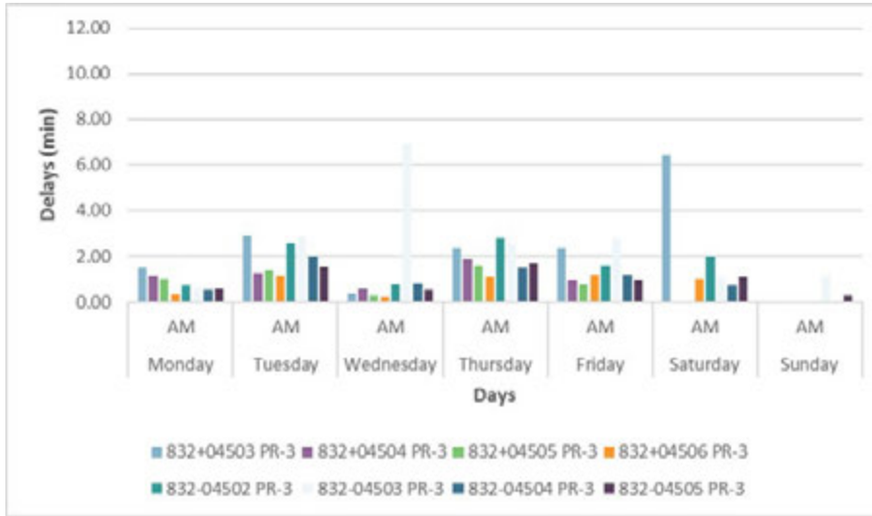
Figure K.316: April 2017, TMC, East Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

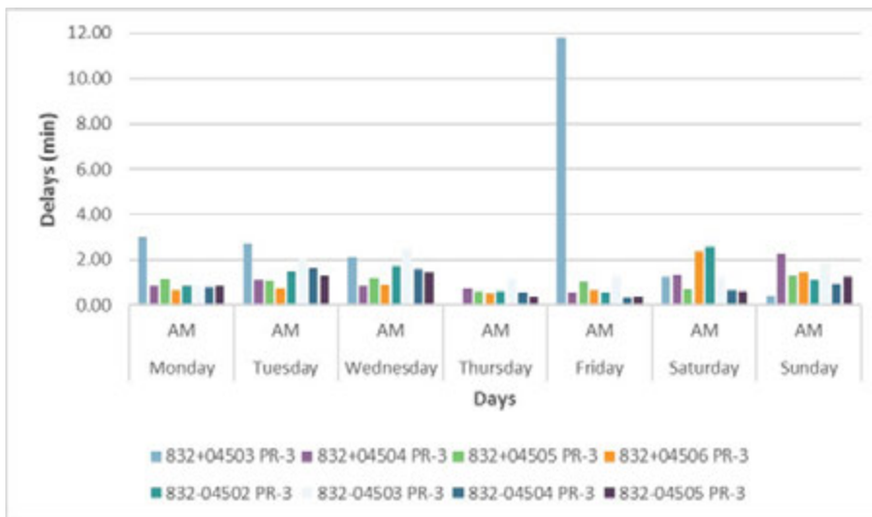
From May to August 2017, the average delay throughout the week was of 1.2 for most segments. The segments with delays above average were 832+04503, 832-04503, 832-04502 with values ranging from 1.5 – 3.5, mostly during week days (Figure K.317 to Figure K.320).

Figure K.317: May 2017, TMC, East Region, (AM)



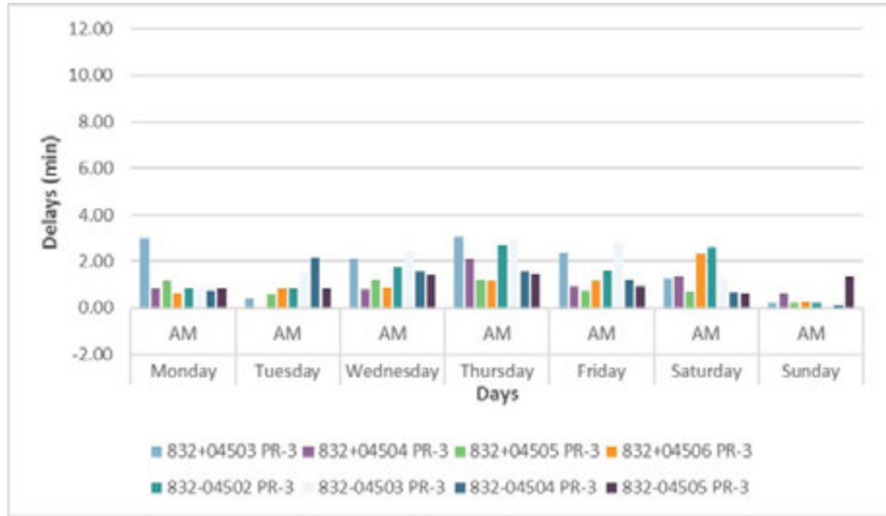
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.318: June 2017, TMC, East Region, (AM)



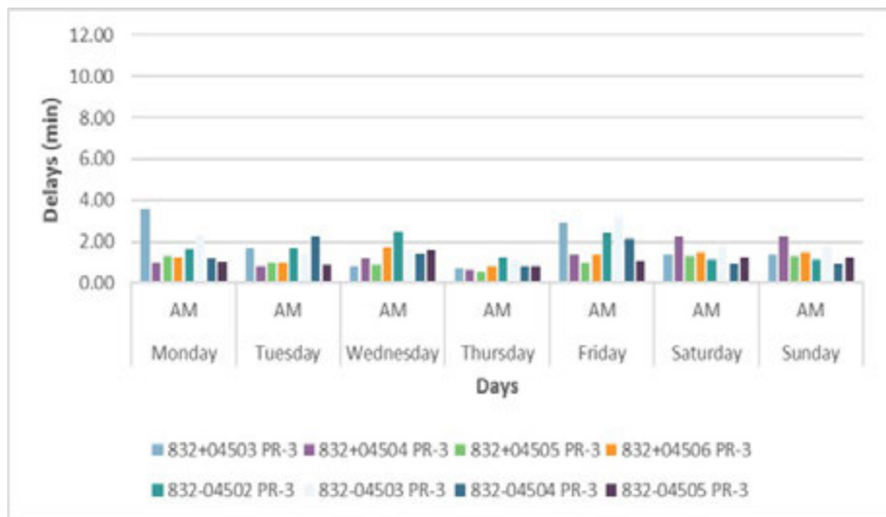
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.319: July 2017, TMC, East Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

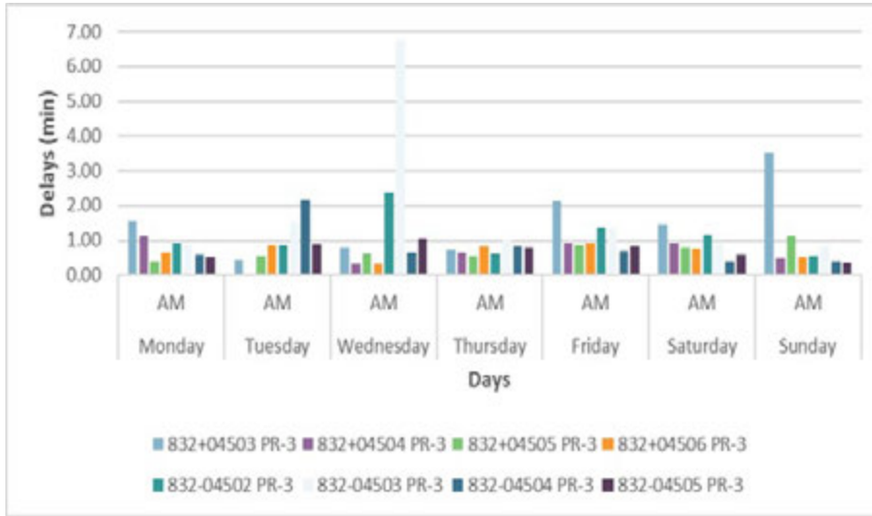
Figure K.320: August 2017, TMC, East Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

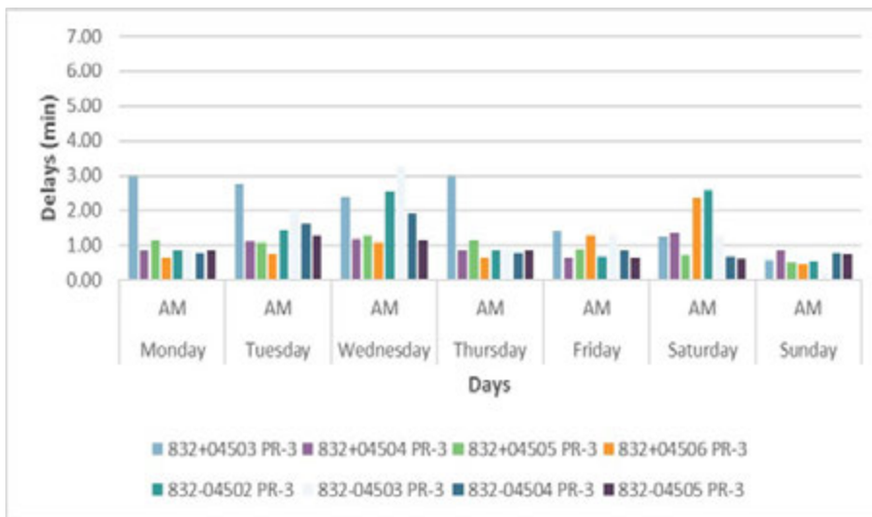
For the first four months between January and April 2018, average delay of segments was below 1.0 minute. Segments with delays above average were: 832-04503 with peaks on Wednesday between 3.0-6.0 minutes from January to March 2018; 832+04503 with delays ranging between 2.0-3.0 from February to March; and 832-04502 with delays between 1.5-2.5 throughout the week, and peaks on Wednesdays (Figure K.321 to Figure K.324).

Figure K.321: January 2018, TMC, East Region, (AM)



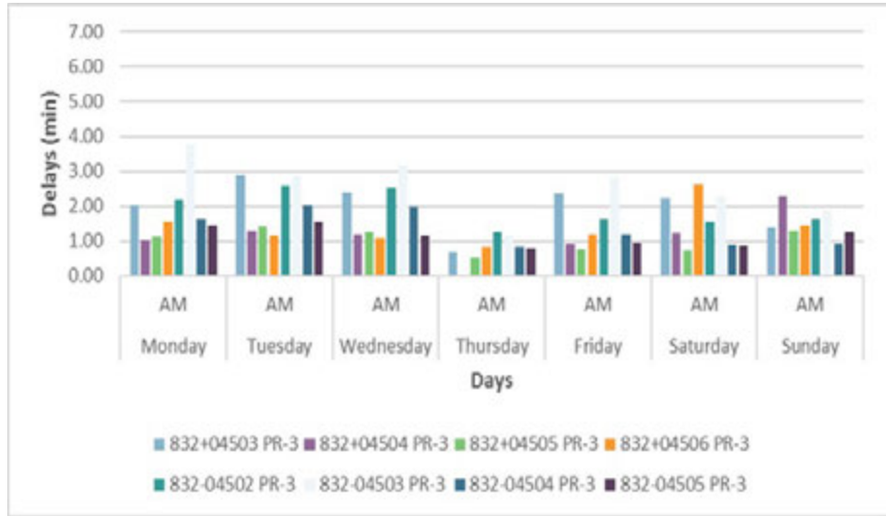
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.322: February 2018, TMC, East Region, (AM)



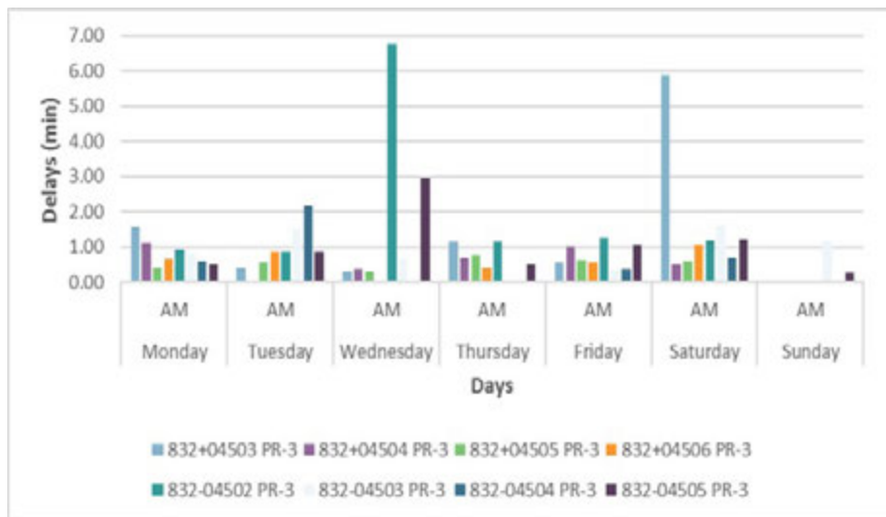
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.323: March 2018, TMC, East Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.324: April 2018, TMC, East Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

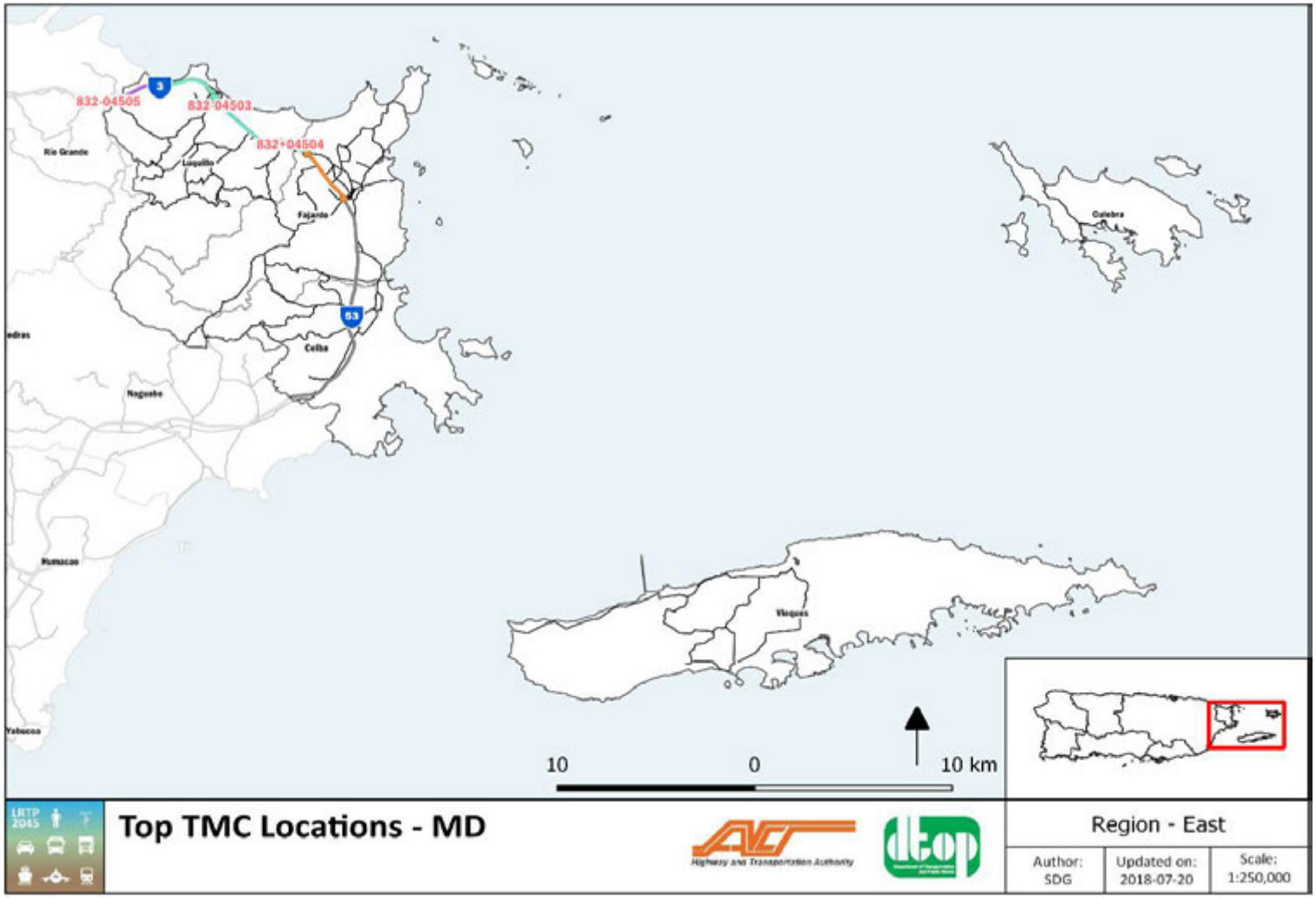
Mid-Day Period (MD)

Segments added on average a delay of 1.8 minutes to the reference travel time for the mid-day period (MD), during the months of September 2016 through April 2018.

TMC 832+04174 ranked the highest from October 2016 to January 2017, with an average delay of 3.0 minutes, and a maximum delay of 5.3 minutes during January 2017.

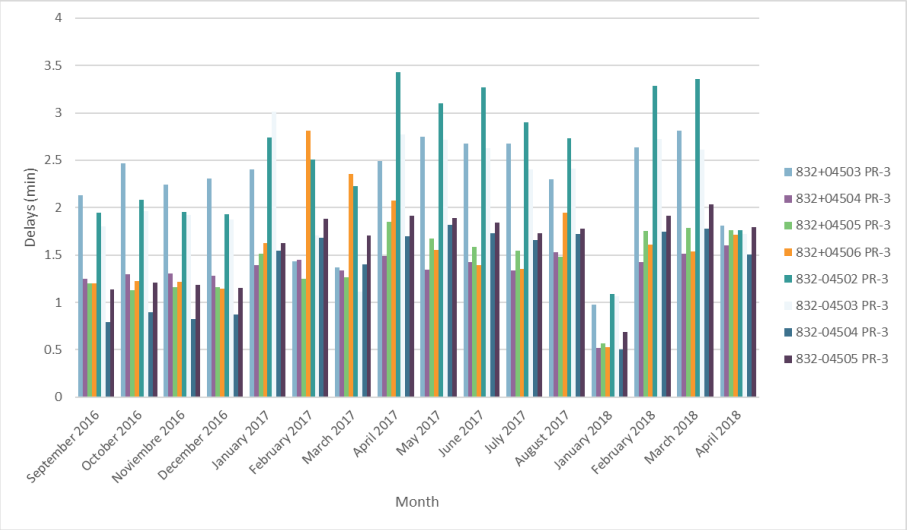
TMC 832-04173 ranked the highest from February 2017 to April 2018, with an average delay of 2.7 minutes, as seen in Figure K.325 and Figure K.326 below.

Figure K.325: East Location, MD Period



Source: SDG. based on NPMRDS Analytics

Figure K.326: Average Delays, East TPR, MD Period

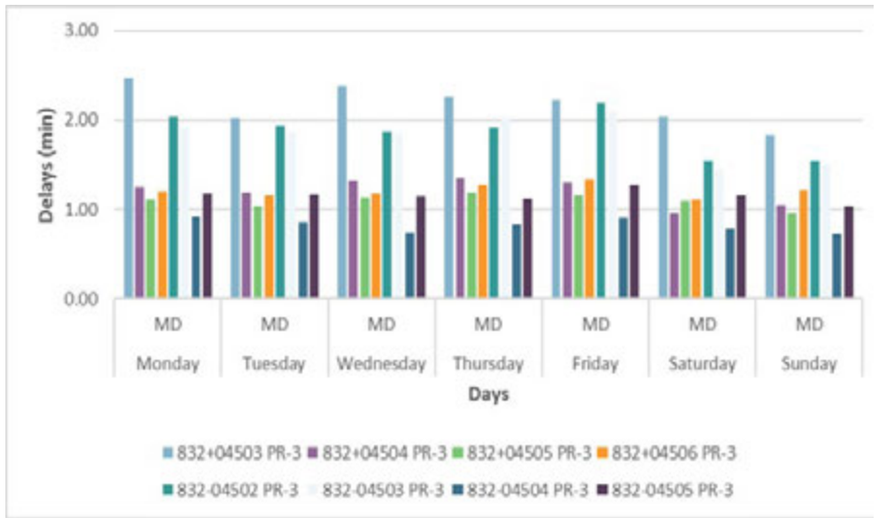


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD) - Weekly

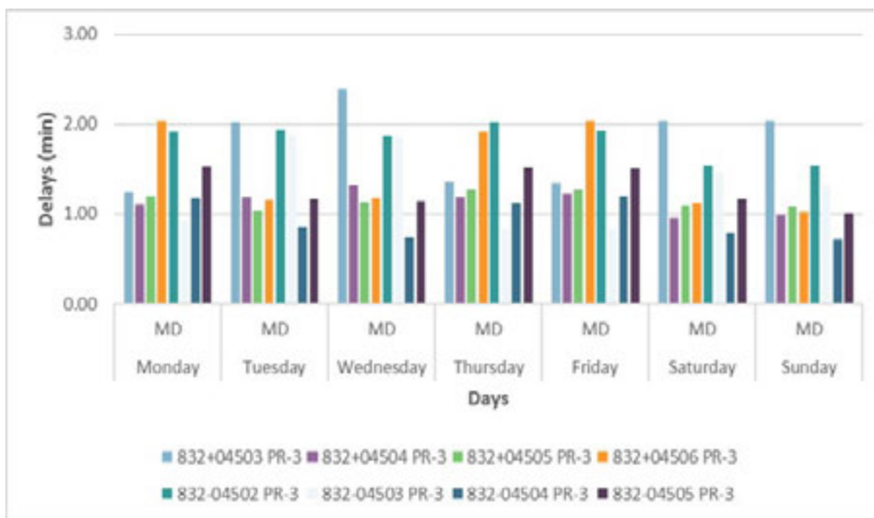
In terms of variation per week day for mid-day period (MD), for the last four months of 2016, from September to December, average delay of segments was 1.2 minutes. Segments with delays above average were: 832+04503 with average values between 2.0-2.5; 832-04502 with delays ranging between 1.5-2.0 minutes (Figure K.327 to Figure K.330).

Figure K.327: September 2016, TMC, East Region, (MD)



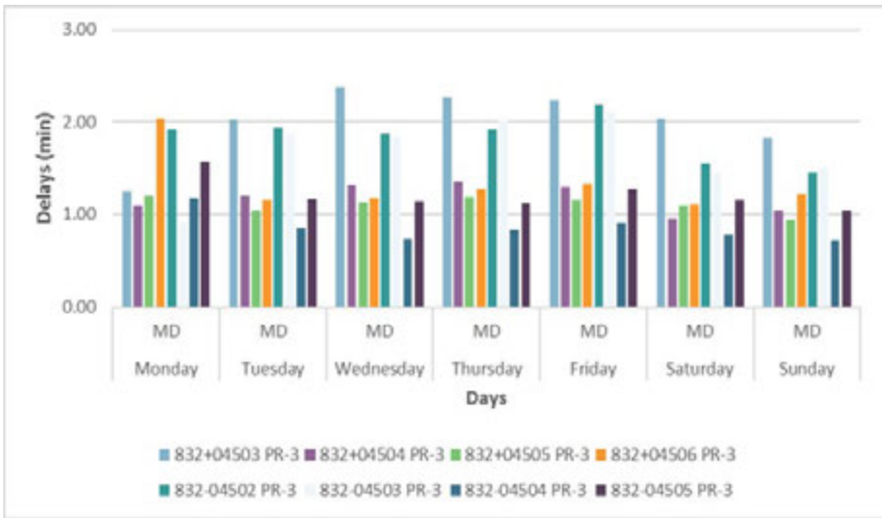
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.328: October 2016, TMC, East Region, (MD)



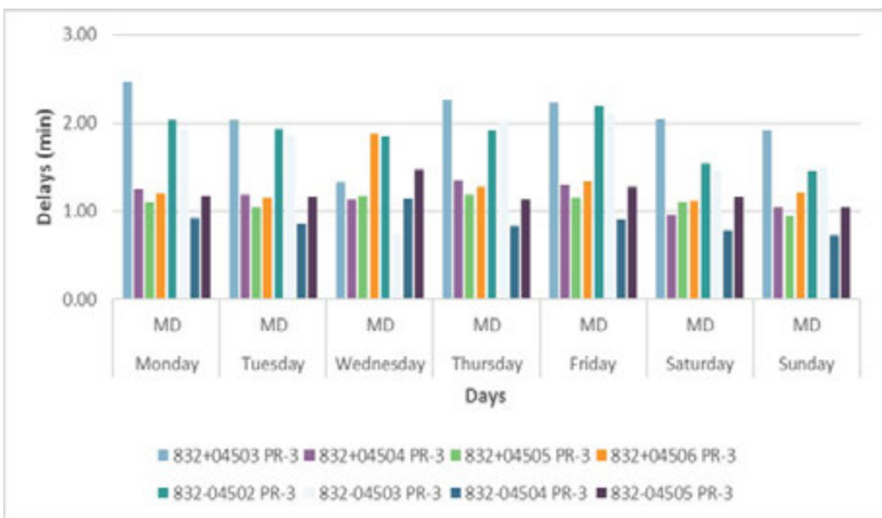
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.329: November 2016, TMC, East Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

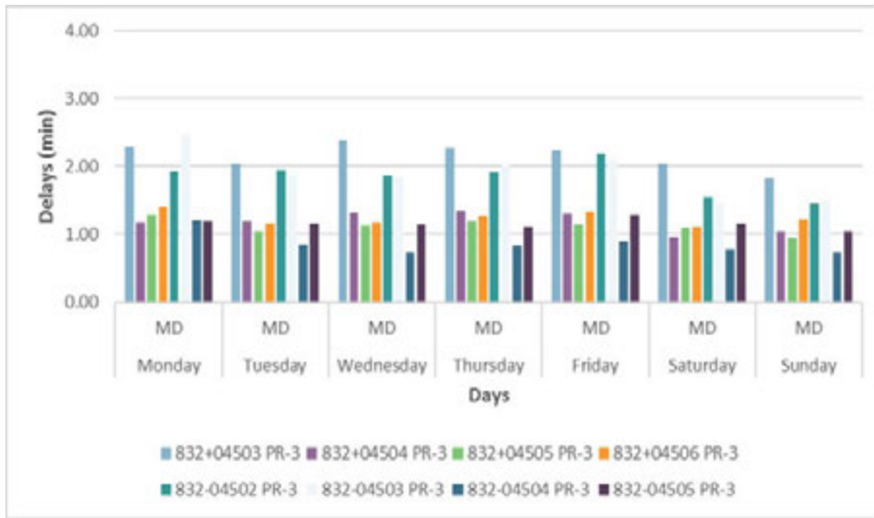
Figure K.330: December 2016, TMC East Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

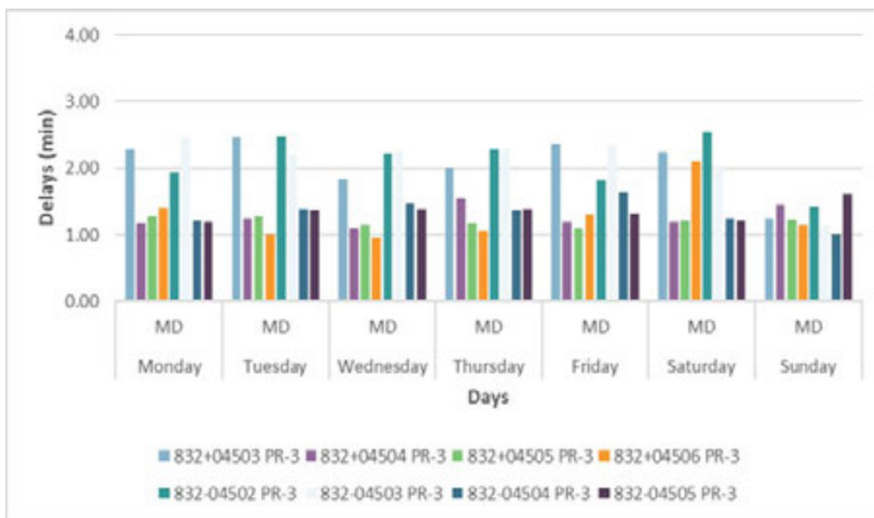
For the first four months of 2017, from January to April, average delay of segments was 1.2 minutes. Segments with delays above average were: 832+04503 with an average of 2.0 minutes; 832-04502 with an average of 1.8 minutes; and 832+04506 during April 2017 with values ranging between 1.0-2.5 (Figure K.331 to Figure K.334).

Figure K.331: January 2017, TMC, East Region, (MD)



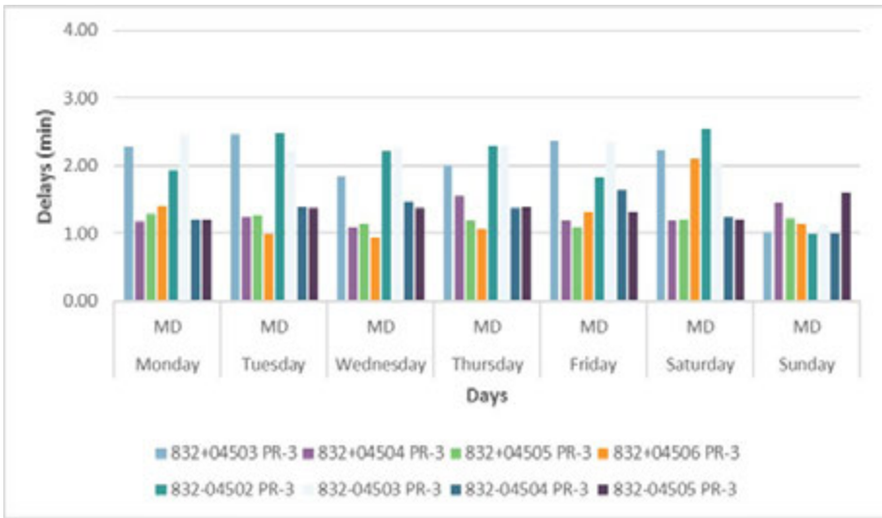
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.332: February 2018, TMC, East Region, (MD)



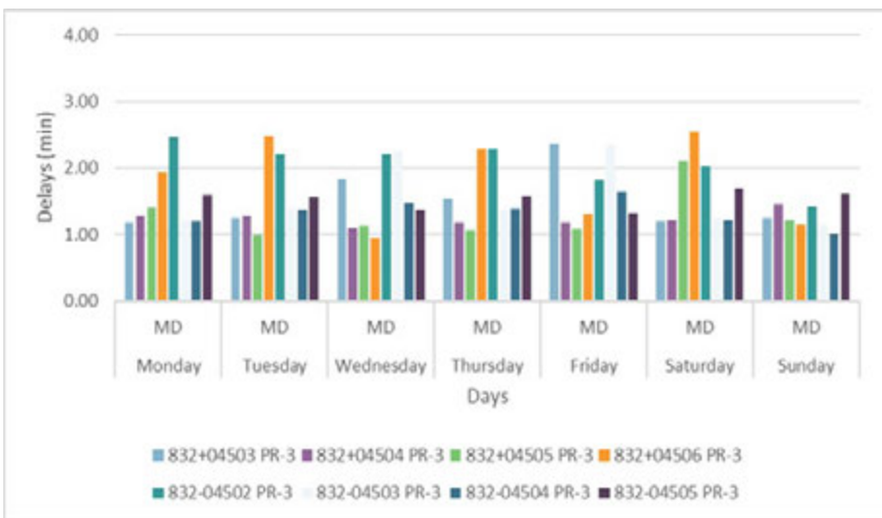
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.333: March 2017, TMC, East Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

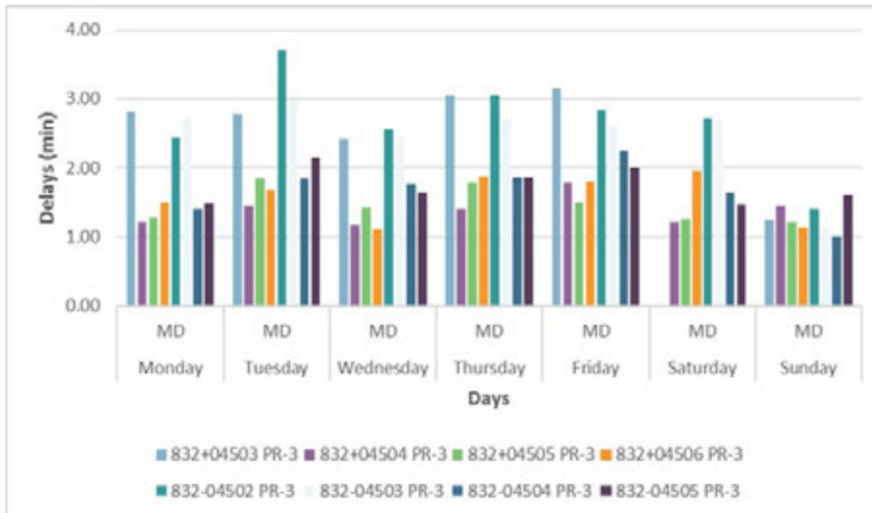
Figure K.334: April 2017, TMC, East Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

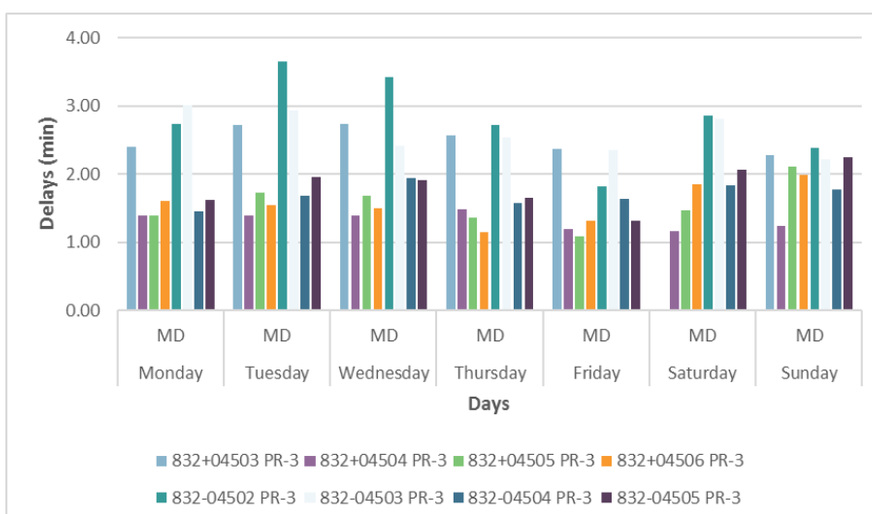
From May to August 2017, the average delay throughout the week was of 1.5 minutes. Segments with delays above average were: 832+04503 with values ranging between 1.5-2.5 minutes; 832-04502 with values ranging between 2.0-3.5 minutes; and 832+04506 during August 2017 with values ranging between 2.0-3.5 minutes (Figure K.335 to Figure K.338).

Figure K.335: May 2017, TMC, East Region, (MD)



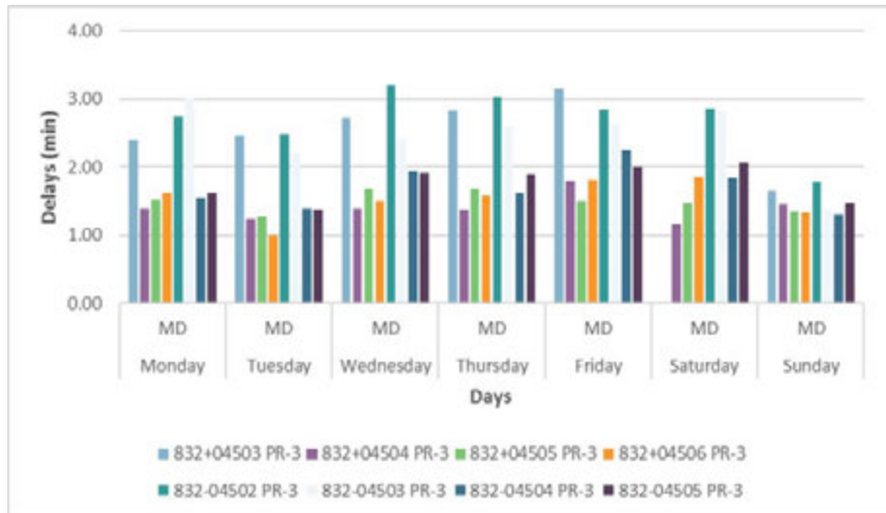
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.336: June 2017, TMC, East Region, (MD)



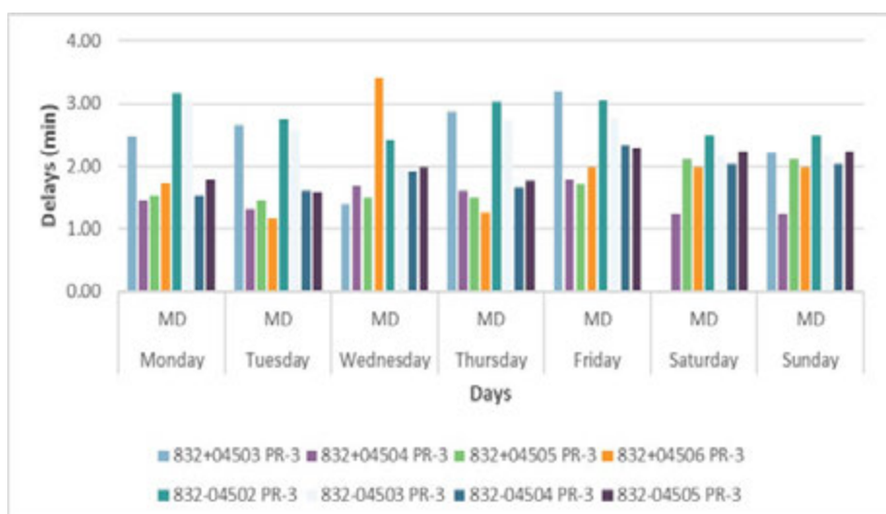
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.337: July 2017, TMC, East Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

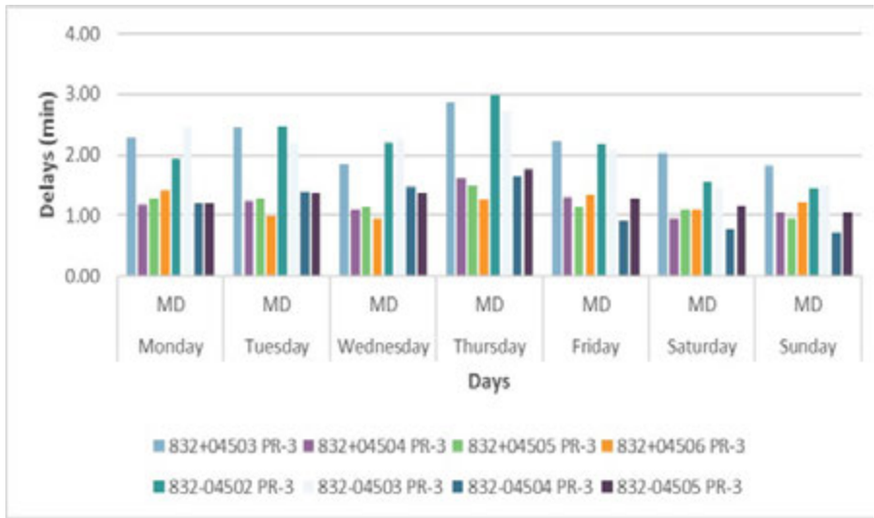
Figure K.338: August 2017, TMC, East Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

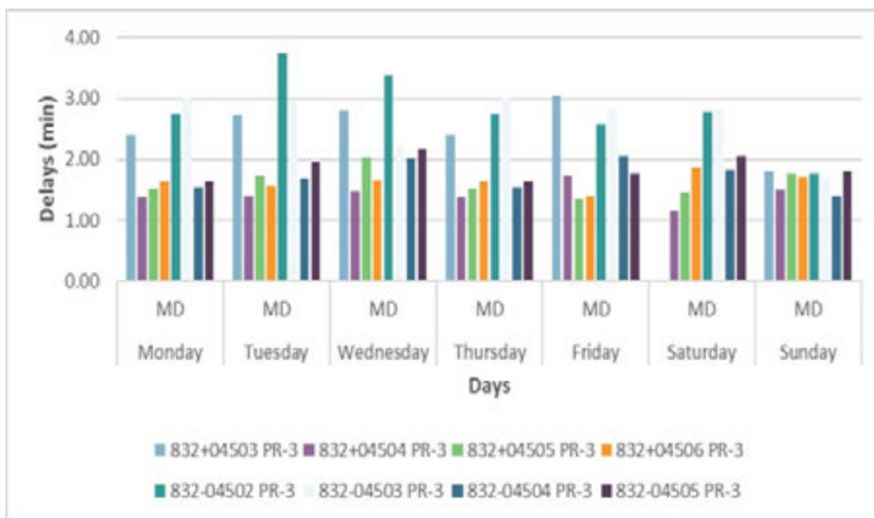
For the first four months between January and April 2018, average delay of segments was of 1.5 minutes. Segments with delays above average were: 832+04503 with an average delay of 2.0 minutes; 832-04502 with an average of 2.5 minutes; and 832+04506 during April with values ranging between 1.0-2.2 minutes (Figure K.339 to Figure K.342).

Figure K.339: January 2018, TMC, East Region, (MD)



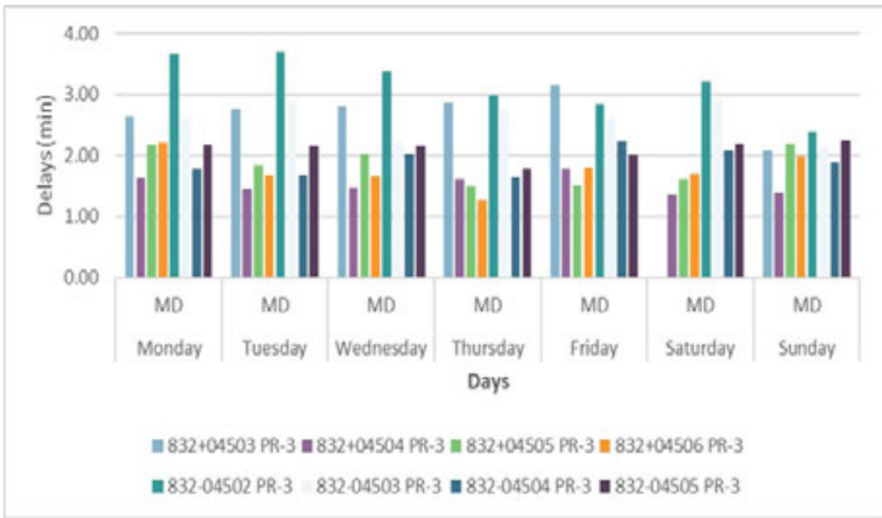
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.340: February 2018, TMC, East Region, (MD)



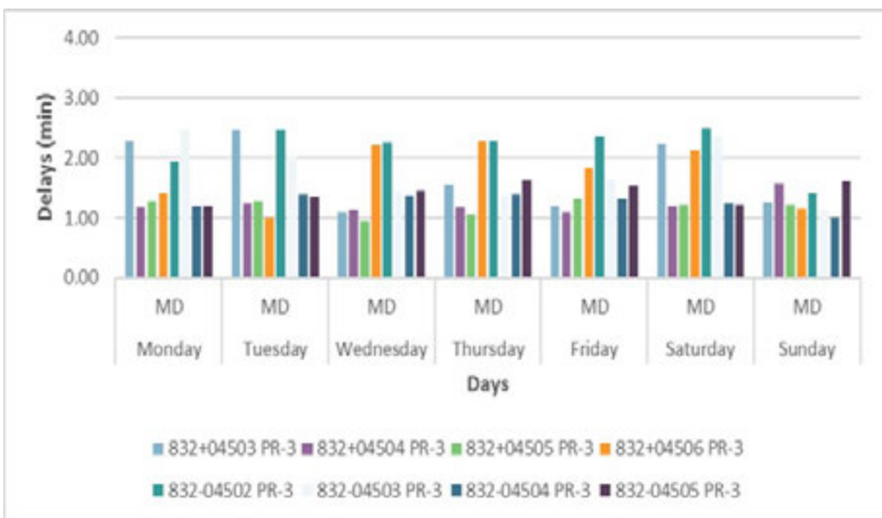
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.341: March 2018, TMC, East Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.342: April 2018, TMC, East Region, (MD)



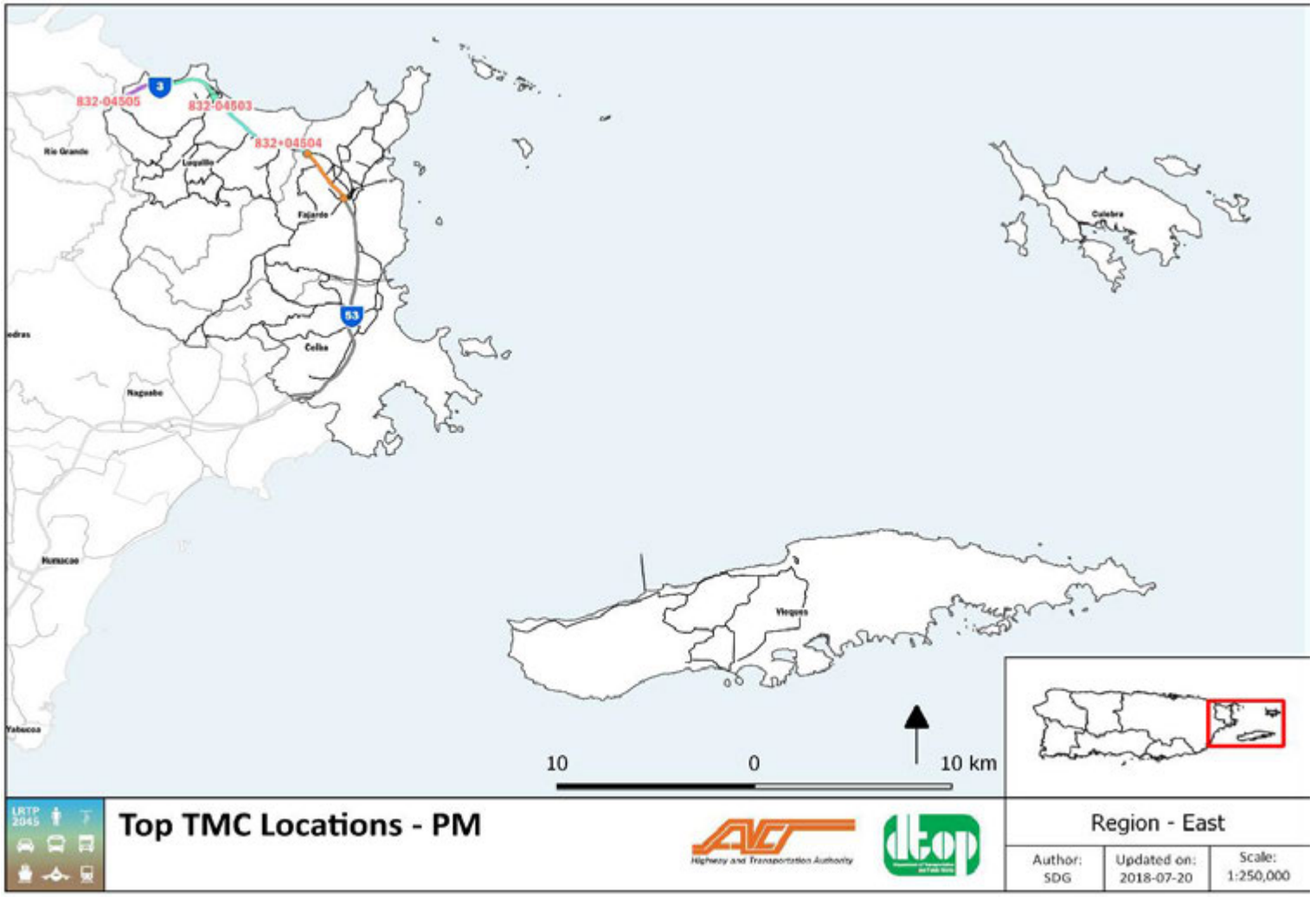
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM)

Segments added on average a delay of 1.8 minutes to the reference travel time for the afternoon period (PM), during the months of September 2016 through April 2018. The highest delay among all segments was recorded in January 2017, with an average of 3.1 minutes.

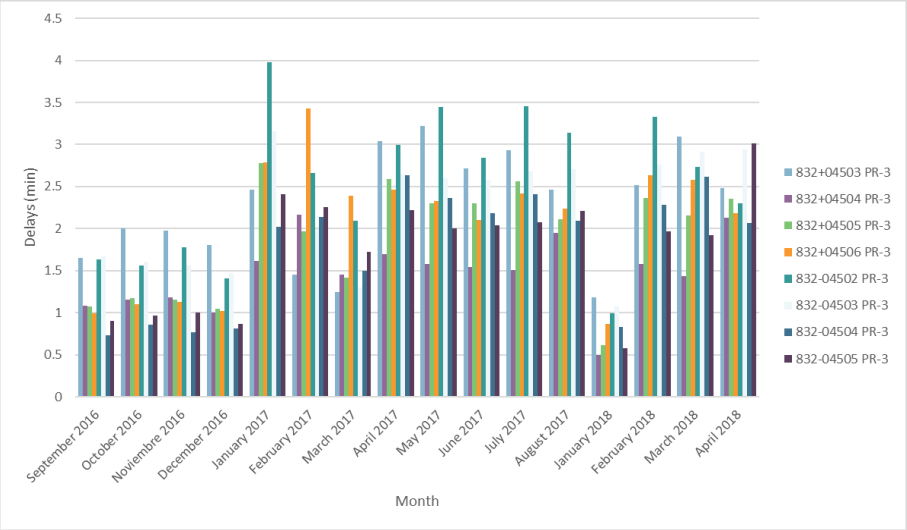
TMC 832-04477 ranked the highest with an average delay of 2.5 minutes, as seen in Figure K.343 and Figure K.344 below.

Figure K.343: East Location, PM Period



Source: SDG, based on NPMRDS Analytics

Figure K.344: Average Delays, East TPR, PM Period

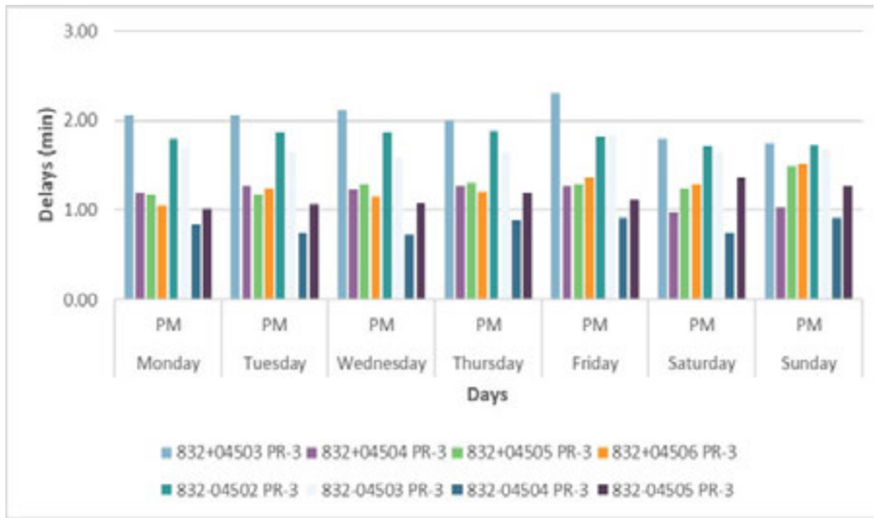


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM) - Weekly

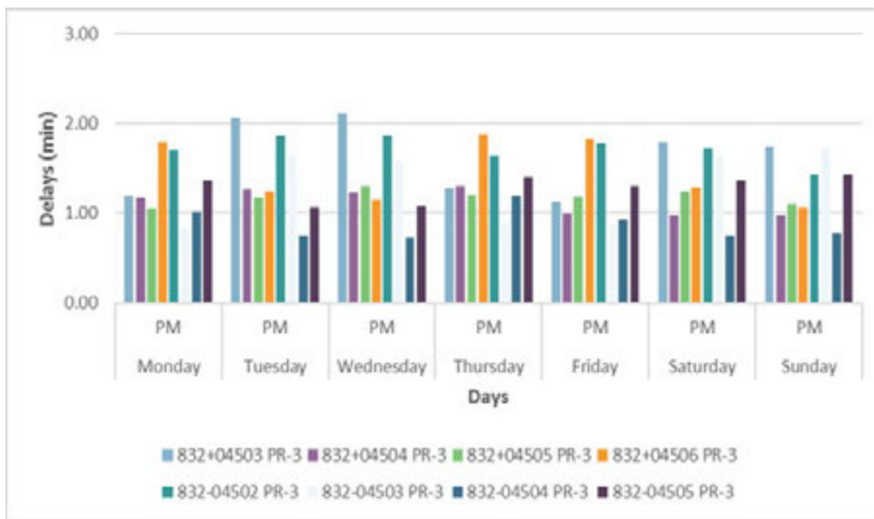
In terms of variation per week day for past-midday period (PM), for the last four months of 2016, between September and December, the average delay of segments was of 1.2 minutes. Segments with delays above average were: 832+04503 with an average delay of 1.8 minutes; 832-04502 with an average of 1.7 minutes; and 832+04506 with an average delay of 1.2 minutes (Figure K.345 to Figure K.348).

Figure K.345: September 2016, TMC, East Region, (PM)



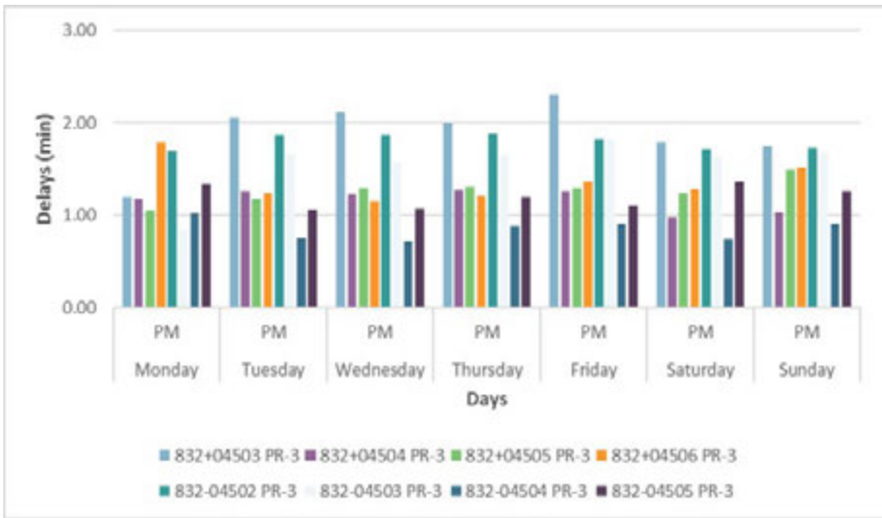
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.346: October 2016, TMC, East Region, (PM)



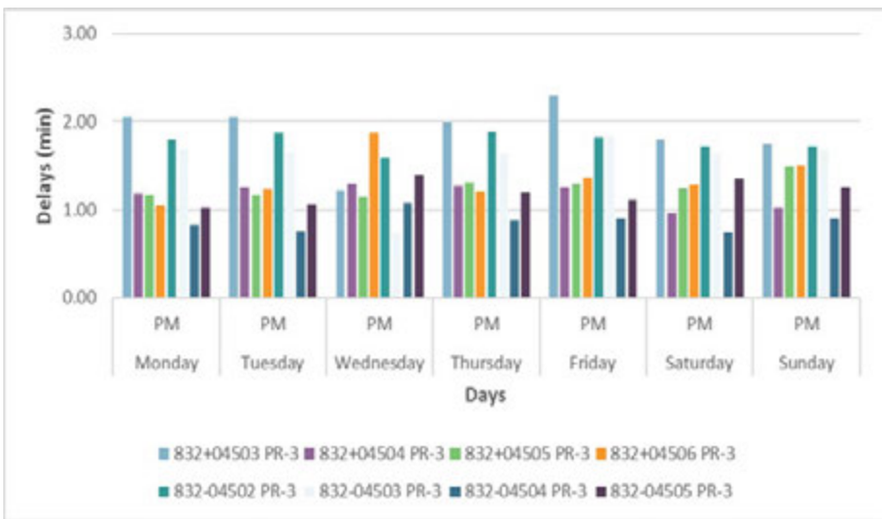
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.347: November 2016, TMC, East Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

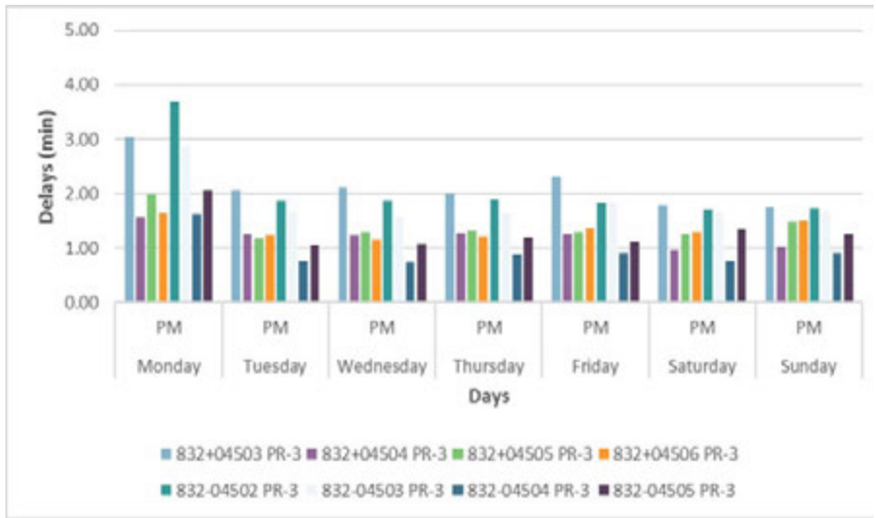
Figure K.348: December 2016, TMC, East Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

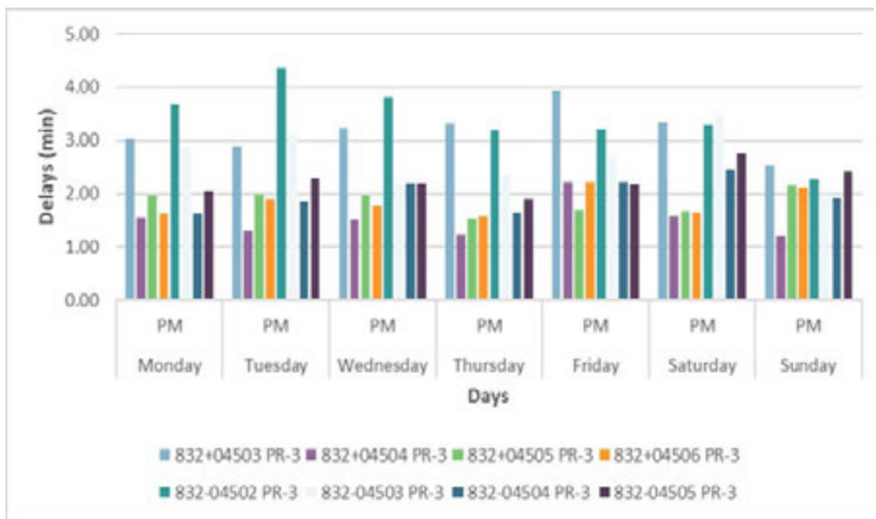
For the first four months of 2017, from January to April, average delay of segments was below 1.5 minutes. Segments with delays above average were: 832+04503 with an average of 2.5 minutes; 832-04502 with an average of 3.0 minutes; and 832+04506 during January 2017 (specifically Monday) experienced the highest delays (Figure K.349 to Figure K.352).

Figure K.349: January 2017, TMC, East Region, (PM)



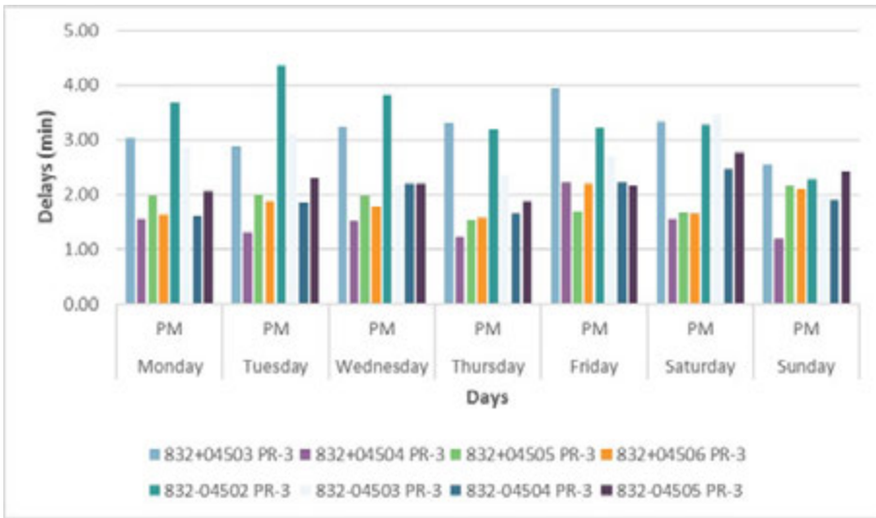
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.350: February 2017, TMC, East Region, (PM)



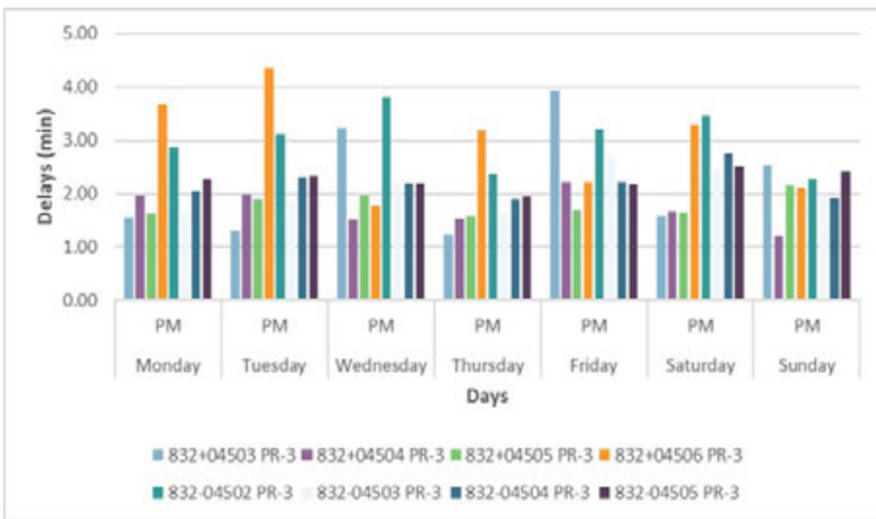
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.351: March 2017, TMC, East Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

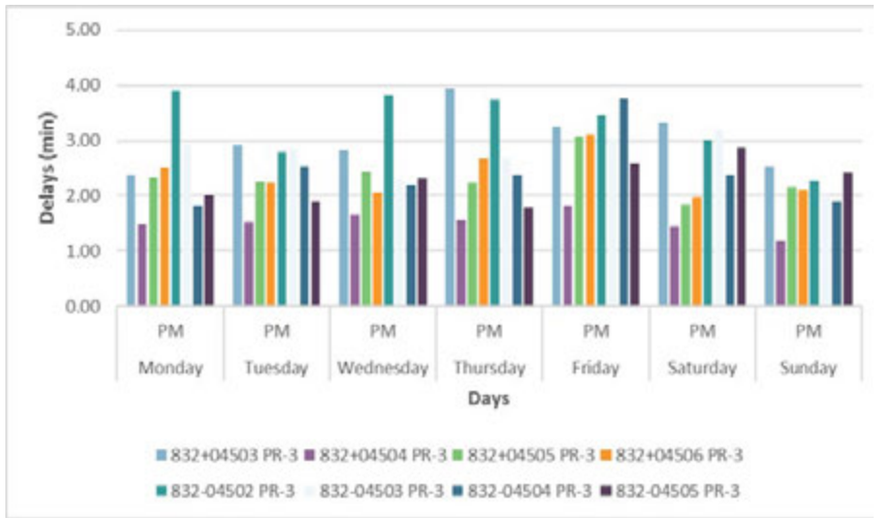
Figure K.352: April 2017, TMC, East Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

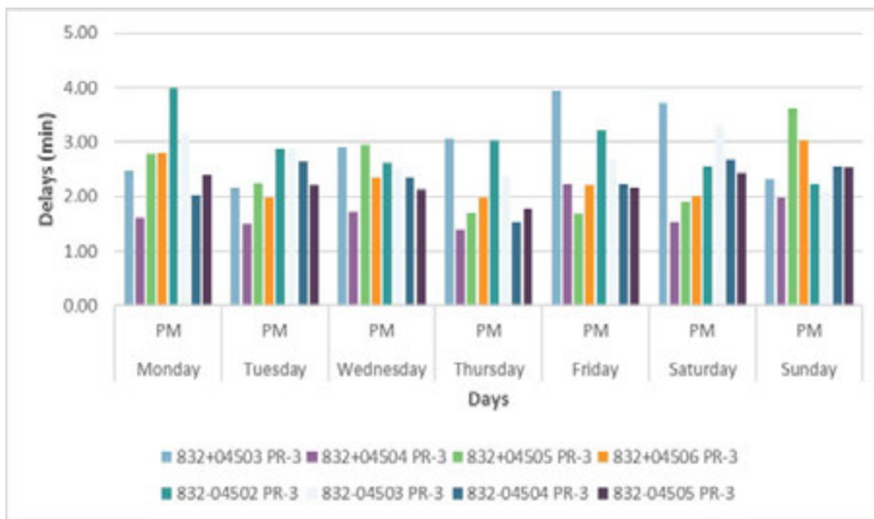
From May to August 2017, the average delay throughout the week was of 2.5 minutes. Segments with delays above average were: 832+04503 with values ranging between 2.5 minutes; 832-04502 with values ranging between 2.0-3.5 minutes; and 832+04506 during August 2017 with values ranging between 1.5-3.0 (Figure K.353 to Figure K.356).

Figure K.353: May 2017, TMC, East Region, (PM)



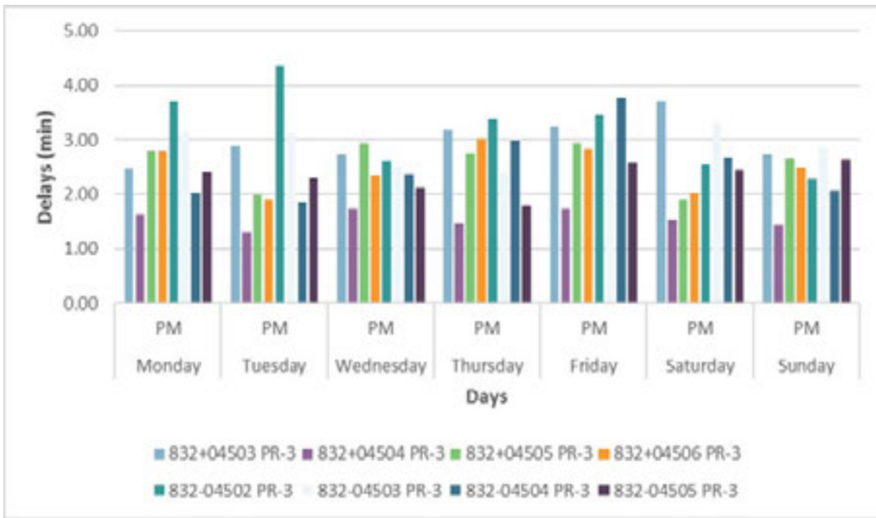
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.354: June 2017, TMC, East Region, (PM)



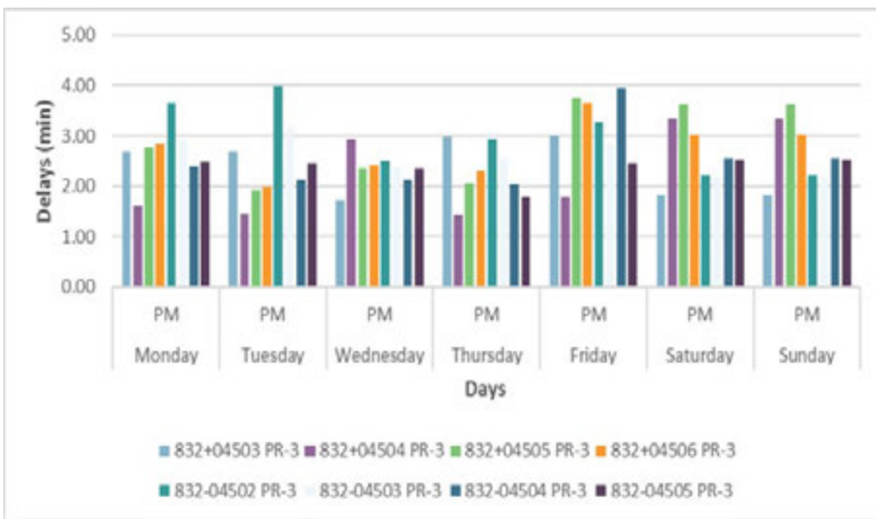
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.355: July 2017, TMC, East Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

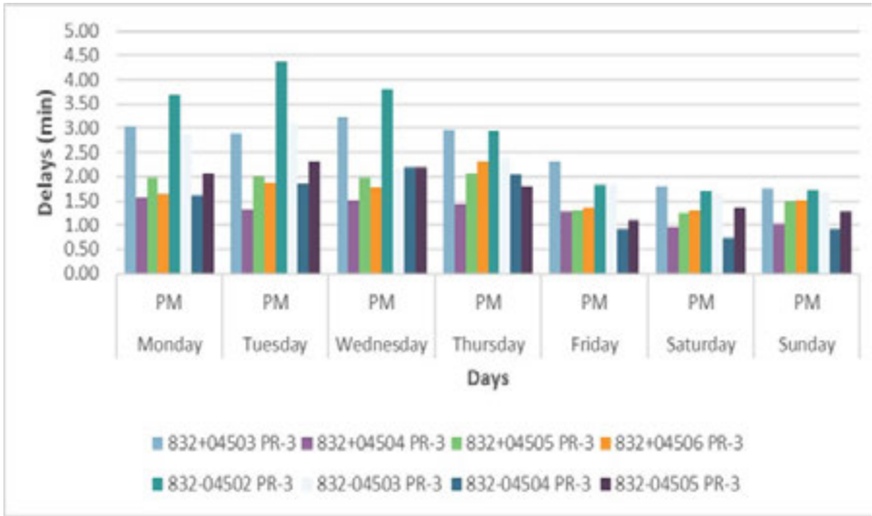
Figure K.356: August 2017, TMC, East Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

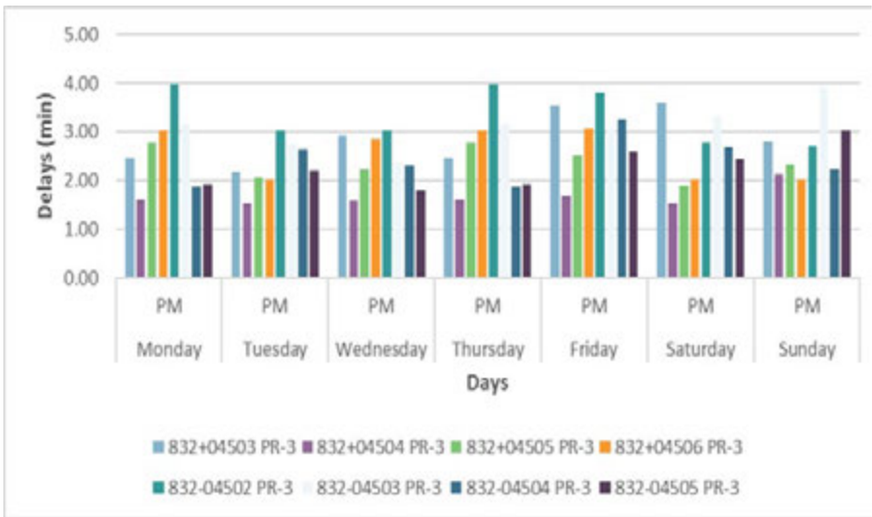
For the first four months between January and April 2018, average delay of segments was of 1.8 minutes. Segments with delays above average were: 832+04503 with an average delay of 2.5 minutes; 832-04502 with an average of 3.0 minutes; and 832+04506 during with average delay of 2.5 minutes. March was the busiest month of the 2018 period analyzed (Figure K.357 to Figure K.360).

Figure K.357: January 2018, TMC, East Region, (PM)



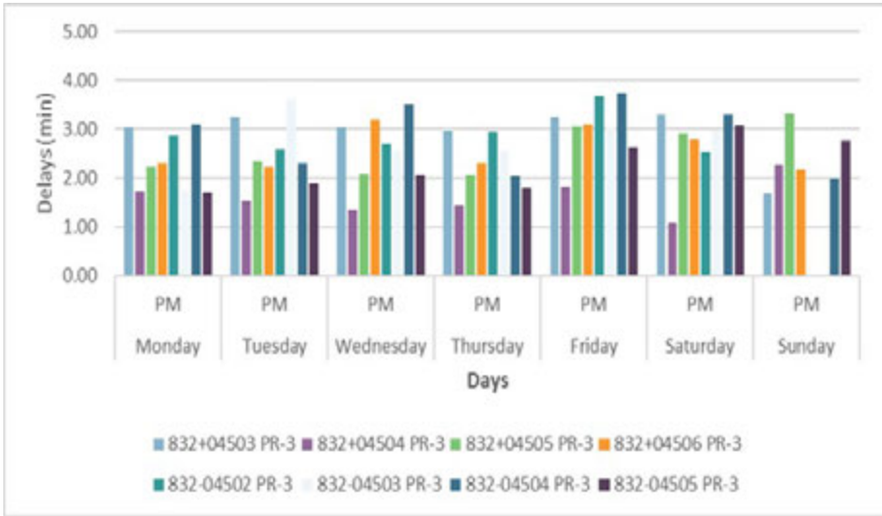
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.358: February 2018, TMC, East Region, (PM)



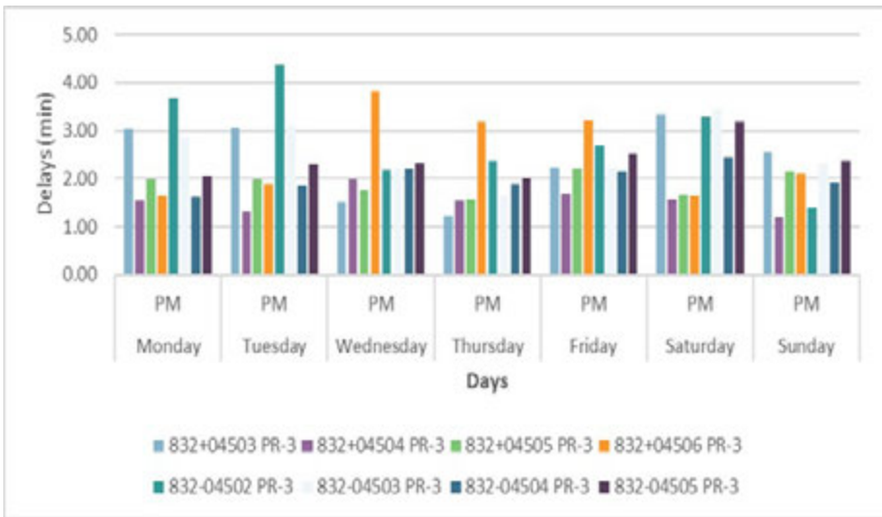
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.359: March 2018, TMC, East Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.360: April 2018, TMC, East Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Results for East Region bottlenecks

For the East region, all TMC segments studied were located along PR-3, and PR-53. The top 10 TMC segments with the worst delays were along PR-3 with delay values ranging between 1.0-3.0 minutes on average per segment per month. The periods of the day had the following average delays: past mid-day period with 1.9 minutes, mid-day period with 1.7 minutes, night-period with 1.4 minutes, and morning period with 1.3 minutes.

- For the morning period, segments with delays above average, ranging between 1.5-1.7 minutes were: 832+04503 westbound and 832-04503 eastbound along PR-3 in section around Margarita; and 832-04502 southbound along PR-3 between Luquillo and Fajardo.
- For the mid-day period, segments with delays above average, ranging between 2.0-2.5 minutes were the same as the morning period.
- For the past-midday period, segments with delays above average, ranging between 2.0-2.5 minutes were 832+04503 westbound and 832-04503 eastbound along PR-3 in section around Margarita; 832-04502 southbound along PR-3 between Luquillo and Fajardo; and 832+04506 around Playa Fortuna y Luquillo county.
- For the night period, segments with delays above average, ranging between 1.5-1.6 minutes were: 832+04503 westbound and 832-04503 eastbound along PR-3 in section around Margarita; and 832+04506 around Playa Fortuna y Luquillo county.

Thus, overall, segments with highest recurrence of delays throughout periods of the day were 832+04503, 832-04503, 832+4506, and 832-04502, all located in Luquillo county along PR-3, in sections around Margarita, Playa Fortuna and between Luquillo and Fajardo.

SOUTHEAST

In the Southeast, the data used in the preparation of the report and the graphs are from the roads PR-3, PR-52 E, PR-52 O, Express José C. Barbosa and PR-54.

Table K.18 to Table K.20 shows roads, months and years selected and the studied periods.

Table K.18: Roads

TCM	Road name
832+04174	PR-52 E
832+04177	PR-52 E
832+04460	PR-54
832+04461	PR-54
832+04472	PR-3
832+04520	Express José C Barbosa
832-04173	PR-52 O
832-04478	PR-3
832-04460	PR-54
832+04478	PR-3

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.19: Months and Years Selected

2016	2017	2018
September	January	January
October	February	February
November	March	March
December	April	April
	May	
	June	
	July	
	August	

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.20: Studied Periods

Night Period (NT)	Morning Period (AM)
Midday Period (MD)	Past-midday Period (PM)

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

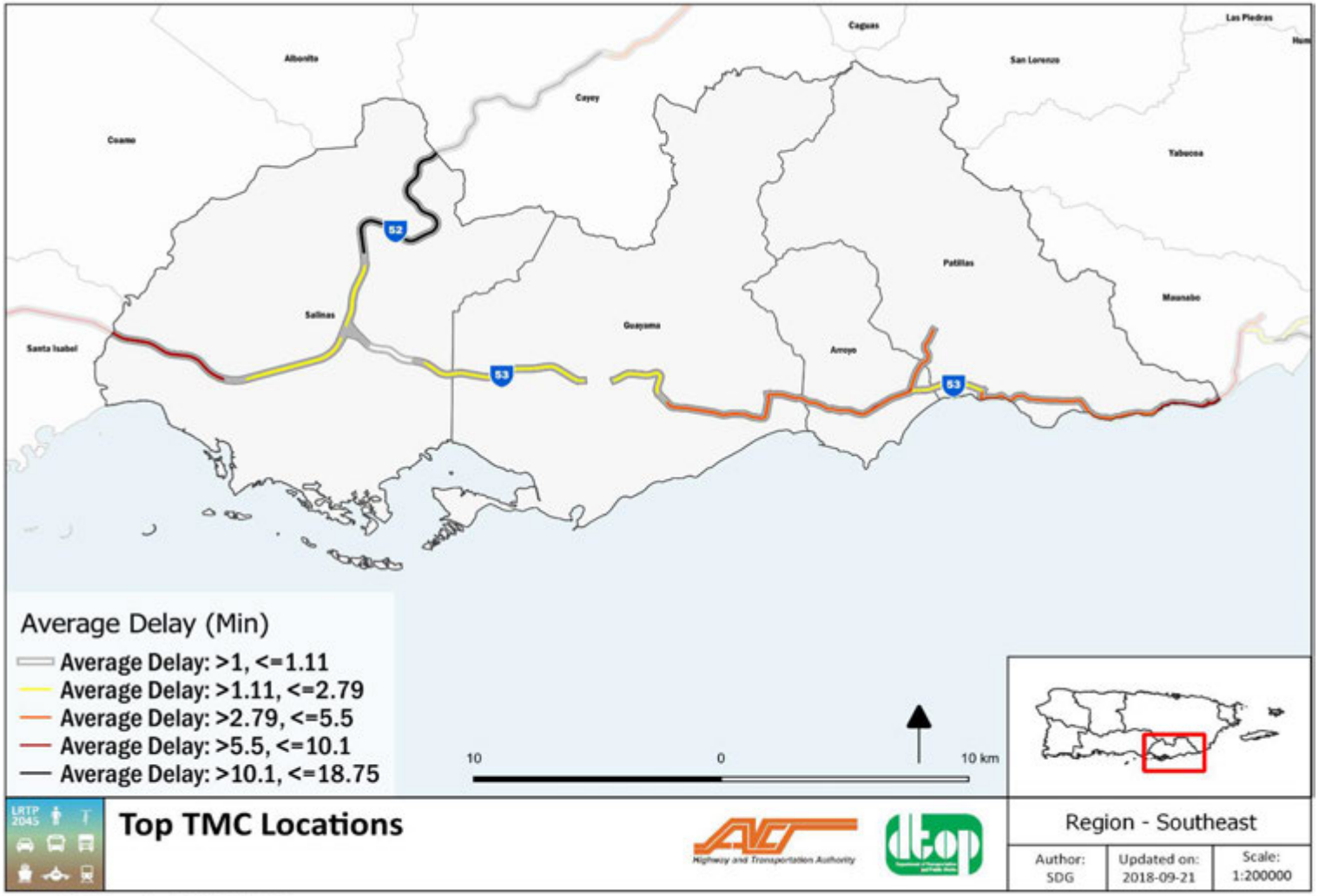
Bottleneck Analysis

Night Period (NT)

For the night period (NT), from 18:00-7:00, segments average between 1.0 – 2.0 minutes of added delay to the reference travel time.

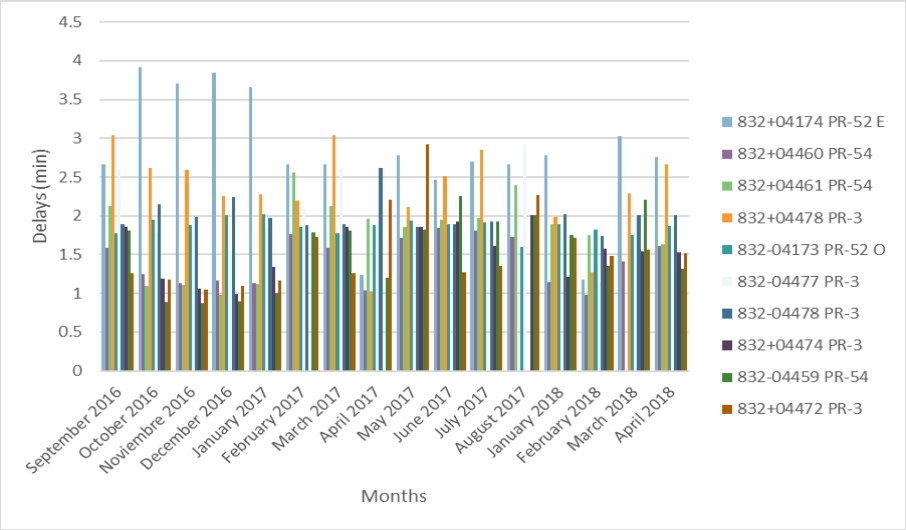
The highest ranking TMC, 832+04174, had an average of 3.8 minutes throughout the months of October 2016 to January 2017. After this period, it maintained an average delay of 2.3 minutes. Next in ranking is 832+04478, with 2.4 minutes, as seen in Figure K.361 and Figure K.362 below.

Figure K.361: Southeast Location



Source: SDG, based on NPMRDS Analytics

Figure K.362: Average Delays, Southeast TPR, NT Period



Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Night Period (NT) - Weekly

In terms of variation per week day for night period (NT), for the last four months of 2016, the average was below 4.0 minutes. However, months varied with segments 832+04174 in PR-52 E, 832+04474 in PR-3 and 832+04478 in PR-3 ranking higher than the average, ranging between 1.0 – 10.0 minutes delay.

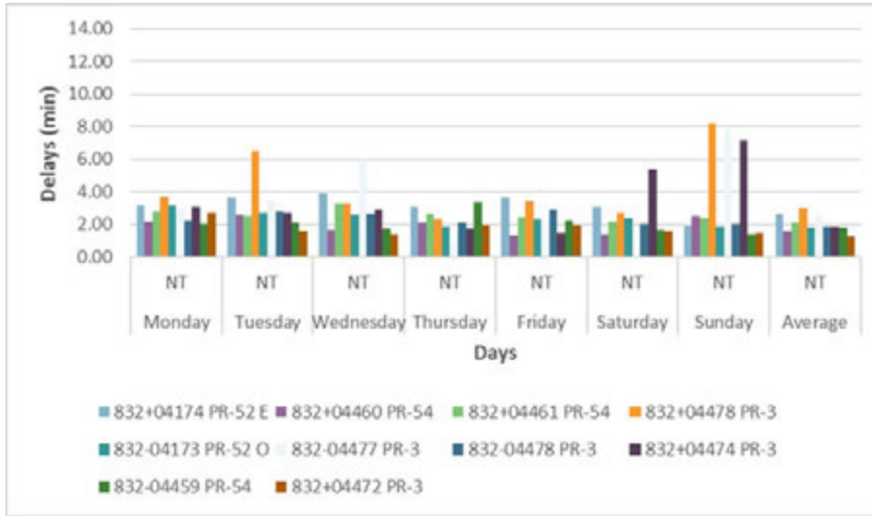
For September 2016, the highest-ranking segments had peaks on Tuesday and Sunday, with 832+04478 in PR-3 recording 6.0 and 8-0 minutes delay, and 832+04460 in PR-54 with values of 5.0 and 7.0 minutes.

For October 2016, 832+04174 in PR-52 E had an average of 4.0 minutes delay throughout the week, and segment 832+04478 in PR-3 had average delays of 4.5 and a peak on Saturday with 10.0 minutes.

For November, the highest-ranking segments were 832+04174 in PR-52 E, mostly Monday through Friday with delays ranging between 4.0 – 5.0 minutes. Segment 832+04478 in PR-3 ranged between 3.0 – 4.5 minutes on average delay. Both segments added double the average delay for most segments.

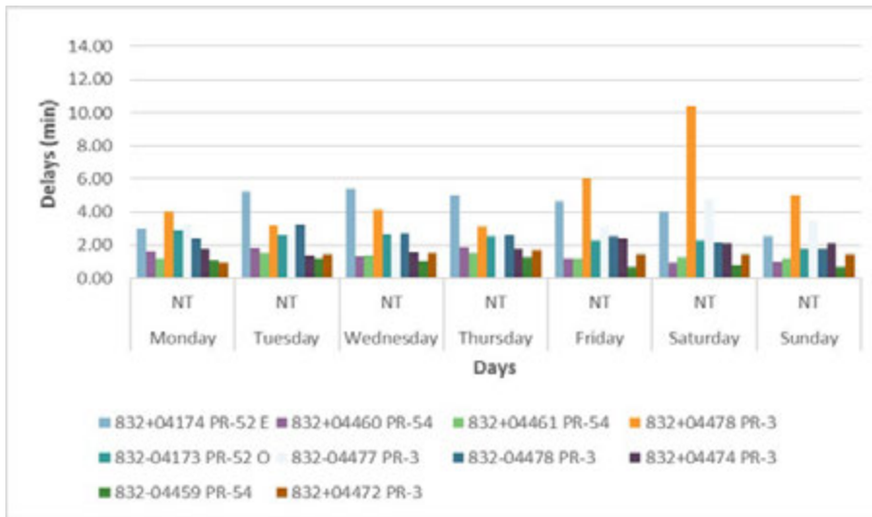
For December, most segments had delays below 5.0 minutes, and the highest-ranking segment was 832+04478 in PR-3 with a peak on Saturday of 14.0 minutes (Figure K.363 to Figure K.366).

Figure K.363: September 2016, TMC, Southeast Region, (NT)



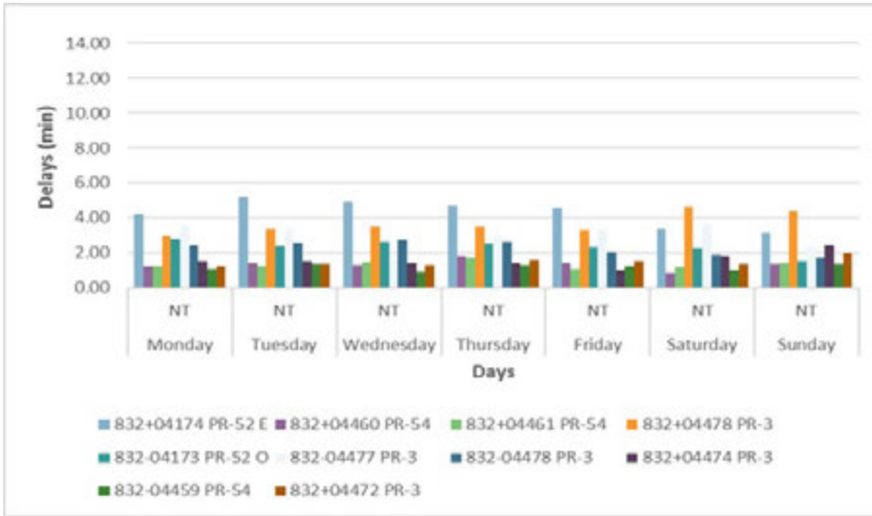
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.364: October 2016, TMC, Southeast Region, (NT)



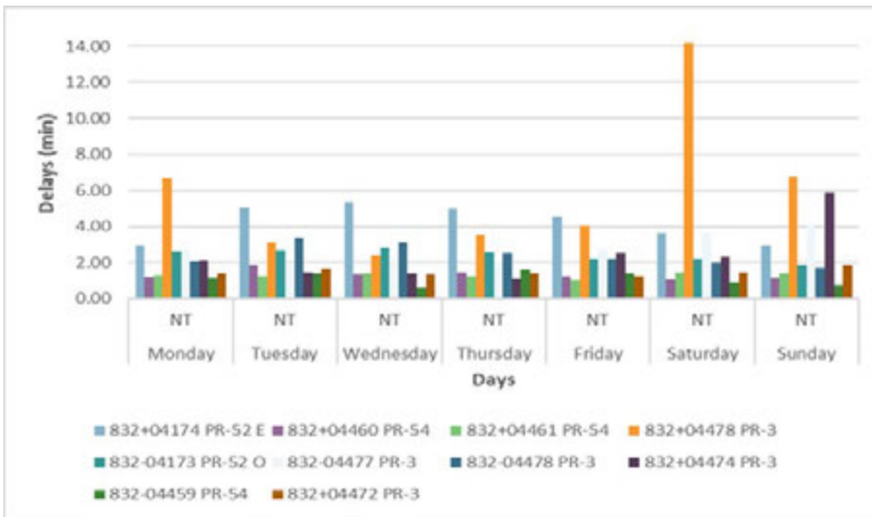
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.365: November 2016, TMC, Southeast Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.366: December 2016, TMC, Southeast Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months of 2017, between January and April, the average delay for most segments was below 5.0 minutes. Segments 832+04174 in PR-52 E, 832-04173 in PR-52 O and 832+04478 in PR-3 ranked above the average, ranging between 2.0 – 15.0 minutes delay.

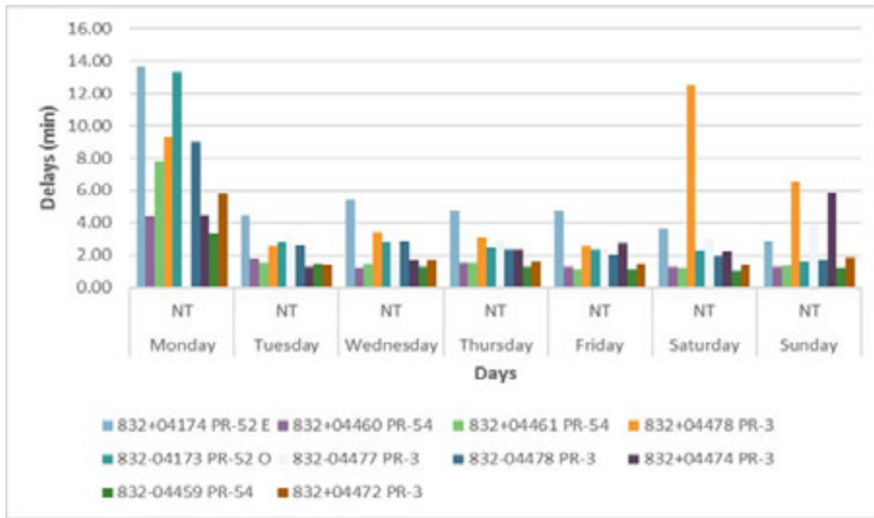
For January, the highest delay happened on Monday with an average of 8.0 minutes. The highest-ranking segments with average delays above 5.0 minutes were: 832+04174 PR-52 E with 13.8 minutes delay; 832-04173 in PR-52 O with 13.3 minutes delay; and 832+04478 in PR-3 with 9.0 minutes, as well as 832+04461 in PR 54 with 8.5 minutes. The recurrent segment with delay above average was 832+04174 in PR-52 E with an average delay of 4.0 minutes.

For February, the highest-ranking segments were 832+04478 in PR-3 with an average of 3.6 minutes and a peak on Sunday with 10.0 minutes; and 832+04460 in PR-54, 832+04174 in PR-52 E with average delays ranging between 2.0 – 4.0 minutes.

For March, the highest-ranking segments were 832+04478 in PR-3 with an average delay ranging from 6.0-8.0 minutes Tuesday and Sunday, and 832-04477 in PR-3 with an average delay that peaks on Sunday at 8.0 minutes.

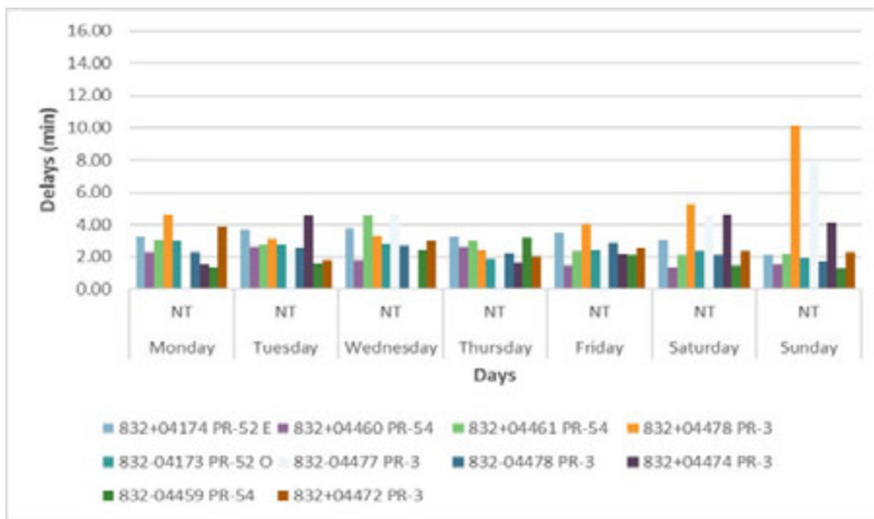
For April, most segments were below 4.0 minutes delay. Only two segments ranked higher, 832-04478 in PR-3 and 832+04478 in PR-3 with a delay ranging from 6.0-15.0 minutes (Figure K.367 to Figure K.370).

Figure K.367: January 2017, TMC, Southeast Region, (NT)



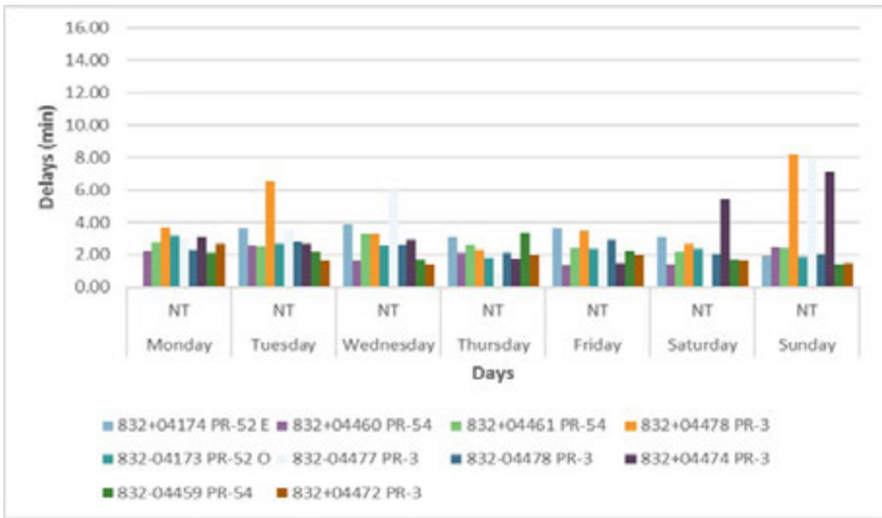
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.368: February 2017, TMC, Southeast Region, (NT)



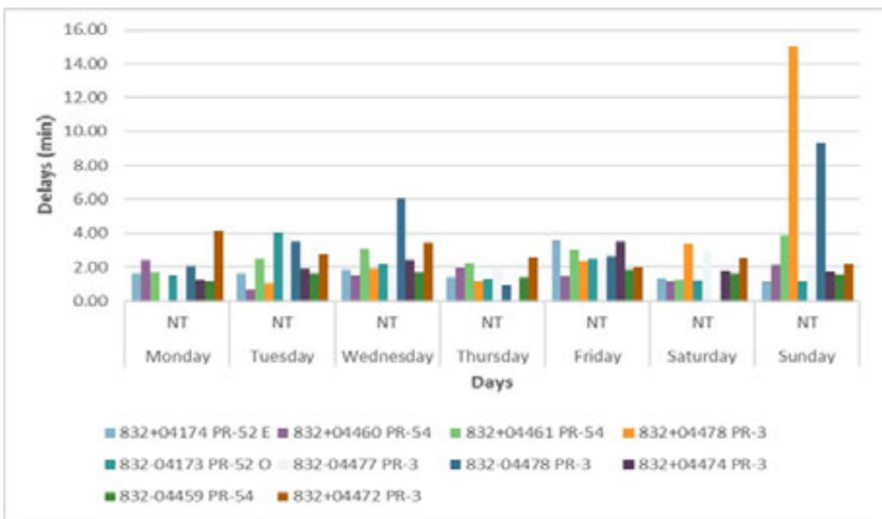
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.369: March 2017, TMC, Southeast Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

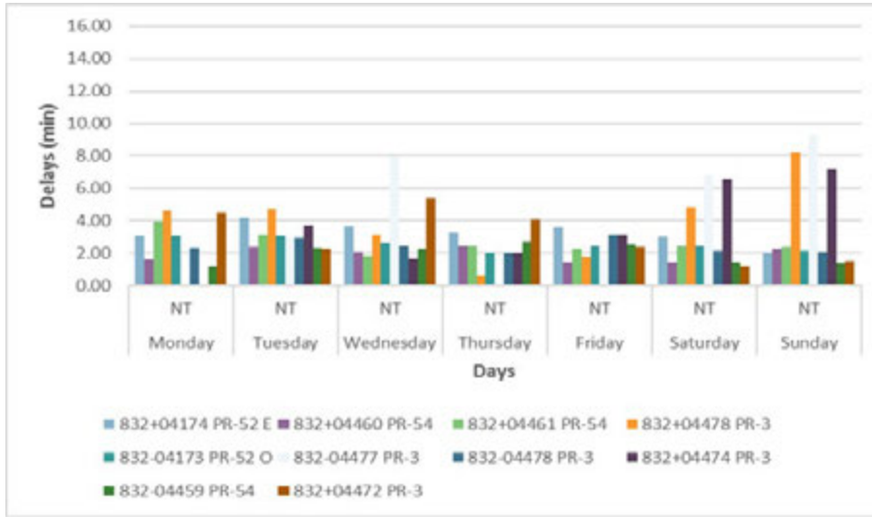
Figure K.370: April 2017, TMC, Southeast Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

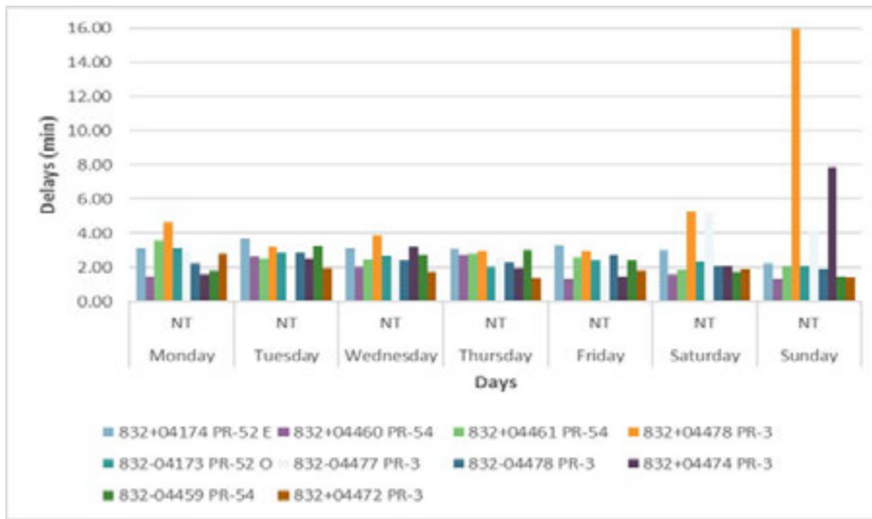
From May to August 2017, the average delay was 2.0 minutes. The highest-ranking segments were 832+04174 in PR-52 E and 832+04478 in PR-3 with average delays ranging between 2.0 – 16.0 minutes (Figure K.371 to Figure K.374).

Figure K.371: May 2017, TMC, Southeast Region, (NT)



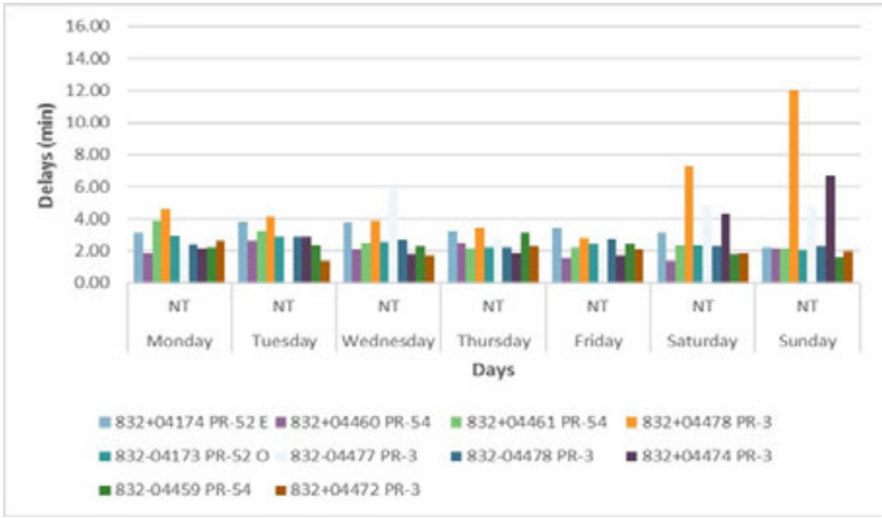
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.372: June 2017, TMC, Southeast Region, (NT)



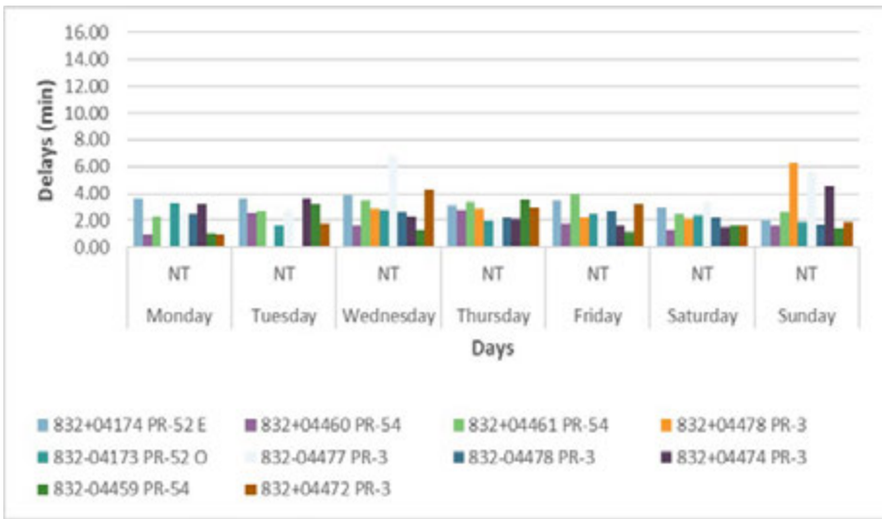
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.373: July 2017, TMC, Southeast Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

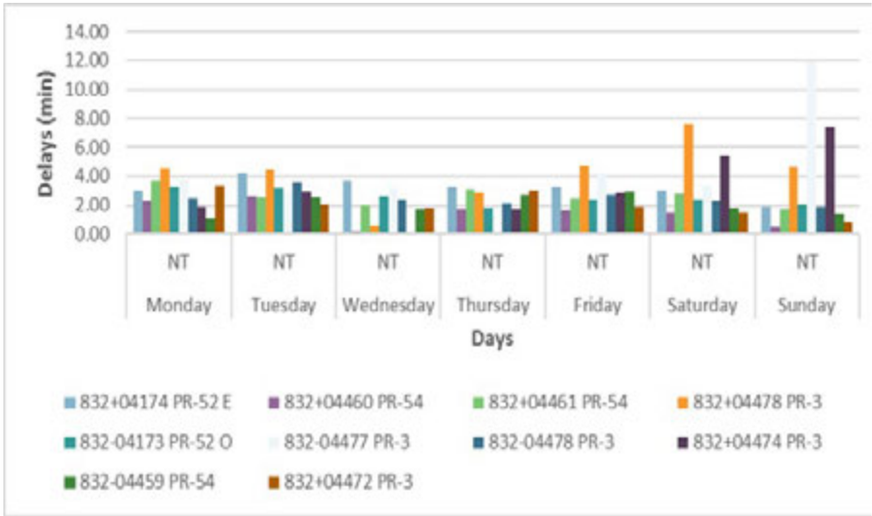
Figure K.374: August 2017, TMC, Southeast Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

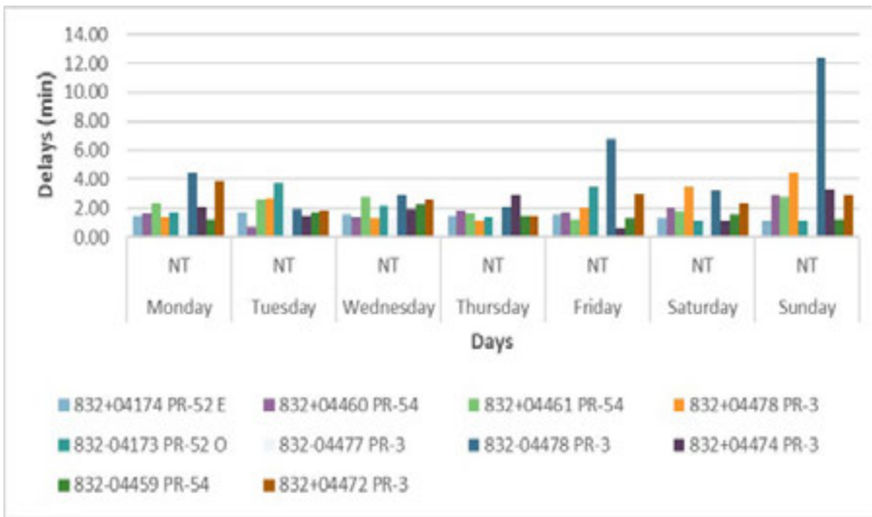
For the first four months between January and April 2018, average delay of segments was of 3.0 minutes, with highest ranking segments being 832+04477 in PR-3 reaching a peak of 11.5 minutes on Sunday, and 832+04478 in PR-3 with average delay ranging from 1.0-8.0 minutes (Figure K.375 to Figure K.378).

Figure K.375: January 2018, TMC, Southeast Region, (NT)



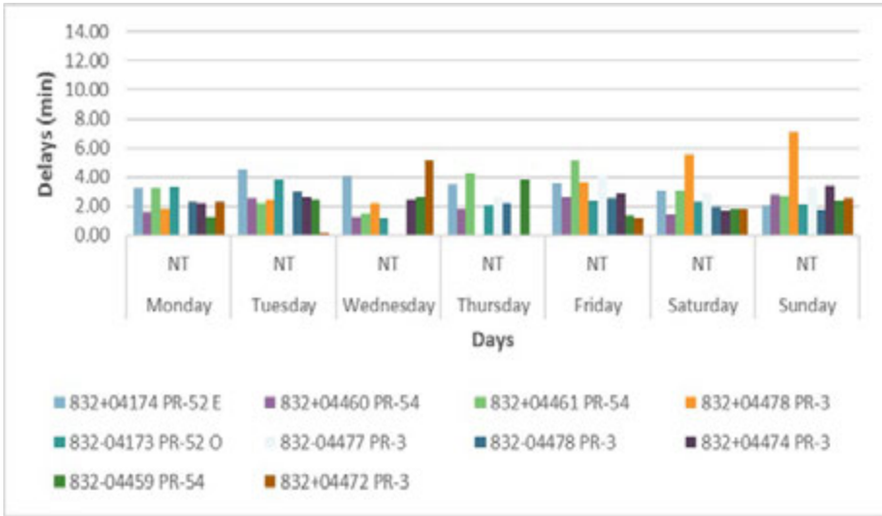
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.376: February 2018, TMC, Southeast Region, (NT)



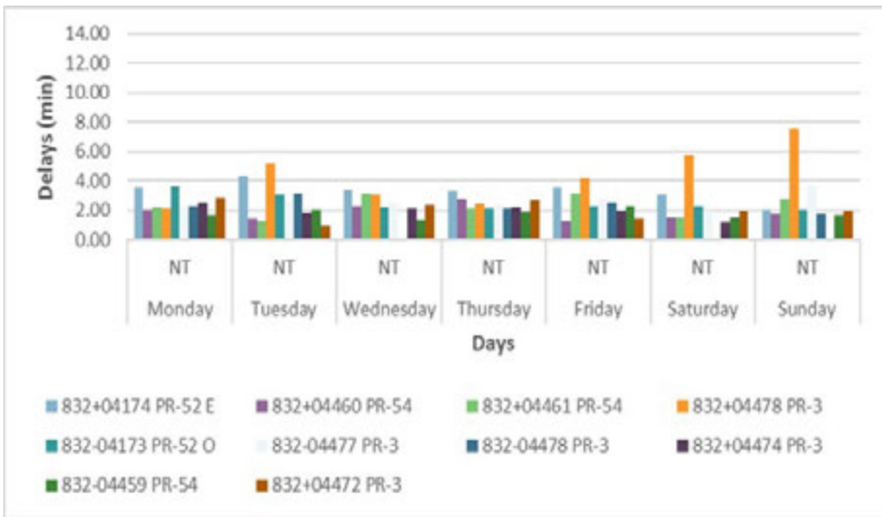
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.377: March 2018, TMC, Southeast Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.378: April 2018, TMC, Southeast Region, (NT)

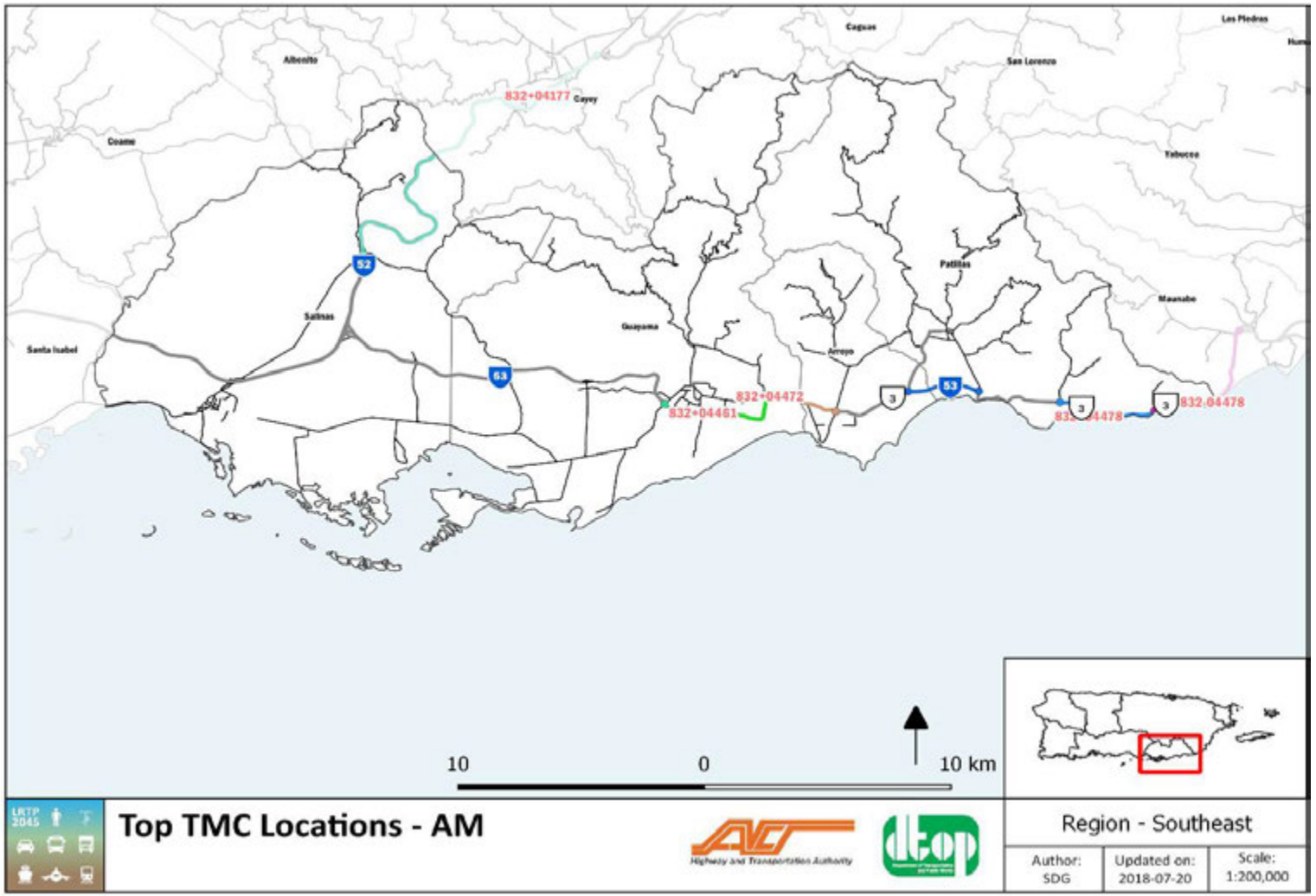


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM)

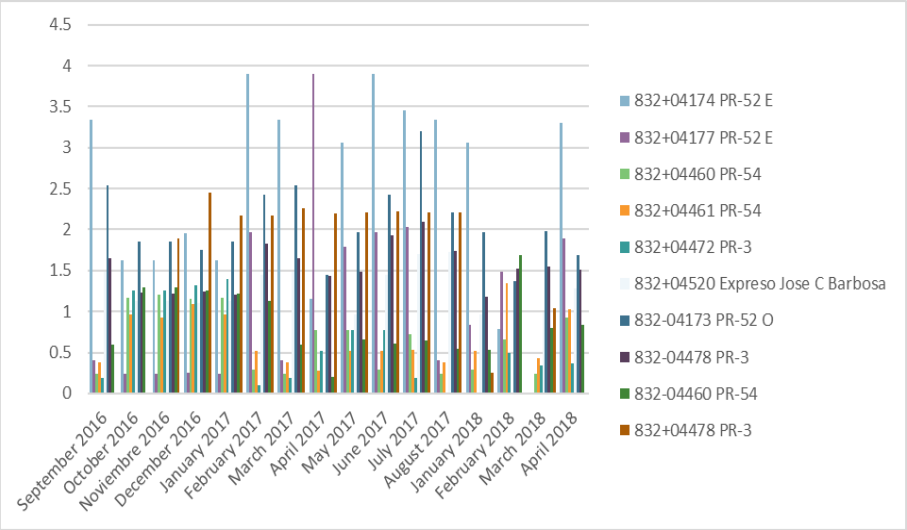
The average delay was between 1.0 and 2.0 minutes before February 2017, for the morning period (AM), from 7:00-9:00 a. m. The following months, delay dropped below 1.0-minute for most segments. The highest ranking TMC was 832+04174, with an average delay of 3.0 minutes, as seen in Figure K.379 and Figure K.380 below.

Figure K.379: Southeast Location, AM Period



Source: SDG, based on NPMRDS Analytics

Figure K.380: Average Delays, Southeast TPR, AM Period

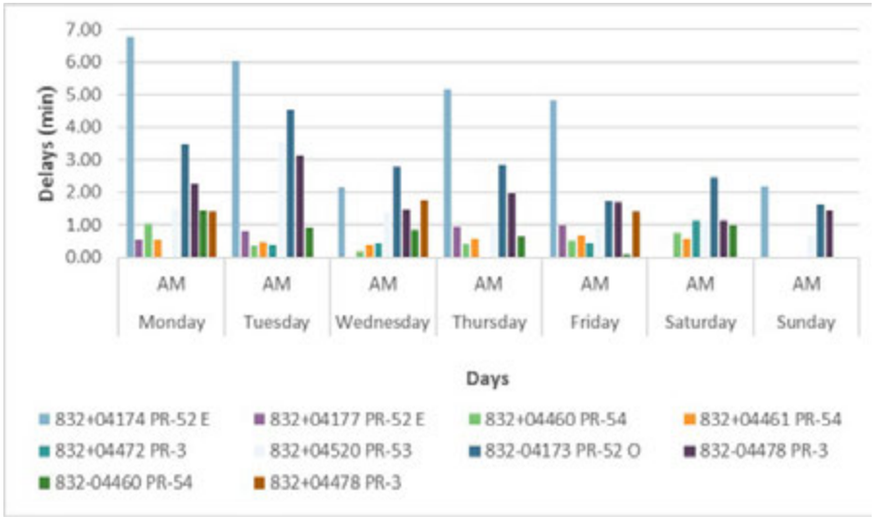


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM) – Weekly

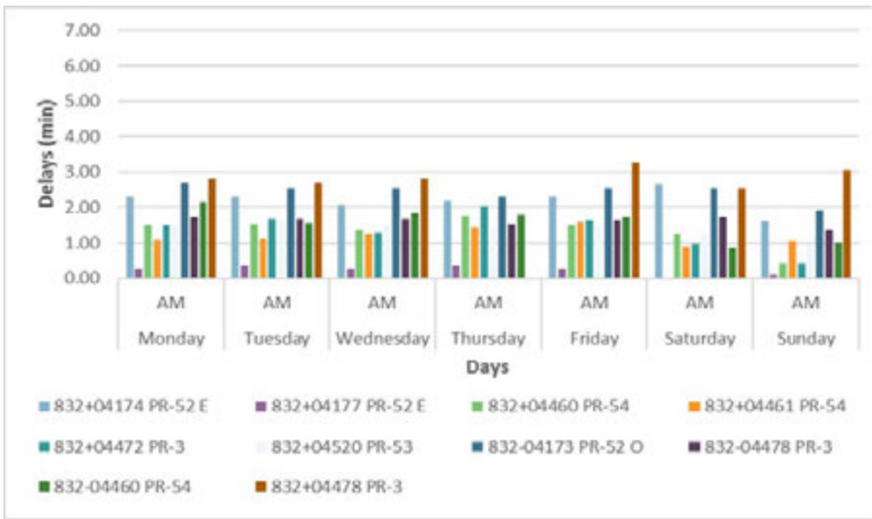
In terms of variation per week day for morning period (AM), for the last four months of 2016, the average delay was 1.5 minutes for most segments. Some of the highest-ranking segments were 832+04478 in PR-3 with a peak of 3.0 minutes, followed by 832-04173 in PR-52 O and 832+04174 in PR-52 E with an average delay ranging from 2.2-6.8 minutes (Figure K.381 to Figure K.384).

Figure K.381: September 2016, TMC, Southeast Region, (AM)



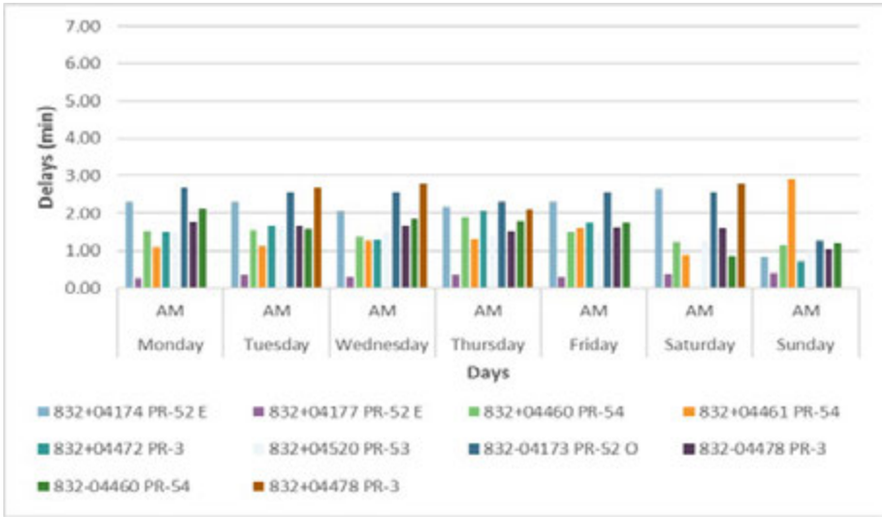
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.382: October 2016, TMC, Southeast Region, (AM)



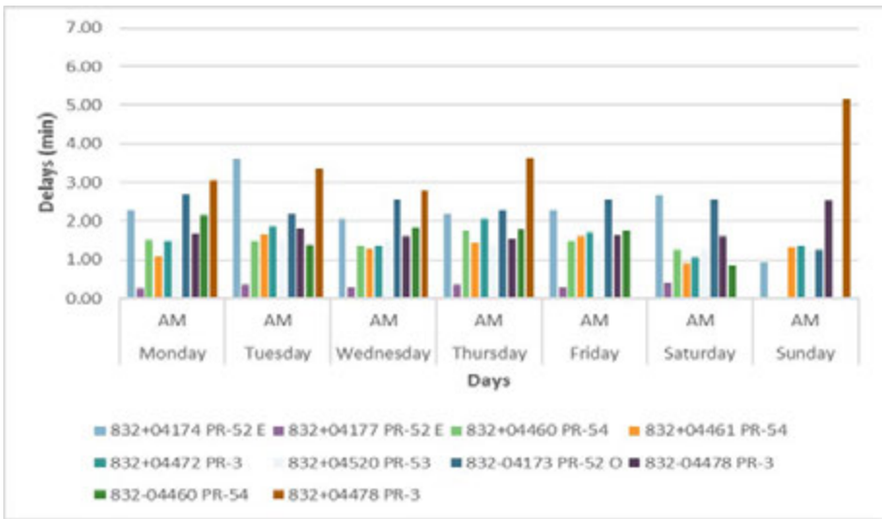
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.383: November 2016, TMC, Southeast Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.384: December 2016, TMC, Southeast Region, (AM)



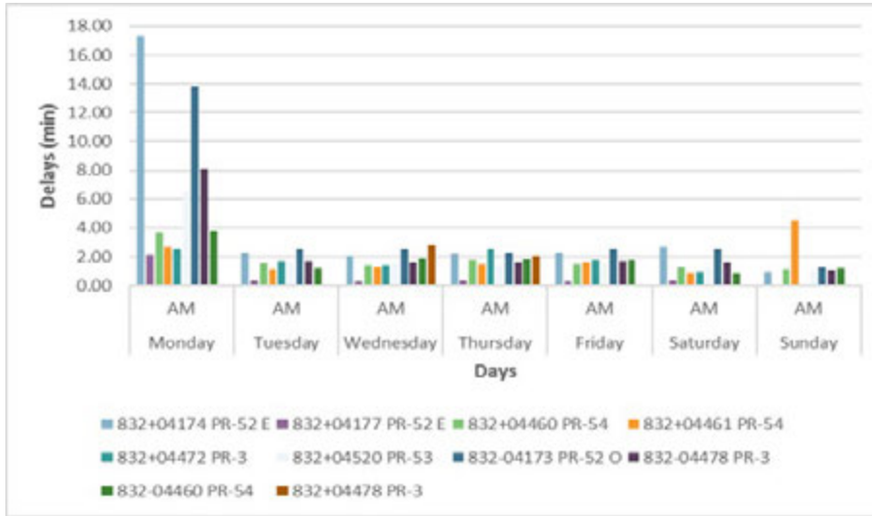
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, most segments delays were below 4.0 minutes, with the highest-ranking segments ranging between 2.0 – 17.8 minutes, mostly from Monday to Thursday.

Among the segments ranking higher was 832+04174 in PR-52 E, with average delays ranging between 2.0 – 17.8 minutes on January.

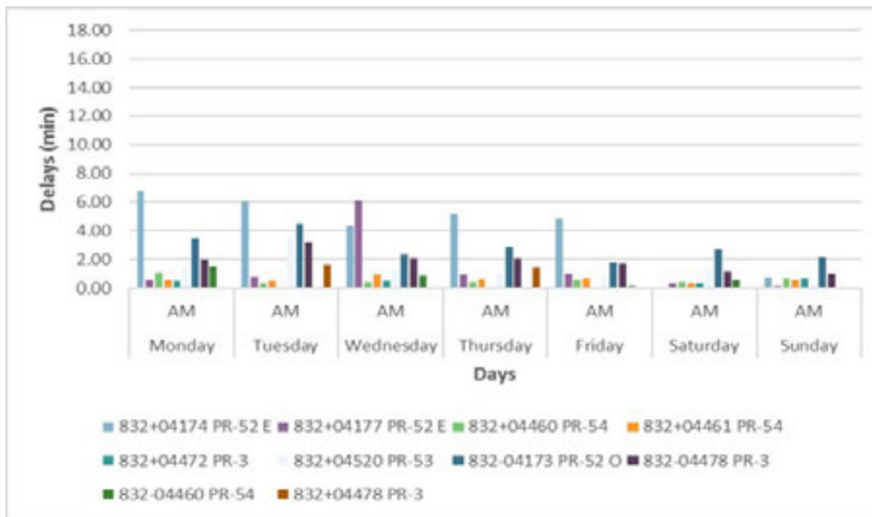
Segment 832-04173 in PR-52 O had average delays ranging between 2.0 – 14.0 minutes on January 2017 (Figure K.385 to Figure K.388).

Figure K.385: January 2017, TMC, Southeast Region, (AM)



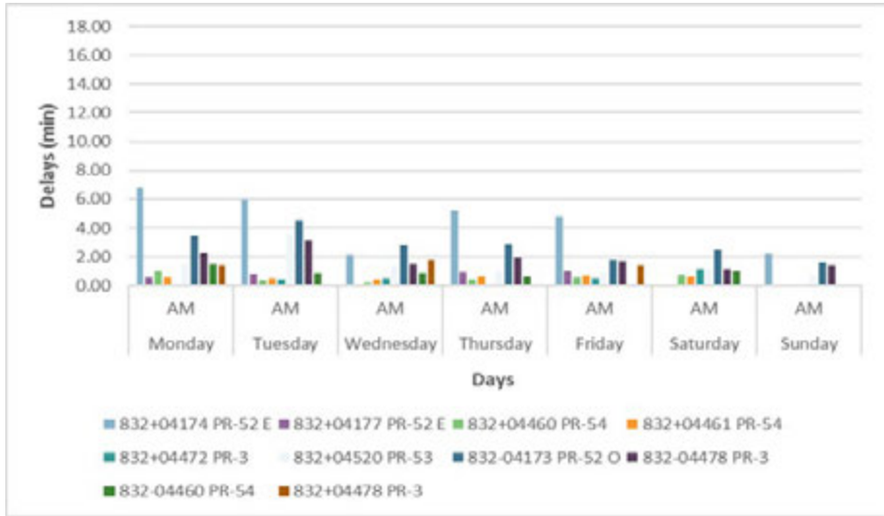
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.386: February 2017, TMC, Southeast Region, (AM)



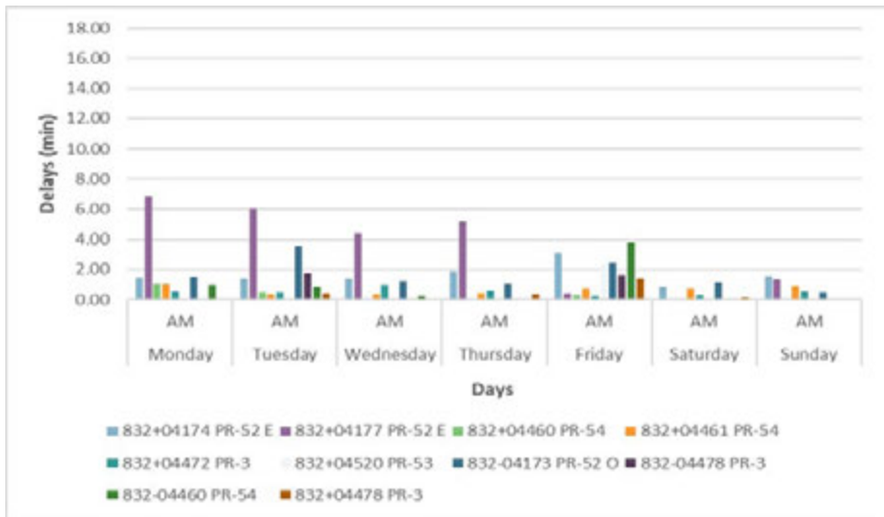
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.387: March 2017, TMC, Southeast Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

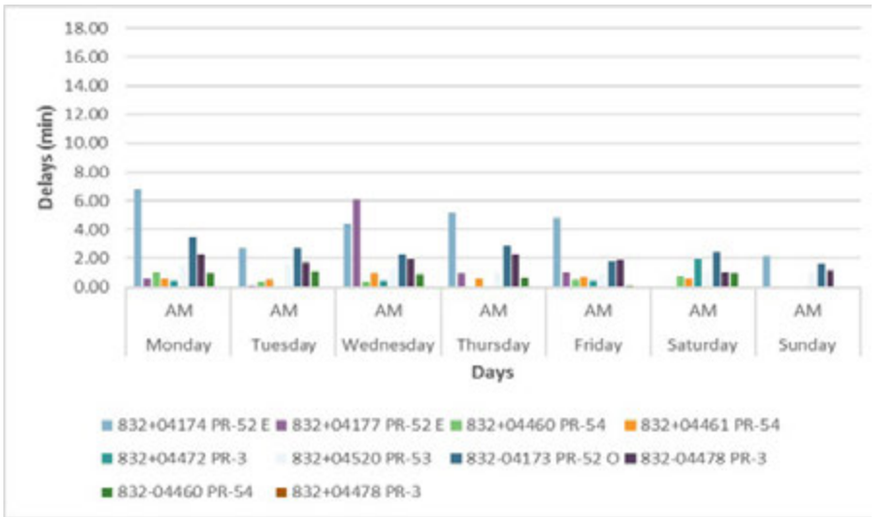
Figure K.388: April 2017, TMC, Southeast Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

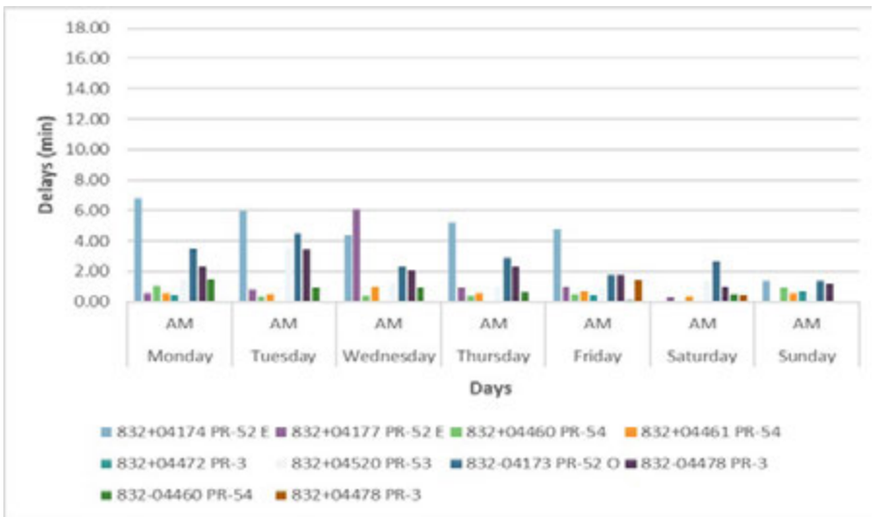
From May to August 2017, the average delay for most segments was below 2.0 minutes, with the highest-ranking segments 832+04174 in PR-52 E and 832-04173 in PR-52 recording average delays between 2.0 – 6.0 minutes delay from Monday to Thursday (Figure K.389 to Figure K.392).

Figure K.389: May 2017, TMC, Southeast Region, (AM)



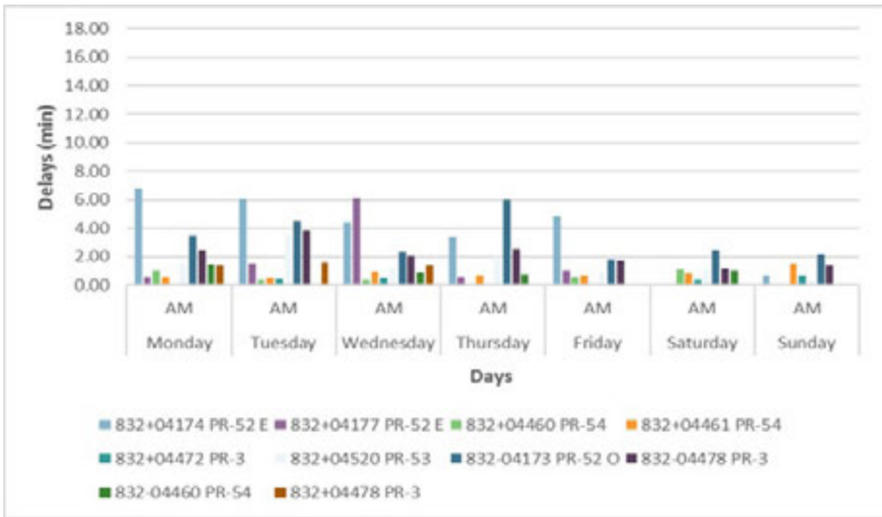
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.390: June 2017, TMC, Southeast Region, (AM)



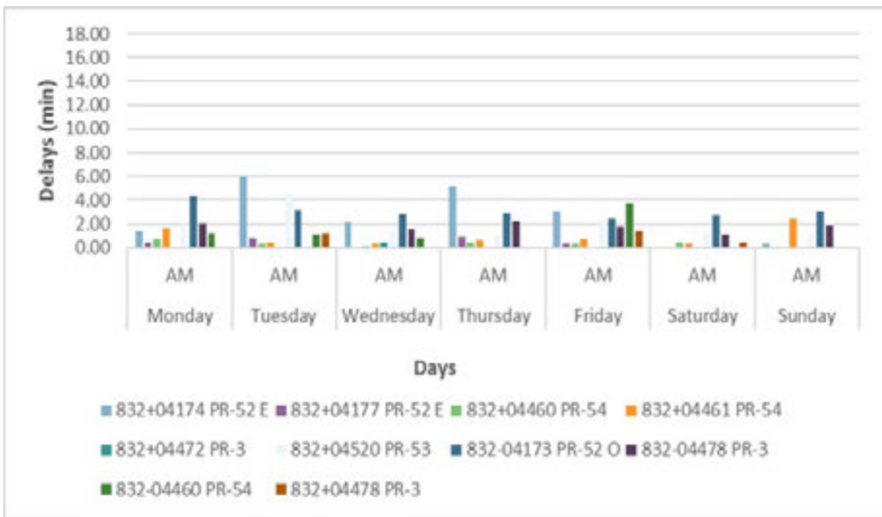
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.391: July 2017, TMC, Southeast Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

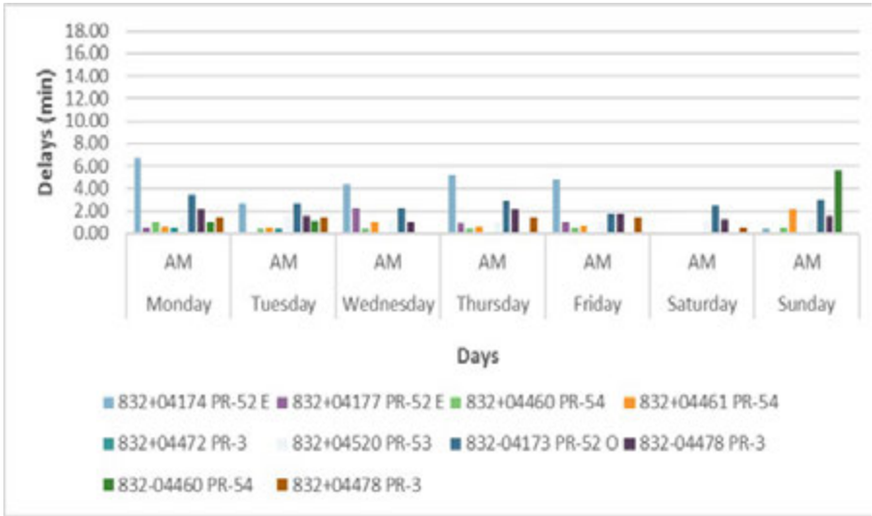
Figure K.392: August 2017, TMC, Southeast Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

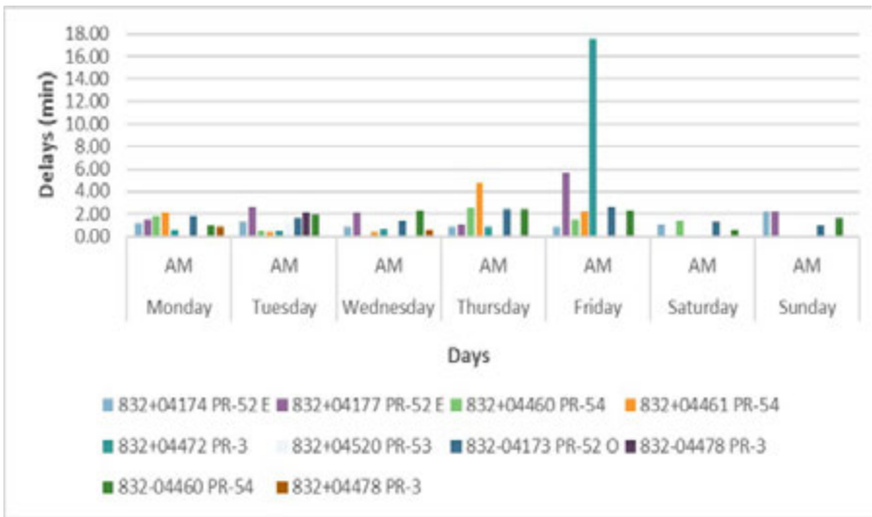
For the first four months between January and April 2018, average delay for most segments was below 3.0 minutes, with the highest-ranking segment 832+04472 in PR-3 recording average delays between 2.0 – 17.8 minutes delay on Friday (Figure K.393 to Figure K.396).

Figure K.393: January 2018, TMC, Southeast Region, (AM)



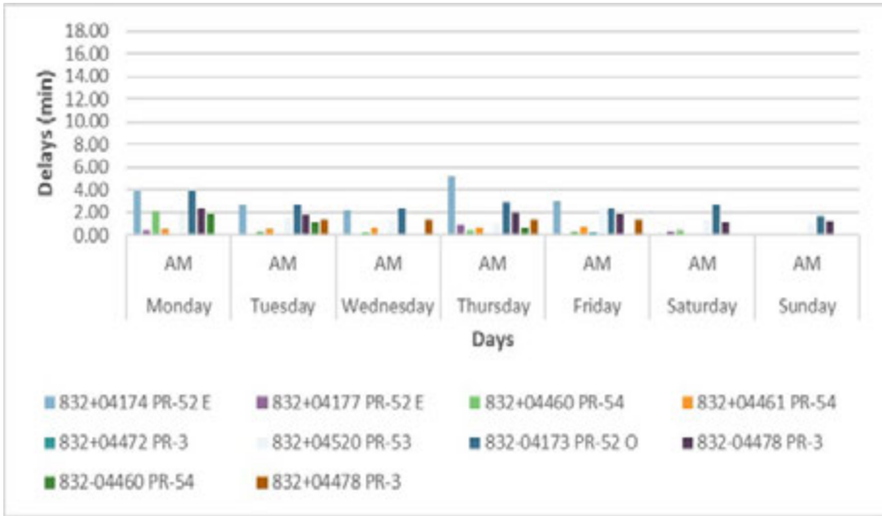
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figur K.394: February 2018, TMC, Southeast Region, (AM)



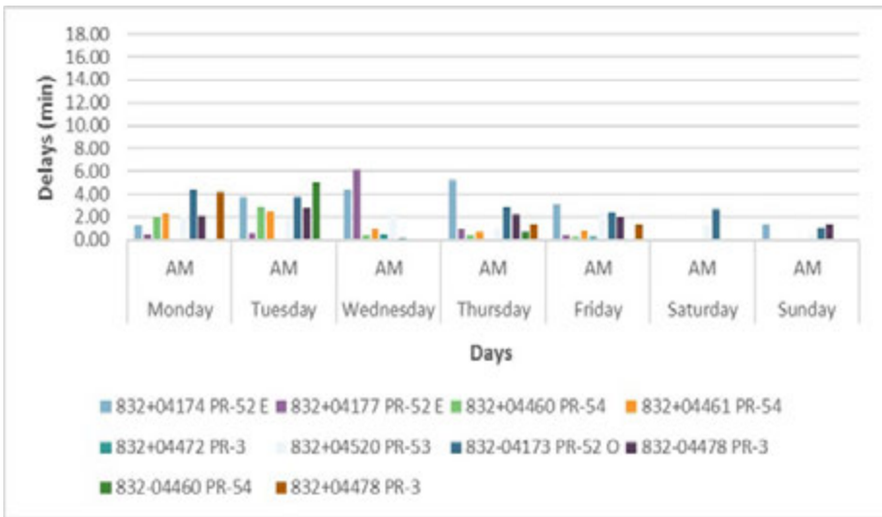
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.395: March 2018, TMC, Southeast Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.396: April 2018, TMC, Southeast Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

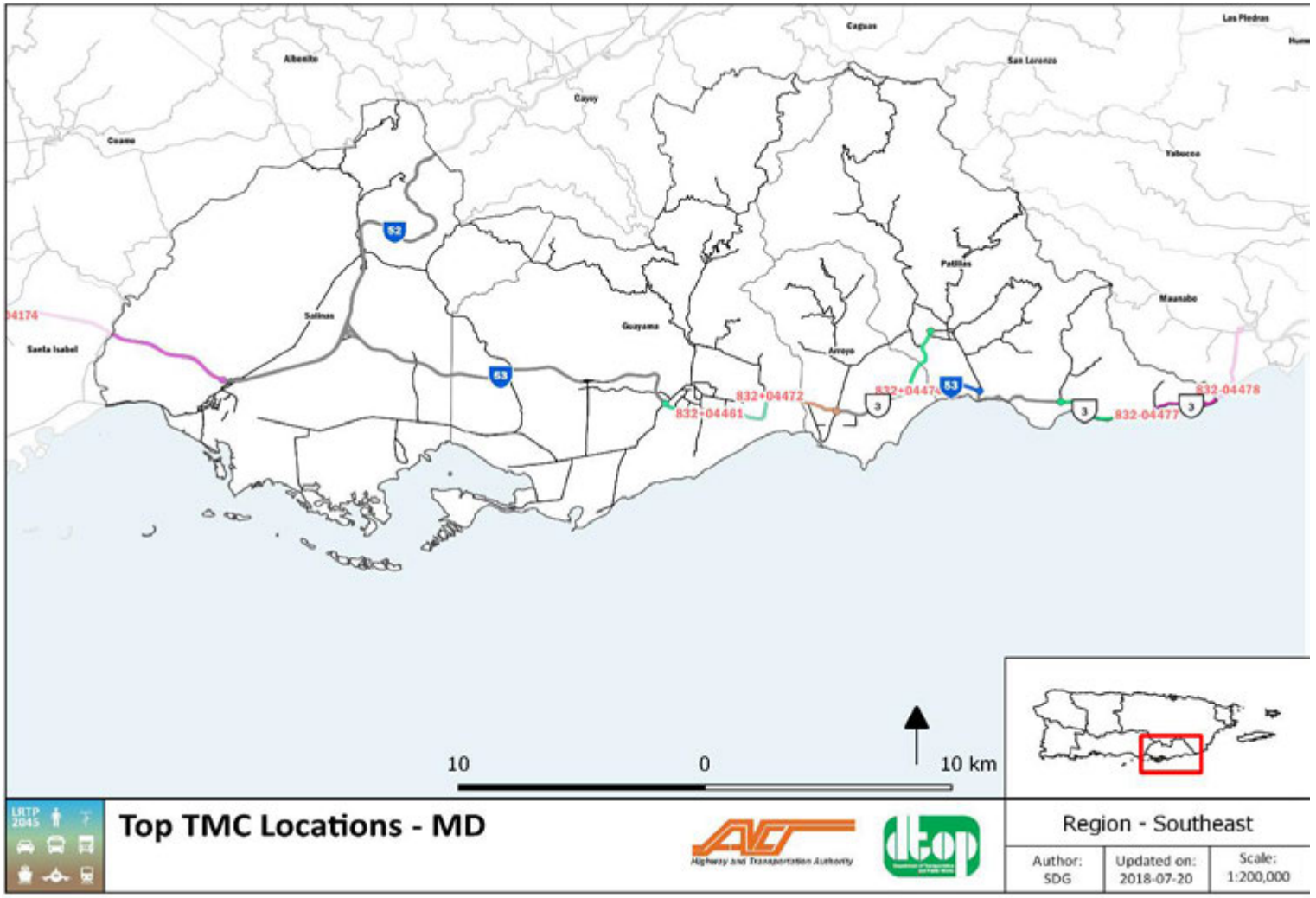
Mid-Day period (MD)

Segments added on average a delay of 1.8 minutes to the reference travel time for the mid-day period (MD), during the months of September 2016 through April 2018.

TMC 832+04174 ranked the highest from October 2016 to January 2017 with an average delay of 3.0 minutes, and a maximum delay of 5.3 minutes during January 2017.

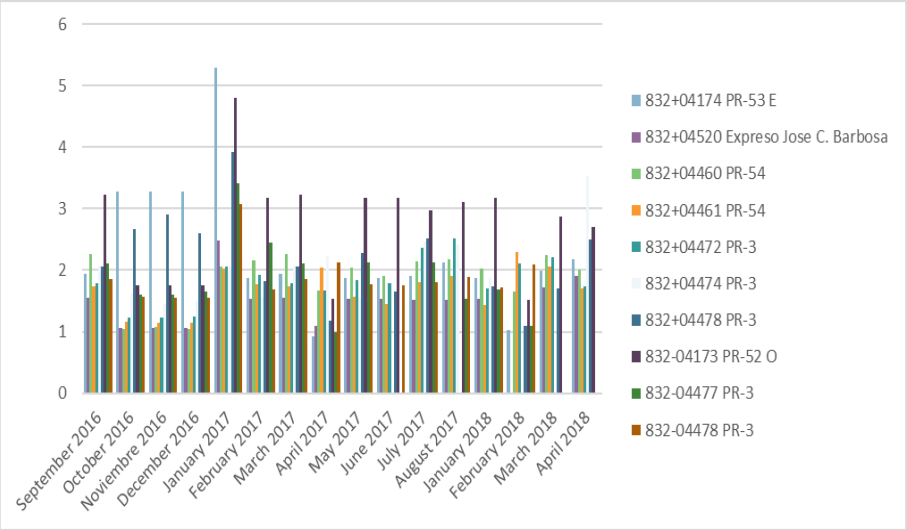
TMC 832-04173 ranked the highest from February 2017 to April 2018, with an average delay of 2.7 minutes, as seen in Figure K.397 and Figure K.398 below.

Figure K.397: Southeast Location, MD Period



Source: SDG, based on NPMRDS Analytics

Figure K.398: Average Delays, Southeast TPR, MD Period

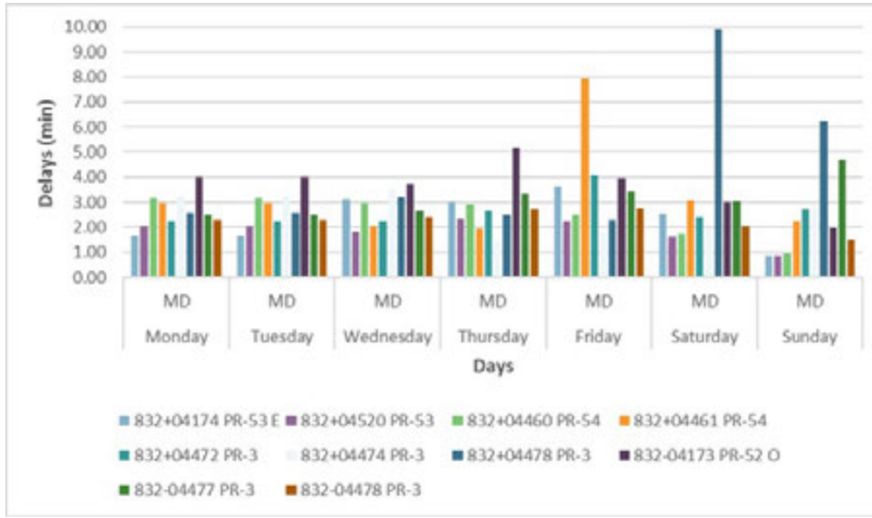


Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Mid-Day period (MD) - Weekly

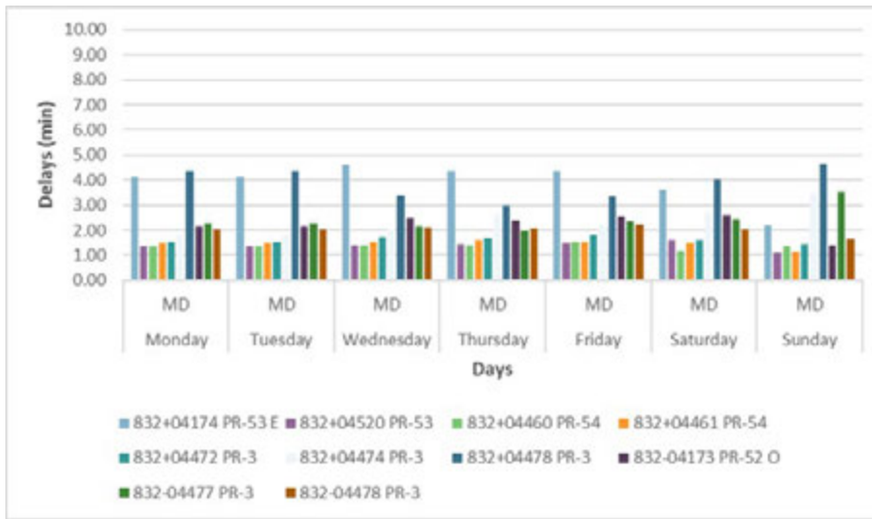
In terms of variation per week day for mid-day period (MD), for the last four months of 2016, the average delay was below 4.0 minutes for most segments. Some of the highest-ranking segments were 832+04174 in PR-53 E and 832+04478 in PR-3 with average delays ranging from 3.0 – 9.9 minute on Monday (Figure K.399 to Figure K.402).

Figure K.399: September 2016, TMC, Southeast Region, (MD)



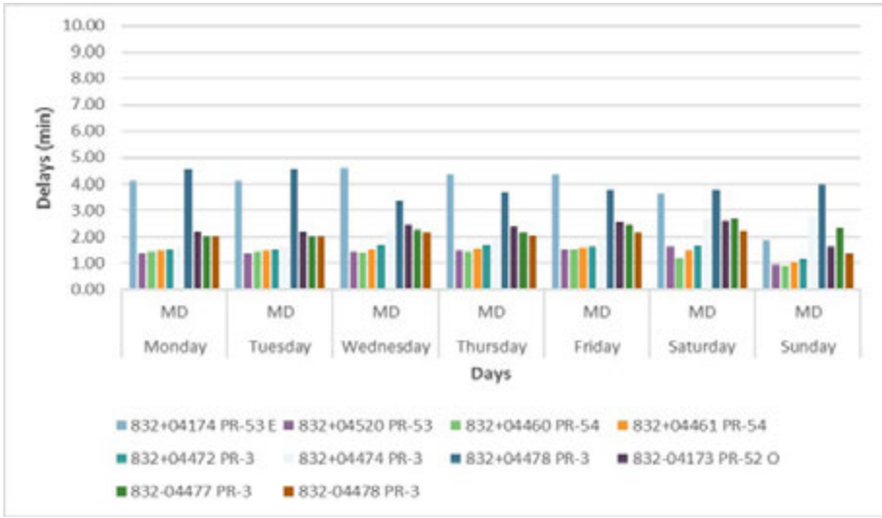
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.400: October 2016, TMC, Southeast Region, (MD)



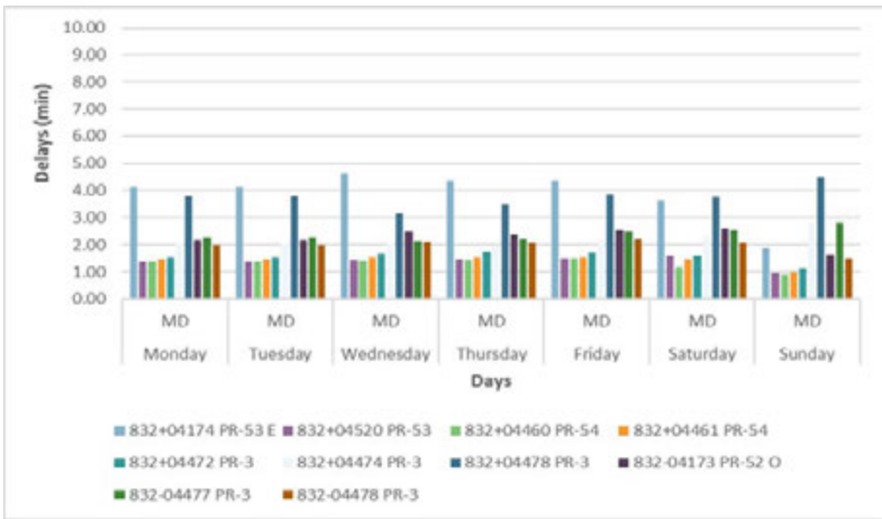
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.401: November 2016, TMC, Southeast Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

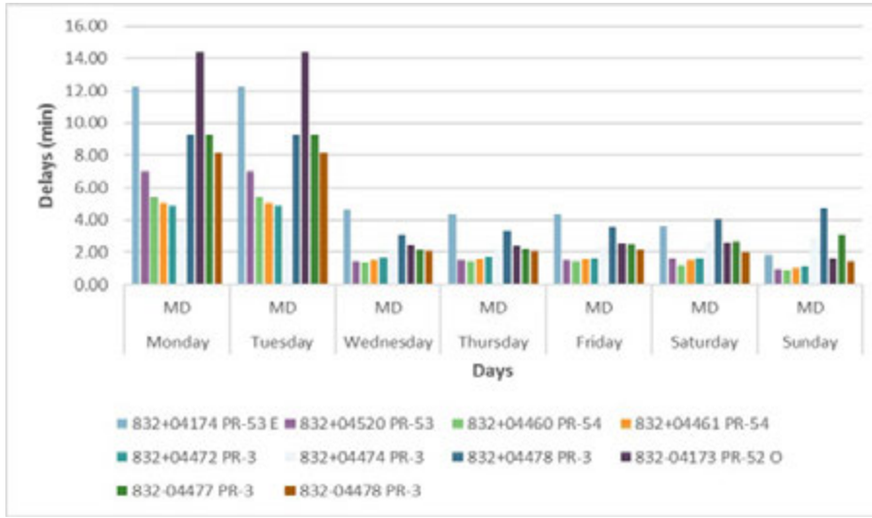
Figure K.402: December 2016, TMC, Southeast Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

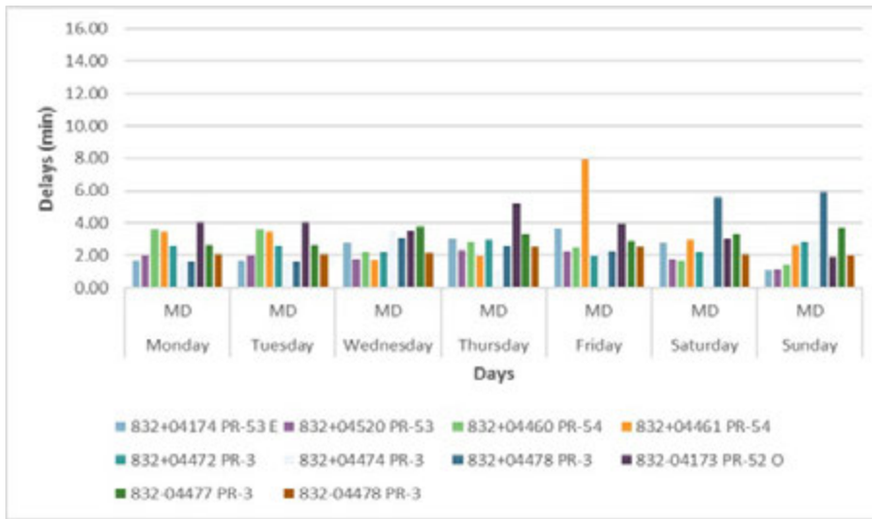
For the first months between January and April 2017, most segments had average delays of 2.5 minutes, with peaks on Monday, Tuesday, Friday and Saturday and for the highest-ranking segments 832-04173 in PR-52 O, and 832+04174 in PR-53 E, recording average delays between 1.0 – 14.0 minutes (Figure K.403 to Figure K.406).

Figure K.403: January 2017, TMC, Southeast Region, (MD)



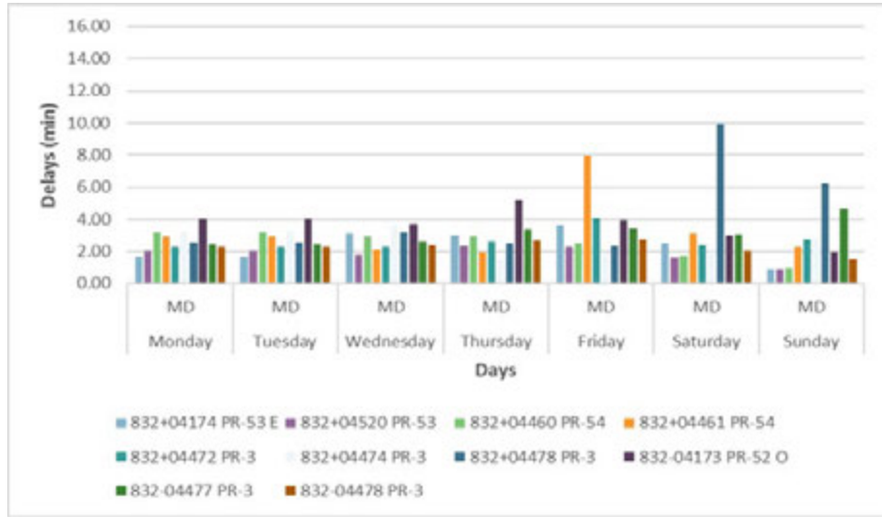
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.404: February 2017, TMC, Southeast Region, (MD)



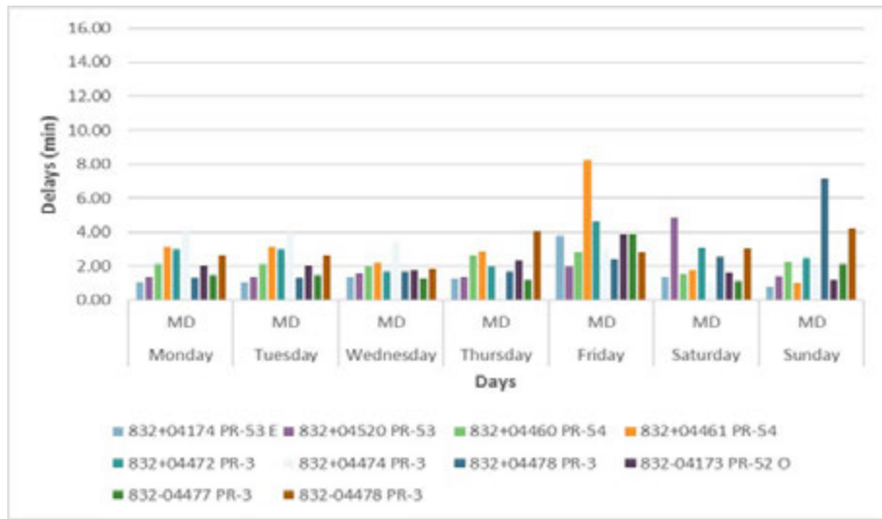
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.405: March 2017, TMC, Southeast Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

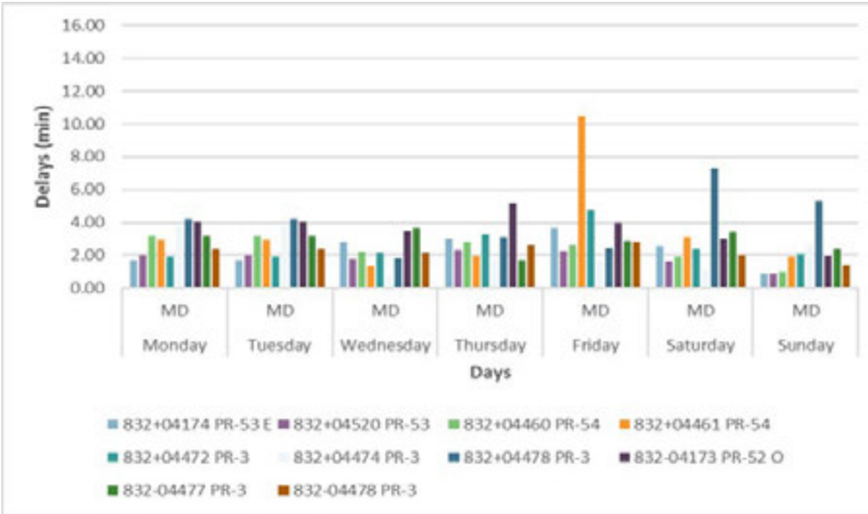
Figure K.406: April 2017, TMC, Southeast Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

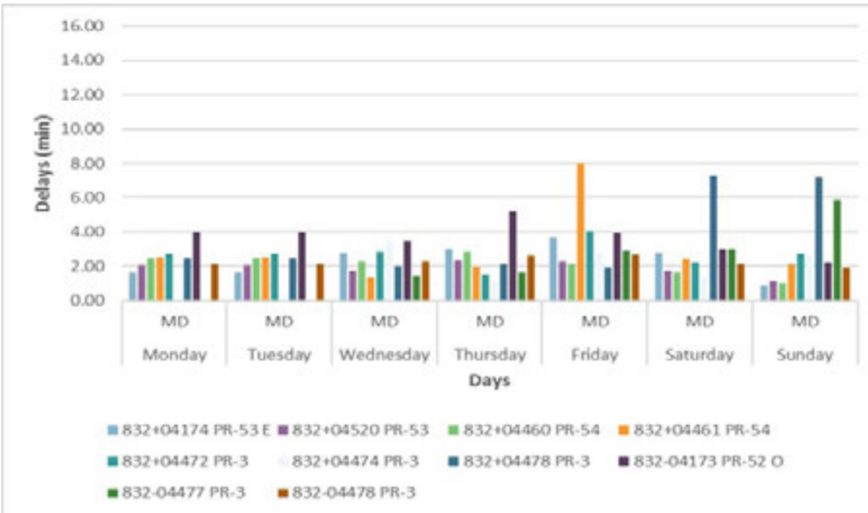
From May to August 2017, the average delay for most segments was below 4.0 minutes, with peaks on Friday, Saturday and Sunday for the highest-ranking segments 832+04461 in PR-54, and 832+04478 in PR-3, recording average delays between 5.0 – 10.2 minutes (Figure K.407 to Figure K.410).

Figure K.407: May 2017, TMC, Southeast Region, (MD)



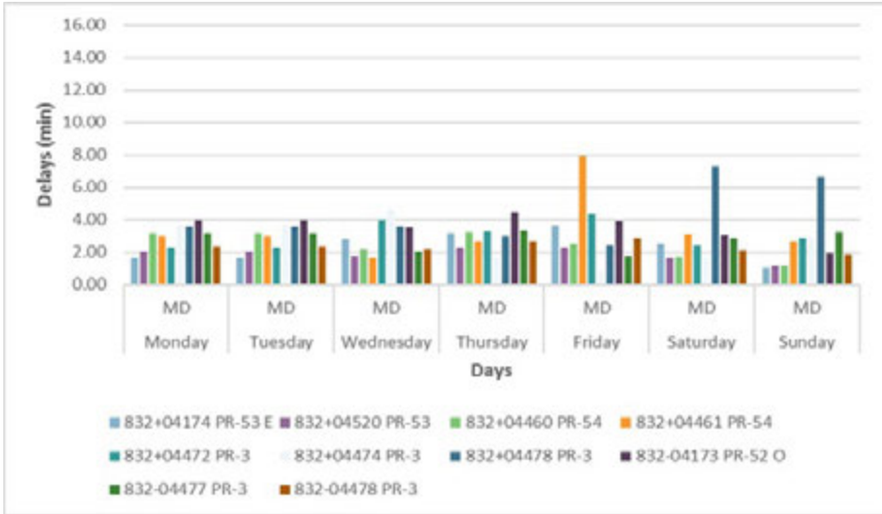
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.408: June 2017, TMC, Southeast Region, (MD)



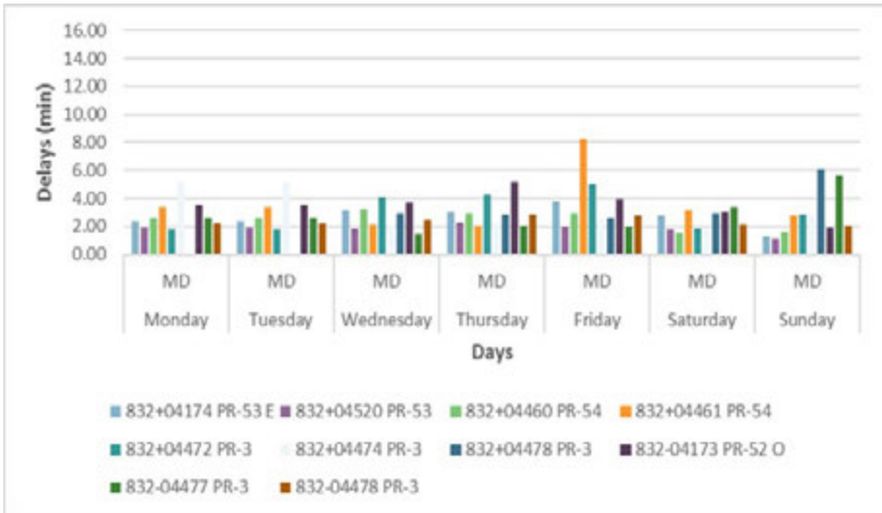
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.409: July 2017, TMC, Southeast Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

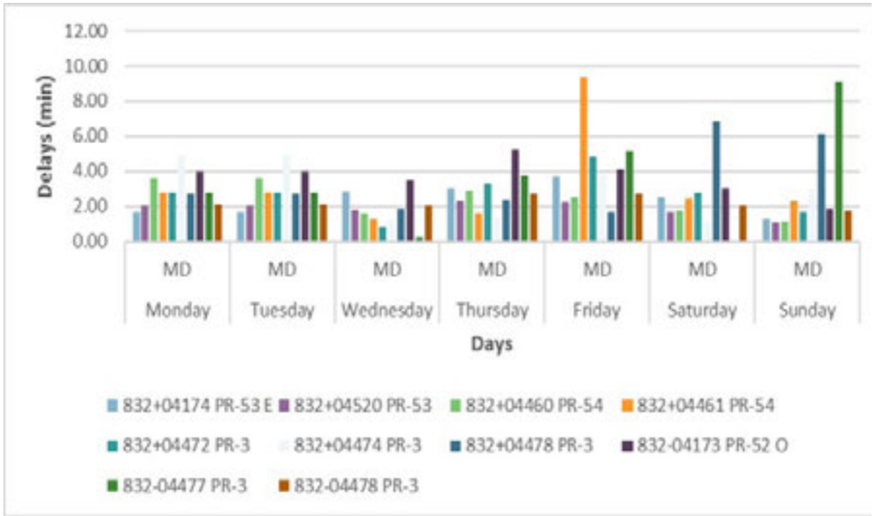
Figure K.410: August 2017, TMC, Southeast Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

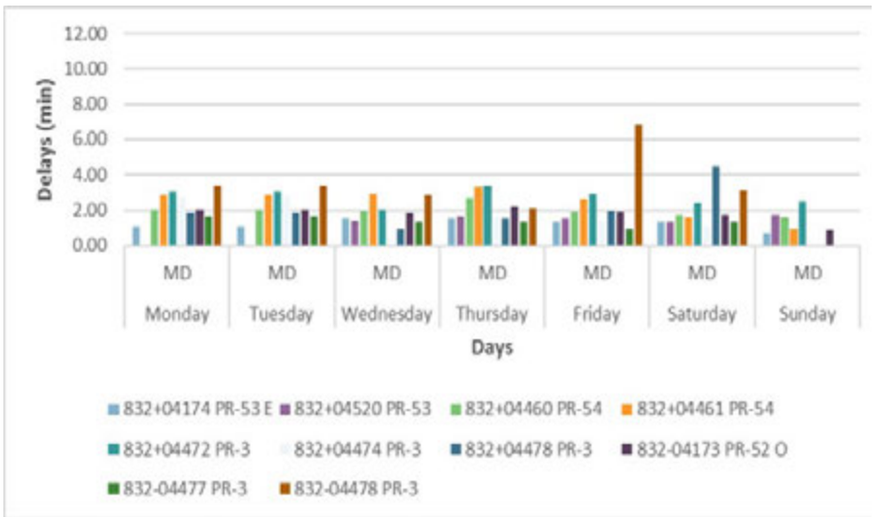
For the first four months between January and April 2018, the average delay for most segments was below 3.0 minutes, with peaks on Friday, Saturday and Sunday for the highest-ranking segments 832+04461 in PR-54, and 832+04477 in PR-3, recording average delays between 5.0 – 9.0 minutes (Figure K.411 to Figure K.414).

Figure K.411: January 2018, TMC, Southeast Region, (MD)



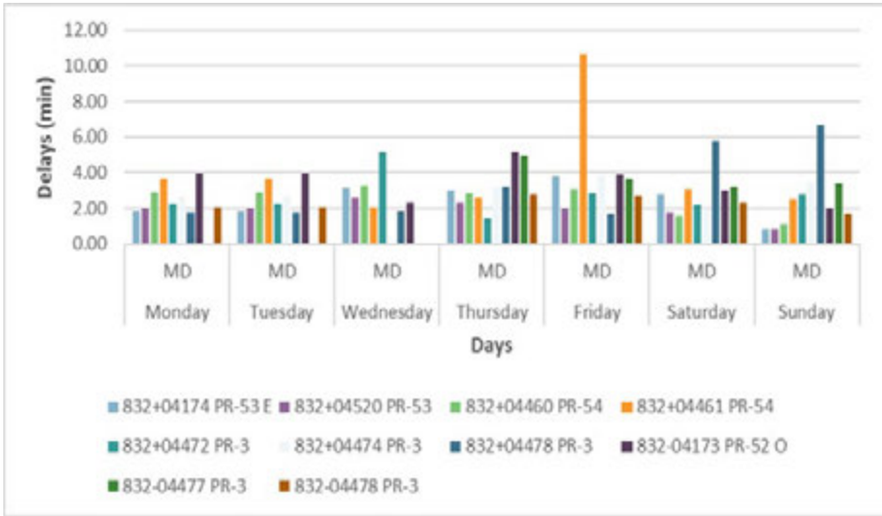
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.412: February 2018, TMC, Southeast Region, (MD)



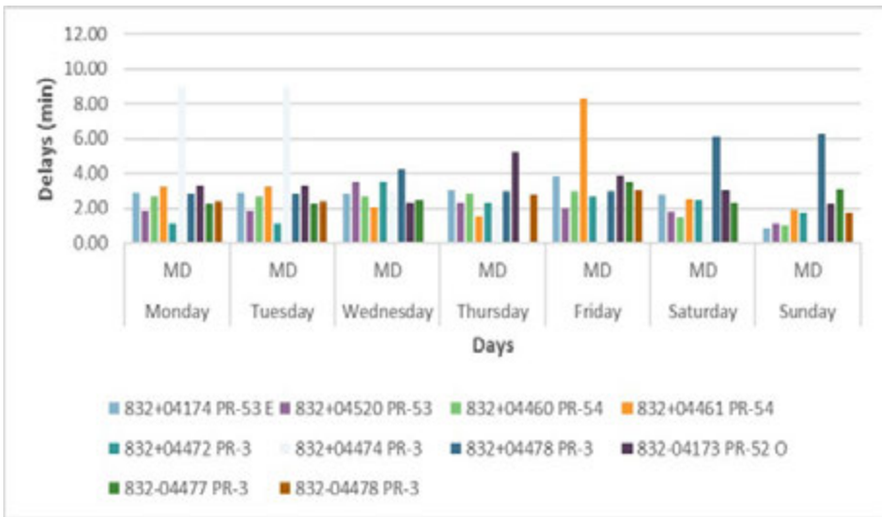
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.413: March 2018, TMC, Southeast Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.414: April 2018, TMC, Southeast Region, (MD)



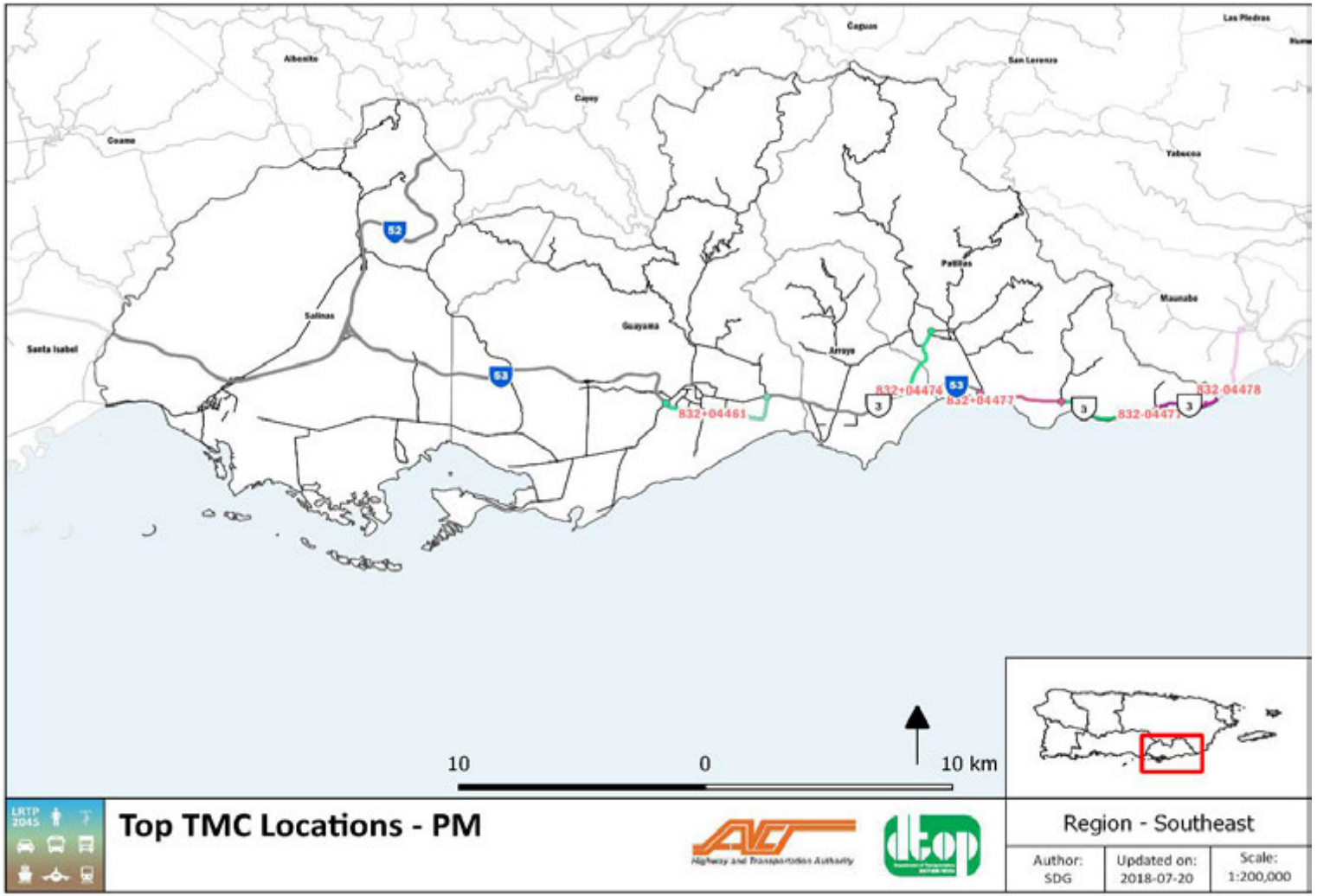
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM)

Segments added on average a delay of 1.8 minutes to the reference travel time for the afternoon period (PM), during the months of September 2016 through April 2018. The highest delay among all segments with an average delay of 3.1 minutes was recorded in January 2017.

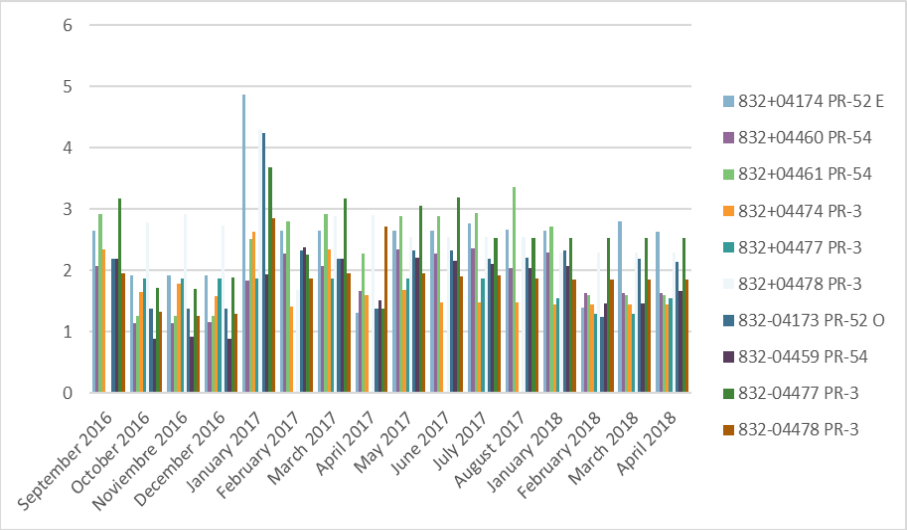
TMC 832-04477 ranked highest with an average delay of 2.5 minutes, as can be seen in Figure K.415 and Figure K.416 below.

Figure K.415: Southeast Location, PM Period



Source: SDG, based on NPMRDS Analytics

Figure K.416: Average Delays, Southeast TPR, PM Period



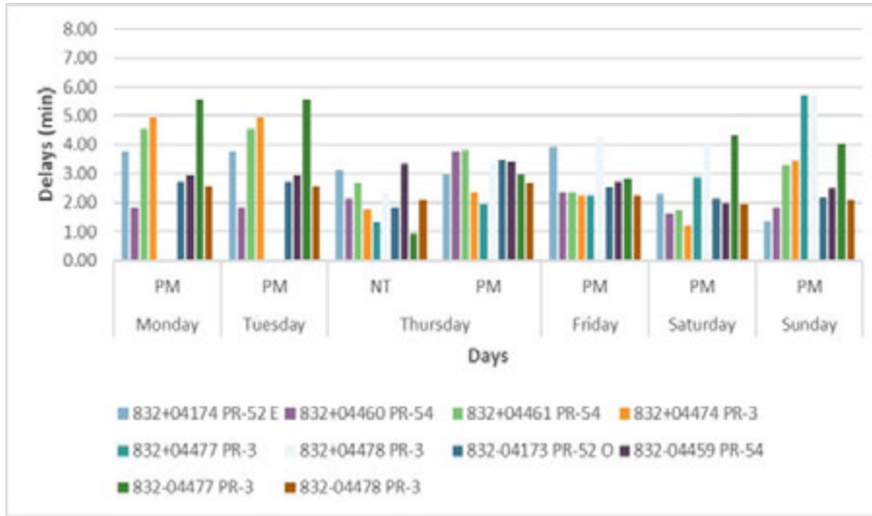
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM) - Weekly

In terms of variation per week day for past-midday period (PM), for the last four months of 2016, most segments had average delays below 3.0 minutes. Some of the highest-ranking segments were 832+04478 in PR-3 with average delays ranging from 4.0 – 5.0 minutes, increasing gradually towards the week-end. Segment 832+04174 in PR-52 E had average delays of 2.5 throughout the week from October to December of 2016.

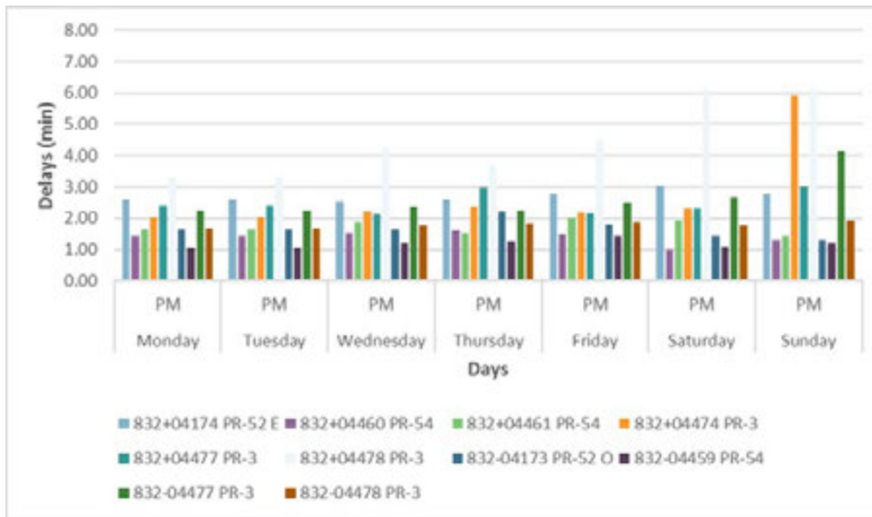
The month of September had higher delays than the rest of the months, with delays ranging from 2.0 – 5.0 minutes for the highest-ranking segments, being 832+04174 in PR-52 E, 832+04460 in PR-54, 832+04461 in PR-54 and 832+04478 in PR-3 (Figure K.417 to Figure K.420).

Figure K.417: September 2016, TMC, Southeast Region, (PM)



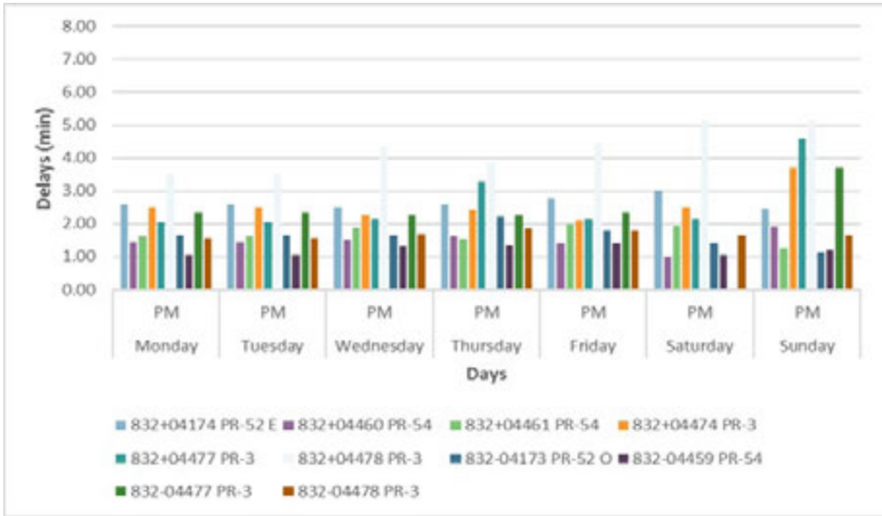
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.418: October 2016, TMC, Southeast Region, (PM)



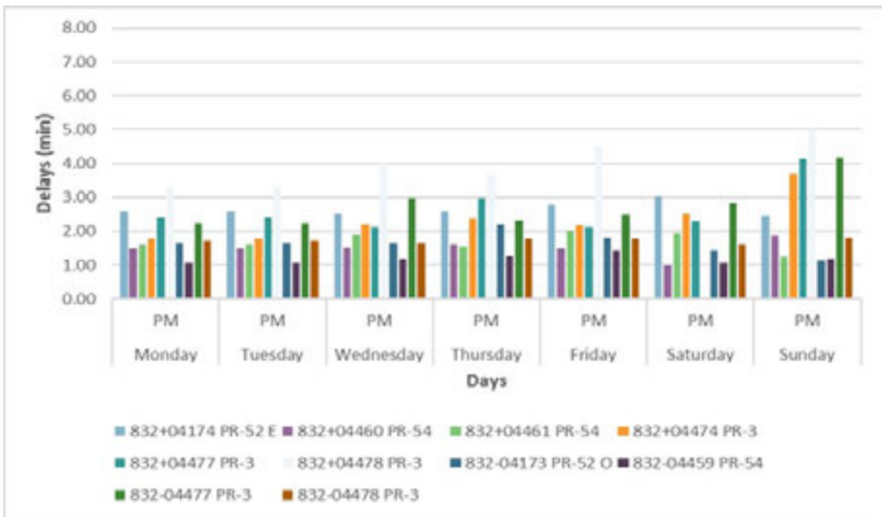
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.419: November 2016, TMC, Southeast Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.420: December 2016, TMC, Southeast Region, (PM)



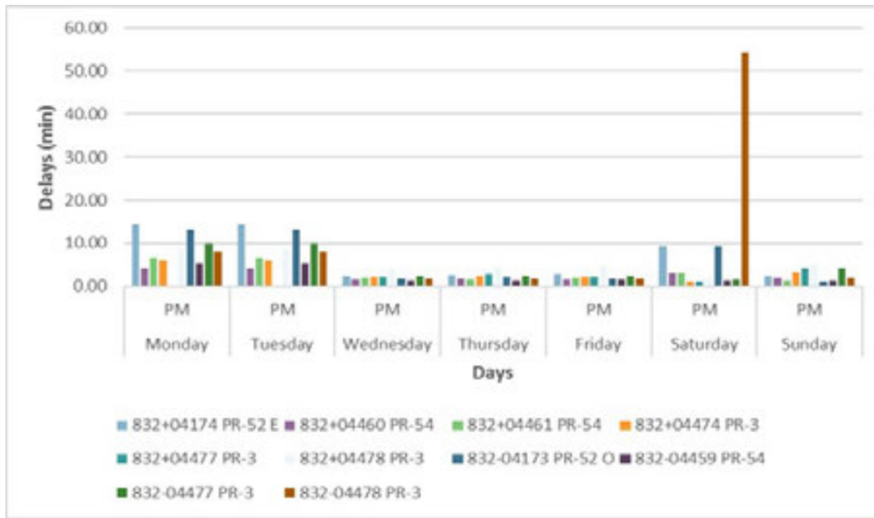
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, the average delay was 2.0 minutes, with variation among the highest-ranking segments.

For January, Monday and Tuesday had the highest delays for all segments with an average of 10.0 minutes. The highest-ranking delay was 832+04478 in PR-3 with a delay above 50.0 minutes.

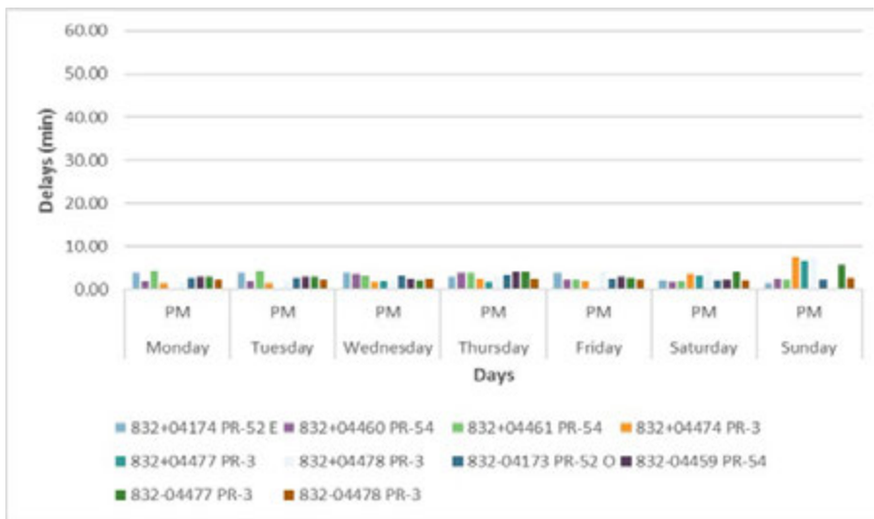
From February to April, the highest-ranking segments were 832-04474 in PR-3, 832+04478 in PR-3, 832+04477 in PR-3 with average delays between 3.0-5.0 minutes (Figure K.421 to Figure K.424).

Figure K.421: January 2017, TMC, Southeast Region, (PM)



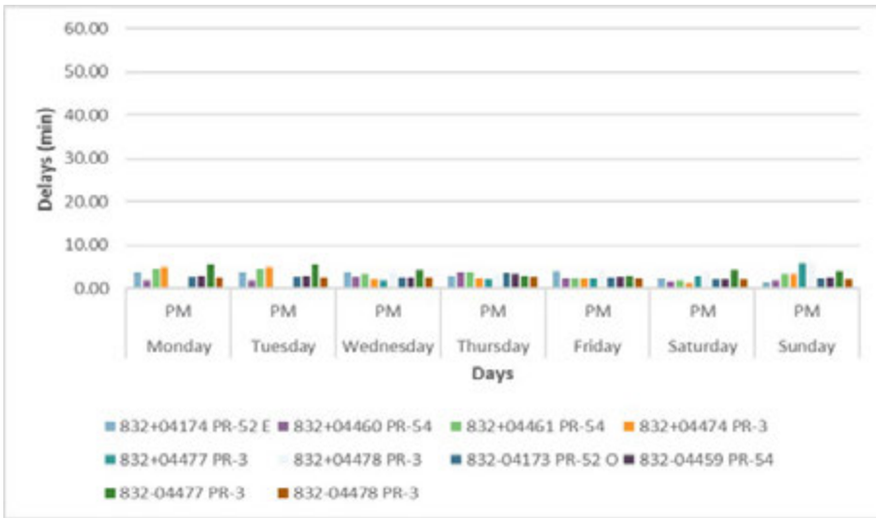
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.422: February 2017, TMC, Southeast Region, (PM)



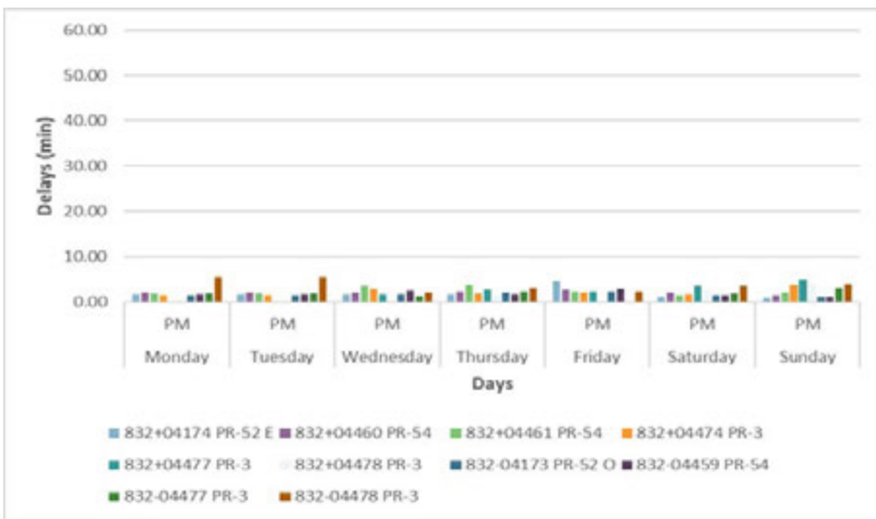
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.423: March 2017, TMC, Southeast Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.424: April 2017, TMC, Southeast Region, (PM)

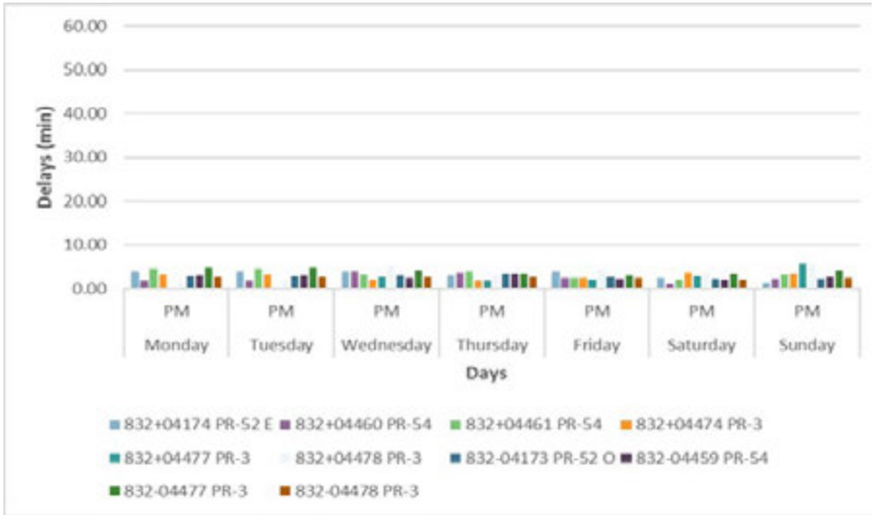


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was of 3.0 minutes. The segment with the highest average delay throughout the week was 832+04474 in PR-3 with a peak of 10.0 minutes.

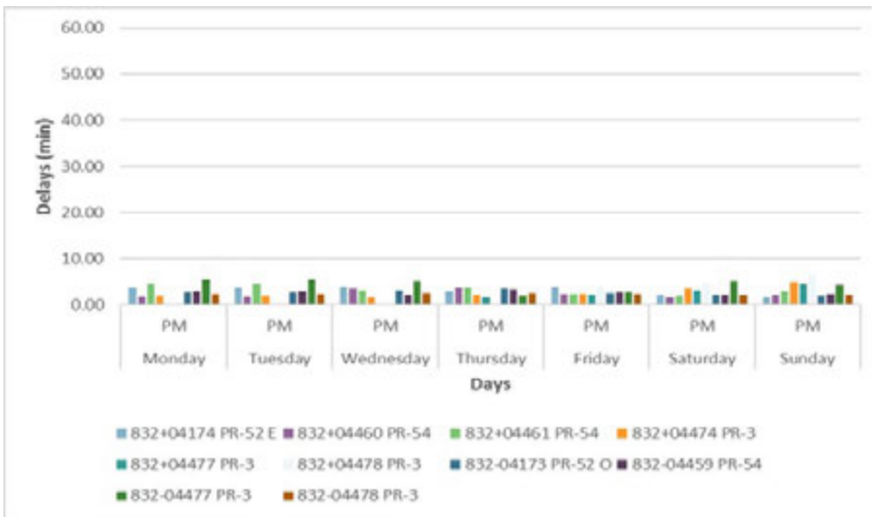
Other segments with higher delays were 832+04478 in PR-3, ranking high mostly throughout the week-end with delays ranging from 4.0 – 6.0 minutes. Similarly, 832+04477 in PR-3 ranked highest on Sunday with delays between 3.5 – 5-0 minutes (Figure K.425 to Figure K.428).

Figure K.425: May 2017, TMC, Southeast Region, (PM)



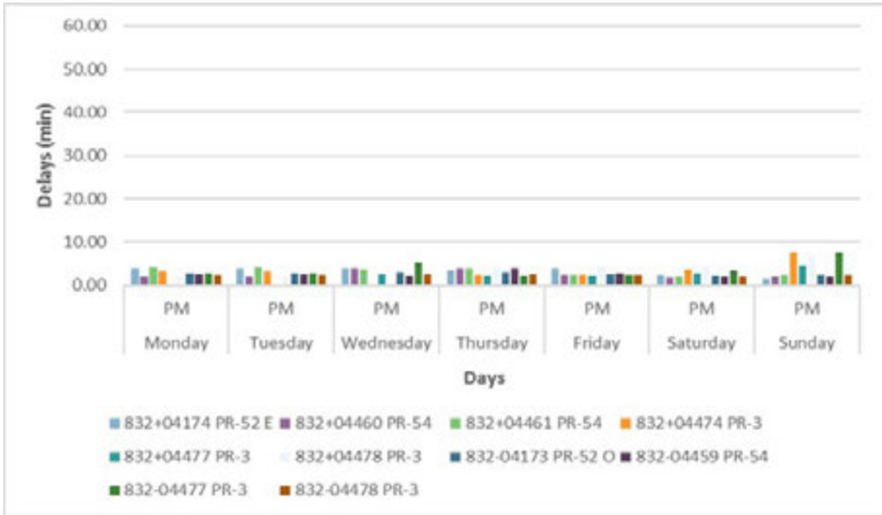
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.426: June 2017, TMC, Southeast Region, (PM)



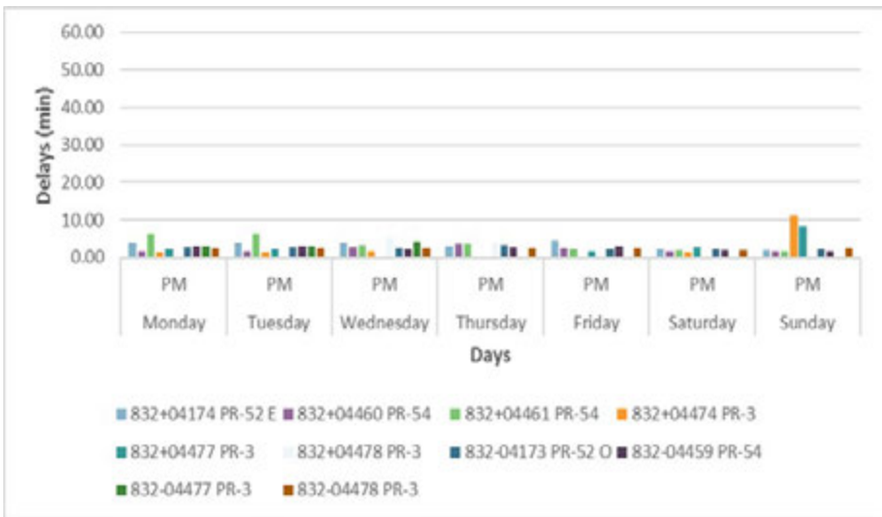
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.427: July 2017, TMC, Southeast Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

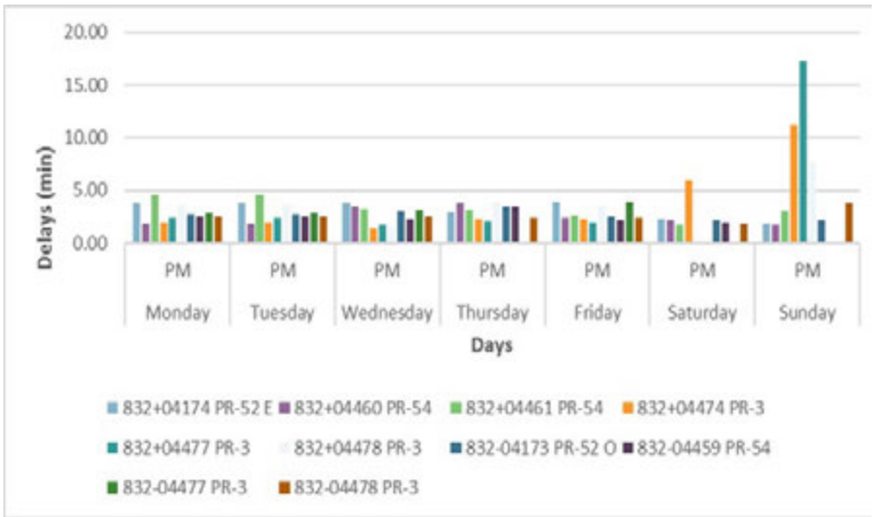
Figure K.428: August 2017, TMC, Southeast Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

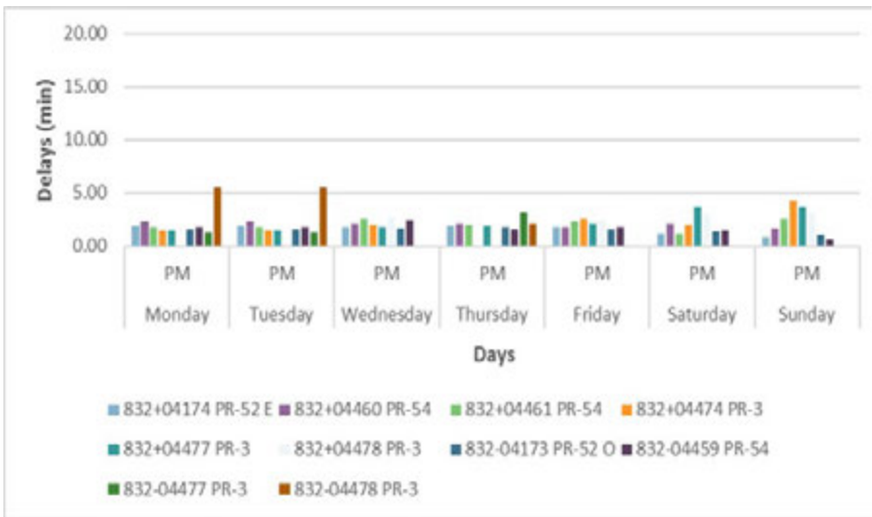
For the first four months between January and April 2018, average delay of segments was below 5.0 minutes, with segments 832+04174 in PR-52 E, recording average delays ranging between 2.0 – 4.0 minutes, and 832+04478 in PR-3 recording average delays ranging between 4.0 – 8.0 minutes (Figure K.429 to Figure K.432).

