

SUMMARY: TRAFFIC STUDY PORT OF THE AMERICAS



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Update: November 2003

This document summarizes an updated Traffic Study for the proposed Port of the Americas (PTA) project. The study was completed by CMA Architects & Engineers on November 2003, and includes the most recent changes to the PTA design, most notable the elimination of the Guayanilla-Peñuelas terminal and the resulting geometric modifications of the Ponce component to satisfy the expected demands for container storage (Figure 2). Please contact the Port of the Americas Authority for the full text of this assessment.

INTRODUCTION AND OBJECTIVES

The objective of this Traffic Study is to determine the impacts of the proposed action on the roadways located in the vicinity of the area of influence of the project, identify the need to perform improvements to the existing road infrastructure, and to develop mitigation measures to maintain acceptable levels of service at these roadways. The Traffic Study complies with the requirements of the Department of Transportation and Public Works (DTOP) and the Highway and Transportation Authority. It also follows the procedures established on the manuals of the Institute of Transportation Engineers (ITE) and the Transportation Research Board (TRB).

In order to achieve these objectives the following activities were performed:

- Determination of the traffic flow for the year 2003.
- Capacity analysis of the traffic network without the Project for the year 2003.
- Projections of the vehicular traffic during the Project service years, reflecting the historical tendencies on vehicular traffic increase in the

areas surrounding the Project, and the vehicular traffic increase as a result of the Project.

- Analysis of the traffic network capacity, considering the Project in the future years once the phases are completed.
- Comparison of the different assigned scenarios and discussion of the obtained results for each of the phases of the Project.
- Formulation of improvements to the traffic network for each of the phases of the Project.
- Conclusions and recommendations for each of the phases of the Project.

This study considers techniques and proceedings enacted in the *ITE* and *TRB* manuals, the requirements of the ACT and DTOP, and computer software accepted by the profession to develop this type of analysis.

SITE ACCESS

Road PR-52 constitutes the best access to the Port of the Americas, since it provides direct access to the main road network of Puerto Rico, which connects the proposed development with the most important regions of the island (Figure 2). The main entrance to the Project is proposed at km 106 of PR-52, where the current Ponce Sur Toll Station is located. Once the toll Station is relocated, a new diamond interchange will be built running north to south connecting PR-52 and the Playa de Ponce sector. This new roadway will provide direct access to the PTA, value added areas, and the Playa de Ponce sector.

By analyzing the different elements that compose the best access routes for each phase of the Port of the Americas development, the required upgrades to the existing road infrastructure will be identified.

