

# “Crossing the Lower Chesapeake Bay”

## The Chesapeake Bay Bridge-Tunnel Facility



March 8, 2018

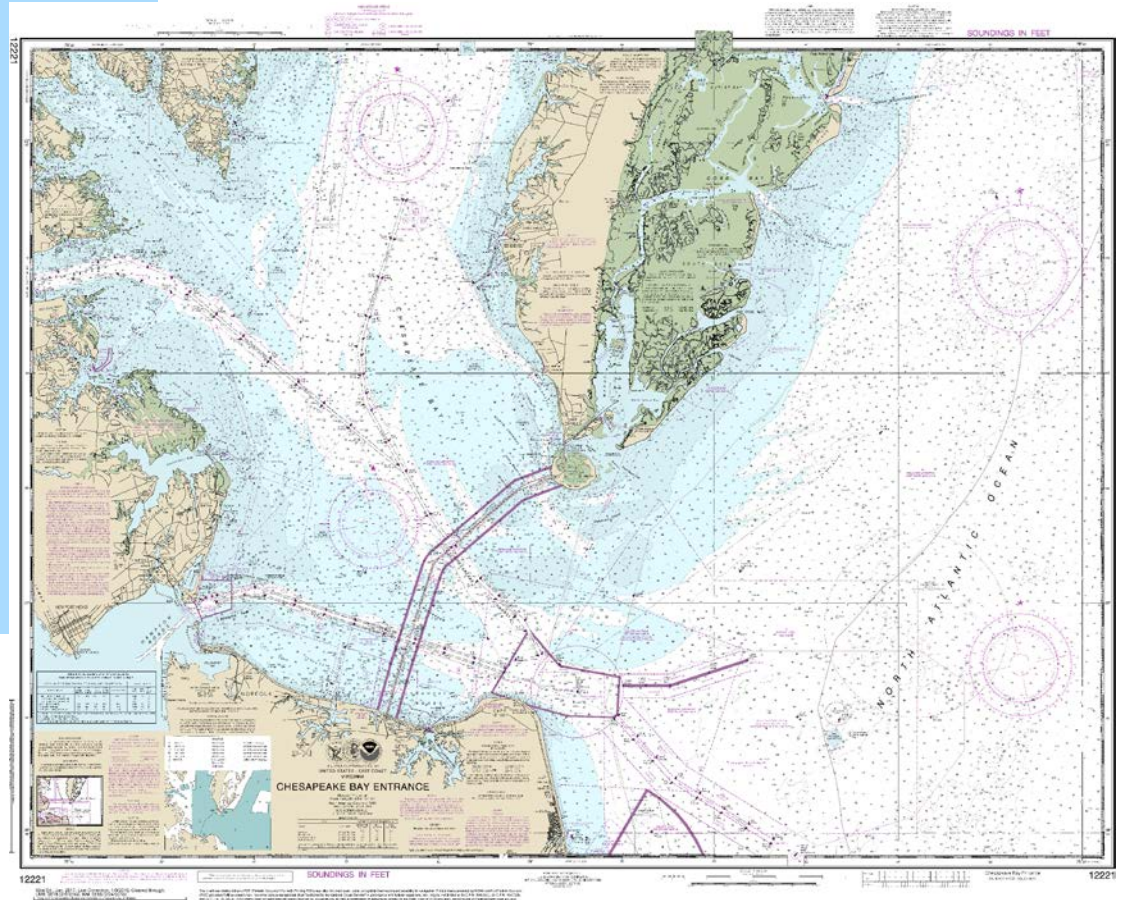
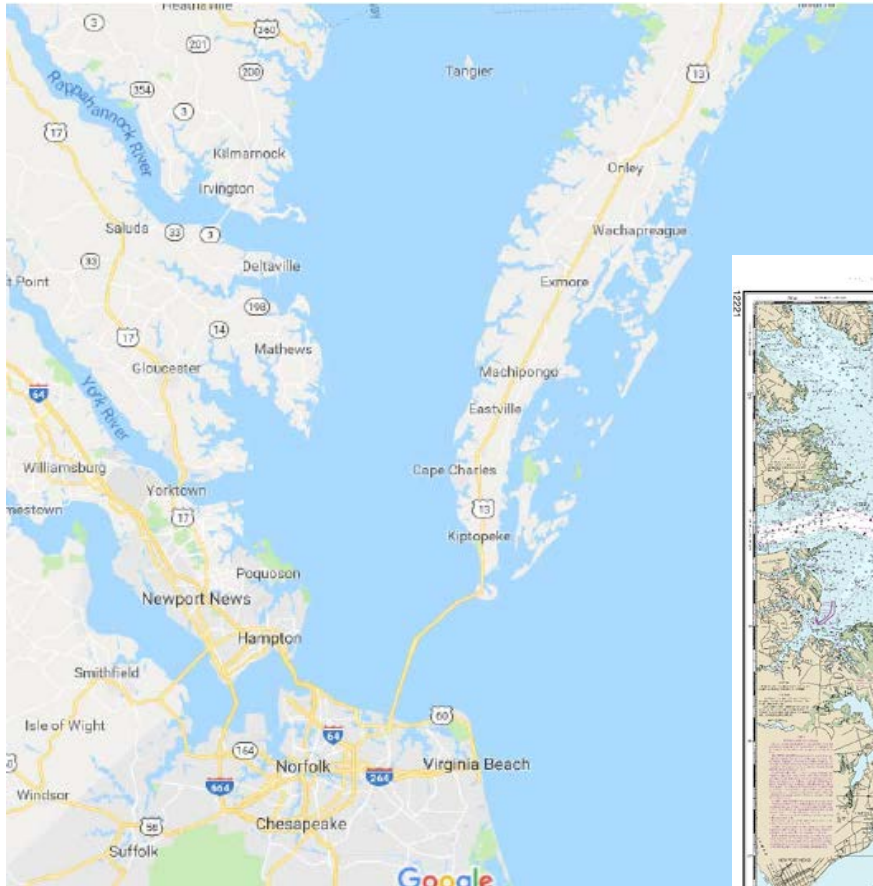
Chris Williams, P.E.  
Jacobs Engineering Group