Figure K.429: January 2018, TMC, Southeast Region, (PM)



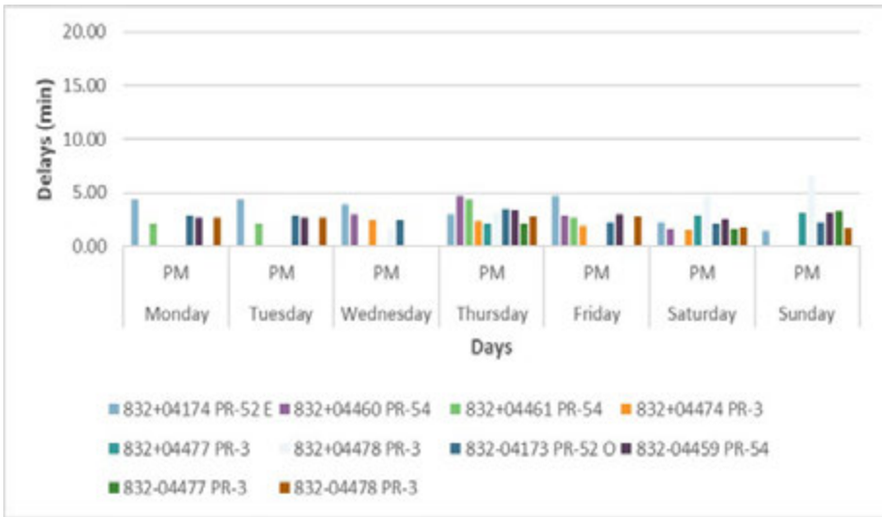
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.430: February 2018, TMC, Southeast Region, (PM)



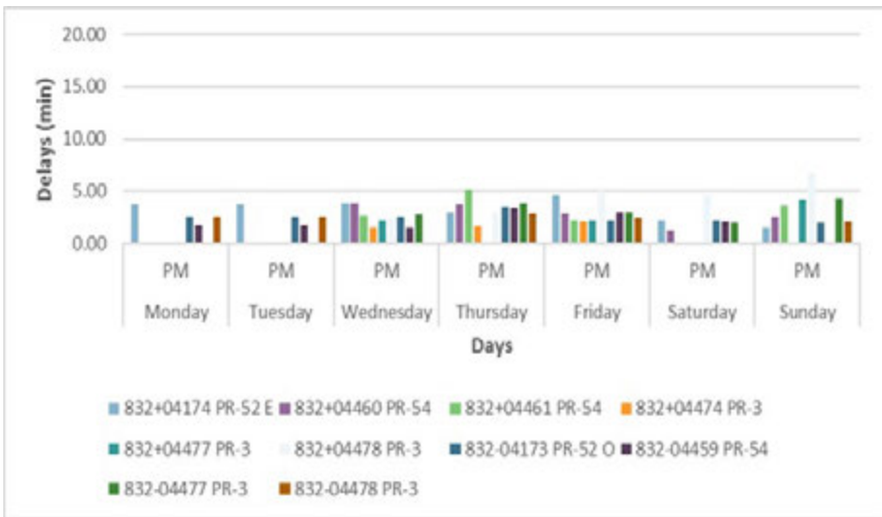
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.431: March 2018, TMC, Southeast Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K432: April 2018, TMC, Southeast Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Results for Southeast Region bottlenecks

For the Southeast region, all TMC segments studied were located along PR-52, PR-53 and PR.3. The top 10 TMC segments with the worst delays were along PR-3 with delay values ranging between 1.0-3.0 minutes on average per segment per month. The periods of the day had the following average delays: past mid-day period with 2.0 minutes, mid-day period with 1.9 minutes, night-period with 1.8 minutes, and morning period with 1.3 minutes.

- For the morning period, segments with delays above average, ranging between 1.5-1.7 minutes were: 832+04174 in PR-52 E and 832-04173 PR-52 O in section between Santa Isabel and Salinas; and 832-04478; 832+04478 in PR-3 section between Patillas and Maunabo counties.
- For the mid-day period, segments with delays above average, ranging between 2.0-2.7 minutes were: 832+04174 in PR-52 E and 832-04173 PR-52 O in section between Santa Isabel and Salinas; 832+04478 in PR-3 between Patillas and Maunabo counties; and 832+04474 in PR-3 section in Palmas.
- For the past-midday period, segments with delays above average, ranging between 2.0-2.6 minutes were: 832+04174 in PR-52 E between Santa Isabel and Salinas, 832+04461 in PR-54 E in section from Santa Elena to Algarrobo; 832+04478 in PR-3 between Patillas and Maunabo; and 832-04173 in PR-52 O between Santa Isabel and Salinas.
- For the night period, segments with delays above average, ranging between 2.0-2.7 minutes were: 832+04174, 832+04478, 832-04477, 832-04478, already recurrent in periods above.

Thus, overall, segments with highest recurrence of delays throughout periods of the day were 832+04174, 832+04478, 832-04173, located in PR-52 section between Santa Isabel and Salinas, in PR-3 between Patillas and Maunabo counties. Other areas with high delays include Pr-3 and PR-54 between Guayama and Arroyo.

SOUTHWEST

In the Southwest, the data used in the preparation of the graphs are from the roads PR-2, PR-2 E, PR-2 O, PR-3 and PR-4.

Table K.21 to Table K.23 shows roads, months and years selected and the studied periods.

Table K.21: Roads

TCM	Road name
832+04405	PR-2
832-04404	PR-2
832+04406	PR-2
832-04235	PR-2 E
832+04407	PR-2
832+04408	PR-2
832-04236	PR-2 O

832+04406	PR-3
832+04408	PR-4

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.22: Months and Years Selected

2016	2017	2018
September	January	January
October	February	February
November	March	March
December	April	April
	May	
	June	
	July	
	August	

Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Table K.23: Studied Periods

Night Period (NT)	Morning Period (AM)
Midday Period (MD)	Past-midday Period (PM)

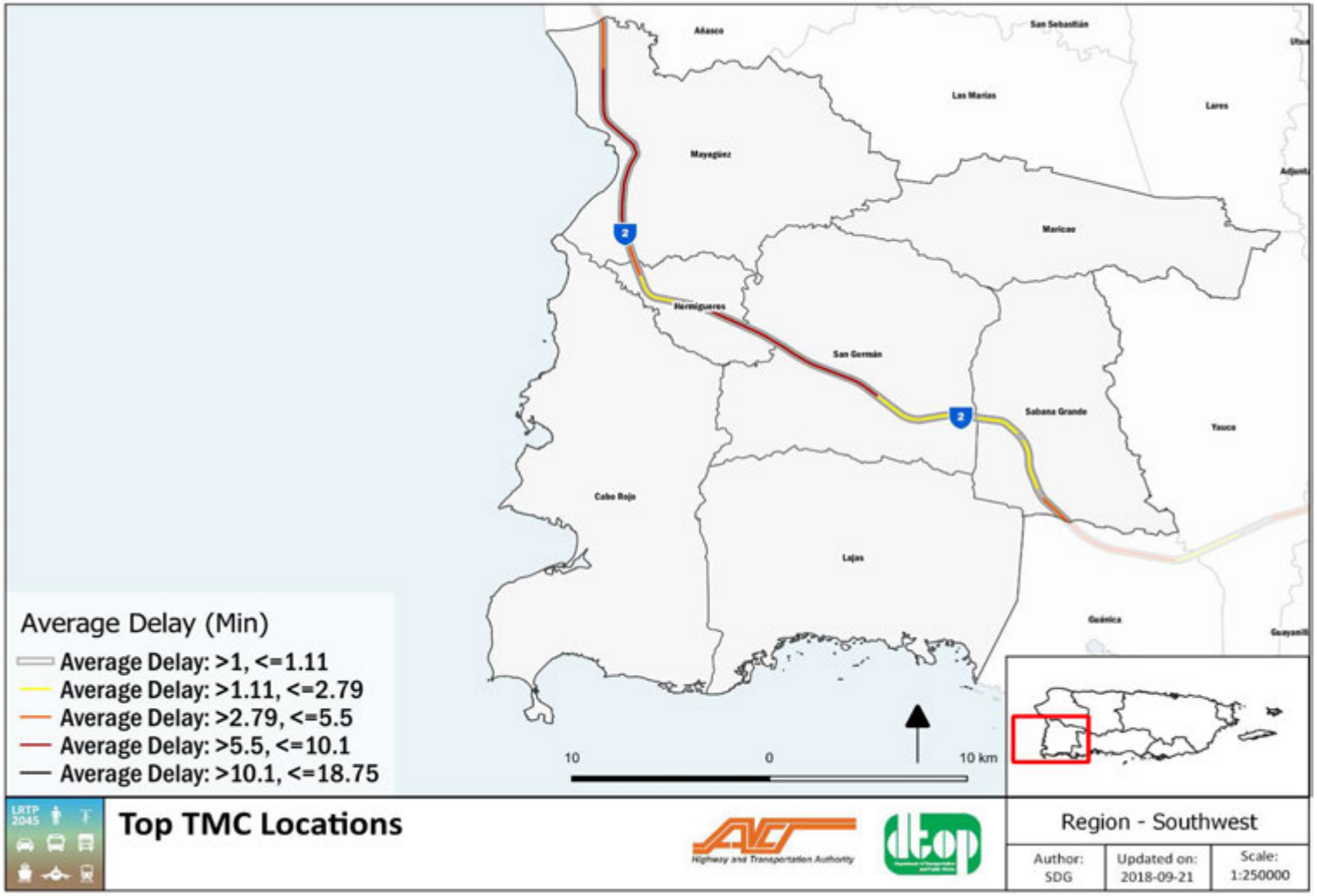
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Bottleneck Analysis

Night Period (NT)

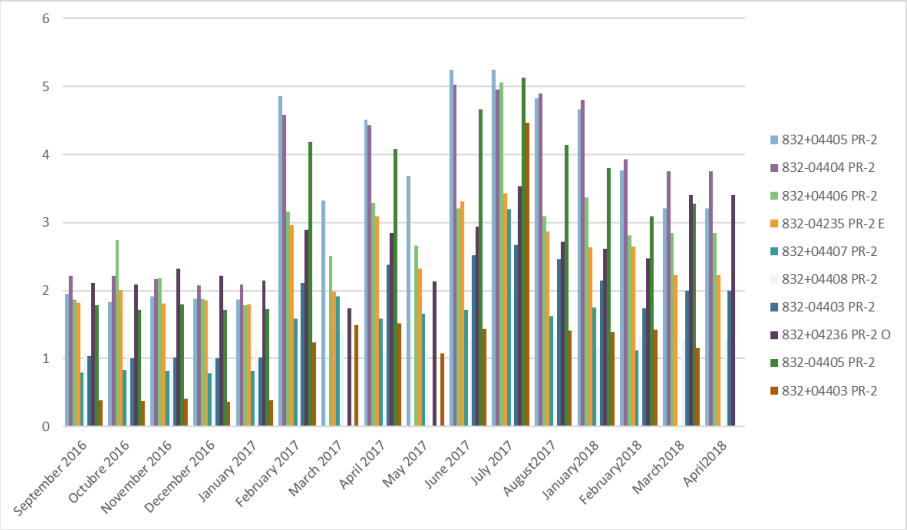
The last four months of 2016 and January 2017 showed an average delay of 1.5 minutes in all segments, for the night period (NT), from 18:00-7:00. The months after February 2017 showed an increase of approximately 3.0 minutes on the average delay. This increase occurred mostly due to TMCs ranking higher from February to August 2017, averaging 4.0 – 5.0 minutes, for example: 832+04405, 832-04404, and 832+04406 along road PR-2., as can be seen in Figure K.433 and Figure K.434 below.

Figure K.433: Southwest Location



Source: SDG, based on NPMRDS Analytics

Figure K.434: Average Delays, Southwest TPR, NT Period



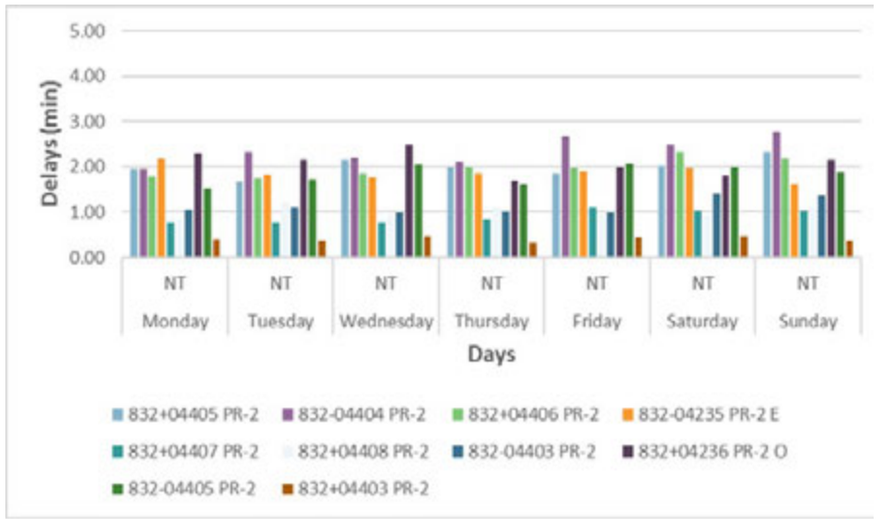
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Night Period (NT) – Weekly

In terms of variation per week day for night period (NT), the average delay for segments was below 2.0 minutes for the last four months of 2016. The segment with the highest delays was 832+04406 in PR-2 with a peak of 4.5 minutes.

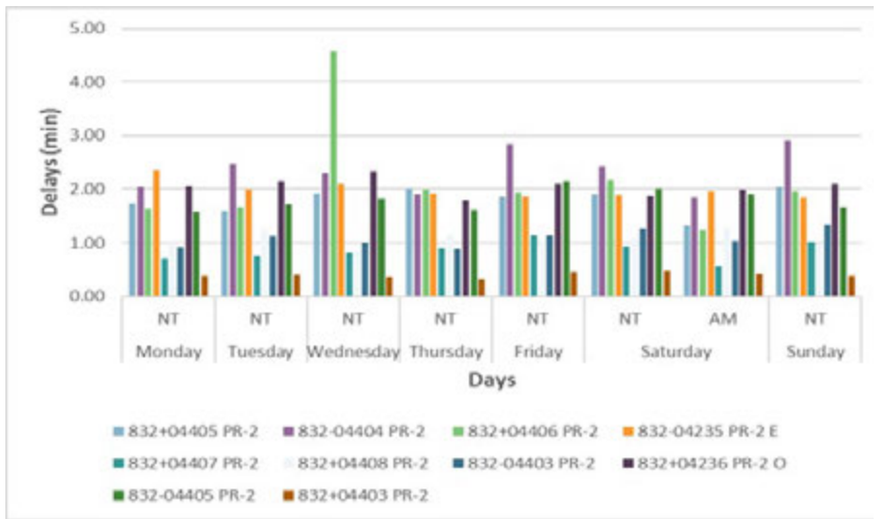
Other segments with average delays ranging from 1.5 to 2.0 minutes were 832+04236 in PR-2 O, 832+04404 in PR-2, 832-04235 on PR-2 E, and 832+04405 in PR-2 (Figure K.435 to Figure K.438).

Figure K.435: September 2016, TMC, Southwest Region, (NT)



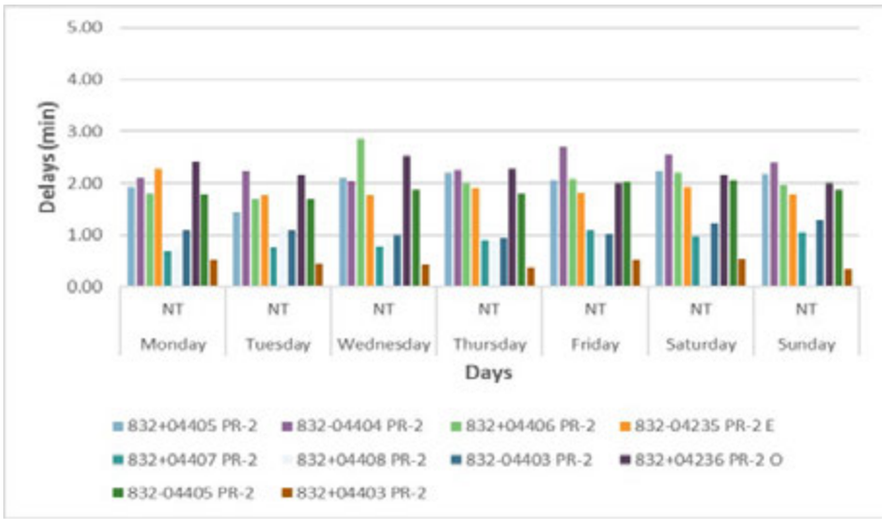
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.436: October 2016, TMC, Southwest Region, (NT)



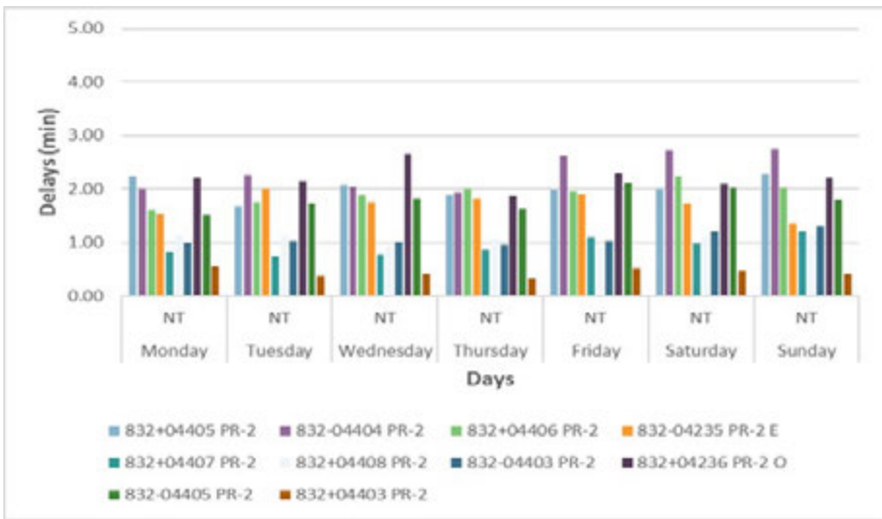
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.437: November 2016, TMC, Southwest Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

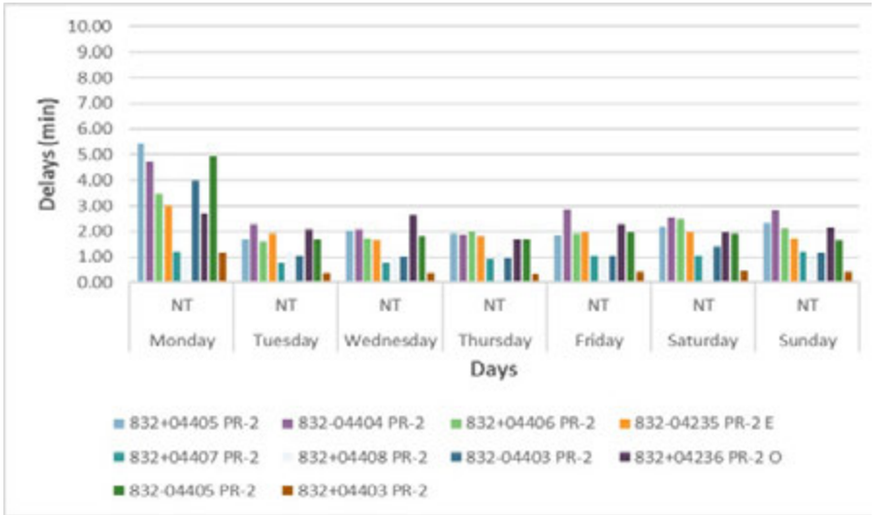
Figure K.438: December 2016, TMC, Southwest Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

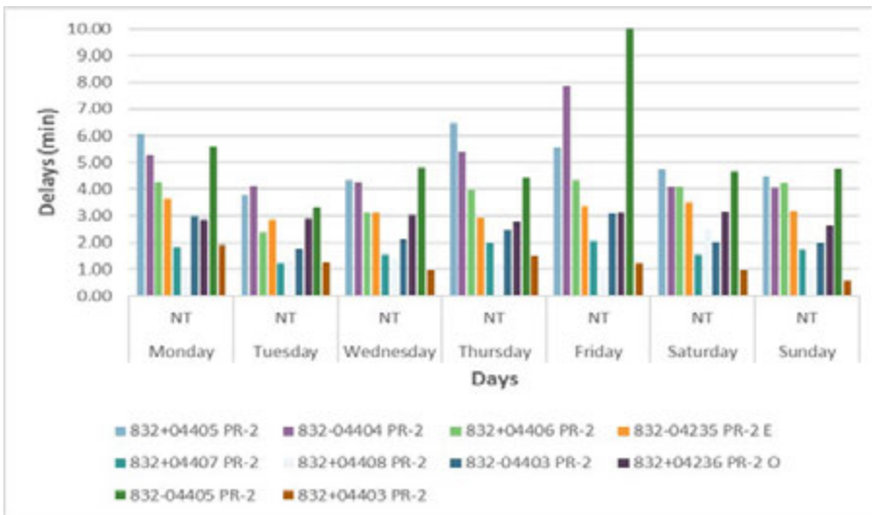
For the first months between January and April 2017, average delay of segments ranged between 2.0-3.0 minutes. The highest delays from February to April were on Friday with a delay of 10.0 minutes for segment 832+04405 in PR-2 (Figure K.439 to Figure K.442).

Figure K.439: January 2017, TMC, Southwest Region, (NT)



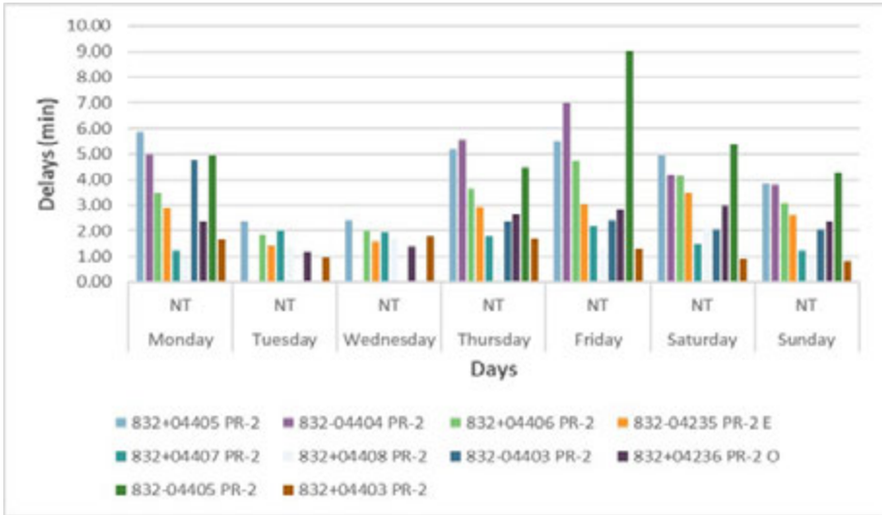
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.440: February 2017, TMC, Southwest Region, (NT)



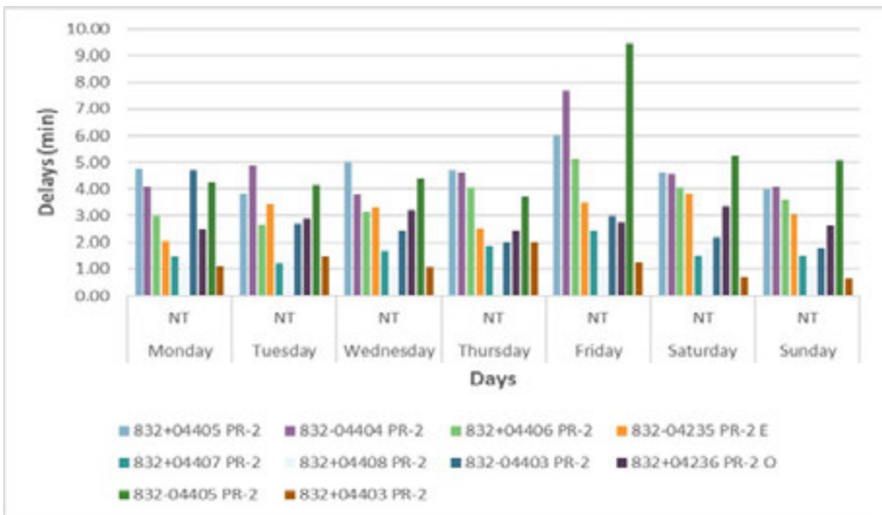
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.441: March 2017, TMC, Southwest Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.442: April 2017, TMC, Southwest Region, (NT)

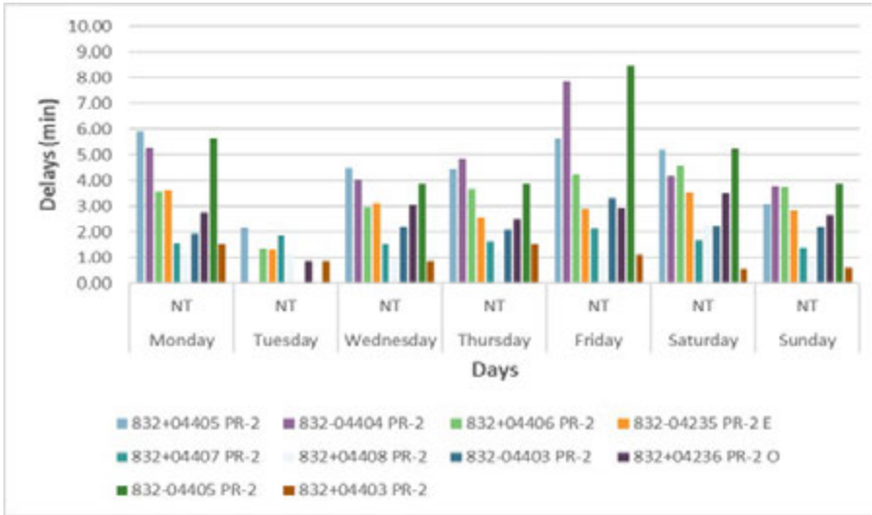


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was of 3.5 minutes for most segments. The highest delays occurred on Friday when the average delay ranged between 4.0-9.0 minutes.

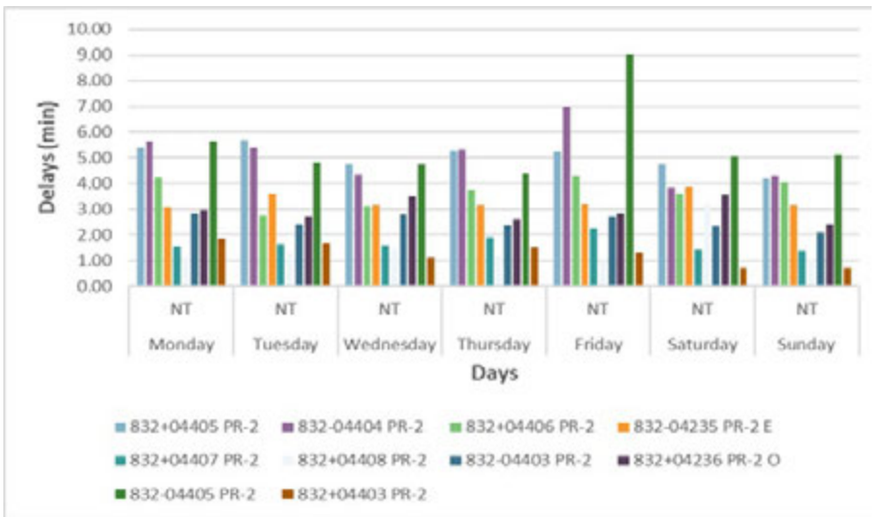
The segments with delays above average were 832-04405 in PR-2 with average delays ranging between 4.0-6-0 minutes, 832-04404 in PR-2 with average delays ranging between 4.0-8.0 minutes, and 832+04405 in PR-5 with average values ranging between 4.0-6.0 minutes (Figure K.443 to Figure K.446).

Figure K.443: May 2017, TMC, Southwest Region, (NT)



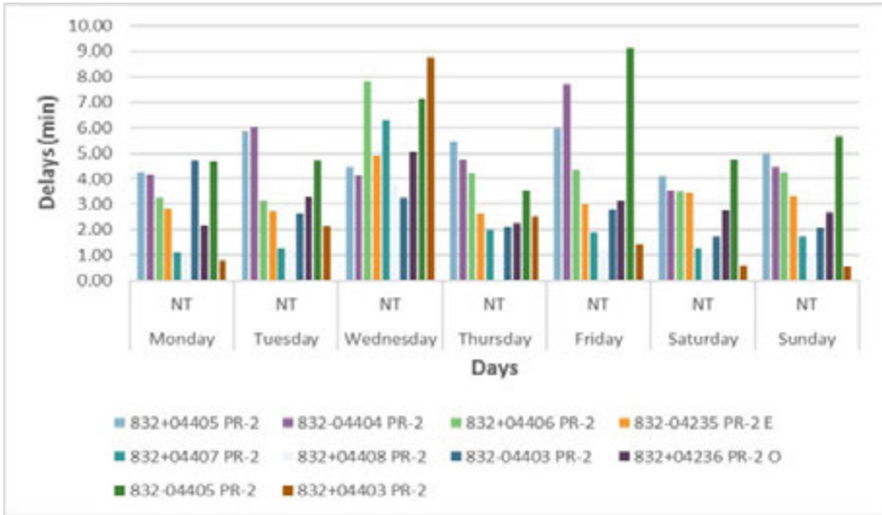
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.444: June 2017, TMC, Southwest Region, (NT)



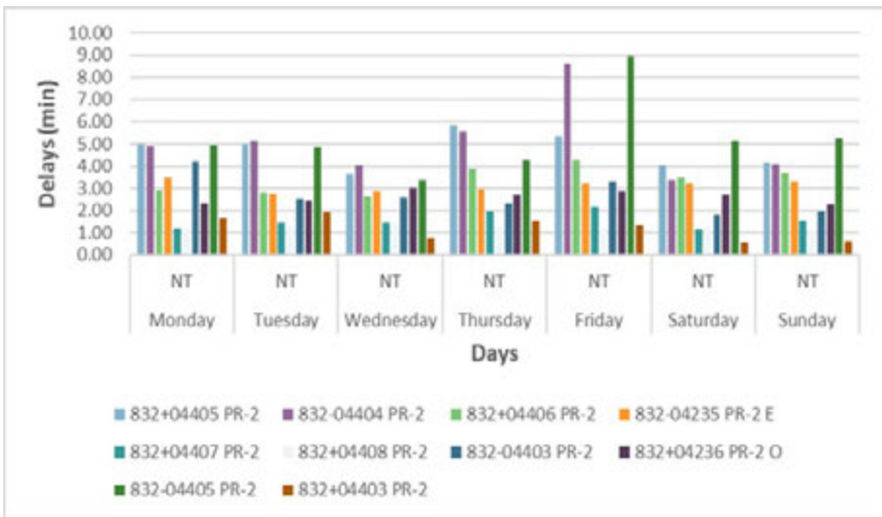
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.445: July 2017, TMC, Southwest Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

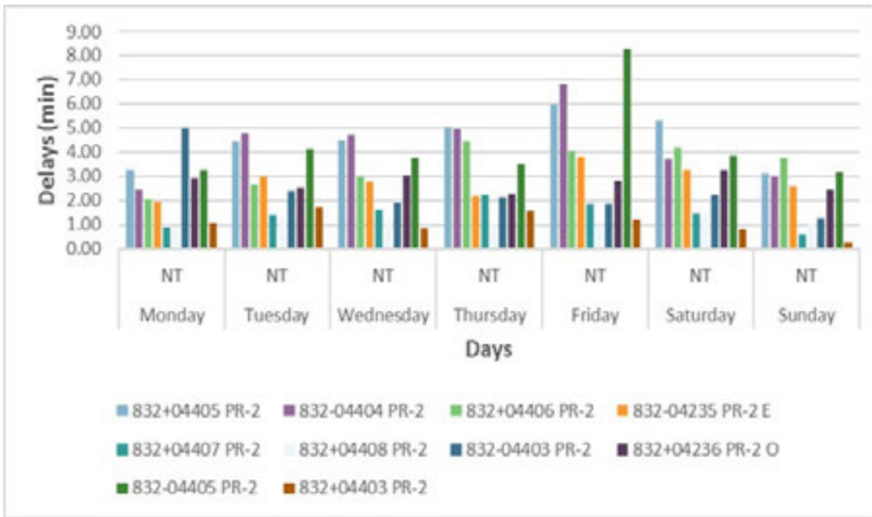
Figure K.446: August 2017, TMC, Southwest Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

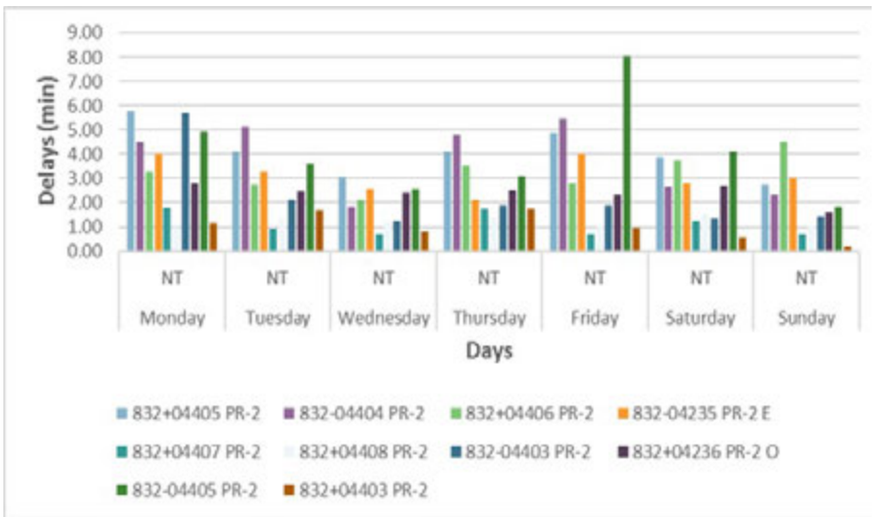
For the first four months between January and April 2018, average delay of segments was of 3.0 minutes. Average delays were mostly higher on Fridays, with segments 832-04405 in PR-2, 832-04404 in PR-2, and 832+04405 in PR-5 ranging between 5.00-8.00 minutes on average delay (Figure K.447 to Figure K.450).

Figure K.447: January 2018, TMC, Southwest Region, (NT)



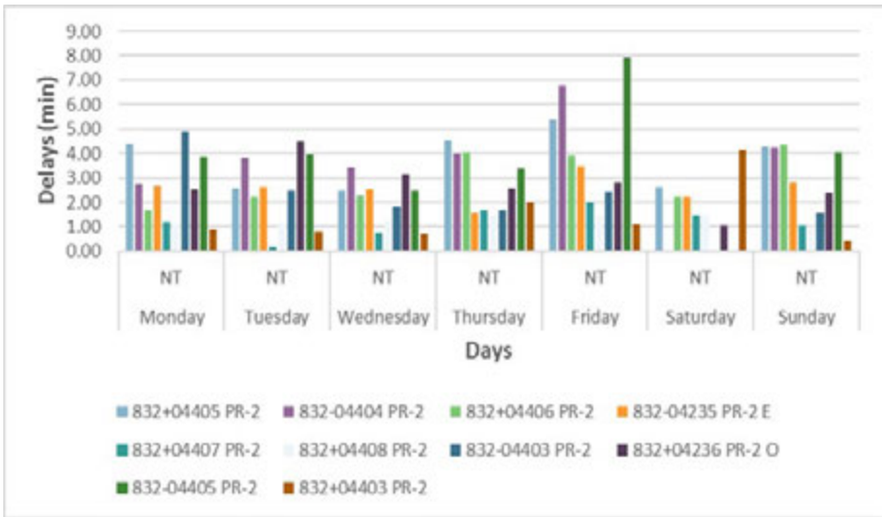
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.448: February 2018, TMC, Southwest Region, (NT)



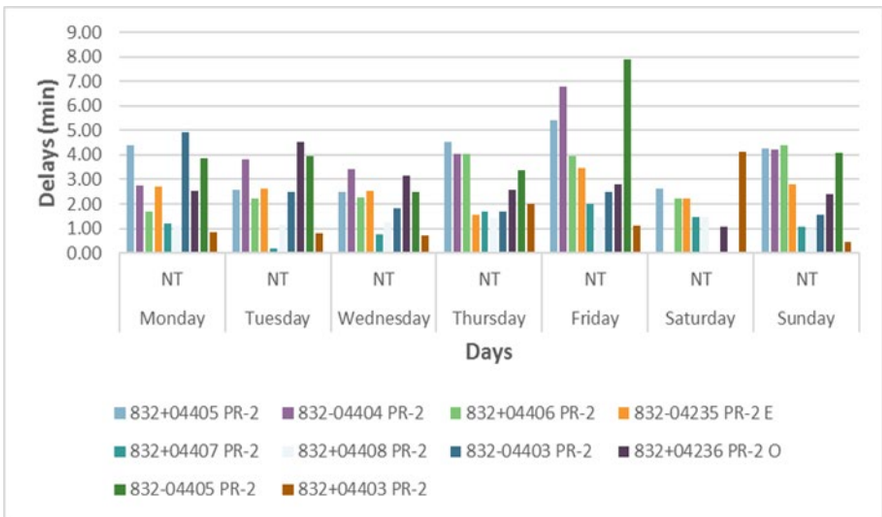
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.449: March 2018, TMC, Southwest Region, (NT)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.450: April 2018, TMC, Southwest Region, (NT)



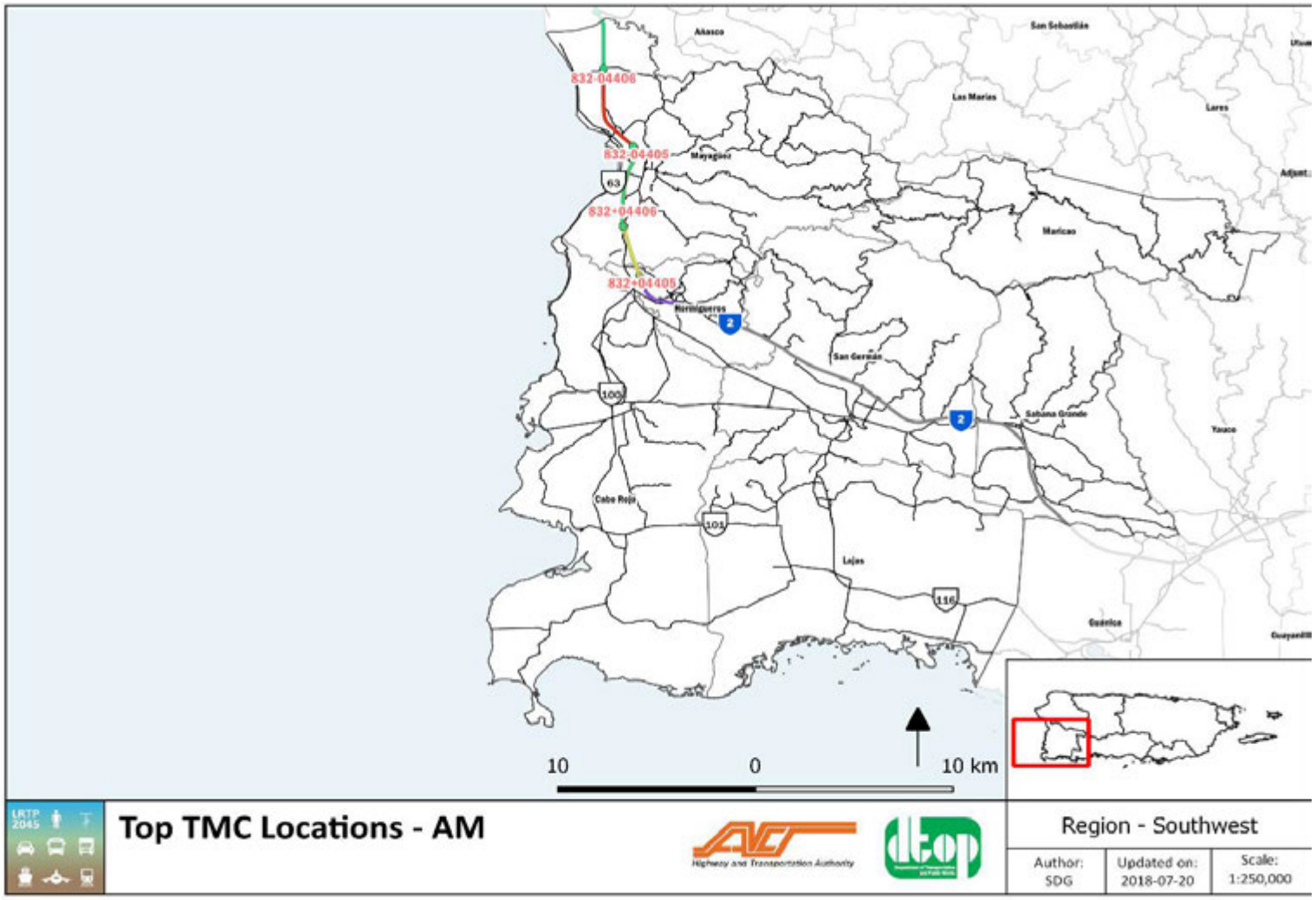
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Morning Period (AM)

The last four months of 2016 and January 2017 showed an average delay of 1.9 minutes in all segments, for the morning period (AM), from 7:00-9:00 a. m. During these months 832-04405 had an average of 3.9 minutes, which in later months dropped to 1.5 minutes.

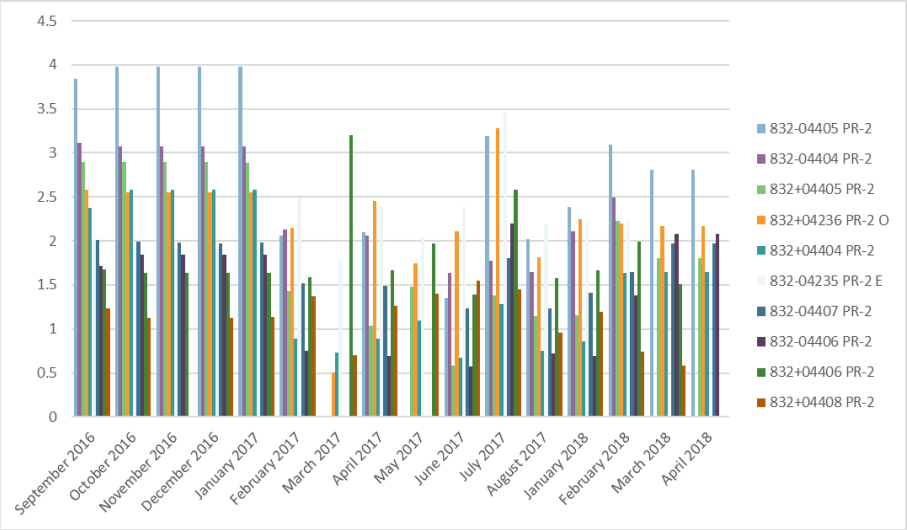
After February 2017, the average delay for all segments was 1.3 minutes, with peaks on some TMC average delays for April 2017, July 2017 and February 2018, as can be seen in Figure K.451 and Figure K.452 below.

Figure K.451: Southwest Location, AM Period



Source: SDG, based on NPMRDS Analytics

Figure K.452: Average Delays, Southwest TPR, AM Period



Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

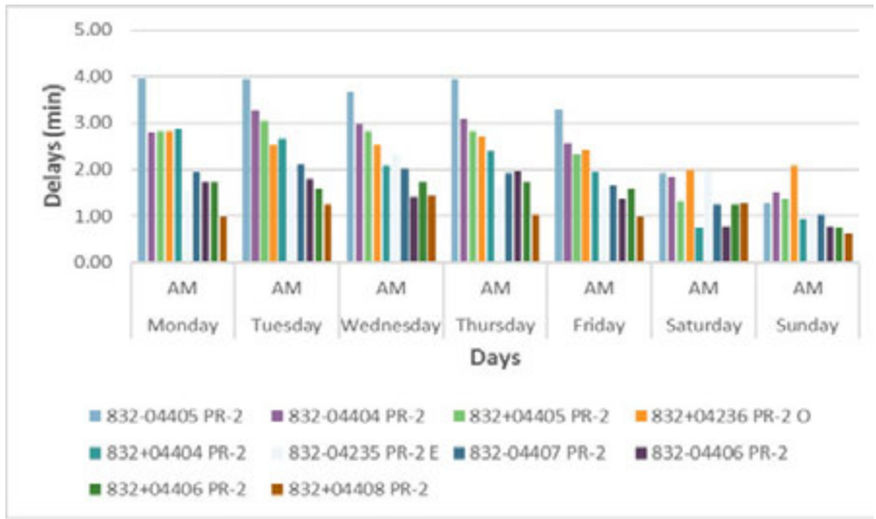
Morning Period (AM) - Weekly

In terms of variation per week day for morning period (AM), for the last four months of 2016, the average delay for segments was below 3.0 minutes. For the morning period, the highest delays were recorded during working days, from Monday to Thursday, and decreasing from Friday to Sunday.

The segment with the highest delay throughout the months was 832-04405 with an average of 3.9 minutes during working days, and segments 832+04405 in PR-2, 832-04404 in PR-2, 832+04236 in PR-2 O with average delays ranging from 2.5-4.0 minutes during working days.

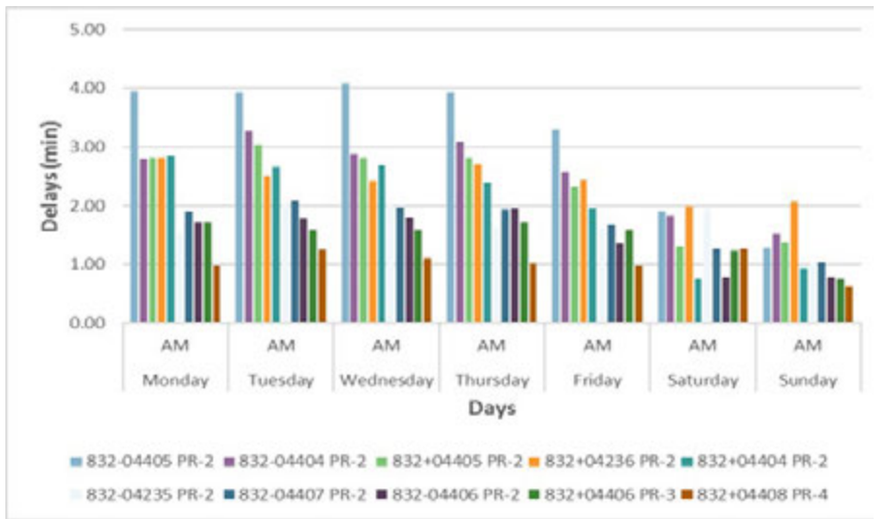
For all months the behavior of each segment is similar, highest in the weekday and lowest times in weekend (Figure K.453 to Figure K.456).

Figure K.453: September 2016, TMC, Southwest Region, (AM)



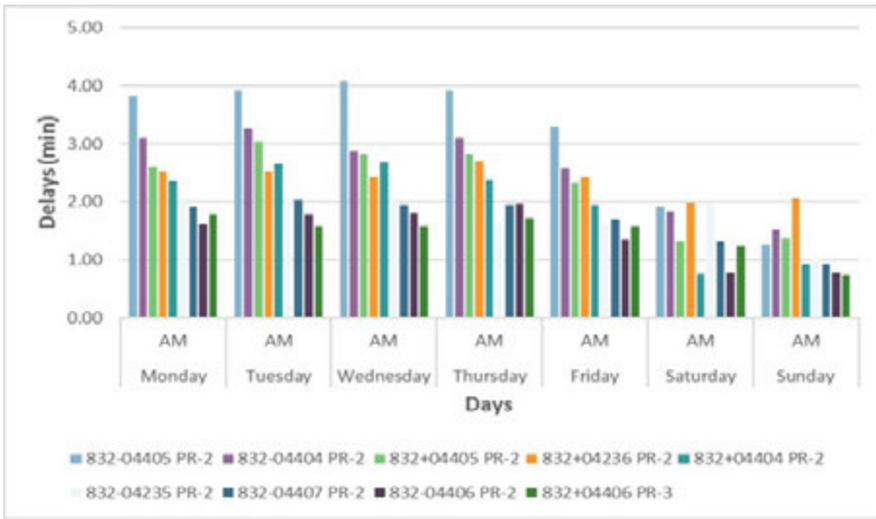
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.454: October 2016, TMC, Southwest Region, (AM)



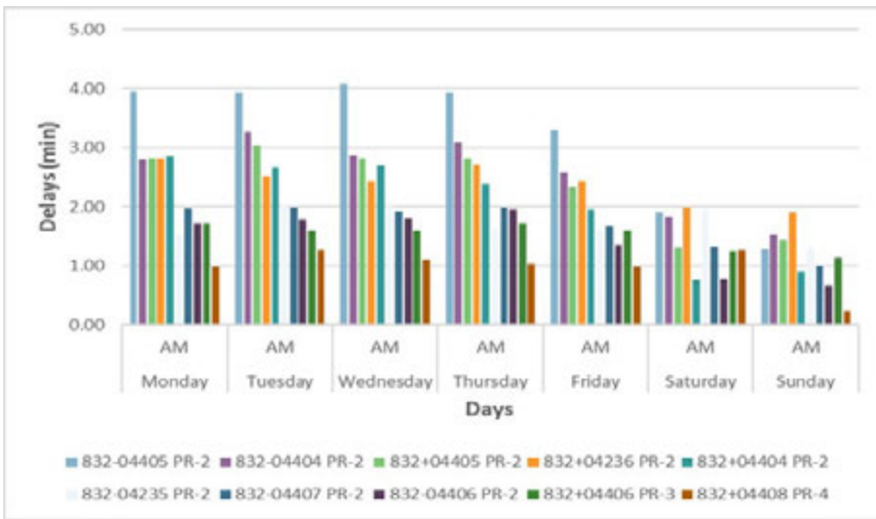
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.455: November 2016, TMC, Southwest Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.456: December 2016, TMC, Southwest Region, (AM)

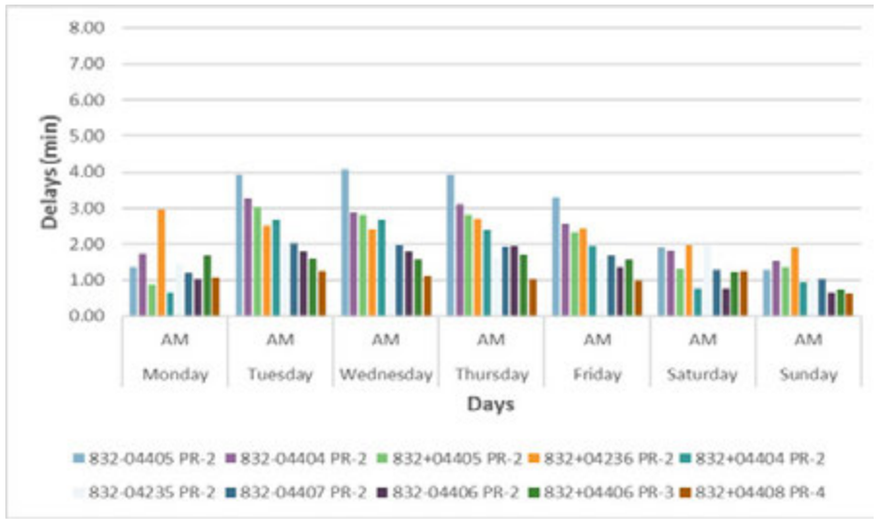


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, segments had an average delay below 2.0 minutes. The segment with the highest delay was 832-04235 in PR-2, with peaks on average delays of 7.8 minutes on Fridays. Other segments above average were 832-04405 in PR-2 with peaks on Saturday of 4.0 minutes on average, and 832+04406 in PR-3 with peaks on Wednesday and Sunday with a peak of 7.7 minutes.

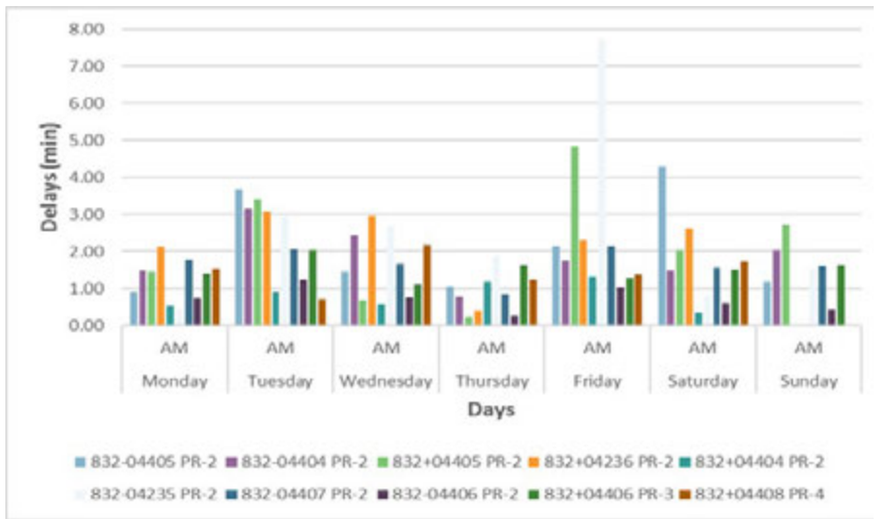
During January 2017, segments 832+04236 in PR-2, 832-04405 in PR-2, 832+04405 in PR-2, and 832-04404 in PR-2 had average delays ranging from 3.0-4.0 minutes, mostly from Tuesday to Friday (Figure K.457 to Figure K.460).

Figure K.457: January 2017, TMC, Southwest Region, (AM)



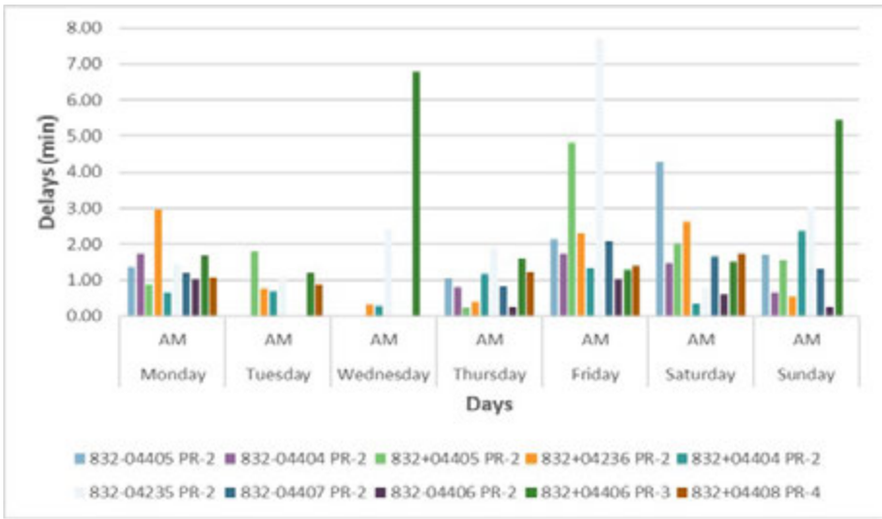
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.458: February 2017, TMC, Southwest Region, (AM)



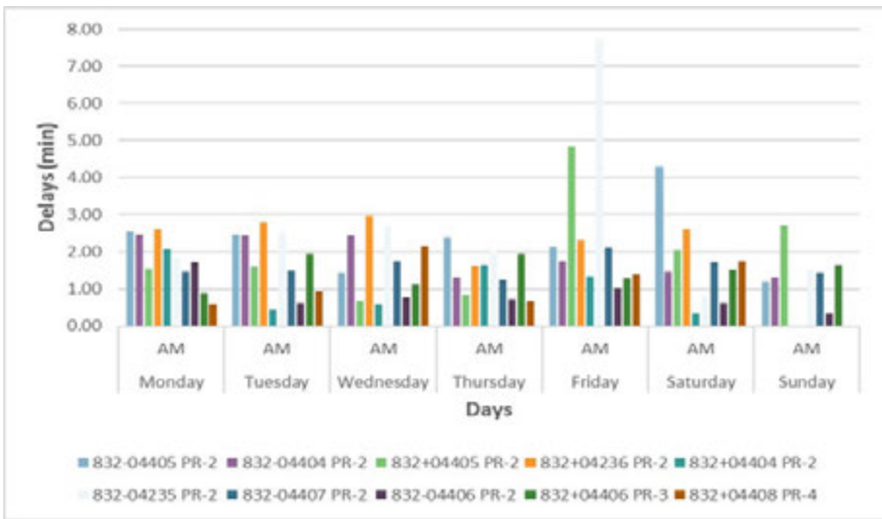
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.459: March 2017, TMC, Southwest Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.460: April 2017, TMC, Southwest Region, (AM)



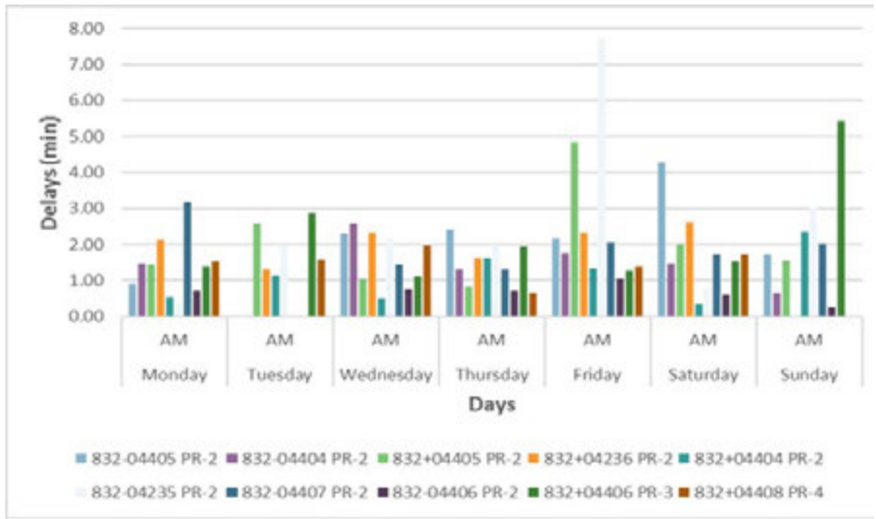
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week for segments was of 1.5 minutes. The segment with the highest delay was 832-04235 in PR-2 E with 7.7 minutes from June to August 2017.

Other segments with delays above average included 832-04405 in PR-2 with peaks on delay on Saturday with an average delay ranging between 2.0-4.0 minutes.

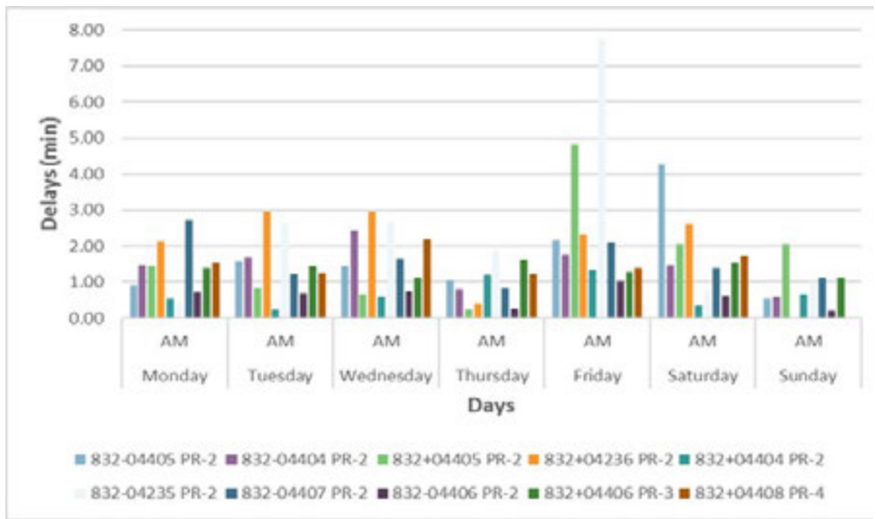
For July 2017, Wednesday was the worst day of the week with an average delay of 5.2 minutes (Figure K.461 to Figure K.464).

Figure K.461: May 2017, TMC, Southwest Region, (AM)



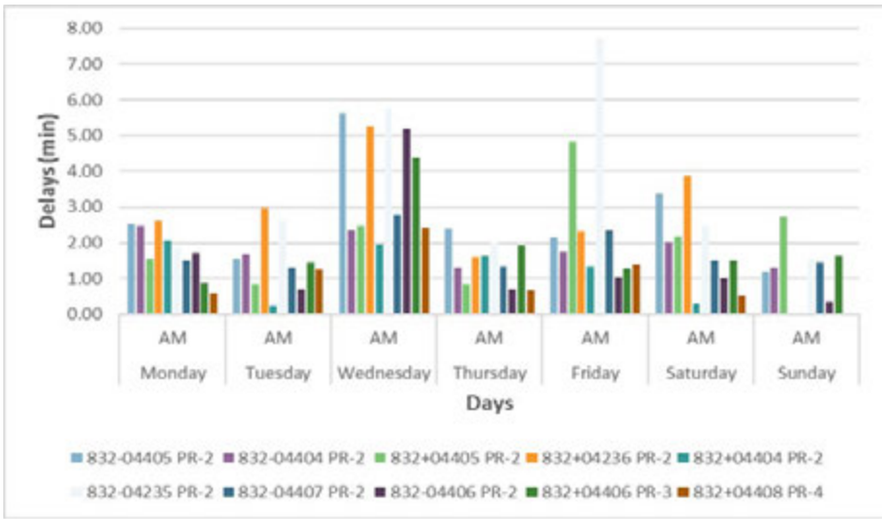
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.462: June 2017, TMC, Southwest Region (AM)



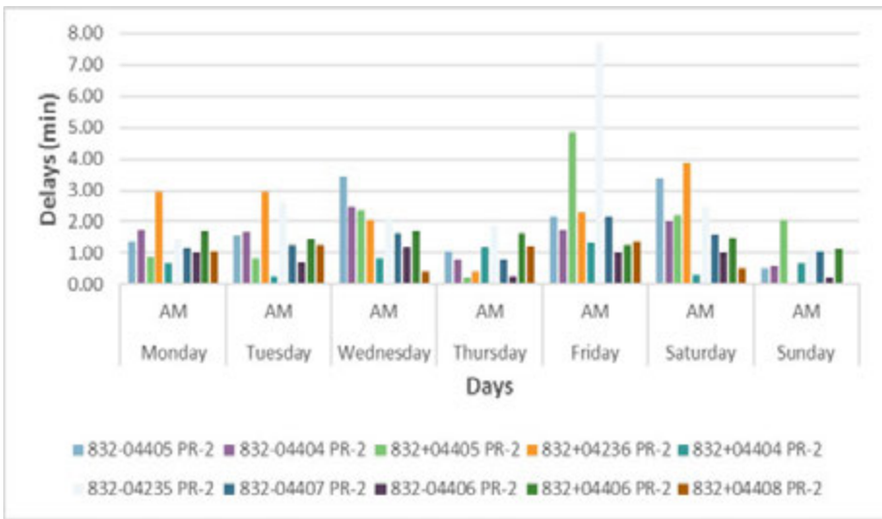
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.463: July 2017, TMC, Southwest Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.464: August 2017, TMC, Southwest Region, (AM)

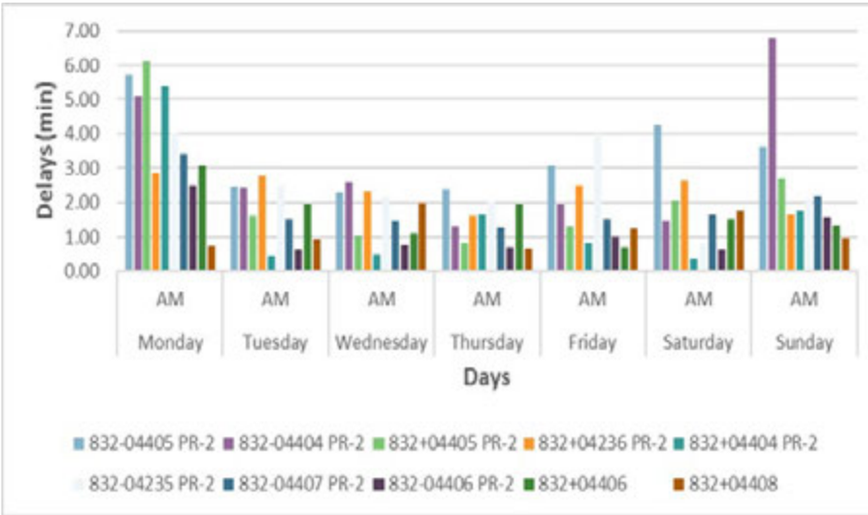


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months between January and April 2018, average delay of segments was of 2.5 minutes. Segments with delays above average were 832-04406 in PR-2, 832+04405 in PR-2, 832-04404 in PR-2, with delays of 4.0 minutes on average during Wednesdays from February to April 2018.

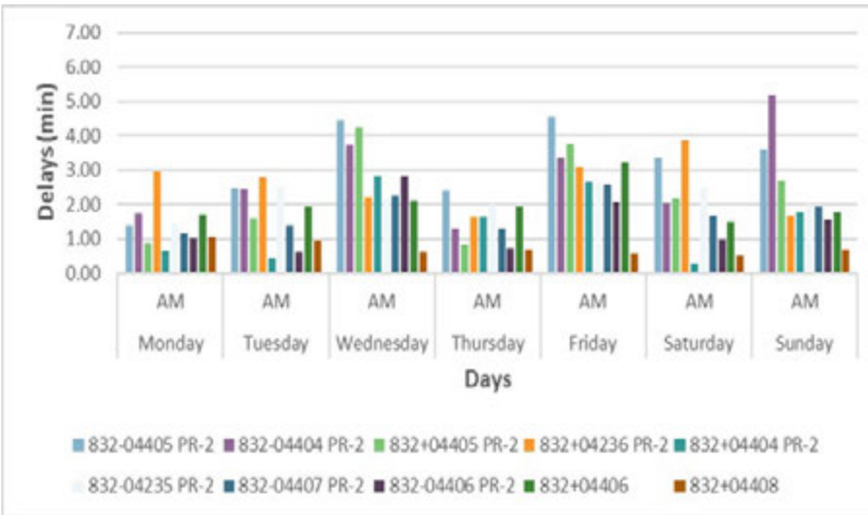
Segment 832-04235 in PR-2 had an average delay of 2.0 minutes and peak on Fridays of March to April 2018 with 4.0 minutes delay, and 832+04406 in PR-2 with 5.2 minutes on Sundays between March to April 2018 (Figure K.465 to Figure K.468).

Figure K.465: January 2018, TMC, Southwest Region, (AM)



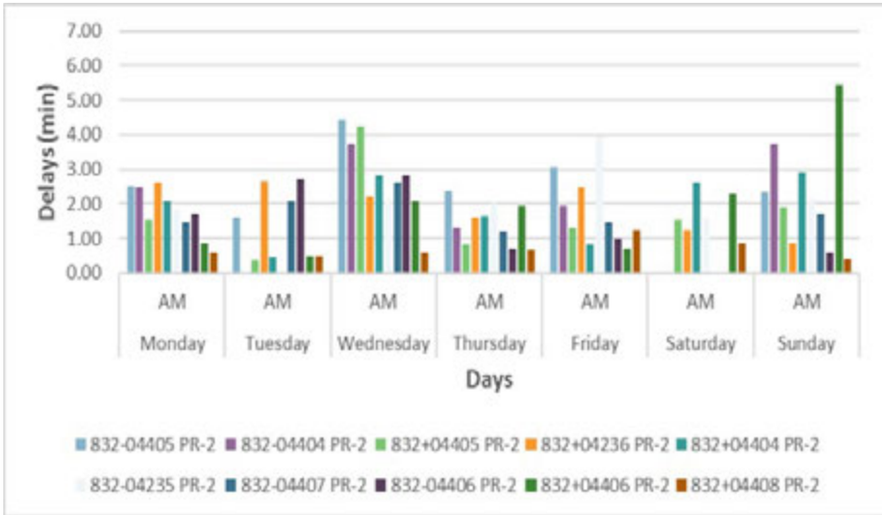
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.466: February 2018, TMC, Southwest Region (AM)



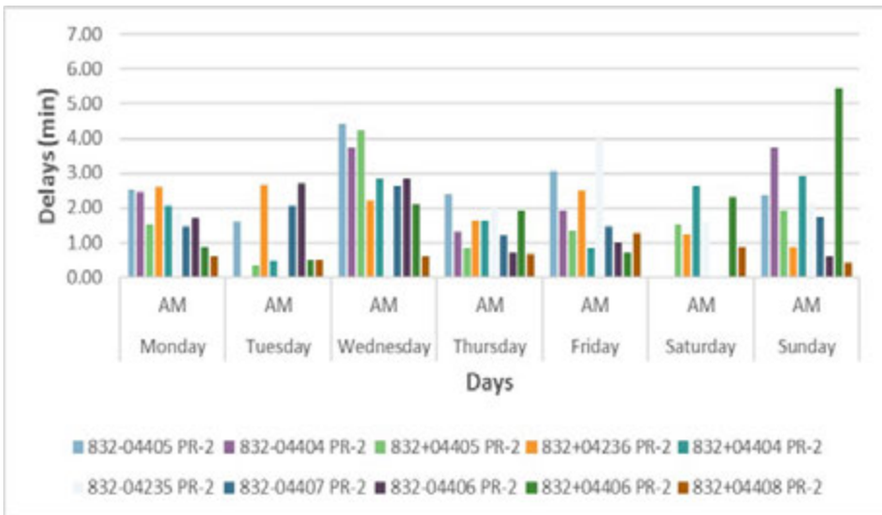
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.467: March 2018, TMC, Southwest Region, (AM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.468: April 2018, TMC, Southwest Region, (AM)



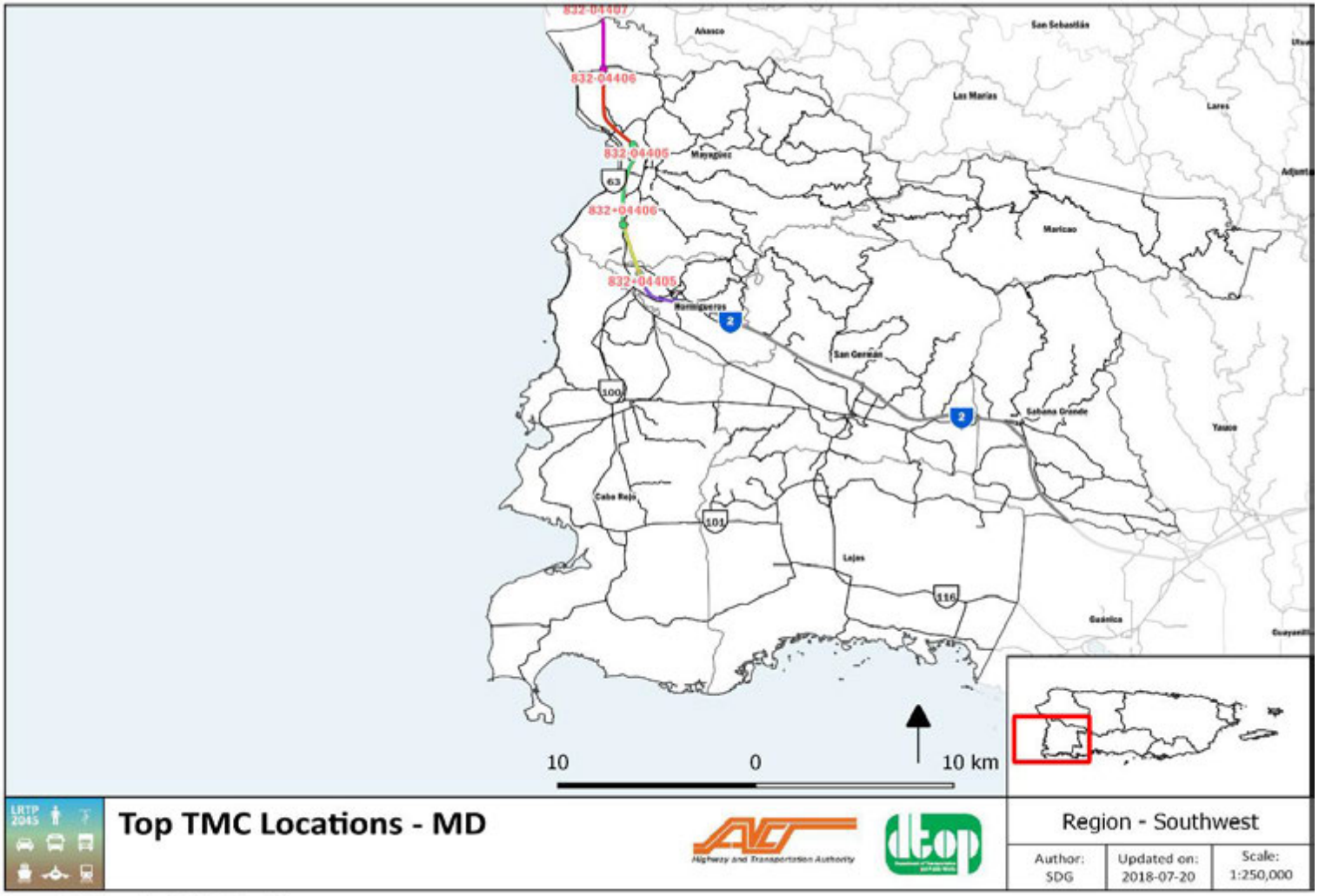
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD)

For the mid-day period (MD), segments added on average a delay of 2.0 minutes to the reference travel time, mostly ranking below 3.0 minutes, during the months of September 2016 through April 2018. From February 2017 to February 2018, the average delay increased to around 3.0 minutes for all segments.

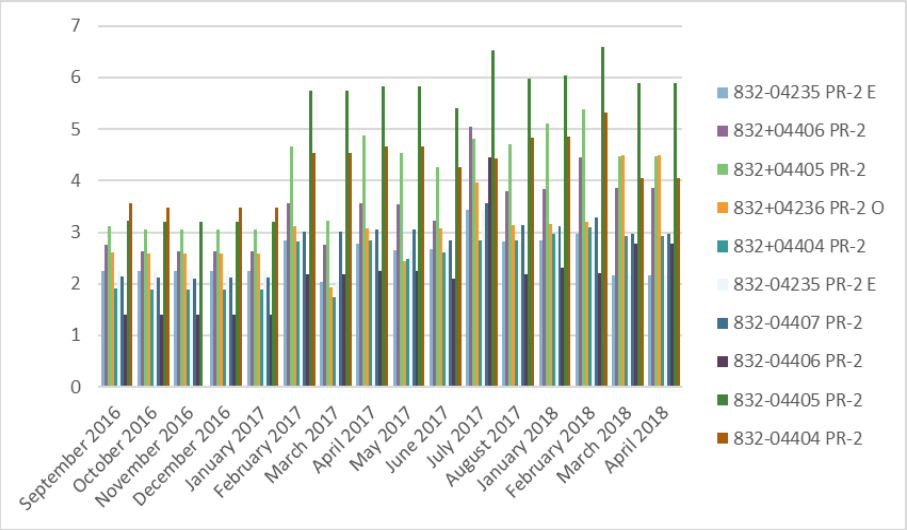
Highest ranking TMCs through 2017 were 832+04405, 832-04405 and 832-04404 along PR-2 with average delays from 4.0 – 6.0 minutes, as seen in Figure K.469 and Figure K.470 below.

Figure K.469: Southwest Location, MD Period



Source: SDG, based on NPMRDS Analytics

Figure K.470: Average Delays, Southwest TPR, MD Period



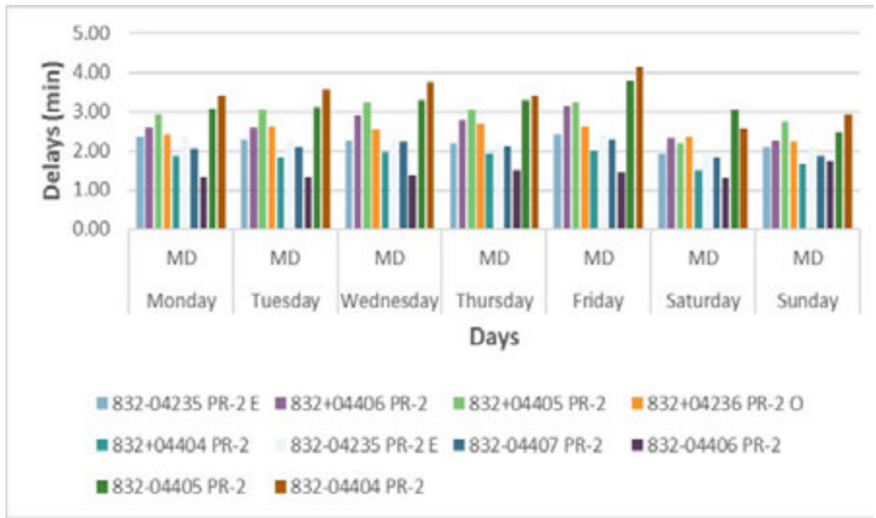
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Mid-Day Period (MD) - Weekly

In terms of variation per week day for mid-day period (MD), for the last four months of 2016, the average delay for segments was 2.5 minutes. The segment with the highest delay was 832-04404 in PR-2 with an average of 3.5 minutes delay.

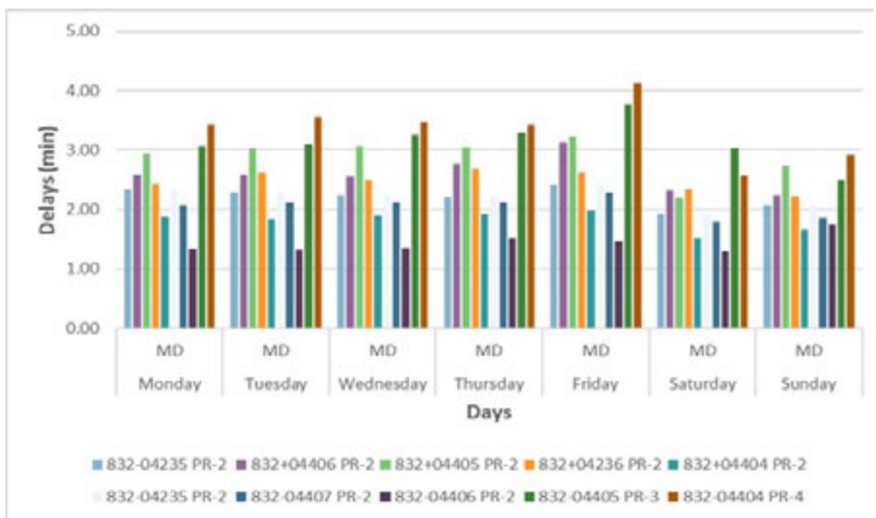
Other segments with delays above average were 832+04405 in PR-2, 832-04405 PR-3, and 832+4406 PR-2 with delays ranging from 2.5-3.0 minutes (Figure K.471 to Figure K.474).

Figure K.471: September 2016, TMC, Southwest Region, (MD)



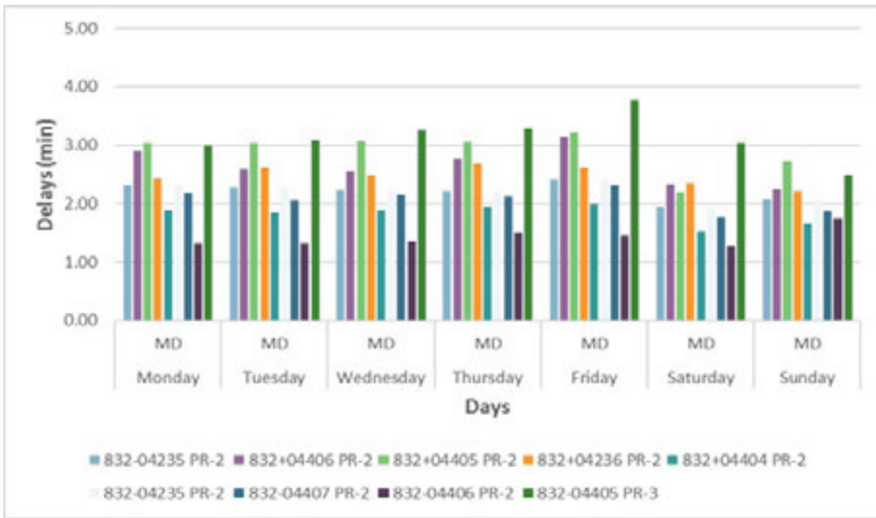
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.472: October 2016, TMC, Southwest Region, (MD)



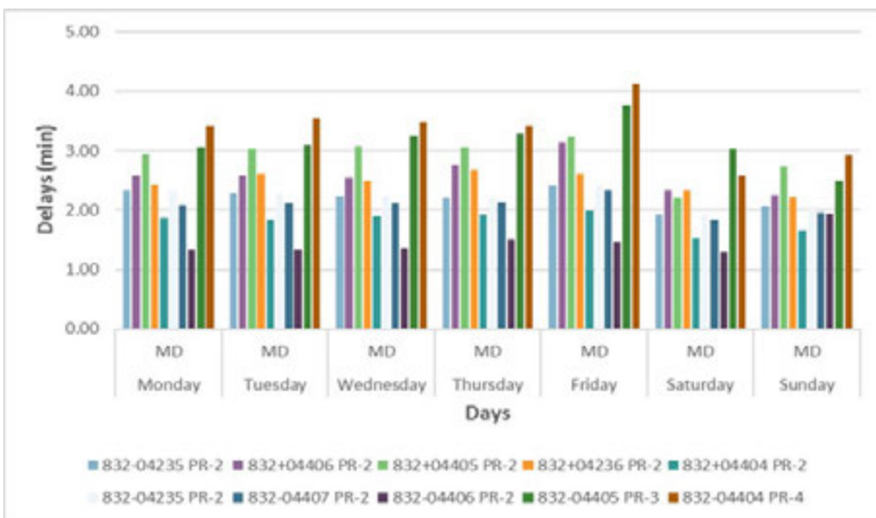
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.473: November 2016, TMC, Southwest Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.474: December 2016, TMC, Southwest Region, (MD)

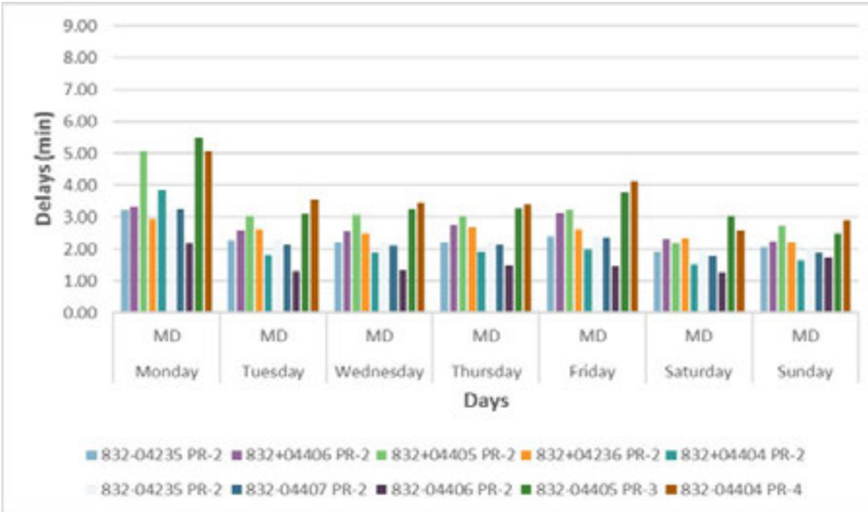


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, segments had an average delay of 2.5 minutes. The segment with the highest delays was 832-04405 in PR-3 with average delays ranging between 5.0-7.0 minutes during working days.

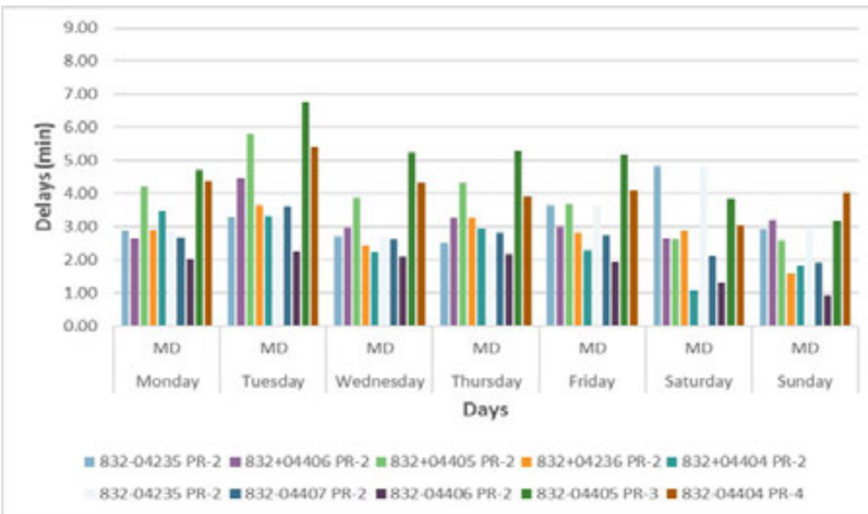
Other segments with delays above average were 832-04235 in Pr-2 with peaks on Sundays of 4.8 minutes delay, and segments 832+04405 in PR-3, 832-04404 in PR-4 with average delays of 3.2 minutes (Figure K.475 to Figure K.478).

Figure K.475: January 2017, TMC, Southwest Region, (MD)



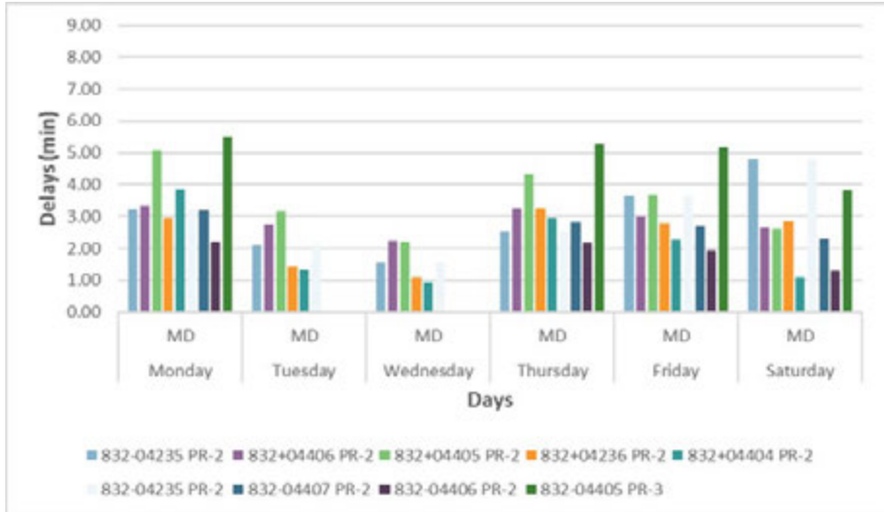
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.476: February 2017, TMC, Southwest Region, (MD)



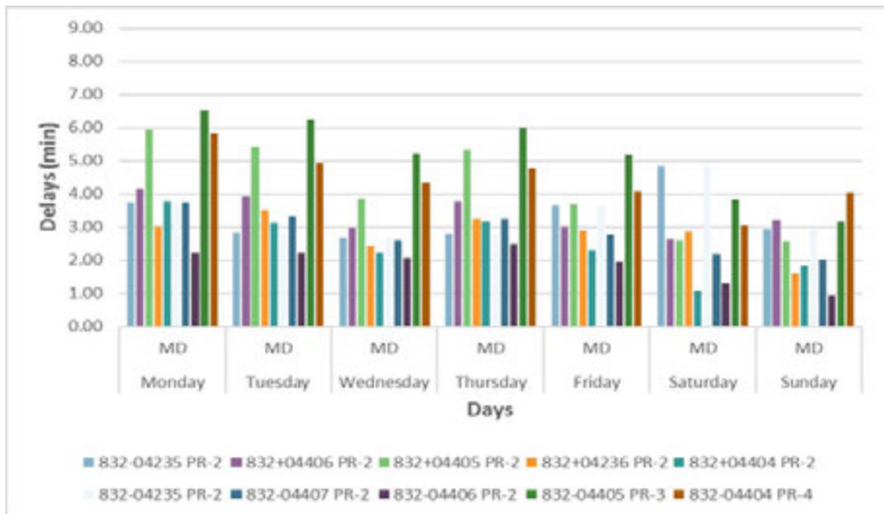
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.477: March 2017, TMC, Southwest Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.478: April 2017, TMC, Southwest Region, (MD)

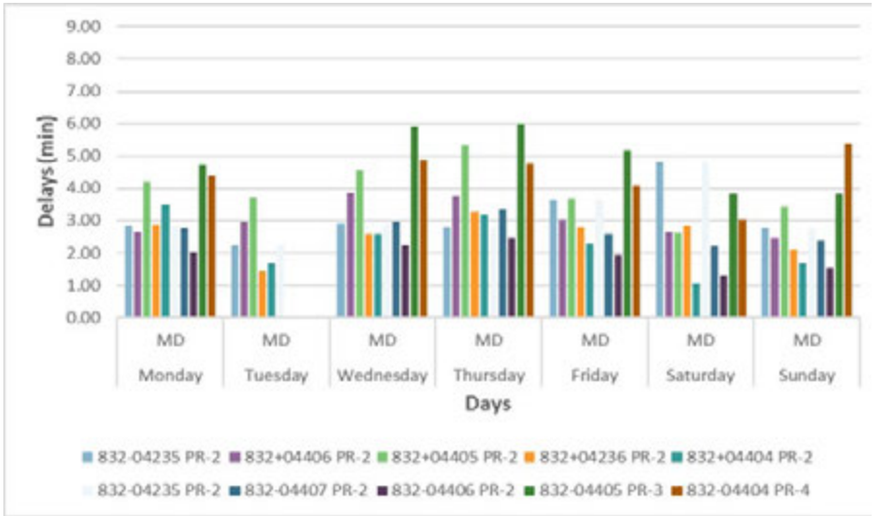


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, the average delay throughout the week was of 3.0 minutes. The segment with highest delays was 832-04405 in PR-3 with an average delay ranging between 5.0-7.0 minutes, mostly during working days from Monday to Friday, decreasing during weekends.

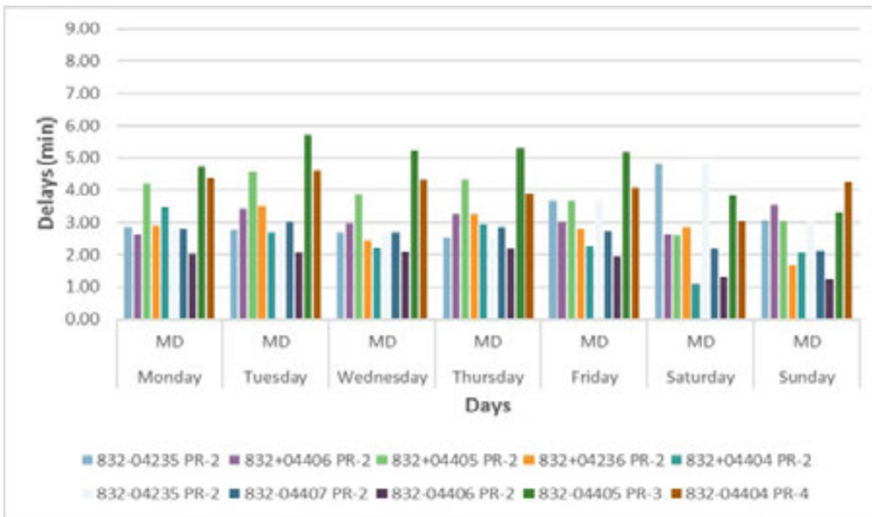
Other segments with delays above average were 832+04405 in PR-3, 832-04404 in PR-4 with average delays of 4.0 minutes (Figure K.479 to Figure K.482).

Figure K.479: May 2017, TMC, Southwest Region, (MD)



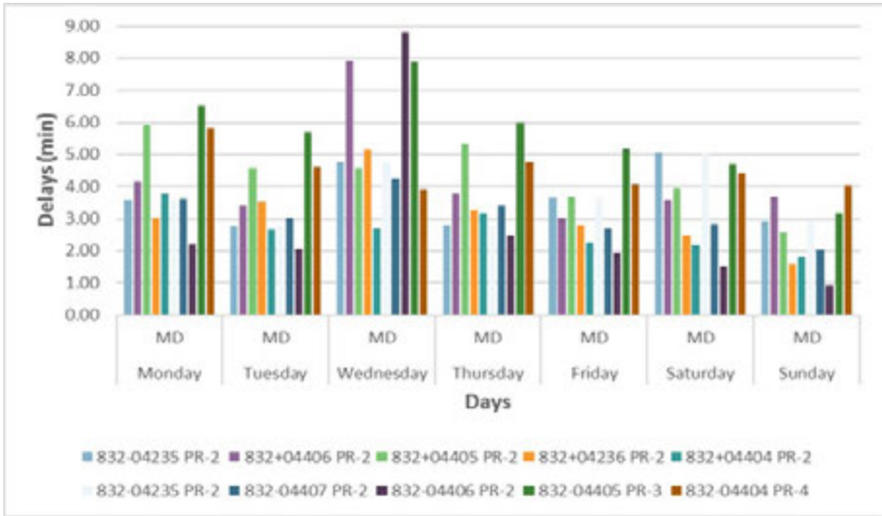
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.480: June 2017, TMC, Southwest Region, (MD)



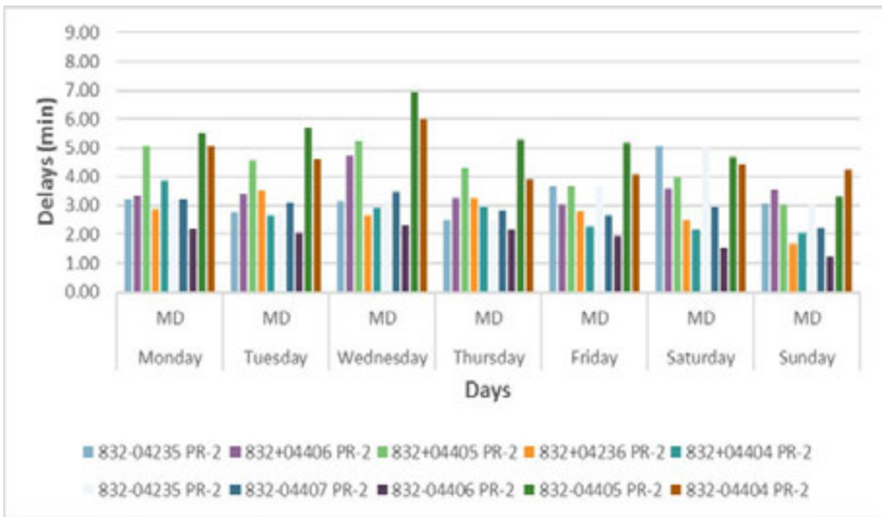
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.481: July 2017, TMC, Southwest Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.482: August 2017, TMC, Southwest Region, (MD)

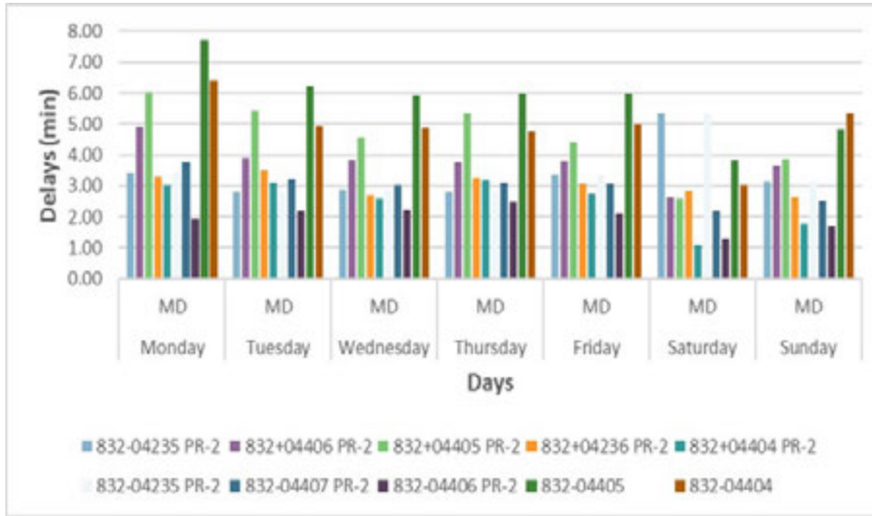


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months between January and April 2018, average delay of segments was of 3.2 minutes. The segment with highest delays was 832-04405 in PR-3 with an average delay ranging between 6.0-8.-0 minutes, mostly during working days from Monday to Friday, decreasing during weekends.

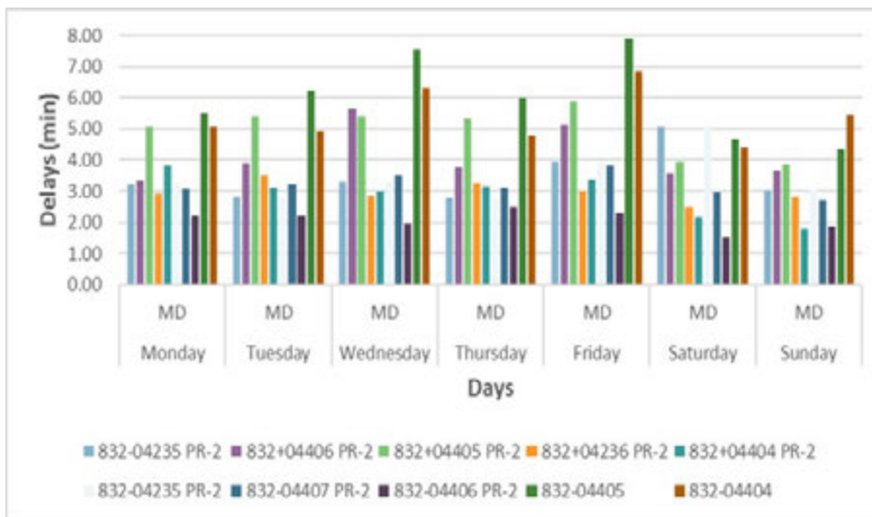
Other segments with delays above average were 832+04405 in PR-2, 832-04404 in PR-4, and 832+04406 in PR-2 with average delays ranging from 3.5-5.0 minutes (Figure K.483 to Figure K.486).

Figure K.483: January 2018, TMC, Southwest Region, (MD)



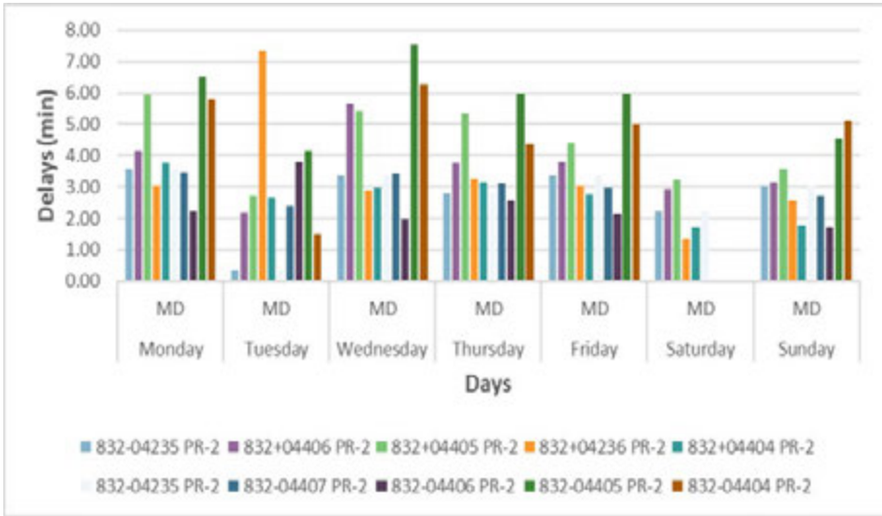
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.484: February 2018, TMC, Southwest Region, (MD)



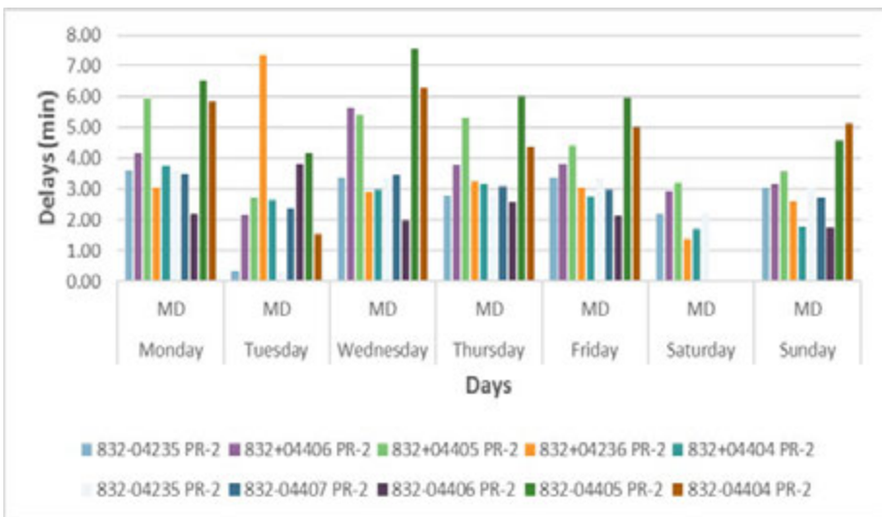
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.485: March 2018, TMC, Southwest Region, (MD)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.486: April 2018, TMC, Southwest Region, (MD)

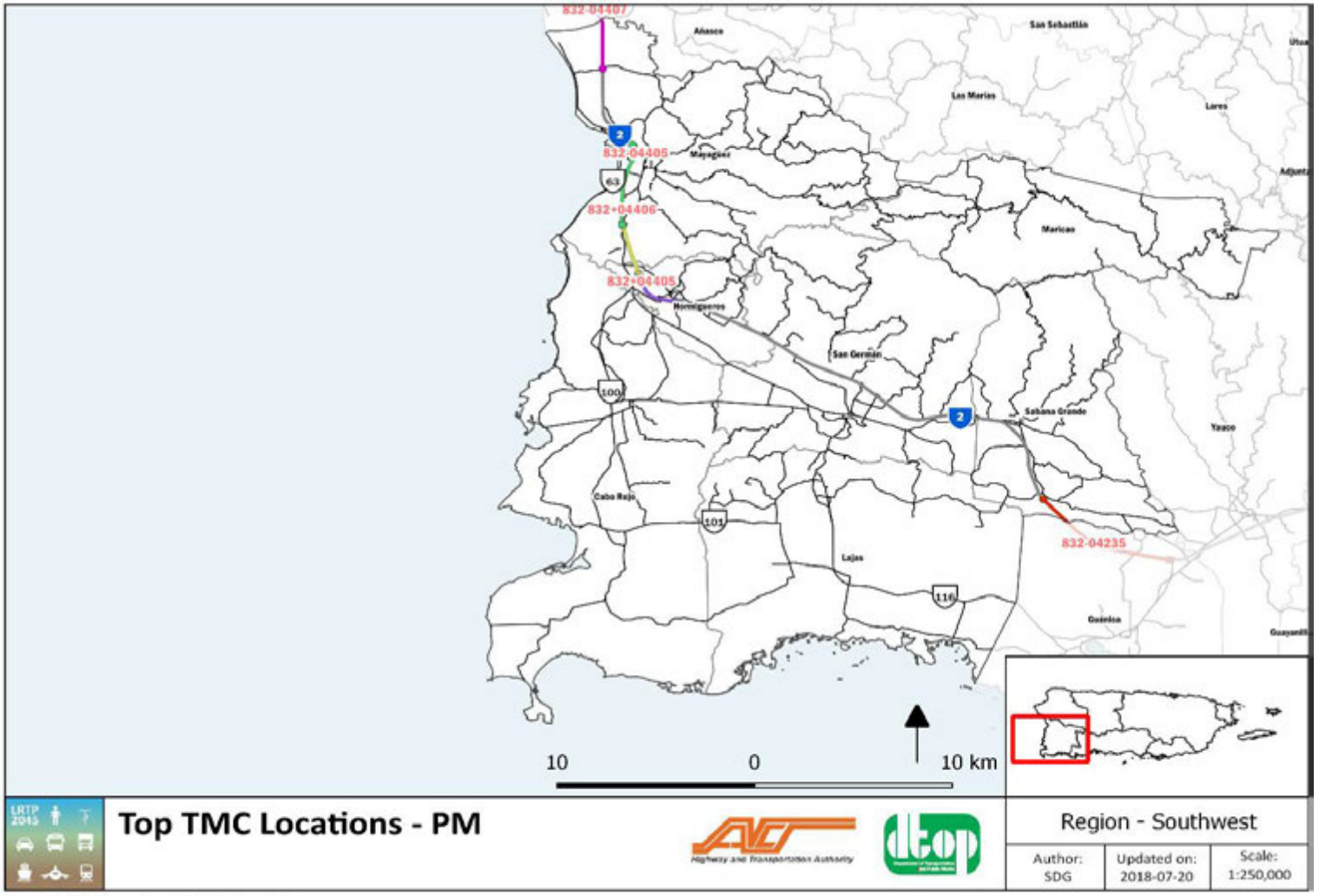


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM)

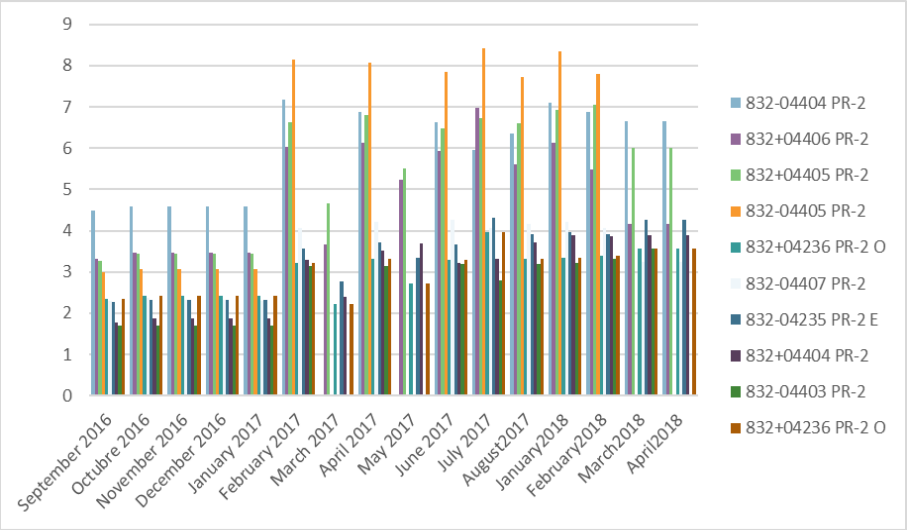
During the past-midday period (PM), Segments added on average a delay of 2.4 minutes to the reference travel time during the months of September 2016 through April 2018. From February 2017 to February 2018, the average delay increased to 4.3 minutes. This increase is mostly related to TMC 832-04405, 832-04404, 832+04405 and 832+04406 along PR-2 with average delays ranging from 6.0 – 8.0 minutes throughout these months, as seen in Figure K.487 and Figure K.488 below.

Figure K.487: Southwest Location, PM Period



Source: SDG, based on NPMRDS Analytics

Figure K.488: Average Delays, Southwest TPR, PM Period



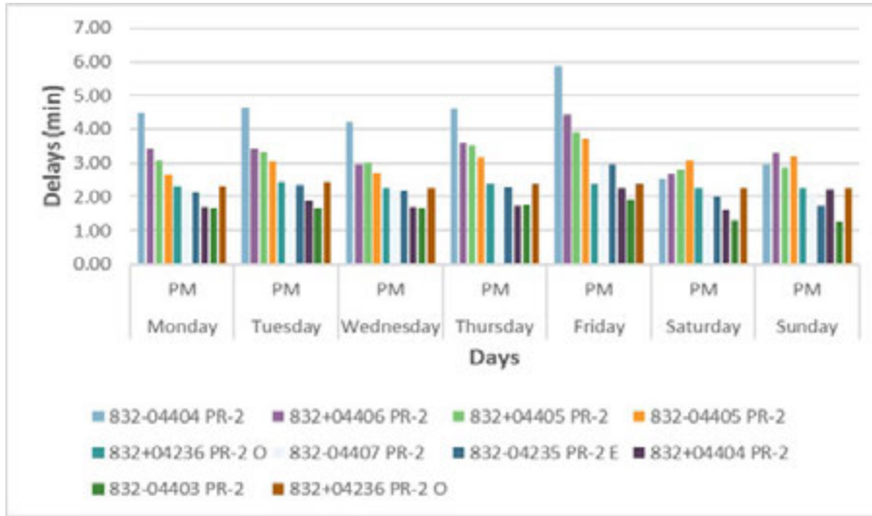
Source: SDG 2018, using National Performance Management Research Data Set (NPMRDS).

Past-Midday Period (PM) - Weekly

In terms of variation per week day for past-midday period (PM), for the last four months of 2016, the average delay was 2.5 minutes. The segment with highest delay was 832-04404 in PR-2 with an average delay ranging between 4.0-6.-0 minutes, mostly during working days from Monday to Friday, and decreasing during weekends.

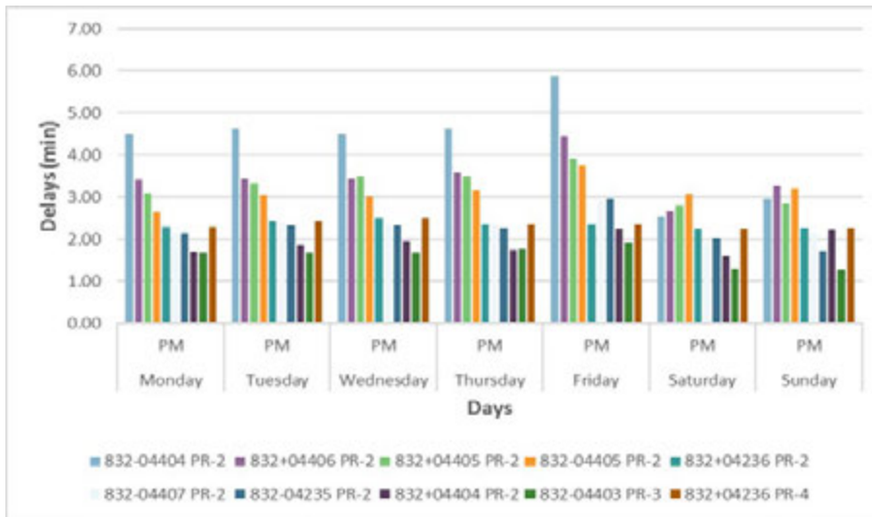
Other segments with delays above average were 832+04405 and 832+04406 along PR-2 with average delays ranging from 3.0-4.0 minutes (Figure K.489 to Figure K.492).

Figure K.489: September 2016, TMC, Southwest Region, (PM)



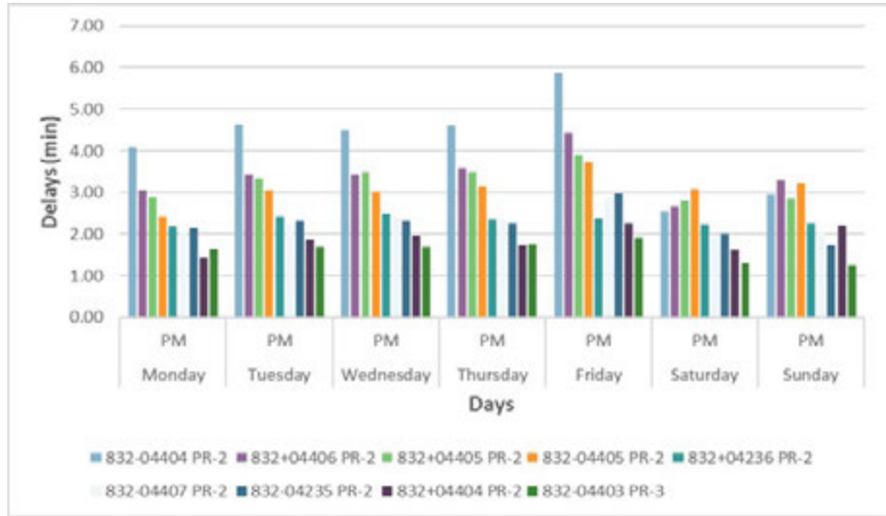
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.490: October 2016, TMC, Southwest Region, (PM)



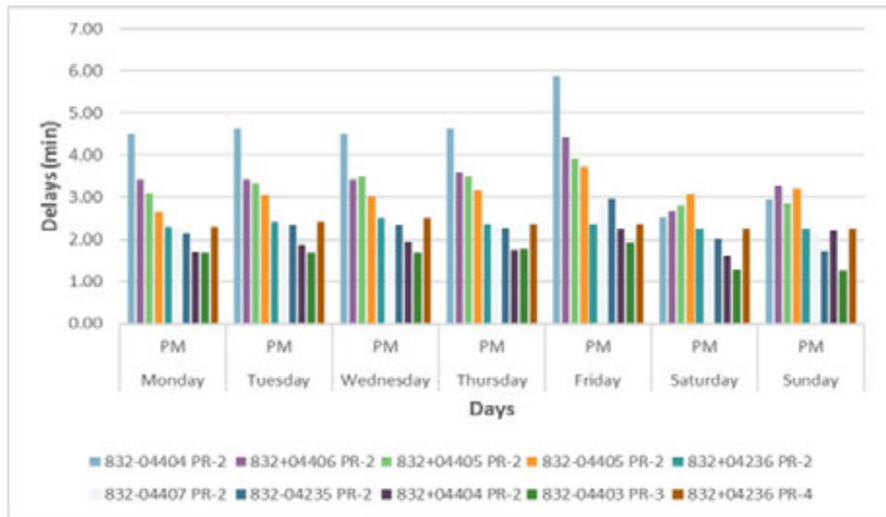
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.491: November 2016, TMC, Southwest Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.492: December 2016, TMC, Southwest Region, (PM)

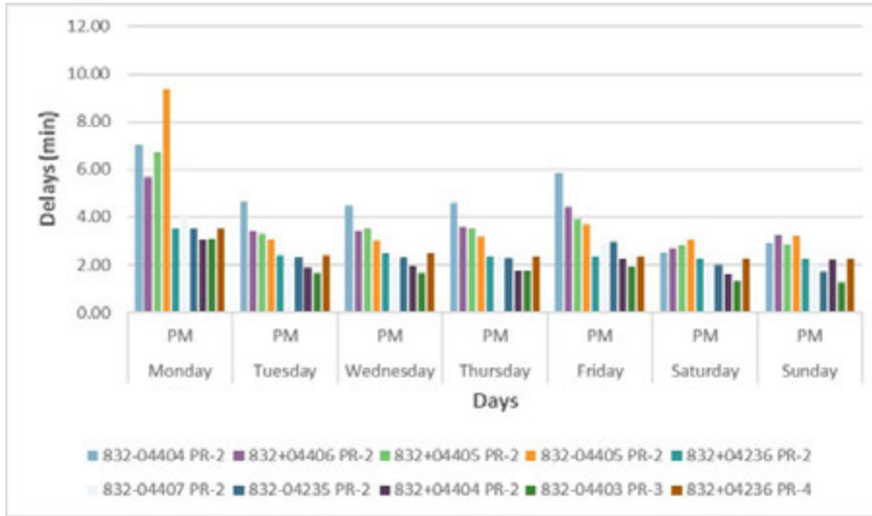


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first months between January and April 2017, average delay for segments was 3.0 minutes. The segment with highest delays was 832-04405 in PR-2 with an average delay ranging between 7.0-9.-0 minutes mostly during working days from Monday to Friday, and decreasing during weekends.

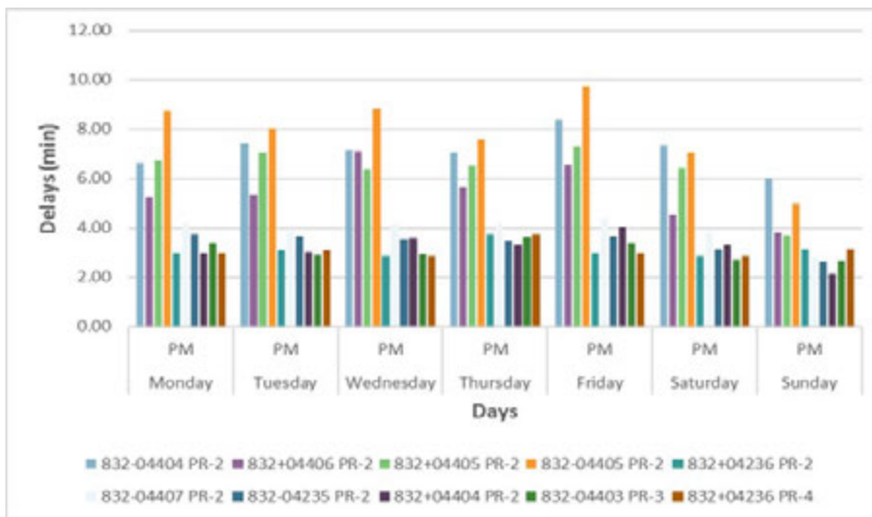
Other segments with delays above average were 832-04404 in PR-2, 832+04405 in PR-2, and 832+04406 in PR-2 with average delays ranging from 3.0-7.5 minutes on January 2017, and 6.0-9.5 minutes from February to April 2017 (Figure K.493 to Figure K.496).

Figure K.493: January 2017, TMC, Southwest Region, (PM)



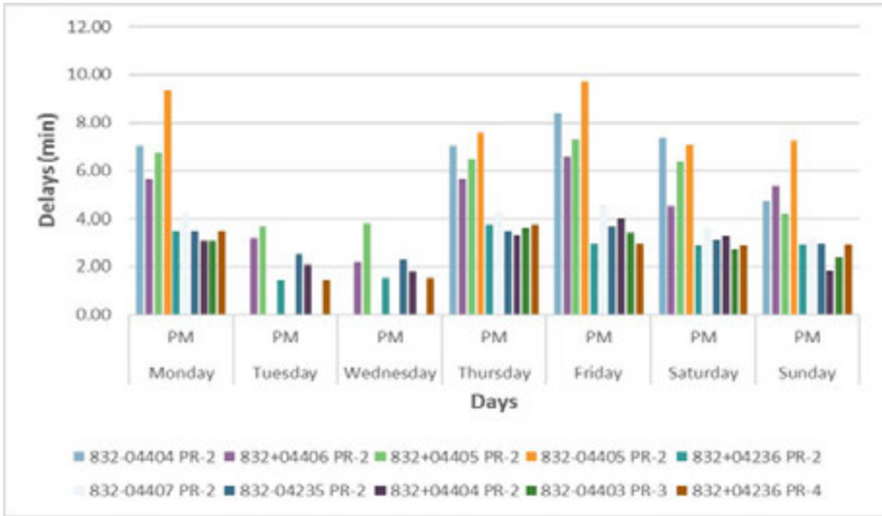
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.494: February 2017, TMC, Southwest Region, (PM)



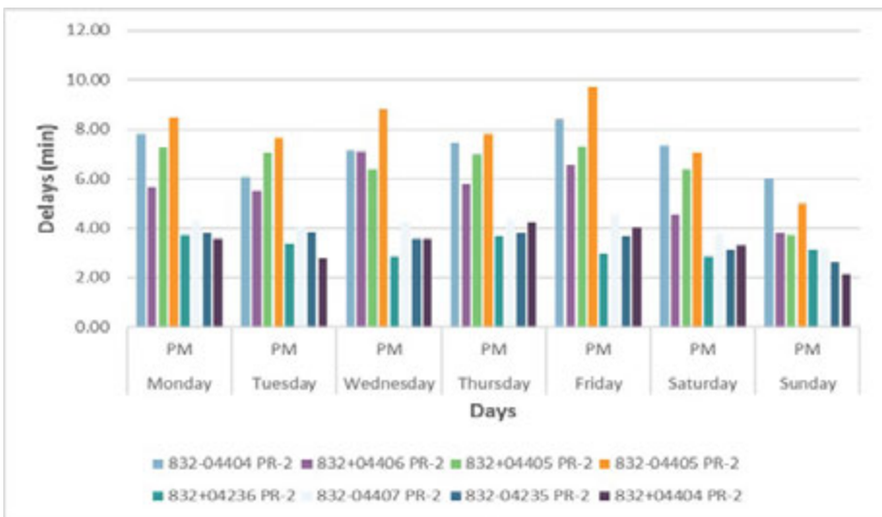
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.495: March 2017, TMC, Southwest Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.496: April 2017, TMC, Southwest Region (PM)

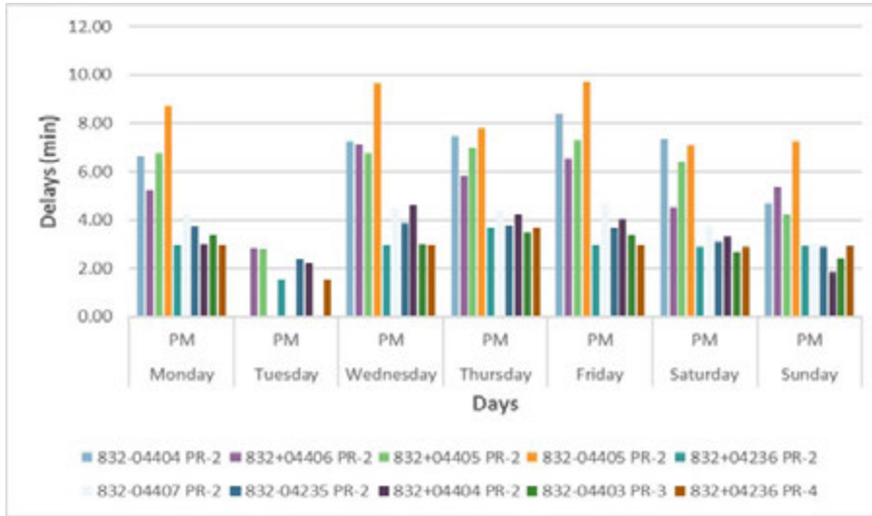


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

From May to August 2017, average delay for segments was 3.7 minutes. The segment with highest delays was 832-04405 in PR-2 with an average delay ranging between 7.0-10.0 minutes.

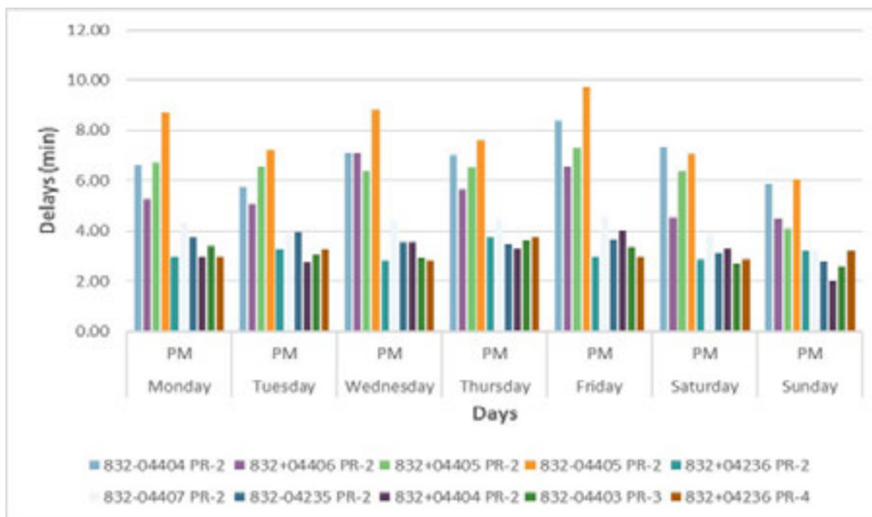
Other segments with delays above average were 832-04404 in PR-2, 832+04405 in PR-2, and 832+04406 in PR-2 with average delays ranging from 3.0-8.0 minutes (Figure K.497 to Figure K.500).

Figure K.497: May 2017, TMC, Southwest Region, (PM)



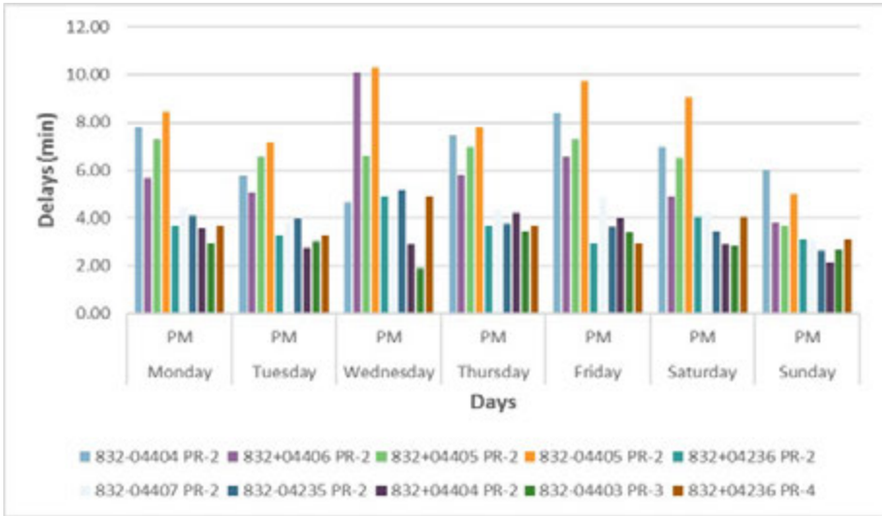
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.498: June 2017, TMC, Southwest Region, (PM)



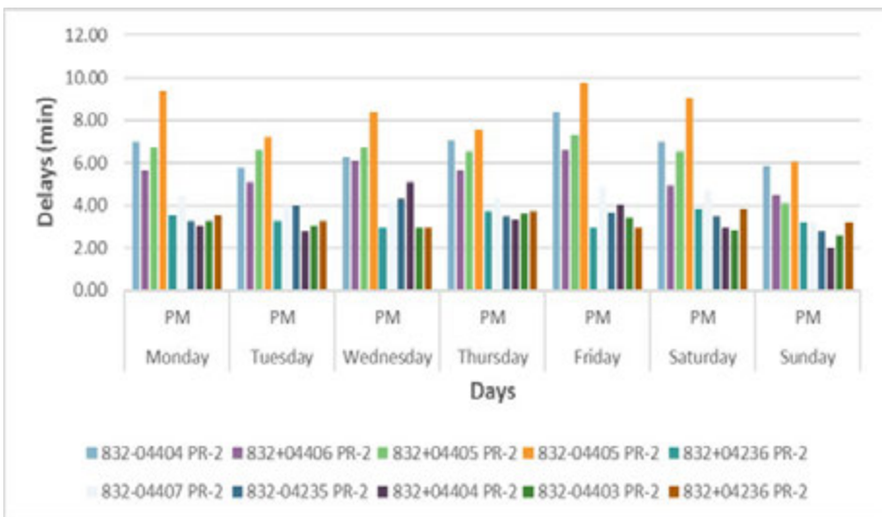
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K. 499: July 2017, TMC, Southwest Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.500: August 2017, TMC, Southwest Region, (PM)

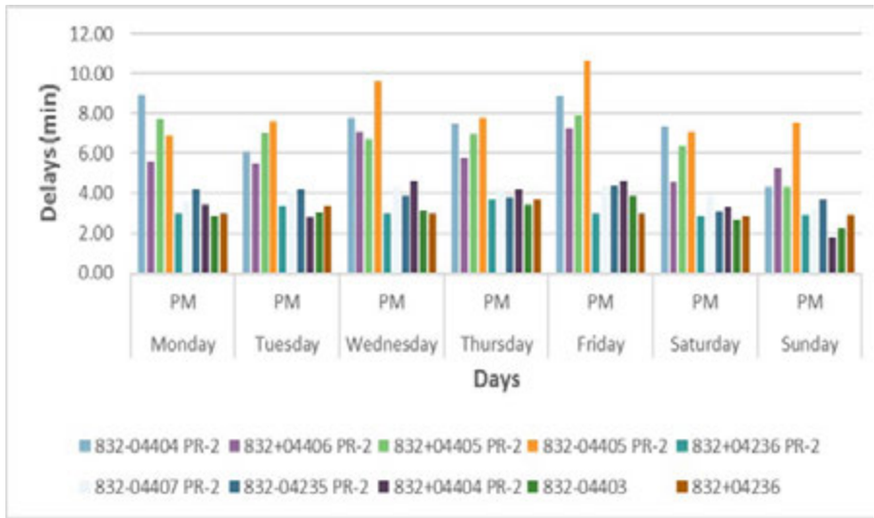


Source: SDG, using National Performance Management Research Data Set (NPMRDS).

For the first four months between January and April 2018, the average delay throughout the week was of 4.0 minutes. The segment with highest delays was 832.04405 in PR-2 with an average delay ranging between 7.0-10.0 minutes.

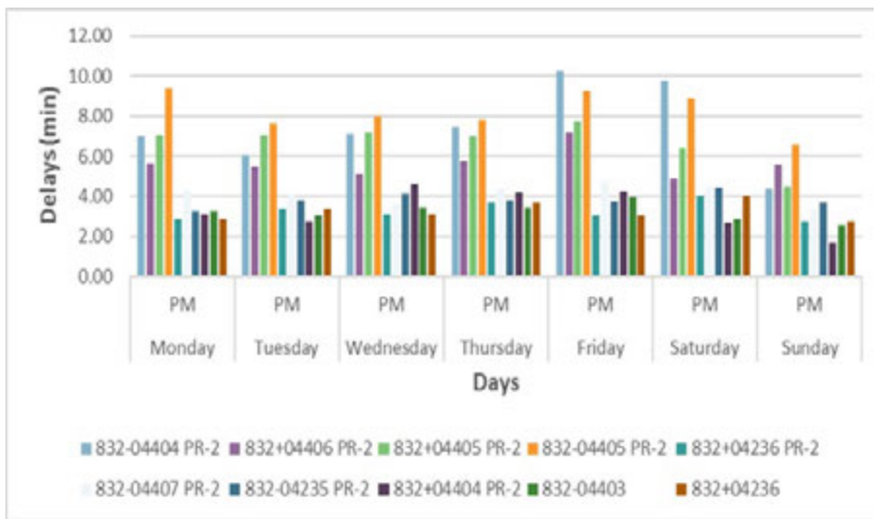
Other segments with delays above average were 832-04404 in PR-2, 832+04405 in PR-2, and 832+04406 in PR 2 with average delays ranging from 4.0-10.0 minutes (Figure K.501 to Figure K.504).

Figure K.501: January 2018, TMC, Southwest Region, (PM)



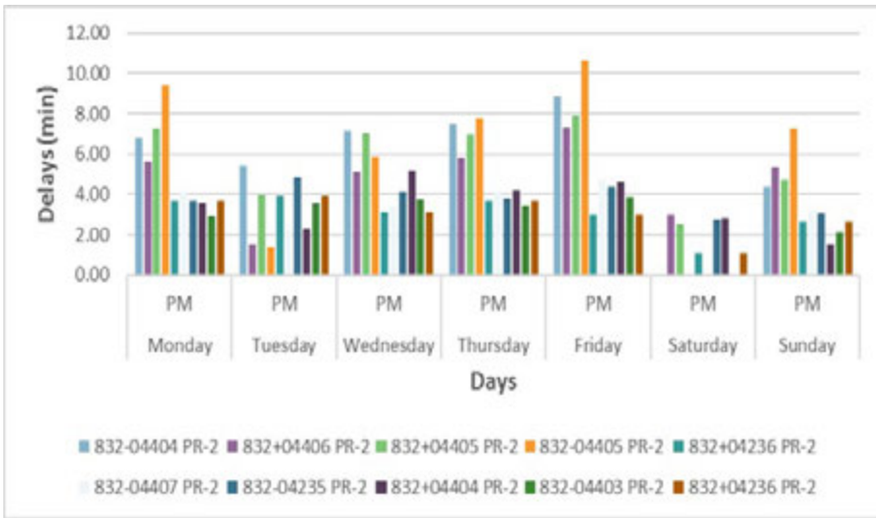
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.502: February 2018, TMC, Southwest Region, (PM)



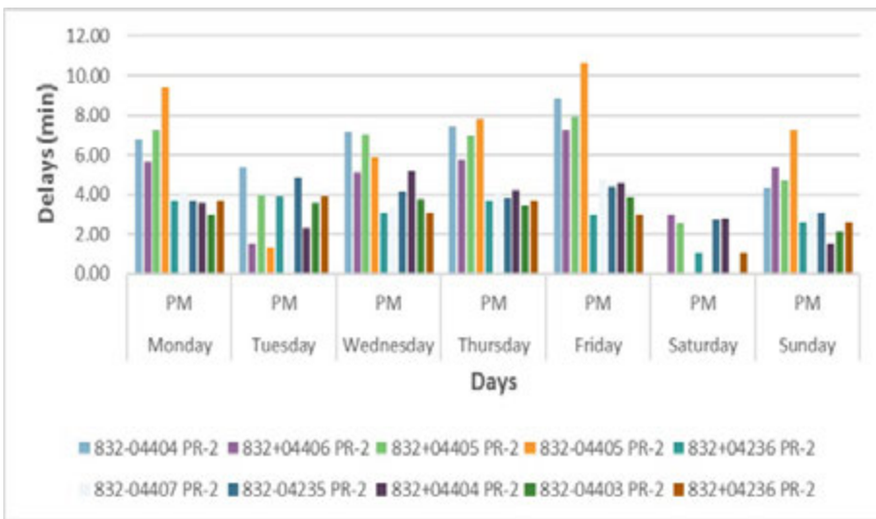
Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.503: March 2018, TMC, Southwest Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Figure K.504: April 2018, TMC, Southwest Region, (PM)



Source: SDG, using National Performance Management Research Data Set (NPMRDS).

Results for Southwest Region bottlenecks

For the Southwest region, all TMC segments studied were located along PR-3, PR-4, and PR-2. The top 10 TMC segments with the worst delays were located along PR-2 and had values ranging between 1.0-5.5 minutes on average per segment per month. The periods of the day had the following average delays: past mid-day period with 3.7 minutes, mid-day period with 3.2 minutes, night-period with 2.3 minutes, and morning period with 1.9 minutes.

- For the morning period, segments with delays above average, ranging between 2.2-2.9 minutes were: 832-04405 southbound around Estadio Isidro García; 832-04404 around Mayaguez Mall, 832+04236, 832-04235 both located in section between Sabana Grande and Guánica.
- For the mid-day period, segments with delays above average, ranging between 3.4-5.0 minutes were: 832+04406, 832+04405, 832-04405, 832-04404 in sections between Mayaguez Pueblo and Mayaguez Mall.
- For the past-midday period, segments with delays above average, ranging between 4.5-5.4 minutes were: 832-04404, 832+04406, 832+04405, 832-04405 same as mid-day period.
- For the night period, segments with delays above average, ranging between 2.8-3.6 minutes were: 832+04405, 832-4404, 832+04406, 832-04405, in same locations mentioned for mid-day and past mid-day period.

Thus, overall, segments with highest recurrence of delays throughout periods of the day were 832-04405, 832-04404, 832+04405, and 832+04406, located in PR-2 sections in Mayaguez between Mayaguez Pueblo and Mayaguez Mall.

L APPENDIX L PUERTO RICO HOUSEHOLD TRAVEL SURVEY

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Appendices

1 CHAPTER 1 HOUSEHOLD TRAVEL SURVEY PLAN

This section describes the sampling method to be used in the data collection process for Household Travel/Activity Surveys for the 2045 Puerto Rico Multimodal Long Range Transportation Plan (2045 LRTP).

INTRODUCTION

The Puerto Rico Household Travel Survey (PRHTS) is an exercise in which citizens are asked to provide information about their households, their members, available vehicles and information on their typical journeys. Once validated, the information is anonymized. The On-Line Travel Survey Manual: A Dynamic Document for Transportation Professionals and the Technical Appendix to NCHRP Report 571: Standardized Procedures for Personal Travel Surveys were followed to prepare and undertake these surveys complying with the Federal requirements.

The objective of the survey is to collect information that characterized urban mobility patterns in Puerto Rico to provide basic inputs to update the existing LRTP model toward creating the 2045 LRTP, for residents of:

- The Transportation Management Area TMA: San Juan TMA and Aguadilla TMA;
- Urbanized Areas with Population of less than 200,000 (UZAs); and
- Non-Urbanized Areas: (UZAs).

The PRHTS design is expected to be completed and approved by the Strategic Planning Office (SPO) of the PRHTA.

The survey was tested between January 10-19, 2018 and survey execution was completed between January 31 and June 8, 2018.

The PRHTS are being promoted by the Puerto Rico Highways and Transportation Authority (PRHTA), the development was carried out by SDG with the support of their sub-consultant Infocus@business (Infocus).

2017 Context

The plan update kicked off in in August 2017. Hurricane María struck and affected Puerto Rico on September 20, 2017. This powerful Category 4 hurricane with 150 mph winds bisected the entire Island having catastrophic effects. This event had a direct effect on this Plan including:

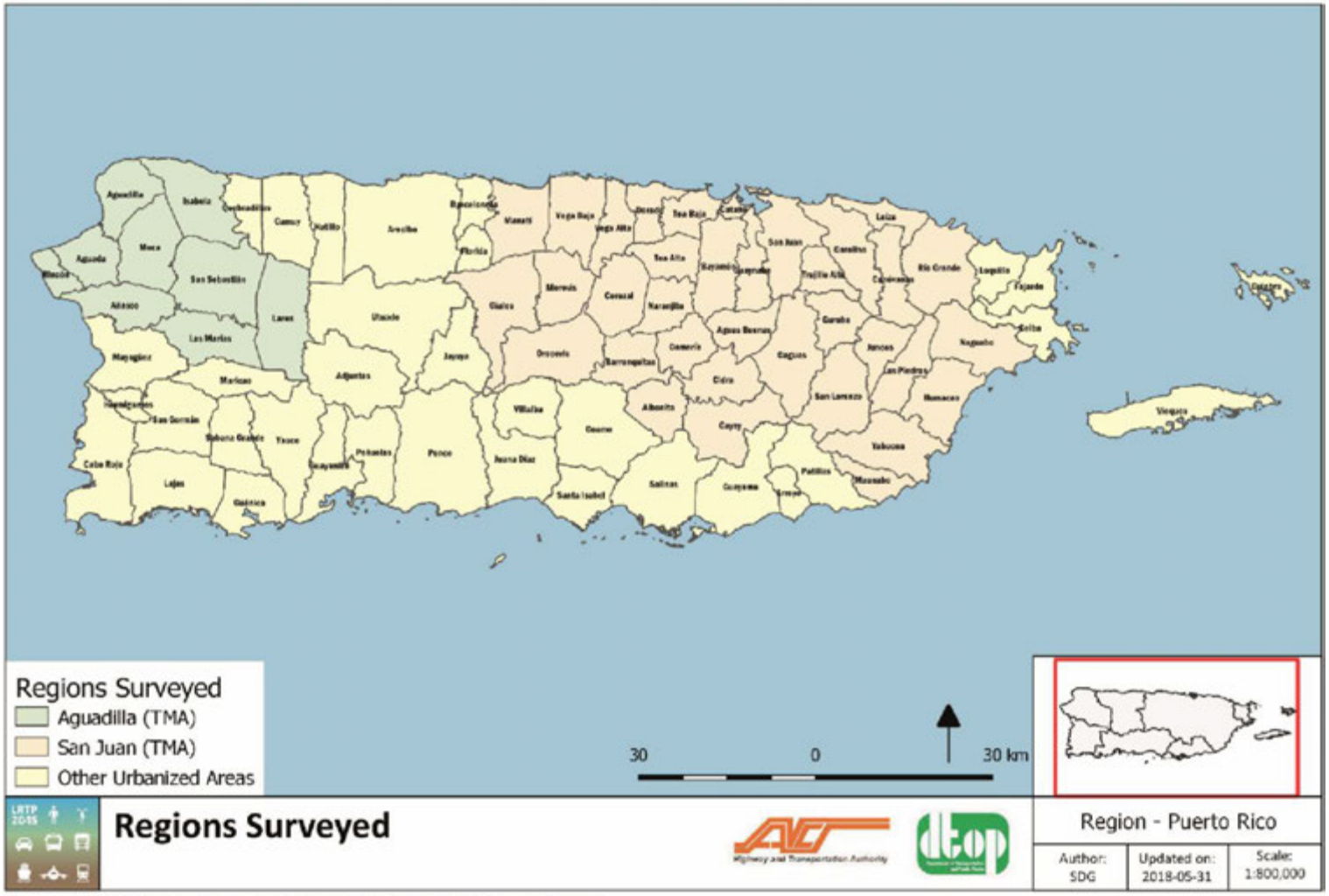
- Major source of data related impacts of major climatic event on everyday life and mobility:
  - Household surveys and public involvement was tailored to gather this data;
  - A resiliency analysis was completed based on evidence.
- The data collection process was not possible considering that mobility patterns were affected by the climatic effect as the infrastructure was affected for over 8 months after the hurricane:
  - As a result, calibration of the model was made using 2016 year;

Since the timeline for the household surveys and the fact that travel patterns will require a long period of time to go back to normality (people living with relatives and many road accesses been compromised); the PRHTS was conducted to codify this extreme event effects on mobility but not to feed into the modelling process as this was based on pre-hurricane conditions (2016) to be relevant to planning future mobility requirements.

SURVEY AREA DEFINITION

The survey area included the 78 Municipalities of Puerto Rico which were classified in three main regions: San Juan TMA, Aguadilla TMA and Other Urbanized Areas (Figure 1.1).

Figure 1.1: PRHTS Study Area

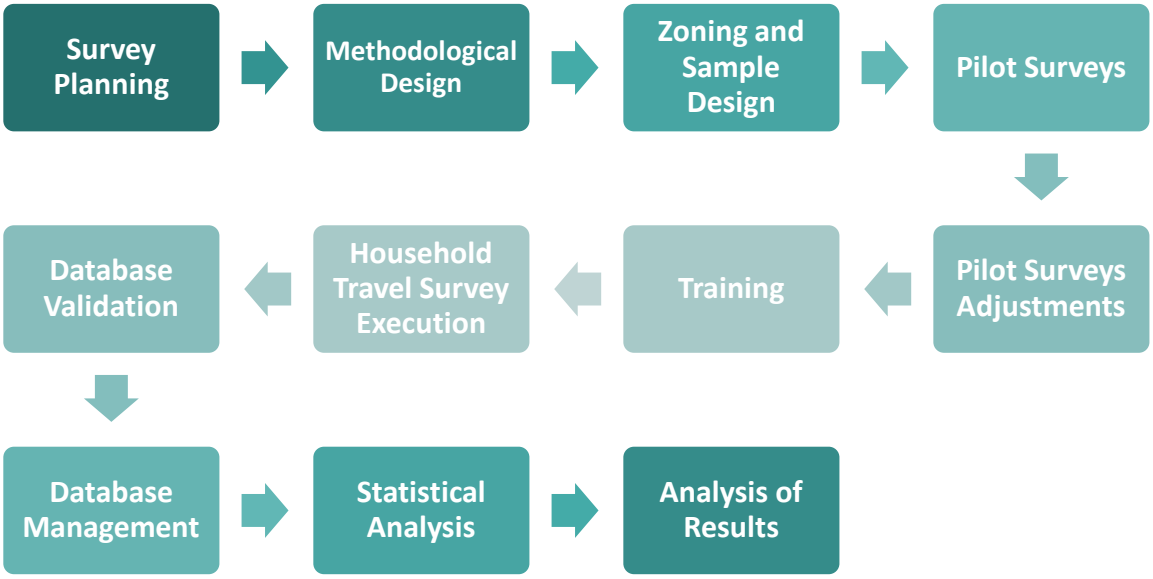


Source: SDG based on FHWA regional subdivision for PR

PRHTS METHODOLOGY

The PRHTS embrace the following components that were developed sequentially (Figure 1.2):

Figure 1.2: Study Elements



Source: SDG

Survey Planning

In this stage, the dates, equipment, size of the survey and other elements necessary to carry out the exercise were reviewed. The activities performed included:

Work Plan Preparation, Methodology and Timeline

Schedules for pilot and survey execution were outlined to clearly define a timeframe for each activity. Literature review about Federal requirements for PRHTS were also performed, as well as, the work plan and methodology to achieve the goals of this study.

Request, Search and Review of Base Information

A compilation of the geographic, statistical and demographic information necessary to perform the calculation of the sample, and zoning of statistical units were made.

Sample Estimation Parameters According to Project Contract

The project contract defined a sample of 2,700 households for this study. Therefore, this number was used as a starting point to establish sample size estimates based on household size and vehicle availability. Having in mind this number allowed to budget time, personnel and resources required for the execution of information gathering activities in the field.

Methodological Design

In this phase it was defined the technical and logistic data collection procedures and also the instrument design to gather the information, the detailed activities are explained below.

Survey Instrument Design

Preliminary paper forms were defined, which contained the following modules:

- Module A: Households;
- Module B: Household's members;
- Module C: Vehicle Availability; and
- Module D: Travel information per Person.

SDG's Data Collection and Analysis Teams oversaw the conceptualization and design of the survey instrument. The revision of survey structure and questions required a revision process from SDG's technical teams: Data Collection and Analysis, CUBE Modelling and Multi-Modal Modelling. The version presented in this report contemplated this revision process.

Once the surveys have been completed, the database was processed to obtain statistical results that allow the characterization of urban mobility.

The preliminary forms were sent to PRHTA, and with the comments received, the final instrument was designed as an online survey used during the pilot and survey execution (See Appendix A).

This survey included all people who belong to households randomly selected in the study area. There are some important definitions that need to be clarify prior to detail the survey execution process.

- **Household:** According to US Census – "A household consists of all the people who occupy a housing unit. A house, an apartment or other group of rooms, or a single room, is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters; that is, when the occupants do not live with any other persons in the structure and there is direct access from the outside or through a common hall".

  "A household includes the related family members and all the unrelated people, if any, such as lodgers, foster children, wards, or employees who share the housing unit. A person living alone in a housing unit, or a group of unrelated people sharing a housing unit such as partners or roomers, is also counted as a household. The count of households excludes group quarters. There are two major categories of households, "family" and "nonfamily" (See definitions of Family household and Nonfamily household)"[1].

- **Travel Related Definitions:**

[1] Definition retrieved from: https://www.census.gov/programs-surveys/cps/technical-documentation/subject-definitions.html#household.

- **Travel:** It is a trip/displacement made by a person with a specific reason and a duration of more than 3 minutes, or a trip/displacement for work or study of any duration;
- **Travel Stages:** The stages of a trip correspond to different modes of transportation other than walk used, until reaching the final destination;
- **Travel Origin:** It corresponds to the place where the person was, from which he/she left to start the trip; and
- **Travel Destination**: Corresponds to the place where the person is traveling to. The location must match the trip purpose.

Communication and Implementation Methodologies Design

A communications plan was design where the communication strategies to be used were always shared to PRHTA.

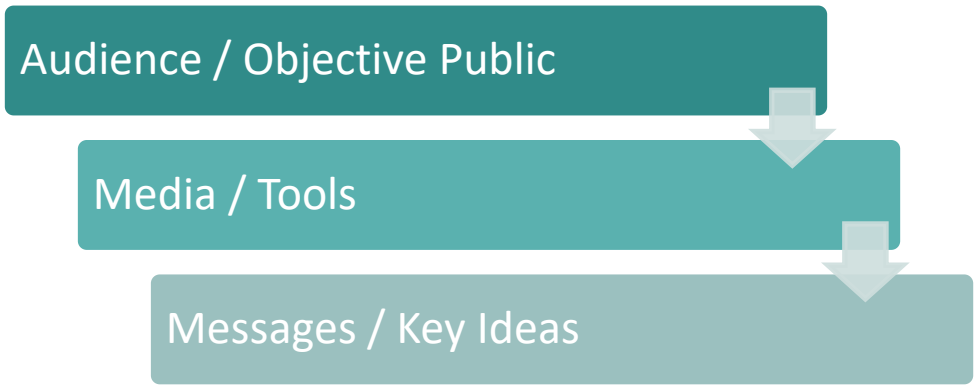
The promotion of the PRHTS contemplated the design and implementation of mass communication activities. The main objective was to present the Household Travel Survey as an instance of participation for the citizens benefit, in which people contribute to Puerto Rico development through their responses. The communication strategies sought that the respondent understood that this survey would improve their quality of life in the future, given that the information provided would allow the authorities to make effective decisions regarding the mobility system.

In order to contribute to achieving the objectives of PRHTS, the following communication goals were pursued:

- Support the interviewers' work in the field;
- Disseminate the survey, both at a massive level and focused;
- Make the survey a recognized process;
- Create a sense of belonging in the population for municipal projects;
- Project responsibility and seriousness of the process; and
- Position the PRHTS as a necessary process that leads to long-term results.

Based on these communication objectives, a series of strategies were needed that consider the definition of a media plan, public relations, promotion and online activities. Each of the communication strategies were defined based on the following parameters (Figure 1.3):

Figure 1.3: Parameters to be Considered in the Communication Strategy



Source: SDG

Communication Strategy 1: Mass and Traditional Media

Audiences or Target Public

Target audiences for this strategy were Citizens in general. At the beginning of the study, the screening questions were used for all strata of the PRHTS design variables (Household Size and Vehicle Availability). Therefore, households that meet these requirements for the Puerto Rico sampling were interviewed.

Media and Diffusion Tools

This study used the following media and diffusion tools:

- **Advance Letter**: An effective way for citizens to support the study was to present at the time of conducting the survey, an official letter from the PRHTA, with which it was possible to verify the authenticity of the study, establish interviewing firm and request the citizenship support to conduct the surveys (Appendix B);
- **Telephone Helpline**: Telephone service to users was another way in which citizens could obtain information about the PRHTS. They could resolve doubts, make suggestions, verify the interviewers' identity and confirm the veracity of the study. This was done through "telephone agents" or "call center agents" who were properly trained to provide users with the information they need about the study; to receive requests, complaints and claims and to answer questions. This telephone line operated from Infocus office.
- **Flyers**: They reinforce the important messages of the study. A two pages flyer was design with information about the PRHTS and the steps to be followed by the public to participate (Appendix C). The flyers were delivered to government agencies. In addition, it is important to mention that flyers were also disseminated through Facebook.
- **Communities or Social Networks**: A LRTP Facebook group was created to keep community inform about the plan activities including information of how to participate in PRHTS.

Communication Strategy 2: Approach with Communities and Targeted Actions

Audiences or Target Public

Target audiences for this strategy were citizens which households' combinations of 0 to 2 vehicles available with 1 to 4+ household size. During the last 6 weeks of the survey execution, efforts were focused to these particular population segments through intercept surveys. That approach was taken because of the difficulty to find households with these specific characteristics in some municipalities of Puerto Rico.

Media and Diffusion Tools

- **Direct Communication**: The direct contact with local leaders became a key tool for the good performance of information gathering. The active participation of PRHTA was vital, in order to facilitate the diffusion of the events through the respective communal authorities. The main focused actions carried out for this strategy were:
    - Involve local leaders: The purpose of this was to inform the community about the plan, survey purpose and request their collaboration to encourage their participation;
    - Social leaders' accompaniment: The purpose was to inform the main objectives and mechanisms of action of the survey process, request collaboration and encourage the active participation of the community in the study.

  In addition, with the purpose of communicating the mobility survey to public servants of local agencies, informative presentations were given to LRTP committees: Advisory, Project Management and Technical.

- **Liaison with Community Leaders:** A communication bridge was established in order to achieved contact with local, community action and neighborhood leaders of several locations in Puerto Rico. These interactions enriched the PRHTS process.

Zoning and Sample Design

Using the US Census 2011-2015 American Community Survey 5-Year Estimates, recruitment maps were developed showing the design variables by municipalities and the zip codes in order to focus the calls in the target strata by municipality and region (Appendix D).

Design and Sample Selection

The sampling frame comprised all residential households of the MPO Regions selected randomly through telephone and zip code-based sampling.

The sample size design contemplated the necessary surveys that cover 20 strata of the design variables: Household Size and Vehicle Availability. This design complies with 95% confidence level and 2.86% of relative precision for the variable Household Size; and 95% confidence level and 4.39% of relative precision for the variable Vehicle Availability at island level (See Chapter 2).

Pilot Surveys

Pilot surveys aimed to validate the proposed field methodologies and the instrument designed for data collection, in order to detect shortcomings and make the adjustments prior to survey execution, this stage includes the following tasks:

- Sample design determination for the pilot; and
- Training of the first team of interviewers.

Pilot survey exercise considered data collection of 30 surveys for several strata. At the end of the survey, there were identified the strengths and key points of field operation improvement, which were fine-tuned for the survey execution (See Chapter 3).

Pilot Survey Adjustments

After the pilot surveys, the corresponding adjustments were made to procedures of data collection, logistics and support tools (See Chapter 3).

Training

The training of interviewers began prior to field work and was done continuously until completing the field equipment required for the study.

Two meetings were hold with Infocus (SDG Sub-contracted surveyor) to coordinate the data gathering process. Trainings in the use of survey instrument were given to interviewers from January 9th – 12th, 2018. Training sessions presented the interviewers with information on different topics such as:

- Survey objectives and purpose;
- Survey dates;
- Procedures to contact potential respondents;
- Behavior and approach to the community;
- Screening questions;
- Type of questions;
- Responses confidentiality;
- Detailed survey method explanation;
- Incentives;
- Complete household and travel related definitions;
- Field work;
- Coordinators', supervisors' and interviewers' norms, duties and responsibilities;
- Communication Protocol;
- Form' structure and filling out process;
- Detailed explanation of survey instrument: Questions in Modules A, B, C, D;
- Use of the Design Variables and Zip Codes Maps;
- Procedures to ask question in a non-bias way;
- Procedures for using computer-assisted questionnaires, in this case: Computer Assisted Personal Interviewing (CAPI);
- Practical exercises to solve doubts before going out to the field;
- Procedures to deal with:
    - Routinely situations: those that generate information continuously as a result of the survey development, but they are not anomalous;
    - Situations that require action or orientation in a daily basis: i.e. appointment novelties, data gathering difficulties, data transmission problems;
    - Situations that require immediate action: those were immediate reporting and actions are needed because they could threat the work continuity and could imply partial or total suspension of the pilot exercise. In this category are some situations such as loss of work

material, technical difficulties with the devices, situations that undermine the integrity of the survey team, methodological changes to be implemented in the field and inconsistencies in the formulation of the survey instrument by atypical situations not contemplated in the design phase.

- In the case of supervisors, an additional session was held to explain the validation of their corresponding surveys and review protocols.

Household Travel Survey Execution

This is the period in which the interviewers will call the households in the study. During the field operation the following activities were performed:

Preparation and Recruitment Maps Delivery

Recruitment Maps (Appendix E) were distributed to survey supervisors to focus calls in areas previously defined.

Recruitment

One of the main consideration in the PRHTS sampling design is the representativeness and randomness of the sample. For that reason, a list with telephone numbers, zip codes and municipalities for Puerto Rico were bought from Cell Phone List (CPL) Database. From this database the households were randomly selected to contact them telephonically.

For this study, two types of household initial contact detail were applied:

- Cold call: in this case the household was called and asked to the respondent to participate in the survey. The household had not prior knowledge of the survey;
- Intercept: Individuals were approach at malls and “open houses” carried out for the planning events of the LRTP, and asked them if their household could be available to participate in the PRHTS. Although this is not the recruitment and retrieval suggested approach for this type of study according to Travel Survey Manual, these drastically measures were approved by PRHTA, as a result of time constraints and difficulties in the recruitment and retrieval process after hurricanes Irma and Maria stroke the island.

Recruitment maps were included in the training and were given to Infocus’ supervisors (Appendix D).

Each interviewer received from his supervisor, all necessary material to perform the information gathering process. This included the tablet/laptop, the selected sample frame, recruitment maps and the trip diary. The call schedule per municipality that was previously defined was adjusted daily; the supervisor distributed the households to be called by the survey interviewing team and that were contacted during the scheduled day.

A recruitment interview script was provided in Spanish and English to Infocus. Interviewing team followed it in order to approach and recruit the household for the survey. Scripts and advance letters are included in Appendix E and B respectively. Based on these documents, all survey interviewers provided to respondents the following information during the interview:

- Interviewer’s name;

- Organizations' Name involved in the survey execution: Infocus and the PRHTA;
- Survey purpose; and
- Confidentiality in the information management.

Information Gathering

The interviewers called households and inquired about household information, people, vehicles and trips made.

The first call in the process was VERY IMPORTANT for what is called the "household sowing". It was named like this because it is very possible that in this first call the interviewer would not be able to contact at least the 50% of household members to survey them about the trips made in a typical day (Monday to Friday) and consequently the interviewer needs to contact him/her by phone. From the interviewer kindness and clearness to communicate the importance of this survey to the household, not only depends that the respondent answers modules A, B, C and D; but also, the effectiveness that the household member who has already responded to the survey, transmits to those who have not responded Module D, the relevance of responding and providing the required information, as well as providing the interviewer with relevant information of the absent members.

Once the interviewers contacted the main informant, they identified themselves and they followed the procedure delineated in the recruitment interview script which indicated the study objectives and need for collaboration of household members. Once the respondent listened carefully through this procedure then the interview process began with the instrument application.

On this first call, a dialogue with the head of the household was requested, if this person was not present, the interviewer proceeded contact with the spouse/partner; if this person was also not present or does not apply because the head of the household does not have a spouse/partner, interviewer asked to contact a person of legal age who permanently resides in the household and who has some degree of consanguinity or affinity with the head of the household (kinship by legal link, e.g. brother-in-law, father-in-law, son-in-law, daughter-in-law); this person was be considered the principal or ideal informant of the household. For example, in households where a friend of the family that permanently resides, as he/she has no link or affinity with the head of the household, he/she cannot become the main informant to provide information in modules A, B and C.

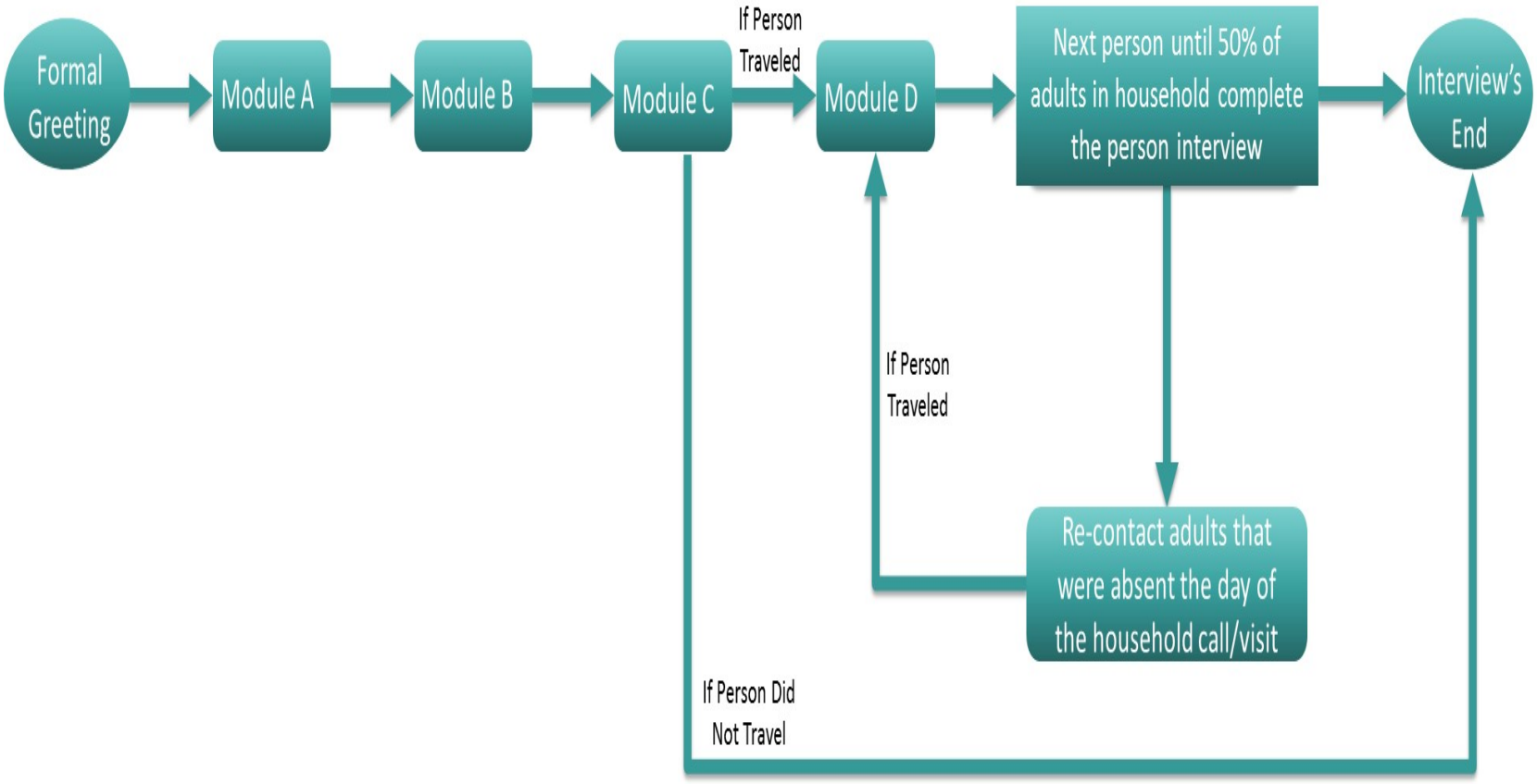
Figure 1.4, illustrates the process of collecting information on households using during the survey pilots and execution. Survey pilot/execution started with the formal greeting to the main informant included in module A. The interviewer applied modules A, B and C to this informant who answers the general household information. Once module C was completed and considering whether this informant reported that have traveled in a typical day, then Module D was applied; otherwise the survey ended.

After completing the survey with the main informant, the interviewer continued with the next member of the household present at the time of the call, until at least 50% of adults in household completed the interview. Household members other than the main informant only responded module D (in case they have traveled in a typical day). For absent adults of the household at the time of the call/interception, a re-call appointment was made to report their trips in Module D.

The survey remained as incomplete then the re-contacting process began and ended when at least 50% of adults' household members had been interviewed.

Appointments confirmation were very important in order to guarantee that household members were at the household at the time of the survey and trying to avoid re-contact procedures by telephone or intercept surveys.

Figure 1.4: PRHTS Process Flow



Source: SDG

Re-contact a Household

To call/intercept a household for the second time, the interviewer took the corresponding record in the checklist of re-calls and proceeded to contact each one of the people who were still waiting to be surveyed. When the interviewer came to complete the household re-call, this was done by the same interviewer who initially "sowed" the survey and who agreed with the household on the date and time of this call.

Survey Closing

In case it was not possible to complete the information of at least 50% of household members, the survey remained in an incomplete state and it was considered not useful until it was completed. Therefore, it was extremely important the appointments coordination made by the interviewer with the household which adult members have not responded to the survey.

If after a maximum of 3 working days, the interviewer was not able to re-contact some of the household members to complete the at least 50% of adult interviewed per household, and consequently, not gathered the information corresponding to module D, the survey process for this household was closed. Therefore, other household were drawn from the sampling frame to replace this one and began the survey interview process again.

Proxy

To complete the forms for Modules A to C, the information may be provided by the head of household or a contact person who was called the "main informant". To process the Travel Module D, the information must be provided only by the adults in the house directly, except in cases where it is not possible. For the later cases, the activities or travel information were reported by someone other than the person as proxy reporting. Based on the federal guidelines these are the PRHTS for proxy reporting standards:

1. "For persons aged 14 and under, require parental or other adult proxy reporting;
2. For persons aged 15 to 17, permit proxy reporting unless the individual is available to report their activities directly with parental permission; and
3. All persons aged 18 or older should be asked directly for their activities or travel".

"Among adult survey participants, there are other instances in which a proxy report might be appropriate, including when the individual is ill or physically or mentally unable to complete the survey. However, determination of these conditions requires the addition of at least two questions to the survey: one asking about long-term disabilities; and the other asking about short-term reasons for not responding directly"[2].

[2] NCHRP Web-Only Document 43: Technical Appendix to NCHRP Report 571: Standardized Procedures for Personal Travel Surveys. 5.2 D-3 Proxy Reporting. Pages: 74-75. National Cooperative Highway Research Program. Transportation Research Board of the National Academies.

For the PRHTS all the interviews were performed to people aged 18 or older, based in the principle that every minor Puerto Rico travels with their parents.

To comply with the requirement of additional questions to determine long term disabilities or short-term reasons for not responding; Module (B) included the following question:

Due to a medical condition, do any members of your household have difficulty using any of the following modes of transportation? If so, please specify which.

- No difficulty using any mode of transportation;
- Automobile;
- Motorcycle;
- Bus;
- Public Car/"Pisa y Corre";
- Trolley;
- Taxi/Uber/Lyft;
- Tren Urbano;
- Ferry;
- Boats ("Cataño");
- Bicycle; and
- All modes of transportation.

Supervisor Validation

Throughout the process, the supervisor guaranteed meeting of survey quotas, the correct allocation of group interviewers calls and the correct application of the instrument. In case of finding inconsistencies or anomalies, the interviewer notified the field coordinator and took the corresponding measures.

Quality Control

Infocus field coordinator made verification calls to 10% of an interviewer's calls to verify the information provided every week and a half during the survey execution.

Sample Advance Control

Using the web database, a weekly progress control report of the field work was performed in order to track the survey quotas' achievement and to assure the requirement that at least 50% of adults in household completed the interview including trip diaries.
Validated surveys were used to consolidate a weekly progress report of the field operation.

Database Validation

Database information was validated to ensure that it complies with the quality parameters established, and maximizes the consistency of the information encoding.

Database Management

The flat database obtained as part of the online data gathering process was a transformed in a relational database transferred to an MS Access file.

Sample Universe Establishment

In this stage the survey sample and response rates were evaluated in relation to census population estimates and demographic distributions. Sampling error was calculated and the survey was re-stratified as necessary, collapsing certain strata in order to assure reasonable levels of error and confidence in estimates.

Imputation of Non-Response Items

At this stage, a travel profile was assigned to those people who did not respond to the travel module (Module D) due to the impossibility of re-contact, inability or refusal to answer this section.

Sample Weighting and Expansion

Survey weights were developed to ensure a representative sample. The weights relate survey sample to the census population ensuring household and population figures match at appropriate strata both at regional and Puerto Rico level.

Standard Errors Calculation

Sample standard errors were obtained to guarantee the quality of the information.

Analysis of Results

The final survey database was analyzed to provide descriptive statistics and present key insights. Specifically, tabulations and summary statistics of demographic characteristics of surveyed households are presented to describe the sample. Trip patterns were analyzed to provide trip rate tables as well as summaries of trip characteristics such as mode use. Other useful specific information, such as vehicle ownership and the effects of Hurricane Maria are presented as well.

PRINTED VS. ONLINE SURVEY INSTRUMENT

The original design of the survey was initially conceived as a printed instrument. Some changes were made from the original survey design presented to the PRHTA in a Technical Note 1 from October 2017.

- The question, what is your occupation? from the original design, was removed from the online survey: The reason was that by including it, the sample would be limiting and excluding this part of the population (personnel with driver's occupations) from the group. To address this issue, the survey was programmed in such way that when a person answers the question about the work status and selects Driver/Messenger, at that moment the system made that in the trip module (Module D) appeared a sentence, indicating that exclude their work trips and include their personal trips in the report. In this way, households with driver occupations were attended and excluded from the analysis about the trips they did for work, including only the personal ones.

- Due to the situations generated as a result of hurricanes Maria/Irma, many people left their main households and are temporarily or permanently living with relatives. If a household with this situation was contacted, several considerations were took into account:
    - Identify those “special” households (in case they induce noise to the information), therefore a question was added.
    - Considering the definition of household provided by the US Census (previously defined):

      Since the members of the household (relatives and all unrelated persons) share the housing unit, they should be considered as a single household. This has a number of implications, such as that household sizes can be much higher than expected.

      Consequently, it was established to manage the data for the entire household since it meets the conditions of the definition of the US Census, but adding questions that allow us to identify if in that dwelling the household is the same size as before the hurricanes or if it corresponds to households with new members.

- To address these special cases for households, the following plan was defined:
    - Identify them clearly, their old (before hurricanes) structure;
    - If people answered that they stayed temporary, there were consider only the first inhabitants of the dwelling as a household. The temporary members of the household would represent patterns of atypical trips that, as soon as the situation normalizes, they would return to their main households;
    - If people answered that they stayed permanent, consider it as a single household, having clear who the new members were. This because according to the official definition of "Household", only includes dwelling in this case. The important matter was to identify these atypical patterns
    - It was important to define the criteria of "temporality". In this case the question included the explanation that a temporal member would return to his/her household once conditions allow. For example, when electricity or water service had been restored.

- The question, Does _____ has any of the following medical conditions? If ___ has more than two then list only the two most severe, was removed from the online survey. After an internal meeting, the team agree that specifying a particular medical condition is sensitive information protected by law and decided not to be included.

2 CHAPTER 2 SAMPLING FRAME AND SAMPLE SIZE

The sampling frame comprise all residential households of the MPO Regions to be selected randomly through telephone and zip code-based sampling.

According to the Travel Survey Manual [3], PRHTS Telephone surveys limit contact only in households with land-line telephones. Additionally, in recent years there has been an increased prevalence in cellular telephone use. Many households have chosen to not have a land-line telephone but prefer using their cellular as their primary source of telephone communication. As cellular telephone numbers are not as yet widely available in public directories, this trend raises additional questions about the validity of phone surveys and the potential for leaving out segments of the population.

The data collection technique selected for the household travel survey was The Single-Contact Telephone Survey. Then, the pilot and the final survey recruitment and retrieval were made through Computer-Assisted Telephone Interviewing (CATI) procedures and as part of the survey programming it was included various checks. In order to prevent bias that could result from the call process, all telephone surveys were conducted from a centralized location -Infocus Office- with supervisors and a field coordinator. Day to day, supervisors observed interviewers in action, ensuring proper follow-up of procedures during the interview and correcting problems as they arose.

However, this pilot exercise began four months after Hurricane Irma and Maria events. Many attempts to communicate to land line telephones were made and it was difficult to establish a connection. Furthermore, since the usage of cell phone in Puerto Rico is very high (84 of each 100 inhabitants have cell phone)[4] the formal survey process included cellphone numbers to allow accessibility to a higher number of population; the screening on the calls confirmed the person been contacted can qualify as the head of the household. In addition, on the 9th week of the survey execution a drastically drop in survey quotas happened, due to the difficulty in recruitment and retrieval of specific combinations of strata and municipality. For that reason, the PRHTA

[3] The On-line Travel Survey Manual: A Dynamic Document for Transportation Professionals in its chapter 3.

[4] https://www.statista.com/statistics/510542/mobile-cellular-subscriptions-per-100-inhabitants-in-puerto-rico/.

approved the use of non-traditional methods for the recruitment and retrieval of households such as people search in malls and other locations where people with less access to telephones can be surveyed. Also, the "open house" events attendance list was used to contact and interview these households. In addition, in a workshop with municipalities representatives on April 4th, 2018, a flyer announcement (Appendix C) with the procedure to participate in the survey was provided.

The sample was organized in terms of the Puerto Rico MPO Regions. Stratified sampling method in the form of Demographic Stratification was used, segmenting the survey population in 20 strata and selecting a random sample of respondents within each stratum. The strata definition was based on two socioeconomic characteristics of the sampling unit: Household Size and Vehicle Availability. The information relating both variables were obtained from US Census 2011-2015 American Community Survey 5-Year Estimates.

The reason to choose this method rely on the following premise of the FHWA Travel Survey Manual:

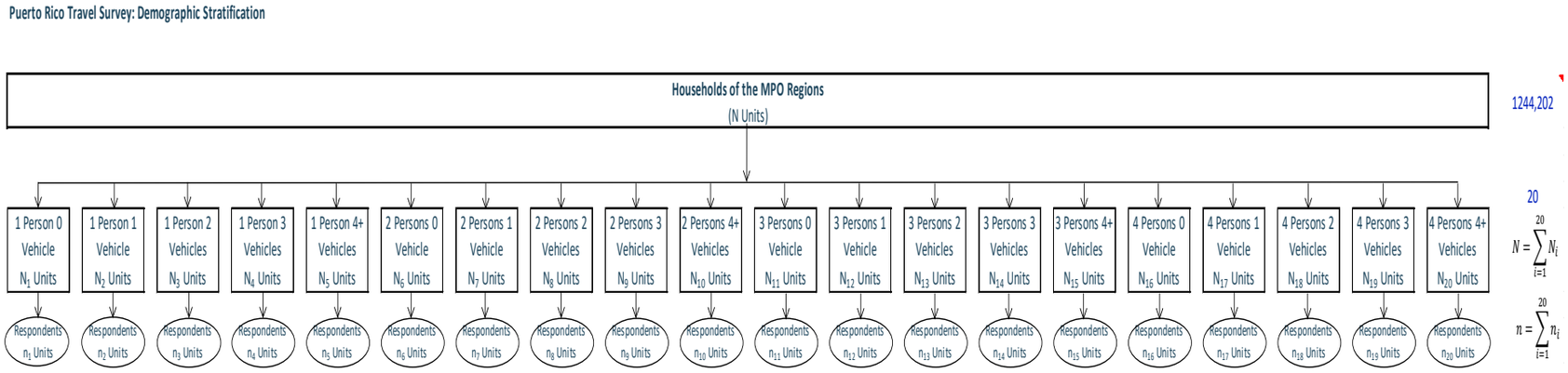
> "Demographic stratification has been used in many surveys where the primary purpose has been to gather information for trip generation models. Commonly, a two-way cross-classification based on the expected form of the trip generation models, such as household size by income or auto ownership, is used"[5].

Figure 2.1 shows a diagram of the sampling plan with its different strata. The specifications defined by PRHTA established obtaining completed surveys for a total of 2,700 households. For both household size and vehicle availability estimates using in the sampling design, the confidence level was 95%. The relative degree of precision for household size is 2.86% and 4.39% for vehicle availability at an island wide aggregation level.

In this first approach, a sample size of 2,565 surveys was defined leaving room for 135 surveys to cover over-sampling to support a deeper understanding of emerging travel demand in the Aguadilla TMA Region.

[5] FHWA, 1996 – 2011 Upgrade in process by the Transportation Research Board's Travel Survey Methods Committee (ABJ40).

Figure 2.1: Puerto Rico Travel Survey: Demographic Stratification



	317,614					387,435					249,852					289,301					1244,202
2015 U.S. Census:	114,830	180,812	19,052	2,322	598	55,670	182,430	130,388	15,786	3,161	24,628	95,252	91,962	32,233	5,777	21,389	83,695	116,822	46,461	20,934	1244,202
Proportional Stratified Random Sampling:	9.23%	14.53%	1.53%	0.19%	0.05%	4.47%	14.66%	10.48%	1.27%	0.25%	1.98%	7.66%	7.39%	2.59%	0.46%	1.72%	6.73%	9.39%	3.73%	1.68%	100%
Sample Size per Stratum:	249	392	41	5	1	121	396	283	34	7	53	207	200	70	13	46	182	254	101	45	2,700

Source: SDG

PUERTO RICO SOCIO-ECONOMIC PROFILE

Information from 2011-2015 American Community Survey was examined to obtain household size and vehicle availability patterns for the 1,244,202 households in Puerto Rico.

Table 2.1 exhibits the distribution of households for each Municipality in Puerto Rico.

Table 2.1: Distribution of Household Size by Municipality

Municipality	1-Person Household	2-Person Household	3-Person Household	4-or-more Person Household	Total Households	% of Households
Adjuntas	1,466	2,090	1,264	1,502	6,322	0.51%
Aguada	2,937	4,232	2,875	3,066	13,110	1.05%
Aguadilla	5,308	6,566	4,332	4,615	20,821	1.67%
Aguas Buenas	2,003	2,838	1,743	2,264	8,848	0.71%
Aibonito	2,030	2,780	1,803	2,095	8,708	0.70%
Añasco	2,229	2,903	2,041	2,399	9,572	0.77%
Arecibo	7,978	11,163	6,206	6,940	32,287	2.59%
Arroyo	1,622	1,710	1,391	1,558	6,281	0.50%
Barceloneta	1,960	2,504	1,698	2,153	8,315	0.67%
Barranquitas	1,847	3,069	1,781	2,622	9,319	0.75%
Bayamón	17,565	21,584	15,546	16,680	71,375	5.74%
Cabo Rojo	4,830	5,349	3,394	3,542	17,115	1.38%
Caguas	12,624	15,220	11,160	11,496	50,500	4.06%
Camuy	2,416	3,484	2,733	3,301	11,934	0.96%
Canóvanas	3,203	4,585	2,962	3,948	14,698	1.18%
Carolina	16,882	20,006	13,041	14,437	64,366	5.17%
Cataño	2,104	2,760	2,201	2,307	9,372	0.75%
Cayey	4,030	5,265	3,519	3,761	16,575	1.33%
Ceiba	1,223	1,350	1,026	985	4,584	0.37%
Ciales	1,379	1,851	1,122	1,547	5,899	0.47%
Cidra	2,500	4,380	3,160	3,865	13,905	1.12%
Coamo	3,036	4,267	2,792	3,553	13,648	1.10%
Comerío	1,594	2,056	1,235	1,607	6,492	0.52%
Corozal	2,032	3,719	1,845	3,443	11,039	0.89%
Culebra	170	198	72	78	518	0.04%
Dorado	2,394	3,869	2,396	3,673	12,332	0.99%
Fajardo	3,498	3,766	2,374	3,121	12,759	1.03%
Florida	797	1,376	912	1,279	4,364	0.35%
Guánica	1,319	1,775	1,065	1,286	5,445	0.44%
Guayama	4,201	4,476	3,138	3,364	15,179	1.22%
Guayanilla	1,340	2,206	1,295	1,779	6,620	0.53%
Guaynabo	9,634	11,200	6,751	7,378	34,963	2.81%
Gurabo	3,499	4,680	3,418	3,709	15,306	1.23%
Hatillo	3,268	4,546	3,224	3,299	14,337	1.15%
Hormigueros	1,766	2,205	1,176	1,271	6,418	0.52%
Humacao	4,338	6,265	3,611	4,349	18,563	1.49%
Isabela	3,757	4,952	3,050	3,544	15,303	1.23%

Municipality	1-Person Household	2-Person Household	3-Person Household	4-or-more Person Household	Total Households	% of Households
Jayuya	926	1,615	924	1,352	4,817	0.39%
Juana Díaz	3,366	4,864	3,591	4,798	16,619	1.34%
Juncos	2,904	3,816	3,105	3,159	12,984	1.04%
Lajas	2,233	2,629	1,785	1,770	8,417	0.68%
Lares	2,253	3,498	1,794	2,583	10,128	0.81%
Las Marías	723	1,074	634	713	3,144	0.25%
Las Piedras	2,553	4,131	2,801	3,399	12,884	1.04%
Loíza	2,121	2,434	1,966	2,486	9,007	0.72%
Luquillo	1,669	2,269	1,187	1,663	6,788	0.55%
Manatí	4,081	4,874	3,172	3,948	16,075	1.29%
Maricao	485	582	332	508	1,907	0.15%
Maunabo	883	1,323	703	1,177	4,086	0.33%
Mayagüez	9,714	9,878	5,552	5,287	30,431	2.45%
Moca	2,654	3,824	2,996	2,805	12,279	0.99%
Morovis	2,083	2,893	1,984	2,828	9,788	0.79%
Naguabo	2,234	2,668	1,655	2,240	8,797	0.71%
Naranjito	1,594	2,352	2,170	2,516	8,632	0.69%
Orocovis	1,426	2,445	1,266	1,720	6,857	0.55%
Patillas	1,843	2,019	1,171	1,403	6,436	0.52%
Peñuelas	1,467	2,045	1,403	2,728	7,643	0.61%
Ponce	15,309	16,017	11,486	12,685	55,497	4.46%
Quebradillas	1,762	3,061	2,056	2,164	9,043	0.73%
Rincón	1,512	1,763	820	1,342	5,437	0.44%
Río Grande	3,637	5,261	3,831	4,102	16,831	1.35%
Sabana Grande	2,037	2,595	1,152	1,291	7,075	0.57%
Salinas	2,754	3,509	2,100	2,664	11,027	0.89%
San Germán	3,883	4,027	2,266	2,254	12,430	1.00%
San Juan	52,645	44,775	25,230	24,666	147,316	11.84%
San Lorenzo	3,195	4,630	2,458	3,366	13,649	1.10%
San Sebastián	3,182	4,874	2,605	2,991	13,652	1.10%
Santa Isabel	1,950	2,041	1,925	1,811	7,727	0.62%
Toa Alta	3,132	6,734	5,101	7,602	22,569	1.81%
Toa Baja	7,385	8,789	5,696	6,963	28,833	2.32%
Trujillo Alto	5,788	7,523	4,977	6,524	24,812	1.99%
Utuado	2,115	3,498	1,879	2,638	10,130	0.81%
Vega Alta	2,919	3,636	2,676	3,341	12,572	1.01%
Vega Baja	4,061	5,811	3,388	4,049	17,309	1.39%
Vieques	883	1,010	521	359	2,773	0.22%
Villalba	1,511	2,478	1,571	2,443	8,003	0.64%
Yabucoa	2,897	3,614	2,719	2,941	12,171	0.98%
Yauco	3,066	3,311	1,852	2,206	10,435	0.84%
Puerto Rico Total	**317,614**	**387,435**	**249,852**	**289,301**	**1,244,202**	

Source: 2011-2015 American Community Survey 5-Year Estimates and SDG, 2017.

Top 5 Municipalities with the highest number of households were:

- San Juan: 11.84%;
- Bayamón: 5.74%;
- Carolina: 5.17%;
- Ponce: 4.46%; and
- Caguas: 4.06%.

And the lowest were:

- Culebra: 0.04%;
- Maricao: 0.15%;
- Vieques: 0.22%;
- Las Marias: 0.25%; and
- Maunabo: 0.33%.

Table 2.2 displays the household's percentage by each municipality and size.

Table 2.2: Household Size Percentage by Municipality

Municipality	1-Person Household	2-Person Household	3-Person Household	4-or-more Person Household
Adjuntas	23.19%	33.06%	19.99%	23.76%
Aguada	22.40%	32.28%	21.93%	23.39%
Aguadilla	25.49%	31.54%	20.81%	22.17%
Aguas Buenas	22.64%	32.08%	19.70%	25.59%
Aibonito	23.31%	31.92%	20.71%	24.06%
Añasco	23.29%	30.33%	21.32%	25.06%
Arecibo	24.71%	34.57%	19.22%	21.49%
Arroyo	25.82%	27.22%	22.15%	24.80%
Barceloneta	23.57%	30.11%	20.42%	25.89%
Barranquitas	19.82%	32.93%	19.11%	28.14%
Bayamón	24.61%	30.24%	21.78%	23.37%
Cabo Rojo	28.22%	31.25%	19.83%	20.70%
Caguas	25.00%	30.14%	22.10%	22.76%
Camuy	20.24%	29.19%	22.90%	27.66%
Canóvanas	21.79%	31.19%	20.15%	26.86%
Carolina	26.23%	31.08%	20.26%	22.43%
Cataño	22.45%	29.45%	23.48%	24.62%
Cayey	24.31%	31.76%	21.23%	22.69%
Ceiba	26.68%	29.45%	22.38%	21.49%
Ciales	23.38%	31.38%	19.02%	26.22%
Cidra	17.98%	31.50%	22.73%	27.80%
Coamo	22.25%	31.26%	20.46%	26.03%
Comerío	24.55%	31.67%	19.02%	24.75%

Municipality	1-Person Household	2-Person Household	3-Person Household	4-or-more Person Household
Corozal	18.41%	33.69%	16.71%	31.19%
Culebra	32.82%	38.22%	13.90%	15.06%
Dorado	19.41%	31.37%	19.43%	29.78%
Fajardo	27.42%	29.52%	18.61%	24.46%
Florida	18.26%	31.53%	20.90%	29.31%
Guánica	24.22%	32.60%	19.56%	23.62%
Guayama	27.68%	29.49%	20.67%	22.16%
Guayanilla	20.24%	33.32%	19.56%	26.87%
Guaynabo	27.55%	32.03%	19.31%	21.10%
Gurabo	22.86%	30.58%	22.33%	24.23%
Hatillo	22.79%	31.71%	22.49%	23.01%
Hormigueros	27.52%	34.36%	18.32%	19.80%
Humacao	23.37%	33.75%	19.45%	23.43%
Isabela	24.55%	32.36%	19.93%	23.16%
Jayuya	19.22%	33.53%	19.18%	28.07%
Juana Díaz	20.25%	29.27%	21.61%	28.87%
Juncos	22.37%	29.39%	23.91%	24.33%
Lajas	26.53%	31.23%	21.21%	21.03%
Lares	22.25%	34.54%	17.71%	25.50%
Las Marías	23.00%	34.16%	20.17%	22.68%
Las Piedras	19.82%	32.06%	21.74%	26.38%
Loíza	23.55%	27.02%	21.83%	27.60%
Luquillo	24.59%	33.43%	17.49%	24.50%
Manatí	25.39%	30.32%	19.73%	24.56%
Maricao	25.43%	30.52%	17.41%	26.64%
Maunabo	21.61%	32.38%	17.21%	28.81%
Mayagüez	31.92%	32.46%	18.24%	17.37%
Moca	21.61%	31.14%	24.40%	22.84%
Morovis	21.28%	29.56%	20.27%	28.89%
Naguabo	25.40%	30.33%	18.81%	25.46%
Naranjito	18.47%	27.25%	25.14%	29.15%
Orocovis	20.80%	35.66%	18.46%	25.08%
Patillas	28.64%	31.37%	18.19%	21.80%
Peñuelas	19.19%	26.76%	18.36%	35.69%
Ponce	27.59%	28.86%	20.70%	22.86%
Quebradillas	19.48%	33.85%	22.74%	23.93%
Rincón	27.81%	32.43%	15.08%	24.68%
Río Grande	21.61%	31.26%	22.76%	24.37%
Sabana Grande	28.79%	36.68%	16.28%	18.25%
Salinas	24.98%	31.82%	19.04%	24.16%
San Germán	31.24%	32.40%	18.23%	18.13%
San Juan	35.74%	30.39%	17.13%	16.74%
San Lorenzo	23.41%	33.92%	18.01%	24.66%
San Sebastián	23.31%	35.70%	19.08%	21.91%
Santa Isabel	25.24%	26.41%	24.91%	23.44%

Municipality	1-Person Household	2-Person Household	3-Person Household	4-or-more Person Household
Toa Alta	13.88%	29.84%	22.60%	33.68%
Toa Baja	25.61%	30.48%	19.76%	24.15%
Trujillo Alto	23.33%	30.32%	20.06%	26.29%
Utuado	20.88%	34.53%	18.55%	26.04%
Vega Alta	23.22%	28.92%	21.29%	26.57%
Vega Baja	23.46%	33.57%	19.57%	23.39%
Vieques	31.84%	36.42%	18.79%	12.95%
Villalba	18.88%	30.96%	19.63%	30.53%
Yabucoa	23.80%	29.69%	22.34%	24.16%
Yauco	29.38%	31.73%	17.75%	21.14%
Puerto Rico Total	**25.53%**	**31.14%**	**20.08%**	**23.25%**

Source: 2011-2015 American Community Survey 5-Year Estimates and SDG, 2017.

Distribution of household sizes in the island ranged between 20.08% to 31.14%. Among the aspects to highlight for family composition in Puerto Rico households were:

- One-person household constituted the 25.53%, being San Juan the municipality in this category with the higher concentration of households (35.74%);
- Two-person household made-up 31.14%, where 38.22% of them are concentrated in Culebra;
- Three-person household only accounted for the 20.08%, where 25.14% of them are concentrated in Naranjito; and
- Four-or-more Person household represented the 23.25%, being Peñuelas the municipality in this category with the higher concentration of households (35.69%).

Table 2.3 shows the distribution of vehicles available for each Municipality in Puerto Rico.

Table 2.3: Distribution of Vehicle Availability by Municipality

Municipality	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	Total Households
Adjuntas	1,217	3,629	1,111	222	143	6,322
Aguada	2,066	5,897	3,741	1,049	357	13,110
Aguadilla	3,700	9,164	5,825	1,615	517	20,821
Aguas Buenas	1,614	4,255	2,262	528	189	8,848
Aibonito	1,447	4,316	2,216	524	205	8,708
Añasco	1,383	4,045	3,193	685	266	9,572
Arecibo	6,032	13,812	9,005	2,588	850	32,287
Arroyo	1,160	3,307	1,579	159	76	6,281
Barceloneta	1,307	3,840	2,260	649	259	8,315
Barranquitas	1,413	5,472	1,806	498	130	9,319
Bayamón	10,366	30,569	22,106	6,472	1,862	71,375
Cabo Rojo	2,699	7,112	5,161	1,683	460	17,115
Caguas	8,634	20,486	15,633	4,371	1,376	50,500
Camuy	1,544	5,310	3,954	889	237	11,934
Canóvanas	2,156	6,036	4,819	1,471	216	14,698

Municipality	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	Total Households
Carolina	9,403	28,126	19,381	5,769	1,687	64,366
Cataño	2,525	3,695	2,262	583	307	9,372
Cayey	2,893	6,987	5,026	1,337	332	16,575
Ceiba	572	2,182	1,354	306	170	4,584
Ciales	1,187	2,694	1,458	467	93	5,899
Cidra	1,755	5,591	4,640	1,399	520	13,905
Coamo	2,145	5,551	4,587	971	394	13,648
Comerío	1,478	3,385	1,202	375	52	6,492
Corozal	1,589	5,648	2,693	894	215	11,039
Culebra	158	210	101	39	10	518
Dorado	1,400	4,343	4,643	1,435	511	12,332
Fajardo	2,104	5,966	3,649	826	214	12,759
Florida	343	2,063	1,524	301	133	4,364
Guánica	925	3,079	1,185	192	64	5,445
Guayama	2,998	7,316	3,706	856	303	15,179
Guayanilla	1,072	3,125	1,876	405	142	6,620
Guaynabo	3,998	14,520	12,220	3,126	1,099	34,963
Gurabo	1,912	5,893	5,286	1,618	597	15,306
Hatillo	1,918	6,658	4,689	850	222	14,337
Hormigueros	918	2,925	1,916	471	188	6,418
Humacao	2,492	8,287	5,787	1,591	406	18,563
Isabela	2,439	6,656	4,843	1,069	296	15,303
Jayuya	966	1,954	1,482	323	92	4,817
Juana Díaz	2,679	7,011	5,148	1,263	518	16,619
Juncos	1,703	5,728	4,307	1,015	231	12,984
Lajas	1,161	3,529	2,758	809	160	8,417
Lares	1,817	5,907	1,811	451	142	10,128
Las Marías	475	1,213	1,142	211	103	3,144
Las Piedras	1,650	5,730	4,104	1,087	313	12,884
Loíza	1,962	3,949	2,177	731	188	9,007
Luquillo	1,200	2,777	2,123	531	157	6,788
Manatí	3,224	6,782	4,494	1,204	371	16,075
Maricao	420	785	468	182	52	1,907
Maunabo	685	1,871	1,075	297	158	4,086
Mayagüez	7,099	13,107	7,542	1,956	727	30,431
Moca	1,789	4,891	4,015	1,214	370	12,279
Morovis	1,705	4,576	2,700	672	135	9,788
Naguabo	1,489	3,734	2,716	700	158	8,797
Naranjito	1,209	4,105	2,290	669	359	8,632
Orocovis	1,379	2,962	1,993	418	105	6,857
Patillas	1,293	2,894	1,713	411	125	6,436
Peñuelas	1,250	3,269	2,247	684	193	7,643
Ponce	11,624	24,608	14,229	3,746	1,290	55,497
Quebradillas	1,150	3,841	3,046	750	256	9,043
Rincón	697	2,683	1,433	521	103	5,437

Municipality	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	Total Households
Río Grande	2,023	6,914	5,775	1,661	458	16,831
Sabana Grande	1,359	3,332	1,969	375	40	7,075
Salinas	1,733	5,140	3,273	689	192	11,027
San Germán	2,506	5,441	3,190	1,058	235	12,430
San Juan	39,015	64,379	33,169	8,134	2,619	147,316
San Lorenzo	2,584	5,584	4,094	1,007	380	13,649
San Sebastián	2,391	6,330	3,732	890	309	13,652
Santa Isabel	1,232	3,306	2,238	783	168	7,727
Toa Alta	2,064	7,767	8,374	3,167	1,197	22,569
Toa Baja	3,839	11,647	10,001	2,620	726	28,833
Trujillo Alto	3,076	9,885	8,440	2,632	779	24,812
Utuado	1,941	4,073	2,631	1,031	454	10,130
Vega Alta	2,060	5,979	3,433	794	306	12,572
Vega Baja	3,223	7,796	4,734	1,249	307	17,309
Vieques	631	1,243	750	128	21	2,773
Villalba	1,237	3,609	2,187	654	316	8,003
Yabucoa	2,123	4,881	3,731	1,073	363	12,171
Yauco	1,892	4,827	2,791	729	196	10,435
Puerto Rico Total	**216,517**	**542,189**	**358,224**	**96,802**	**30,470**	**1,244,202**

Source: 2011-2015 American Community Survey 5-Year Estimates and SDG, 2017.

Table 2.4 displays household vehicles availability's percentage by each municipality and category.

Table 2.4: Vehicle Availability Share by Municipality

Municipality	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
Adjuntas	19.25%	57.40%	17.57%	3.51%	2.26%
Aguada	15.76%	44.98%	28.54%	8.00%	2.72%
Aguadilla	17.77%	44.01%	27.98%	7.76%	2.48%
Aguas Buenas	18.24%	48.09%	25.57%	5.97%	2.14%
Aibonito	16.62%	49.56%	25.45%	6.02%	2.35%
Añasco	14.45%	42.26%	33.36%	7.16%	2.78%
Arecibo	18.68%	42.78%	27.89%	8.02%	2.63%
Arroyo	18.47%	52.65%	25.14%	2.53%	1.21%
Barceloneta	15.72%	46.18%	27.18%	7.81%	3.11%
Barranquitas	15.16%	58.72%	19.38%	5.34%	1.39%
Bayamón	14.52%	42.83%	30.97%	9.07%	2.61%
Cabo Rojo	15.77%	41.55%	30.15%	9.83%	2.69%
Caguas	17.10%	40.57%	30.96%	8.66%	2.72%
Camuy	12.94%	44.49%	33.13%	7.45%	1.99%
Canóvanas	14.67%	41.07%	32.79%	10.01%	1.47%
Carolina	14.61%	43.70%	30.11%	8.96%	2.62%
Cataño	26.94%	39.43%	24.14%	6.22%	3.28%
Cayey	17.45%	42.15%	30.32%	8.07%	2.00%

Municipality	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
Ceiba	12.48%	47.60%	29.54%	6.68%	3.71%
Ciales	20.12%	45.67%	24.72%	7.92%	1.58%
Cidra	12.62%	40.21%	33.37%	10.06%	3.74%
Coamo	15.72%	40.67%	33.61%	7.11%	2.89%
Comerío	22.77%	52.14%	18.52%	5.78%	0.80%
Corozal	14.39%	51.16%	24.40%	8.10%	1.95%
Culebra	30.50%	40.54%	19.50%	7.53%	1.93%
Dorado	11.35%	35.22%	37.65%	11.64%	4.14%
Fajardo	16.49%	46.76%	28.60%	6.47%	1.68%
Florida	7.86%	47.27%	34.92%	6.90%	3.05%
Guánica	16.99%	56.55%	21.76%	3.53%	1.18%
Guayama	19.75%	48.20%	24.42%	5.64%	2.00%
Guayanilla	16.19%	47.21%	28.34%	6.12%	2.15%
Guaynabo	11.43%	41.53%	34.95%	8.94%	3.14%
Gurabo	12.49%	38.50%	34.54%	10.57%	3.90%
Hatillo	13.38%	46.44%	32.71%	5.93%	1.55%
Hormigueros	14.30%	45.57%	29.85%	7.34%	2.93%
Humacao	13.42%	44.64%	31.17%	8.57%	2.19%
Isabela	15.94%	43.49%	31.65%	6.99%	1.93%
Jayuya	20.05%	40.56%	30.77%	6.71%	1.91%
Juana Díaz	16.12%	42.19%	30.98%	7.60%	3.12%
Juncos	13.12%	44.12%	33.17%	7.82%	1.78%
Lajas	13.79%	41.93%	32.77%	9.61%	1.90%
Lares	17.94%	58.32%	17.88%	4.45%	1.40%
Las Marías	15.11%	38.58%	36.32%	6.71%	3.28%
Las Piedras	12.81%	44.47%	31.85%	8.44%	2.43%
Loíza	21.78%	43.84%	24.17%	8.12%	2.09%
Luquillo	17.68%	40.91%	31.28%	7.82%	2.31%
Manatí	20.06%	42.19%	27.96%	7.49%	2.31%
Maricao	22.02%	41.16%	24.54%	9.54%	2.73%
Maunabo	16.76%	45.79%	26.31%	7.27%	3.87%
Mayagüez	23.33%	43.07%	24.78%	6.43%	2.39%
Moca	14.57%	39.83%	32.70%	9.89%	3.01%
Morovis	17.42%	46.75%	27.58%	6.87%	1.38%
Naguabo	16.93%	42.45%	30.87%	7.96%	1.80%
Naranjito	14.01%	47.56%	26.53%	7.75%	4.16%
Orocovis	20.11%	43.20%	29.07%	6.10%	1.53%
Patillas	20.09%	44.97%	26.62%	6.39%	1.94%
Peñuelas	16.35%	42.77%	29.40%	8.95%	2.53%
Ponce	20.95%	44.34%	25.64%	6.75%	2.32%
Quebradillas	12.72%	42.47%	33.68%	8.29%	2.83%
Rincón	12.82%	49.35%	26.36%	9.58%	1.89%
Río Grande	12.02%	41.08%	34.31%	9.87%	2.72%
Sabana Grande	19.21%	47.10%	27.83%	5.30%	0.57%
Salinas	15.72%	46.61%	29.68%	6.25%	1.74%

Municipality	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
San Germán	20.16%	43.77%	25.66%	8.51%	1.89%
San Juan	26.48%	43.70%	22.52%	5.52%	1.78%
San Lorenzo	18.93%	40.91%	29.99%	7.38%	2.78%
San Sebastián	17.51%	46.37%	27.34%	6.52%	2.26%
Santa Isabel	15.94%	42.79%	28.96%	10.13%	2.17%
Toa Alta	9.15%	34.41%	37.10%	14.03%	5.30%
Toa Baja	13.31%	40.39%	34.69%	9.09%	2.52%
Trujillo Alto	12.40%	39.84%	34.02%	10.61%	3.14%
Utuado	19.16%	40.21%	25.97%	10.18%	4.48%
Vega Alta	16.39%	47.56%	27.31%	6.32%	2.43%
Vega Baja	18.62%	45.04%	27.35%	7.22%	1.77%
Vieques	22.76%	44.83%	27.05%	4.62%	0.76%
Villalba	15.46%	45.10%	27.33%	8.17%	3.95%
Yabucoa	17.44%	40.10%	30.65%	8.82%	2.98%
Yauco	18.13%	46.26%	26.75%	6.99%	1.88%
Puerto Rico Total	**17.40%**	**43.58%**	**28.79%**	**7.78%**	**2.45%**

Source: 2011-2015 American Community Survey 5-Year Estimates and SDG, 2017.

