

Today's Technology at the Midtown Tunnel

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Overview

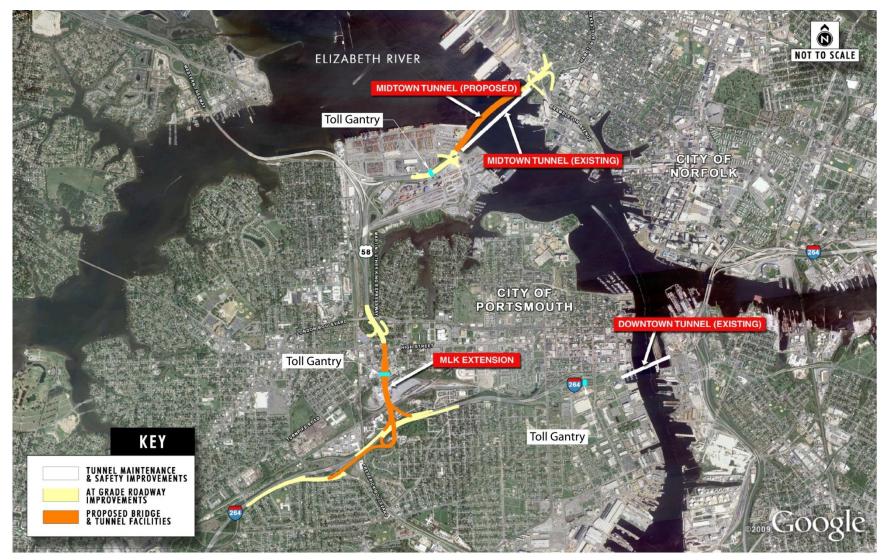


- The Downtown Tunnel/Midtown Tunnel/MLK Extension project required that Toll Collection, ITS and SCADA systems be implemented on three existing tunnels, one new tunnel tube, one new section of tolled highway and extend into the surrounding highway network
- Considering the existing congestion at the tunnels, this crucial \$2.1 billion project would literally not have been possible without All Electronic Tolling (AET)
- New systems were designed from scratch incorporating today's technology while making accommodation for tomorrow's advancements
- Modern toll systems enable the seamless flow of data into management and accounting systems
- Agenda:
 - 1. Project Overview
 - 2. Heavy Civil & Marine Technology
 - Toll Collection
 - 4. ITS
 - 5. SCADA

Project Background

Portsmouth and Norfolk, Virginia





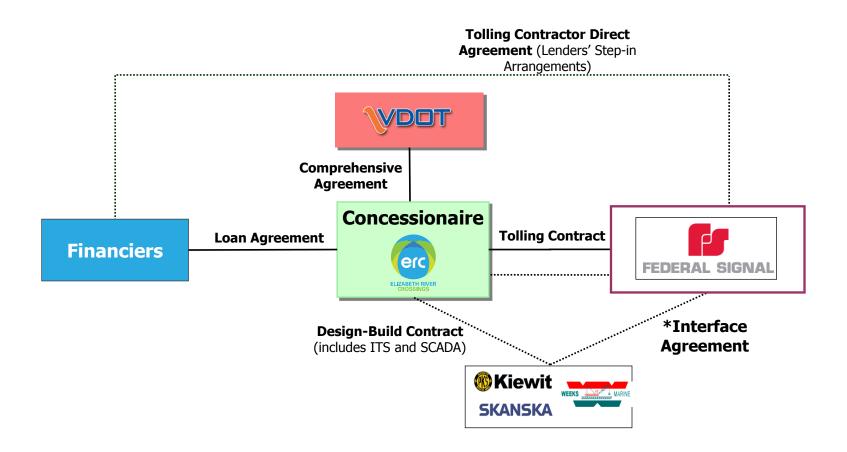
Public-Private Partnership



- VDOT procured the project under Virginia's PPTA statute in 2008
- Elizabeth River Crossings (50% Macquaire, 50% Skanska Infrastructure Development) was the only respondent
 - —Design-Build Joint Venture of Skanska-Kiewit-Weeks Marine
- Comprehensive Agreement signed in December 2011
- Tolling authorized under FHWA Value Pricing Pilot Program
- Term of contract is 58 years
- Risk transfer of design, construction, finance, operations and maintenance
- Financing includes over \$300M contribution from Virginia, \$422M TIFIA Loan, \$675M in PABs and the rest is sponsor's equity investment
- Tolling delayed until January 2014

Contractual Structure





*Interface Agreement governs coordination and cooperation of contractors when working together on the same site. Will only apply during 6 month period at end of MLK construction.