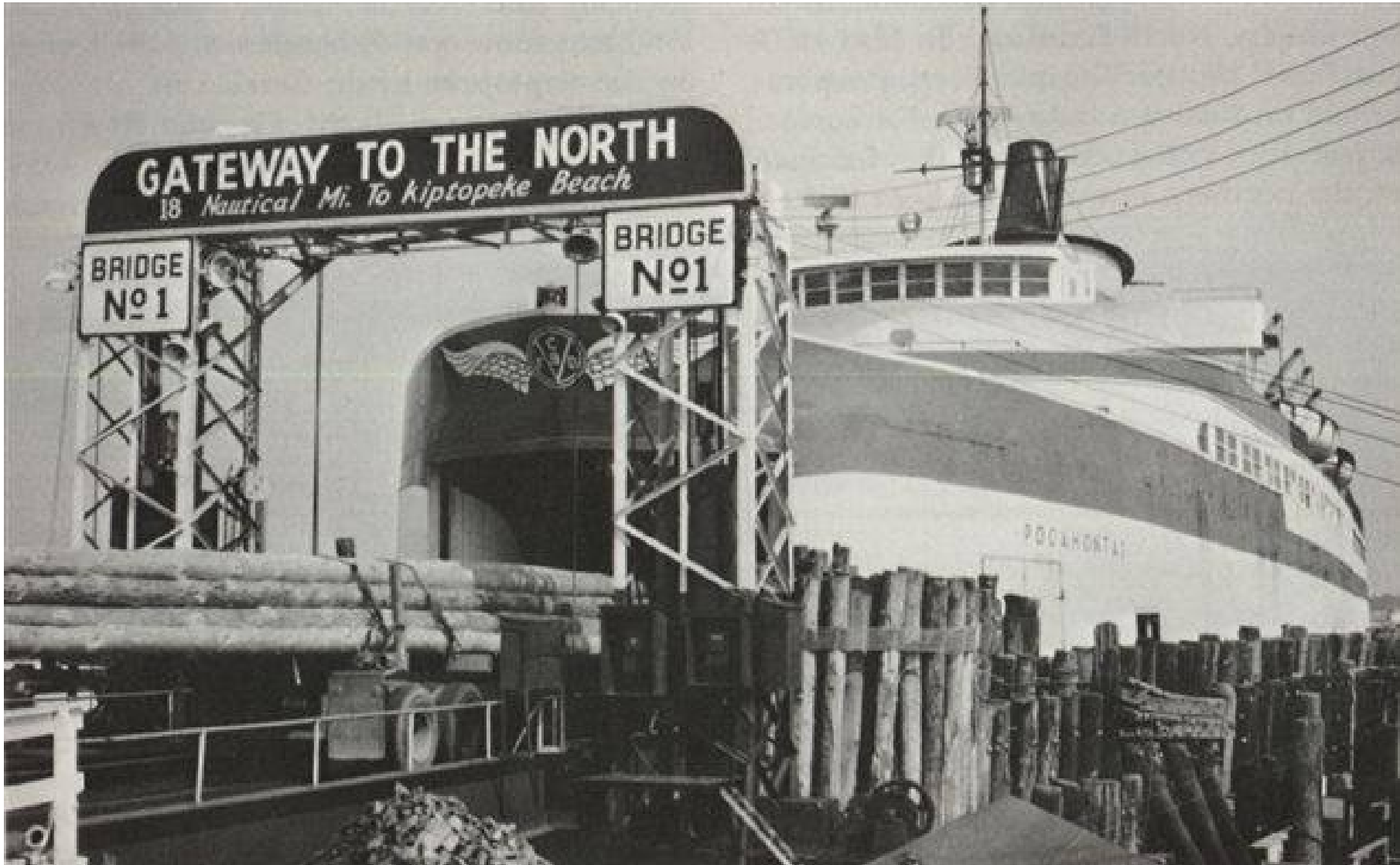
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# Location