Distribution of vehicle availability in the island ranged between 2.45% to 43.58%. Among the aspects to highlight for vehicle availability categories in Puerto Rico households are:

- No vehicle household constituted the 17.40%, being Culebra the municipality in this category with the higher concentration of households (30.50%);
- One-vehicle household made-up 43.58%, where 58.72% of them are concentrated in Barranquitas;
- Two vehicles household represented the 28.79%, being Dorado the municipality in this category with the higher concentration of households (37.65%);
- Three vehicles household represented the 7.78%, being Toa Alta the municipality in this category with the higher concentration of households (14.03%); and
- Four-or-more vehicles household only accounted for the 2.45%, where 5.30% of them are concentrated in Toa Alta.

3 CHAPTER 3 HOUSEHOLD TRAVEL SURVEY PILOT

PRHTS' pilot period was conducted from January 10 - 19, 2018 in pursuance of assessing the feasibility of the design and implementation process of the PRHTS before their formal execution; following the Federal guidelines[6].

Table 3.1 and Figure 3.1 show the pilot survey schedule.

[6] Technical Appendix to NCHRP Report 571 in its chapter 6.

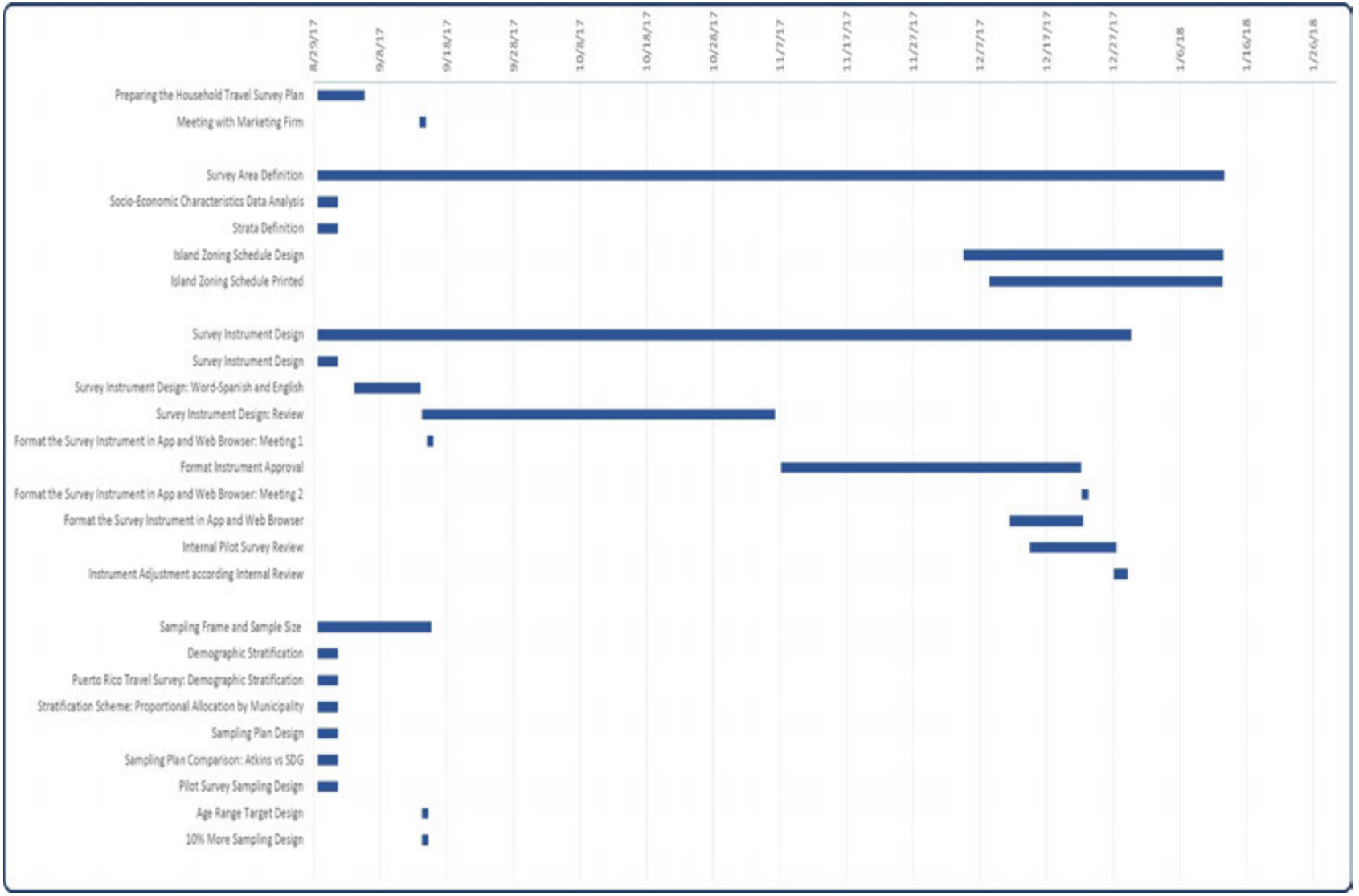
Table 3.1: Pilot Survey Schedule

	Task Name	Start Date	End Date	Duration (Days)	Days Complete	Days Remaining	Percent Complete
0	Preparing the Household Travel Survey Plan	29/08/2017	05/09/2017	7	7	0	100%
1	Meeting with Marketing Firm	13/09/2017	14/09/2017	1	1	0	100%
2	Survey Area Definition	29/08/2017	12/01/2018	136	136	0	100%
2.1	Socio-Economic Characteristics Data Analysis	29/08/2017	01/09/2017	3	3	0	100%
2.2	Strata Definition	29/08/2017	01/09/2017	3	3	0	100%
2.3	Island Zoning Schedule Design	04/12/2017	12/01/2018	39	39	0	100%
2.4	Island Zoning Schedule Printed	08/12/2017	12/01/2018	35	35	0	100%
3	Survey Instrument Design	29/08/2017	29/12/2017	122	122	0	100%
3.1	Survey Instrument Design	29/08/2017	01/09/2017	3	3	0	100%
3.2	Survey Instrument Design: Word-Spanish and English	04/09/2017	14/09/2017	10	10	0	100%
3.3	Survey Instrument Design: Review	14/09/2017	06/11/2017	53	53	0	100%
3.4	Format the Survey Instrument in App and Web Browser: Meeting 1	15/09/2017	16/09/2017	1	1	0	100%
3.5	Format Instrument Approval	07/11/2017	22/12/2017	45	45	0	100%
3.6	Format the Survey Instrument in App and Web Browser: Meeting 2	22/12/2017	23/12/2017	1	1	0	100%
3.7	Format the Survey Instrument in App and Web Browser	11/12/2017	22/12/2017	11	11	0	100%

	Task Name	Start Date	End Date	Duration (Days)	Days Complete	Days Remaining	Percent Complete
3.8	Internal Pilot Survey Review	14/12/2017	27/12/2017	13	13	0	100%
3.9	Instrument Adjustment According Internal Review	27/12/2017	29/12/2017	2	2	0	100%
4	Sampling Frame and Sample Size	29/08/2017	15/09/2017	17	17	0	100%
4.1	Demographic Stratification	29/08/2017	01/09/2017	3	3	0	100%
4.2	Puerto Rico Travel Survey: Demographic Stratification	29/08/2017	01/09/2017	3	3	0	100%
4.3	Stratification Scheme: Proportional Allocation by Municipality	29/08/2017	01/09/2017	3	3	0	100%
4.4	Sampling Plan Design	29/08/2017	01/09/2017	3	3	0	100%
4.5	Sampling Plan Comparison: 2040LRTP vs 2045 LRTP	29/08/2017	01/09/2017	3	3	0	100%
4.6	Pilot Survey Sampling Design	29/08/2017	01/09/2017	3	3	0	100%
4.7	Age Range Target Design	14/09/2017	15/09/2017	1	1	0	100%
4.8	10% More Sampling Design	14/09/2017	15/09/2017	1	1	0	100%

Source: SDG

Figure 3.1: Gantt Chart Pilot Survey Schedule



Source: SDG

PILOT PRHTS SAMPLE

A response rate of 25% of completed households was assumed based on other survey exercises prepared by Infocus in Puerto Rico. A sample size of **32** would ensure a ±15% of accuracy (Table 3.2).

Table 3.2: Sample Sizes Required for Specified Levels of Accuracy

Measure	Assumed Value	Desired Accuracy	Sample Size
Response Rate	50%	±5%	384
	50%	±10%	96
	50%	±15%	43
	50%	±20%	24
	60% or 40%	±5%	369
	60% or 40%	±10%	92
	60% or 40%	±15%	41
	60% or 40%	±20%	23
	75% or 25%	±5%	288
	75% or 25%	±10%	72
	75% or 25%	**±15%**	**32**
	75% or 25%	±20%	18

Source: NCHRP Web-Only Document 43: Technical Appendix to NCHRP Report 571: Standardized Procedures for Personal Travel Surveys

Table 3.3 displays the sampling framework for the Pilot with both variables Household Size and Vehicle Availability.

Table 3.3: Goal Number of Completed Households Pilot Surveys

Vehicle Availability (Vehicles/Household)	Household Size (Person/Household)				
	1	2	3	4+	Total
0	3	1	1	1	6
1	5	5	2	2	14
2	0	3	2	3	8
3	0	0	1	1	2
4+	0	1	1	0	2
Total	**8**	**10**	**7**	**7**	**32**

Source: SDG

San Juan TMA, Aguadilla TMA and Other Urbanized Areas were the geographic areas in which the pilot sample was segmented. Table 3.4 exhibits the stratification scheme made proportionally by Municipality in terms of both variables Household Size and Vehicle Availability.

To guarantee that survey was an accessible instrument for both Hispanics and Anglo speakers, the PRHTS were available in both Spanish and English languages.

Table 3.4: Pilot Survey Stratification Scheme: Proportional Allocation of Household Size and Automobile Ownership by Municipality

Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality
	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
Aguada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Aguadilla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Añasco	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Arecibo	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Bayamón	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Caguas	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Carolina	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2
Ceiba	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Coamo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Culebra	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Fajardo	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Guaynabo	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hatillo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Lares	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Las Marías	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Maricao	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Mayagüez	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Moca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Ponce	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rincón	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Sabana Grande	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
San Germán	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
San Juan	1	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	4
San Sebastián	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Toa Alta	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1

Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality
	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
Toa Baja	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Trujillo Alto	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	**3**	**5**	**0**	**0**	**0**	**1**	**5**	**3**	**0**	**1**	**1**	**2**	**2**	**1**	**1**	**1**	**2**	**3**	**1**	**0**	**32**

Source: SDG

PILOT SURVEY RESPONSE RATES

33 households were interviewed during the pilots, however there were missing trip diaries in some of them. Therefore 27 surveys were considered as completed, that is, meeting the requirement that 50% of adults of the households completed trip diaries.

Three screening questions were made at the beginning of the survey to evaluate if the household's characteristics were eligible to participate in the survey. The screening questions were:

1. How many vehicles are there in your household?
   - No Vehicles;
   - 1 Vehicle;
   - 2 Vehicles;
   - 3 Vehicles; and
   - 4 or more Vehicles.

   Vehicle availability is the first variable of the cross-classification plan. This question allowed to know in this first approach to the potential respondent, whether his/her household fell in the travel survey stratification scheme previously established.

2. How many people live in your household?
   - 1-Person Household;
   - 2-Person Household;
   - 3-Person Household; and
   - 4 or More Person Household.

   Household size is the second variable of the cross-classification plan. This question allowed to know whether the number of person per household fell in the travel survey stratification scheme previously established.

3. Have you been living in Puerto Rico for six months or more?
   - Yes, More than 6 months; and
   - No, Less than 6 months.

   This specific question lets the interviewer to know if the respondent has a permanent resident in Puerto Rico.

Actual response rates were higher (76.74%) in comparison with the response rate assumption (25%) based in other survey exercises prepared by Infocus in Puerto Rico. Out of the 43 households that were recruited,33[7] of them participate in the pilots. Table 3.9 displays the household retrieval by Region and Municipalities.

[7] Six surveys had missing trip diaries.

PILOT RESULTS

Total retrieval for the pilots were 33 households. Out of those, a total of 27 households were effectively completed and six were partially completed. The final retrieval to recruitment ratio was 76.74% and the final completion rate for fully completed households was 62.79% (Table 3.5).

Table 3.5: Recruited and Retrieval Pilot Household Travel Surveys Response Rates

	Total Households	Response Rate
Contacted Households	43	-
Recruited Households	43	100.00%
Surveyed Households	33	76.74%
Uncompleted Households	6	13.95%
Completed Households	27	62.79%

Source: SDG

Table 3.6 presents final results from completed records (27 households) considering the design variables.

Table 3.6: Retrieval - Number of Completed Households Pilot Surveys

Vehicle Availability (Vehicles/Household)	Household Size (Person/Household)				
	1	2	3	4+	Total
0	4	9	6	5	24
1	1				1
2			1		1
3					0
4+			1		1
Total	**5**	**9**	**8**	**5**	**27**

Source: SDG

Table 3.7 and Table 3.8 show the target adherence for the pilot household travel survey sample. In overall terms, targets were difficult to meet for some strata and exceeded in others. Dark green cells represent values higher than 100% which suggested an over-representation of certain strata and regions in the sample. Light green cells show values around 100% which suggested that this sample was comparable to the original sampling targets. Orange cells display values below 70% which suggested that the sample was under-represented in each region. Finally, red cells represent strata where no information was gathered from the pilot surveys.

Table 3.7: Adherence to Sample Targets by Designed Variables

Vehicle Availability (Vehicles/Household)	Household Size (Person/Household)			
	1	2	3	4+
0	133.3%	900.0%	600.0%	500.0%
1	20.0%	0.0%	0.0%	0.0%
2	0.0%	0.0%	50.0%	0.0%
3	0.0%	0.0%	0.0%	0.0%

Vehicle Availability (Vehicles/Household)	Household Size (Person/Household)			
	1	2	3	4+
4+	0.0%	0.0%	100.0%	0.0%

Source: SDG

Table 3.8: Adherence to Sample Targets by Region

Area	Total Households in Region	Households Target	Households Retrieval	Adherence to Sample Target
San Juan TMA	757,432	13	13	100.0%
Aguadilla TMA	103,446	8	11	137.50%
Other Urbanized Areas	383,324	11	3	27.27%
Total	**1,244,202**	**32**	**27**	

Source: SDG

Table 3.9 exhibits response rates by municipalities. San Juan TMA was the region with highest response rates (86.67%).

Table 3.9: Pilot Survey Response Rates by Geographic Area and Municipality

Area	Municipality	Total Households in Region	Households Target	Households Recruited	Households Retrieval	Response Rate
San Juan TMA	Aguas Buenas	8,848	0	1	1	100.00%
	Aibonito	8,708	0	2	1	50.00%
	Barranquitas	9,319	0	3	2	66.67%
	Bayamón	71,375	2	0	0	-
	Caguas	50,500	1	1	1	100.00%
	Canóvanas	14,698	0	0	0	-
	Carolina	64,366	2	2	1	50.00%
	Cataño	9,372	0	0	0	-
	Cayey	16,575	0	0	0	-
	Ciales	5,899	0	0	0	-
	Cidra	13,905	0	0	0	-
	Comerío	6,492	0	0	0	-
	Corozal	11,039	0	0	0	-
	Dorado	12,332	0	0	0	-
	Guaynabo	34,963	1	0	0	-
	Gurabo	15,306	0	0	1	-
	Humacao	18,563	0	0	0	-
	Juncos	12,984	0	0	0	-
	Las Piedras	12,884	0	0	0	-
	Loíza	9,007	0	0	0	-
	Manatí	16,075	0	1	1	100.00%
	Maunabo	4,086	0	0	0	-
	Morovis	9,788	0	0	0	-
	Naguabo	8,797	0	0	0	-

Area	Municipality	Total Households in Region	Households Target	Households Recruited	Households Retrieval	Response Rate
Aguadilla TMA	Naranjito	8,632	0	1	0	0.00%
	Orocovis	6,857	0	0	0	-
	Río Grande	16,831	0	0	0	-
	San Juan	147,316	4	4	5	125.00%
	San Lorenzo	13,649	0	0	0	-
	Toa Alta	22,569	1	0	0	-
	Toa Baja	28,833	1	0	0	-
	Trujillo Alto	24,812	1	0	0	-
	Vega Alta	12,572	0	0	0	-
	Vega Baja	17,309	0	0	0	-
	Yabucoa	12,171	0	0	0	-
	Subtotal	**757,432**	**13**	**15**	**13**	**86.67%**
	Aguada	13,110	1	1	0	0.00%
	Aguadilla	20,821	1	6	3	50.00%
	Añasco	9,572	1	1	1	100.00%
	Isabela	15,303	0	3	1	33.33%
	Lares	10,128	1	3	2	66.67%
	Las Marías	3,144	1	0	0	-
	Moca	12,279	1	2	2	100.00%
	Rincón	5,437	1	1	1	100.00%
	San Sebastián	13,652	1	4	1	25.00%
	Subtotal	**103,446**	**8**	**21**	**11**	**52.38%**
Other Urbanized Areas	Ceiba	4,584	1	0	0	-
	Culebra	518	1	0	0	-
	Fajardo	12,759	1	0	0	-
	Luquillo	6,788	0	0	0	-
	Vieques	2,773	0	0	0	-
	Adjuntas	6,322	0	0	0	-
	Arecibo	32,287	1	1	0	0.00%
	Barceloneta	8,315	0	0	0	-
	Camuy	11,934	0	0	0	-
	Florida	4,364	0	0	0	-
	Hatillo	14,337	1	0	0	-
	Jayuya	4,817	0	0	0	-
	Quebradillas	9,043	0	0	0	-
	Utuado	10,130	0	0	0	-
	Arroyo	6,281	0	0	0	-
	Guayama	15,179	0	0	0	-
	Patillas	6,436	0	0	0	-
	Salinas	11,027	0	0	0	-
	Coamo	13,648	1	0	0	-
	Guánica	5,445	0	1	1	100.00%
	Guayanilla	6,620	0	0	0	-
	Juana Díaz	16,619	0	0	0	-
	Peñuelas	7,643	0	0	0	-

Area	Municipality	Total Households in Region	Households Target	Households Recruited	Households Retrieval	Response Rate
	Ponce	55,497	1	2	0	0.00%
	Santa Isabel	7,727	0	0	0	-
	Villalba	8,003	0	0	0	-
	Yauco	10,435	0	0	0	-
	Cabo Rojo	17,115	0	0	0	-
	Hormigueros	6,418	0	0	0	-
	Lajas	8,417	0	0	0	-
	Maricao	1,907	1	0	0	-
	Mayagüez	30,431	1	0	0	-
	Sabana Grande	7,075	1	0	0	-
	San Germán	12,430	1	3	2	66.67%
	Subtotal	**383,324**	**11**	**7**	**3**	**42.86%**
	Total	**1,244,202**	**32**	**43**	**27**	**62.79%**

Source: SDG

One of the lessons learned during the pilots is the need for internal programming to assure at least 50% of adults in household completed the interview including trip diaries (Module D). This procedure was implemented after pilot finished; and only 27 surveys meet the requirement where at least 50% of adults in household completed the interview.

No major changes were required to the survey design that could affect survey methodology; therefore, 27 pilot surveys (completed records) were added to the main survey data for final analyses.

From the pilot exercise it was identified that it would be harder to complete surveys for households that meet the following characteristics:

- 1-person households;
- 0 vehicle ownerships; and
- Located in Other Urbanized Areas.

This was considered during the development of the formal household travel surveys exercise.

4 CHAPTER 4 SURVEY IMPLEMENTATION

USE OF TABLETS/LAPTOPS FOR DATA GATHERING

PRHTS data gathering process through tablets/laptops allowed to provide the following benefits:

- Incorporate interactive validation to help minimize errors by the respondent;
- Provide the capability to ask respondent-specific questions and dynamically alter content using survey logic; and
- Facilitate survey monitoring such as tracking completed surveys or identifying underrepresentation in the sample.

A clean and organized electronic database of the survey responses was one of the most important deliverables of the study. Once the survey administration process was completed, SDG cleaned the survey responses database drawing on the experience with local and international surveys, and the deep understanding of the survey process. First, SDG checked that the data were internally consistent, logical, and within acceptable ranges. Depending on the degree of inconsistency, one or more of the data items were recoded to "missing information" if no other correction is logically indicated and in certain cases the entire survey vas considered invalid. At the conclusion of the editing phase, weights were computed to scale the responses to reflect population totals.

SURVEY INCENTIVES

Following the FHWA Travel Survey Manual Update in its chapter 10, incentives are allowed for this type of exercises:

- “Pre-paid incentives or post-paid incentives;
- Cash, check, VISA/MC, gift cards from specific retailers; and
- Distribution by mail or email”.[8]

[8] THE ON-LINE TRAVEL SURVEY MANUAL: A Dynamic Document for Transportation Professionals. Provided by the Members and Friends of the Transportation Research Board’s Travel Survey Methods Committee (ABJ40). Chapter 10 Household Survey Implementation.

Therefore, by delivering the whole information comprised in Modules A, B, C and D and complying with the quality requirements, each person participating in the survey enter in the raffle of three prizes at the end of the PRHTS Execution:

- First Prize: Samsung Galaxy Tab E SM-7377A;
- Second Prize: $100 gift card; and
- Third Prize: Action Camera, Dash Cam.

SURVEY DATA RETRIEVAL

Total retrieval for the PRHTS were 2,950 households. Out of those, a total of 2,784 households were effectively completed and 166 were uncompleted because of the trip diaries or were duplicated surveys. The final retrieval to recruitment ratio was 97.26% and the final completion rate for fully completed households was 91.79% (Table 4.1).

Table 4.1: Recruited and Retrieval Household Travel Surveys Response Rates

	Total Households	Response Rate
Contacted Households	23,505	-
Recruited Households	3,033	12.90%
Surveyed Households	2,950	97.26%
Uncompleted Households	166	5.47%
Completed Households	2,784	91.79%

Source: SDG

Table 4.2 presents call history files of the household survey execution. From the 23,505 contacted households, 2,950 were surveyed and 20,555 were not effective calls.

Table 4.2: Call History Files

Label	Calls
Hang up in the middle of the interview	83
No answer	8,135
Busy	2,209
Business Number	224
Out of service	6,402
No participated	1,401
Other	1,740
Scheduled for call-back	361
Total	**20,555**

Source: SDG

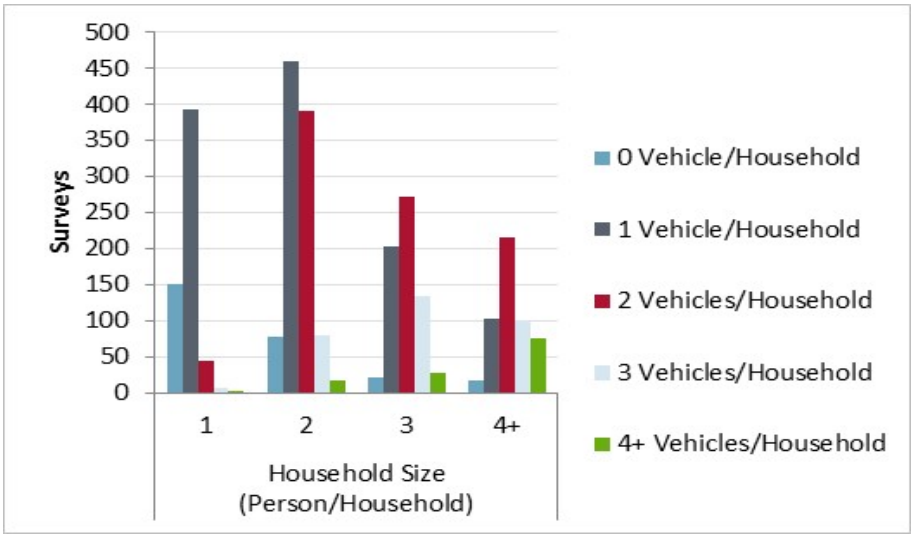
Table 4.3 and Figure 4.1 presents final results from completed records (2,784 households) considering the design variables.

Table 4.3: Retrieval - Number of Completed Households Surveys

Vehicle Availability (Vehicles/Household)	Household Size (Person/Household)				
	1	2	3	4+	Total
0	151	78	21	16	266
1	392	460	202	102	1,156
2	43	390	271	216	920
3	6	80	134	101	321
4+	2	16	27	76	121
Total	**594**	**1,024**	**655**	**511**	**2,784**

Source: SDG

Figure 4.1: Retrieval - Number of Completed Households Surveys



Source: SDG

Table 4.4 shows that in general at a regional level the retrieval sample was aligned with the sampling plan, recruited sample and U.S. Census estimates. However, Aguadilla TMA sample presented a higher relative error due to over-sampling made in the sampling design stage in order to support a deeper understanding of emerging travel demand in the Aguadilla TMA Region. San Juan TMA and Other Urbanized Areas sample was well-balanced for and consistent with the sampling plan.

Table 4.4: PRHTS and Census Comparison: Sampling Region Level

Region	U.S. Census 2015		Sampling Plan		Recruited		Retrieval		Relative Error
	Quantity	%	Quantity	%	Quantity	%	Quantity	%	
San Juan TMA	757,432	60.88%	1,561	51.47%	1,849	60.96%	1,663	59.73%	1.88%
Aguadilla TMA	103,446	8.31%	348	11.47%	338	11.14%	341	12.25%	(47.32%)
Other Urbanized Areas	383,324	30.81%	791	26.08%	846	27.89%	780	28.02%	9.06%
Total	**1,244,202**	**100.00%**	**2,700**	**89.02%**	**3,033**	**100.00%**	**2,784**	**100.00%**	

Source: SDG

Table 4.5 shows that at a municipal level the retrieval sample was aligned with the sampling plan, recruited sample and U.S. Census estimates.

Table 4.5: PRHTS and Census Comparison: Sampling Municipality Level

Area	Municipality	U.S. Census 2015		Sampling Plan		Recruited		Retrieval	
		Quantity	%	Quantity	%	Quantity	%	Quantity	%
San Juan TMA	Aguas Buenas	8,848	0.71%	18	0.67%	19	0.63%	18	0.65%
	Aibonito	8,708	0.70%	18	0.67%	24	0.79%	20	0.72%
	Barranquitas	9,319	0.75%	19	0.70%	26	0.86%	24	0.86%
	Bayamón	71,375	5.74%	147	5.44%	289	9.53%	243	8.73%
	Caguas	50,500	4.06%	104	3.85%	117	3.86%	100	3.59%
	Canóvanas	14,698	1.18%	30	1.11%	67	2.21%	67	2.41%
	Carolina	64,366	5.17%	133	4.93%	142	4.68%	132	4.74%
	Cataño	9,372	0.75%	19	0.70%	9	0.30%	9	0.32%
	Cayey	16,575	1.33%	34	1.26%	37	1.22%	31	1.11%
	Ciales	5,899	0.47%	12	0.44%	7	0.23%	6	0.22%
	Cidra	13,905	1.12%	29	1.07%	19	0.63%	20	0.72%
	Comerío	6,492	0.52%	13	0.48%	8	0.26%	7	0.25%
	Corozal	11,039	0.89%	23	0.85%	14	0.46%	13	0.47%
	Dorado	12,332	0.99%	25	0.93%	26	0.86%	27	0.97%
	Guaynabo	34,963	2.81%	72	2.67%	78	2.57%	73	2.62%
	Gurabo	15,306	1.23%	32	1.19%	28	0.92%	27	0.97%
	Humacao	18,563	1.49%	38	1.41%	16	0.53%	17	0.61%
	Juncos	12,984	1.04%	27	1.00%	20	0.66%	17	0.61%
	Las Piedras	12,884	1.04%	27	1.00%	16	0.53%	16	0.57%
	Loíza	9,007	0.72%	19	0.70%	20	0.66%	19	0.68%
	Manatí	16,075	1.29%	33	1.22%	36	1.19%	37	1.33%
	Maunabo	4,086	0.33%	8	0.30%	7	0.23%	6	0.22%
	Morovis	9,788	0.79%	20	0.74%	13	0.43%	12	0.43%
	Naguabo	8,797	0.71%	18	0.67%	7	0.23%	7	0.25%
	Naranjito	8,632	0.69%	18	0.67%	24	0.79%	22	0.79%
	Orocovis	6,857	0.55%	14	0.52%	8	0.26%	5	0.18%
	Río Grande	16,831	1.35%	35	1.30%	66	2.18%	59	2.12%
	San Juan	147,316	11.84%	304	11.26%	413	13.62%	349	12.54%

Area	Municipality	U.S. Census 2015		Sampling Plan		Recruited		Retrieval	
		Quantity	%	Quantity	%	Quantity	%	Quantity	%
Aguadilla TMA	San Lorenzo	13,649	1.10%	28	1.04%	22	0.73%	22	0.79%
	Toa Alta	22,569	1.81%	47	1.74%	55	1.81%	52	1.87%
	Toa Baja	28,833	2.32%	59	2.19%	85	2.80%	72	2.59%
	Trujillo Alto	24,812	1.99%	51	1.89%	57	1.88%	58	2.08%
	Vega Alta	12,572	1.01%	26	0.96%	29	0.96%	28	1.01%
	Vega Baja	17,309	1.39%	36	1.33%	31	1.02%	30	1.08%
	Yabucoa	12,171	0.98%	25	0.93%	14	0.46%	18	0.65%
	Subtotal	**757,432**	**60.88%**	**1,561**	**57.81%**	**1,849**	**60.96%**	**1,663**	**59.73%**
	Aguada	13,110	1.05%	42	1.56%	44	1.45%	40	1.44%
	Aguadilla	20,821	1.67%	58	2.15%	59	1.95%	58	2.08%
	Añasco	9,572	0.77%	35	1.30%	39	1.29%	39	1.40%
	Isabela	15,303	1.23%	47	1.74%	48	1.58%	47	1.69%
	Lares	10,128	0.81%	36	1.33%	38	1.25%	41	1.47%
	Las Marías	3,144	0.25%	21	0.78%	10	0.33%	10	0.36%
	Moca	12,279	0.99%	40	1.48%	37	1.22%	39	1.40%
	Rincón	5,437	0.44%	26	0.96%	21	0.69%	22	0.79%
	San Sebastián	13,652	1.10%	43	1.59%	42	1.38%	45	1.62%
	Subtotal	**103,446**	**8.31%**	**348**	**12.89%**	**338**	**11.14%**	**341**	**12.25%**
	Ceiba	4,584	0.37%	9	0.33%	10	0.33%	8	0.29%
	Culebra	518	0.04%	1	0.04%	2	0.07%	1	0.04%
	Fajardo	12,759	1.03%	26	0.96%	46	1.52%	31	1.11%
	Luquillo	6,788	0.55%	14	0.52%	21	0.69%	18	0.65%
	Vieques	2,773	0.22%	6	0.22%	3	0.10%	3	0.11%
	Adjuntas	6,322	0.51%	13	0.48%	31	1.02%	10	0.36%
	Arecibo	32,287	2.59%	67	2.48%	101	3.33%	99	3.56%
	Barceloneta	8,315	0.67%	17	0.63%	19	0.63%	20	0.72%
	Camuy	11,934	0.96%	25	0.93%	39	1.29%	38	1.36%
	Florida	4,364	0.35%	9	0.33%	3	0.10%	3	0.11%
	Hatillo	14,337	1.15%	30	1.11%	30	0.99%	31	1.11%
	Jayuya	4,817	0.39%	10	0.37%	10	0.33%	9	0.32%

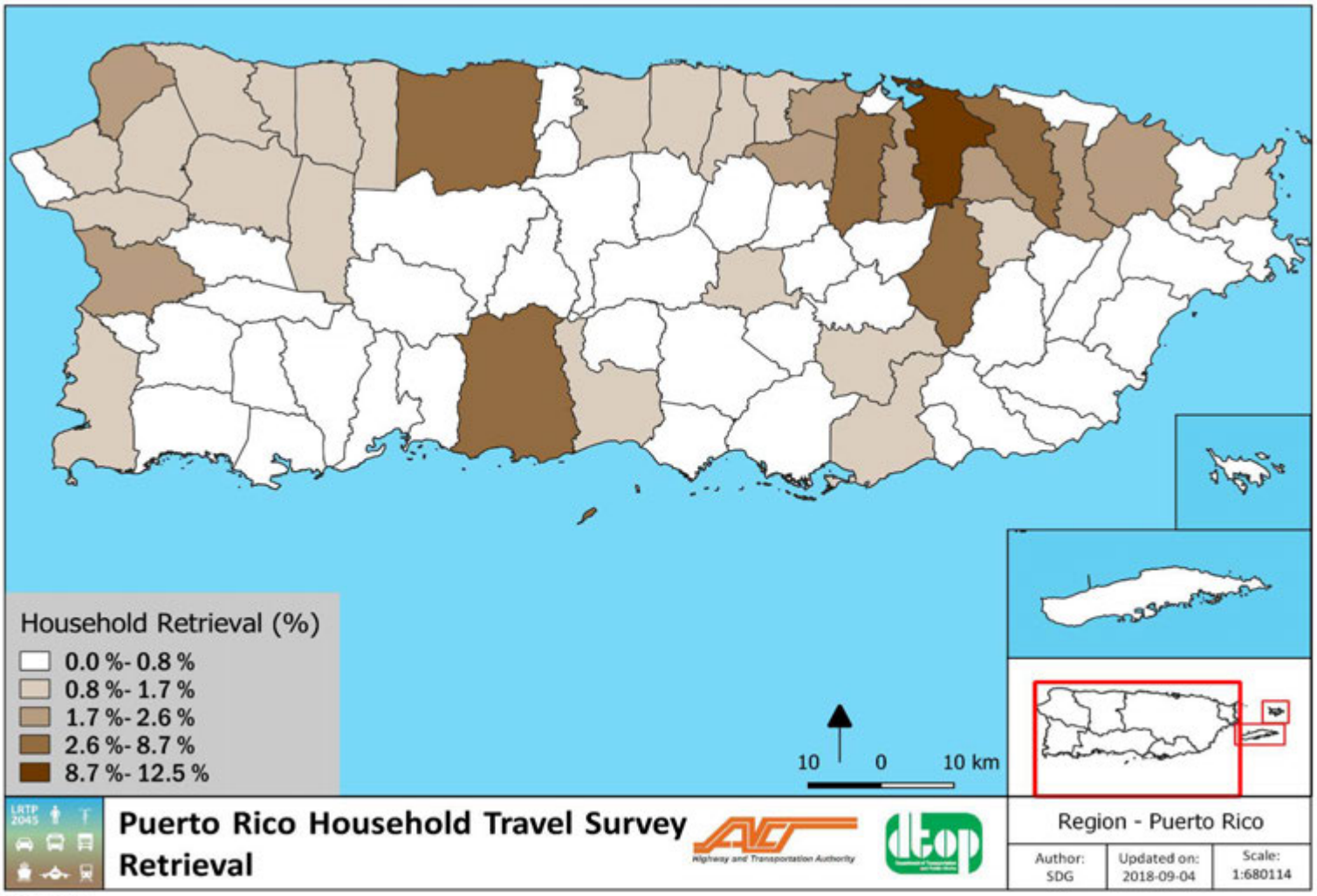
Area	Municipality	U.S. Census 2015		Sampling Plan		Recruited		Retrieval	
		Quantity	%	Quantity	%	Quantity	%	Quantity	%
Other Urbanized Areas	Quebradillas	9,043	0.73%	19	0.70%	23	0.76%	23	0.83%
	Utuado	10,130	0.81%	21	0.78%	17	0.56%	20	0.72%
	Arroyo	6,281	0.50%	13	0.48%	7	0.23%	7	0.25%
	Guayama	15,179	1.22%	31	1.15%	36	1.19%	34	1.22%
	Patillas	6,436	0.52%	13	0.48%	9	0.30%	8	0.29%
	Salinas	11,027	0.89%	23	0.85%	21	0.69%	21	0.75%
	Coamo	13,648	1.10%	28	1.04%	18	0.59%	18	0.65%
	Guánica	5,445	0.44%	11	0.41%	8	0.26%	10	0.36%
	Guayanilla	6,620	0.53%	14	0.52%	7	0.23%	4	0.14%
	Juana Díaz	16,619	1.34%	34	1.26%	38	1.25%	33	1.19%
	Peñuelas	7,643	0.61%	16	0.59%	18	0.59%	15	0.54%
	Ponce	55,497	4.46%	114	4.22%	135	4.45%	128	4.60%
	Santa Isabel	7,727	0.62%	16	0.59%	10	0.33%	11	0.40%
	Villalba	8,003	0.64%	16	0.59%	13	0.43%	13	0.47%
	Yauco	10,435	0.84%	22	0.81%	29	0.96%	22	0.79%
	Cabo Rojo	17,115	1.38%	35	1.30%	37	1.22%	35	1.26%
	Hormigueros	6,418	0.52%	13	0.48%	13	0.43%	12	0.43%
	Lajas	8,417	0.68%	17	0.63%	4	0.13%	6	0.22%
	Maricao	1,907	0.15%	4	0.15%	2	0.07%	3	0.11%
	Mayagüez	30,431	2.45%	63	2.33%	68	2.24%	63	2.26%
	Sabana Grande	7,075	0.57%	15	0.56%	4	0.13%	6	0.22%
	San Germán	12,430	1.00%	26	0.96%	14	0.46%	17	0.61%
	Subtotal	**383,324**	**30.81%**	**791**	**29.30%**	**846**	**27.89%**	**780**	**28.02%**
	Total	**1,244,202**	**100.00%**	**2,700**	**100.00%**	**3,033**	**100.00%**	**2,866**	**2,784**

Source: SDG

Figure 4.2 presents a choropleth map of the PRHTS execution. Top 5 municipalities were highest quantity of surveys were completed are:

- San Juan: 12.54%;
- Bayamon: 8.73%;
- Carolina: 4.74;
- Caguas: 3.59%; and
- Ponce: 4.60%.

Figure 4.2: PRHTS Percentage Retrieval



Source: SDG

Table 4.6 shows PRHTS retrieval by municipality and design variables. Red cells (blue font) represent municipalities where according to U.S. Census (2015) do not have households in that specific strata. Red cells (white font) represent municipalities that although U.S. Census (2015) established that this specific combination of municipality and strata did not have households, during the survey execution were found households that meet that criteria. Table 4.7 is showing the percentage representation of these data.

Table 4.6: PRHTS Retrieval by Municipality and Design Variables

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality RETRIEVAL
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
San Juan TMA	Aguas Buenas	0	1	0	0	0	0	5	1	1	0	0	0	2	2	4	0	1	0	0	1	18
	Aibonito	0	4	0	0	0	0	5	2	1	1	0	2	4	0	0	0	1	0	0	0	20
	Barranquitas	3	1	1	0	0	0	3	4	0	0	1	0	3	3	1	0	1	2	0	1	24
	Bayamón	23	36	4	1	0	11	39	36	4	1	3	14	27	9	1	0	10	12	7	5	243
	Caguas	6	11	3	0	0	3	18	17	2	1	0	6	13	9	0	1	2	5	2	1	100
	Canóvanas	2	8	2	0	0	2	11	15	1	0	0	5	7	3	1	1	4	2	2	1	67
	Carolina	5	17	1	0	0	1	22	21	6	0	2	14	12	7	2	0	4	4	8	6	132
	Cataño	0	1	0	0	0	1	0	2	0	0	0	0	2	1	0	0	1	0	0	1	9
	Cayey	2	4	0	0	0	0	4	3	1	0	0	2	1	0	1	0	2	8	2	1	31
	Ciales	0	0	1	0	0	1	2	0	1	0	0	0	0	0	0	0	0	1	0	0	6
	Cidra	1	2	1	0	0	0	3	3	1	1	1	0	3	2	0	0	0	2	0	0	20
	Comerío	0	0	0	0	0	0	3	1	0	0	0	1	0	0	0	0	0	0	0	2	7
	Corozal	0	0	0	0	0	0	2	2	0	1	0	3	2	1	0	0	1	1	0	0	13
	Dorado	2	3	1	0	0	0	4	3	1	0	0	1	3	0	0	0	1	5	1	2	27
	Guaynabo	8	11	0	0	0	3	9	14	3	0	0	2	5	5	2	0	3	6	0	2	73
	Gurabo	0	1	0	0	0	1	6	4	1	0	0	1	3	2	3	0	0	1	3	1	27
	Humacao	2	2	0	0	0	0	5	2	1	0	0	0	2	0	0	1	1	0	1	0	17
	Juncos	0	3	0	0	0	0	2	6	0	0	0	1	2	2	0	0	0	1	0	0	17
	Las Piedras	1	2	0	1	0	0	3	0	2	0	0	2	1	1	0	0	0	2	0	1	16
	Loíza	2	2	0	0	0	0	4	1	0	0	1	2	1	2	0	1	0	3	0	0	19
	Manatí	2	8	1	0	0	1	4	6	0	0	0	2	5	1	0	1	0	4	1	1	37
	Maunabo	0	2	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	6
	Morovis	0	1	0	0	0	0	2	2	1	0	0	1	0	0	0	0	1	3	1	0	12
	Naguabo	0	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0	1	1	1	0	7
	Naranjito	0	3	0	0	0	1	2	5	3	0	0	4	0	0	0	0	0	1	2	1	22

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality RETRIEVAL
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
Aguadilla TMA	Orocovis	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	1	1	0	0	5
	Río Grande	1	8	1	1	0	2	10	10	0	0	0	5	2	3	0	0	3	8	2	3	59
	San Juan	18	59	5	0	0	13	53	33	6	1	5	24	38	10	1	1	19	38	9	16	349
	San Lorenzo	0	2	1	0	0	0	5	2	0	0	0	2	2	0	1	0	1	2	2	2	22
	Toa Alta	0	5	0	0	0	0	5	8	1	0	0	4	7	6	2	0	1	6	5	2	52
	Toa Baja	1	13	4	1	0	0	10	11	1	1	0	3	8	2	0	1	3	7	4	2	72
	Trujillo Alto	3	9	0	0	0	1	6	9	2	1	0	2	6	3	2	0	3	4	6	1	58
	Vega Alta	1	2	1	0	0	1	3	4	1	0	0	3	4	0	1	0	1	3	2	1	28
	Vega Baja	3	2	0	0	0	0	5	8	1	0	0	3	2	1	0	0	0	4	0	1	30
	Yabucoa	3	2	0	0	0	0	4	2	0	0	0	1	3	1	0	0	0	1	1	0	18
	Subtotal	**89**	**226**	**27**	**4**	**0**	**42**	**262**	**240**	**43**	**9**	**13**	**111**	**170**	**77**	**22**	**7**	**66**	**138**	**62**	**55**	**1663**
	Aguada	1	8	0	0	0	0	14	6	1	0	0	3	1	2	0	0	0	3	1	0	40
	Aguadilla	5	10	1	0	0	3	12	7	2	0	1	3	3	3	0	1	1	2	3	1	58
	Añasco	4	7	0	0	0	0	8	5	2	0	0	3	2	3	1	1	0	2	1	0	39
	Isabela	4	14	2	0	0	0	4	4	1	0	1	2	4	3	0	0	3	1	3	1	47
	Lares	1	2	0	0	0	2	9	4	0	1	3	6	2	1	0	2	2	2	2	2	41
	Las Marías	1	0	0	0	0	1	0	0	0	0	0	1	3	2	0	0	1	1	0	0	10
	Moca	5	6	1	0	0	0	5	8	0	0	0	4	4	0	0	0	1	1	1	3	39
	Rincón	0	2	1	0	0	0	6	4	0	0	0	3	2	2	0	0	1	0	0	1	22
	San Sebastián	0	5	0	0	0	2	10	3	2	0	0	7	5	3	0	0	2	4	1	1	45
	Subtotal	**21**	**54**	**5**	**0**	**0**	**8**	**68**	**41**	**8**	**1**	**5**	**32**	**26**	**19**	**1**	**4**	**11**	**16**	**12**	**9**	**341**
Other Urbanized Areas	Ceiba	1	0	0	0	0	1	0	2	0	0	0	0	2	0	0	0	0	1	0	1	8
	Culebra	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Fajardo	1	5	0	1	0	5	8	1	0	0	0	0	4	2	0	0	2	2	0	0	31
	Luquillo	1	2	0	0	0	0	3	3	1	0	0	0	3	1	0	0	2	2	0	0	18
	Vieques	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	3
	Adjuntas	1	0	0	0	0	1	2	2	0	1	0	2	0	0	0	0	0	0	1	0	10

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality RETRIEVAL
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
	Arecibo	6	15	2	0	1	2	18	12	2	0	1	13	7	4	0	0	1	12	3	0	99
	Barceloneta	0	5	0	0	0	1	3	6	2	0	0	0	1	1	0	0	0	1	0	0	20
	Camuy	1	9	0	0	0	1	4	4	1	1	0	3	4	0	1	0	1	6	1	1	38
	Florida	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	3
	Hatillo	0	5	1	0	0	0	4	7	2	0	1	0	6	2	0	0	2	0	1	0	31
	Jayuya	0	0	0	0	0	0	1	3	0	0	0	2	1	1	0	0	0	0	1	0	9
	Quebradillas	2	4	0	0	0	0	3	1	2	0	0	1	1	5	0	0	0	3	1	0	23
	Utuado	0	2	0	0	0	0	5	5	1	0	0	1	2	0	0	0	1	3	0	0	20
	Arroyo	1	0	0	0	0	1	2	2	0	0	0	0	0	0	0	0	0	1	0	0	7
	Guayama	9	4	1	0	0	1	5	3	1	0	0	2	1	2	0	0	1	2	2	0	34
	Patillas	0	2	0	0	0	0	0	0	0	0	0	1	2	0	0	0	2	0	0	1	8
	Salinas	5	1	0	0	0	0	2	2	1	0	0	1	3	0	1	2	1	1	1	0	21
	Coamo	0	3	0	0	0	0	1	2	0	1	0	0	4	3	0	0	0	3	1	0	18
	Guánica	1	2	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	1	0	1	10
	Guayanilla	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	1	0	0	4
	Juana Díaz	0	4	0	0	1	1	11	2	3	0	0	1	4	1	1	0	2	0	2	0	33
	Peñuelas	1	3	0	1	0	1	3	2	0	0	0	0	0	0	1	0	0	0	1	2	15
	Ponce	6	16	4	0	0	8	24	17	3	1	0	12	10	7	0	1	4	11	3	1	128
	Santa Isabel	1	0	0	0	0	0	2	3	1	0	0	1	1	0	0	0	1	0	0	1	11
	Villalba	1	3	0	0	0	0	2	1	0	0	0	2	1	1	0	0	0	0	1	1	13
	Yauco	0	1	0	0	0	1	2	3	2	1	0	3	1	1	0	0	0	3	4	0	22
	Cabo Rojo	0	5	1	0	0	0	6	8	0	0	0	2	2	1	0	0	2	4	3	1	35
	Hormigueros	0	1	2	0	0	0	1	2	0	0	0	1	2	1	0	1	0	1	0	0	12
	Lajas	0	0	0	0	0	0	2	1	1	0	0	1	1	0	0	0	0	0	0	0	6
	Maricao	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	3
	Mayagüez	2	13	0	0	0	1	9	7	4	0	1	7	10	3	0	1	1	3	0	1	63

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality RETRIEVAL
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
	Sabana Grande	0	0	0	0	0	2	0	0	0	0	0	0	2	1	0	0	0	1	0	0	6
	San Germán	1	5	0	0	0	1	3	2	0	0	0	2	0	1	0	0	1	0	0	1	17
	Subtotal	**41**	**112**	**11**	**2**	**2**	**28**	**130**	**109**	**29**	**6**	**3**	**59**	**75**	**38**	**4**	**5**	**25**	**62**	**27**	**12**	**780**
	Total	**151**	**392**	**43**	**6**	**2**	**78**	**460**	**390**	**80**	**16**	**21**	**202**	**271**	**134**	**27**	**16**	**102**	**216**	**101**	**76**	**2784**

Source: SDG

Table 4.7: Percentage Representation of PRHTS Retrieval by Municipality and Design Variables

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality RETRIEVAL
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
San Juan TMA	Aguas Buenas	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	1.09%	0.26%	1.25%	0.00%	0.00%	0.00%	0.74%	1.49%	14.81%	0.00%	0.98%	0.00%	0.00%	1.32%	0.65%
	Aibonito	0.00%	1.02%	0.00%	0.00%	0.00%	0.00%	1.09%	0.51%	1.25%	6.25%	0.00%	0.99%	1.48%	0.00%	0.00%	0.00%	0.98%	0.00%	0.00%	0.00%	0.72%
	Barranquitas	1.99%	0.26%	2.33%	0.00%	0.00%	0.00%	0.65%	1.03%	0.00%	0.00%	4.76%	0.00%	1.11%	2.24%	3.70%	0.00%	0.98%	0.93%	0.00%	1.32%	0.86%
	Bayamón	15.23%	9.18%	9.30%	16.67%	0.00%	14.10%	8.48%	9.23%	5.00%	6.25%	14.29%	6.93%	9.96%	6.72%	3.70%	0.00%	9.80%	5.56%	6.93%	6.58%	8.73%
	Caguas	3.97%	2.81%	6.98%	0.00%	0.00%	3.85%	3.91%	4.36%	2.50%	6.25%	0.00%	2.97%	4.80%	6.72%	0.00%	6.25%	1.96%	2.31%	1.98%	1.32%	3.59%
	Canóvanas	1.32%	2.04%	4.65%	0.00%	0.00%	2.56%	2.39%	3.85%	1.25%	0.00%	0.00%	2.48%	2.58%	2.24%	3.70%	6.25%	3.92%	0.93%	1.98%	1.32%	2.41%
	Carolina	3.31%	4.34%	2.33%	0.00%	0.00%	1.28%	4.78%	5.38%	7.50%	0.00%	9.52%	6.93%	4.43%	5.22%	7.41%	0.00%	3.92%	1.85%	7.92%	7.89%	4.74%
	Cataño	0.00%	0.26%	0.00%	0.00%	0.00%	1.28%	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	0.74%	0.75%	0.00%	0.00%	0.98%	0.00%	0.00%	1.32%	0.32%
	Cayey	1.32%	1.02%	0.00%	0.00%	0.00%	0.00%	0.87%	0.77%	1.25%	0.00%	0.00%	0.99%	0.37%	0.00%	3.70%	0.00%	1.96%	3.70%	1.98%	1.32%	1.11%
	Ciales	0.00%	0.00%	2.33%	0.00%	0.00%	1.28%	0.43%	0.00%	1.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%	0.22%
	Cidra	0.66%	0.51%	2.33%	0.00%	0.00%	0.00%	0.65%	0.77%	1.25%	6.25%	4.76%	0.00%	1.11%	1.49%	0.00%	0.00%	0.00%	0.93%	0.00%	0.00%	0.72%
	Comerío	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.65%	0.26%	0.00%	0.00%	0.00%	0.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.63%	0.25%
	Corozal	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.51%	0.00%	6.25%	0.00%	1.49%	0.74%	0.75%	0.00%	0.00%	0.98%	0.46%	0.00%	0.00%	0.47%
	Dorado	1.32%	0.77%	2.33%	0.00%	0.00%	0.00%	0.87%	0.77%	1.25%	0.00%	0.00%	0.50%	1.11%	0.00%	0.00%	0.00%	0.98%	2.31%	0.99%	2.63%	0.97%

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality RETRIEVAL
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
	Guaynabo	5.30%	2.81%	0.00%	0.00%	0.00%	3.85%	1.96%	3.59%	3.75%	0.00%	0.00%	0.99%	1.85%	3.73%	7.41%	0.00%	2.94%	2.78%	0.00%	2.63%	2.62%
	Gurabo	0.00%	0.26%	0.00%	0.00%	0.00%	1.28%	1.30%	1.03%	1.25%	0.00%	0.00%	0.50%	1.11%	1.49%	11.11%	0.00%	0.00%	0.46%	2.97%	1.32%	0.97%
	Humacao	1.32%	0.51%	0.00%	0.00%	0.00%	0.00%	1.09%	0.51%	1.25%	0.00%	0.00%	0.00%	0.74%	0.00%	0.00%	6.25%	0.98%	0.00%	0.99%	0.00%	0.61%
	Juncos	0.00%	0.77%	0.00%	0.00%	0.00%	0.00%	0.43%	1.54%	0.00%	0.00%	0.00%	0.50%	0.74%	1.49%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%	0.61%
	Las Piedras	0.66%	0.51%	0.00%	16.67%	0.00%	0.00%	0.65%	0.00%	2.50%	0.00%	0.00%	0.99%	0.37%	0.75%	0.00%	0.00%	0.00%	0.93%	0.00%	1.32%	0.57%
	Loíza	1.32%	0.51%	0.00%	0.00%	0.00%	0.00%	0.87%	0.26%	0.00%	0.00%	4.76%	0.99%	0.37%	1.49%	0.00%	6.25%	0.00%	1.39%	0.00%	0.00%	0.68%
	Manatí	1.32%	2.04%	2.33%	0.00%	0.00%	1.28%	0.87%	1.54%	0.00%	0.00%	0.00%	0.99%	1.85%	0.75%	0.00%	6.25%	0.00%	1.85%	0.99%	1.32%	1.33%
	Maunabo	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	0.22%	0.00%	1.25%	6.25%	0.00%	0.00%	0.00%	0.75%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%
	Morovis	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	0.43%	0.51%	1.25%	0.00%	0.00%	0.50%	0.00%	0.00%	0.00%	0.00%	0.98%	1.39%	0.99%	0.00%	0.43%
	Naguabo	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	0.22%	0.26%	0.00%	0.00%	0.00%	0.50%	0.00%	0.00%	0.00%	0.00%	0.98%	0.46%	0.99%	0.00%	0.25%
	Naranjito	0.00%	0.77%	0.00%	0.00%	0.00%	1.28%	0.43%	1.28%	3.75%	0.00%	0.00%	1.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	1.98%	1.32%	0.79%
	Orocovis	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.98%	0.46%	0.00%	0.00%	0.18%
	Río Grande	0.66%	2.04%	2.33%	16.67%	0.00%	2.56%	2.17%	2.56%	0.00%	0.00%	0.00%	2.48%	0.74%	2.24%	0.00%	0.00%	2.94%	3.70%	1.98%	3.95%	2.12%
	San Juan	11.92%	15.05%	11.63%	0.00%	0.00%	16.67%	11.52%	8.46%	7.50%	6.25%	23.81%	11.88%	14.02%	7.46%	3.70%	6.25%	18.63%	17.59%	8.91%	21.05%	12.54%
	San Lorenzo	0.00%	0.51%	2.33%	0.00%	0.00%	0.00%	1.09%	0.51%	0.00%	0.00%	0.00%	0.99%	0.74%	0.00%	3.70%	0.00%	0.98%	0.93%	1.98%	2.63%	0.79%
	Toa Alta	0.00%	1.28%	0.00%	0.00%	0.00%	0.00%	1.09%	2.05%	1.25%	0.00%	0.00%	1.98%	2.58%	4.48%	7.41%	0.00%	0.98%	2.78%	4.95%	2.63%	1.87%
	Toa Baja	0.66%	3.32%	9.30%	16.67%	0.00%	0.00%	2.17%	2.82%	1.25%	6.25%	0.00%	1.49%	2.95%	1.49%	0.00%	6.25%	2.94%	3.24%	3.96%	2.63%	2.59%
	Trujillo Alto	1.99%	2.30%	0.00%	0.00%	0.00%	1.28%	1.30%	2.31%	2.50%	6.25%	0.00%	0.99%	2.21%	2.24%	7.41%	0.00%	2.94%	1.85%	5.94%	1.32%	2.08%
	Vega Alta	0.66%	0.51%	2.33%	0.00%	0.00%	1.28%	0.65%	1.03%	1.25%	0.00%	0.00%	1.49%	1.48%	0.00%	3.70%	0.00%	0.98%	1.39%	1.98%	1.32%	1.01%
	Vega Baja	1.99%	0.51%	0.00%	0.00%	0.00%	0.00%	1.09%	2.05%	1.25%	0.00%	0.00%	1.49%	0.74%	0.75%	0.00%	0.00%	0.00%	1.85%	0.00%	1.32%	1.08%
	Yabucoa	1.99%	0.51%	0.00%	0.00%	0.00%	0.00%	0.87%	0.51%	0.00%	0.00%	0.00%	0.50%	1.11%	0.75%	0.00%	0.00%	0.00%	0.46%	0.99%	0.00%	0.65%
	Subtotal	58.94%	57.65%	62.79%	66.67%	0.00%	53.85%	56.96%	61.54%	53.75%	56.25%	61.90%	54.95%	62.73%	57.46%	81.48%	43.75%	64.71%	63.89%	61.39%	72.37%	59.73%
	Aguada	0.66%	2.04%	0.00%	0.00%	0.00%	0.00%	3.04%	1.54%	1.25%	0.00%	0.00%	1.49%	0.37%	1.49%	0.00%	0.00%	0.00%	1.39%	0.99%	0.00%	1.44%
	Aguadilla	3.31%	2.55%	2.33%	0.00%	0.00%	3.85%	2.61%	1.79%	2.50%	0.00%	4.76%	1.49%	1.11%	2.24%	0.00%	6.25%	0.98%	0.93%	2.97%	1.32%	2.08%
Aguadilla TMA	Añasco	2.65%	1.79%	0.00%	0.00%	0.00%	0.00%	1.74%	1.28%	2.50%	0.00%	0.00%	1.49%	0.74%	2.24%	3.70%	6.25%	0.00%	0.93%	0.99%	0.00%	1.40%
	Isabela	2.65%	3.57%	4.65%	0.00%	0.00%	0.00%	0.87%	1.03%	1.25%	0.00%	4.76%	0.99%	1.48%	2.24%	0.00%	0.00%	2.94%	0.46%	2.97%	1.32%	1.69%
	Lares	0.66%	0.51%	0.00%	0.00%	0.00%	2.56%	1.96%	1.03%	0.00%	6.25%	14.29%	2.97%	0.74%	0.75%	0.00%	12.50%	1.96%	0.93%	1.98%	2.63%	1.47%

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality RETRIEVAL
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
Other Urbanized Areas	Las Marías	0.66%	0.00%	0.00%	0.00%	0.00%	1.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.50%	1.11%	1.49%	0.00%	0.00%	0.98%	0.46%	0.00%	0.00%	0.36%
	Moca	3.31%	1.53%	2.33%	0.00%	0.00%	0.00%	1.09%	2.05%	0.00%	0.00%	0.00%	1.98%	1.48%	0.00%	0.00%	0.00%	0.98%	0.46%	0.99%	3.95%	1.40%
	Rincón	0.00%	0.51%	2.33%	0.00%	0.00%	0.00%	1.30%	1.03%	0.00%	0.00%	0.00%	1.49%	0.74%	1.49%	0.00%	0.00%	0.98%	0.00%	0.00%	1.32%	0.79%
	San Sebastián	0.00%	1.28%	0.00%	0.00%	0.00%	2.56%	2.17%	0.77%	2.50%	0.00%	0.00%	3.47%	1.85%	2.24%	0.00%	0.00%	1.96%	1.85%	0.99%	1.32%	1.62%
	Subtotal	13.91%	13.78%	11.63%	0.00%	0.00%	10.26%	14.78%	10.51%	10.00%	6.25%	23.81%	15.84%	9.59%	14.18%	3.70%	25.00%	10.78%	7.41%	11.88%	11.84%	12.25%
	Ceiba	0.66%	0.00%	0.00%	0.00%	0.00%	1.28%	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	0.74%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	1.32%	0.29%
	Culebra	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%
	Fajardo	0.66%	1.28%	0.00%	16.67%	0.00%	6.41%	1.74%	0.26%	0.00%	0.00%	0.00%	0.00%	1.48%	1.49%	0.00%	0.00%	1.96%	0.93%	0.00%	0.00%	1.11%
	Luquillo	0.66%	0.51%	0.00%	0.00%	0.00%	0.00%	0.65%	0.77%	1.25%	0.00%	0.00%	0.00%	1.11%	0.75%	0.00%	0.00%	1.96%	0.93%	0.00%	0.00%	0.65%
	Vieques	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.26%	0.00%	6.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.11%
	Adjuntas	0.66%	0.00%	0.00%	0.00%	0.00%	1.28%	0.43%	0.51%	0.00%	6.25%	0.00%	0.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.99%	0.00%	0.36%
	Arecibo	3.97%	3.83%	4.65%	0.00%	50.00%	2.56%	3.91%	3.08%	2.50%	0.00%	4.76%	6.44%	2.58%	2.99%	0.00%	0.00%	0.98%	5.56%	2.97%	0.00%	3.56%
	Barceloneta	0.00%	1.28%	0.00%	0.00%	0.00%	1.28%	0.65%	1.54%	2.50%	0.00%	0.00%	0.00%	0.37%	0.75%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%	0.72%
	Camuy	0.66%	2.30%	0.00%	0.00%	0.00%	1.28%	0.87%	1.03%	1.25%	6.25%	0.00%	1.49%	1.48%	0.00%	3.70%	0.00%	0.98%	2.78%	0.99%	1.32%	1.36%
	Florida	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.98%	0.00%	0.00%	0.00%	0.11%
	Hatillo	0.00%	1.28%	2.33%	0.00%	0.00%	0.00%	0.87%	1.79%	2.50%	0.00%	4.76%	0.00%	2.21%	1.49%	0.00%	0.00%	1.96%	0.00%	0.99%	0.00%	1.11%
	Jayuya	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.77%	0.00%	0.00%	0.00%	0.99%	0.37%	0.75%	0.00%	0.00%	0.00%	0.00%	0.99%	0.00%	0.32%
	Quebradillas	1.32%	1.02%	0.00%	0.00%	0.00%	0.00%	0.65%	0.26%	2.50%	0.00%	0.00%	0.50%	0.37%	3.73%	0.00%	0.00%	0.00%	1.39%	0.99%	0.00%	0.83%
	Utuado	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	1.09%	1.28%	1.25%	0.00%	0.00%	0.50%	0.74%	0.00%	0.00%	0.00%	0.98%	1.39%	0.00%	0.00%	0.72%
	Arroyo	0.66%	0.00%	0.00%	0.00%	0.00%	1.28%	0.43%	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%	0.25%
	Guayama	5.96%	1.02%	2.33%	0.00%	0.00%	1.28%	1.09%	0.77%	1.25%	0.00%	0.00%	0.99%	0.37%	1.49%	0.00%	0.00%	0.98%	0.93%	1.98%	0.00%	1.22%
	Patillas	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.50%	0.74%	0.00%	0.00%	0.00%	1.96%	0.00%	0.00%	1.32%	0.29%
	Salinas	3.31%	0.26%	0.00%	0.00%	0.00%	0.00%	0.43%	0.51%	1.25%	0.00%	0.00%	0.50%	1.11%	0.00%	3.70%	12.50%	0.98%	0.46%	0.99%	0.00%	0.75%
	Coamo	0.00%	0.77%	0.00%	0.00%	0.00%	0.00%	0.22%	0.51%	0.00%	6.25%	0.00%	0.00%	1.48%	2.24%	0.00%	0.00%	0.00%	1.39%	0.99%	0.00%	0.65%
	Guánica	0.66%	0.51%	0.00%	0.00%	0.00%	0.00%	0.43%	0.51%	1.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	1.32%	0.36%
	Guayanilla	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.00%	1.25%	0.00%	0.00%	0.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%	0.14%
	Juana Díaz	0.00%	1.02%	0.00%	0.00%	50.00%	1.28%	2.39%	0.51%	3.75%	0.00%	0.00%	0.50%	1.48%	0.75%	3.70%	0.00%	1.96%	0.00%	1.98%	0.00%	1.19%

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality RETRIEVAL
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
	Peñuelas	0.66%	0.77%	0.00%	16.67%	0.00%	1.28%	0.65%	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.70%	0.00%	0.00%	0.00%	0.99%	2.63%	0.54%
	Ponce	3.97%	4.08%	9.30%	0.00%	0.00%	10.26%	5.22%	4.36%	3.75%	6.25%	0.00%	5.94%	3.69%	5.22%	0.00%	6.25%	3.92%	5.09%	2.97%	1.32%	4.60%
	Santa Isabel	0.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.77%	1.25%	0.00%	0.00%	0.50%	0.37%	0.00%	0.00%	0.00%	0.98%	0.00%	0.00%	1.32%	0.40%
	Villalba	0.66%	0.77%	0.00%	0.00%	0.00%	0.00%	0.43%	0.26%	0.00%	0.00%	0.00%	0.99%	0.37%	0.75%	0.00%	0.00%	0.00%	0.00%	0.99%	1.32%	0.47%
	Yauco	0.00%	0.26%	0.00%	0.00%	0.00%	1.28%	0.43%	0.77%	2.50%	6.25%	0.00%	1.49%	0.37%	0.75%	0.00%	0.00%	0.00%	1.39%	3.96%	0.00%	0.79%
	Cabo Rojo	0.00%	1.28%	2.33%	0.00%	0.00%	0.00%	1.30%	2.05%	0.00%	0.00%	0.00%	0.99%	0.74%	0.75%	0.00%	0.00%	1.96%	1.85%	2.97%	1.32%	1.26%
	Hormigueros	0.00%	0.26%	4.65%	0.00%	0.00%	0.00%	0.22%	0.51%	0.00%	0.00%	0.00%	0.50%	0.74%	0.75%	0.00%	6.25%	0.00%	0.46%	0.00%	0.00%	0.43%
	Lajas	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.26%	1.25%	0.00%	0.00%	0.50%	0.37%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%
	Maricao	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.99%	0.00%	0.11%
	Mayagüez	1.32%	3.32%	0.00%	0.00%	0.00%	1.28%	1.96%	1.79%	5.00%	0.00%	4.76%	3.47%	3.69%	2.24%	0.00%	6.25%	0.98%	1.39%	0.00%	1.32%	2.26%
	Sabana Grande	0.00%	0.00%	0.00%	0.00%	0.00%	2.56%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.74%	0.75%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%	0.22%
	San Germán	0.66%	1.28%	0.00%	0.00%	0.00%	1.28%	0.65%	0.51%	0.00%	0.00%	0.00%	0.99%	0.00%	0.75%	0.00%	0.00%	0.98%	0.00%	0.00%	1.32%	0.61%
	Subtotal	27.15%	28.57%	25.58%	33.33%	100.00%	35.90%	28.26%	27.95%	36.25%	37.50%	14.29%	29.21%	27.68%	28.36%	14.81%	31.25%	24.51%	28.70%	26.73%	15.79%	28.02%
	Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: SDG

Table 4.8 exhibits response rates by municipalities. Aguadilla TMA was the region with highest response rates (100.89%).

Table 4.8: Survey Response Rates by Geographic Area and Municipality

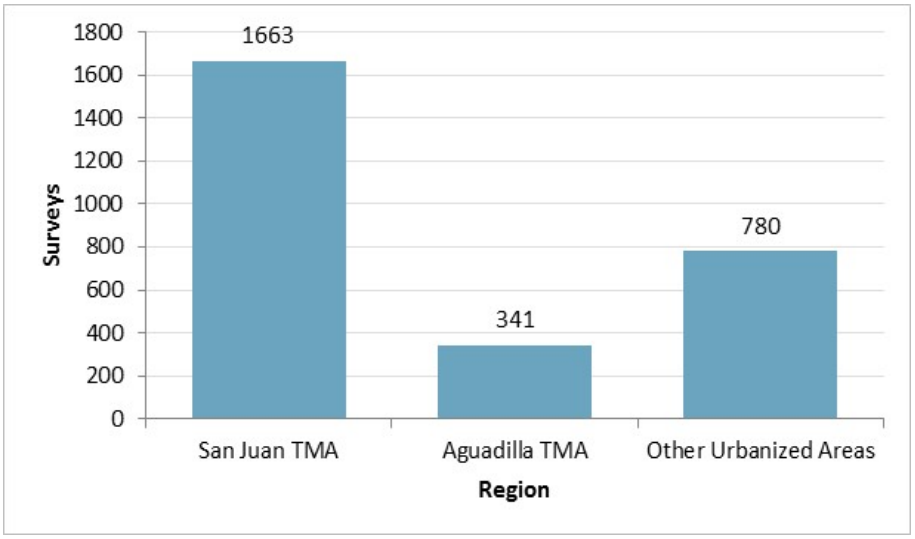
Area	Municipality	Total Households in Region	Households Target	Households Recruited	Households Retrieval	Response Rate
San Juan TMA	Aguas Buenas	8,848	18	19	18	94.74%
	Aibonito	8,708	18	24	20	83.33%
	Barranquitas	9,319	19	26	24	92.31%
	Bayamón	71,375	147	289	243	84.08%
	Caguas	50,500	104	117	100	85.47%
	Canóvanas	14,698	30	67	67	100.00%
	Carolina	64,366	133	142	132	92.96%
	Cataño	9,372	19	9	9	100.00%
	Cayey	16,575	34	37	31	83.78%
	Ciales	5,899	12	7	6	85.71%
	Cidra	13,905	29	19	20	105.26%
	Comerío	6,492	13	8	7	87.50%
	Corozal	11,039	23	14	13	92.86%
	Dorado	12,332	25	26	27	103.85%
	Guaynabo	34,963	72	78	73	93.59%
	Gurabo	15,306	32	28	27	96.43%
	Humacao	18,563	38	16	17	106.25%
	Juncos	12,984	27	20	17	85.00%
	Las Piedras	12,884	27	16	16	100.00%
	Loíza	9,007	19	20	19	95.00%
	Manatí	16,075	33	36	37	102.78%
	Maunabo	4,086	8	7	6	85.71%
	Morovis	9,788	20	13	12	92.31%
	Naguabo	8,797	18	7	7	100.00%
	Naranjito	8,632	18	24	22	91.67%
	Orocovis	6,857	14	8	5	62.50%
	Río Grande	16,831	35	66	59	89.39%
	San Juan	147,316	304	413	349	84.50%
	San Lorenzo	13,649	28	22	22	100.00%
	Toa Alta	22,569	47	55	52	94.55%
	Toa Baja	28,833	59	85	72	84.71%
	Trujillo Alto	24,812	51	57	58	101.75%
	Vega Alta	12,572	26	29	28	96.55%
	Vega Baja	17,309	36	31	30	96.77%
	Yabucoa	12,171	25	14	18	128.57%
	Subtotal	**757,432**	**1,561**	**1,849**	**1,663**	**89.94%**
Aguadilla TMA	Aguada	13,110	42	44	40	90.91%
	Aguadilla	20,821	58	59	58	98.31%
	Añasco	9,572	35	39	39	100.00%
	Isabela	15,303	47	48	47	97.92%
	Lares	10,128	36	38	41	107.89%

Area	Municipality	Total Households in Region	Households Target	Households Recruited	Households Retrieval	Response Rate
Other Urbanized Areas	Las Marías	3,144	21	10	10	100.00%
	Moca	12,279	40	37	39	105.41%
	Rincón	5,437	26	21	22	104.76%
	San Sebastián	13,652	43	42	45	107.14%
	Subtotal	**103,446**	**348**	**338**	**341**	**100.89%**
	Ceiba	4,584	9	10	8	80.00%
	Culebra	518	1	2	1	50.00%
	Fajardo	12,759	26	46	31	67.39%
	Luquillo	6,788	14	21	18	85.71%
	Vieques	2,773	6	3	3	100.00%
	Adjuntas	6,322	13	31	10	32.26%
	Arecibo	32,287	67	101	99	98.02%
	Barceloneta	8,315	17	19	20	105.26%
	Camuy	11,934	25	39	38	97.44%
	Florida	4,364	9	3	3	100.00%
	Hatillo	14,337	30	30	31	103.33%
	Jayuya	4,817	10	10	9	90.00%
	Quebradillas	9,043	19	23	23	100.00%
	Utuado	10,130	21	17	20	117.65%
	Arroyo	6,281	13	7	7	100.00%
	Guayama	15,179	31	36	34	94.44%
	Patillas	6,436	13	9	8	88.89%
	Salinas	11,027	23	21	21	100.00%
	Coamo	13,648	28	18	18	100.00%
	Guánica	5,445	11	8	10	125.00%
	Guayanilla	6,620	14	7	4	57.14%
	Juana Díaz	16,619	34	38	33	86.84%
	Peñuelas	7,643	16	18	15	83.33%
	Ponce	55,497	114	135	128	94.81%
	Santa Isabel	7,727	16	10	11	110.00%
	Villalba	8,003	16	13	13	100.00%
	Yauco	10,435	22	29	22	75.86%
	Cabo Rojo	17,115	35	37	35	94.59%
	Hormigueros	6,418	13	13	12	92.31%
	Lajas	8,417	17	4	6	150.00%
	Maricao	1,907	4	2	3	150.00%
	Mayagüez	30,431	63	68	63	92.65%
	Sabana Grande	7,075	15	4	6	150.00%
	San Germán	12,430	26	14	17	121.43%
	Subtotal	**383,324**	**791**	**846**	**780**	**92.20%**
	Total	**1,244,202**	**2,700**	**3,033**	**2,784**	**91.79%**

Source: SDG

Figure 4.3 shows the quantity of households surveyed by region.

Figure 4.3: Quantity of Surveys by Region



Source: SDG

Survey Data Geocoding

PRHTS allowed to identify the geographic location of a trip origin and destination and coding a number to represent a specific location. As the survey was not to be intended to feed the CUBE model in anyways, this step was not carried out at this stage.

Survey Quality Control Plan

Survey team developed a plan that outlines weekly number of surveys that would be recruited. This plan delineated weekly quotas for household recruitments (Table 4.9). As a quality control procedure each household was individually tracked to completion throughout execution, using a weekly report generated through a python®[9] script which extracted from the Sawtooth®[10] database the completed household travel surveys (those where at least 50% of adults' household members completed the trip diary).

As well, during the data collection process, weekly reports were delivered to Infocus. These reports not only provided the 50% check but also:

- The design variable matrix (vehicle availability vs household size) showing the number of surveys needed to complete the goal;
- Quantity of surveys by municipality; and
- The design variable matrix by region/municipality.

The development of these weekly reports allowed to monitor not only the quotas fulfillment but also to monitor sample representativeness.

[9] Programming Language.

[10] Programming Language.

Table 4.9: Survey Execution Schedule

Area	Municipality	Week	Year Week	Number of Surveys	Total per Week	1-person household:					2-person household:					3-person household:					4-or-more-person household:				
						No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
San Juan-Caguas-Guaynabo	Aibonito	31 Jan - 02 Feb	5	20	250	2	2	0	0	0	1	4	2	0	0	0	2	1	0	0	1	2	2	1	0
	Arecibo			74		8	10	1	0	0	3	12	8	2	0	1	6	5	2	0	1	5	6	3	1
	Barceloneta			19		1	3	0	0	0	2	3	2	0	0	0	3	1	0	0	0	1	2	1	0
	Barranquitas			21		1	3	0	0	0	1	5	1	0	0	0	2	1	0	0	1	3	2	1	0
	Caguas			116		11	16	1	0	0	5	15	14	1	0	2	10	10	3	0	2	7	12	5	2
	Bayamón	3 - 9 Feb	6	164	251	13	24	2	0	0	5	24	19	2	0	3	12	15	5	1	2	11	16	7	3
	Corozal			25		2	3	0	0	0	1	4	2	0	1	0	2	1	1	0	0	4	3	1	0
	Dorado			28		1	3	1	1	0	1	3	4	1	0	1	2	2	1	0	0	1	3	2	1
	Canóvanas			34		3	4	0	0	0	1	5	4	1	0	0	3	3	1	0	1	2	4	2	0
	Camuy	10 - 16 Feb	7	27	252	2	3	0	0	0	0	4	3	0	0	0	3	3	1	0	0	2	4	1	1
	Loíza			21		2	2	0	1	0	1	3	1	1	0	1	2	1	0	0	1	2	2	1	0
	Carolina			148		11	26	2	0	0	5	21	18	2	0	3	11	11	4	1	2	8	14	7	2
	Cataño			22		2	2	0	0	0	1	3	2	0	0	1	2	1	1	0	1	2	2	1	1
	Aguas Buenas			20		2	3	0	1	0	1	3	2	0	0	0	2	1	0	0	0	2	2	1	0
	Ciales			14		1	2	0	0	0	1	3	2	0	0	0	1	1	0	0	0	1	1	1	0
	Cayey			38		3	5	0	0	0	1	6	4	1	0	1	3	3	1	1	1	2	4	2	0
	Cidra			32		2	4	1	0	0	1	5	3	0	0	1	2	3	1	1	0	2	4	1	1
	Comerío			15		2	2	0	0	0	1	2	1	0	0	0	2	1	0	0	0	2	1	1	0
	Florida			10		1	1	0	0	0	0	2	2	0	0	0	1	1	0	0	0	1	1	0	0
	Gurabo	17 - 23 Feb	8	35	245	3	4	1	0	0	1	5	4	1	0	0	3	3	1	0	0	2	4	2	1
	Hatillo			33		2	5	0	0	0	1	6	4	0	0	0	3	4	1	0	0	2	4	1	0
	Humacao			43		3	7	0	0	0	2	7	6	0	0	1	3	2	1	1	1	2	4	2	1
	Maunabo			9		1	2	0	0	0	1	1	1	0	0	0	0	1	0	0	0	1	1	0	0
	Juncos			30		2	3	0	0	0	1	5	3	1	1	1	3	4	0	0	0	2	3	1	0
	Las Piedras	24 Feb - 2 Mar	9	30	237	2	4	0	0	0	1	5	3	1	0	0	2	3	1	0	0	3	3	1	1
	Manatí			37		3	5	1	0	0	3	5	3	1	0	1	2	3	1	0	1	3	3	1	1
	Morovis			23		2	2	1	0	0	1	4	1	0	0	0	3	2	1	0	1	2	2	1	0
	Naguabo			20		2	2	1	0	0	1	2	2	1	0	1	1	1	1	1	0	1	2	1	0
	Naranjito			20		2	3	0	0	0	1	3	1	0	0	0	2	2	1	0	0	2	2	1	0
	Orocovis			16		2	2	0	0	0	1	3	2	1	1	0	1	1	0	0	0	1	1	0	0
	Río Grande			39		3	5	1	0	0	1	5	5	1	0	1	3	4	2	0	0	2	4	1	1
	Toa Alta			52		2	4	1	0	0	2	6	6	1	0	0	3	4	3	1	1	4	8	3	3
	San Lorenzo	3 - 9 Mar	10	31	248	3	4	1	0	0	1	4	4	1	0	1	2	3	1	0	0	1	3	1	1
	Yabucoa			29		3	4	1	0	0	1	3	3	0	0	1	3	3	1	0	0	2	3	1	0
	Guaynabo			81		5	15	2	0	0	2	11	12	1	0	1	5	6	3	1	1	4	8	3	1

Area	Municipality	Week	Year Week	Number of Surveys	Total per Week	1-person household:					2-person household:					3-person household:					4-or-more-person household:				
						No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
Aguadilla-Isabela-San Sebastian	Quebradillas	10 -16 Mar	11	21	250	2	2	1	0	0	1	4	3	0	0	0	2	2	0	0	0	1	2	1	0
	Trujillo Alto			57		4	8	1	0	0	2	8	7	1	0	1	3	5	2	0	1	3	7	3	1
	Vega Alta			29		3	5	0	0	0	1	4	2	0	0	1	3	2	0	0	1	3	3	1	0
	Vega Baja			40		3	5	1	0	0	2	6	4	0	0	1	4	4	1	0	1	3	4	1	0
	Toa Baja			66		5	10	1	0	0	2	9	8	1	0	1	4	6	1	1	1	4	8	3	1
	San Juan			144		49	69	5	1	0	21	45	33	3	1	9	20	17	9	1	10	16	22	5	3
		17 - 23 Mar	12	195	245																				
	Isabela			50		4	5	0	1	0	2	7	6	0	0	2	4	4	1	0	1	4	4	3	2
	Aguada	24 Mar - 30 Mar	13	45	248	3	4	1	0	0	2	6	4	1	1	2	3	3	2	1	2	3	3	2	2
	Aguadilla			63		5	9	1	0	0	4	9	6	1	1	2	4	4	2	1	3	3	5	2	1
	Lares			38		3	4	0	1	0	2	7	2	0	0	1	3	1	1	0	1	5	3	2	2
	Añasco			37		3	4	0	0	0	2	5	3	1	1	1	2	4	1	1	1	2	3	2	1
	Moca			43		3	4	1	0	0	2	5	4	1	0	2	4	3	2	0	1	2	5	2	2
	Las Marías			22		1	3	1	0	0	1	1	2	1	0	1	1	2	1	0	1	1	2	2	1
	San Sebastián			47		4	4	2	0	0	2	8	4	1	1	2	3	3	1	0	1	3	4	2	2
	Rincón			28		2	3	1	0	1	1	3	2	1	0	1	2	2	1	0	1	2	2	1	2
Other Areas	Adjuntas	31 Mar - 6 Apr	14	15	250	1	2	0	0	0	1	3	1	1	0	0	2	1	0	0	0	2	1	0	0
	Arroyo			14		1	3	0	0	0	1	2	1	0	0	0	2	1	0	0	0	1	2	0	0
	Ceiba			11		1	2	0	0	0	0	2	2	0	0	0	1	1	0	0	0	1	1	0	0
	Culebra			1		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Vieques			6		1	1	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0
	Fajardo			29		2	4	1	0	0	1	5	3	0	0	1	2	2	0	0	1	3	3	1	0
	Sabana Grande			17		2	2	0	0	0	1	4	2	0	0	0	2	1	0	0	0	1	2	0	0
	Utuado			23		2	3	1	0	0	1	3	2	1	0	0	2	2	0	0	0	2	2	1	1
	San Germán			29		3	6	1	0	0	2	5	3	0	0	0	2	2	1	0	0	1	2	1	0
	Guayanilla			15		1	2	0	0	0	1	2	2	0	0	0	1	1	0	0	0	3	1	1	0
	Hormigueros			15		1	3	0	0	0	1	3	2	0	0	0	1	1	0	0	0	1	1	1	0
	Guánica	7 - 13 Apr	15	13	254	1	2	0	0	0	1	3	1	0	0	0	2	1	0	0	0	1	1	0	0
	Guayama			35		4	6	1	0	0	1	5	3	0	0	1	4	2	0	0	1	3	3	1	0
	Jayuya			11		1	1	0	0	0	1	2	1	0	0	0	1	1	0	0	0	2	1	0	0
	Luquillo			16		1	3	0	0	0	1	3	2	0	0	0	1	1	0	0	0	1	2	1	0
	Coamo			31		3	3	1	0	0	1	4	4	0	0	1	3	2	1	0	0	2	4	1	1
	Cabo Rojo			39		4	6	0	0	0	1	6	5	0	0	0	3	3	2	0	0	2	4	2	1
	Patillas			15		2	3	0	0	0	1	2	2	1	0	0	1	1	0	0	0	1	1	0	0
	Maricao			5		1	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mayagüez			71		10	12	1	0	0	3	12	7	1	0	1	5	5	3	0	1	3	5	1	1
	Peñuelas			18		2	3	1	0	0	1	2	1	0	0	0	1	1	0	0	1	2	2	1	0
	Ponce	14 - 20 Apr	16	128	251	15	20	2	0	0	7	17	11	1	0	4	10	9	3	1	3	9	11	3	2
	Salinas			25		3	4	1	0	0	1	4	2	0	0	0	2	2	0	0	0	2	3	1	0
	Santa Isabel			18		1	3	1	0	0	1	2	2	0	0	1	1	1	1	0	0	1	2	1	0

Area	Municipality	Week	Year Week	Number of Surveys	Total per Week	1-person household:					2-person household:					3-person household:					4-or-more-person household:				
						No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
	Yauco			24		3	4	0	0	0	1	5	2	0	0	0	2	2	0	0	0	2	2	1	0
	Villalba			18		1	2	1	0	0	1	3	1	0	0	0	1	1	1	0	0	2	2	1	1
	Juana Díaz			38		3	4	0	0	0	1	5	4	0	0	1	3	4	1	0	1	4	5	1	1
	Lajas	21 - 27 Apr	17	19	19	2	2	0	0	0	1	3	3	0	0	0	2	1	1	0	0	1	2	1	0
			Total	**3000**																					

Source: SDG

Data Gathering Tracking Process

Table 4.10 exhibits a summary of recruited households and retrieved households by all the methods available for the exercise: Phone, web and intercept retrieval. In addition, the summary shows by week the percentage of total retrieved from recruit and the percentage of total retrieved from target; and a column with remarks of important events that occurred in that week.

Table 4.10: PRHTS Recruit and Retrieval Summary

Period				Recruit		Retrieval								
Week Number	Planned Week	Recruitment Week	Travel/Call Week	Estimated Recruit	Weekly Recruit	Target Retrieval	In-Home Retrieval	Phone Retrieval	Web Retrieval	Intercept Retrieval	Actual Retrieved	% of Total Retrieved from Recruit	% of Total Retrieved from Target	Remarks
2	10 Jan - 18 Jan	10 Jan - 18 Jan	10 Jan - 18 Jan	-	-	-	0	33	0	0	33	-	-	Pilot
5	31 Jan - 02 Feb	20 Jan - 02 Feb	20 Jan - 02 Feb	250	293	250	0	282	0	0	282	96.25%	112.80%	-
6	3 - 9 Feb	3 - 9 Feb	3 - 9 Feb	251	237	251	0	214	0	0	214	90.30%	85.26%	-
7	10 - 16 Feb	10 - 16 Feb	10 - 16 Feb	252	221	252	0	231	0	0	231	104.52%	91.67%	-
8	17 - 23 Feb	17 - 23 Feb	17 - 23 Feb	245	241	245	0	232	0	0	232	96.27%	94.69%	-
9	24 Feb - 2 Mar	24 Feb - 2 Mar	24 Feb - 2 Mar	237	217	237	0	206	0	0	206	94.93%	86.92%	Problems with electric power consequence of damage in the PR electrical grid due to Maria and Irma hurricanes.
10	3 - 9 Mar	3 - 9 Mar	3 - 9 Mar	248	198	248	0	194	0	0	194	97.98%	78.23%	
11	10 -16 Mar	10 -16 Mar	10 -16 Mar	250	150	250	0	138	0	0	138	92.00%	55.20%	
12	17 - 23 Mar	17 - 23 Mar	17 - 23 Mar	245	185	245	0	191	0	0	191	103.24%	77.96%	Begin actions of stop interviewing households of specifics strata in order to fulfil design matrix requirements.

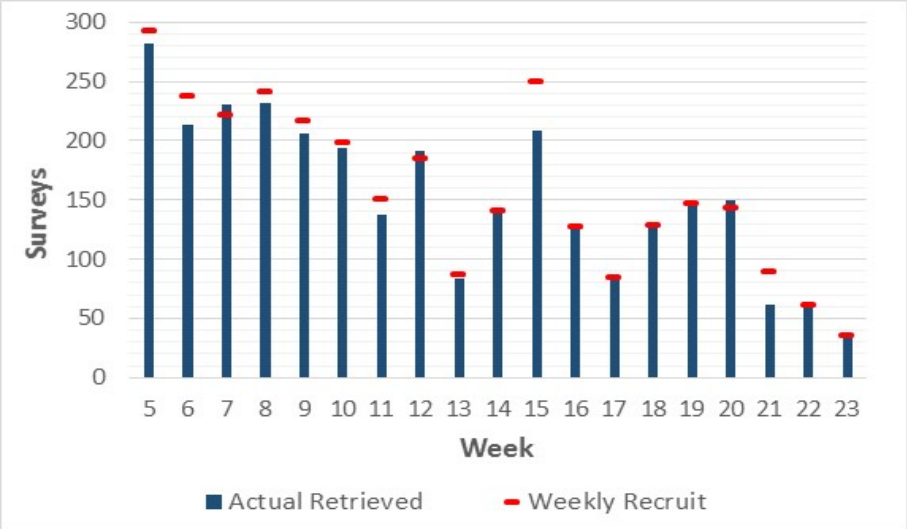
Period				Recruit		Retrieval								
Week Number	Planned Week	Recruitment Week	Travel/Call Week	Estimated Recruit	Weekly Recruit	Target Retrieval	In-Home Retrieval	Phone Retrieval	Web Retrieval	Intercept Retrieval	Actual Retrieved	% of Total Retrieved from Recruit	% of Total Retrieved from Target	Remarks
13	24 Mar - 30 Mar	24 Mar - 30 Mar	24 Mar - 30 Mar	248	87	248	0	84	0	0	84	96.55%	33.87%	Target recruit and retrieval drop down drastically due to the following reasons: after took actions of stop interviewing households of certain strata that meet quotas according with weekly reports and eastern week.
14	31 Mar - 6 Apr	31 Mar - 6 Apr	31 Mar - 6 Apr	250	141	250	0	140	0	0	140	99.29%	56.00%	Client approved no-traditional methods for the recruitment and retrieval of households such as people search in malls and other locations where people with less access to telephones can be surveyed. Also, were used open house attendance list to contact and interview these households.
15	7 - 13 Apr	7 - 13 Apr	7 - 13 Apr	254	249	254	0	48	0	160	208	83.53%	81.89%	Approved by client, from April 12 to 13 begun the recruit and retrieval of households in Santa Rosa Mall (Bayamón).
16	14 - 20 Apr	14 - 20 Apr	14 - 20 Apr	251	127	251	0	24	0	105	129	101.57%	51.39%	Intercept Surveys: Saturday April 14: Santa Rosa Mall (Bayamón). Wednesday April 18: Carolina Thursday April 19: Ponce Friday April 20: Hatillo

Period				Recruit		Retrieval								
Week Number	Planned Week	Recruitment Week	Travel/Call Week	Estimated Recruit	Weekly Recruit	Target Retrieval	In-Home Retrieval	Phone Retrieval	Web Retrieval	Intercept Retrieval	Actual Retrieved	% of Total Retrieved from Recruit	% of Total Retrieved from Target	Remarks
17	21 - 27 Apr	21 - 27 Apr	21 - 27 Apr	19	84	19	0	76	0	8	84	100.00%	442.11%	Intercept Surveys: Wednesday April 26: Acropolis Baseball Park (Manatí)
18	28 Apr - 04 May	28 Apr - 04 May	28 Apr - 04 May	158	128	158	0	50	0	78	128	100.00%	81.01%	Intercept Surveys: Saturday April 28: Ponce. Friday May 04: Plaza Canóvanas.
19	05 May - 11 May	05 May - 11 May	05 May - 11 May	158	147	158	0	37	0	111	148	100.68%	93.67%	Intercept Surveys: Saturday May 05: Plaza Canóvanas. Tuesday May 08: Plaza del Pueblo of Arecibo. Wednesday May 09: Lares. Thursday May 10: Plaza Atlántico in Arecibo. Saturday May 11: Kmart Plaza Atlántico in Arecibo.
20	12 May - 18 May	12 May - 18 May	12 May - 18 May	222	143	222	0	72	0	78	150	104.90%	67.57%	Intercept Surveys: Tuesday May 15: Ponce Wednesday May 16: Aguadilla and Isabela Friday May 18: Fajardo
21	19May - 25 May	19May - 25 May	19May - 25 May	143	89	143	0	18	0	44	62	69.66%	43.36%	Intercept Surveys: Wednesday May 23: Guayama y Salinas. Thursday May 24: Guaynabo
22	26 May - 01 June	26 May - 01 June	26 May - 01 June	83	61	83	0	24	0	37	61	100.00%	73.49%	Intercept Surveys: Wednesday May 31: Moca y San Sebastián.

Period				Recruit		Retrieval								
Week Number	Planned Week	Recruitment Week	Travel/Call Week	Estimated Recruit	Weekly Recruit	Target Retrieval	In-Home Retrieval	Phone Retrieval	Web Retrieval	Intercept Retrieval	Actual Retrieved	% of Total Retrieved from Recruit	% of Total Retrieved from Target	Remarks
23	02 June - 08 June	02 June - 08 June	02 June - 08 June	30	35	30	0	35	0	0	35	100.00%	116.67%	-
			Total	**3,794**	**3,033**	**3,794**	**0**	**2,329**	**0**	**621**	**2,950**	**97.26%**	**77.75%**	

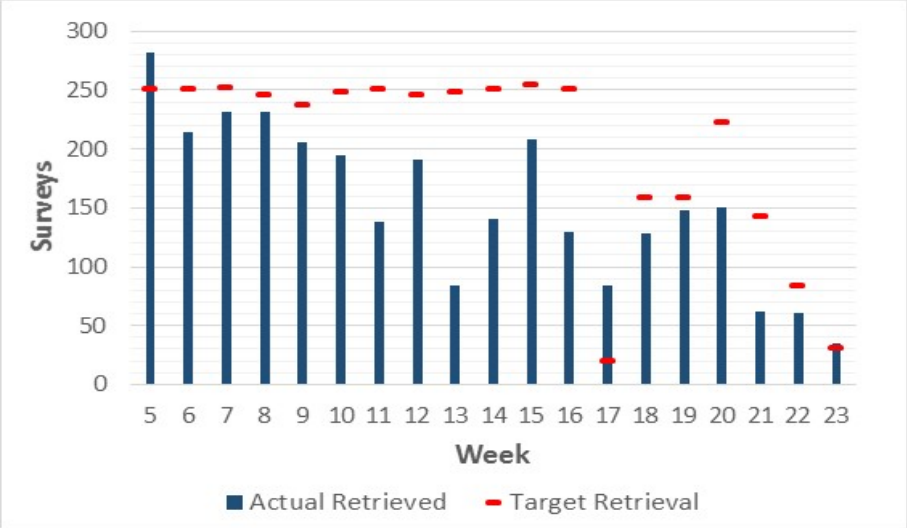
Source: SDG

Figure 4.4: Percentage of Total Retrieved from Recruit



Source: SDG

Figure 4.5: Percentage of Total Retrieved from Target



Source: SDG

Adherence to Geographic Targets

Table 4.11 and Table 4.12 show the target adherence for the household travel survey sample. In overall terms, targets were difficult to meet for some strata and exceeded in others. Dark green cells represent values higher than 100% which suggested an over-representation of certain strata and regions in the sample. Light green cells show values around 100% which suggested that this sample was comparable to the original sampling targets. Orange cells display values below 70% which suggested that the sample was under-represented in each region. Finally, red cells represent strata where no information was gathered from the surveys or data was collected but there were no sample assigned to this strata in the sampling design.

Table 4.11: Adherence to Sample Targets by Designed Variables

Vehicle Availability (Vehicles/Household)	Household Size (Person/Household)			
	1	2	3	4+
0 Vehicle/Household	60.6%	64.5%	39.6%	34.8%
1 Vehicle/Household	100.0%	116.2%	97.6%	56.0%
2 Vehicles/Household	104.9%	137.8%	135.5%	85.0%
3 Vehicles/Household	120.0%	235.3%	191.4%	100.0%
4+ Vehicles/Household	200.0%	228.6%	207.7%	168.9%

Source: SDG

Table 4.12: Adherence to Sample Targets by Region

Area	Total Households in Region	Households Target	Households Retrieval	Adherence to Sample Target
San Juan TMA	757,432	1,561	1,663	106.53%
Aguadilla TMA	103,446	348	341	97.99%
Other Urbanized Areas	383,324	791	780	98.61%
Total	**1,244,202**	**2,700**	**2,784**	

Source: SDG

Table 4.13 presents percentage retrieval, by region and design variables respectively.

Table 4.14 and Table 4.15 presents a summary by region and design variables of the U.S. census and sampling plan respectively. Red values suggest sampling strata that would not be easily to meet.

Table 4.16 shows the results of survey execution and Table 4.17 exhibits adherence to sample target. Results in both tables confirm some of the patterns exhibited in the sampling plan and the U.S. Census:

- 1-person household with 3 vehicles in the Aguadilla TMA: Although the U.S. Census established few households with this criterion, during the survey execution was not a combination found;
- 1-person household with 4+ vehicles in Aguadilla TMA: This was a stratum where household were not found during the survey execution and represent a low quantity of household in the Census;
- The following strata were behind the sample target:
  - 1-person household with No vehicle: in the 3 regions;
  - 1-person household with 1 vehicle: in San Juan TMA and Other Urbanized Areas;
  - 1-person household with 2 vehicles: in Aguadilla TMA and Other Urbanized Areas;
  - 2-person household with No vehicle: in the 3 regions;
  - 2-person household with 4-or-more-vehicles: in Aguadilla TMA;
  - 3-person household with No vehicle: in the 3 regions;
  - 3-person household with 1 vehicle: in San Juan TMA and Other Urbanized Areas;
  - 3-person household with 4-or-more-vehicles: in Aguadilla TMA;

  - 4-or-more-person household with No vehicle: in the 3 regions;
  - 4-or-more-person household with 1 vehicle: in the 3 regions;
  - 4-or-more-person household with 2 vehicles: in the 3 regions;
  - 4-or-more-person household with 3 vehicles: in Aguadilla TMA; and
  - 4-or-more-person household with 4-or-more-vehicles: in Aguadilla TMA.
- The following strata exceeded the sample target:
  - 1-person household with 1 vehicle: in Aguadilla TMA;
  - 1-person household with 2 vehicles: in San Juan TMA;
  - 1-person household with 3 vehicles: in San Juan TMA;
  - 2-person household with 1 vehicle: in the 3 regions;
  - 2-person household with 2 vehicles: in the 3 regions;
  - 2-person household with 3 vehicles: in the 3 regions;
  - 2-person household with 4-or-more-vehicles: in San Juan TMA;
  - 3-person household with 1 vehicle: in Aguadilla TMA;
  - 3-person household with 2 vehicles: in the 3 regions;
  - 3-person household with 3 vehicles: in the 3 regions;
  - 3-person household with 4-or-more-vehicles: in San Juan TMA and Other Urbanized Areas;
  - 4-or-more-person household with 3 vehicles: in San Juan TMA; and
  - 4-or-more-person household with 4-or-more-vehicles: in San Juan TMA and Other Urbanized Areas.
- The stratum 4-or-more-person household with 3 vehicles in Other Urbanized Areas met the target.

Despite the sampling stratification, not all strata were able to be adequately sampled to provide desired statistical representativeness (See Table 4.25).

In order to provide a best-representative unit, post survey re stratification was necessary. The representativeness of the sample was presented based on these new defined units and is discussed in further detail later in the report.

Table 4.13: PRHTS Percentage Retrieval

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:				
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
San Juan TMA	Subtotal	58.94%	57.65%	62.79%	66.67%	0.00%	53.85%	56.96%	61.54%	53.75%	56.25%	61.90%	54.95%	62.73%	57.46%	81.48%	43.75%	64.71%	63.89%	61.39%	72.37%
Aguadilla TMA	Subtotal	13.91%	13.78%	11.63%	0.00%	0.00%	10.26%	14.78%	10.51%	10.00%	6.25%	23.81%	15.84%	9.59%	14.18%	3.70%	25.00%	10.78%	7.41%	11.88%	11.84%
Other Urbanized Areas	Subtotal	27.15%	28.57%	25.58%	33.33%	100.00%	35.90%	28.26%	27.95%	36.25%	37.50%	14.29%	29.21%	27.68%	28.36%	14.81%	31.25%	24.51%	28.70%	26.73%	15.79%

Source: SDG

Table 4.14: U.S. Census 2015

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality Target
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
San Juan TMA	Subtotal	68,345	113,336	11,771	1,430	314	33,940	106,888	81,264	9,910	1,834	15,427	55,673	56,554	20,940	3,598	13,563	48,675	71,458	29,308	13,204	**757,432**
Aguadilla TMA	Subtotal	9,364	13,651	1,313	131	96	4,082	17,531	10,738	1,104	231	1,969	8,090	7,903	2,687	498	1,342	7,514	9,781	3,783	1,638	**103,446**
Other Urbanized Areas	Subtotal	37,121	53,825	5,968	761	188	17,648	58,011	38,386	4,772	1,096	7,232	31,489	27,505	8,606	1,681	6,484	27,506	35,583	13,370	6,092	**383,324**
Total		**114,830**	**180,812**	**19,052**	**2,322**	**598**	**55,670**	**182,430**	**130,388**	**15,786**	**3,161**	**24,628**	**95,252**	**91,962**	**32,233**	**5,777**	**21,389**	**83,695**	**116,822**	**46,461**	**20,934**	1,244,202

Source: SDG

Table 4.15: Sampling Plan

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality Target
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
San Juan TMA	Subtotal	143	239	22	3	0	68	223	169	21	3	32	115	116	44	9	28	98	148	58	22	**1,561**
Aguadilla TMA	Subtotal	26	38	6	2	1	15	47	32	7	4	11	26	25	12	3	10	23	30	16	14	**348**
Other Urbanized Areas	Subtotal	80	115	13	0	0	38	126	82	6	0	10	66	59	14	1	8	61	76	27	9	**791**
Total		**223**	**354**	**35**	**3**	**0**	**106**	**349**	**251**	**27**	**3**	**42**	**181**	**175**	**58**	**10**	**36**	**159**	**224**	**85**	**31**	2,700

Source: SDG

Table 4.16: Retrieval

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality Retrieval
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
San Juan TMA	Subtotal	89	226	27	4	0	42	262	240	43	9	13	111	170	77	22	7	66	138	62	55	**1,663**
Aguadilla TMA	Subtotal	21	54	5	0	0	8	68	41	8	1	5	32	26	19	1	4	11	16	12	9	**341**
Other Urbanized Areas	Subtotal	41	112	11	2	2	28	130	109	29	6	3	59	75	38	4	5	25	62	27	12	**780**
Total		**151**	**392**	**43**	**6**	**2**	**78**	**460**	**390**	**80**	**16**	**21**	**202**	**271**	**134**	**27**	**16**	**102**	**216**	**101**	**76**	2,784

Source: SDG

Table 4.17: Adherence to Sample Target

Area	Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:					Total by Municipality Retrieval
		No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	
San Juan TMA	Subtotal	62.24%	94.56%	122.73%	133.33%	0.00%	61.76%	117.49%	142.01%	204.76%	300.00%	40.63%	96.52%	146.55%	175.00%	244.44%	25.00%	67.35%	93.24%	106.90%	250.00%	106.53%
Aguadilla TMA	Subtotal	80.77%	142.11%	83.33%	0.00%	0.00%	53.33%	144.68%	128.13%	114.29%	25.00%	45.45%	123.08%	104.00%	158.33%	33.33%	40.00%	47.83%	53.33%	75.00%	64.29%	97.99%
Other Urbanized Areas	Subtotal	51.25%	97.39%	84.62%	0.00%	0.00%	73.68%	103.17%	132.93%	483.33%	0.00%	30.00%	89.39%	127.12%	271.43%	400.00%	62.50%	40.98%	81.58%	100.00%	133.33%	98.61%

Source: SDG

Assessment of Quality Database Validation

Computer Assisted Personal Interviewing techniques were used which check reasonability and congruence of live responses when compare with related responses during the interview. This maximized the quality of information gathered and minimized mistakes potentially made in paper surveys. Afterwards, recorded surveys were validated to meet certain criteria, and otherwise discarded from primary analysis. Although there are accepted international standards for what is considered a "valid household travel survey", for the Puerto Rico Household Travel Survey, the decision to reject a survey considered three key aspects:

1. The replacement of a sampled household modifies the integrity of the original sample and induces biases in the sample obtained.
2. The elimination and its replacement increase the cost of the information collected.
3. A household travel survey can be understood as an information tree for which it is not always possible to have detailed information on the trips of some of the people. Rejecting a survey due to this condition would imply wasting a quantity of useful and valuable information for the purposes of the study.

Consequently, it is necessary to establish the minimum information contents acceptable to obtain essential data household trips structure, which allow to accept as valid a domiciliary survey. The definition of what constitutes a valid survey is also important since it helps to determine when the sample size specified for the survey is reached.

In this context, it was necessary to clarify the minimum requirements in the information quality collected in the household travel survey, having as fundamental purposes:

1. The different levels of importance and use of information.
2. The quality of the information to be collected.
3. The control of the consequences in the data processing.
4. The performance and approval of household travel surveys.

Indeed, a part of the information to be obtained through the survey is critical, that is, without it the survey does not meet its objectives. For example, the number of people living in the household is an essential data with the purpose of validating the survey, considering that the information obtained was used with the aim of expansion and modeling.

Other part of the information is not critical, or it can be inferred from data recorded in other questions. For example, the neighborhood where the household is located can be obtained from the address. The lack of this type of information does not invalidate the survey, considering of data recovery possibilities.

It was important to identify the importance level of each question in the survey and define the validation criteria, considering that a correct and fully completed household travel survey is not always obtained. In practice, there are numerous reasons that make data collection difficult: absent residents at the time of the survey, lack of time of respondents, resistance to answer long forms, desire to "simplify the task" by the respondent because of rationale like "Yesterday It was an exceptional day", which translate in incomplete records, among many other reasons.

Underlying, there is the issue of non-response, which has been defined as, "the failure to obtain a specific piece of data from a responding member of the sample"[11], *or "the failure to obtain 'full' and complete data from each respondent"*[12]. Thus, the non-response item occurs not only as a result of non-existent information, but also, when incorrect information is provided[13].

Based on the above considerations, it was considered essential for the success of the PRHTS to incorporate the concept of Minimum Information Content (MIC) of household travel surveys, which identifies the essential information for the project objectives.

Acceptance Parameters for the HTS

For the definition of parameters, it was important to preliminarily identify that the household travel survey was divided into two parts: household information (modules A, B, C) and household trips information (module D). In this way, clear criteria were defined for each of these parts, considering that when invalidating a data in modules A, B and C, it also invalidates Module D.

The survey is considered completed when at least 50% of adults' household members had been interviewed and completed Module D. It means, that surveys with uncompleted trip modules were part of the imputation process.

Another situation could be that in a household the valid information was not provided in module A. Since this information applies to the whole household and respondents, the entire survey, including the trip modules, is invalidated.

Due to this type of situation it is important to define clear and sufficient criteria for an adequate validation process, both the total survey and of the trip modules.

In order to define the acceptance parameters, recommendations from technical literature[14] were took into account, as well as the specific results of recent household travel surveys[15]. Based on the revised references, the corresponding criteria were adopted, establishing that a trip module per person was not considered valid if:

- Some of the information of the minimum information content (MIC = YES) defined in this section is missing.

[11] Zimowski, M., R. Tourangeau and R. Ghadialy (1997). An Introduction to Panel Surveys in Transportation Studies, prepared for Federal Highway Administration.

[12] Zmud, J., and Arce, C. (1997). Item non-response in travel surveys: Causes and solutions. Transport Surveys: Raising the Standard. Proceedings of an International Conference on Transport Survey Quality and Innovation.

[13] Household Travel Surveys: Proposed Standards and Guidelines Peter R. Stopher, Chester G. Wilmot, Cheryl Stecher, Rahaf Alsnih. Travel Survey Methods. 2006, 19-74

[14] Stopher, Wilmot, Stecher, & Alsnih, 2006.

[15] Santiago – Chile, 2001; Santiago – Chile, 2006; Auckland – New Zealand, 2007; Bogotá – Colombia, 2011; Popayán – Colombia, 2015; Cali – Colombia, 2015; Querétaro – Mexico, 2016; and Rionegro – Colombia 2016.

- On the other hand, it was established that a household travel survey was not considered valid, if one of the following situations occurred:
    - If any of the information of the minimum information content (MIC = YES) of modules A, B and C is missing; and
    - If in total for a household, less than 50% of the valid responses were obtained.

it was important to keep in mind that those households in which people did not make trips in a typical day, they are valid, as long as the MIC questions of modules A, B and C have been correctly answered.

Key Aspects of Re-Contact

Considering that sometimes during the first call/visit it was not possible to have all the members of the household available, the field work methodology identified the need for re-contact, in order to obtain information on missing travel modules with aims to complete the survey and meet the MIC standards defined throughout this section.

The key aspects for information retrieval and re-contact in order to validate its development during the gathering of information were:

- The re-contacting of the households was carried out through additional calls/visits that sought the on-site completion by people of the household.
- Since it is common for absent people to have difficulty in scheduling an appointment, the re-calls allowed:
    - Obtain travel information, as long as the information is provided directly by the person who made the trips.
    - Verification of specific modules information: household, people, vehicles and trips within the scope of the process survey validation.

Travel information can only be provided for typical days from Monday to Friday. In this way, only the business day prior to the date of contact with the person was taken as reference. In case information was taken on Sundays or Mondays, all the information of the households, people and household vehicles were taken, leaving the trip modules for the valid information collection periods.

MIC Definition for HTS

The key aspect of the MIC concept definition is the identification of the essential information, not only to help ensure the basic objectives of the HTS, but also to define the basic guidelines to establish a household travel survey as valid.

In accordance with the above, the practice adopted worldwide in exercises of this type consists in defining a MIC for each aspect of the survey. By determining this minimum information content, a validation process was carried out for each of the questions and response options. For this purpose, the quality control of the information adopted in the HTS of 2011 in Bogotá – Colombia,

2015 in Popayán – Colombia, 2015 in Cali – Colombia, 2016 in Querétaro – Mexico and 2016 in Rionegro – Colombia was taken as reference.

In order to establish the acceptance degree of the amount and type of essential information to be collected in households, with the aim of defining the validity of the surveys, the following aspects were considered:

- Set clear and specific parameters to avoid misinterpretations by different agencies or institutions that subsequently use the information.
- Identify each of the essential indicators for future correction, expansion and modeling processes from the collected information.

For this case, Table 4.18 to Table 4.23 have been designed, which present the identifier and detail of each questions in the survey (Columns 1 and 2). In column 3, the module to which each of these questions belongs is indicated. In the fourth column of the table the minimum information content qualification is presented, that is, the obligation or not to obtain each data is identified. If a question is assigned the attribute Yes, this means that the data is essential and, therefore, the absence of one of these data may be causal for the rejection of the survey. If a question is assigned the attribute NO, it is understood that the omission of this information does not mean that the survey is rejected.

The fifth column defines a relationship with the type of survey data. In addition to the MIC classification (Yes or No), a categorization of data can be done according to its nature, from the points of view of handling and obtaining the information. Consequently, the following parameters can be assigned according to the case:

1. **Data of work procedure**: these are data that would not be investigated in the surveyed household and that would be of exclusive management by the interviewer and the field supervisor. In this classification, some data correspond to the location of the household (Map Number, Address). These data will be supplied directly by the field supervisor according to the data received by the team of statistics and random selection of households' telephones.
2. **Deductible data**: these are data that can be obtained from other survey data. For example, data such as the suburb can be deducted based on the household address.

   With respect to the deductible data, it is important to bear in mind that these must be obtained during the information monitoring and processing in order to complete the survey database.
3. **Respondent Data**: it is the data that can only be obtained through inquiry to household people. For example: trip purpose, person age, etc.

The last column of the table corresponds to the Action label, it presents the activities or recommendations to be considered in each case.

Table 4.24. show the definition of the minimum information required for the survey validity. From the total number of questions, 50% of MIC data is available. The absence of any of these records invalidates the survey conducted at the household or the trip module according to the case. Most of the MIC validation data (absolute and relative presence) correspond to the characterization of

people's individual trips. Likewise, there is only one registry (respondent age and income), which although it is respondent data, is not considered MIC given the vulnerability of its response, not only because of an eventual non-response, but because it could be false.

Table 4.18: Identification and Control Module

ID	Questions	Variable Name	Module	MIC	Action
1	Interviewers' Last Name	Name: interviewerInfo_intFirst	ID	NO	Procedure data (deductible).
2	Interviewers' First Name	Name: interviewerInfo_intLast	ID	NO	Procedure data (deductible).
3	Supervisor's Name	Name: interviewerInfo_intSup	ID	NO	Procedure data (deductible).
4	Map Number	Name: interviewerInfo_intMapNum	ID	NO	Procedure data (deductible).
5	Phone Number	Name: interviewerInfo_intPhone1	ID	NO	Procedure data (deductible).
6	Household Address	Name: interviewerInfo_intAddress	ID	YES	Procedure data. MIC = NO invalidates the survey. Necessary for the identification and georeferencing of the survey.
7	Suburb	Name: interviewerInfo_intSub	ID	NO	Procedure data (deductible).
8	Municipality	Name: interviewerInfo_intMun	ID	YES	Procedure data. MIC = NO invalidates the survey. Necessary for the identification and georeferencing of the survey.
9	State	Name: interviewerInfo_intState	ID	NO	Procedure data (deductible).
10	Zip Code	Name: interviewerInfo_intZip	ID	YES	Procedure data. MIC = NO invalidates the survey. Necessary for the identification and georeferencing of the survey.
11	Date	Name: interviewerInfo_Date	ID	YES	Procedure data. MIC = NO invalidates the survey.
12	Time	Name: interviewerInfo_Time	ID	NO	Procedure data (deductible).
13	Household ID	Name: interviewerInfo_houseID	ID	NO	Procedure data (deductible).

Source: SDG

Table 4.19: Module A: Household

ID	Questions	Variable Name	Module	MIC	Action
1	Skip to Trip Diary?	List Name: skiptotripdiaryList	A	YES	It is an essential data for fulfil trip diaries from absent people.
2	How many vehicles are there in your household?	Question Name: screenNumVehicles	A	YES	It is an essential data for recruitment.
3	How many people live in your household?	Question Name: demoNumFamilyMembers	A	YES	It is an essential data for recruitment.
4	Have you been living in Puerto Rico for six months or more?	Question Name: screenTimeInPR	A	YES	It is an essential data for recruitment.
	Can you please provide the name of the household's primary contact and provide some contact information?	Question Name: respContact	A		
5	First Name	Name: respContact_First	A	YES	It is an essential data for the recontact. Each survey should be analyzed individually when this information is not available.
6	Last Name	Name: respContact_Last	A	YES	It is an essential data for the recontact. Each survey should be analyzed individually when this information is not available.
7	Phone Number	Name: respContact_phone1	A	YES	
8	Phone Number 2 Optional	Name: respContact_phone2	A	YES	It is an essential data for the recontact. Each survey should be analyzed individually when this information is not available. You must have at least one phone number.
9	Phone Number 3 Optional	Name: respContact_phone3	A	YES	

ID	Questions	Variable Name	Module	MIC	Action
10	What type of dwelling does your household reside in?	Question Name: respHouseType	A	NO	Respondent Data. The expansion was not made using this information. However, it can be used for other informational purposes. In addition, it was not used in modeling either.
11	The dwelling where this household resides is:	Question Name: respHouseOwnership	A	NO	Respondent Data. Informative data. It was not used for validation or modeling purposes.
12	How many households live in your dwelling.	Question Name: respHouseholdsInDwell	A	YES	Respondent Data. MIC = NO invalidates the survey. Necessary to adjust the expansion factor. It was not used for modeling purposes.
13	Including yourself, how many people live in your household?	Question Name: demoNumFamilyMembers	A	YES	Respondent Data. MIC = NO invalidates the survey. Required for expansion. It was not used for modeling purposes.
14	How many people age 5 and older live in your household?	Question Name: demoNumFamilyMembersGT5	A	YES	Respondent Data. MIC = NO invalidates the survey. Required for expansion. It was not used for modeling purposes.

Source: SDG

Table 4.20: Module B: Household's People

ID	Questions	Variable Name	Module	MIC	Action
1	Please give a name for each person in the household.	Question Name: demoNames	B	NO	Respondent Data. It is not necessary for the correction or validation processes.
2	For each member of your household, are they staying with you permanently or temporarily?	Question Name: demoTemp	B	YES	Respondent Data. MIC = NO invalidates the survey. Required to identify households with permanent and temporary residents.
3	What is the relationship of each person to the head of the household? Please choose one person to be the head of household.	Question Name: demoRoles	B	NO	Respondent Data. Informative Data.
4	Please indicate the gender of each member of the household.	Question Name: demoGender	B	YES	Respondent Data. MIC = NO invalidates the survey. It was necessary for correction but it was not used for modeling purposes.

ID	Questions	Variable Name	Module	MIC	Action
5	Please enter the age of each member of the household.	Question Name: demoAge	B	YES	Respondent Data. MIC = NO invalidates the survey. It is necessary to know the demographic profile and to open the trip module.
6	What is the highest level of education obtained by each member of the household?	Question Name: demoEdu	B	NO	Respondent data. Informative data (not critical).
7	What was the employment status of each member of the household as of last week?	Question Name: demoEmpStatus	B	NO	Respondent data. Informative data (not critical).
8	You indicated the following members of your household are employed as workers. What industry does each member work in?	Question Name: demoWorkerIndustry	B	YES	Respondent data. Used for Imputation.
9	You indicated the following members of your household are employed as workers. How many hours a week does each member work?	Question Name: demoWorkerHours	B	NO	Respondent data. Informative data (not critical).
10	Due to a medical condition, do any members of your household have difficulty using any of the following modes of transportation? If so, please specify which.	Question Name: demoMedCondDifficulty	B	NO	Respondent data. Informative data (not critical).
11	Which members of the household have a valid driver's license? If a person has no license, select "No License."	Question Name: demoLicense	B	NO	Respondent data. Informative data (not critical). However, it could be useful for modeling and in some cases, can be inferred.

Source: SDG

Table 4.21: Module C: Vehicle Availability

ID	Questions	Variable Name	Module	MIC	Action
1	Regardless of ownership, how many of the following vehicles, licensed to drive in Puerto Rico, are available for use by members of your household?	Question Name: vhLicensedVehicles	C	YES	Respondent Data. MIC = NO invalidates the survey. It was not used for modal partition modeling.
2	Regardless of ownership, how many of the following vehicles are available for use by members of your household?	Question Name: vhOtherVehicles	C	YES	Respondent Data. MIC = NO invalidates the survey. It was not used for modal partition modeling.
	You indicated that there were 0 vehicles in your household. Please provide us with some information about those vehicles. (If you have more than 8 vehicles we will only ask about the first 8.)		C	NO	Respondent data. Informative data (not critical).

ID	Questions	Variable Name	Module	MIC	Action
3	Vehicle Type	Question Name: vhMake	C	NO	Respondent data. Informative data (not critical).
4	Make		C	NO	Respondent data. Informative data (not critical).
5	Model		C	NO	Respondent data. Informative data (not critical).
6	Enter the approximate odometers reading for each of these vehicles. If you do not know please leave the question blank.	Question Name: vhOdometer	C	NO	Respondent data. Informative data (not critical).
7	What type of fuel does each vehicle use?	Question Name: vhFuel	C	NO	Respondent data. Informative data (not critical).
8	Are any of these vehicles used for commercial purposes?	Question Name: vhCommercial	C	NO	Respondent data. Informative data (not critical).
9	Who is the owner of each of these vehicles?	Question Name: vhOwner	C	NO	Respondent data. Informative data (not critical).
10	How is each vehicle parked overnight and how much is payed for overnight parking? (If you pay nothing, please enter $ 0.00)	Question Name: vhParking	C	NO	Respondent data. Informative data (not critical).
11	Who is the primary user of each vehicle and what is each vehicle primarily used for?	Question Name: vhUsedByPurpose	C	NO	Respondent data. Informative data (not critical).

Source: SDG

Table 4.22: Module D: Trip Module

ID	Questions	Variable Name	Module	MIC	Action
1	Did any of the below family members leave the household on a weekday this week for any reason?	Question Name: demoLeaveHouse	D	YES	Respondent Data. MIC = NO invalidates the survey. Necessary to control if the person traveled or not.
2	Which members below are available to answer questions about trips they make on a typical day this week? If a member is not currently available to answer questions, a trip diary will be provided to report their trips.	Question Name: tripAvailableToAnswer	D	YES	Respondent Data. MIC = NO invalidates the survey. Necessary to obtain travel information.
3	How many trips did you make on one typical day this week?	Question Name: tripHowManyTrips	D	YES	MIC = NO invalidates the survey. Deductible procedure data, used to verify the number of trips reported in module D.

ID	Questions	Variable Name	Module	MIC	Action
4	Where did you start this day?	Question Name: tripLocationStart	D	YES	Respondent Data. MIC = NO invalidates the trip module. Indispensable information to establish the origin of the first trip.
	You indicated that you began the day somewhere other than your home. Please enter the address.	Question Name: tripOtherLocation	D		
5	Address	Question Name: tripOtherLocation	D	YES	Respondent Data. MIC = NO invalidates the trip module.
6	Suburb	Question Name: tripOtherLocation	D	NO	Respondent Data (not critical). It can be obtained from the place where the day began.
7	Municipality	Question Name: tripOtherLocation	D	YES	Respondent Data. MIC = NO invalidates the trip module.
8	State	Question Name: tripOtherLocation	D	NO	Procedure data (deductible).
9	Zip Code	Question Name: tripOtherLocation	D	YES	Respondent Data. MIC = NO invalidates the trip module.
10	What was the purpose of your trip?	Question Name: tripPurpose	D	YES	Respondent Data. MIC = NO invalidates the trip module.
11	At what time on this day did you depart for this trip?	Question Name: tripTime	D	YES	Respondent Data. MIC = NO invalidates the trip module. Necessary to measure trip duration and the distribution throughout the day.
12	What modes of transportation did you use on this trip. Select all that apply.	Question Name: tripMode	D	YES	Respondent Data. MIC = NO invalidates the trip module.
13	How many times a week do you make this trip?	Question Name: tripModeFrequency	D	YES	Respondent Data. MIC = NO invalidates the trip module.
14	Has there been any change since the year before? (Since Hurricane Maria?)	Question Name: tripChangedHurricane	D	YES	Respondent Data. MIC = NO invalidates the trip module.
15	How many minutes did you walk to reach this mode of transportation?	Question Name: tripHowManyMinutesWalk	D	NO	Respondent Data. This subjective information is not always reliable and requires correction adjustments to be used in modeling.
16	If applicable what was the fare? (If there was no fare, leave the question blank)	Question Name: tripFare	D	NO	Respondent Data. This is subjective information for some modes of transportation.

ID	Questions	Variable Name	Module	MIC	Action
17	Who owns the vehicle that you used?	Question Name: tripWhoOwnsCar	D	NO	Respondent Data. Informative data (not critical). It is not necessary for modeling purposes.
18	Where did you park?	Question Name: tripWherePark	D	NO	This information is useful but not always reliable.
19	How much did you pay for parking? (If you did not pay, please mark $0.00)	Question Name: tripParkingCost	D	NO	This information is useful but not always reliable.
20	How were you charged for parking?	Question Name: tripParkingHowCharged	D	NO	This information is useful but not always reliable.
21	Who paid for parking?	Question Name: tripParkingWhoPays	D	NO	This information is useful but not always reliable.
22	Were any of the vehicles you described earlier in the survey available on this day of travel?	Question Name: tripOldVehAvail	D	YES	Respondent Data. MIC = NO invalidates the trip module.
23	Were any alternative vehicles available on the day of travel? For example, a temporary or for-hire car.	Question Name: tripAltAvail	D	YES	Respondent Data. MIC = NO invalidates the trip module.
24	What time did you arrive at your destination?	Question Name: tripArrivalTime	D	YES	Respondent Data. MIC = NO invalidates the trip module.
	Please enter the address of your final destination on this trip.	Question Name: tripFinalLocation1	D		
25	Address	Question Name: tripFinalLocation1	D	YES	Respondent Data. MIC = NO invalidates the trip module.
26	Suburb	Question Name: tripFinalLocation1	D	NO	Respondent Data (not critical). It can be obtained from the place where the day began.
27	Municipality	Question Name: tripFinalLocation1	D	YES	Respondent Data. MIC = NO invalidates the trip module.
28	State	Question Name: tripFinalLocation1	D	NO	Procedure data (deductible).
29	Zip Code	Question Name: tripFinalLocation1	D	YES	Respondent Data. MIC = NO invalidates the trip module.
30	On what days of the week do you make this trip?	Question Name: tripDOW	D	YES	Respondent Data. MIC = NO invalidates the trip module.
31	Were you accompanied by anyone else on this trip?	Question Name: tripAccompanied	D	YES	Respondent Data. MIC = NO invalidates the trip module.
32	Did you use any mobile app before the trip to plan your route?	Question Name: tripMobileAppBefore	D	NO	Respondent Data.

ID	Questions	Variable Name	Module	MIC	Action
33	Did you use any mobile app during the trip to plan your route?	Question Name: tripMobileAppDuring	D	NO	Respondent Data.
34	Thank you for answering questions about this trip. Are you able to answer more questions regarding the next trip you made that day?	Question Name: tripEndAnchor	D	NO	Respondent Data.
35	Would you be willing to further collaborate with us in the future?	Question Name: hhFutContact	D	NO	Respondent Data.
36	Thank you for answering questions regarding the trips you made. Is ____ available to answer questions?	Question Name: tripPersonEndAnchor	D	YES	Respondent Data. MIC = NO invalidates the trip module. This question allows to know people available to answer trip module.

Source: SDG

Table 4.23: Additional Information - Household Income

ID	Questions	Variable Name	Module	MIC	Action
1	What is the total income of this household? Consider pensions, lease income, salaries, and other income you normally receive.	Question Name: hhFamInc	D	NO	Respondent Data. It is not always certain, it depends on the response disposition and knowledge on the part of the informant, about the income of each one of the household members.

Source: SDG

Table 4.24: HTS Summary

Module	Total Number of Questions	Number of Mic= YES Questions	% Questions MIC=YES
Identification and Control Module	13	4	30.77%
A: Household	14	12	85.71%
B: Household's People	11	4	36.36%
C: Vehicle Availability	11	2	18.18%
D: Trip Module	36	21	58.33%
Additional Information - Household Income	1	0	0.00%
Total Survey	**86**	**43**	**50.00%**

Source: SDG

REPRESENTATIVENESS OF SAMPLE AND DATA PROCESSING

Error Calculations and Re-Stratification

A key part of ensuring a survey is usable to represent the population is calculation of sampling and standard errors. The standard and sampling error are statistics computed from survey and known

population values which describe the variability in the data gathered. High errors suggest data gathered is too noisy and cannot be reliably used to describe a population. This can result from bias in sampling plan, small sample size, non-responses, or low response rate from minority populations. A common threshold for error is 10% or less. Error checking was performed throughout collection period but was ultimately performed after full completion and validation but before weighting and expansion.

San Juan TMA, Aguadilla TMA and Other Urbanized Areas were the region strata originally considered to perform the HTS. In each region, there were 4 household size strata and 5 vehicle ownership strata, leading to a total of 60 strata. In order to improve representativeness, re-stratification was performed after collection and validation. The first re-stratification was subdivision of the 3 regions into 6 regions based on population density and contribution. These new region strata are:

- San Juan TMA without San Juan;
- San Juan;
- Aguadilla TMA;
- Other Urbanized Areas without Ponce and Mayagüez;
- Mayagüez; and
- Ponce.

At this point, error was calculated for the 120 strata. Due to the large number of strata, there were occurrences where the response number for a given strata was low. This is especially the case where a strata's population was a smaller proportion of the overall population, despite efforts during sampling to target proportional responses. In order to maximize the statistical representativeness of population, strata which did not meet error cutoffs of 10% were re-evaluated.

To find a unit that was representative, a second round of re-stratification was performed, following preferred conditions to merge unreliable strata. The strata were kept intact on the following prioritization: geographic region, household size, then vehicle ownership. That is, it was preferred to not merge strata of different regions or different household size, and combined vehicle size strata first. In all cases this was possible.

The new stratification yielded 60 strata and was the basis for evaluating the representativeness of the sample. Table 4.25 shows the error calculations (standard error, margin of error, and sampling error) for the metric of interest, average trips per household, before expansion, for the 60 strata. The error is below the 10% threshold in almost all cases. In a handful of cases, the error is slightly above 10%, but further collapsing of stratification is not desired. In most of these cases the error is very close to 10% and collapsing with another strata which already has low error will only reduce the granularity of the data. In cases, such as Mayagüez, further collapsing would require merging household size or regions. Reasonable exceptions were made to the error threshold in order to preserve a desired level of detail for the overall sample. The standard error of average trips per household for the entire sample is 0.0222. Trip data which was not gathered directly

from survey (and imputed later) was not included in the calculation of errors or used in the process of re-stratification.

Table 4.25: Trips Error Before Expansion

Municipalities	Vehicles	HH size	N HH	n HH	n Pop	SumTrips	MeanTrips	Standard Deviation Trips	SE	MOE	Sampling Error
San Juan (TMA) Without San Juan	0	1	47286	73	73	143	1.96	0.54	0.063	0.104	3.2%
San Juan (TMA) Without San Juan	1	1	84497	172	172	363	2.11	0.80	0.061	0.100	2.9%
San Juan (TMA) Without San Juan	2+	1	10768	26	26	57	2.19	0.75	0.147	0.241	6.7%
San Juan (TMA) Without San Juan	0-1	2	112036	238	476	541	2.27	0.92	0.060	0.098	2.6%
San Juan (TMA) Without San Juan	2	2	66938	208	416	464	2.23	0.91	0.063	0.103	2.8%
San Juan (TMA) Without San Juan	3	2	8462	38	76	81	2.13	0.62	0.101	0.166	4.7%
San Juan (TMA) Without San Juan	4	2	1625	8	16	17	2.13	0.35	0.125	0.205	5.9%
San Juan (TMA) Without San Juan	0-1	3	57641	97	291	250	2.58	1.20	0.121	0.200	4.7%
San Juan (TMA) Without San Juan	2	3	48714	134	402	393	2.93	1.55	0.134	0.220	4.6%
San Juan (TMA) Without San Juan	3	3	17483	66	198	217	3.29	1.32	0.162	0.267	4.9%
San Juan (TMA) Without San Juan	4	3	3124	21	63	65	3.10	1.14	0.247	0.406	8.0%
San Juan (TMA) Without San Juan	0-1	4	50993	58	262	178	3.07	1.52	0.199	0.328	6.5%
San Juan (TMA) Without San Juan	2	4	62846	103	446	335	3.25	1.39	0.137	0.225	4.2%
San Juan (TMA) Without San Juan	3	4	26359	58	262	204	3.52	1.45	0.191	0.314	5.4%
San Juan (TMA) Without San Juan	4	4	11344	47	219	182	3.87	1.44	0.209	0.345	5.4%
San Juan	0	1	21059	18	18	42	2.33	0.69	0.162	0.266	6.9%
San Juan	1+	1	31586	64	64	145	2.27	0.60	0.075	0.123	3.3%
San Juan	0	2	9270	13	26	33	2.54	0.78	0.215	0.354	8.5%
San Juan	1	2	19522	53	106	139	2.62	0.88	0.121	0.199	4.6%
San Juan	2+	2	15983	41	82	88	2.15	0.69	0.108	0.177	5.0%
San Juan	0-2	3	21299	71	213	203	2.86	1.65	0.196	0.322	6.8%
San Juan	3+	3	3931	11	33	32	2.91	1.14	0.342	0.563	11.8%
San Juan	0-2	4	19857	66	281	237	3.59	2.19	0.269	0.443	7.5%
San Juan	3+	4	4809	30	147	115	3.83	1.97	0.358	0.589	9.3%
Aguadilla (TMA)	0	1	9364	23	23	38	1.65	0.71	0.149	0.245	9.0%
Aguadilla (TMA)	1+	1	15191	60	60	111	1.85	0.52	0.066	0.109	3.6%
Aguadilla (TMA)	0	2	4082	8	16	11	1.38	0.52	0.183	0.301	13.3%
Aguadilla (TMA)	1	2	17531	68	136	134	1.97	0.42	0.051	0.084	2.6%
Aguadilla (TMA)	2	2	10738	41	82	83	2.02	0.57	0.089	0.146	4.4%
Aguadilla (TMA)	3+	2	1335	9	18	15	1.67	0.50	0.166	0.273	10.0%
Aguadilla (TMA)	0-1	3	10059	37	111	84	2.27	1.17	0.192	0.316	8.5%

Municipalities	Vehicles	HH size	N HH	n HH	n Pop	SumTrips	MeanTrips	Standard Deviation Trips	SE	MOE	Sampling Error
Aguadilla (TMA)	2	3	7903	26	78	75	2.88	1.34	0.262	0.430	9.1%
Aguadilla (TMA)	3+	3	3185	20	60	58	2.90	1.33	0.297	0.489	10.3%
Aguadilla (TMA)	0-2	4	18637	32	138	104	3.25	1.65	0.291	0.478	8.9%
Aguadilla (TMA)	3+	4	5421	27	119	113	4.19	1.90	0.365	0.601	8.7%
Other Urbanized Areas Without Ponce and Mayagüez	0	1	26940	33	33	65	1.97	0.53	0.092	0.152	4.7%
Other Urbanized Areas Without Ponce and Mayagüez	1	1	40493	83	83	174	2.10	0.64	0.070	0.115	3.3%
Other Urbanized Areas Without Ponce and Mayagüez	2+	1	5407	11	11	22	2.00	0.63	0.190	0.313	9.5%
Other Urbanized Areas Without Ponce and Mayagüez	0	2	13108	19	38	38	2.00	0.00	0.000	0.000	-
Other Urbanized Areas Without Ponce and Mayagüez	1	2	45941	97	194	194	2.00	0.88	0.089	0.146	4.5%
Other Urbanized Areas Without Ponce and Mayagüez	2	2	30407	85	170	177	2.08	0.66	0.071	0.117	3.4%
Other Urbanized Areas Without Ponce and Mayagüez	3	2	3705	22	44	43	1.95	0.21	0.045	0.075	2.3%
Other Urbanized Areas Without Ponce and Mayagüez	4	2	857	5	10	11	2.20	0.45	0.199	0.328	9.1%
Other Urbanized Areas Without Ponce and Mayagüez	0-1	3	30036	42	126	108	2.57	1.19	0.184	0.302	7.1%
Other Urbanized Areas Without Ponce and Mayagüez	2	3	21568	55	165	169	3.07	1.43	0.192	0.316	6.2%
Other Urbanized Areas Without Ponce and Mayagüez	3+	3	7871	32	96	116	3.63	1.41	0.248	0.409	6.9%
Other Urbanized Areas Without Ponce and Mayagüez	0-1	4	26360	31	138	77	2.48	1.18	0.212	0.348	8.5%
Other Urbanized Areas Without Ponce and Mayagüez	2	4	28970	53	229	162	3.06	1.43	0.197	0.324	6.4%
Other Urbanized Areas Without Ponce and Mayagüez	3+	4	15733	39	179	162	4.15	1.95	0.312	0.514	7.5%
Ponce	0	1	6067	6	6	11	1.83	0.41	0.167	0.274	9.1%
Ponce	1+	1	9242	20	20	45	2.25	0.72	0.160	0.263	7.1%
Ponce	0-1	2	10295	32	64	66	2.06	0.95	0.167	0.275	8.1%
Ponce	2+	2	5722	21	42	43	2.05	0.59	0.128	0.211	6.3%

Municipalities	Vehicles	HH size	N HH	n HH	n Pop	SumTrips	MeanTrips	Standard Deviation Trips	SE	MOE	Sampling Error
Ponce	0-1	3	5983	12	36	30	2.50	1.17	0.337	0.554	13.5%
Ponce	2+	3	5503	17	51	47	2.76	1.03	0.250	0.411	9.0%
Ponce	0+	4	12685	23	106	70	3.04	1.80	0.374	0.615	12.3%
Mayagüez	0+	1	9714	15	15	31	2.07	0.26	0.067	0.110	3.2%
Mayagüez	0+	2	9878	21	42	44	2.10	0.54	0.117	0.193	5.6%
Mayagüez	0+	3	5552	21	63	73	3.48	1.69	0.368	0.606	10.6%
Mayagüez	0+	4	5287	6	26	18	3.00	1.26	0.516	0.849	17.2%

Source: SDG

Weighting and Expansion

Once re-stratification was finalized, the survey weights/expansion factors were created. The weights are developed by strata and are derived from the inverse probability of inclusion into the sample. These weights will serve two purposes, first to allow the sample distribution to match population distribution, hence ensuring representativeness of population and proper inference, and second to scale up values to population wide totals.

Weights for a given strata are equal to the inverse probability of inclusion as based on 2015 ACS estimates which informed sampling plan. Formally, the weight is equal to the ratio between the strata's survey households count and the census count. This will ensure that expanded survey households will match census household numbers. For 1,2, and 3-person households, the expanded population will also match the census population. However, the 4+ person households surveyed may not have a representative distribution of people per household as in the census. Therefore, strata including 4plus-person household have an additional post-stratification weight. This involves shifting weight among 4-person, 5-person, and 6plus-person households, within a certain constrained tolerance, to match a representative people per household. Four geographic regions' 4plus person households can be reweighted to match population perfectly, or near perfectly. The two exceptions are Aguadilla and Mayagüez, where the number of 5-person and 6plus-person households sampled was not large enough to allow for perfect reweighting.

NON-RESPONSE ITEMS INFORMATION IMPUTATION

General Information

Usually in household travel surveys occurs that despite applying the mechanisms of prior contact and direct visits to the household, some people do not report a part of the information. The non-response answers can be of two types:

- People who cannot respond, by absence in the household, inability to contact, etc.; and
- People who reject the survey due to lack of time, reluctance, extension of the form tool, etc.

Considering this is a common situation in practice, the consultant team defined previously the valid surveys identification document, which specifies the questions of Minimum Information Content (MIC) and the maximum number of items non-response according to the number of people of 5 years or more in the household.

From household database, the next step is to define the procedures and criteria of management and item non-response adjustments in order to obtain a valid information basis for further analysis of the information processes.

Normally, statistical imputation refers to data directly related to the sampling unit. In this case, it is important to mention that the unit of sampling are households, of which it has 100% of the required information. Taking into account that the HTS gathers different sub-levels of information when consider conglomerate units that make up these households; is important to mention that the imputation process needs to be understood in a special way according to the tree complexity

information retrieved. Therefore, the first step is to understand at what level the imputation is developed and what is the level of obtaining the information gathered, i.e.:

- Units that are defined in the sampling frame: households. Information collected 100% of the study variables. Does not require imputation;
- Second level of information: people who are part of the household. Information collected 100% of the study variables. Does not require imputation;
- Second level information: vehicles available for the household. Information collected 100% of the study variables. Does not require imputation; and
- Third level of information: trips of people in the household. Information collected 93% of people travel information. Imputation process is required.

Worth mention that even for the specific cases of people rejection, socio-economic information was obtained through the main informant of the household.

The application of imputation on non-response items seeks to achieve a statistical basis within the ranges of reliability and acceptable error.

This type of procedures becomes even more necessary to avoid unrealistic information bias, since in this type of surveys people with more probability to answer the survey are those that do not travel. On the other hand, people who travel have a lower probability of contact and less willingness to answer.

In this way, the non-response items related to travel information should not be ignored. In the specific case of the HTS, corresponding filters in measuring instruments were designed to know with certainty whether people who did not provide travel information made displacements the reference day. In this way, these imputation data are properly distinguishable cases from the "not traveled" cases.

Theoretical Foundations of Statistical Imputation

Statistical imputation is a process in which are assigned values not reported in an observation by others selected using a specific statistical procedure. The imputation corresponds to the case that is assigned a single value according to the rules of consistency established.

There is a lot of imputation methodologies that adapt to different cases according to the characteristics of the survey to develop. From the good selection of the methodology will depend the not altering of survey results.

The Need of Assigning

The imputation procedure plays a main role in the development of the survey since it allows to validate a significant fraction of the collected information which continues to be representative for the study.

Additionally, allows to study the profiles of non-response of the respondents to identify biases that can alter the representativeness of the collected information.

Finally, the success in obtaining all the mobility indicators requires that statistical imputation procedures are implemented to not underestimate or overestimate absolute values that can alter the study results.

Key Aspects' Procedure

The imputation method selection is mainly linked with:

- Non-response profile; and
- Variables to impute.

In terms of the non-response profile it is important to identify if missing information corresponds to some behavior especially in the respondent that incite the non-response of it, i.e. the non-response depend on or not of socio-economic variables and behavior of the respondents. For that, it is defined within the literature missing information profiles as follows:

- MCAR: (Missing completely at random), this profile is assigned when the probability of non-response is completely independent from the data observed and not observed.
- MAR: (Missing at random), is assigned when the probability of non-response depends only on the observed data, i.e., inferences about the missing information using the data collected can be made.
- MNAR: (Missing not at random), is assigned when the probability of no answer depends on the non-observed value of the missing items[16].

On the other hand, the types of variables to impute should be analyzed, since some methods are only restricted to numeric variables while others allow to impute variables such as texts and dates.

In the specific case of the HTS, the types of variables to impute are listed below.

- Numerical variables:
  - Income
  - Household and Vehicle Availability
- Variables in text strings:
  - Occupation

Due to the variety in the type of the variables to be imputed, a method allowing to obtain these different types of information for a single individual at the same time must be chosen, since they are interrelated variables.

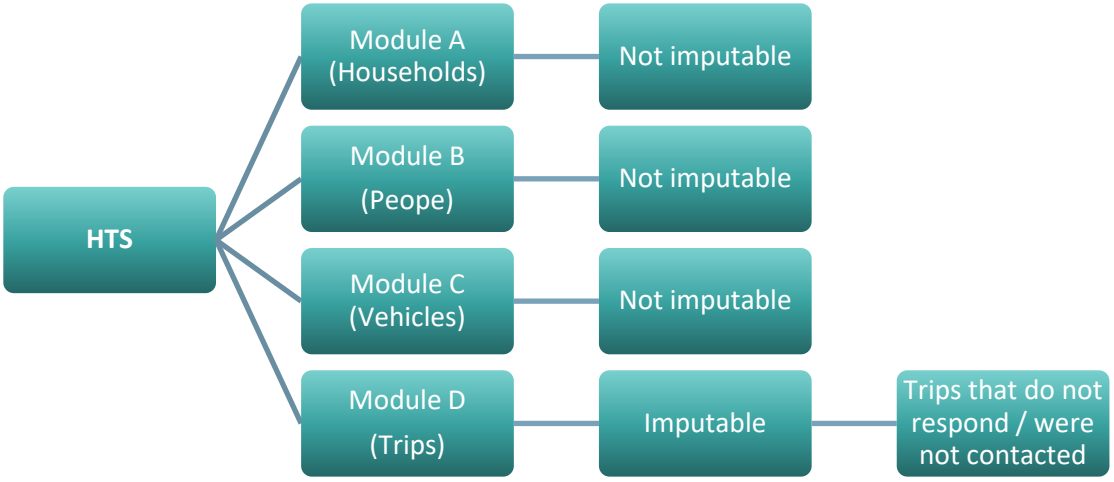
Imputation Scope

Data imputation processes are developed for specific variables according to required analysis. In this way, analyzing the database found that in general, Household information (module A), the information of Household's People (module B) and vehicles information (module C) was obtained entirely. Even for the specific cases of rejection of people, socio-economic information was obtained through the main informant of the household. The information was even obtained if the

[16] Restrepo & Marin, 2012.

person who did not respond to the travel module made trips during the typical day, this information is explained in detail in Figure 4.6.

Figure 4.6: Survey Tree, Imputation Scope



Source: UT SDG – CNC – Mobility Survey – Households Cali 2015.

In this way, in order to estimate the number of trips in the study area according to the different geographical, modal and socio-economic categories, the data imputation process was only applicable to the information regarding number of trips per day and critical trip information for specific cases of people whose information could not be obtained.

The application of imputation on non-response items seeks to achieve one statistical basis within the ranges of reliability and acceptable error, which adequately represent mobility indicators. However, due to lack of geographic information of the imputed trips, this procedure was not used to feed origin-destination matrices.

Imputation Methods Review

This section summarizes different methods of statistical imputation from which there are evidence of implementation in different countries. The information obtained is condensed in the following table that complies with the purposes of method's validation and organization and allows a methodological choice of the most suitable for the HTS.

The selection of the most suitable method is carried out by analyzing:

- The type information of non-response (type of variables to impute).
- Profiles of non-response (bias analysis).

After identifying the method that can be better adjusted to the HTS, next step was to explain the detailed methodology with which the imputation procedure took place.

For this specific study was selected the method k Nearest Neighbor Hot Deck Imputation subject to covariates that adapts best to the study specifications and the subsequent use of the information to be gathered. Table 4.26 shows a summary of the most important imputation methods handled in the statistical studies and that have been studied by this consultancy.

Table 4.26: Imputation Methods Reviewed for the Study

Method / Variable	Technique	Types of Data	Profile	Application	Advantages	Disadvantages
Deductive	Based on external information	• Numeric • Date-time • Alphanumeric fields	MNAR	According to the criterion critique review and encoding, missing information is editing in order to be consistent with the information reviewed to date.	• Ensures the consistency of the information.	• Not guaranteed to represent 100% of reality. • It can be considered as an information edition. • very atypical cases that are likely to represent the case to be imputed can be excluded.
Historical	Based on external information	• Numeric • Date-time • Alphanumeric fields	MNAR	It takes constant values from external sources to fill the loss variable	• Easy to apply. • In cases where the likely behavior is more representative than the temporal changes it turns out to be a very good tool for imputation.	• There is no information from previous surveys. • Historical replacement could induce noise in the survey, since the conditions and the transportation offer has changed in the city in recent years.
Mean Match	Deterministic	Numeric	MAR	Compares the profile of the missing data with complete cases, imputing the corresponding value to the closest case.	• Allows to review not to have data from repeated imputations.	• It is a very tedious method to be applied in studies with a lot of information. • Study of the cases may be different depending on the person who analyzes it.
Completed Data / Listwise	Elimination	• Numeric • Date-time • Alphanumeric fields	MCAR-MAR	Observations that have information for all variables are used	• Easy to apply • Common use	• Cannot be allowed not to have the complete information of the variables to impute.

Method / Variable	Technique	Types of Data	Profile	Application	Advantages	Disadvantages
						• Not meets the study needs to generate indicators based on the trips' information (such as the total city trips).
Completed Data / Pairwise	Elimination	• Numeric • Date-time • Alphanumeric fields	MCAR	Each variable is analyzed separately with all available data, so incomplete records can be analyzed in a partial way.	• Easy to apply. • Works with all the variables.	• The statistical parameters of the sample are distorted.
Cold Deck	Deterministic	• Numeric • Date-time • Alphanumeric fields	MNAR	Missing values are assigned from a survey or previous studies	• Easy to apply.	• The quality of the information from the previous surveys is unknown. • Citizenship behavior can vary depending on the time, so it may not represent completely the reality.
By Means / Not Conditioned	Deterministic	Numeric	MCAR	It is estimated the mean of the observed values and with these missing values are estimated.	• Easy to apply.	• It does not allow to impute other types of data different to the numerical variables. • Generates biased indicators. • Alters the indicators' variance.
By Means / By Subgroup (Conditioned)	Deterministic	Numeric	MCAR	Complete and incomplete records are divided into subgroups that meet the same characteristics, then missing values are imputed using the mean of the observed	• Decreases the indicators' affect when impute different values for group and	• It does not allow to impute other types of data different to the numerical variables.

Method / Variable	Technique	Types of Data	Profile	Application	Advantages	Disadvantages
				values within the respective class.	not for all the information.	• Generates biased indicators. • Alters the indicators' variance.
By Rates	Deterministic	Numeric	MCAR	Auxiliary variables that are highly related to the variables to be imputed are used. The data to be imputed is obtained by multiplying the average rate of the completed records.	• Highly correlated models can be generated that produce very characteristic imputations.	• It is not fully efficient. • If there are identical auxiliary variables, they will generate similar indicators, which can distort the distribution of the imputed variable.
Binary Variables	Random	Yes/No data	MCAR	Creates a logistic based on binary variables that allow to identify observations with missing data.	• Binary variables have a simple approach	• In regression models produce distortions in the parameters.
Re-weighting	Deterministic	Numeric	MCAR	Subgroups based on similar characteristics are formed and missing data are deleted on them; after that, the information by variable within each group is weighted.	• It allows to estimate correct values within each one of the records	• When you have high rates of non-response, values can be biased.
Hot Deck / Conditioned to Covariates	Random	• Numeric • Date-time • Alphanumeric fields	MAR	Full records in subgroups that meet the same characteristics. Incomplete records are replaced with information from a full record that is in the same group.	• Donors and receivers are part of the same group. • Number of donors is conditioned to the covariant.	• The criteria under which sub-groups are formed must be carefully analyzed and validated.
Hot Deck / By Regression Conditioned to Covariates	Random	Numeric	MCAR	Divide the full records in subgroups that meet the same characteristics. Incomplete records are replaced with average value estimated by	• Easy to apply.	• Repeat the value imputed observations to be charged in the same group. • Underestimated the variance

Method / Variable	Technique	Types of Data	Profile	Application	Advantages	Disadvantages
				regression for the interest group.		and standard error.
Hot Deck / Sequential	Deterministic	• Numeric • Date-time • Alphanumeric fields	MAR	Records based on a previously selected parameter are organized, then missing values are replaced by the preceding registry values.	• Easy to apply. • The parameter definition can simulate the approach between similar profiles.	• If many records must be imputed maybe the same value could be use many times resulting in bias.
Hot Deck / Nearest Neighbor	Deterministic	• Numeric • Date-time • Alphanumeric fields	MCAR	It is based on the assumption that near individuals have similar characteristics. Defined subgroups of measures, a measure of distance[17] based on a known parameter and the missing record is imputed with the data of the closest record.	• It allows to make a justified technical selection of the replacement cases to the records to be imputed.	• Possible duplication of the same value many times. • Selection of the appropriate distance metric can be a sensitive issue at the time of your application.
Regression / General	Deterministic	Numeric	MCAR	Missing values are replaced with the estimated mean value by regression performed based on all records.	• Easy to apply	• Estimates could be biased. • It underestimates the variance of the indicators. • It is not easy to find a valid model for the variable of interest.
Regression / By Subgroup	Deterministic	Numeric	MCAR	The database is divided into subgroups based on correlated variables. Missing values are replaced with the mean value estimated by regression in the subgroup of interest	• Easy to apply	• Estimates could be biased. • It underestimates the variance of the indicators. • It is not easy to find a valid model for the variable of interest.

[17] Possible distance measures: Maximum deviation, Mahalanobis distance and Euclidean distance.

Method / Variable	Technique	Types of Data	Profile	Application	Advantages	Disadvantages
Regression / Random	Random	Numeric	MAR	Like the general method, add a random residual value.	• It solves the distribution distortion problem of the variable to be imputed.	• It can create inconsistencies within the database, because it can generate values out of range.
Maximum Likelihood (ML), Expectation Maximization (EM)	Deterministic	• Numeric • Date-time • Alphanumeric fields	MAR	A multivariate model with complete variables is proposed to estimate the missing parameters.	• You can make important assimilations with the reality.	• The function definition can be complex. • It could be assigned to more than one allocation the same result information of the EM model.
Neural Networks	Random	Numeric	MAR	The creation of a procedures neural network is proposed that evaluates a number of previous cases, and under the supervision of the programmer imputes according to parameterized criteria and learned constantly.	• It feeds constantly, this makes the result be re-evaluated imputation after imputation.	• Complex design and acting. • Requires an advanced knowledge of the topic. • In case of not being supervised it may leave the expected ranges and losing total validity.
Multiple imputation	Deterministic	Numeric	MAR	The imputation of several values to a same missing data generating *m* estimates is performed, then through statistical analysis different assignments are combined to a single value.	• It allows estimators non-biased and adequately reflect the uncertainty of non-response.	• Requires that data being MAR. • Situations in which the assumptions are not met occurs. • The model search for the appropriate model can be very complex.
Multiple Imputation Based on Bayesian Models	Deterministic	• Numeric • Date-time • Alphanumeric fields	MAR	Part of the information on the responses distribution, through a probability calculation.	• It allows to keep the statistical parameters of error and variance.	• Required previous information to estimate the probability distributions.

Source: UT SDG - CNC – Mobility Survey Cali 2015.

Procedure Development

Method Choice

Based on an analysis of possible imputation methodologies k Nearest Neighbors Hot-deck method was used, considering the following arguments:

- The analysis performed to the information that is presented in more detail later, allows to know that non-response cases are distributed randomly in all population, geographical and socio-economic groups. Therefore, the principle about items imputation available or "donors" to the non-response items or "recipients" is applicable to this case;
- It allows the imputation of diverse types of variable such as dates, text and numeric variables; and
- It ensures obtaining information required in terms of information consistency networks.

Definition of Imputation Characteristics

The most important aspect of the imputation method used is the selection of characteristics used to define an individual's "neighborhood". The characteristics are used to create measures of "distance" to describe similarity between observations, in this case people. Then a neighborhood of donors is determined based on the largest similarity between the individual with missing trips and other individuals in the dataset with complete data. Of the 5,653 people in the survey, 1,810 (32%) had missing trip diaries which need to be imputed.

The definition of key imputation characteristics utilized:

- **Region:** 6 groups were considered:
  - San Juan (TMA) Without San Juan;
  - San Juan;
  - Aguadilla (TMA);
  - Other Urbanized Areas Without Mayagüez and Ponce;
  - Ponce; and
  - Mayagüez.
- **Strata (Household Size and Vehicle Availability):** Initially, 20 groups of household size and vehicle available were defined in the sampling design:
  - 1-person household-No vehicle available;
  - 1-person household-1 vehicle available;
  - 1-person household-2 vehicles available;
  - 1-person household-3 vehicles available;
  - 1-person household-4 or more vehicles available;
  - 2-person household-No vehicle available;
  - 2-person household-1 vehicle available;
  - 2-person household-2 vehicles available;
  - 2-person household-3 vehicles available;
  - 2-person household-4 or more vehicles available;
  - 3-person household-No vehicle available;
  - 3-person household-1 vehicle available;
  - 3-person household-2 vehicles available;

- 3-person household-3 vehicles available;
- 3-person household-4 or more vehicles available;
- 4-or-more-person household-No vehicle available;
- 4-or-more-person household-1 vehicle available;
- 4-or-more-person household-2 vehicles available;
- 4-or-more-person household-3 vehicles available; and
- 4-or-more-person household-4 or more vehicles available.

However, as it was explained in Error Calculations section, the union of different strata within the sample was carried out, which preferably share certain conditions in order to find a unit that be statistically representative. Then 60 groups were formed.

- **Occupation:** 3 groups were considered for the following general occupations:
  - Student;
  - Employed; and
  - Other.
- **Income:** 11 groups were considered:
  - Under $10,000;
  - $10,000 - $14,999;
  - $15,000 - $24,999;
  - $25,000 - $34,999;
  - $35,000 - $49,999;
  - $50,000 - $74,999;
  - $75,000 - $99,999;
  - $100,000 - $149,999;
  - $150,000 - $199,999;
  - $200,000 or More; and
  - Don't know/Prefer not to say.

Bias Control in the Imputation

A first step in bias mitigation in the imputation results is related with the appropriate design of sample categories. Having the classification categories of imputation consistent with the possible information variations according to the study variables, which guarantees that resulting variation ranges. Further, it is important that individuals with missing trip diaries do not have systematic differences in their characteristics, particularly those used to impute. Otherwise imputed trips will be biased towards a small number of individuals observed which are similar to the people with missing trips. In Table 4.27 through Source: SDG

Table 4.30, the distribution of key variables used to impute are shown for the individuals with observed trip diaries and those missing and are imputed. In general, the distribution of profiles of missing and observed trip response are very similar which will limit bias.

Table 4.27: Distribution of Household Size between Observed and Imputed

NumPeopleStrata	Observed	Missing
1	11.8%	-
2	26.2%	40.1%

NumPeopleStrata	Observed	Missing
3	28.2%	30.0%
4	33.9%	29.9%

Source: SDG

Table 4.28: Distribution of Vehicle Stratification between Observed and Imputed

VehStrata	Observed	Missing
0	7.0%	4.8%
1	35.9%	30.5%
2	36.3%	40.6%
3	14.3%	16.1%
4	6.6%	8.0%

Source: SDG

Table 4.29: Distribution of HH Income between Observed and Imputed

HH Income	Observed	Missing
Don't know/Prefer Not to Say	61.3%	64.8%
Under $10,000	12.6%	10.1%
$10,000 - $14,999	7.5%	6.5%
$15,000 - $24,999	6.5%	6.6%
$25,000 - $34,999	4.8%	3.8%
$35,000 - $49,999	3.1%	3.1%
$50,000 - $74,999	2.7%	2.8%
$75,000 - $99,999	0.5%	0.9%
$100,000 - $149,999	0.6%	0.9%
$150,000 - 149,999	0.2%	0.2%
$200,000 or More	0.3%	0.3%

Source: SDG

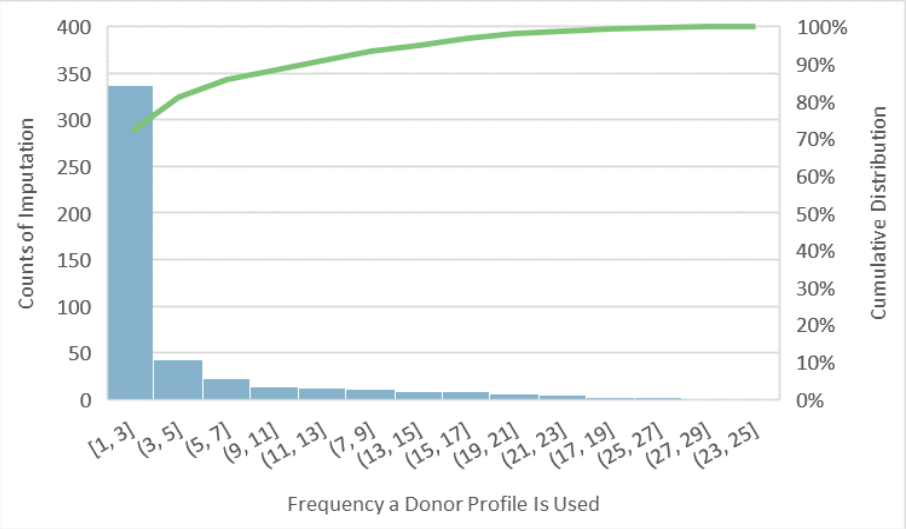
Table 4.30: Distribution of Occupation between Observed and Imputed

Occupation	Observed	Missing
Employed	34.2%	44.5%
Other	39.9%	45.9%
Student	23.1%	9.6%
NA	2.8%	-

Source: SDG

An additional source of bias may arise if a particular set of observations are used too heavily as donors in imputation. To check reasonable distribution of donors, a histogram of donor frequency is shown in Figure 4.7 which shows counts of imputation records by how frequently their donor profiles were used. In the vast majority of imputation, a given donor profile was used between 1 and 3 times, and 90% of imputation cases are based on donor profiles which are not used 10 times or less. Thus, the imputation does not rely on small sets of donors and will not introduce bias.

Figure 4.7: Frequency of Donor Profiles



Source: SDG

Further, there may be some variation depending on k selected, the parameter determining the size of the neighborhood of donors to consider. The size of k chosen is 10, and simulations are done using k ranging from 5 to 15. Overall, the total trips and average trip per person are shown in Table 4.31. The total number of trips remains very stable, which shows that the selection of neighborhood size will not have material impact on results.

Table 4.31: Simulation of imputation process

k	Trips Imputed	Average Trips
5	3552	1.96
6	3477	1.92
7	3504	1.94
8	3480	1.92
9	3451	1.91
10	3448	1.90
11	3448	1.90
12	3426	1.89
13	3455	1.91
14	3455	1.91
15	3422	1.89

Source: SDG

5 CHAPTER 5 SURVEY FINDINGS

OVERVIEW

The analysis will be presented in terms of total population using survey results that have been weighted. Using these weights, which were developed to accurately reflect the number of regional households by specific household size and vehicle ownership, survey results have been scaled to represent regional and Puerto Rico level number of households, population, trips, and vehicles.

DEMOGRAPHIC CHARACTERISTICS OF SURVEY PARTICIPANTS

The demographic characteristics of all households and persons that participated in this study are tabulated in this section. They are tabulated separately by geographic area (Area 1 - San Juan TMA, Area 2 – Aguadilla TMA, Area 3 – Other Urban Areas). It will be important to assess the survey capture rate of individuals with no access to private vehicles compared to those with access. Furthermore, the trip tendencies and utilization of public transport of these groups is explored.

The chapter contains figures and tables for the following demographic data:

- Gender of survey participants;
- Age of survey participants;
- Vehicles per household;
- Persons per household;
- Housing type;
- Housing ownership status;
- Age of survey participants; and
- Education/employment status of survey participants:
  - Level of achieved education of survey participants; and
  - Employment by industry for employed survey participants.

Household Level Demographic Data

Household demographic data was captured for the 2,784 households who participated in the survey. Results are shown in Table 5.1 to Table 5.5 and Figure 5.1 to Figure 5.5.

Significant Findings

Household Occupants: Seen in Table 5.1, just over 23% of Puerto Rico's households have 4 or more occupants. Overall, the distribution of household sizes for Puerto Rico holds across regions. In all regions, 2-person households make up over 30% of total households, more than any other household size strata in their respective regions.

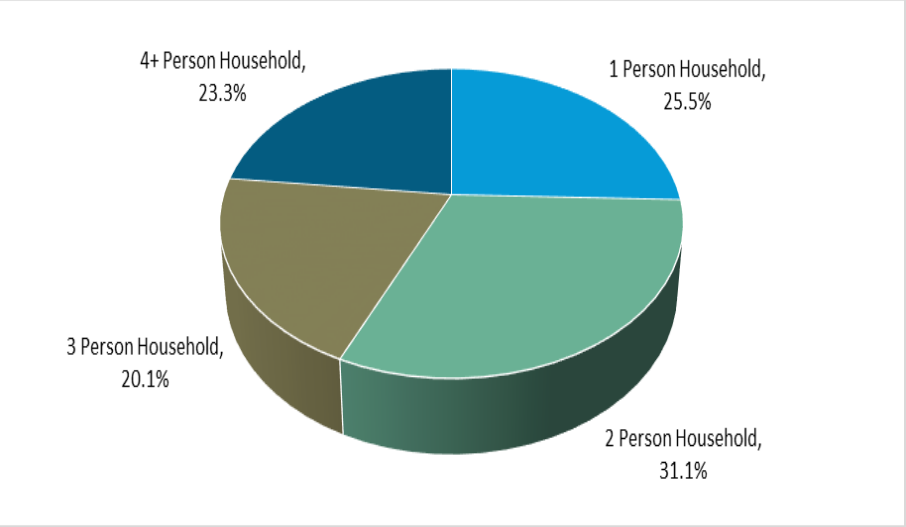
Vehicles per Household: At the Puerto Rico level close to 60% of households have 1 or less available vehicles, with just under 15% of households without access to a private vehicle.

Housing Structure: In Puerto Rico, just over 80% of households live in single-family homes, with close to 15% living in multi-family homes.

Income: With just under 60% of the population's income unknown due to survey respondent's choice to not disclose, this is unable to provide as much information as would be desired. Of those who disclosed income the majority of household incomes fall under $25,000.

Home Ownership: At the Puerto Rico level, shown in, over 70% of all households own and have either paid in full or are currently paying, as over 50% of all household own and have paid off their home.

Figure 5.1: Puerto Rico Household Distribution by Household Size



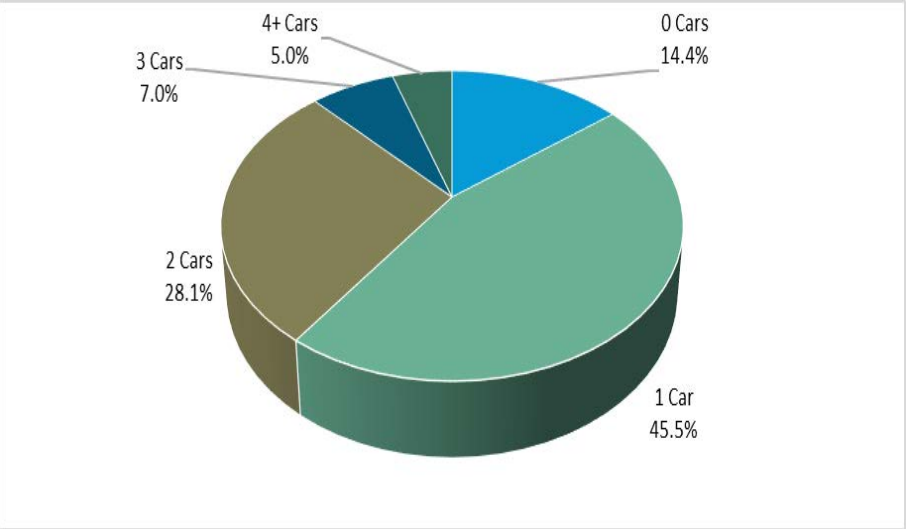
Source: SDG – Using Weighted Survey Results

Table 5.1: Household Distribution by Household Size and by Region

Household Size	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
1	195,196 (25.8%)	24,555 (23.7%)	97,863 (25.5%)	317,614 (25.5%)
2	233,836 (30.9%)	33,686 (32.6%)	119,913 (31.3%)	387,435 (31.1%)
3	152,192 (20.1%)	21,147 (20.4%)	76,513 (20.0%)	249,852 (20.1%)
4+	176,208 (23.3%)	24,058 (23.3%)	89,035 (23.2%)	289,301 (23.3%)
Total	**757,432 (60.9%)**	**103,446 (8.3%)**	**383,324 (30.8%)**	**1,244,202 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.2: Puerto Rico Household Distribution by Vehicle Ownership



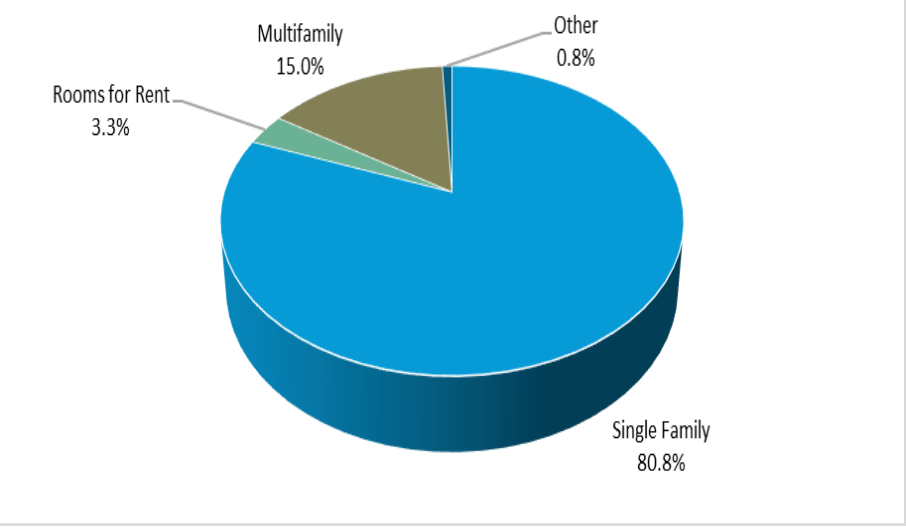
Source: SDG – Using Weighted Survey Results

Table 5.2: Household Distribution by Vehicle Ownership and by Region

Number of Vehicles	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
0	102,510 (13.5%)	15,407 (14.9%)	61,499 (16.0%)	179,416 (14.4%)
1	357,305 (47.2%)	42,785 (41.4%)	165,761 (43.2%)	565,851 (45.5%)
2	202,098 (26.7%)	33,184 (32.1%)	114,059 (29.8%)	349,341 (28.1%)
3	55,057 (7.3%)	6,536 (6.3%)	25,944 (6.8%)	87,536 (7.0%)
4+	40,463 (5.3%)	5,534 (5.4%)	16,061 (4.2%)	62,059 (5.0%)
Total	**757,432 (60.9%)**	**103,446 (8.3%)**	**383,324 (30.8%)**	**1,244,202 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.3: Puerto Rico Household Distribution by Household Type



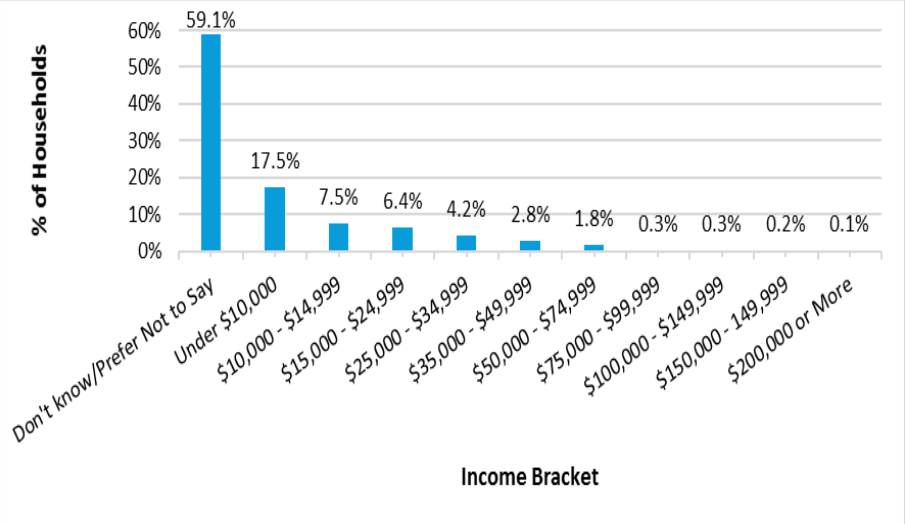
Source: SDG – Using Weighted Survey Results

Table 5.3: Household Distribution by Housing Type and Region

Housing Type	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Single Family	589,381 (77.8%)	91,300 (88.3%)	324,859 (84.7%)	1,005,541 (80.8%)
Rooms for Rent	27,069 (3.6%)	3,816 (3.7%)	10,672 (2.8%)	41,557 (3.3%)
Multifamily	132,137 (17.4%)	8,330 (8.1%)	46,631 (12.2%)	187,098 (15.0%)
Other	8,844 (1.2%)	0 (0.0%)	1,162 (0.3%)	10,006 (0.8%)
Total	**757,432 (60.9%)**	**103,446 (8.3%)**	**383,324 (30.8%)**	**1,244,202 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.4: Household Distribution by Household Income Brackets



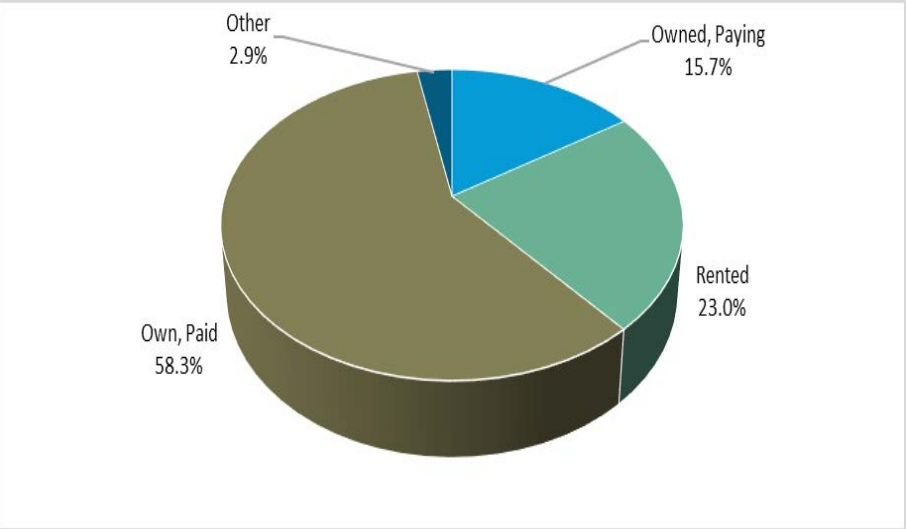
Source: SDG – Using Weighted Survey Results

Table 5.4: Household Distribution by Household Income Brackets and Region

HH Income	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Totals
Don't know/Prefer Not to Say	443,061 (58.5%)	66,547 (64.3%)	225,336 (58.8%)	734,944 (59.1%)
Under $10,000	129,287 (17.1%)	14,276 (13.8%)	73,628 (19.2%)	217,192 (17.5%)
$10,000 - $14,999	56,391 (7.4%)	7,472 (7.2%)	28,930 (7.5%)	92,792 (7.5%)
$15,000 - $24,999	51,388 (6.8%)	4,714 (4.6%)	23,013 (6.0%)	79,115 (6.4%)
$25,000 - $34,999	35,093 (4.6%)	3,590 (3.5%)	13,085 (3.4%)	51,769 (4.2%)
$35,000 - $49,999	18,504 (2.4%)	3,527 (3.4%)	12,297 (3.2%)	34,327 (2.8%)
$50,000 - $74,999	16,205 (2.1%)	2,652 (2.6%)	4,096 (1.1%)	22,953 (1.8%)
$75,000 - $99,999	2,931 (0.4%)	0 (0.0%)	1,276 (0.3%)	4,207 (0.3%)
$100,000 - $149,999	1,790 (0.2%)	410 (0.4%)	1,491 (0.4%)	3,691 (0.3%)
$150,000 - 199,999	1,885 (0.2%)	0 (0.0%)	171 (0.0%)	2,056 (0.2%)
$200,000 or More	898 (0.1%)	258 (0.2%)	0 (0.0%)	1,156 (0.1%)
Total	**757,432 (60.9%)**	**103,446 (8.3%)**	**383,324 (30.8%)**	**1,244,202 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.5: Puerto Rico Household Distribution by Home Ownership Status



Source: SDG – Using Weighted Survey Results

Table 5.5: Household Distribution by Home Ownership Status and Region

Housing Status	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Totals
Owned, Paying	135,954 (17.9%)	12,255 (11.8%)	47,451 (12.4%)	195,660 (15.7%)
Rented	180,746 (23.9%)	22,764 (22.0%)	83,254 (21.7%)	286,763 (23.0%)
Own, Paid	421,764 (55.7%)	65,015 (62.8%)	238,850 (62.3%)	725,629 (58.3%)
Other	18,967 (2.5%)	3,413 (3.3%)	13,769 (3.6%)	36,149 (2.9%)
Total	**757,432 (60.9%)**	**103,446 (8.3%)**	**383,324 (30.8%)**	**1,244,202 (100.0%)**

Source: SDG – Using Weighted Survey Results

Person Level Demographic Data

Person level demographic data was captured for the 6,861 people who participated in the survey.

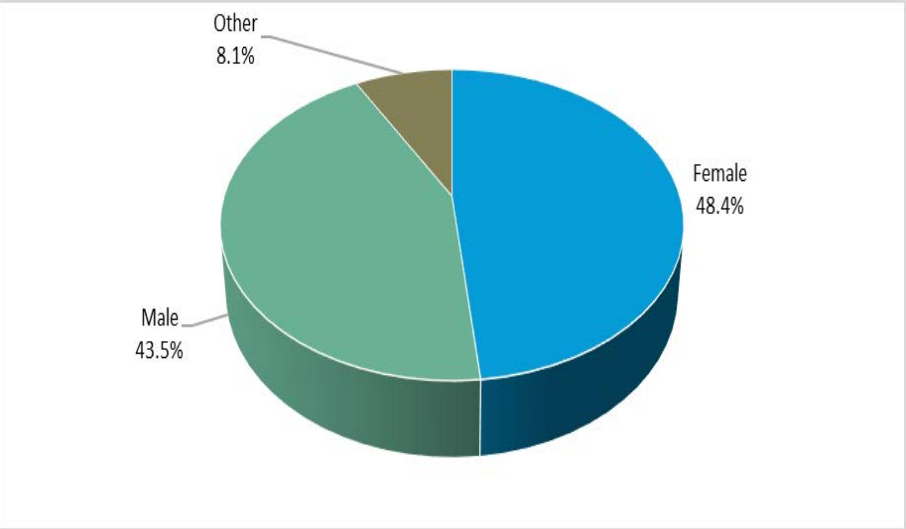
Significant Findings

Gender: In Puerto Rico, just over 48% and close to 44% of people identify as Female and Male respectively. Aguadilla TMA is the one region where there is a higher percentage of males than females.

Age: In Puerto Rico, just over 25% of the population falls under the age of 20, just over 36% falls between 20 and 49 years of age, and 34% are older than 50.

Education Level: Just over 65% of the Puerto Rico Population have achieved High School completion or above.

Figure 5.6: Puerto Rico Population Distribution by Gender



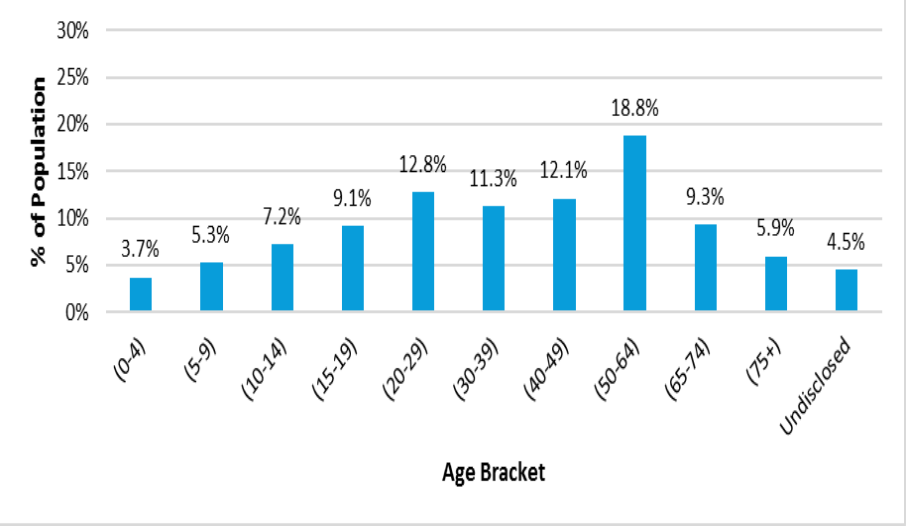
Source: SDG – Using Weighted Survey Results

Table 5.6: Population Distribution by Gender and Region

Gender	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Female	1,050,831 (48.8%)	128,279 (46.3%)	514,921 (48.0%)	1,694,031 (48.4%)
Male	885,176 (41.1%)	141,556 (51.1%)	497,689 (46.4%)	1,524,420 (43.5%)
Other	216,625 (10.1%)	7,389 (2.7%)	60,430 (5.6%)	284,444 (8.1%)
Total	**2,152,632 (61.5%)**	**277,224 (7.9%)**	**1,073,040 (30.6%)**	**3,502,895 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.7: Puerto Rico Population Distribution by Age Brackets



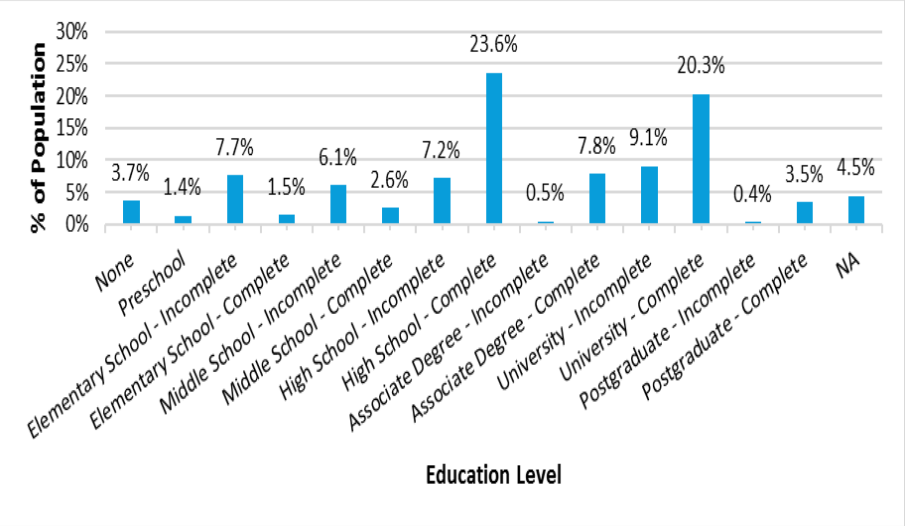
Source: SDG – Using Weighted Survey Results

Table 5.7: Population Distribution by Age Bracket and Region

Age Bracket	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
(0-4)	71,633 (3.3%)	6,893 (2.5%)	50,051 (4.7%)	128,577 (3.7%)
(5-9)	122,514 (5.7%)	6,322 (2.3%)	56,558 (5.3%)	185,394 (5.3%)
(10-14)	116,673 (5.4%)	32,320 (11.7%)	104,195 (9.7%)	253,188 (7.2%)
(15-19)	201,311 (9.4%)	16,738 (6.0%)	101,785 (9.5%)	319,834 (9.1%)
(20-29)	280,861 (13.0%)	39,716 (14.3%)	128,179 (11.9%)	448,756 (12.8%)
(30-39)	224,949 (10.4%)	37,277 (13.4%)	133,864 (12.5%)	396,090 (11.3%)
(40-49)	241,784 (11.2%)	42,916 (15.5%)	138,788 (12.9%)	423,488 (12.1%)
(50-64)	417,983 (19.4%)	51,290 (18.5%)	188,523 (17.6%)	657,796 (18.8%)
(65-74)	194,289 (9.0%)	24,752 (8.9%)	107,023 (10.0%)	326,064 (9.3%)
(75+)	135,574 (6.3%)	12,892 (4.7%)	58,909 (5.5%)	207,375 (5.9%)
Undisclosed	145,061 (6.7%)	6,108 (2.2%)	5,164 (0.5%)	156,333 (4.5%)
Total	**2,152,632 (61.5%)**	**277,224 (7.9%)**	**1,073,040 (30.6%)**	**3,502,895 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.8: Puerto Rico Population Distribution by Education Level



Source: SDG – Using Weighted Survey Results

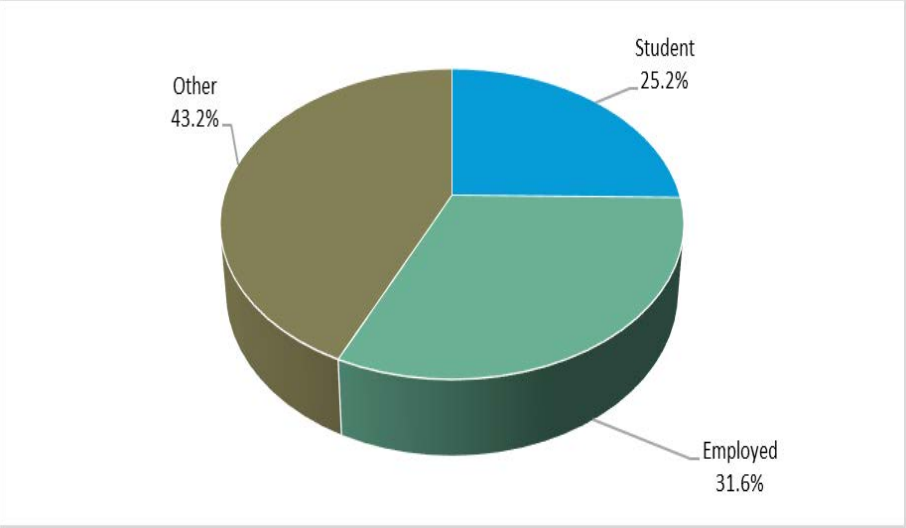
Table 5.8: Population Distribution by Education Level and Region

Education	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
None	72,726 (3.4%)	9,655 (3.5%)	45,748 (4.3%)	128,129 (3.7%)
Preschool	37,952 (1.8%)	1,333 (0.5%)	8,527 (0.8%)	47,812 (1.4%)
Elementary School - Incomplete	154,162 (7.2%)	12,396 (4.5%)	103,646 (9.7%)	270,204 (7.7%)
Elementary School - Complete	29,852 (1.4%)	3,520 (1.3%)	20,795 (1.9%)	54,167 (1.5%)
Middle School - Incomplete	96,581 (4.5%)	21,686 (7.8%)	96,978 (9.0%)	215,245 (6.1%)
Middle School - Complete	52,375 (2.4%)	10,833 (3.9%)	29,373 (2.7%)	92,581 (2.6%)
High School - Incomplete	161,820 (7.5%)	21,105 (7.6%)	69,914 (6.5%)	252,840 (7.2%)
High School - Complete	486,889 (22.6%)	69,833 (25.2%)	270,040 (25.2%)	826,762 (23.6%)

Education	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Associate Degree - Incomplete	10,930 (0.5%)	2,328 (0.8%)	5,187 (0.5%)	18,445 (0.5%)
Associate Degree - Complete	183,826 (8.5%)	19,984 (7.2%)	70,441 (6.6%)	274,251 (7.8%)
University - Incomplete	184,379 (8.6%)	21,928 (7.9%)	111,395 (10.4%)	317,703 (9.1%)
University - Complete	446,836 (20.8%)	69,868 (25.2%)	195,046 (18.2%)	711,750 (20.3%)
Postgraduate - Incomplete	9,701 (0.5%)	224 (0.1%)	2,690 (0.3%)	12,615 (0.4%)
Postgraduate - Complete	79,540 (3.7%)	6,423 (2.3%)	38,095 (3.6%)	124,058 (3.5%)
NA	145,061 (6.7%)	6,108 (2.2%)	5,164 (0.5%)	156,333 (4.5%)
Total	**2,152,632 (61.5%)**	**277,224 (7.9%)**	**1,073,040 (30.6%)**	**3,502,895 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.9: Population Distribution by Employment/Student Status



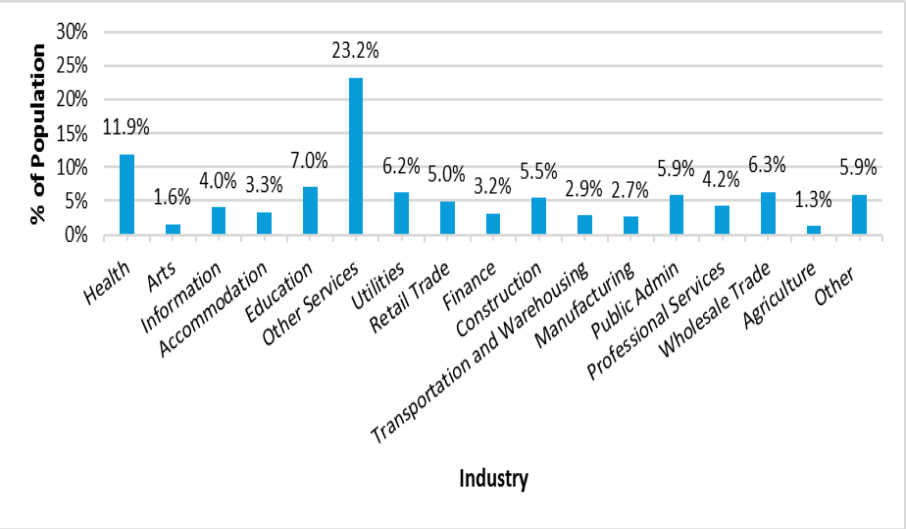
Source: SDG – Using Weighted Survey Results

Table 5.9: Population Distribution by Employment/Student Status and Region

Employment	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Other	953,519 (44.3%)	115,035 (41.5%)	454,590 (42.4%)	1,523,144 (43.5%)
Student	527,679 (24.5%)	63,728 (23.0%)	313,246 (29.2%)	904,653 (25.8%)
Employed	671,433 (31.2%)	98,461 (35.5%)	305,204 (28.4%)	1,075,098 (30.7%)
Total	**2,152,632 (61.5%)**	**277,224 (7.9%)**	**1,073,040 (30.6%)**	**3,502,895 (100.0%)**

Source: SDG– Using Weighted Survey Results

Figure 5.10: Puerto Rico Employed Population Distribution by Industry



Source: SDG – Using Weighted Survey Results

Table 5.10: Employed Population Distribution by Industry and Region

Industry	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Health Care and Social Assistance	74,945 (11.2%)	5,905 (6.0%)	47,118 (15.4%)	127,968 (11.9%)
Arts, Entertainment, and Recreation	16,696 (2.5%)	0 (0.0%)	0 (0.0%)	16,696 (1.6%)
Information	24,771 (3.7%)	5,849 (5.9%)	12,461 (4.1%)	43,082 (4.0%)
Accommodation and Food Service	24,535 (3.7%)	1,921 (2.0%)	9,471 (3.1%)	35,927 (3.3%)
Educational Services	44,550 (6.6%)	3,513 (3.6%)	27,482 (9.0%)	75,545 (7.0%)
Other Services (Except Public Administration)	172,778 (25.7%)	18,912 (19.2%)	57,966 (19.0%)	249,656 (23.2%)
Utilities	33,093 (4.9%)	9,403 (9.6%)	24,217 (7.9%)	66,712 (6.2%)
Retail Trade	39,599 (5.9%)	4,420 (4.5%)	9,308 (3.0%)	53,326 (5.0%)
Finance and Insurance	25,396 (3.8%)	1,513 (1.5%)	7,060 (2.3%)	33,970 (3.2%)
Construction	35,678 (5.3%)	6,560 (6.7%)	16,517 (5.4%)	58,754 (5.5%)
Transportation and Warehousing	23,343 (3.5%)	2,886 (2.9%)	4,420 (1.4%)	30,650 (2.9%)
Manufacturing	12,568 (1.9%)	970 (1.0%)	15,146 (5.0%)	28,684 (2.7%)
Public Administration	25,563 (3.8%)	10,579 (10.7%)	26,786 (8.8%)	62,928 (5.9%)
Professional, Scientific, and Technical Services	33,374 (5.0%)	5,476 (5.6%)	6,414 (2.1%)	45,265 (4.2%)
Wholesale Trade	37,655 (5.6%)	5,328 (5.4%)	25,106 (8.2%)	68,088 (6.3%)
Agriculture, Forestry, Fishing, and Hunting	7,527 (1.1%)	2,713 (2.8%)	3,839 (1.3%)	14,079 (1.3%)
Other	39,365 (5.9%)	12,510 (12.7%)	11,894 (3.9%)	63,768 (5.9%)
Total	**671,433 (62.5%)**	**98,461 (9.2%)**	**305,204 (28.4%)**	**1,075,098 (100.0%)**

Source: SDG – Using Weighted Survey Results

ANALYSIS OF TRIP PURPOSE AND FREQUENCY

The trip level data for participants with completed travel diaries is analyzed in this section, there were 10,557 trips and their respective details captured by the survey.

Significant Findings

Trips Per Household: As seen in Table 5.11, the mean trips generally increase with growth in household size and/or vehicle ownership. The greatest portion of households are 2-person and 1-vehicle households and their mean daily trips are 3.47.

Transportation Mode: Close to 90% of trips in Puerto Rico are made in private vehicles as either the driver or as a passenger. San Juan has the highest portion of trips on public transit with 2.5% of trips on either bus or train.

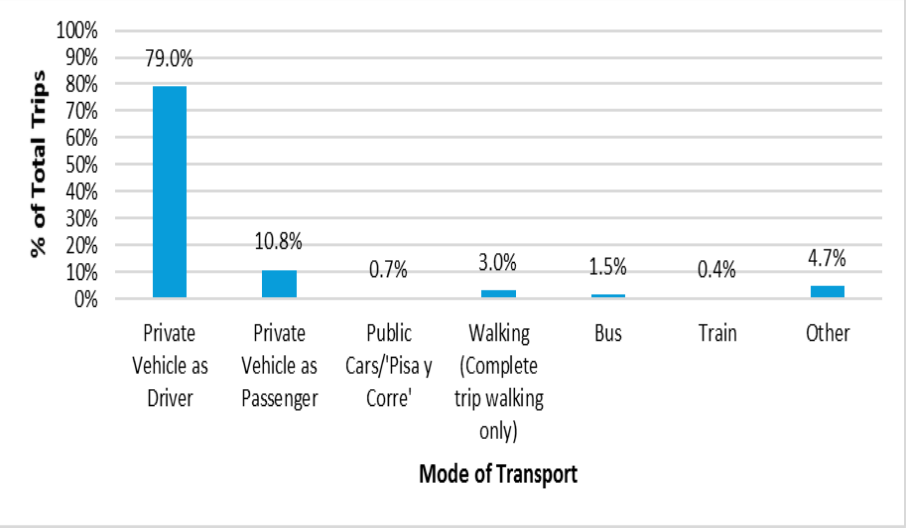
Trip Frequency: In Puerto Rico, just over 60% of all specific trips are recurring and completed 5 times or more a week.

Table 5.11: Household Travel Survey – Trips Per Household Per Typical Day – Sample Size (N=2,784)

HS	N HH	n HH survey	Mean Trips	SE	MOE	Total Trips
1	317,614	594	2.09	0.01	+/-0.02	662,412
2	387,435	1,024	3.48	0.04	+/-0.07	1,349,793
3	249,852	655	4.33	0.12	+/-0.2	1,082,629
4	289,301	511	6.19	0.48	+/-0.78	1,791,470
Total	**1,244,202**	**2,784**	**3.93**	**0.11**	**+/-0.18**	**4,886,304**

Source: SDG – Using Weighted Survey Results

Figure 5.11: Puerto Rico Trip Distribution by Transportation Mode



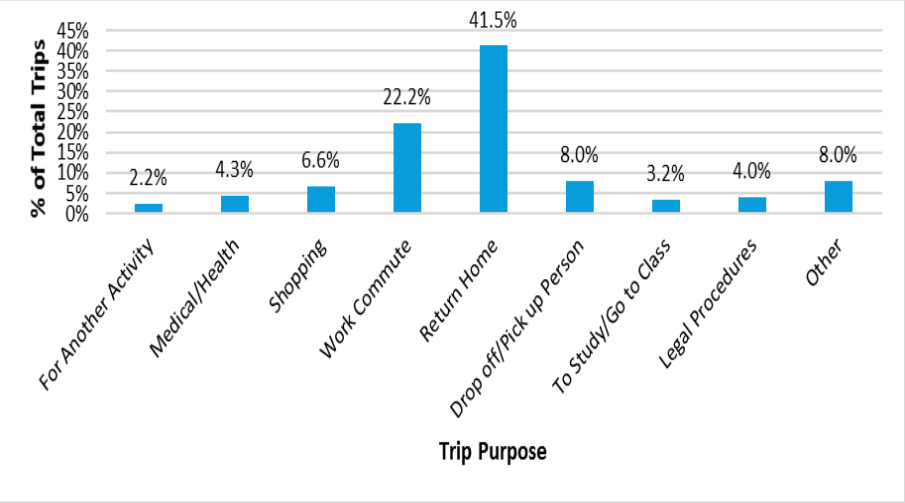
Source: SDG – Using Weighted Survey Results

Table 5.12: Trip Distribution by Transportation Mode and Region

Mode of Transport	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Totals
Private Vehicle as Driver	2,317,946 (76.8%)	319,415 (79.6%)	1,221,349 (83.2%)	3,858,709 (79.0%)
Private Vehicle as Passenger	368,383 (12.2%)	33,830 (8.4%)	125,033 (8.5%)	527,246 (10.8%)
Public Cars/'Pisa y Corre'	22,672 (0.8%)	990 (0.2%)	9,456 (0.6%)	33,118 (0.7%)
Walking (Complete Trip Walking Only)	69,476 (2.3%)	25,954 (6.5%)	52,326 (3.6%)	147,757 (3.0%)
Bus	58,020 (1.9%)	1,466 (0.4%)	13,126 (0.9%)	72,613 (1.5%)
Train	19,392 (0.6%)	0 (0.0%)	0 (0.0%)	19,392 (0.4%)
Other	160,715 (5.3%)	19,836 (4.9%)	46,916 (3.2%)	227,468 (4.7%)
Total	**3,016,605 (61.7%)**	**401,491 (8.2%)**	**1,468,207 (30.0%)**	**4,886,304 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.12: Puerto Rico Trip Distribution by Trip Purpose



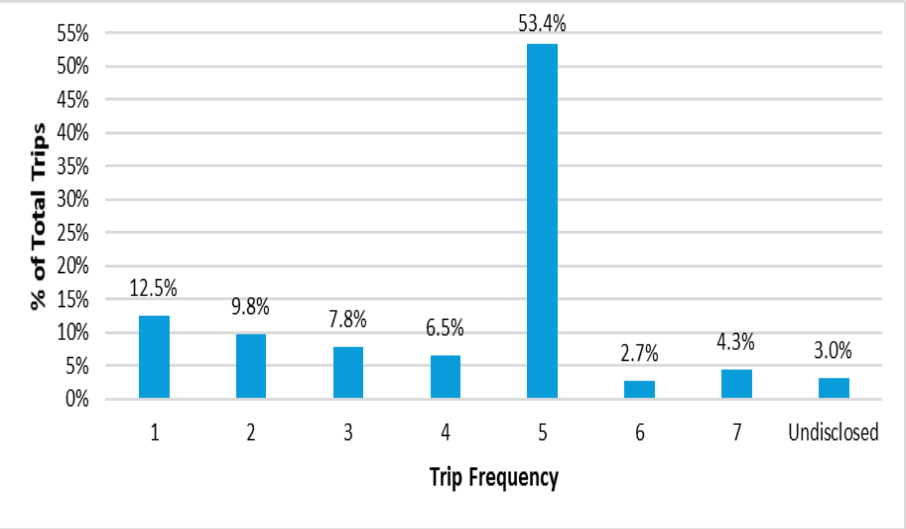
Source: SDG – Using Weighted Survey Results

Table 5.13: Trip Distribution by Trip Purpose and Region

Trip Purpose	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
For Another Activity	74,692 (2.5%)	6,860 (1.7%)	26,206 (1.8%)	107,759 (2.2%)
For Medical/Health Related Purposes	134,327 (4.5%)	12,665 (3.2%)	61,279 (4.2%)	208,271 (4.3%)
To Go Shopping	210,991 (7.0%)	18,901 (4.7%)	94,519 (6.4%)	324,411 (6.6%)
To Commute to Work	644,142 (21.4%)	103,865 (25.9%)	335,946 (22.9%)	1,083,954 (22.2%)
To Return Home	1,233,002 (40.9%)	171,616 (42.7%)	624,039 (42.5%)	2,028,657 (41.5%)
To Drop Off/Pick Up Someone	264,483 (8.8%)	18,877 (4.7%)	107,249 (7.3%)	390,610 (8.0%)
To Study/Go to Class	95,547 (3.2%)	17,070 (4.3%)	43,773 (3.0%)	156,390 (3.2%)
For Legal Procedures	118,416 (3.9%)	10,850 (2.7%)	67,350 (4.6%)	196,616 (4.0%)
Other	241,005 (8.0%)	40,786 (10.2%)	107,845 (7.3%)	389,636 (8.0%)
Total	**3,016,605 (61.7%)**	**401,491 (8.2%)**	**1,468,207 (30.0%)**	**4,886,304 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.13: Puerto Rico Trip Distribution by Trip Frequency Per Week



Source: SDG – Using Weighted Survey Results

Table 5.14: Trip Distribution by Trip Frequency and Region

Weekly Frequency of Trip	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
1	396,881 (13.2%)	33,244 (8.3%)	180,338 (12.3%)	610,463 (12.5%)
2	308,168 (10.2%)	36,357 (9.1%)	132,168 (9.0%)	476,694 (9.8%)
3	225,669 (7.5%)	25,984 (6.5%)	129,792 (8.8%)	381,446 (7.8%)
4	193,940 (6.4%)	37,709 (9.4%)	87,782 (6.0%)	319,430 (6.5%)
5	1,550,652 (51.4%)	221,453 (55.2%)	839,403 (57.2%)	2,611,508 (53.4%)
6	67,441 (2.2%)	17,361 (4.3%)	46,164 (3.1%)	130,966 (2.7%)
7	165,963 (5.5%)	16,298 (4.1%)	27,241 (1.9%)	209,502 (4.3%)
Undisclosed	107,891 (3.6%)	13,085 (3.3%)	25,319 (1.7%)	146,294 (3.0%)
Total	**3,016,605 (61.7%)**	**401,491 (8.2%)**	**1,468,207 (30.0%)**	**4,886,304 (100.0%)**

Source: SDG – Using Weighted Survey Results

VEHICLE TYPE AND CLASSIFICATIONS

Vehicle data was logged by survey participants for 4,490 vehicles.