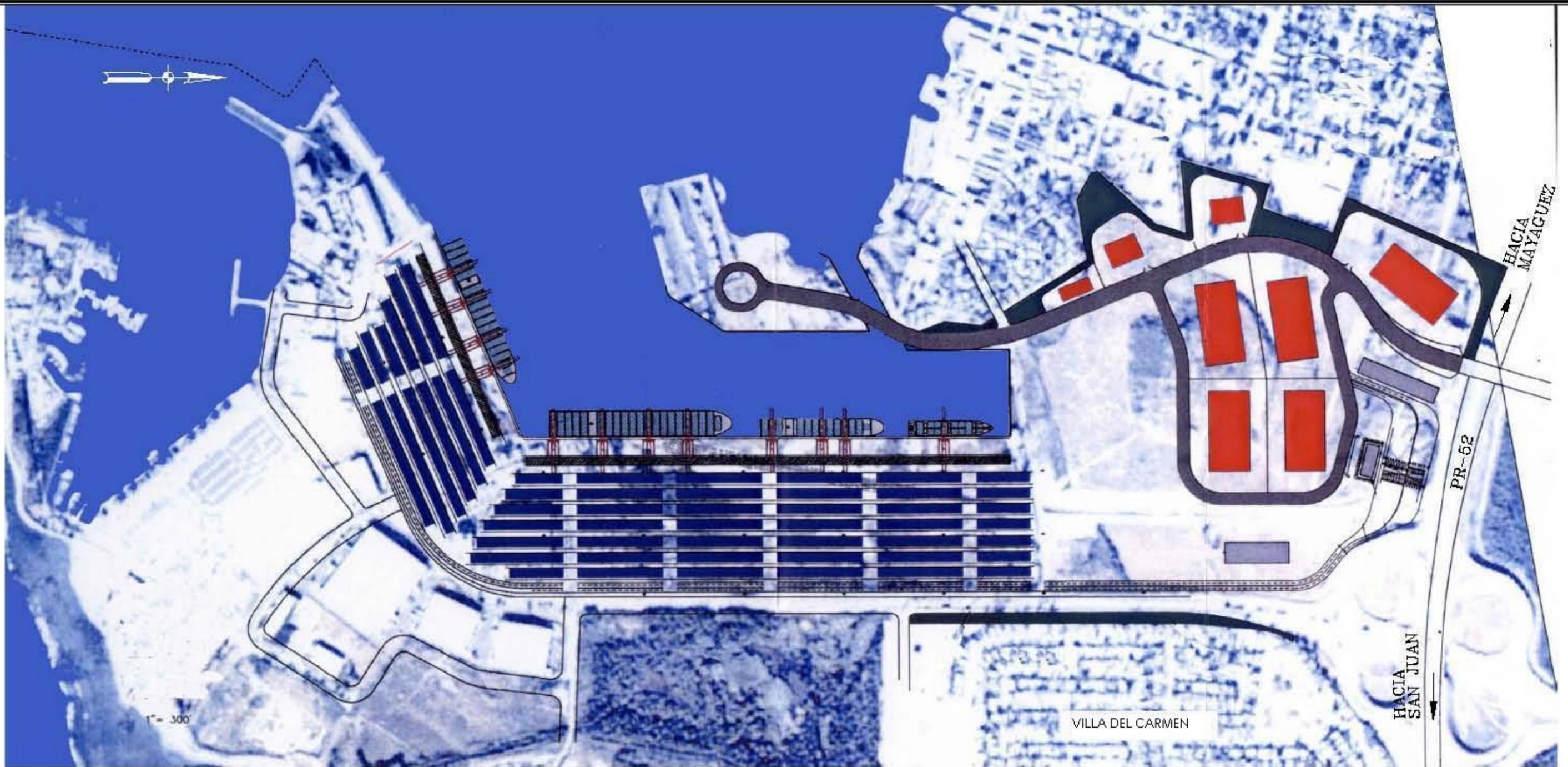


FIGURE BY:
 MOFFAT AND NICHOL ENGINEERS AND IGLESIAS VAZQUEZ AND ASSOCIATES



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PORT OF THE AMERICAS
 ELEMENTS OF THE ROAD NETWORK TO BE ANALYZED

PROJECT
 01039C

DATE:
 NOV. 2003

SCALE:
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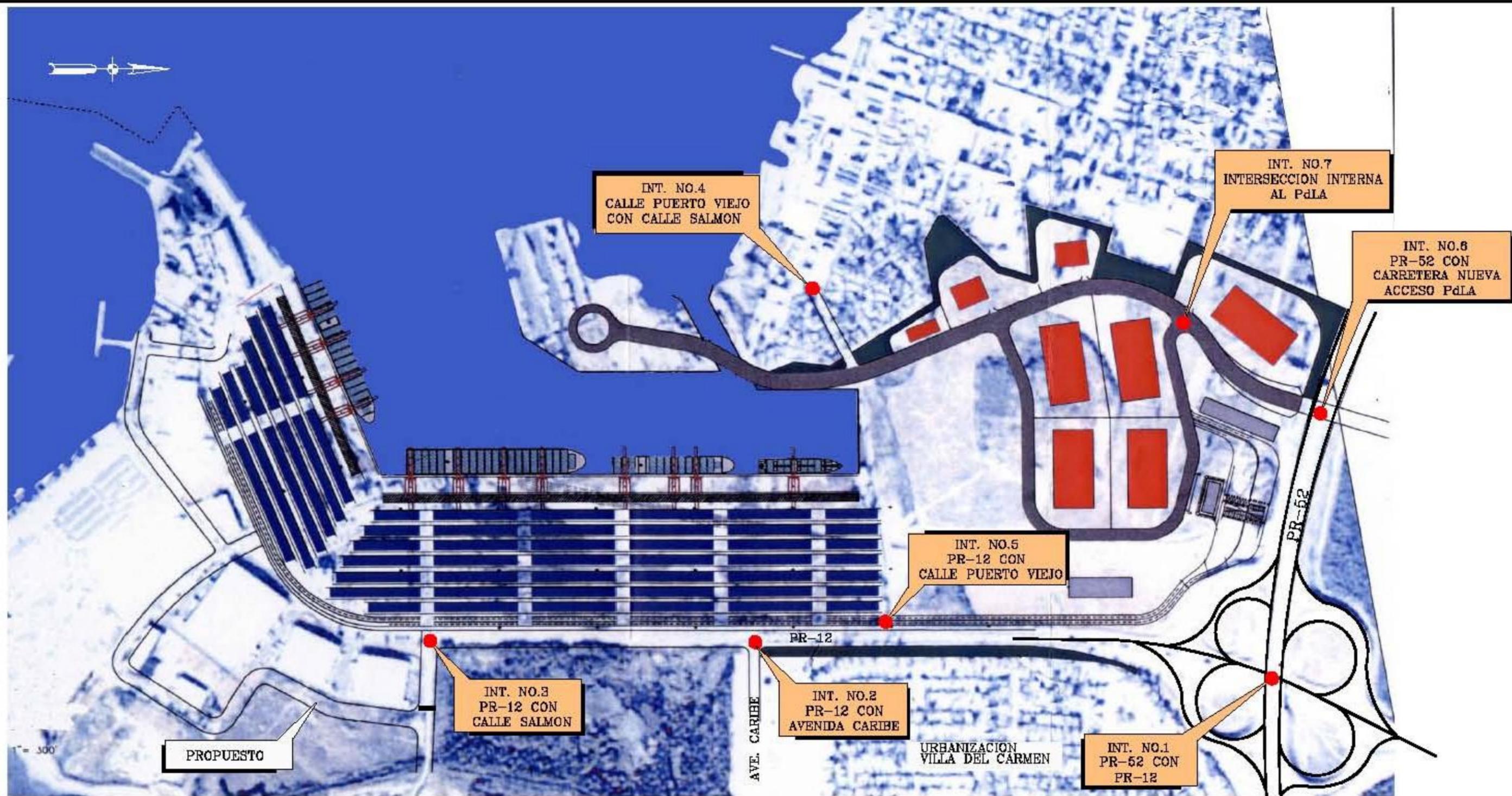
FIGURE

2

ELEMENTS OF THE ROAD NETWORK TO BE STUDIED

Road PR-52 will serve as the principal access to the PTA. PR-52 constitutes the best access roads to the Port of the Americas at their respective areas of influence. The following areas were also identified for study (Figure 3):

- Segment 1: PR-52 up to its intersection with PR-12
- Segment 2: PR-12 with Ave. Caribe. This is a traffic light intersection which forms a T shape with an operational velocity of 45 mph.
- Segment 3: PR-12 with Salmon Street (PR-123). This is a traffic light intersection.
- Segment 4: Salmon Street (PR-123) with Puerto Viejo Street.
- Segment 5: PR-12 with Puerto Viejo Street. This is a Y-shape intersection.
- Segment 6: Proposed diamond-type ramp interchange (substituting Ponce Sur Toll Station) with a north-to-south avenue connecting PR-52 with Playa de Ponce.
- Segment 7: PTA main entrance. T-shaped traffic light intersection.



NOTA: FIGURA PROVISTA POR LAS FIRMAS MOFFATT & NICHOL ENGINEERS E IGLESIAS VAZQUEZ Y ASOCIADOS



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PORT OF THE AMERICAS
ELEMENTS OF THE ROAD NETWORK TO BE ANALYZED

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FIGURE

3

METHODOLOGY

1. The traffic data used to accomplish the different analyses was provided by the following documents:
 - Vehicle counting at the intersections of PR-12 with PR-52 (ramps), PR-12 and Caribe Avenue, PR-12 and Salmon St. (PR-123), and Salmon St. with Puerto Viejo St. carried out between September 30 to October 2, 2003 (see Attachment C).
 - Report from the Planning Office from the PR Highway and Transport Authority (ACT, by its Spanish acronym) "Highway Performance Monitoring System (HPMS) 2002 Data" (see Attachment D).
 - Report from the Planning Office from the PR Highway and Transport Authority (ACT, by its Spanish acronym) "1994 Classification Logs" (see Attachment D).
 - The Office of Compilation and Analysis of Data from the Planning Area of the ACT - Through the Office of Compilation and Analysis of Traffic Data from the Planning Area of the ACT the total Average Annual Diary Traffic (AADT) data for both directions was obtained for the roads under study (see Attachment D).
 - The maps of Traffic Flow of Puerto Rico from the ACT and DTOP for 1994 (Revised in 1996) and 1999.
2. From the vehicle flow data obtained from the vehicle counting, the current ADT was determined and, with the vehicular annual growth rate corresponding to the area of influence of the developments, projections were obtained for the traffic volumes during the development of the PTA.
3. Based on the employment opportunities generated by Port of the Americas the number of trips that will be generated from and to the proposed Project during the analysis years period was estimated. For this process, the occupational vehicle rates that characterize the trips from home to work from the employees that work in different areas of the port were used. Attachment A includes the sources utilized to determine the heavy vehicle

volume that will be generated by the cargo transport operations departing and arriving at the port.

4. The proposed Costa Caribe Resort traffic volume was forecasted using the "Trip Generation 4.0", software version produced by Microtrans.
5. With the traffic data projected to the future years, including the trips generated by Port of the Americas at its different phases of development, the behavior of the road network elements for the Project were analyzed. The following computer software was used:
 - aaSIDRA ("aaTraffic Signalized & Unsignalized Intersection Design and Research Aid", Full 1.02, September 2000), produced by the company Akcelik & Associates Pty Ltd., for the analysis of intersections (Attachment E).
 - HCS 2000 Version 4.1c Highway Capacity Analysis Software produced by McTrans Center for the analysis of road segments of two lanes, multiple lanes, and ramps(Attachment F).
6. The elements of the studied road network were analyzed under the following conditions with their respective scenarios (Figure 4):
 - Existing Condition, year 2003, without Project and current road network.
 - Future Condition, year 2006-2027, analysis period with vehicular flows projected to the future years. The assumed scenarios incorporated the concept of the best access route to the different phases of the Port of the Americas.
7. Comparison of the service levels, the delays, and degrees of saturation resulting from the different scenarios, and the discussion of results.
8. Based on the analysis described previously, the necessity of generating alternatives to attenuate any negative impact on the traffic at the new development was determined and different alternatives are compared using as criteria the levels of service, the degree of saturation, and the delays.
9. Conclusions and recommendations are addressed based on the obtained results.