# Ferry Crossing



# The Original Crossing



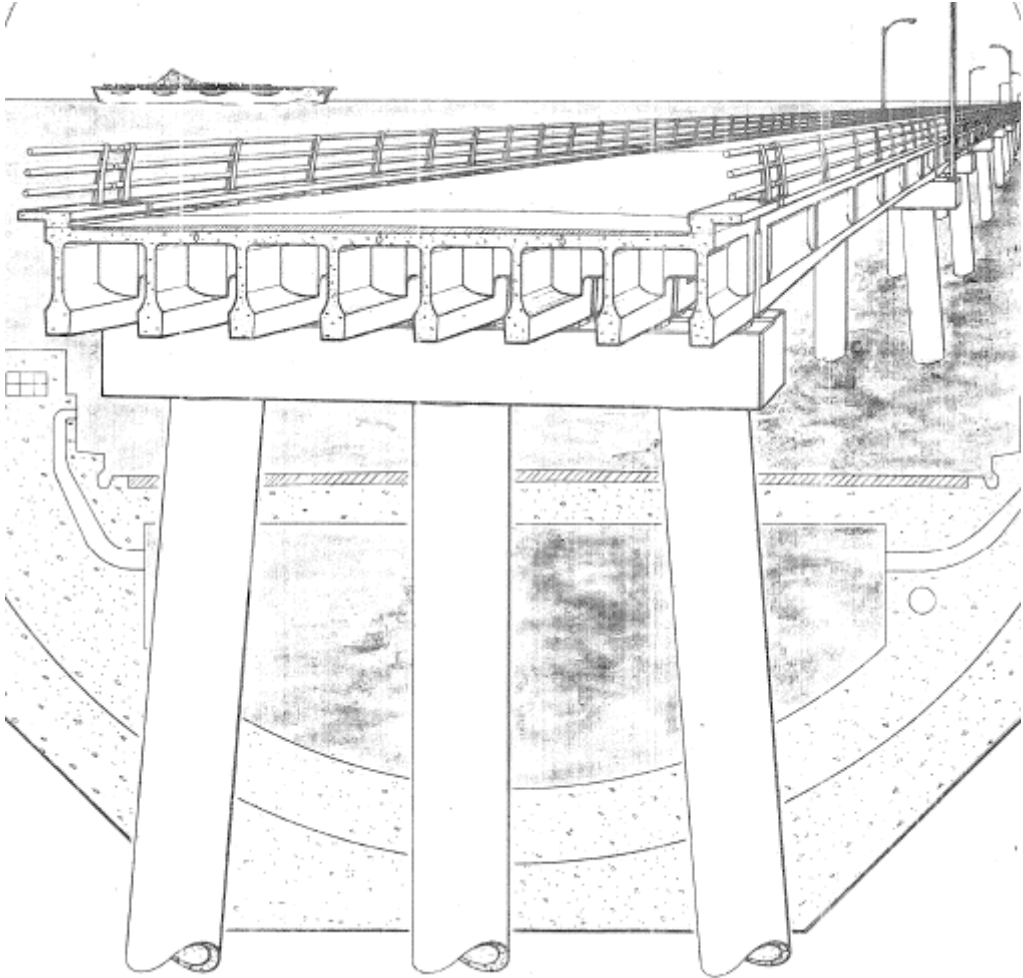
# The Original Crossing



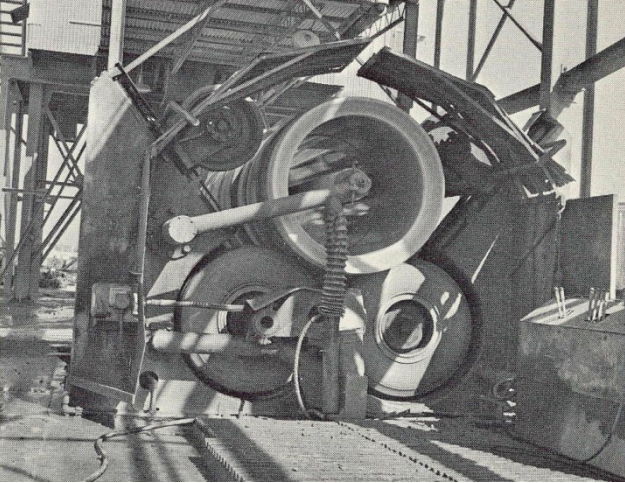
# The Original Crossing



# The Original Crossing



# The Original Crossing





# The Original Crossing



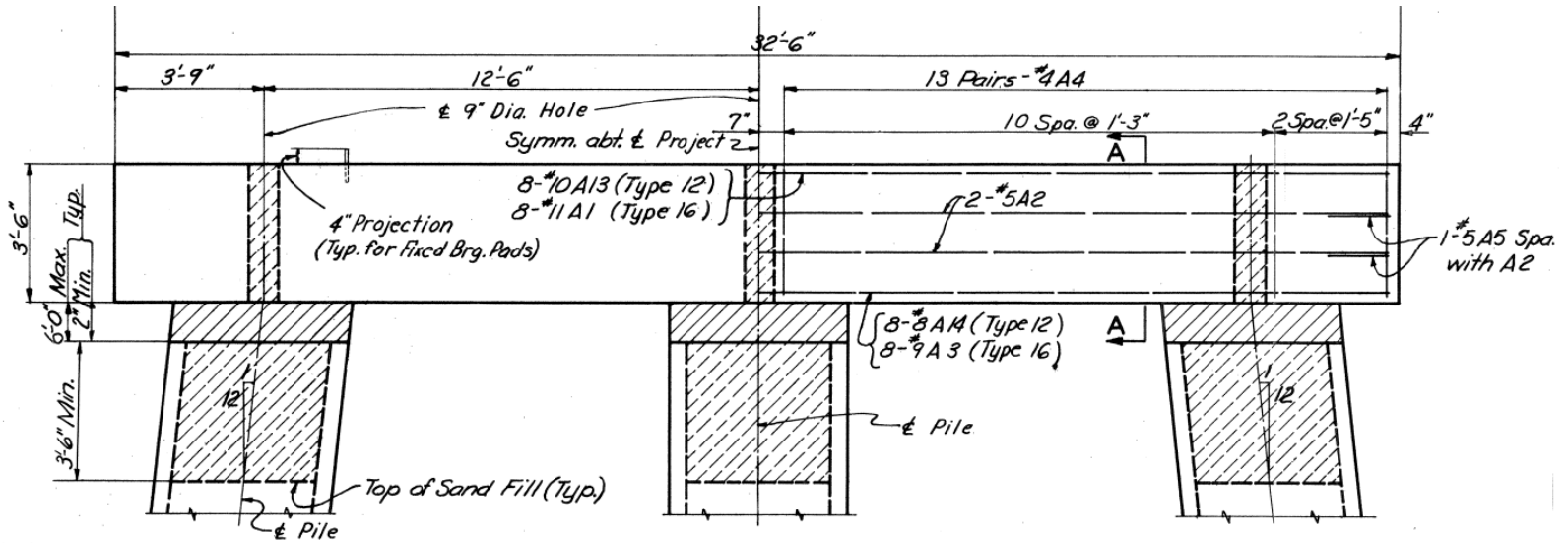