Significant Findings:

Vehicle Brand: Over 31% of vehicles in Puerto Rico are manufactured by Toyota, with Mitsubishi in second place with 10% of total vehicles.

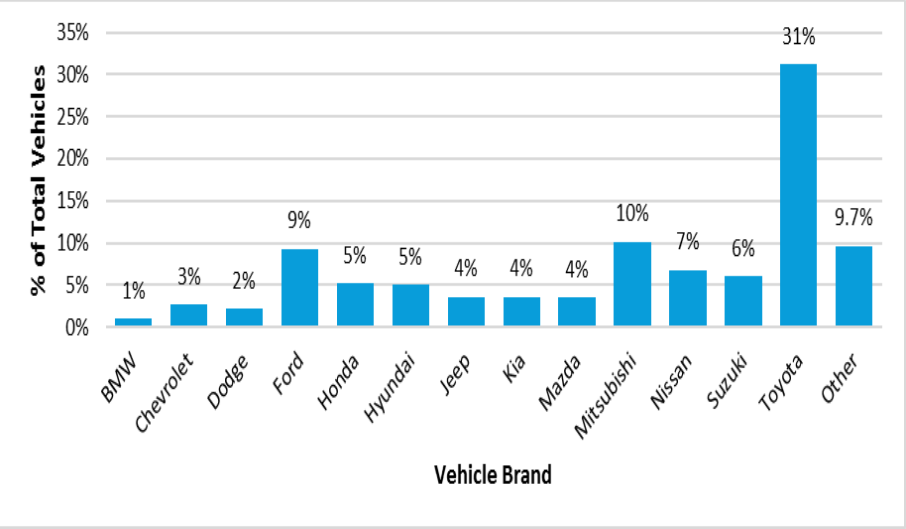
Model Year: In Puerto Rico, over 25% of vehicles were manufactured prior to 2000. The largest portion of vehicles manufactured in any 5-year window in Puerto Rico were between 2001 and 2005, at close to 23% of total vehicles.

Vehicle Type: In Puerto Rico, close to 60% of vehicles are standard cars/sedans, while over 30% are SUV's.

Primary User: Over 80% of the time, the primary users of vehicles are the head of household or spouse/partner. With under 15% of vehicles being primarily used by children in a household.

Parking Status: Close to 85% of all vehicles are stored in personal garages/driveways in Puerto Rico.

Figure 5.14: Puerto Rico Vehicle Distribution by Brand



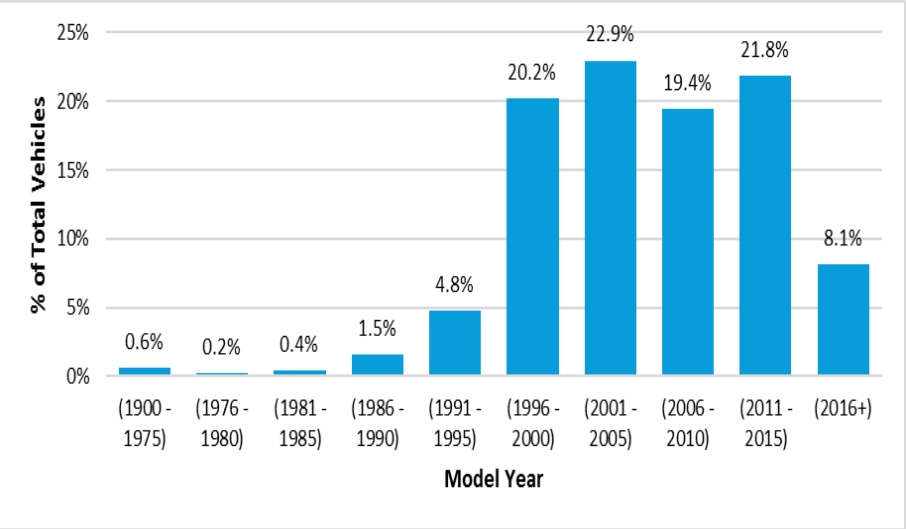
Source: SDG – Using Weighted Survey Results

Table 5.15: Vehicle Distribution by Brand and Region

Car Model	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
BMW	9,339 (0.8%)	516 (0.3%)	8,444 (1.5%)	18,299 (1.0%)
Chevrolet	31,377 (2.8%)	5,481 (3.6%)	12,468 (2.3%)	49,326 (2.7%)
Dodge	16,015 (1.4%)	2,336 (1.5%)	20,363 (3.7%)	38,713 (2.1%)
Ford	108,827 (9.8%)	9,361 (6.1%)	50,493 (9.2%)	168,682 (9.3%)
Honda	74,330 (6.7%)	4,185 (2.7%)	15,788 (2.9%)	94,303 (5.2%)
Hyundai	60,781 (5.5%)	10,367 (6.8%)	18,854 (3.4%)	90,003 (5.0%)
Jeep	35,441 (3.2%)	4,212 (2.8%)	25,732 (4.7%)	65,385 (3.6%)
Kia	41,876 (3.8%)	4,788 (3.1%)	18,824 (3.4%)	65,489 (3.6%)
Mazda	33,867 (3.1%)	4,460 (2.9%)	25,363 (4.6%)	63,690 (3.5%)
Mitsubishi	108,057 (9.7%)	11,960 (7.8%)	63,995 (11.7%)	184,011 (10.2%)
Nissan	82,845 (7.5%)	12,039 (7.9%)	28,433 (5.2%)	123,317 (6.8%)
Suzuki	56,851 (5.1%)	14,830 (9.7%)	36,828 (6.7%)	108,509 (6.0%)
Toyota	334,092 (30.1%)	59,138 (38.7%)	172,299 (31.5%)	565,529 (31.2%)
Other	116,138 (10.5%)	8,968 (5.9%)	49,641 (9.1%)	174,747 (9.7%)
Total	1,109,838 (61.3%)	152,640 (8.4%)	547,525 (30.2%)	1,810,003 (100.0%)

Source: SDG – Using Weighted Survey Results

Figure 5.15: Puerto Rico Vehicle Distribution by Model Year



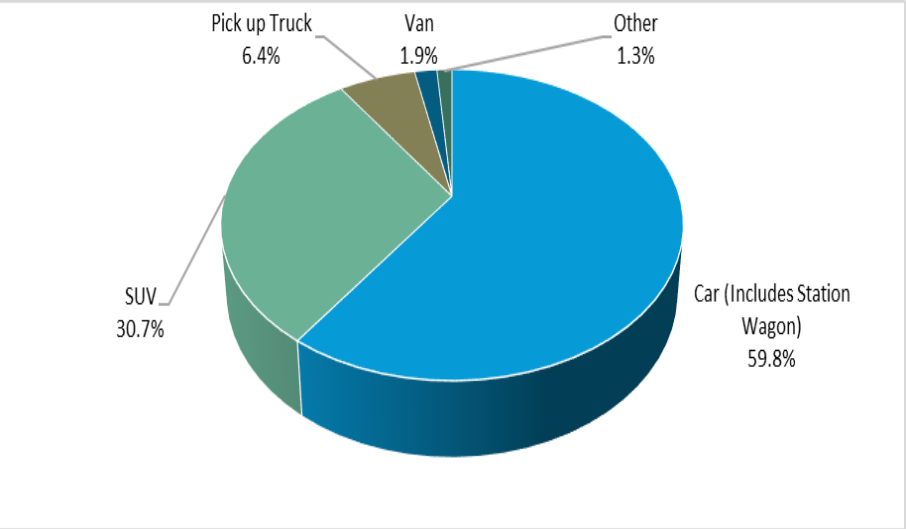
Source: SDG – Using Weighted Survey Results

Table 5.16: Vehicle Distribution by Model Year and Region

Year of Model	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
(1900 - 1975)	5,007 (0.5%)	2,286 (1.5%)	3,508 (0.6%)	10,800 (0.6%)
(1976 - 1980)	48 (0.0%)	258 (0.2%)	3,426 (0.6%)	3,732 (0.2%)
(1981 - 1985)	4,368 (0.4%)	475 (0.3%)	3,186 (0.6%)	8,028 (0.4%)
(1986 - 1990)	12,320 (1.1%)	4,840 (3.2%)	10,838 (2.0%)	27,998 (1.5%)
(1991 - 1995)	40,286 (3.6%)	5,866 (3.8%)	40,036 (7.3%)	86,188 (4.8%)
(1996 - 2000)	223,812 (20.2%)	27,779 (18.2%)	113,817 (20.8%)	365,408 (20.2%)
(2001 - 2005)	248,951 (22.4%)	37,972 (24.9%)	128,240 (23.5%)	415,163 (22.9%)
(2006 - 2010)	223,988 (20.2%)	34,150 (22.4%)	92,808 (17.0%)	350,947 (19.4%)
(2011 - 2015)	261,772 (23.6%)	29,917 (19.6%)	102,766 (18.8%)	394,455 (21.8%)
(2016+)	89,286 (8.0%)	9,098 (6.0%)	48,180 (8.8%)	146,564 (8.1%)
Total	**1,109,838 (61.3%)**	**152,640 (8.4%)**	**546,805 (30.2%)**	**1,809,283 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.16: Puerto Rico Vehicle Distribution by Vehicle Type



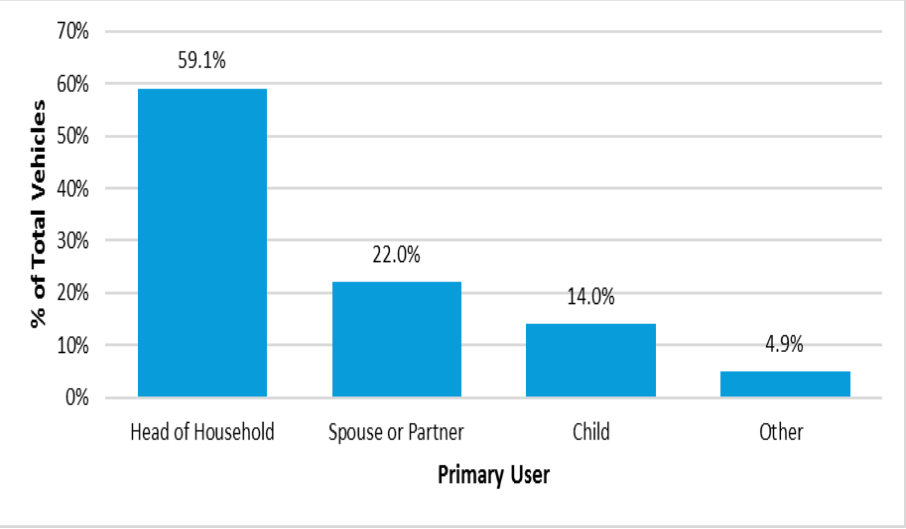
Source: SDG – Using Weighted Survey Results

Table 5.17: Vehicle Distribution by Vehicle Type and Region

Vehicle Type	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Car (Includes Station Wagon)	650,013 (58.6%)	95,899 (62.8%)	336,081 (61.4%)	1,081,993 (59.8%)
SUV	360,198 (32.5%)	44,426 (29.1%)	150,746 (27.5%)	555,370 (30.7%)
Pick-up Truck	57,186 (5.2%)	8,638 (5.7%)	50,244 (9.2%)	116,068 (6.4%)
Van	27,980 (2.5%)	1,787 (1.2%)	3,989 (0.7%)	33,756 (1.9%)
Other	14,460 (1.3%)	1,891 (1.2%)	6,466 (1.2%)	22,816 (1.3%)
Total	**1,109,838 (61.3%)**	**152,640 (8.4%)**	**547,525 (30.2%)**	**1,810,003 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.17: Puerto Rico Vehicle Distribution by Primary User



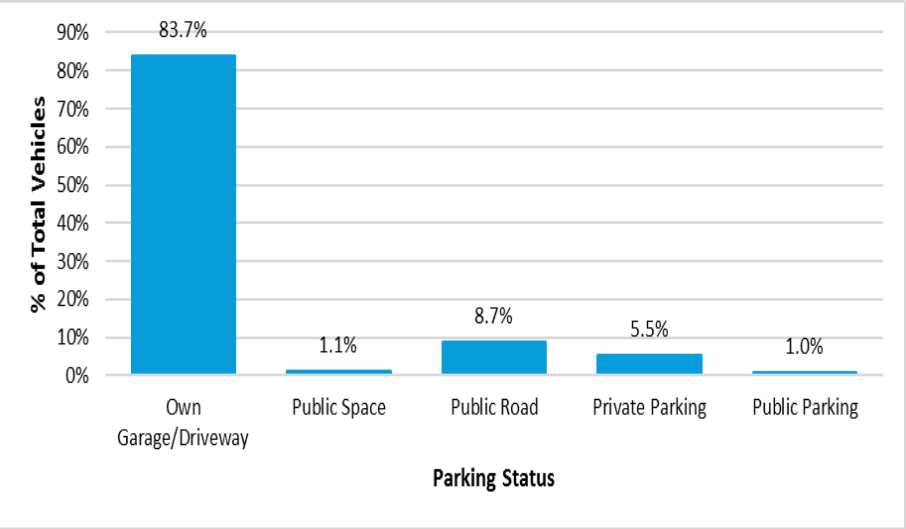
Source: SDG – Using Weighted Survey Results

Table 5.18: Vehicle Distribution by Primary User and Region

Primarily Used By	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Head of Household	665,318 (59.9%)	83,400 (54.6%)	321,352 (58.7%)	1,070,070 (59.1%)
Spouse or Partner	242,869 (21.9%)	37,263 (24.4%)	117,330 (21.4%)	397,462 (22.0%)
Child	150,526 (13.6%)	23,587 (15.5%)	78,942 (14.4%)	253,056 (14.0%)
Other	51,125 (4.6%)	8,390 (5.5%)	29,900 (5.5%)	89,415 (4.9%)
Total	**1,109,838 (61.3%)**	**152,640 (8.4%)**	**547,525 (30.2%)**	**1,810,003 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.18: Puerto Rico Vehicle Distribution by Parking Status



Source: SDG – Using Weighted Survey Results

Table 5.19: Vehicle Distribution by Parking Status and Region

Parking Status	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Own Garage/Driveway	902,410 (81.3%)	140,164 (91.8%)	472,664 (86.3%)	1,515,238 (83.7%)
Public Space	8,160 (0.7%)	0 (0.0%)	12,563 (2.3%)	20,722 (1.1%)
Public Road	117,295 (10.6%)	5,268 (3.5%)	35,446 (6.5%)	158,009 (8.7%)
Private Parking	70,474 (6.3%)	6,071 (4.0%)	22,291 (4.1%)	98,836 (5.5%)
Public Parking	11,499 (1.0%)	1,138 (0.7%)	4,562 (0.8%)	17,198 (1.0%)
Total	**1,109,838 (61.3%)**	**152,640 (8.4%)**	**547,525 (30.2%)**	**1,810,003 (100.0%)**

Source: SDG – Using Weighted Survey Results

FOCUSED STUDY – HOUSEHOLDS/PEOPLE WITHOUT ACCESS TO VEHICLES

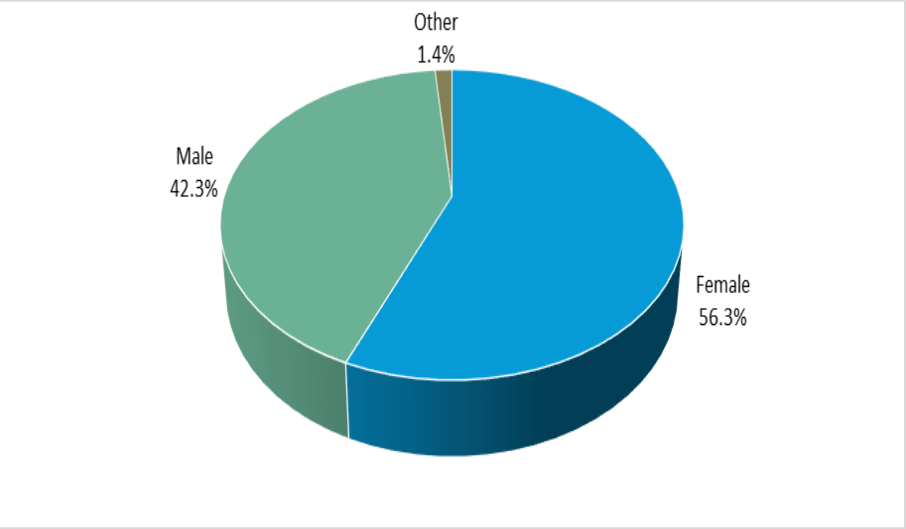
Out of the participants in the household survey, 438 persons (15.7%) stated live in households with zero private vehicles. This section analyzes this group in further depth, specifically their demographics and trip patterns.

Significant Findings

Age: Over 50% of people who do not own a vehicle in Puerto Rico are over 50 years of age.

Transportation Mode: Of trips taken by individuals who do not own a vehicle in Puerto Rico, just over 26% of trips are made via walking, while just over 26% of trips are completed as the passenger in a private vehicle. In Aguadilla, over 45% of trips are completed via walking, the highest of the regions.

Figure 5.19: Puerto Rico Population Distribution, Persons Without Owned Vehicles, by Gender



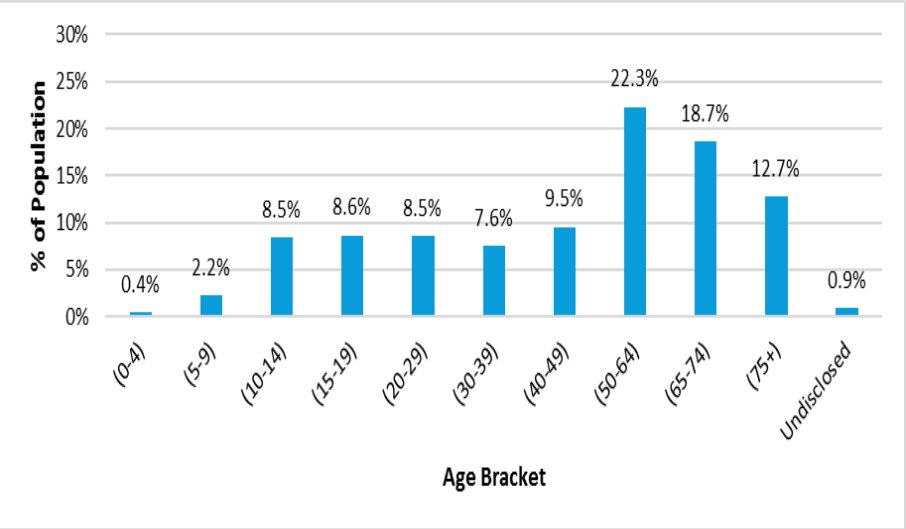
Source: SDG – Using Weighted Survey Results

Table 5.20: Population Distribution, Persons Without Owned Vehicles, by Gender and Region

Gender	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Female	97,480 (62.3%)	10,221 (42.6%)	64,831 (51.5%)	172,532 (56.3%)
Male	55,471 (35.5%)	12,979 (54.1%)	61,059 (48.5%)	129,509 (42.3%)
Other	3,517 (2.2%)	811 (3.4%)	0 (0.0%)	4,328 (1.4%)
Total	**156,469 (51.1%)**	**24,011 (7.8%)**	**125,890 (41.1%)**	**306,369 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.20: Puerto Rico Population Distribution, Persons Without Owned Vehicles, by Age Bracket



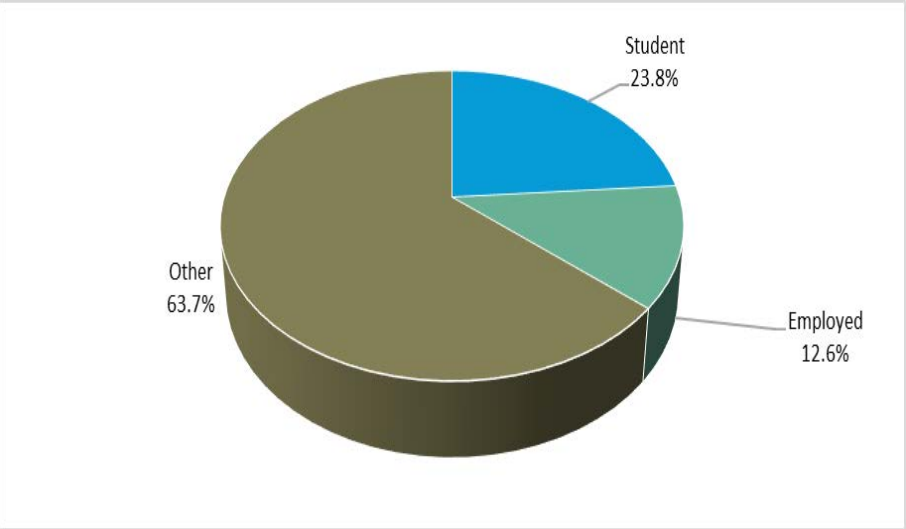
Source: SDG – Using Weighted Survey Results

Table 5.21: Population Distribution, Persons Without Owned Vehicles, by Age Bracket and Region

Age Bracket	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
(0-4)	1,213 (0.8%)	0 (0.0%)	0 (0.0%)	1,213 (0.4%)
(5-9)	5,572 (3.6%)	301 (1.3%)	935 (0.7%)	6,808 (2.2%)
(10-14)	8,389 (5.4%)	572 (2.4%)	16,956 (13.5%)	25,917 (8.5%)
(15-19)	6,483 (4.1%)	596 (2.5%)	19,372 (15.4%)	26,451 (8.6%)
(20-29)	17,816 (11.4%)	2,943 (12.3%)	5,406 (4.3%)	26,164 (8.5%)
(30-39)	9,313 (6.0%)	3,296 (13.7%)	10,578 (8.4%)	23,186 (7.6%)
(40-49)	9,970 (6.4%)	2,311 (9.6%)	16,970 (13.5%)	29,251 (9.5%)
(50-64)	36,882 (23.6%)	5,952 (24.8%)	25,518 (20.3%)	68,352 (22.3%)
(65-74)	36,240 (23.2%)	5,682 (23.7%)	15,279 (12.1%)	57,201 (18.7%)
(75+)	22,244 (14.2%)	1,848 (7.7%)	14,875 (11.8%)	38,967 (12.7%)
Undisclosed	2,347 (1.5%)	510 (2.1%)	0 (0.0%)	2,857 (0.9%)
Total	**156,469 (51.1%)**	**24,011 (7.8%)**	**125,890 (41.1%)**	**306,369 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.21: Puerto Rico Population Distribution, Persons Without Owned Vehicles, by Employment/Student Status



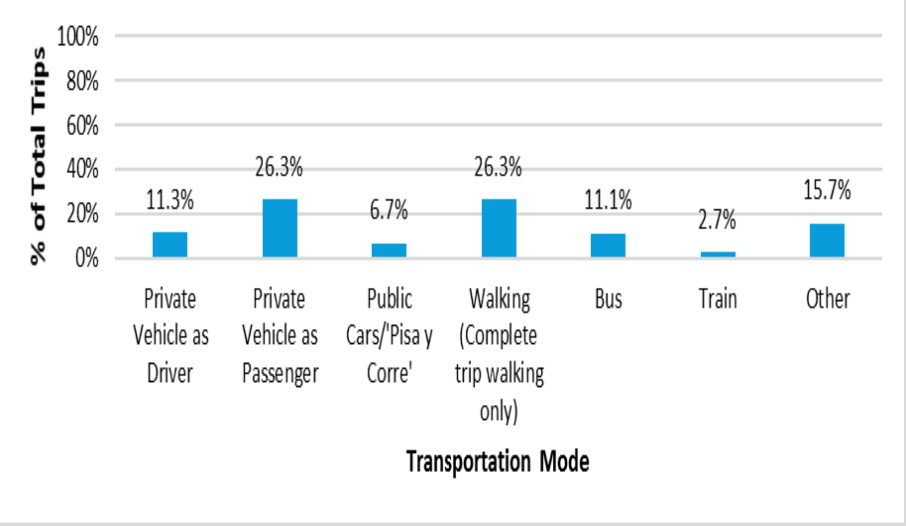
Source: SDG – Using Weighted Survey Results

Table 5.22: Population Distribution, Persons Without Owned Vehicles, by Employment/Student Status and Region

Employment	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Other	110,884 (70.9%)	16,101 (67.1%)	68,037 (54.0%)	195,022 (63.7%)
Student	23,906 (15.3%)	2,697 (11.2%)	46,245 (36.7%)	72,848 (23.8%)
Employed	21,680 (13.9%)	5,213 (21.7%)	11,607 (9.2%)	38,500 (12.6%)
Total	**156,469 (51.1%)**	**24,011 (7.8%)**	**125,890 (41.1%)**	**306,369 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.22: Puerto Rico Trip Distribution, Persons Without Owned Vehicles, by Transportation Mode



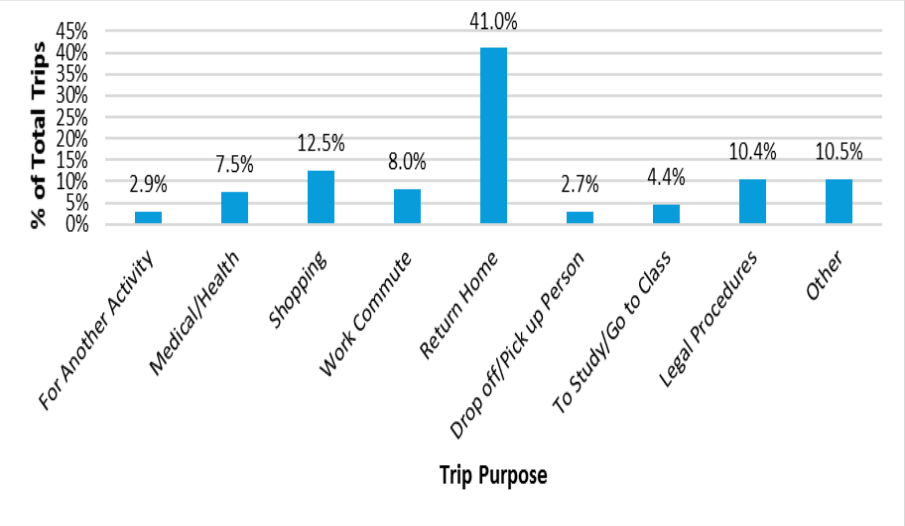
Source: SDG – Using Weighted Survey Results

Table 5.23: Trip Distribution, Persons Without Owned Vehicles, by Transportation Mode and Region

Mode of Transport	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Private Vehicle as Driver	22,826 (8.7%)	2,521 (6.9%)	25,355 (17.1%)	50,702 (11.3%)
Private Vehicle as Passenger	64,382 (24.4%)	8,477 (23.2%)	44,978 (30.3%)	117,837 (26.3%)
Public Cars/'Pisa y Corre'	20,479 (7.8%)	990 (2.7%)	8,672 (5.8%)	30,141 (6.7%)
Walking (Complete Trip Walking Only)	59,568 (22.6%)	16,868 (46.1%)	41,708 (28.1%)	118,144 (26.3%)
Bus	36,425 (13.8%)	1,466 (4.0%)	11,844 (8.0%)	49,735 (11.1%)
Train	11,997 (4.5%)	0 (0.0%)	0 (0.0%)	11,997 (2.7%)
Other	48,016 (18.2%)	6,286 (17.2%)	15,952 (10.7%)	70,254 (15.7%)
Total	**263,694 (58.8%)**	**36,608 (8.2%)**	**148,507 (33.1%)**	**448,809 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.23: Puerto Rico Trip Distribution, Persons Without Owned Vehicles, by Trip Purpose



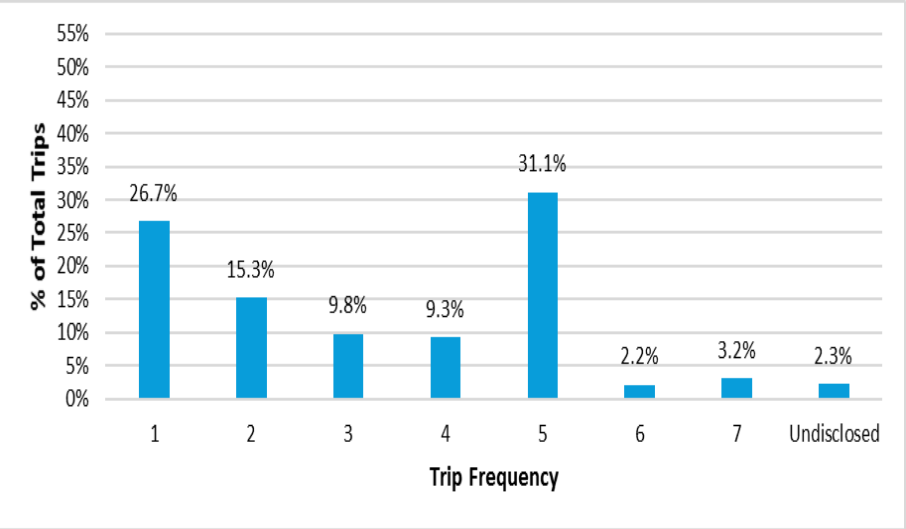
Source: SDG – Using Weighted Survey Results

Table 5.24: Trip Distribution, Persons Without Owned Vehicles, by Trip Purpose and Region

Trip Purpose	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
For Another Activity	8,349 (3.2%)	892 (2.4%)	3,829 (2.6%)	13,069 (2.9%)
For Medical/Health Related Purposes	22,466 (8.5%)	3,302 (9.0%)	7,947 (5.4%)	33,715 (7.5%)
To go Shopping	40,440 (15.3%)	2,964 (8.1%)	12,832 (8.6%)	56,235 (12.5%)
To Commute to Work	19,911 (7.6%)	3,474 (9.5%)	12,536 (8.4%)	35,922 (8.0%)
To Return Home	105,750 (40.1%)	13,084 (35.7%)	65,334 (44.0%)	184,168 (41.0%)
To Drop Off/Pick up Someone	8,492 (3.2%)	1,596 (4.4%)	2,073 (1.4%)	12,162 (2.7%)
To Study/Go to Class	7,438 (2.8%)	892 (2.4%)	11,341 (7.6%)	19,671 (4.4%)
For Legal Procedures	25,443 (9.6%)	3,570 (9.8%)	17,719 (11.9%)	46,731 (10.4%)
Other	25,405 (9.6%)	6,834 (18.7%)	14,897 (10.0%)	47,137 (10.5%)
Total	**263,694 (58.8%)**	**36,608 (8.2%)**	**148,507 (33.1%)**	**448,809 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.24: Puerto Rico Trip Distribution, Persons Without Owned Vehicles, by Trip Frequency Per Week



Source: SDG – Using Weighted Survey Results

Table 5.25: Trip Distribution, Persons Without Owned Vehicles, by Trip Frequency and Region

Weekly Frequency of Trip	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
1	80,802 (30.6%)	1,192 (3.3%)	37,951 (25.6%)	119,945 (26.7%)
2	40,379 (15.3%)	8,210 (22.4%)	20,192 (13.6%)	68,780 (15.3%)
3	28,854 (10.9%)	4,192 (11.5%)	11,078 (7.5%)	44,124 (9.8%)
4	25,071 (9.5%)	4,206 (11.5%)	12,646 (8.5%)	41,923 (9.3%)
5	64,558 (24.5%)	16,051 (43.8%)	59,099 (39.8%)	139,708 (31.1%)
6	5,103 (1.9%)	1,021 (2.8%)	3,655 (2.5%)	9,778 (2.2%)
7	10,254 (3.9%)	892 (2.4%)	3,013 (2.0%)	14,158 (3.2%)
Undisclosed	8,674 (3.3%)	844 (2.3%)	874 (0.6%)	10,392 (2.3%)
Total	**263,694 (58.8%)**	**36,608 (8.2%)**	**148,507 (33.1%)**	**448,809 (100.0%)**

Source: SDG – Using Weighted Survey Results

FOCUSED STUDY – TRANSPORTATION AFFECTED BY HURRICANE MARIA

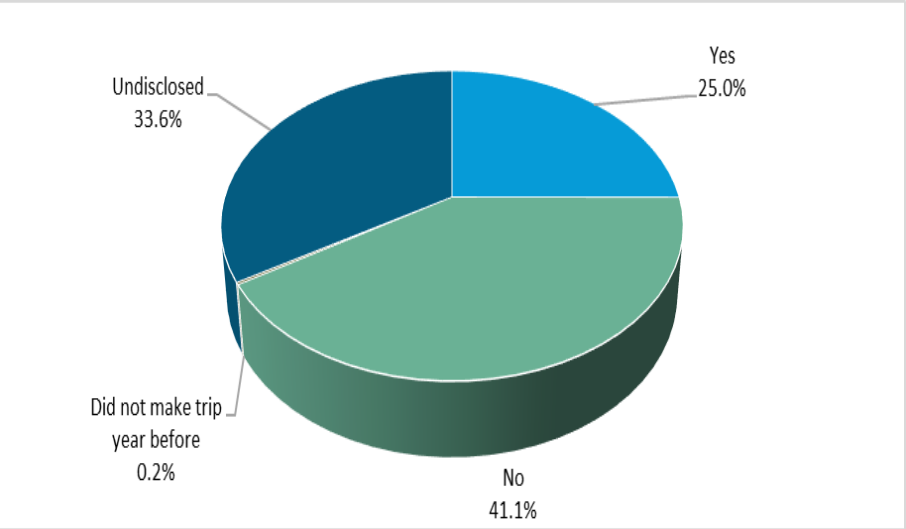
Out of the participants in the household survey, 1,365 persons (49%) stated that their trips were affected by Hurricane Maria. This section analyzes this group in further depth, specifically their demographics and trip patterns.

Significant Findings

Age: Over 50% of individuals in Puerto Rico whose trips were affected by Hurricane Maria are over 50 years of age.

Transportation Mode: Close to 90% of trips affected by Hurricane Maria were completed as either driver or passenger of a private vehicle.

Figure 5.25: Puerto Rico Trip Distribution by "Was Trip and/or Transportation Mode Affected by Hurricane Maria"



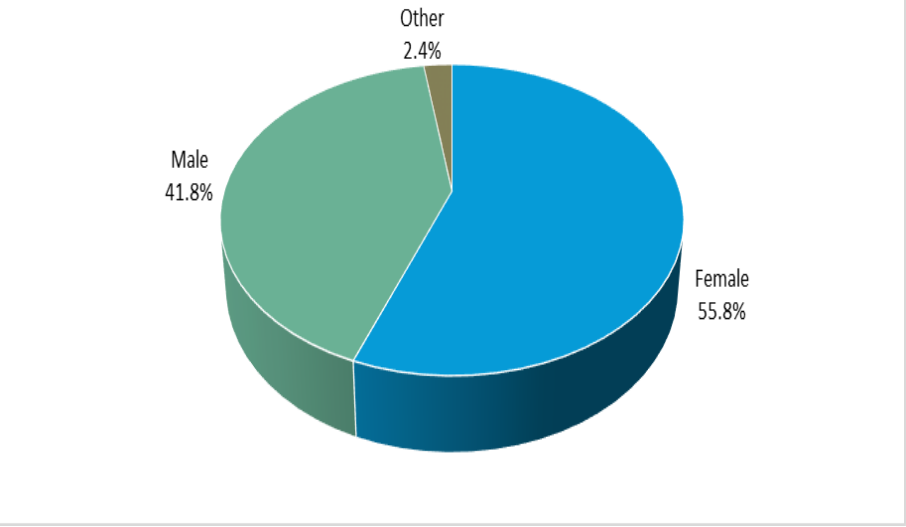
Source: SDG – Using Weighted Survey Results

Table 5.26: Trip Distribution by "Was Trip and/or Transportation Mode Affected by Hurricane Maria" and Region

Changed by Hurricane	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Yes	721,328 (23.9%)	94,660 (23.6%)	406,674 (27.7%)	1,222,662 (25.0%)
No	1,287,838 (42.7%)	143,392 (35.7%)	577,833 (39.4%)	2,009,063 (41.1%)
Did not make trip year before	7,744 (0.3%)	892 (0.2%)	2,580 (0.2%)	11,216 (0.2%)
Undisclosed	999,696 (33.1%)	162,547 (40.5%)	481,120 (32.8%)	1,643,363 (33.6%)
Total	**3,016,605 (61.7%)**	**401,491 (8.2%)**	**1,468,207 (30.0%)**	**4,886,304 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.26: Puerto Rico Population Distribution, People with Trips Affected by Hurricane Maria, by Gender



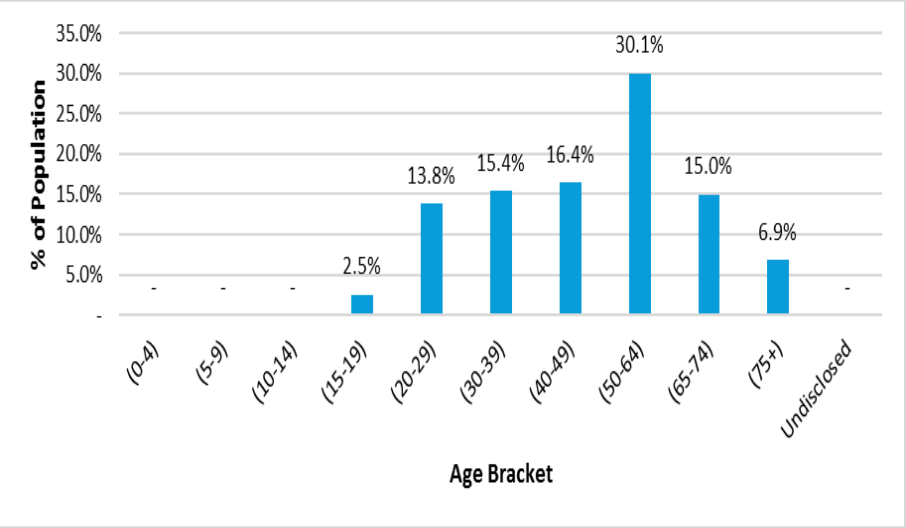
Source: SDG – Using Weighted Survey Results

Table 5.27: Population Distribution, People with Trips Affected by Hurricane Maria, By Gender and Region

Gender	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Female	213,497 (61.4%)	23,327 (44.1%)	97,825 (49.2%)	334,649 (55.8%)
Male	129,691 (37.3%)	29,550 (55.9%)	91,422 (46.0%)	250,662 (41.8%)
Other	4,554 (1.3%)	0 (0.0%)	9,556 (4.8%)	14,111 (2.4%)
Total	**347,741 (58.0%)**	**52,877 (8.8%)**	**198,803 (33.2%)**	**599,422 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.27: Puerto Rico Population Distribution, People with Trips Affected by Hurricane Maria, by Age Bracket



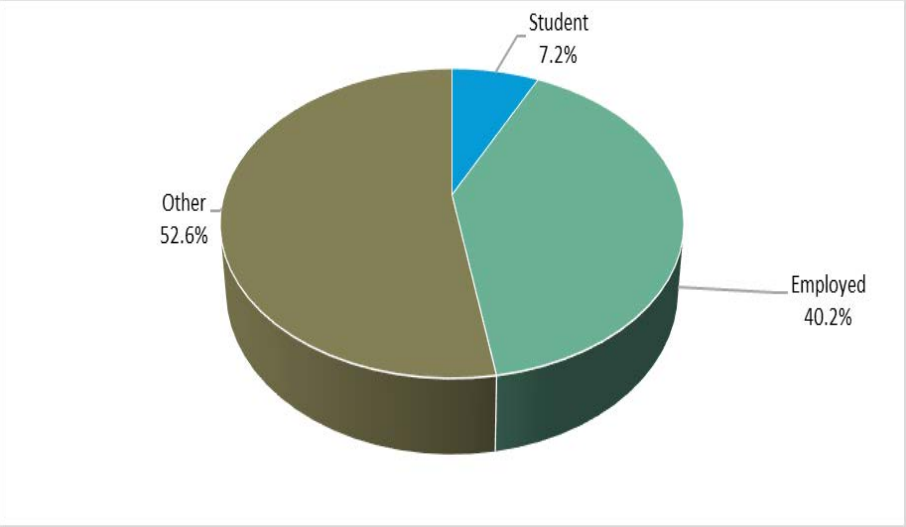
Source: SDG – Using Weighted Survey Results

Table 5.28: Population Distribution, People with Trips Affected by Hurricane Maria, by Age Bracket and Region

Age Bracket	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
(0-4)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
(5-9)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
(10-14)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
(15-19)	11,325 (3.3%)	304 (0.6%)	3,480 (1.8%)	15,109 (2.5%)
(20-29)	53,958 (15.5%)	9,849 (18.6%)	18,779 (9.4%)	82,586 (13.8%)
(30-39)	42,395 (12.2%)	9,378 (17.7%)	40,361 (20.3%)	92,135 (15.4%)
(40-49)	49,893 (14.3%)	9,370 (17.7%)	39,293 (19.8%)	98,557 (16.4%)
(50-64)	108,023 (31.1%)	14,667 (27.7%)	57,445 (28.9%)	180,136 (30.1%)
(65-74)	56,272 (16.2%)	6,537 (12.4%)	26,978 (13.6%)	89,788 (15.0%)
(75+)	25,875 (7.4%)	2,772 (5.2%)	12,464 (6.3%)	41,111 (6.9%)
Undisclosed	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	**347,741 (58.0%)**	**52,877 (8.8%)**	**198,803 (33.2%)**	**599,422 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.28: Puerto Rico Population Distribution, People with Trips Affected by Hurricane Maria, by Employment/Student Status



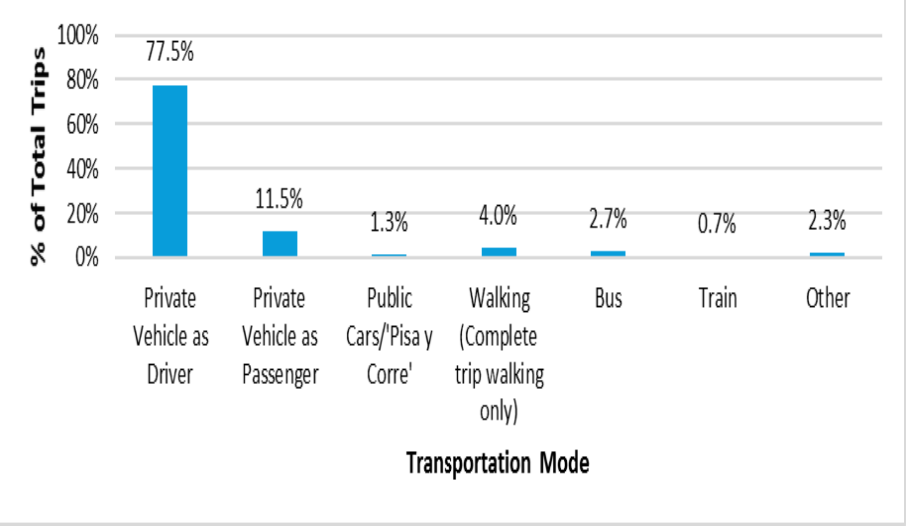
Source: SDG – Using Weighted Survey Results

Table 5.29: Population Distribution, People with Trips Affected by Hurricane Maria, by Employment/Student Status and Region

Employment	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
Other	186,380 (53.6%)	26,963 (51.0%)	101,678 (51.1%)	315,021 (52.6%)
Student	22,045 (6.3%)	3,339 (6.3%)	18,072 (9.1%)	43,456 (7.2%)
Employed	139,316 (40.1%)	22,575 (42.7%)	79,053 (39.8%)	240,944 (40.2%)
Total	**347,741 (58.0%)**	**52,877 (8.8%)**	**198,803 (33.2%)**	**599,422 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.29: Puerto Rico Trip Distribution, Trips Affected by Hurricane Maria, by Transportation Mode



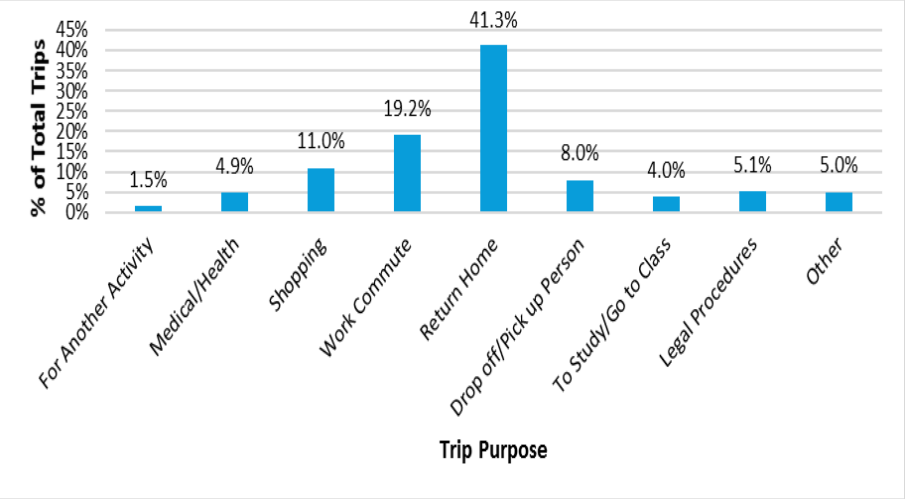
Source: SDG – Using Weighted Survey Results

Table 5.30: Trip Distribution, Trips Affected by Hurricane Maria, by Transportation Mode and Region

Mode of Transport	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Totals
Private Vehicle as Driver	532,748 (73.9%)	78,629 (83.1%)	336,608 (82.8%)	947,985 (77.5%)
Private Vehicle as Passenger	93,868 (13.0%)	5,816 (6.1%)	40,356 (9.9%)	140,040 (11.5%)
Public Cars/'Pisa y Corre'	11,430 (1.6%)	446 (0.5%)	3,408 (0.8%)	15,284 (1.3%)
Walking (Complete trip walking only)	21,742 (3.0%)	8,041 (8.5%)	19,235 (4.7%)	49,017 (4.0%)
Bus	31,753 (4.4%)	446 (0.5%)	1,283 (0.3%)	33,482 (2.7%)
Train	9,105 (1.3%)	0 (0.0%)	0 (0.0%)	9,105 (0.7%)
Other	20,682 (2.9%)	1,282 (1.4%)	5,785 (1.4%)	27,750 (2.3%)
Total	**721,328 (59.0%)**	**94,660 (7.7%)**	**406,674 (33.3%)**	**1,222,662 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.30: Puerto Rico Trip Distribution, Trips Affected by Hurricane Maria, by Trip Purpose



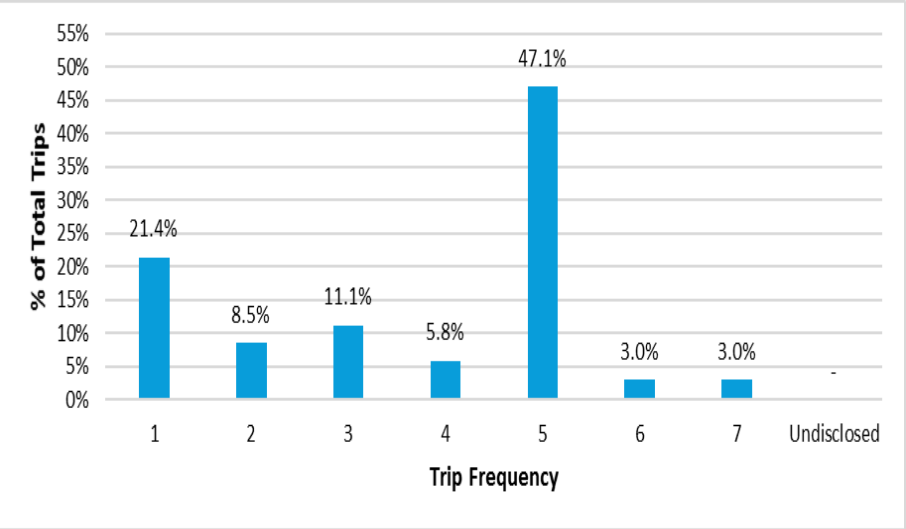
Source: SDG – Using Weighted Survey Results

Table 5.31: Trip Distribution, Trips Affected by Hurricane Maria, by Trip Purpose and Region

Trip Purpose	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
For Another Activity	10,680 (1.5%)	801 (0.8%)	7,069 (1.7%)	18,550 (1.5%)
For Medical/Health Related Purposes	37,476 (5.2%)	5,325 (5.6%)	16,806 (4.1%)	59,608 (4.9%)
To go Shopping	89,839 (12.5%)	5,609 (5.9%)	38,801 (9.5%)	134,250 (11.0%)
To Commute to Work	137,619 (19.1%)	19,859 (21.0%)	77,377 (19.0%)	234,854 (19.2%)
To Return Home	294,163 (40.8%)	36,714 (38.8%)	173,910 (42.8%)	504,787 (41.3%)
To Drop Off/Pick up Someone	58,116 (8.1%)	6,341 (6.7%)	33,680 (8.3%)	98,137 (8.0%)
To Study/Go to Class	25,489 (3.5%)	5,545 (5.9%)	17,424 (4.3%)	48,458 (4.0%)
For Legal Procedures	39,076 (5.4%)	4,788 (5.1%)	18,885 (4.6%)	62,750 (5.1%)
Other	28,870 (4.0%)	9,678 (10.2%)	22,722 (5.6%)	61,269 (5.0%)
Total	**721,328 (59.0%)**	**94,660 (7.7%)**	**406,674 (33.3%)**	**1,222,662 (100.0%)**

Source: SDG – Using Weighted Survey Results

Figure 5.31: Puerto Rico Trip Distribution, Trips Affected by Hurricane Maria, by Trip Frequency Per Week



Source: SDG – Using Weighted Survey Results

Table 5.32: Trip Distribution, Trips Affected by Hurricane Maria, by Trip Frequency and Region

Weekly Frequency of Trip	San Juan (TMA)	Aguadilla (TMA)	Other Urbanized Areas	Puerto Rico
1	168,883 (23.4%)	12,780 (13.5%)	79,977 (19.7%)	261,640 (21.4%)
2	63,857 (8.9%)	8,698 (9.2%)	31,578 (7.8%)	104,132 (8.5%)
3	91,323 (12.7%)	8,218 (8.7%)	36,784 (9.0%)	136,325 (11.1%)
4	42,083 (5.8%)	6,875 (7.3%)	22,018 (5.4%)	70,976 (5.8%)
5	306,029 (42.4%)	52,166 (55.1%)	217,906 (53.6%)	576,102 (47.1%)
6	20,547 (2.8%)	4,453 (4.7%)	11,522 (2.8%)	36,522 (3.0%)
7	28,605 (4.0%)	1,470 (1.6%)	6,889 (1.7%)	36,964 (3.0%)
Undisclosed	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	**721,328 (59.0%)**	**94,660 (7.7%)**	**406,674 (33.3%)**	**1,222,662 (100.0%)**

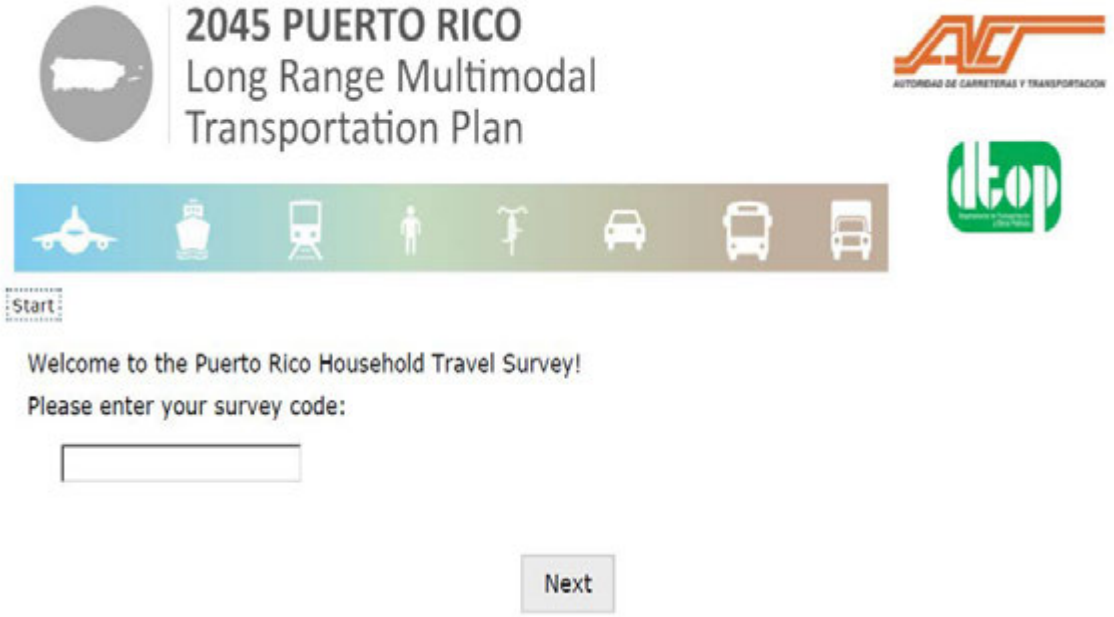
Source: SDG – Using Weighted Survey Results

APPENDIX

A APPENDIX A SURVEY INSTRUMENT

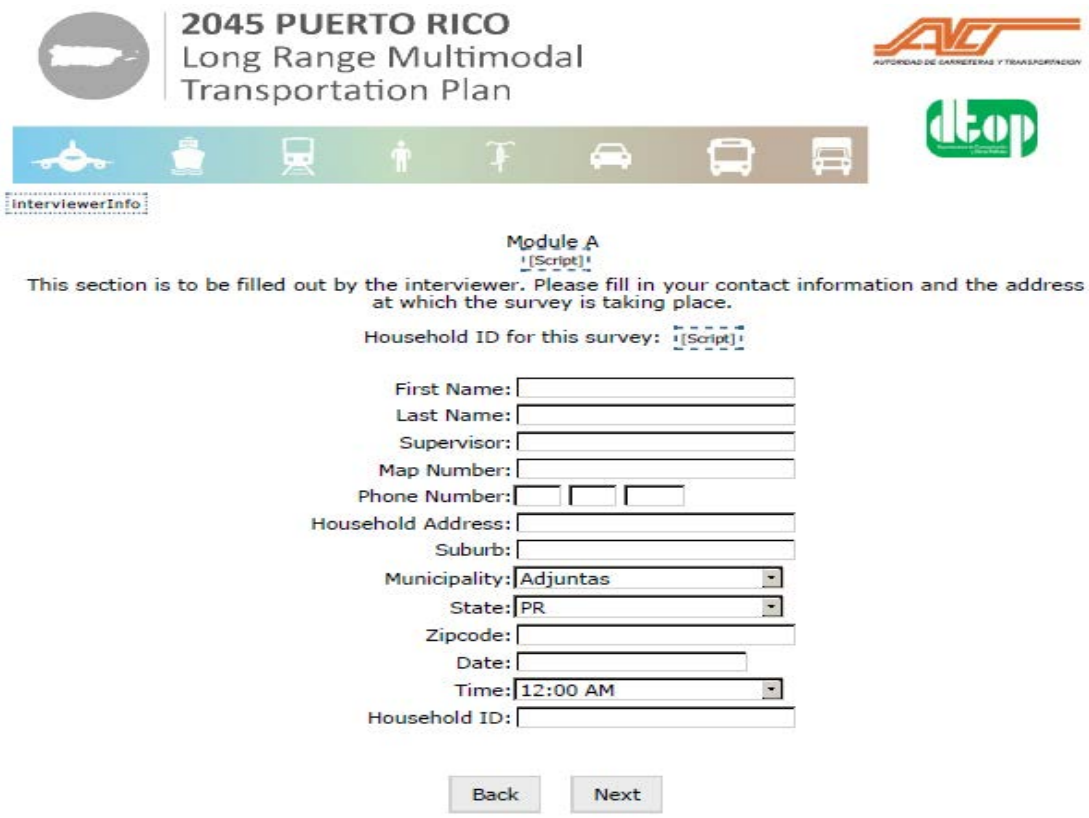
ENGLISH VERSION

Figure A.1: Welcome Message



Source: SDG

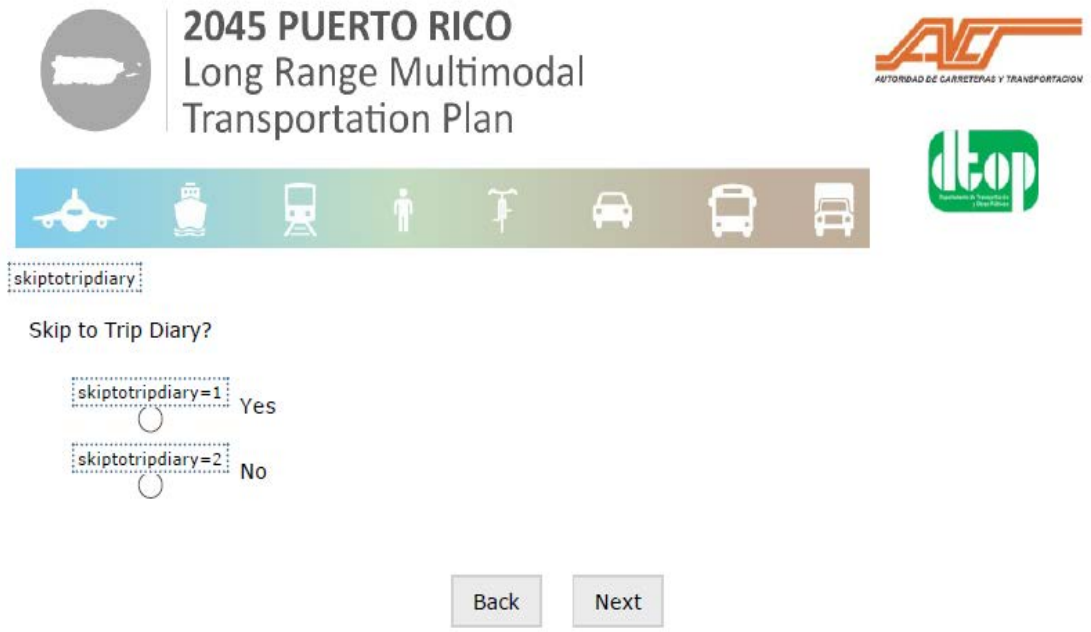
Figure A.2: Interviewer and Household Information



Municipality Options					State Options				Time Options		
Adjuntas	Cayey	Hormigueros	Morovis	Toa Alta	AK	ME	OK	FM	12:00AM	8:30AM	5:00PM
Aguada	Ceiba	Humacao	Naguabo	Toa Baja	AZ	MD	OR	GU	12:30AM	9:00AM	5:30PM
Aguadilla	Ciales	Isabela	Naranjito	Trujillo Alto	AR	MA	PA	MH	1:00AM	9:30AM	6:00PM
Aguas Buenas	Cidra	Jayuya	Orocovis	Utuado	CA	MI	RI	MP	1:30AM	10:00AM	6:30PM
Aibonito	Coamo	Juana Díaz	Patillas	Vega Alta	CO	MN	SC	PW	2:00AM	10:30AM	7:00PM
Añasco	Comerío	Juncos	Peñuelas	Vega Baja	CT	MS	SD	VI	2:30AM	11:00AM	7:30PM
Arecibo	Corozal	Lajas	Ponce	Vieques	DE	MO	TN		3:00AM	11:30AM	8:00PM
Arroyo	Culebra	Lares	Quebradillas	Villalba	FL	MT	TX		3:30AM	12:00PM	8:30PM
Barceloneta	Dorado	Las Marías	Rincón	Yabucoa	GA	NE	UT		4:00AM	12:30PM	9:00PM
Barranquitas	Fajardo	Las Piedras	Río Grande	Yauco	HI	NV	VT		4:30AM	1:00PM	9:30PM
Bayamón	Florida	Loíza	Sabana Grande		ID	NH	VA		5:00AM	1:30PM	10:00PM
Cabo Rojo	Guánica	Luquillo	Salinas		IL	NJ	WA		5:30AM	2:00PM	10:30PM
Caguas	Guayama	Manatí	San Germán		IN	NM	WV		6:00AM	2:30PM	11:00PM
Camuy	Guayanilla	Maricao	San Juan		IA	NY	WI		6:30AM	3:00PM	11:30PM
Canóvanas	Guaynabo	Maunabo	San Lorenzo		KS	NC	WY		7:00AM	3:30PM	
Carolina	Gurabo	Mayagüez	San Sebastián		KY	ND	AS		7:30AM	4:00PM	
Cataño	Hatillo	Moca	Santa Isabel		LA	OH	DC		8:00AM	4:30PM	

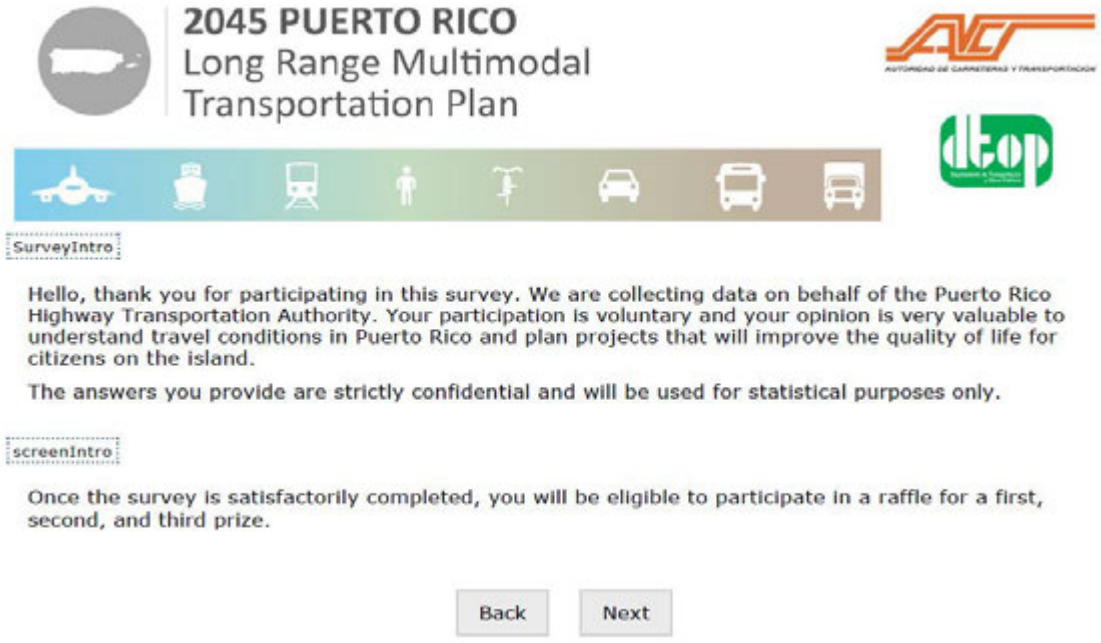
Source: SDG

Figure A.3: Skip to Trip Diary



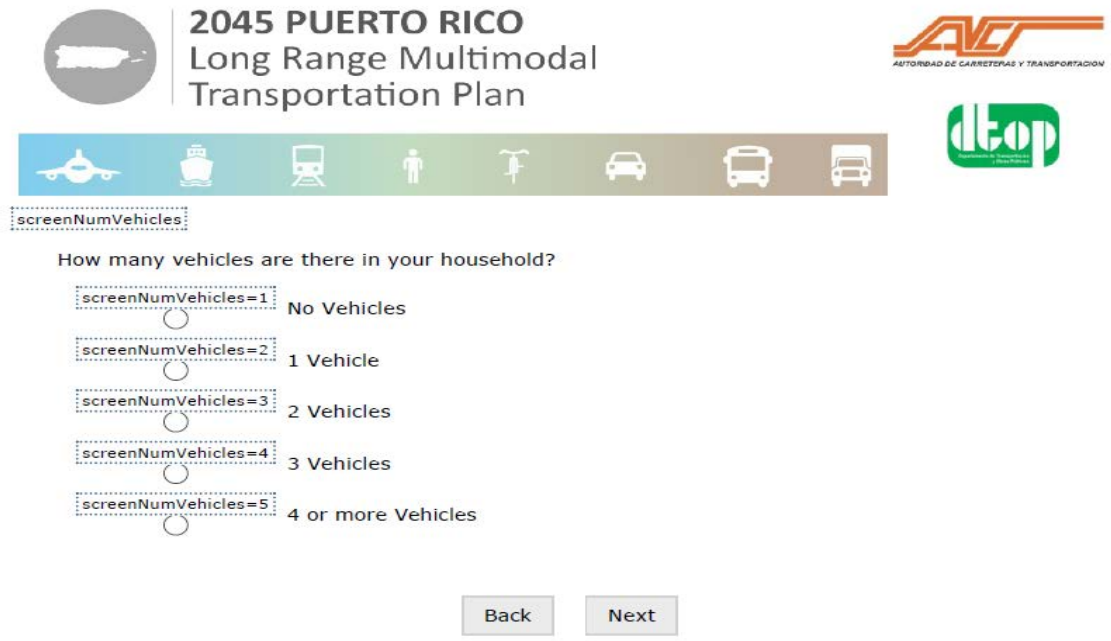
Source: SDG

Figure A.4: Survey Introduction and Purpose



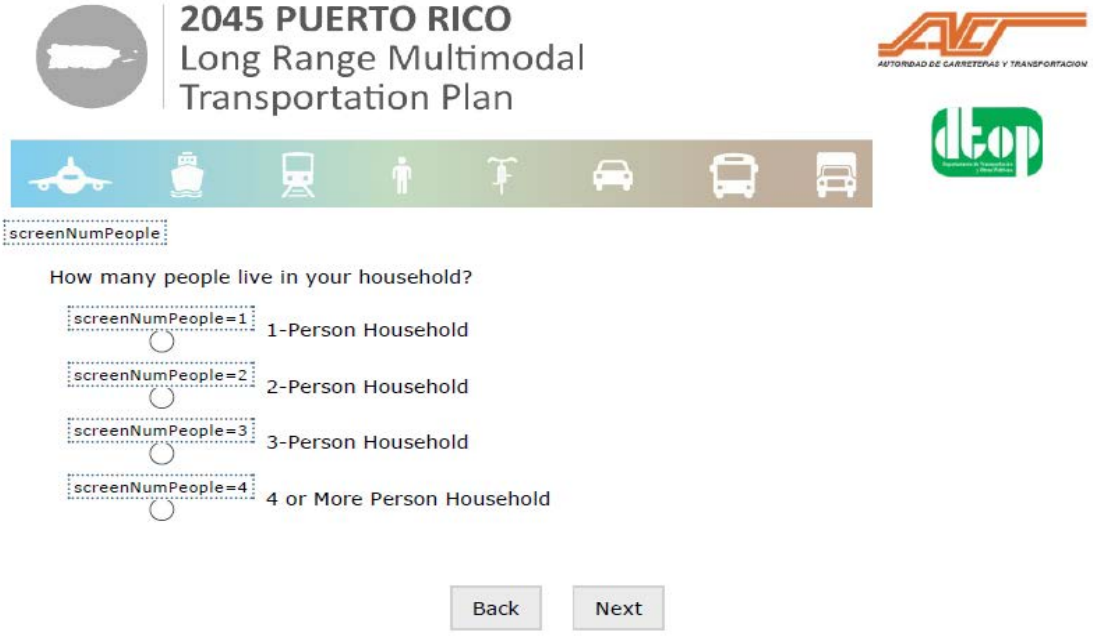
Source: SDG

Figure A.5: Screening Question – Vehicle Availability



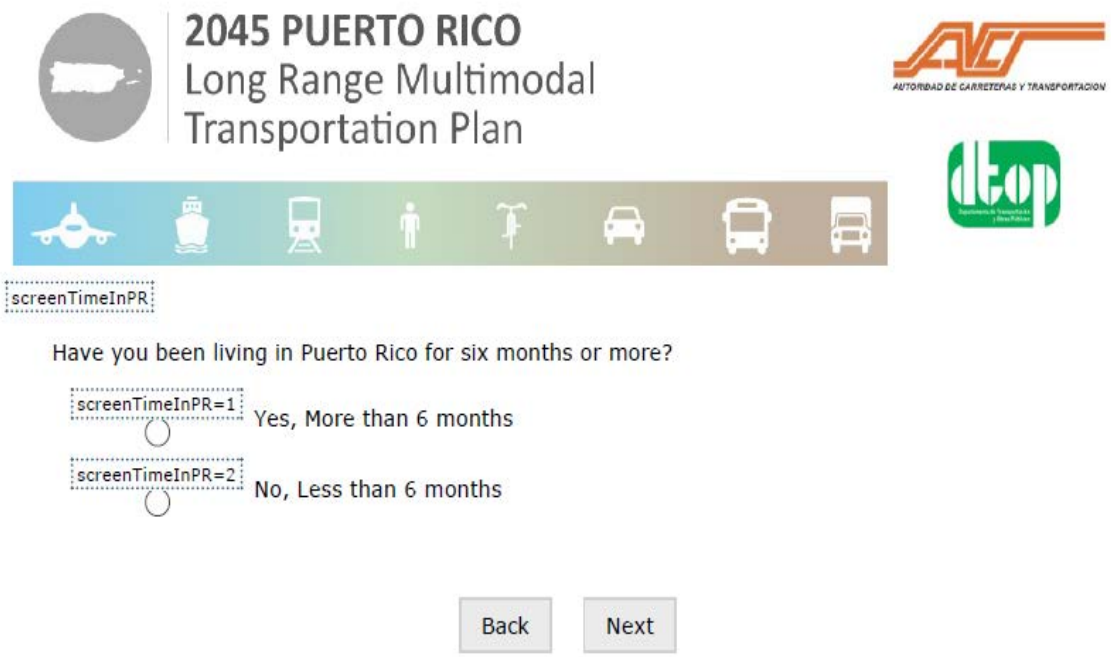
Source: SDG

Figure A.6: Screening Question – Household Size



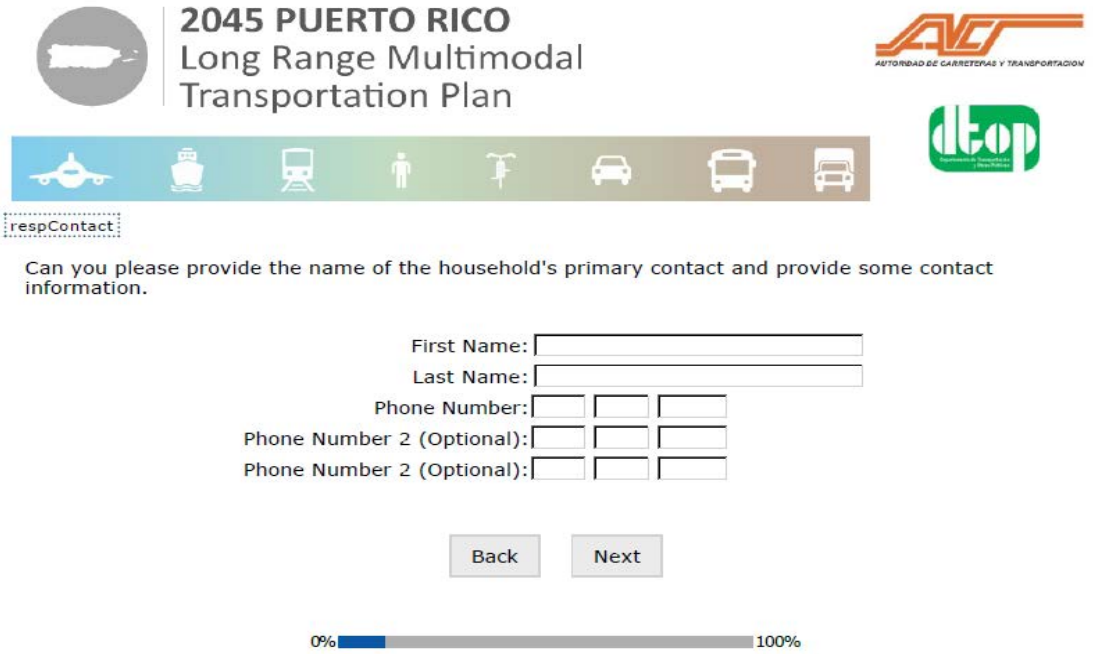
Source: SDG

Figure A.7: Screening Question – Stay in Puerto Rico



Source: SDG

Figure A.8: Household's Primary Contact Information

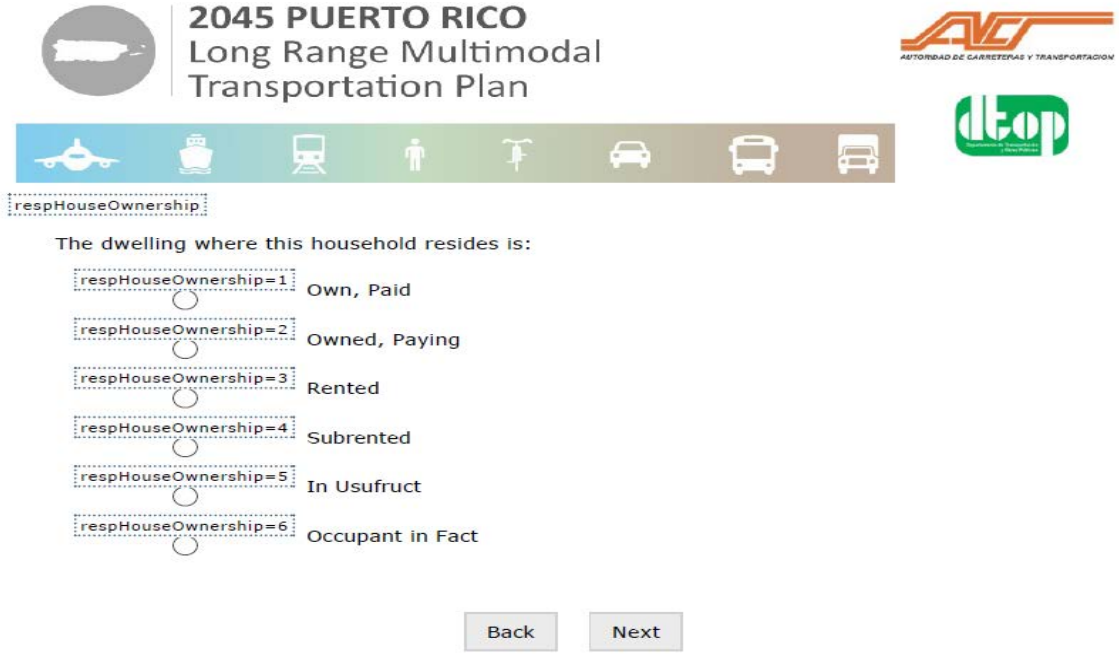


Source: SDG

Figure A.9: House Type

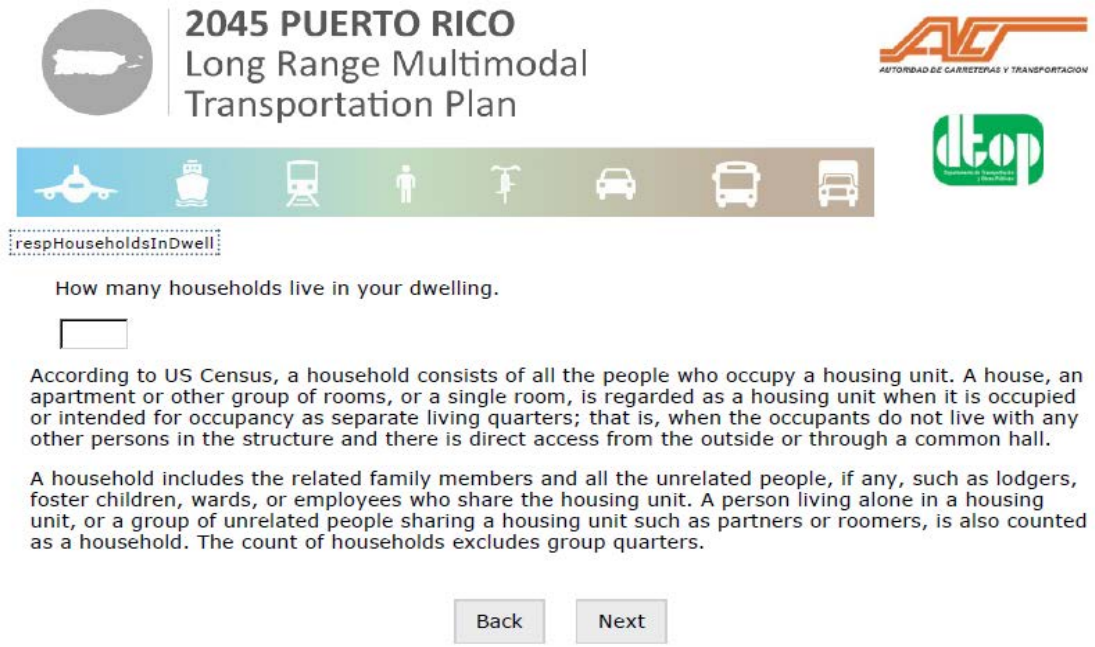
Source: SDG

Figure A.10: House Ownership



Source: SDG

Figure A.11: Quantity of Households in Dwelling

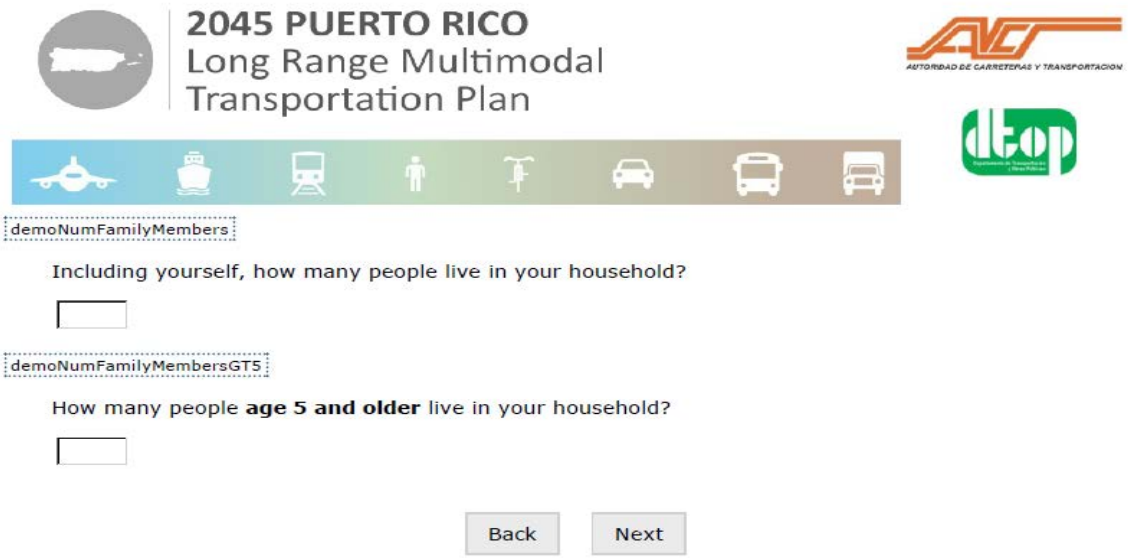


Source: SDG

Figure A.12: Demographics Introduction Information

Source: SDG

Figure A.13: Household Size and Number of People Greater than 5 Years Old

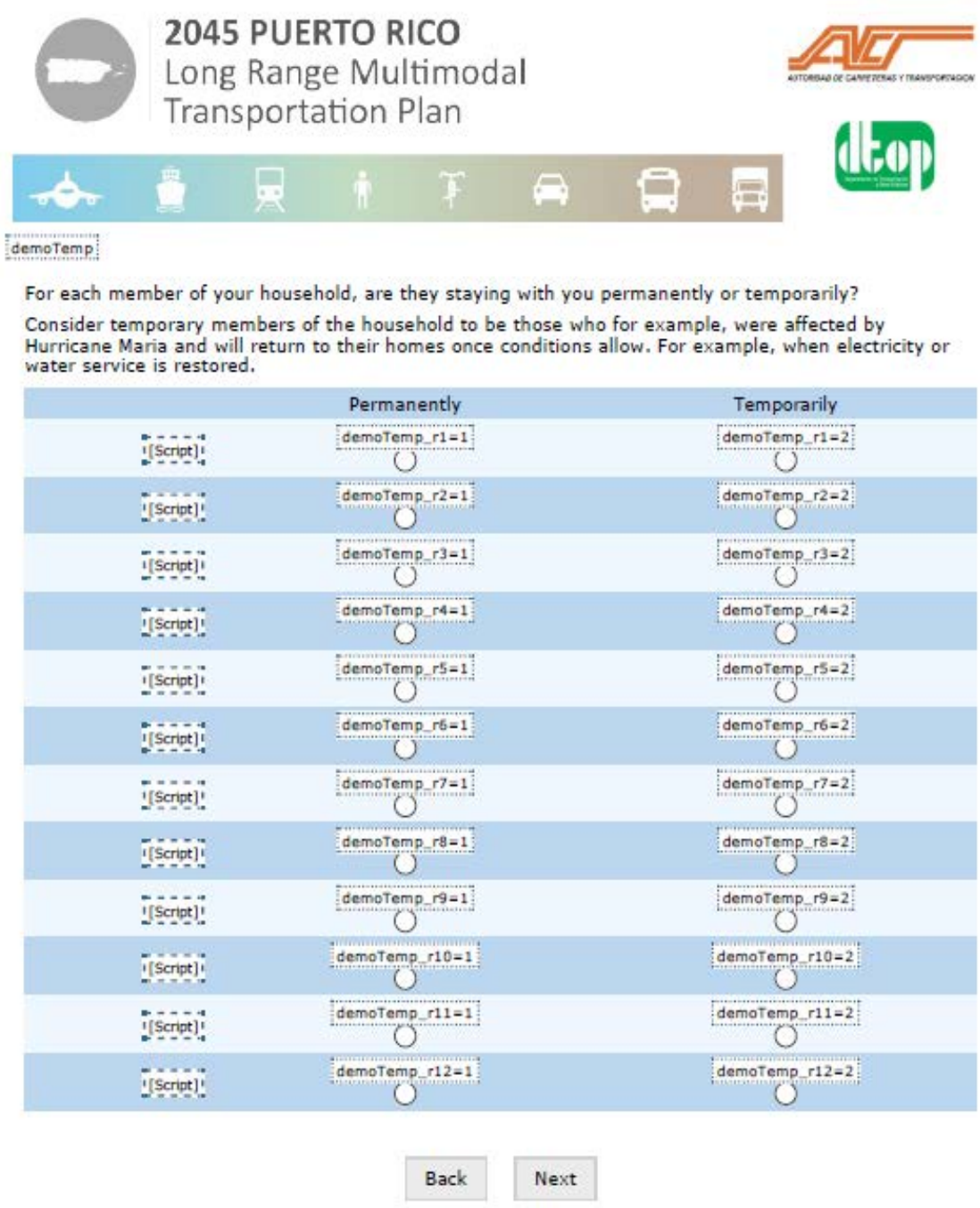


Source: SDG

Figure A.14: People's Names

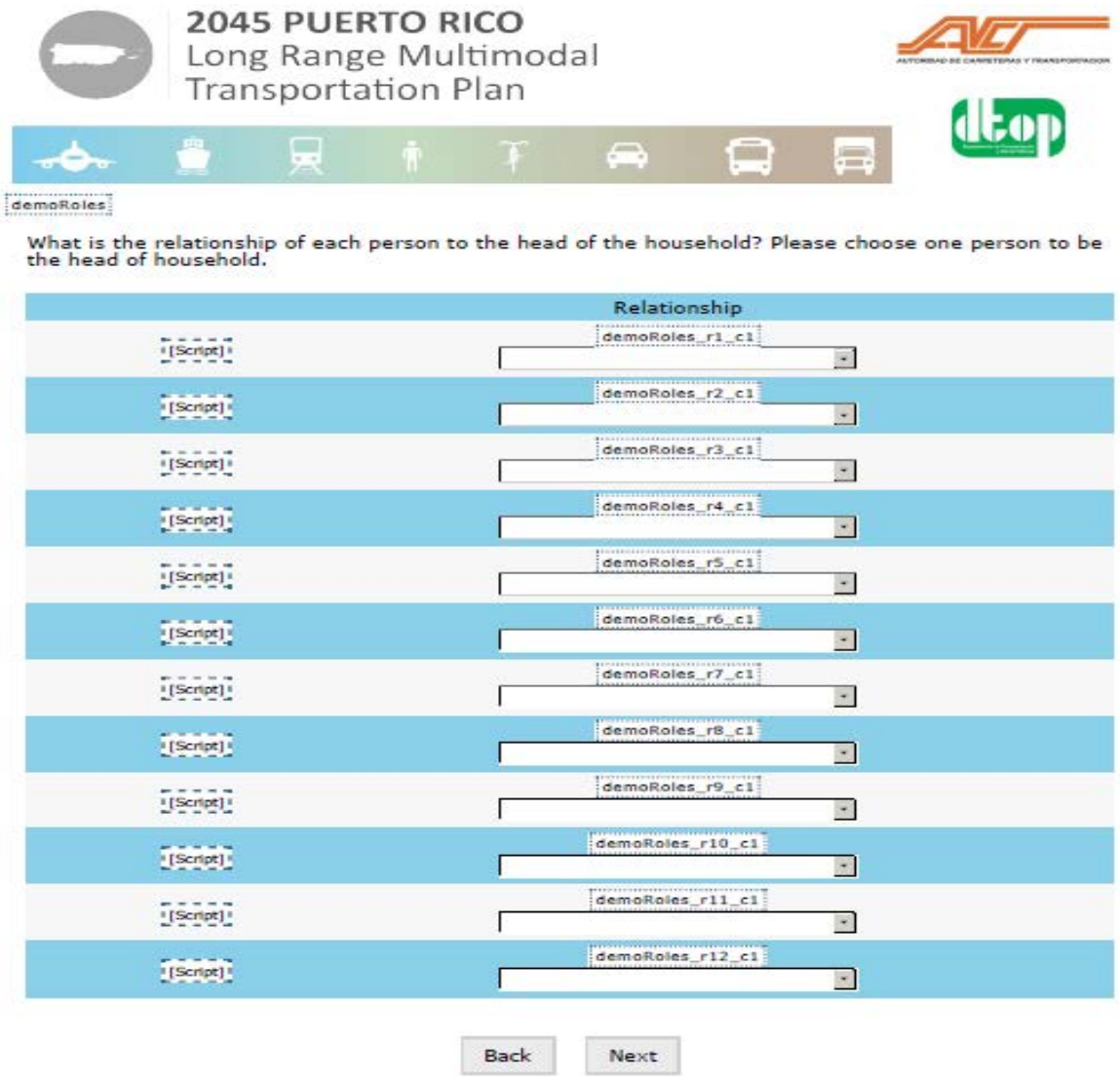
Source: SDG

Figure A.15: Permanent or Temporary Staying



Source: SDG

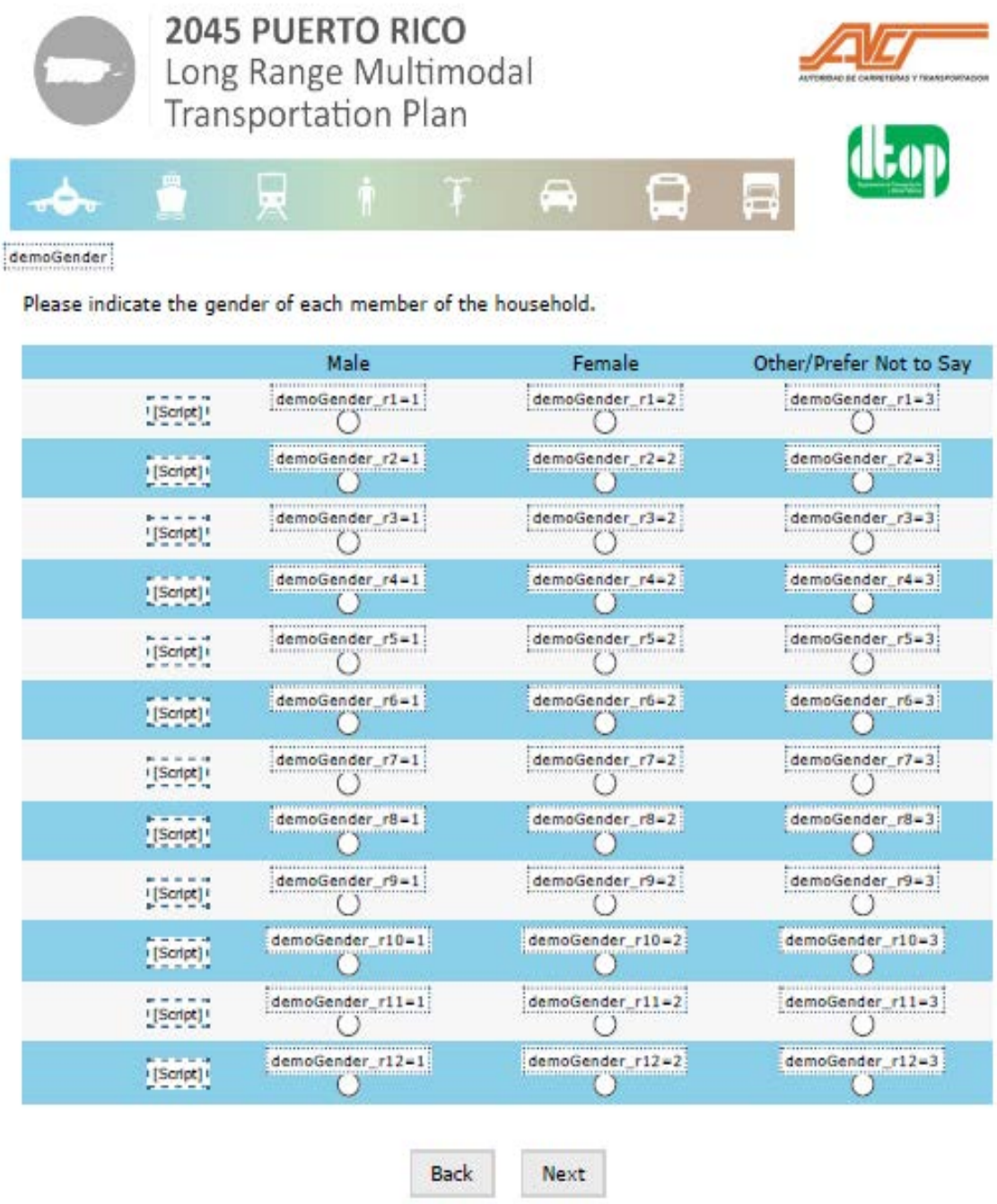
Figure A.16: Relationship to the Head of the Household



Relationship Options	
Head of Household	Uncle or Aunt
Spouse or Partner	Nephew or Niece
Child	Cousin
Grandchild	Brother-in-Law or Sister-in-Law
Father or Mother	Other Relative
Brother or Sister	Domestic Service
Son-in-Law or Daughter-in-Law	Domestic Service Children
Grandparent	Non-Relative
Father-in-Law or Mother-in-Law	

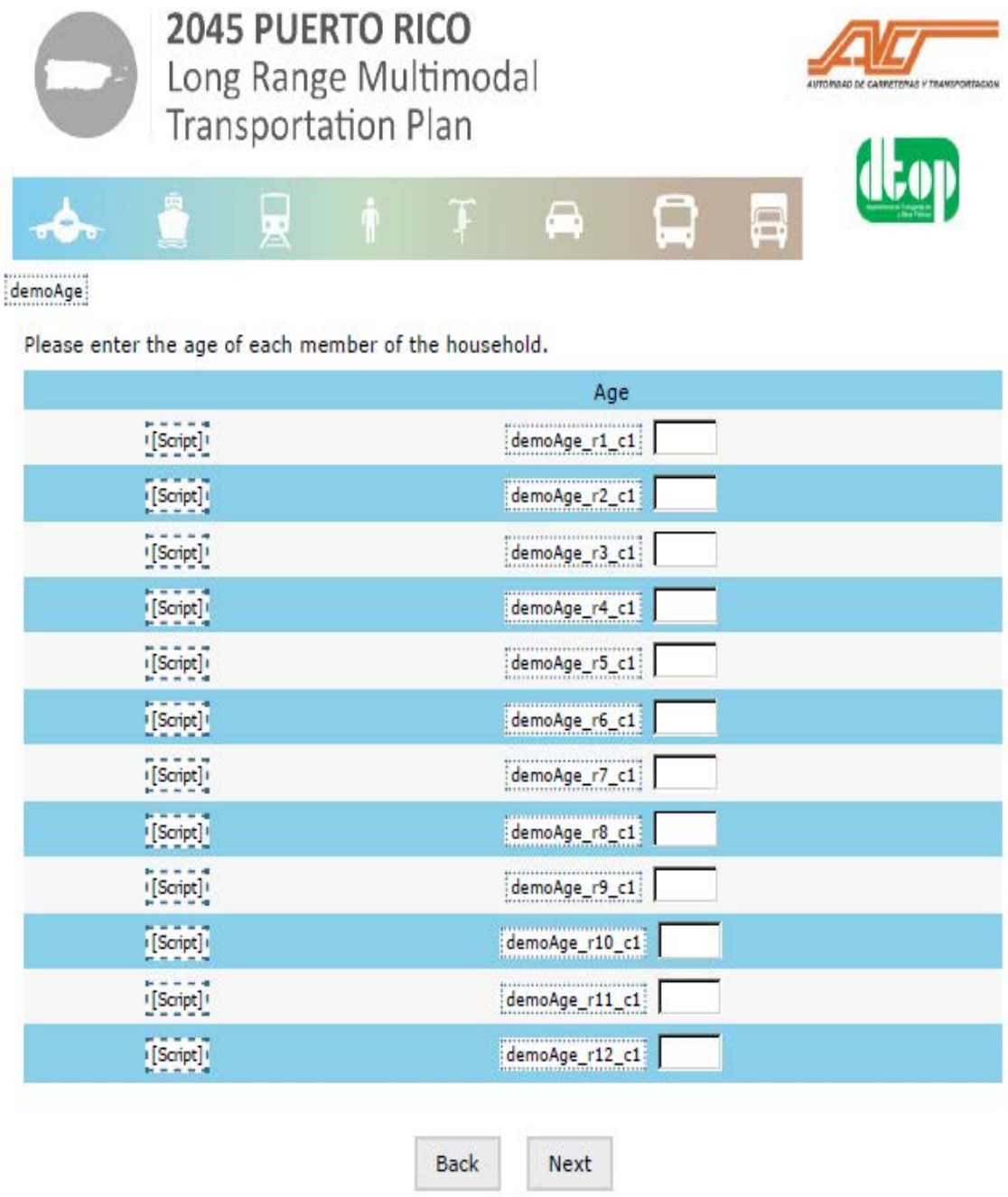
Source: SDG

Figure A.17: Gender



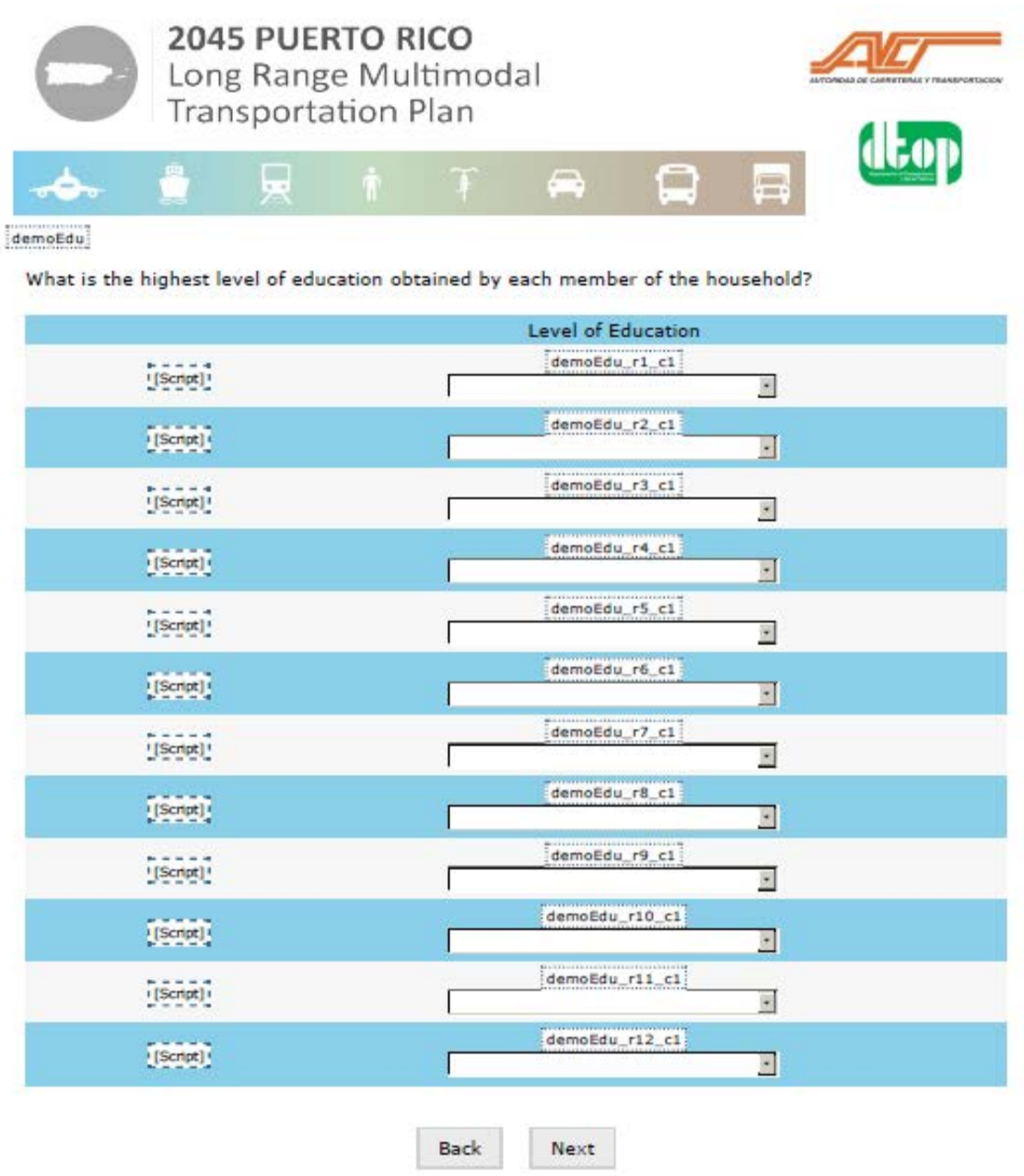
Source: SDG

Figure A.18: Age



Source: SDG

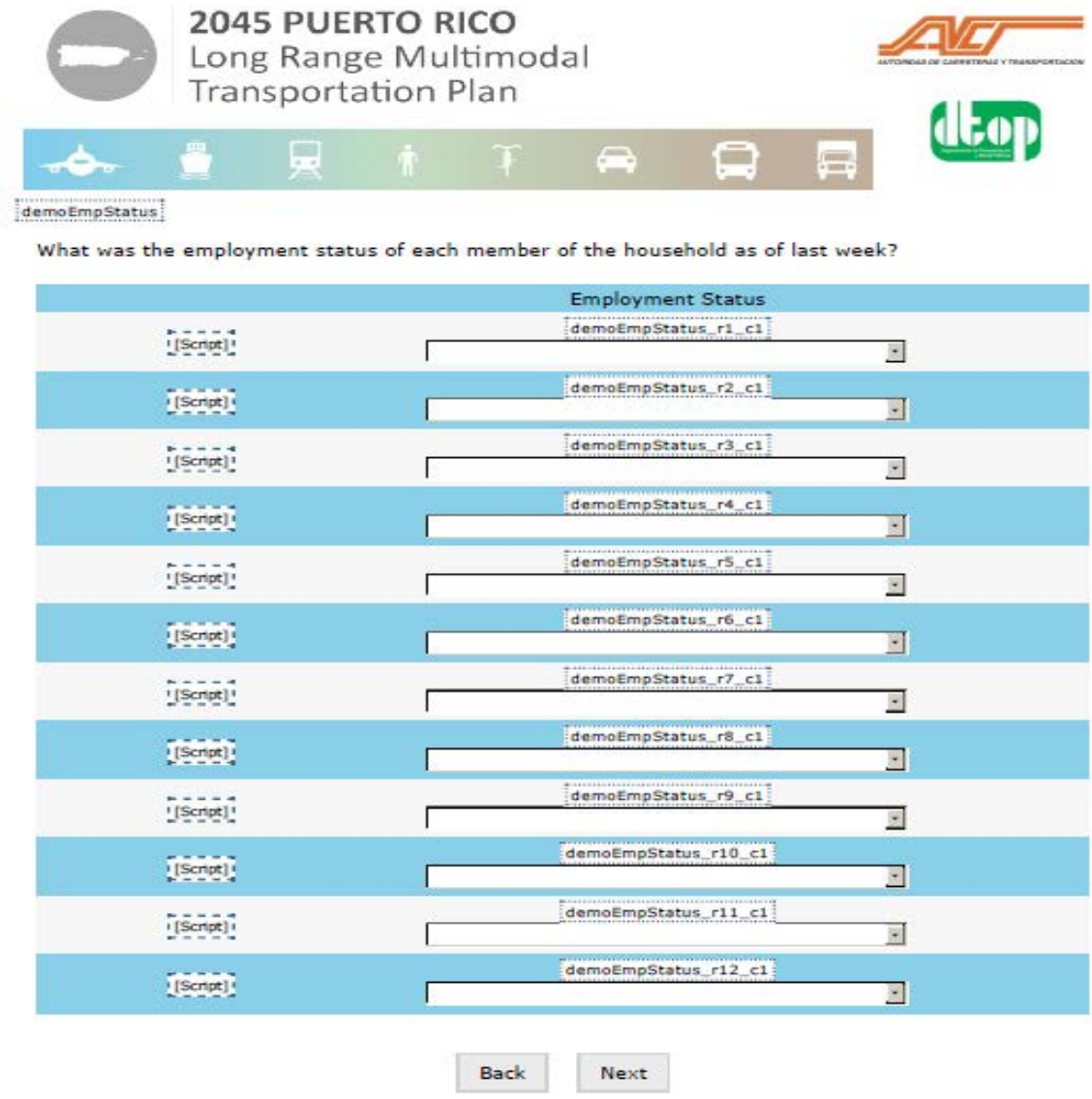
Figure A.19: Level of Education



Level of Education Options		
None	Middle School - Complete	University - Incomplete
Preschool	High School - Incomplete	University - Complete
Elementary School - Incomplete	High School - Complete	Postgraduate - Incomplete
Elementary School - Complete	Associate Degree - Incomplete	Postgraduate – Complete
Middle School - Incomplete	Associate Degree - Complete	

Source: SDG

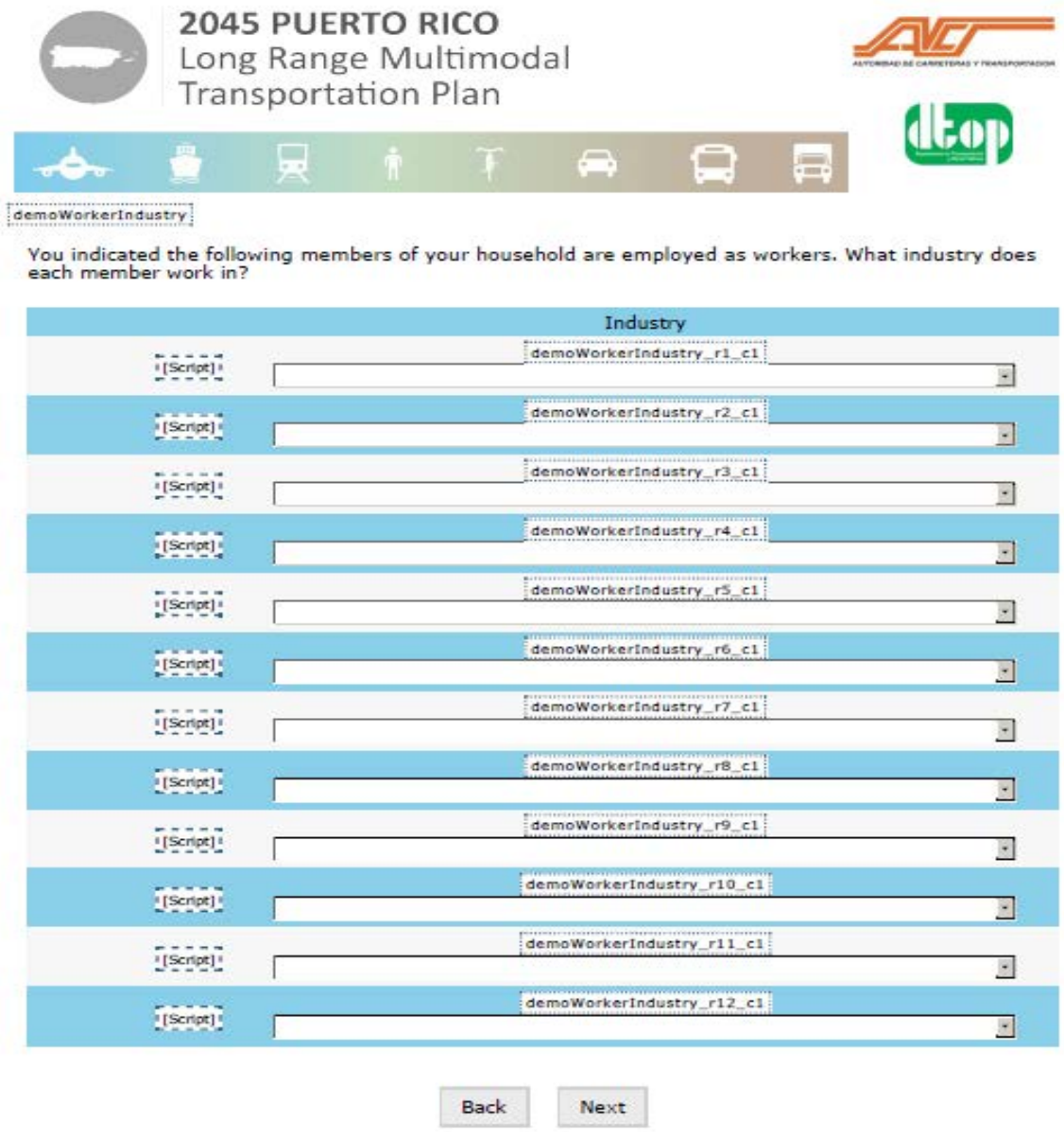
Figure A.20: Employment Status



Employment Status Options		
Student - Private or Public School	Employed - Driver/Messenger	Other - Retired
Student - University Undergraduate	Employed - Unpaid Worker	Other - Looking for Job
Student - University Graduate	Employed - Private Enterprise Employee	Other - Permanently Disabled
Student - Technical/Technological Institution	Employed - Government Employee	Other - Go to Daycare
Student - Informal Education Institution	Employed - Independent Professional	Other - Investor/Lessee
Employed - Worker	Employed - Self-Employed	Other - Other Activity [Respondent Specify]
Employed - Laborer/Farmer	Employed - Employer	
Employed - Domestic Employee	Other - Homemaker	

Source: SDG

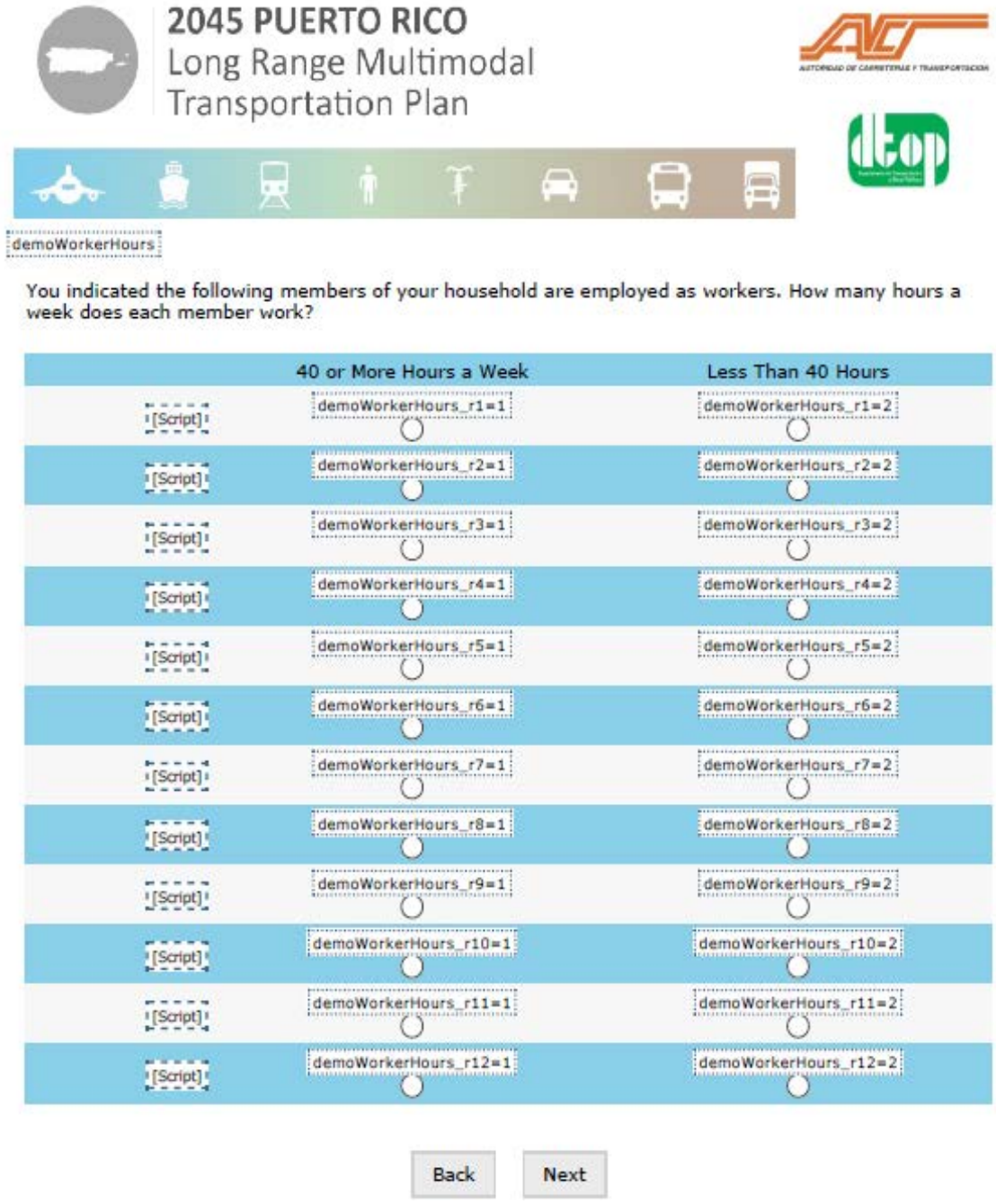
Figure A.21: Type of Industry



Type of Industry Options			
Agriculture, Forestry, Fishing, and Hunting	Wholesale Trade	Real Estate and Rental and Leasing	Health Care and Social Assistance
Mining, Quarrying, and Oil and Gas extraction	Retail Trade	Professional, Scientific, and Technical Services	Arts, Entertainment, and Recreation
Utilities	Transportation and Warehousing	Management of Companies and Enterprises	Accommodation and Food Service
Construction	Information	Administrative, Support, Waste Management, and Remediation Services	Other Services (Except Public Administration)
Manufacturing	Finance and Insurance	Educational Services	Public Administration

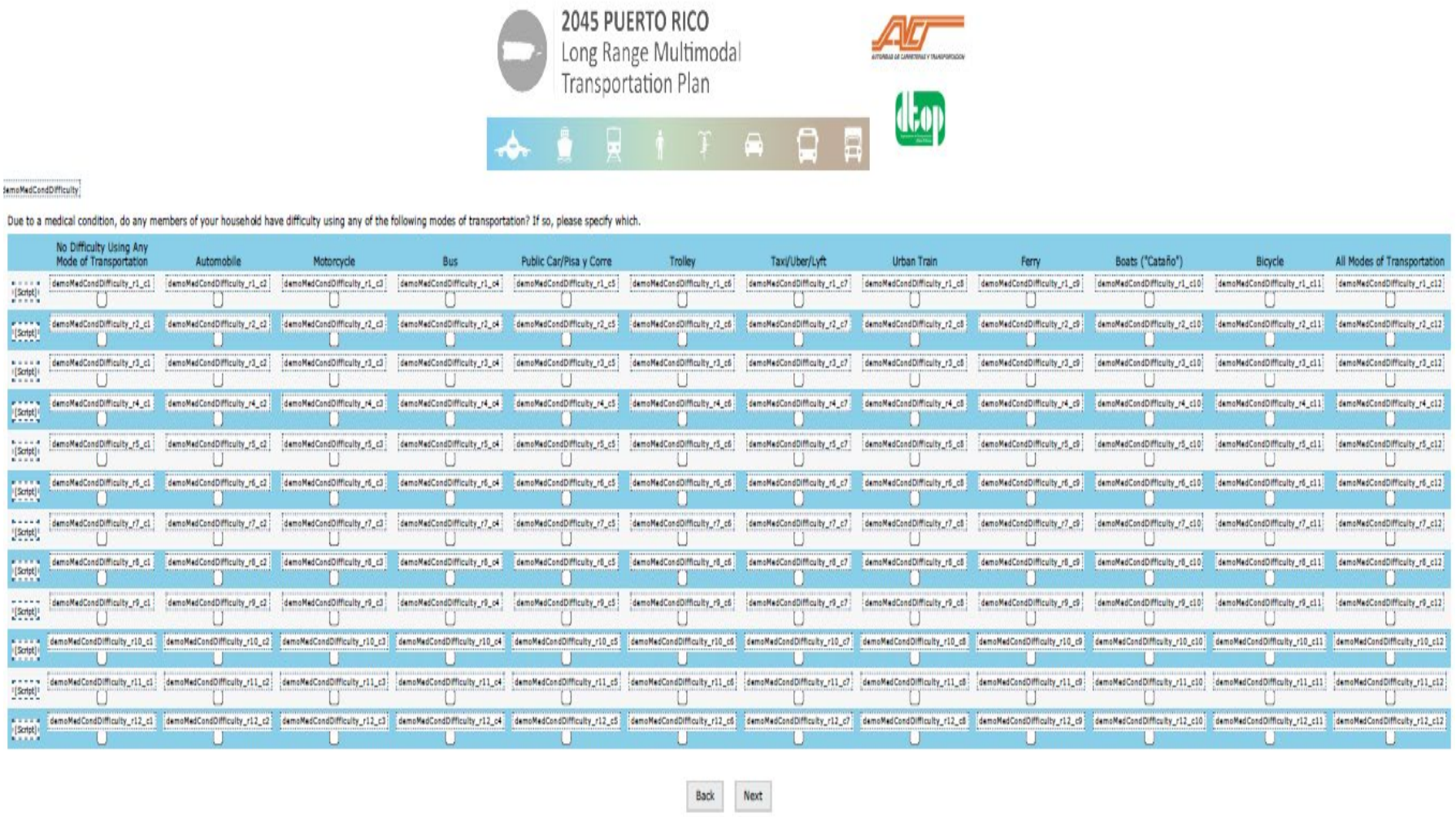
Source: SDG

Figure A.22: Worked Hours



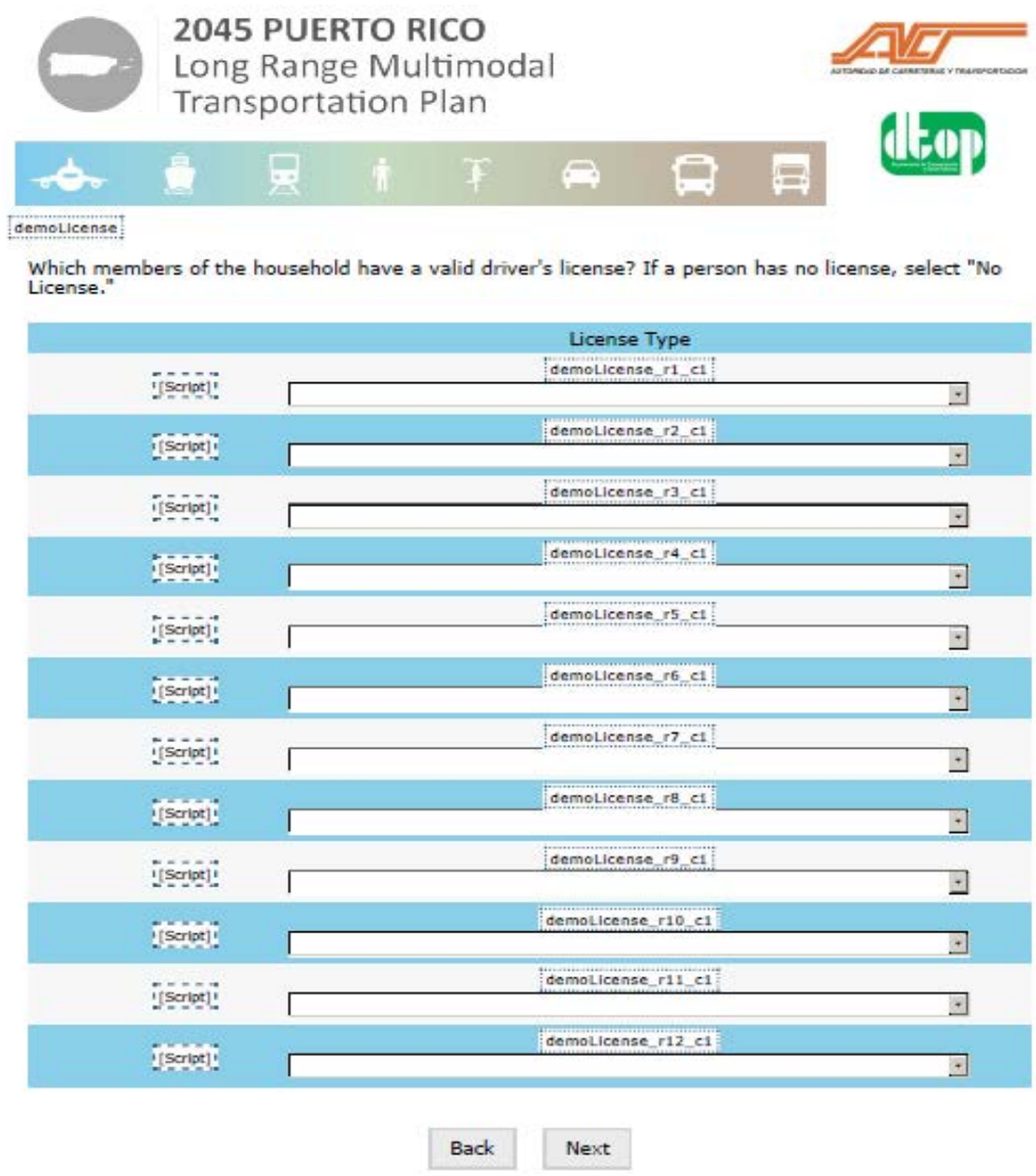
Source: SDG

Figure A.23: Medical Conditions



Source: SDG

Figure A.24: Driver's License



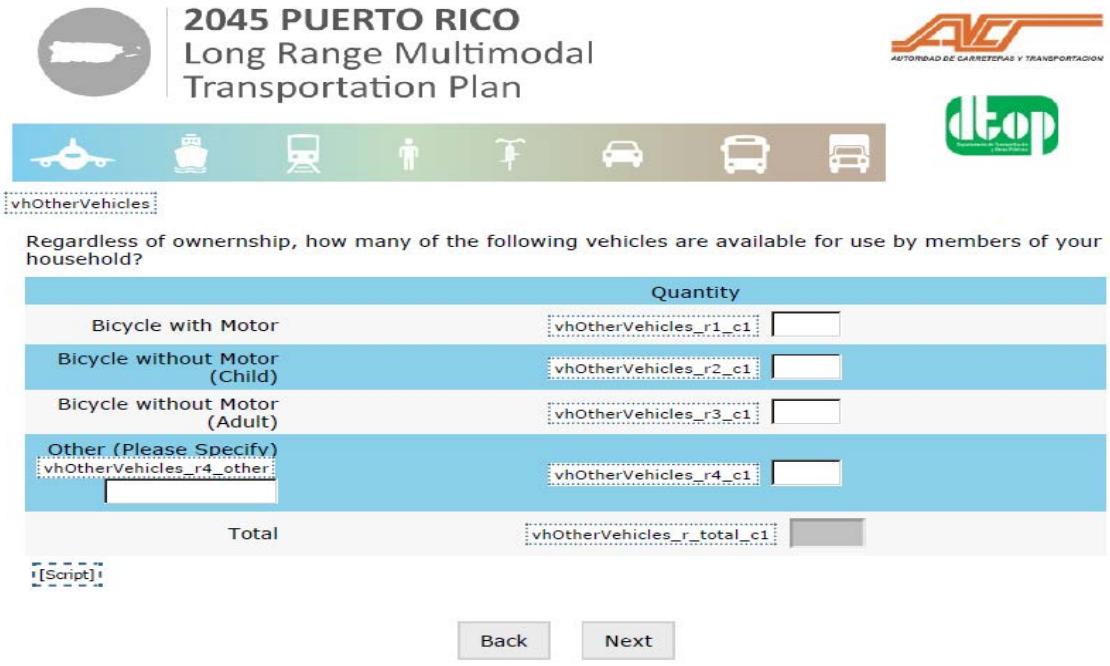
Driver's License Options	
Learner's Permit	Heavy Vehicle Type III (Category 8)
Conductor	Tractor or Tug with or without Crawley or Semi-Crawler (Category 9)
Driver	Motorcycle
Heavy Vehicle Type I (Category 6)	No License
Heavy Vehicle Type II (Category 7)	

Source: SDG

Figure A.25: Licensed Vehicle Availability

Source: SDG

Figure A.26: Other Vehicles



Source: SDG

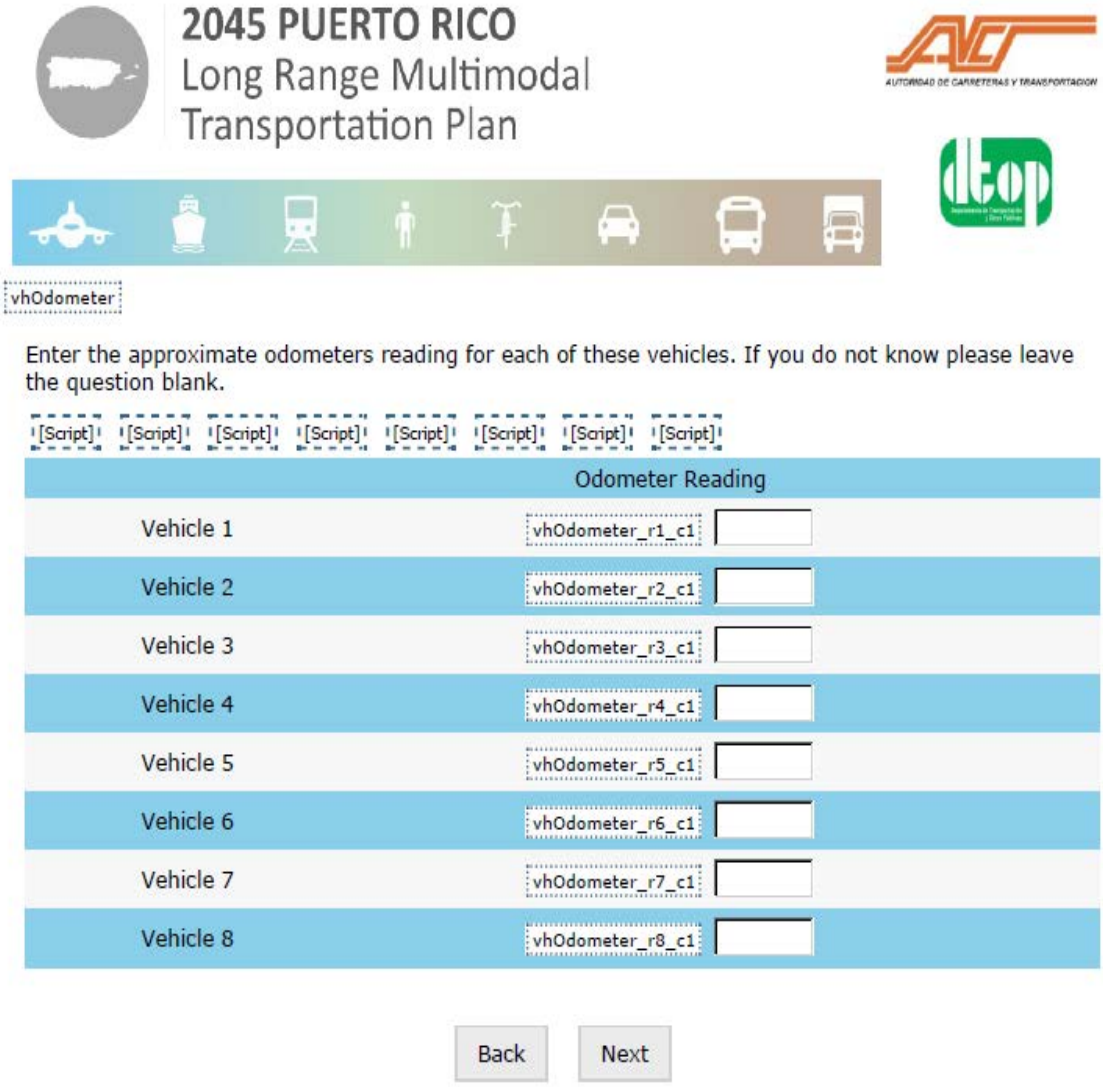
Figure A.27: Vehicle Information

Vehicle Type Options	
Car (Includes Station Wagon)	Motorcycle (including small motorcycles)
SUV	Taxi Operated by a Member of the Household
Pickup Truck	Goods Vehicles
Van	Special Services Car or SUV

Vehicle Make Options				
Acura	Diamond Reo or Reo	Jensen	Navistar	Sunbeam
Alfa Romeo	DINA	Jeep	Neoplan	Suzuki
AM General	Divco	Kaiser-Jeep	Nissan	Tesla
American Motors	Dodge	Kawasaki	Norton	Thomas Built
Aston Martin	Ducati	Kenworth	Oldsmobile	Toyota
Audi	Eagle	Kia	Opel	Triumph
Austin/Austin	Eagle Coach	Koeingsegg	Orion	TVR
Healey	Excabalier	Lada	Oshkosh	UD
Avanti	Ferrari	Lamborghini	Packard	Van Hool
Auto-Union-DKW	Fiat	Lancia	Panoz	Victory
Bentley	Ford	Land Rover	Peterbilt	Volkswagen
Bertone	Freightliner	Lexus	Peugeot	Volvo
Bluebird	FWD	Lincon	Plymouth	Western Star
BMW	GEO	Lotus	Pontiac	White/Autocar
Bricklin	Gazelle	Mack	Porsche	White/GMC
Brockway	Gillig	Mahinda	Reliant (British)	Willys-Jeep
BSA	GMC	Maserati	Renault	Yamaha
Buick	Grumman	Maybach	Rolls Royce	YES
Cadillac	Harley Davison	Mazda	Saab	Yugo
Carpenter	Hillman	MCI	Saleen	Other motorcycles brands
Checker	Hino	Mercedes-Benz	Saturn	Other small motorcycles brands
Chevrolet	Honda	Mercury	Scania	Other
Chrysler	Hudson	Merker	Simca	
Collins Bus	Hyundai	Mid Bus	Singer	
Daewoo	Imperial	Mini-Cooper	Smart	
Daihatsu	Infiniti	MG	Spyker	
Datsun	International Harvester	Mitsubishi	Sterling	
DeLorean	Isuzu	Morgan	Studabaker	
Desoto	Iveco/Magirus	Morris	Stutz	
Desta	Jaguar	Moto-Guzzi	Subaru	

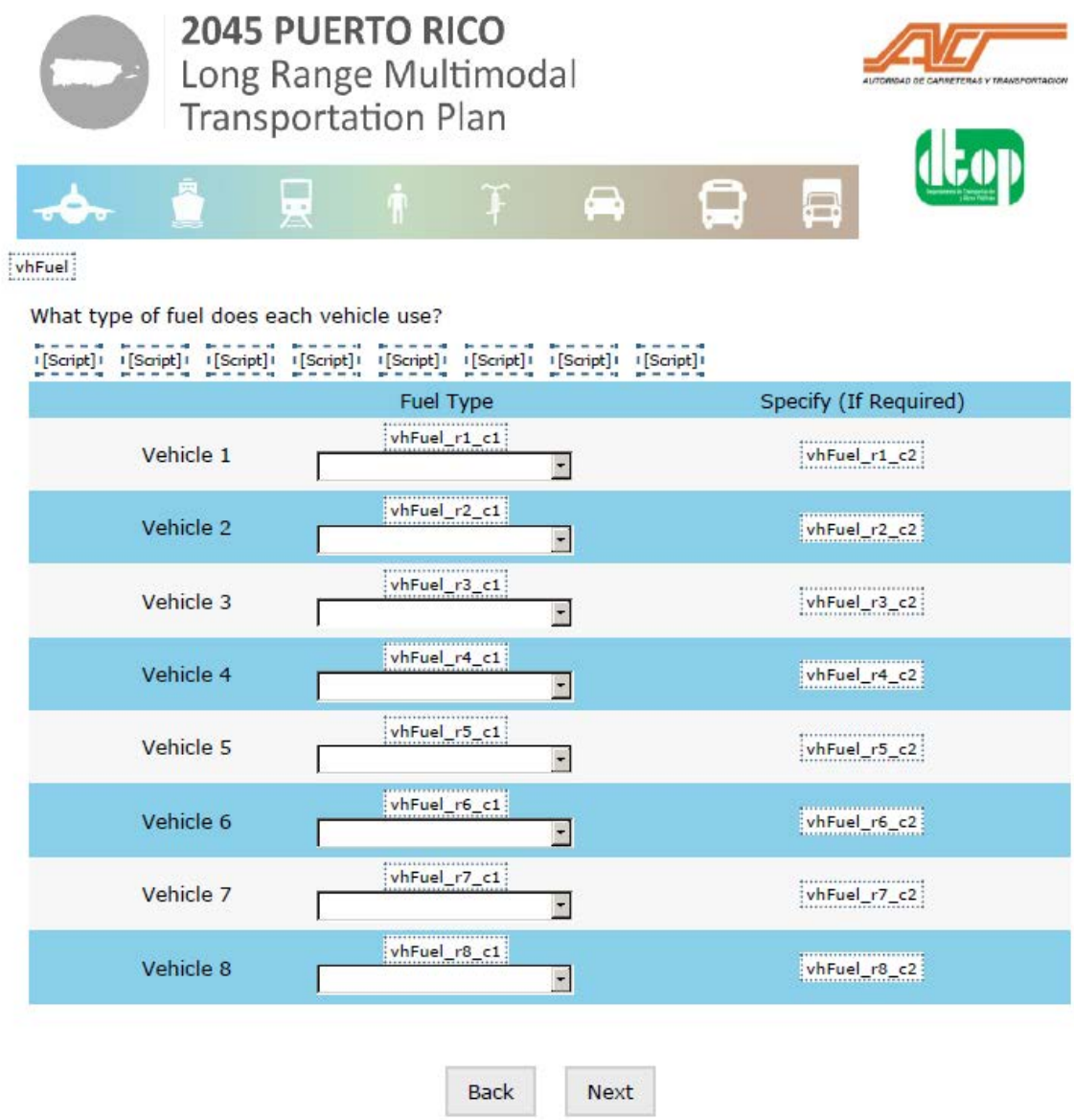
Source: National Household Travel Survey and Code Manual, Fifth Educational National Crime Information Center U.S. Department of Justice, Federal Bureau of Investigation Section 4– Vehicle Make Codes, 2009

Figure A.28: Odometer Reading



Source: SDG

Figure A.29: Types of Vehicle Fuel



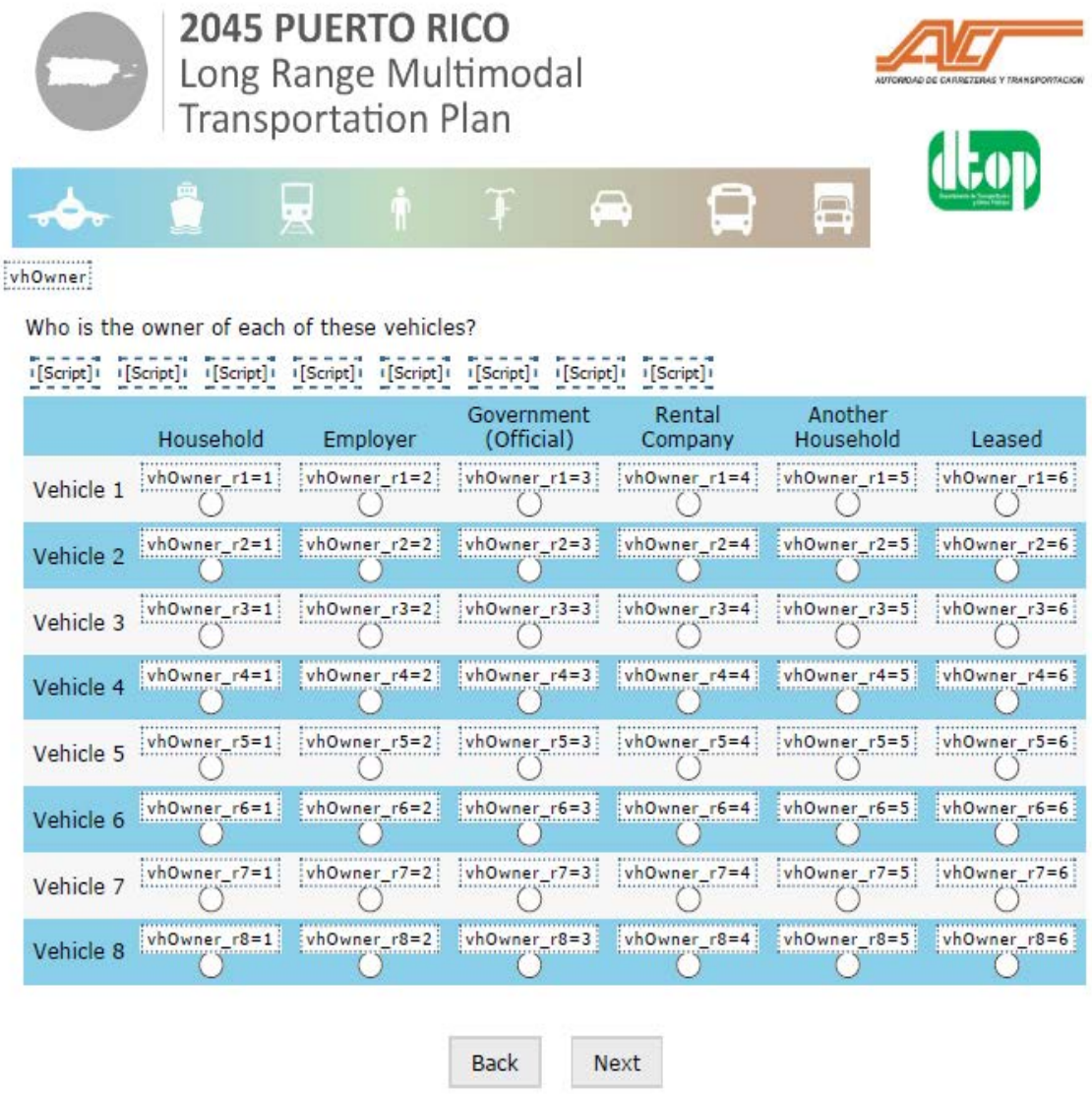
Types of Vehicle Fuel Options
Only Gasoline
Diesel
Propane
Natural Gas
Electric
Gas/Electric
Other (Please Specify) [Respondent Specify]

Source: SDG

Figure A.30: Commercial Purposes

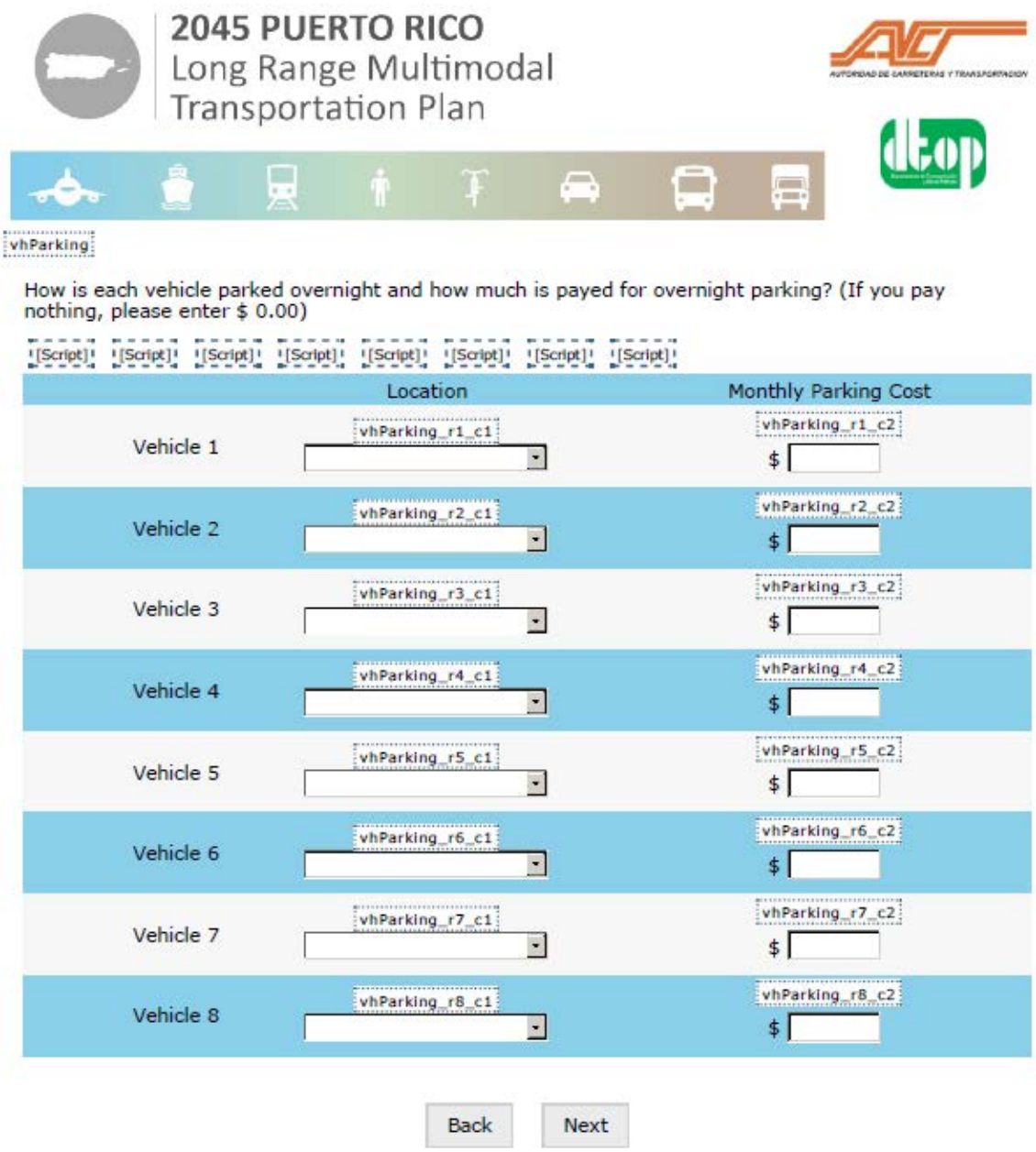
Source: SDG

Figure A.31: Vehicle Owner



Source: SDG

Figure A.32: Parking



Parking Location Options
Own Garage/Driveway
Private Parking
Public Parking
Public Road
Public Space

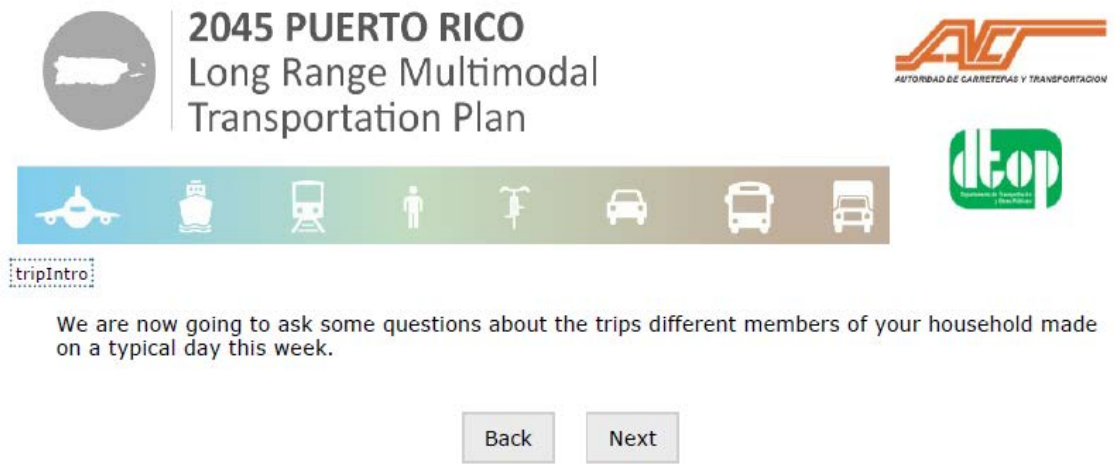
Source: SDG

Figure A.33: Vehicle Primary User and Purpose

Primary Purpose	
To Commute to Work	To go Eat or Drink
For Work (Business Related)	To go Shopping
To Study/Go to Class	For Recreation
For Medical/Health Related Purposes	For Legal Procedures
To See Someone for Business	To Search for a Job
To See Someone for Non-Work Related Purposes	For Social/Religious Activities
To Return Home	To Accompany Another Person (Please Specify Their Trip Purpose) [Respondent Specify]
To Drop Off/Pick up Someone	For Another Activity (Please Specify) [Respondent Specify]
To Drop Off/Pick up Something	

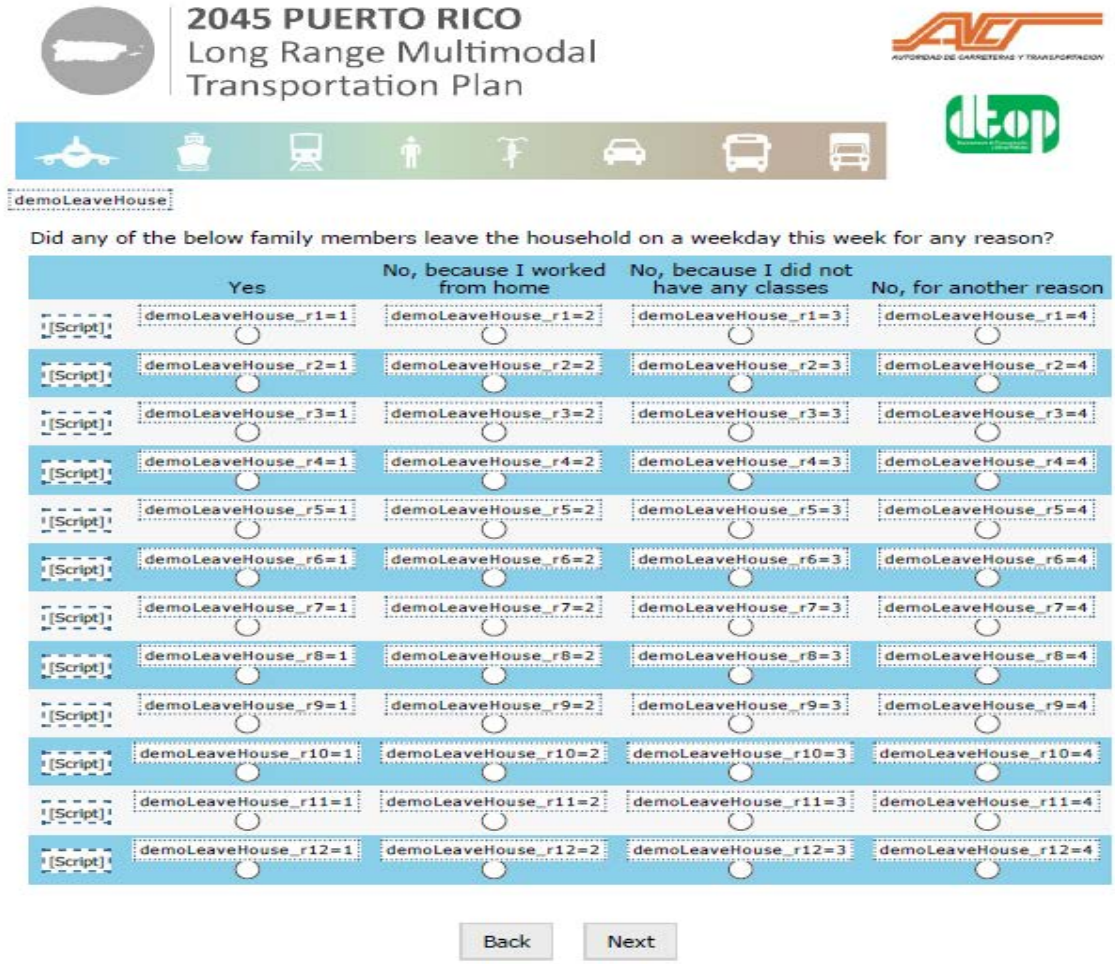
Source: SDG

Figure A.34: Trips Information Introduction



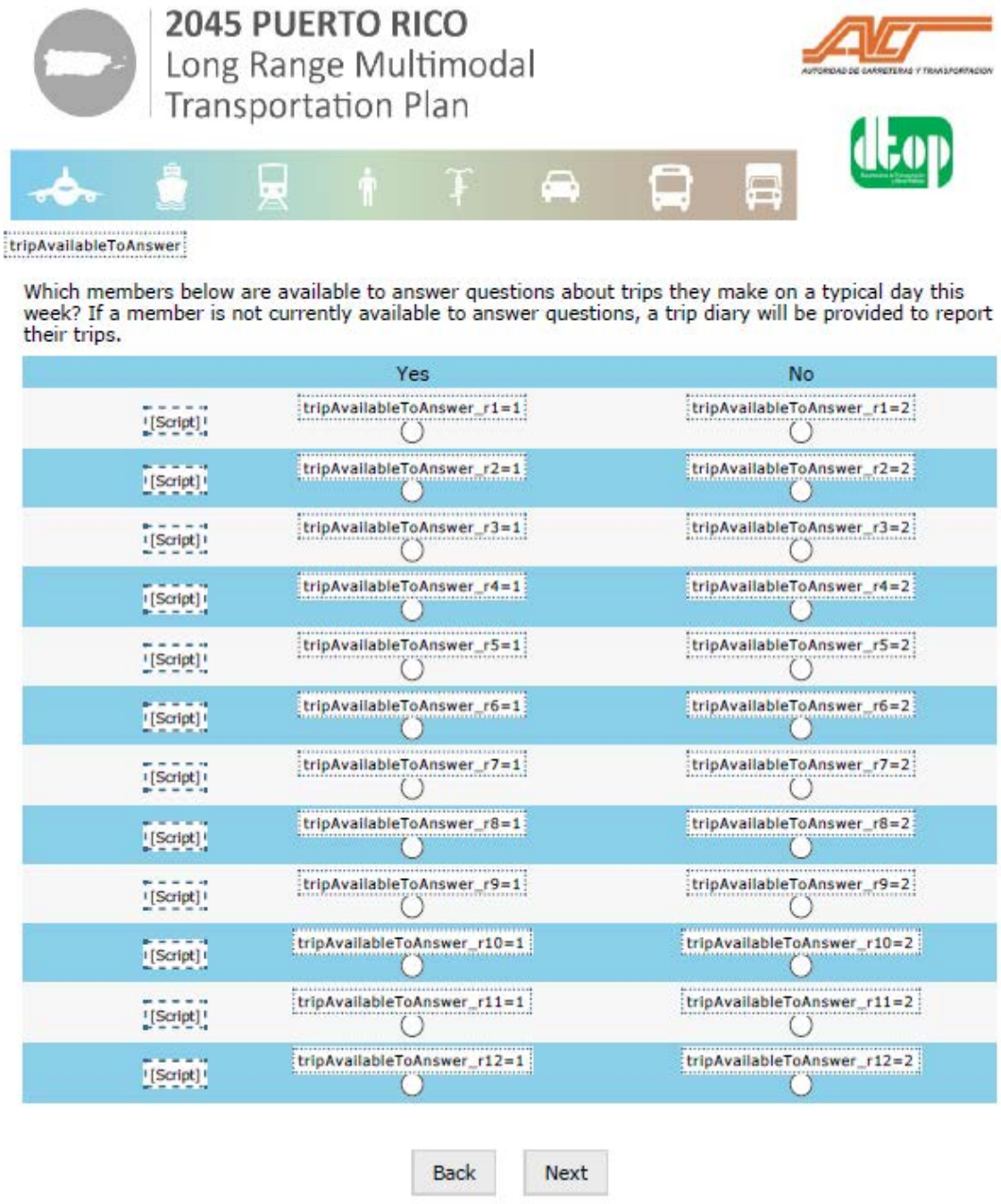
Source: SDG

Figure A.35: Reasons for Leaving the House



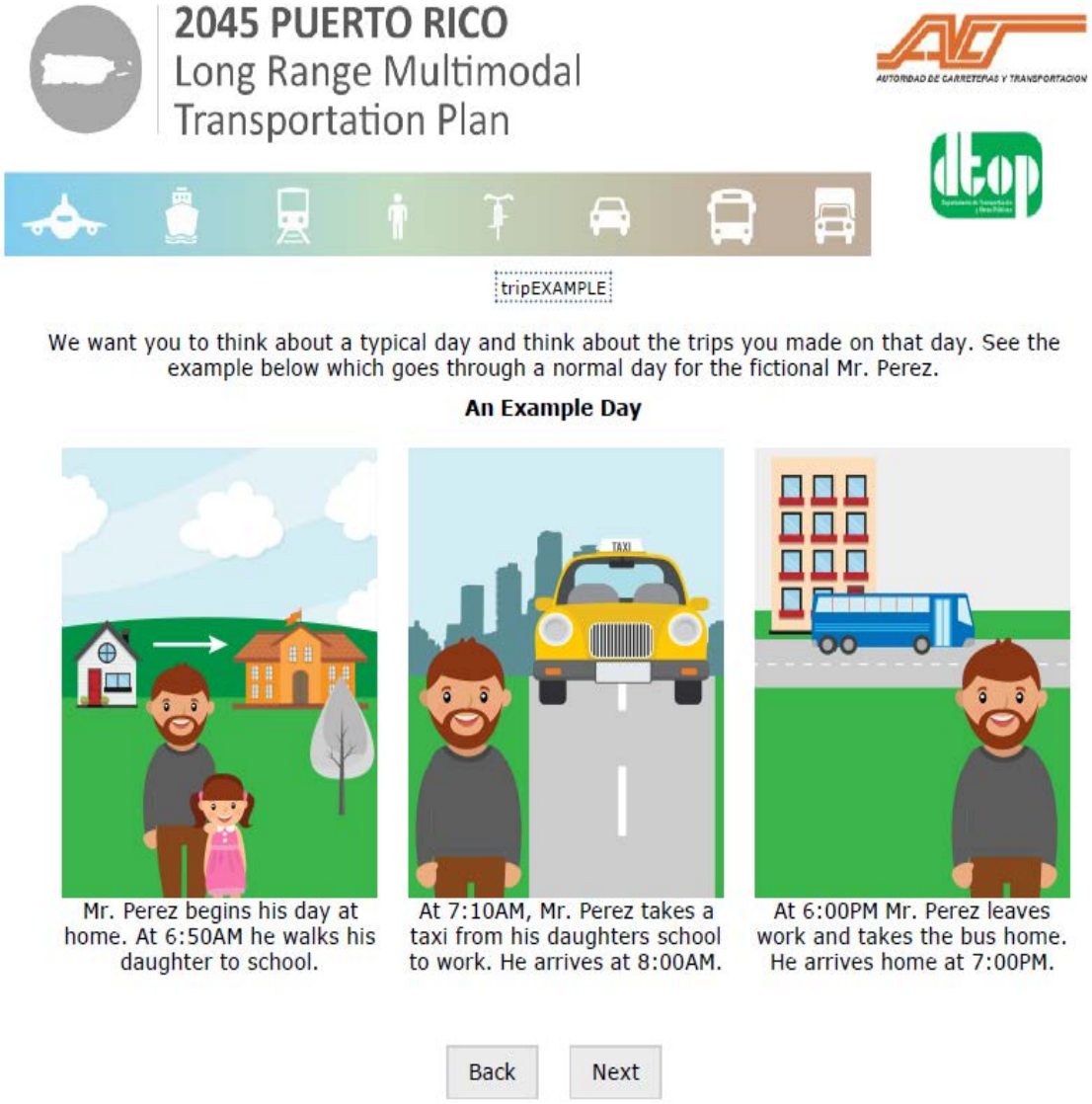
Source: SDG

Figure A.36: Members' Availability to Answer Module D



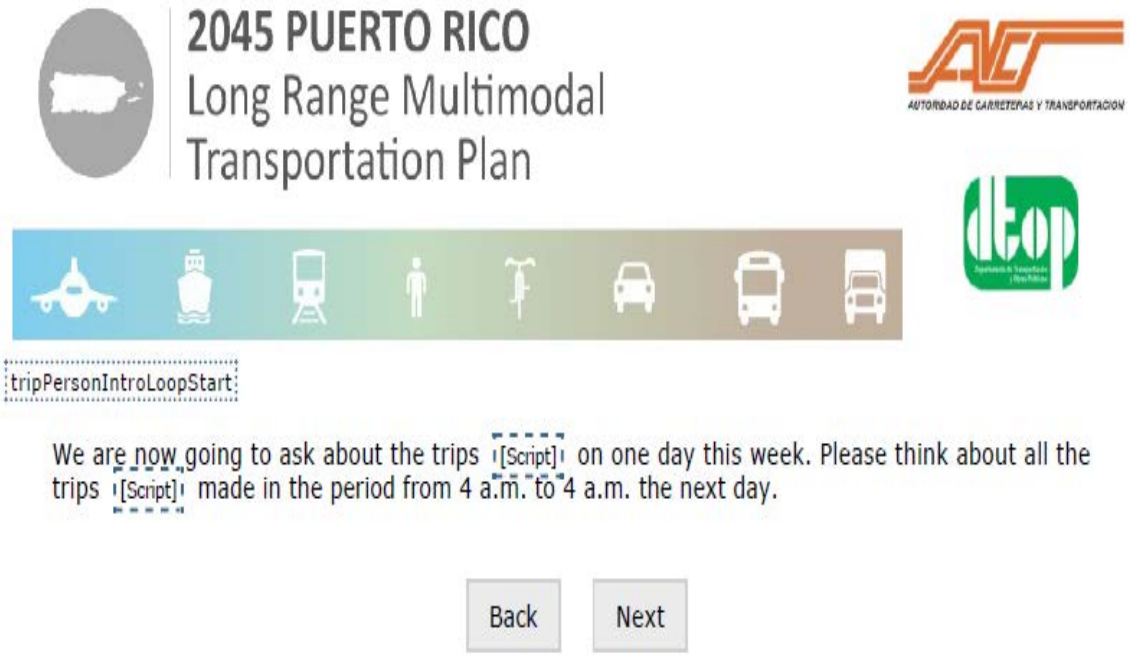
Source: SDG

Figure A.37: Trip Example



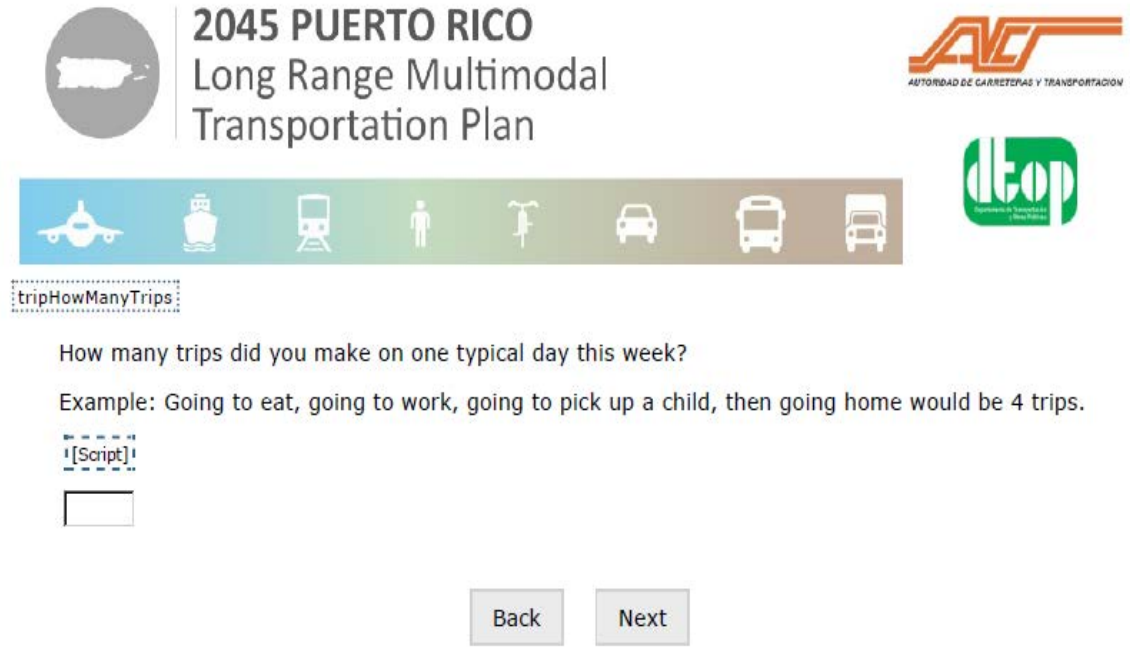
Source: SDG

Figure A.38: Trip Person Introduction



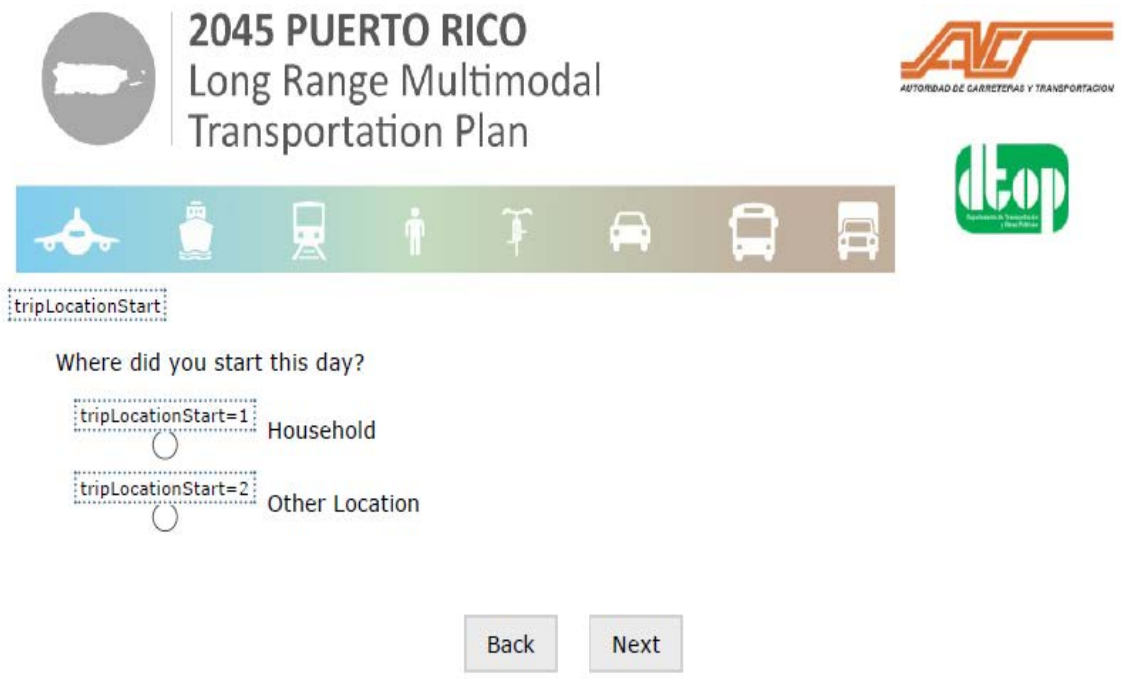
Source: SDG

Figure A.39: Number of Trips



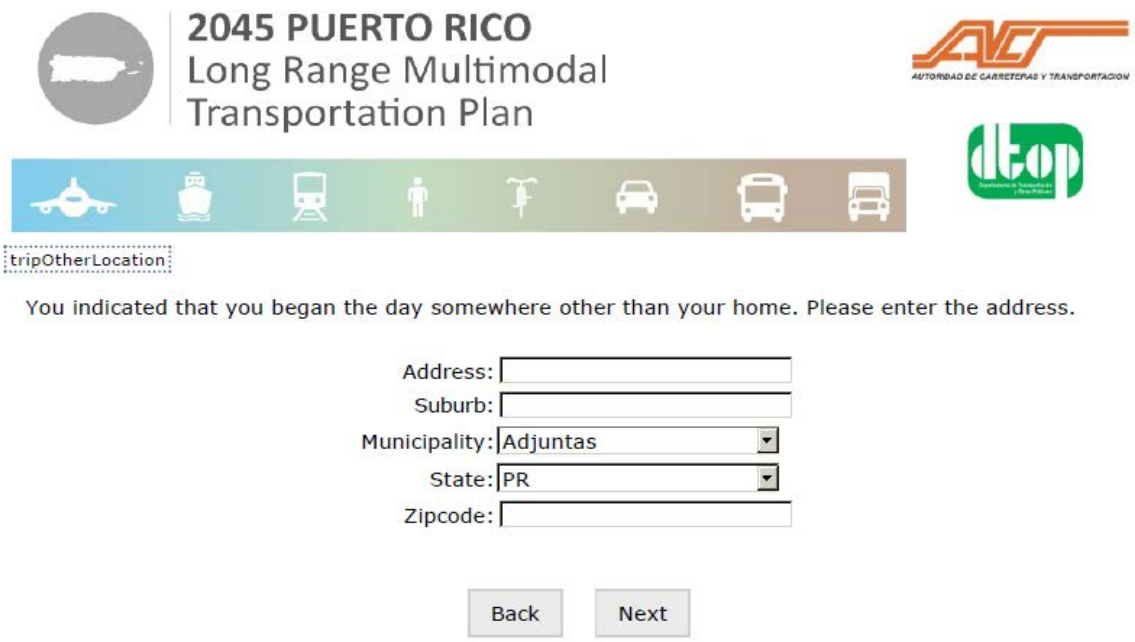
Source: SDG

Figure A.40: Trip Location Start – Household



Source: SDG

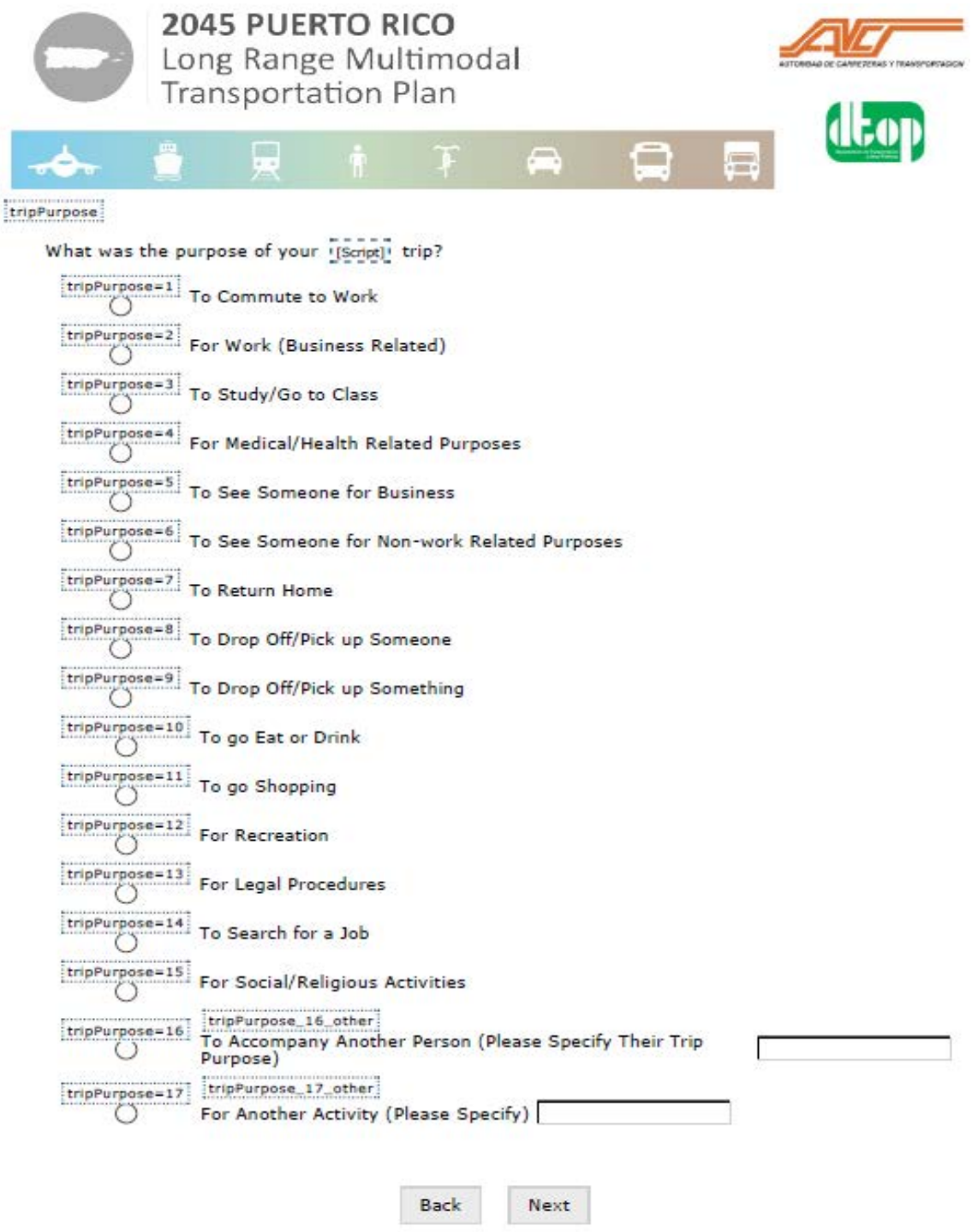
Figure A.41: Trip Location Start – Other Location



Municipality Options					State Options			
Adjuntas	Cayey	Hormigueros	Morovis	Toa Alta	AK	ME	OK	FM
Aguada	Ceiba	Humacao	Naguabo	Toa Baja	AZ	MD	OR	GU
Aguadilla	Ciales	Isabela	Naranjito	Trujillo Alto	AR	MA	PA	MH
Aguas Buenas	Cidra	Jayuya	Orocovis	Utuado	CA	MI	RI	MP
Aibonito	Coamo	Juana Díaz	Patillas	Vega Alta	CO	MN	SC	PW
Añasco	Comerío	Juncos	Peñuelas	Vega Baja	CT	MS	SD	VI
Arecibo	Corozal	Lajas	Ponce	Vieques	DE	MO	TN	
Arroyo	Culebra	Lares	Quebradillas	Villalba	FL	MT	TX	
Barceloneta	Dorado	Las Marías	Rincón	Yabucoa	GA	NE	UT	
Barranquitas	Fajardo	Las Piedras	Río Grande	Yauco	HI	NV	VT	
Bayamón	Florida	Loíza	Sabana Grande		ID	NH	VA	
Cabo Rojo	Guánica	Luquillo	Salinas		IL	NJ	WA	
Caguas	Guayama	Manatí	San Germán		IN	NM	WV	
Camuy	Guayanilla	Maricao	San Juan		IA	NY	WI	
Canóvanas	Guaynabo	Maunabo	San Lorenzo		KS	NC	WY	
Carolina	Gurabo	Mayagüez	San Sebastián		KY	ND	AS	
Cataño	Hatillo	Moca	Santa Isabel		LA	OH	DC	

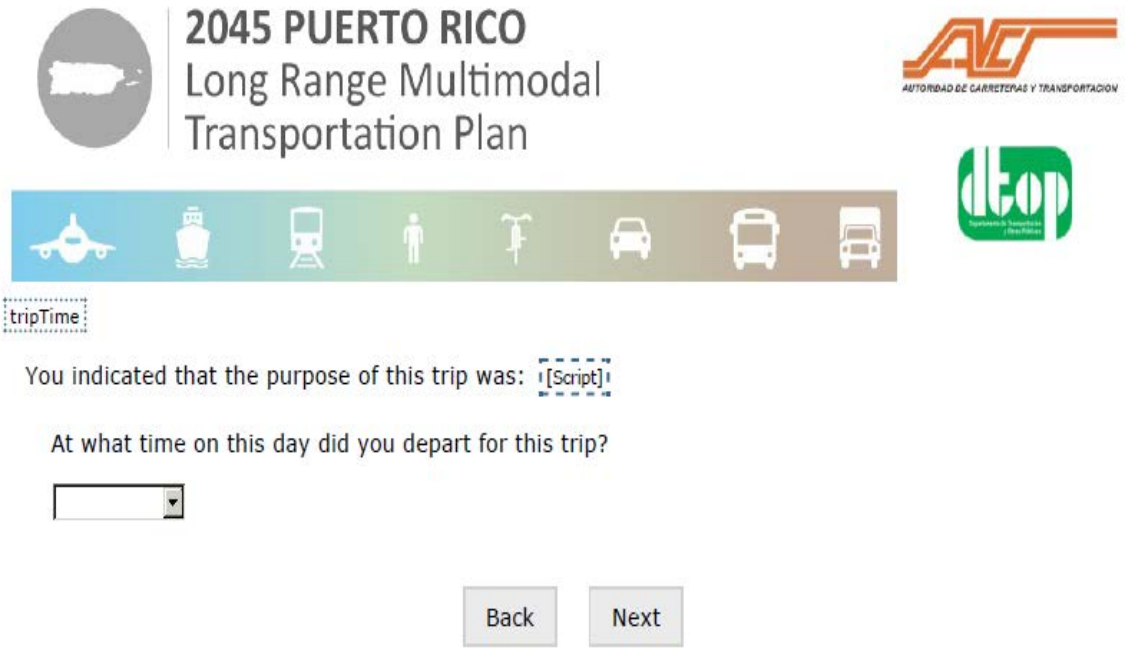
Source: SDG

Figure A.42: Trip Purpose



Source: SDG

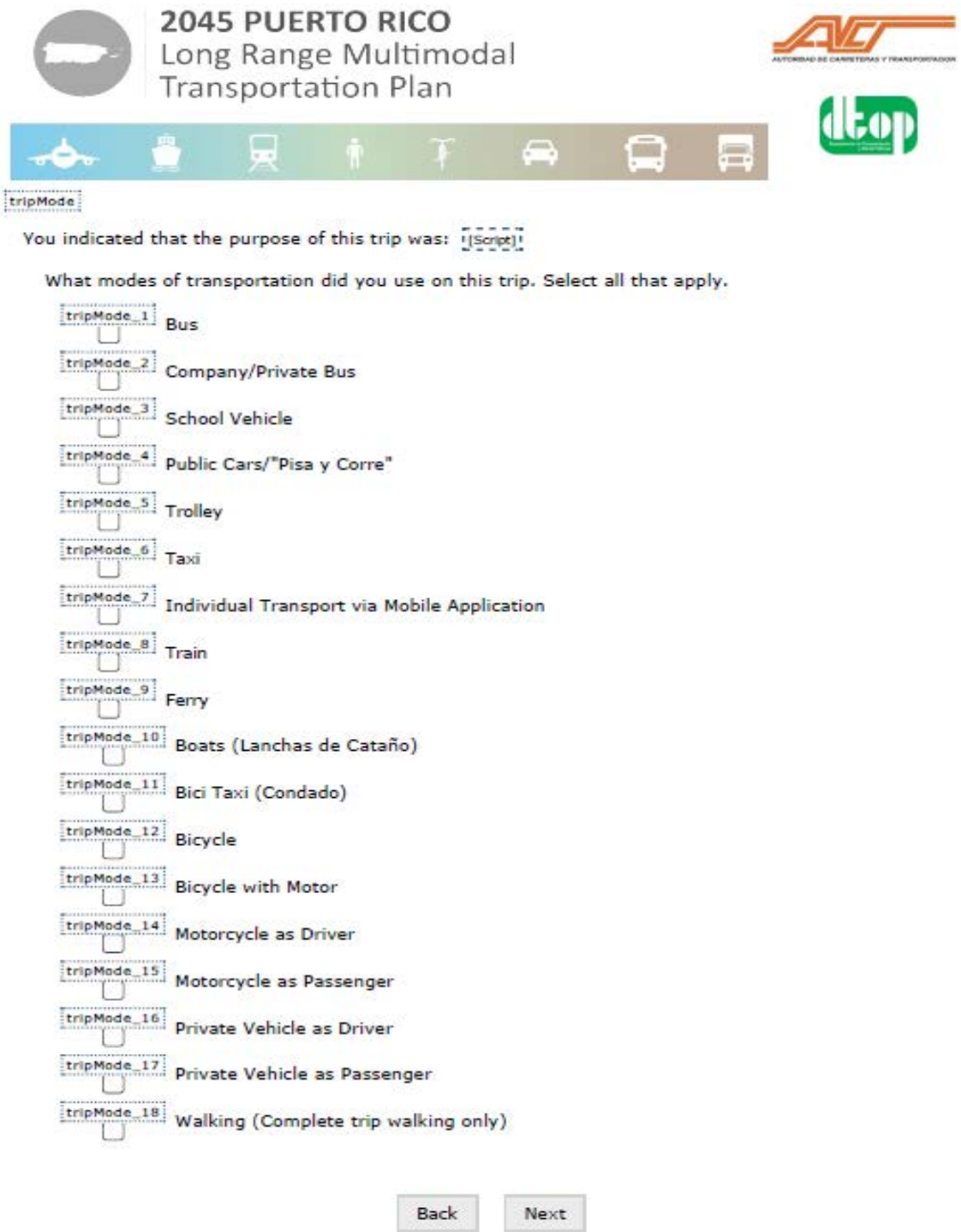
Figure A.43: Depart Time



Time Options		
12:00AM	8:30AM	5:00PM
12:30AM	9:00AM	5:30PM
1:00AM	9:30AM	6:00PM
1:30AM	10:00AM	6:30PM
2:00AM	10:30AM	7:00PM
2:30AM	11:00AM	7:30PM
3:00AM	11:30AM	8:00PM
3:30AM	12:00PM	8:30PM
4:00AM	12:30PM	9:00PM
4:30AM	1:00PM	9:30PM
5:00AM	1:30PM	10:00PM
5:30AM	2:00PM	10:30PM
6:00AM	2:30PM	11:00PM
6:30AM	3:00PM	11:30PM
7:00AM	3:30PM	
7:30AM	4:00PM	
8:00AM	4:30PM	

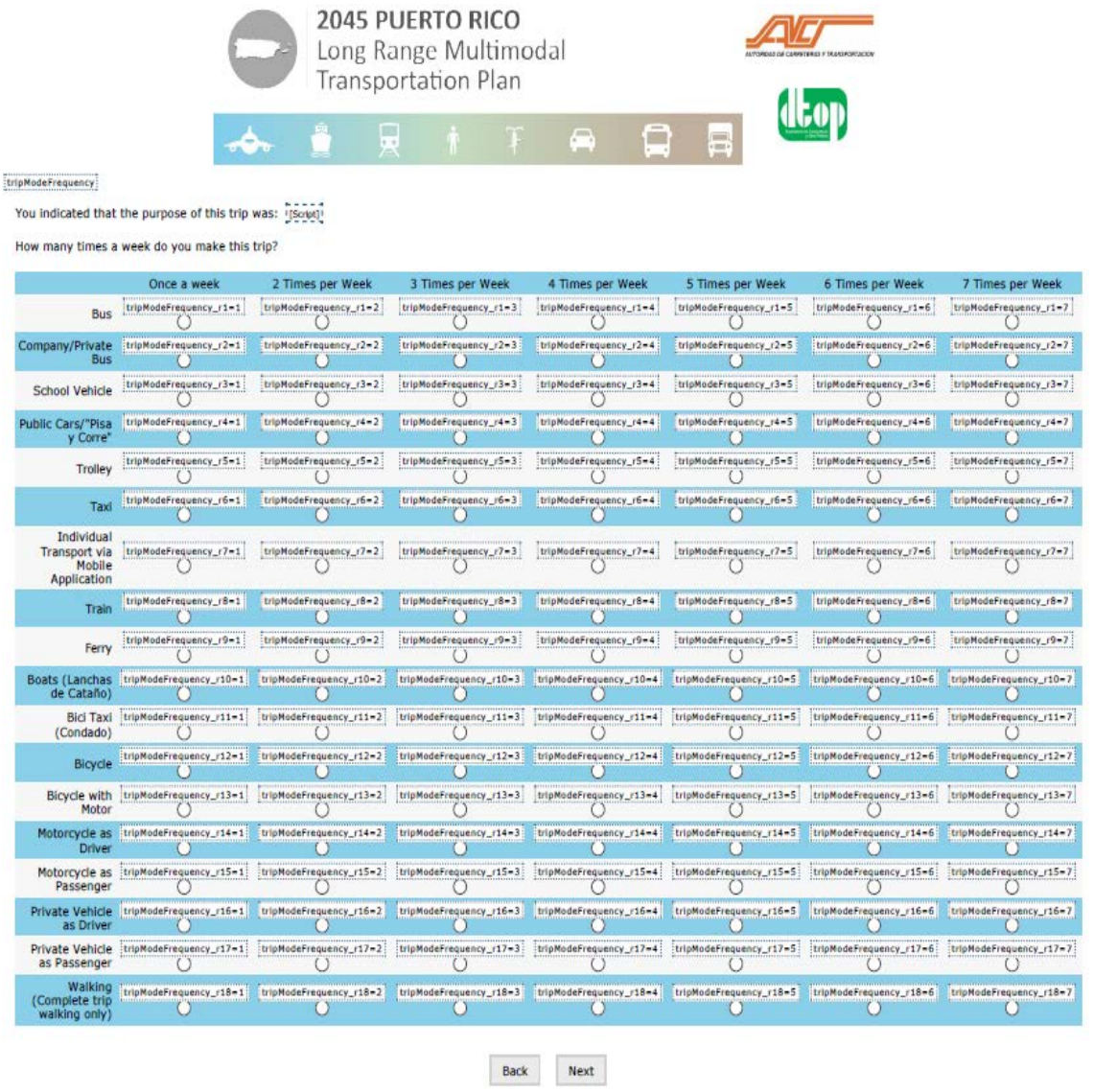
Source: SDG

Figure A.44: Modes of Transportation



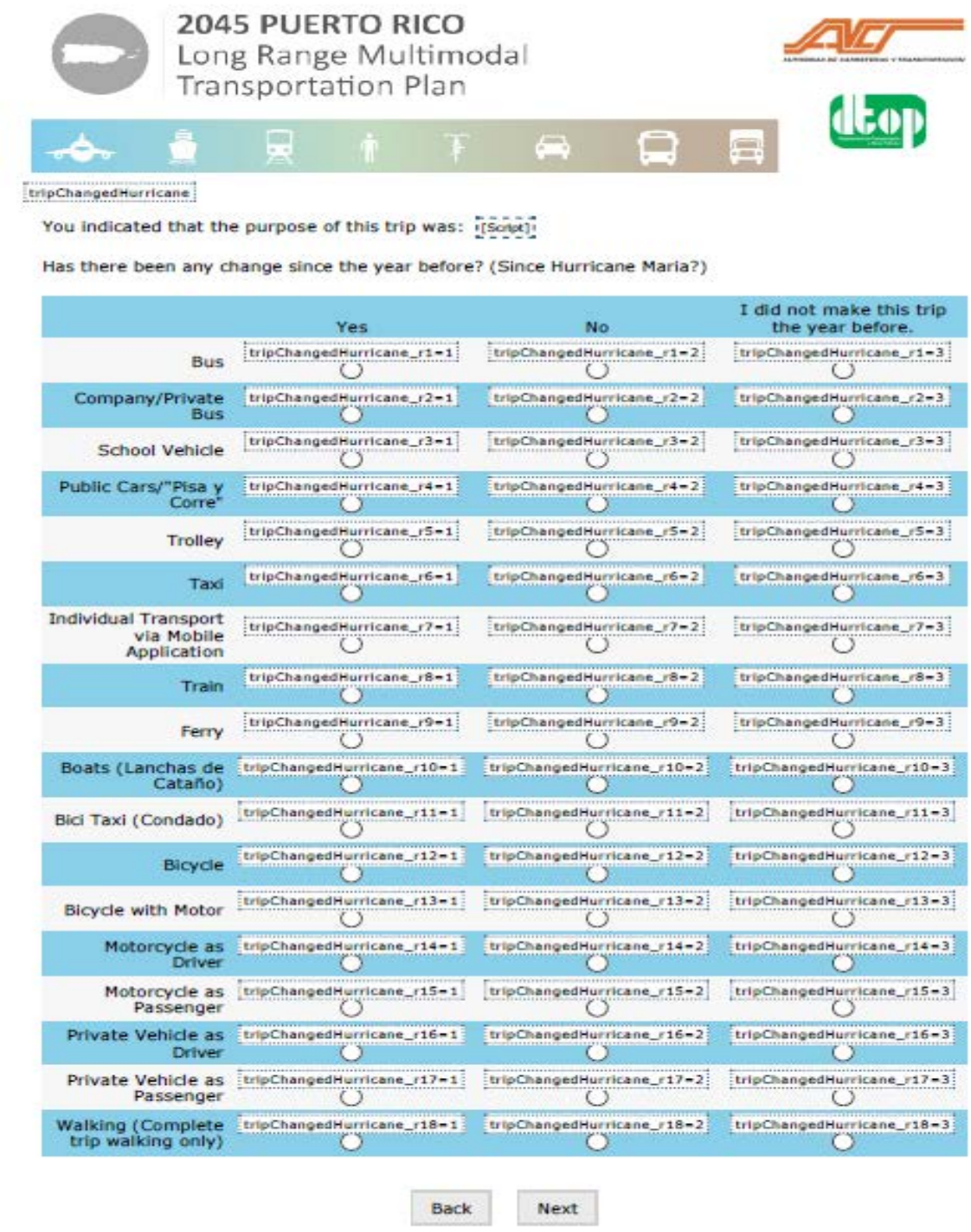
Source: SDG

Figure A.45: Trip Frequency



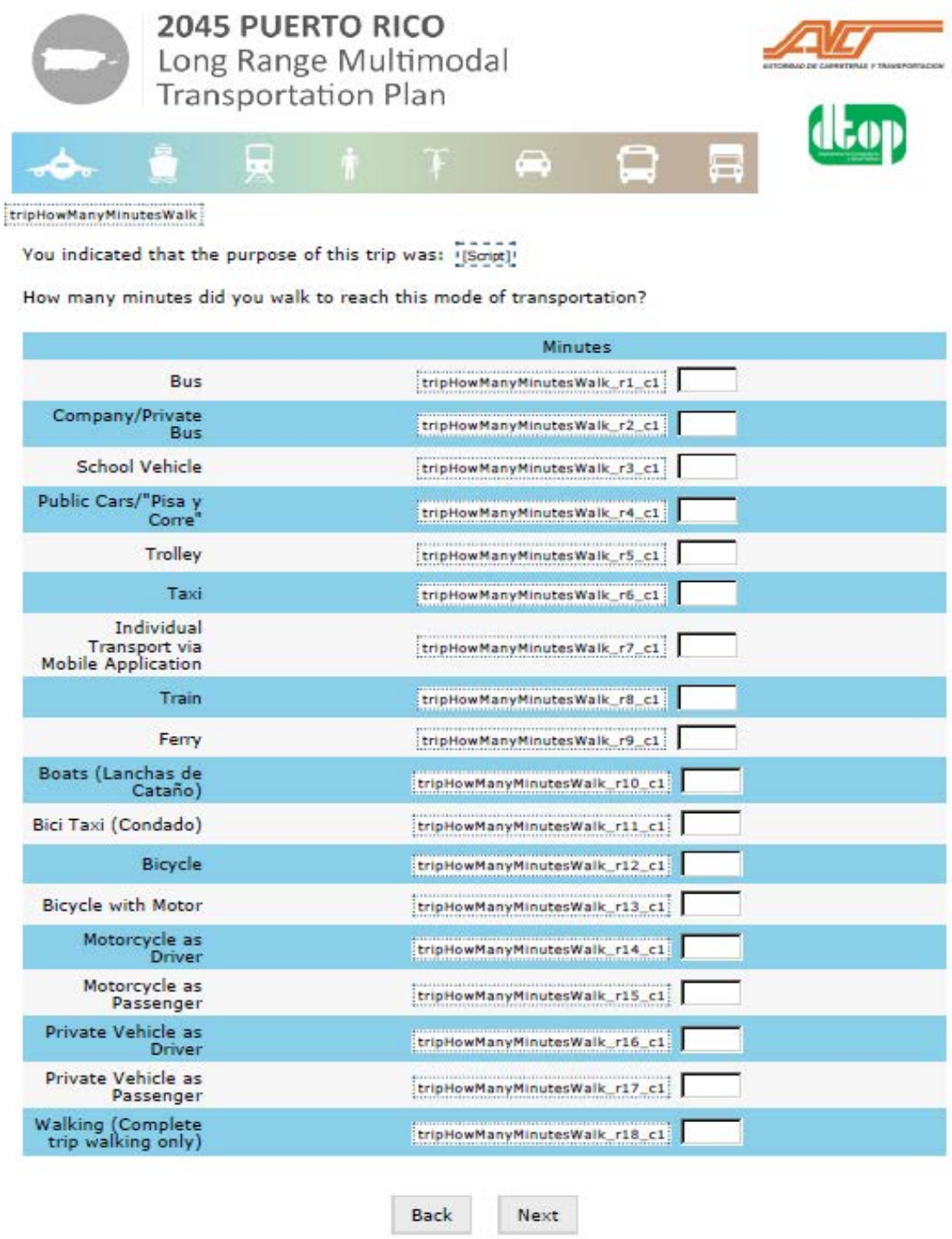
Source: SDG

Figure A.46: Trip Changes Due to Maria



Source: SDG

Figure A.47: Minutes Walking to Reach Modes of Transportation

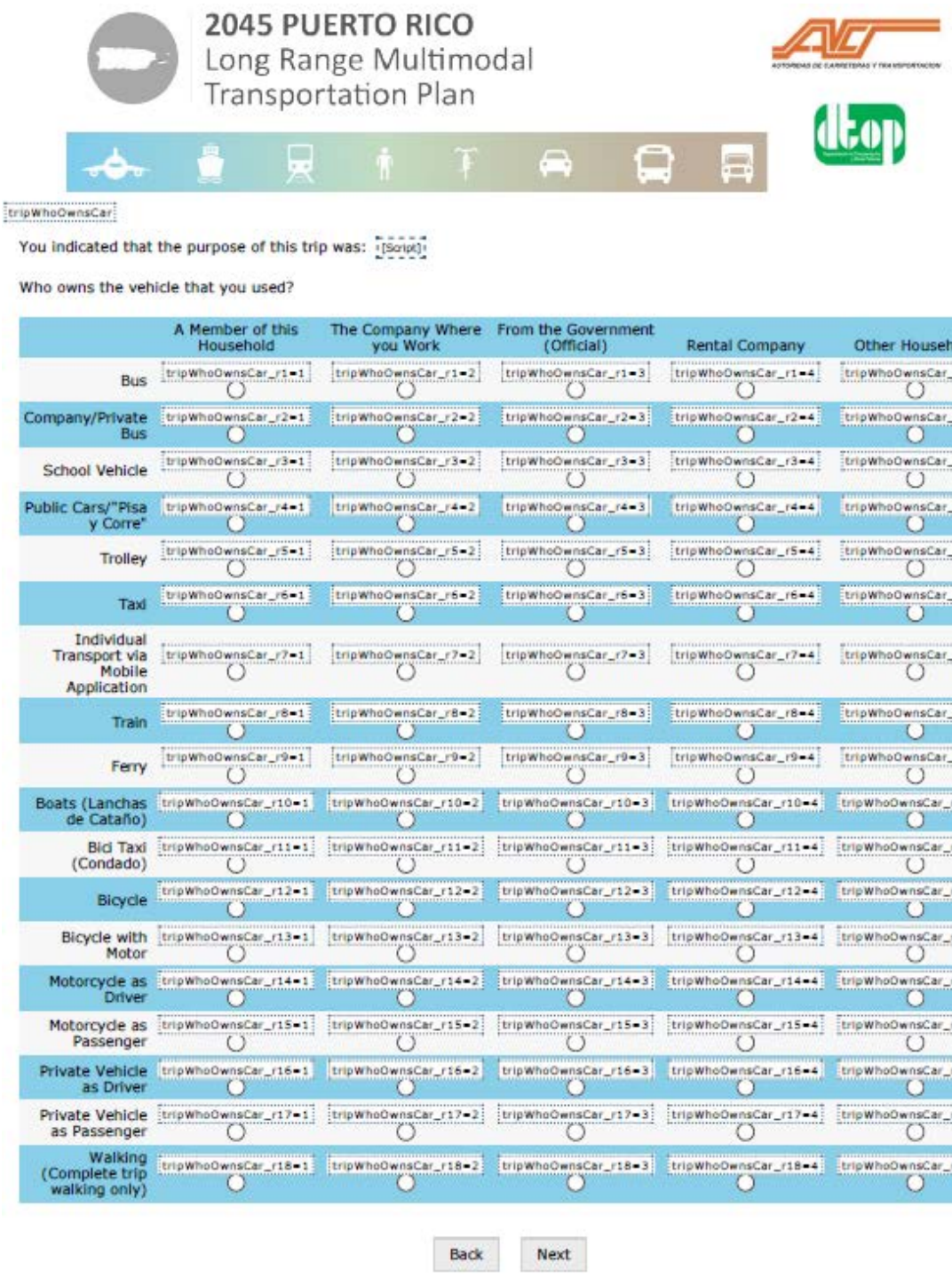


Source: SDG

Figure A.48: Mode of Transportation Fare

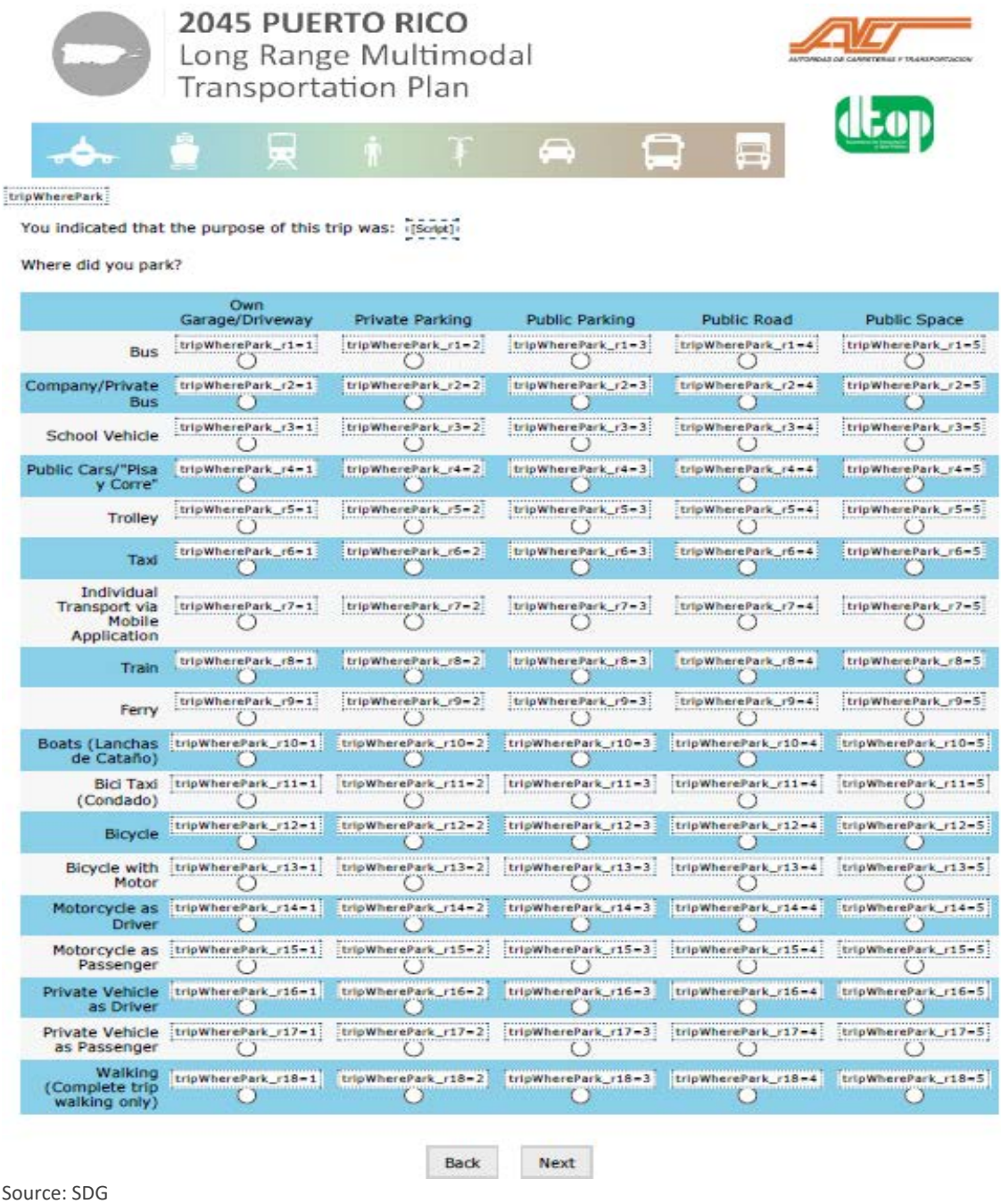
Source: SDG

Figure A.49: Vehicle Ownership



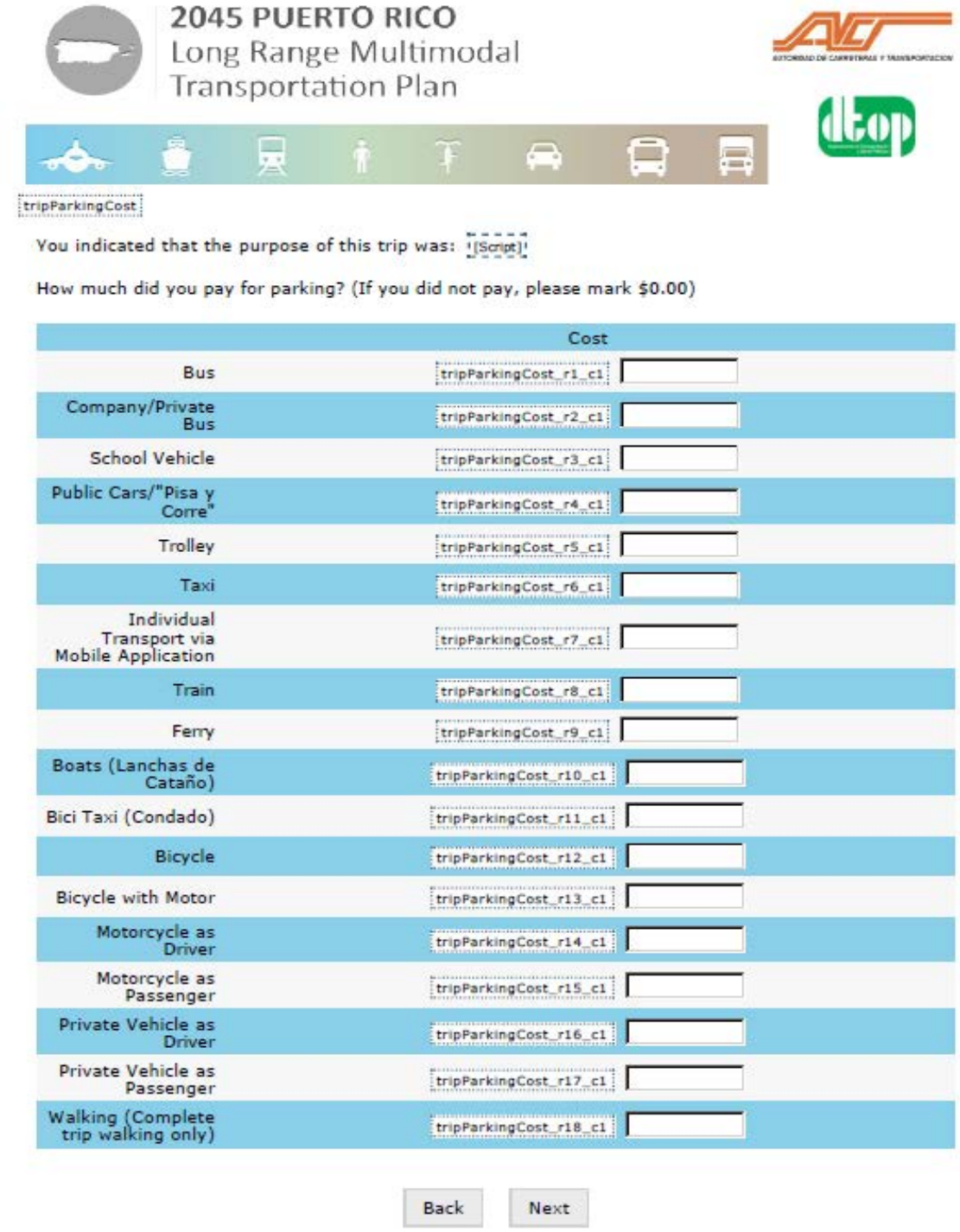
Source: SDG

Figure A.50: Parking Location



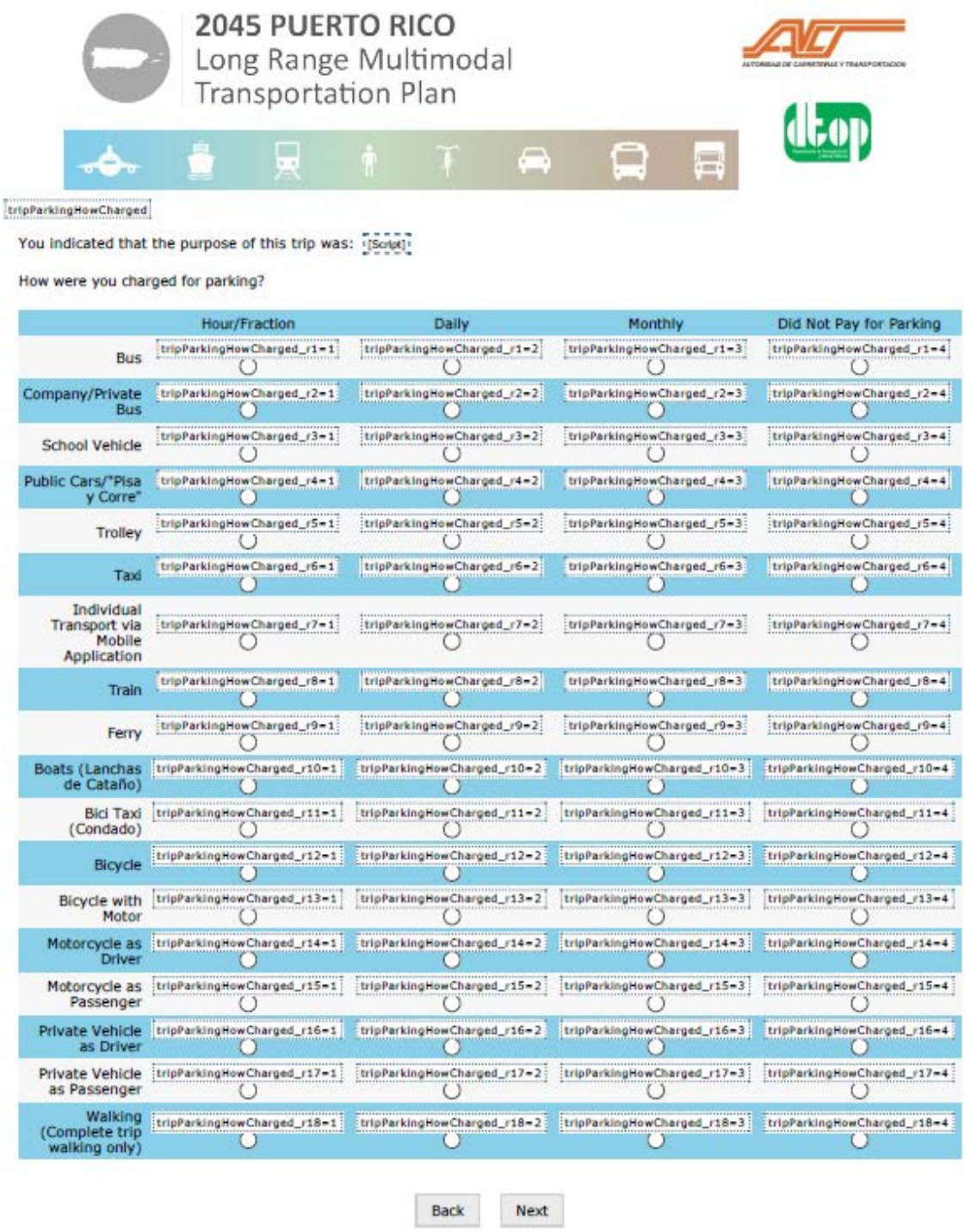
Source: SDG

Figure A.51: Parking Fare



Source: SDG

Figure A.52: Parking Fare Type of Charge

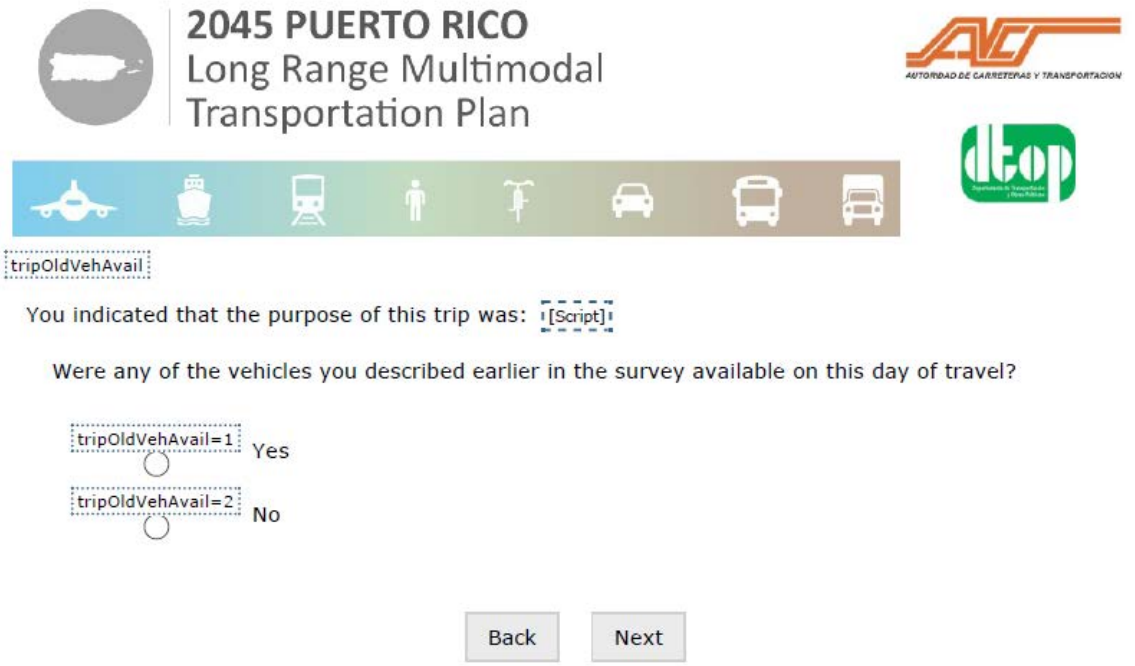


Source: SDG

Figure A.53: Person in Charge of Parking Payment

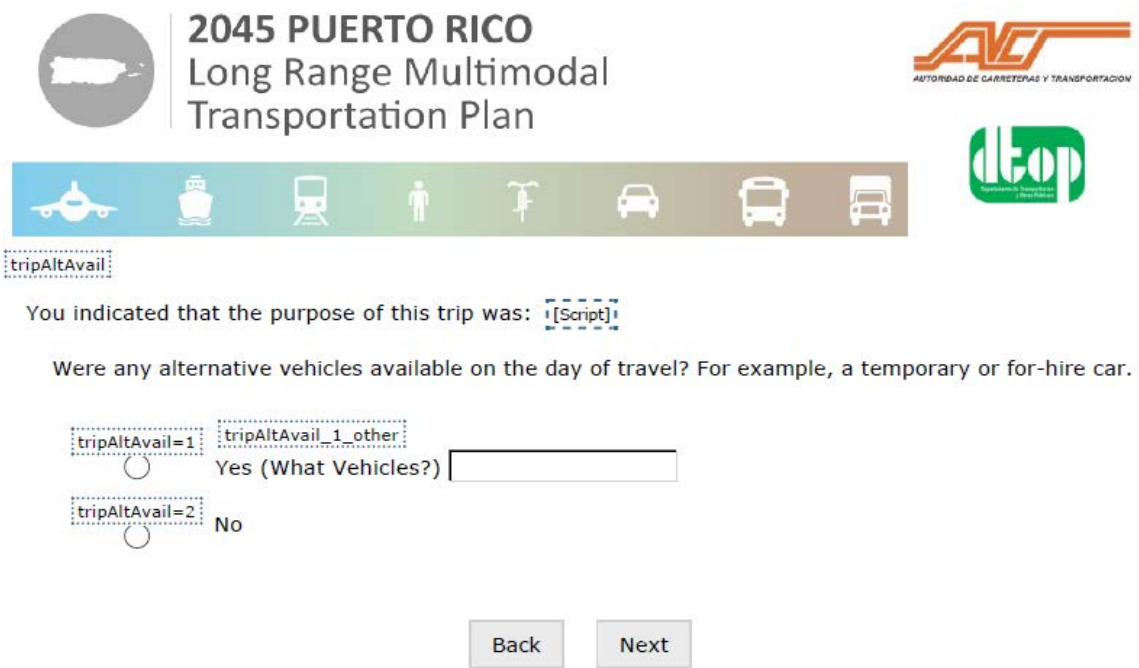
Source: SDG

Figure A.54: Availability of Vehicles in the Day of Travel



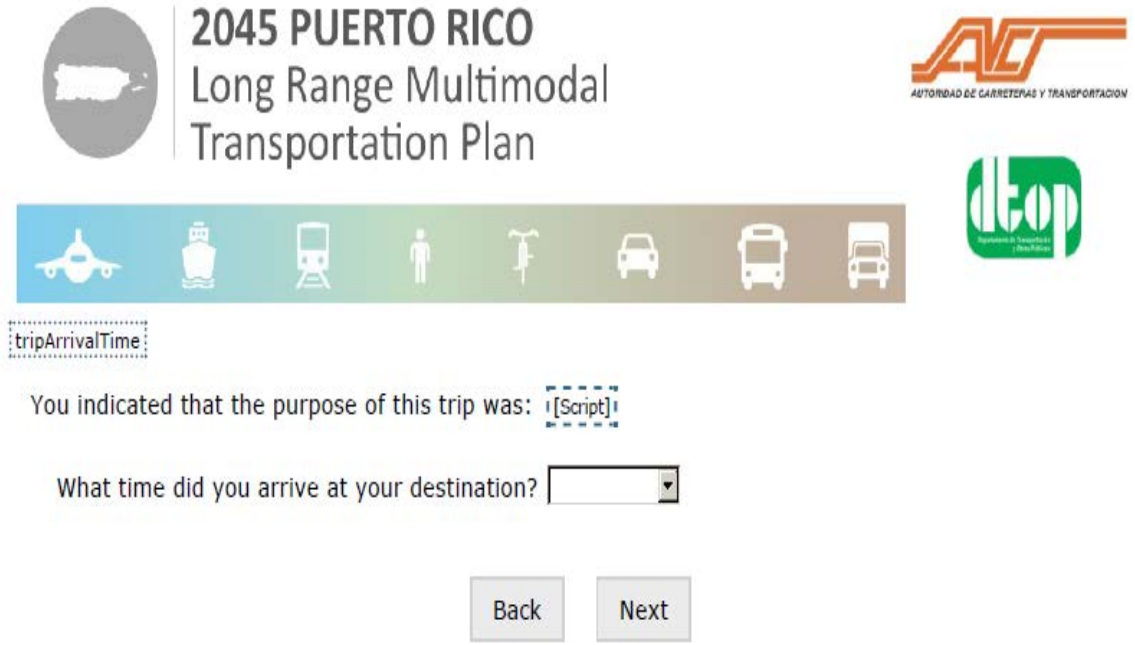
Source: SDG

Figure A.55: Alternative Vehicles



Source: SDG

Figure A.56: Destination Arrival Time



Time Options		
12:00AM	8:30AM	5:00PM
12:30AM	9:00AM	5:30PM
1:00AM	9:30AM	6:00PM
1:30AM	10:00AM	6:30PM
2:00AM	10:30AM	7:00PM
2:30AM	11:00AM	7:30PM
3:00AM	11:30AM	8:00PM
3:30AM	12:00PM	8:30PM
4:00AM	12:30PM	9:00PM
4:30AM	1:00PM	9:30PM
5:00AM	1:30PM	10:00PM
5:30AM	2:00PM	10:30PM
6:00AM	2:30PM	11:00PM
6:30AM	3:00PM	11:30PM
7:00AM	3:30PM	
7:30AM	4:00PM	
8:00AM	4:30PM	