EVALUATION CRITERIA

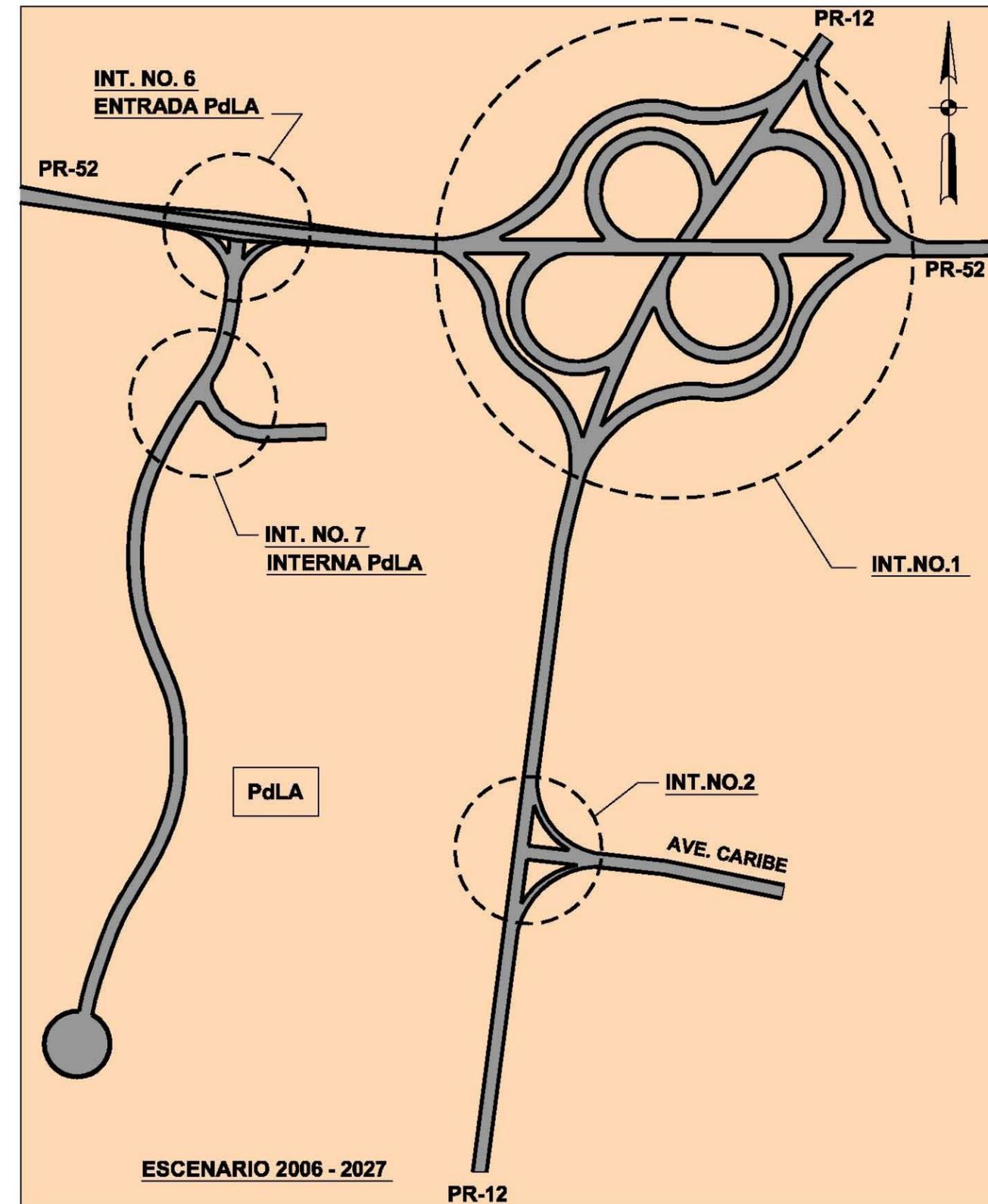
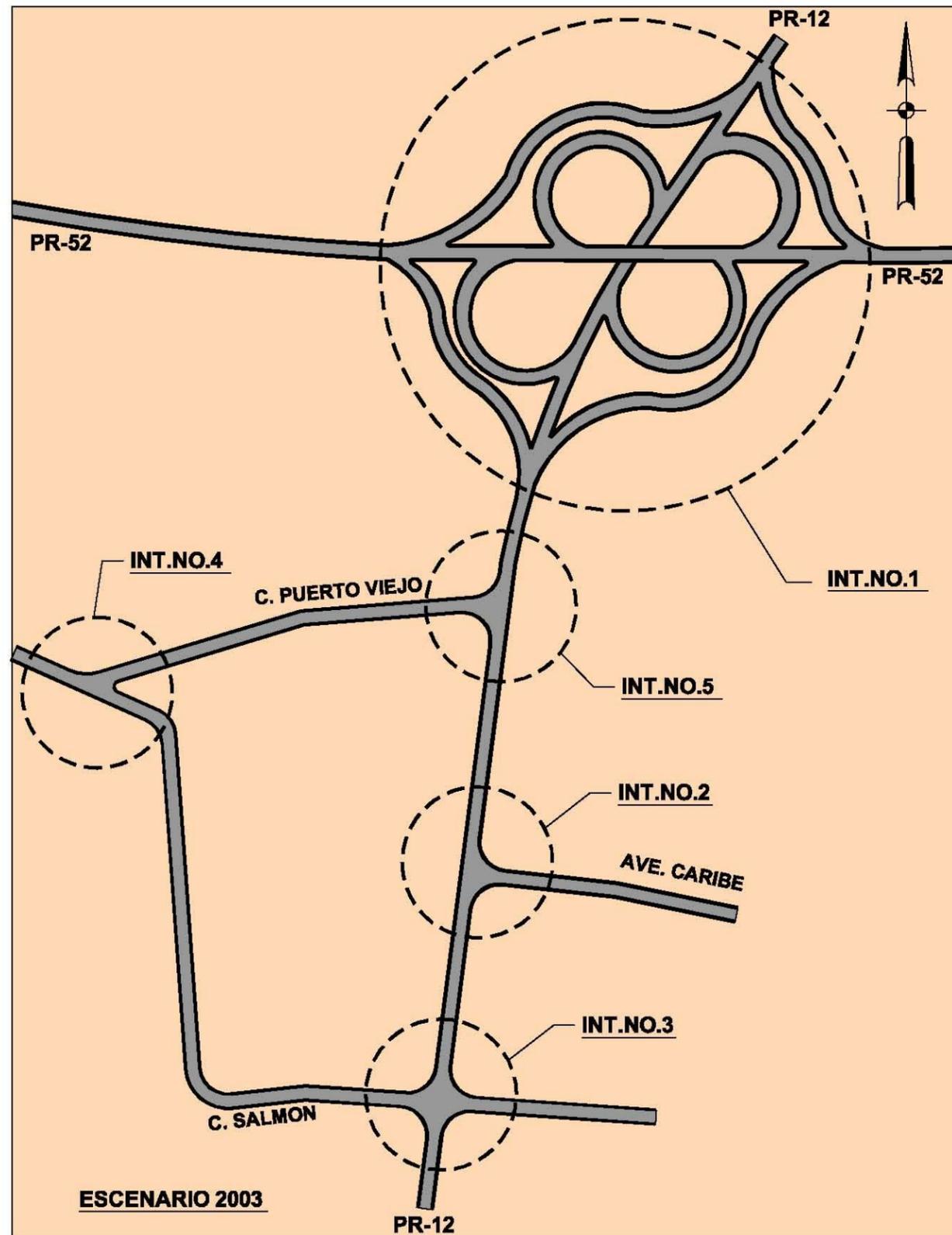
Level of Service

The Level of Service (LOS) for a roadway is a measure of effectiveness of the road to operate in an efficient manner. The operating characteristics of a roadway include, but are not limited to, the number of lanes, pavement width, design speed, traffic controls, shoulder condition, and horizontal and vertical alignments. Levels of Service are divided into six categories from LOS=A (best operating conditions) to LOS=F (worst operating conditions). The following table summarizes this rating system.

A	Free flow; low volumes and no delays; delay at signals <10 seconds.
B	Stable flow; speeds restricted by travel conditions; minor delays; delay at signals 10-20 seconds.
C	Stable flow; speeds and maneuverability closely controlled due to higher volumes; delays at signals 20-35 seconds.
D	Stable flow; speeds considerably affected by change in operating conditions; minor delays; high density traffic restricts maneuverability; delays at signals 35-55 seconds.
E	Unstable flow; low speeds; considerable delay; volume at or near capacity; freedom to maneuver extremely difficult; delay at signals 55-80 seconds.
F	Forced flow; very low speeds; volume exceeds capacity; long delays; stop and go traffic; delays at signal more than 80 seconds.

Delays

Delays are one of the most important parameters used to rate roadways with traffic controls (HCM 2000). Delay is a measure that most directly relates the driver's experience, in that it describes the amount of time consumed in traversing an intersection. This parameter provides valuable information about the quality of traffic flow and is the primary performance measure in many intersection analysis procedures.



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PORT OF THE AMERICAS
SIMULATED SCENARIOS