Value Beyond Traffic Improvements





Direct Economic Stimulus

- Over \$1 billion in construction works
- Built by local companies
- Built by local labor
- Utilizes local suppliers and contractors



Promotes Economic Development

- \$170 to \$254 million increase in regional productivity¹
- Long-term economic development
- Access to 2,000 more jobs²
- Local projects can be prioritized



Local Job Creation

- Over 500 construction jobs directly created
- Over 1000 jobs indirectly created
- 200 facilities maintenance and operations jobs
- Small, women, minority owned business involvement
- Apprenticeship Programs

MLK Extension Alignment

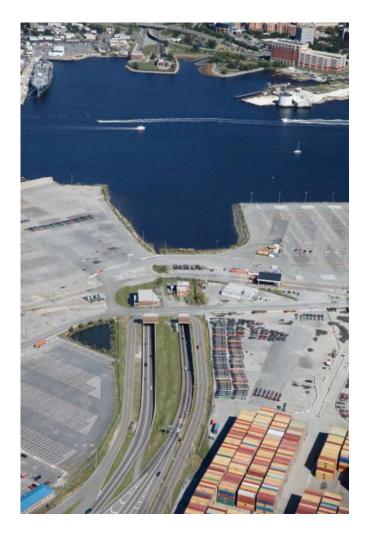




Midtown Tunnel Portals



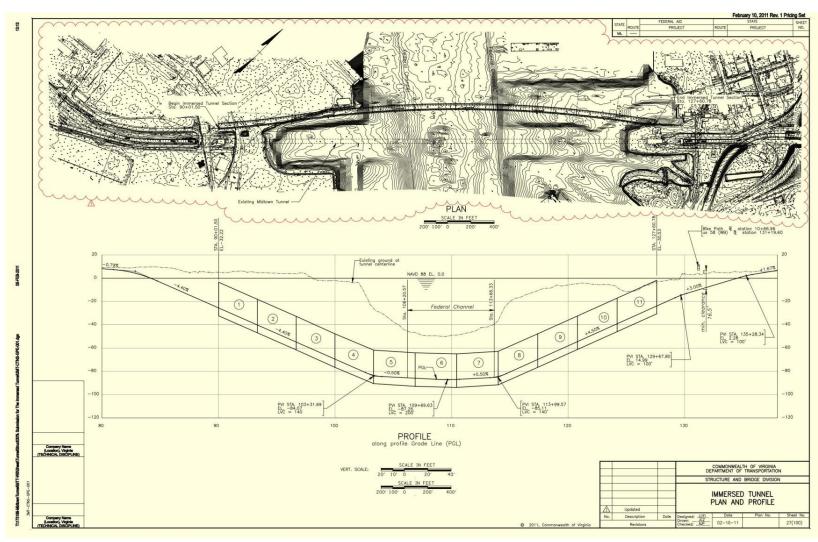




Heavy Civil & Marine Technology

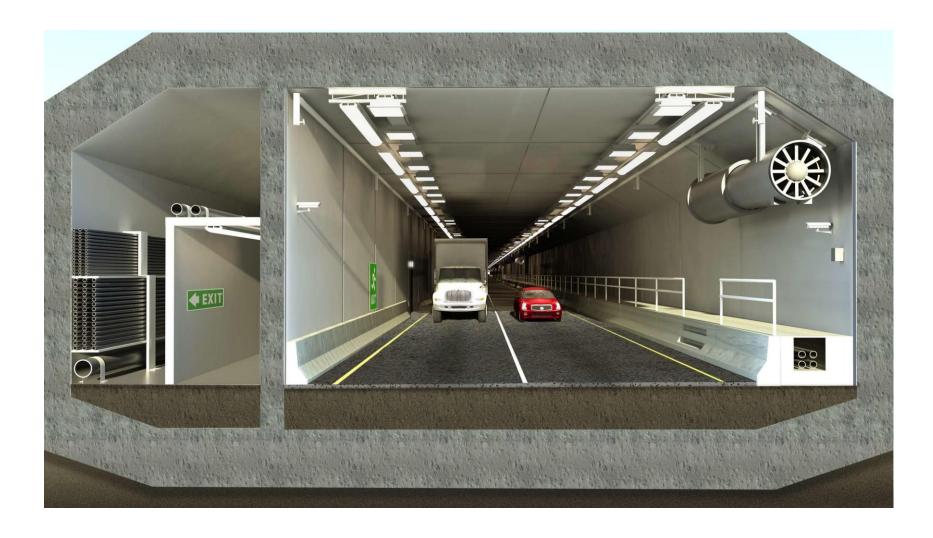
Plan and Profile





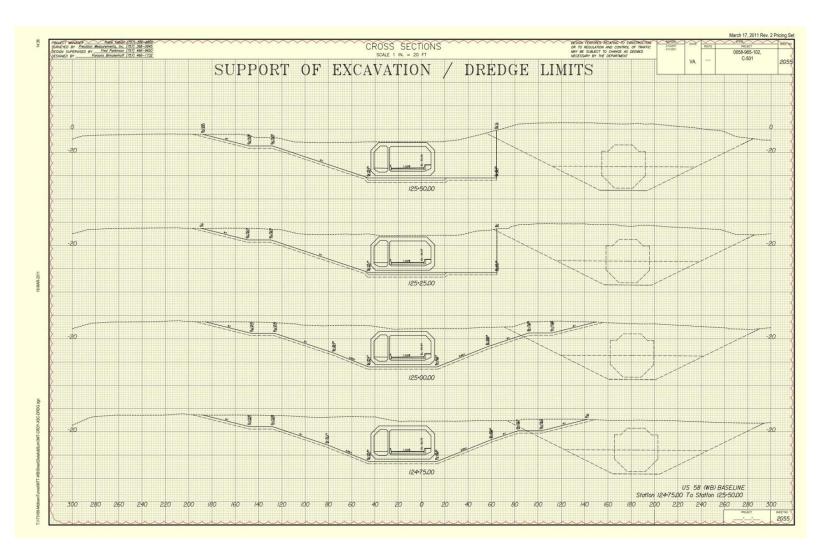
Immersed Tube Typical Section





Proposed vs. Existing

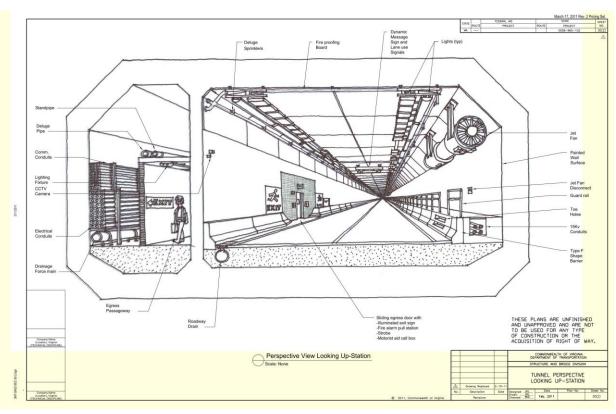




Safety Systems

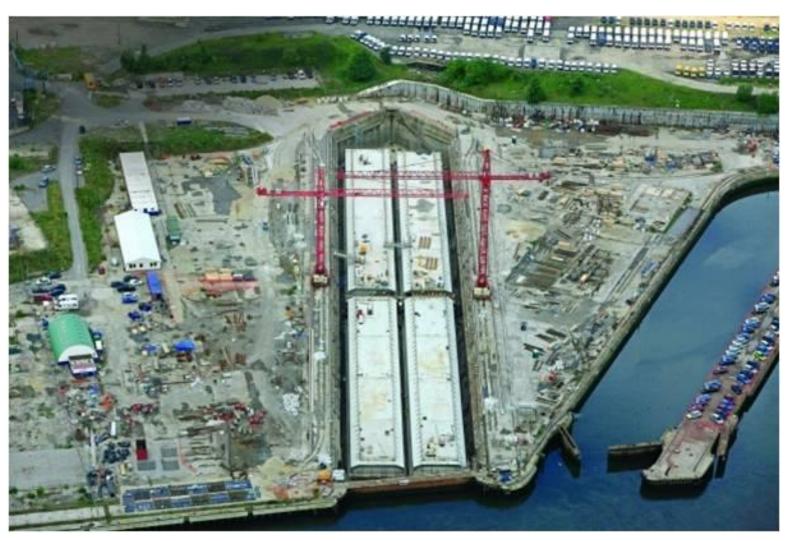


- Escape Corridor
- Jet Fans
- Deluge System
- Fire Sensors
- Fire Alarms
- Extinguishers
- Hose Connections
- Fireproofing
- Motorist Aid Phones
- Full camera surveillance