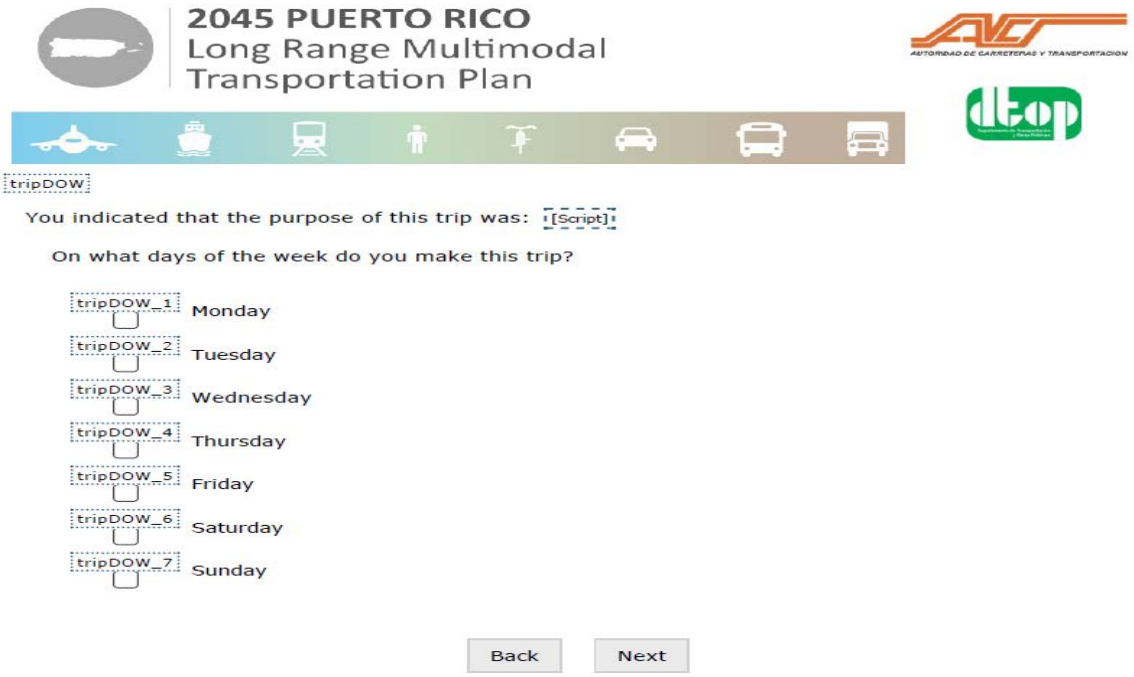
Source: SDG

Figure A.57: Final Destination Location

Municipality Options					State Options			
Adjuntas	Cayey	Hormigueros	Morovis	Toa Alta	AK	ME	OK	FM
Aguada	Ceiba	Humacao	Naguabo	Toa Baja	AZ	MD	OR	GU
Aguadilla	Ciales	Isabela	Naranjito	Trujillo Alto	AR	MA	PA	MH
Aguas Buenas	Cidra	Jayuya	Orocovis	Utuado	CA	MI	RI	MP
Aibonito	Coamo	Juana Díaz	Patillas	Vega Alta	CO	MN	SC	PW
Añasco	Comerío	Juncos	Peñuelas	Vega Baja	CT	MS	SD	VI
Arecibo	Corozal	Lajas	Ponce	Vieques	DE	MO	TN	
Arroyo	Culebra	Lares	Quebradillas	Villalba	FL	MT	TX	
Barceloneta	Dorado	Las Marías	Rincón	Yabucoa	GA	NE	UT	
Barranquitas	Fajardo	Las Piedras	Río Grande	Yauco	HI	NV	VT	
Bayamón	Florida	Loíza	Sabana Grande		ID	NH	VA	
Cabo Rojo	Guánica	Luquillo	Salinas		IL	NJ	WA	
Caguas	Guayama	Manatí	San Germán		IN	NM	WV	
Camuy	Guayanilla	Maricao	San Juan		IA	NY	WI	
Canóvanas	Guaynabo	Maunabo	San Lorenzo		KS	NC	WY	
Carolina	Gurabo	Mayagüez	San Sebastián		KY	ND	AS	
Cataño	Hatillo	Moca	Santa Isabel		LA	OH	DC	

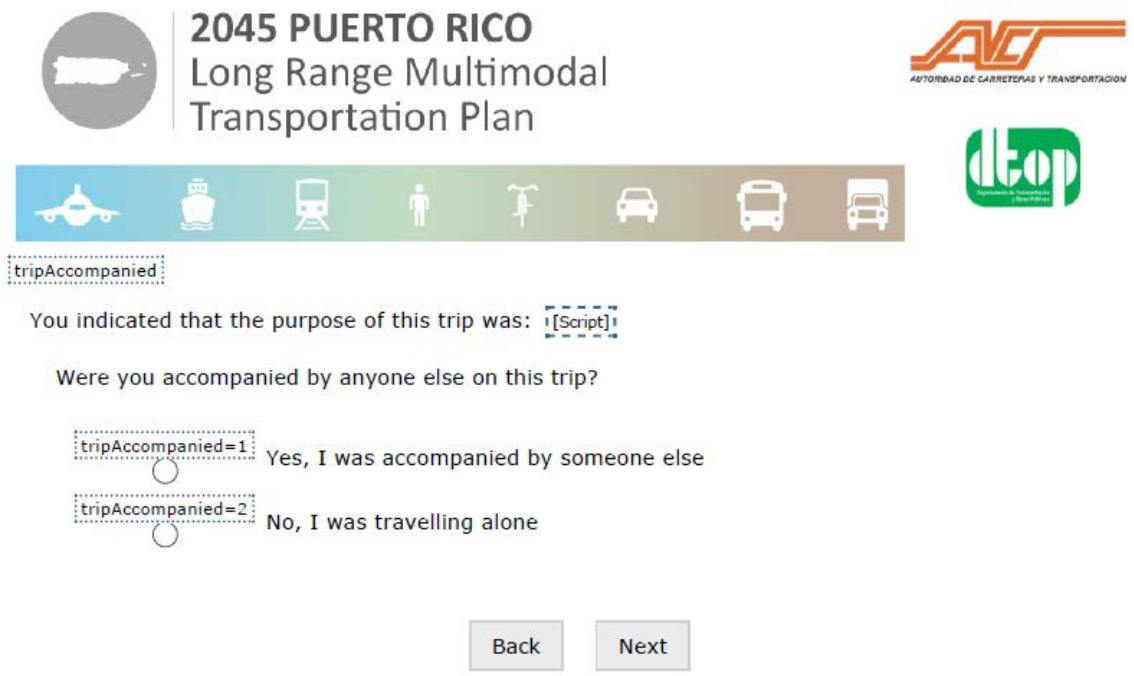
Source: SDG

Figure A.58: Days of the Week



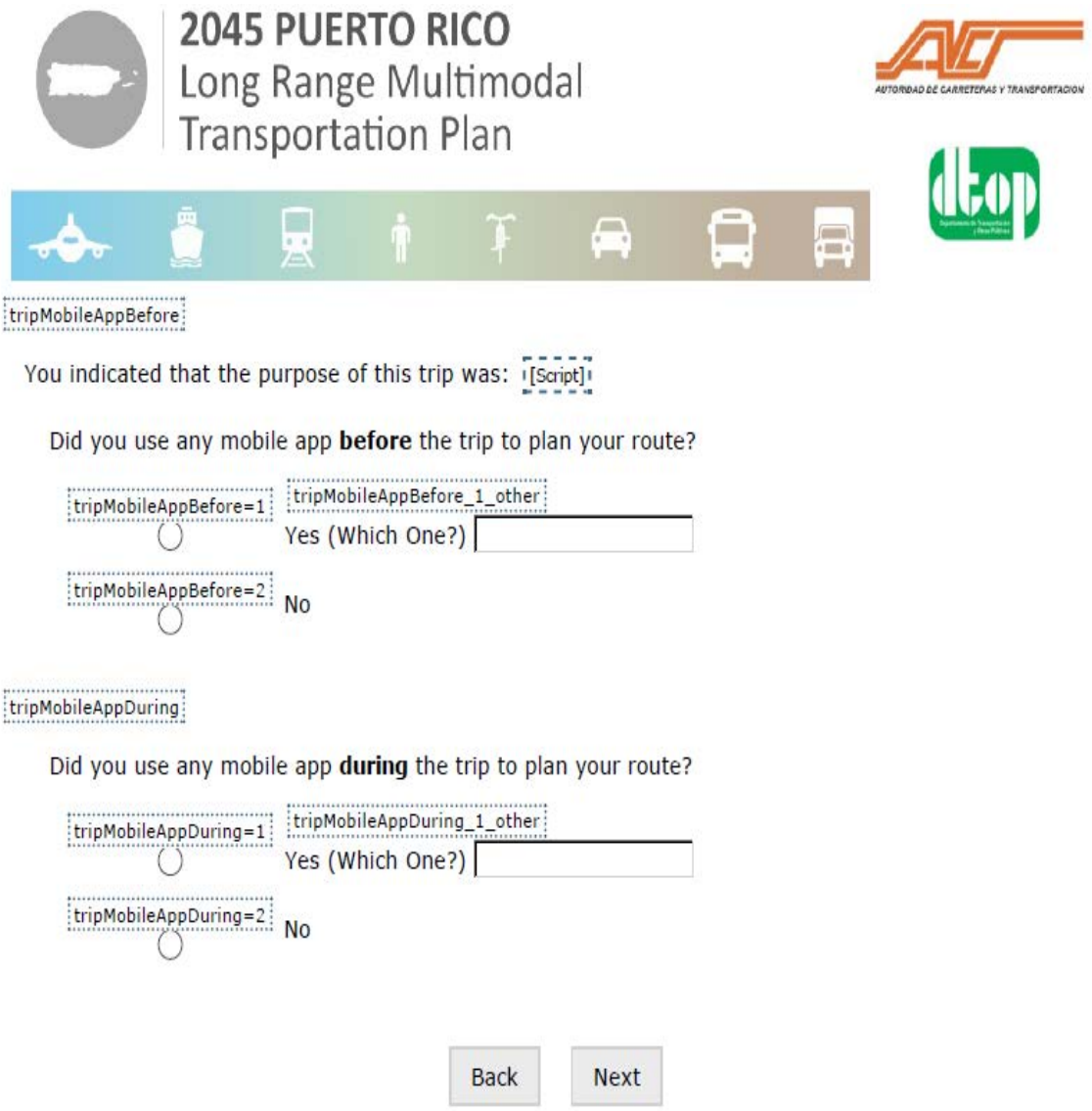
Source: SDG

Figure A.59: Accompaniment



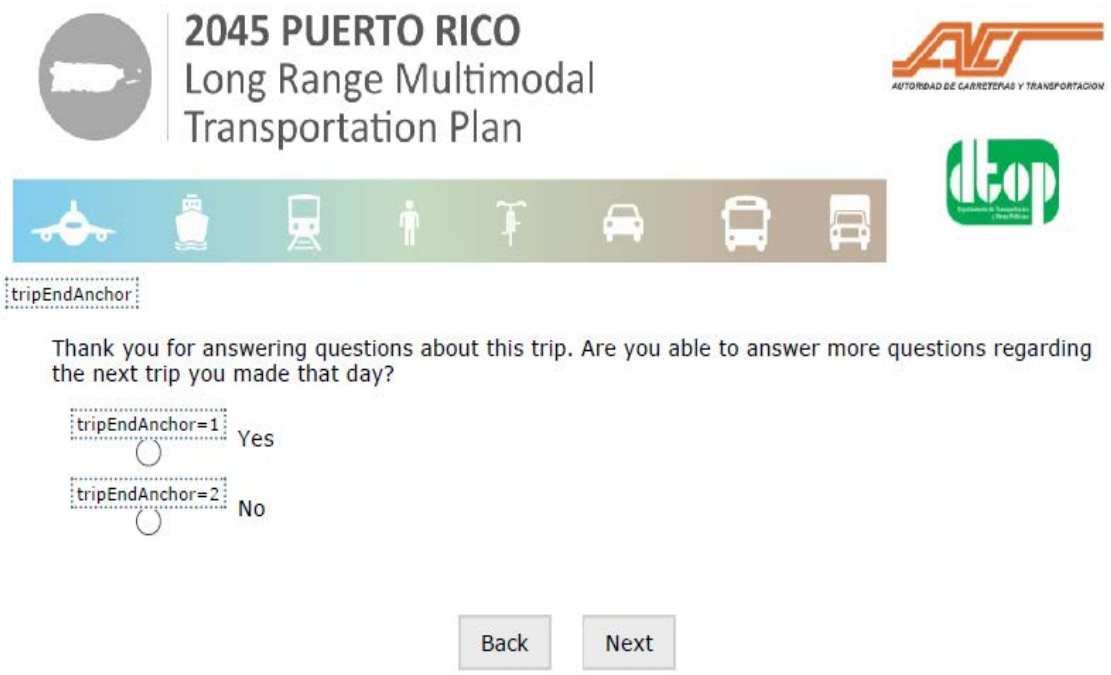
Source: SDG

Figure A.60: Use of Mobile App



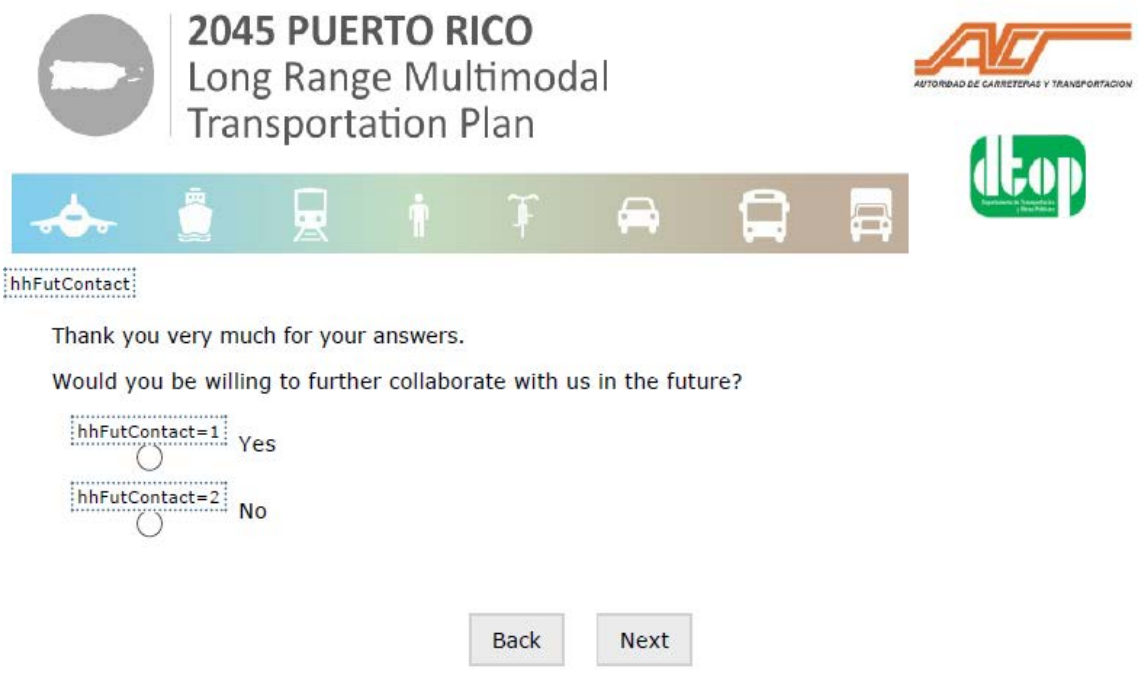
Source: SDG

Figure A.61: Answer More Questions



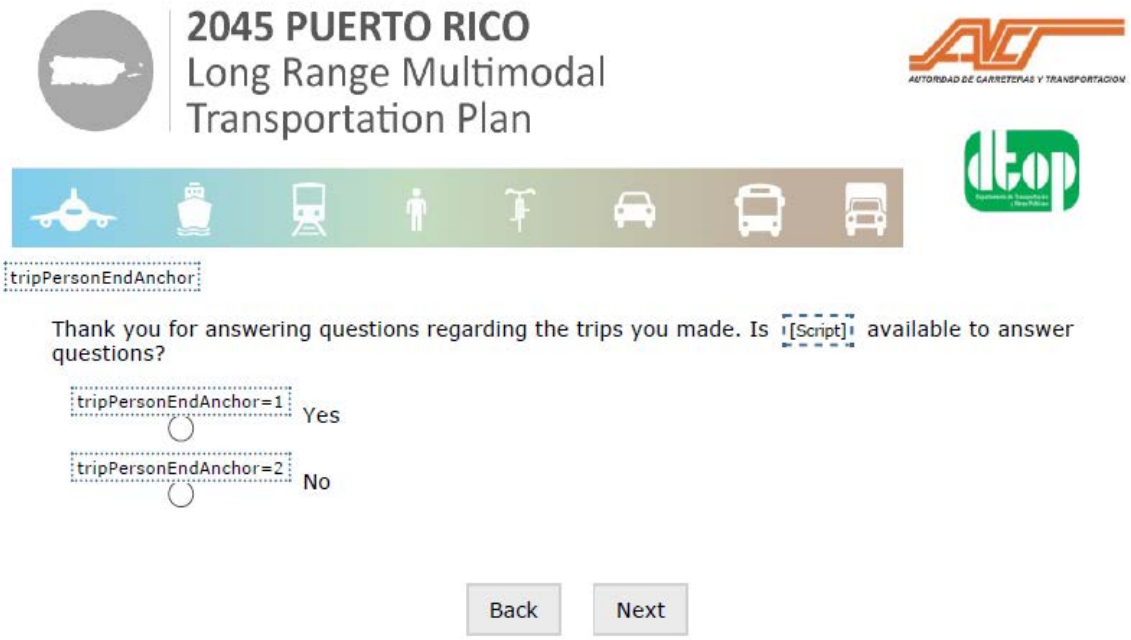
Source: SDG

Figure A.62: Willing to Collaborate



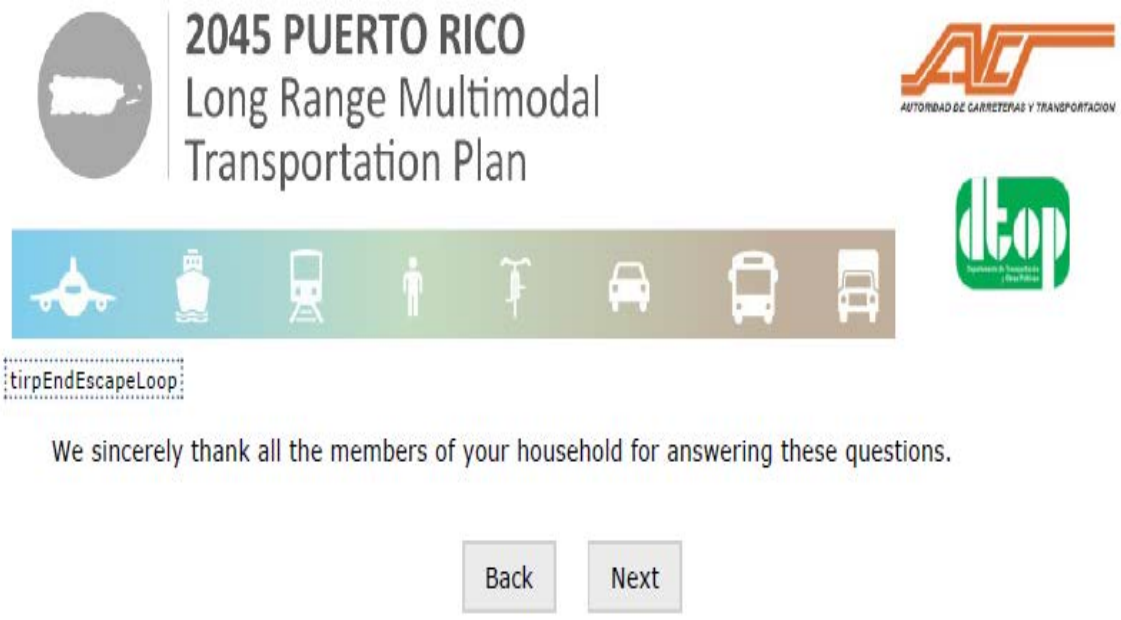
Source: SDG

Figure A.63: Available to Answer



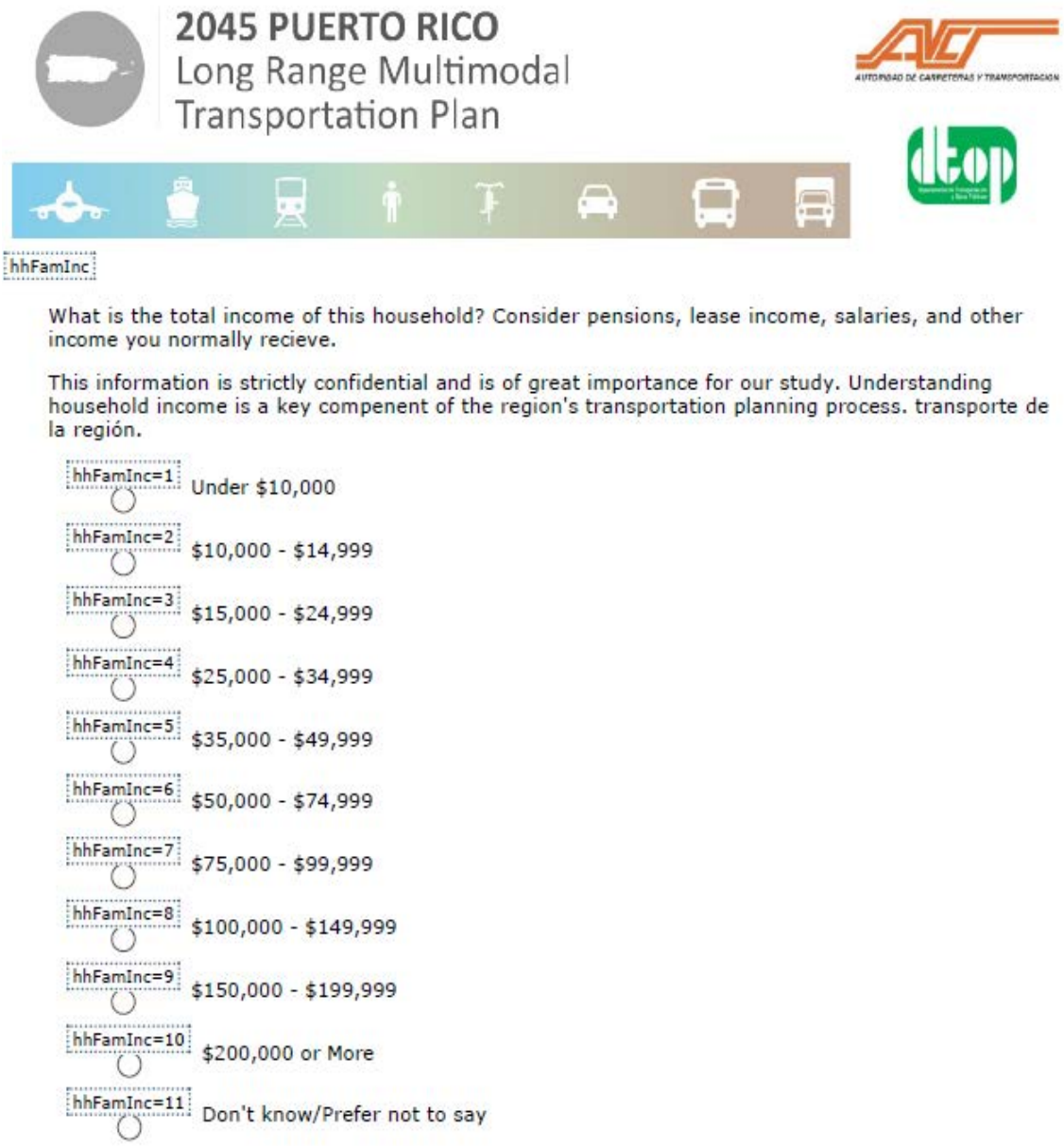
Source: SDG

Figure A.64: Thank You Page



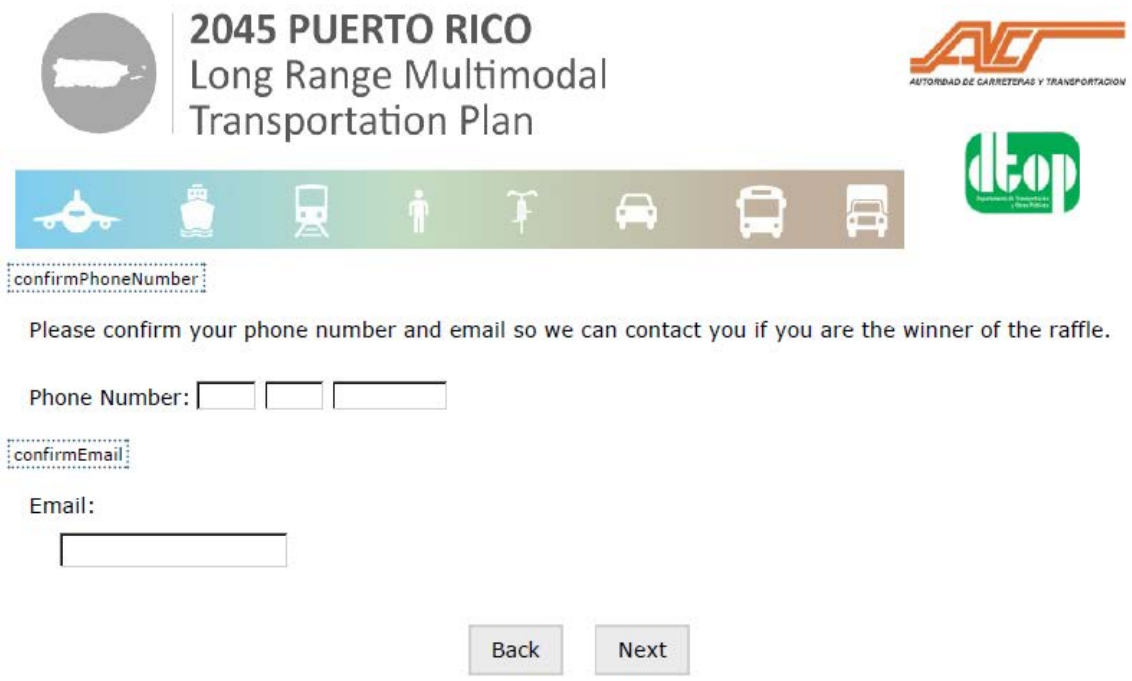
Source: SDG

Figure A.65: Household Income



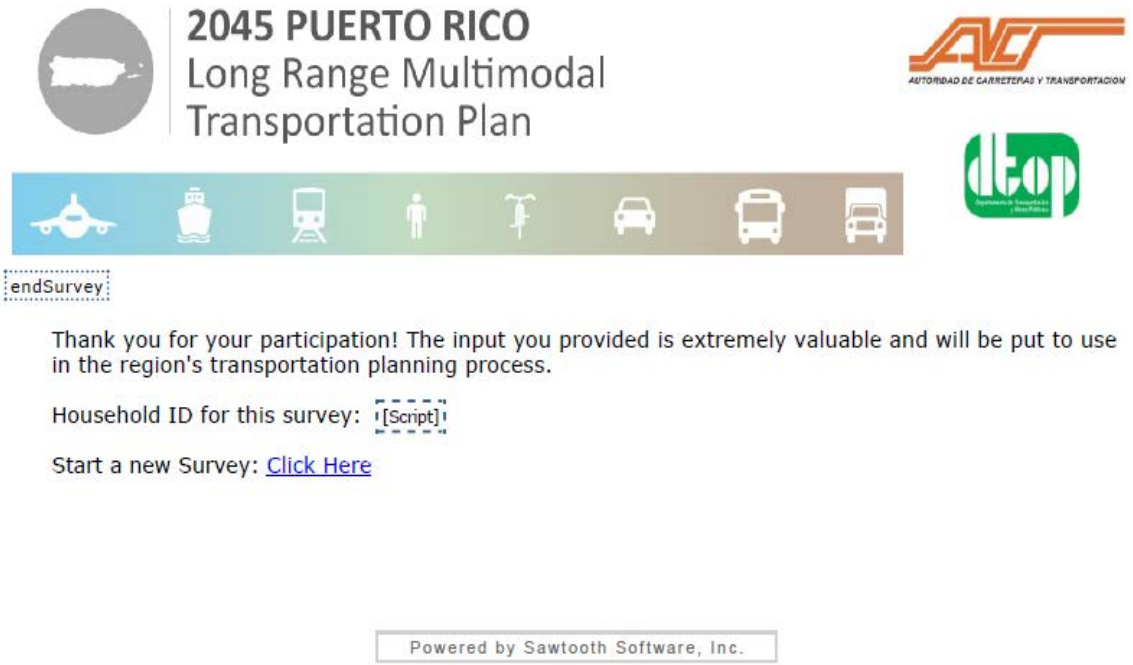
Source: SDG

Figure A.66: Information to Participate in a Raffle



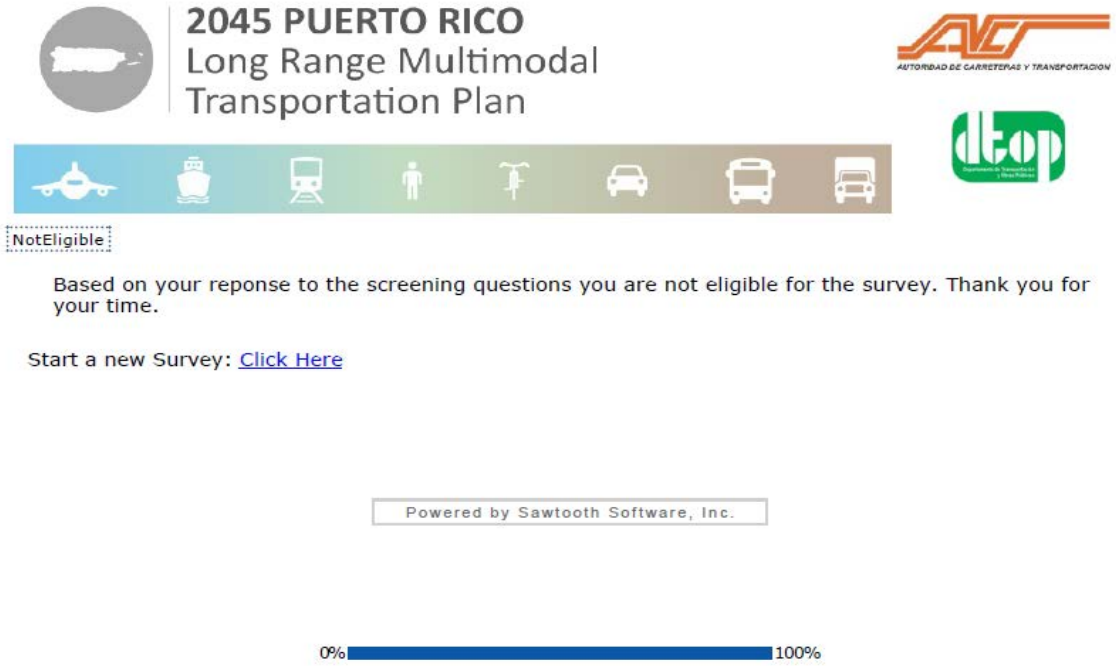
Source: SDG

Figure A.67: End of the Survey



Source: SDG

Figure A.68: Not Eligible Screen Information



Source: SDG

SPANISH VERSION

Figure A.69: Welcome Message

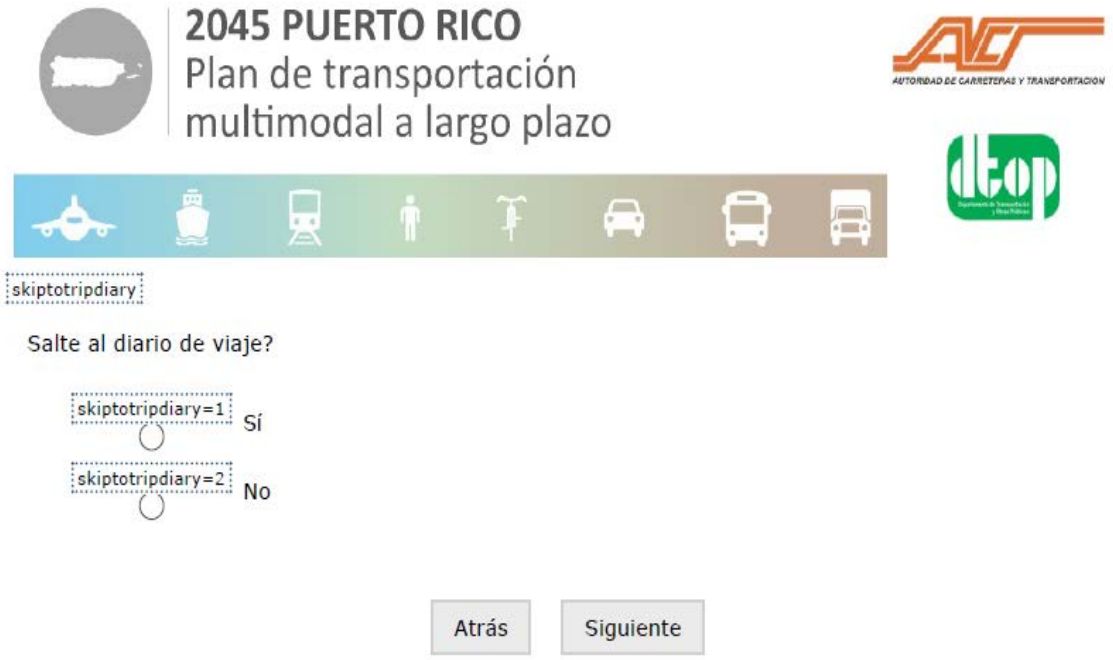
Source: SDG

Figure A.70: Interviewer and Household Information

Municipality Options					State Options				Time Options		
Adjuntas	Cayey	Hormigueros	Morovis	Toa Alta	AK	ME	OK	FM	12:00AM	8:30AM	5:00PM
Aguada	Ceiba	Humacao	Naguabo	Toa Baja	AZ	MD	OR	GU	12:30AM	9:00AM	5:30PM
Aguadilla	Ciales	Isabela	Naranjito	Trujillo Alto	AR	MA	PA	MH	1:00AM	9:30AM	6:00PM
Aguas Buenas	Cidra	Jayuya	Orocovis	Utuado	CA	MI	RI	MP	1:30AM	10:00AM	6:30PM
Aibonito	Coamo	Juana Díaz	Patillas	Vega Alta	CO	MN	SC	PW	2:00AM	10:30AM	7:00PM
Añasco	Comerío	Juncos	Peñuelas	Vega Baja	CT	MS	SD	VI	2:30AM	11:00AM	7:30PM
Arecibo	Corozal	Lajas	Ponce	Vieques	DE	MO	TN		3:00AM	11:30AM	8:00PM
Arroyo	Culebra	Lares	Quebradillas	Villalba	FL	MT	TX		3:30AM	12:00PM	8:30PM
Barceloneta	Dorado	Las Marías	Rincón	Yabucoa	GA	NE	UT		4:00AM	12:30PM	9:00PM
Barranquitas	Fajardo	Las Piedras	Río Grande	Yauco	HI	NV	VT		4:30AM	1:00PM	9:30PM
Bayamón	Florida	Loíza	Sabana Grande		ID	NH	VA		5:00AM	1:30PM	10:00PM
Cabo Rojo	Guánica	Luquillo	Salinas		IL	NJ	WA		5:30AM	2:00PM	10:30PM
Caguas	Guayama	Manatí	San Germán		IN	NM	WV		6:00AM	2:30PM	11:00PM
Camuy	Guayanilla	Maricao	San Juan		IA	NY	WI		6:30AM	3:00PM	11:30PM
Canóvanas	Guaynabo	Maunabo	San Lorenzo		KS	NC	WY		7:00AM	3:30PM	
Carolina	Gurabo	Mayagüez	San Sebastián		KY	ND	AS		7:30AM	4:00PM	
Cataño	Hatillo	Moca	Santa Isabel		LA	OH	DC		8:00AM	4:30PM	

Source: SDG

Figure A.71: Skip to Trip Diary

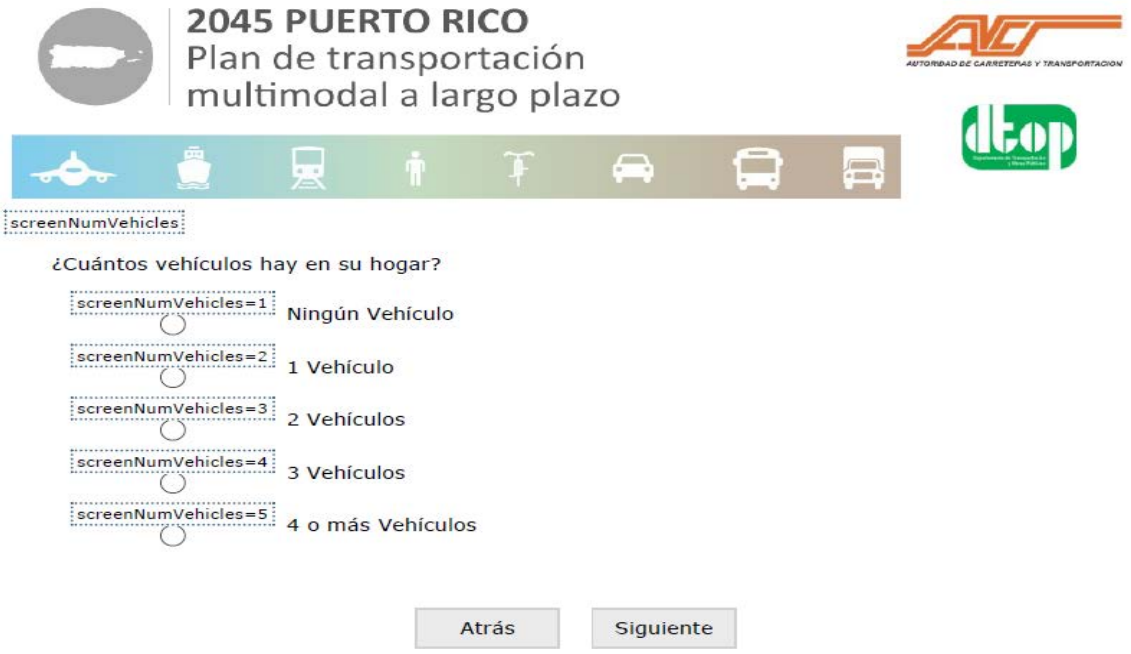


Source: SDG

Figure A.72: Survey Introduction and Purpose

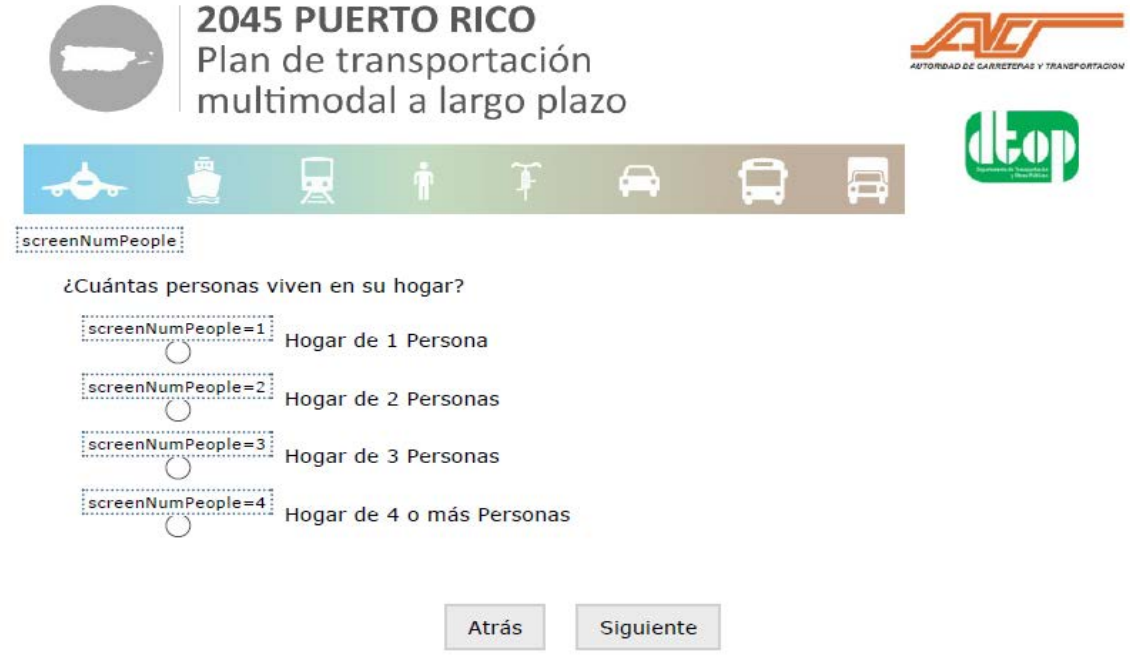
Source: SDG

Figure A.73: Screening Question – Vehicle Availability



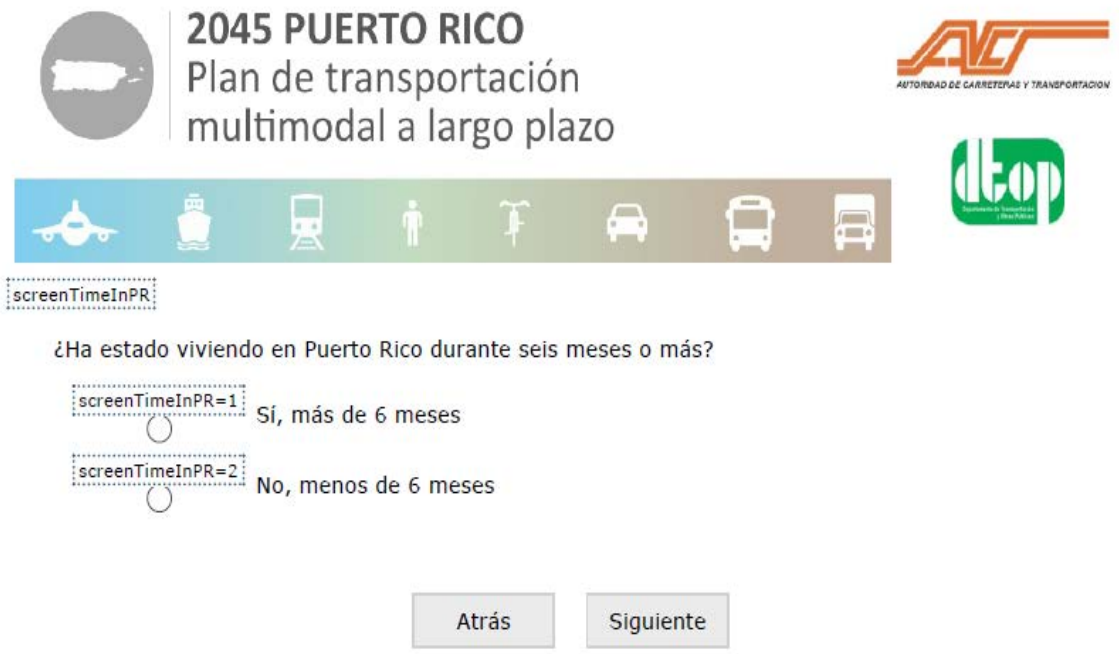
Source: SDG

Figure A.74: Screening Question – Household Size



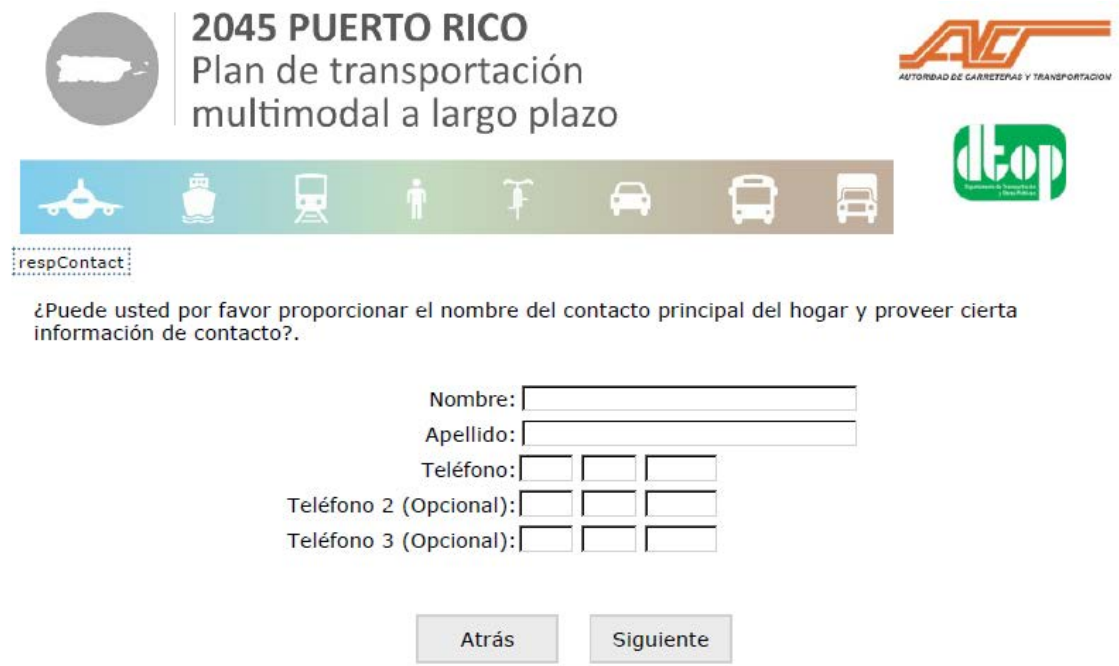
Source: SDG

Figure A.75: Screening Question – Stay in Puerto Rico



Source: SDG

Figure A.76: Household's Primary Contact Information



Source: SDG

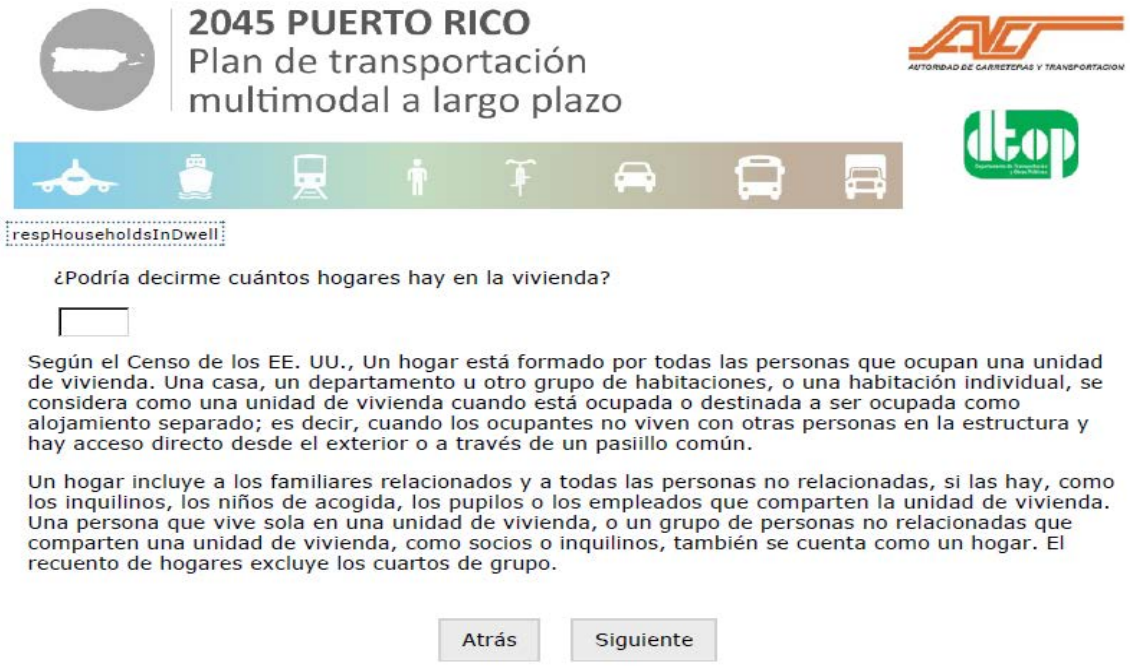
Figure A.77: House Type

Source: SDG

Figure A.78: House Ownership

Source: SDG

Figure A.79: Quantity of Households in Dwelling

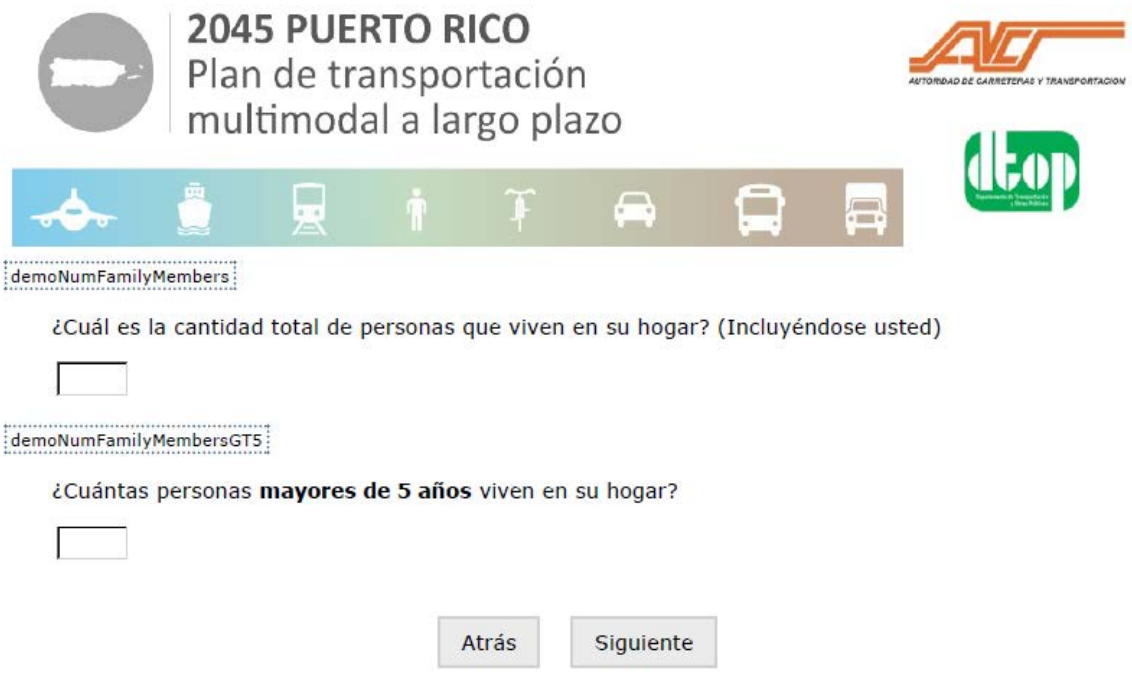


Source: SDG

Figure A.80: Demographics Introduction Information

Source: SDG

Figure A.81: Household Size and Number of People Greater than 5 Years Old

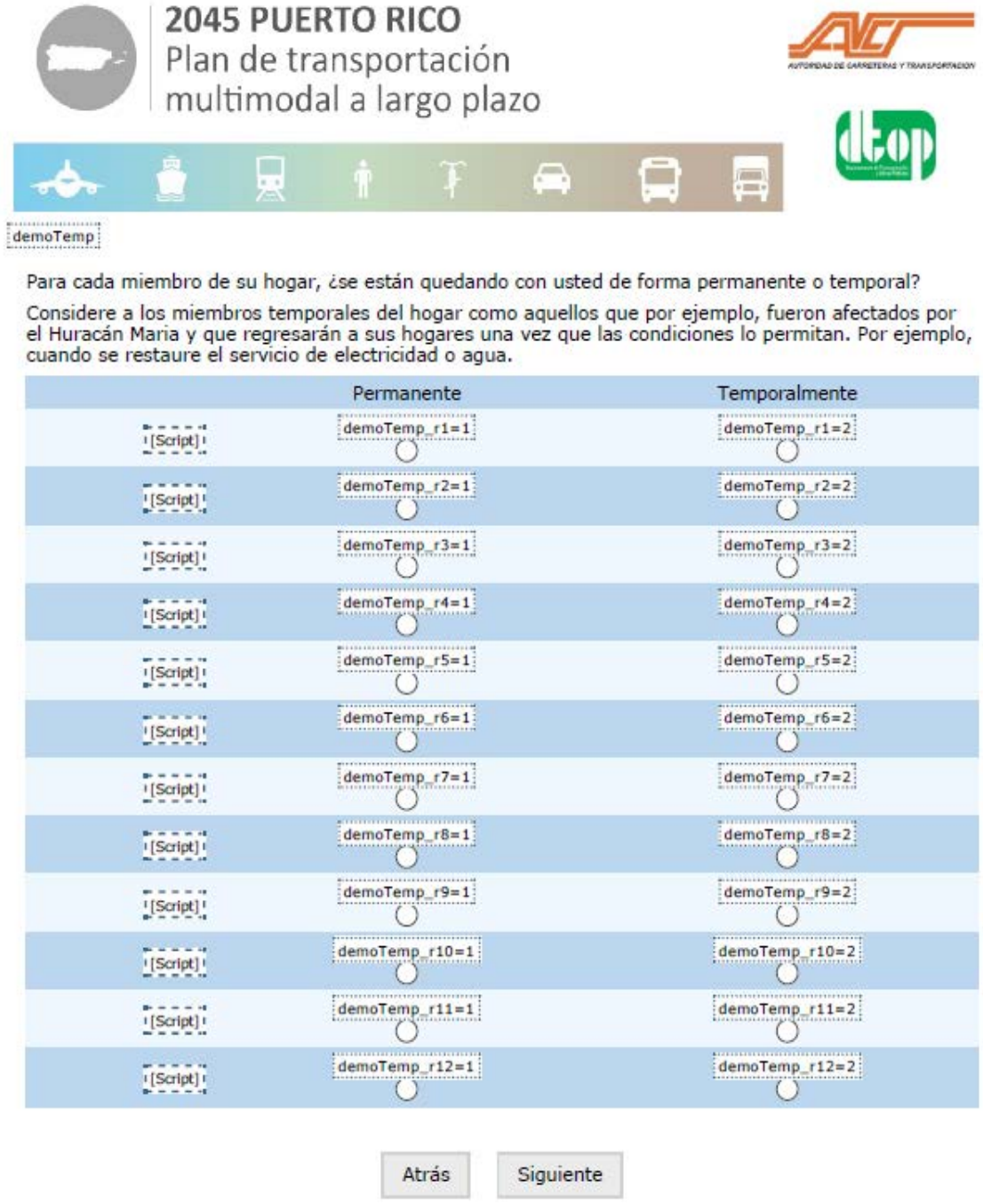


Source: SDG

Figure A.82: People's Names

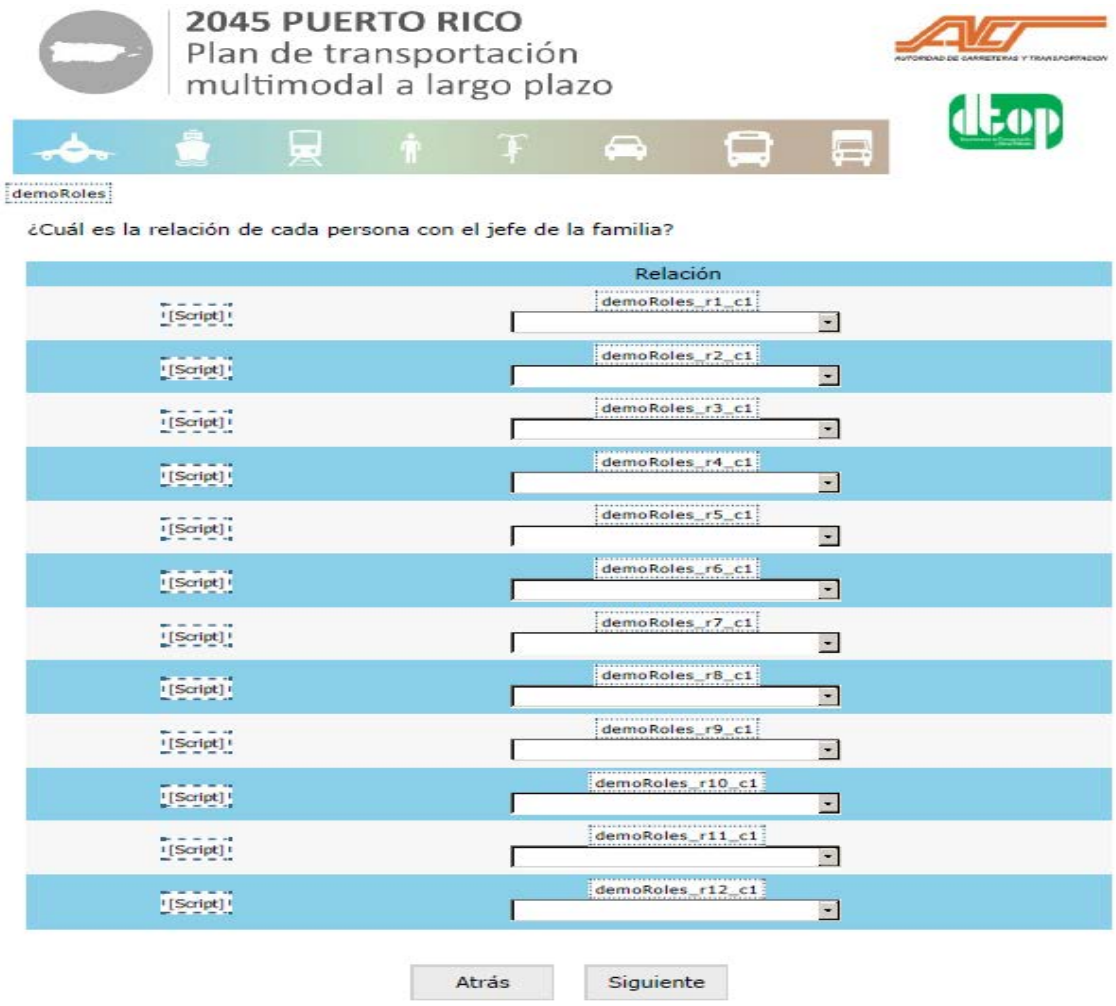
Source: SDG

Figure A.83: Permanent or Temporary Staying



Source: SDG

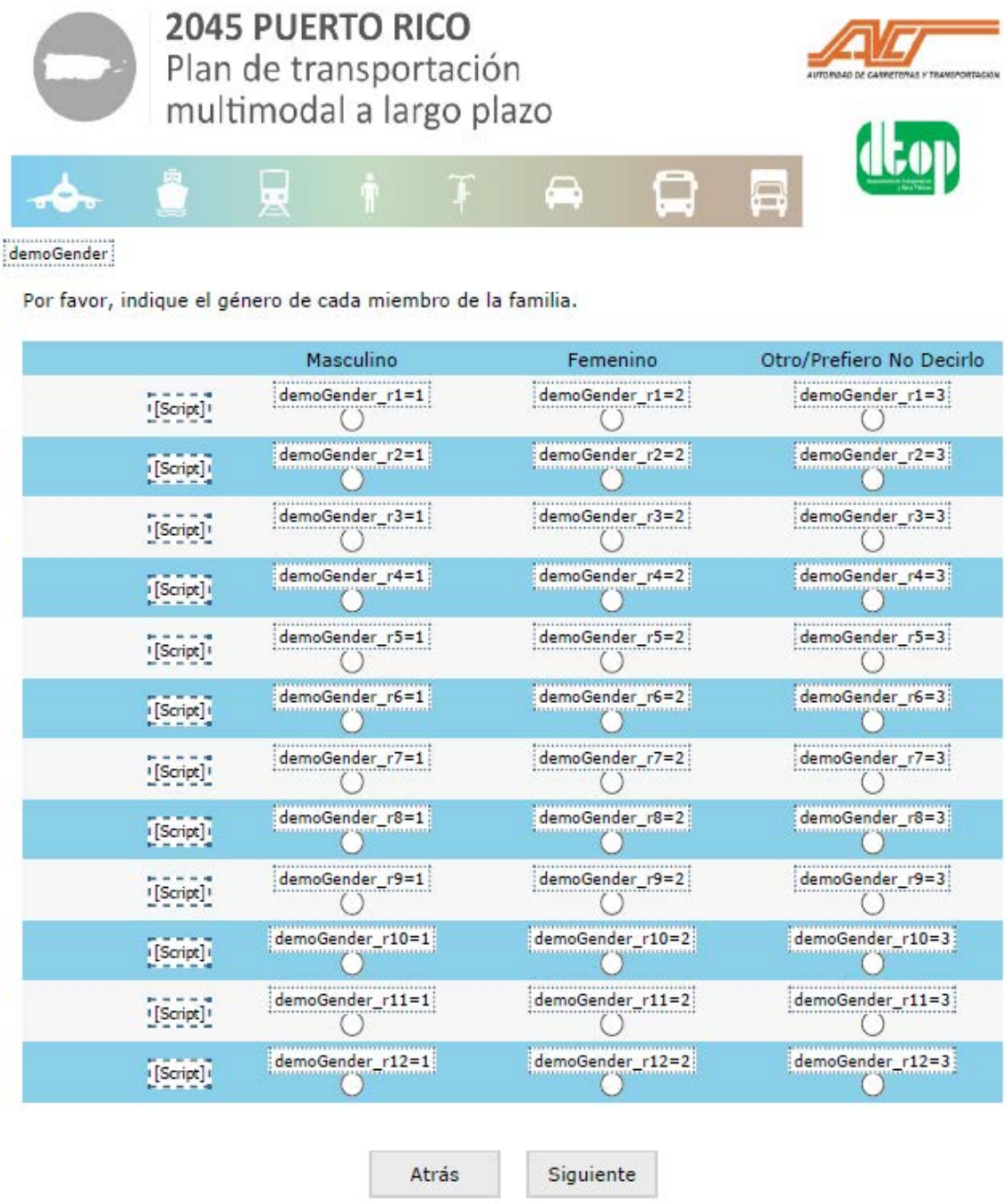
Figure A.84: Relationship to the Head of the Household



Relationship Options	
Jefe del Hogar	Sobrino o Sobrina
Cónyuge o Pareja	Primo (a)
Hijo (a)	Cuñado o Cuñada
Nieto (a)	Otro Pariente
Padre o Madre	Servicio Doméstico
Hermano o Hermana	Hijos del Servicio Doméstico
Yerno o Nuera	No es Pariente
Abuelo (a)	
Suegro o Suegra	
Tío o Tía	

Source: SDG

Figure A.85: Gender

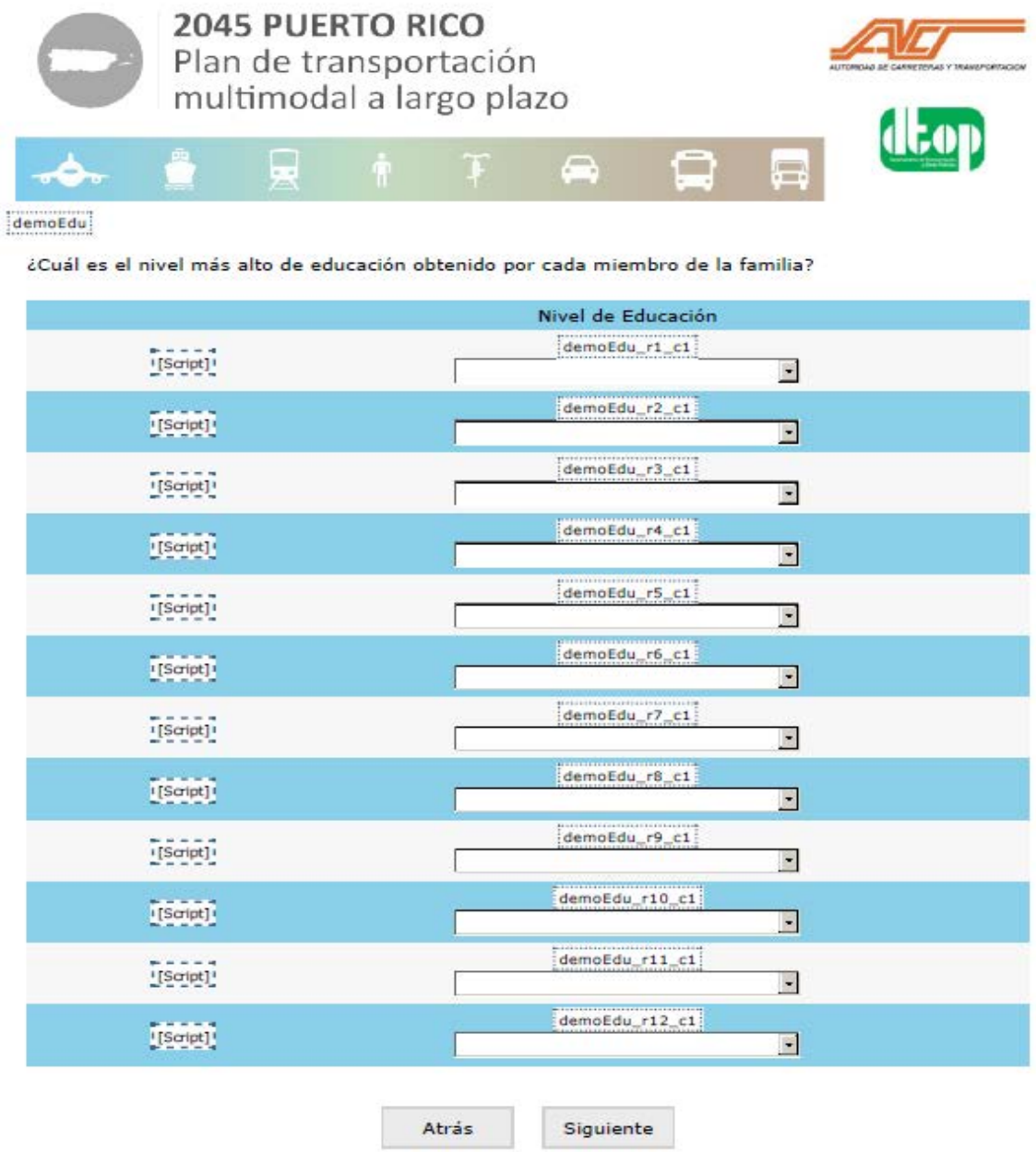


Source: SDG

Figure A.86: Age

Source: SDG

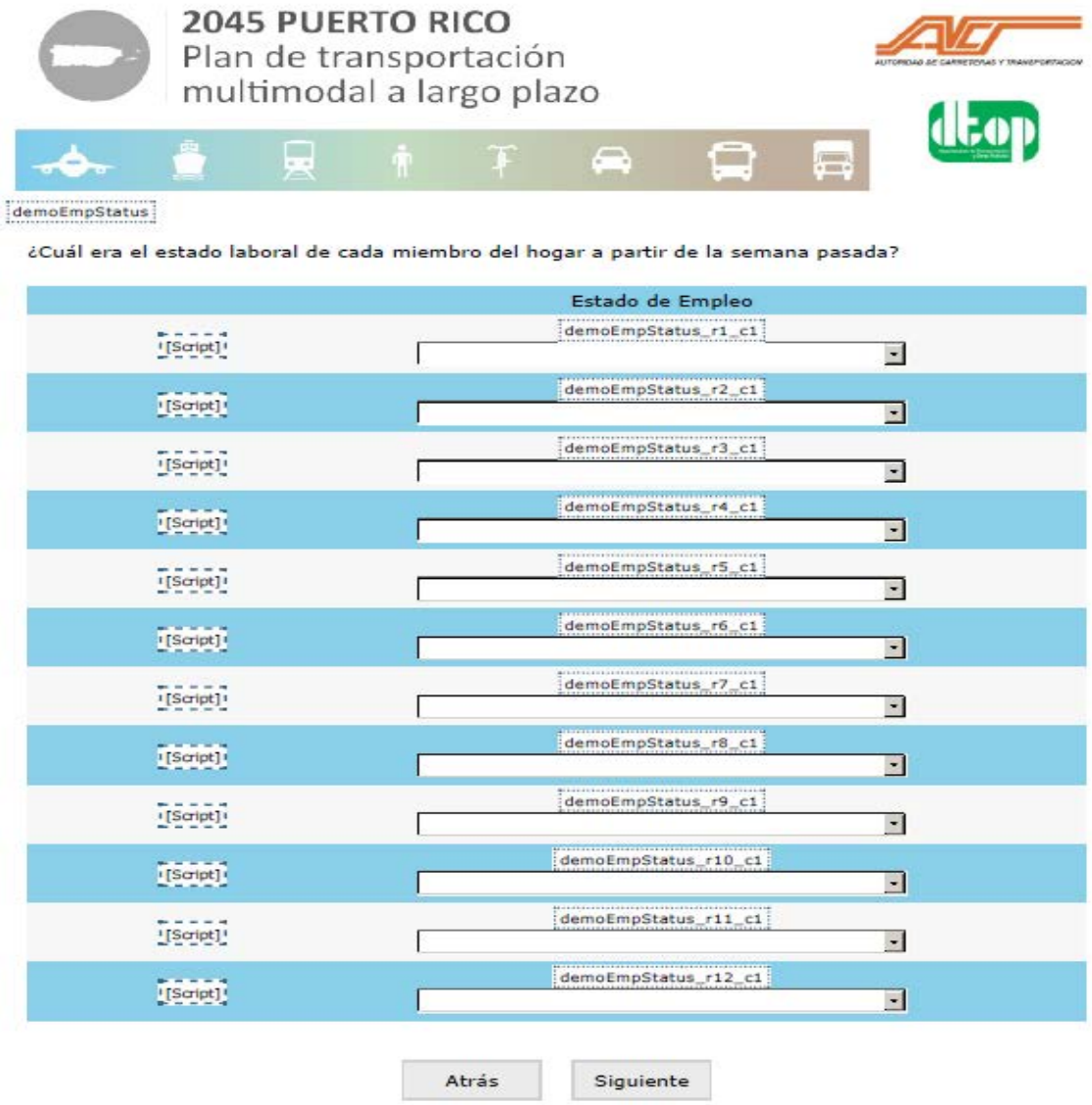
Figure A.87: Level of Education



Level of Education Options		
Ninguno	Escuela Intermedia - Completa	Universitario - Incompleto
Preescolar	Escuela Superior - Incompleta	Universitario - Completo
Escuela Elemental - Incompleta	Escuela Superior - Completa	Postgrado - Incompleto
Escuela Elemental - Completa	Grado Asociado - Incompleto	Postgrado - Completo
Escuela Intermedia - Incompleta	Grado Asociado - Completo	

Source: SDG

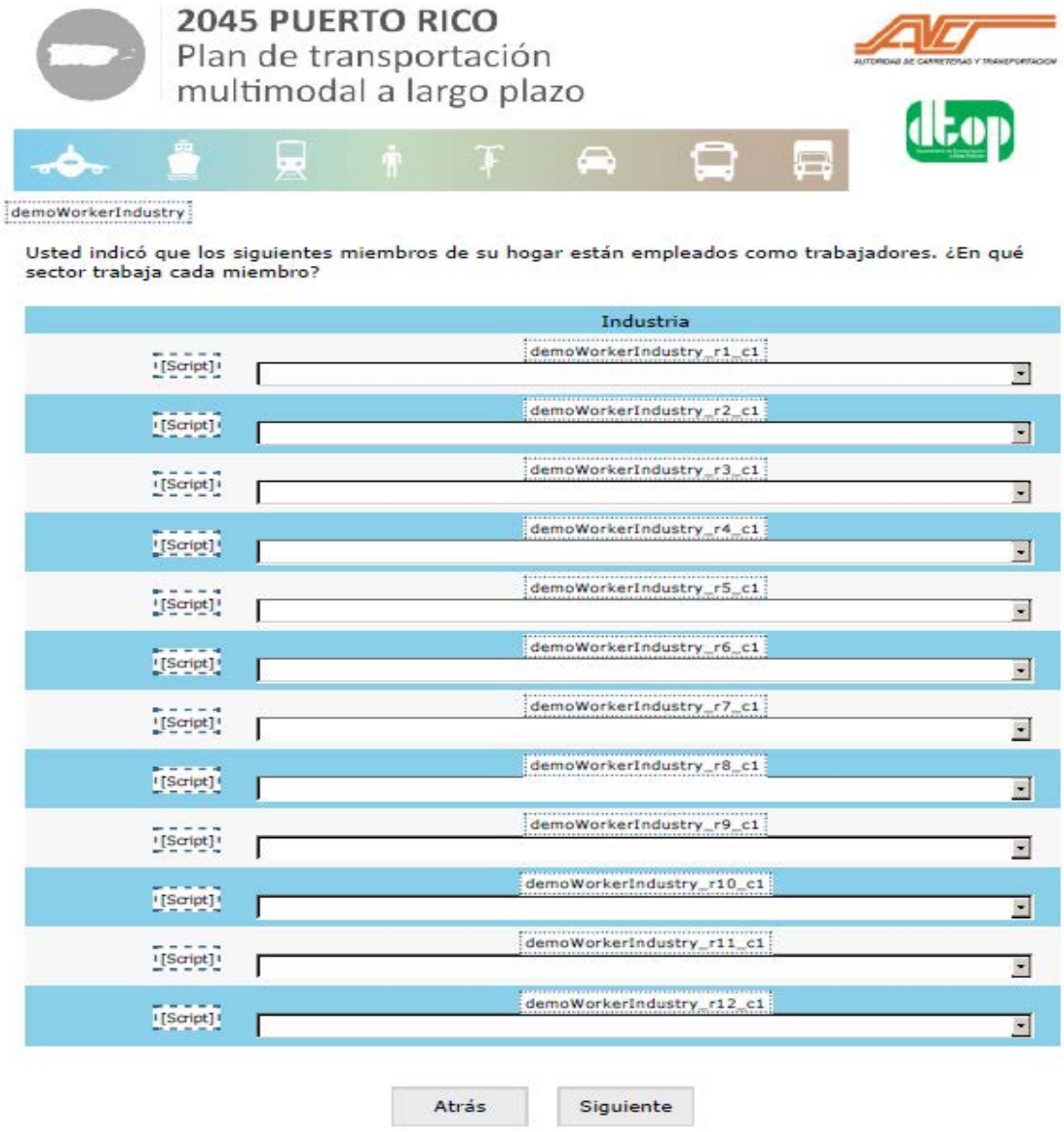
Figure A.88: Employment Status



Employment Status Options		
Estudiante - Escuela Privada o Pública	Empleado - Conductor/Mensajero	Otro - Jubilado
Estudiante - Universidad Sub-graduado	Empleado - Trabajador sin Remuneración	Otro - Buscar Trabajo
Estudiante - Universidad Graduado	Empleado - Empleado de Empresa Privada	Otro - Discapacitado Permanente
Estudiante - Institución Técnica/Tecnológica	Empleado - Empleado del Gobierno	Otro - Ir al Cuido
Estudiante - Institución Educacion No Formal	Empleado - Profesional Independiente	Otro - Inversionista/Arrendatario
Empleado - Obrero	Empleado - Autoempleo	Otro - Otra Actividad [Especifique]
Empleado - Jornalero/Agricultor	Empleado - Empleador	
Empleado - Empleado Doméstico	Otro - Dedicado al Hogar	

Source: SDG

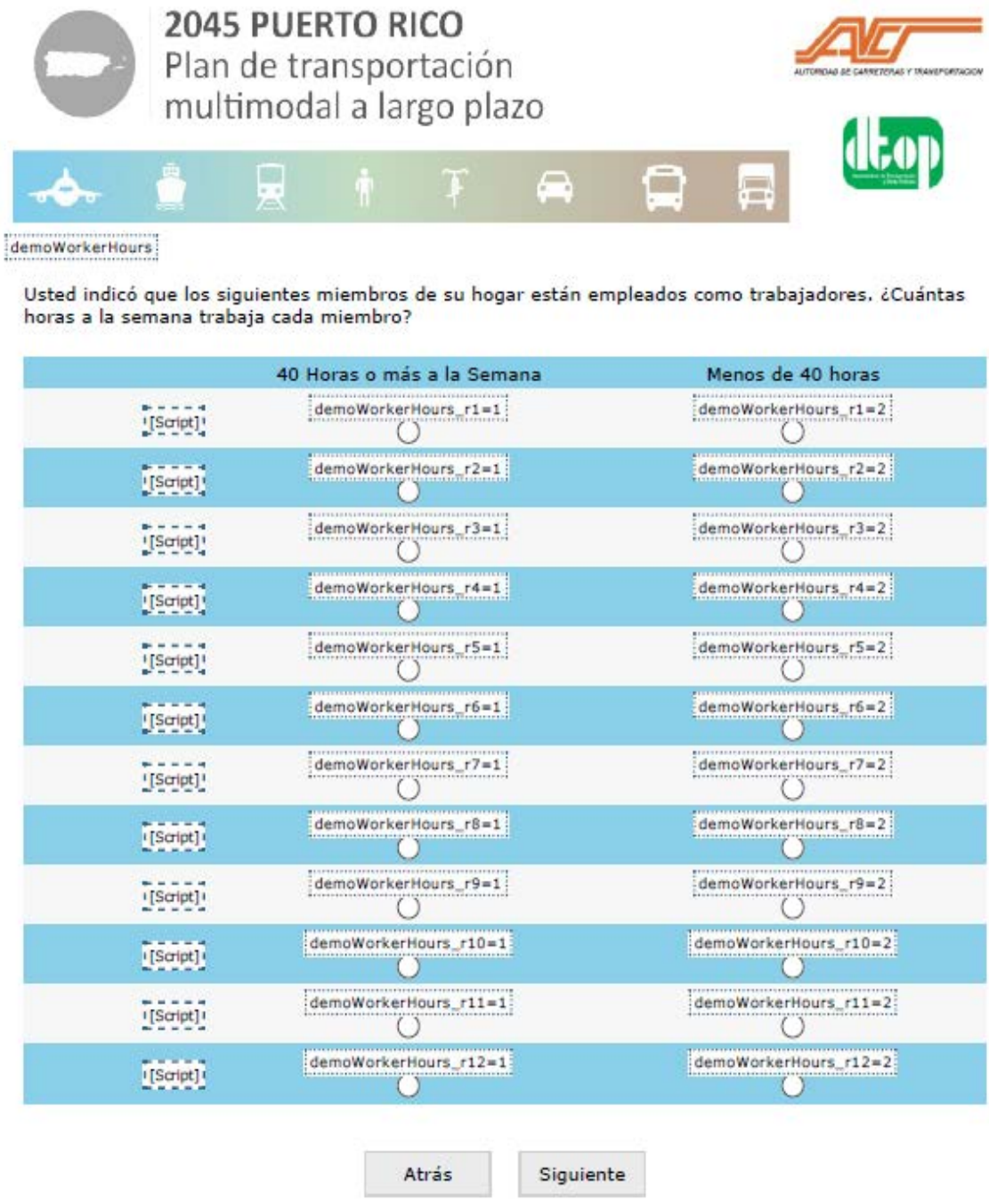
Figure A.89: Type of Industry



Type of Industry Options			
Agricultura, Silvicultura, Pesca y Caza	Comercio al por Mayor	Bienes Raíces y Arrendamientos y Alquiler	Atención de Salud y Asistencia Social
Minería, Canteras y Extracción de Petróleo y Gas	Comercio al por Menor	Servicios Profesionales, Científicos y Técnicos	Artes, Entretenimiento y Recreación
Utilidades	Transporte y Almacenaje	Gestión de Empresas y Negocios	Alojamiento y Servicios de Alimentación
Construcción	Información	Servicios Administrativos y de Apoyo y Manejo de Desechos y Remediación	Otros servicios (Excepto Administración Pública)
Manufactura	Finanzas y Seguros	Servicios Educativos	Administración Pública

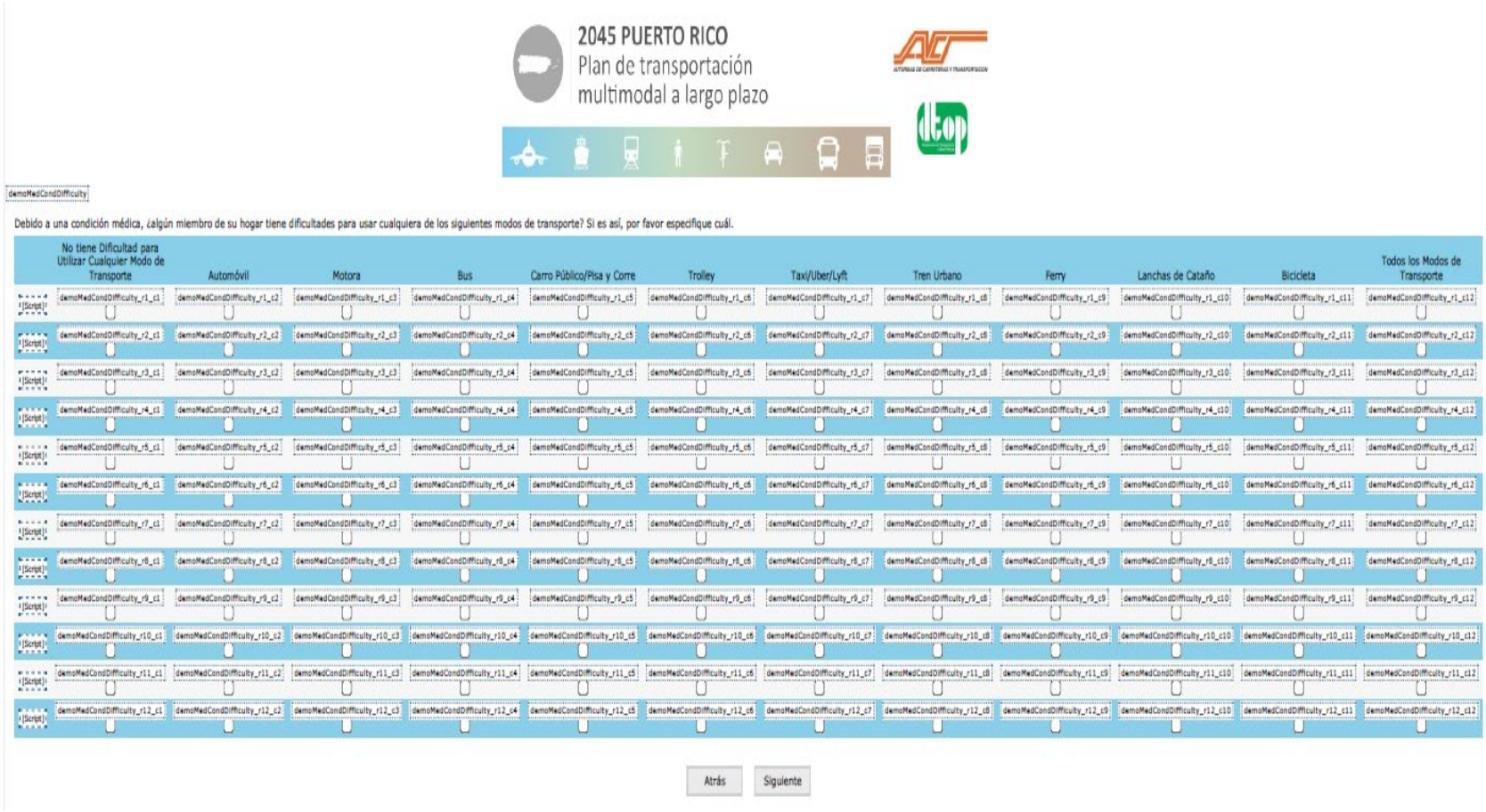
Source: SDG

Figure A.90: Worked Hours



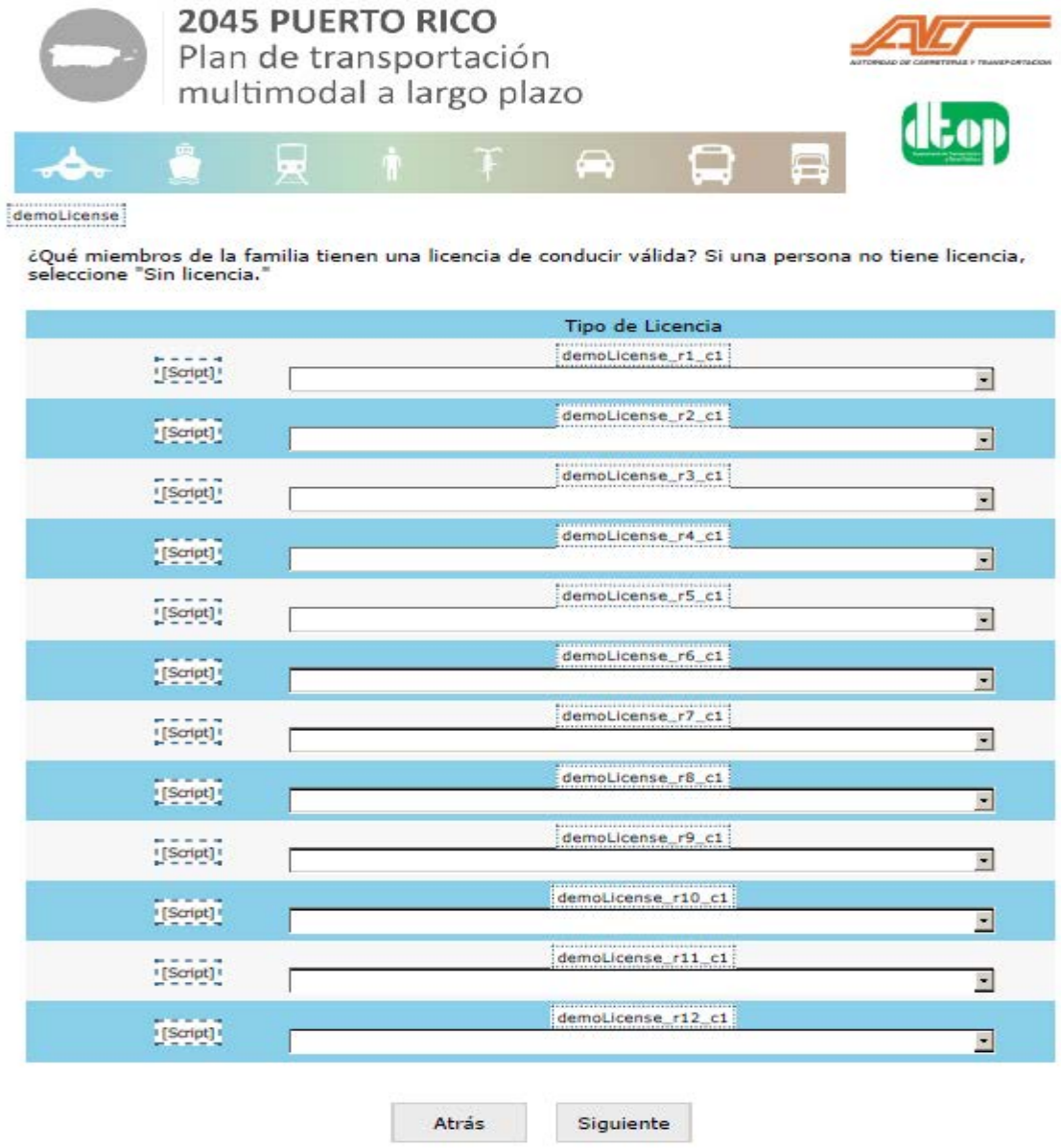
Source: SDG

Figure A.91: Medical Conditions



Source: SDG

Figure A.92: Driver's License



Driver's License Options	
Permiso de Aprendizaje	Vehículo Pesado de Motor Tipo III (Categoría 8)
Conductor	Tractor o Remolcador con o sin Arrastre o Semiarrastre (Categoría 9)
Chofer	Motora
Vehículo Pesado de Motor Tipo I (Categoría 6)	Sin Licencia
Vehículo Pesado de Motor Tipo II (Categoría 7)	

Source: SDG

Figure A.93: Licensed Vehicle Availability

Source: SDG

Figure A.94: Other Vehicles

Source: SDG

Figure A.95: Vehicle Information

Vehicle Type Options	
Auto (Incluye Station Wagon)	Motora (Incluye Motora Pequeña)
Guagua/SUV	Taxi Guiado por un Miembro del Hogar
Guagua Pick up	Vehículos de Carga
Van	Auto o Guagua de Servicio Especial

Vehicle Make Options				
Acura	Diamond Reo or Reo	Jensen	Navistar	Sunbeam
Alfa Romeo	DINA	Jeep	Neoplan	Suzuki

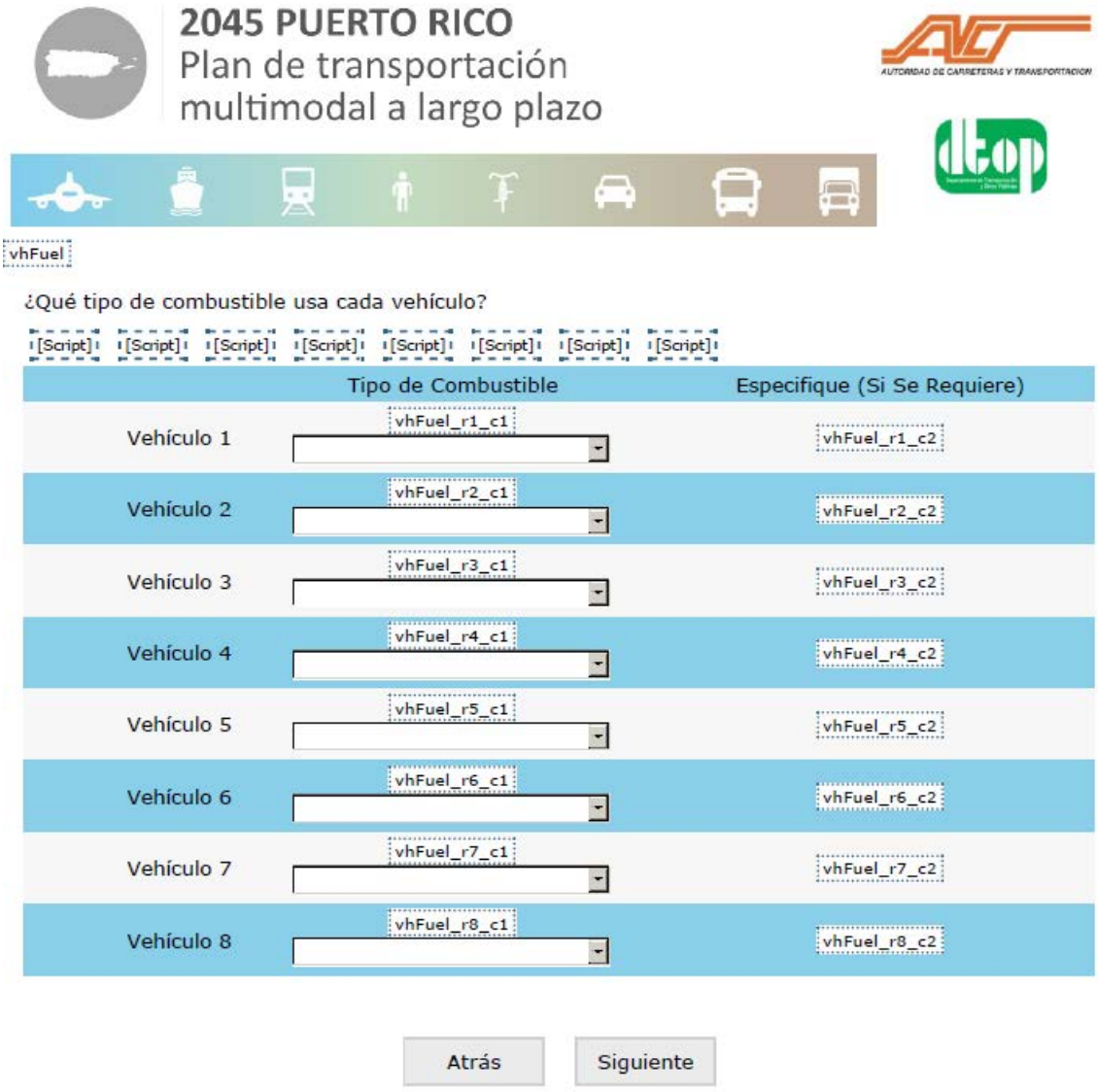
Vehicle Make Options				
AM General	Divco	Kaiser-Jeep	Nissan	Tesla
American Motors	Dodge	Kawasaki	Norton	Thomas Built
Aston Martin	Ducati	Kenworth	Oldsmobile	Toyota
Audi	Eagle	Kia	Opel	Triumph
Austin/Austin	Eagle Coach	Koeingsegg	Orion	TVR
Healey	Excabalier	Lada	Oshkosh	UD
Avanti	Ferrari	Lamborghini	Packard	Van Hool
Auto-Union-DKW	Fiat	Lancia	Panoz	Victory
Bentley	Ford	Land Rover	Peterbilt	Volkswagen
Bertone	Freightliner	Lexus	Peugeot	Volvo
Bluebird	FWD	Lincon	Plymouth	Western Star
BMW	GEO	Lotus	Pontiac	White/Autocar
Bricklin	Gazelle	Mack	Porsche	White/GMC
Brockway	Gillig	Mahinda	Reliant (British)	Willys-Jeep
BSA	GMC	Maserati	Renault	Yamaha
Buick	Grumman	Maybach	Rolls Royce	YES
Cadillac	Harley Davison	Mazda	Saab	Yugo
Carpenter	Hillman	MCI	Saleen	Other motorcycles brands
Checker	Hino	Mercedes-Benz	Saturn	Other small motorcycles brands
Chevrolet	Honda	Mercury	Scania	Other
Chrysler	Hudson	Merker	Simca	
Collins Bus	Hyundai	Mid Bus	Singer	
Daewoo	Imperial	Mini-Cooper	Smart	
Daihatsu	Infiniti	MG	Spyker	
Datsun	International Harvester	Mitsubishi	Sterling	
DeLorean	Isuzu	Morgan	Studabaker	
Desoto	Iveco/Magirus	Morris	Stutz	
Desta	Jaguar	Moto-Guzzi	Subaru	

Source: SDG

Figure A.96: Odometer Reading

Source: SDG

Figure A.97: Types of Vehicle Fuel



Types of Vehicle Fuel Options
Sólo Gasolina
Diesel
Propano
Gas Natural
Eléctrico
Gas/Eléctrico
Otro (Por favor Especifique)

Source: SDG

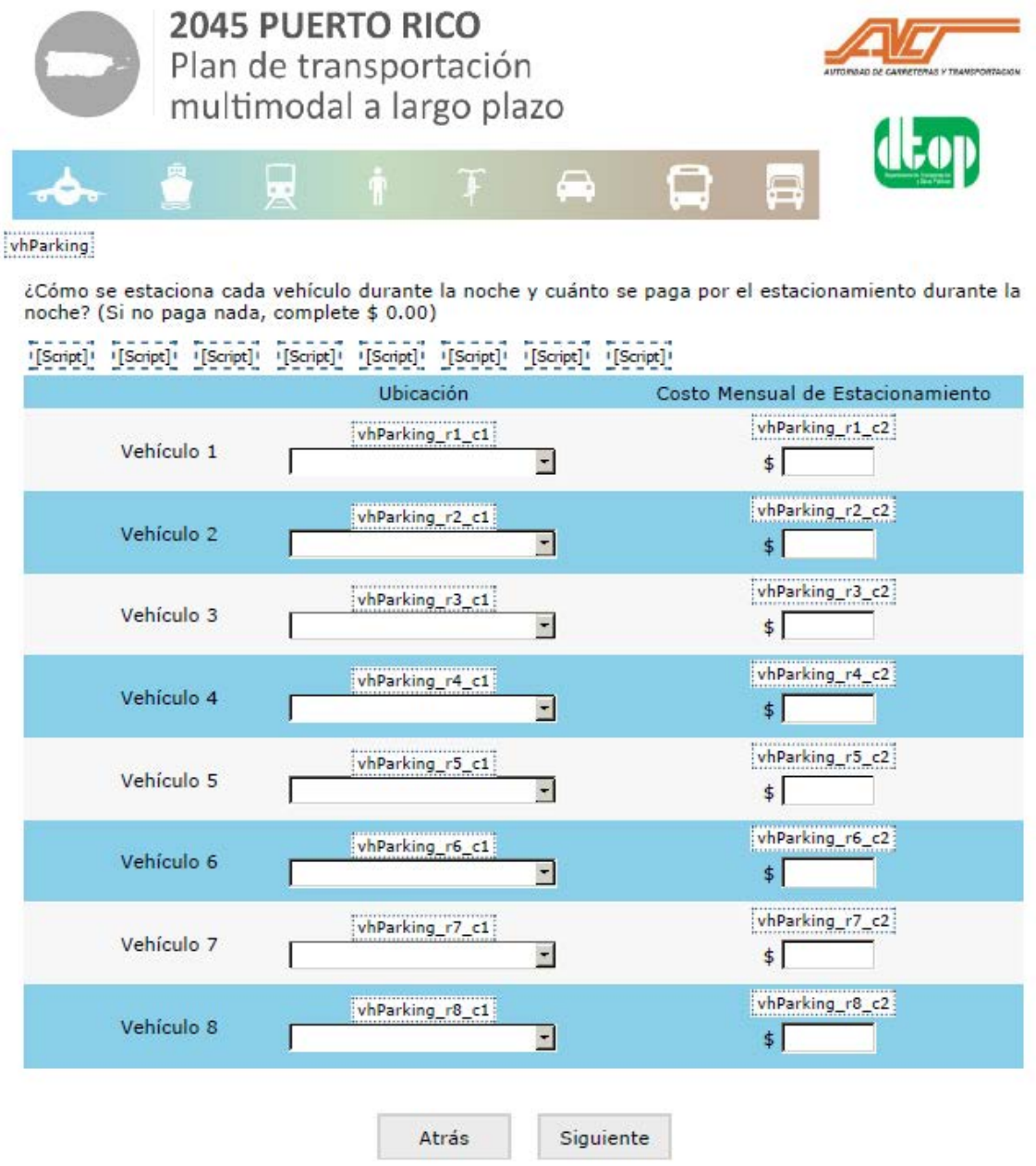
Figure A.98: Commercial Purposes

Source: SDG

Figure A.99: Vehicle Owner

Source: SDG

Figure A.100: Parking



Parking Location Options
Garaje Propio/Entrada
Estacionamiento Privado
Estacionamiento Público
Vía Pública
Espacio Público

Source: SDG

Figure A.101: Vehicle Primary User and Purpose

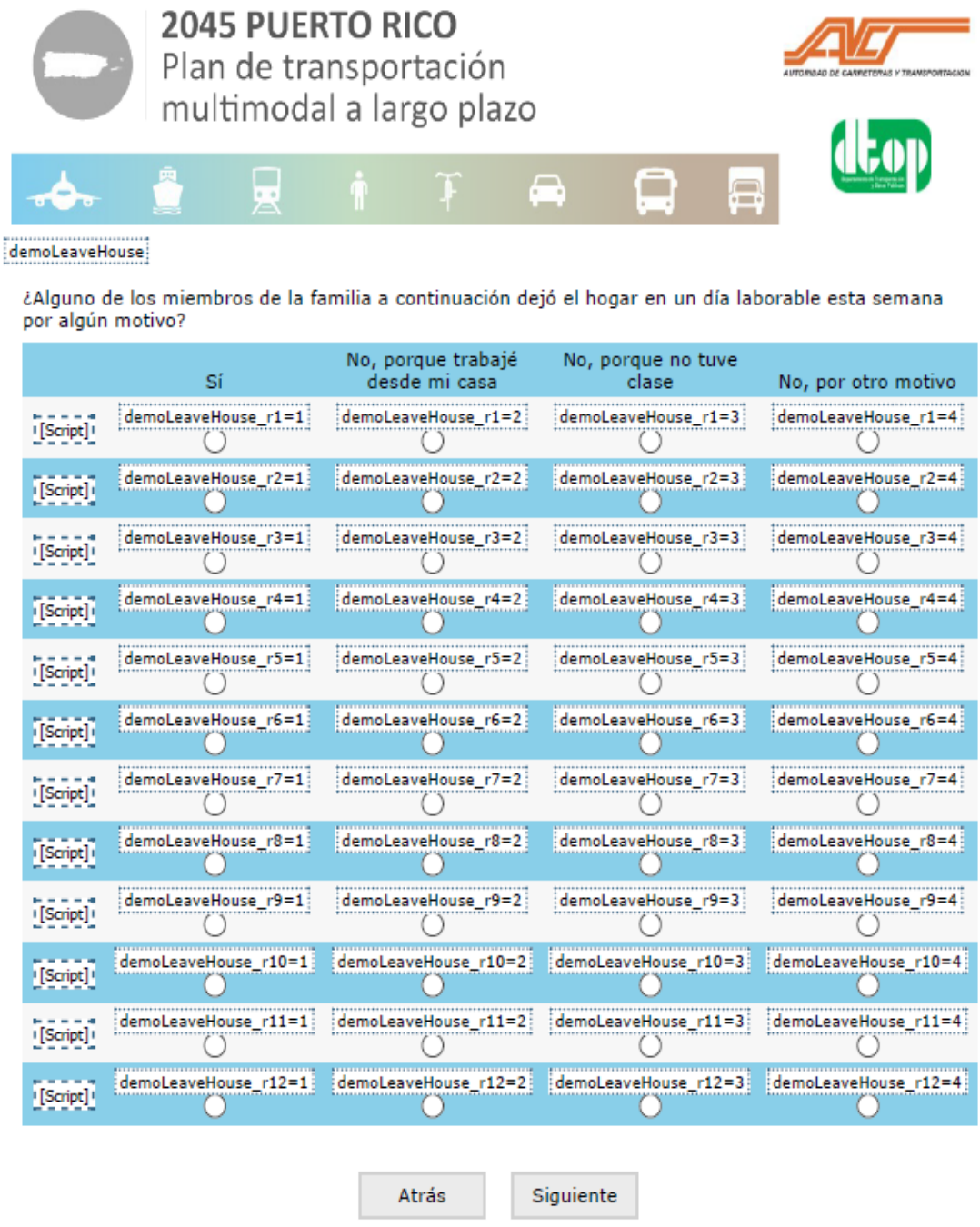
Primary Purpose	
Viajes al Trabajo	Comer/Beber Algo
Relacionado con el Negocio	Compras
Estudiar	Recreación
Médico/Relacionado con la Salud	Trámites
Ver a Alguien para Hacer Negocios	Buscar Trabajo
Ver a alguien para Fines No Relacionados con el Trabajo	Social/Religión
Regresar a Casa	Acompañar a Otra Persona (Por Favor Especifique el Propósito de su Viaje)
Dejar/Recoger a Alguien	Otra Actividad (Por Favor Especifique)
Dejar/Recoger Algo	

Source: SDG

Figure A.102: Trips Information Introduction

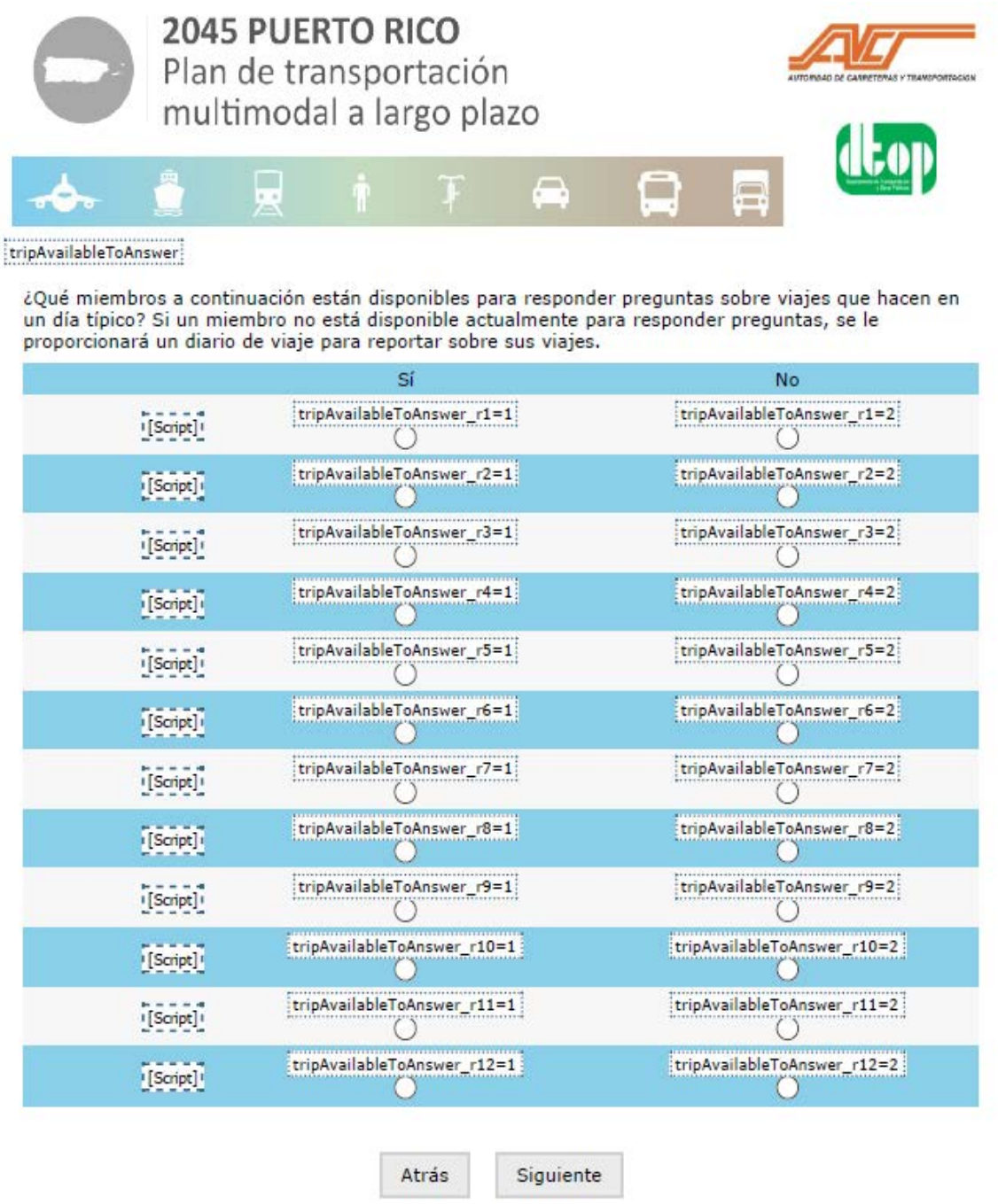
Source: SDG

Figure A.103: Reasons for Leaving the House



Source: SDG

Figure A.104: Members' Availability to Answer Module D



Source: SDG

Figure A.105: Trip Example

Source: SDG

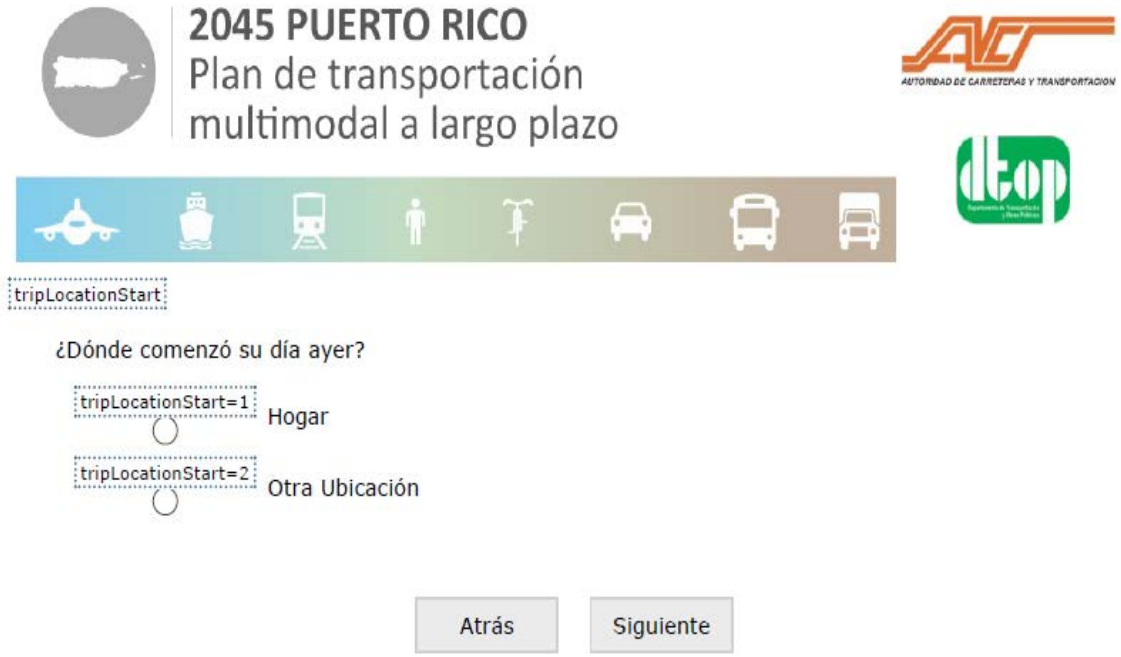
Figure A.106: Trip Person Introduction

Source: SDG

Figure A.107: Number of Trips

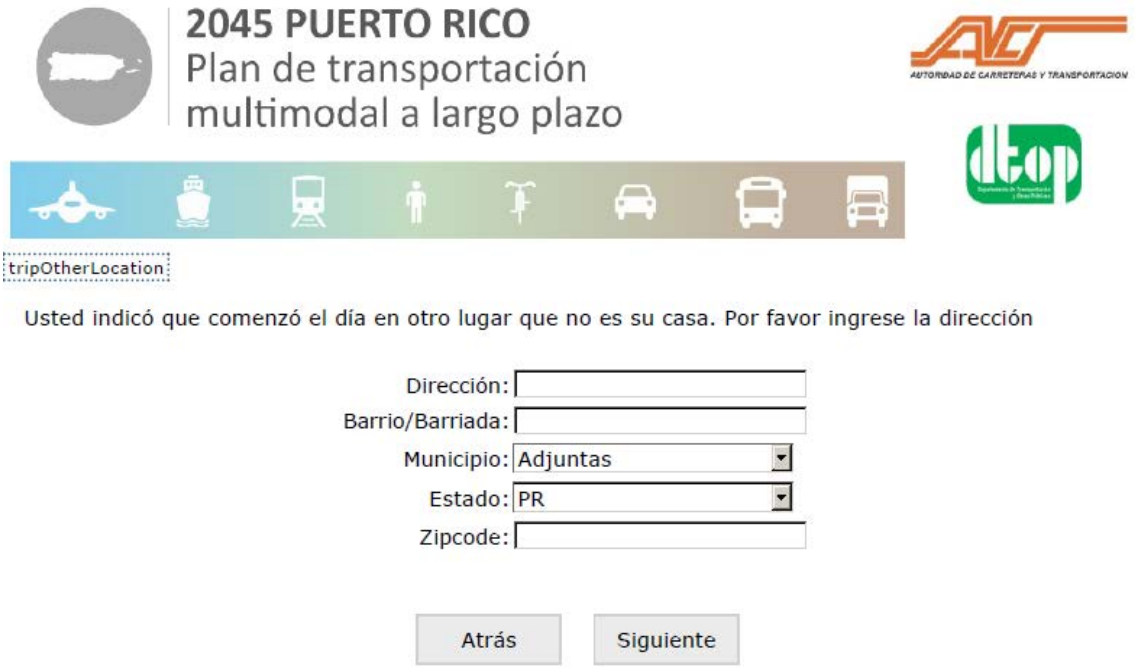
Source: SDG

Figure A.108: Trip Location Start – Household



Source: SDG

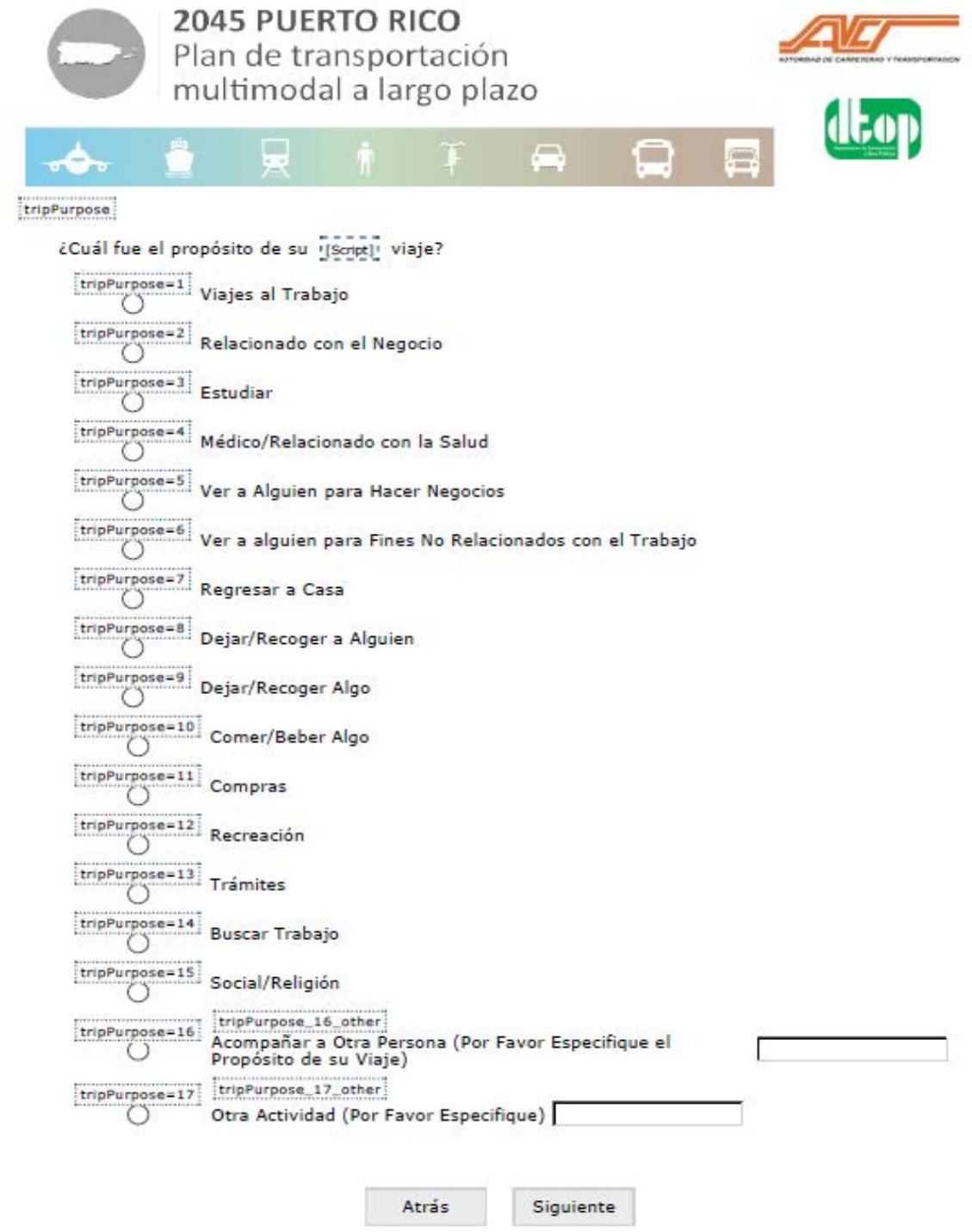
Figure A.109: Trip Location Start – Other Location



Municipality Options					State Options			
Adjuntas	Cayey	Hormigueros	Morovis	Toa Alta	AK	ME	OK	FM
Aguada	Ceiba	Humacao	Naguabo	Toa Baja	AZ	MD	OR	GU
Aguadilla	Ciales	Isabela	Naranjito	Trujillo Alto	AR	MA	PA	MH
Aguas Buenas	Cidra	Jayuya	Orocovis	Utuado	CA	MI	RI	MP
Aibonito	Coamo	Juana Díaz	Patillas	Vega Alta	CO	MN	SC	PW
Añasco	Comerío	Juncos	Peñuelas	Vega Baja	CT	MS	SD	VI
Arecibo	Corozal	Lajas	Ponce	Vieques	DE	MO	TN	
Arroyo	Culebra	Lares	Quebradillas	Villalba	FL	MT	TX	
Barceloneta	Dorado	Las Marías	Rincón	Yabucoa	GA	NE	UT	
Barranquitas	Fajardo	Las Piedras	Río Grande	Yauco	HI	NV	VT	
Bayamón	Florida	Loíza	Sabana Grande		ID	NH	VA	
Cabo Rojo	Guánica	Luquillo	Salinas		IL	NJ	WA	
Caguas	Guayama	Manatí	San Germán		IN	NM	WV	
Camuy	Guayanilla	Maricao	San Juan		IA	NY	WI	
Canóvanas	Guaynabo	Maunabo	San Lorenzo		KS	NC	WY	
Carolina	Gurabo	Mayagüez	San Sebastián		KY	ND	AS	
Cataño	Hatillo	Moca	Santa Isabel		LA	OH	DC	

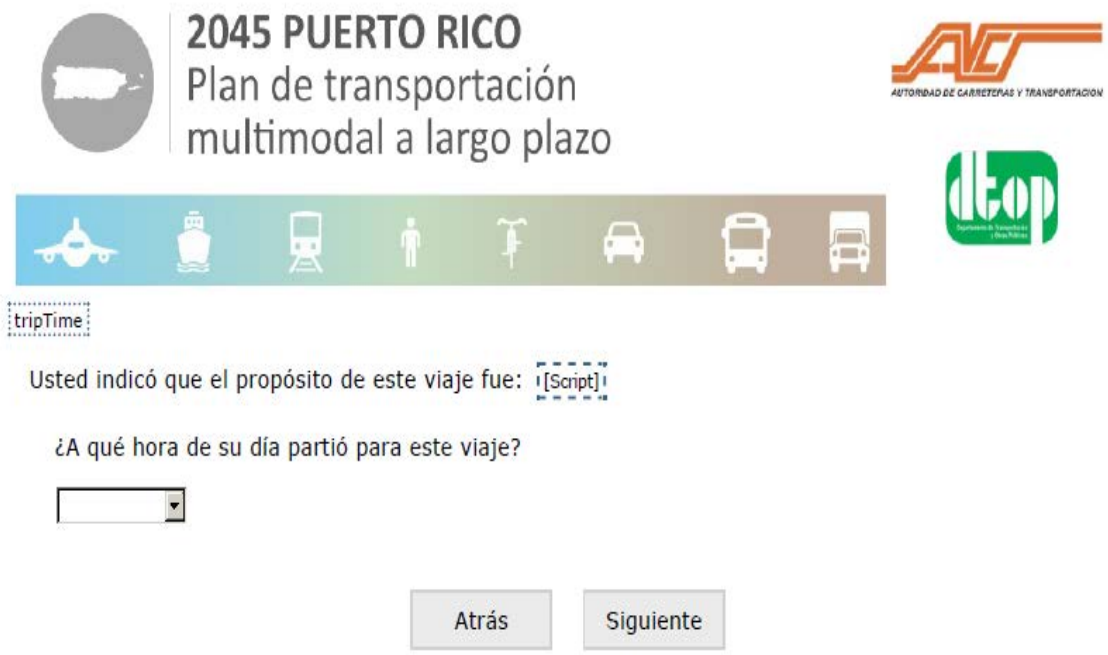
Source: SDG

Figure A.110: Trip Purpose



Source: SDG

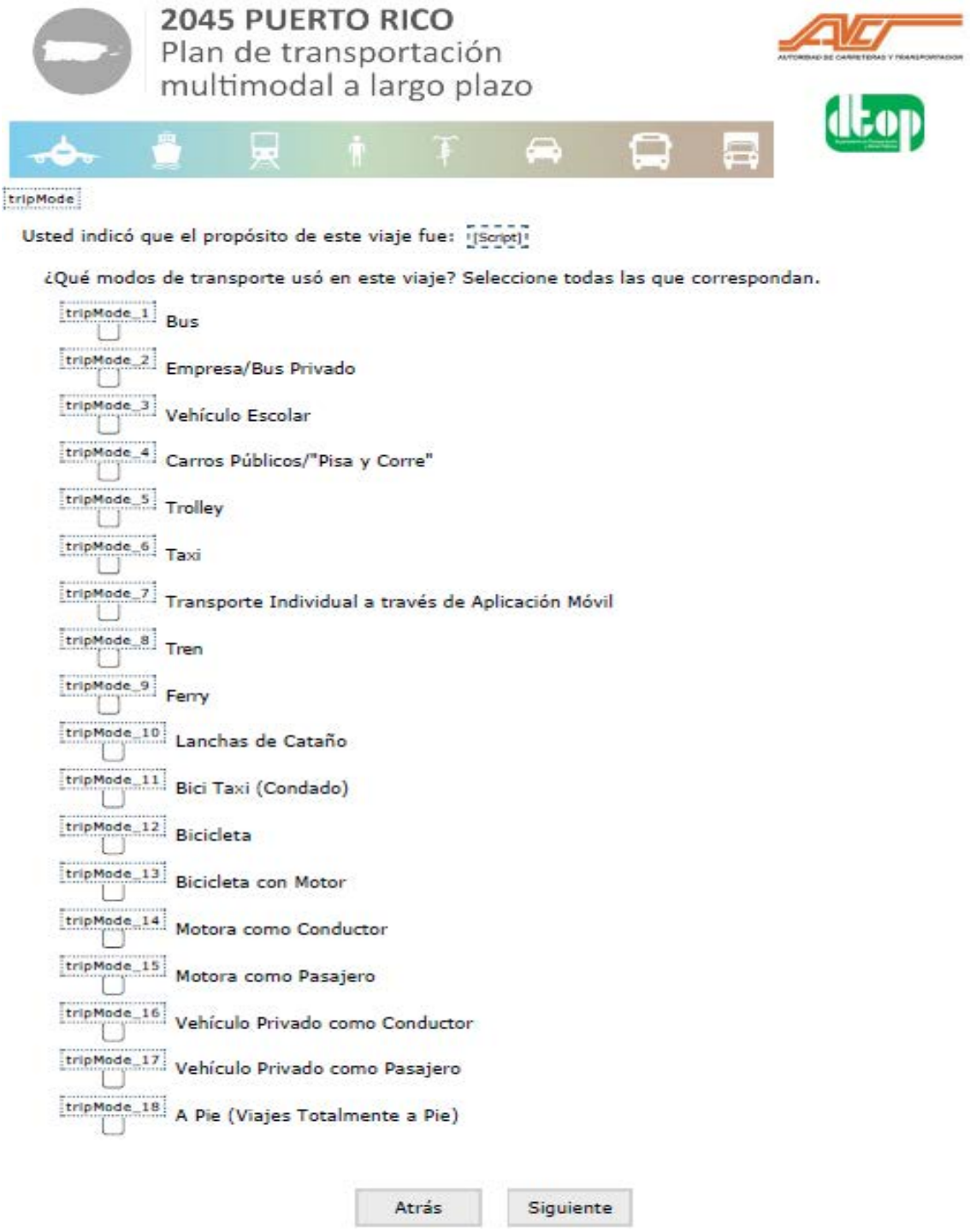
Figure A.111: Depart Time



Time Options		
12:00AM	8:30AM	5:00PM
12:30AM	9:00AM	5:30PM
1:00AM	9:30AM	6:00PM
1:30AM	10:00AM	6:30PM
2:00AM	10:30AM	7:00PM
2:30AM	11:00AM	7:30PM
3:00AM	11:30AM	8:00PM
3:30AM	12:00PM	8:30PM
4:00AM	12:30PM	9:00PM
4:30AM	1:00PM	9:30PM
5:00AM	1:30PM	10:00PM
5:30AM	2:00PM	10:30PM
6:00AM	2:30PM	11:00PM
6:30AM	3:00PM	11:30PM
7:00AM	3:30PM	
7:30AM	4:00PM	
8:00AM	4:30PM	

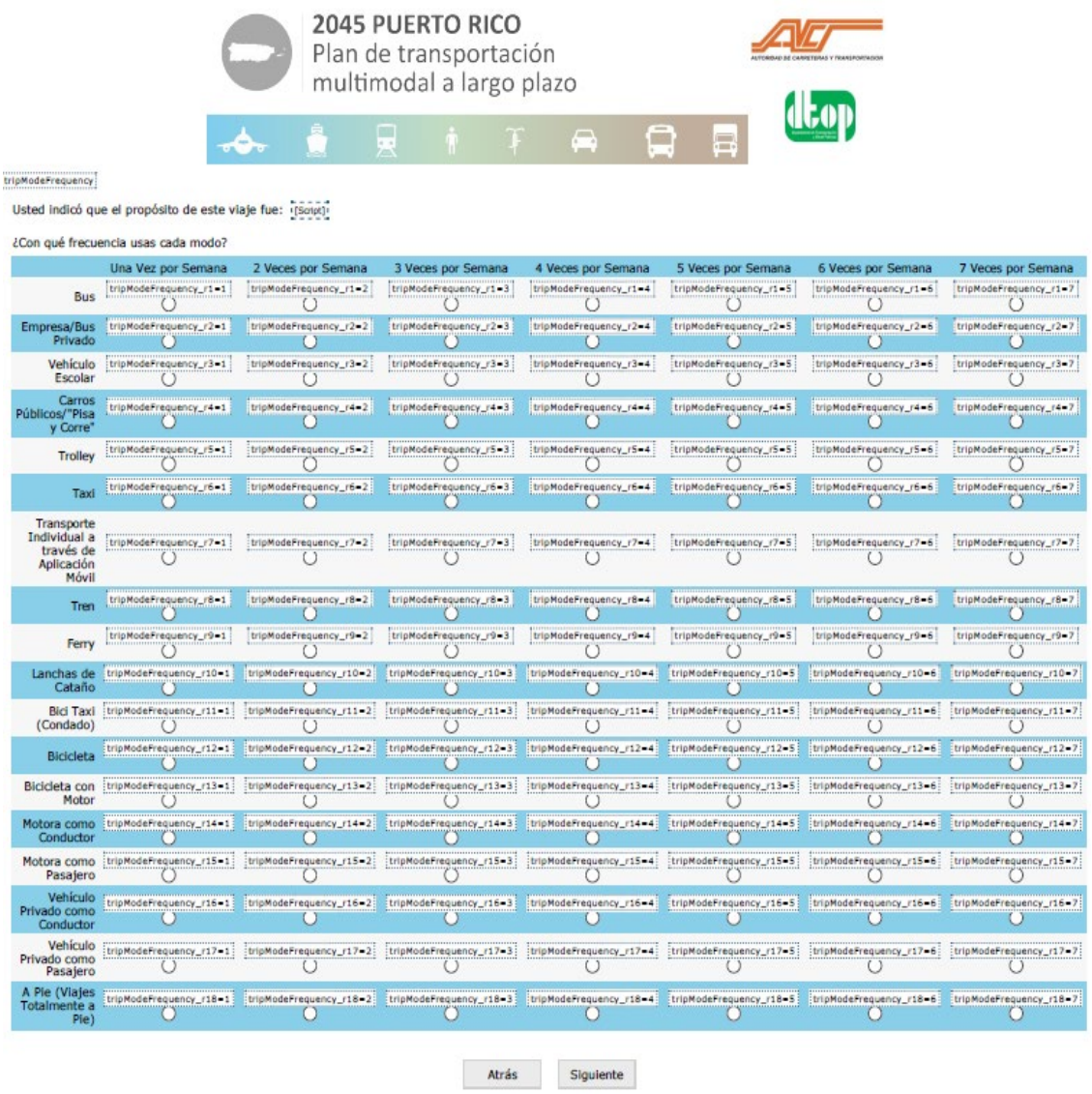
Source: SDG

Figure A.112: Modes of Transportation



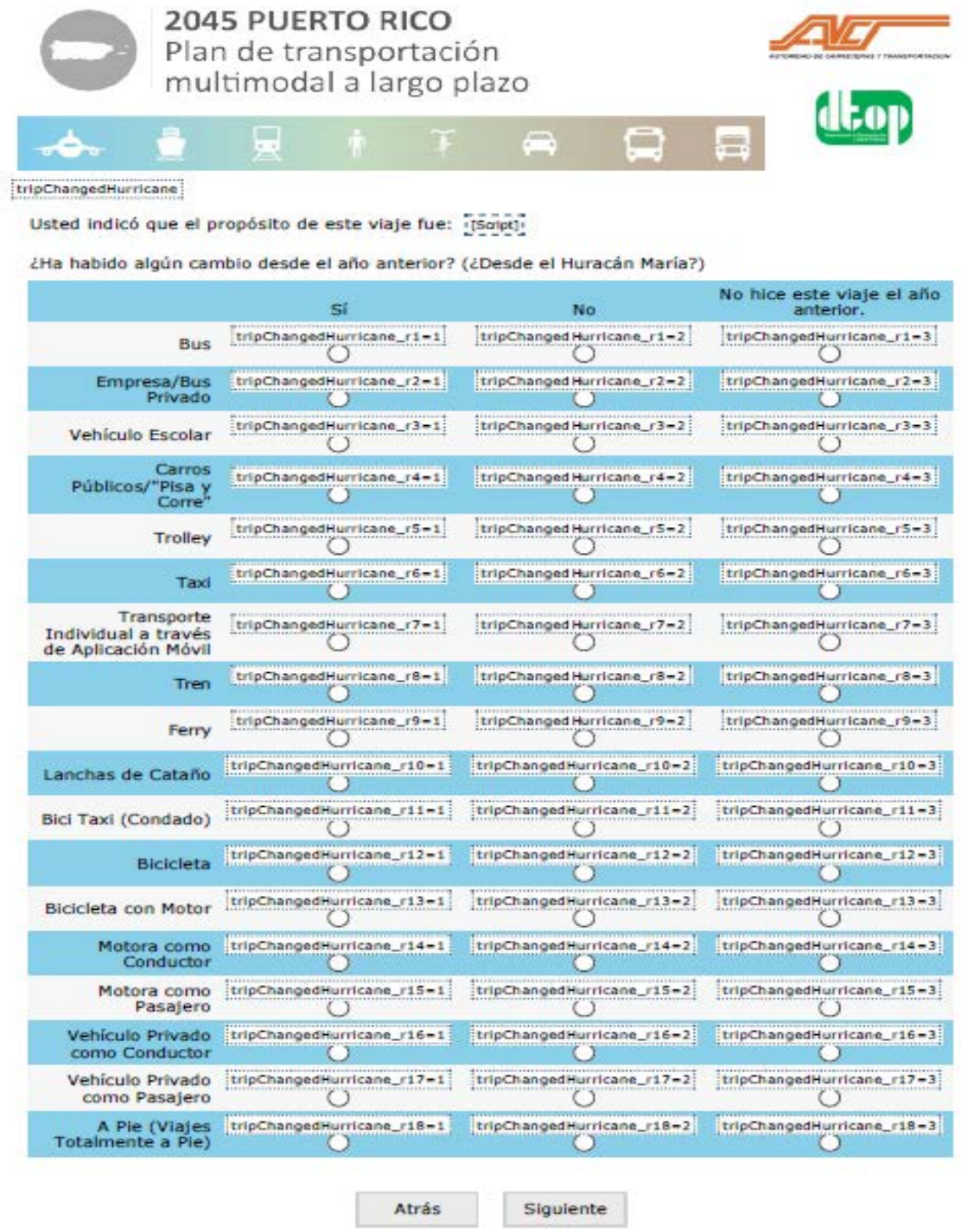
Source: SDG

Figure A.113: Trip Frequency



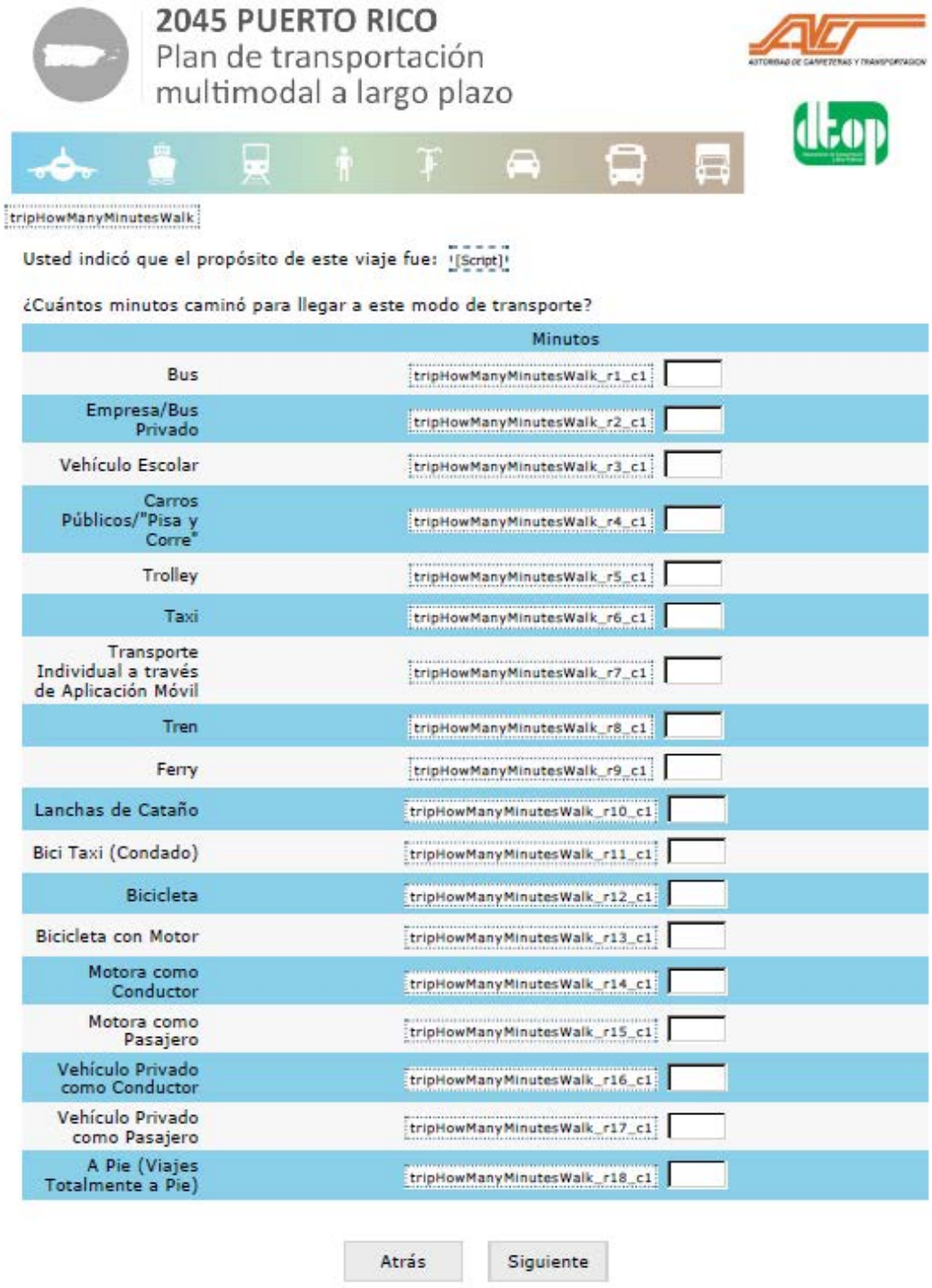
Source: SDG

Figure A.114: Trip Changes Due to Maria



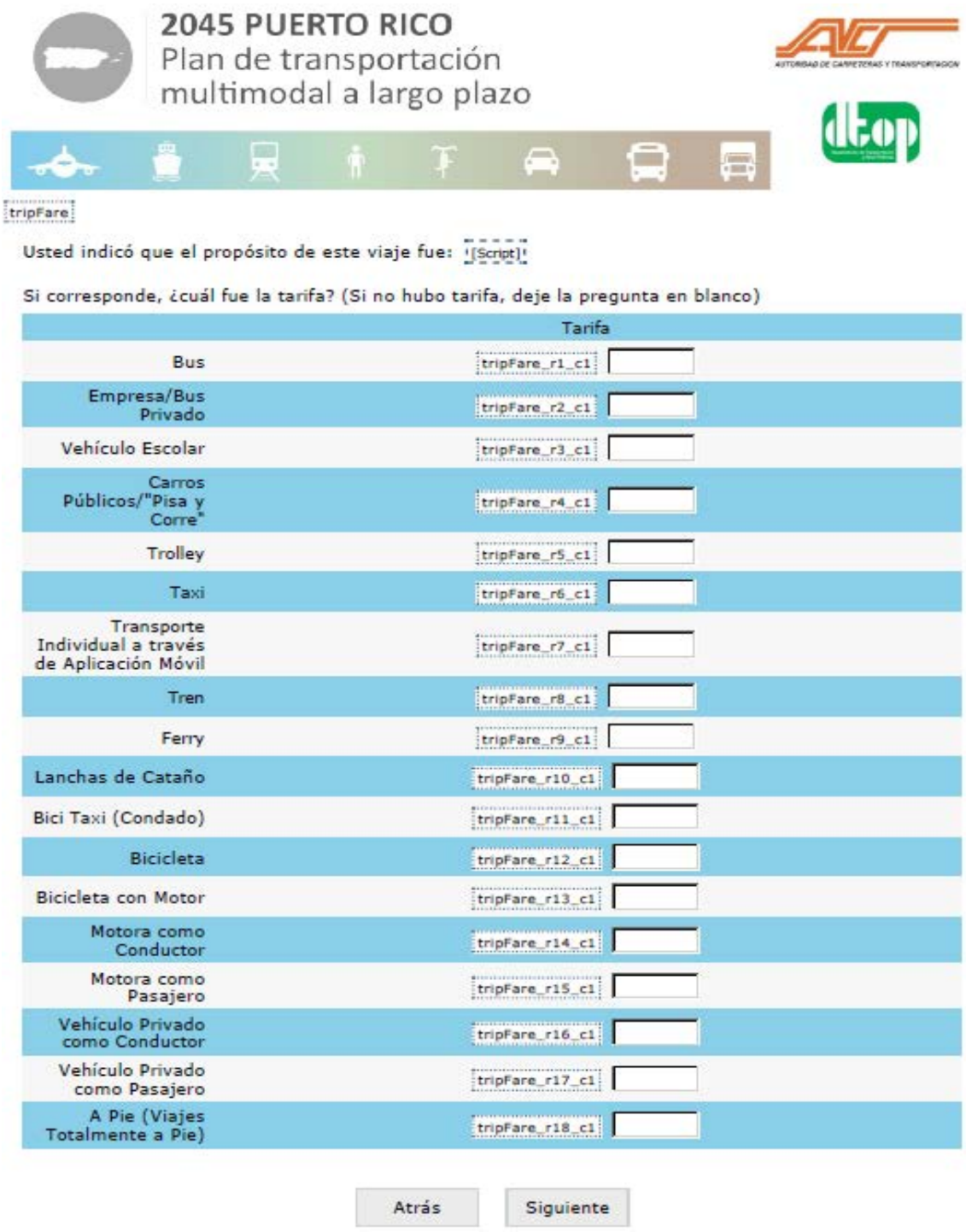
Source: SDG

Figure A.115: Minutes Walking to Reach Modes of Transportation



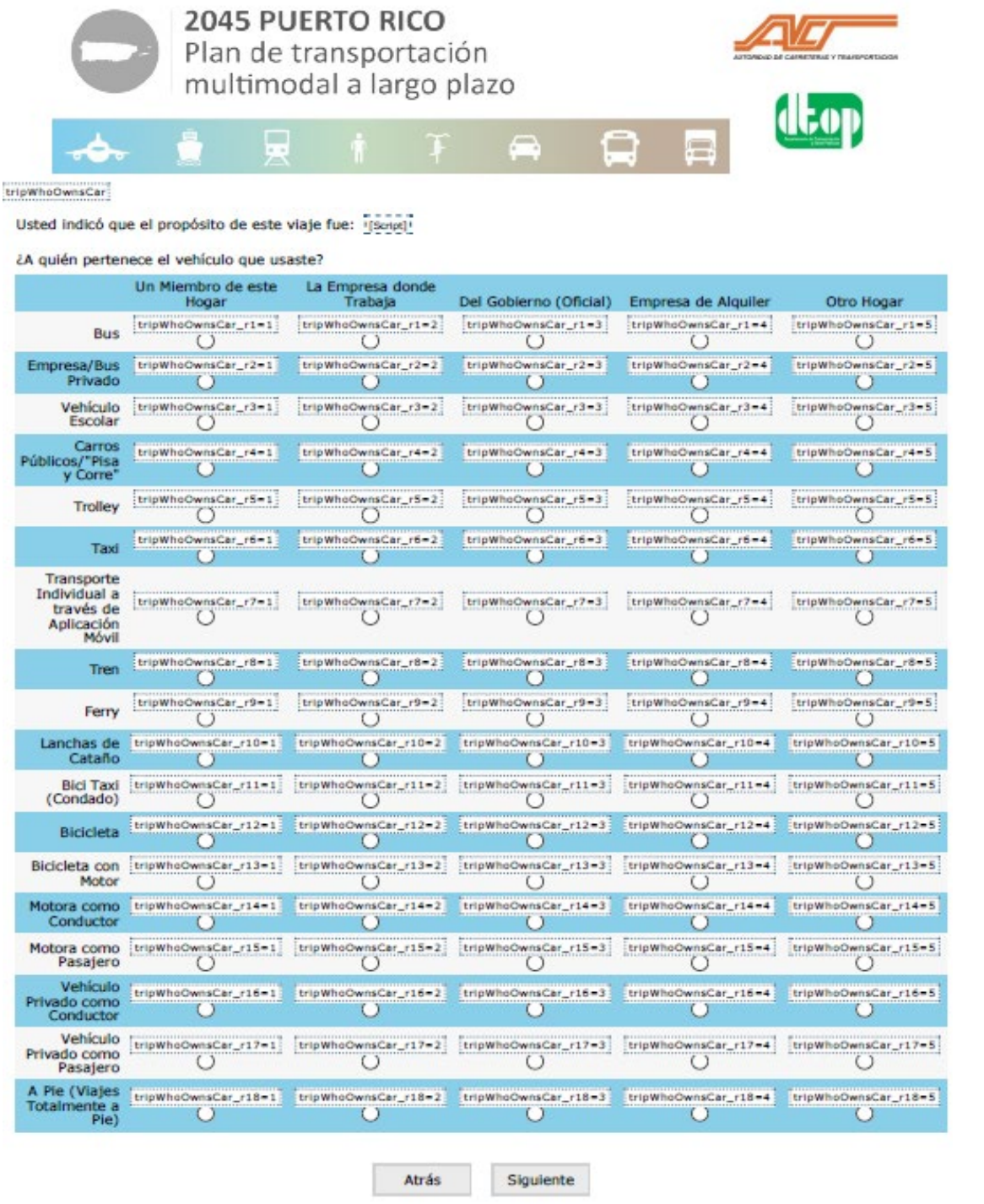
Source: SDG

Figure A.116: Mode of Transportation Fare



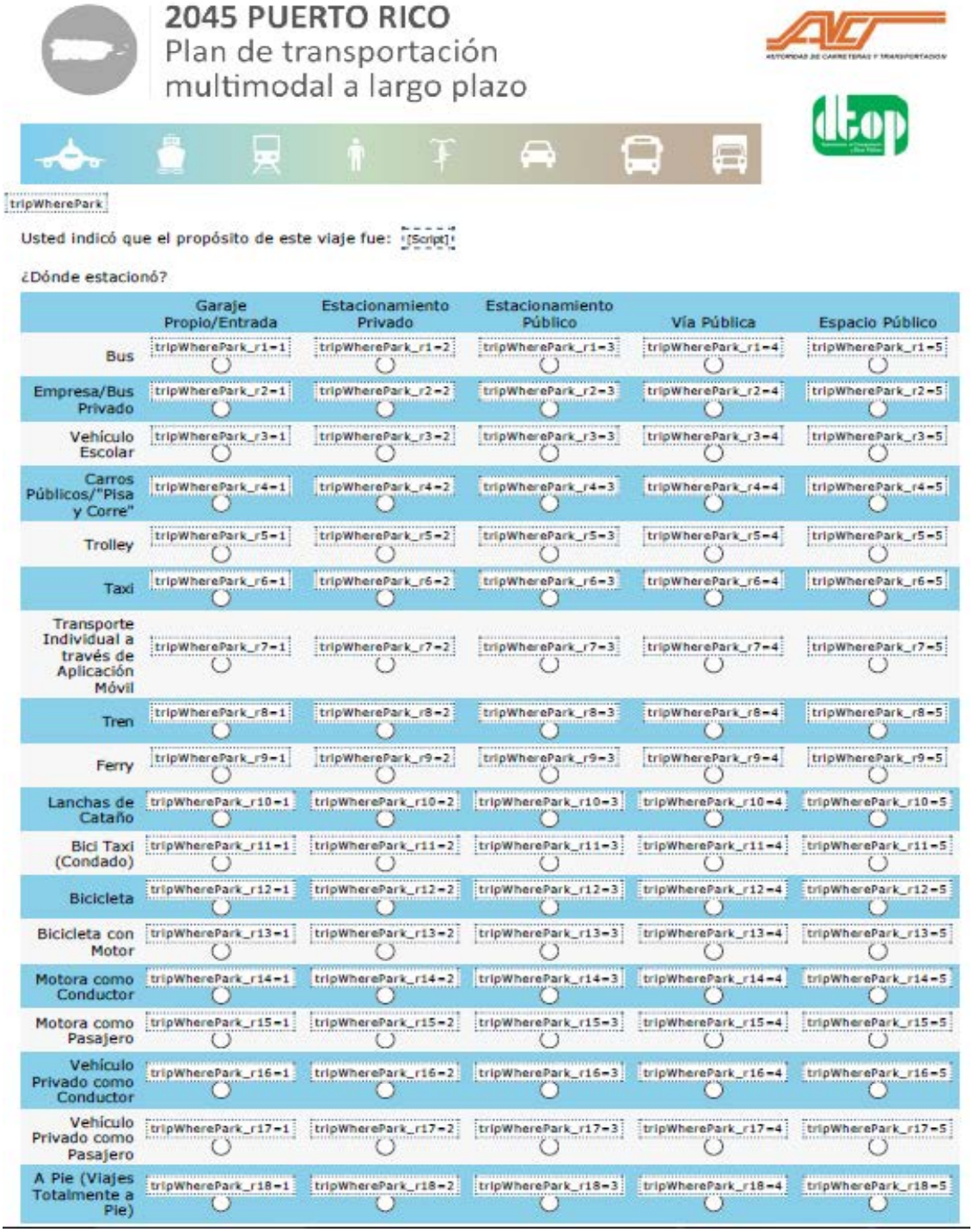
Source: SDG

Figure A.117: Vehicle Ownership



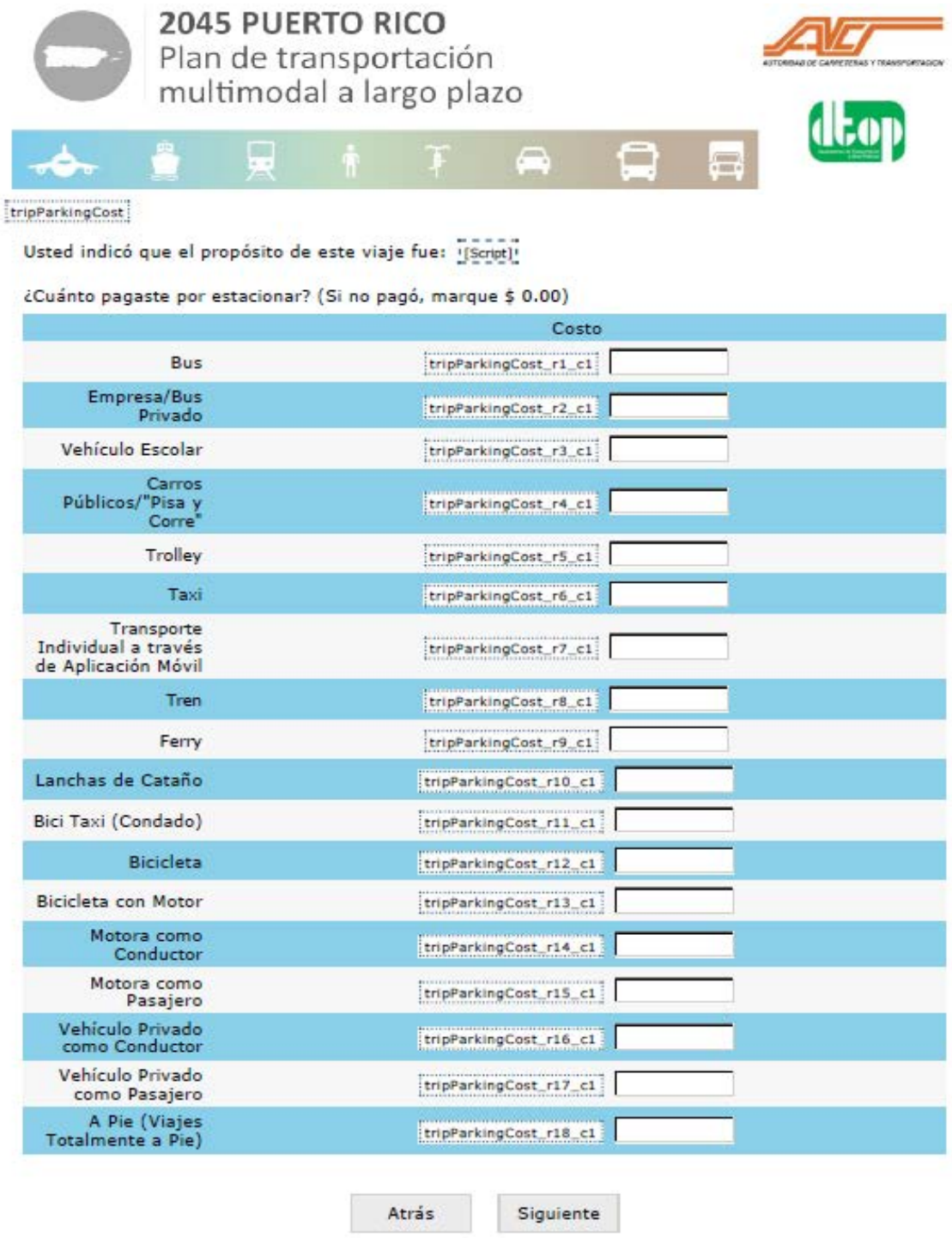
Source: SDG

Figure A.118: Parking Location



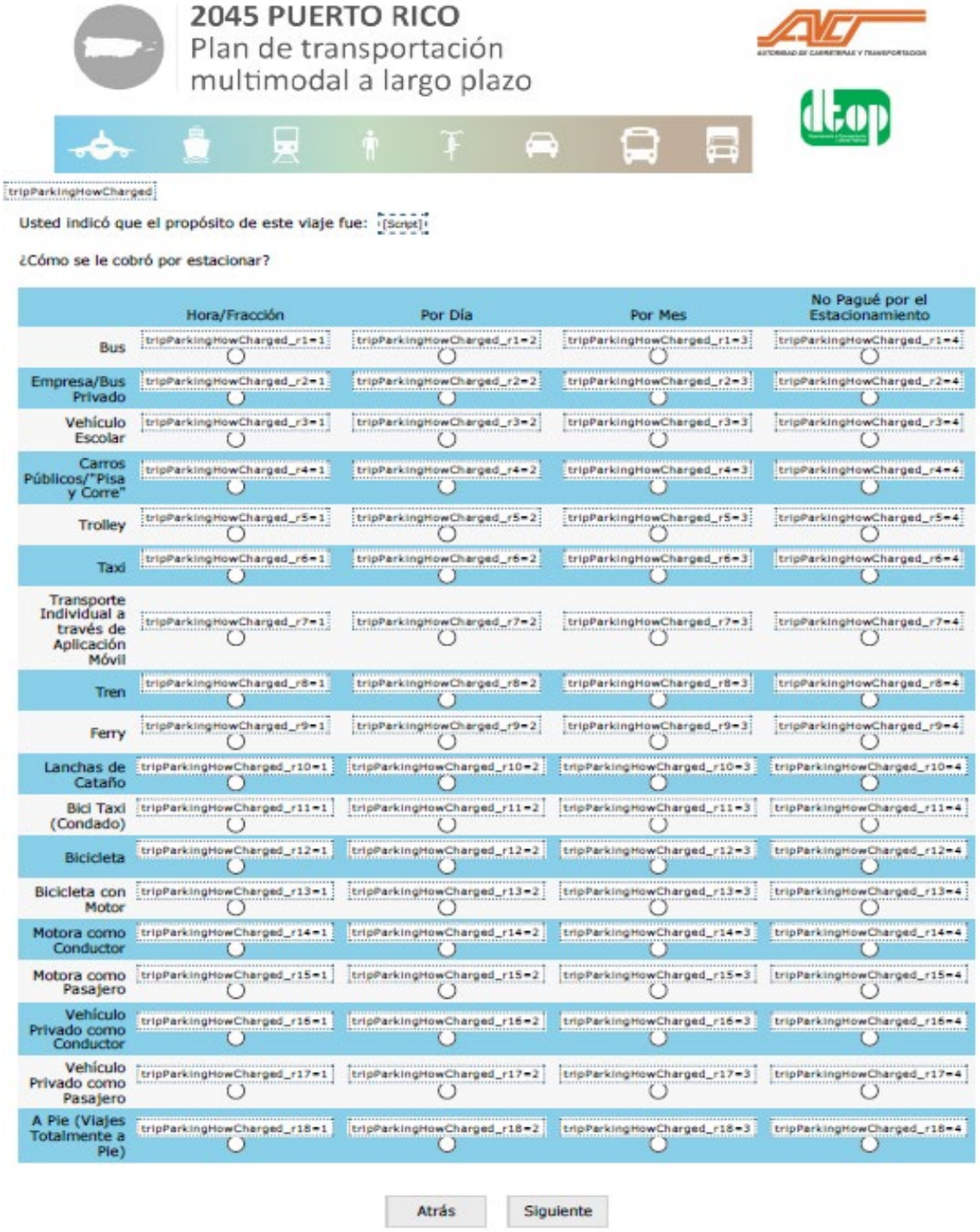
Source: SDG

Figure A.119: Parking Fare



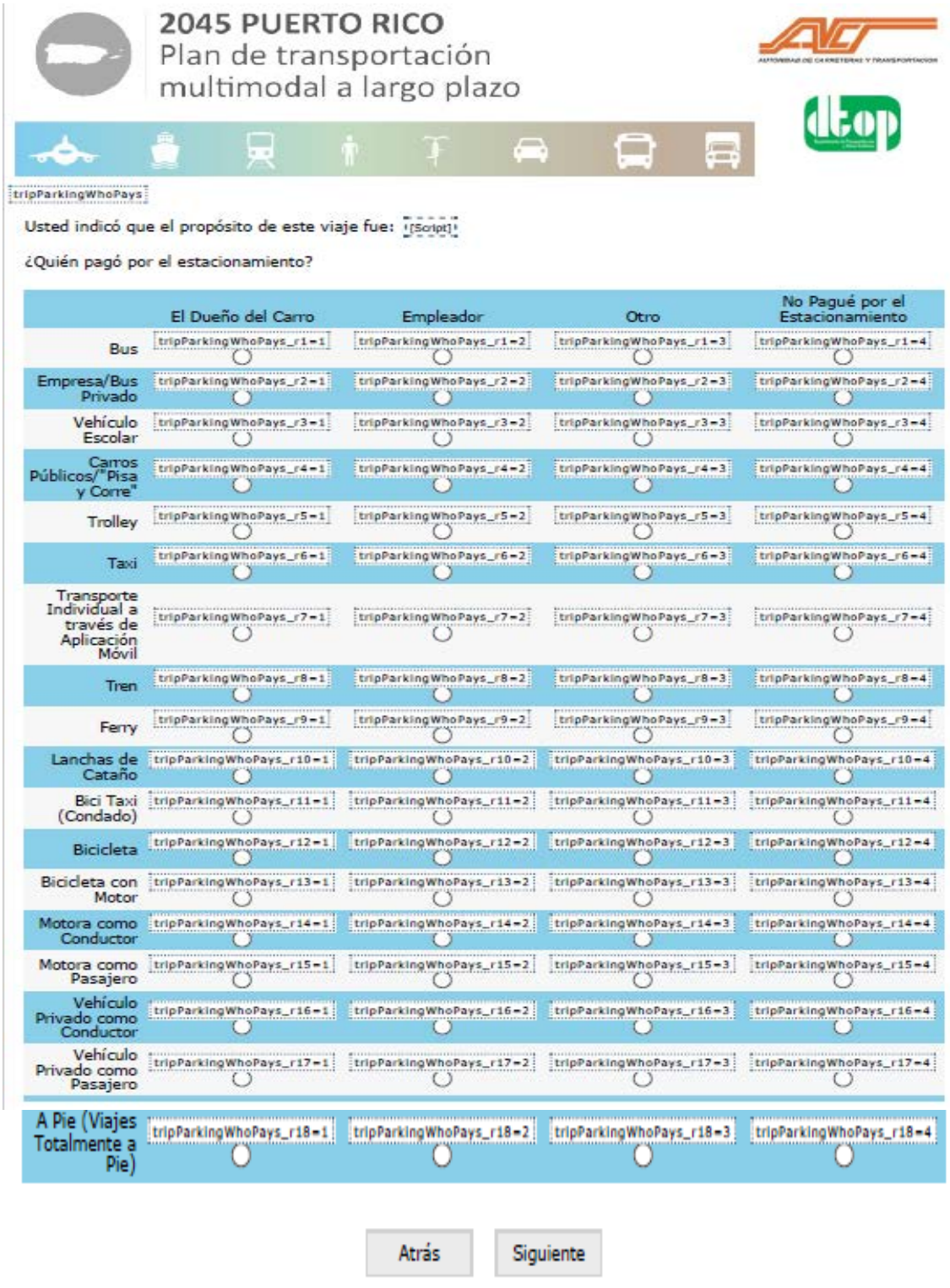
Source: SDG

Figure A.120: Parking Fare Type of Charge



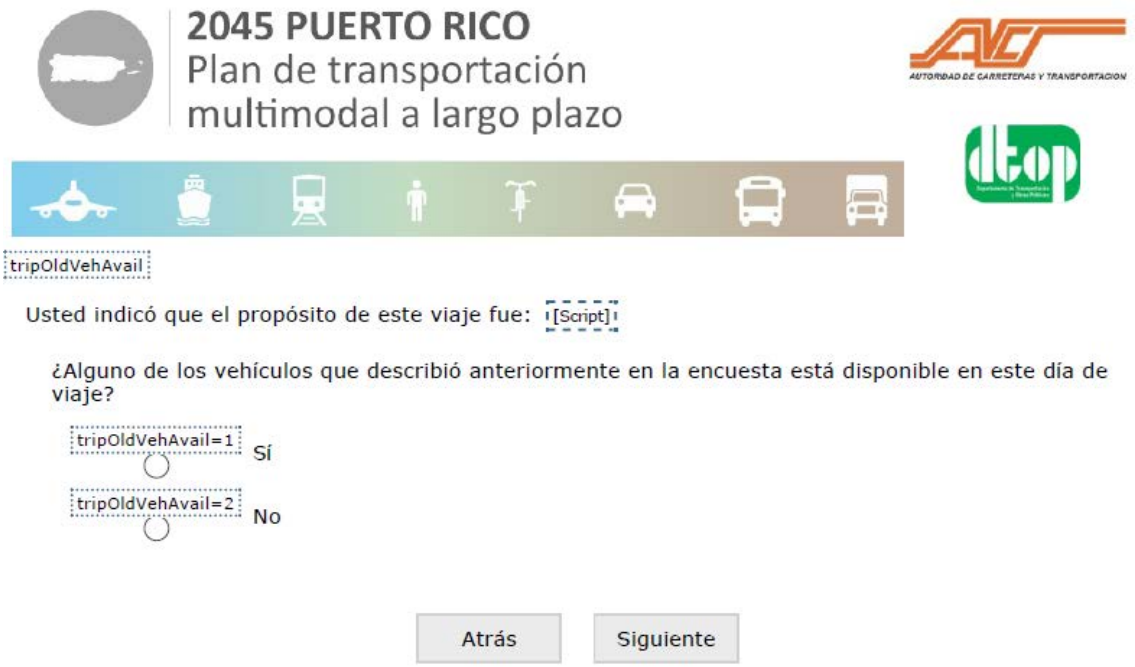
Source: SDG

Figure A.121: Person in Charge of Parking Payment



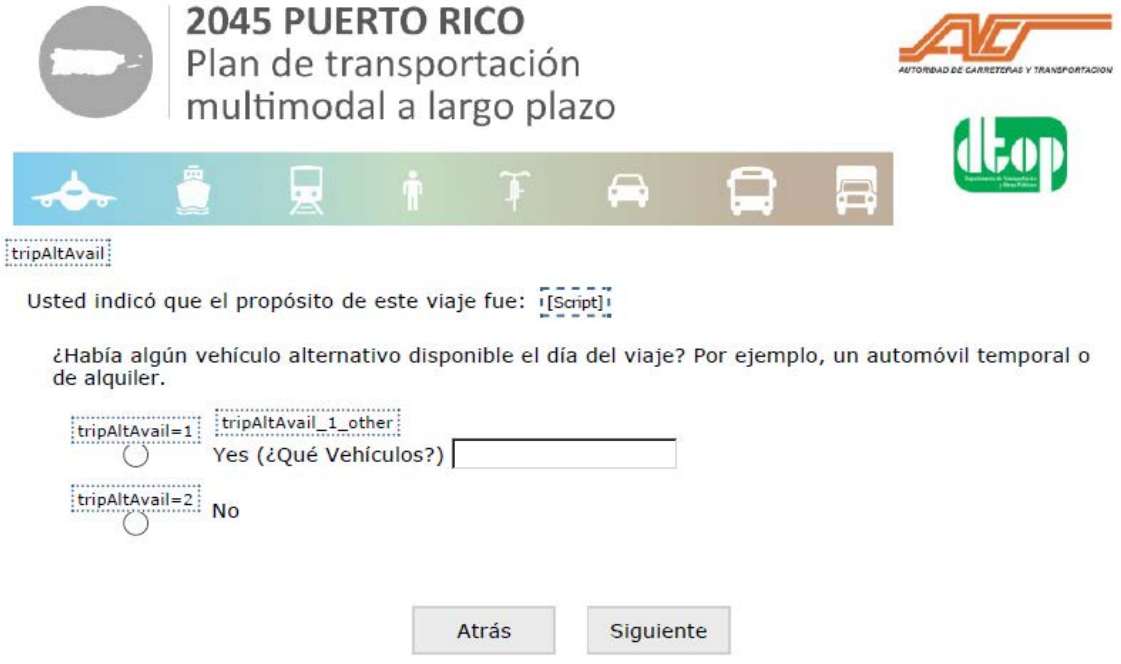
Source: SDG

Figure A.122: Availability of Vehicles in the Day of Travel



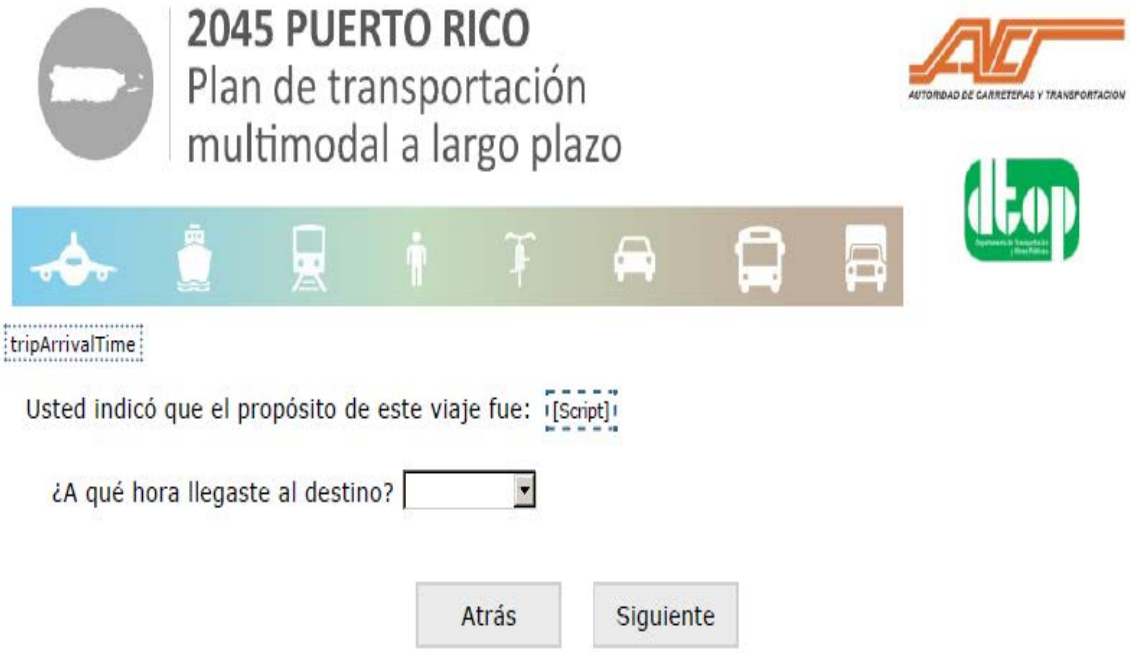
Source: SDG

Figure A.123: Alternative Vehicles



Source: SDG

Figure A.124: Destination Arrival Time



Time Options		
12:00AM	8:30AM	5:00PM
12:30AM	9:00AM	5:30PM
1:00AM	9:30AM	6:00PM
1:30AM	10:00AM	6:30PM
2:00AM	10:30AM	7:00PM
2:30AM	11:00AM	7:30PM
3:00AM	11:30AM	8:00PM
3:30AM	12:00PM	8:30PM
4:00AM	12:30PM	9:00PM
4:30AM	1:00PM	9:30PM
5:00AM	1:30PM	10:00PM
5:30AM	2:00PM	10:30PM
6:00AM	2:30PM	11:00PM
6:30AM	3:00PM	11:30PM
7:00AM	3:30PM	
7:30AM	4:00PM	
8:00AM	4:30PM	

Source: SDG

Figure A.125: Final Destination Location

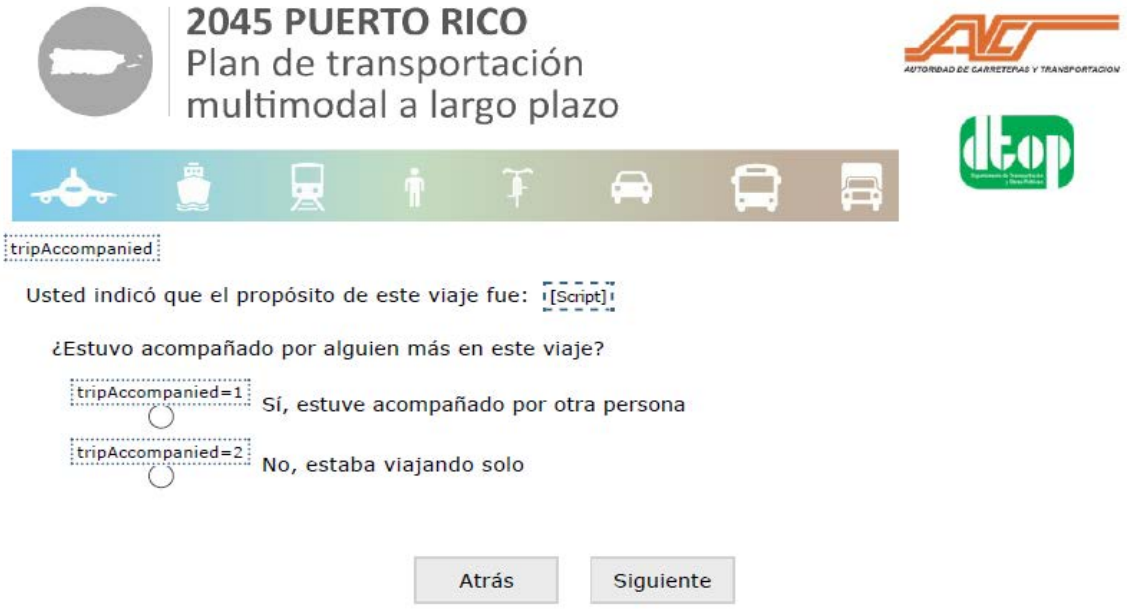
Municipality Options					State Options			
Adjuntas	Cayey	Hormigueros	Morovis	Toa Alta	AK	ME	OK	FM
Aguada	Ceiba	Humacao	Naguabo	Toa Baja	AZ	MD	OR	GU
Aguadilla	Ciales	Isabela	Naranjito	Trujillo Alto	AR	MA	PA	MH
Aguas Buenas	Cidra	Jayuya	Orocovis	Utuado	CA	MI	RI	MP
Aibonito	Coamo	Juana Díaz	Patillas	Vega Alta	CO	MN	SC	PW
Añasco	Comerío	Juncos	Peñuelas	Vega Baja	CT	MS	SD	VI
Arecibo	Corozal	Lajas	Ponce	Vieques	DE	MO	TN	
Arroyo	Culebra	Lares	Quebradillas	Villalba	FL	MT	TX	
Barceloneta	Dorado	Las Marías	Rincón	Yabucoa	GA	NE	UT	
Barranquitas	Fajardo	Las Piedras	Río Grande	Yauco	HI	NV	VT	
Bayamón	Florida	Loíza	Sabana Grande		ID	NH	VA	
Cabo Rojo	Guánica	Luquillo	Salinas		IL	NJ	WA	
Caguas	Guayama	Manatí	San Germán		IN	NM	WV	
Camuy	Guayanilla	Maricao	San Juan		IA	NY	WI	
Canóvanas	Guaynabo	Maunabo	San Lorenzo		KS	NC	WY	
Carolina	Gurabo	Mayagüez	San Sebastián		KY	ND	AS	
Cataño	Hatillo	Moca	Santa Isabel		LA	OH	DC	

Source: SDG

Figure A.126: Days of the Week

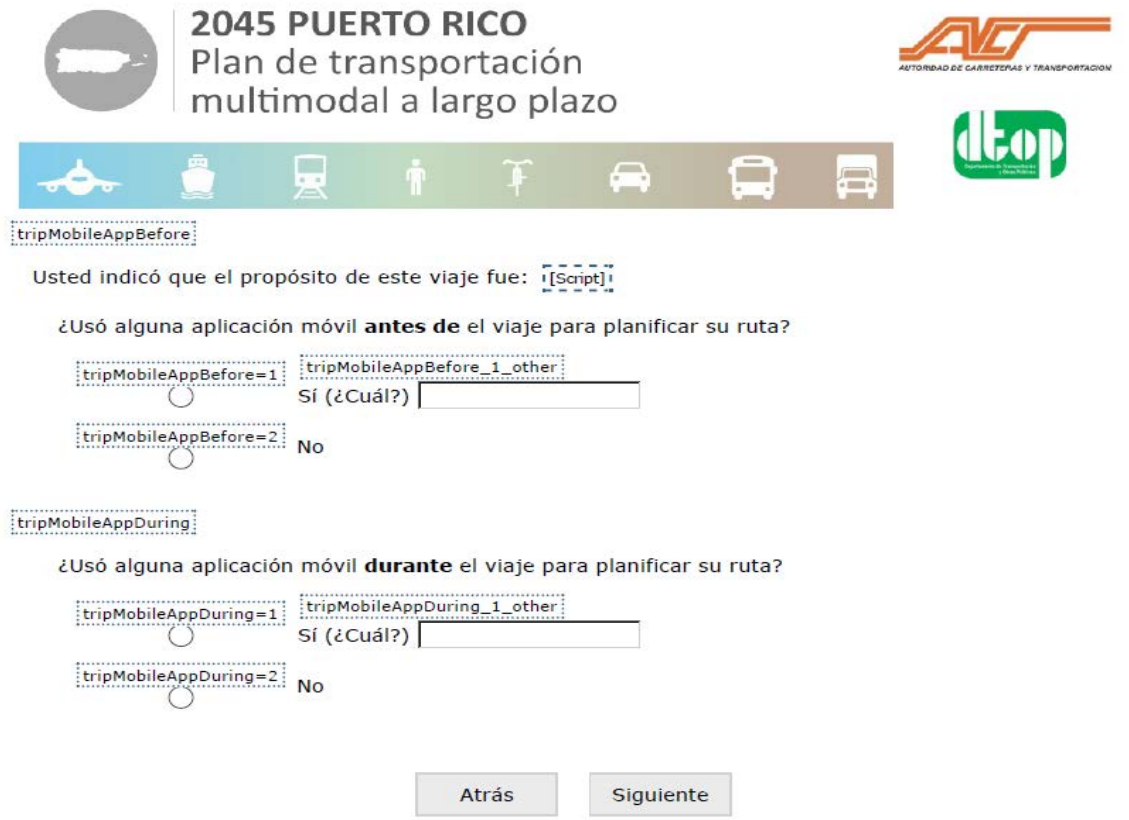
Source: SDG

Figure A.127: Accompaniment



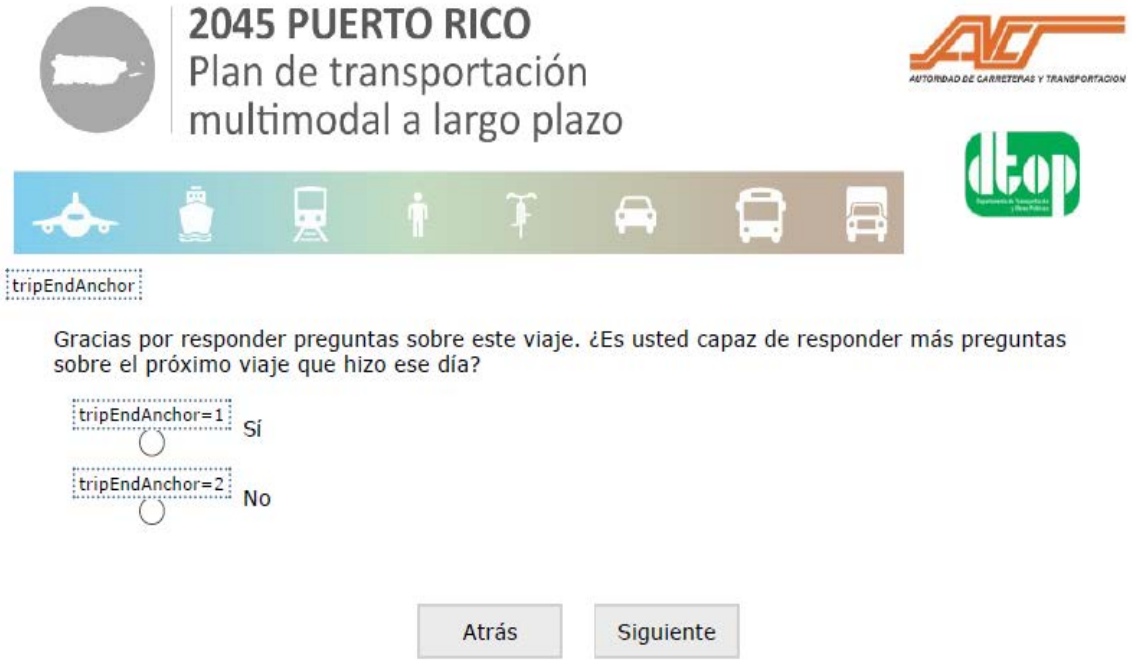
Source: SDG

Figure A.128: Use of Mobile App



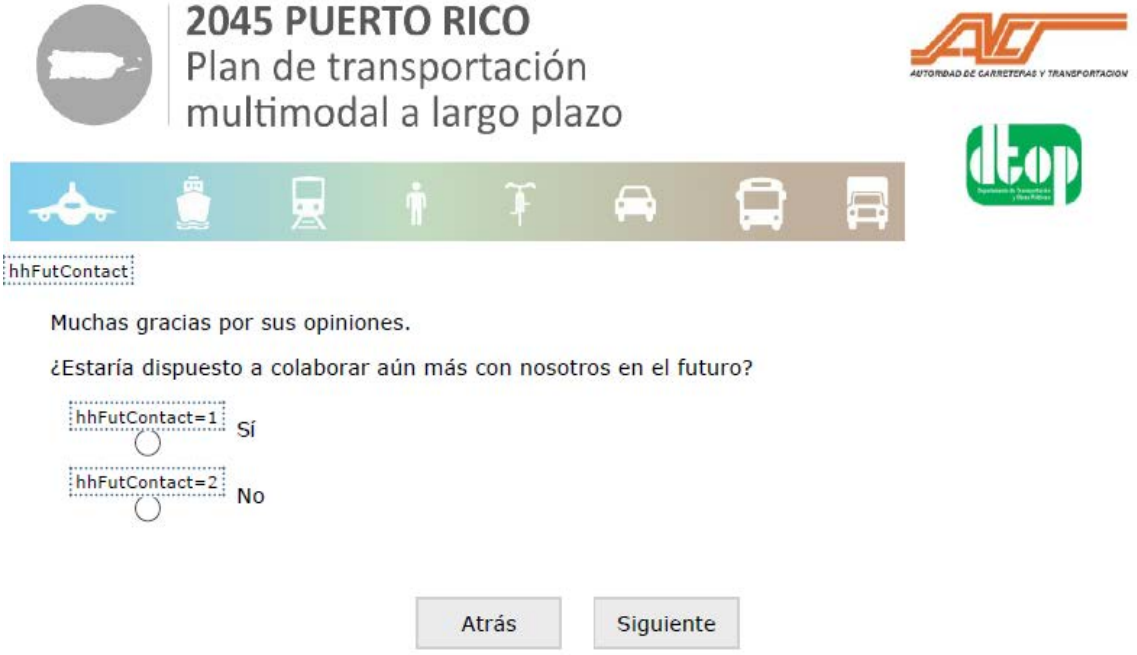
Source: SDG

Figure A.129: Answer More Questions



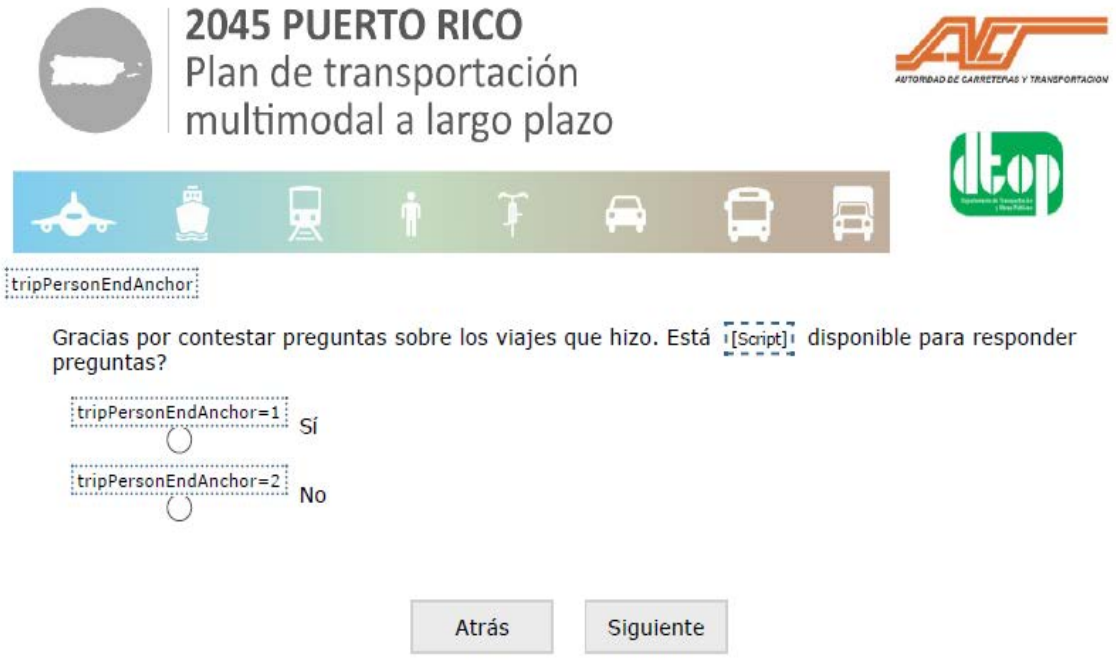
Source: SDG

Figure A.130: Willing to Collaborate



Source: SDG

Figure A.131: Available to Answer

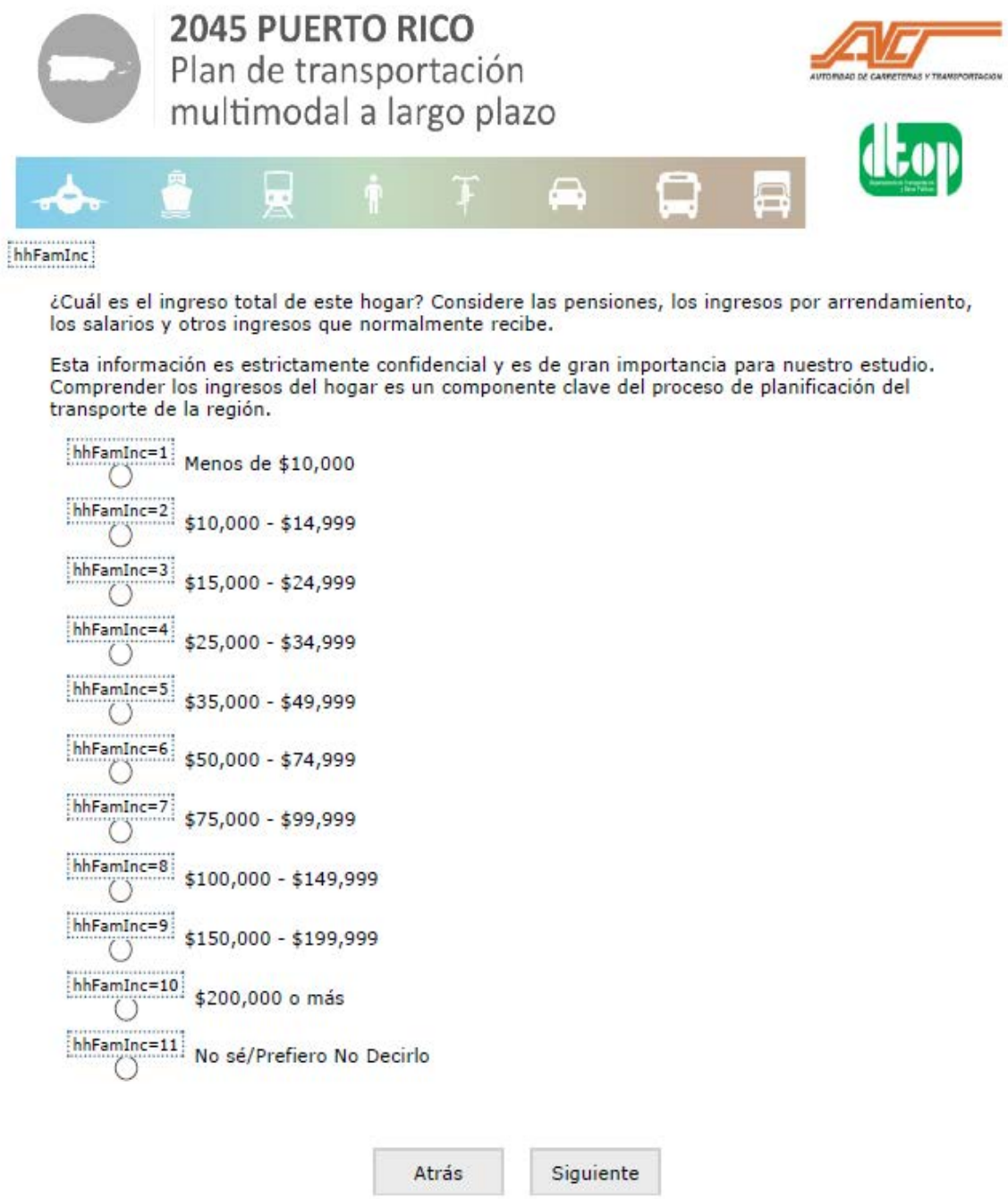


Source: SDG

Figure A.132: Thank You Page

Source: SDG

Figure A.133: Household Income



Source: SDG

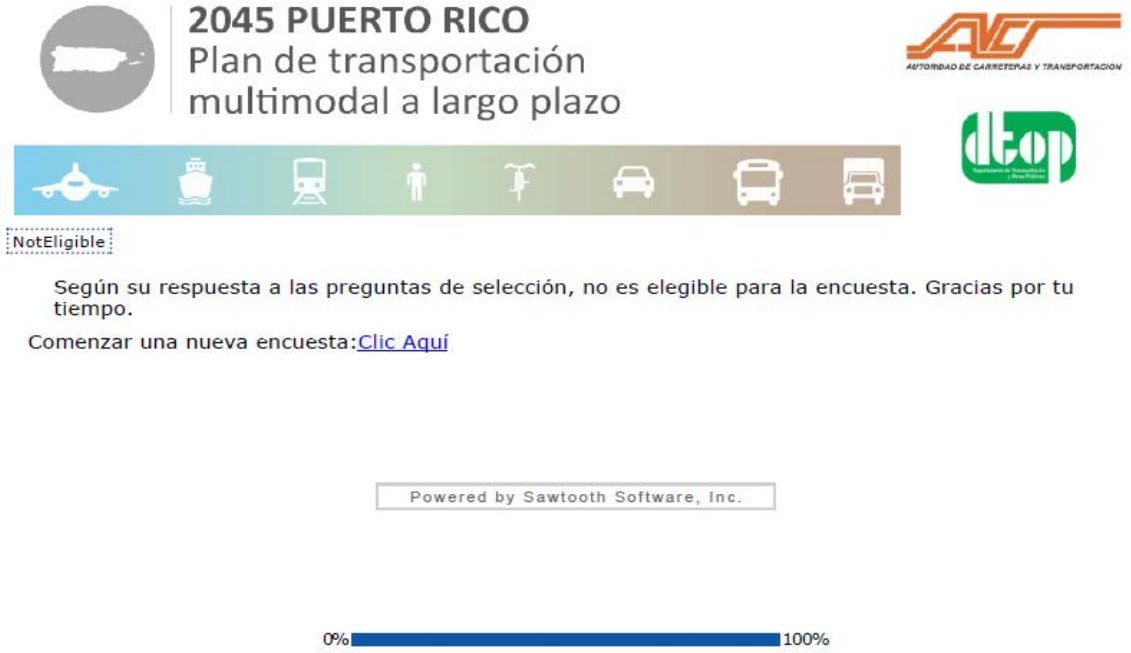
Figure A.134: Information to Participate in a Raffle

Source: SDG

Figure A.135: End of the Survey

Source: SDG

Figure A.136: Not Eligible Screen Information



Source: SDG

B APPENDIX B ADVANCE LETTERS

ENGLISH VERSION

Figure B.1: PRHTS Advance Letter – English Version

GOVERNMENT OF PUERTO RICO
Puerto Rico Highway and Transportation Authority

January 22, 2018

Dear Puerto Rico Resident

HOUSEHOLD TRAVEL SURVEYS

The Puerto Rico Department of Transportation and Public Works (PRDTPW) and the Metropolitan Planning Organization (MPC), through the Puerto Rico Highway and Transportation Authority (PRHTA), is conducting a Household Travel Survey to understand the mobility and travel patterns conditions of Puerto Rico. This survey will allow us to assess the operational conditions of our roads so that we can plan projects that will improve the quality of transport and accessibility to the citizens of the island. The results of this survey will be used to develop the 2045 Long Range Transportation Plan as required by federal regulations.

Your home has been randomly selected to participate in this household travel survey. Your participation is voluntary, confidential and essential for the planning process. The survey will be conducted by the Steer Davies Gleave with the support of Infocus@bussiness, on behalf of the PRHTA. Provided responses are completely confidential and the data will be used only for statistical purposes.

The interview addresses questions related to your household characteristics, the availability of vehicle or mode in which its members travel daily (public transport, Uber, your private vehicle) and the travel routes done daily by your family or household members. The survey provides the following three ways to participate at your convenience:

1. **Phone call:** a trained interviewer from Infocus will call your home to carry out the survey.
2. **Interviews at home:** a trained interviewer from Infocus will contact your household to schedule an appointment for a visit. A travel diary will be provided to record the trips you and member of your household make regularly during weekdays.
3. **Internet:** a trained interviewer from Infocus will call your home to provide the password you need to access the survey. Complete the survey by logging on to the web site at **https://PRHTS.sawtoothsoftware.com/EN/login.html** and entering your unique password.

