



TREN URBANO
RP-SITE OFFICE

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Río Piedras Contract

- Rodolfo E. Mejía
- Resident Engineer HTA
- Office Engineer TU

Project Goals

- ⇒ Heavy Rail Design-Build Underground Project.
- ⇒ One of the few projects being built under this technology.
- ⇒ Procurement included 30% design. Contractor-Designer to refine design to 100%.
- ⇒ Project to be ready in ~4 years.

Description

- **Río Piedras Contract consists mainly of ~1.7 km of Underground structures which includes two stations (Río Piedras and Universidad) under Ponce de León Ave. progressing from 65 de Infantería Highway to Piñero Expressway.**

Technology

- **Design Build which included State of the Art Laser guided EPBM, Shielded TDM, and NATM for Tunnels Excavation**
 - **Reduce Overall Project Construction time while delivering a High quality Product.**
 - **Industry Standards that apply to this type of Construction are in full force at all times.**
 - **Are well known by project personnel**
 - **The concept of Design first and Build later is not part of this project**
 - **One of the drawbacks is that construction might push redesign, but there are savings in time and costs.**

EPBM: Earth Pressure Balance Machine

TDM: Tunnel Driving Machine

NATM: New Austrian Tunnelling Method

Team/Resources

- **No prior experience by local contractors in building this type of project.**
 - **KKZ/CMA Team includes people from around the world who have been training local personnel.**
 - **Conventional equipment, as well as state of the art EPBM, which was brought from abroad, are used to build this project.**
 - **Ireland, France, Norway, Turkey, China, Mexico, Dominican Republic, USA, Puerto Rico among others...**
 - **Jacobs Associates, Tunnel Design; Sverdrup Civil, Structures Design; Woodward Clyde; Environmental Consultant; Soletanche Bachy, Grouting for support of existing structures.**
 - **Buy America Clause of the contract assures that more than 50% of the materials are manufactured in the USA.**

Procedures

- **The design approach on a design-build project is somewhat different than is typically experienced on design -bid-build- projects.**
 - **The short contract duration, only 43 months, meant that construction had to star at the same time as the design.**
 - **The 30% design provided by the Owner was necessary to customize the preliminary design to the specific construction methods being used by the contractor.**
 - **To meet material procurement requirements, designers had to advance designs so that the procurement schedule was not impacted, which required a concerted effort to keep design ahead of procurement and construction!**

Procedures (Cont.)

- **CONSTRUCTION**
 - Utility Relocation
 - Dewatering Wells
 - Support of Structures (Grouting Program)
 - Cut and Cover
 - NATM
 - Stacked Drifts
 - Circular Earth Tunnels

Schedule

- Universidad Station Completion March 21, 2000 vs. Contractual Oct 24, 2000.
- Río Piedras Station Completion Dec. 21, 2000 vs. Contractual Oct. 10, 2001.
- Guideway Completion March 21, 2000 vs. Contractual Oct. 24, 2000

FOR MORE INFO PLEASE CONTACT:

Project Controls
Río Piedras Contract Field Office
Tel. 759-0180

Current Status

- Unexpected delays or issues
 - Hurricanes, Utility Relocation, Archaeology.