

# *Evaluation of Maintenance of Traffic Plan to be Implemented During Tren Urbano's Construction*



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## *Presentation Outline*

- *Why this topic?*
- *Maintenance of Traffic*
- *Component parts of a work zone*
- *Types of Traffic Control Devices*
- *Case study: Bayamón Alignment*
- *Recommendations*

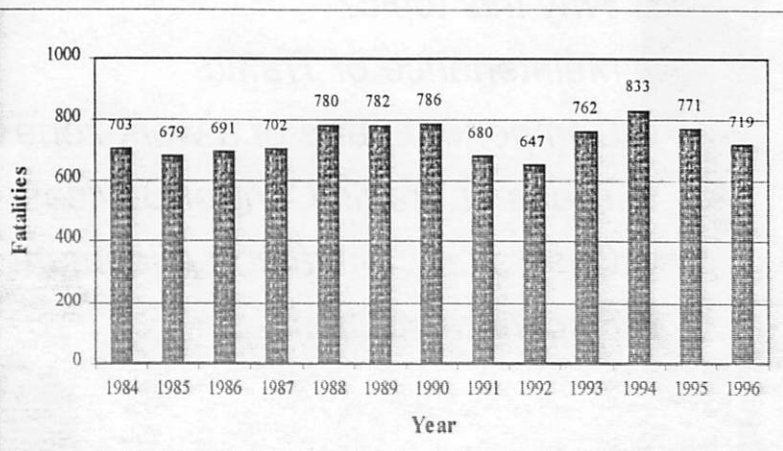


## Why this topic?

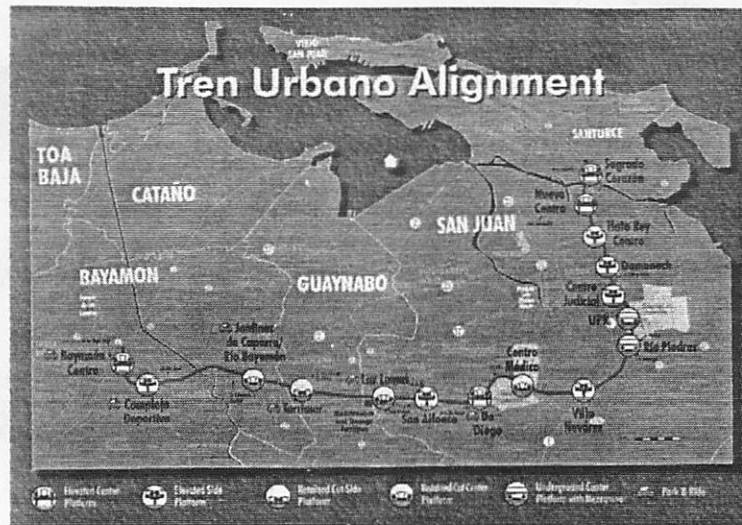


- *Mayor Infrastructure Project now under development in Puerto Rico.*
- *37,800 disabling injuries are estimated resulting from work zone accidents.*
- *The annual cost to society from work zone accidents was \$3.04 billion in 1993.*
- *"Best and Worst of Boston" and "Doing it Right in San Juan."*

## Work Zone Fatalities 1984-1996



## *Tren Urbano Alignment*



## *Maintenance of Traffic (MOT)*



- What the contract says?
- Contractors shall submit a Traffic Control Plan.
- Construction Efficiency vs. Traffic Mitigation.
  - Traffic flow
  - Accessibility

## Fundamental Principles

- Coordination
- Traffic & pedestrian safety
- Guidance
- Acceptable levels of operation
- Engineering study required
- Training
- Public relations



## Public Relations

ción servirá como un  
transferencia intermodal  
y Metrobus.

un importante punto  
provenientes de las  
políticas de San Juan.

biente.

Centro será diseñada  
a diversos concesionarios  
alrededor de los residentes.

idad pública.

es se han considerado  
as para garantizar la  
incluyendo el área de  
días de seguridad en  
la plaza propuesta.

varios a las estaciones como a todo el sistema  
del Tren Urbano. Como elemento clave en toda  
la seguridad pública propuesta, se destaca la  
utilización de un sistema de televisión de circuito  
cerrado y la creación del Cuerpo de la Policía  
del Tren Urbano, visiblemente localizado en cada  
una de las estaciones, las 24 horas del día.