To ensure that the survey is an instrument accessible both for Hispanics and for English speakers, it will be available in both languages, Spanish and English.

If you have any questions about the Household Travel Survey, please contact Infocus at the **(787)- 991-7702** or send us an email to 2045_prirtp@dtop.pr.gov .

Thank you very much for your attention and participation.

Cordially,

Ivelisse R. Gorbea Class, PPL
Strategic Planning Office

Centro Gubernamental Roberto Sánchez Vilella, Torre Sur / P.O. Box 41269 , San Juan, Puerto Rico 00940-1269
Teléfono 787 722 5929 / www.dtop.pr.gov

Source: Puerto Rico Highway Transportation Authority

SPANISH VERSION

Figure B.2: PRHTS Advance Letter – Spanish Version

GOBIERNO DE PUERTO RICO
Autoridad de Carreteras y Transportación

22 de enero de 2018

Estimado residente de Puerto Rico:

ENCUESTAS DE MOVILIDAD

El Departamento de Transportación y Obras Públicas de Puerto Rico (DTOP) y la Organización Metropolitana de Planificación, a través de la Autoridad de Carreteras y Transportación de Puerto Rico (ACT), está realizando una Encuesta de Movilidad para entender los patrones de viaje y movilidad de los hogares en Puerto Rico. Esta encuesta nos permitirá evaluar las condiciones existentes de la operación de nuestras carreteras de manera que podamos planificar proyectos que mejorarán la calidad del transporte y accesibilidad para los ciudadanos de la isla. Los resultados de esta encuesta se usarán para preparar el Plan de Transportación a Largo Plazo para el año 2045.

Su hogar ha sido seleccionado al azar para participar en esta encuesta de movilidad. Su participación es voluntaria, confidencial y esencial para el proceso de planificación. La encuesta se llevará a cabo por la empresa Steer Davies Gleave con el apoyo de la compañía Infocus@bussiness a nombre de la ACT. Las respuestas proporcionadas son completamente confidenciales y los datos se usarán sólo con fines estadísticos.

La entrevista aborda preguntas relacionadas a las características del hogar, la disponibilidad de vehículo o modo en que viaja diariamente (transporte público, Uber, su vehículo privado) y las rutas de viaje que realiza diariamente. La encuesta provee las siguientes tres maneras de participar para su mejor conveniencia:

1. **Llamada telefónica:** un entrevistador capacitado de la compañía Infocus llamará a su hogar para realizar la encuesta.
2. **Entrevistas en el hogar:** un entrevistador capacitado de la compañía Infocus se pondrá en contacto con su hogar para programar una cita para una visita. Se proporcionará un diario de viaje para registrar los recorridos que a diario usted y los miembros de su hogar realizan regularmente en días de semana.
3. **Internet:** un entrevistador capacitado de la compañía Infocus llamará a su hogar para proporcionar la contraseña que necesita para acceder a la encuesta. Complete la encuesta iniciando sesión en el sitio web en **https://PRHTS.sawtoothsoftware.com/ES/login.html** e ingresando su contraseña única.

Para garantizar que la encuesta sea un instrumento accesible la misma estará disponible en ambos idiomas, español e inglés.

Si tiene alguna pregunta sobre la encuesta de movilidad, comuníquese con la compañía Infocus al the **(787)-991-7702** o envíenos un correo electrónico a **2045_prhtp@dtop.pr.gov**.

Muchas gracias por su atención y participación.

Cordialmente,

Ivelisse R. Gorbea Class, PPL
Oficina de Planificación Estratégica

Centro Gubernamental Roberto Sánchez Vilella, Torre Sur / P.O. Box 41999, San Juan, Puerto Rico 00940-1999
Teléfono 787.721.9090 / www.dtop.pr.gov

Source: Puerto Rico Highway Transportation Authority

C APPENDIX C PUBLIC OUTREACH ANNOUNCEMENTS

Figure C.1: PRHTS Announcement – Flyer

¿Cómo puedes participar?

1 Primer Paso
Llamar

Llámenos para participar al (787)- 991- 7702

2 Segundo Paso
Completar la encuesta de movilidad

Una vez determinada la elegibilidad de su hogar para participar, tendrá las siguientes opciones para completar la encuesta.

1 Llamada telefónica	Un entrevistador capacitado llamará a su hogar para realizar la encuesta vía telefónica.
2 Entrevista en el hogar	Un entrevistador capacitado se pondrá en contacto con su hogar para programar una visita. En la visita se estará proporcionando un diario de viaje donde se registrarán los recorridos que a diario usted y los miembros de su hogar realizan regularmente en la semana.
3 Encuesta online	Un entrevistador capacitado llamará a su hogar para proporcionarle una contraseña que necesitará para acceder la encuesta electrónicamente. Completará la encuesta iniciando sesión en la siguiente dirección; *https://PRHTS.sawtoothsoftware.com/ES/login.ht* e ingresando su contraseña única.

Confidencialidad

Su participación es voluntaria y su opinión es confidencial y clave para el proceso de planificación. La encuesta se llevará a cabo por la empresa Steer Davies Gleave con el apoyo de *Infocus@bussiness* a nombre de la ACT. Las respuestas proporcionadas son completamente confidenciales y los datos se usarán solo con fines estadísticos.

Una vez completada la encuestas, automáticamente estarás participando de una rifa donde podrás ganar uno de tres premios:

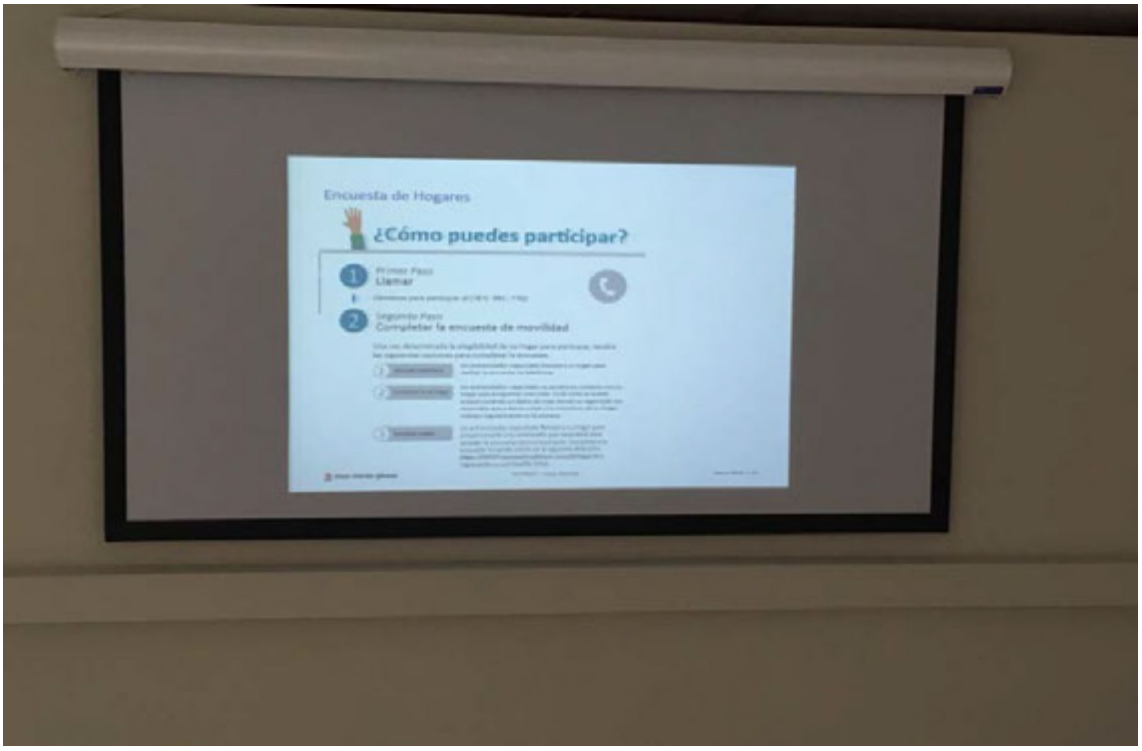
- 1er Premio: Samsung Galaxy Tab E SM-7377A
- 2do Premio: Tarjeta de regalo de $100
- 3er Premio: Action Camera, Dash Cam

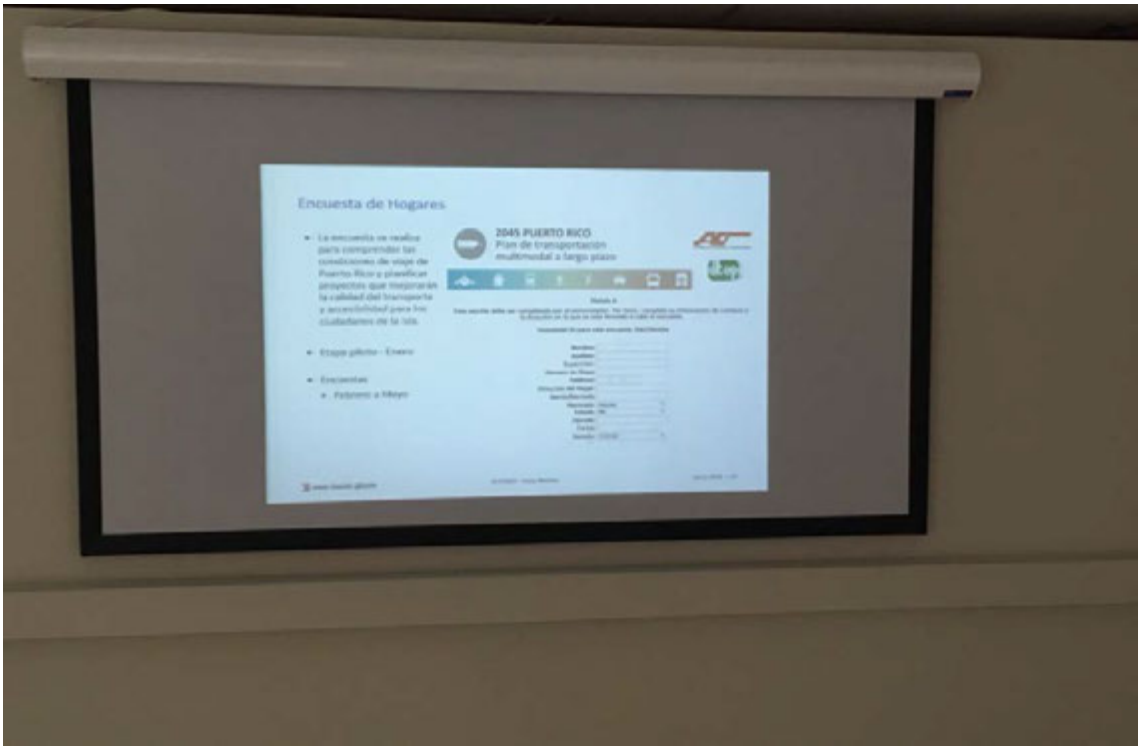
Garantizando que la encuesta sea un instrumento accesible tanto para hispanos como para anglo parlantes, la misma estará disponible en ambos idiomas, español e inglés.

Si tiene alguna pregunta sobre la encuesta de movilidad, comuníquese con Infocus al (787)-991-7702.

Source: SDG

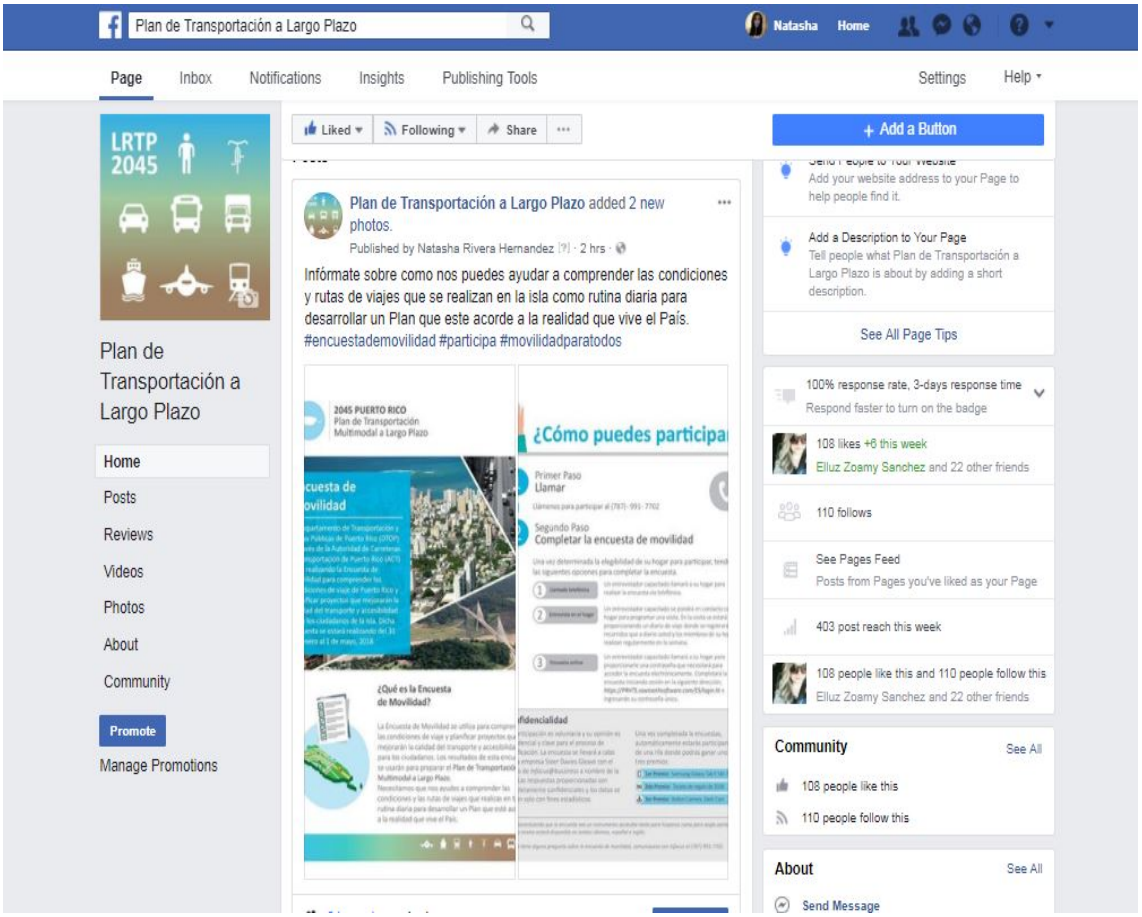
Figure C.2: PRHTS Announcement showed in Caguas Open House





Source: SDG

Figure C.3: PRHTS Announcement in Facebook Webpage



Source: SDG

D APPENDIX D RECRUITMENT MAPS

Table D.1: Map Numbers by Municipality

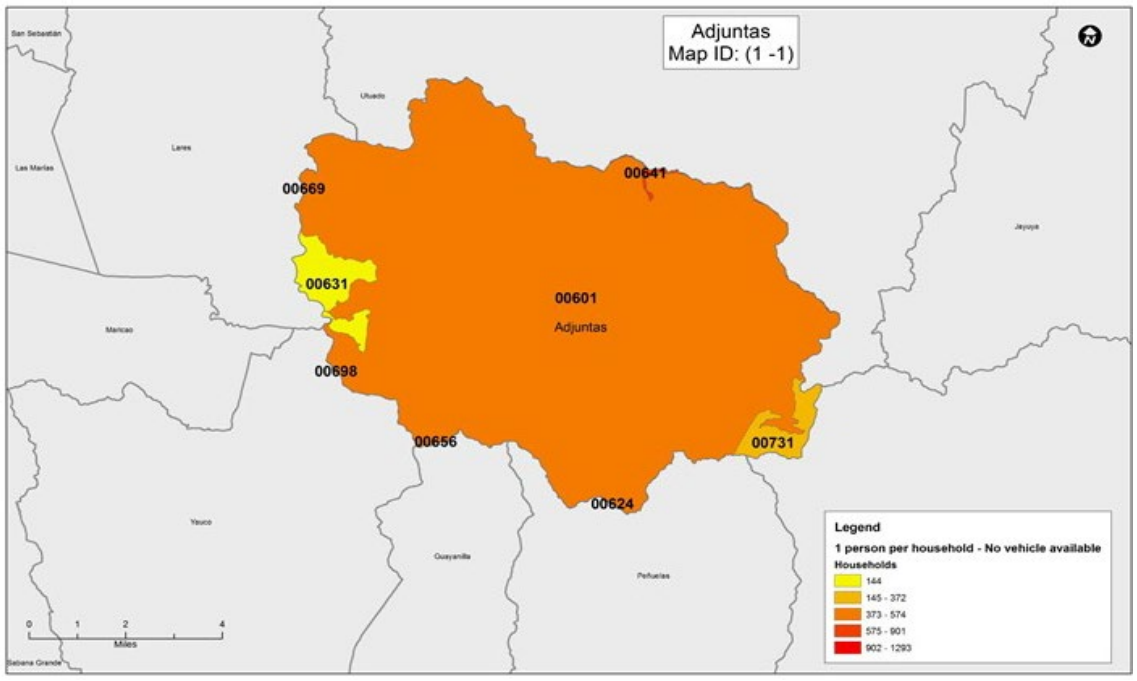
Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:				
	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
Adjuntas	(1-1)	(1-2)	(1-3)	(1-4)	(1-5)	(1-6)	(1-7)	(1-8)	(1-9)	(1-10)	(1-11)	(1-12)	(1-13)	(1-14)	(1-15)	(1-16)	(1-17)	(1-18)	(1-19)	(1-20)
Aguada	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Aguadilla	(3-1)	(3-2)	(3-3)	(3-4)	(3-5)	(3-6)	(3-7)	(3-8)	(3-9)	(3-10)	(3-11)	(3-12)	(3-13)	(3-14)	(3-15)	(3-16)	(3-17)	(3-18)	(3-19)	(3-20)
Aguas Buenas	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Aibonito	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Añasco	(80-1)	(80-2)	(80-3)	(80-4)	(80-5)	(80-6)	(80-7)	(80-8)	(80-9	(80-10)	(80-11	(80-12)	(80-13)	(80-14)	(80-15)	(80-16)	(80-17)	(80-18)	(80-19)	(80-20)
Arecibo	(82-1)	(82-2)	(82-3)	(82-4)	(82-5)	(82-6)	(82-7)	(82-8)	(82-9)	(82-10)	(82-11)	(82-12)	(82-13)	(82-14)	(82-15)	(82-16)	(82-17)	(82-18)	(82-19)	(82-20)
Arroyo	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Barceloneta	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Barranquitas	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Bayamón	(11-1)	(11-2)	(11-3)	(11-4)	(11-5)	(11-6)	(11-7)	(11-8)	(11-9)	(11-10)	(11-11)	(11-12)	(11-13)	(11-14)	(11-15)	(11-16)	(11-17)	(11-18)	(11-19)	(11-20)
Cabo Rojo	(80-1)	(80-2)	(80-3)	(80-4)	(80-5)	(80-6)	(80-7)	(80-8)	(80-9	(80-10)	(80-11	(80-12)	(80-13)	(80-14)	(80-15)	(80-16)	(80-17)	(80-18)	(80-19)	(80-20)
Caguas	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Camuy	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Canóvanas	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Carolina	(16-1)	(16-2)	(16-3)	(16-4)	(16-5)	(16-6)	(16-7)	(16-8)	(16-9)	(16-10)	(16-11)	(16-12)	(16-13)	(16-14)	(16-15)	(16-16)	(16-17)	(16-18)	(16-19)	(16-20)
Cataño	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Cayey	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Ceiba	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Ciales	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Cidra	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Coamo	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Comerío	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Corozal	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Culebra	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Dorado	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Fajardo	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)

Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:				
	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
Florida	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Guánica	(80-1)	(80-2)	(80-3)	(80-4)	(80-5)	(80-6)	(80-7)	(80-8)	(80-9	(80-10)	(80-11	(80-12)	(80-13)	(80-14)	(80-15)	(80-16)	(80-17)	(80-18)	(80-19)	(80-20)
Guayama	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Guayanilla	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Guaynabo	(32-1)	(32-2)	(32-3)	(32-4)	(32-5)	(32-6)	(32-7)	(32-8)	(32-9)	(32-10)	(32-11)	(32-12)	(32-13)	(32-14)	(32-15)	(32-16)	(32-17)	(32-18)	(32-19)	(32-20)
Gurabo	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Hatillo	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Hormigueros	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Humacao	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Isabela	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Jayuya	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Juana Díaz	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Juncos	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Lajas	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Lares	(80-1)	(80-2)	(80-3)	(80-4)	(80-5)	(80-6)	(80-7)	(80-8)	(80-9	(80-10)	(80-11	(80-12)	(80-13)	(80-14)	(80-15)	(80-16)	(80-17)	(80-18)	(80-19)	(80-20)
Las Marías	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Las Piedras	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Loíza	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Luquillo	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Manatí	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Maricao	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Maunabo	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Mayagüez	(80-1)	(80-2)	(80-3)	(80-4)	(80-5)	(80-6)	(80-7)	(80-8)	(80-9	(80-10)	(80-11	(80-12)	(80-13)	(80-14)	(80-15)	(80-16)	(80-17)	(80-18)	(80-19)	(80-20)
Moca	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Morovis	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Naguabo	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Naranjito	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Orocovis	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)

Municipalities	1-person household:					2-person household:					3-person household:					4-or-more-person household:				
	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available	No vehicle available	1 vehicle available	2 vehicles available	3 vehicles available	4 or more vehicles available
Patillas	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Peñuelas	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Ponce	(58-1)	(58-2)	(58-3)	(58-4)	(58-5)	(58-6)	(58-7)	(58-8)	(58-9)	(58-10)	(58-11)	(58-12)	(58-13)	(58-14)	(58-15)	(58-16)	(58-17)	(58-18)	(58-19)	(58-20)
Quebradillas	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Rincón	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Río Grande	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Sabana Grande	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Salinas	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
San Germán	(80-1)	(80-2)	(80-3)	(80-4)	(80-5)	(80-6)	(80-7)	(80-8)	(80-9)	(80-10)	(80-11	(80-12)	(80-13)	(80-14)	(80-15)	(80-16)	(80-17)	(80-18)	(80-19)	(80-20)
San Juan	(65-1)	(65-2)	(65-3)	(65-4)	(65-5)	(65-6)	(65-7)	(65-8)	(65-9)	(65-10)	(65-11)	(65-12)	(65-13)	(65-14)	(65-15)	(65-16)	(65-17)	(65-18)	(65-19)	(65-20)
San Lorenzo	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)
San Sebastián	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Santa Isabel	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Toa Alta	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Toa Baja	(82-1)	(82-2)	(82-3)	(82-4)	(82-5)	(82-6)	(82-7)	(82-8)	(82-9)	(82-10)	(82-11)	(82-12)	(82-13)	(82-14)	(82-15)	(82-16)	(82-17)	(82-18)	(82-19)	(82-20)
Trujillo Alto	(71-1)	(71-2)	(71-3)	(71-4)	(71-5)	(71-6)	(71-7)	(71-8)	(71-9)	(71-10)	(71-11)	(71-12)	(71-13)	(71-14)	(71-15)	(71-16)	(71-17)	(71-18)	(71-19)	(71-20)
Utuado	(80-1)	(80-2)	(80-3)	(80-4)	(80-5)	(80-6)	(80-7)	(80-8)	(80-9	(80-10)	(80-11	(80-12)	(80-13)	(80-14)	(80-15)	(80-16)	(80-17)	(80-18)	(80-19)	(80-20)
Vega Alta	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Vega Baja	(81-1)	(81-2)	(81-3)	(81-4)	(81-5)	(81-6)	(81-7)	(81-8)	(81-9)	(81-10)	(81-11)	(81-12)	(81-13)	(81-14)	(81-15)	(81-16)	(81-17)	(81-18)	(81-19)	(81-20)
Vieques	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Villalba	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Yabucoa	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)
Yauco	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1)	(79-1	(79-1)	(79-1)	(79-1)	(79-1)

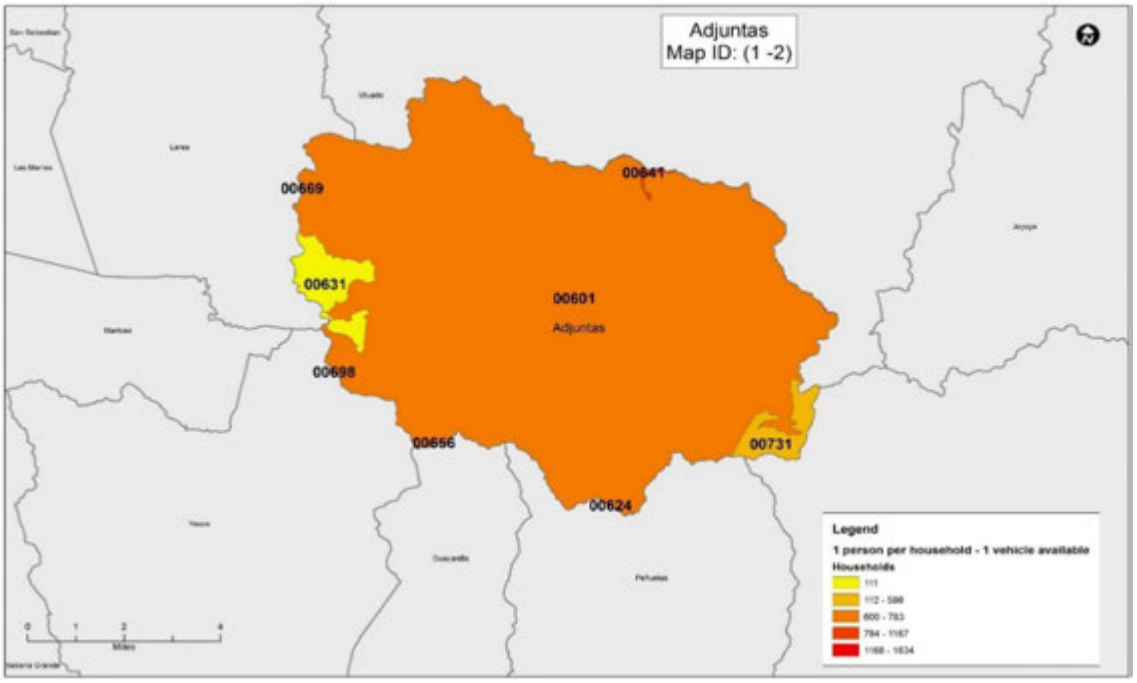
Source: SDG

Figure D.1: Adjuntas, 1 Person per Household – No Vehicle Available



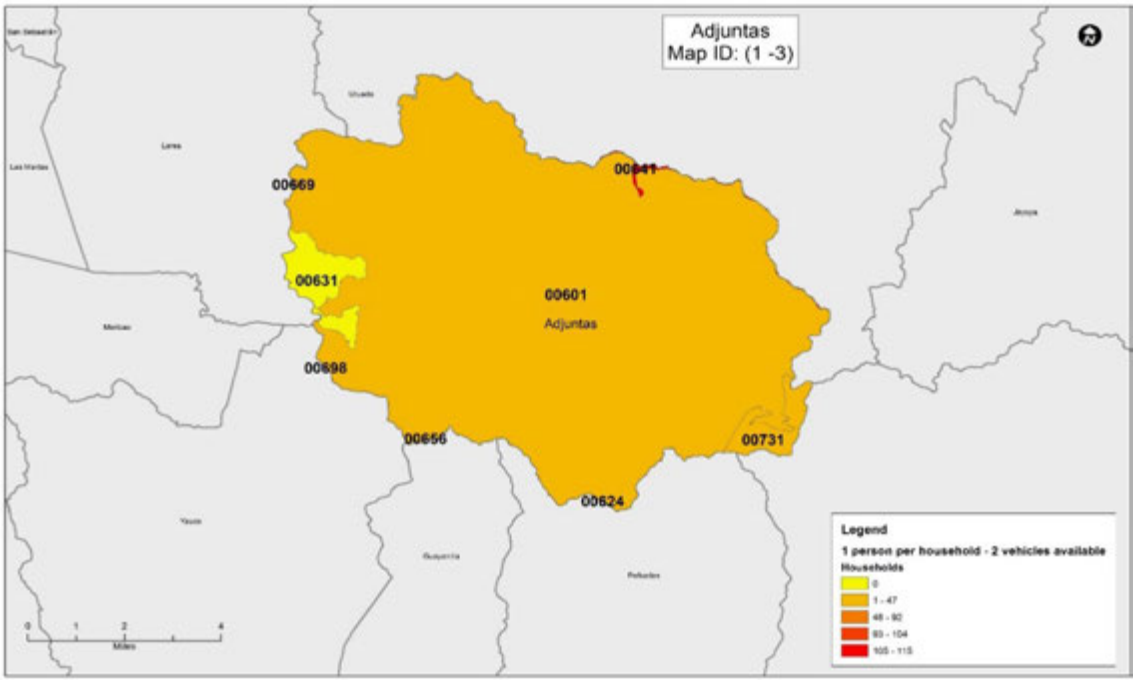
Source: US Census Bureau, 2015 and SDG

Figure D.2: Adjuntas, 1 per Household – 1 Vehicle Available



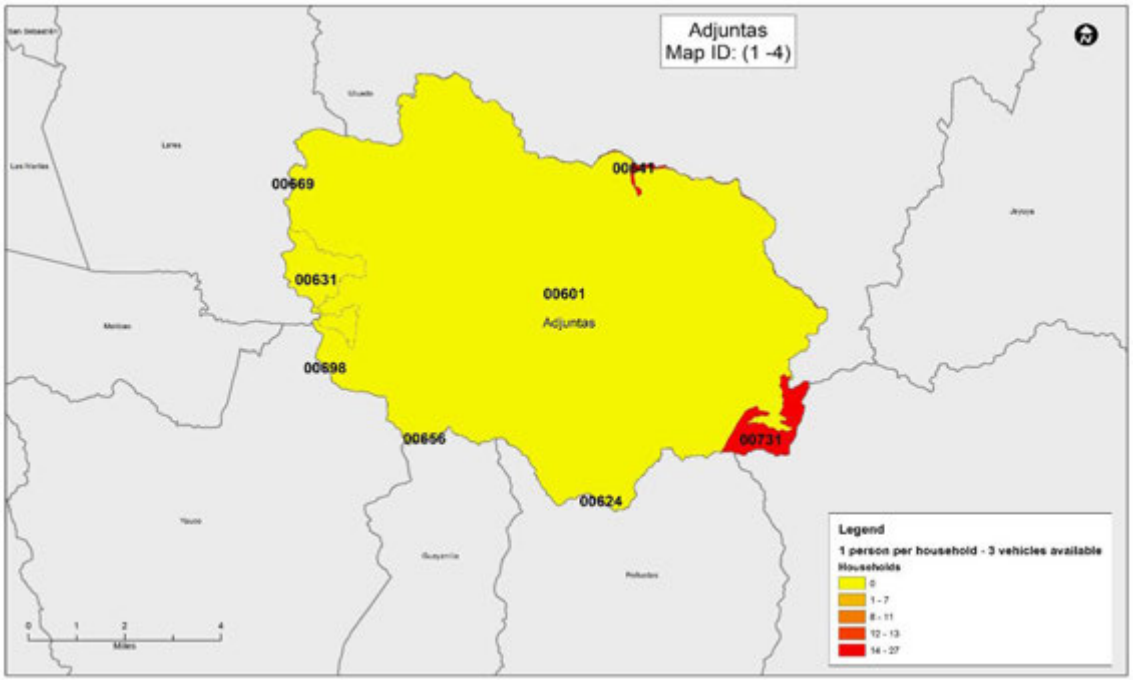
Source: US Census Bureau, 2015 and SDG

Figure D.3: Adjuntas, 1 Person per Household – 2 Vehicles Available



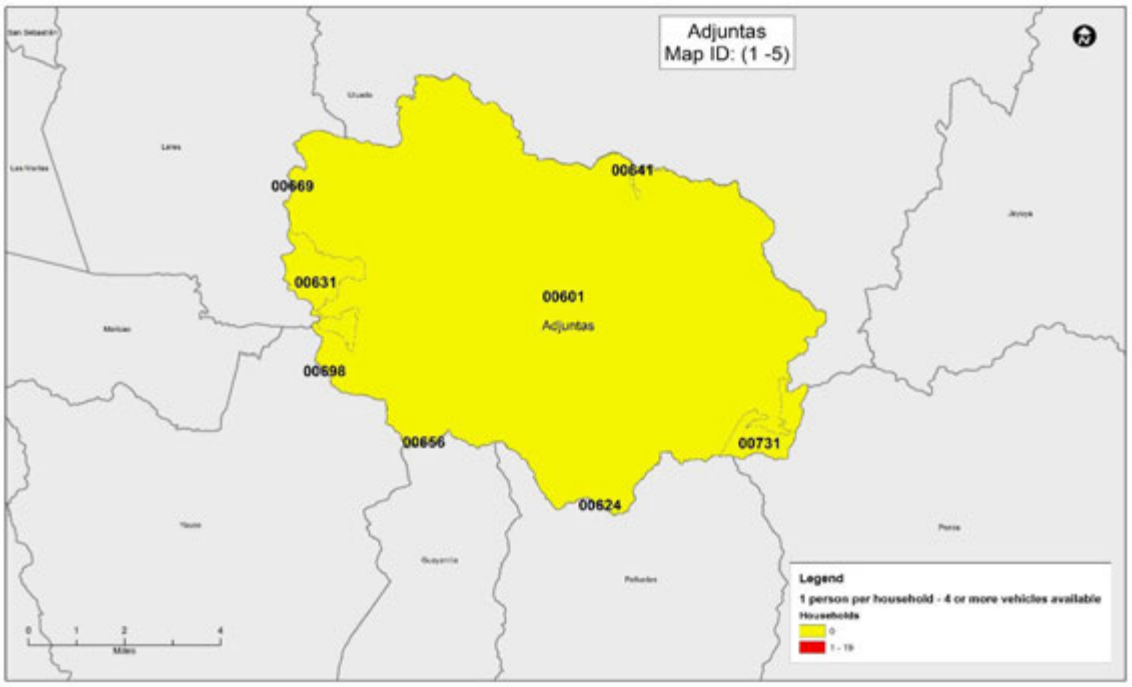
Source: US Census Bureau, 2015 and SDG

Figure D.4: Adjuntas, 1 Person per Household – 3 Vehicles Available



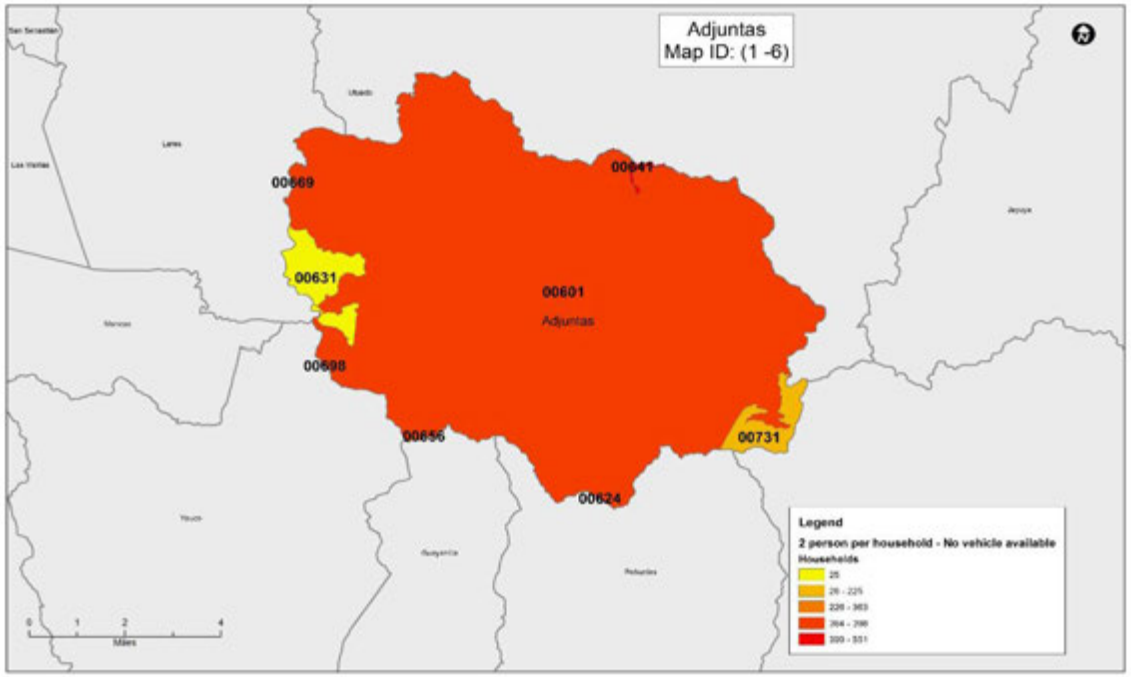
Source: US Census Bureau, 2015 and SDG

Figure D.5: Adjuntas, 1 Person per Household – 4 or More Vehicles Available



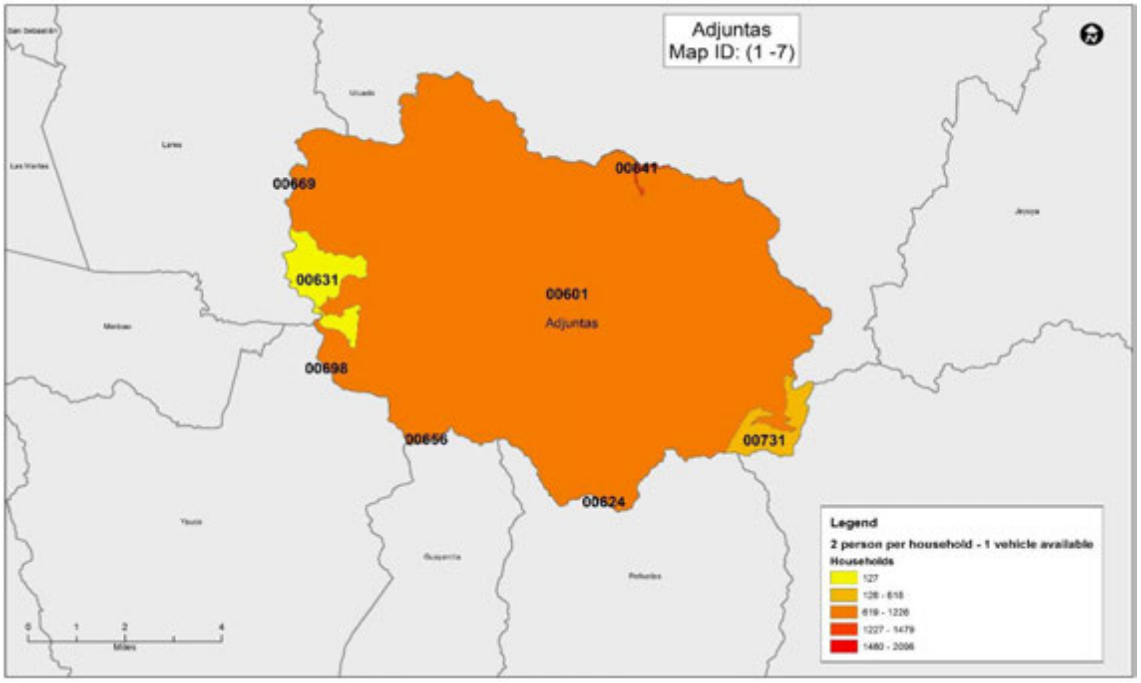
Source: US Census Bureau, 2015 and SDG

Figure D.6: Adjuntas, 2 Person per Household – No Vehicle Available



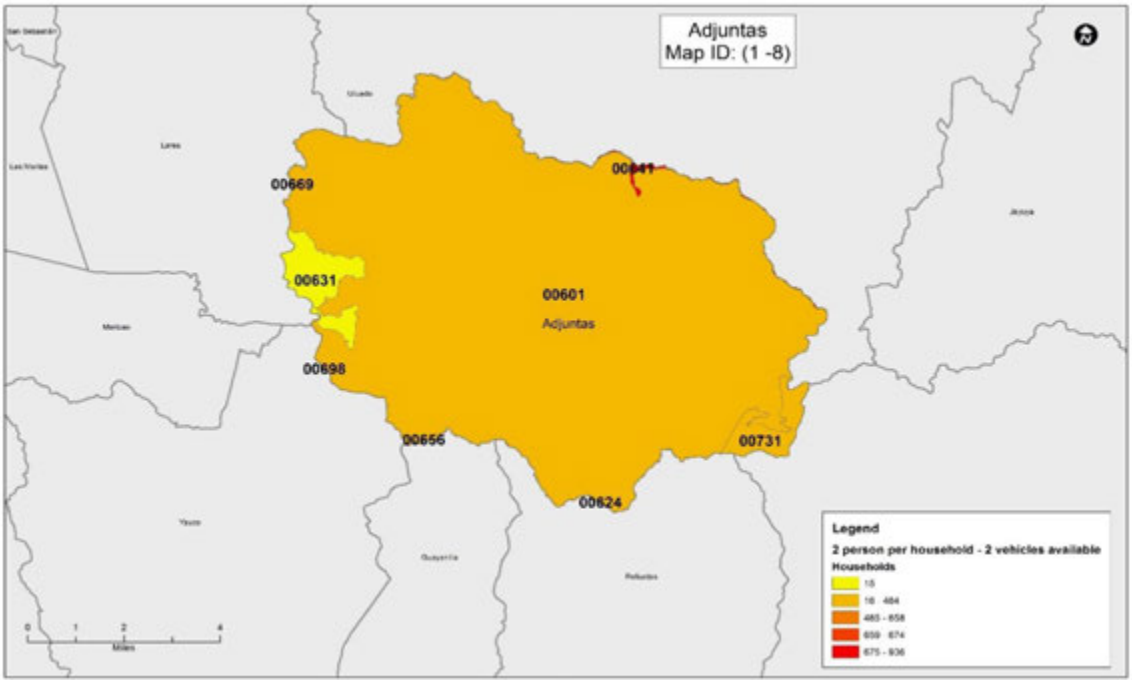
Source: US Census Bureau, 2015 and SDG

Figure D.7: Adjuntas, 2 Person per Household – 1 Vehicle Available



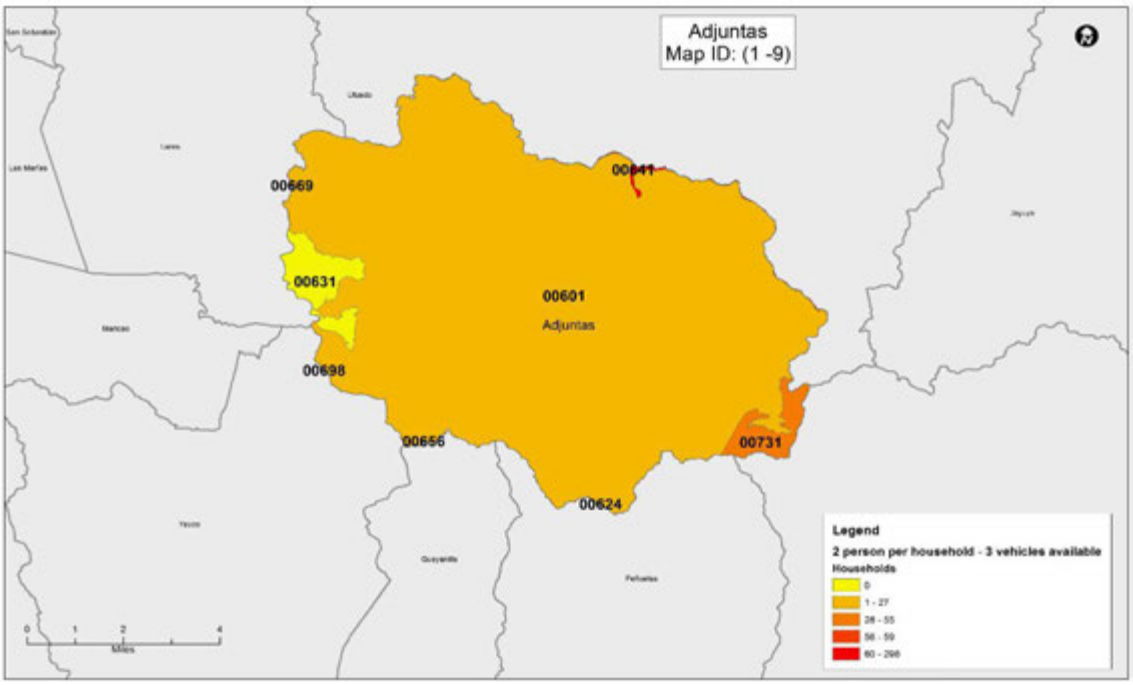
Source: US Census Bureau, 2015 and SDG

Figure D.8: Adjuntas, 2 Person per Household – 2 Vehicles Available



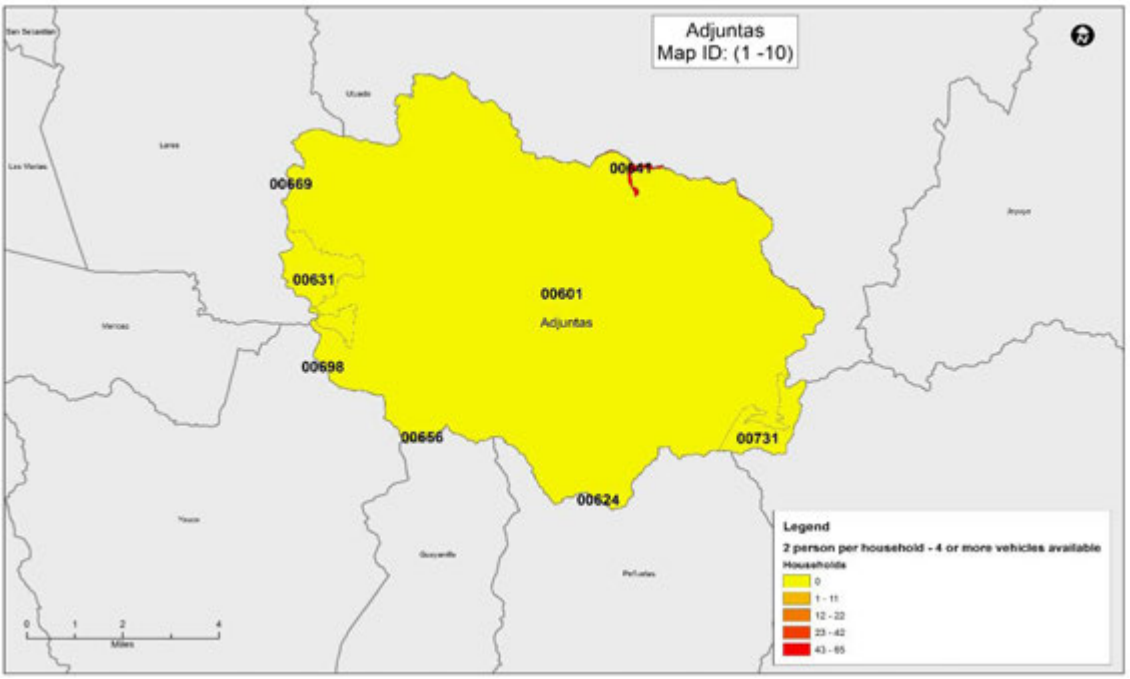
Source: US Census Bureau, 2015 and SDG

Figure D.9: Adjuntas, 2 Person per Household – 3 Vehicles Available



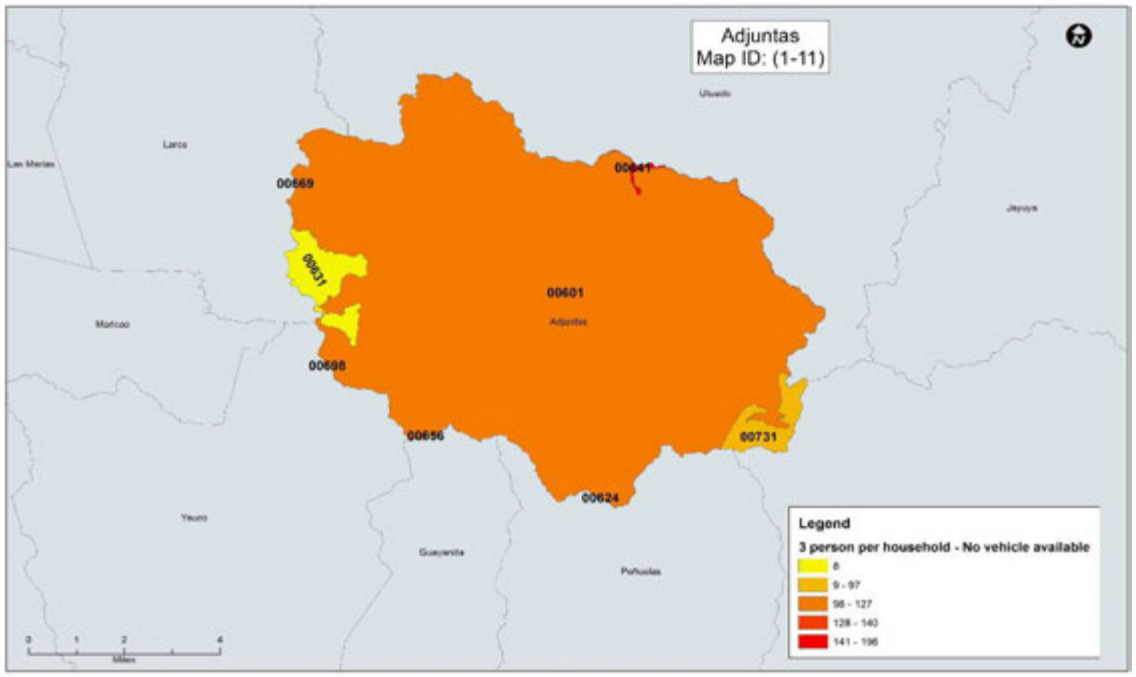
Source: US Census Bureau, 2015 and SDG

Figure D.10: Adjuntas, 2 Person per Household – 4 or more Vehicles Available



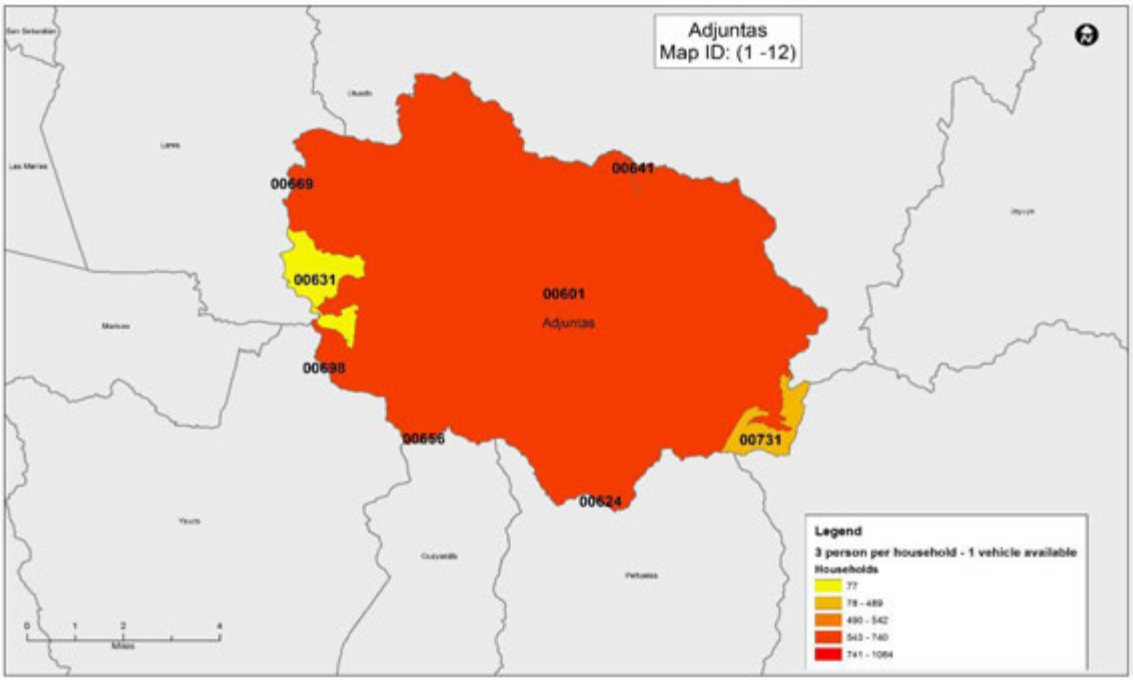
Source: US Census Bureau, 2015 and SDG

Figure D.11: Adjuntas, 3 Person per Household – No Vehicle Available



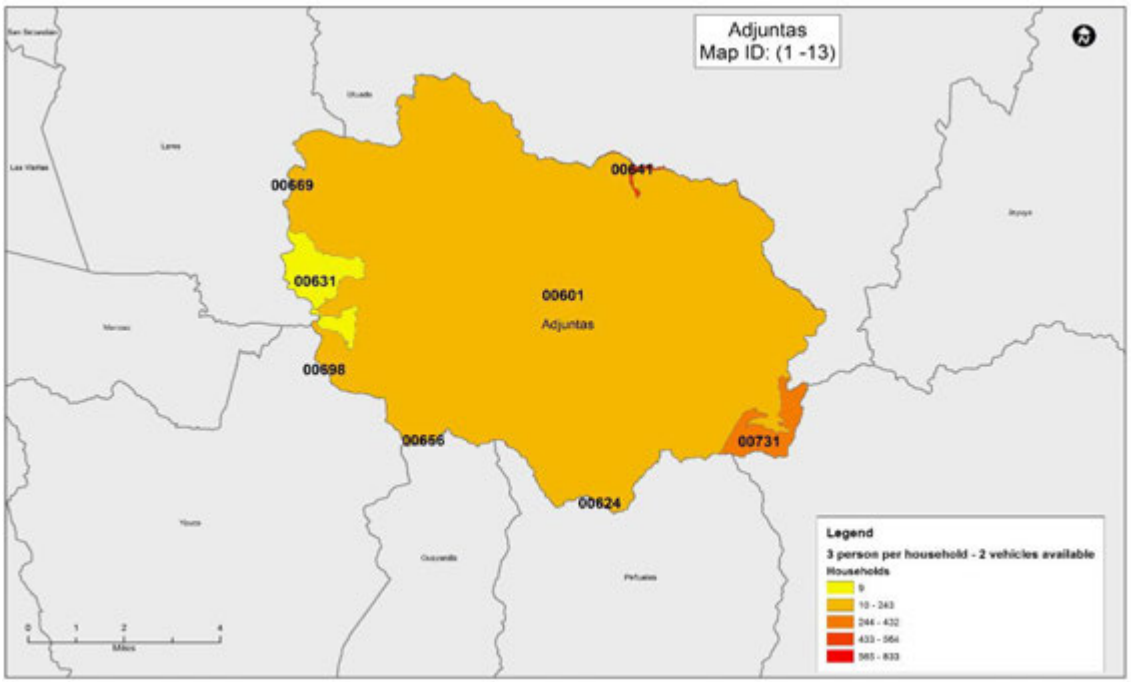
Source: US Census Bureau, 2015 and SDG

Figure D.12: Adjuntas, 3 Person per Household – 1 Vehicle Available



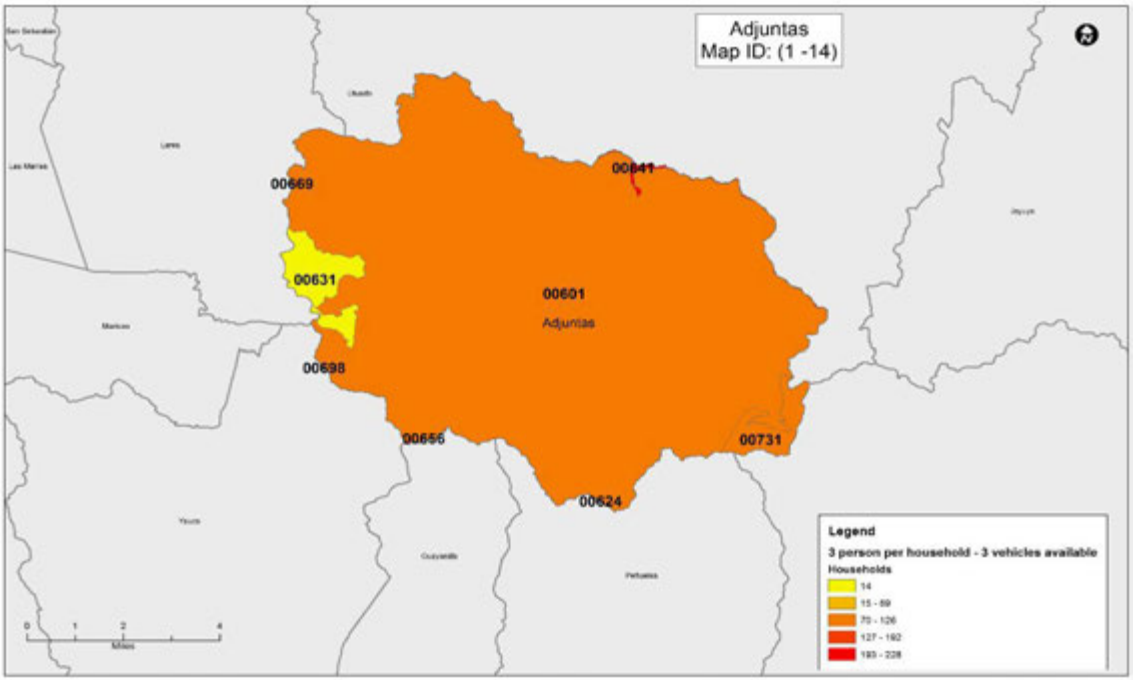
Source: US Census Bureau, 2015 and SDG

Figure D.13: Adjuntas, 3 Person per Household – 2 Vehicles Available



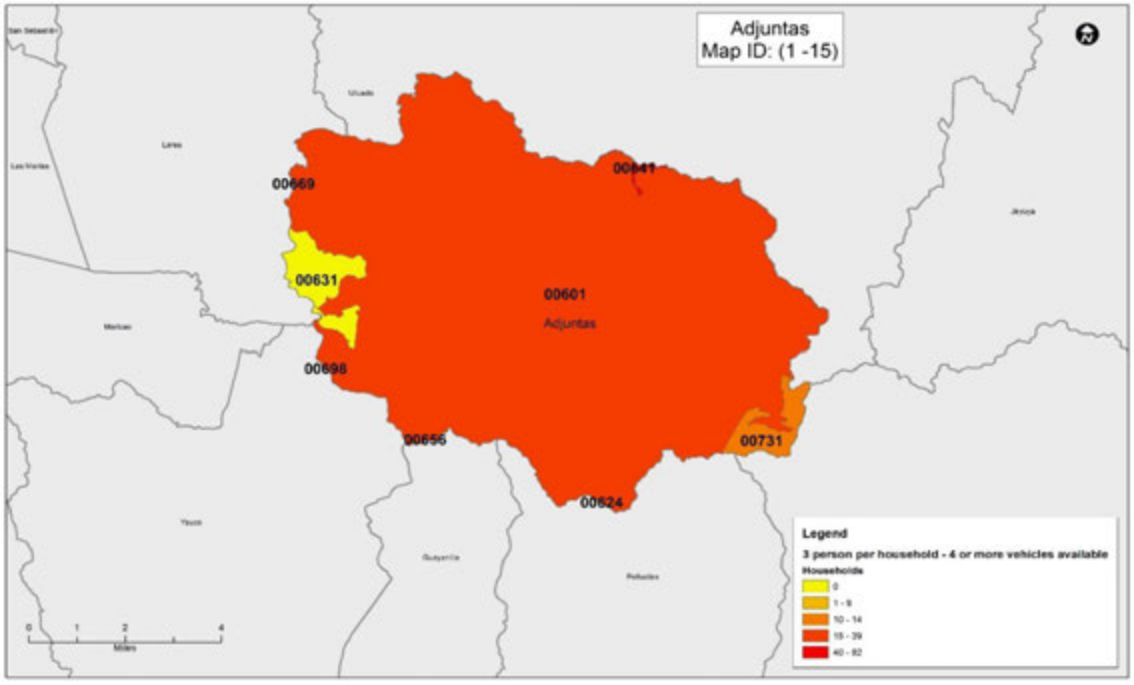
Source: US Census Bureau, 2015 and SDG

Figure D.14: Adjuntas, 3 Person per Household – 3 Vehicles Available



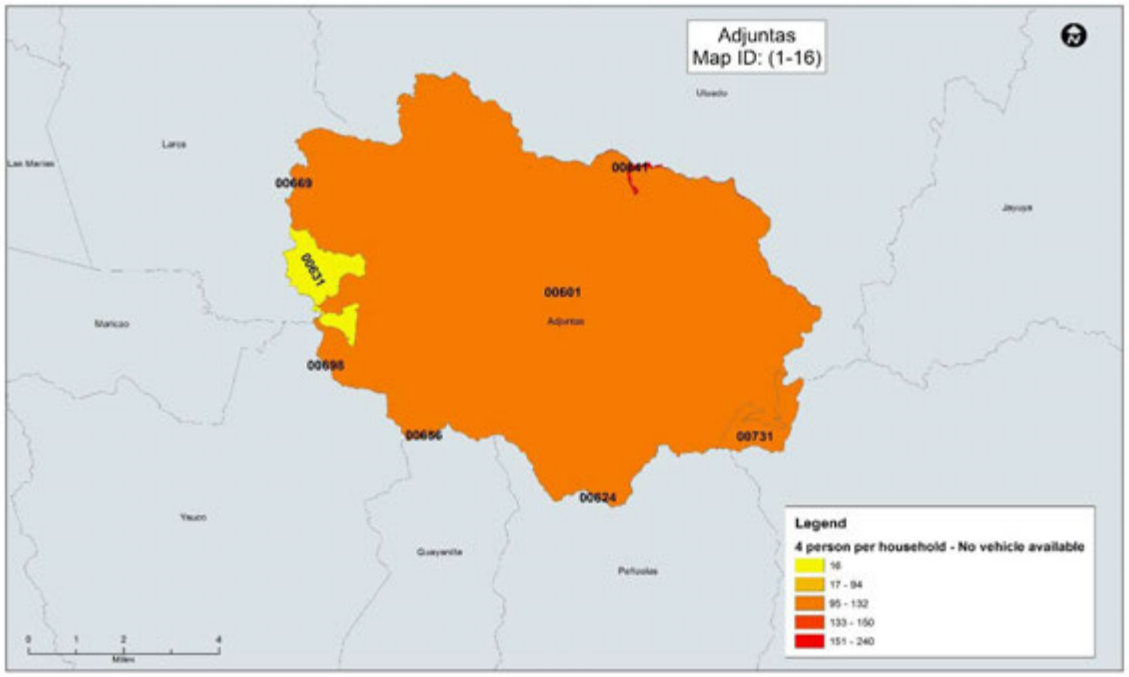
Source: US Census Bureau, 2015 and SDG

Figure D.15: Adjuntas, 3 Person per Household – 4 or More Vehicles Available



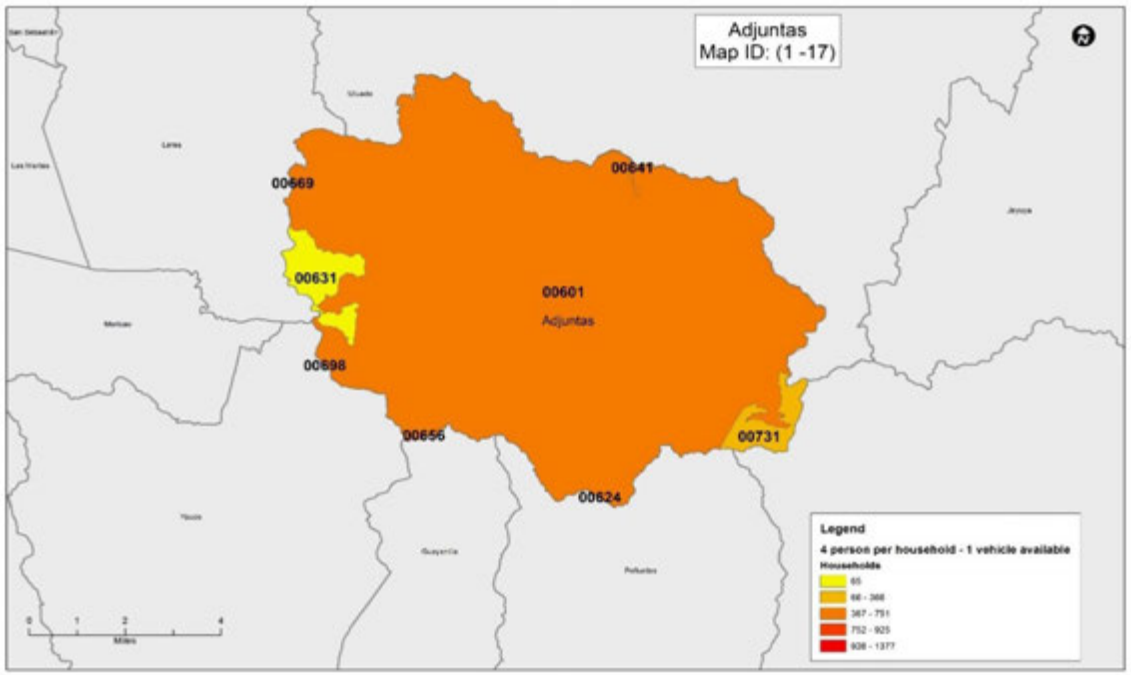
Source: US Census Bureau, 2015 and SDG

Figure D.16: Adjuntas, 4 Person per Household – No Vehicle Available



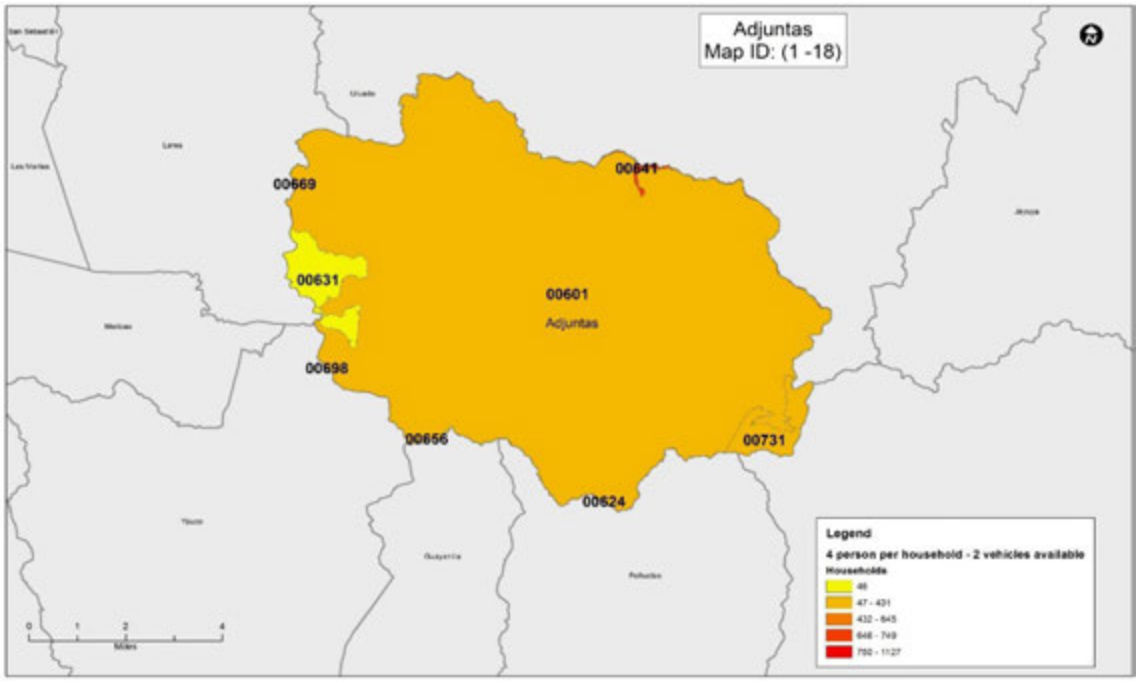
Source: US Census Bureau, 2015 and SDG

Figure D.17: Adjuntas, 4 Person per Household – 1 Vehicle Available



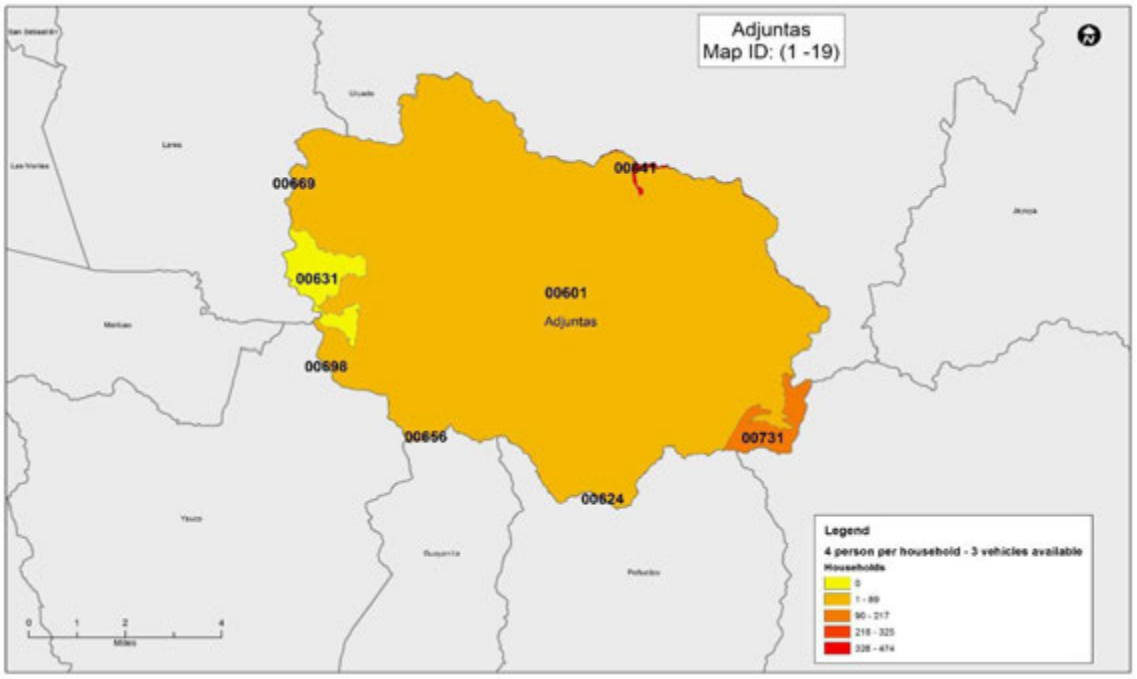
Source: US Census Bureau, 2015 and SDG

Figure D.18: Adjuntas, 4 Person per Household – 2 Vehicles Available



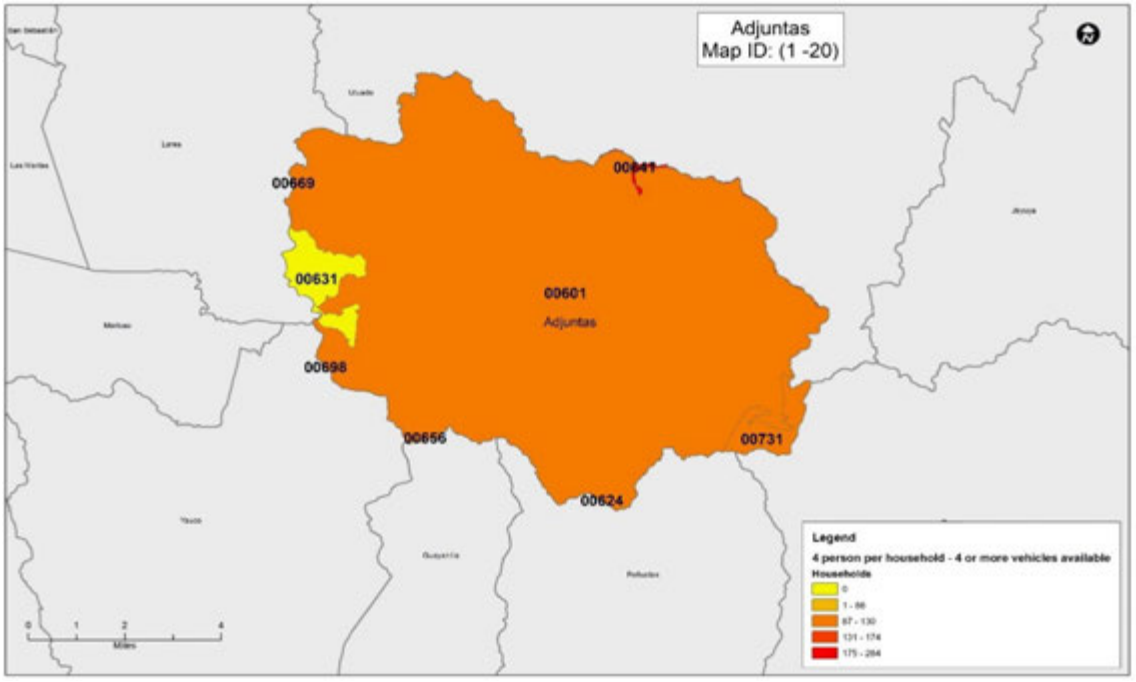
Source: US Census Bureau, 2015 and SDG

Figure D.19: Adjuntas, 4 Person per Household – 3 Vehicles Available



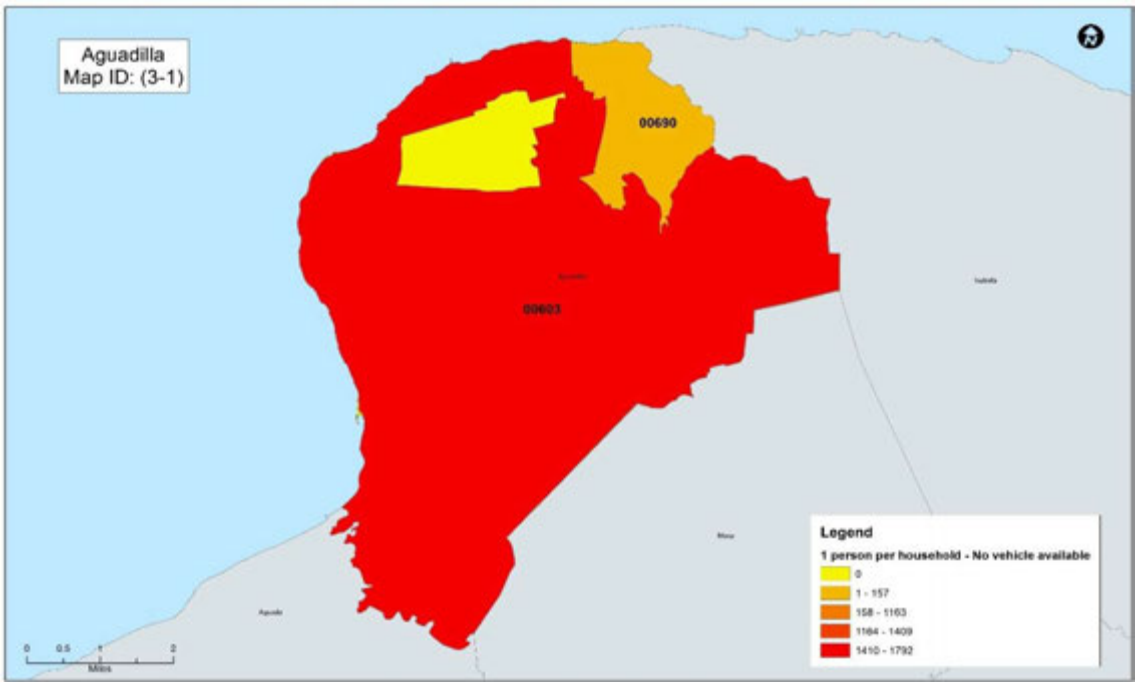
Source: US Census Bureau, 2015 and SDG

Figure D.20: Adjuntas, 4 Person per Household – 4 or More Vehicles Available



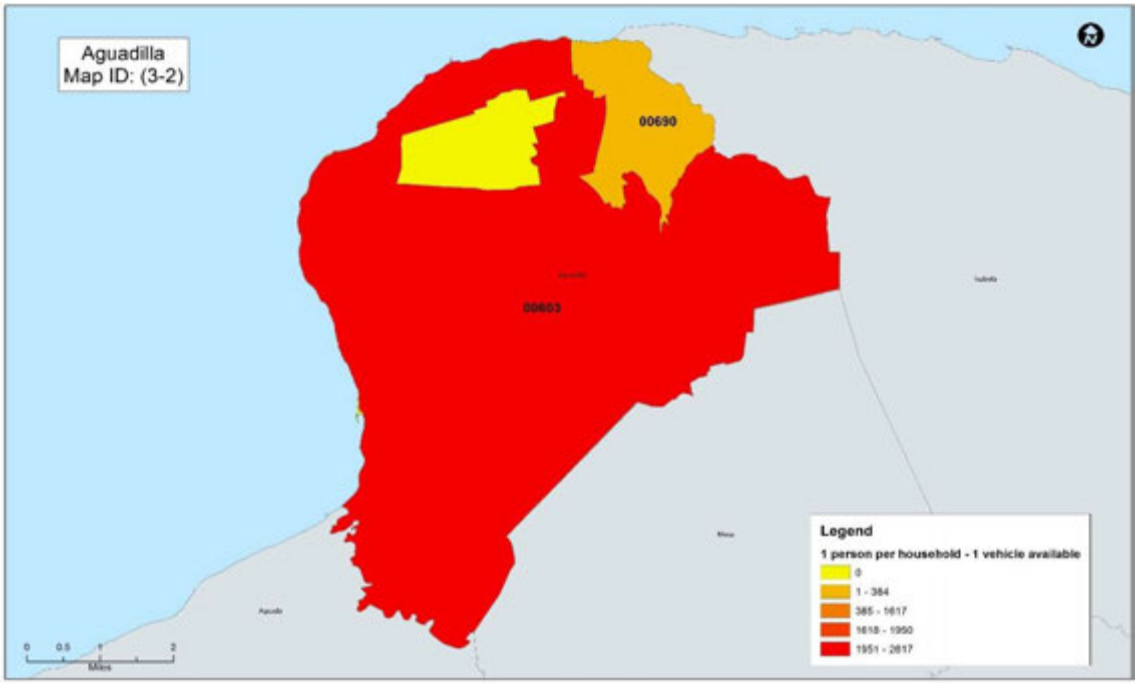
Source: US Census Bureau, 2015 and SDG

Figure D.21: Aguadilla, 1 Person per Household – No Vehicle Available



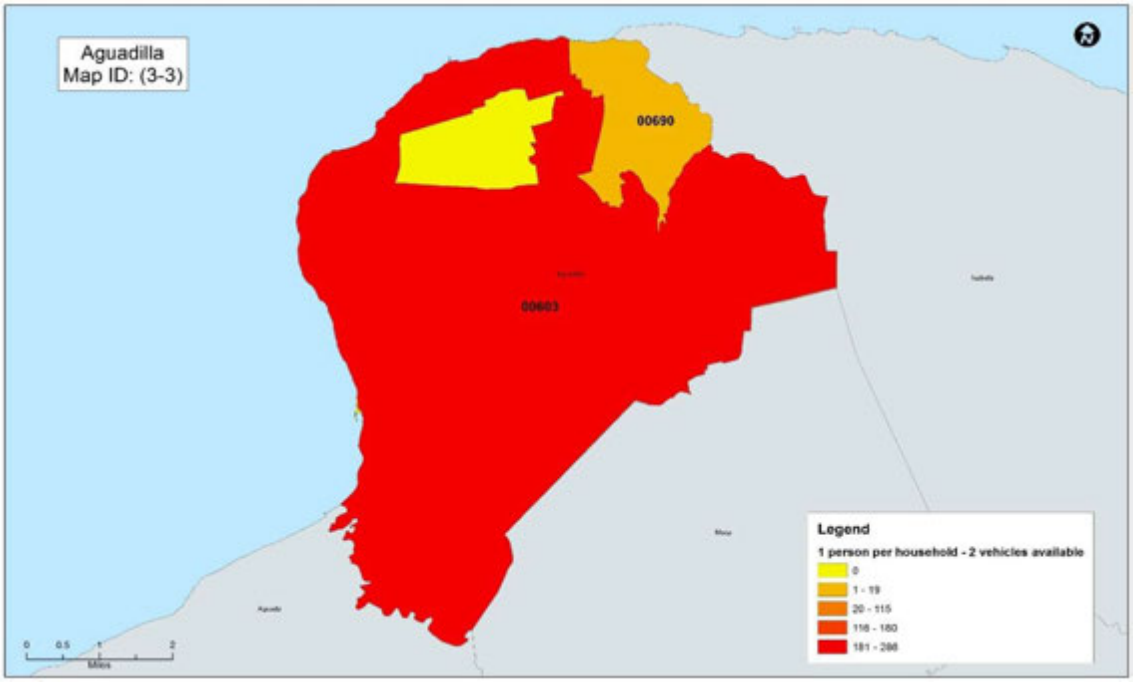
Source: US Census Bureau, 2015 and SDG

Figure D.22: Aguadilla, 1 Person per Household – 1 Vehicle Available



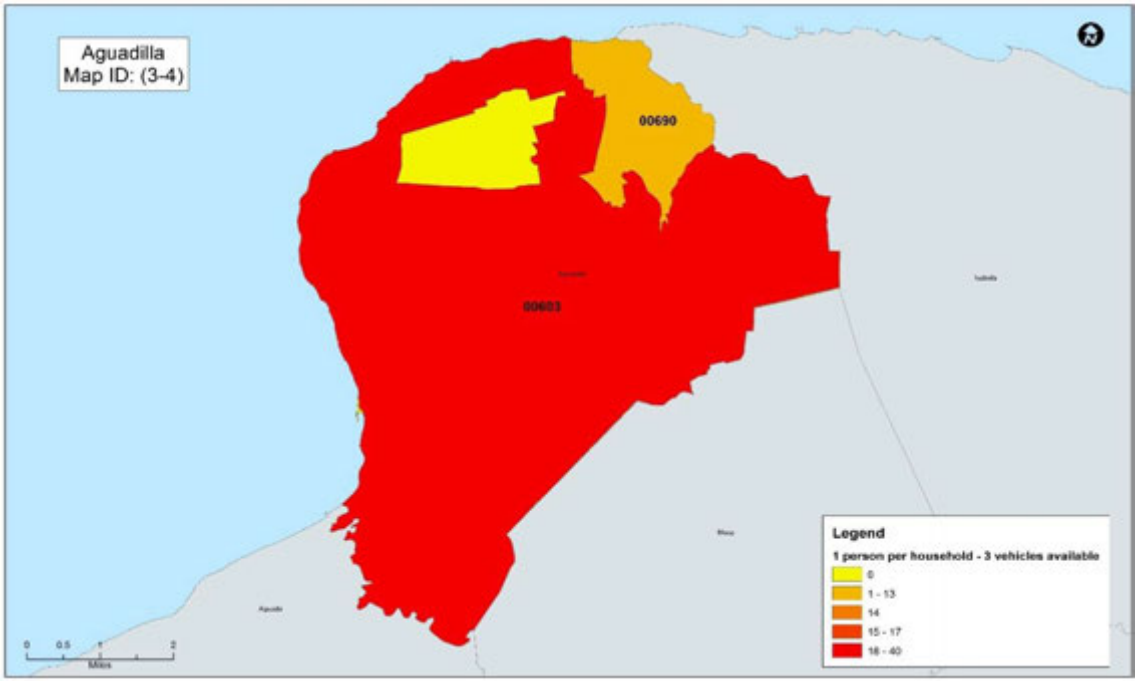
Source: US Census Bureau, 2015 and SDG

Figure D.23: Aguadilla, 1 Person per Household – 2 Vehicles Available



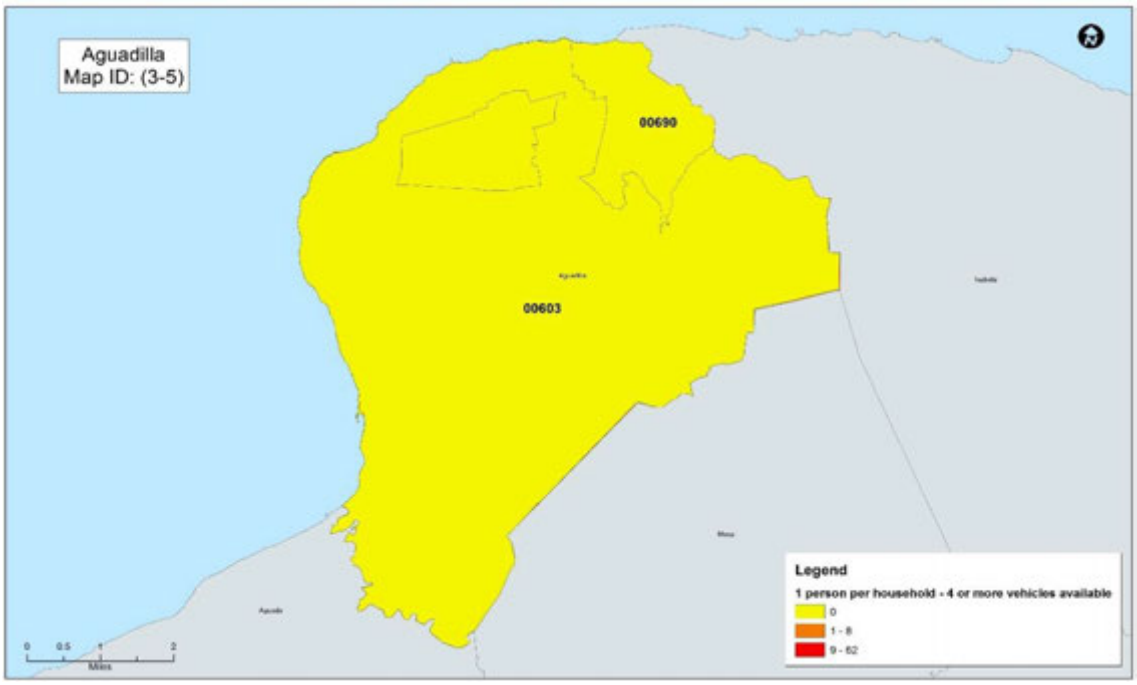
Source: US Census Bureau, 2015 and SDG

Figure D.24: Aguadilla, 1 Person per Household – 3 Vehicles Available



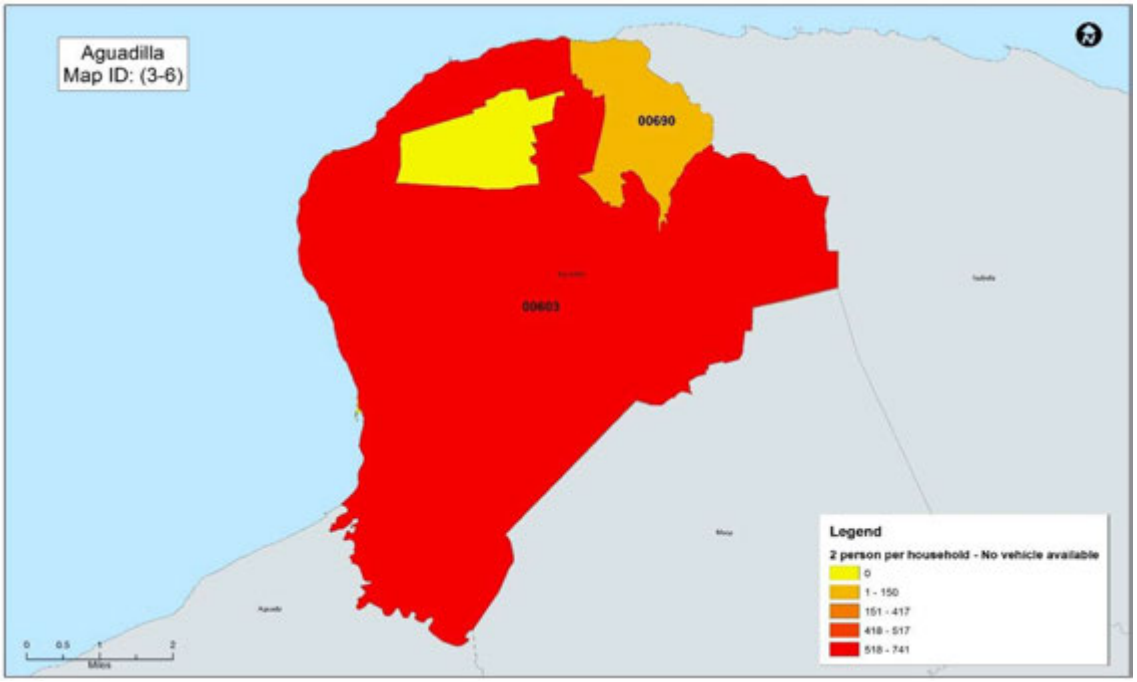
Source: US Census Bureau, 2015 and SDG

Figure D.25: Aguadilla, 1 Person per Household – 4 or more Vehicles Available



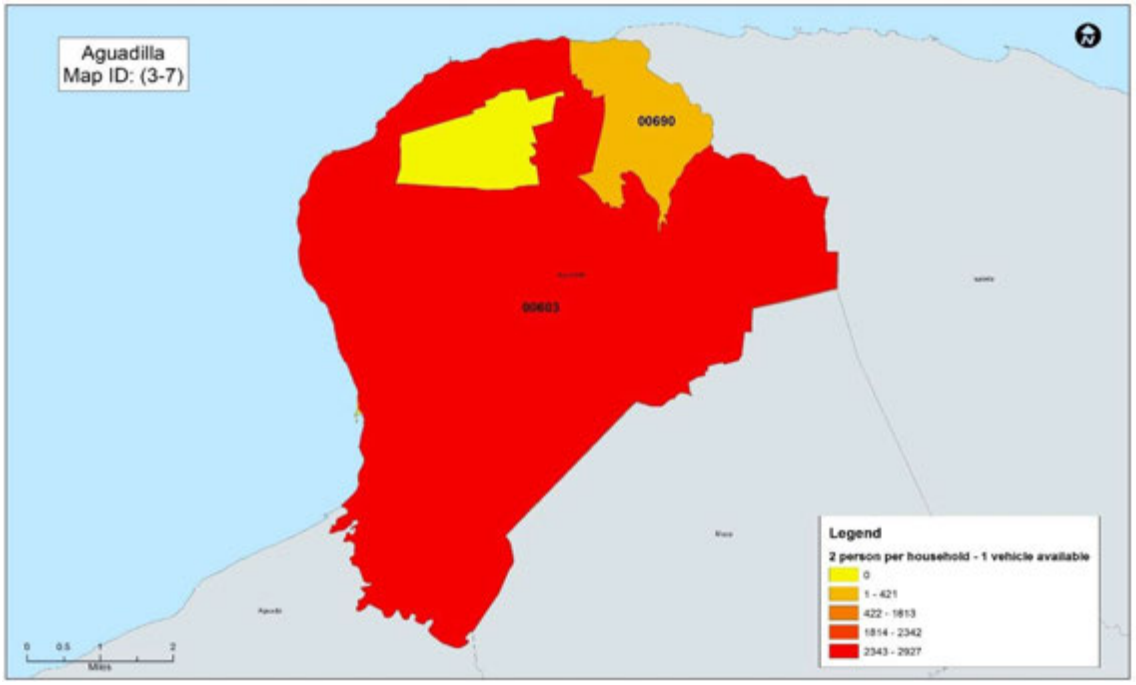
Source: US Census Bureau, 2015 and SDG

Figure D.26: Aguadilla, 2 Person per Household – No Vehicle Available



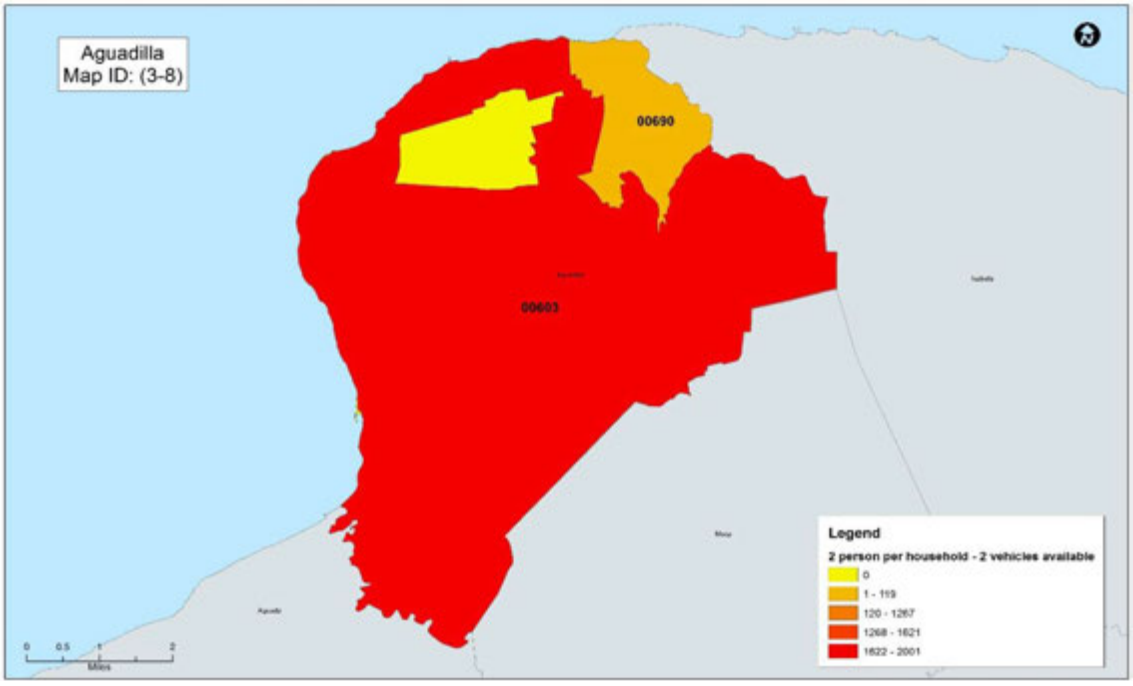
Source: US Census Bureau, 2015 and SDG

Figure D.27: Aguadilla, 2 Person per Household – 1 Vehicle Available



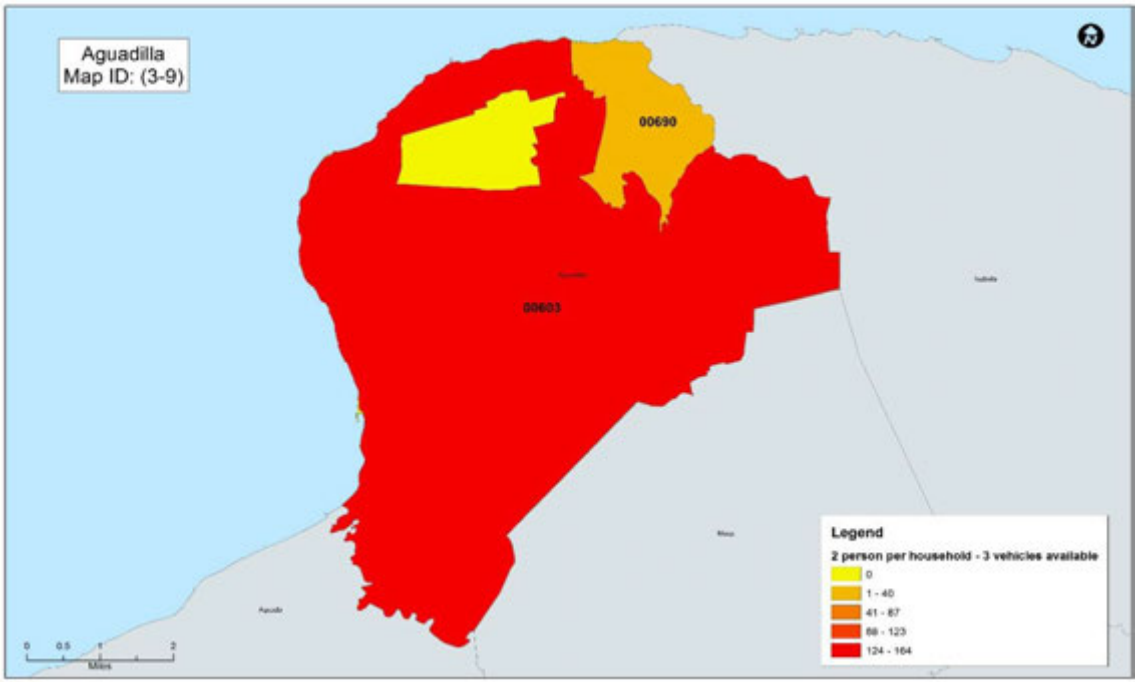
Source: US Census Bureau, 2015 and SDG

Figure D.28: Aguadilla, 2 Person per Household – 2 Vehicles Available



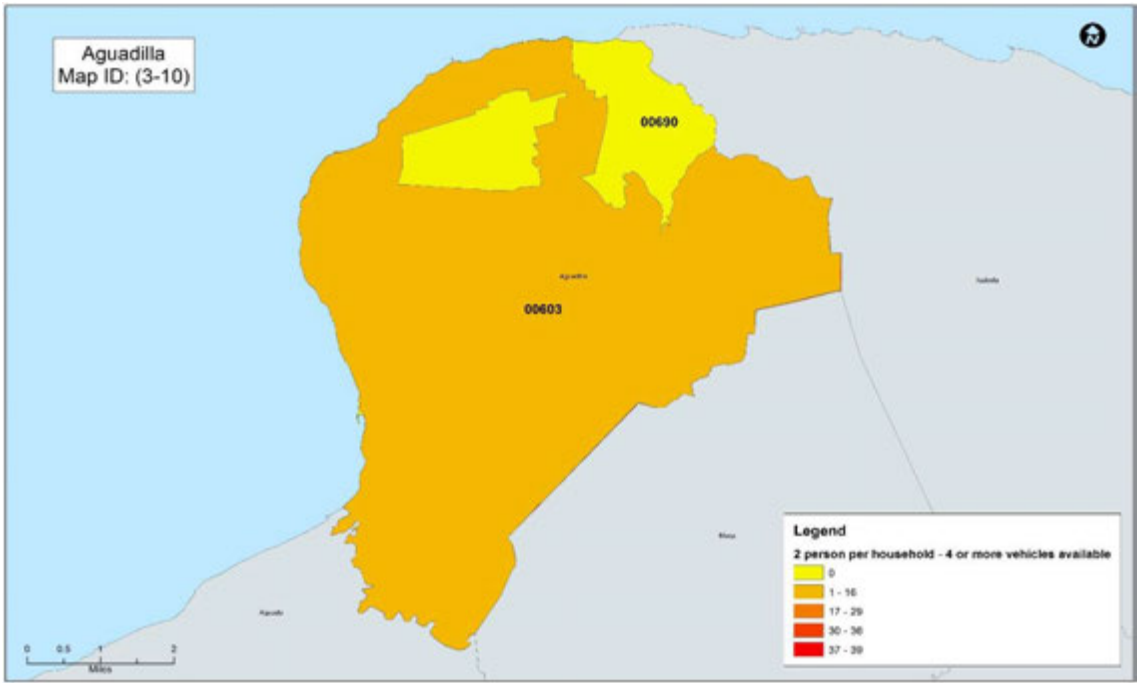
Source: US Census Bureau, 2015 and SDG

Figure D.29: Aguadilla, 2 Person per Household – 3 Vehicles Available



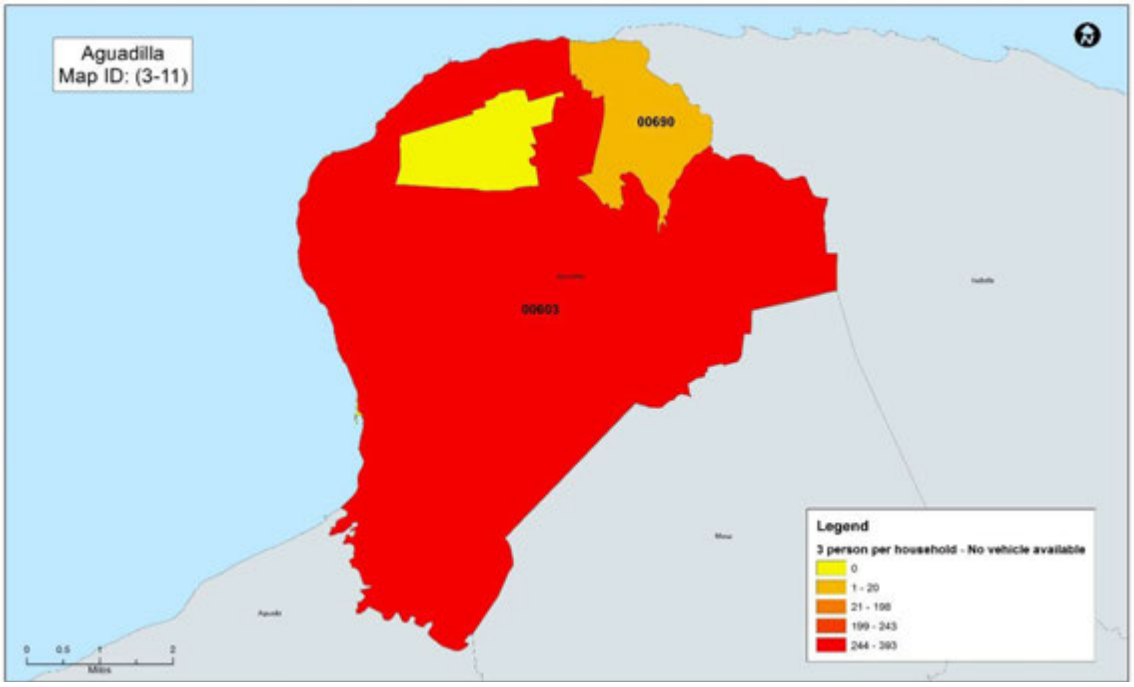
Source: US Census Bureau, 2015 and SDG

Figure D.30: Aguadilla, 2 Person per Household – 4 or more Vehicles Available



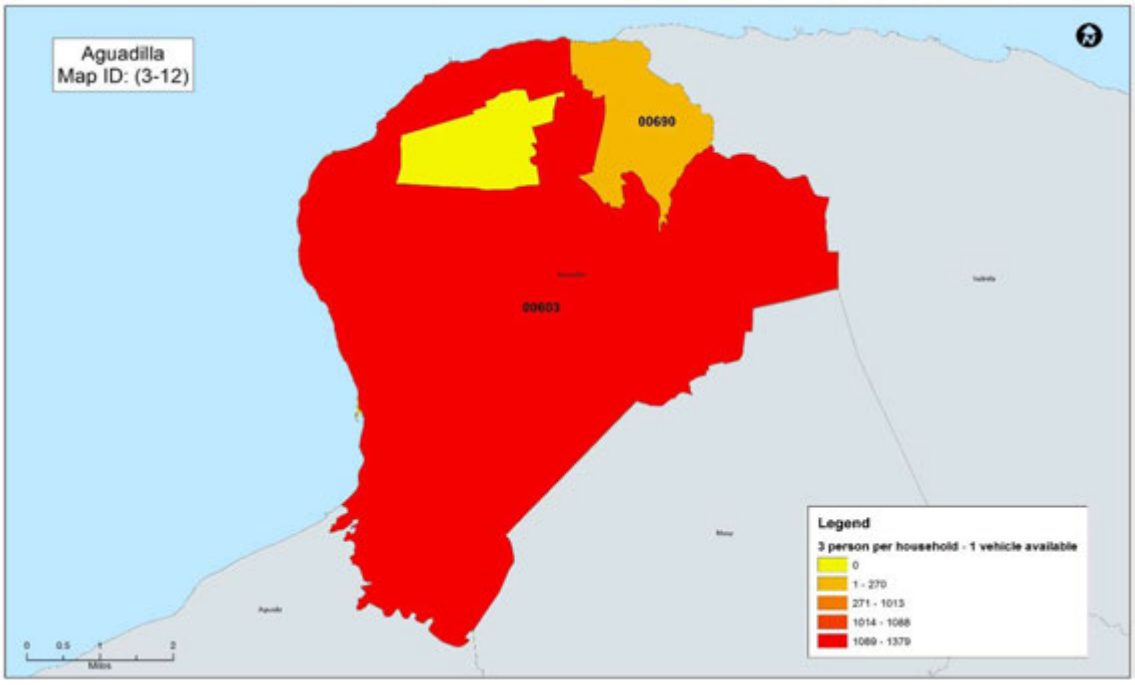
Source: US Census Bureau, 2015 and SDG

Figure D.31: Aguadilla, 3 Person per Household – No Vehicle Available



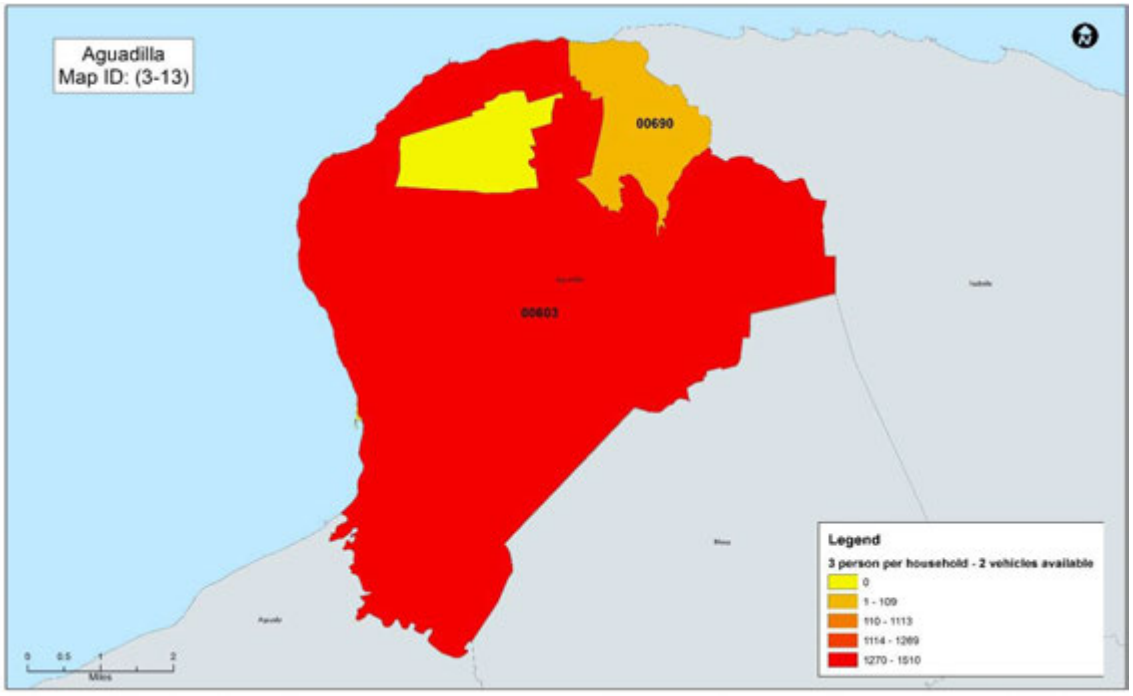
Source: US Census Bureau, 2015 and SDG

Figure D.32: Aguadilla, 3 Person per Household – 1 Vehicle Available



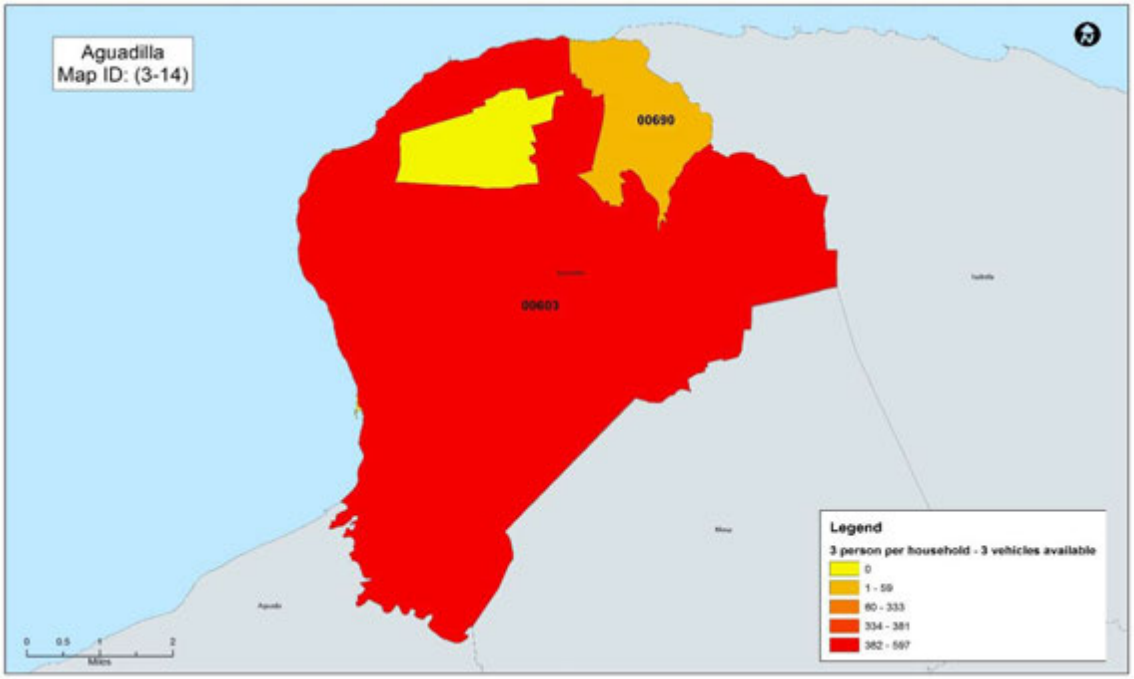
Source: US Census Bureau, 2015 and SDG

Figure D.33: Aguadilla, 3 Person per Household – 2 Vehicles Available



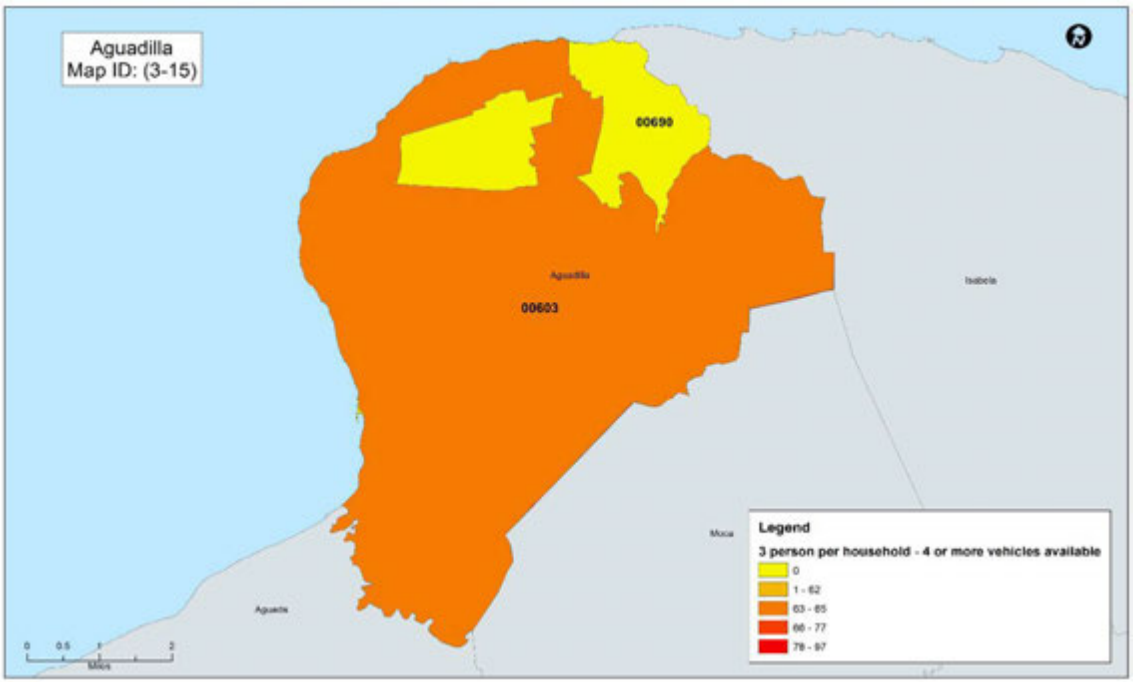
Source: US Census Bureau, 2015 and SDG

Figure D.34: Aguadilla, 3 Person per Household – 3 Vehicles Available



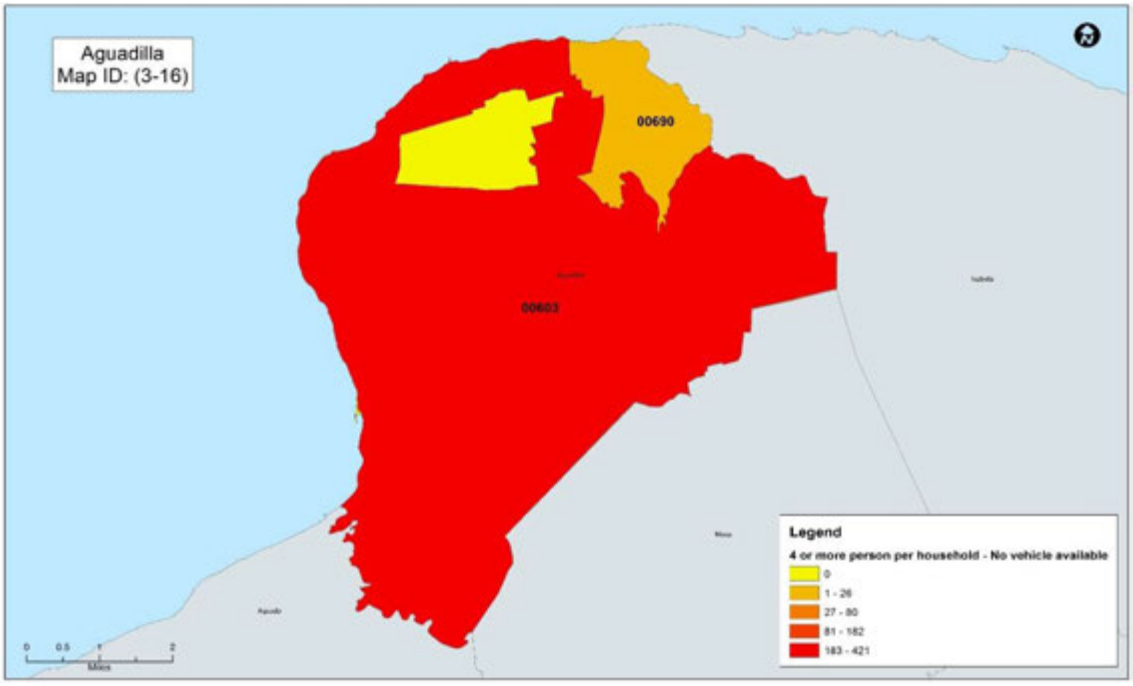
Source: US Census Bureau, 2015 and SDG

Figure D.35: Aguadilla, 3 Person per Household – 4 or more Vehicles Available



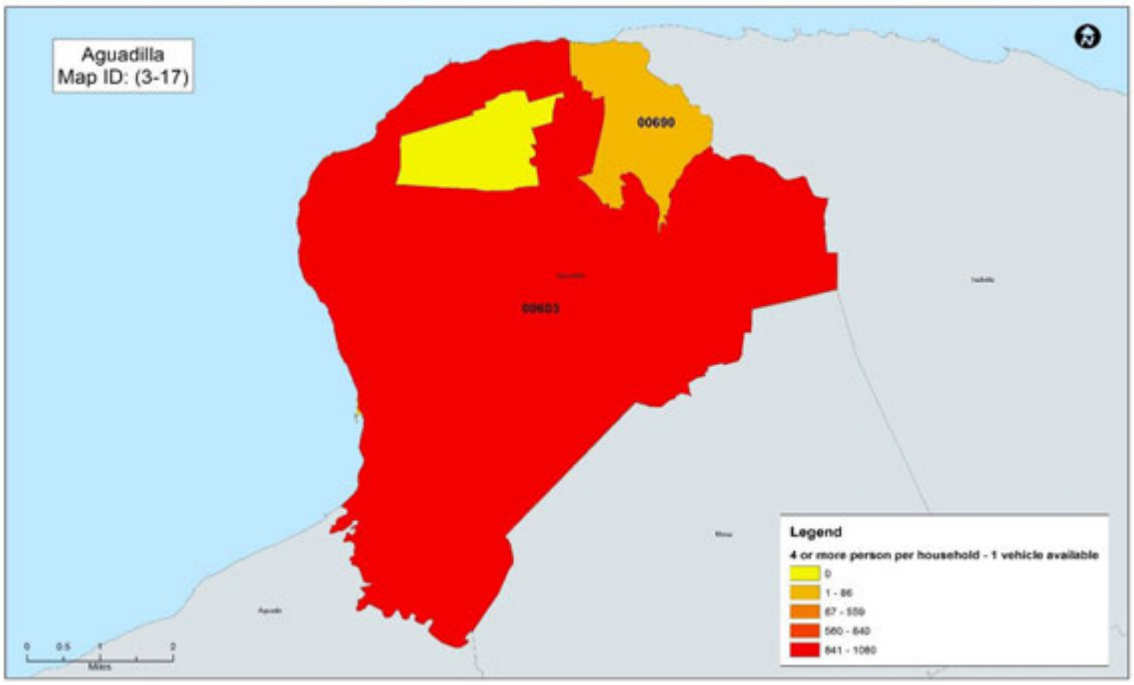
Source: US Census Bureau, 2015 and SDG

Figure D.36: Aguadilla, 4 or more Person per Household – No Vehicle Available



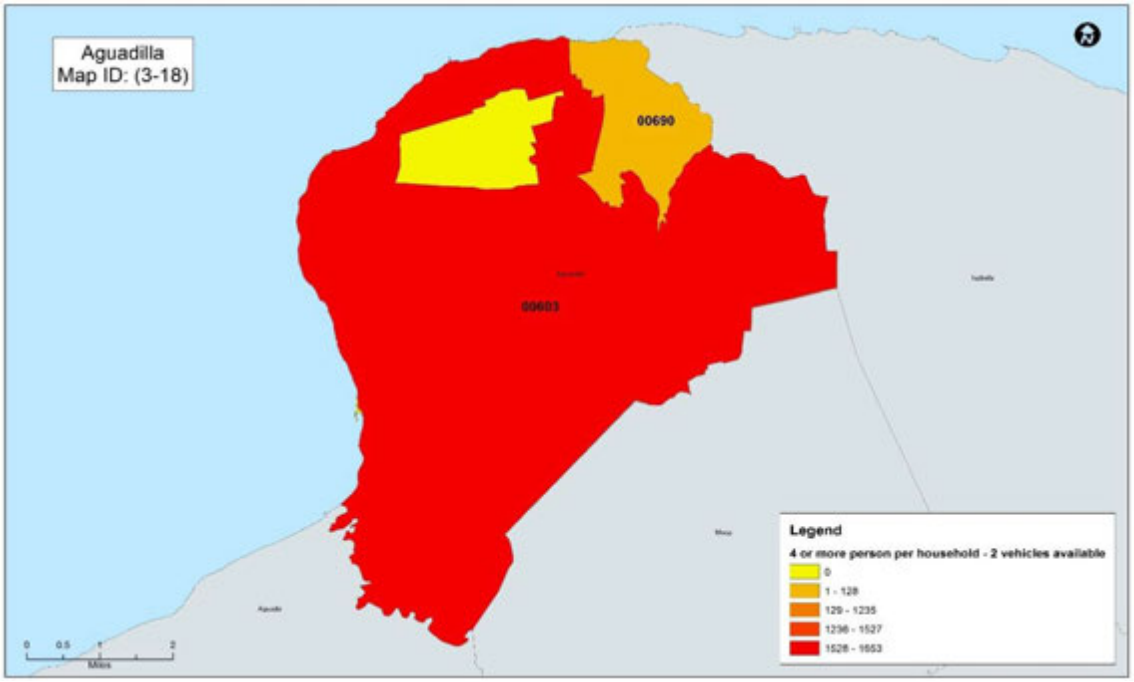
Source: US Census Bureau, 2015 and SDG

Figure D.37: Aguadilla, 4 or more Person per Household – 1 Vehicle Available



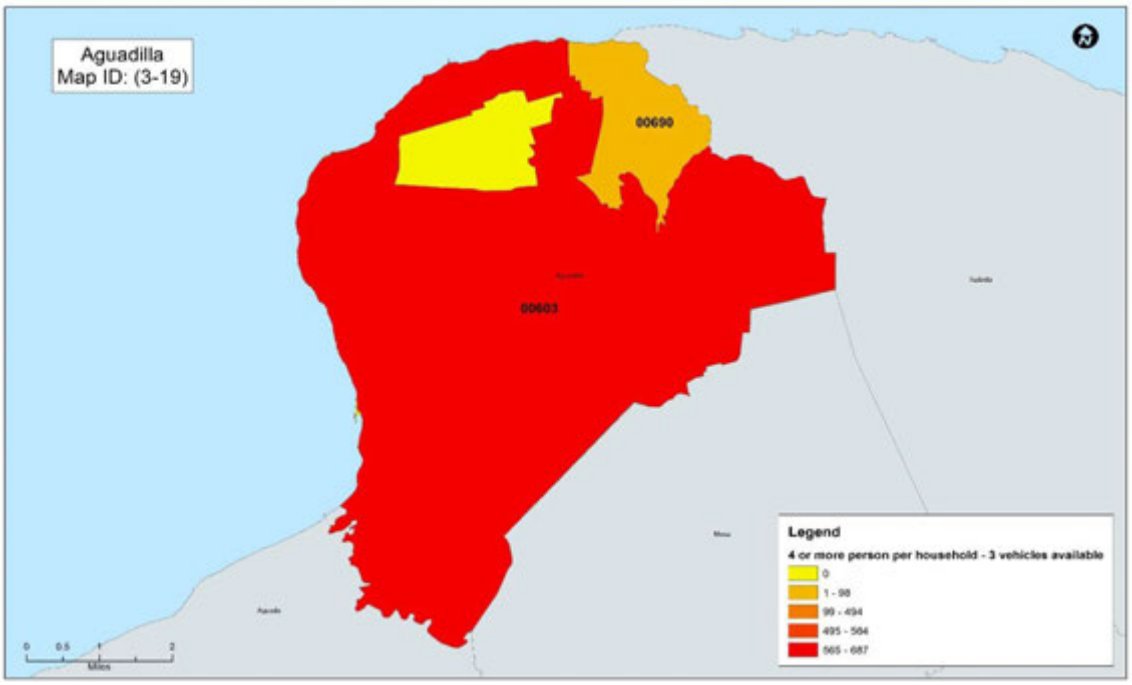
Source: US Census Bureau, 2015 and SDG

Figure D.38: Aguadilla, 4 or more Person per Household – 2 Vehicles Available



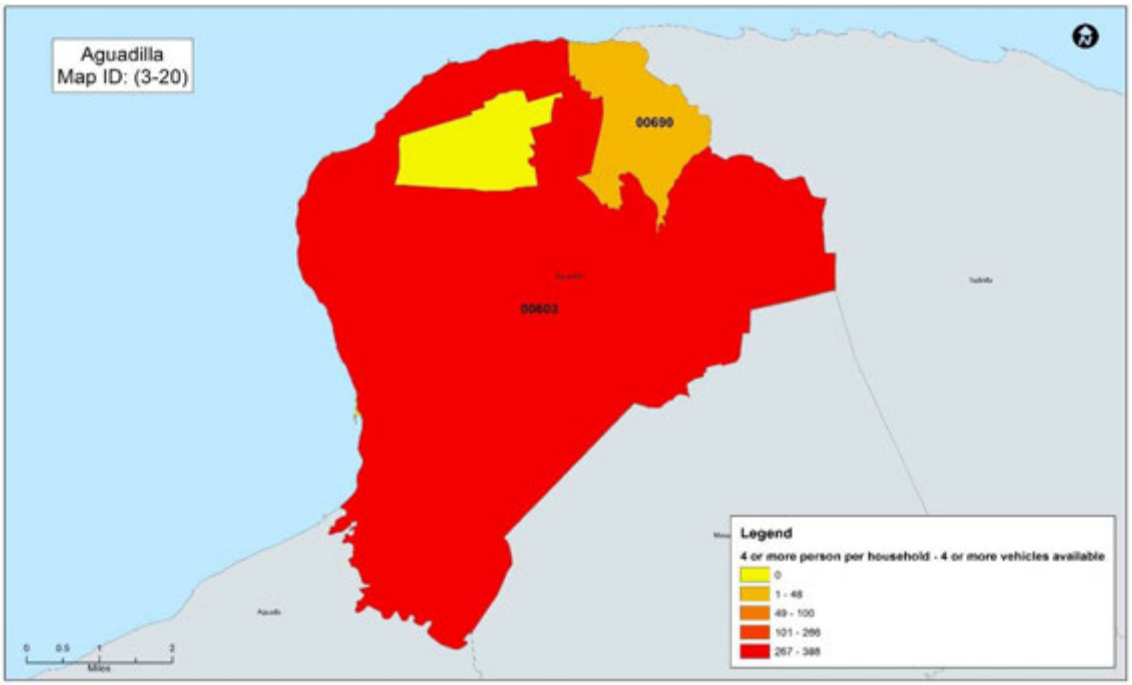
Source: US Census Bureau, 2015 and SDG

Figure D.39: Aguadilla, 4 or more Person per Household – 3 Vehicles Available



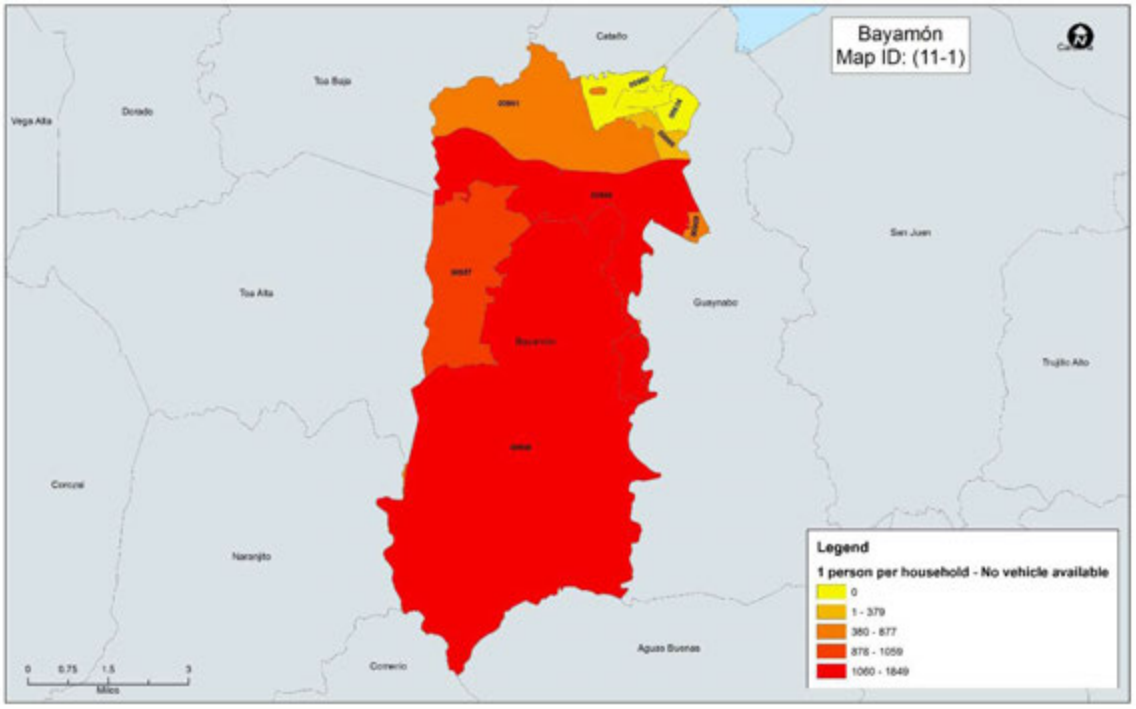
Source: US Census Bureau, 2015 and SDG

Figure D.40: Aguadilla, 4 or more Person per Household – 4 or more Vehicles Available



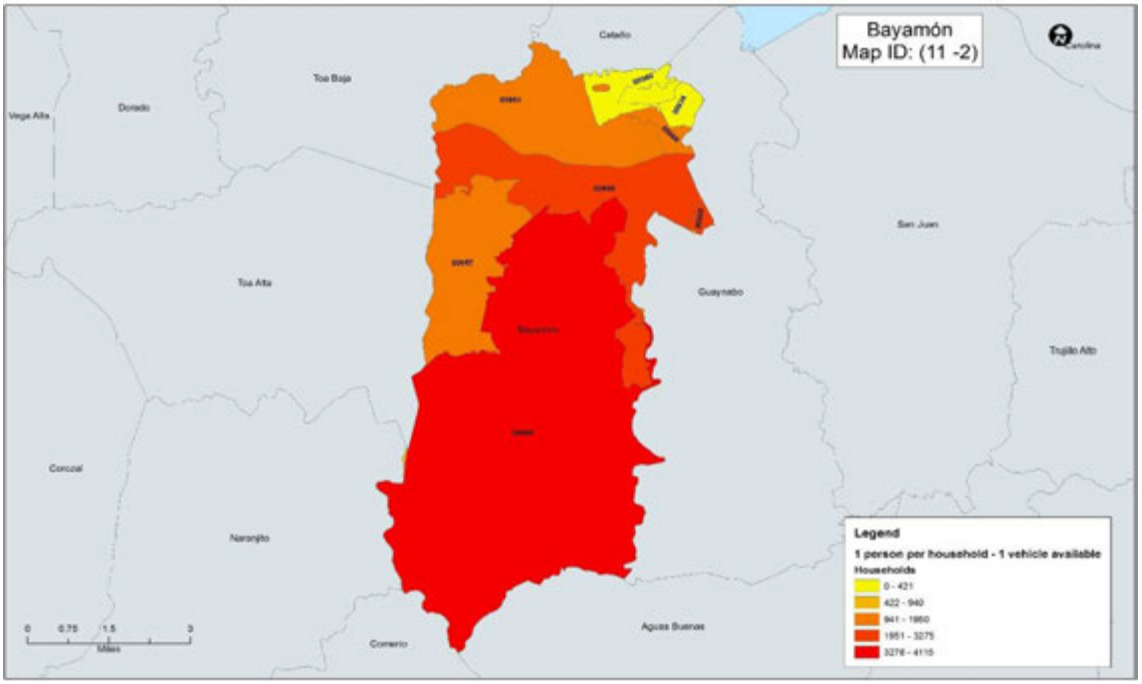
Source: US Census Bureau, 2015 and SDG

Figure D.41: Bayamón, 1 Person per Household – No Vehicle Available



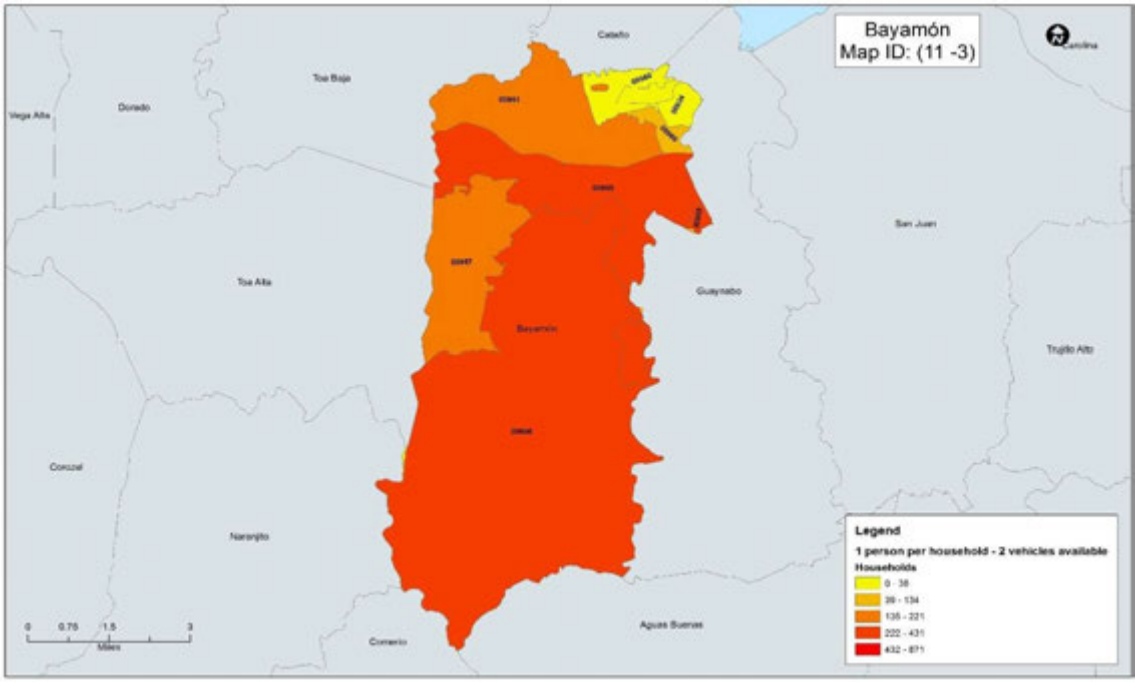
Source: US Census Bureau, 2015 and SDG

Figure D.42: Bayamón, 1 Person per Household – 1 Vehicle Available



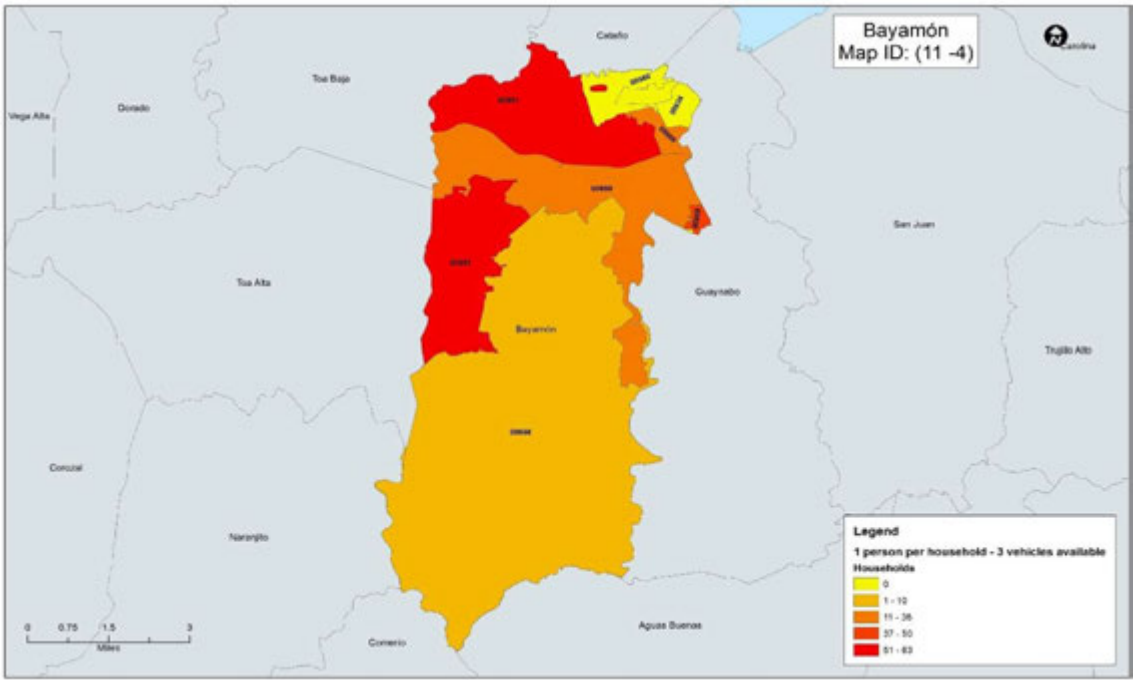
Source: US Census Bureau, 2015 and SDG

Figure D.43: Bayamón, 1 Person per Household – 2 Vehicles Available



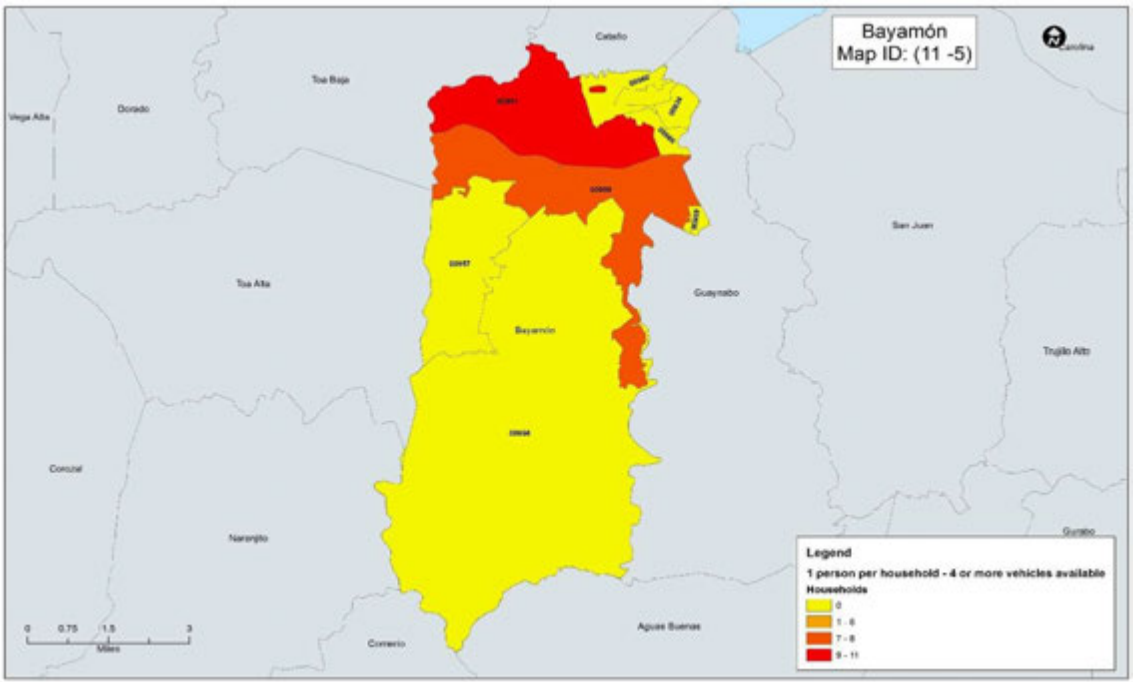
Source: US Census Bureau, 2015 and SDG

Figure D.44: Bayamón, 1 Person per Household – 3 Vehicles Available



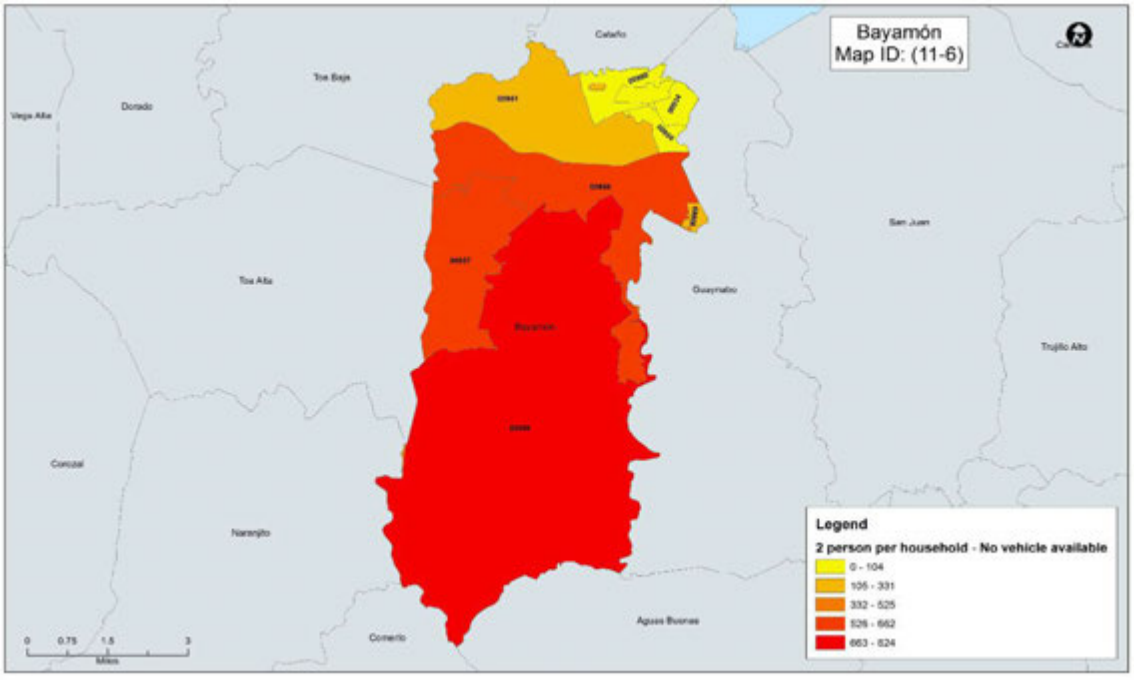
Source: US Census Bureau, 2015 and SDG

Figure D.45: Bayamón, 1 Person per Household – 4 or more Vehicles Available



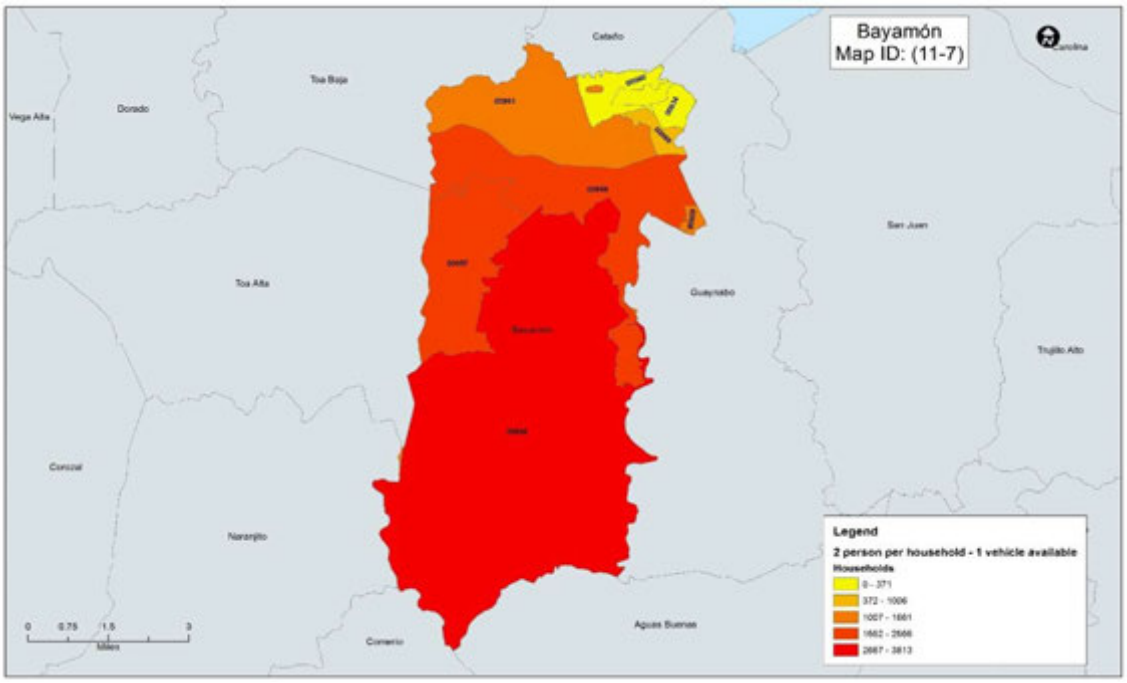
Source: US Census Bureau, 2015 and SDG

Figure D.46: Bayamón, 2 Person per Household – No Vehicle Available



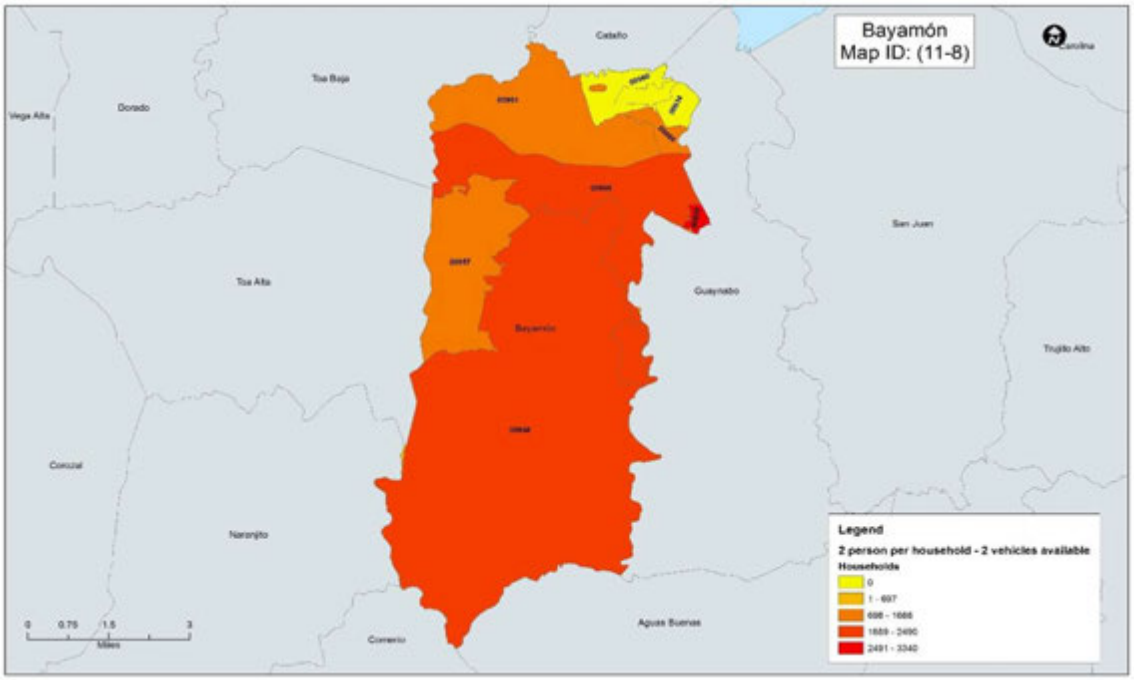
Source: US Census Bureau, 2015 and SDG

Figure D.47: Bayamón, 2 Person per Household – 1 Vehicle Available



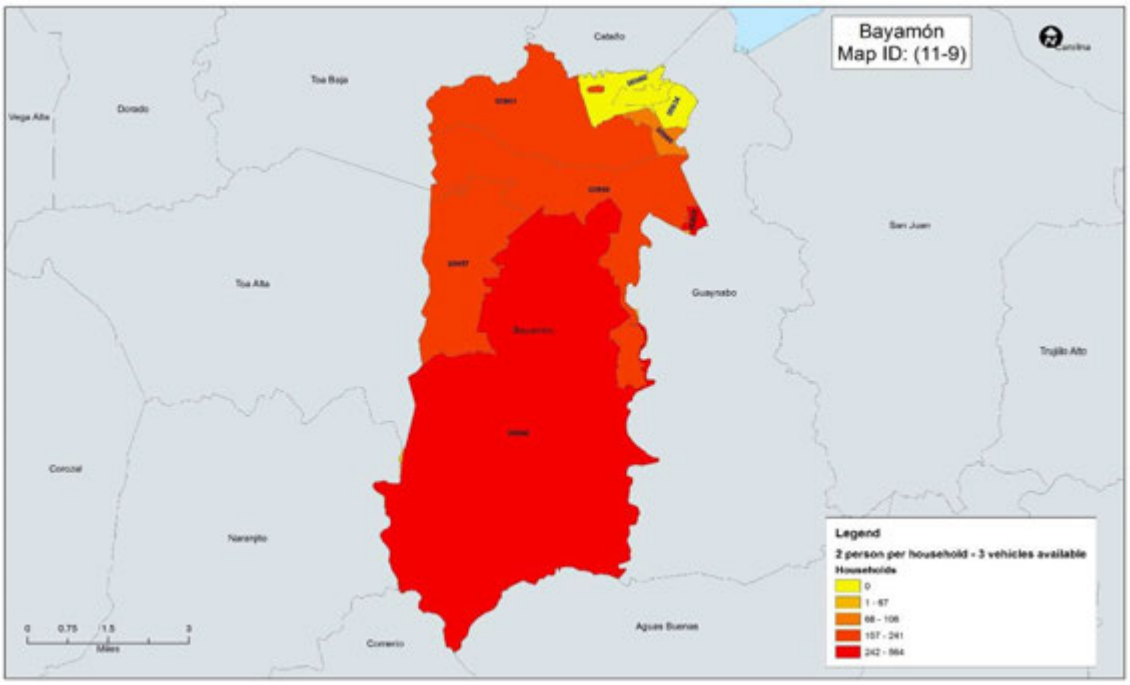
Source: US Census Bureau, 2015 and SDG

Figure D.48: Bayamón, 2 Person per Household – 2 Vehicles Available



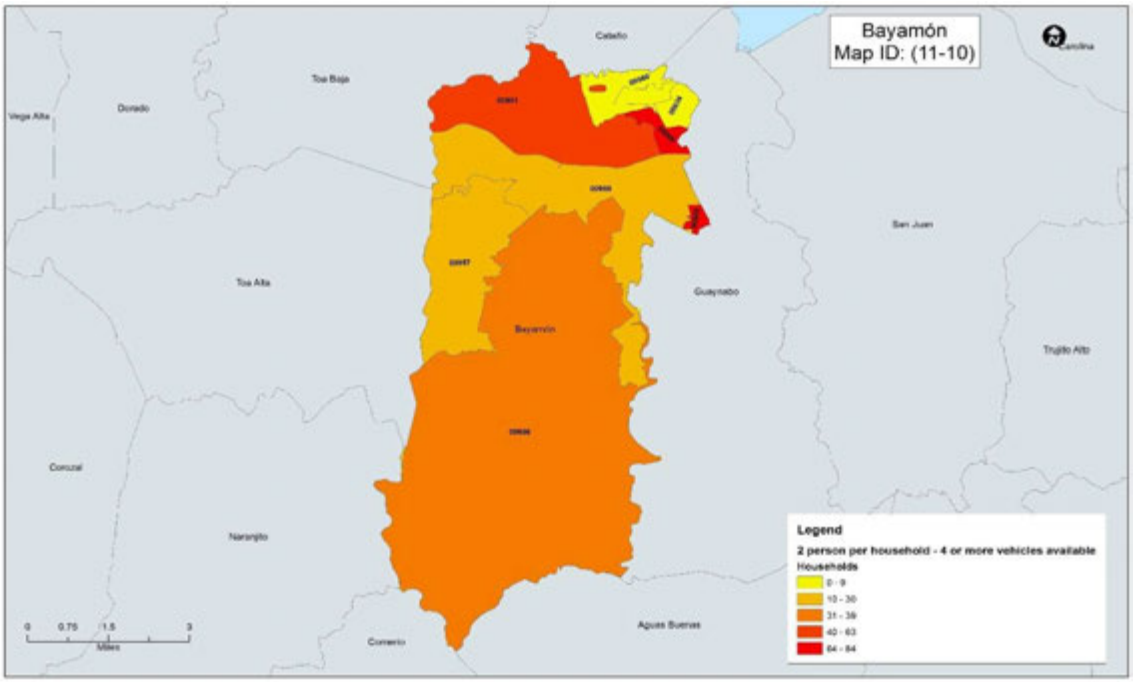
Source: US Census Bureau, 2015 and SDG

Figure D.49: Bayamón, 2 Person per Household – 3 Vehicles Available



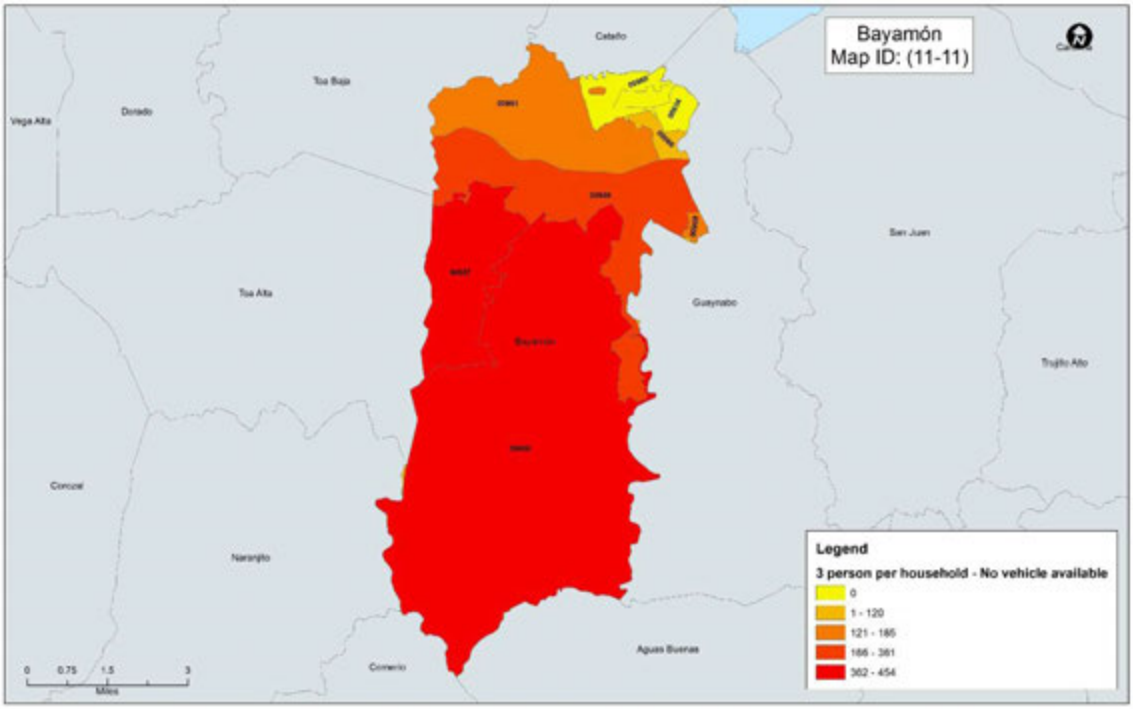
Source: US Census Bureau, 2015 and SDG

Figure D.50: Bayamón, 2 Person per Household – 4 or more Vehicles Available



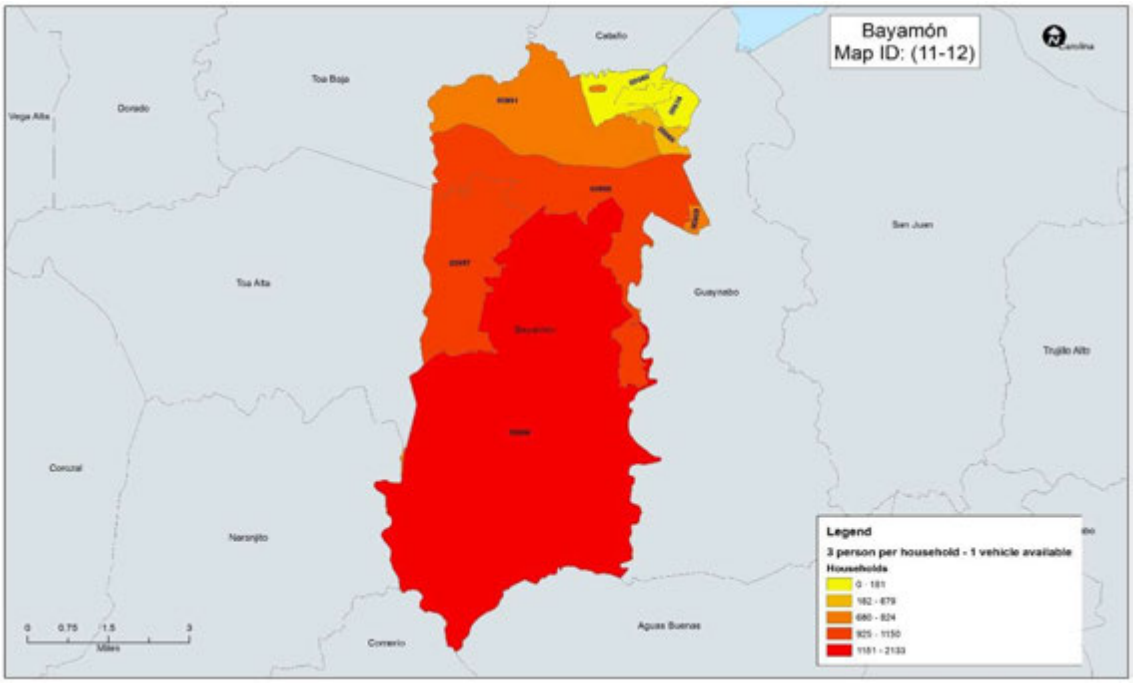
Source: US Census Bureau, 2015 and SDG

Figure D.51: Bayamón, 3 Person per Household – No Vehicle Available



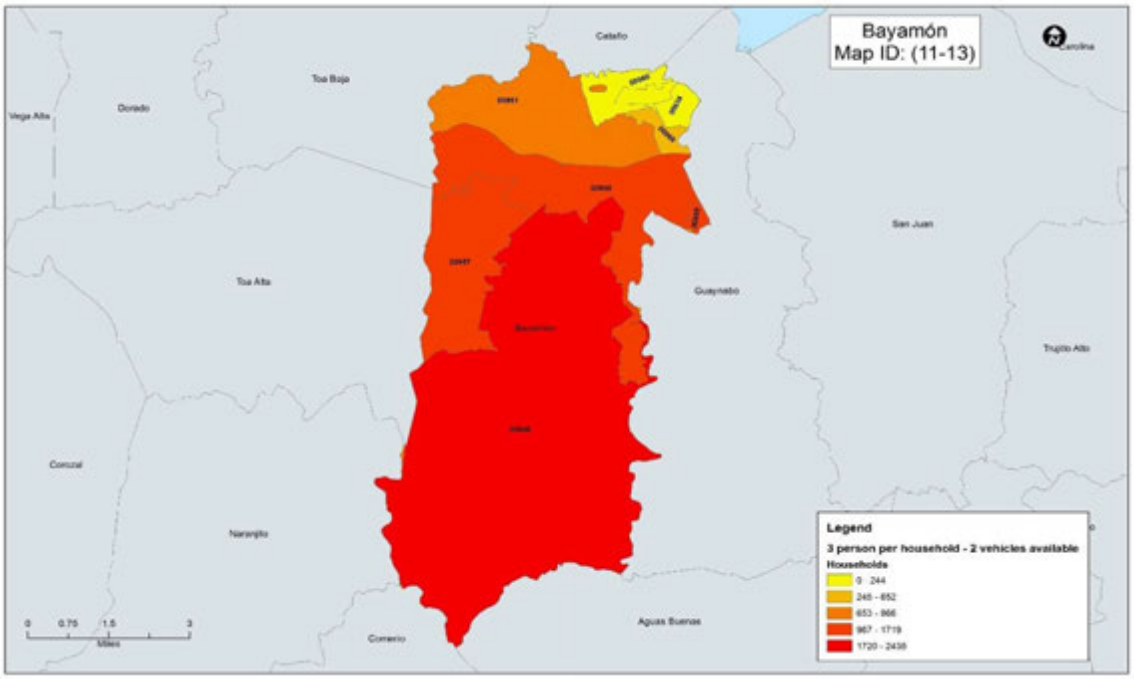
Source: US Census Bureau, 2015 and SDG

Figure D.52: Bayamón, 3 Person per Household – 1 Vehicle Available



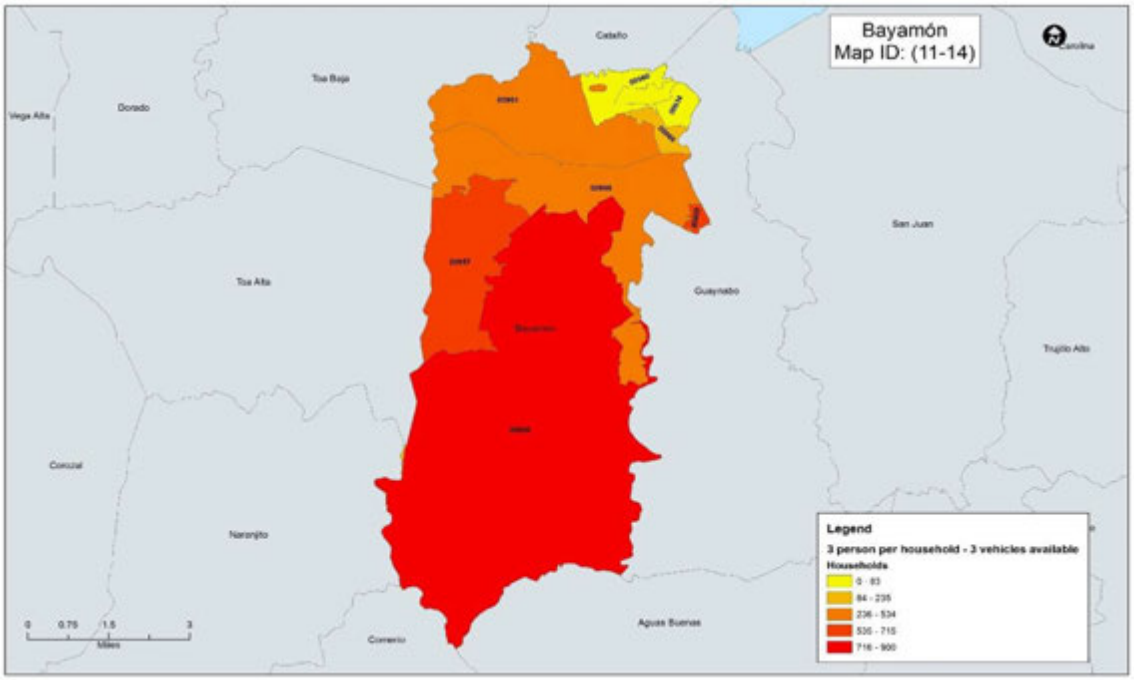
Source: US Census Bureau, 2015 and SDG

Figure D.53: Bayamón, 3 Person per Household – 2 Vehicles Available



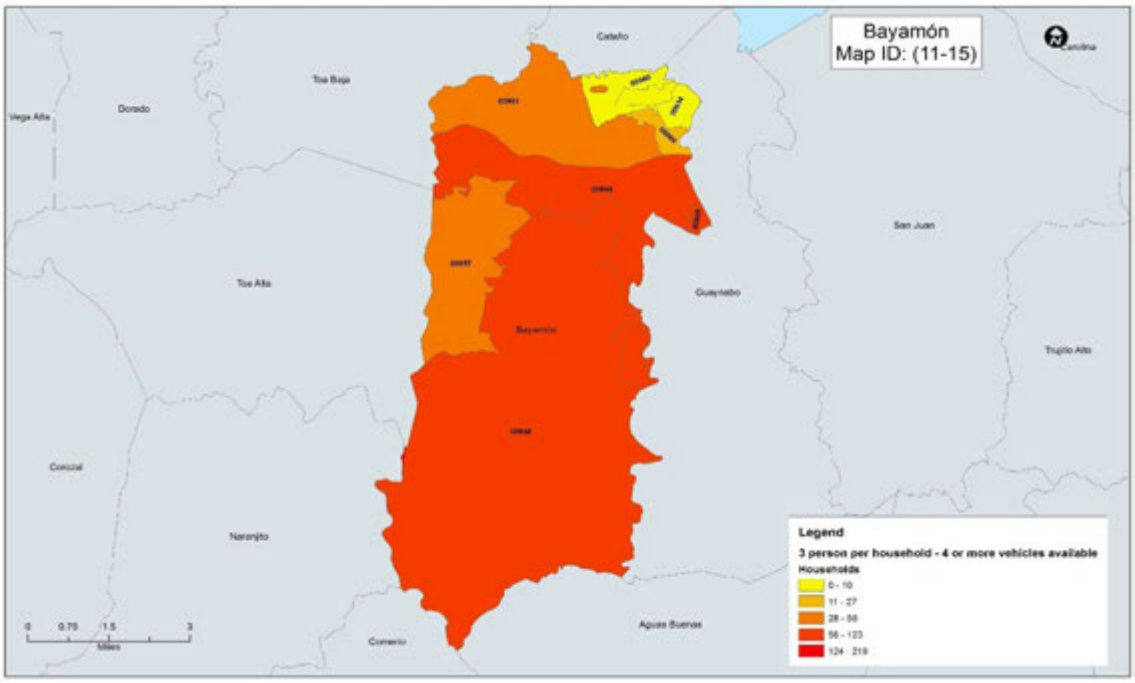
Source: US Census Bureau, 2015 and SDG

Figure D.54: Bayamón, 3 Person per Household – 3 Vehicles Available



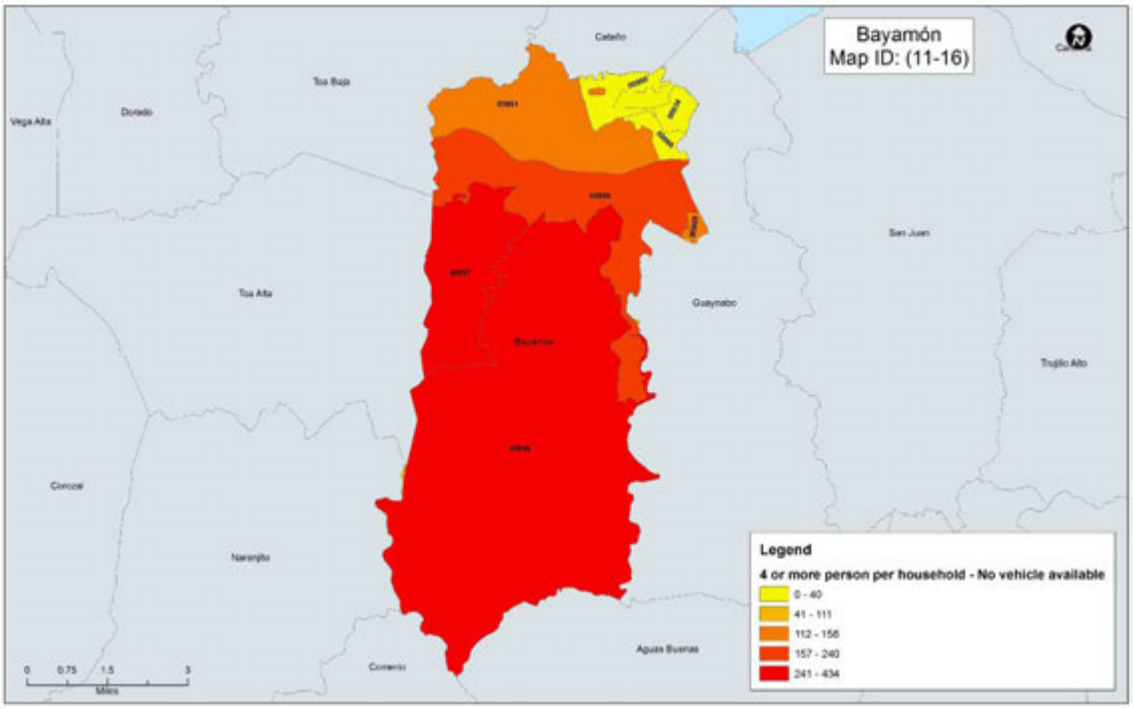
Source: US Census Bureau, 2015 and SDG

Figure D.55: Bayamón, 3 Person per Household – 4 or more Vehicles Available



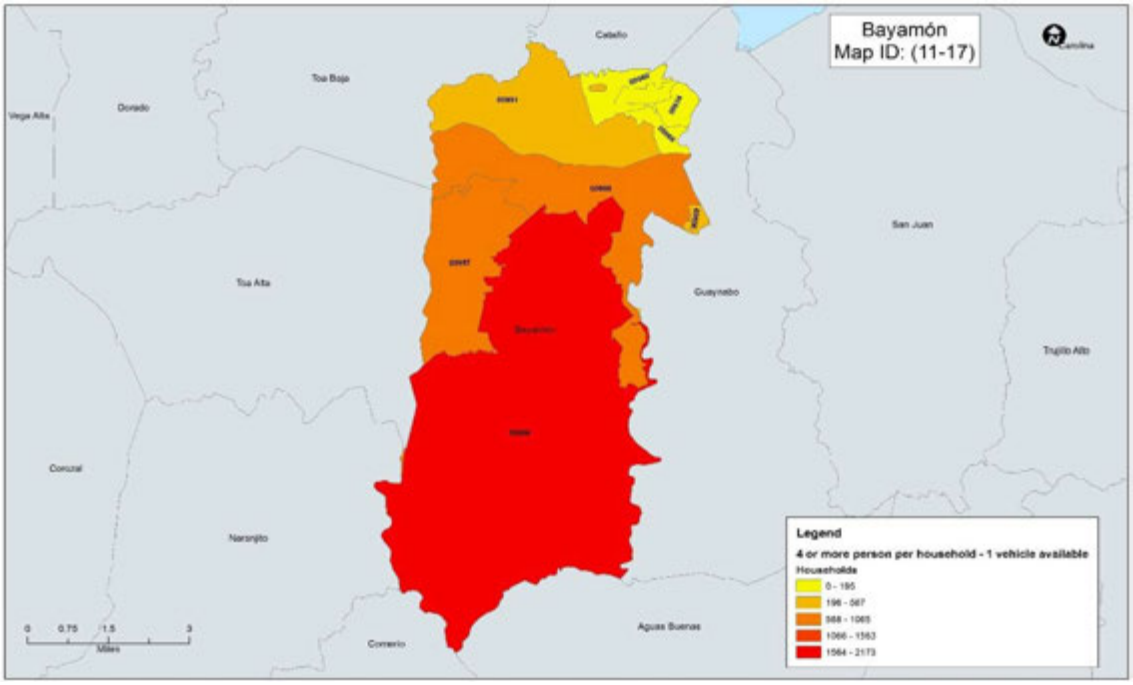
Source: US Census Bureau, 2015 and SDG

Figure D.56: Bayamón, 4 or more Person per Household – No Vehicle Available



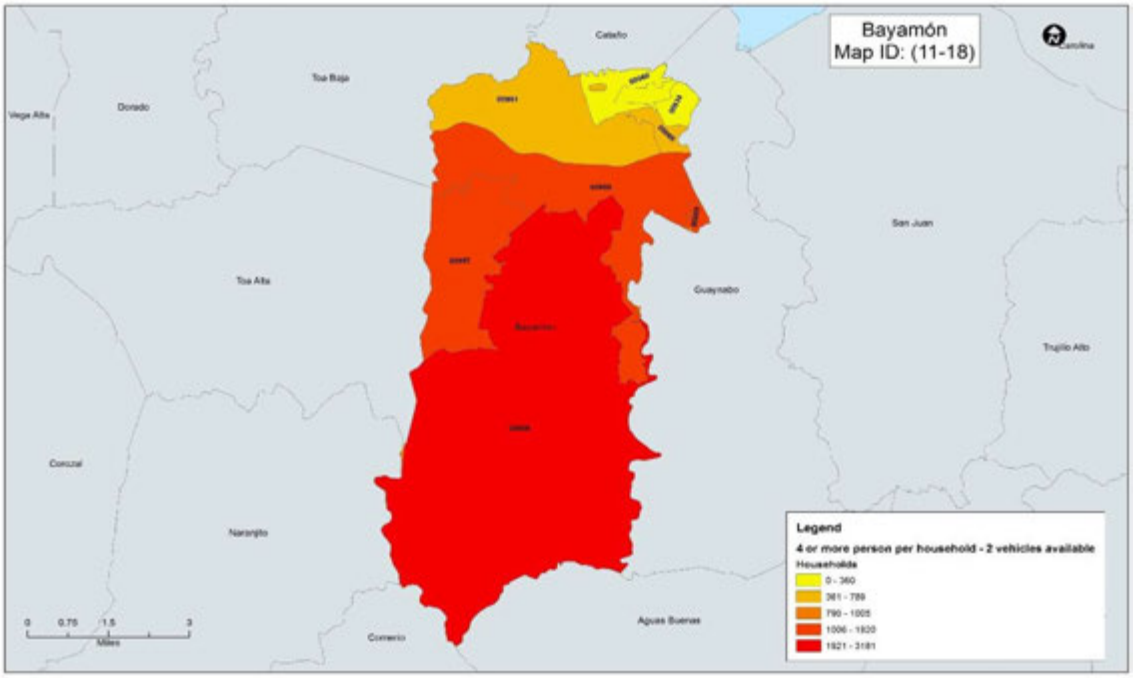
Source: US Census Bureau, 2015 and SDG

Figure D.57: Bayamón, 4 or more Person per Household – 1 Vehicle Available



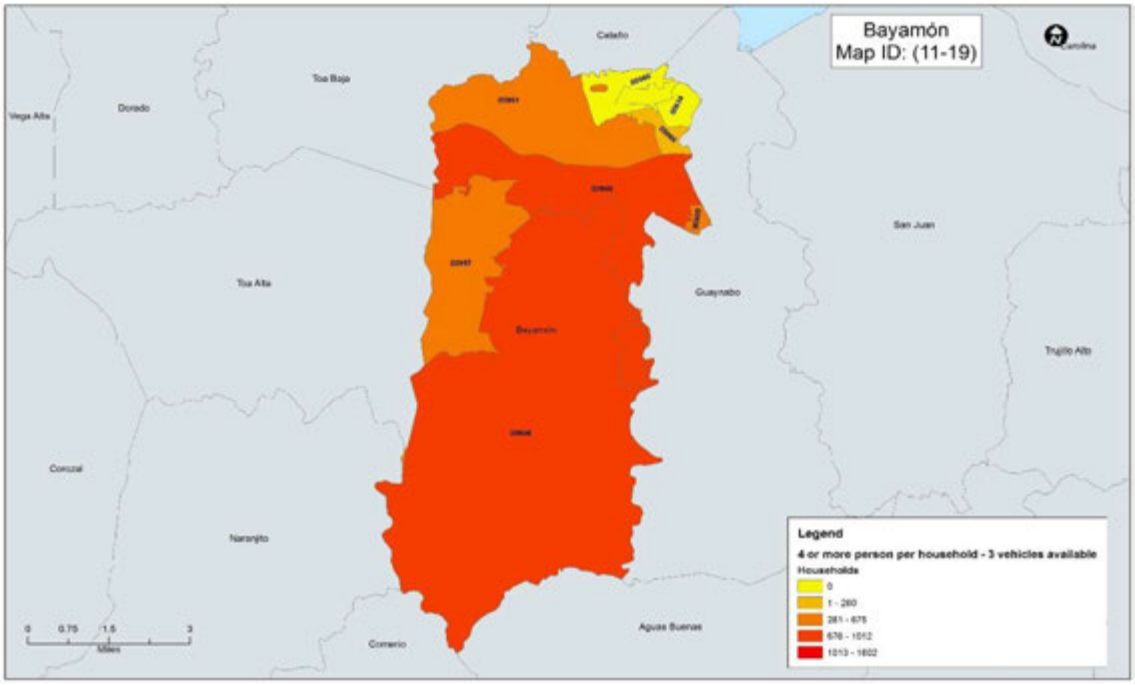
Source: US Census Bureau, 2015 and SDG

Figure D.58: Bayamón, 4 or more Person per Household – 2 Vehicles Available



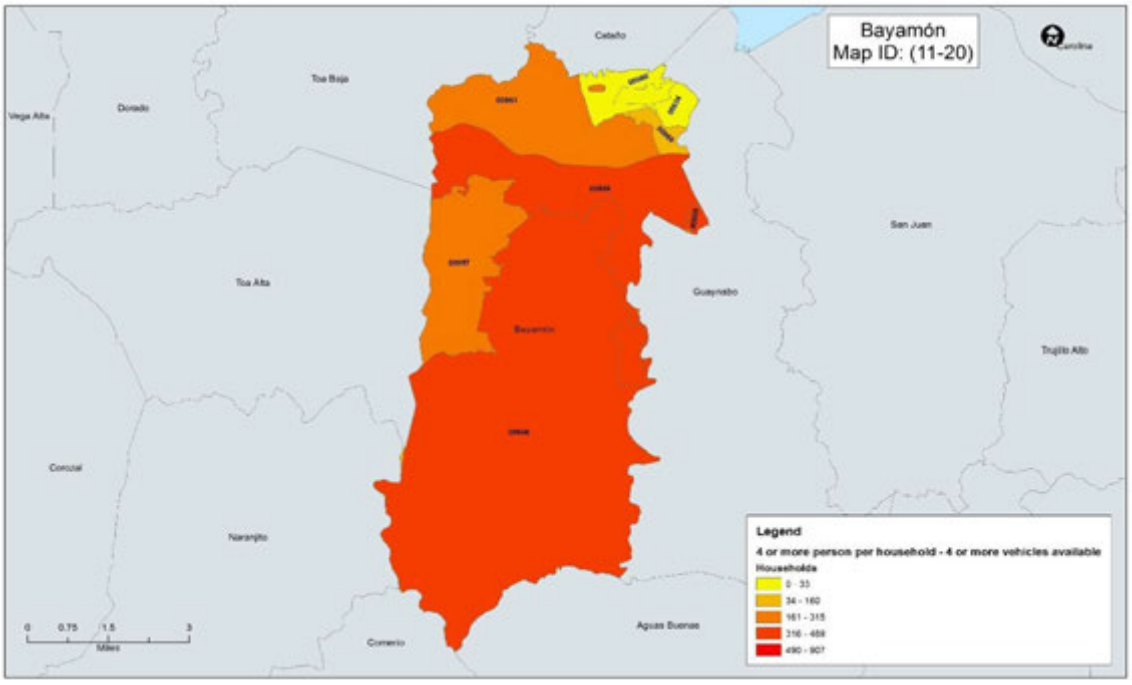
Source: US Census Bureau, 2015 and SDG

Figure D.59: Bayamón, 4 or more Person per Household – 3 Vehicles Available



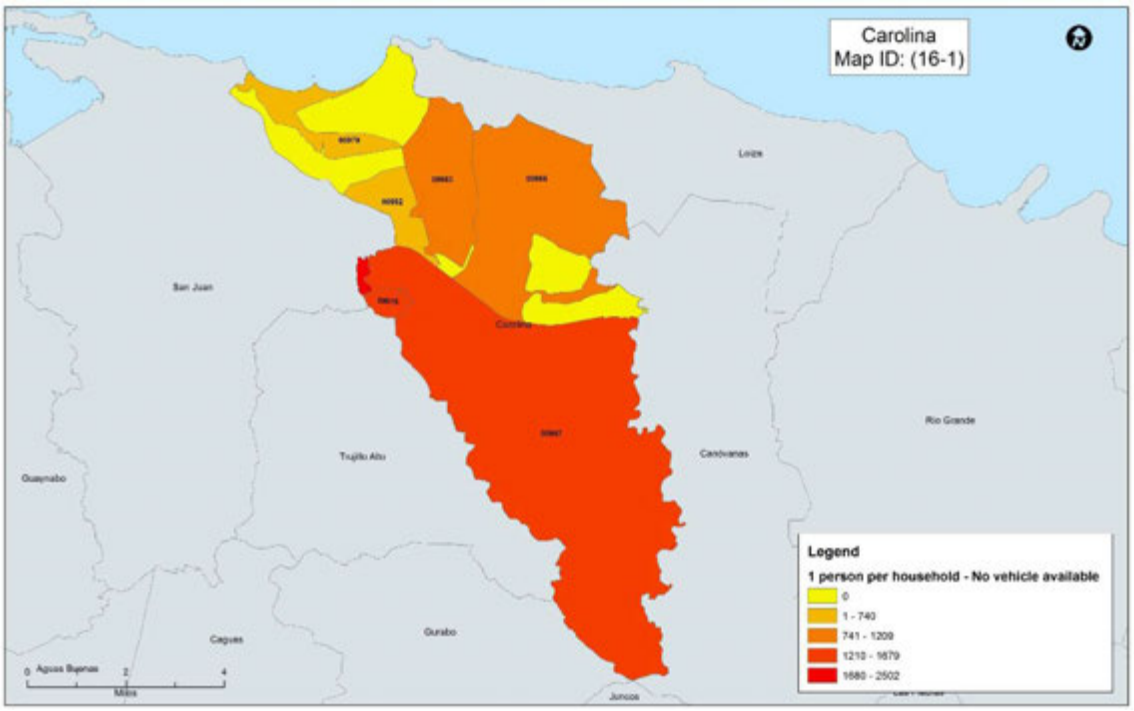
Source: US Census Bureau, 2015 and SDG

Figure D.60: Bayamón, 4 or more Person per Household – 4 or more Vehicles Available