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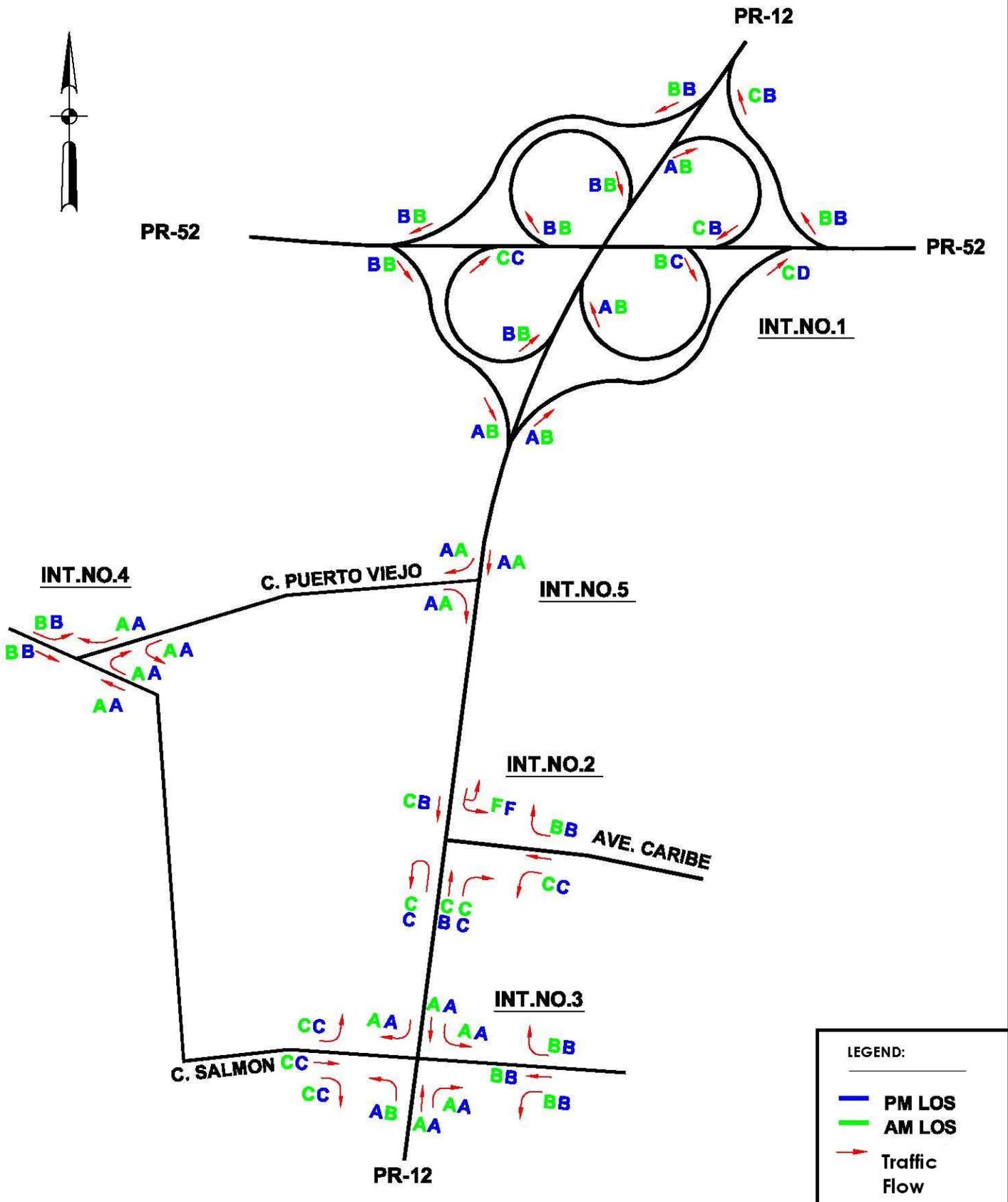
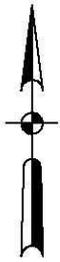
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FIGURE
4

RESULTS

For the present road traffic condition in the vicinity of the proposed site for the PTA, a total of five intersections were studied and simulated. Results of this analysis are shown in Figure 5.

For the prospective conditions (year 2006, 2009, 2014, 2019, 2024, and 2027) a total of four intersections were studied and simulated. Results of this analysis are shown in Figure 6 through Figure 10.



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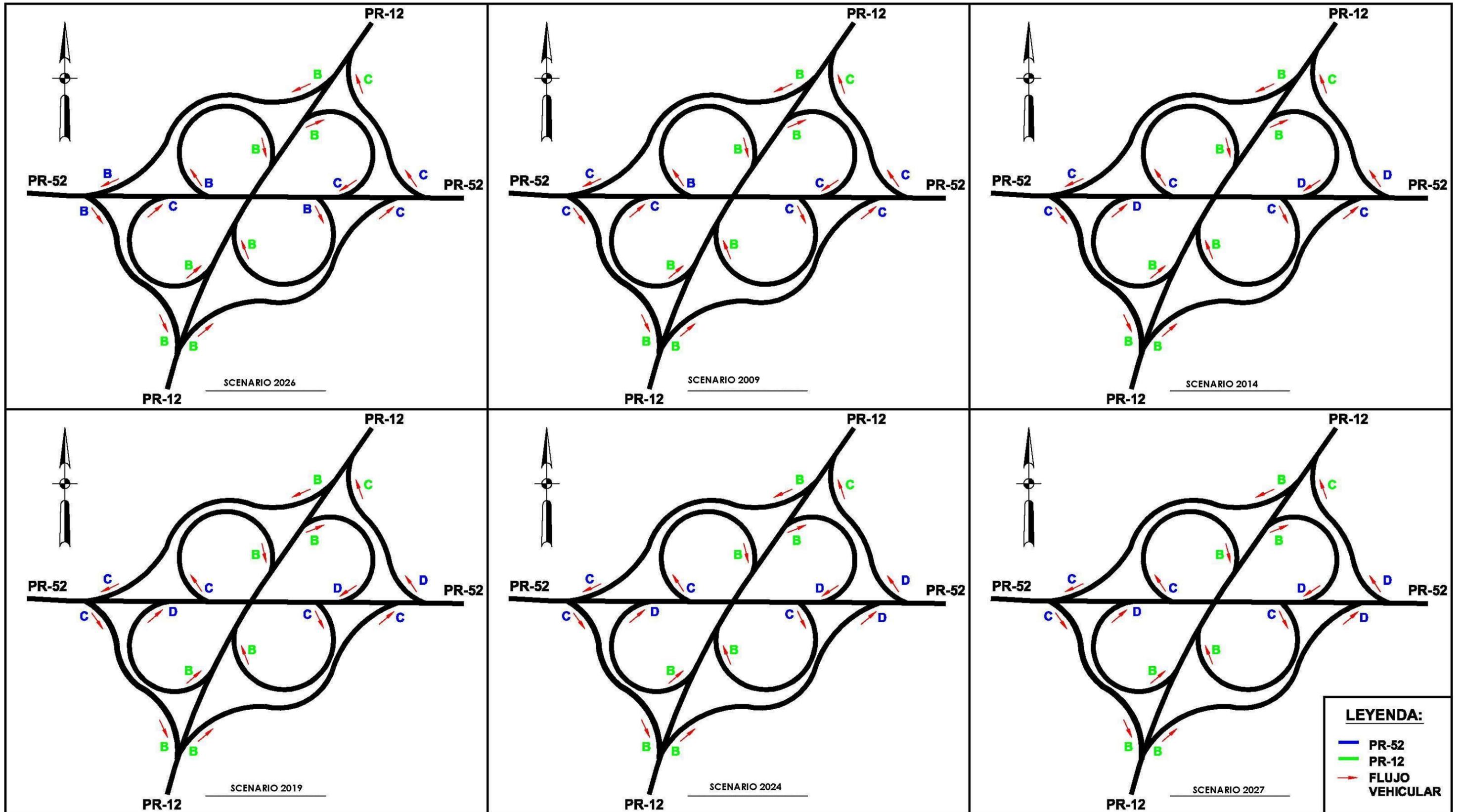
PORT OF THE AMERICAS
Actual Situation Results (2003)

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01039C

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NOV. / 2003

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FIGURE
5



LEYENDA:

- PR-52
- PR-12
- FLUJO VEHICULAR

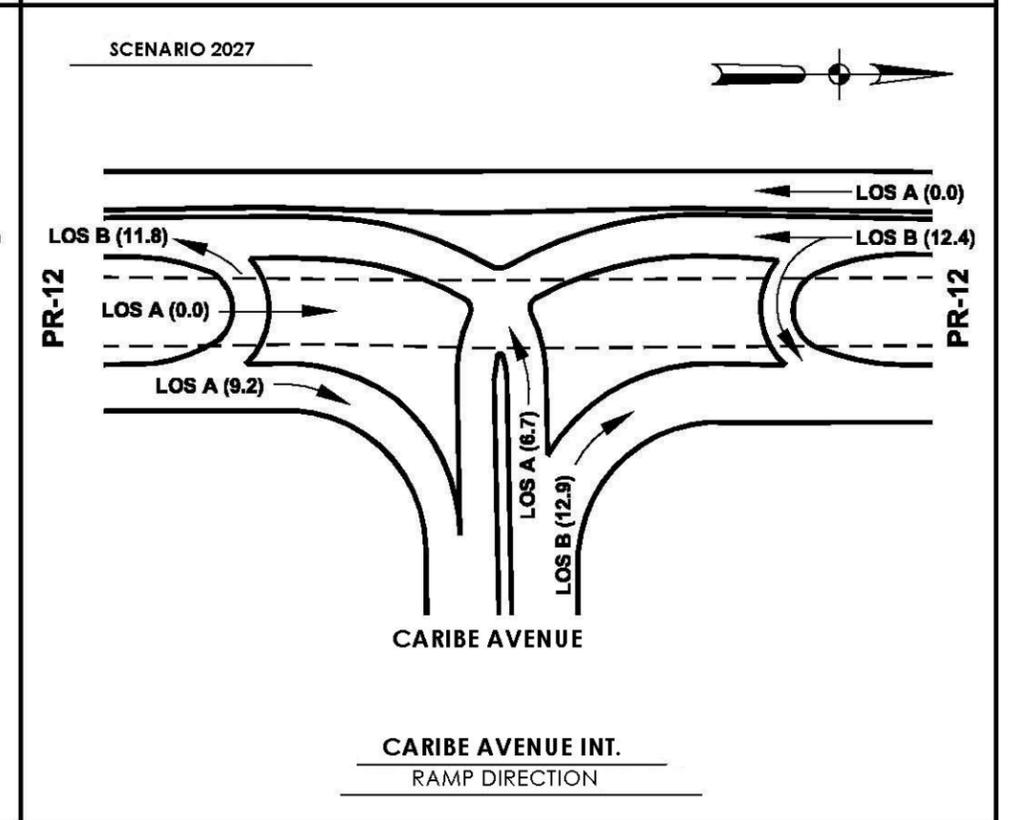
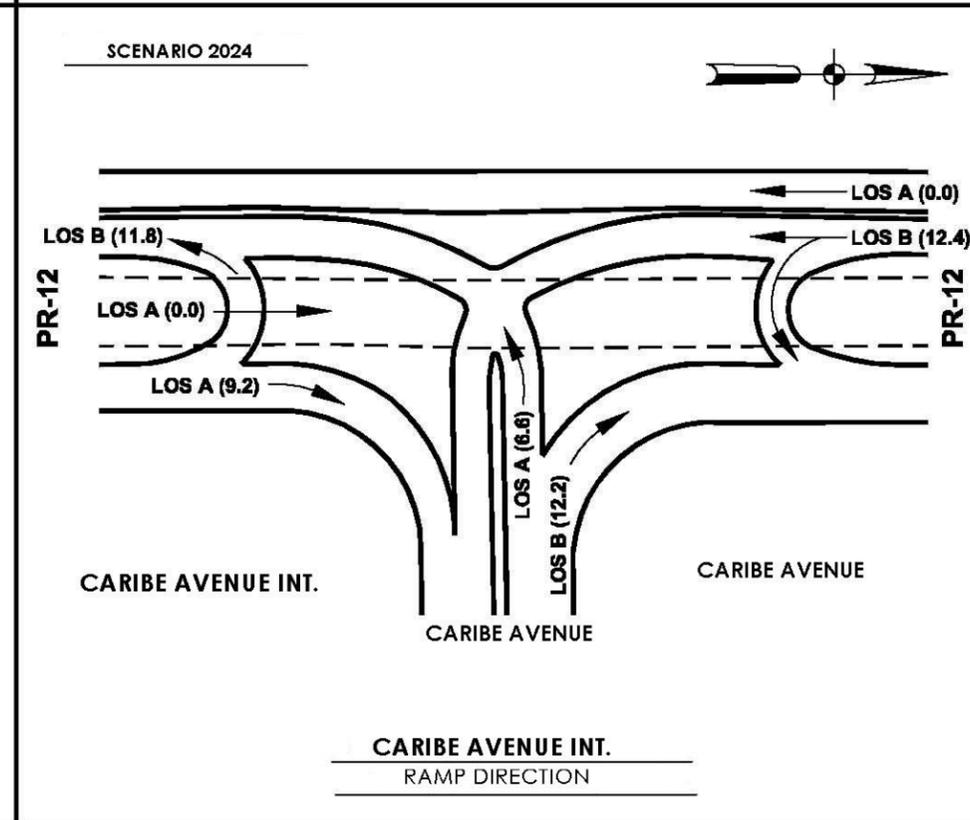
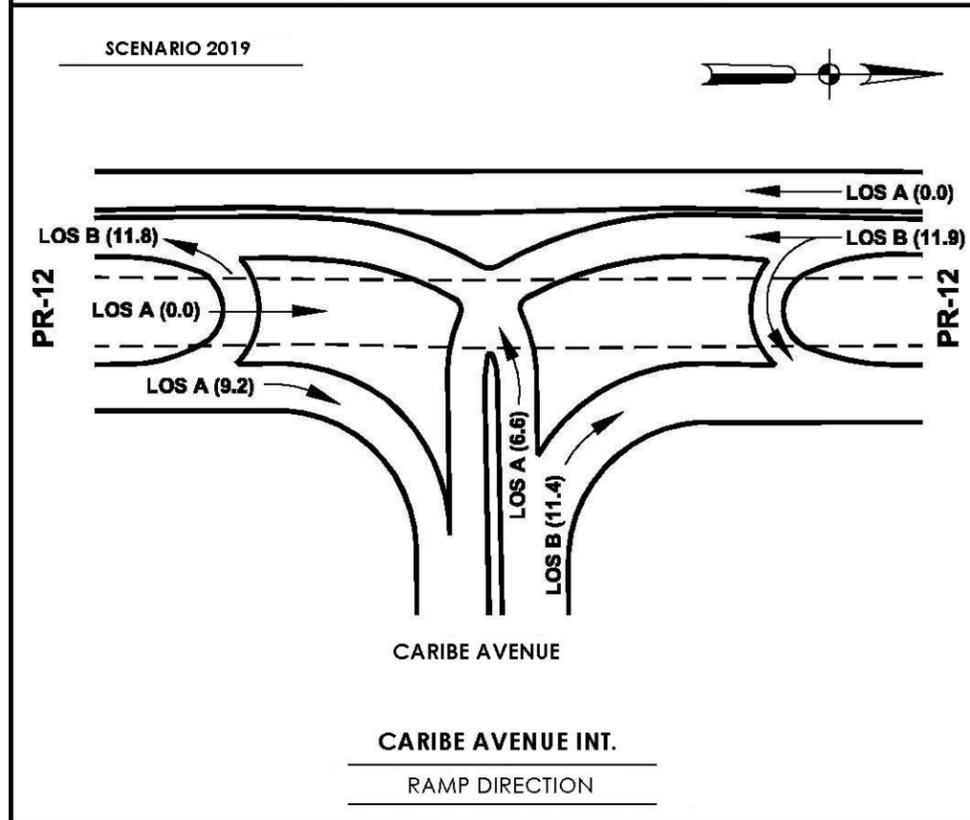
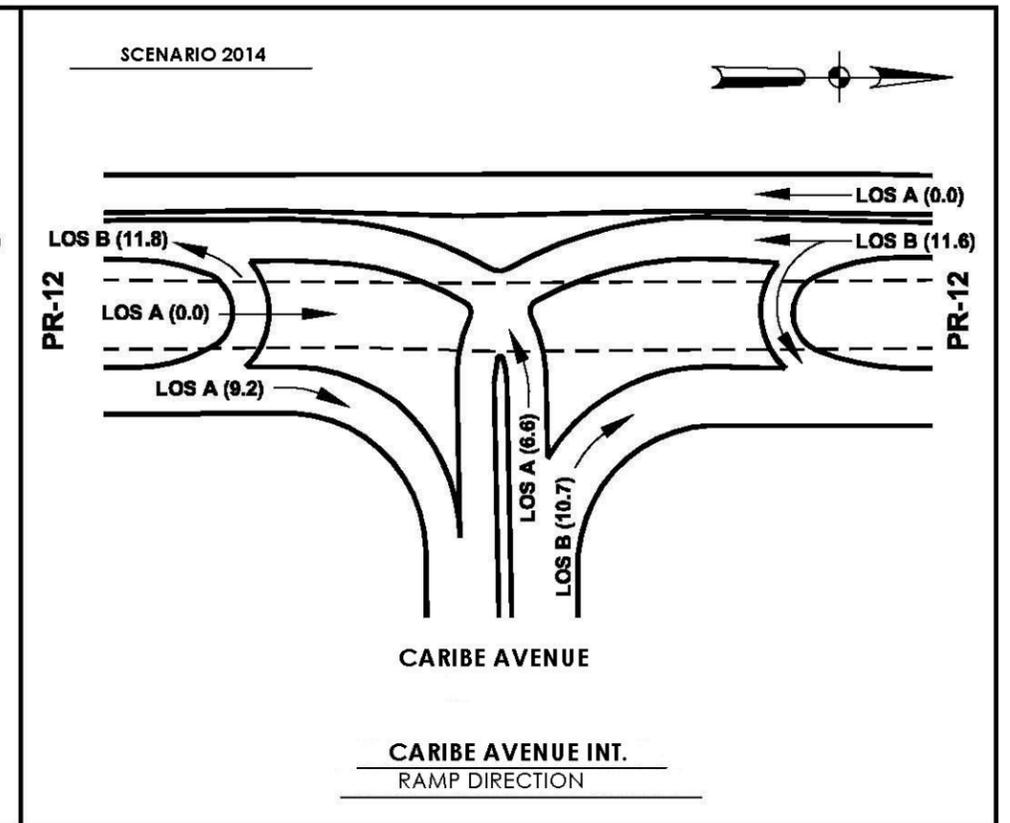