### Coordinación de la construcción

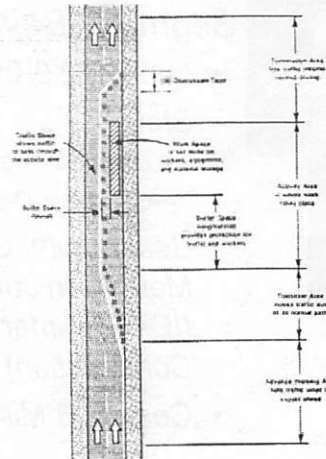
Durante el periodo de construcción se tomarán  
las medidas necesarias para garantizar un tránsito  
vehicular seguro, fácil y sin contratiempos por  
esta zona. Un plan de manejo del tránsito será  
desarrollado en coordinación con el comercio y  
los residentes del centro de Bayamón para  
beneficio de toda la comunidad.

Información adicional del proyecto puede obtenerse  
en las oficinas del Tren Urbano a través del  
765-0927, extensiones 105, 206 ó 212.



## Component Parts of a Work Zone

- Four components:
  - Advance Warning Area
  - Transition Area
  - Activity Area
    - work space
    - traffic space
    - buffer space
    - incident management vehicle storage space
  - Termination Area



## Types of Traffic Control Devices

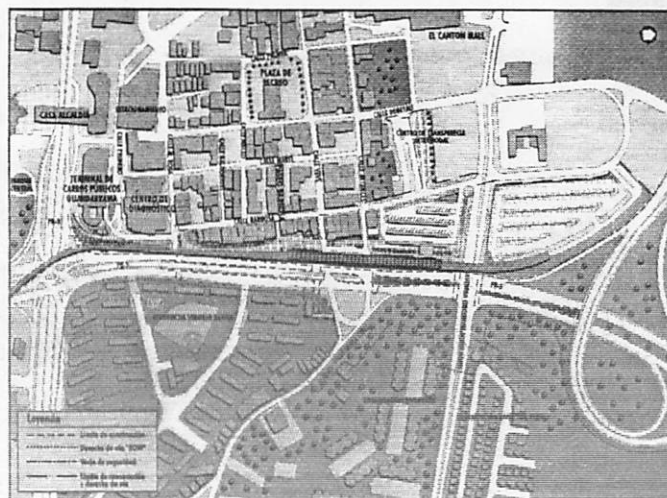


- Signs
- Arrow displays
- Channelizing Devices
- Marking
- Lighting Devices

## *Case study: Bayamón Alignment*

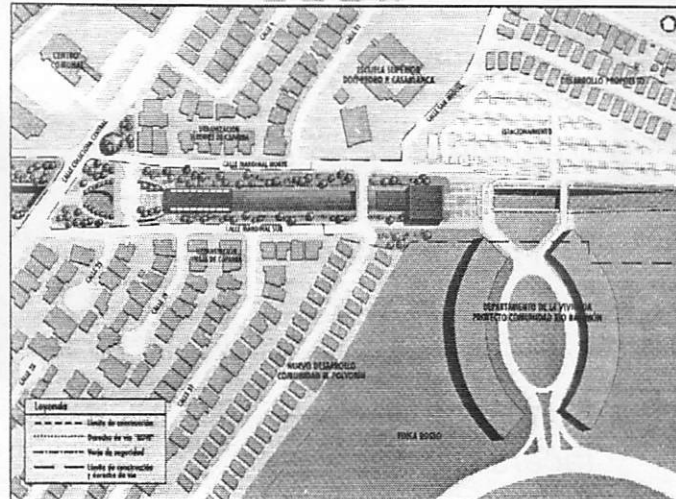
- |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>■ <b>Segment: Bayamón</b></p> <ul style="list-style-type: none"><li>• Length=2.9Km</li><li>• Stations<ul style="list-style-type: none"><li>– Bayamón Centro</li><li>– Complejo Deportivo</li></ul></li><li>• Consortium: Grupo Metro San Juan (ICA-Miramar Construction)</li><li>• Cost=\$68 Millions</li></ul> | <p>■ <b>Segment: Río Bayamón</b></p> <ul style="list-style-type: none"><li>• Length=1.7Km</li><li>• Station<ul style="list-style-type: none"><li>– Río Bayamón</li></ul></li><li>• Consortium: Redondo-Entrecanales</li><li>• Cost:\$37 Millions</li></ul> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## *Description of the Area*