# The Original Crossing



# The Original Crossing



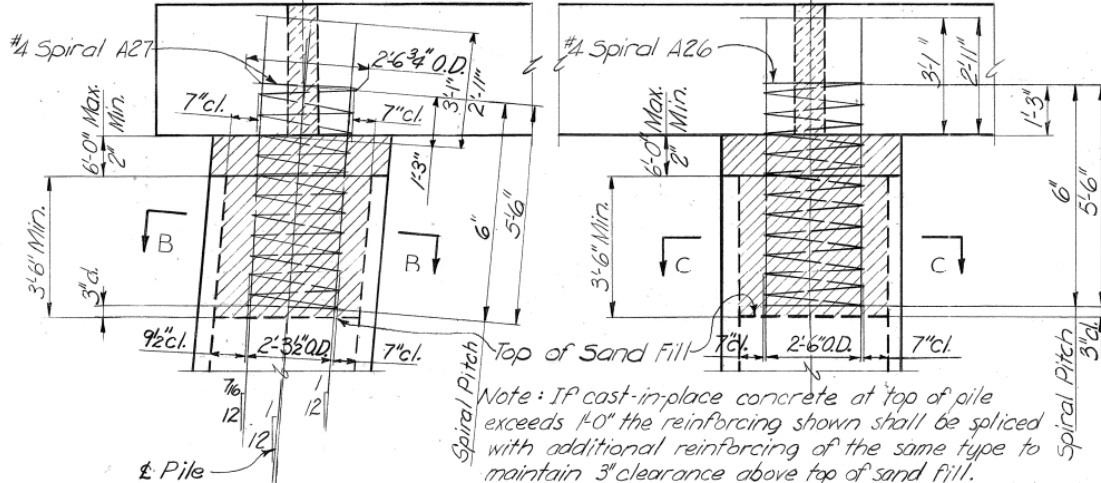
# The Original Crossing



9" Dia. hole may be shifted slightly to facilitate formwork, subject to Engineer's final approval of formwork drawings.

Note: For Reinf. Bar sizes see Sections B-B & C-C.