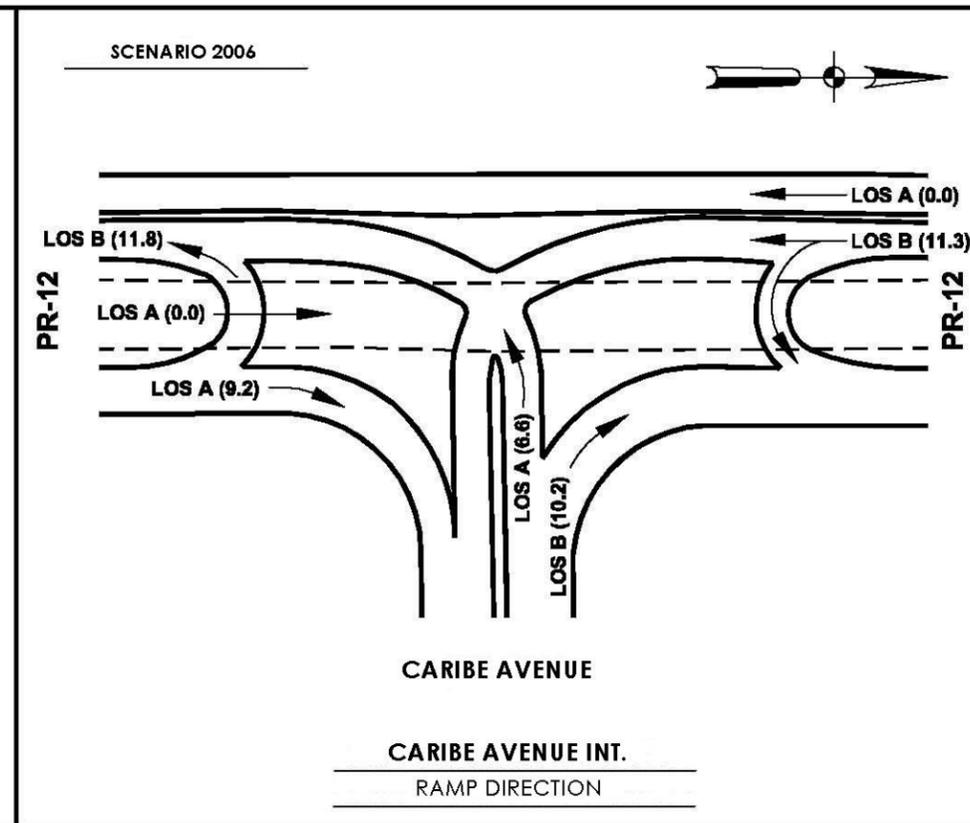
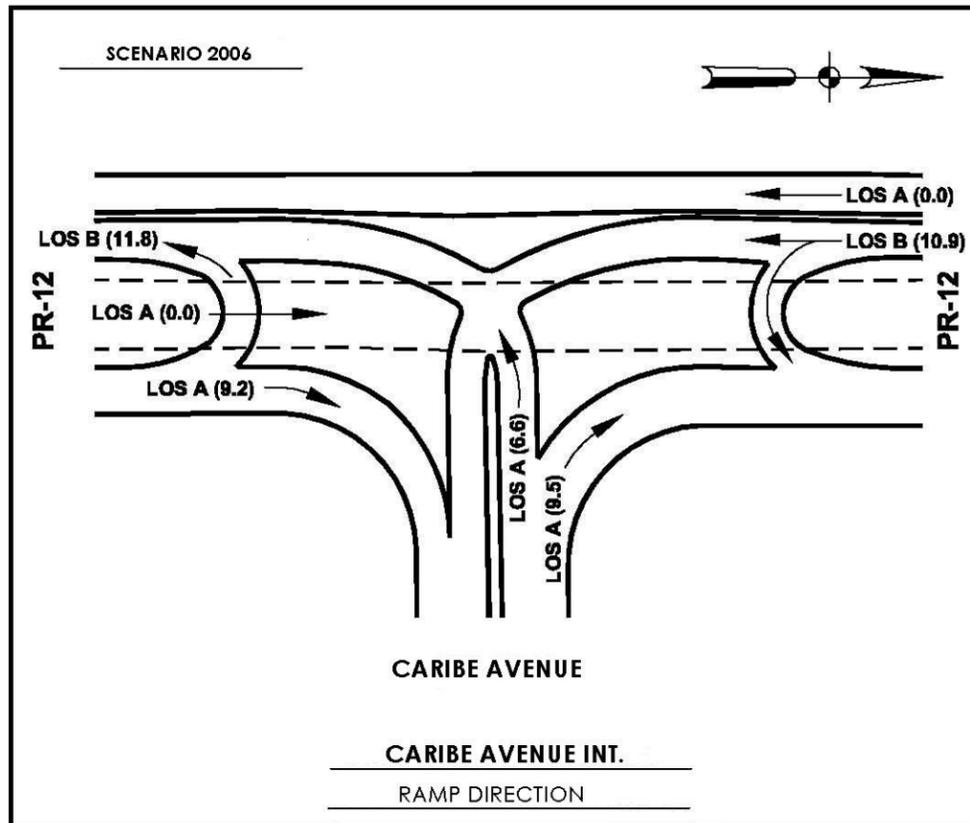
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PORT OF THE AMERICAS
 PROJECT FUTURE SIMULATION
 INT. NO. 1 PR-52 WITH PR-12