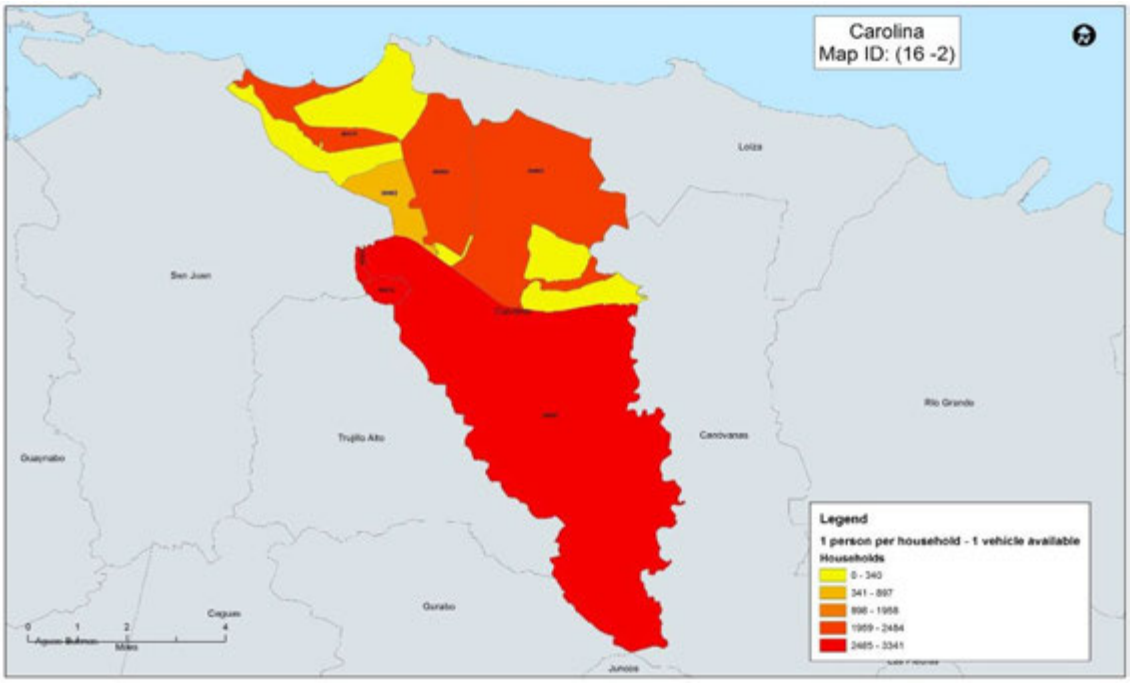
Source: US Census Bureau, 2015 and SDG

Figure D.61: Carolina, 1 Person per Household – No Vehicle Available



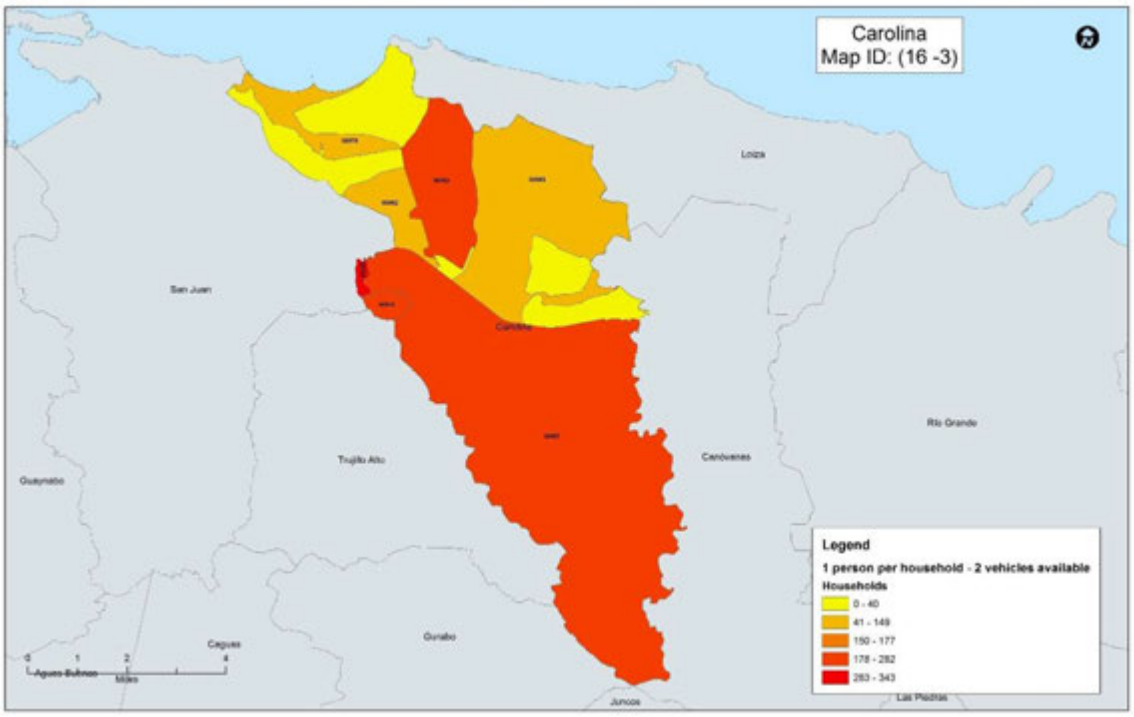
Source: US Census Bureau, 2015 and SDG

Figure D.62: Carolina, 1 Person per Household – 1 Vehicle Available



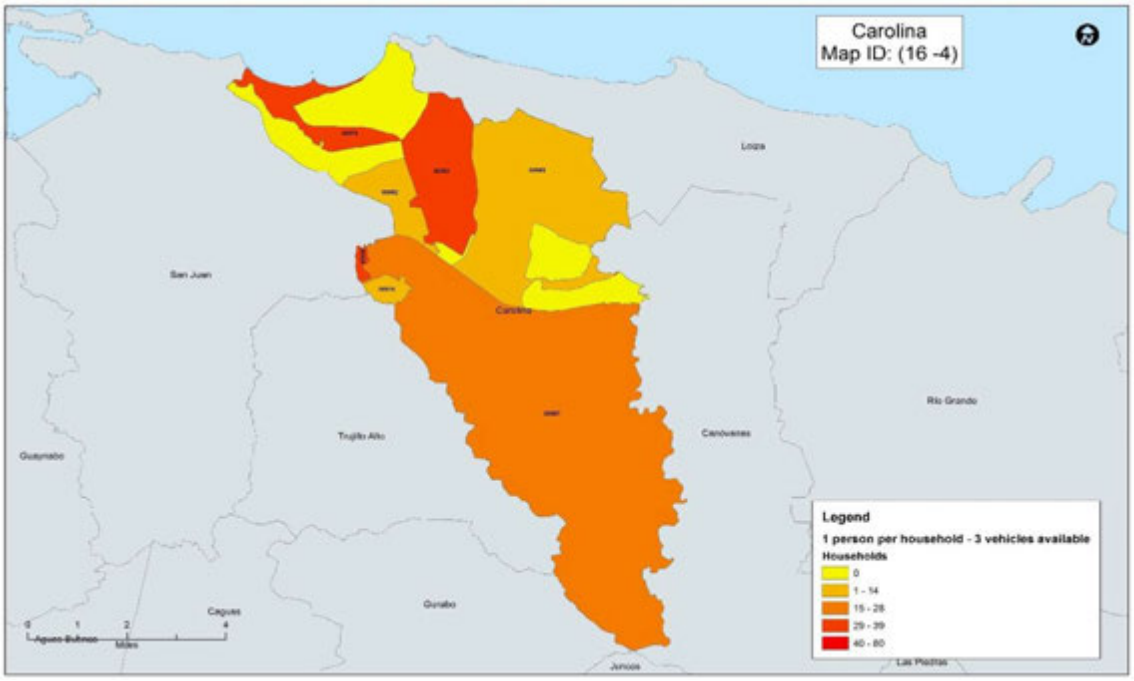
Source: US Census Bureau, 2015 and SDG

Figure D.63: Carolina, 1 Person per Household – 2 Vehicles Available



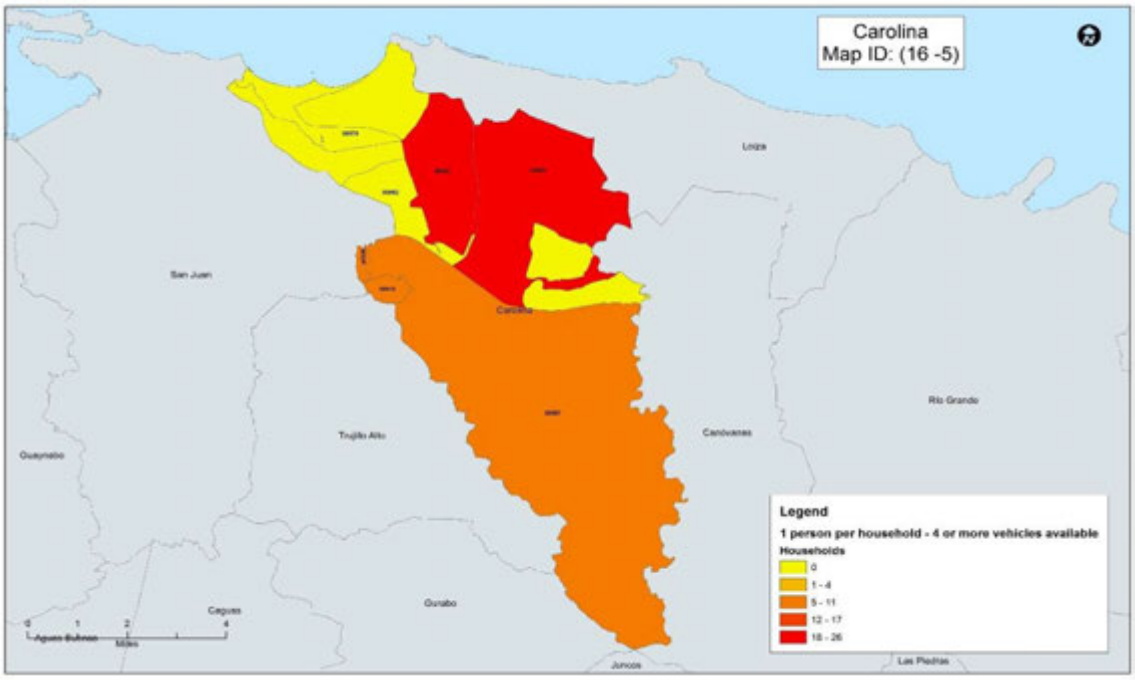
Source: US Census Bureau, 2015 and SDG

Figure D.64: Carolina, 1 Person per Household – 3 Vehicles Available



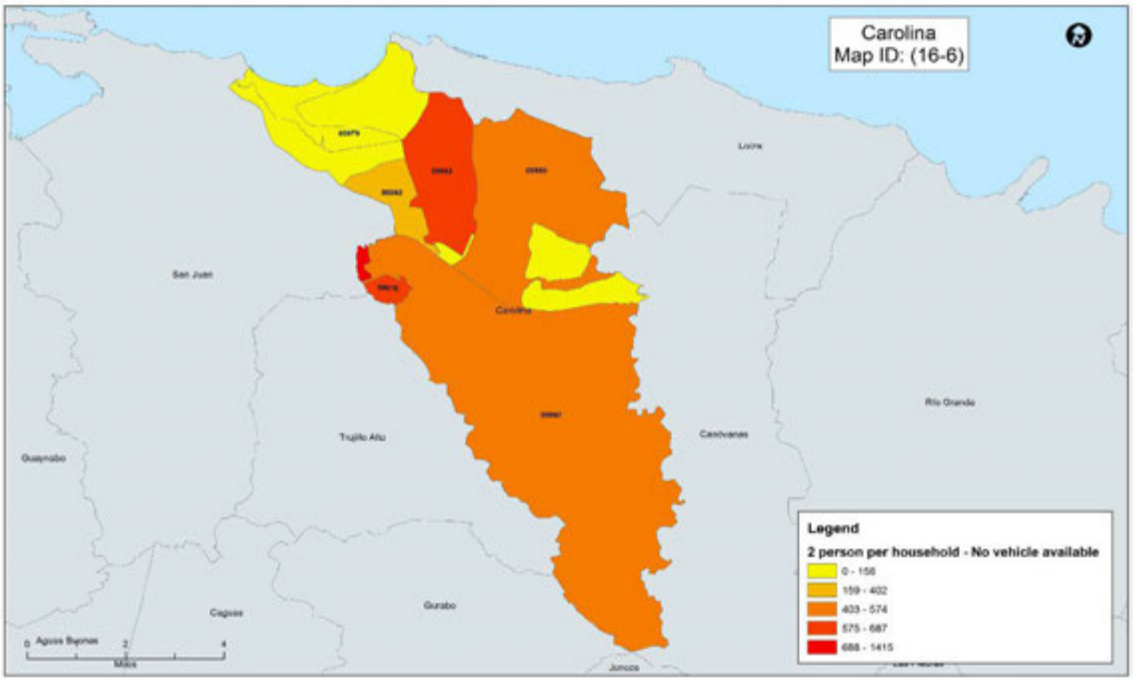
Source: US Census Bureau, 2015 and SDG

Figure D.65: Carolina, 1 Person per Household – 4 or more Vehicles Available



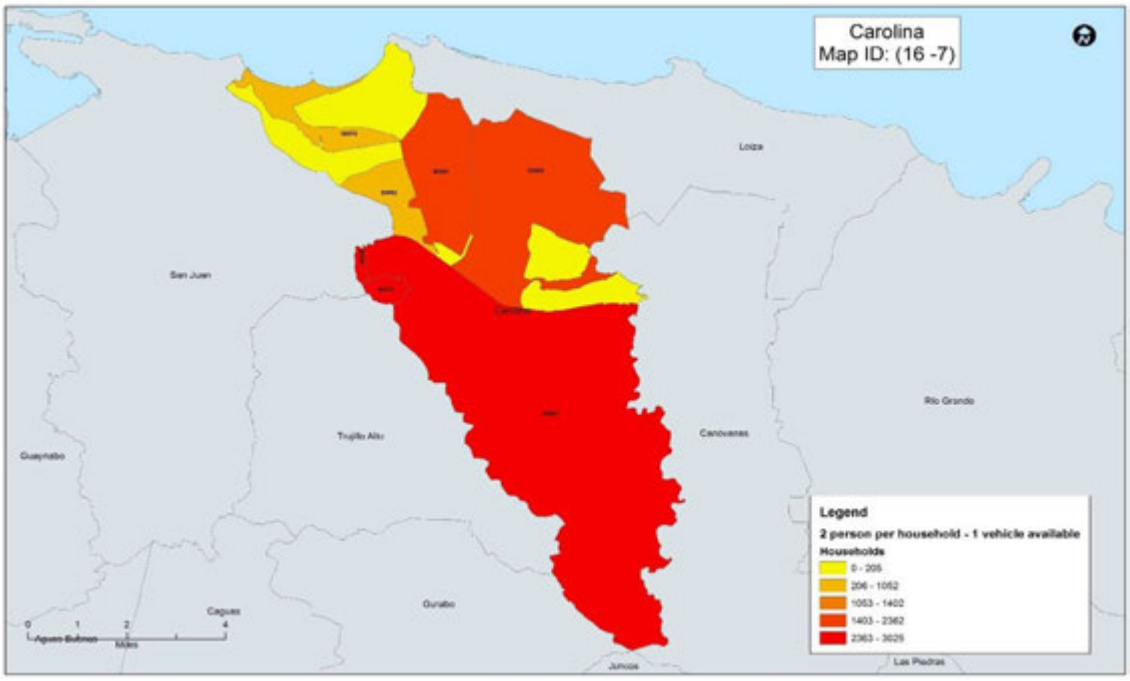
Source: US Census Bureau, 2015 and SDG

Figure D.66: Carolina, 2 Person per Household – No Vehicle Available



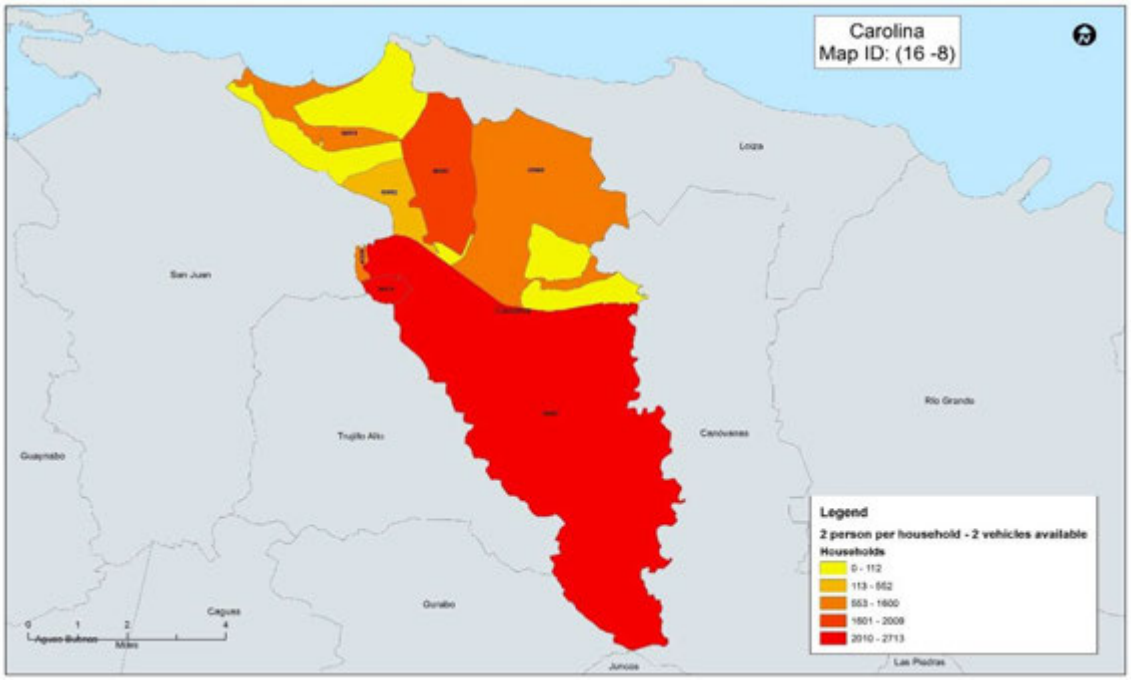
Source: US Census Bureau, 2015 and SDG

Figure D.67: Carolina, 2 Person per Household – 1 Vehicle Available



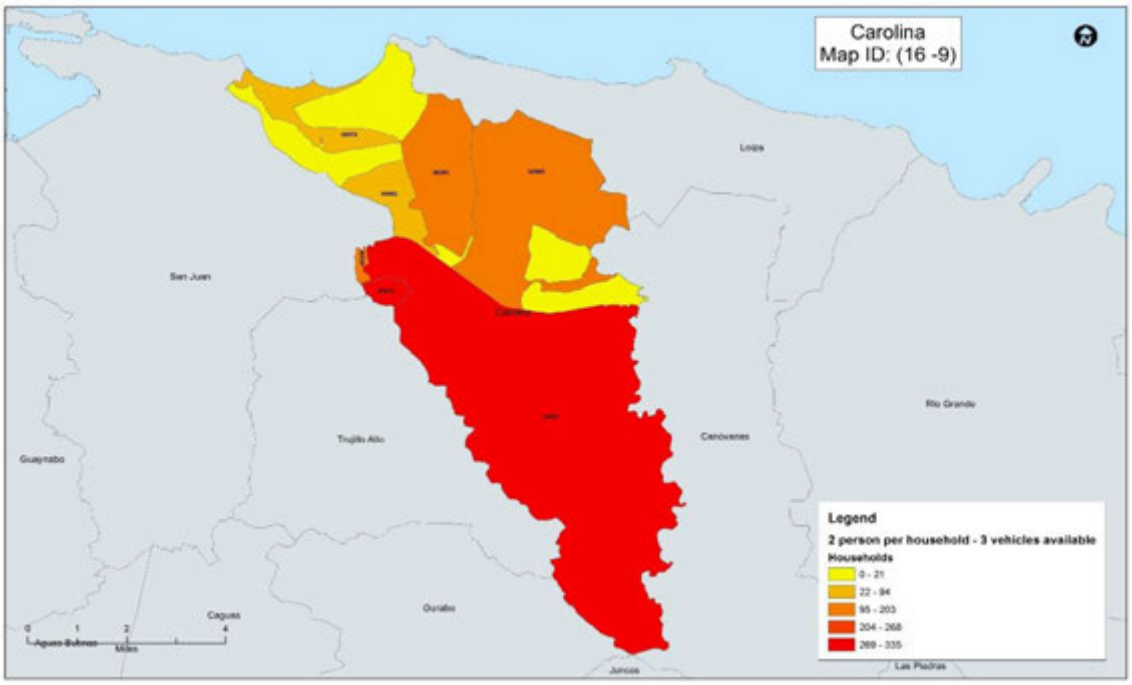
Source: US Census Bureau, 2015 and SDG

Figure D.68: Carolina, 2 Person per Household – 2 Vehicles Available



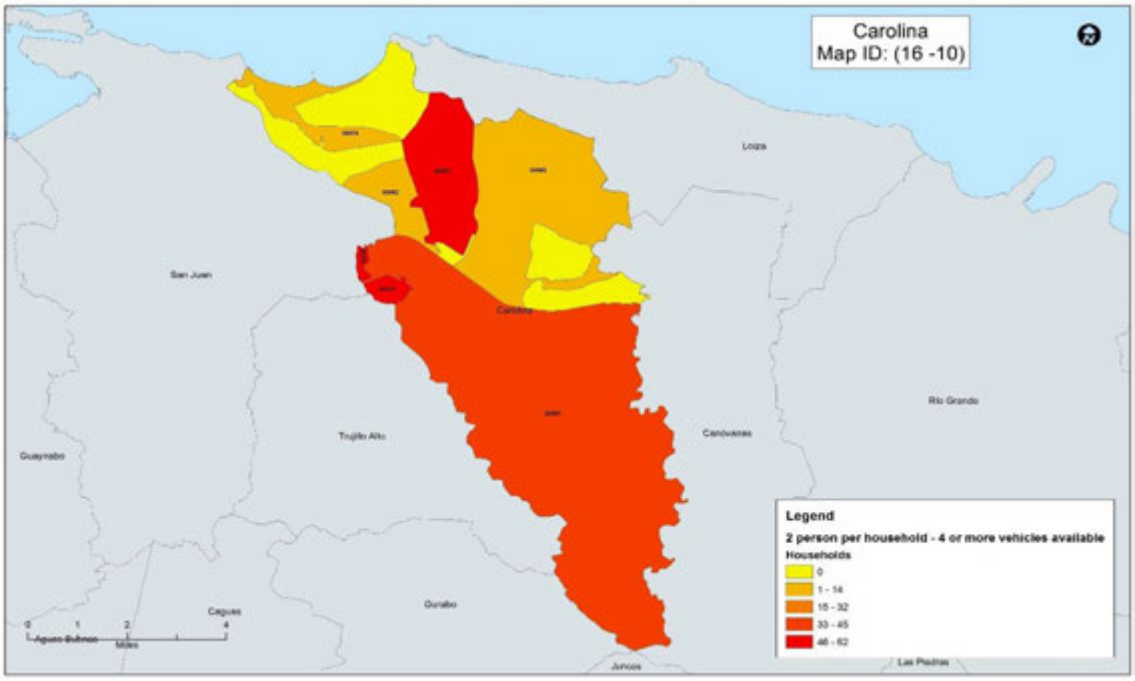
Source: US Census Bureau, 2015 and SDG

Figure D.69: Carolina, 2 Person per Household – 3 Vehicles Available



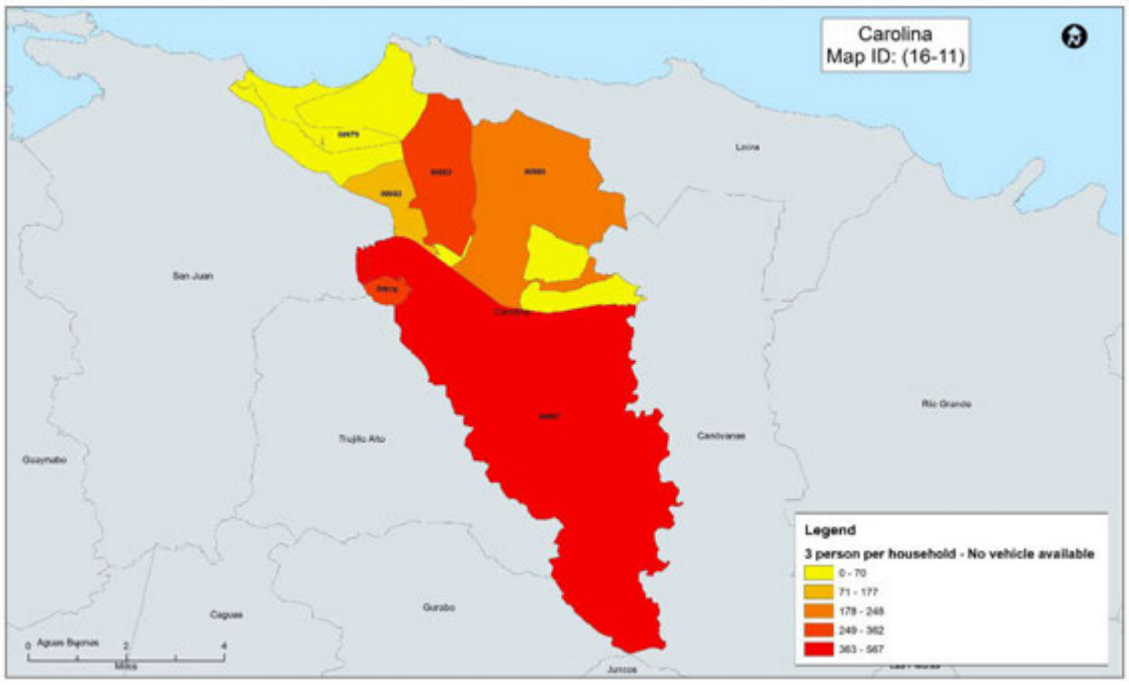
Source: US Census Bureau, 2015 and SDG

Figure D.70: Carolina, 2 Person per Household – 4 or more Vehicles Available



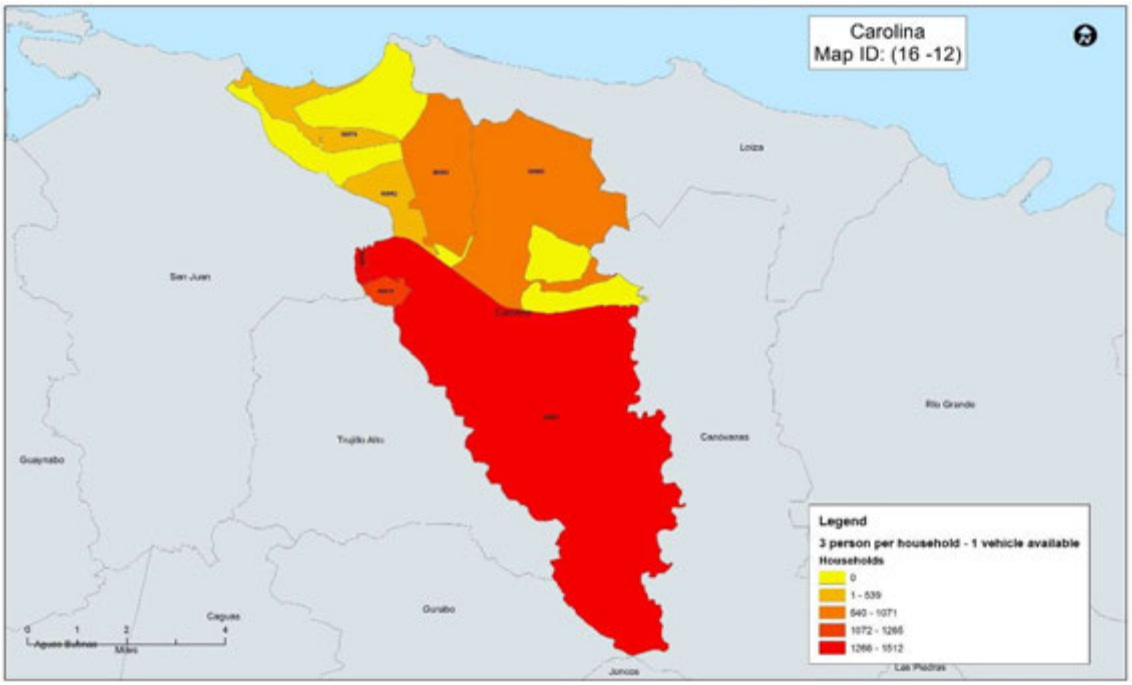
Source: US Census Bureau, 2015 and SDG

Figure D.71: Carolina, 3 Person per Household – No Vehicle Available



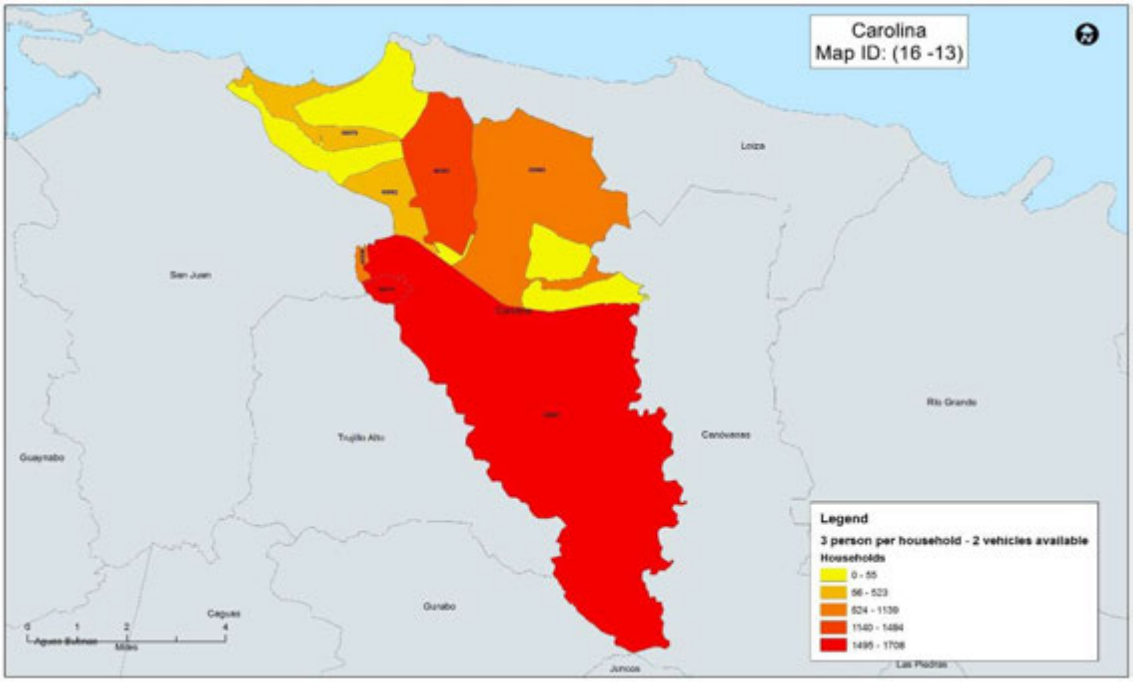
Source: US Census Bureau, 2015 and SDG

Figure D.72: Carolina, 3 Person per Household – 1 Vehicle Available



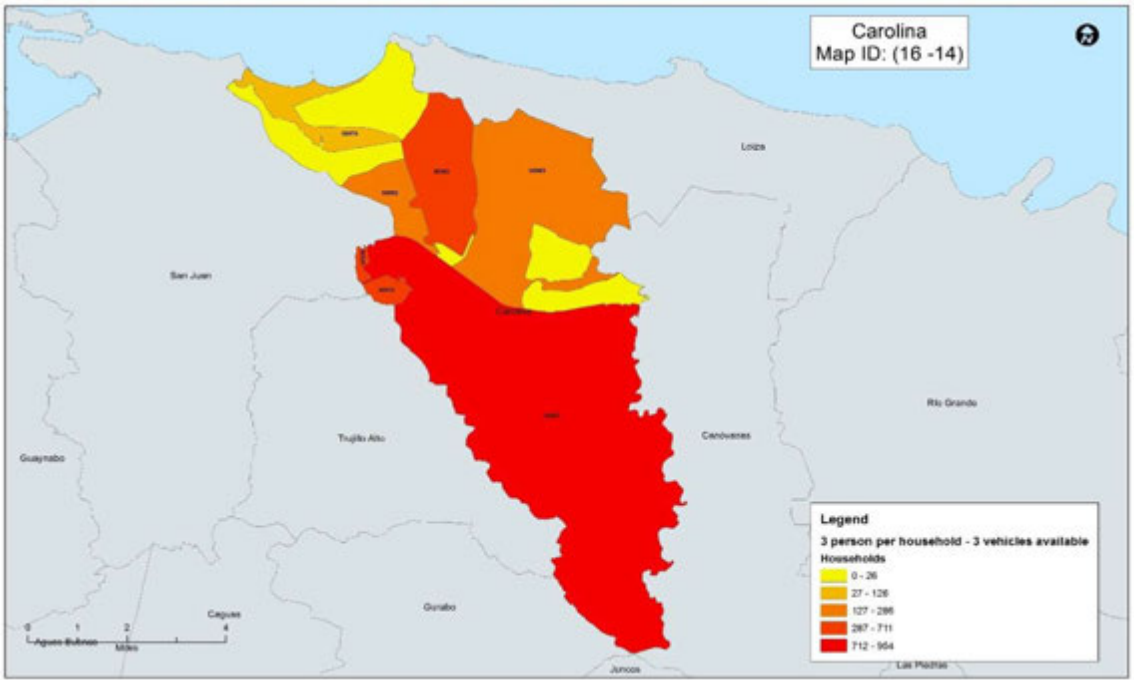
Source: US Census Bureau, 2015 and SDG

Figure D.73: Carolina, 3 Person per Household – 2 Vehicles Available



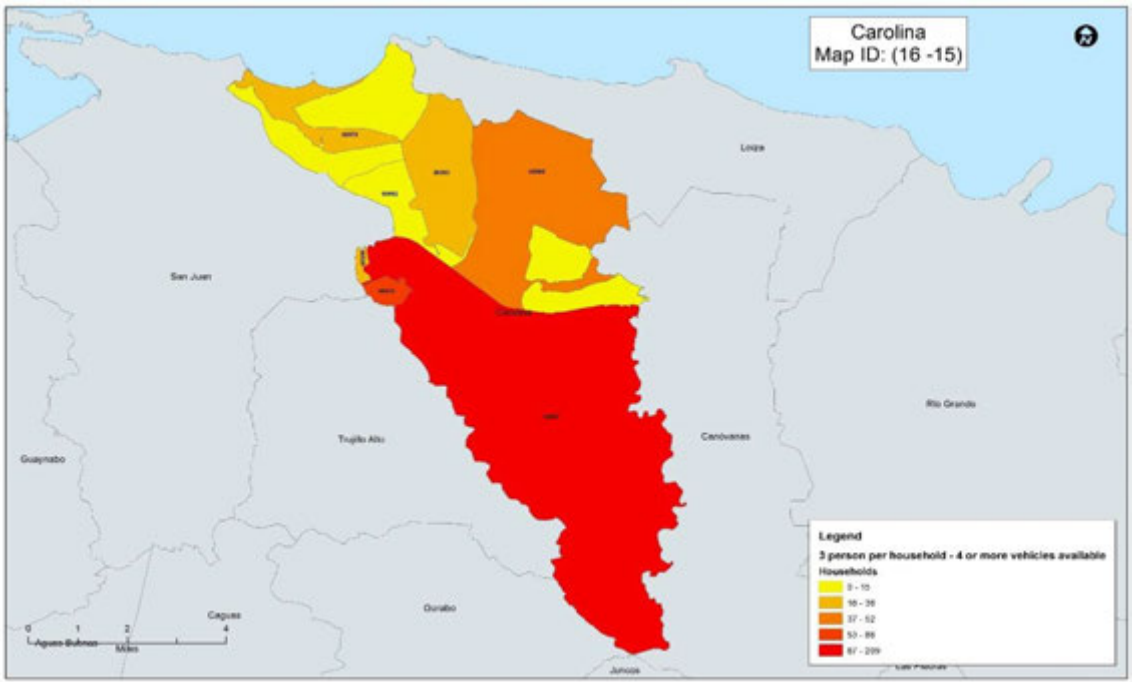
Source: US Census Bureau, 2015 and SDG

Figure D.74: Carolina, 3 Person per Household – 3 Vehicles Available



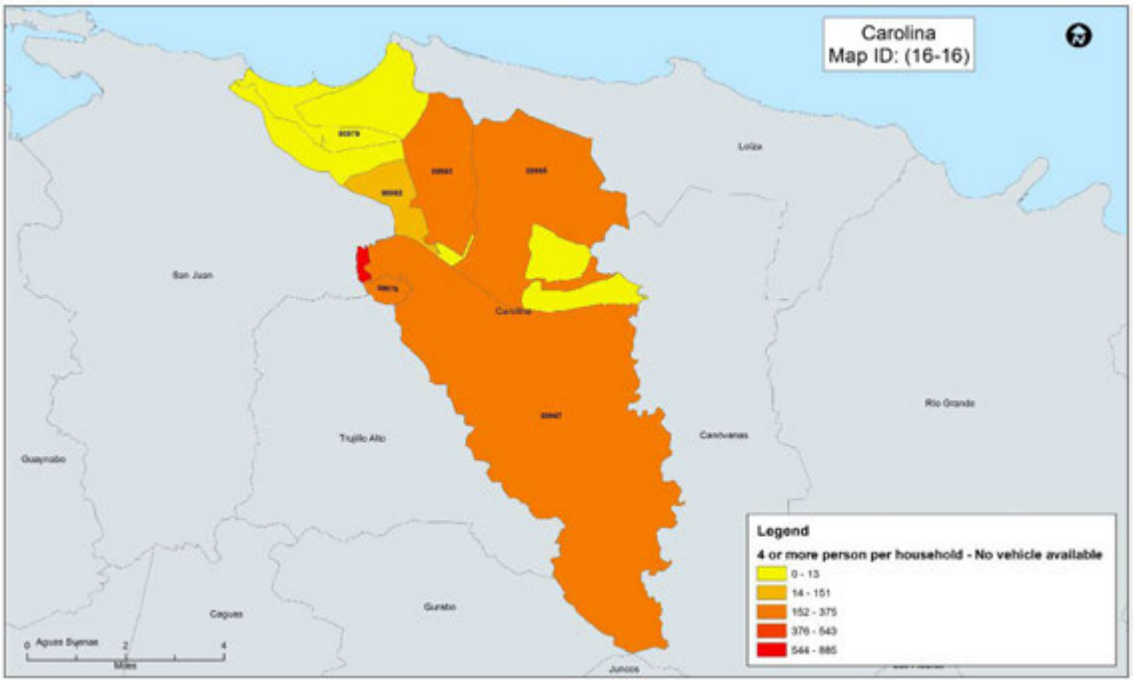
Source: US Census Bureau, 2015 and SDG

Figure D.75: Carolina, 3 Person per Household – 4 or more Vehicles Available



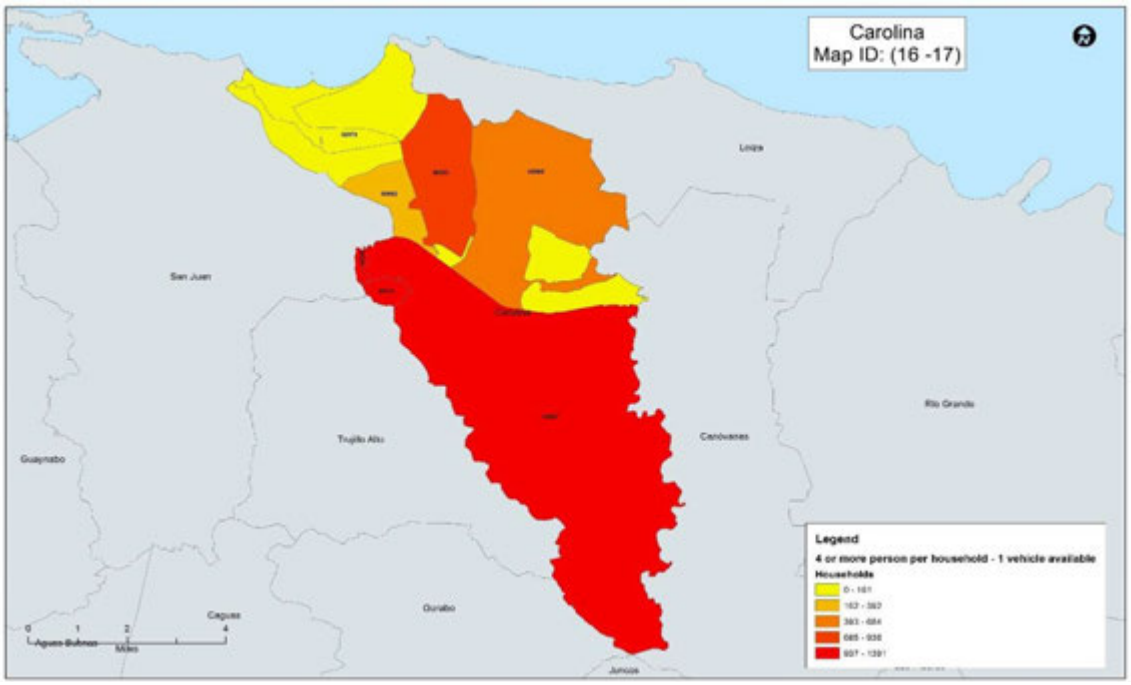
Source: US Census Bureau, 2015 and SDG

Figure D.76: Carolina, 4 or more Person per Household – No Vehicle Available



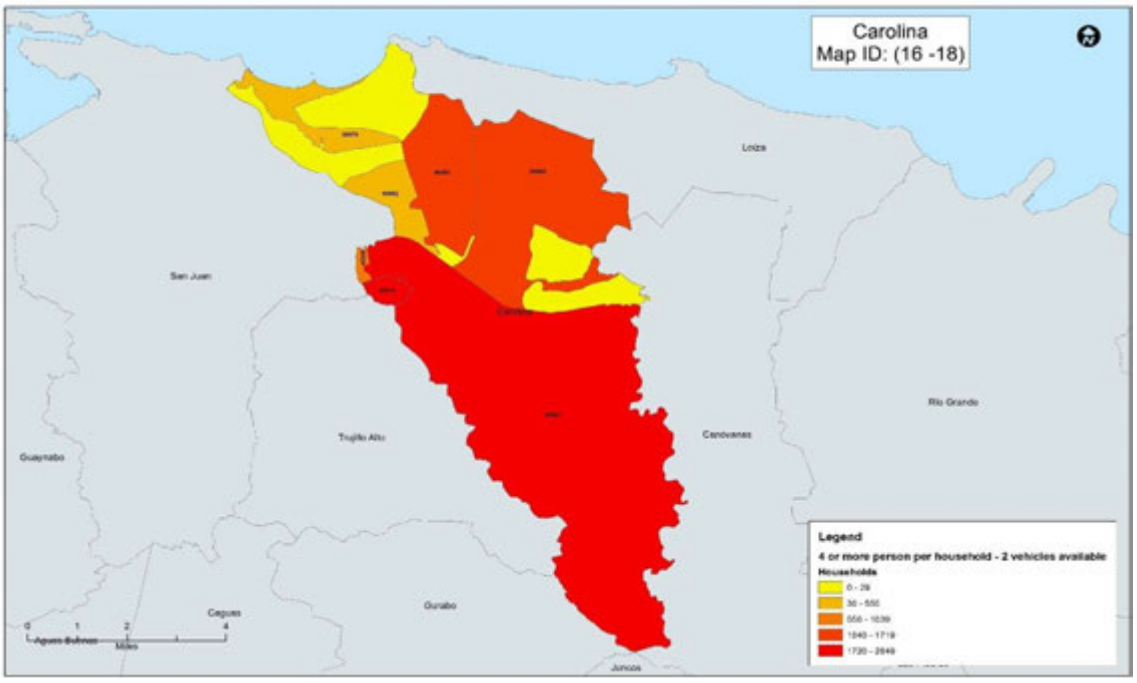
Source: US Census Bureau, 2015 and SDG

Figure D.77: Carolina, 4 or more Person per Household – 1 Vehicle Available



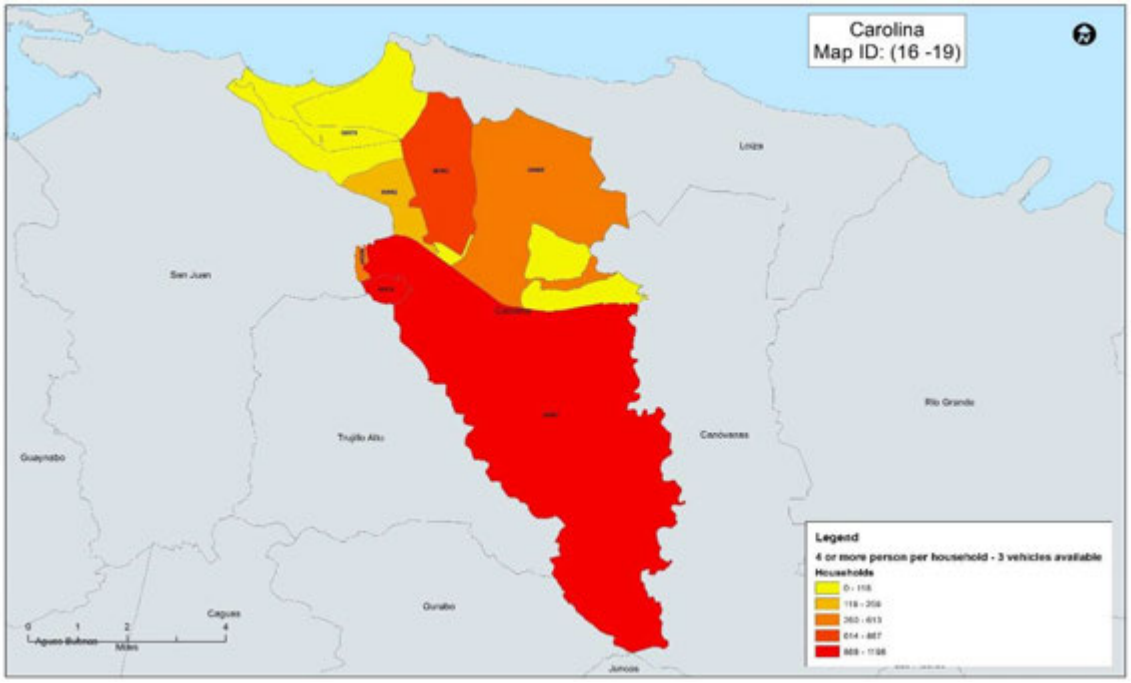
Source: US Census Bureau, 2015 and SDG

Figure D.78: Carolina, 4 or more Person per Household – 2 Vehicles Available



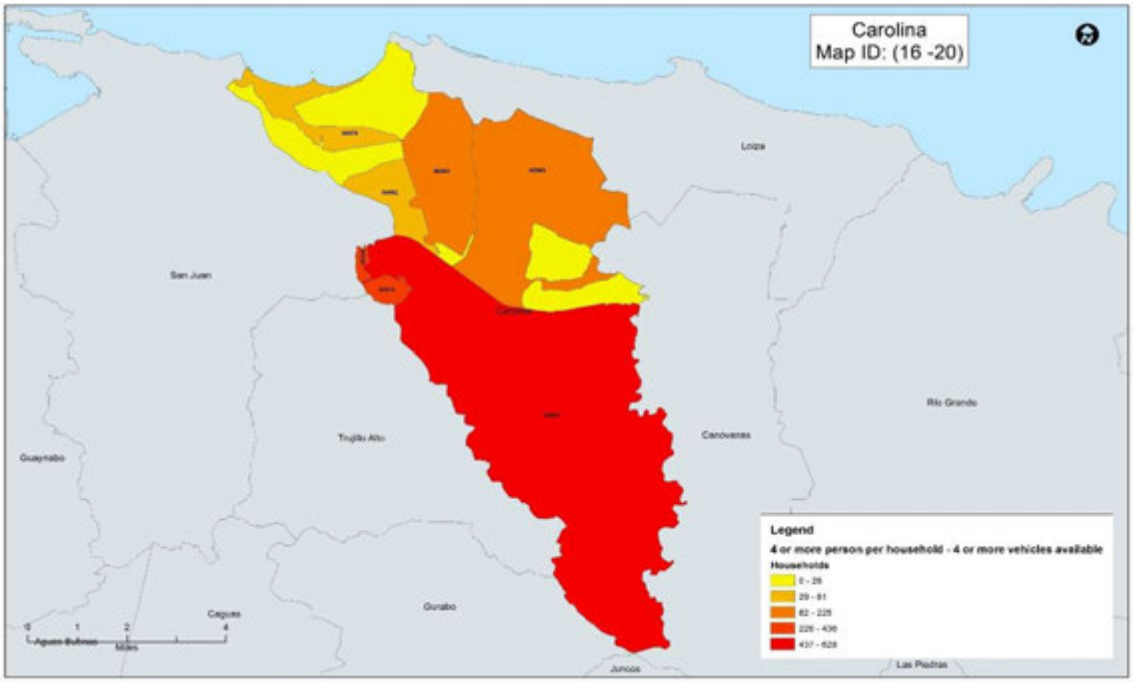
Source: US Census Bureau, 2015 and SDG

Figure D.79: Carolina, 4 or more Person per Household – 3 Vehicles Available



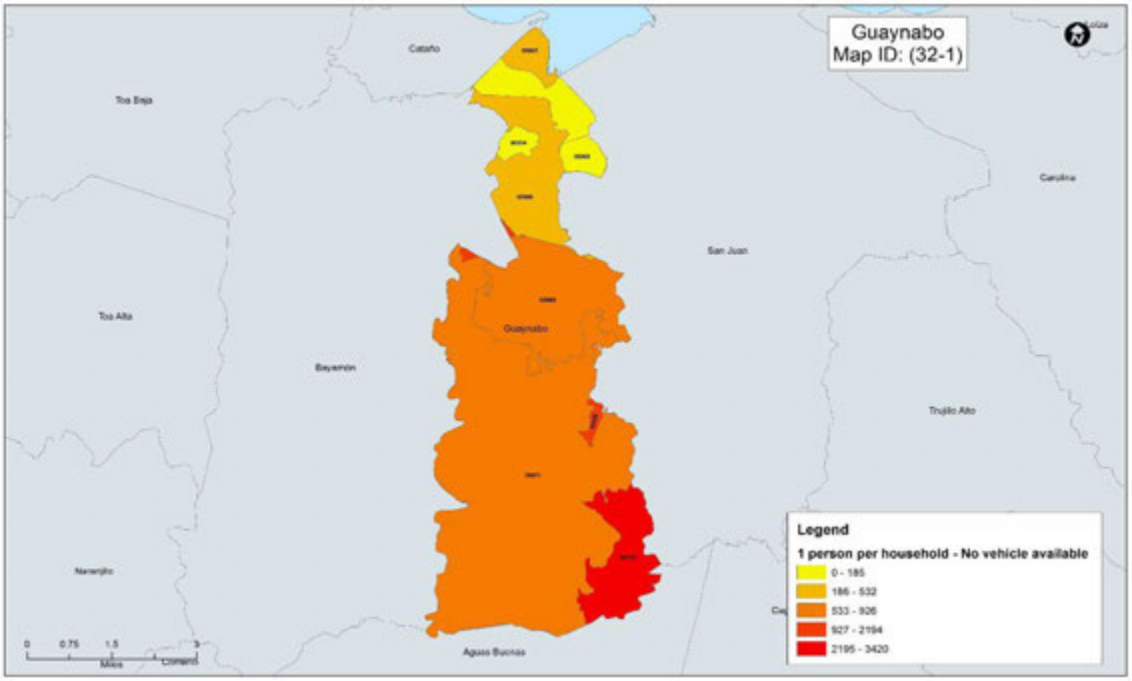
Source: US Census Bureau, 2015 and SDG

Figure D.80: Carolina, 4 or more Person per Household – 4 or more Vehicles Available



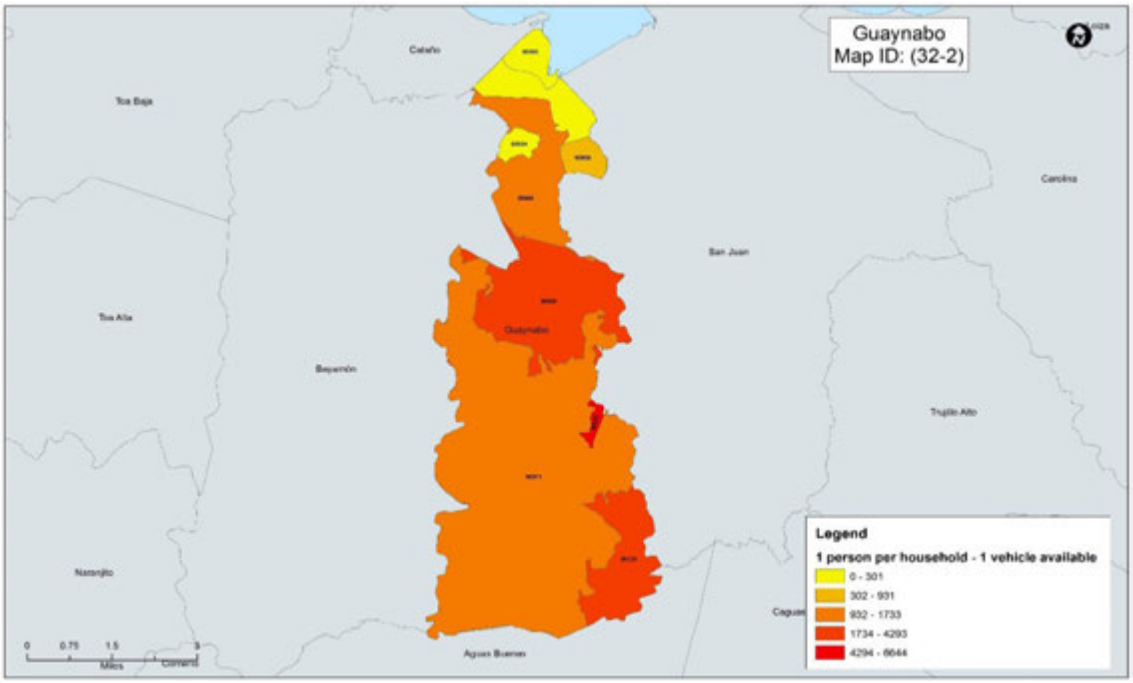
Source: US Census Bureau, 2015 and SDG

Figure D.81: Guaynabo, 1 Person per Household – No Vehicle Available



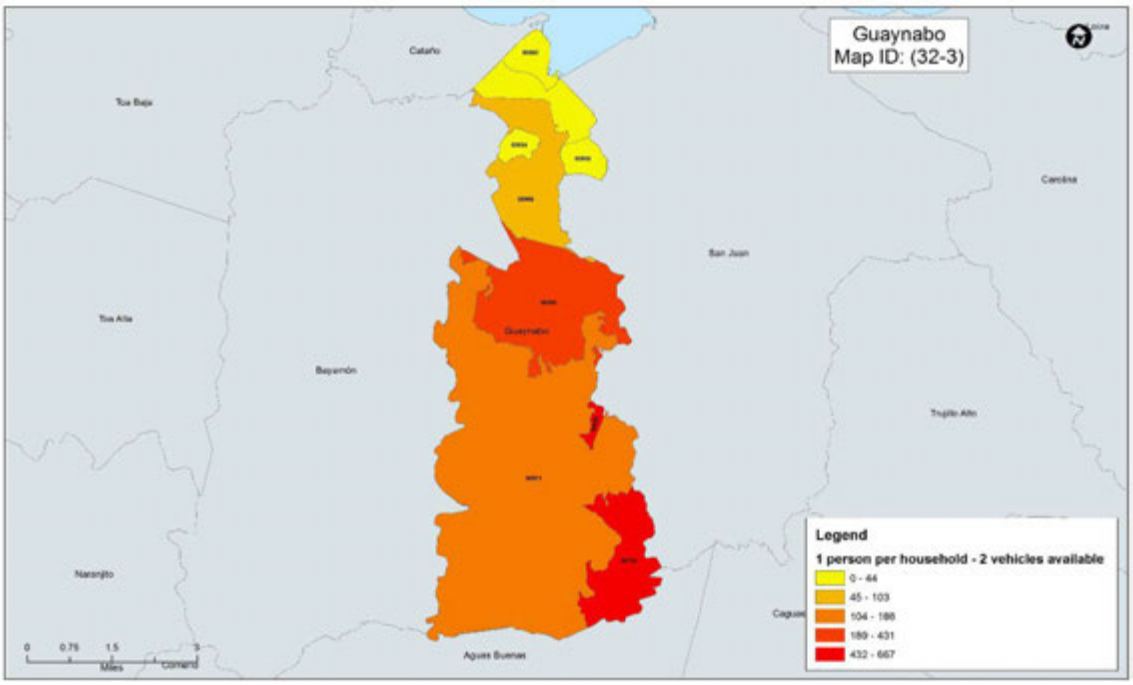
Source: US Census Bureau, 2015 and SDG

Figure D.82: Guaynabo, 1 Person per Household – 1 Vehicle Available



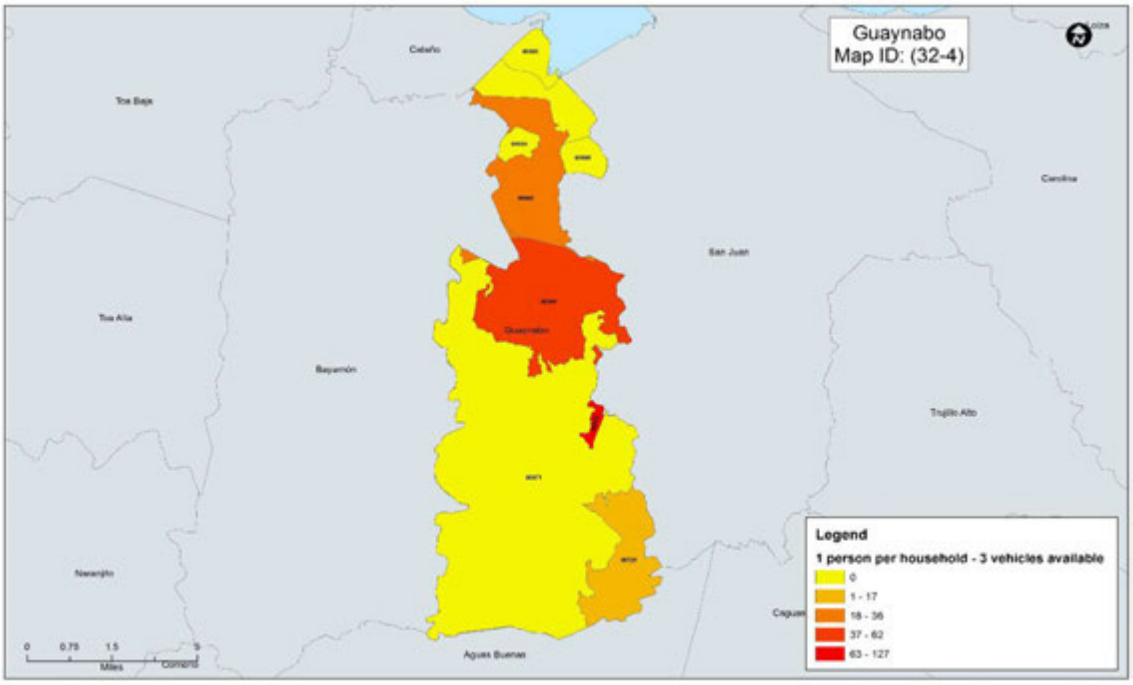
Source: US Census Bureau, 2015 and SDG

Figure D.83: Guaynabo, 1 Person per Household – 2 Vehicles Available



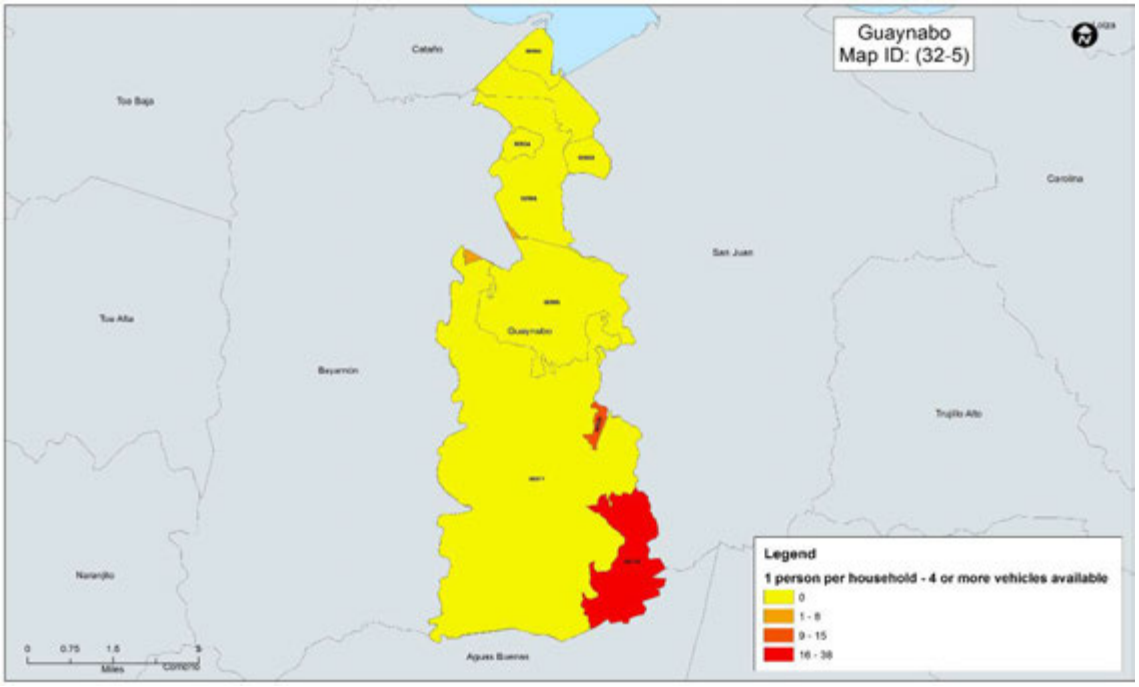
Source: US Census Bureau, 2015 and SDG

Figure D.84: Guaynabo, 1 Person per Household – 3 Vehicles Available



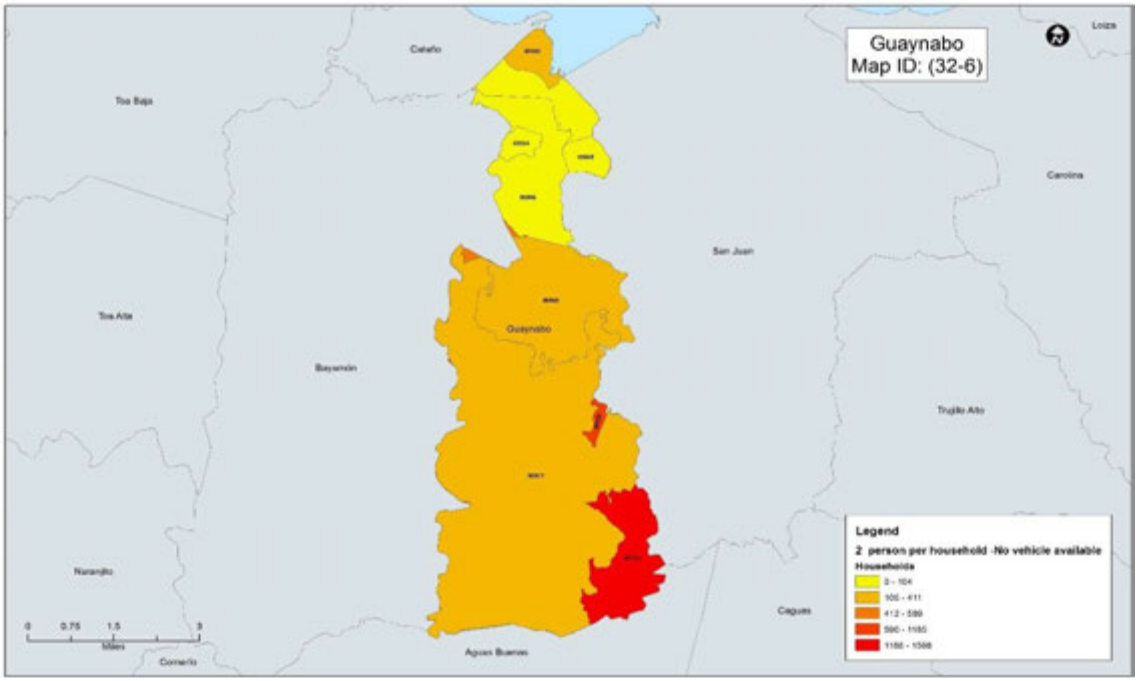
Source: US Census Bureau, 2015 and SDG

Figure D.85: Guaynabo, 1 Person per Household – 4 or more Vehicles Available



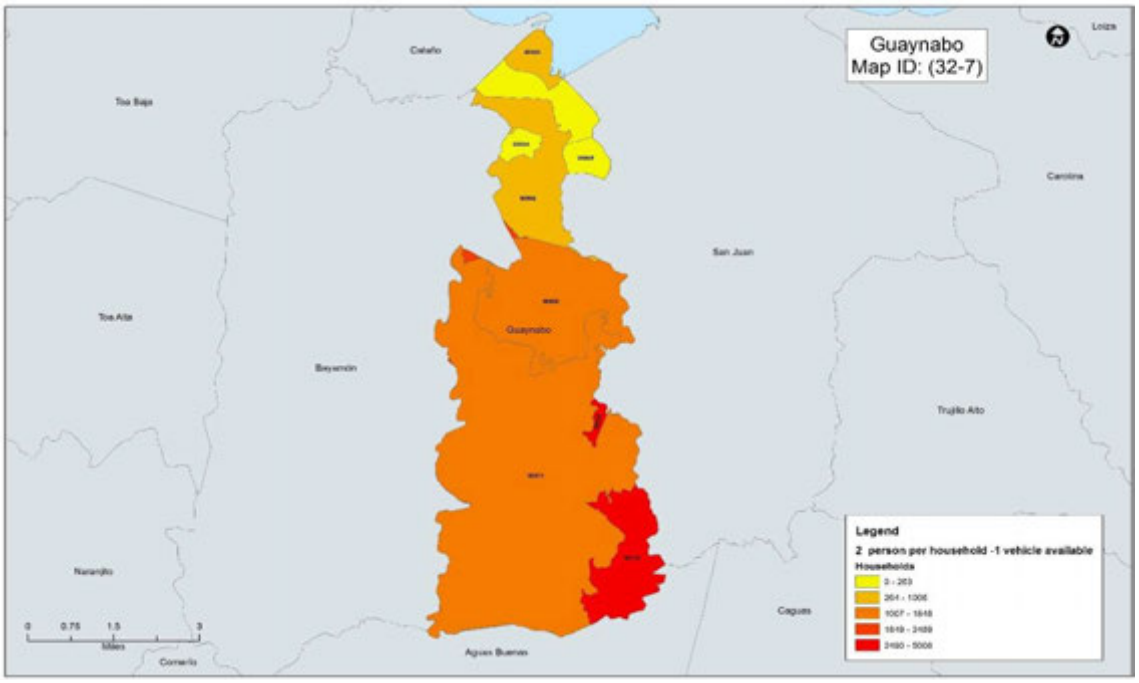
Source: US Census Bureau, 2015 and SDG

Figure D.86: Guaynabo, 2 Person per Household – No Vehicle Available



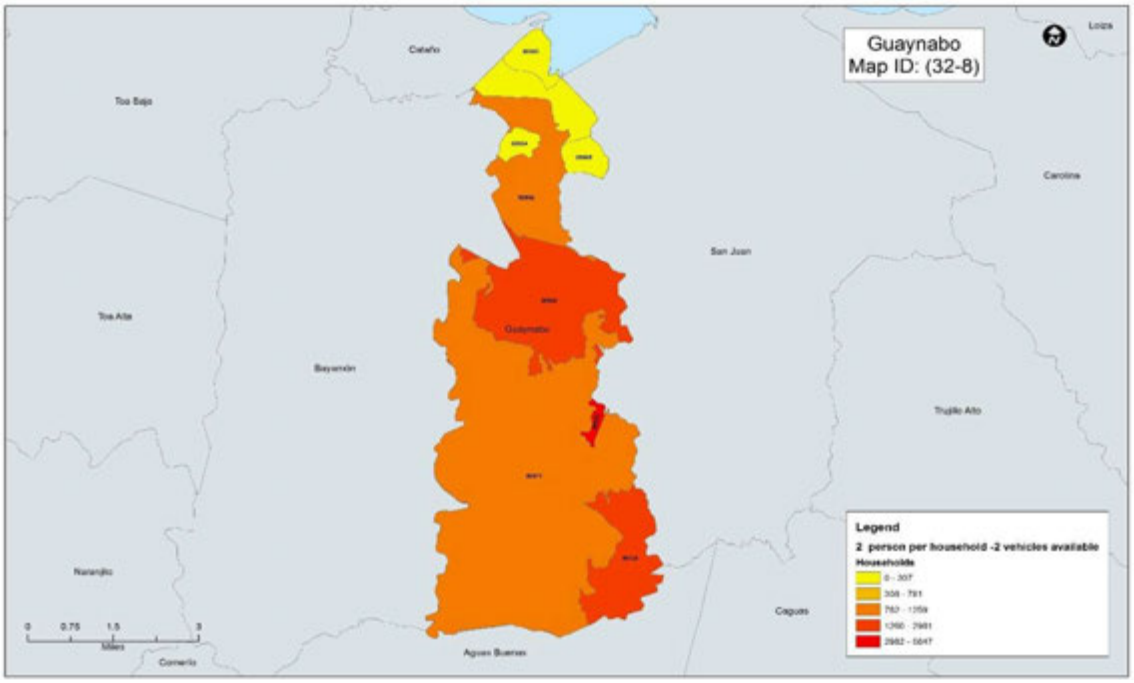
Source: US Census Bureau, 2015 and SDG

Figure D.87: Guaynabo, 2 Person per Household – 1 Vehicle Available



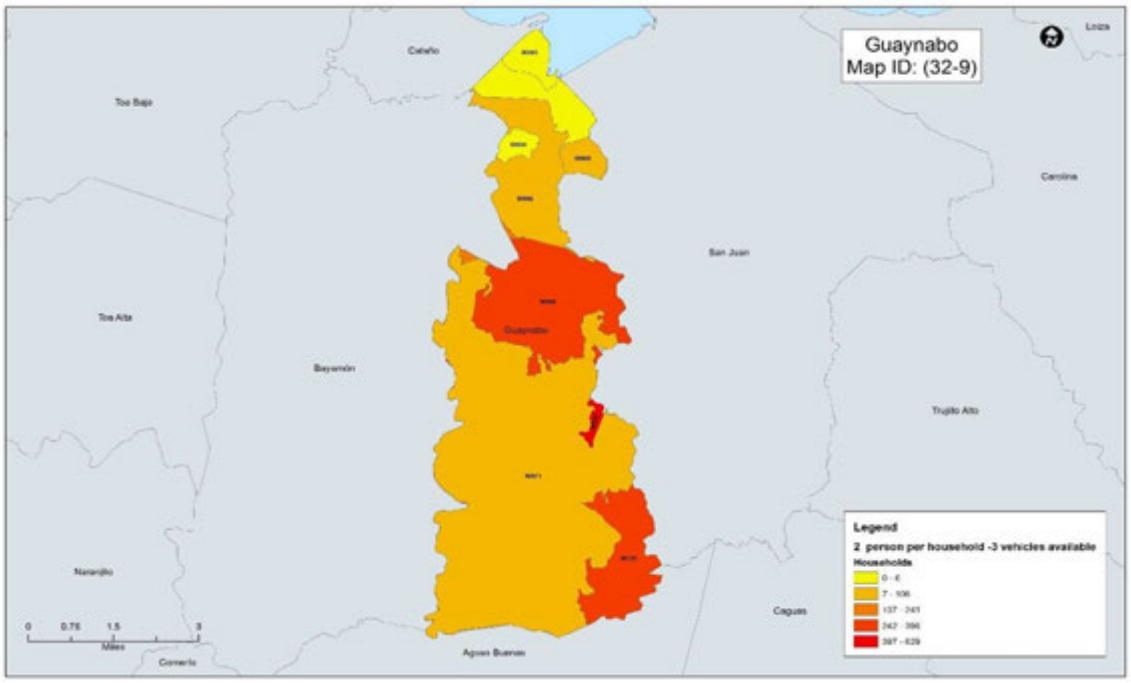
Source: US Census Bureau, 2015 and SDG

Figure D.88: Guaynabo, 2 Person per Household – 2 Vehicles Available



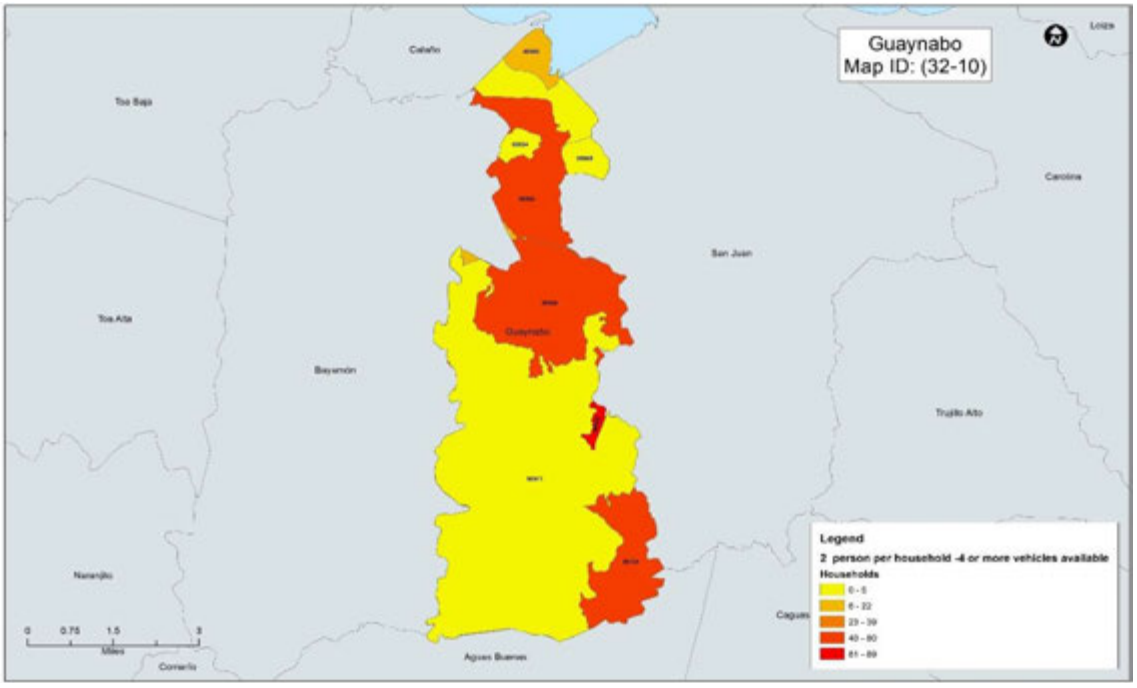
Source: US Census Bureau, 2015 and SDG

Figure D.89: Guaynabo, 2 Person per Household – 3 Vehicles Available



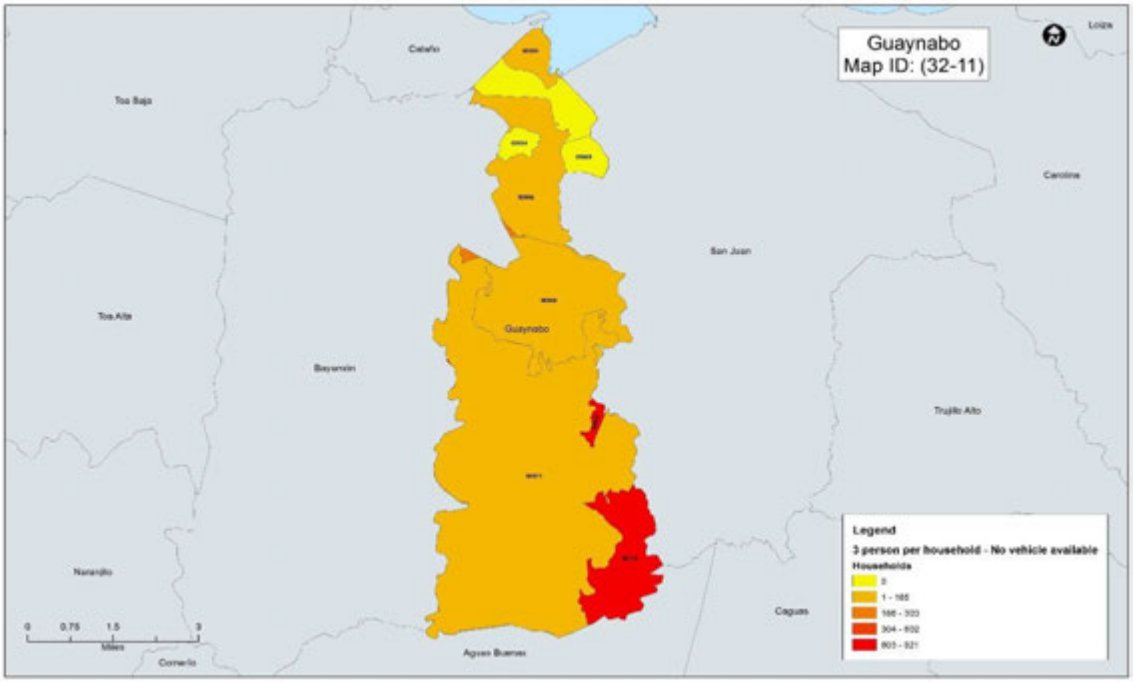
Source: US Census Bureau, 2015 and SDG

Figure D.90: Guaynabo, 2 Person per Household – 4 or more Vehicles Available



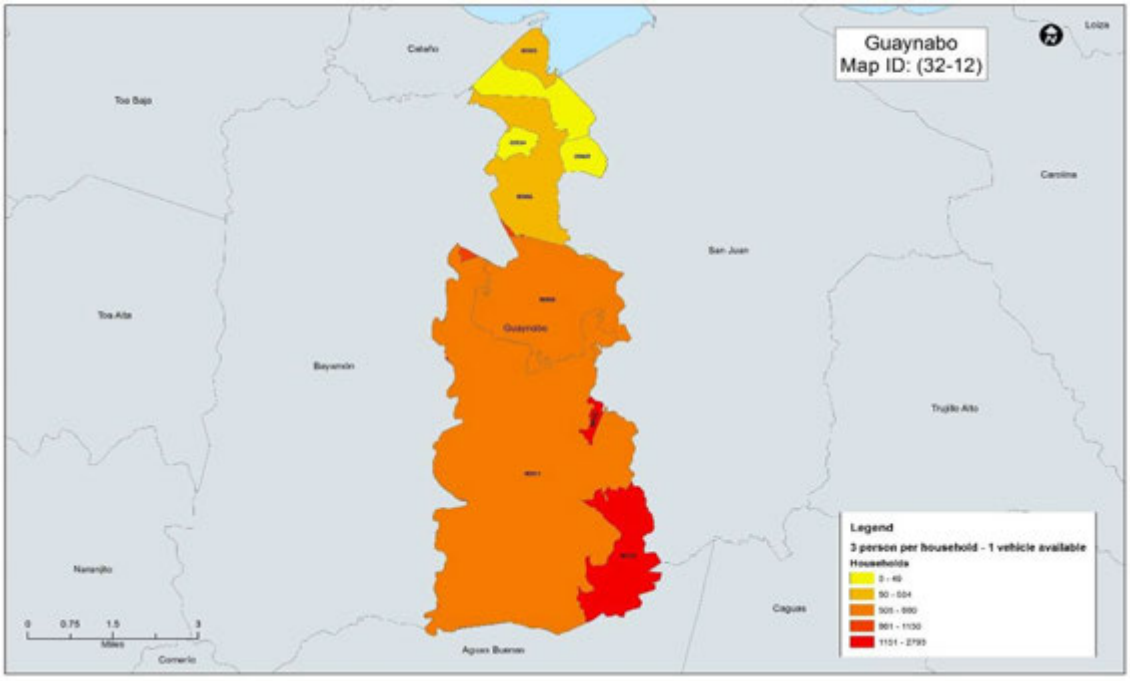
Source: US Census Bureau, 2015 and SDG

Figure D.91: Guaynabo, 3 Person per Household – No Vehicle Available



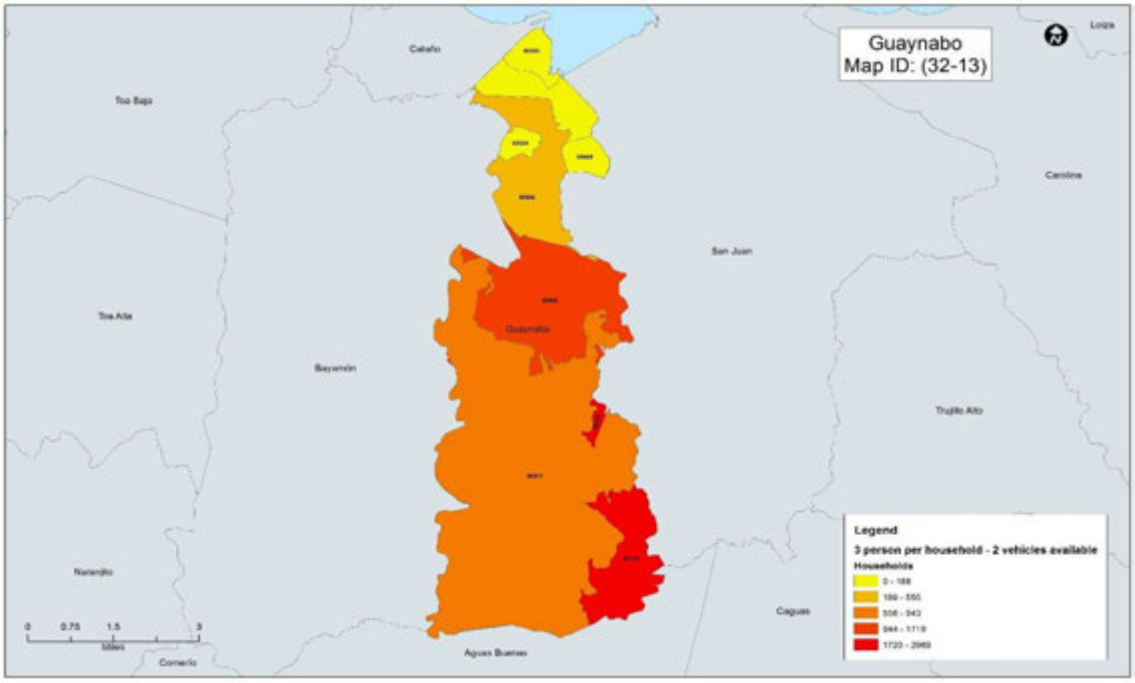
Source: US Census Bureau, 2015 and SDG

Figure D.92: Guaynabo, 3 Person per Household – 1 Vehicle Available



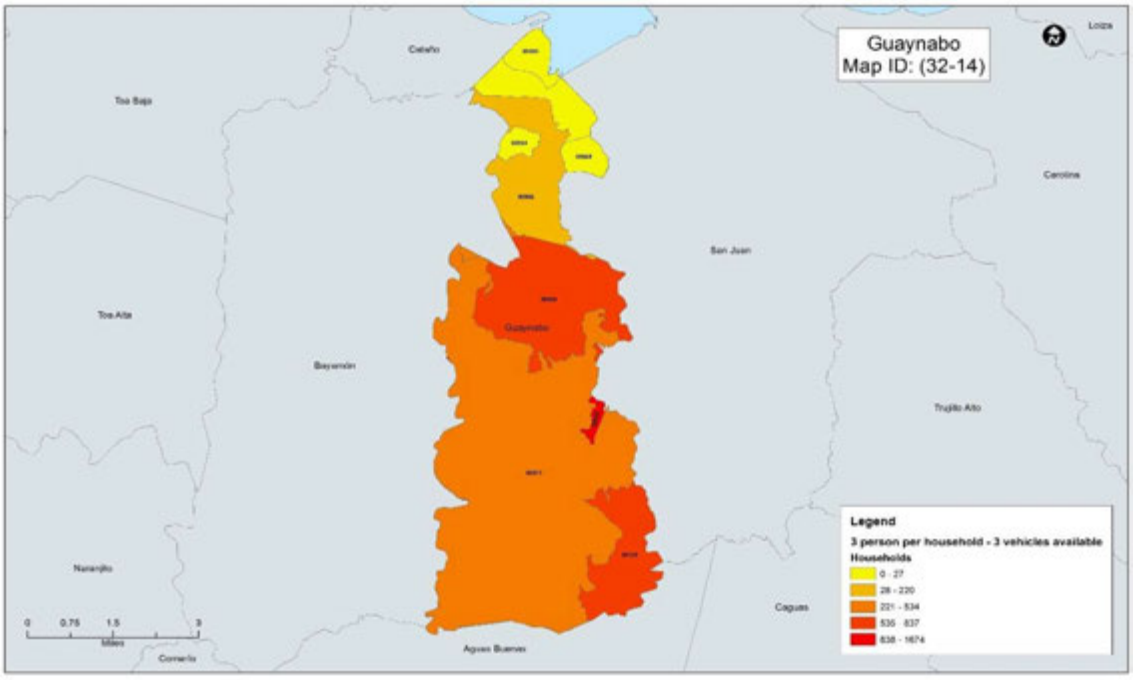
Source: US Census Bureau, 2015 and SDG

Figure D.93: Guaynabo, 3 Person per Household – 2 Vehicles Available



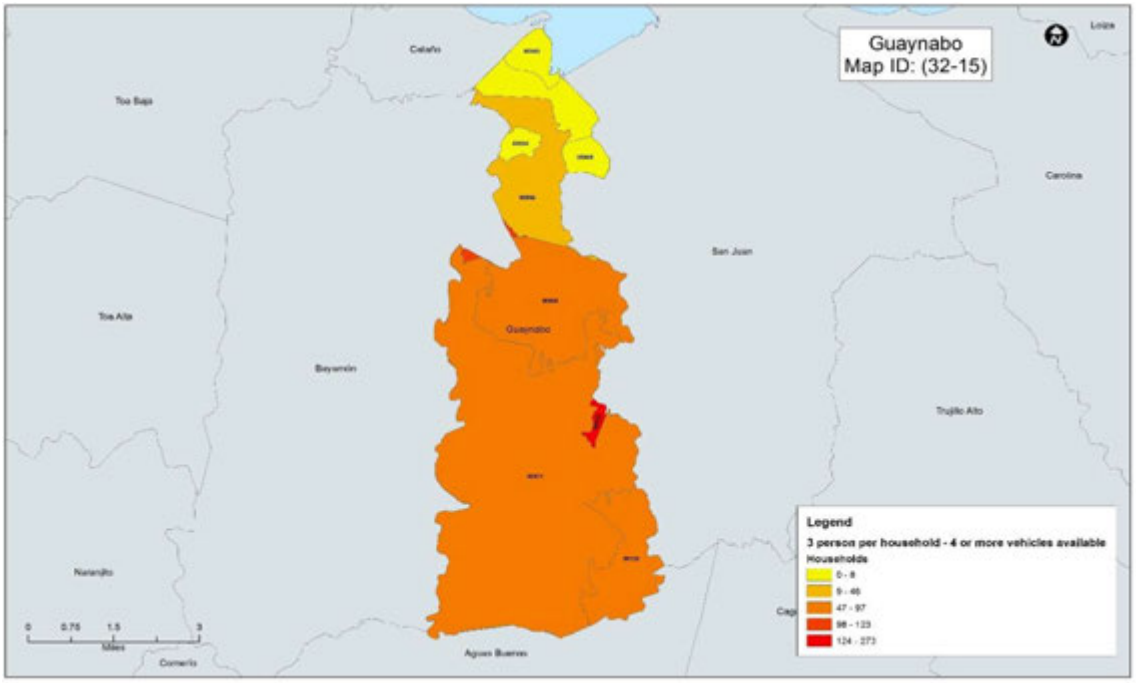
Source: US Census Bureau, 2015 and SDG

Figure D.94: Guaynabo, 3 Person per Household – 3 Vehicles Available



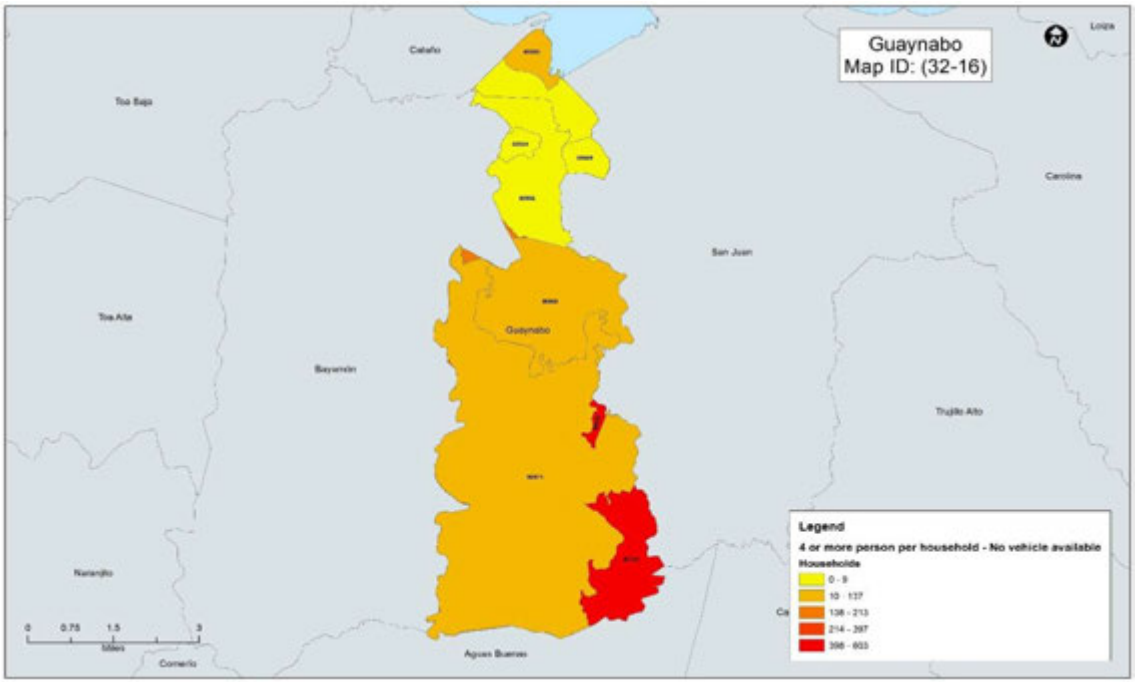
Source: US Census Bureau, 2015 and SDG

Figure D.95: Guaynabo, 3 Person per Household – 4 or more Vehicles Available



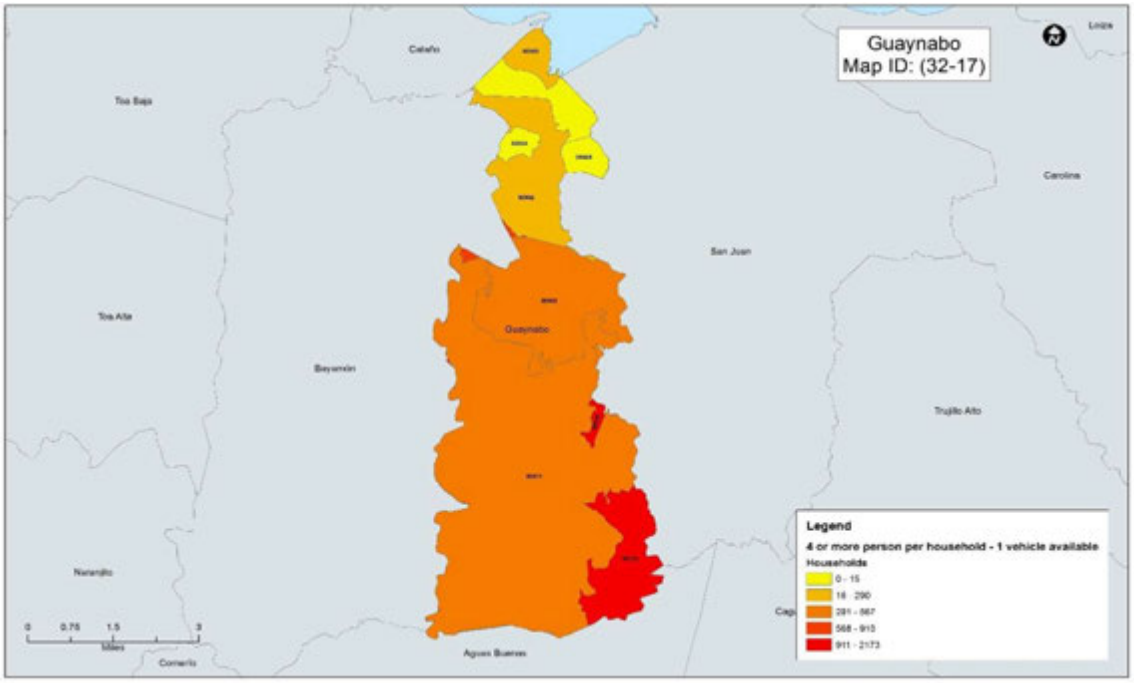
Source: US Census Bureau, 2015 and SDG

Figure D.96: Guaynabo, 4 or more Person per Household – No Vehicle Available



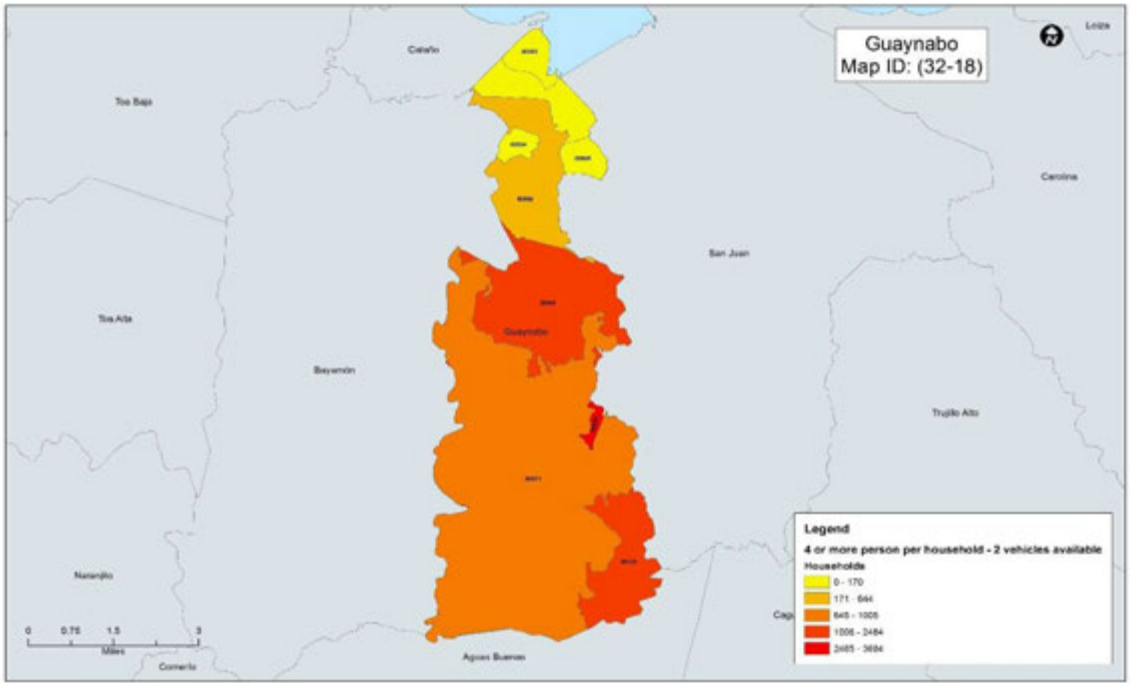
Source: US Census Bureau, 2015 and SDG

Figure D.97: Guaynabo, 4 or more Person per Household – 1 Vehicle Available



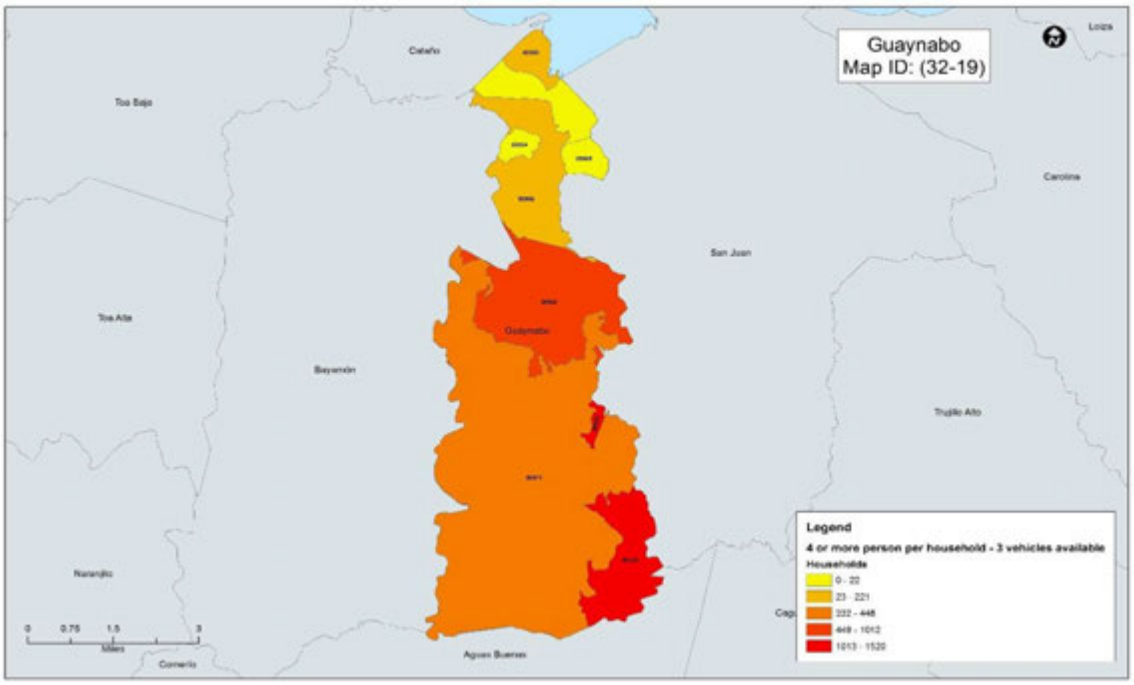
Source: US Census Bureau, 2015 and SDG

Figure D.98: Guaynabo, 4 or more Person per Household – 2 Vehicles Available



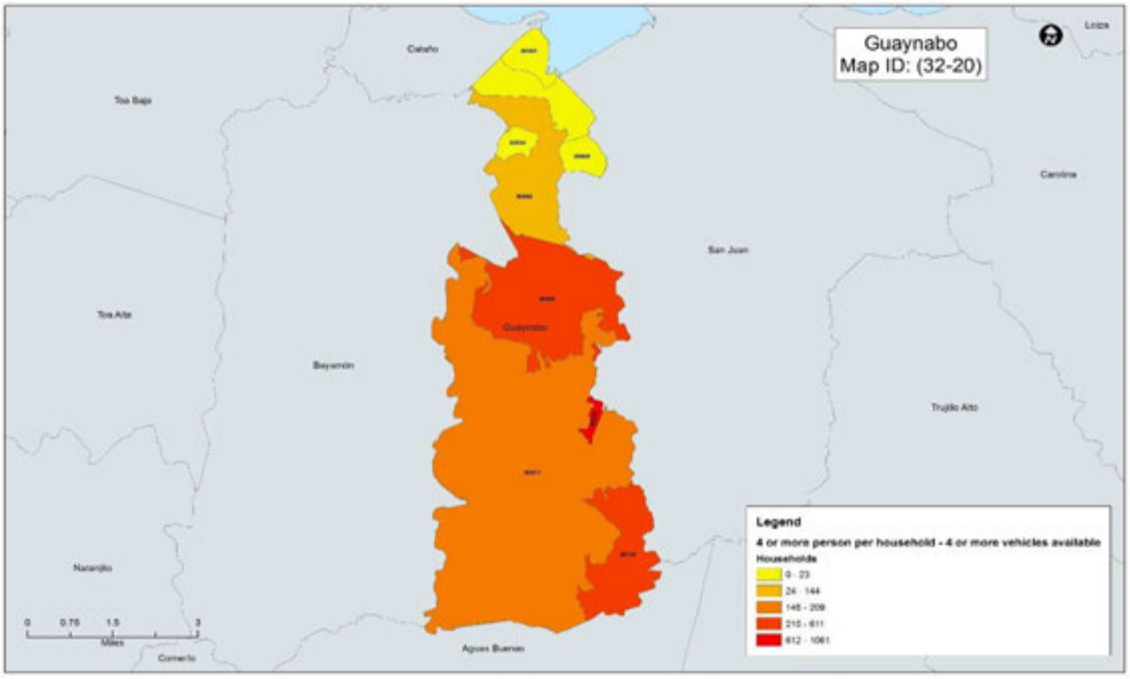
Source: US Census Bureau, 2015 and SDG

Figure D.99: Guaynabo, 4 or more Person per Household – 3 Vehicles Available



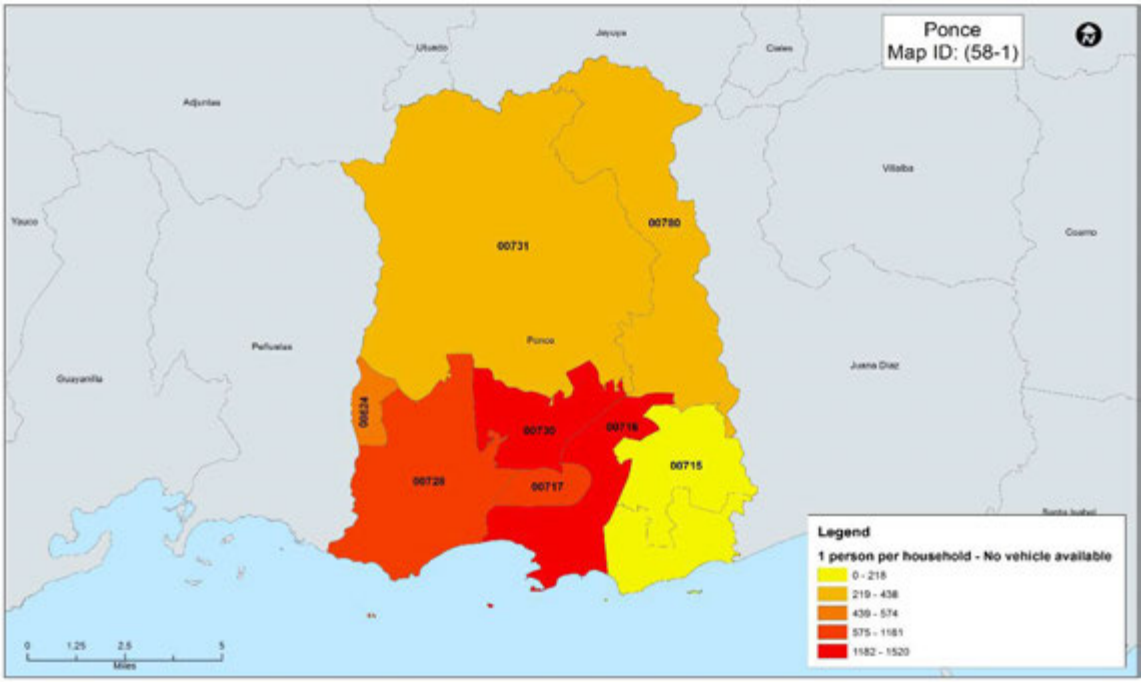
Source: US Census Bureau, 2015 and SDG

Figure D.100: Guaynabo, 4 or more Person per Household – 4 or more Vehicles Available



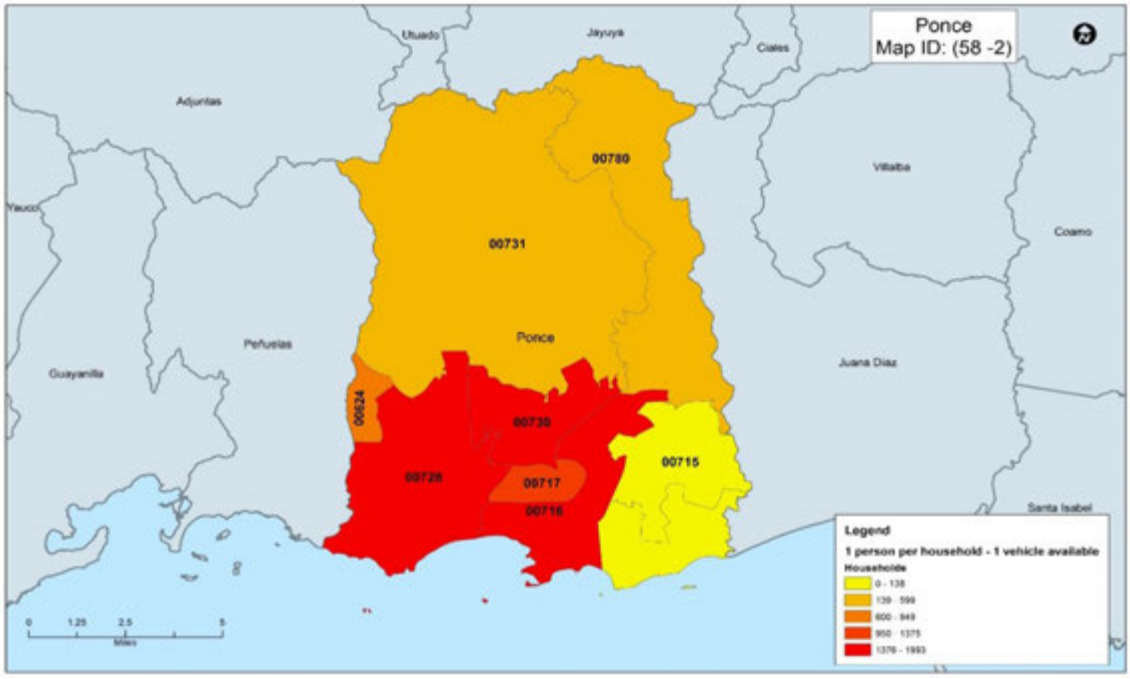
Source: US Census Bureau, 2015 and SDG

Figure D.101: Ponce, 1 Person per Household – No Vehicle Available



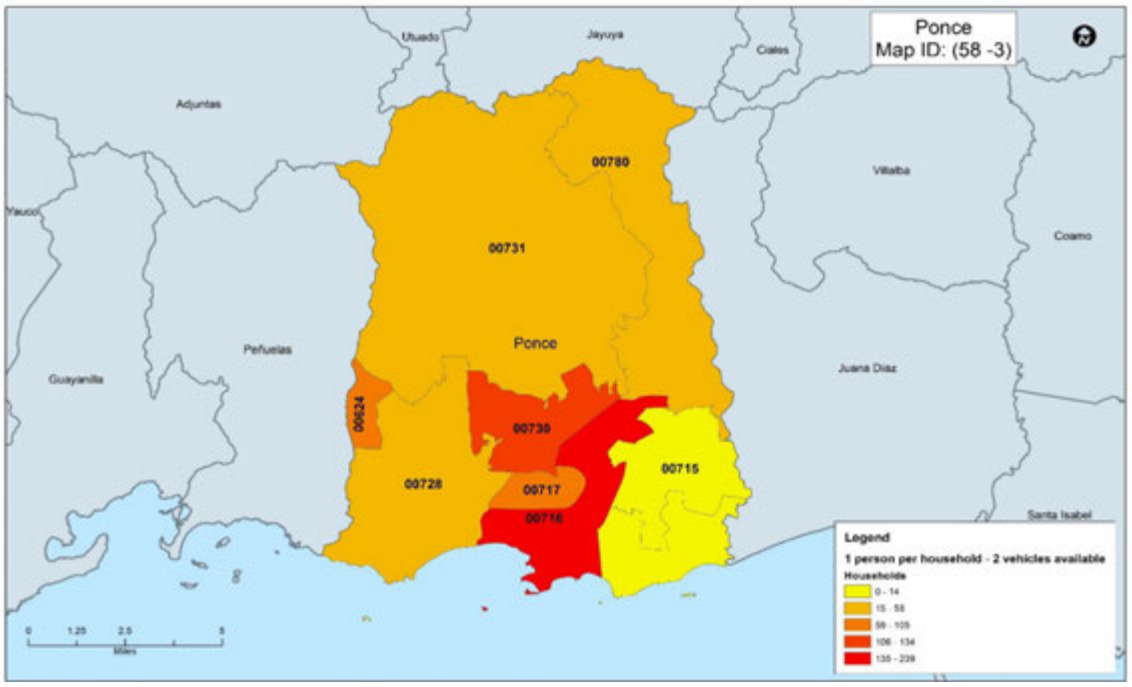
Source: US Census Bureau, 2015 and SDG

Figure D.102: Ponce, 1 Person per Household – 1 Vehicle Available



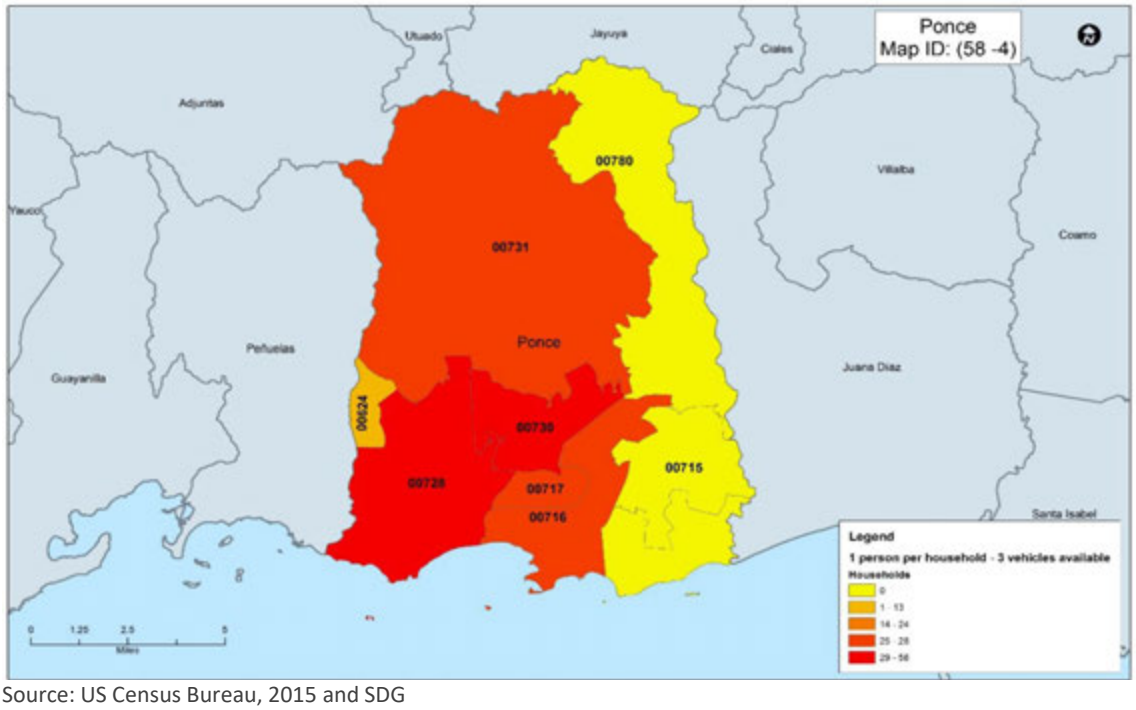
Source: US Census Bureau, 2015 and SDG

Figure D.103: Ponce, 1 Person per Household – 2 Vehicles Available



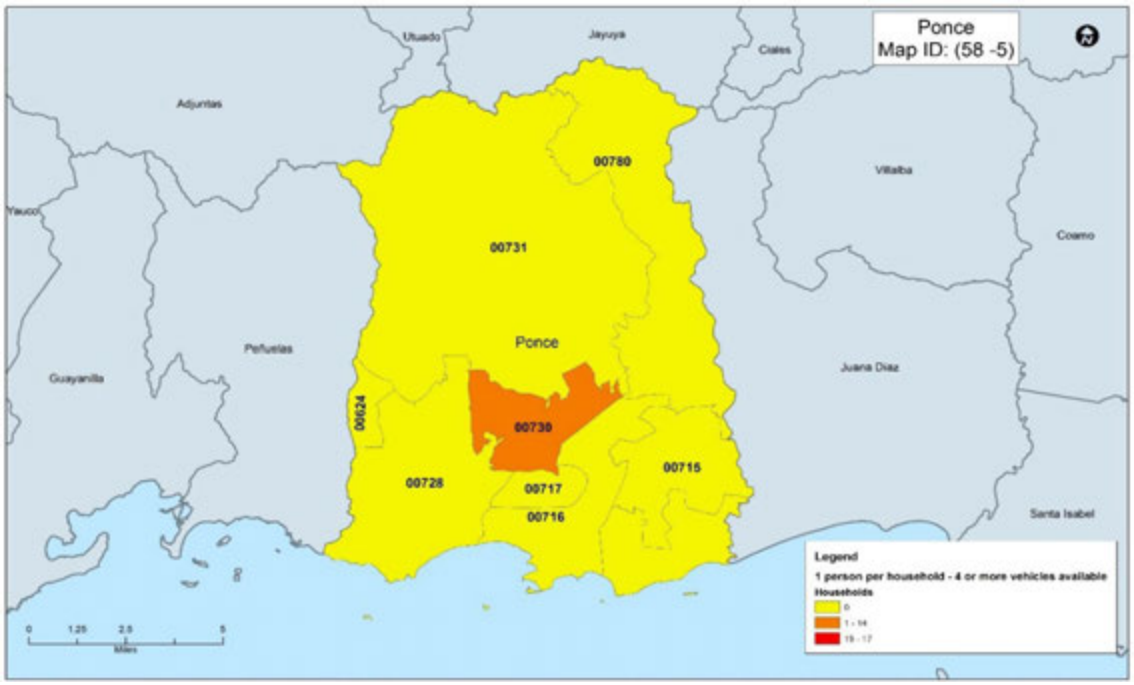
Source: US Census Bureau, 2015 and SDG

Figure D.104: Ponce, 1 Person per Household – 3 Vehicles Available



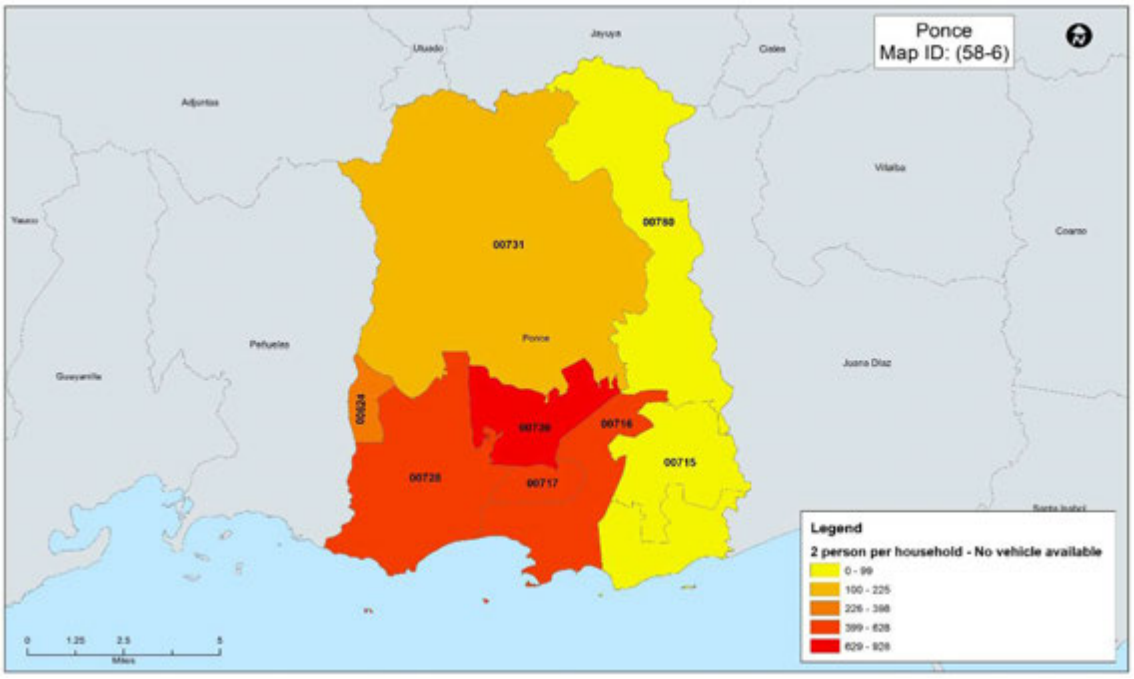
Source: US Census Bureau, 2015 and SDG

Figure D.105: Ponce, 1 Person per Household – 4 or More Vehicle Available



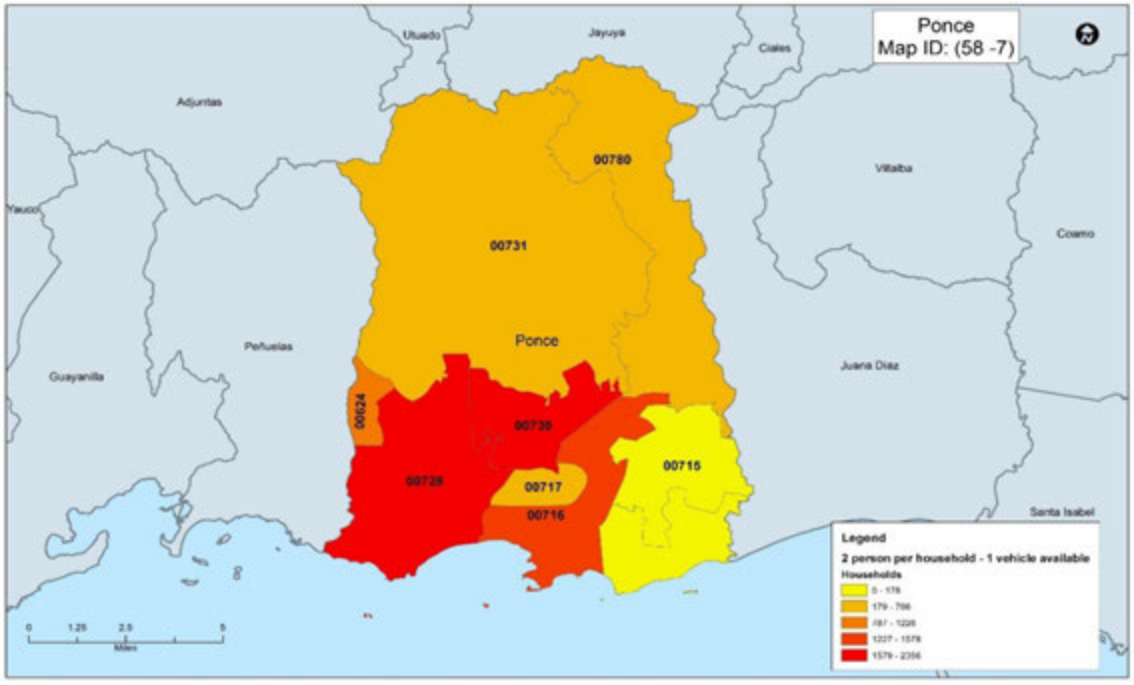
Source: US Census Bureau, 2015 and SDG

Figure D.106: Ponce, 2 Person per Household – No Vehicle Available



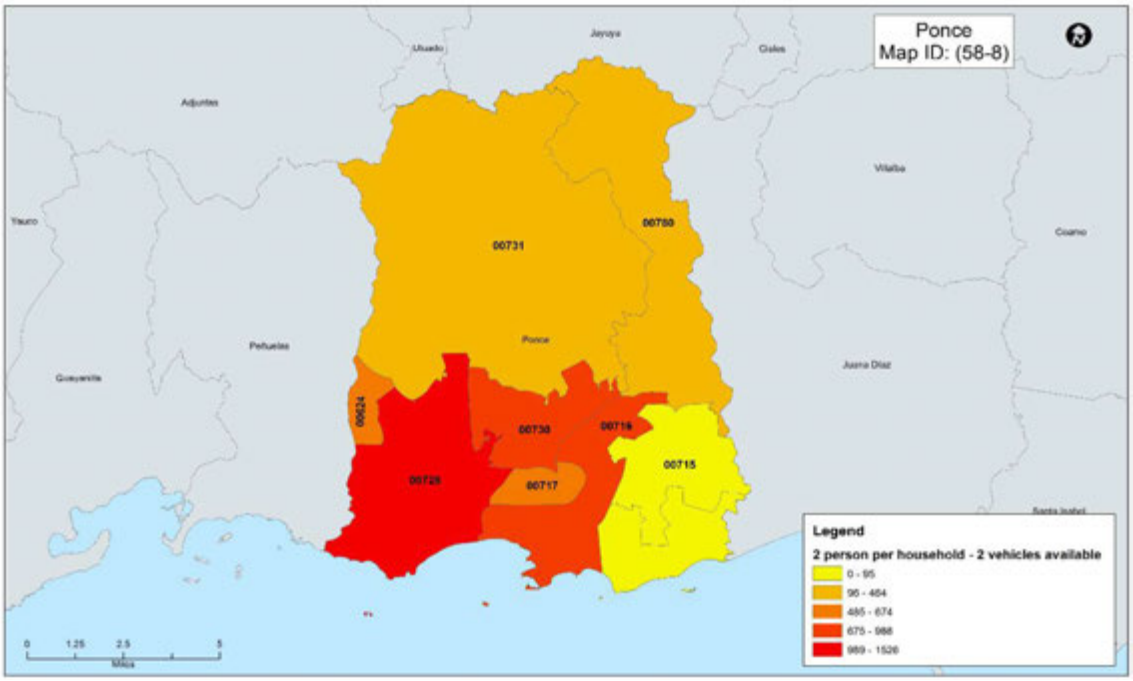
Source: US Census Bureau, 2015 and SDG

Figure D.107: Ponce, 2 Person per Household – 1 Vehicle Available



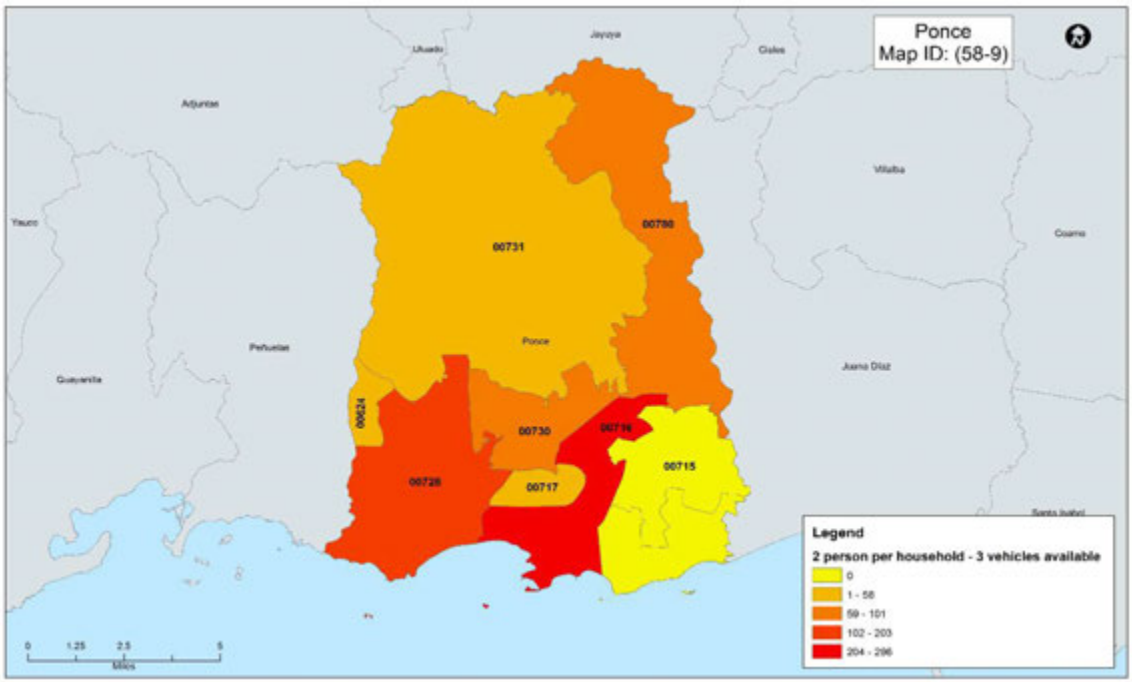
Source: US Census Bureau, 2015 and SDG

Figure D.108: Ponce, 2 Person per Household – 2 Vehicles Available



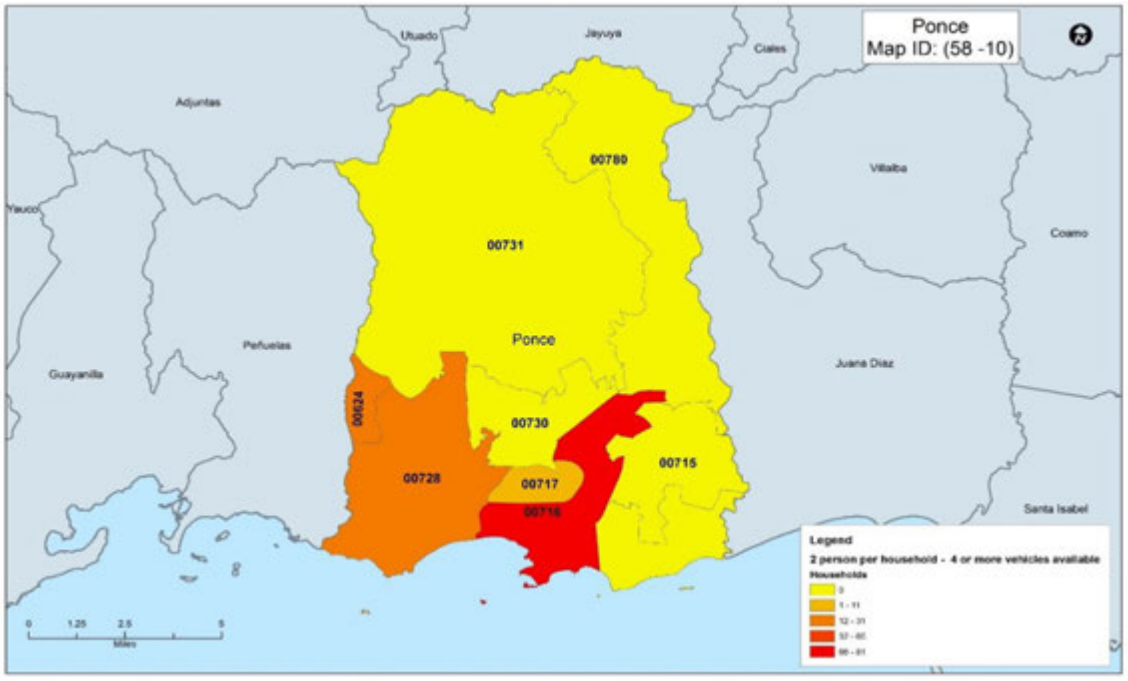
Source: US Census Bureau, 2015 and SDG

Figure D.109: Ponce, 2 Person per Household – 3 Vehicles Available



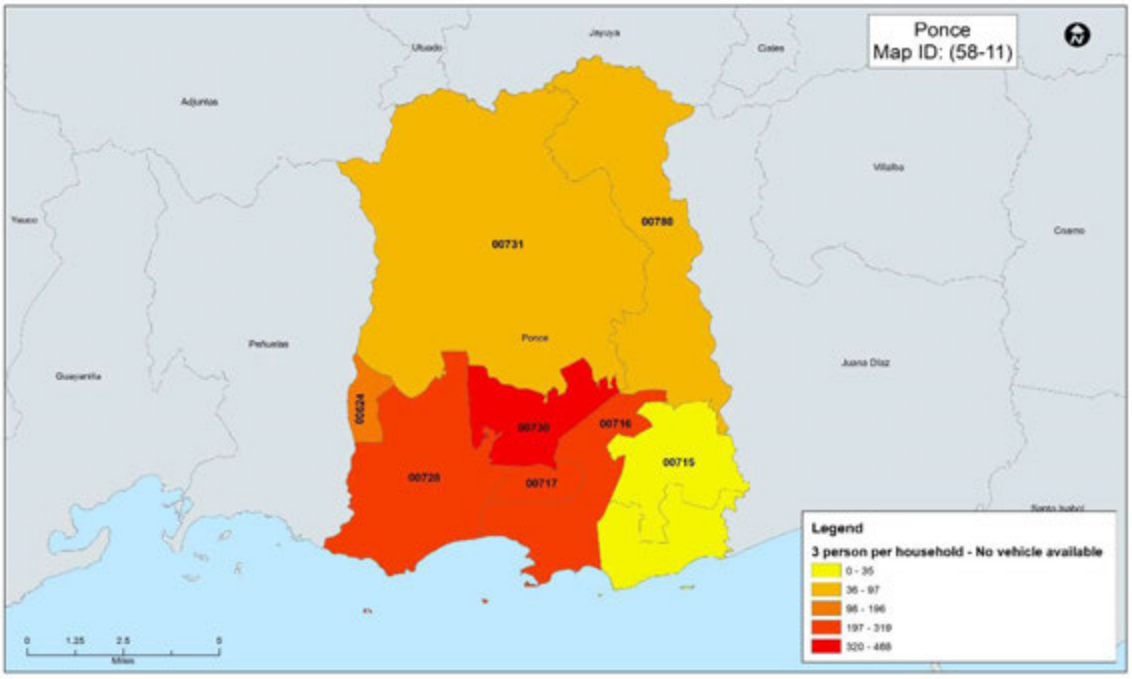
Source: US Census Bureau, 2015 and SDG

Figure D.110: Ponce, 2 Person per Household – 4 Vehicles Available



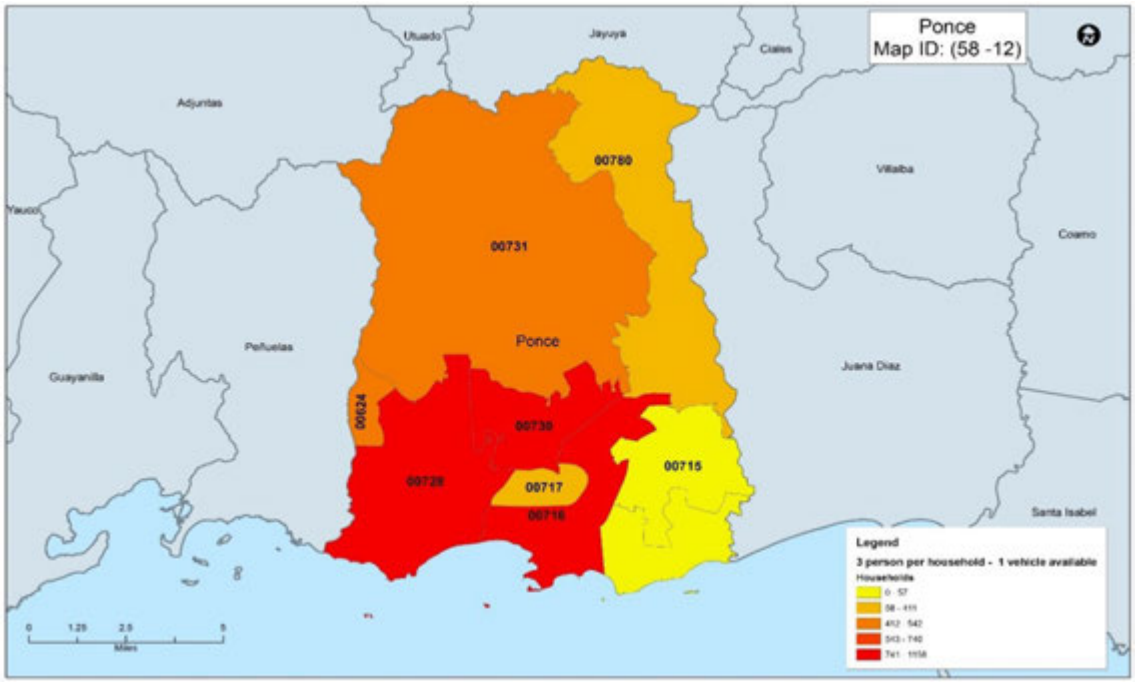
Source: US Census Bureau, 2015 and SDG

Figure D.111: Ponce, 3 Person per Household – No Vehicle Available



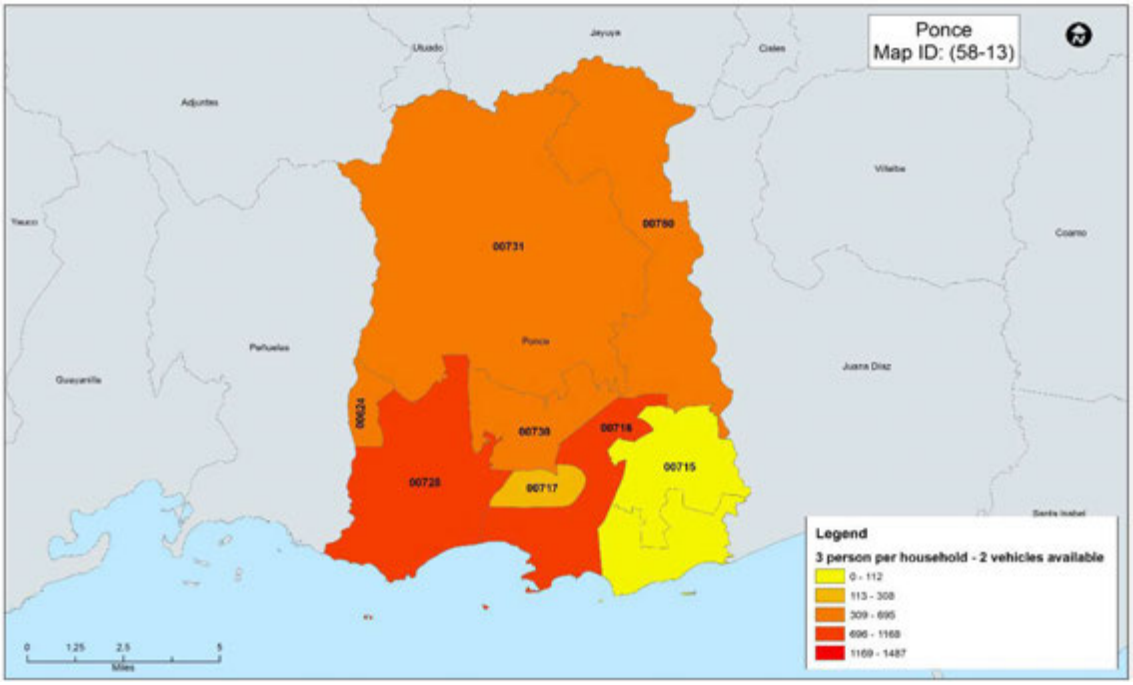
Source: US Census Bureau, 2015 and SDG

Figure D.112: Ponce, 3 Person per Household – 1 Vehicle Available



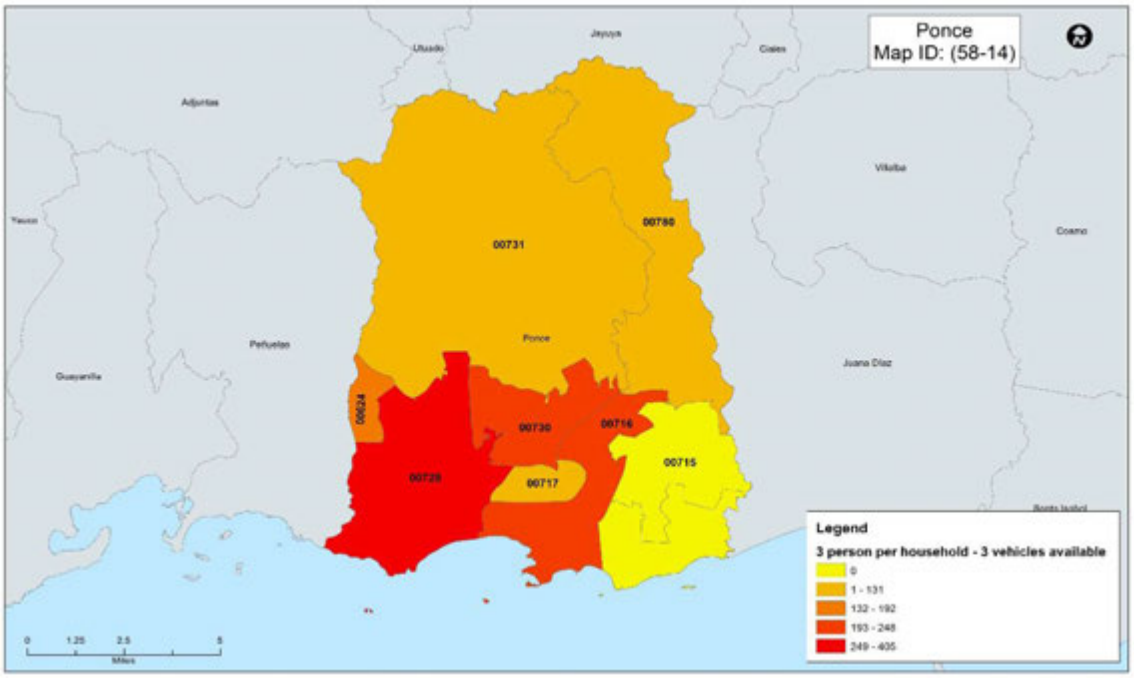
Source: US Census Bureau, 2015 and SDG

Figure D.113: Ponce, 3 Person per Household – 2 Vehicles Available



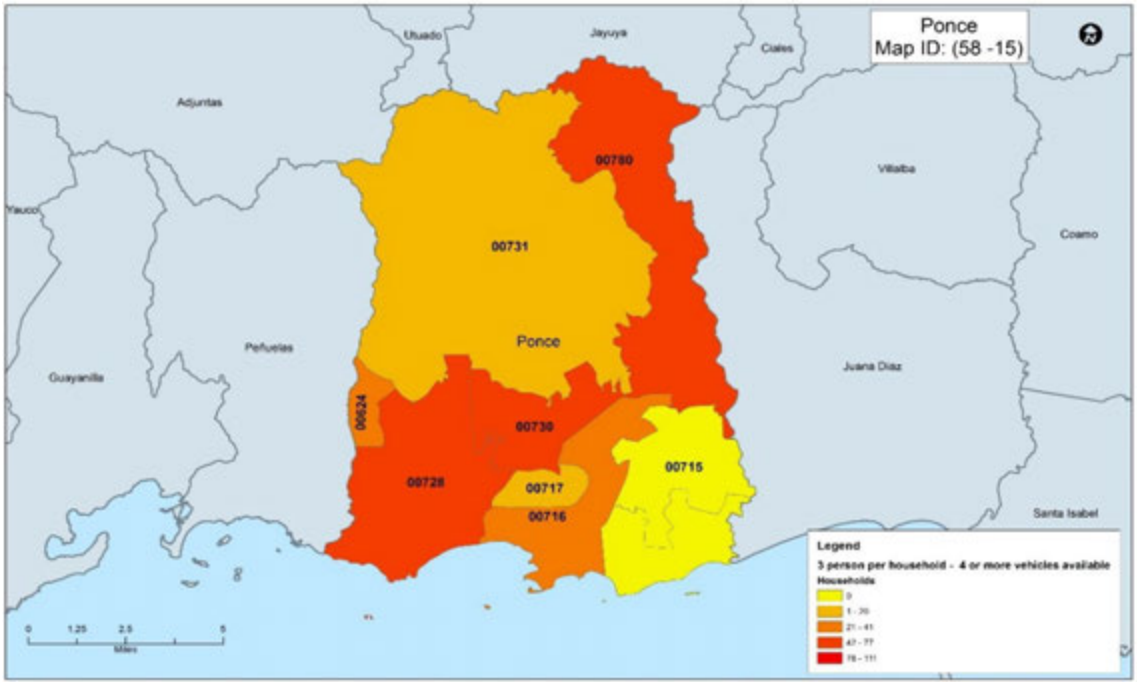
Source: US Census Bureau, 2015 and SDG

Figure D.114: Ponce, 3 Person per Household – 3 Vehicles Available



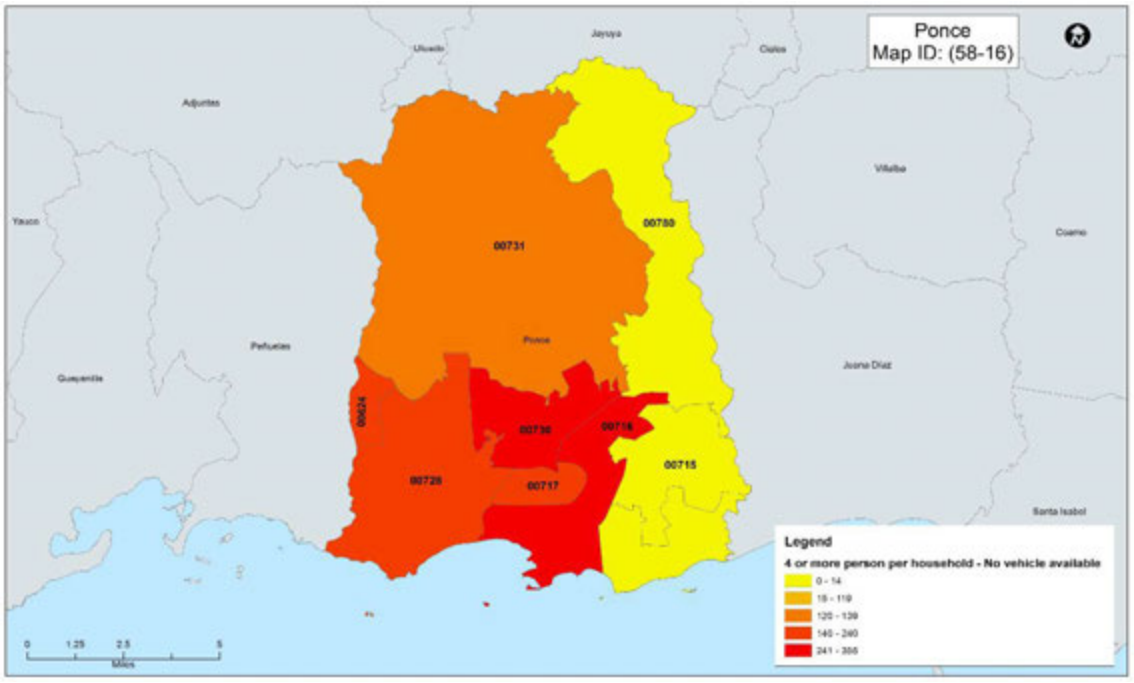
Source: US Census Bureau, 2015 and SDG

Figure D.115: Ponce, 3 Person per Household – 4 or more Vehicles Available



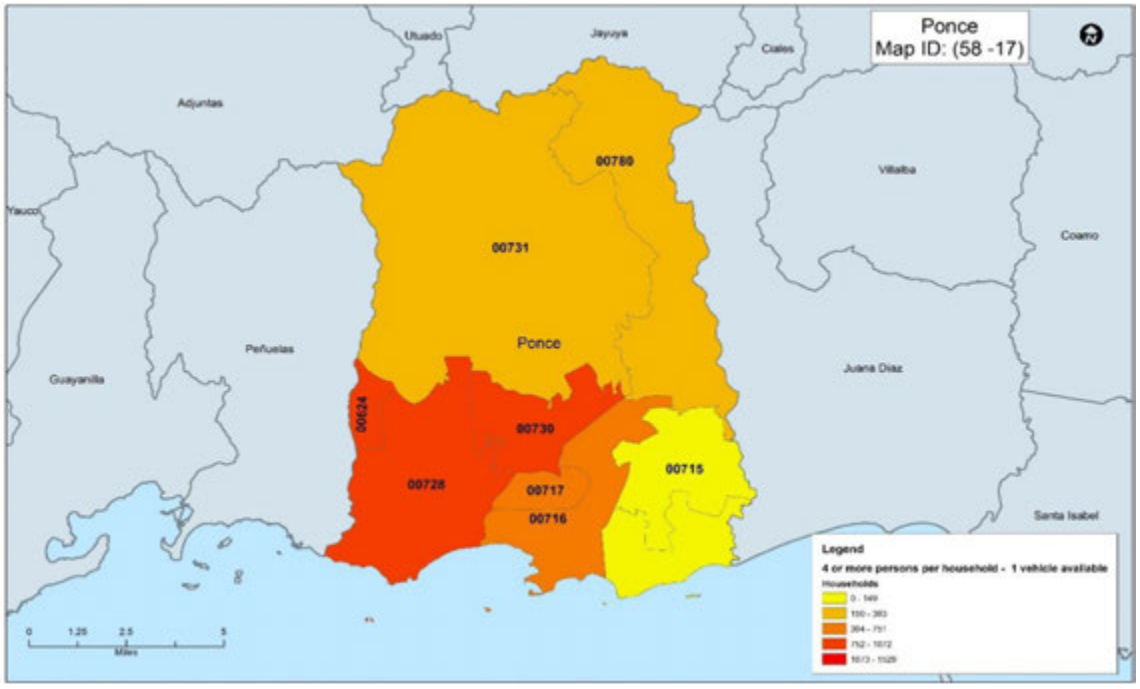
Source: US Census Bureau, 2015 and SDG

Figure D.116: Ponce, 4 or more Person per Household – No Vehicle Available



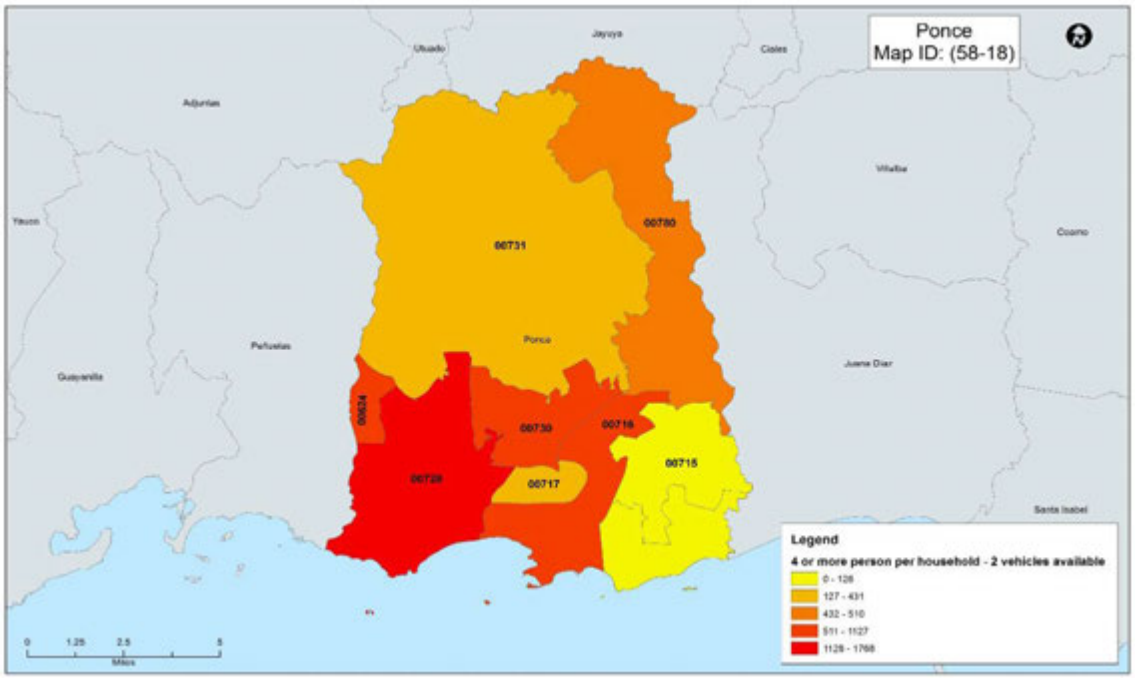
Source: US Census Bureau, 2015 and SDG

Figure D.117: Ponce, 4 or more Person per Household – 1 Vehicle Available



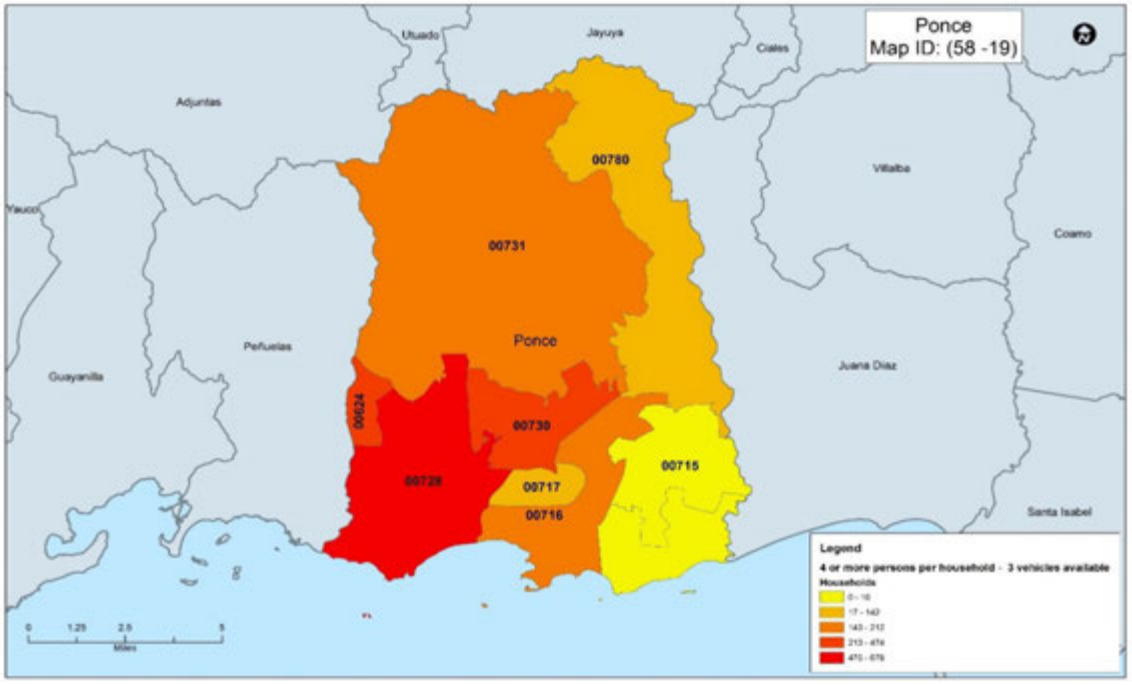
Source: US Census Bureau, 2015 and SDG

Figure D.118: Ponce, 4 or more Person per Household – 2 Vehicles Available



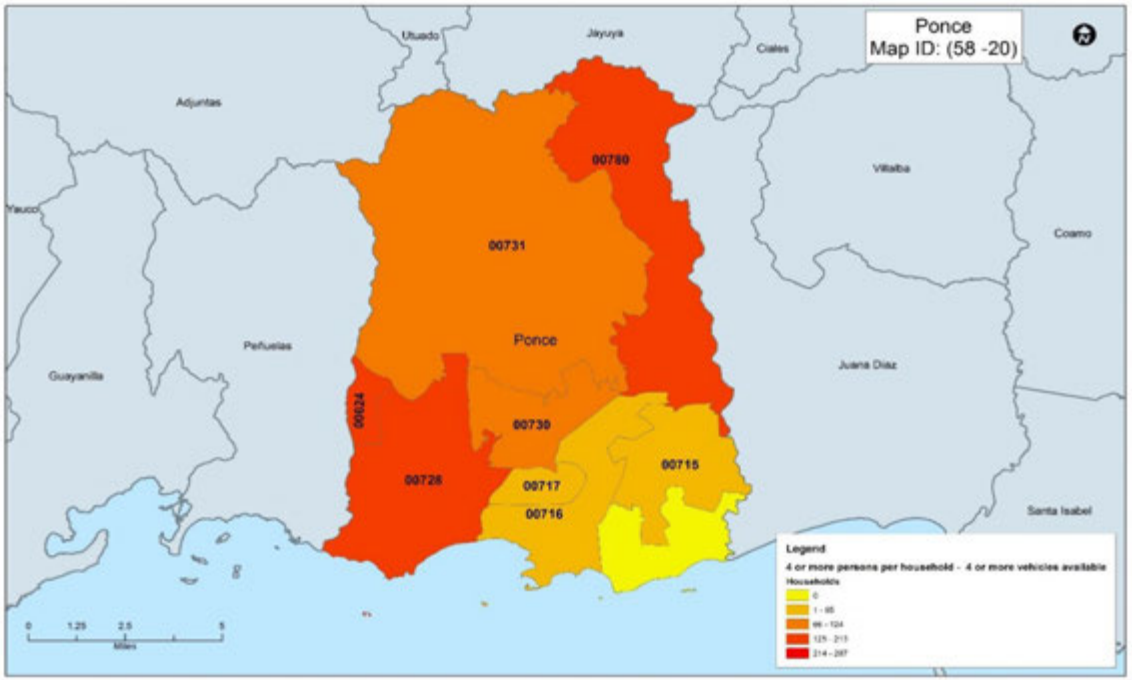
Source: US Census Bureau, 2015 and SDG

Figure D.119: Ponce, 4 or more Person per Household – 3 Vehicles Available



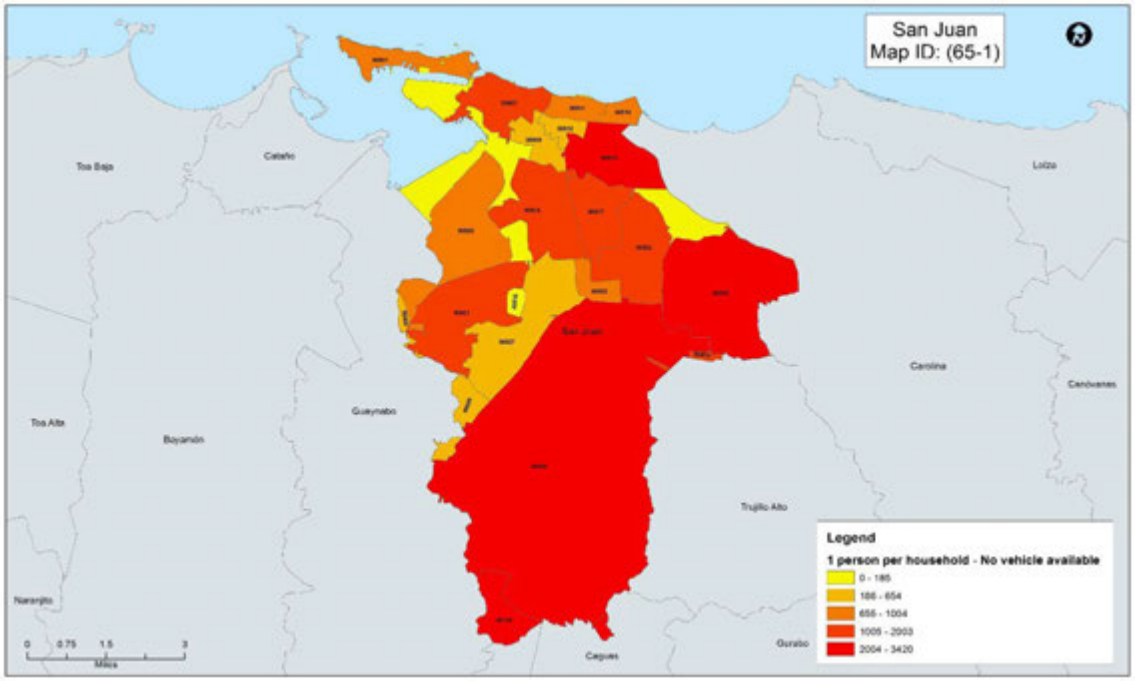
Source: US Census Bureau, 2015 and SDG

Figure D.120: Ponce, 4 or more Person per Household – 4 or more Vehicles Available



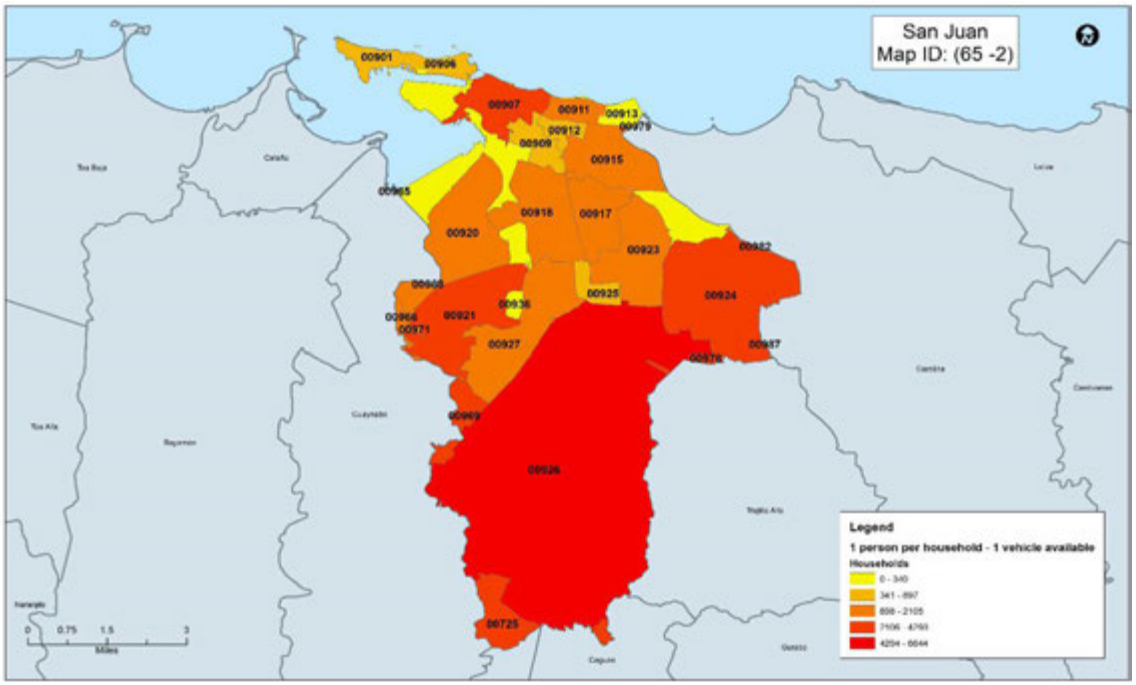
Source: US Census Bureau, 2015 and SDG

Figure D.121: San Juan, 1 Person per Household – No Vehicle Available



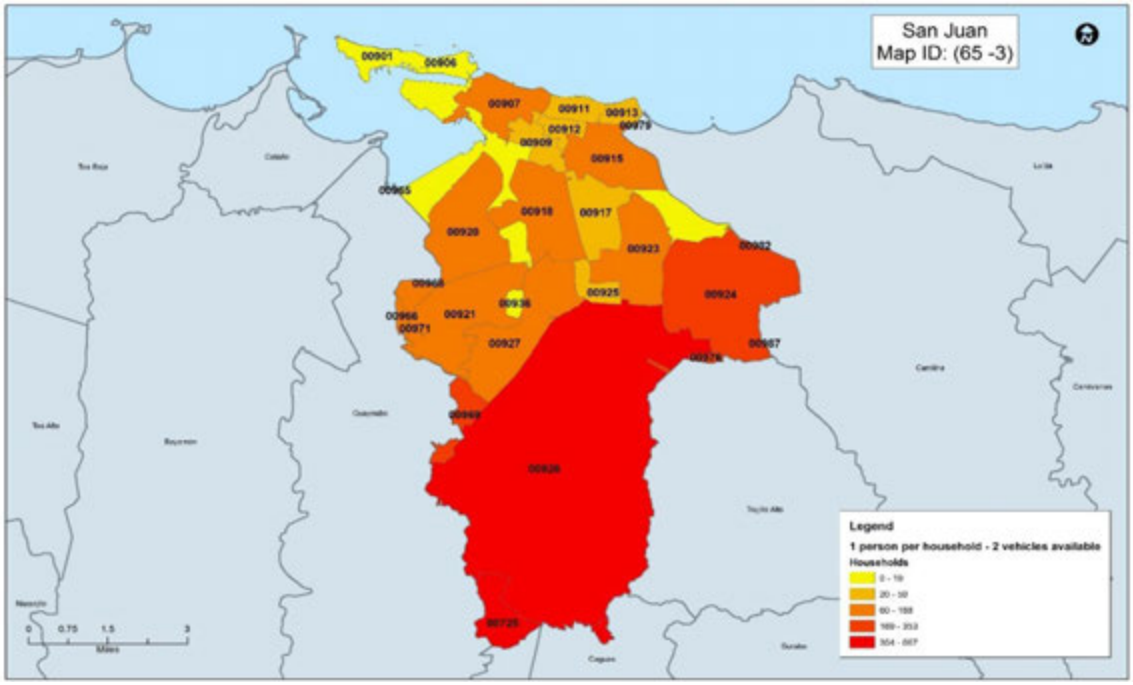
Source: US Census Bureau, 2015 and SDG

Figure D.122: San Juan, 1 Person per Household – 1 Vehicle Available



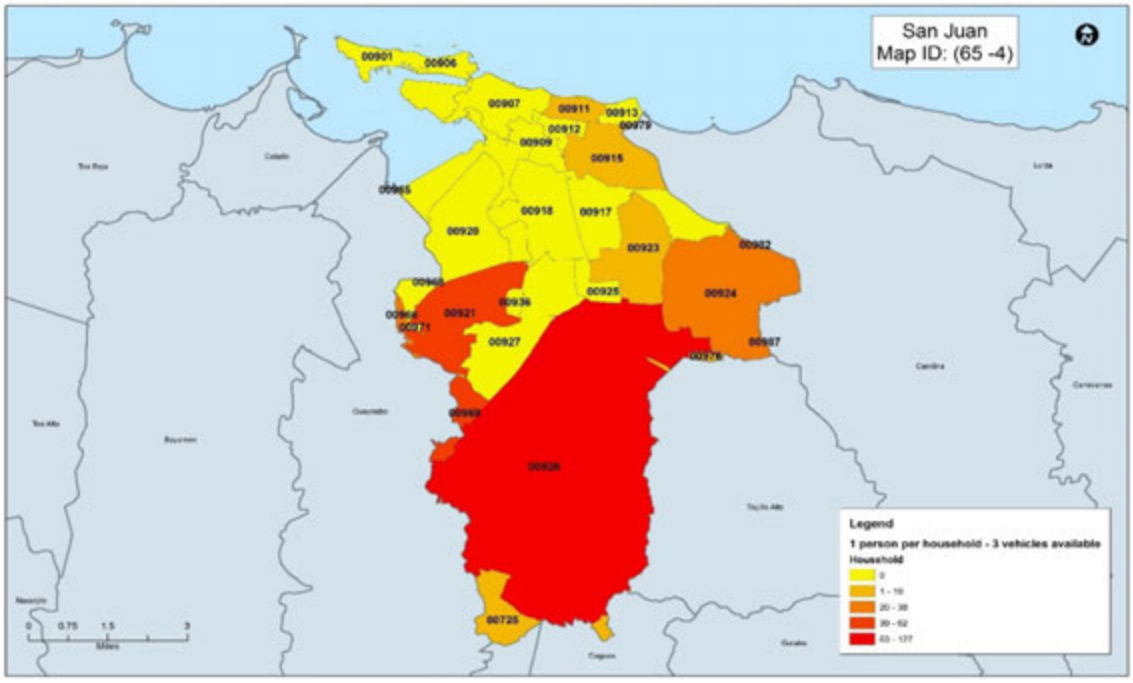
Source: US Census Bureau, 2015 and SDG

Figure D.123: San Juan, 1 Person per Household – 2 Vehicles Available



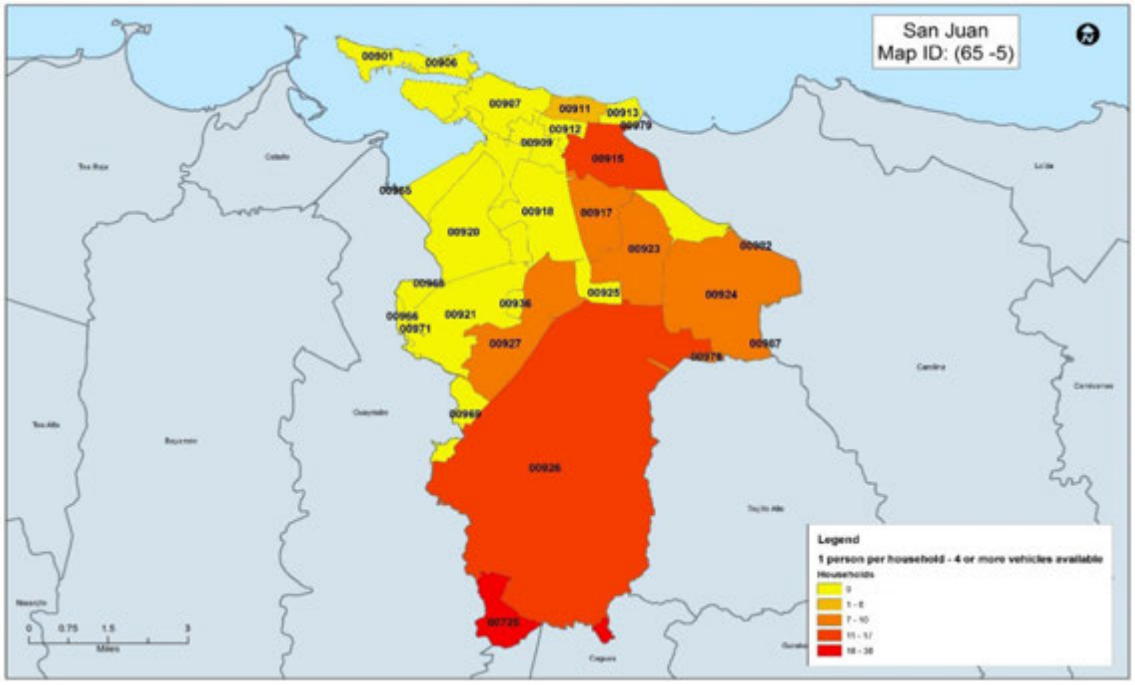
Source: US Census Bureau, 2015 and SDG

Figure D.124: San Juan, 1 Person per Household – 3 Vehicles Available



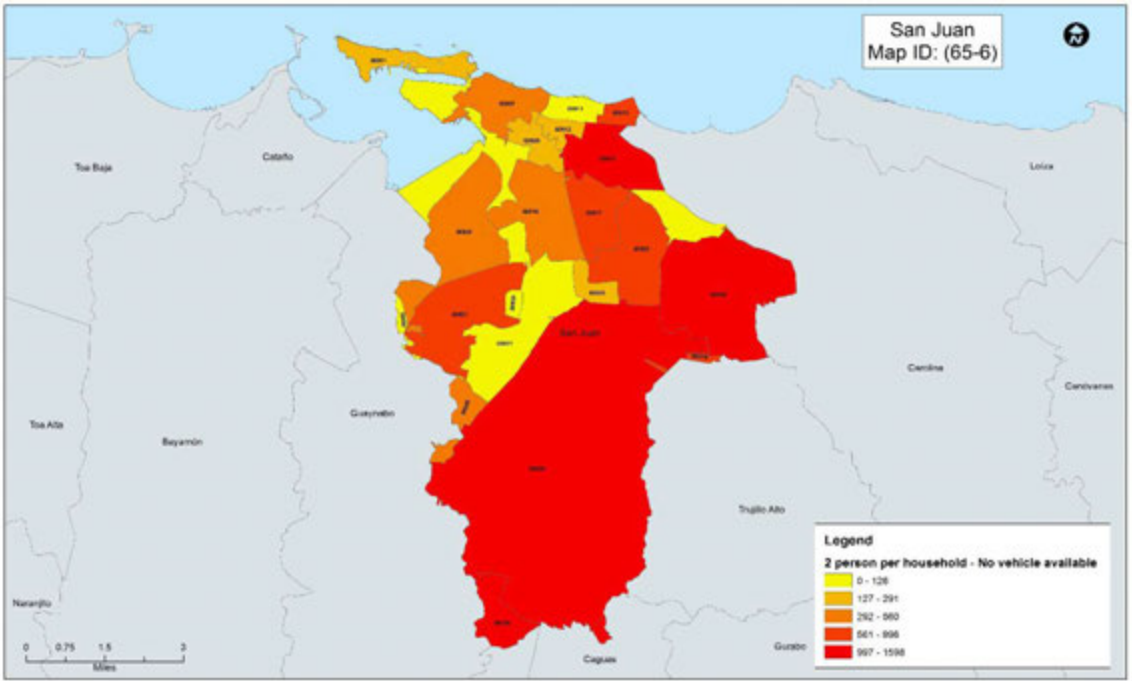
Source: US Census Bureau, 2015 and SDG

Figure D.125: San Juan, 1 Person per Household – 4 or more Vehicles Available



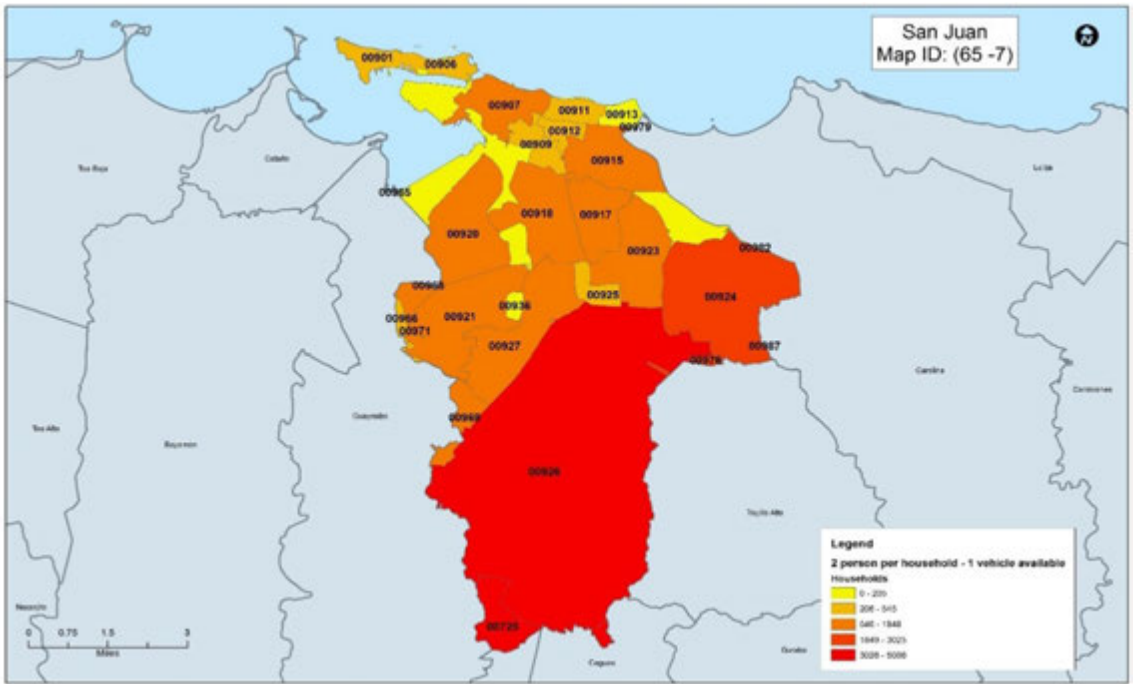
Source: US Census Bureau, 2015 and SDG

Figure D.126: San Juan, 2 Person per Household – No Vehicle Available



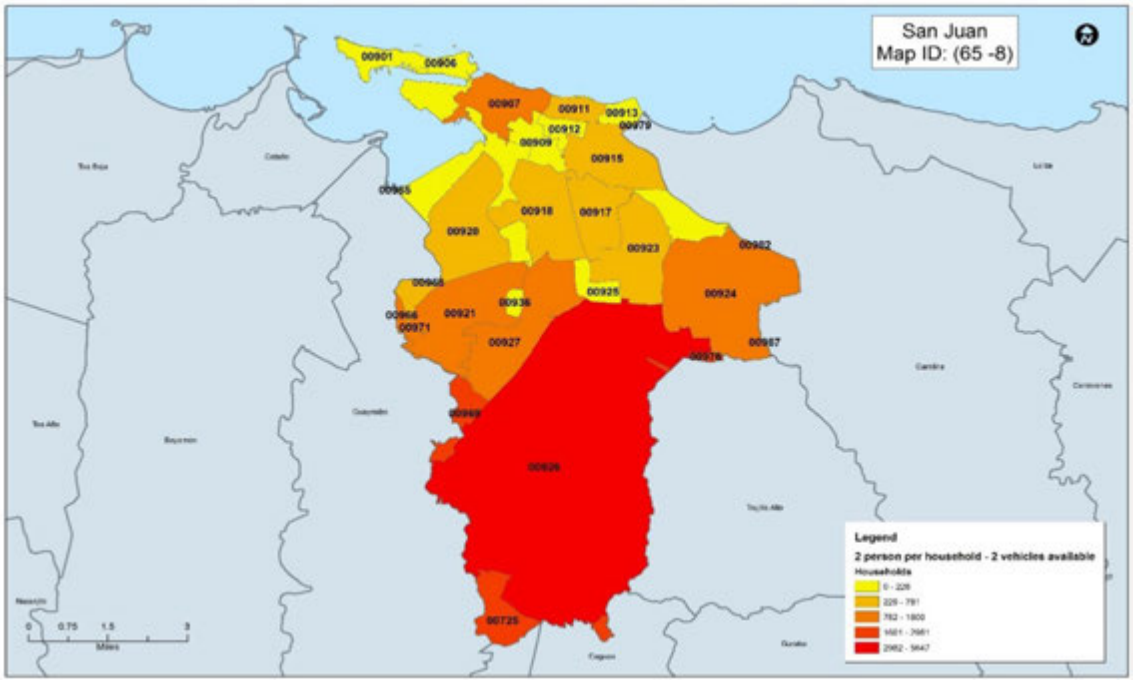
Source: US Census Bureau, 2015 and SDG

Figure D.127: San Juan, 2 Person per Household – 1 Vehicle Available



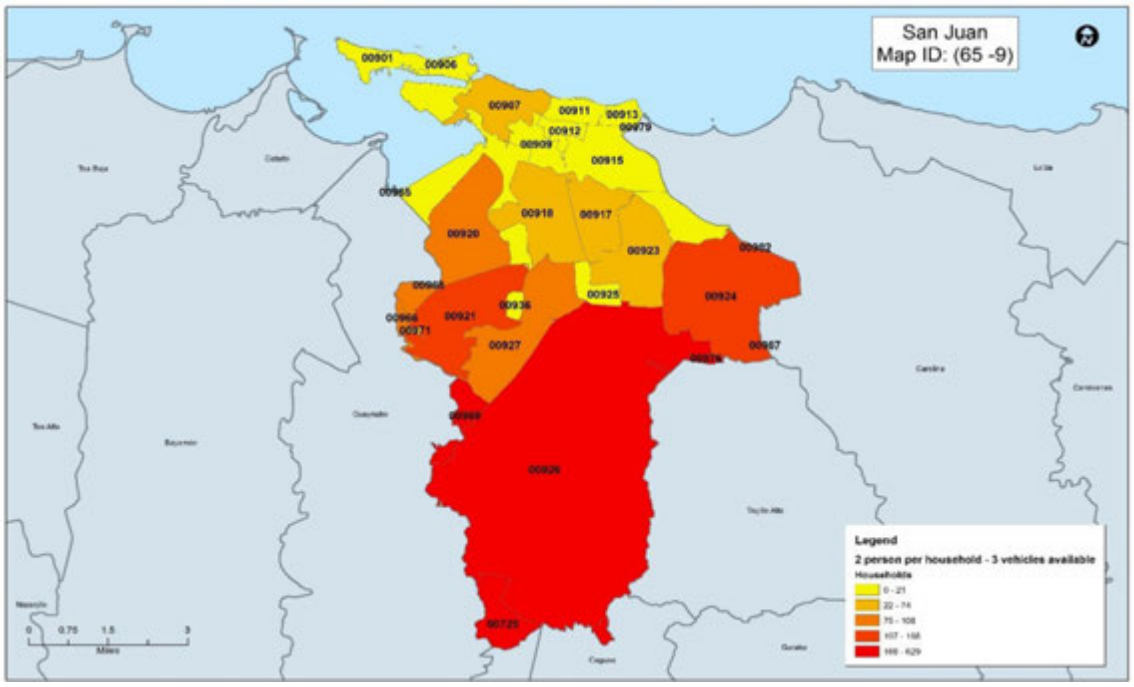
Source: US Census Bureau, 2015 and SDG

Figure D.128: San Juan, 2 Person per Household – 2 Vehicles Available



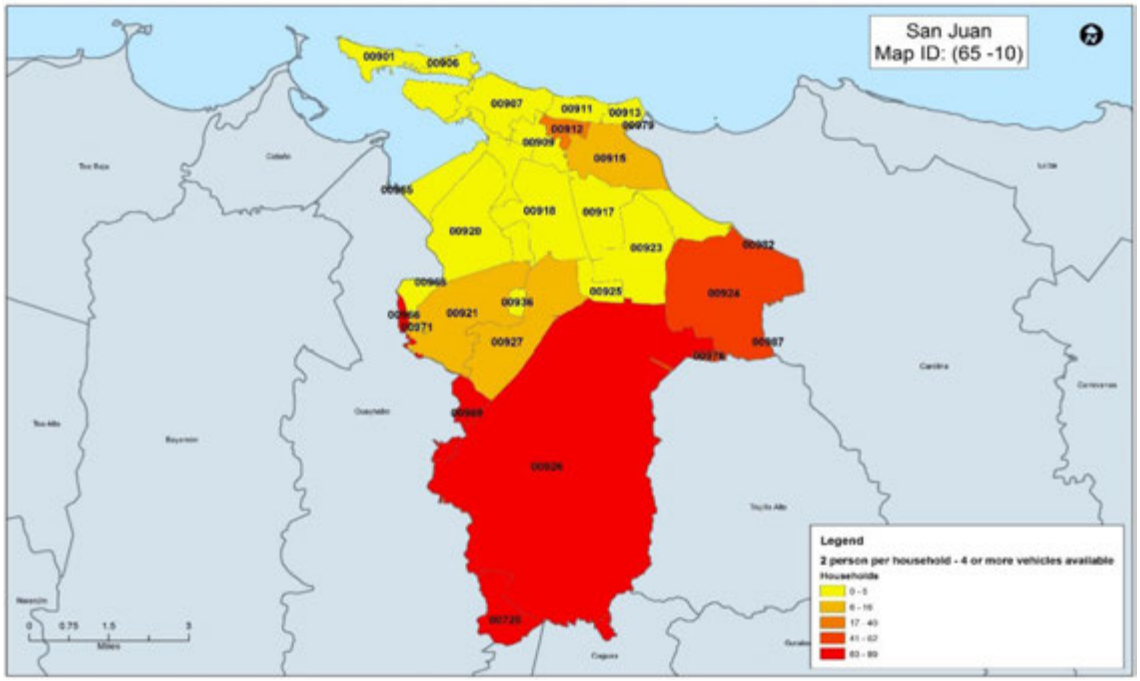
Source: US Census Bureau, 2015 and SDG

Figure D.129: San Juan, 2 Person per Household – 3 Vehicles Available



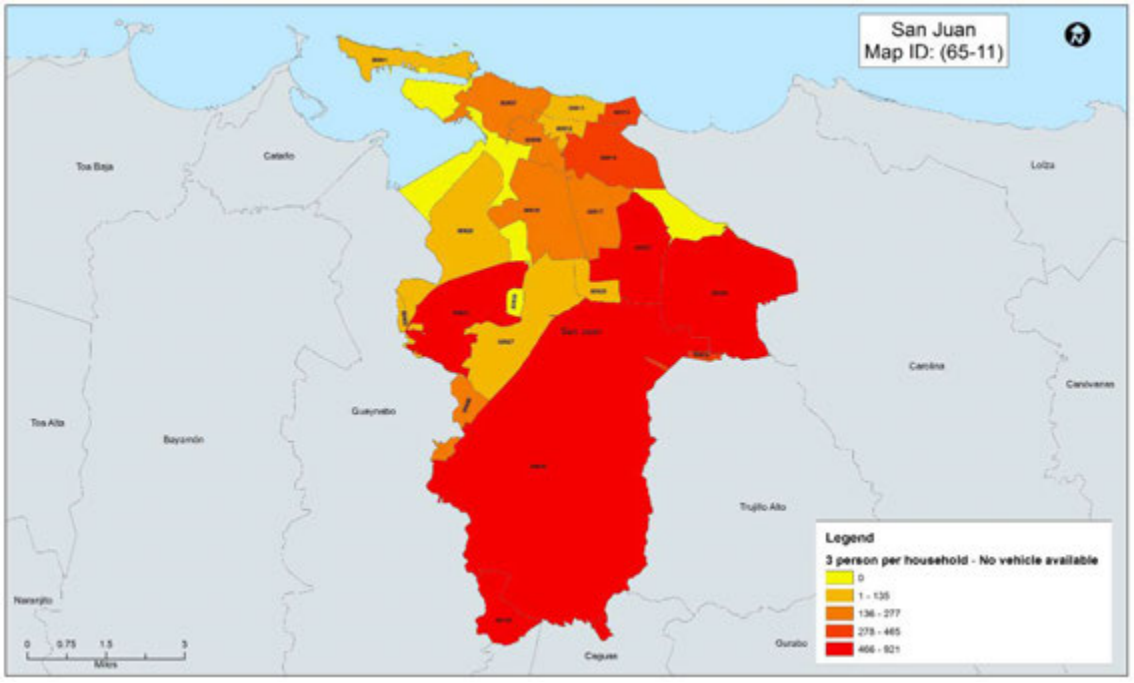
Source: US Census Bureau, 2015 and SDG

Figure D.130: San Juan, 2 Person per Household – 4 or more Vehicles Available



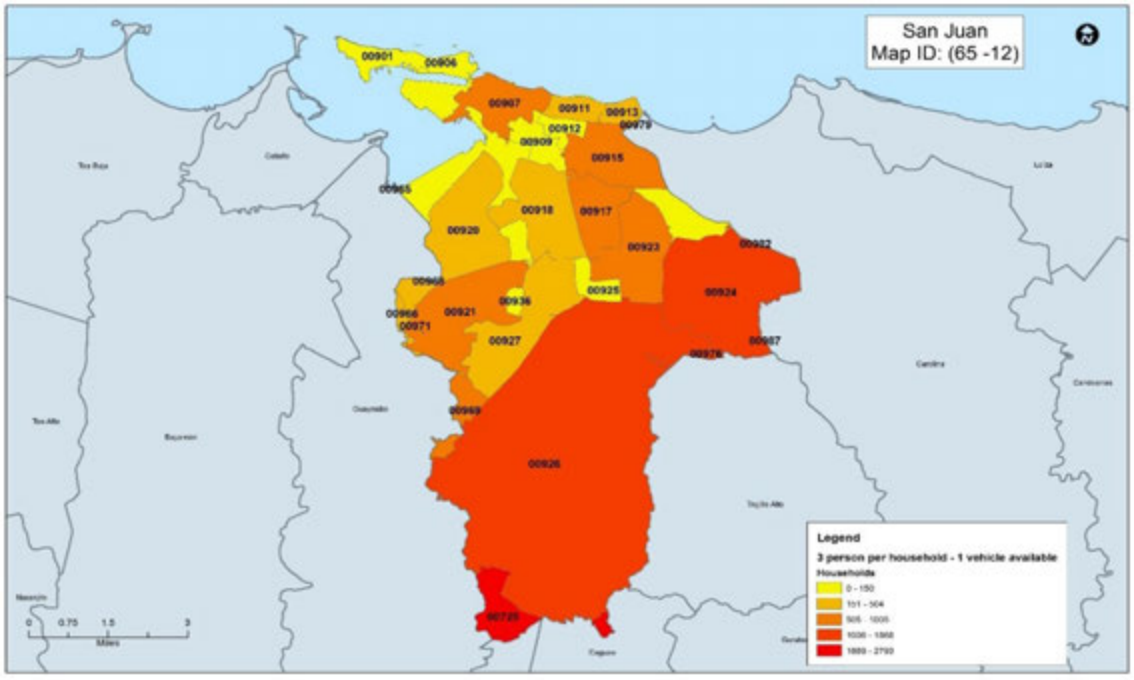
Source: US Census Bureau, 2015 and SDG

Figure D.131: San Juan, 3 Person per Household – No Vehicle Available



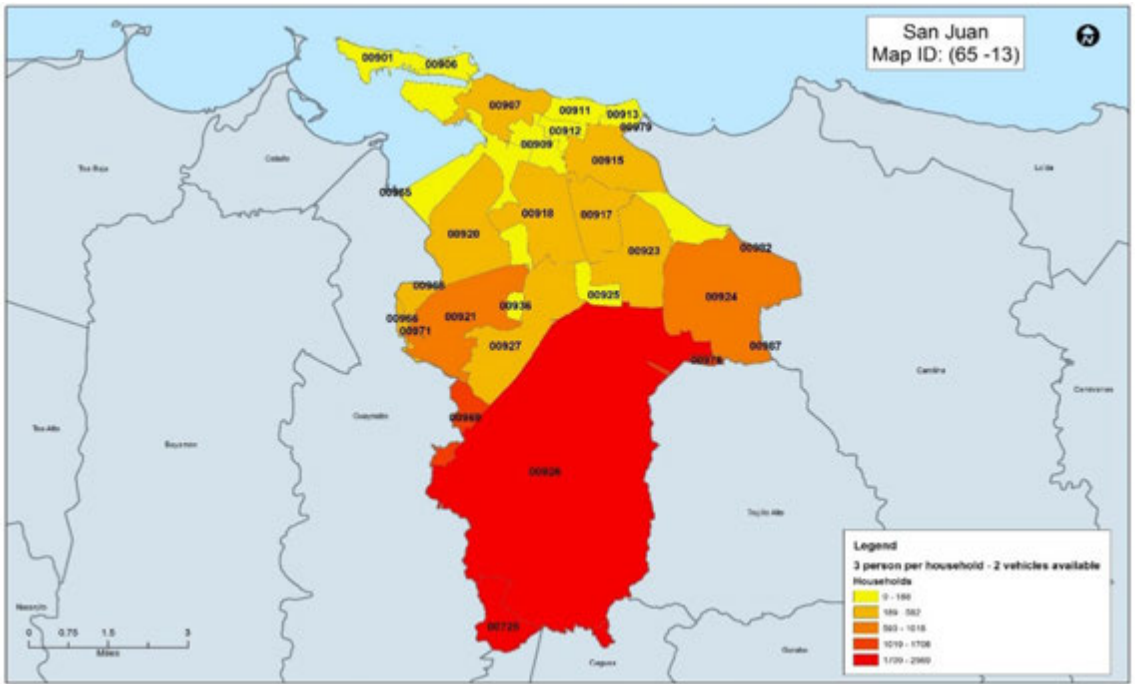
Source: US Census Bureau, 2015 and SDG

Figure D.132: San Juan, 3 Person per Household – 1 Vehicle Available



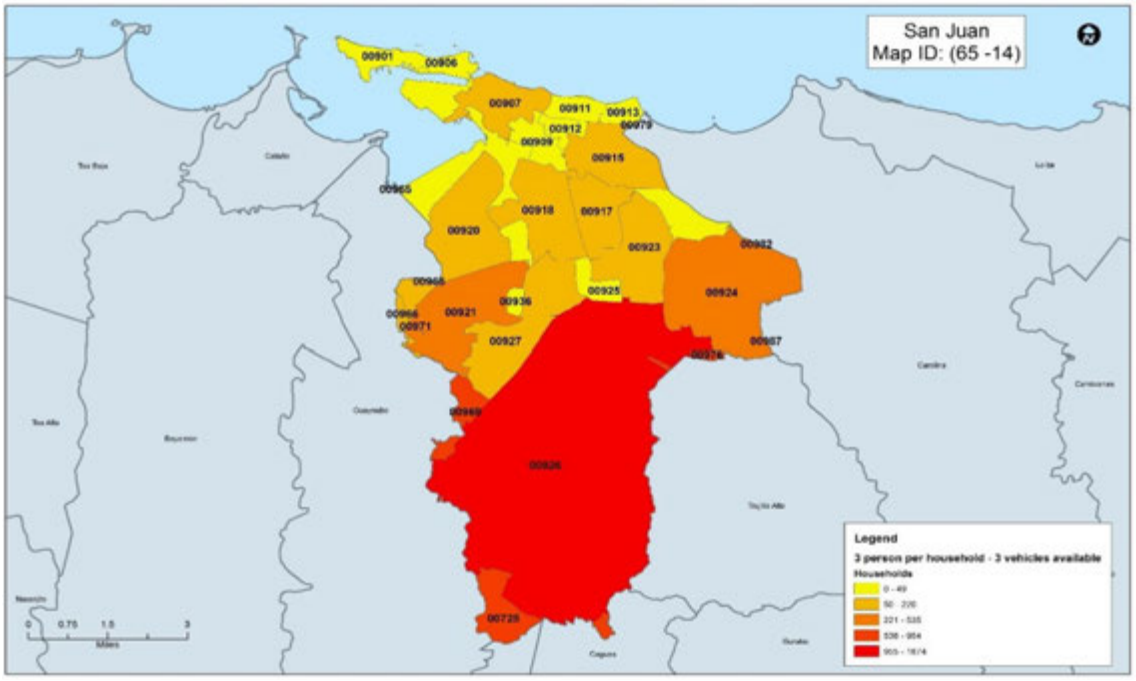
Source: US Census Bureau, 2015 and SDG

Figure D.133: San Juan, 3 Person per Household – 2 Vehicles Available



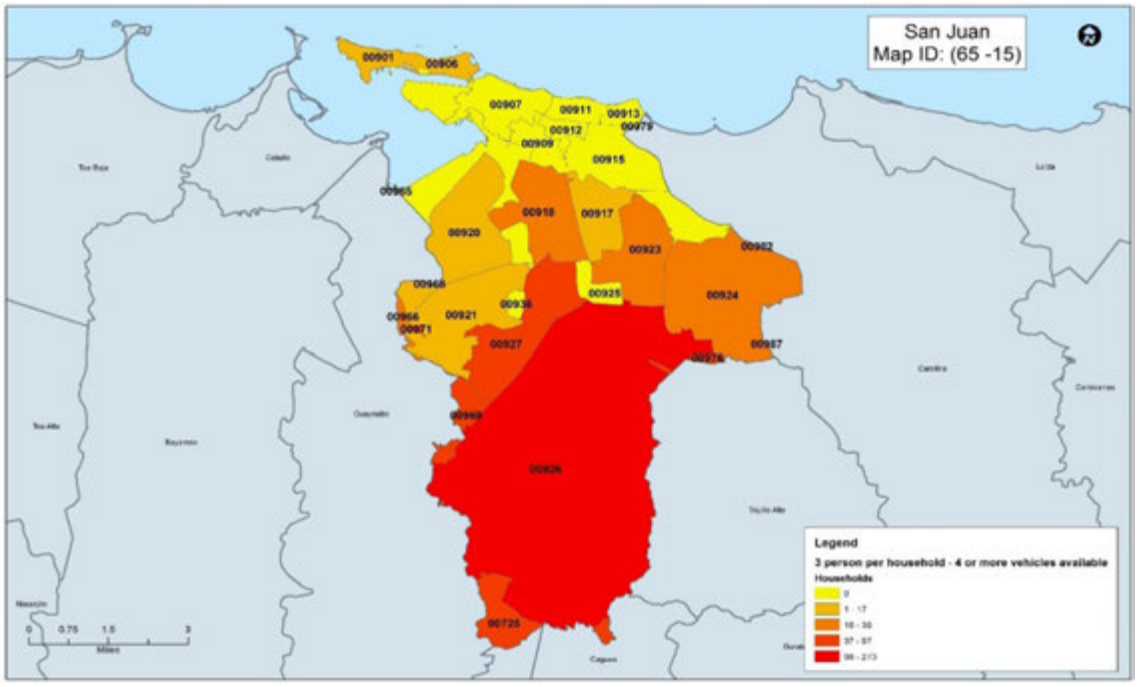
Source: US Census Bureau, 2015 and SDG

Figure D.134: San Juan, 3 Person per Household – 3 Vehicles Available



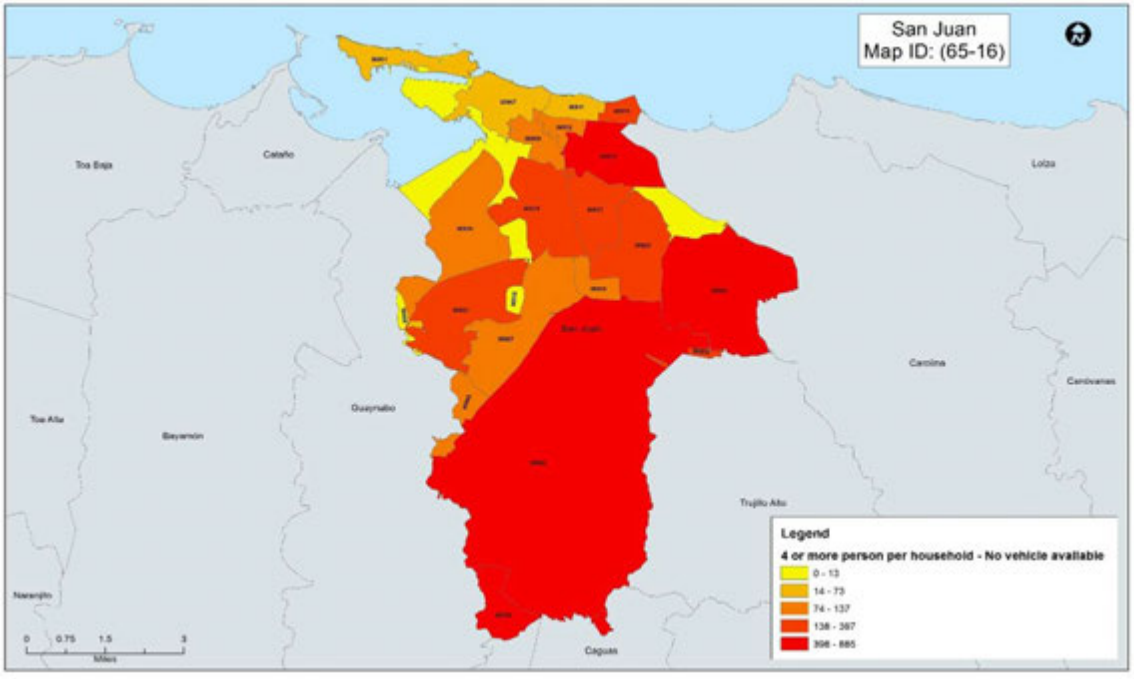
Source: US Census Bureau, 2015 and SDG

Figure D.135: San Juan, 3 Person per Household – 4 or more Vehicles Available



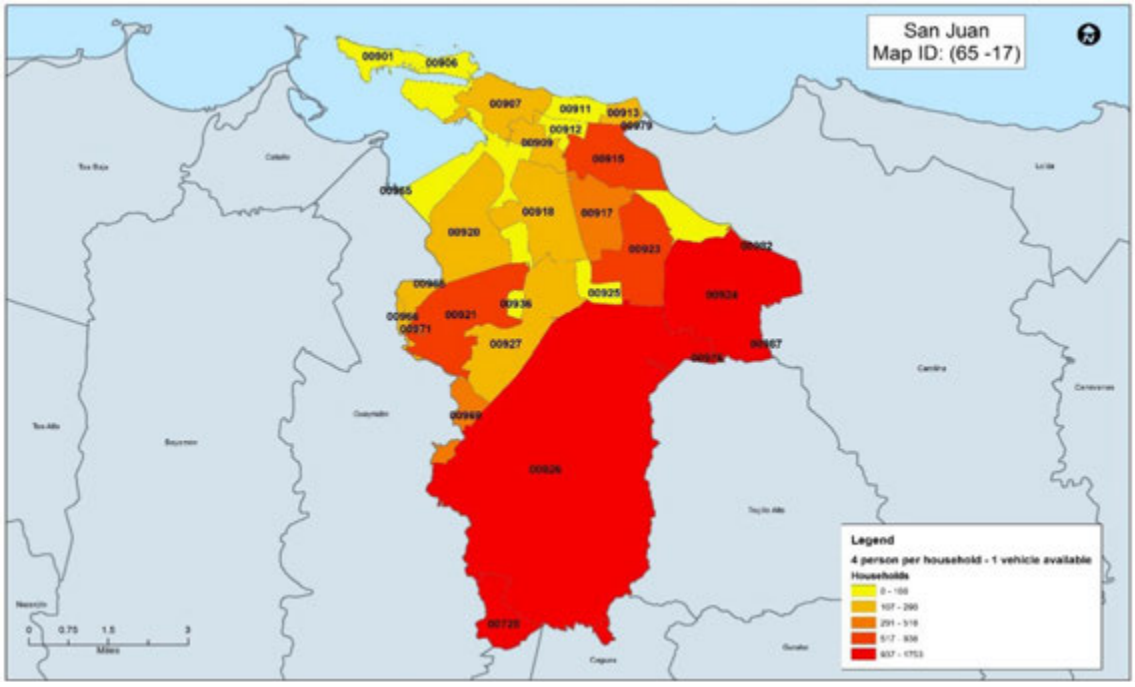
Source: US Census Bureau, 2015 and SDG

Figure D.136: San Juan, 4 or more Person per Household – No Vehicle Available



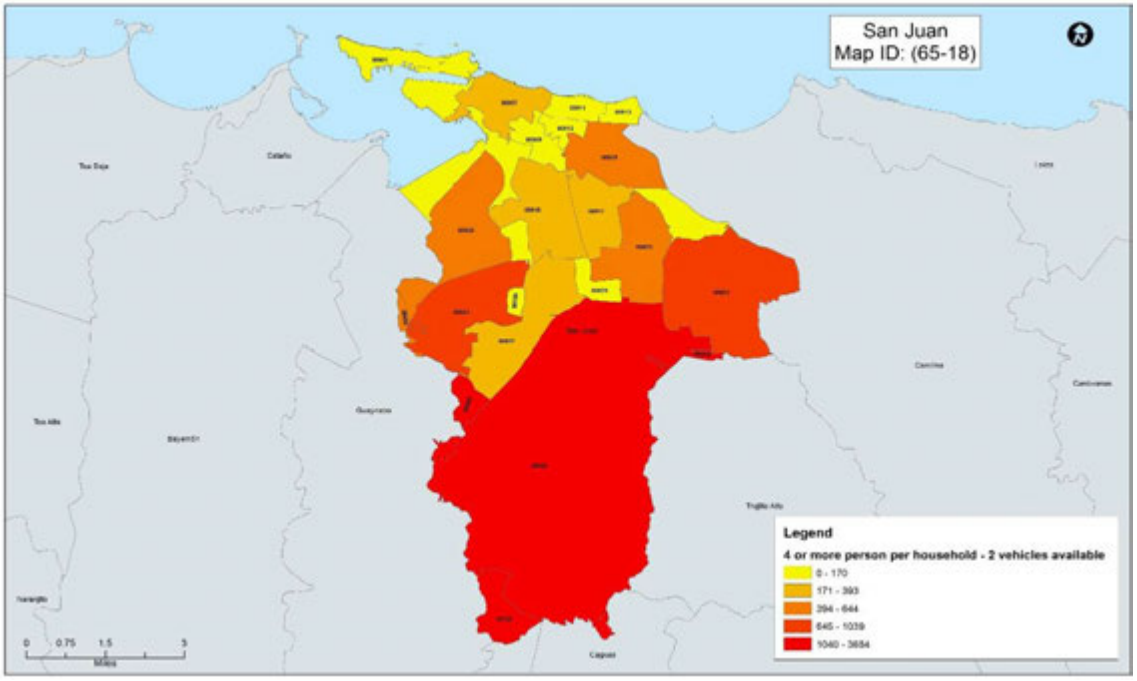
Source: US Census Bureau, 2015 and SDG

Figure D.137: San Juan, 4 or more Person per Household – 1 Vehicle Available



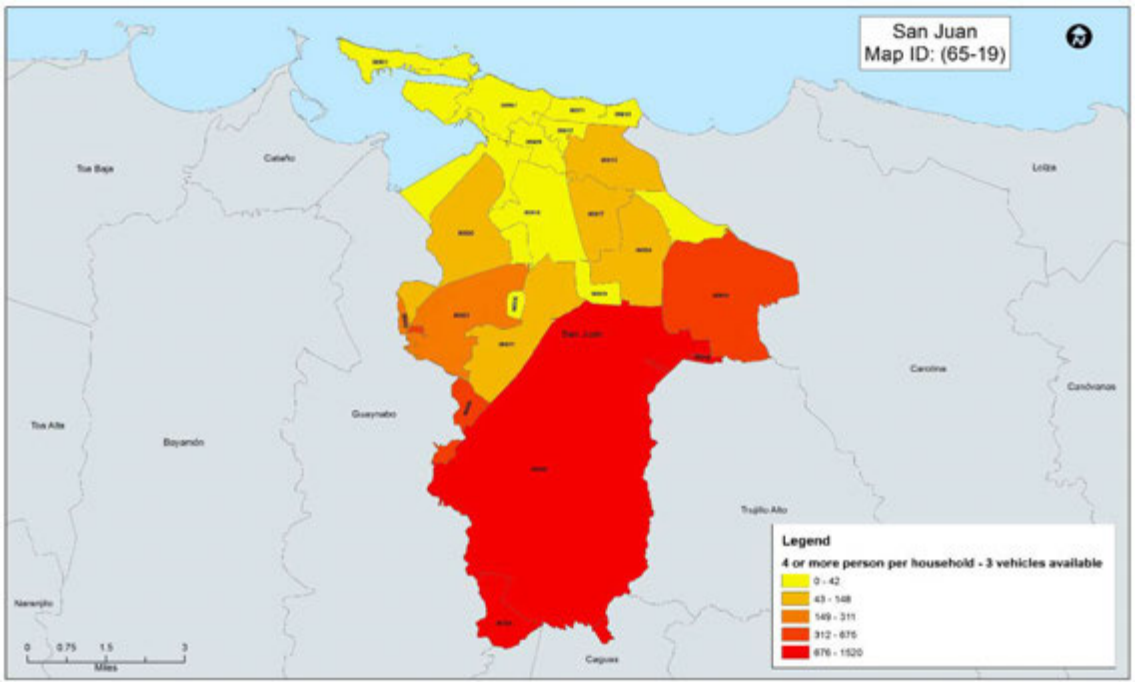
Source: US Census Bureau, 2015 and SDG

Figure D.138: San Juan, 4 or more Person per Household – 2 Vehicles Available



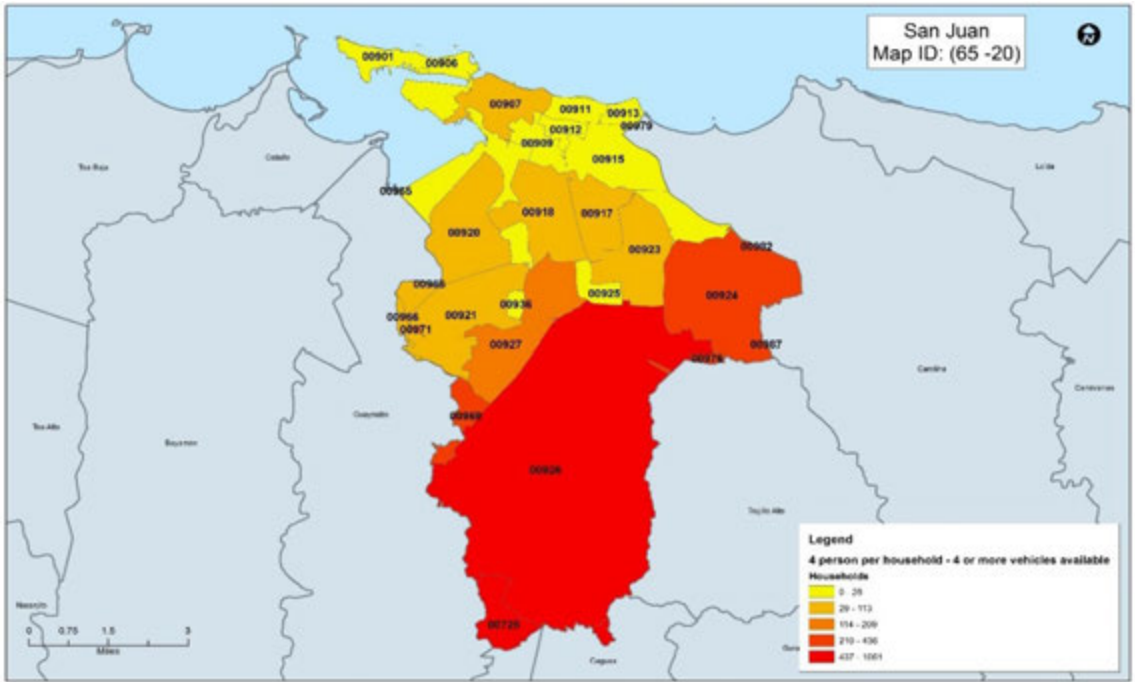
Source: US Census Bureau, 2015 and SDG

Figure D.139: San Juan, 4 or more Person per Household – 3 Vehicles Available



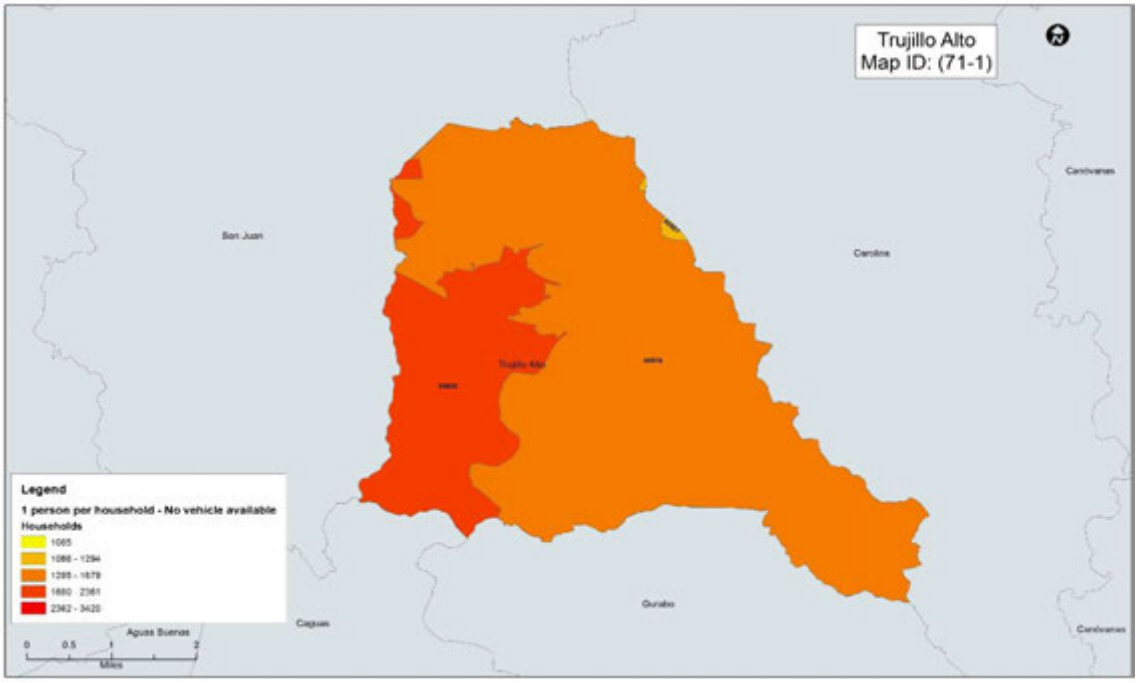
Source: US Census Bureau, 2015 and SDG

Figure D.140: San Juan, 4 or more Person per Household – 4 or more Vehicles Available



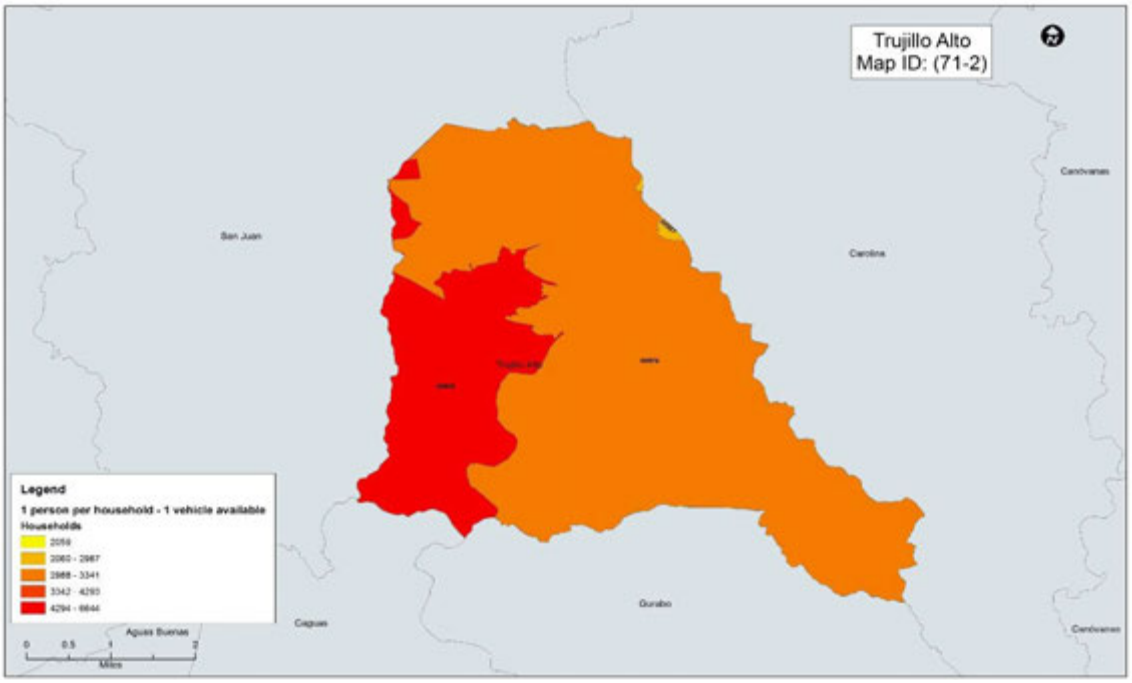
Source: US Census Bureau, 2015 and SDG

Figure D.141: Trujillo Alto, 1 Person per Household – No Vehicle Available



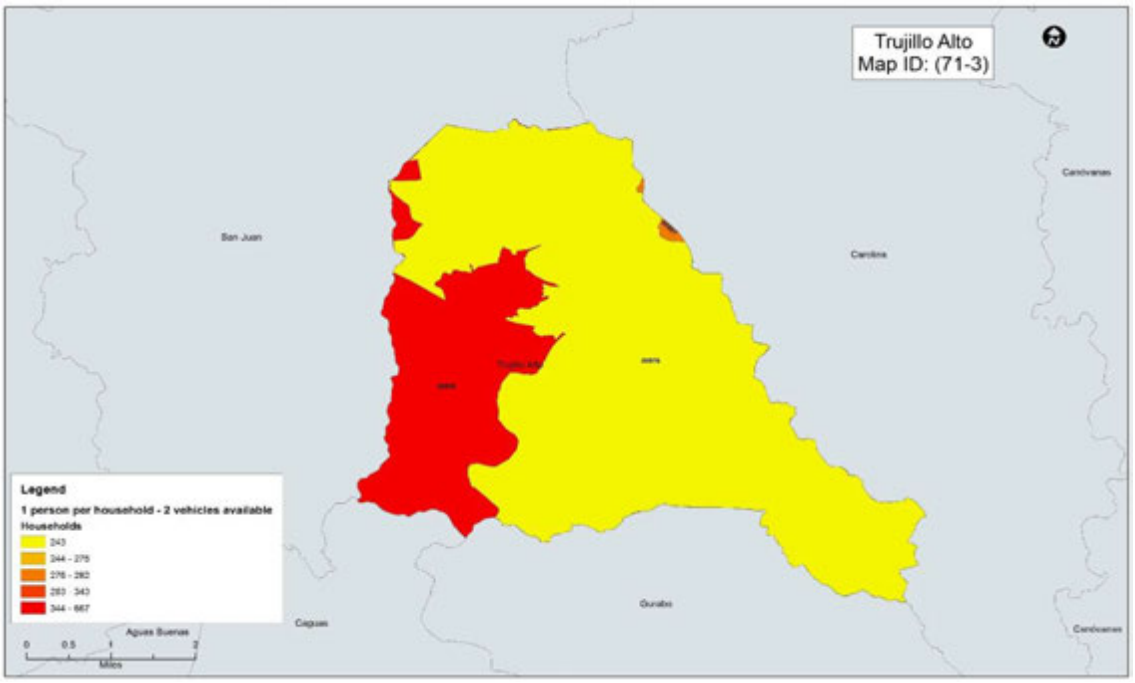
Source: US Census Bureau, 2015 and SDG

Figure D.142: Trujillo Alto, 1 Person per Household – 1 Vehicle Available



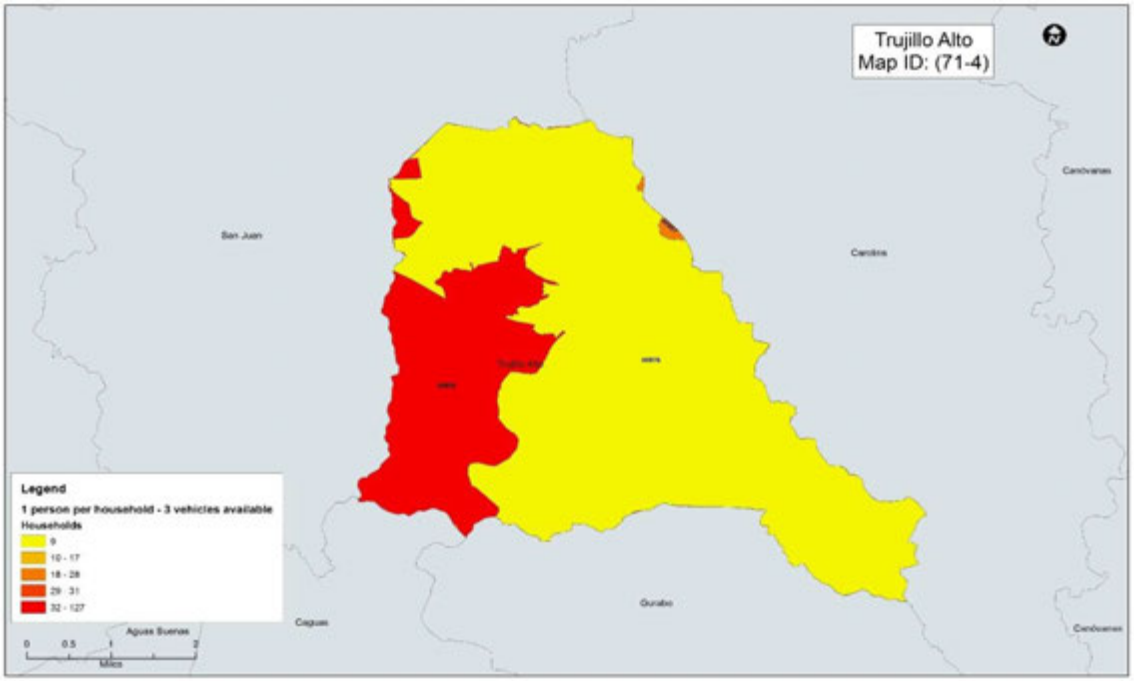
Source: US Census Bureau, 2015 and SDG

Figure D.143: Trujillo Alto, 1 Person per Household – 2 Vehicles Available



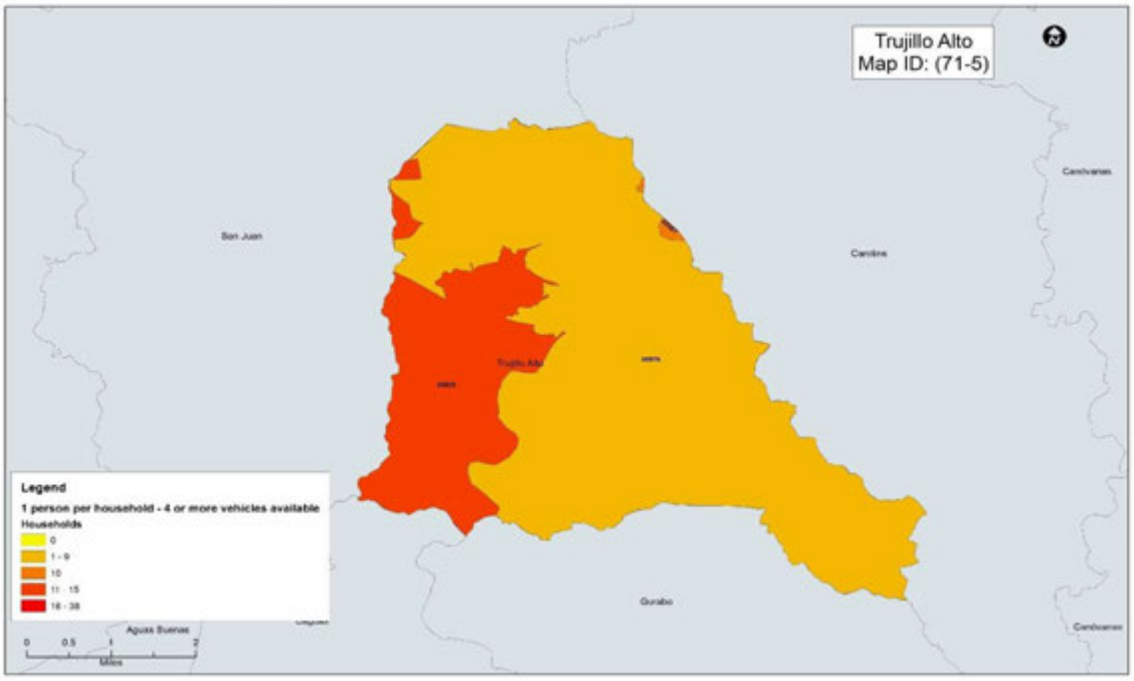
Source: US Census Bureau, 2015 and SDG

Figure D.144: Trujillo Alto, 1 Person per Household – 3 Vehicles Available



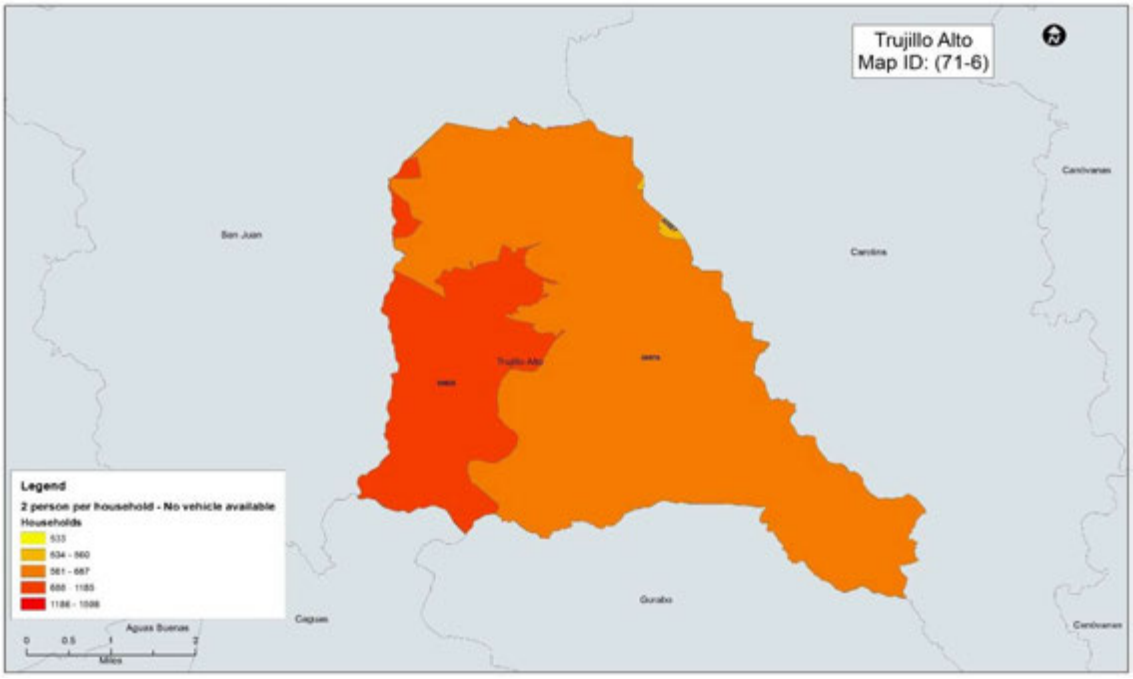
Source: US Census Bureau, 2015 and SDG

Figure D.145: Trujillo Alto, 1 Person per Household – 4 or more Vehicles Available