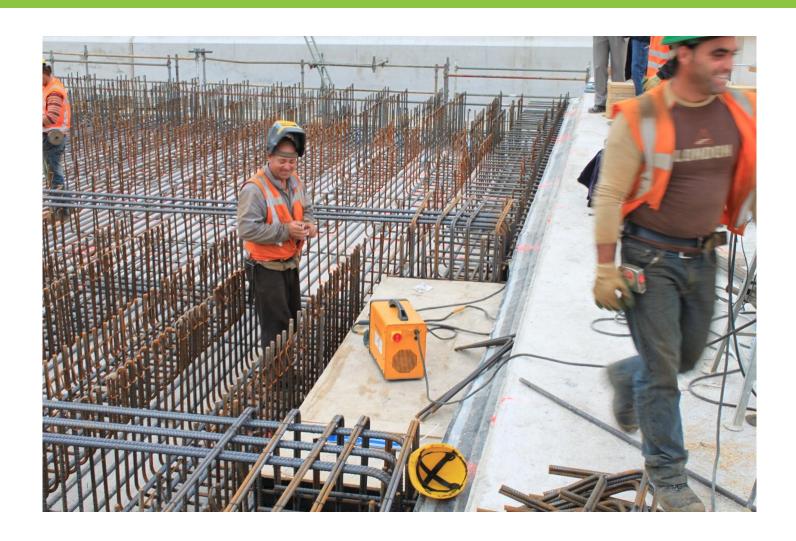
Typical Graving Dock





Reinforcing Steel





Building the Ballast Tanks





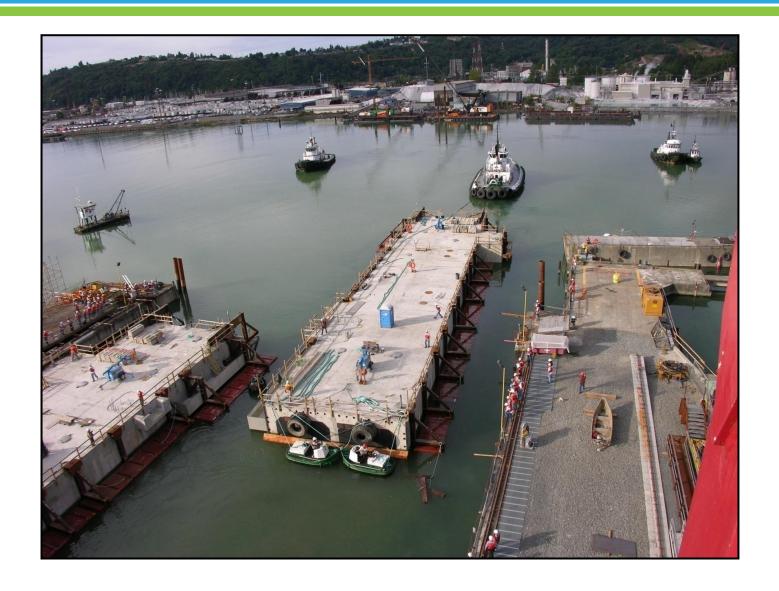
End Bulkheads





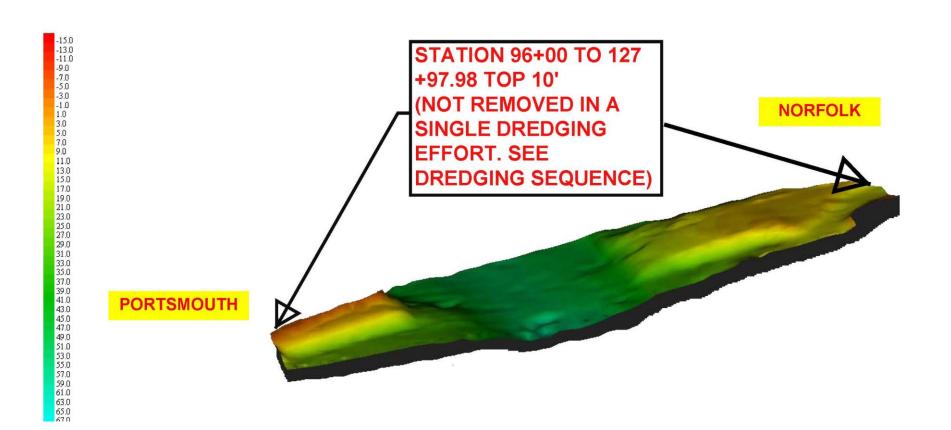
Float Out & Transport





River Bottom Dredging





Immersing the Tube Element





Toll Collection Technology

All Electronic Tolling (AET)