Estación Bayamón Centro  
Bayamón Centro Station

## Description of the Area (cont.)



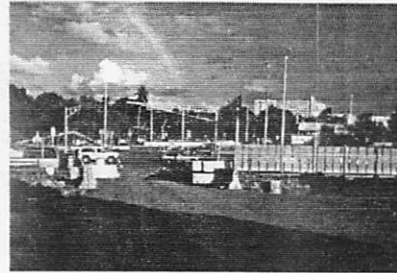
Estación Jardines de Caparra/Río Bayamón  
Jardines de Caparra/Río Bayamón Station

## Operational Analysis of Intersections

| Intersection                | LOS (AM) | Flow (vph) | LOS (PM) | Flow (vph) |
|-----------------------------|----------|------------|----------|------------|
| PR-5/PR-8855                | E        | 3582       | E        | 3494       |
| PR-5/Dr. Betances           | C        | 2819       | C        | 3188       |
| PR-5/Dr. Velez              | A        | 2838       | A        | 2680       |
| PR-5/M. Rosa                | B        | 1055       |          |            |
| PR-2/PR-5                   | F        | 5930       |          | 5726       |
| Marginal Santa Rosa/Entrada |          |            | C        | 1211       |
| PR-2/PR-855                 |          | 5744       |          | 8174       |
| PR-2/PR-21                  | C        | 5172       |          | 7331       |

## *MOT-Bayamón Contract*

- *Traffic study was done*
- *Meet the standards*
- *Regional detours and haul routes*
- *Some signs were wrong in localization*
- *Some merging tapers were not appropriate*

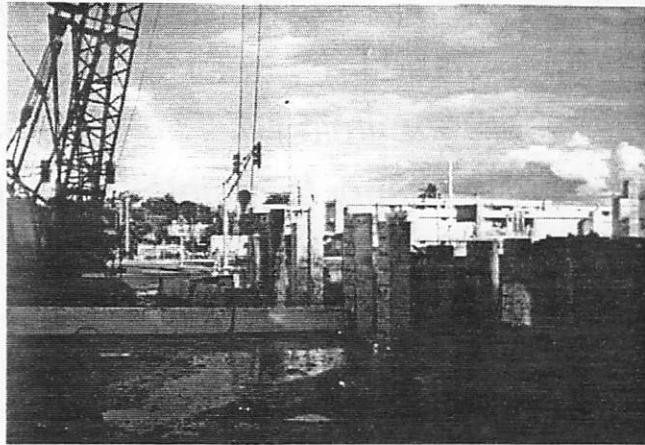


## *MOT-Río Bayamón Contract*

- *A traffic study was not done in order to develop this MOT*
- *Haul routes are not provided*
- *Spacing of warning signs does not meet the standard*
- *Adequate traffic control devices are not provided.*



## *Field Visit*

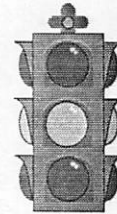


## *Field Visit*



## *Recommendations*

- *Maintenance of devices should be to high standards.*
- *Reprogramming of Traffic Signals*
- *Its necessary to maintain people well informed about the construction status and progress*

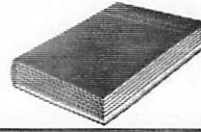


## *Future Work*

- *Evaluate MOT plan for Río Piedras Contract.*
- *Evaluate MOT plan for Centro Médico Contract.*
- *Perform a capacity analysis of a intersection in Bayamón after the implementation of the plan.*



## *References*



- *Part VI of the Manual on Uniform Control Devices (U.S. DOT, 1993)*
- *Standard Drawings (PRHTA, 1996)*
- *Highway Capacity Manual (TRB, 1994)*
- *Highway Capacity Software (University of Florida, 1995)*
- *Bayamón Alignment Section Contract M.O.T.*
- *Río Bayamón Contract M.O.T.*

## *Questions, Suggestions...*