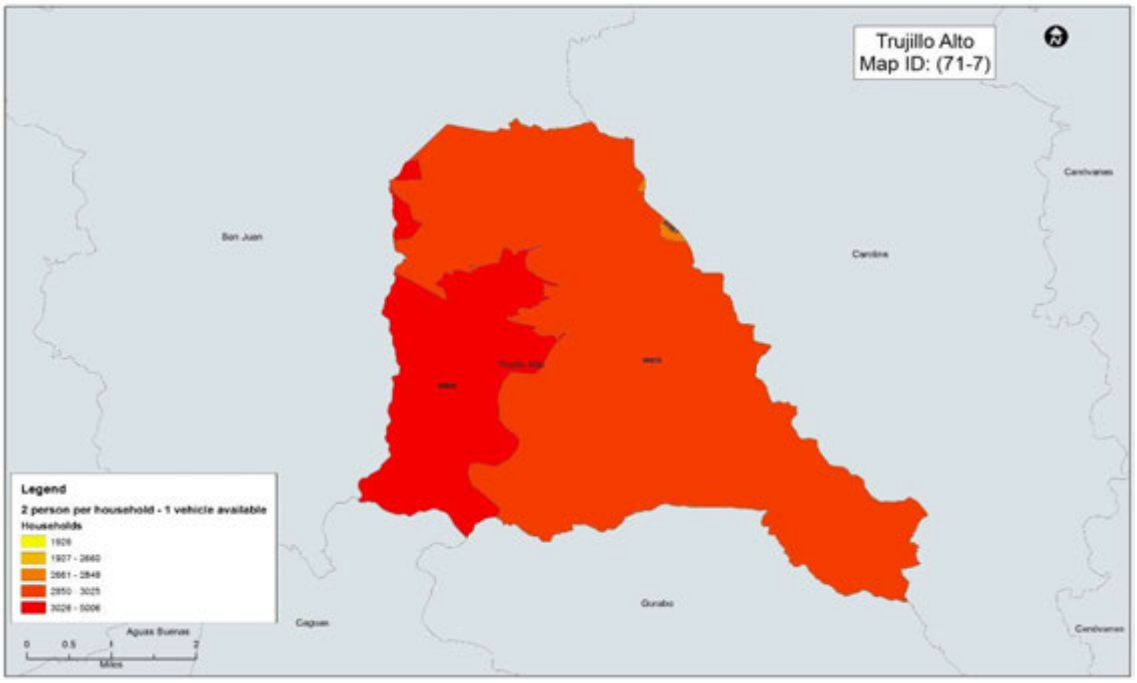
Source: US Census Bureau, 2015 and SDG

Figure D.146: Trujillo Alto, 2 Person per Household – No Vehicle Available



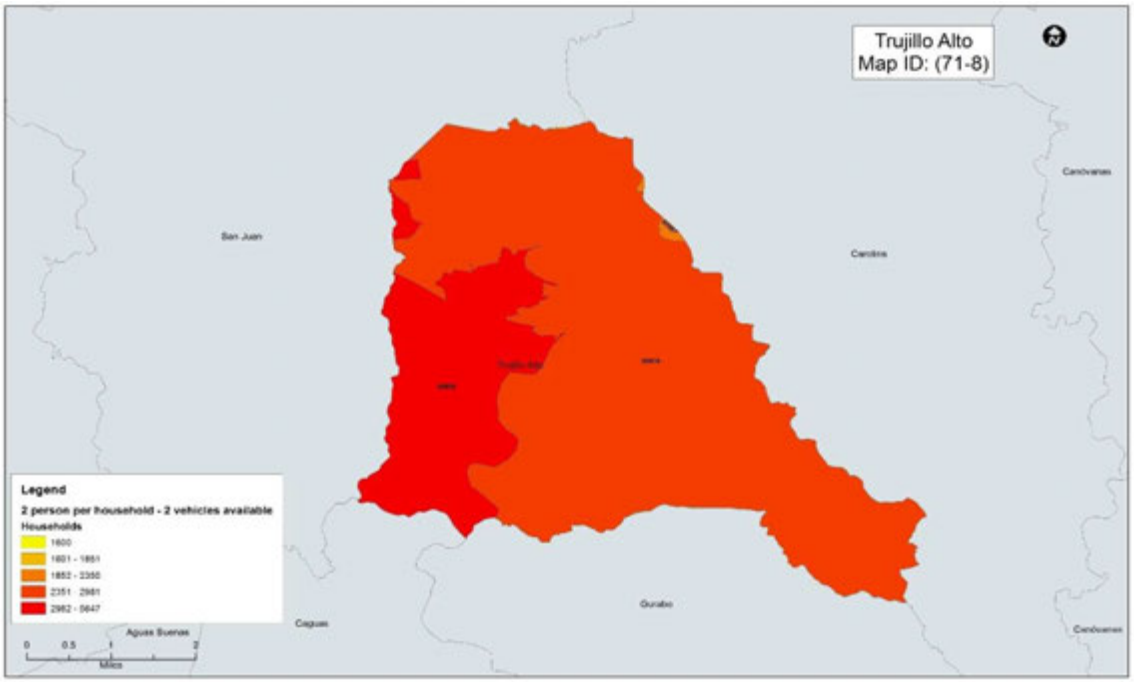
Source: US Census Bureau, 2015 and SDG

Figure D.147: Trujillo Alto, 2 Person per Household – 1 Vehicle Available



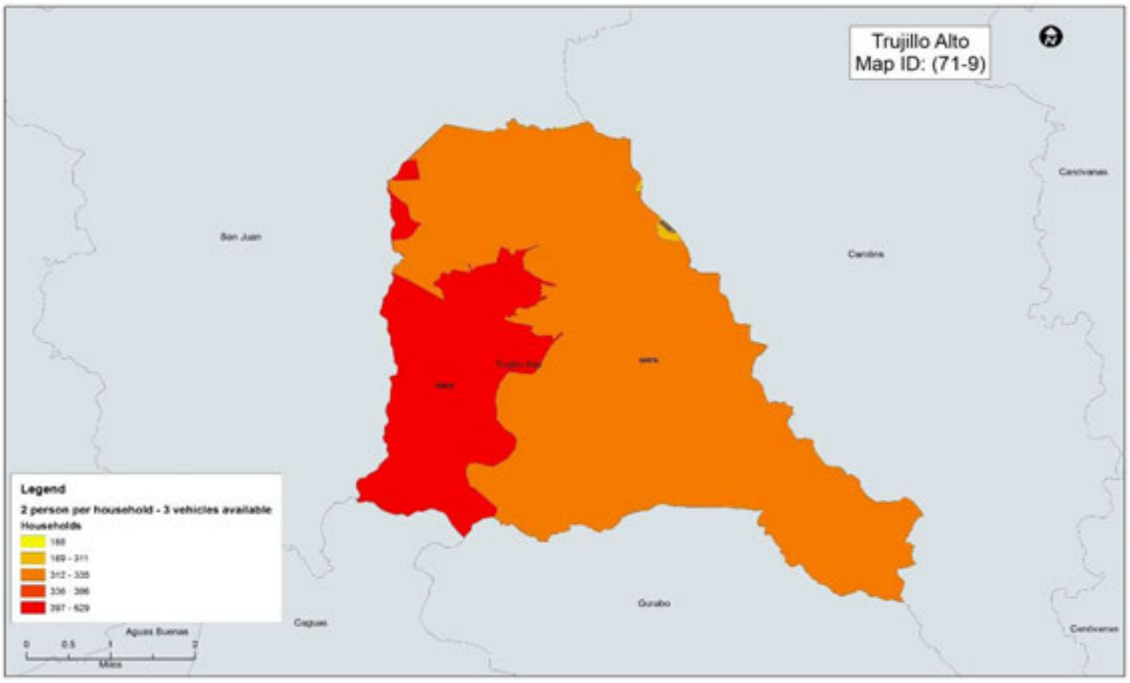
Source: US Census Bureau, 2015 and SDG

Figure D.148: Trujillo Alto, 2 Person per Household – 2 Vehicles Available



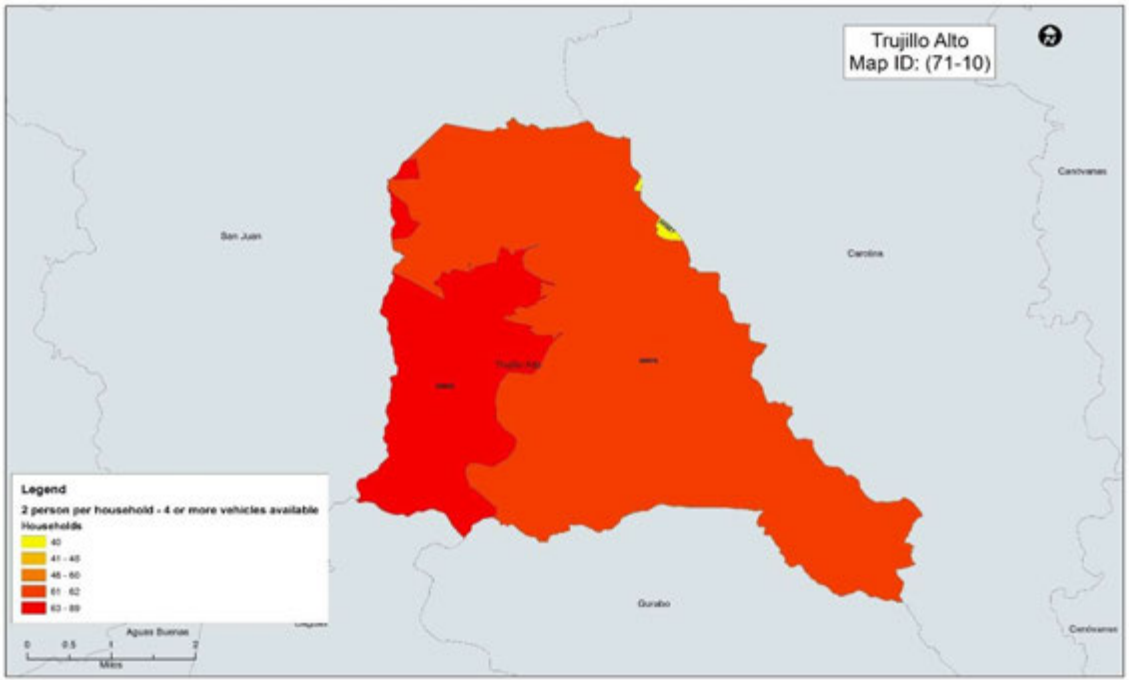
Source: US Census Bureau, 2015 and SDG

Figure D.149: Trujillo Alto, 2 Person per Household – 3 Vehicles Available



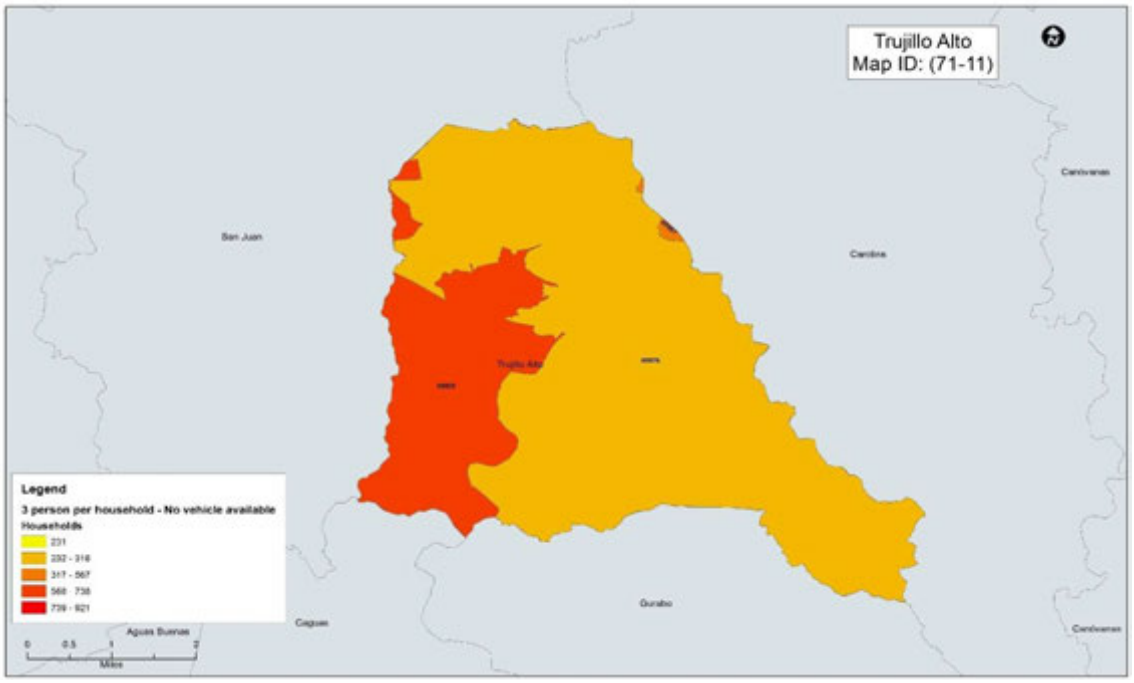
Source: US Census Bureau, 2015 and SDG

Figure D.150: Trujillo Alto, 2 Person per Household – 4 or more Vehicles Available



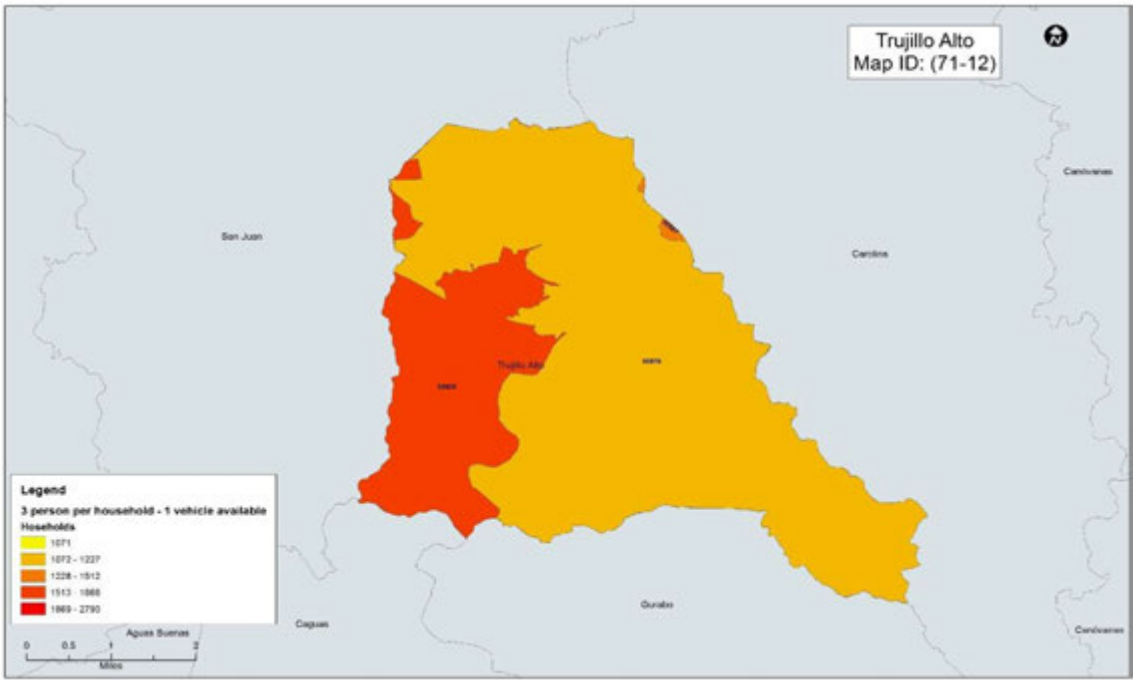
Source: US Census Bureau, 2015 and SDG

Figure D.151: Trujillo Alto, 3 Person per Household – No Vehicle Available



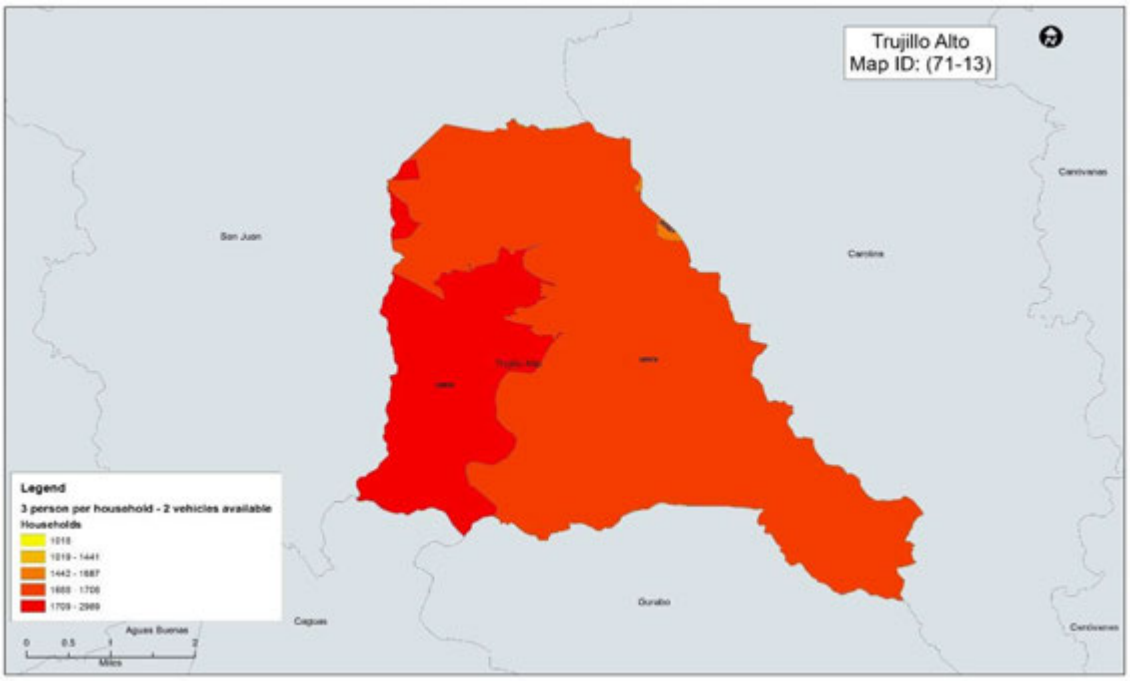
Source: US Census Bureau, 2015 and SDG

Figure D.152: Trujillo Alto, 3 Person per Household – 1 Vehicle Available



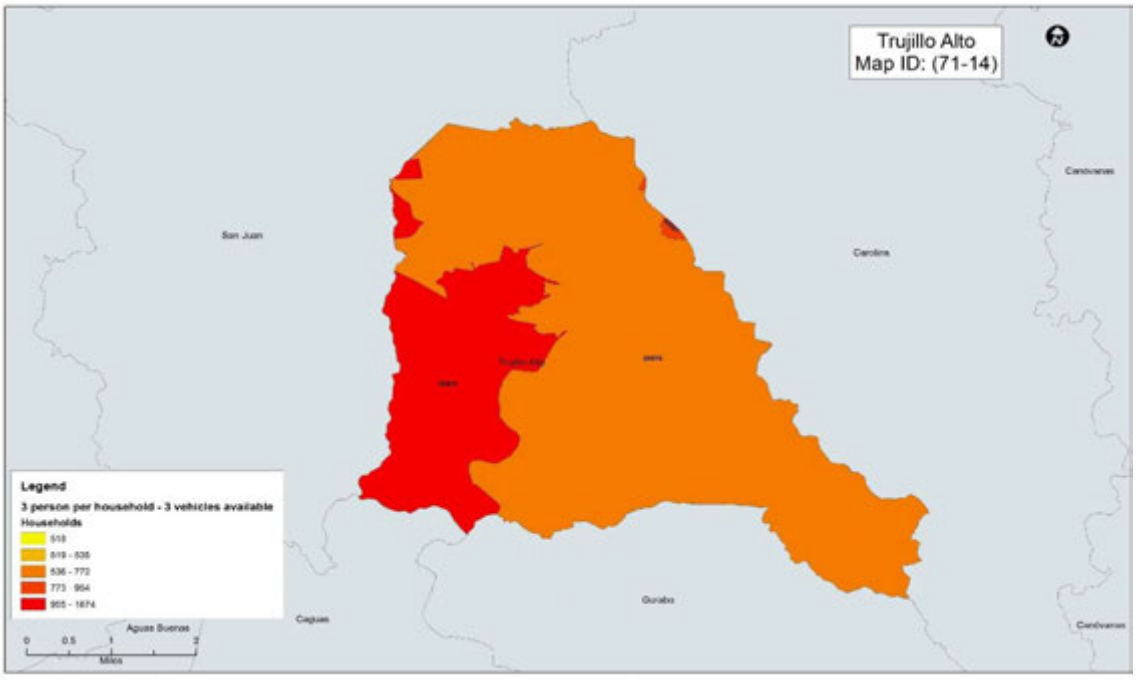
Source: US Census Bureau, 2015 and SDG

Figure D.153: Trujillo Alto, 3 Person per Household – 2 Vehicles Available



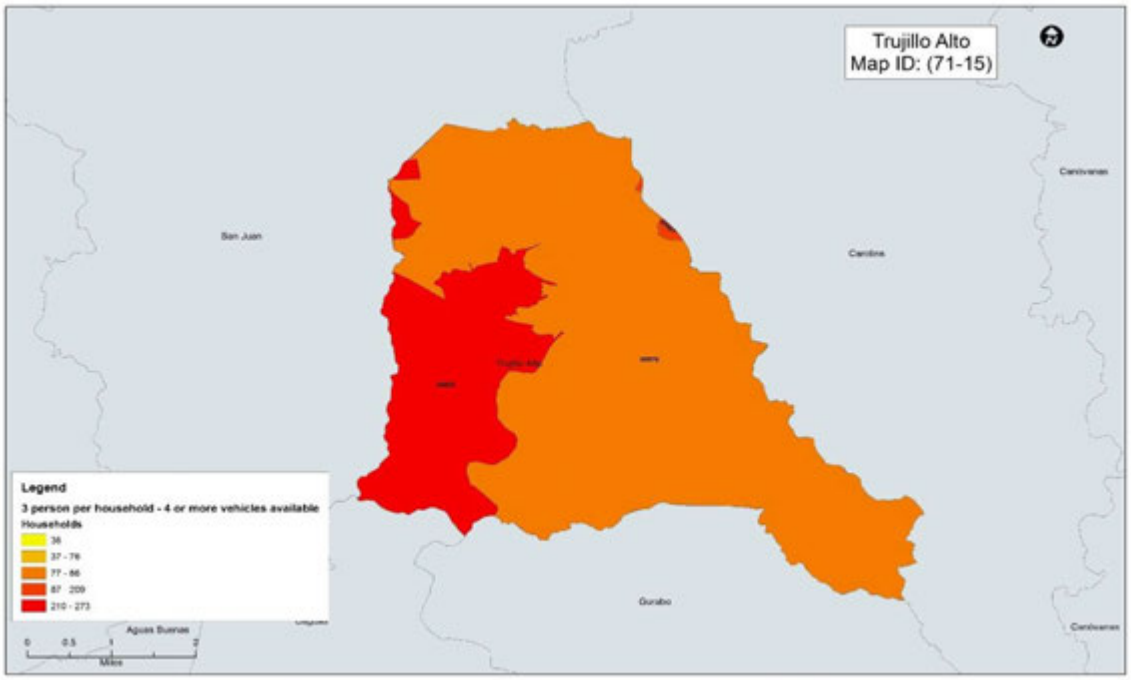
Source: US Census Bureau, 2015 and SDG

Figure D.154: Trujillo Alto, 3 Person per Household – 3 Vehicles Available



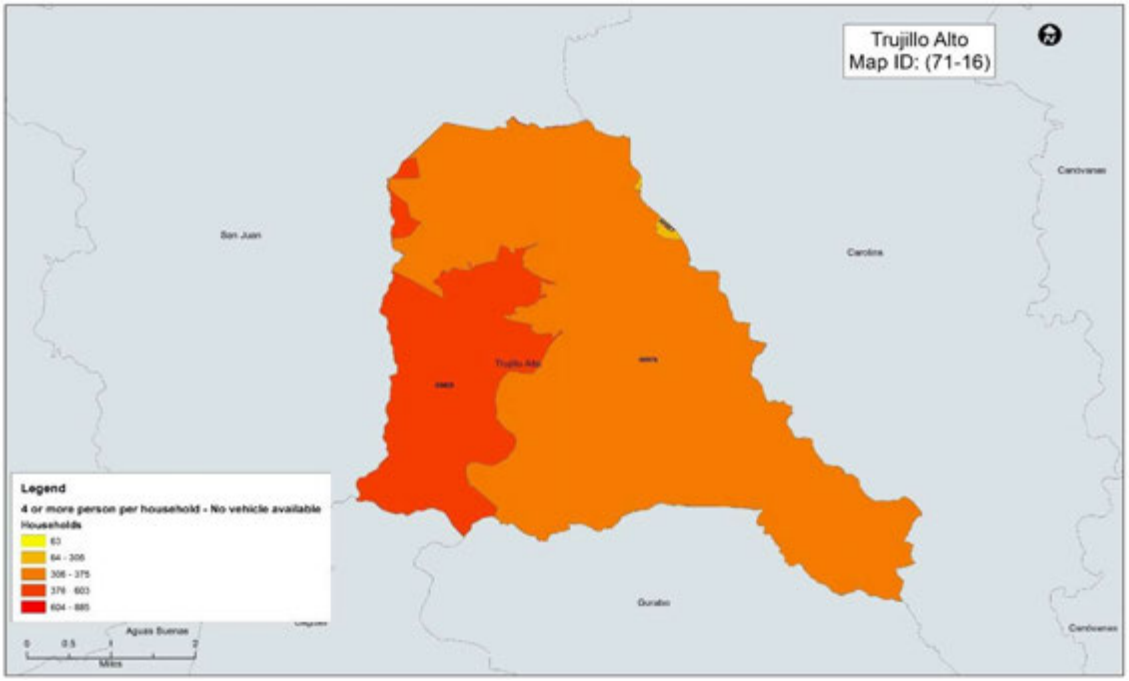
Source: US Census Bureau, 2015 and SDG

Figure D.155: Trujillo Alto, 3 Person per Household – 4 or more Vehicles Available



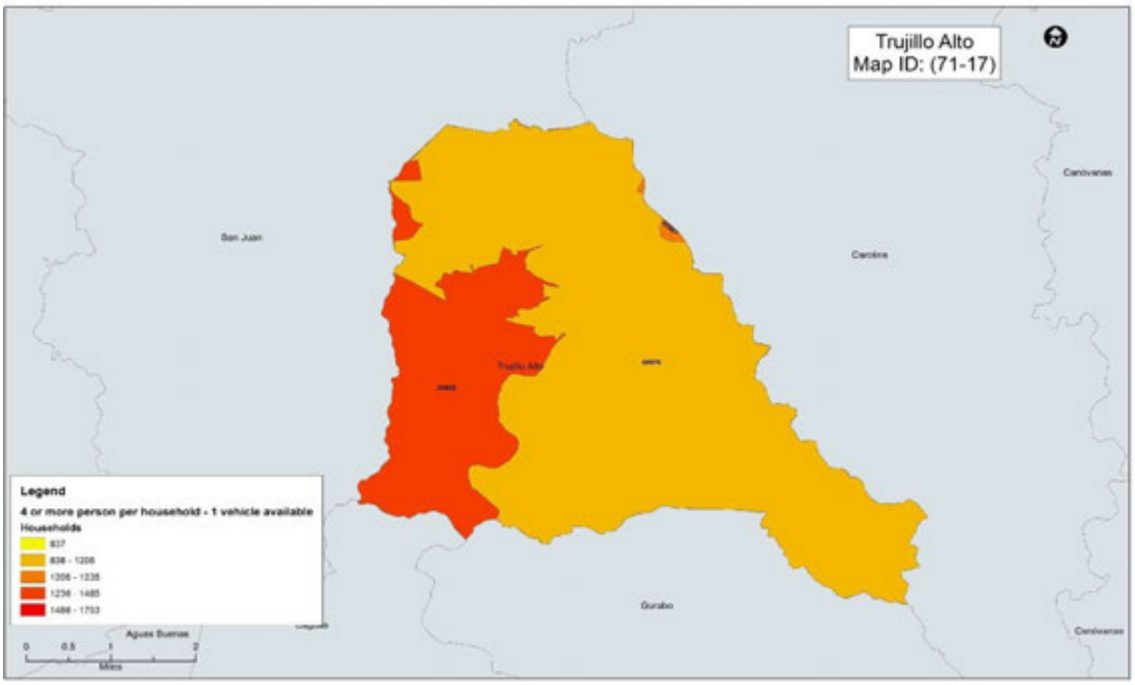
Source: US Census Bureau, 2015 and SDG

Figure D.156: Trujillo Alto, 4 or more Person per Household – No Vehicle Available



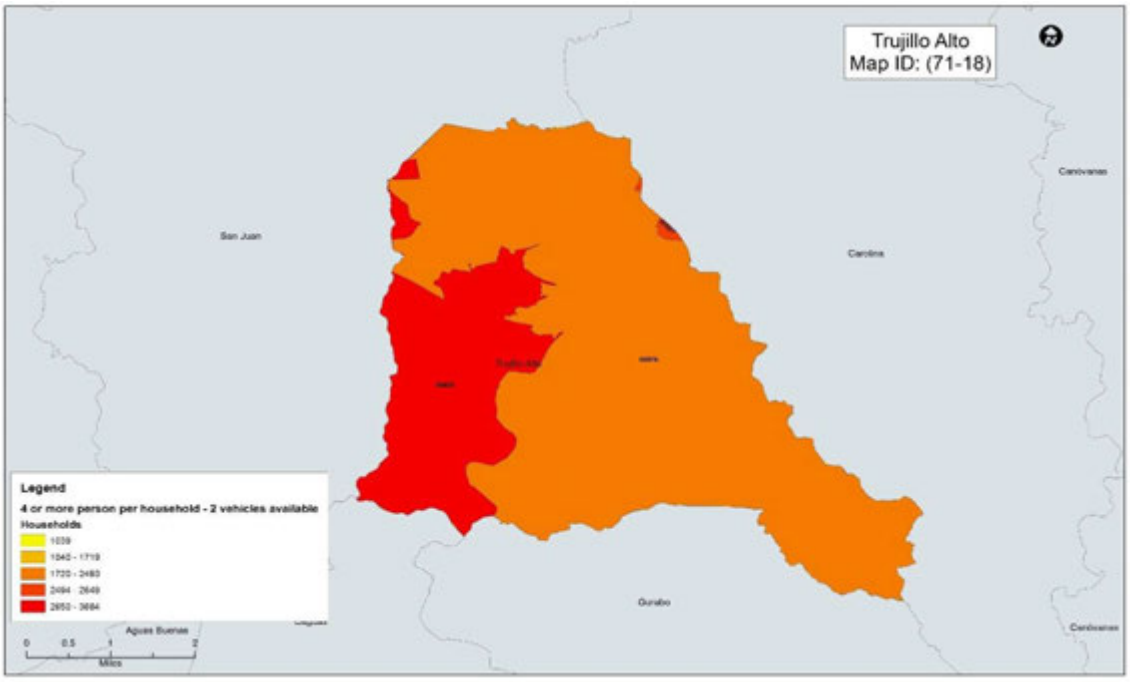
Source: US Census Bureau, 2015 and SDG

Figure D.157: Trujillo Alto, 4 or more Person per Household – No Vehicle Available



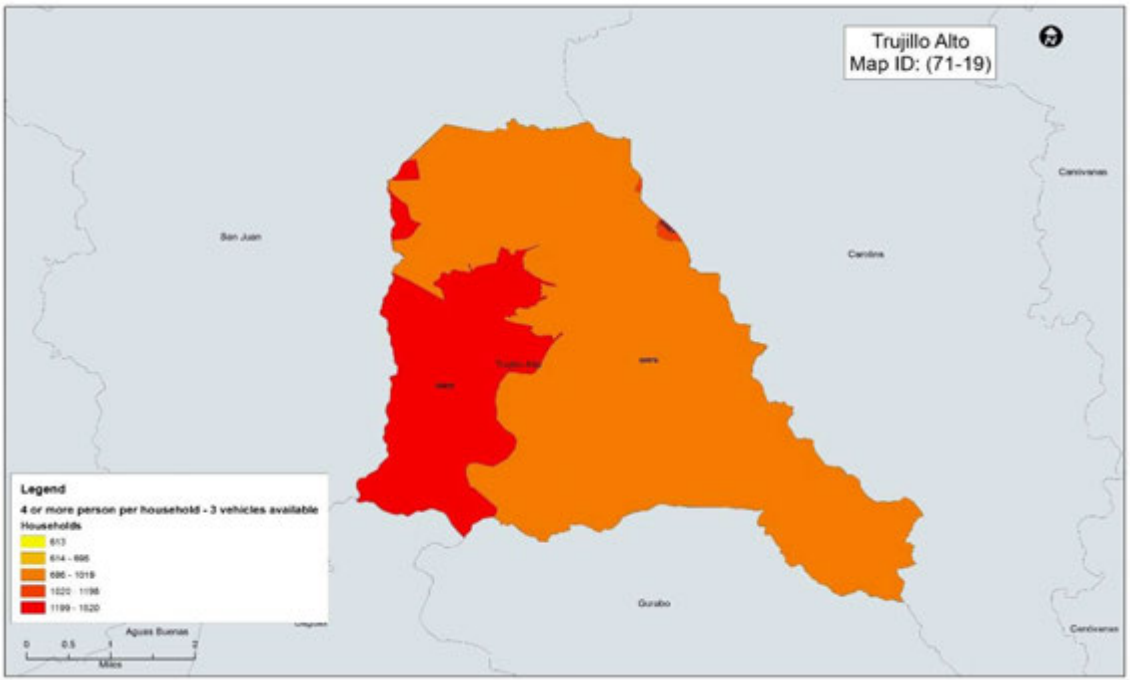
Source: US Census Bureau, 2015 and SDG

Figure D.158: Trujillo Alto, 4 or more Person per Household – 2 Vehicles Available



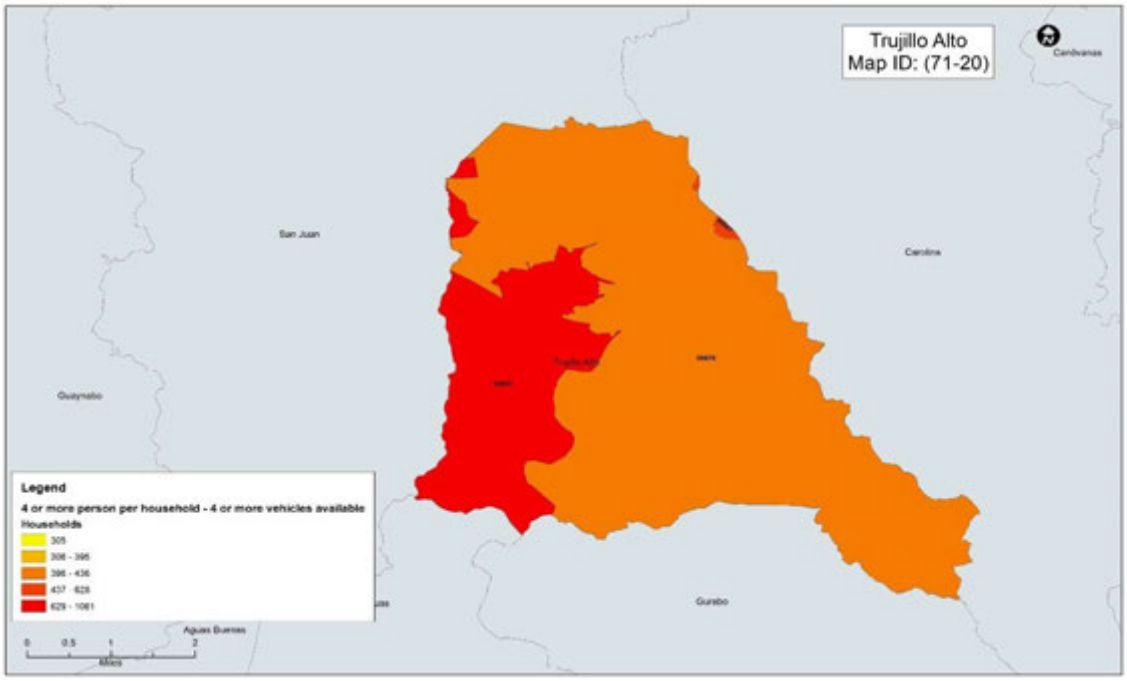
Source: US Census Bureau, 2015 and SDG

Figure D.159: Trujillo Alto, 4 or more Person per Household – 3 Vehicles Available



Source: US Census Bureau, 2015 and SDG

Figure D.160: Trujillo Alto, 4 or more Person per Household – 4 or more Vehicles Available

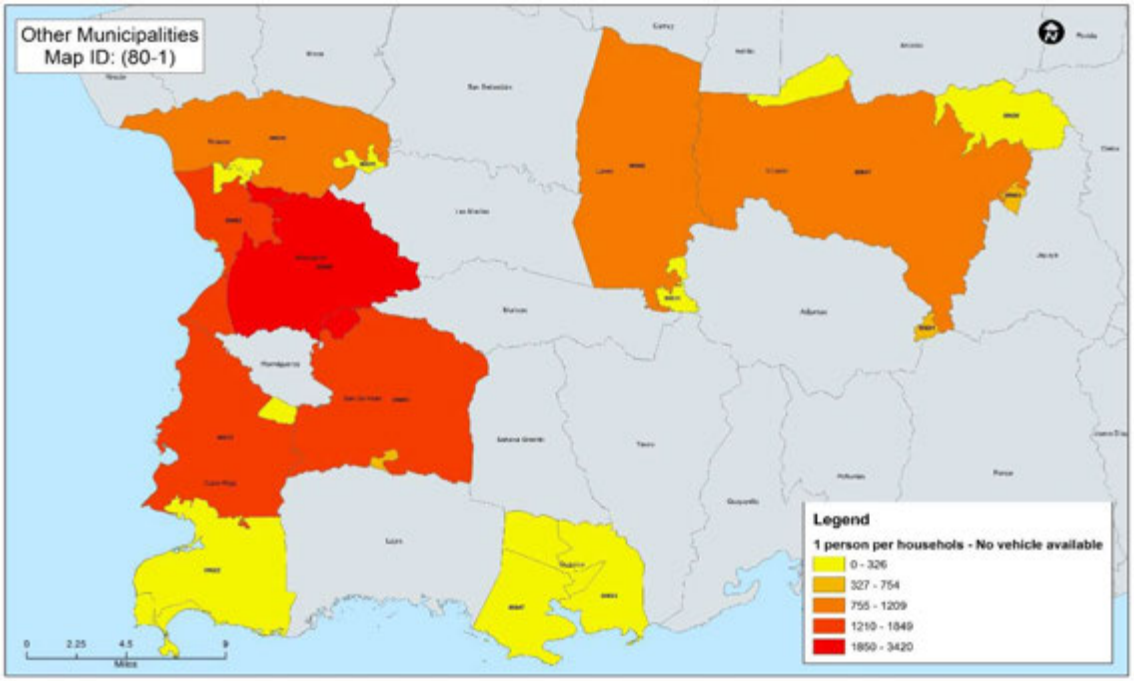


Source: US Census Bureau, 2015 and SDG

Figure D.161: Municipalities with 1 Zip Code

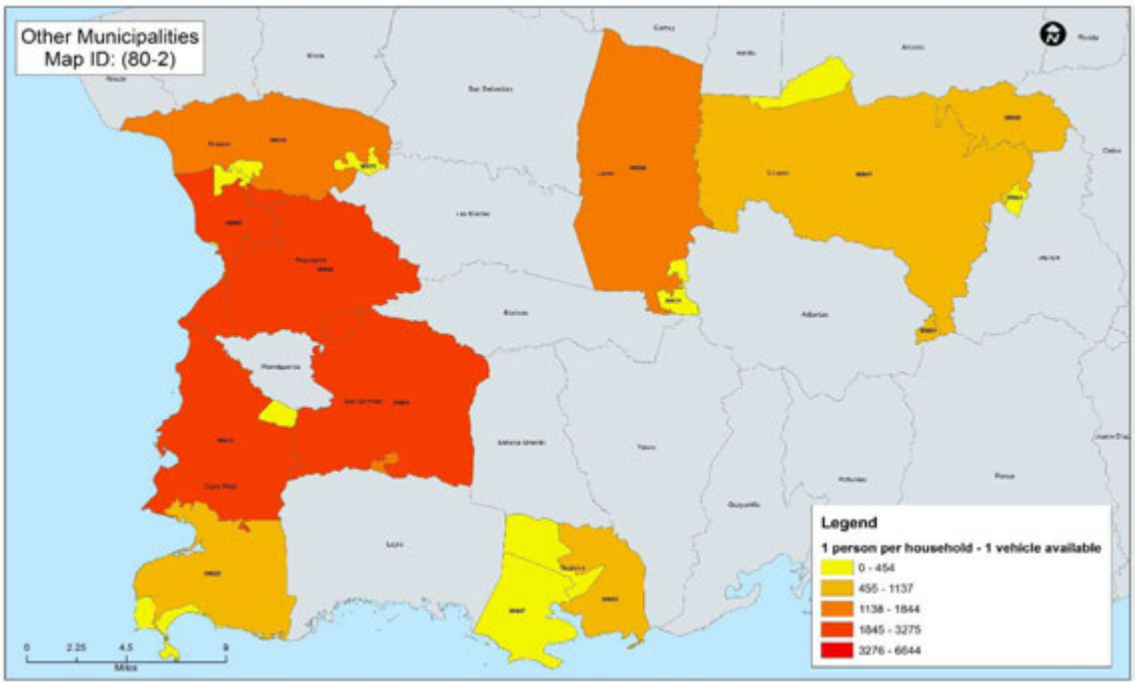
Source: US Census Bureau, 2015 and SDG

Figure D.162: Other Municipalities, 1 Person per Household – No Vehicle Available



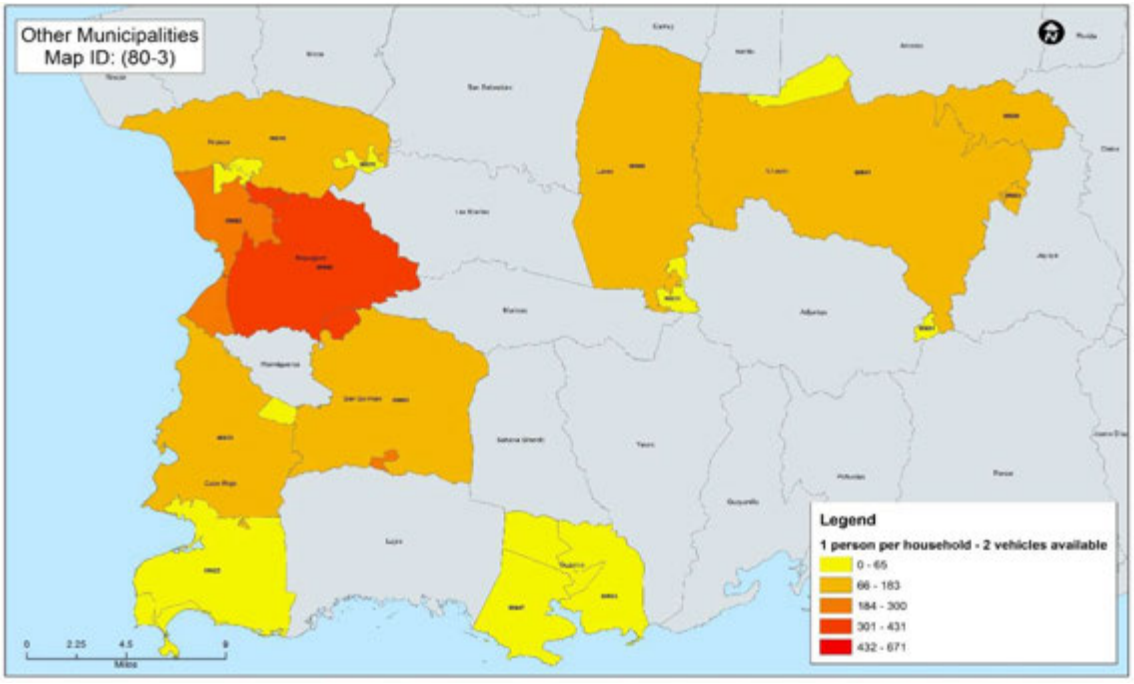
Source: US Census Bureau, 2015 and SDG

Figure D.163: Other Municipalities, 1 Person per Household – 1 Vehicle Available



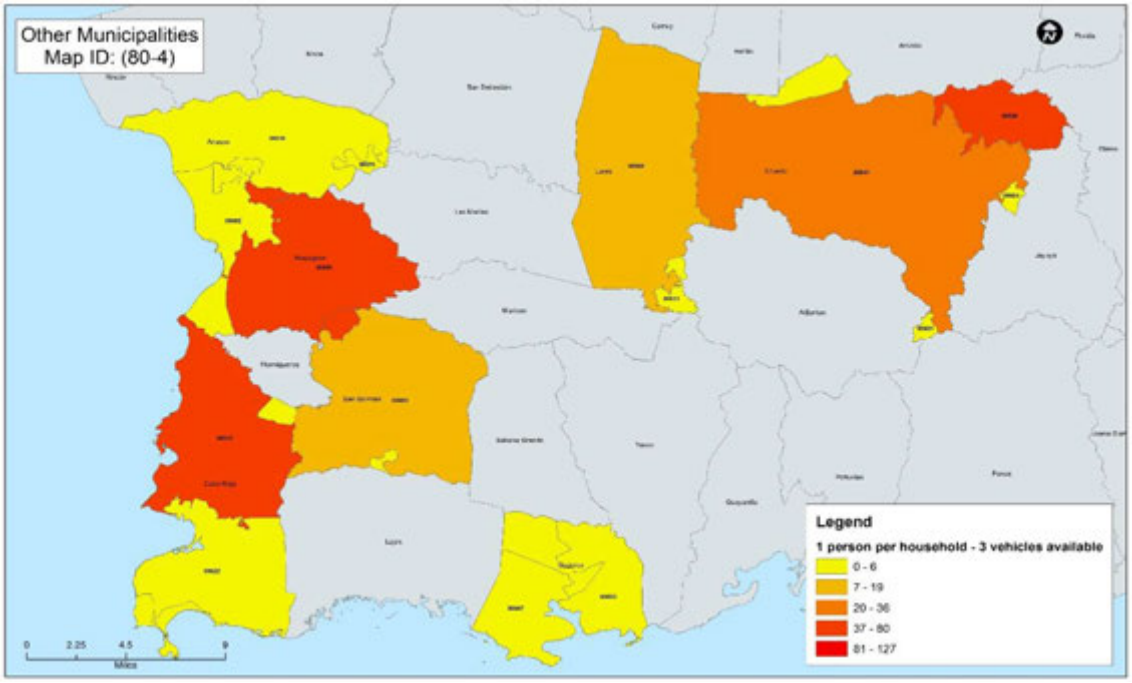
Source: US Census Bureau, 2015 and SDG

Figure D.164: Other Municipalities, 1 Person per Household – 2 Vehicles Available



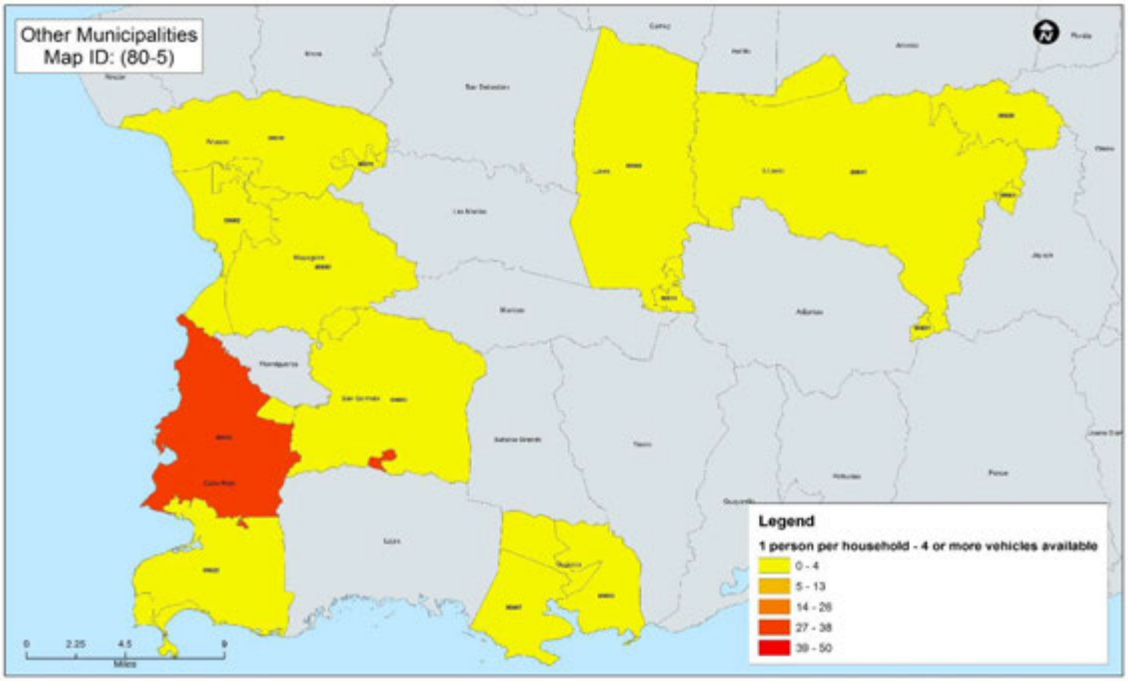
Source: US Census Bureau, 2015 and SDG

Figure D.165: Other Municipalities, 1 Person per Household – 3 Vehicles Available



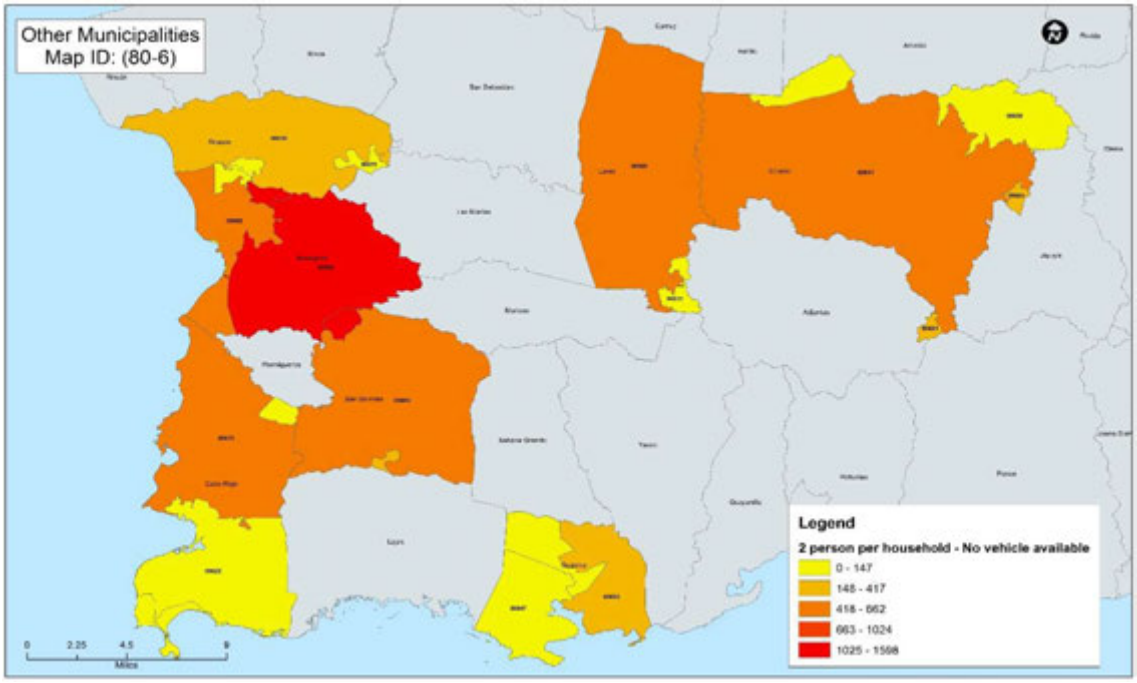
Source: US Census Bureau, 2015 and SDG

Figure D.166: Other Municipalities, 1 Person per Household – 4 or more Vehicles Available



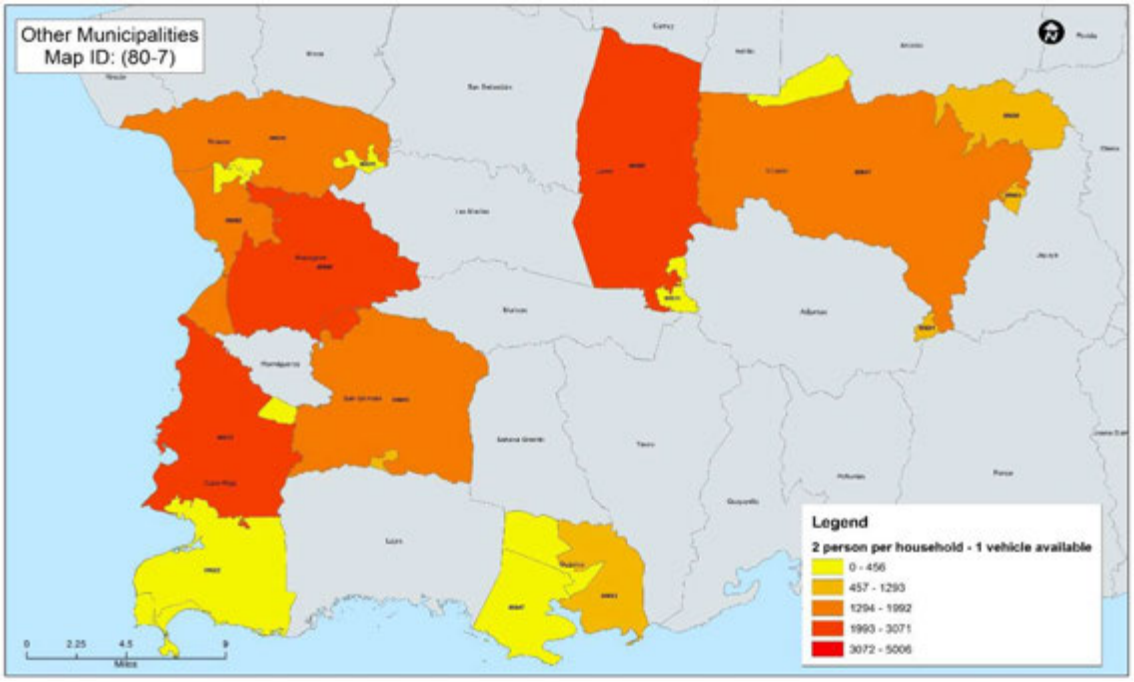
Source: US Census Bureau, 2015 and SDG

Figure D.167: Other Municipalities, 2 Person per Household – No Vehicle Available



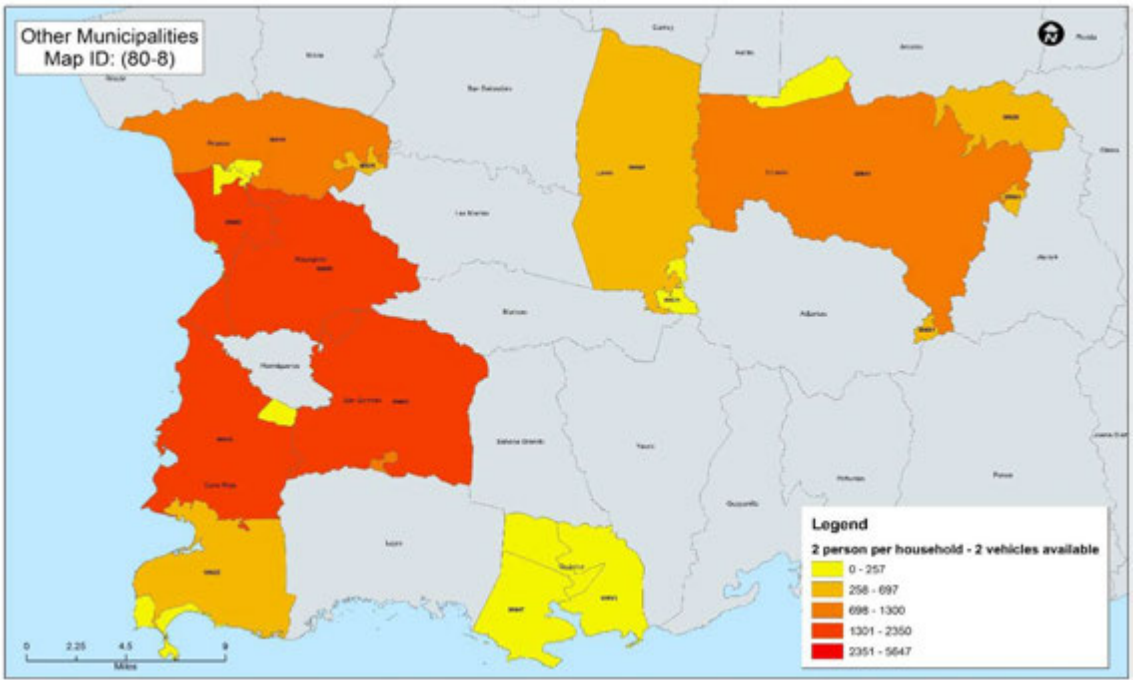
Source: US Census Bureau, 2015 and SDG

Figure D.168: Other Municipalities, 2 Person per Household – 1 Vehicle Available



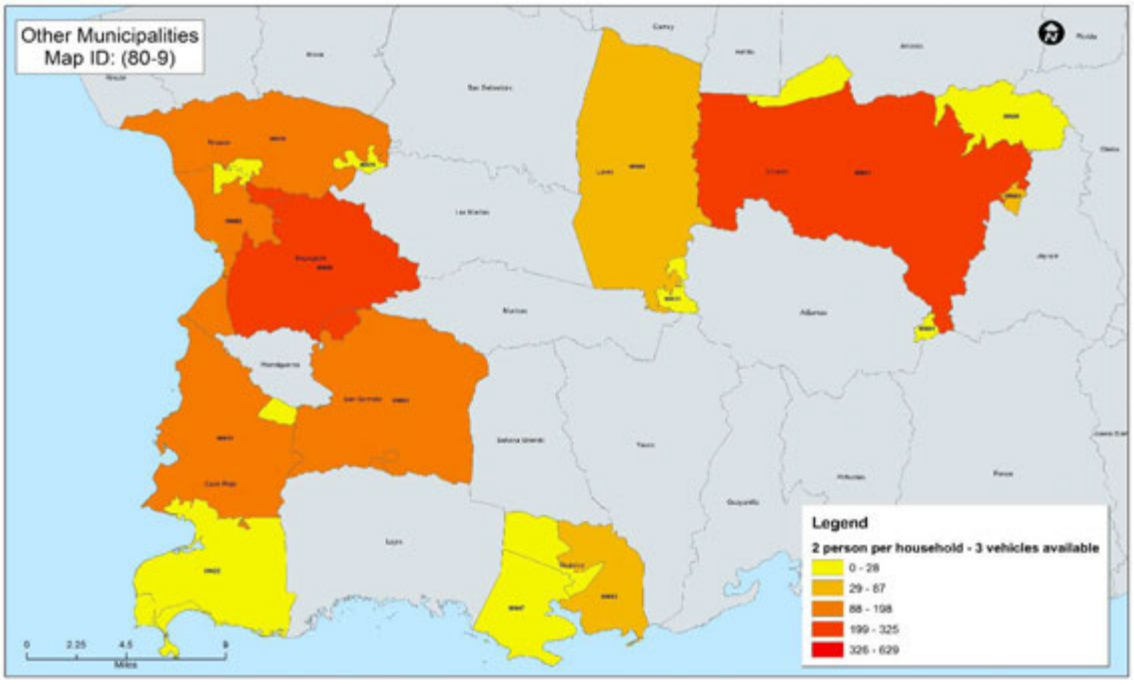
Source: US Census Bureau, 2015 and SDG

Figure D.169: Other Municipalities, 2 Person per Household – 2 Vehicles Available



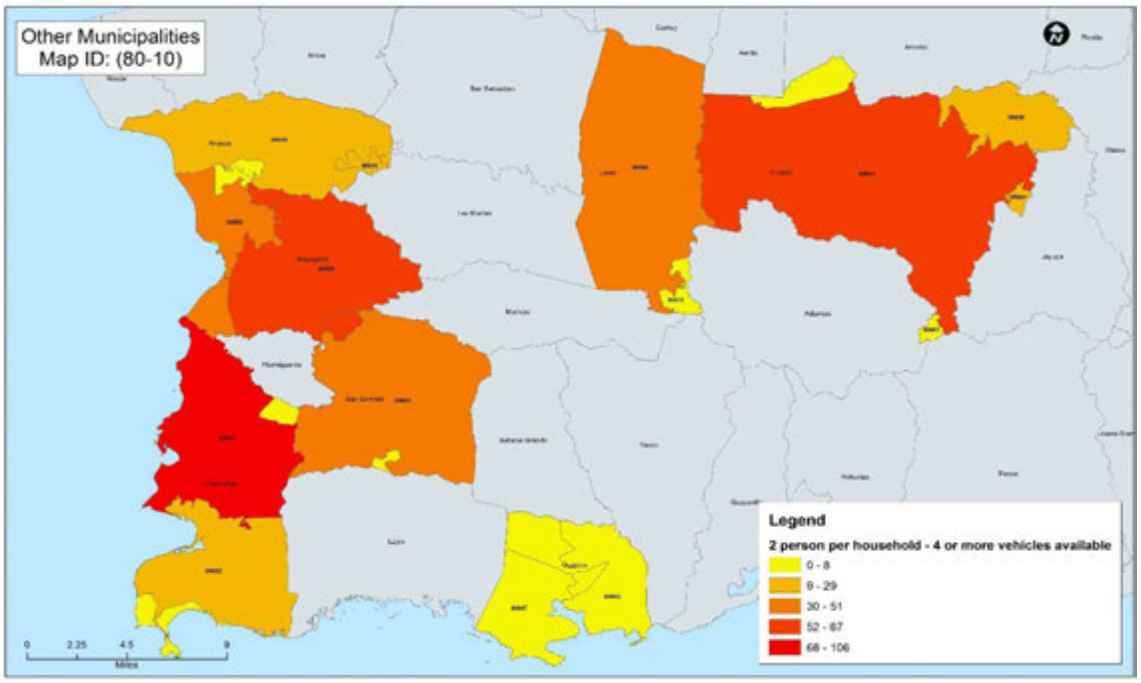
Source: US Census Bureau, 2015 and SDG

Figure D.170: Other Municipalities, 2 Person per Household – 3 Vehicles Available



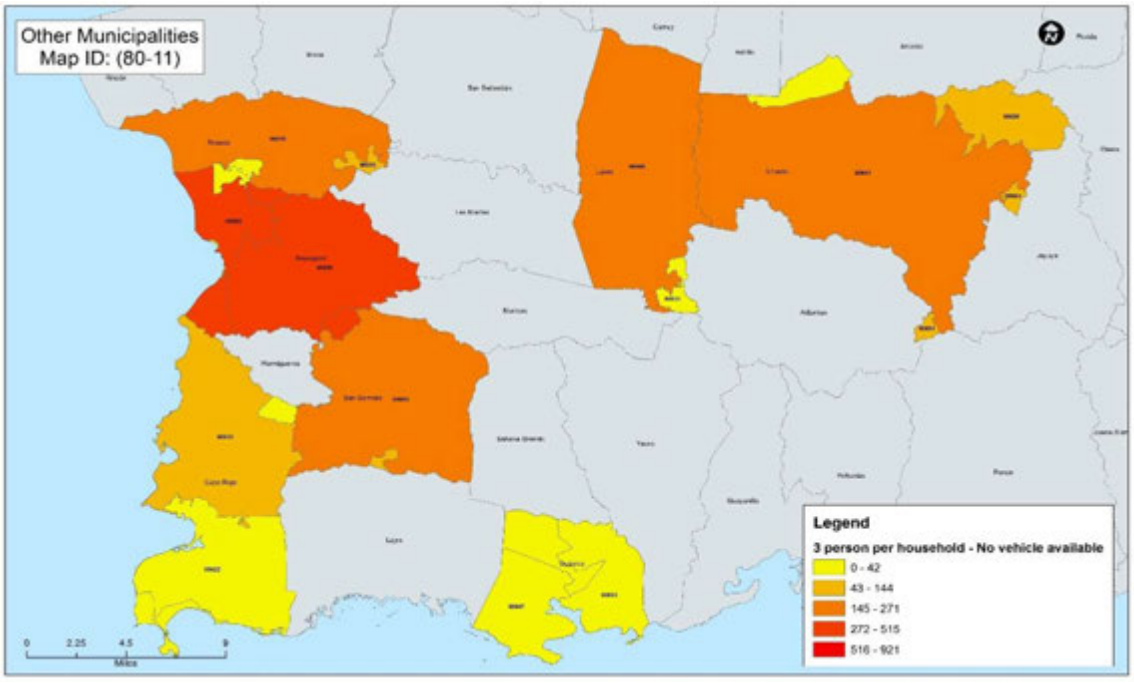
Source: US Census Bureau, 2015 and SDG

Figure D.171: Other Municipalities, 2 Person per Household – 4 or more Vehicle Available



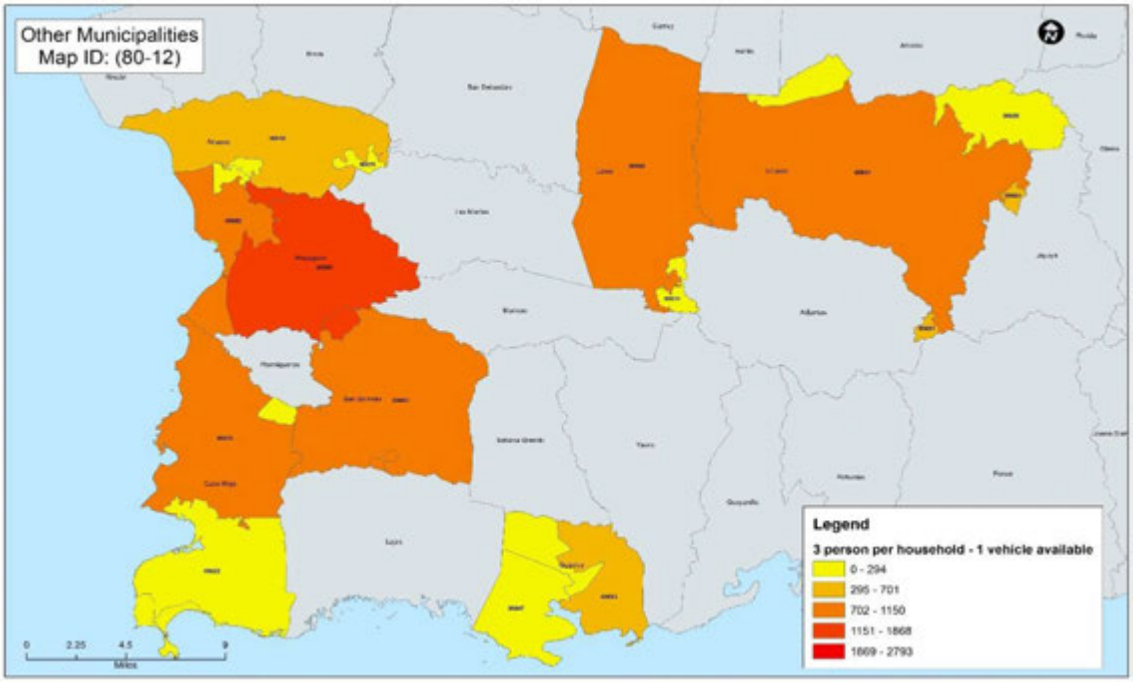
Source: US Census Bureau, 2015 and SDG

Figure D.172: Other Municipalities, 3 Person per Household – No Vehicle Available



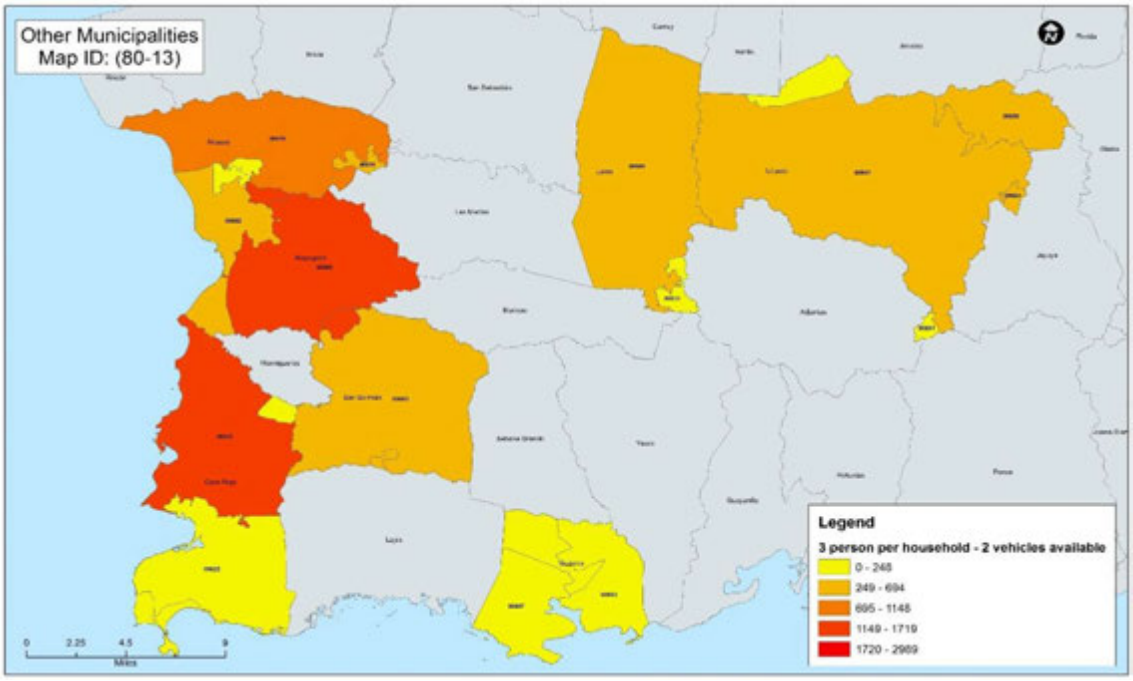
Source: US Census Bureau, 2015 and SDG

Figure D.173: Other Municipalities, 3 Person per Household – 1 Vehicle Available



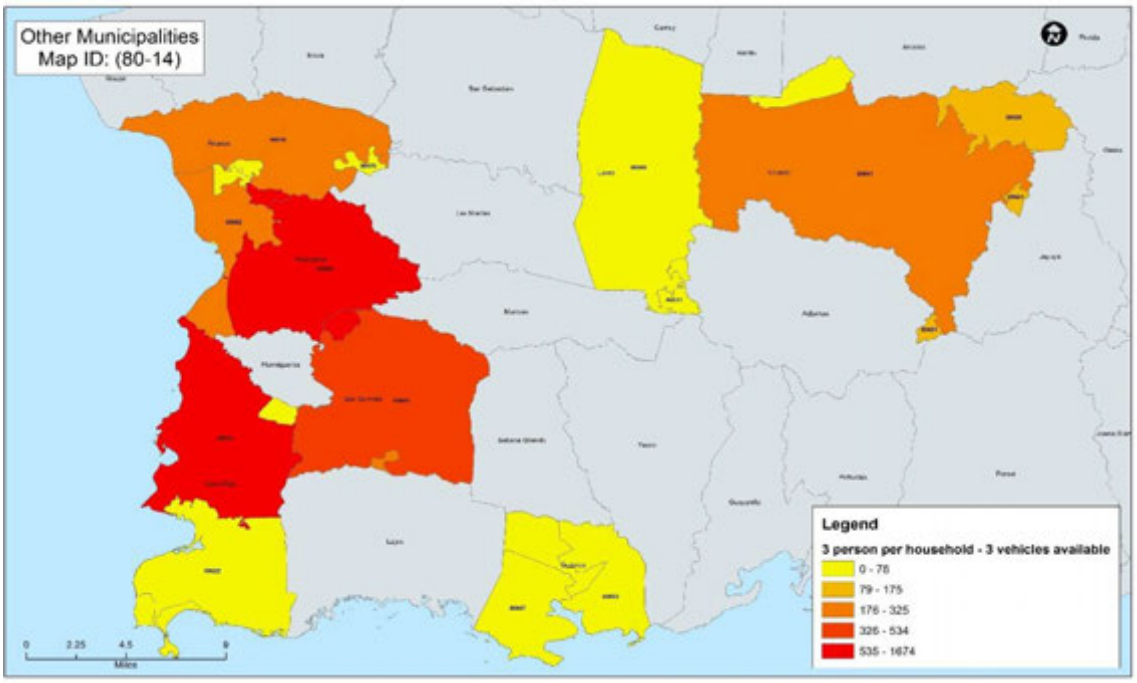
Source: US Census Bureau, 2015 and SDG

Figure D.174: Other Municipalities, 3 Person per Household – 2 Vehicles Available



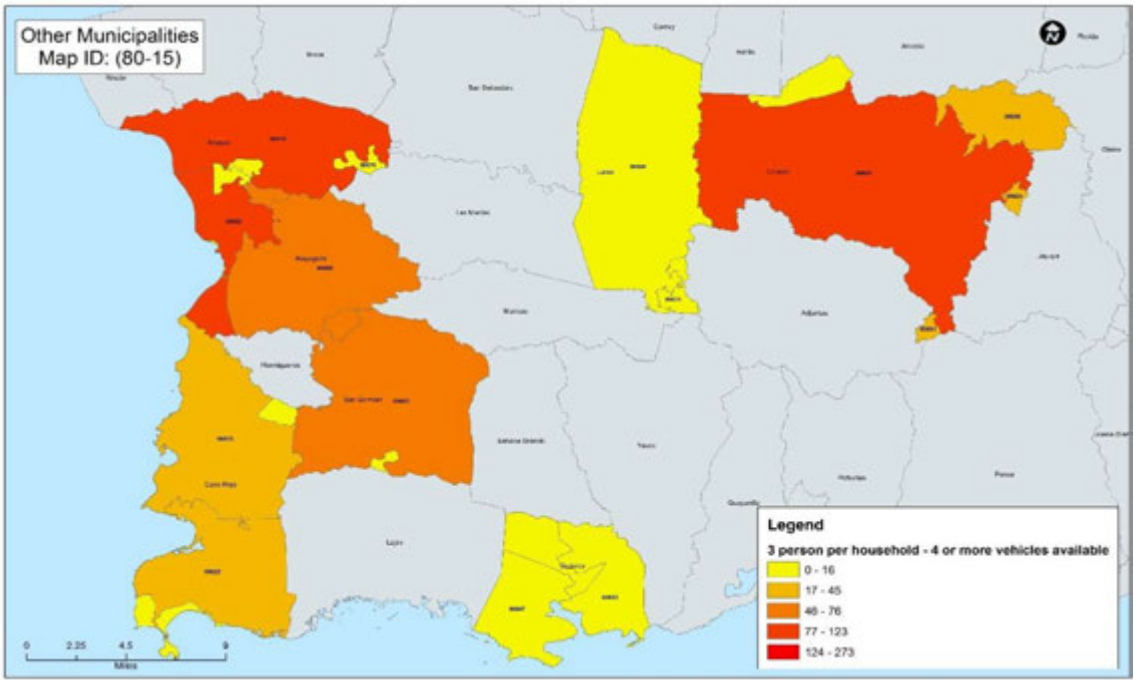
Source: US Census Bureau, 2015 and SDG

Figure D.175: Other Municipalities, 3 Person per Household – 3 Vehicles Available



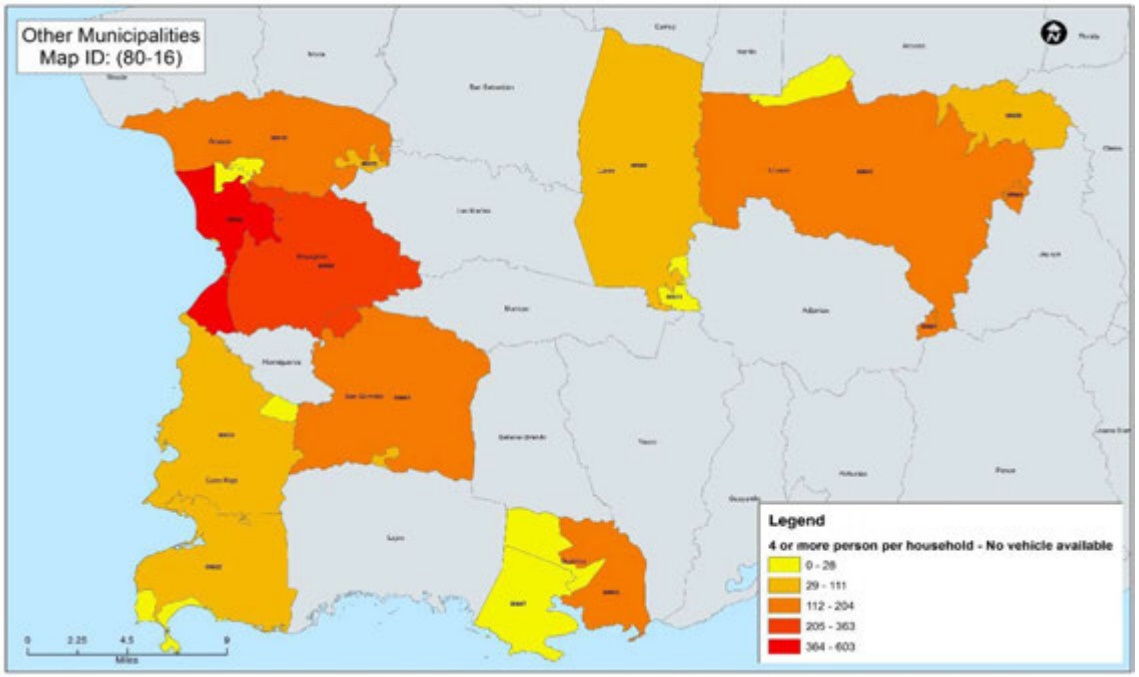
Source: US Census Bureau, 2015 and SDG

Figure D.176: Other Municipalities, 3 Person per Household – 4 or more Vehicles Available



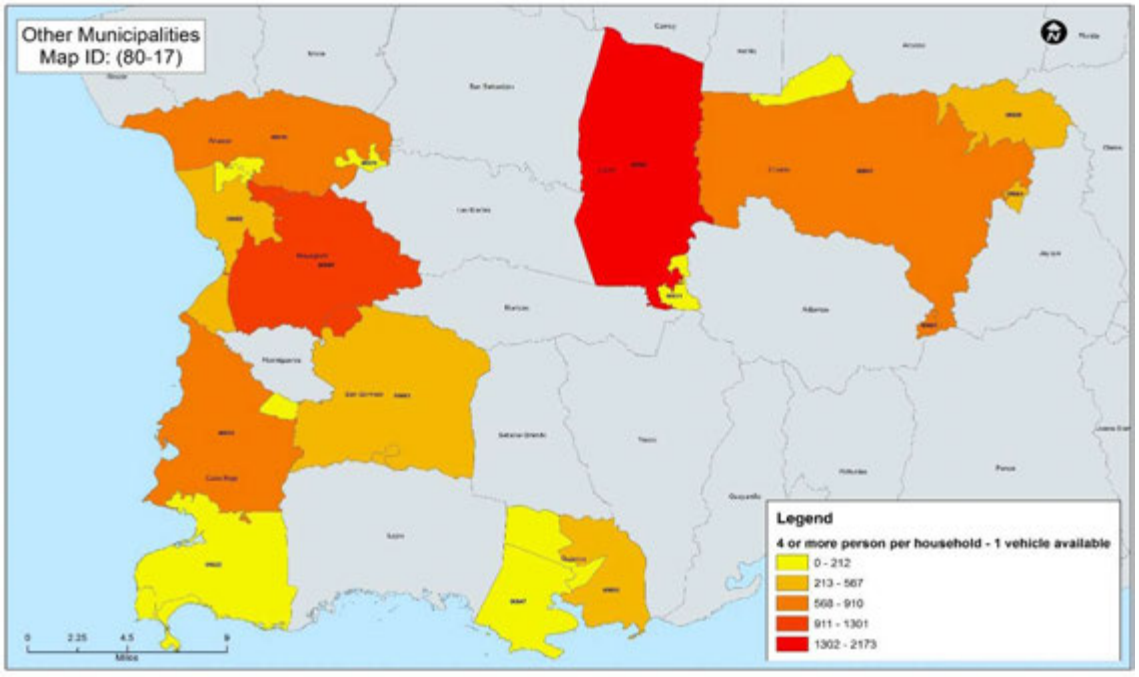
Source: US Census Bureau, 2015 and SDG

Figure D.177: Other Municipalities, 4 or more Person per Household – No Vehicle Available



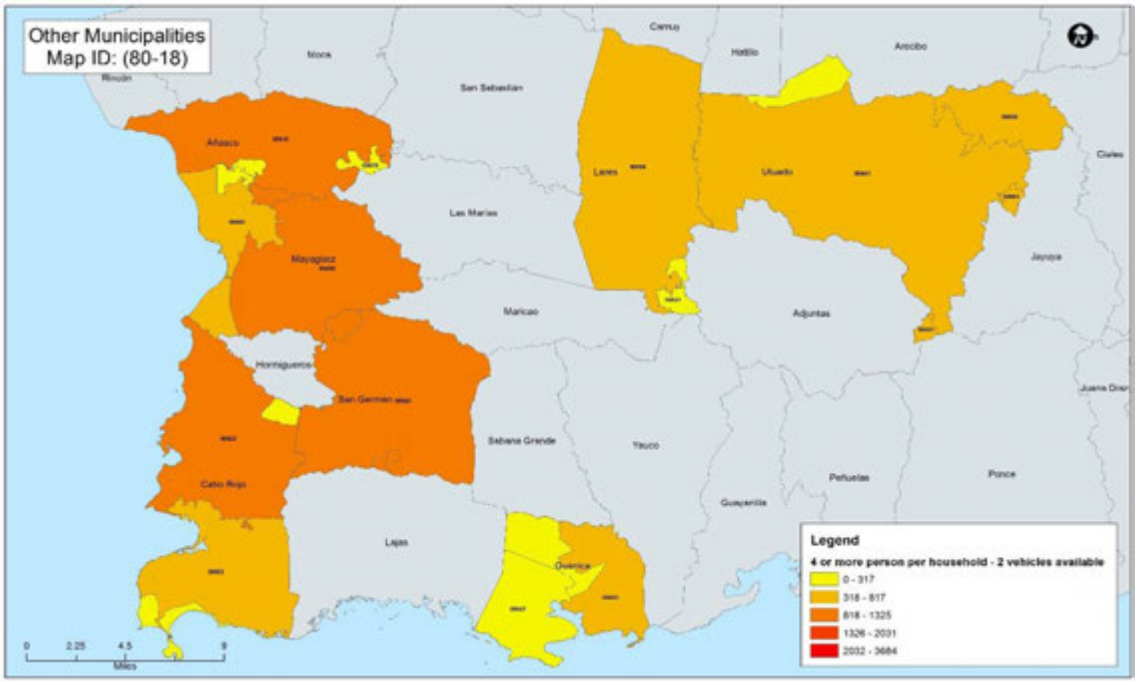
Source: US Census Bureau, 2015 and SDG

Figure D.178: Other Municipalities, 4 or more Person per Household – 1 Vehicle Available



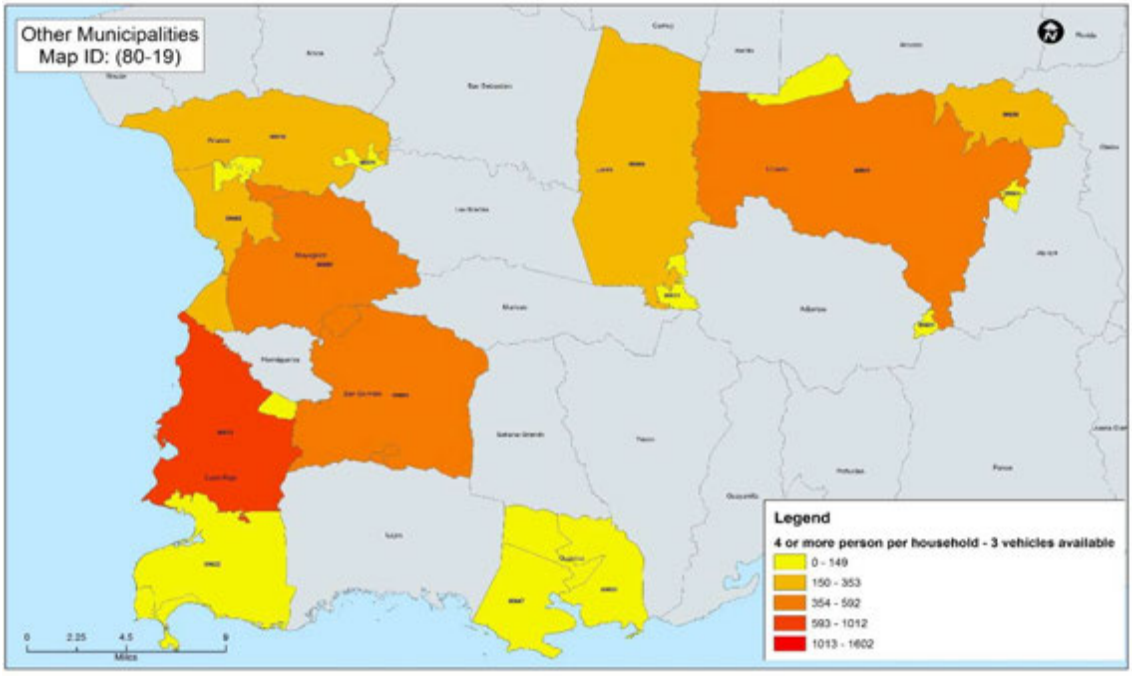
Source: US Census Bureau, 2015 and SDG

Figure D.179: Other Municipalities, 4 or more Person per Household – 2 Vehicles Available



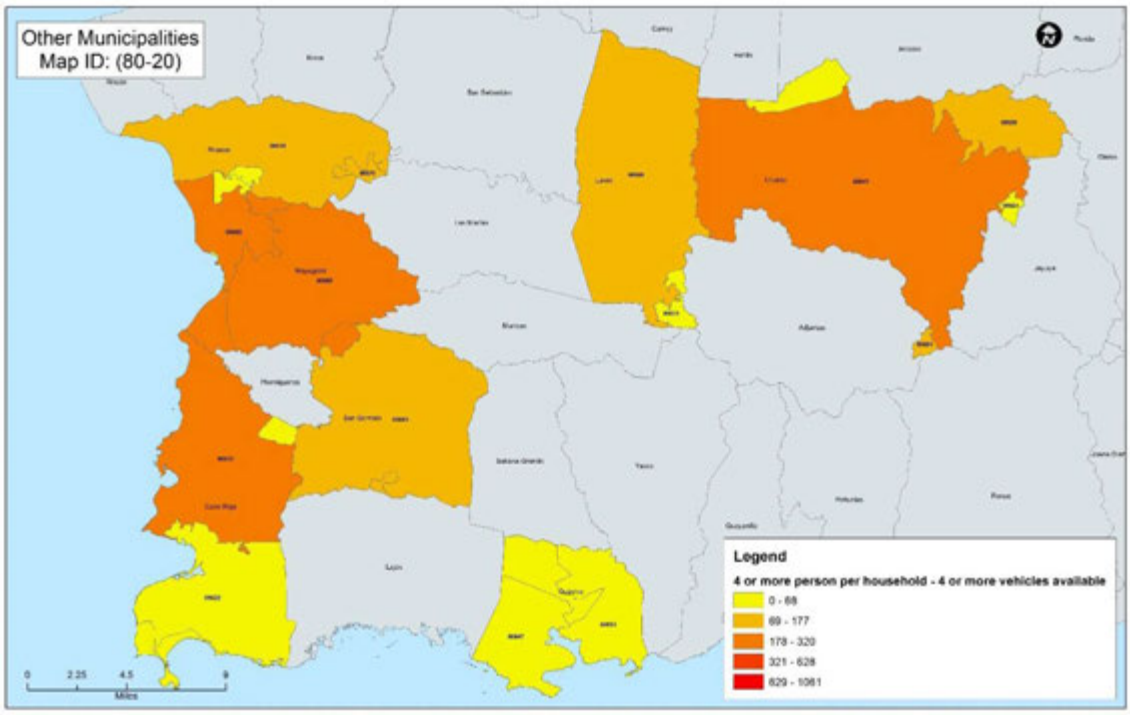
Source: US Census Bureau, 2015 and SDG

Figure D.180: Other Municipalities, 4 or more Person per Household – 3 Vehicles Available



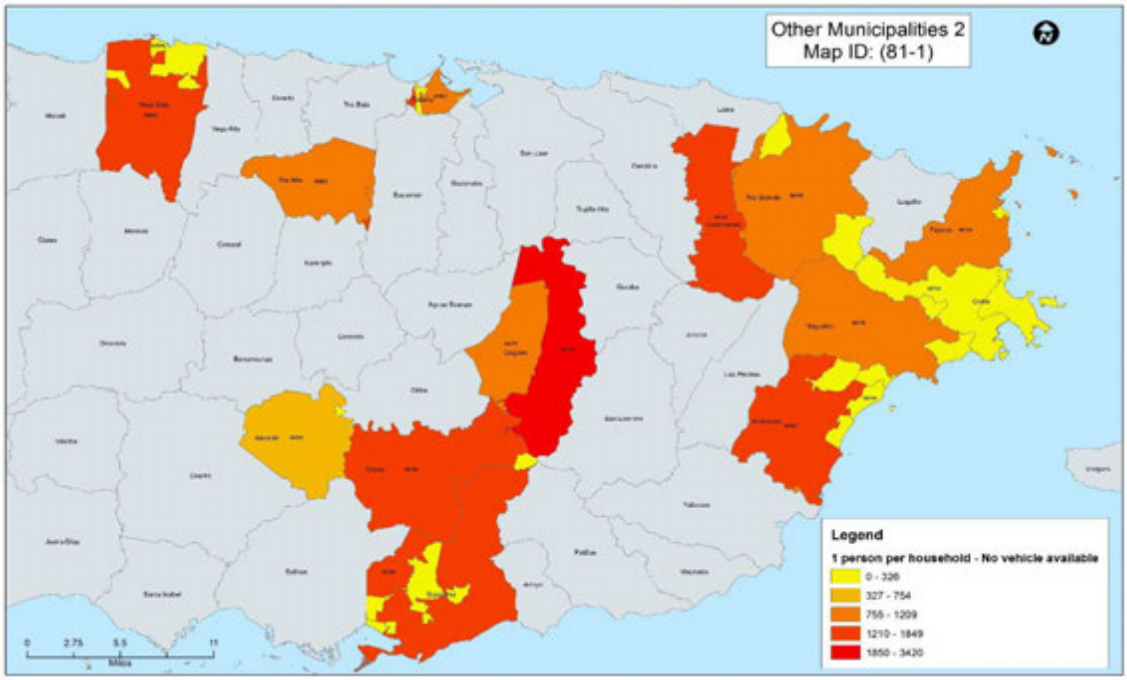
Source: US Census Bureau, 2015 and SDG

Figure D.181: Other Municipalities, 4 or more Person per Household – 4 or more Vehicles Available



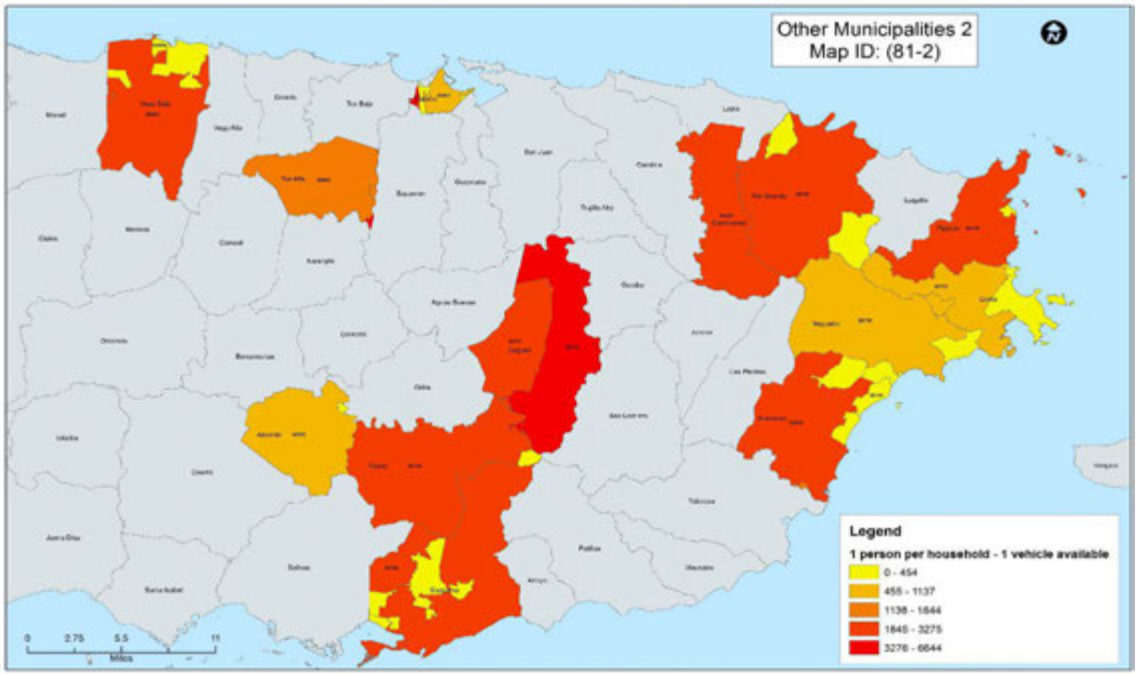
Source: US Census Bureau, 2015 and SDG

Figure D.182: Other Municipalities 2, 1 Person per Household – No Vehicle Available



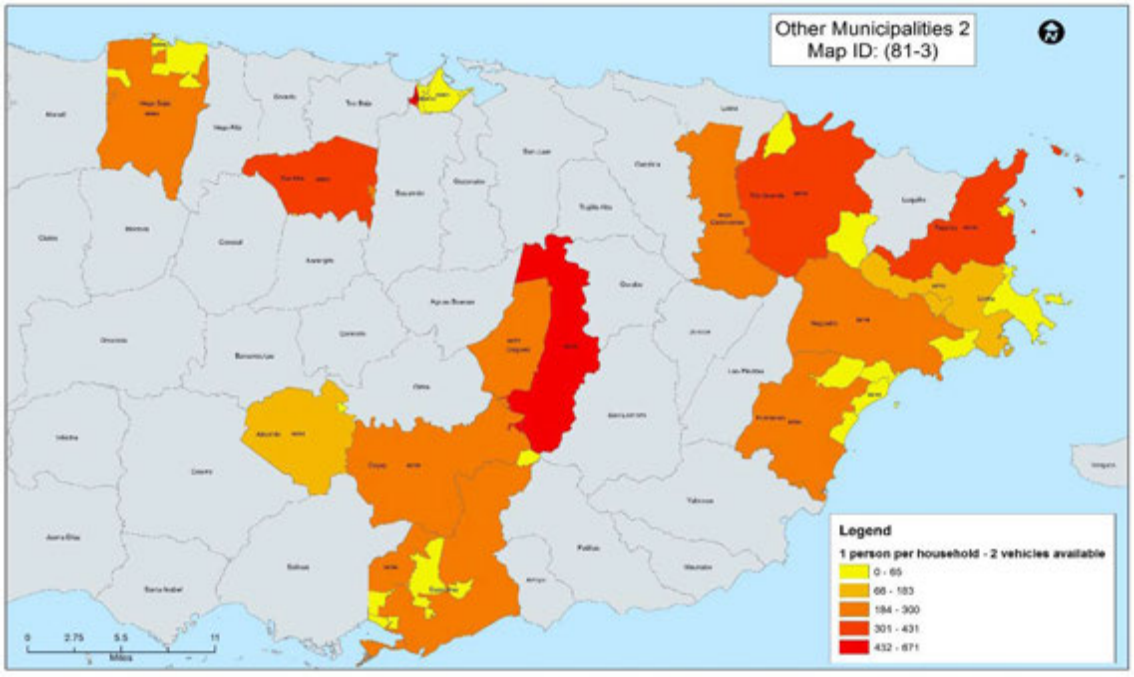
Source: US Census Bureau, 2015 and SDG

Figure D.183: Other Municipalities 2, 1 Person per Household – 1 Vehicle Available



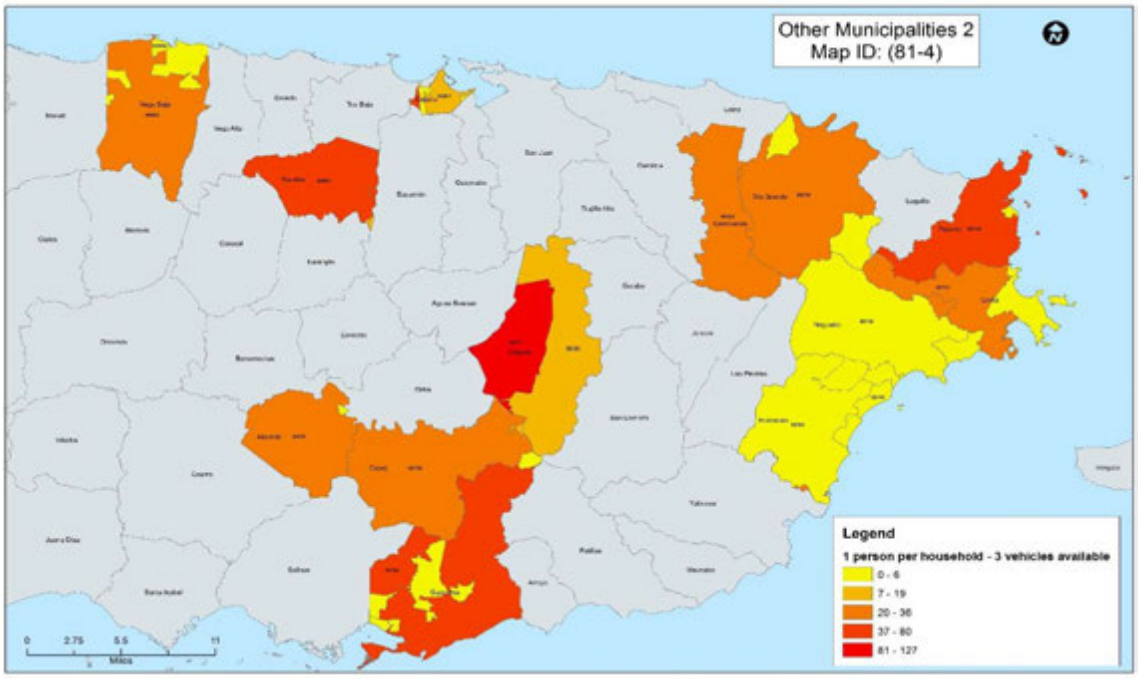
Source: US Census Bureau, 2015 and SDG

Figure D.184: Other Municipalities 2, 1 Person per Household – 2 Vehicles Available



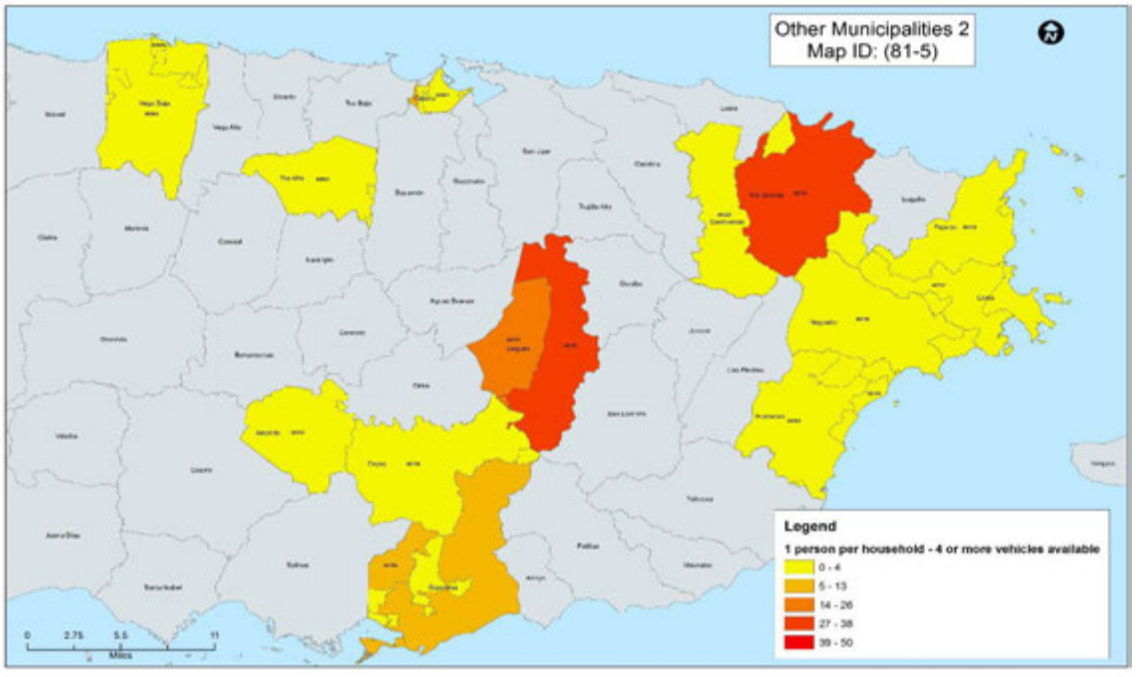
Source: US Census Bureau, 2015 and SDG

Figure D.185: Other Municipalities 2, 1 Person per Household – 3 Vehicles Available



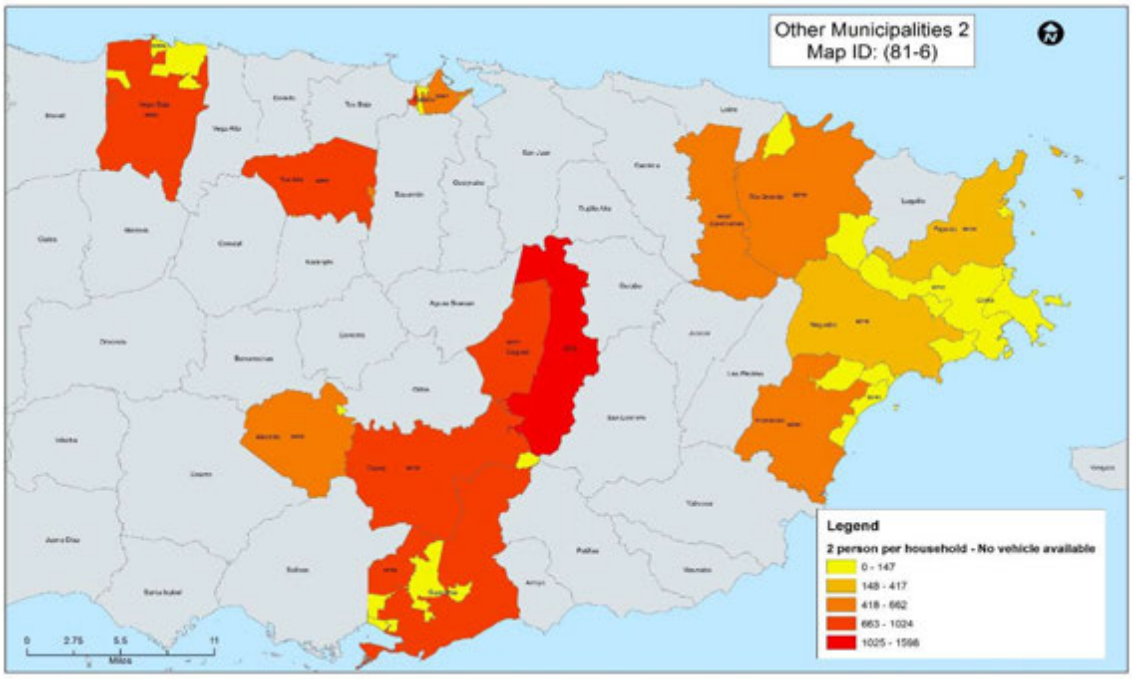
Source: US Census Bureau, 2015 and SDG

Figure D.186: Other Municipalities 2, 1 Person per Household – 4 or more Vehicles Available



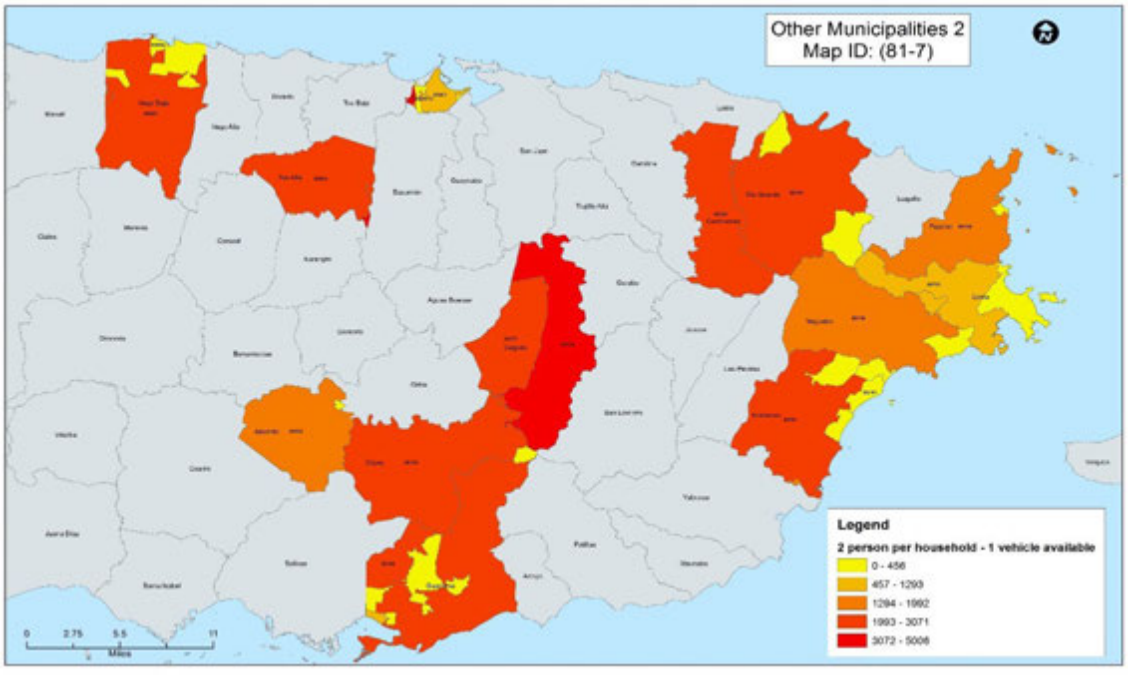
Source: US Census Bureau, 2015 and SDG

Figure D.187: Other Municipalities 2, 2 Person per Household – No Vehicle Available



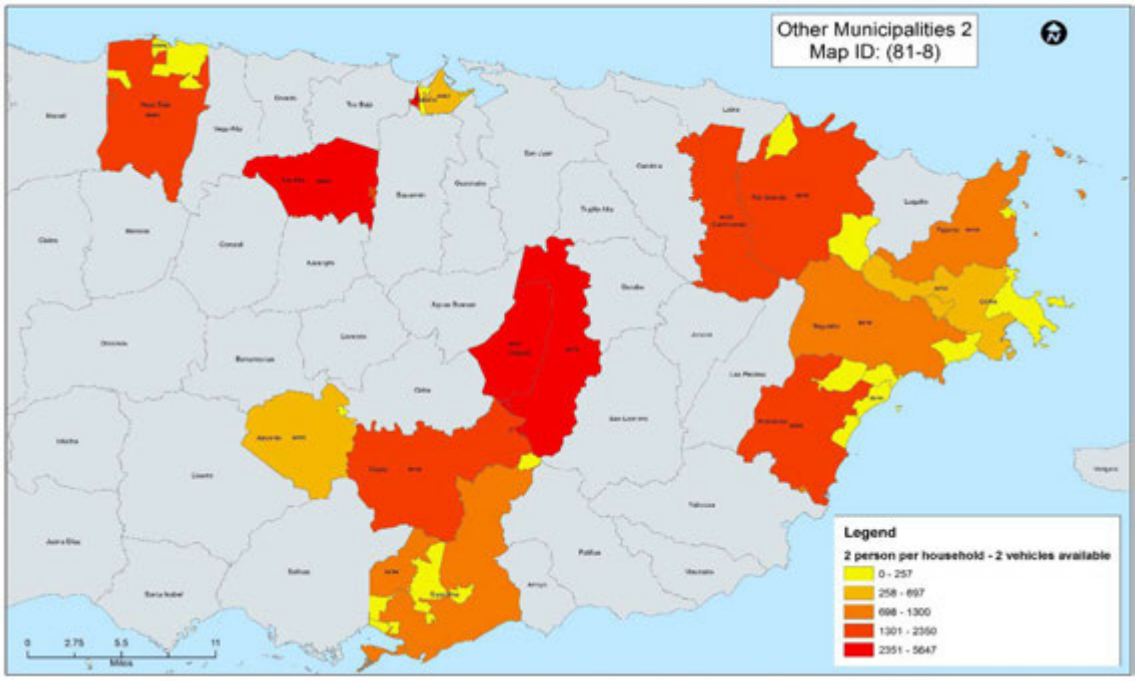
Source: US Census Bureau, 2015 and SDG

Figure D.188: Other Municipalities 2, 2 Person per Household – 1 Vehicle Available



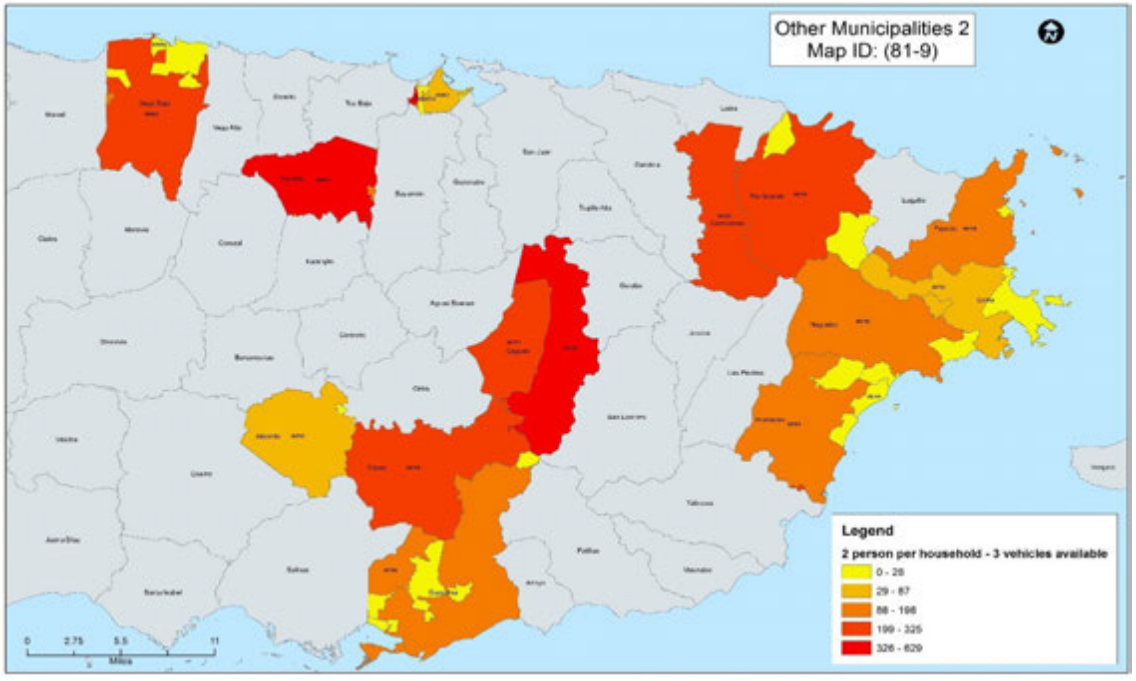
Source: US Census Bureau, 2015 and SDG

Figure D.189: Other Municipalities 2, 2 Person per Household – 2 Vehicles Available



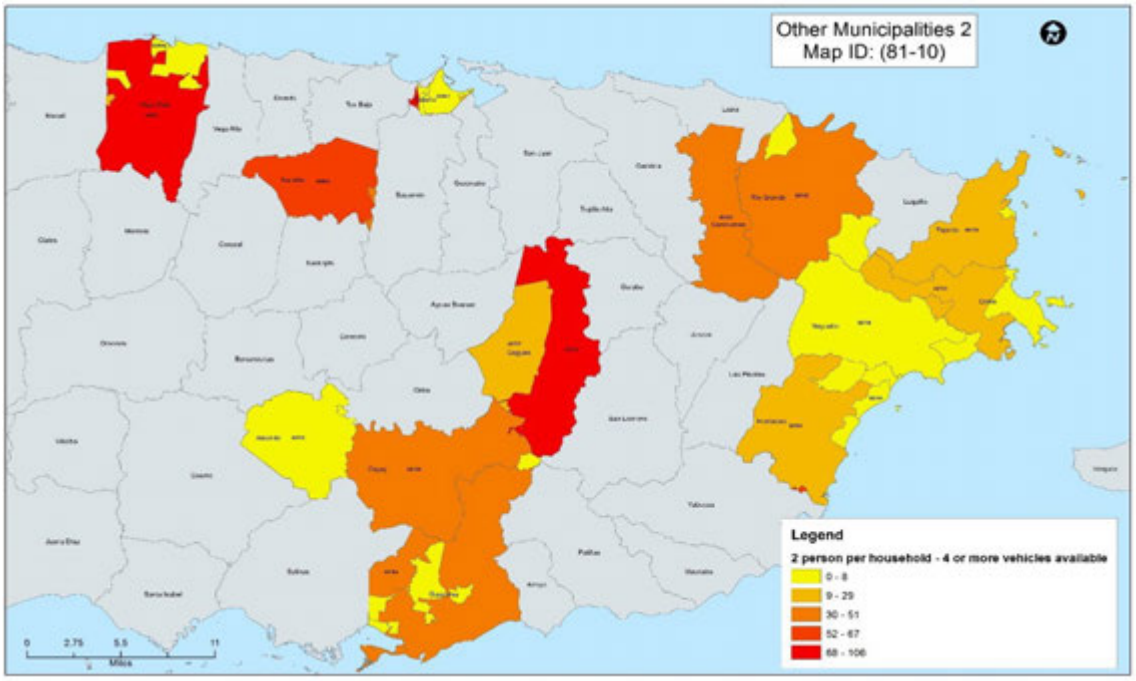
Source: US Census Bureau, 2015 and SDG

Figure D.190: Other Municipalities 2, 2 Person per Household – 3 Vehicles Available



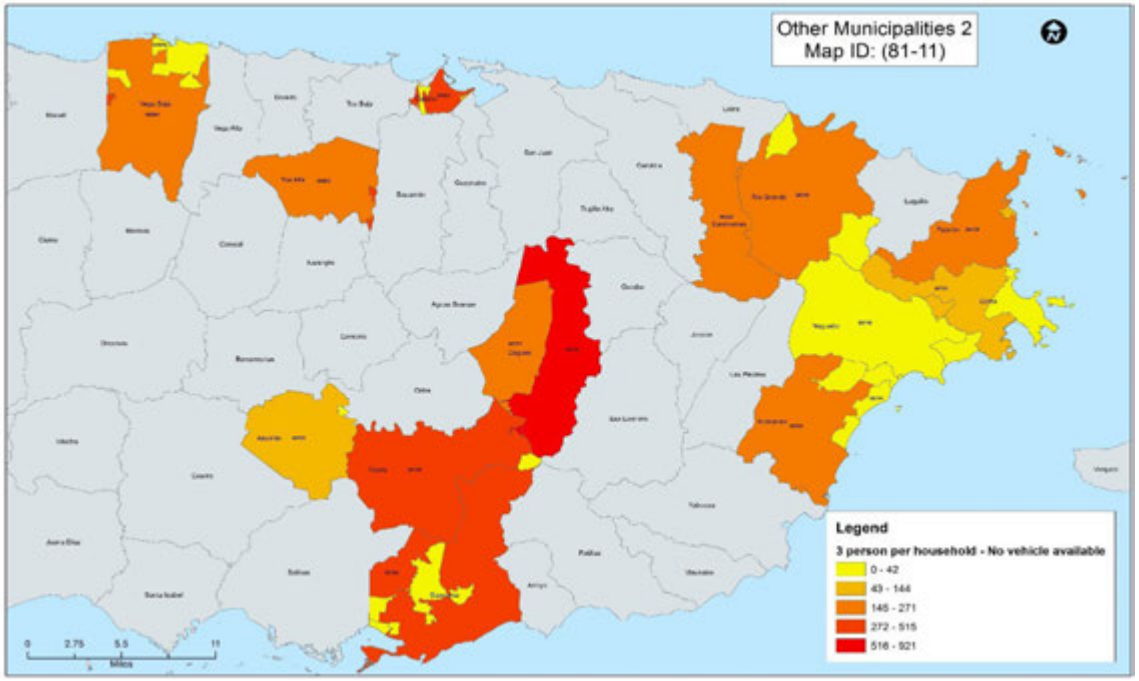
Source: US Census Bureau, 2015 and SDG

Figure D.191: Other Municipalities 2, 2 Person per Household – 4 or more Vehicles Available



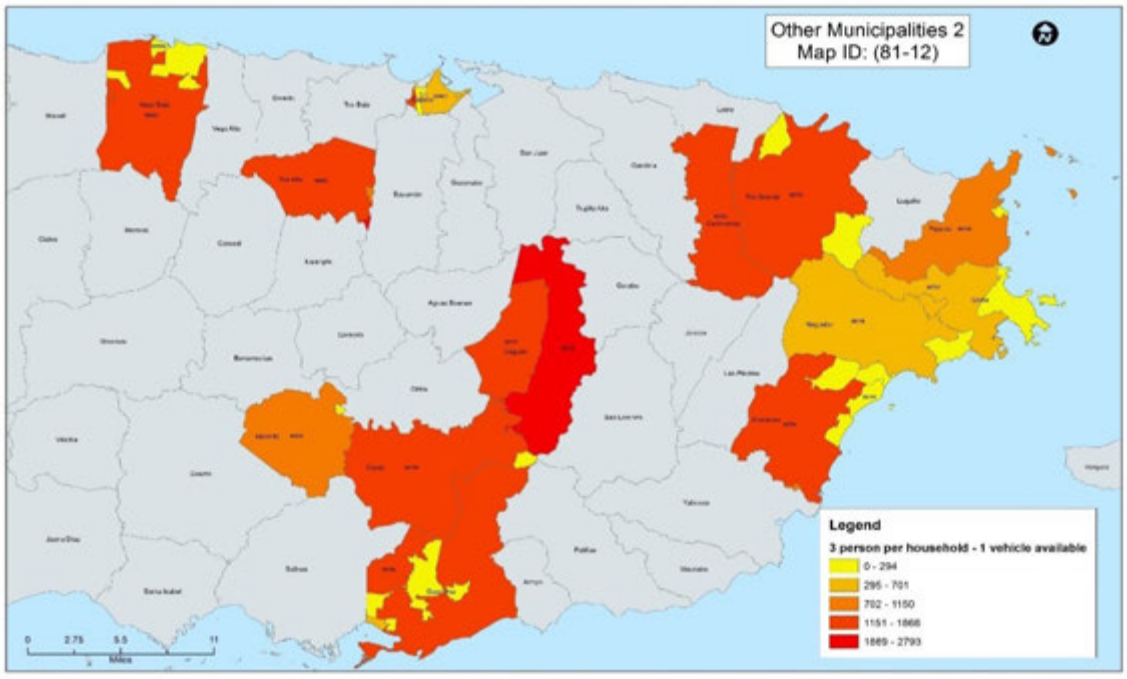
Source: US Census Bureau, 2015 and SDG

Figure D.192: Other Municipalities 2, 3 Person per Household – No Vehicle Available



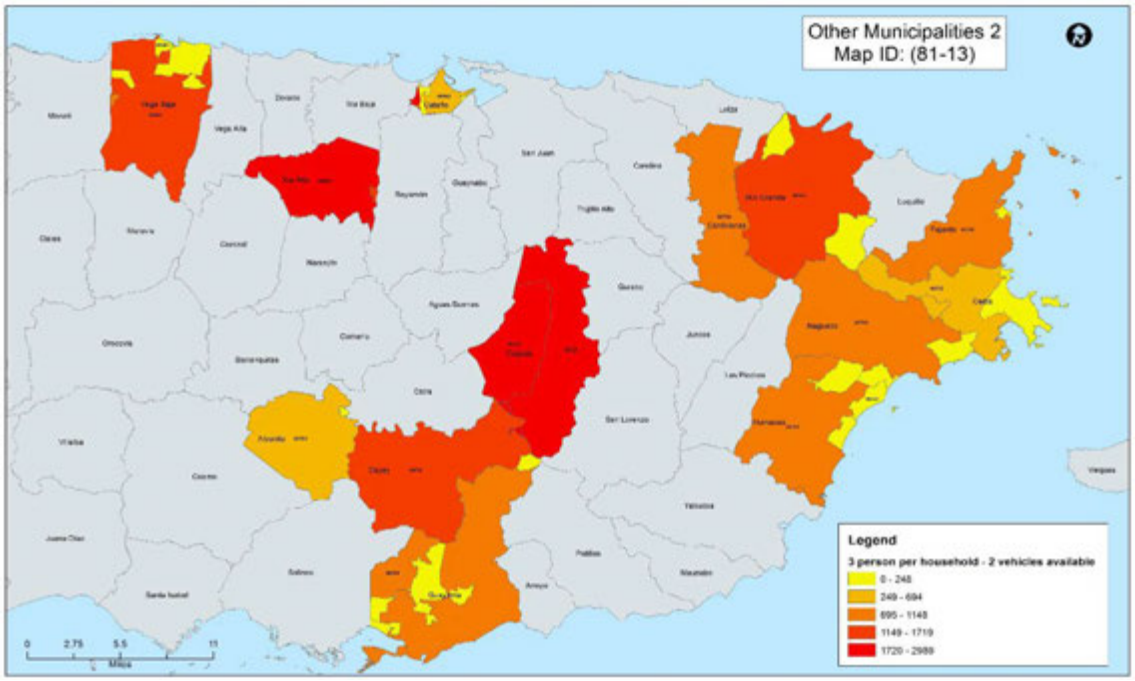
Source: US Census Bureau, 2015 and SDG

Figure D.193: Other Municipalities 2, 3 Person per Household – 1 Vehicle Available



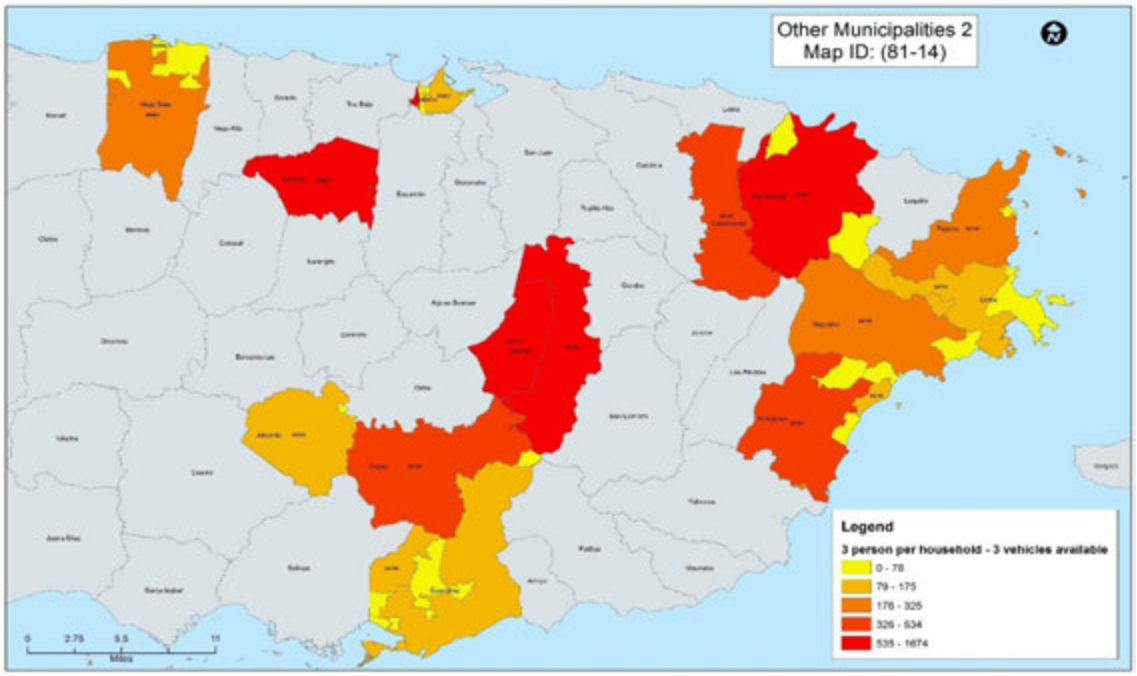
Source: US Census Bureau, 2015 and SDG

Figure D.194: Other Municipalities 2, 3 Person per Household – 2 Vehicles Available



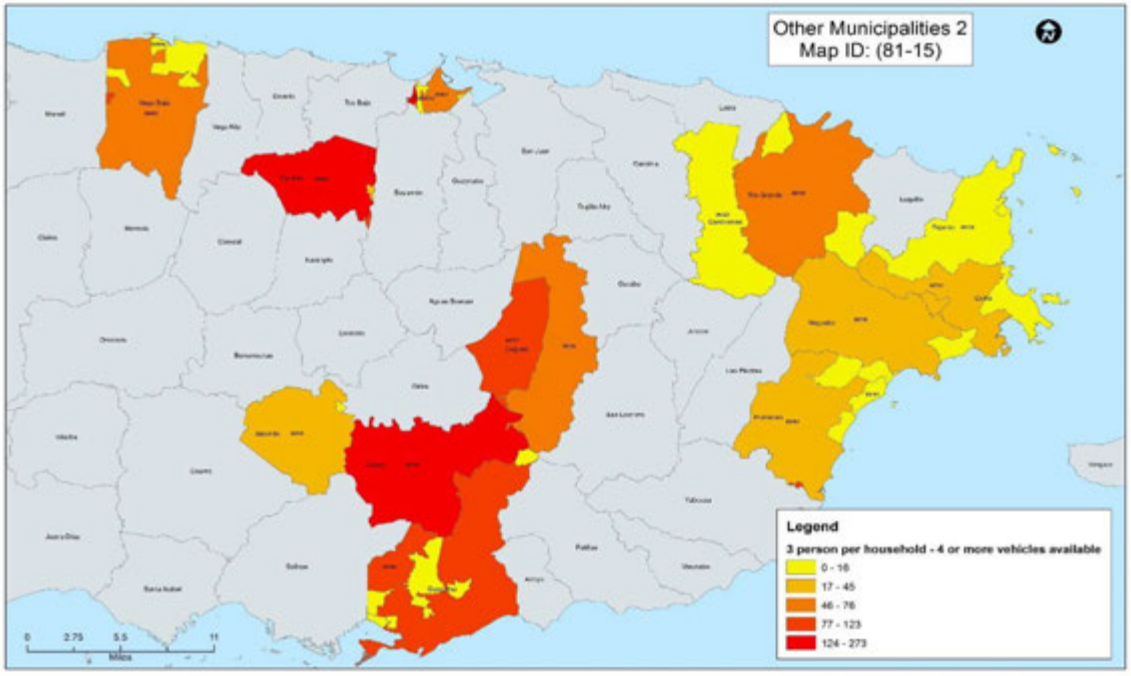
Source: US Census Bureau, 2015 and SDG

Figure D.195: Other Municipalities 2, 3 Person per Household – 3 Vehicles Available



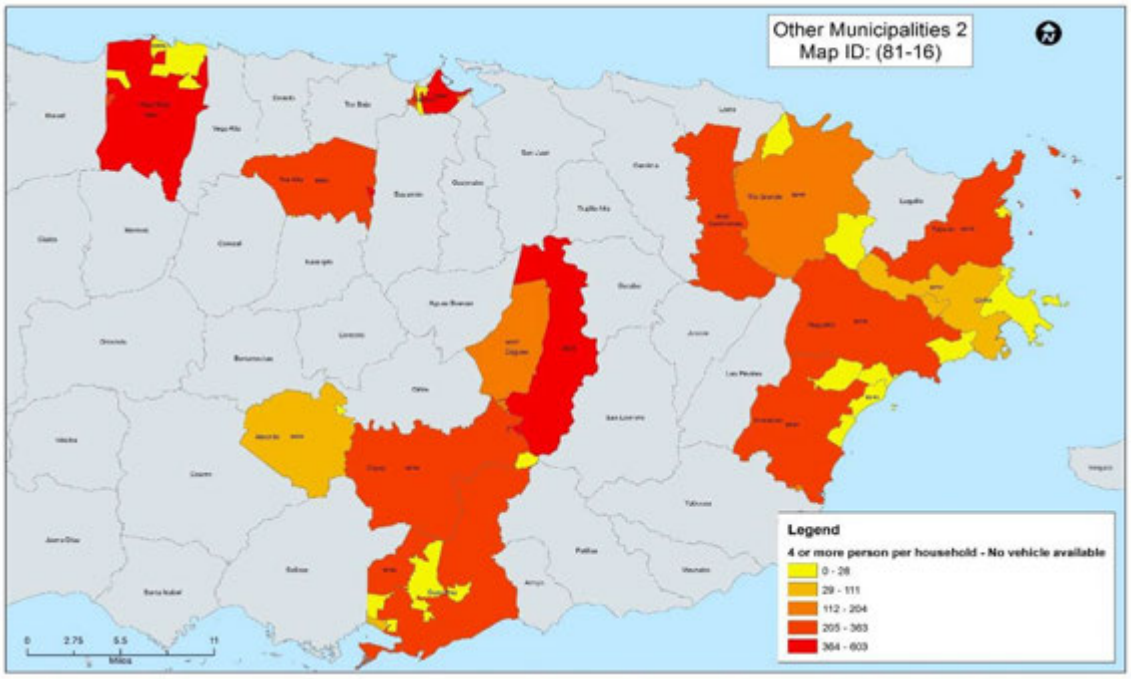
Source: US Census Bureau, 2015 and SDG

Figure D.196: Other Municipalities 2, 3 Person per Household – 4 or more Vehicles Available



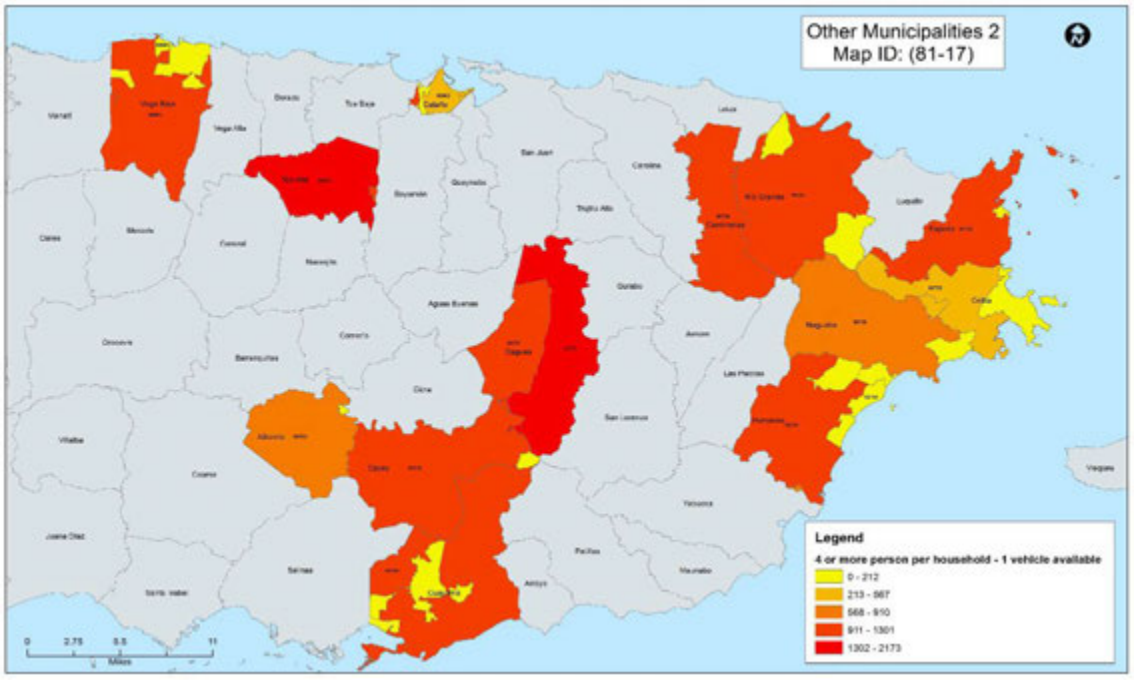
Source: US Census Bureau, 2015 and SDG

Figure D.197: Other Municipalities 2, 4 or more Person per Household – No Vehicle Available



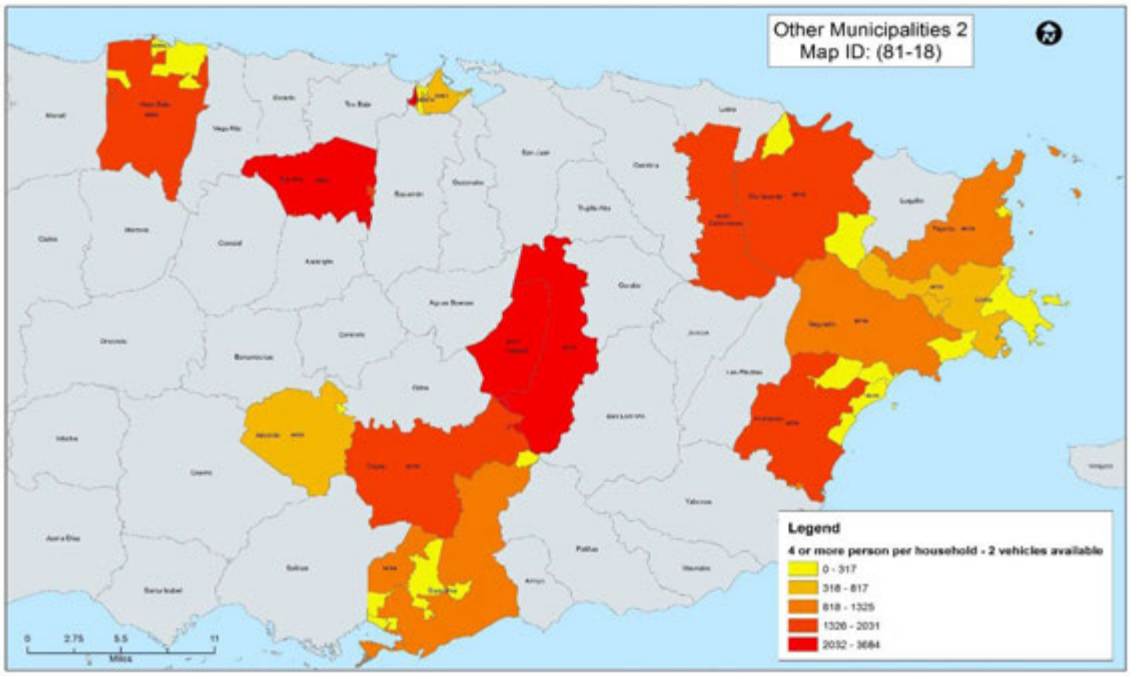
Source: US Census Bureau, 2015 and SDG

Figure D.198: Other Municipalities 2, 4 or more Person per Household – 1 Vehicle Available



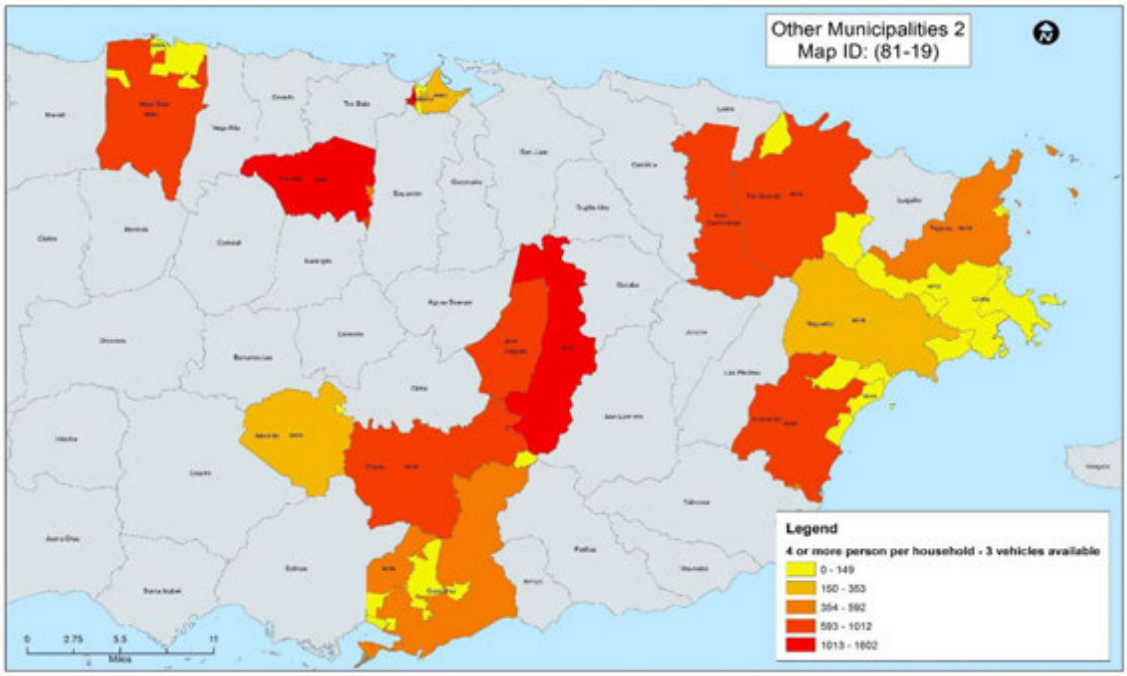
Source: US Census Bureau, 2015 and SDG

Figure D.199: Other Municipalities 2, 4 or more Person per Household – 2 Vehicles Available



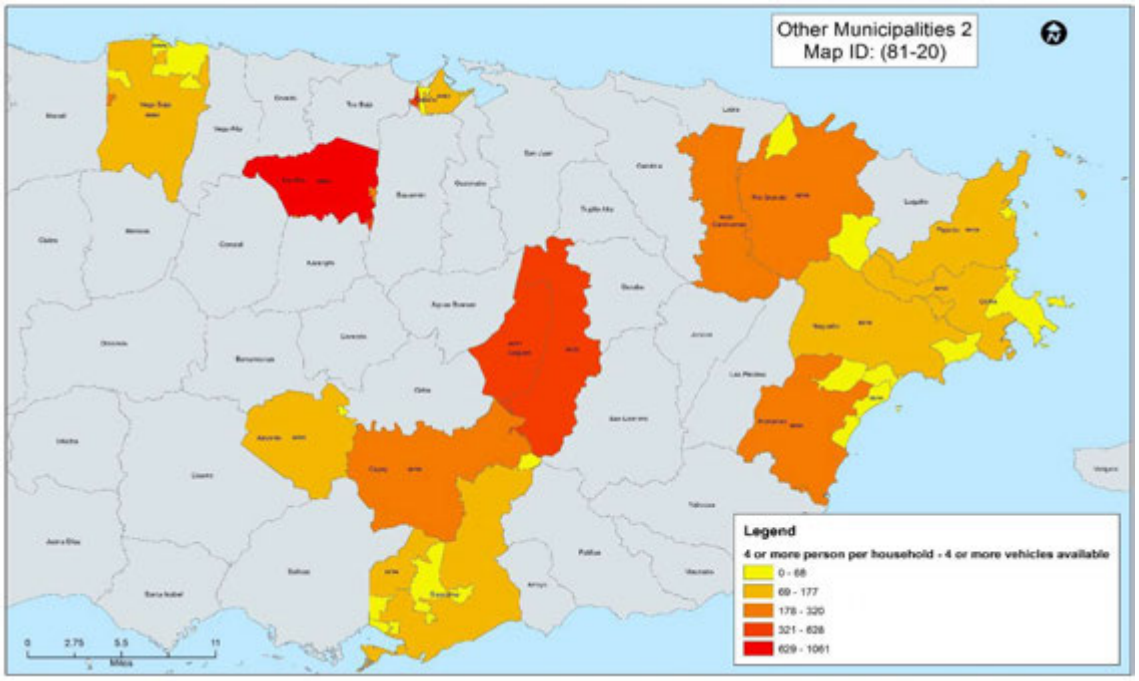
Source: US Census Bureau, 2015 and SDG

Figure D.200: Other Municipalities 2, 4 or more Person per Household – 3 Vehicles Available



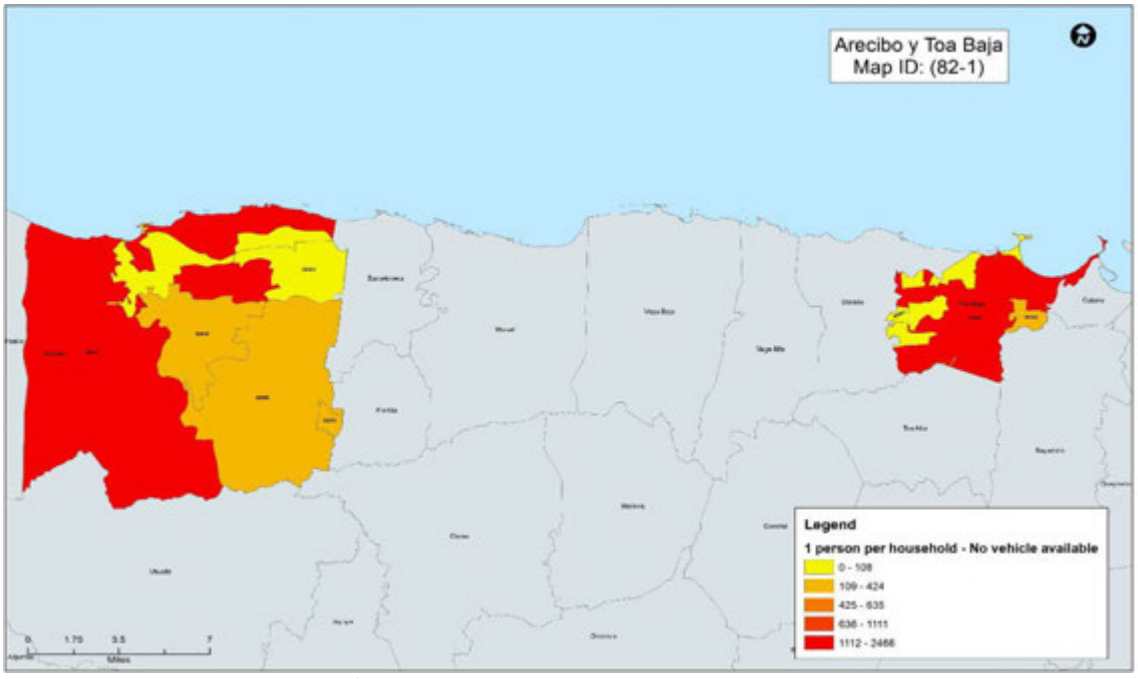
Source: US Census Bureau, 2015 and SDG

Figure D.201: Other Municipalities 2, 4 or more Person per Household – 4 or more Vehicles Available



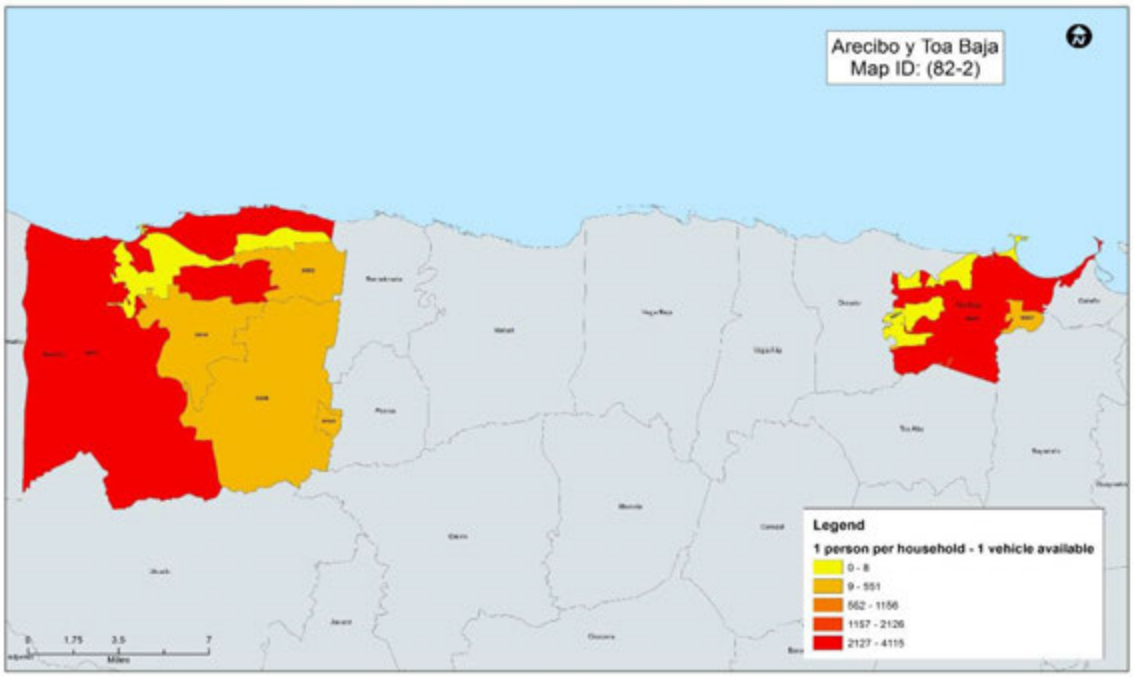
Source: US Census Bureau, 2015 and SDG

Figure D.202: Arecibo y Toa Baja, 1 Person per Household – No Vehicle Available



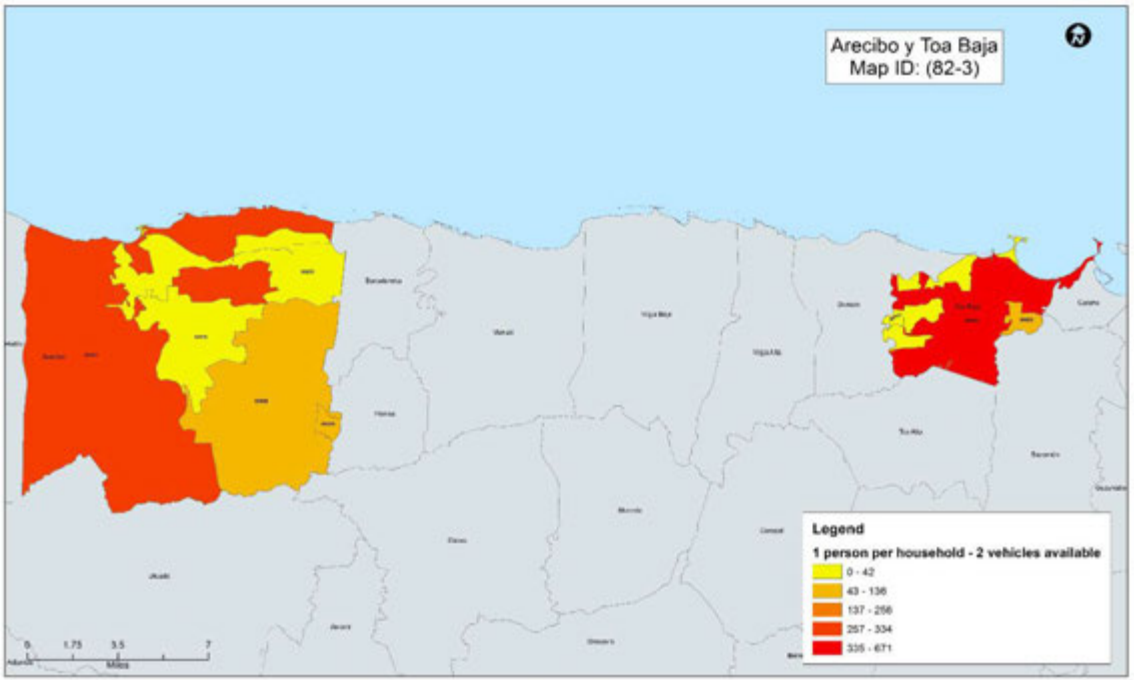
Source: US Census Bureau, 2015 and SDG

Figure D.203: Arecibo y Toa Baja, 1 Person per Household – 1 Vehicle Available



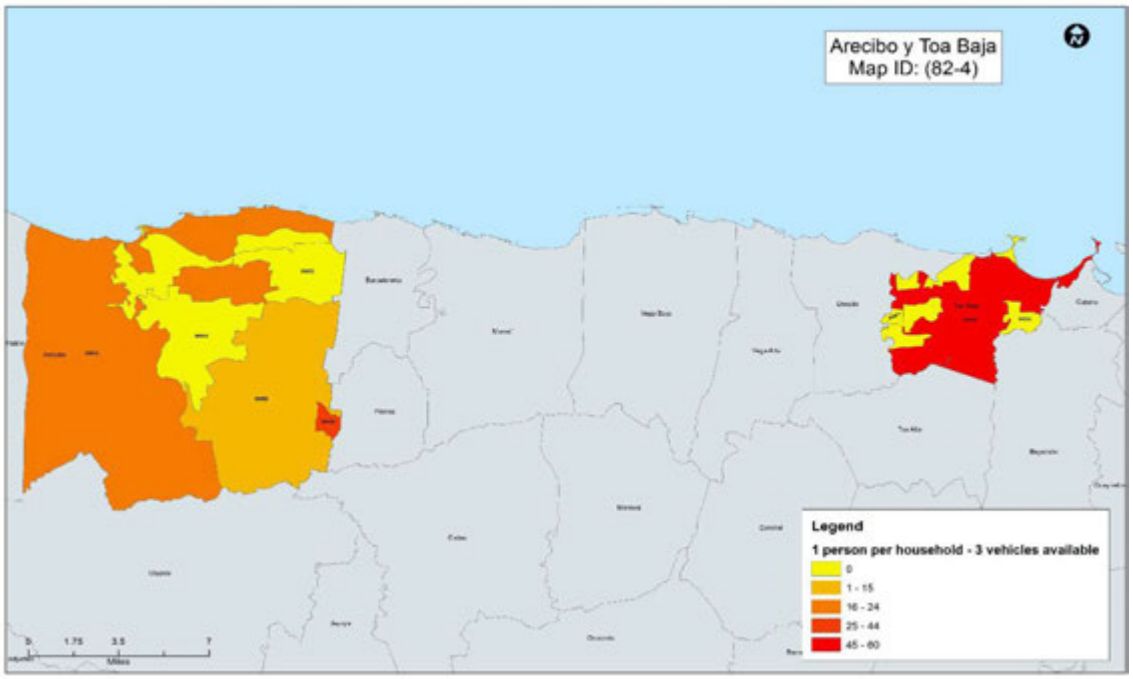
Source: US Census Bureau, 2015 and SDG

Figure D.204: Arecibo y Toa Baja, 1 Person per Household – 2 Vehicles Available



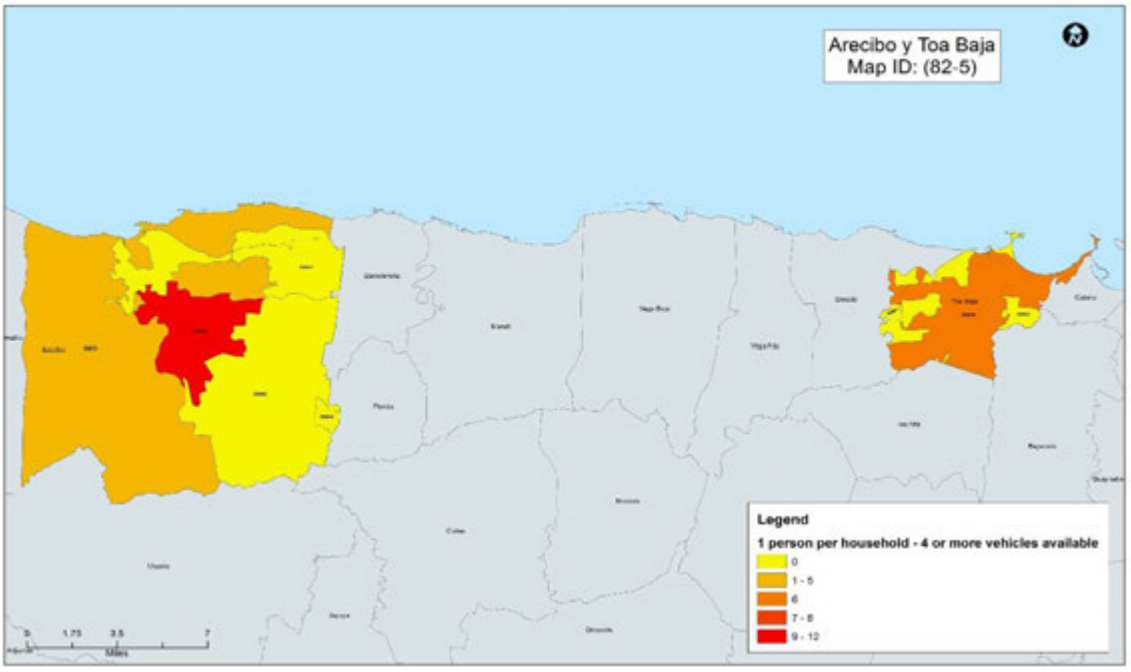
Source: US Census Bureau, 2015 and SDG

Figure D.205: Arecibo y Toa Baja, 1 Person per Household – 3 Vehicles Available



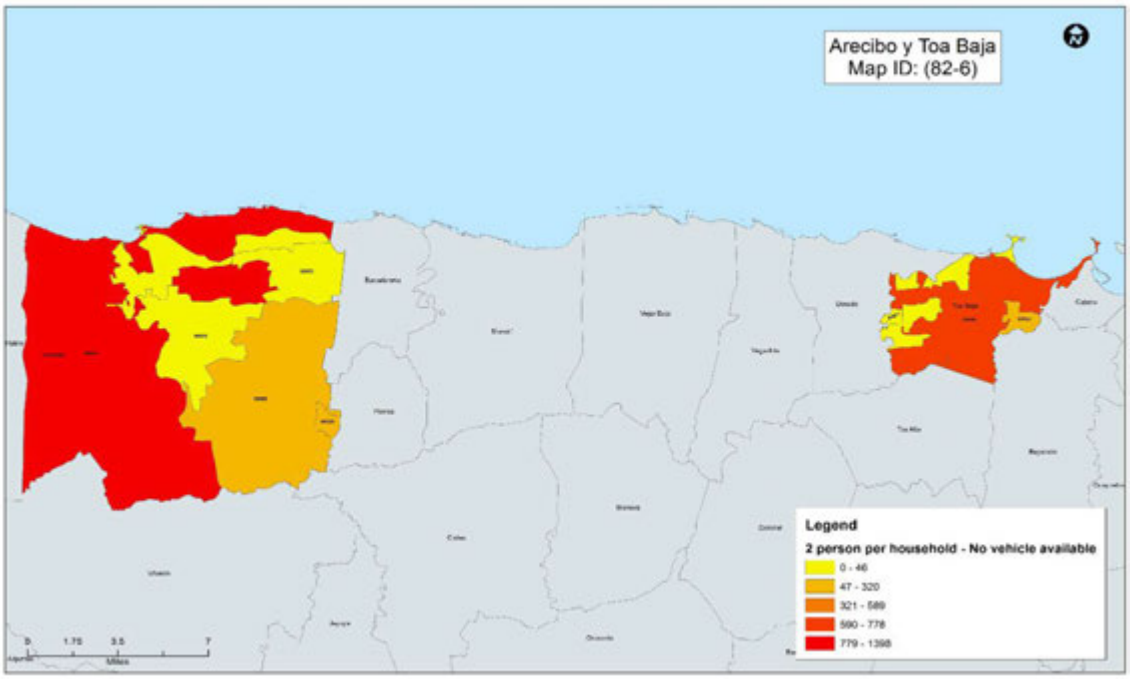
Source: US Census Bureau, 2015 and SDG

Figure D.206: Arecibo y Toa Baja, 1 Person per Household – 4 or more Vehicles Available



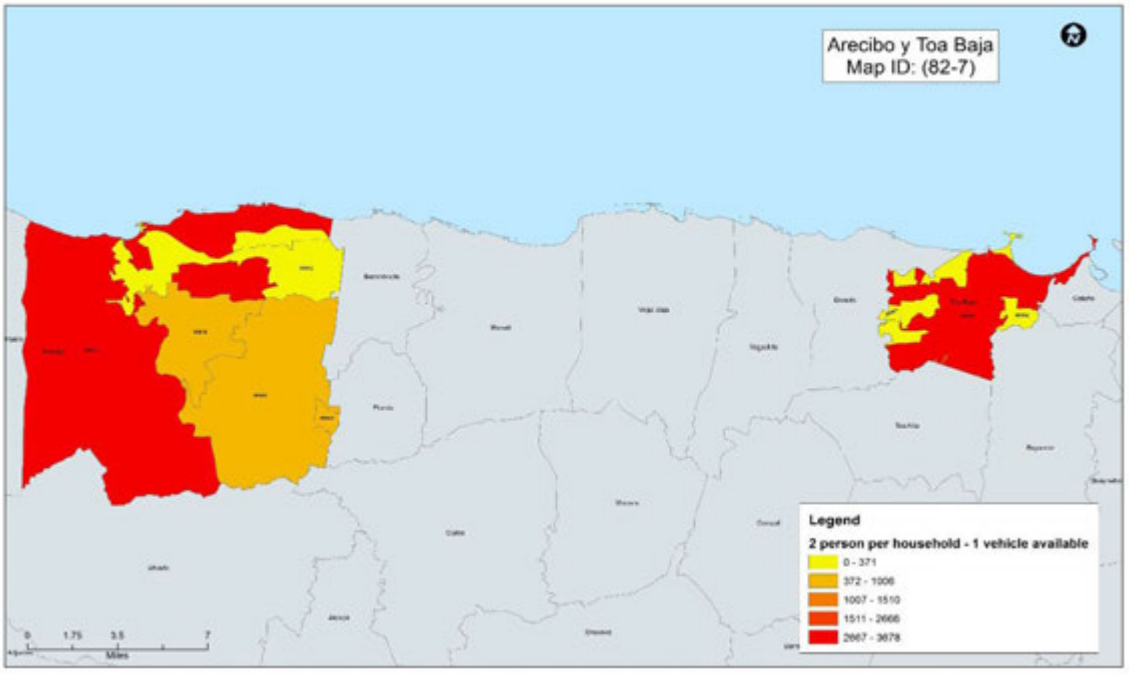
Source: US Census Bureau, 2015 and SDG

Figure D.207: Arecibo y Toa Baja, 2 Person per Household – No Vehicle Available



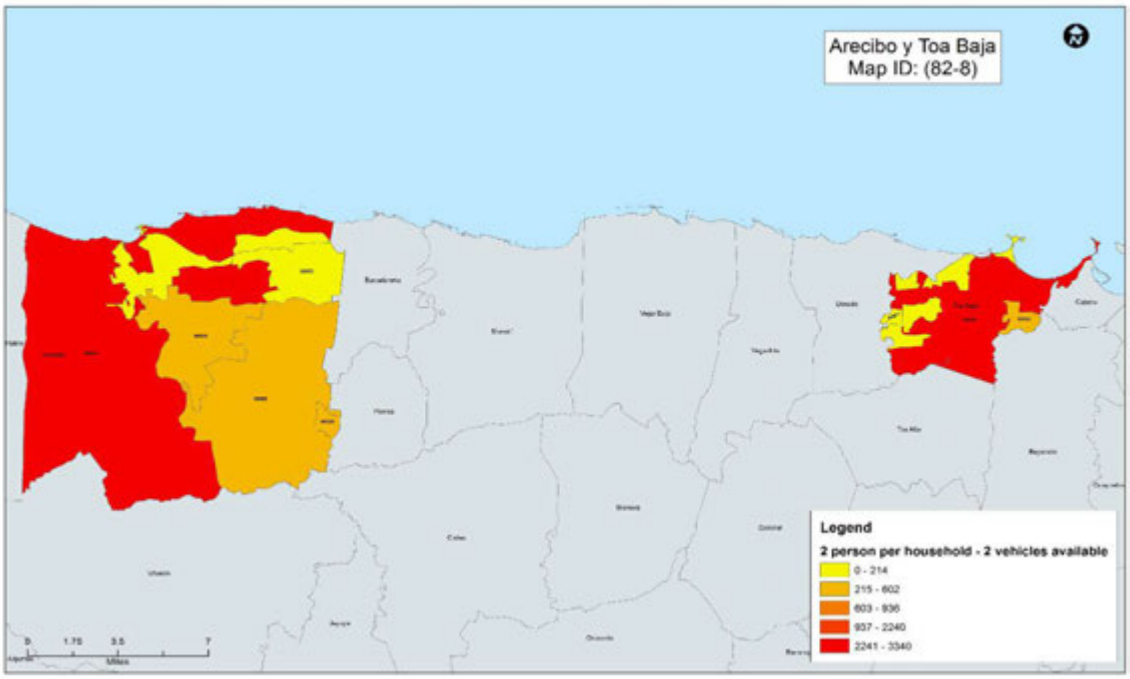
Source: US Census Bureau, 2015 and SDG

Figure D.208: Arecibo y Toa Baja, 2 Person per Household – 1 Vehicle Available



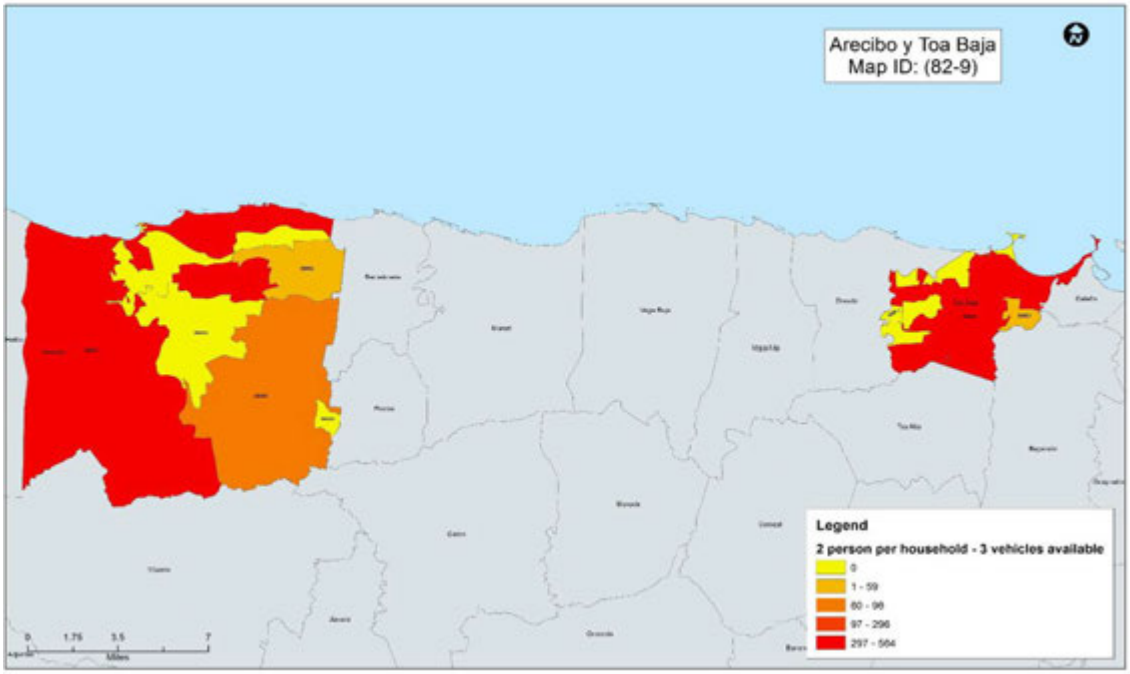
Source: US Census Bureau, 2015 and SDG

Figure D.209: Arecibo y Toa Baja, 2 Person per Household – 2 Vehicles Available



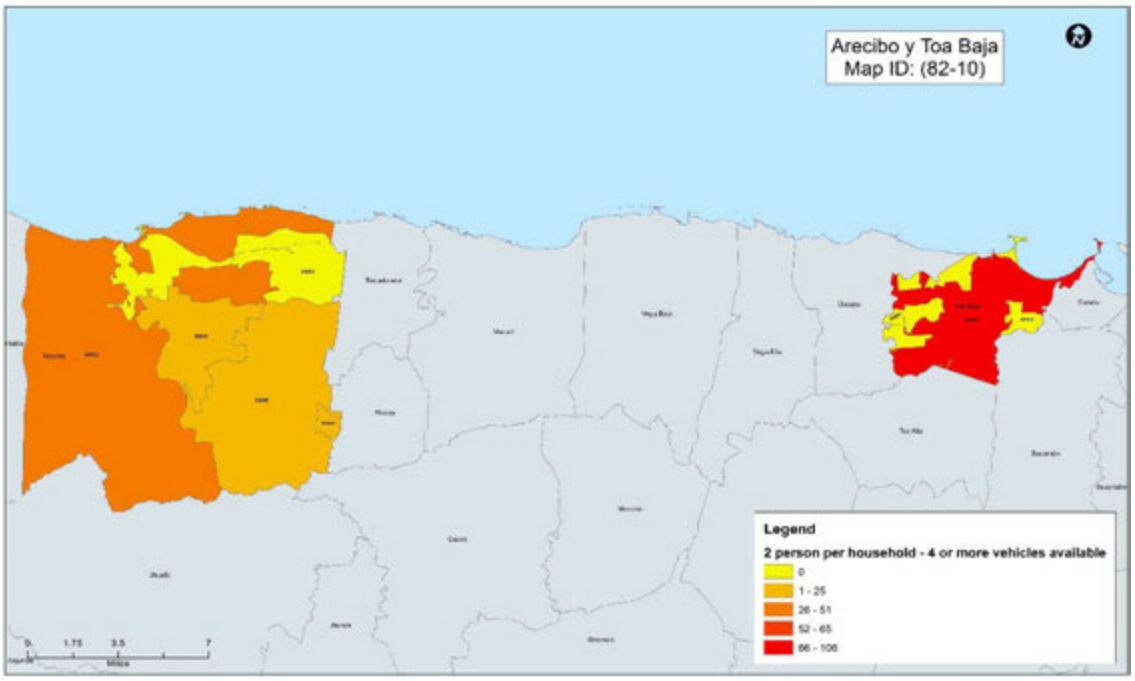
Source: US Census Bureau, 2015 and SDG

Figure D.210: Arecibo y Toa Baja, 2 Person per Household – 3 Vehicles Available



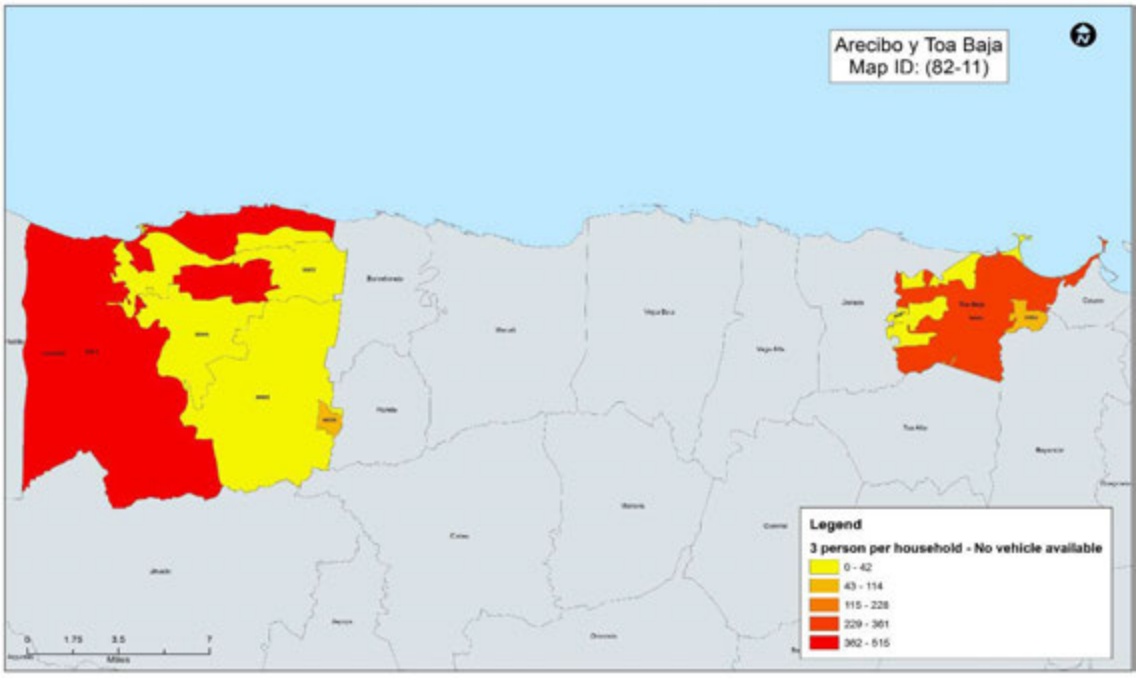
Source: US Census Bureau, 2015 and SDG

Figure D.211: Arecibo y Toa Baja, 2 Person per Household – 4 or more Vehicles Available



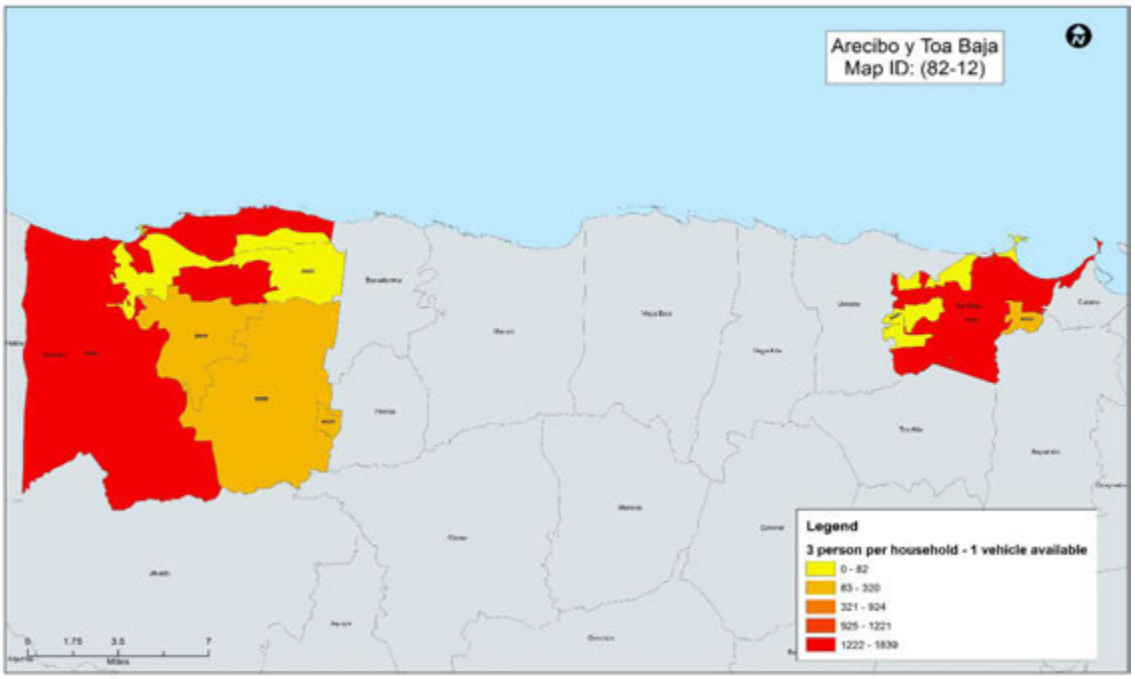
Source: US Census Bureau, 2015 and SDG

Figure D.212: Arecibo y Toa Baja, 3 Person per Household – No Vehicle Available



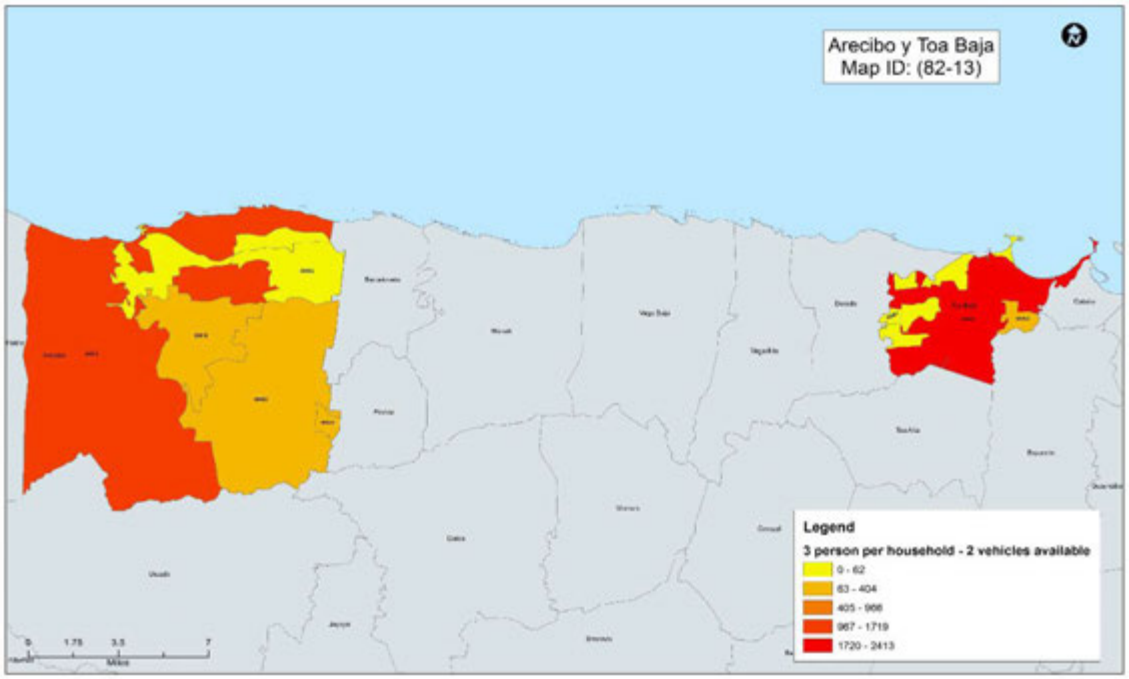
Source: US Census Bureau, 2015 and SDG

Figure D.213: Arecibo y Toa Baja, 3 Person per Household – 1 Vehicle Available



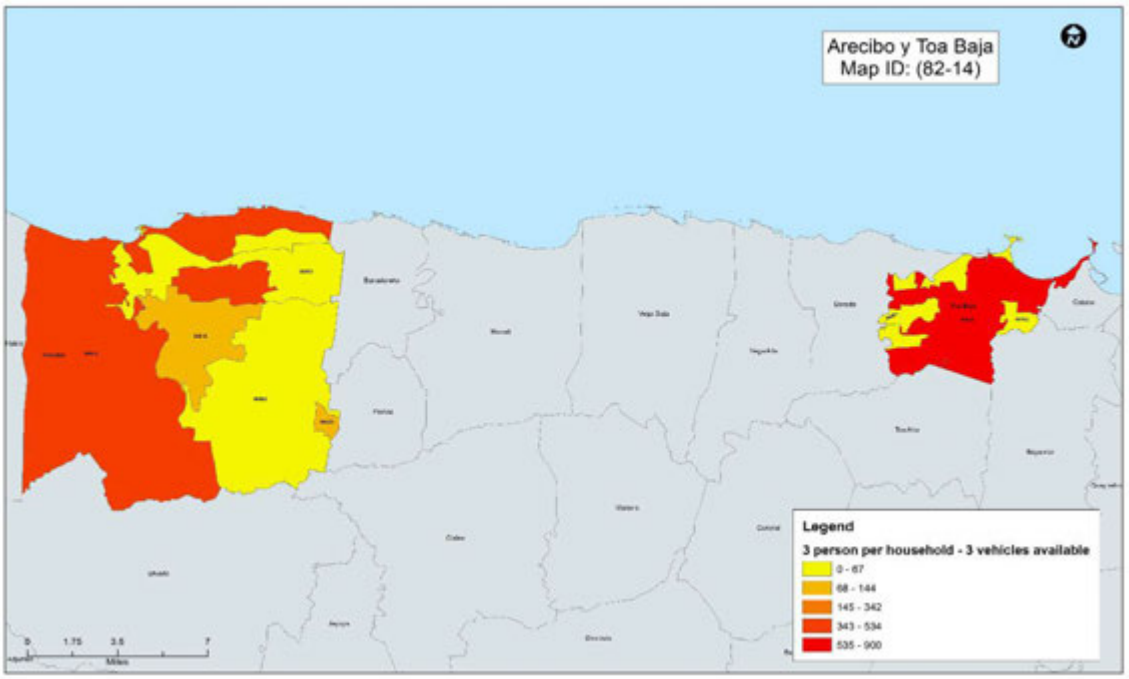
Source: US Census Bureau, 2015 and SDG

Figure D.214: Arecibo y Toa Baja, 3 Person per Household – 2 Vehicles Available



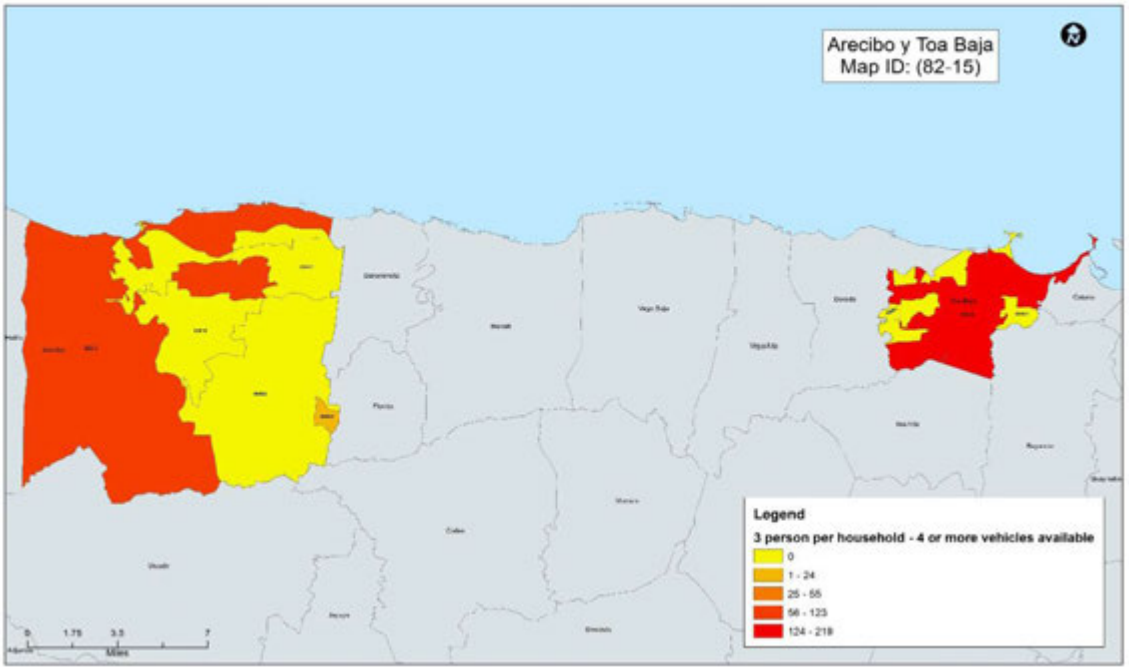
Source: US Census Bureau, 2015 and SDG

Figure D.215: Arecibo y Toa Baja, 3 Person per Household – 3 Vehicles Available



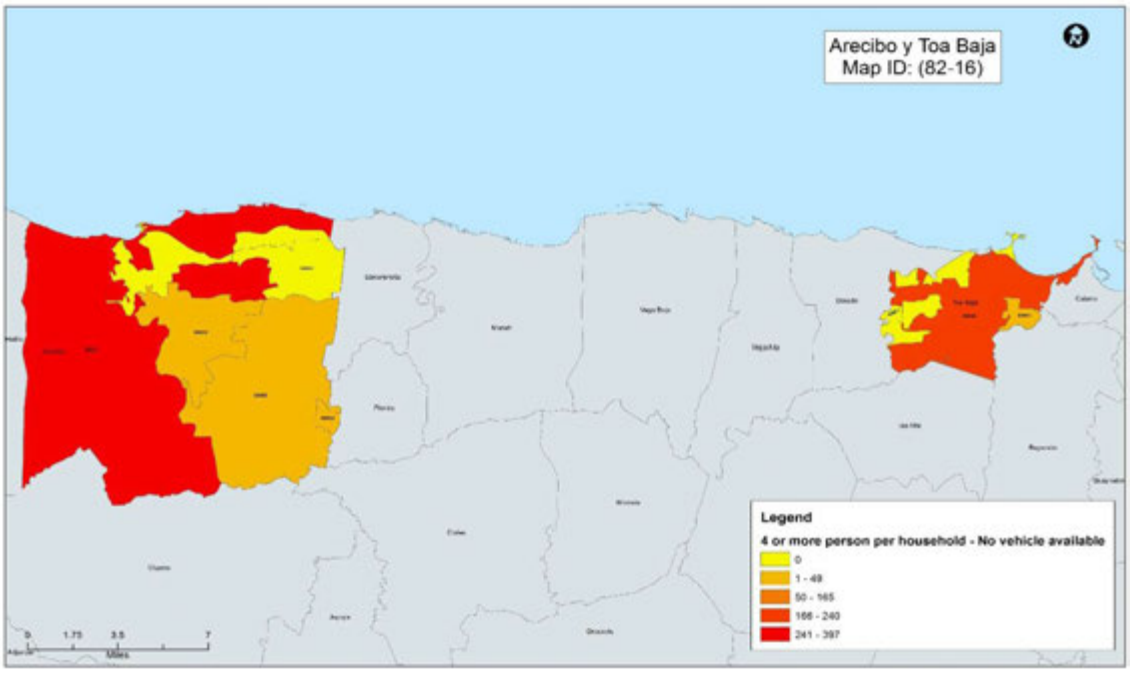
Source: US Census Bureau, 2015 and SDG

Figure D.216: Arecibo y Toa Baja, 3 Person per Household – 4 or more Vehicles Available



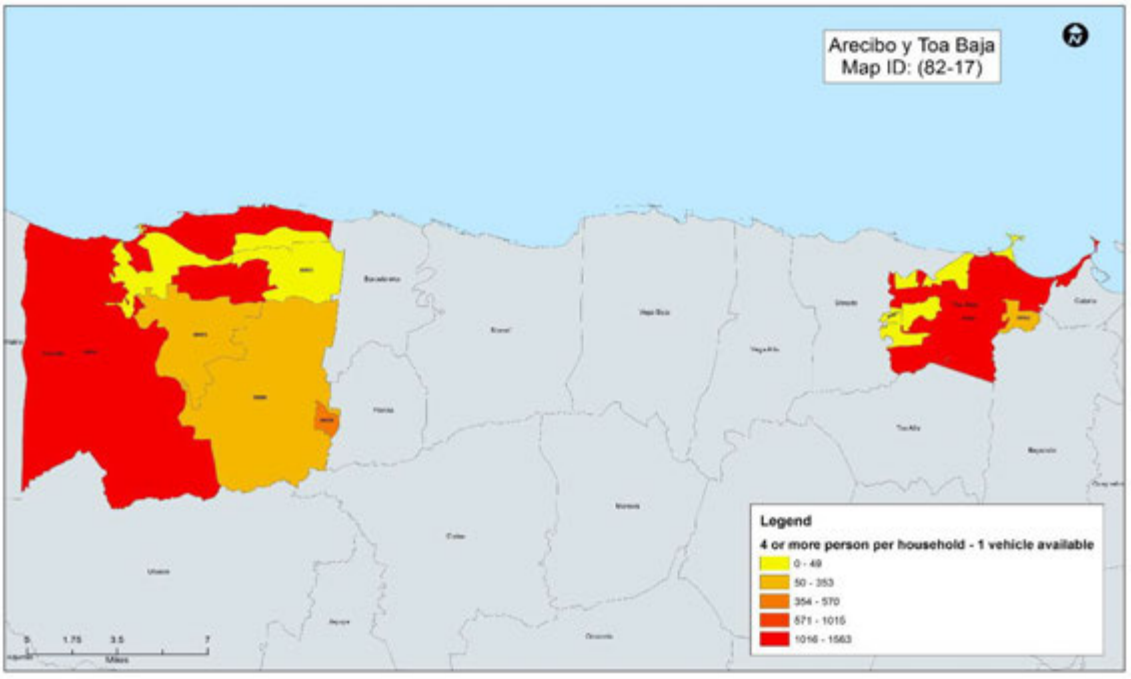
Source: US Census Bureau, 2015 and SDG

Figure D.217: Arecibo y Toa Baja, 4 or more Person per Household – No Vehicle Available



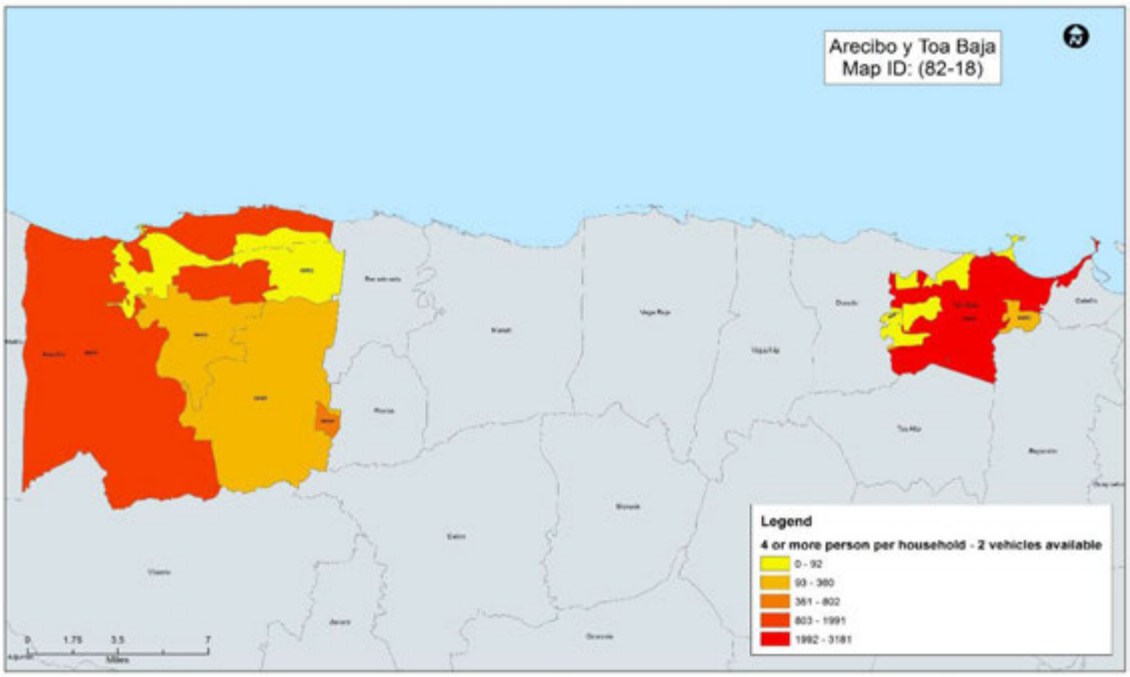
Source: US Census Bureau, 2015 and SDG

Figure D.218: Arecibo y Toa Baja, 4 or more Person per Household – 1 Vehicle Available



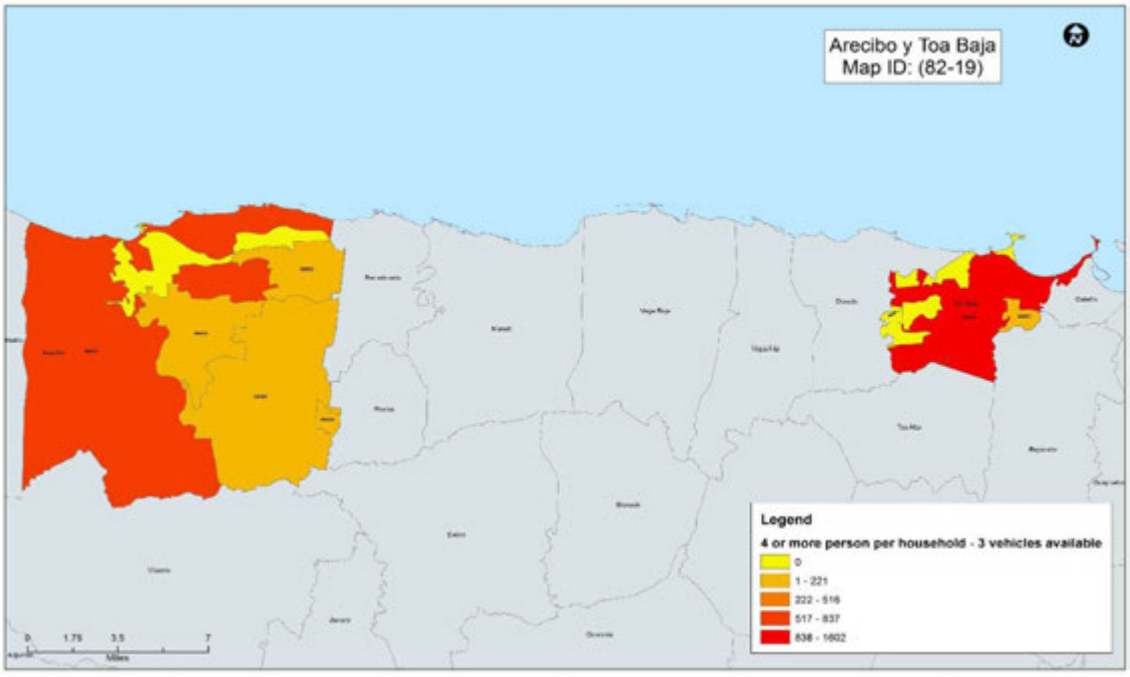
Source: US Census Bureau, 2015 and SDG

Figure D.219: Arecibo y Toa Baja, 4 or more Person per Household – 2 Vehicles Available



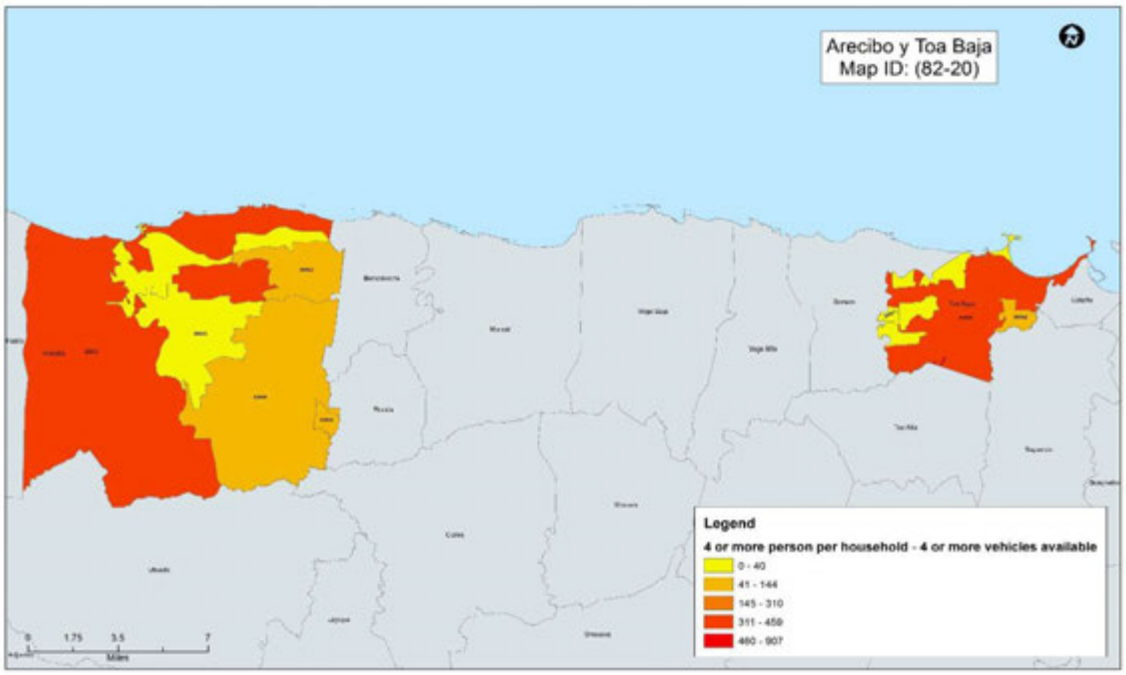
Source: US Census Bureau, 2015 and SDG

Figure D.220: Arecibo y Toa Baja, 4 or more Person per Household – 3 Vehicles Available



Source: US Census Bureau, 2015 and SDG

Figure D.221: Arecibo y Toa Baja, 4 or more Person per Household – 4 or more Vehicles Available



Source: US Census Bureau, 2015 and SDG

E APPENDIX E RECRUITMENT INTERVIEW

ENGLISH VERSION

Introduction

Hello, my name is (First and last name) from Infocus calling on behalf of the Puerto Rico Highways and Transportation Authority.

Are you the person in charge of the household?

IF NO, says: Could you please put on the phone the person in charge of the household?

IF YES, says: We are conducting a household travel survey for the PRHTA to understand the travel conditions of Puerto Rico and to plan projects which will improve the quality of transportation for citizens of the island, commissioned by PRHTA and your home was chosen randomly to respond to the survey. Your participation is voluntary and your opinion is very important to us and the planning process. As thanks, your household will be eligible to participate on a raffle for: first, second, and third price at the end of the PRHTS Execution.

Would you let me ask you some questions? The answers provided are confidential and the data will be used for statistical purposes only;

IF REFUSED, says: I understand your reluctance to participate in this study, but the PRHTA provide another option, to complete the survey online to be finished at your convenience up to May 1st, 2018.

I could email you a link to complete the online survey. Would you please provide an email address where I can send the information?

IF YES: Write down the email and says, thank you very much for your time.

Terminate Recruitment

IF NO: Give the interviewed the project website URL and says, you can verify the legitimacy of this study by visiting our project website. Thank you very much for your time.

Introduction-Screening Questions

First of all, I need to confirm that your household meets the requirements of the study:

1. How many vehicles are there in your household? (*Interviewer: review the inventory of recruited households that meet strata requirements*)

2. How many people live in your household? (*Interviewer: review the inventory of recruited households that meet strata requirements*)

3. Have you been living in Puerto Rico for 6 months or more? (*Interviewer: Less than that period does not qualify for the study.*)

Terminate Recruitment

IF HOUSEHOLD IS IN-SCOPE, proceed to make an appointment to call the household.

IF HOUSEHOLD IS NOT IN-SCOPE says, unfortunately your household does not fit the requirements for this study. Thank you very much for your time.

SPANISH VERSION

Introducción.

Hola, mi nombre es (Nombre y Apellido) de Infocus, le estamos llamando de parte de la Autoridad de Carreteras y Transportación (ACT).

¿Es usted la persona a cargo del hogar?

SI NO, diga: ¿Podría por favor poner al teléfono a la persona a cargo del hogar?

SI Sí, diga: Estamos llevando a cabo una encuesta de movilidad para la ACT para entender las condiciones de viaje de Puerto Rico y para planificar proyectos que mejorarán la calidad del transporte para los ciudadanos de la isla, encargado por la ACT y su hogar fue elegido al azar para responder a la encuesta. Su participación es voluntaria y su opinión es muy importante para nosotros y para el proceso de planificación. Como agradecimiento, su hogar será elegible para participar en un sorteo por premios: primer, segundo y tercer lugar al final de la ejecución de las encuestas de movilidad.

¿Me dejaría hacerle algunas preguntas a la persona a cargo de la casa? Las respuestas proporcionadas son confidenciales y los datos se usarán solo con fines estadísticos;

SI SE REHUSA, diga: Entiendo su renuencia a participar en este estudio, pero la ACT brinda otra opción, completar la encuesta en línea para que se finalice a su conveniencia hasta el 1 de mayo de 2018.

Yo podría enviarle un enlace por correo electrónico para completar la encuesta en línea. ¿Podría proporcionar una dirección de correo electrónico donde pueda enviar la información?

SI Sí: Escriba el correo electrónico y diga, muchas gracias por su tiempo.

Terminar Reclutamiento

SI NO: Entregue al entrevistado la URL del sitio web del proyecto y diga, usted puede verificar la legitimidad de este estudio visitando el sitio web de nuestro proyecto. Muchas gracias por tu tiempo.

Introducción- Preguntas de Detección

Antes que nada, necesito confirmar que su hogar cumple con los requisitos del estudio:

1. ¿Cuantos vehículos hay en su hogar? (*Entrevistador: revise el inventario de hogares reclutados que cumplen con los requisitos del estrato*)

2. ¿Cuántas personas hay en su hogar? (*Entrevistador: revise el inventario de hogares reclutados que cumplen con los requisitos del estrato*)

3. ¿Usted tiene 6 meses o más de residiendo en Puerto Rico?

Terminar Reclutamiento

SI EL HOGAR ESTÁ DENTRO DEL ALCANCE, programe una cita para llamar el hogar.

SI EL HOGAR NO ESTÁ DENTRO DEL ALCANCE, lamentablemente su hogar no cumple los requisitos para este estudio. Muchas gracias por tu tiempo.

CONTROL INFORMATION

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