- No toll booths free flow through the Tunnels and on the MLK Extension
- Tolls collected by E-ZPass or license plate video
- A variety of convenient payment options
- Public information campaign prior to implementation
- Possible to vary tolls by time of day as a method to reduce congestion or offer targeted discounts



This project would not be possible without AET

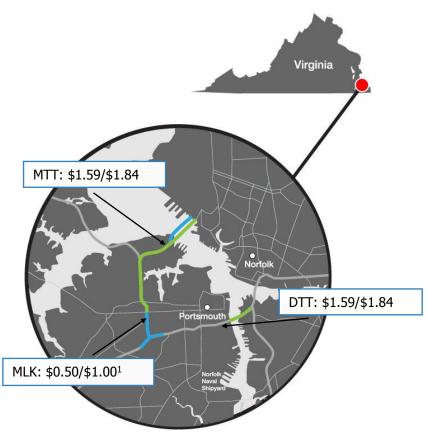
ETC Evolution to AET



- AET is a new stage for electronic toll collection (ETC) in Virginia:
 - —1st Generation: ETC at traditional toll plaza (Downtown Expressway)
 - —2nd Generation: ETC in express lanes (Pocahontas, Powhite)
 - —3rd Generation: ETC in HOT Lanes (transponder required)
 - —4th Generation: AET uses mix of ETC and Video Tolling open to all vehicles
- Virginia currently enforces toll violations by exception (2-4% of traffic)
- AET must process 20%-40% non E-ZPass customers every day
- These users must be given an opportunity to post-pay before being considered violators
- Legislative changes to enforcement have been made for AET
- Policies / Business Rules developed accordingly

Project Tolling





Tolling will be all-electronic (E-Zpass & video)

E-ZPass is pre-paid by customers

- E-ZPass accounts administered by VDOT state-wide Customer Service Center
- Electronic Toll Services Agreement between VDOT and ERC
- ERC will contract video tolling to FST
- Video toll surcharge is \$3.18
- Peak period tolls in effect from 5:30-9:00 AM and from 2:30-7:00 PM