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FIGURE
7



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FUTURE SIMULATIONS RESULTS
INT. NO. 2 -PR -12 WITH CARIBE AVENUE

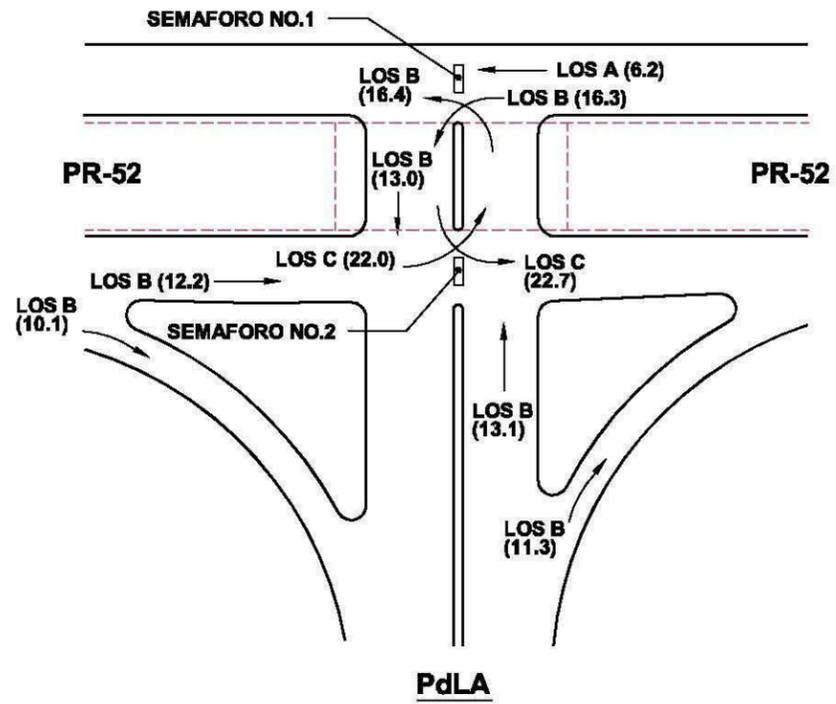
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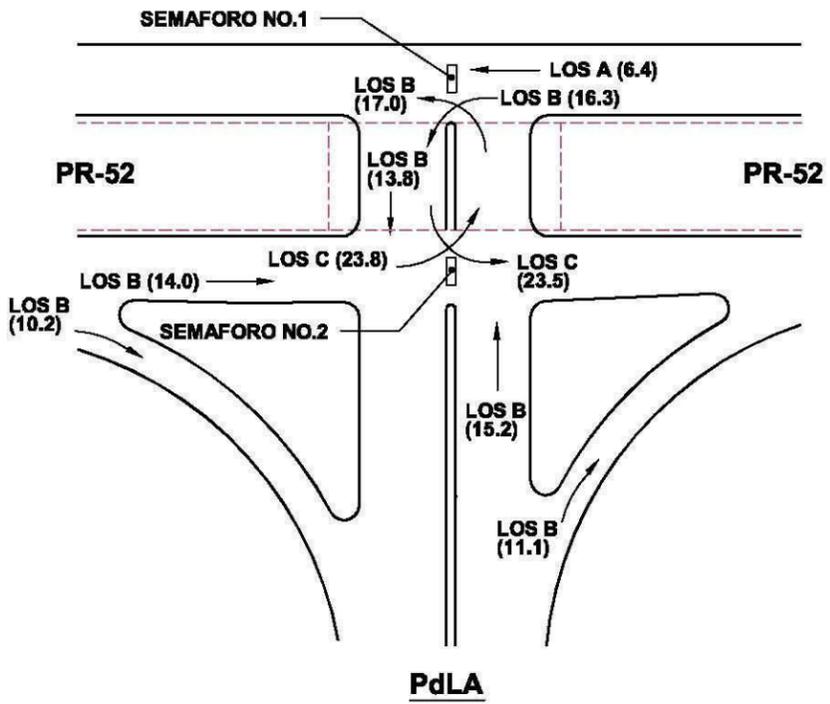
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FIGURA
8