Key

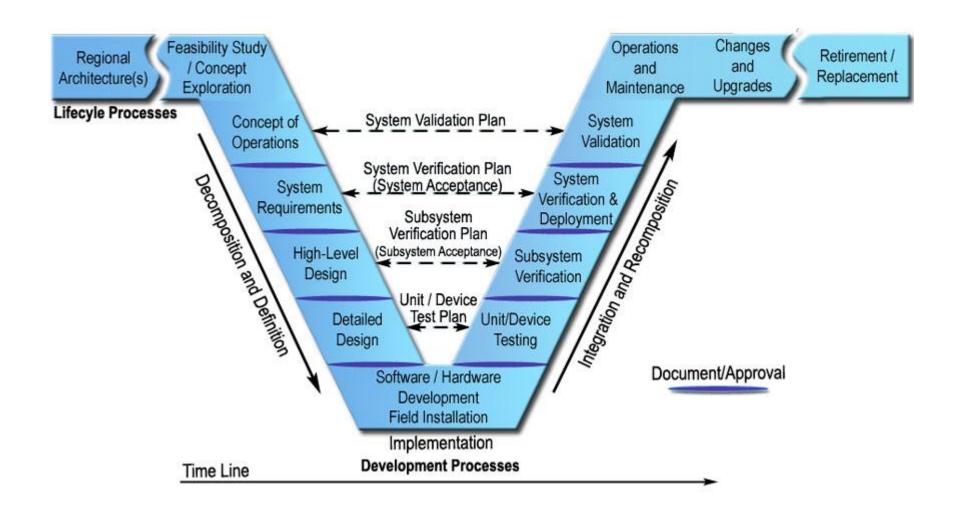
Blue = Greenfield components

Green = Brownfield components

1. Vehicles that use a tunnel on the same trip pay \$0.50

FHWA Systems Engineering





Toll System Contractor



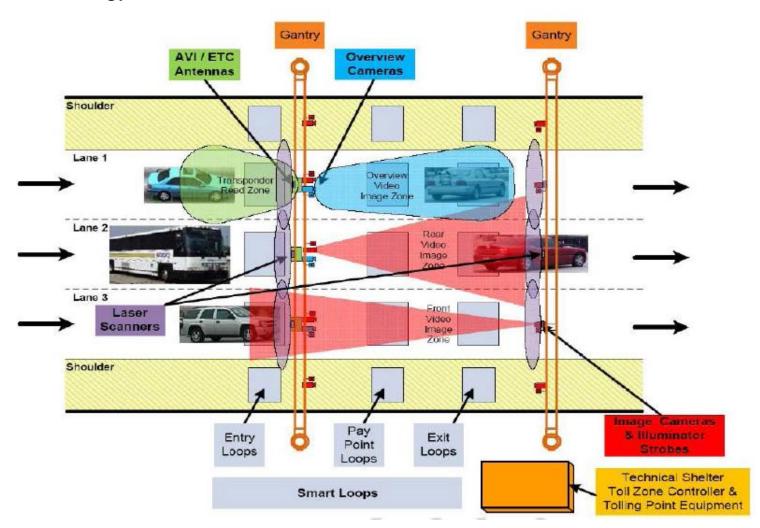
- Federal Signal Technologies Inc (FST) has been contracted to design and install the tolling system, and conduct toll collection operations
- FST acquired industry leader VE Systems and top-line equipment makers:
 - Idris inductive loops (de-facto industry standard)
 - PIPS cameras for video tolling
 - SIRIT lane controllers
- FST was recently acquired by 3M
- Currently performs work for VDOT and toll agencies in CA, TX, CO
- Will operate back-office, phone center, website



Typical Toll Zone



AET technology is state-of-the-art



Toll Gantries at Midtown Tunnel

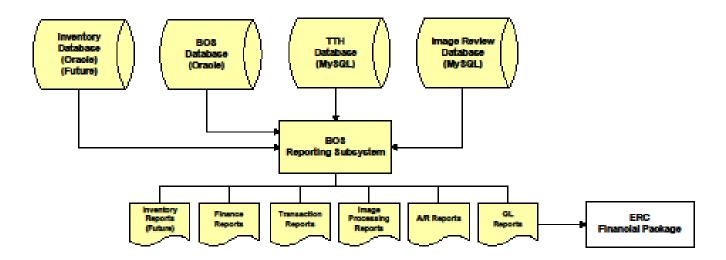




Seamless Data Flow



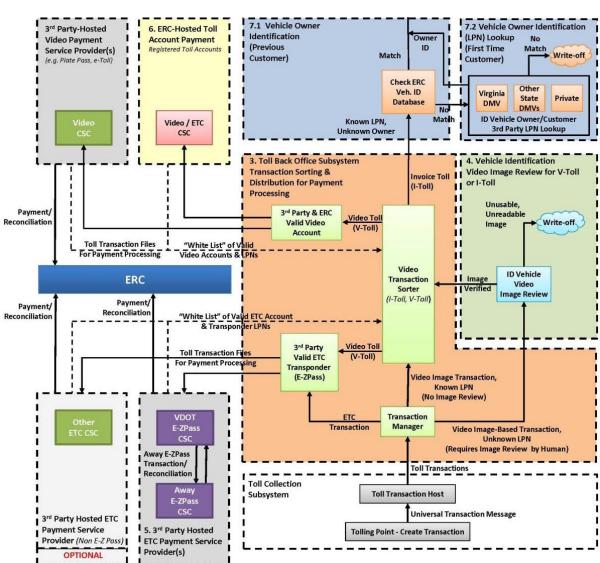
Data from the toll system flows through the reporting system into financial software package



Ready for Tommorrow?



- E-Zpass is processed through VDOT
- Video tolls processed by ERC
- System is designed to accommodate any number of external providers
- Multi-protocol readers are an option
- Must report to FHWA regarding interoperability



ITS Technology

ITS Design Stages



- ERC and VDOT entered into an Interim Agreement in December 2010
- Co-development up to approximately 30% design at signing of CA
- ERC retained Atkins for ITS to:
 - —Evaluate existing VDOT systems
 - —Recommend a strategy for ERC to "control its own destiny"
 - —Prepare a conceptual design and report
- Coordinated with:
 - —VDOT and Hampton Roads TOC
 - —CJV SKW (Skanska-Kiewit-Weeks Marine)
 - —Designer Parsons Brinkerhoff
 - —Systems Integrator Transdyn
 - —Installation sub Mass Electric
- Now beginning final design process

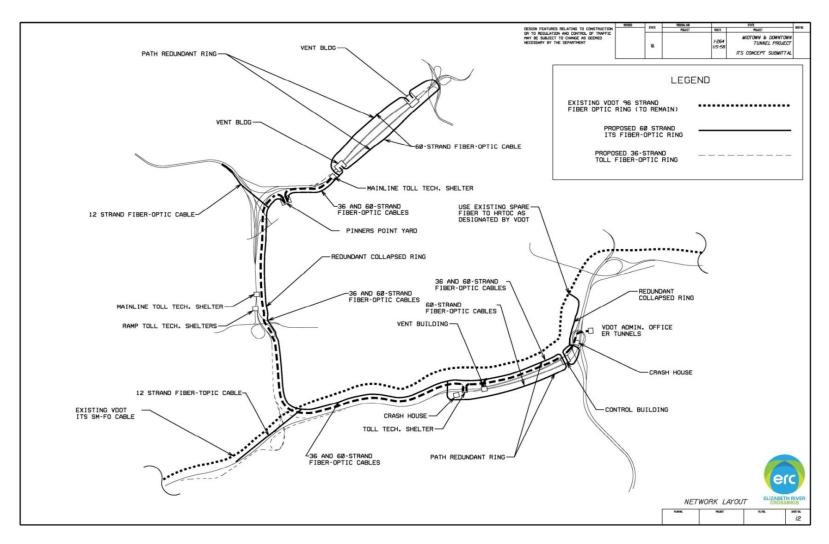
ERC ITS System Quantities



- 60 CCTV cameras (including those in the tunnels used also for video incident detection)
- 48 DMS signs (1, 2 or 3 line types)
- Twelve variable speed limit signs
- Nineteen microwave detectors
- 120 reversible lane signals
- Twenty traffic signals
- Eight barrier gates
- 39 over-height detectors
- Ten over-height inspection stations

Communication Network





Existing Downtown Control Room



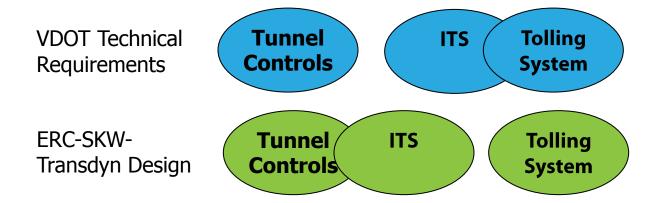


Tunnel SCADA

Systems Integration

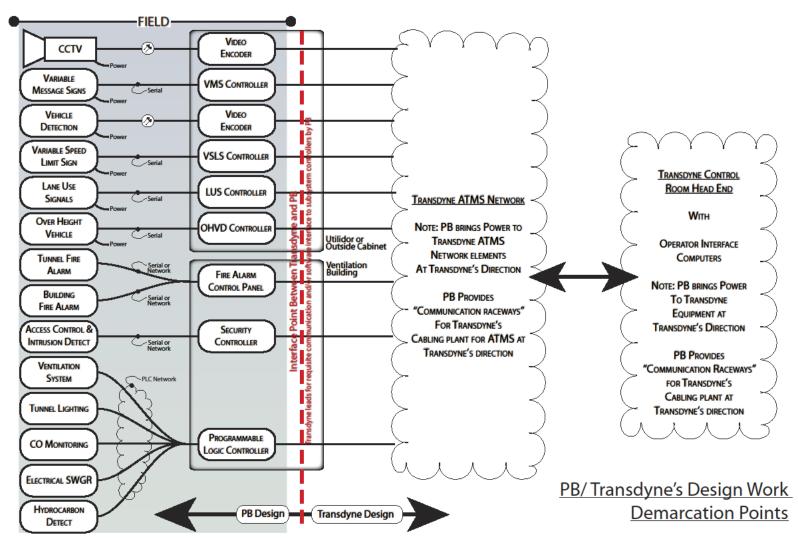


- ERC Approach to systems integration is opposite what VDOT envisioned
- Roadway ITS will be integrated with tunnel controls (SCADA)
 - Current separate control rooms will be combined into refurbished DTT which will control both tunnels
 - —Previously separate systems will be integrated for smooth operation.
 - —"Pre-programmed Response Plans" will be built in
- Toll System will be designed, operated and maintained completely separate



Scope Demarcation





Thank you!