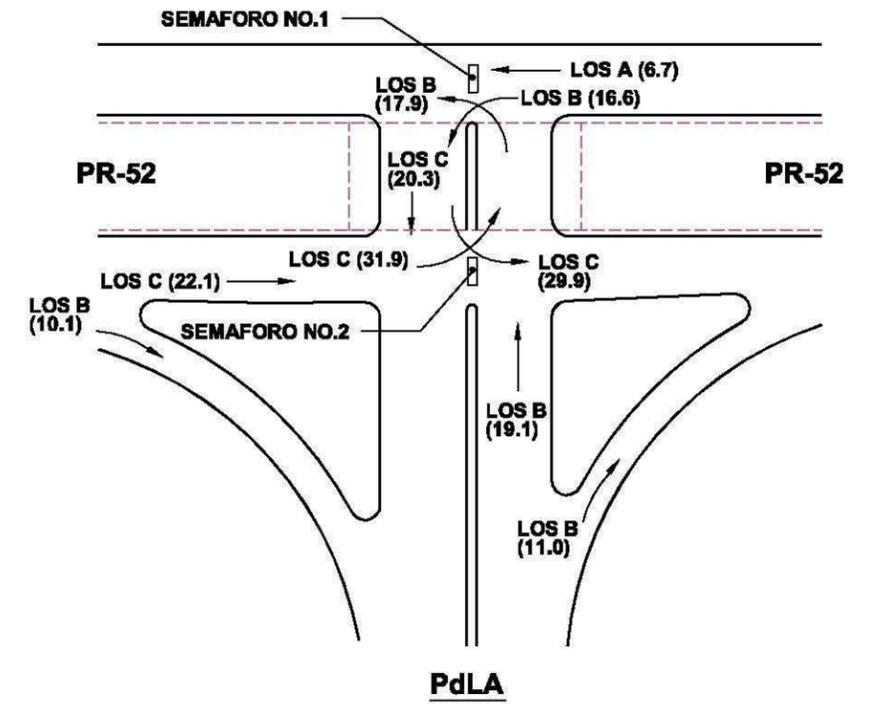
SCENARIO 2006



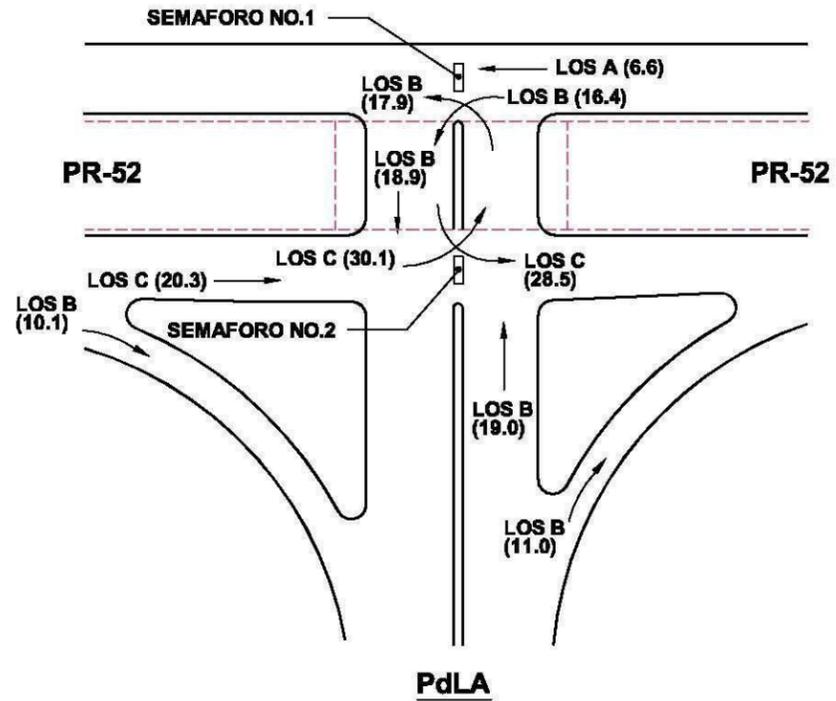
SCENARIO 2009



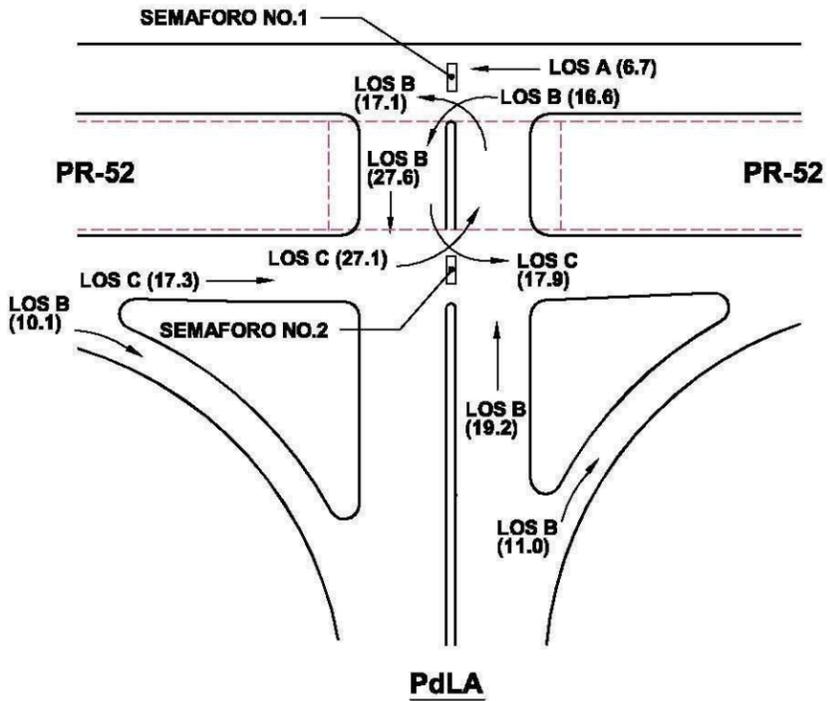
SCENARIO 2014



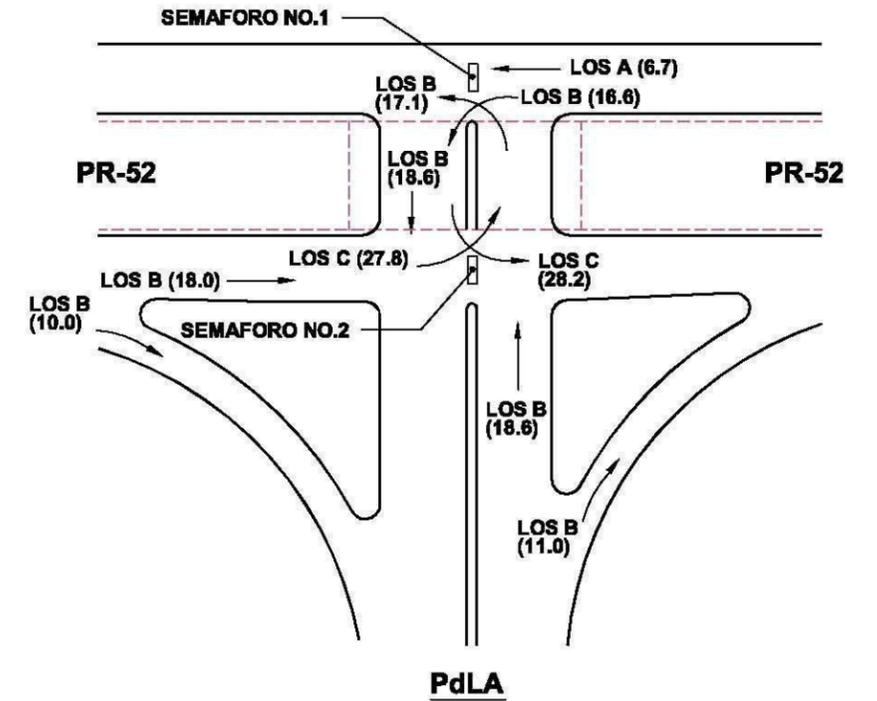
SCENARIO 2027



SCENARIO 2024



SCENARIO 2027



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PORT OF THE AMERICAS
SIMULATION REPORTS OF FUTURE SITUATIONS
INTERSECTION NO. 6 ENTRANCE AND EXIT PdLa

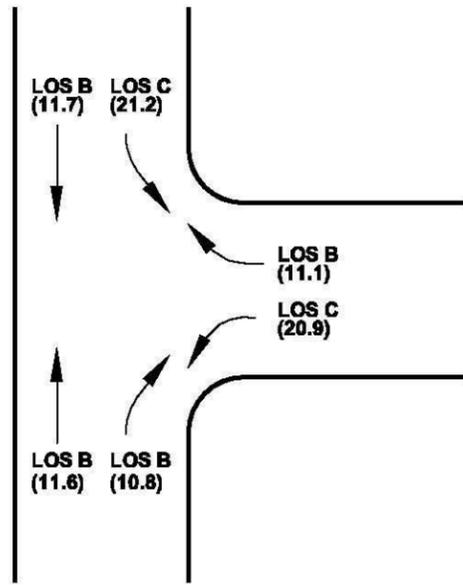
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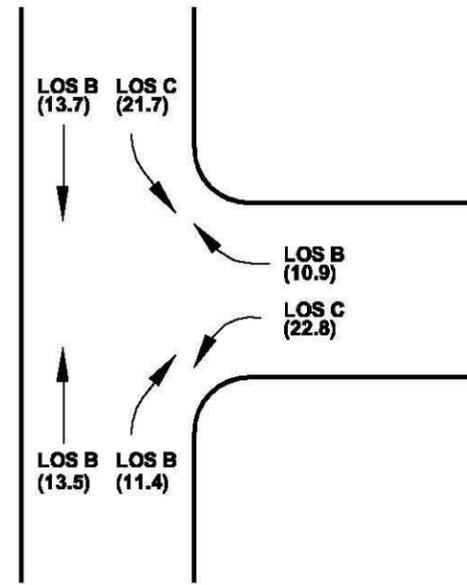
FIGURE
9

SCENARIO 2006



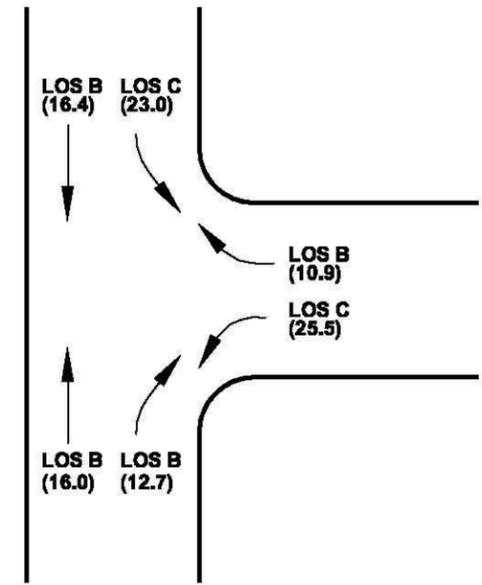
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SCENARIO 2009



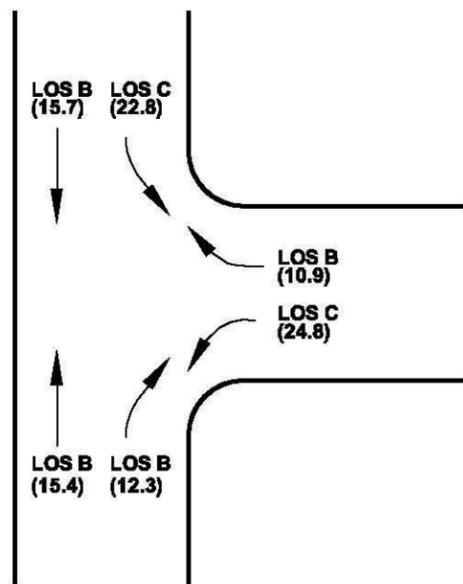
INTERNAL CROSSING

SCENARIO 2014



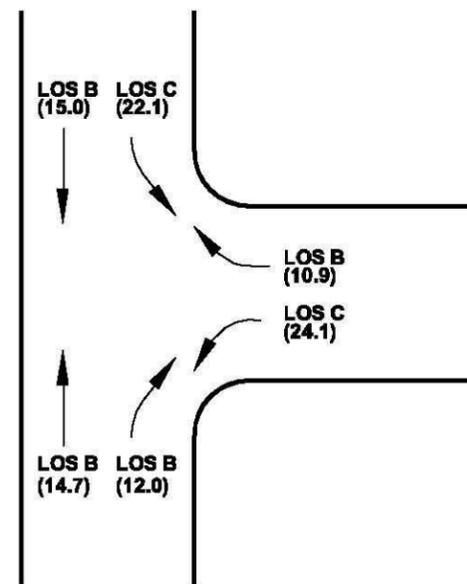
INTERNAL CROSSING

SCENARIO 2019



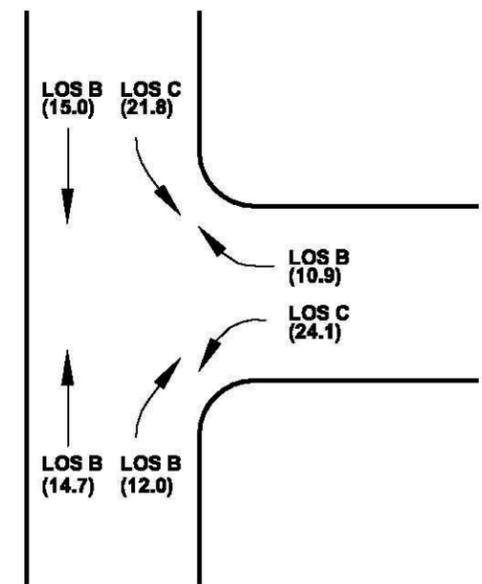
INTERNAL CROSSING

SCENARIO 2024



INTERNAL CROSSING

SCENARIO 2027



INTERNAL CROSSING



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 SIMULATIONS RESULTS FOR FUTURE CONDITIONS
 INTERNAL CROSSING NO. 7 - INT CROSSING PDLA

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FIGURE
10

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are among the most important findings from the analysis previously described:

- At present, the Level of Service (LOS) at the exits connecting road PR-12 (Santiago de Los Caballeros Ave.) with highway PR-52, the intersection between PR-12 and Salmon Street (former Comercio Avenue), PR-12 and Puerto Viejo St., and Salmon St. and Puerto Viejo St. have been rated as adequate (LOS A, B, C) both during the morning and evening peak periods.
- By 2006, the geometric changes proposed for the intersection of road PR-12 and Caribe Avenue would improve the general condition of the traffic in the area, allowing for improved LOS A and LOS B at all intersections.
- It is anticipated that the roads proposed for the PTA will provide adequate capacity not only for the heavy traffic brought about by the operation of the PTA, but also for local and tourism-related traffic in the vicinity of the PTA (LOS A and LOS C).
- The study recommends the establishment of alternate means of transport for the employees and visitors of the PTA. Satellite parking facilities should be established and its use encouraged by the PTA authorities. Also, working schedules should be modified in order to avoid to the extent possible high volumes of traffic during morning and evening peak periods.