PILE DET  
SCALE: 3/8"=1'

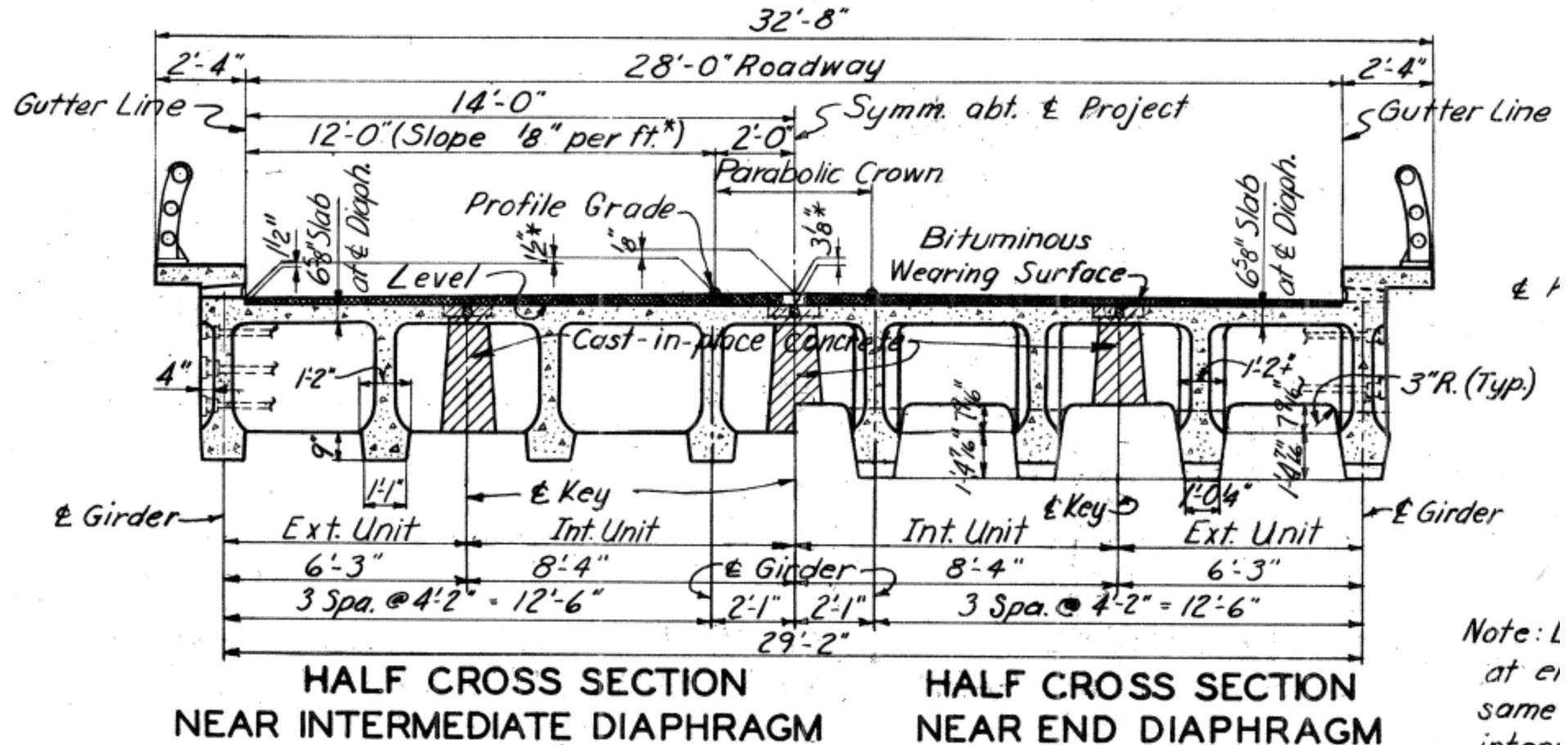


Note: If cast-in-place concrete at top of pile exceeds 1'-0" the reinforcing shown shall be spliced with additional reinforcing of the same type to maintain 3" clearance above top of sand fill.

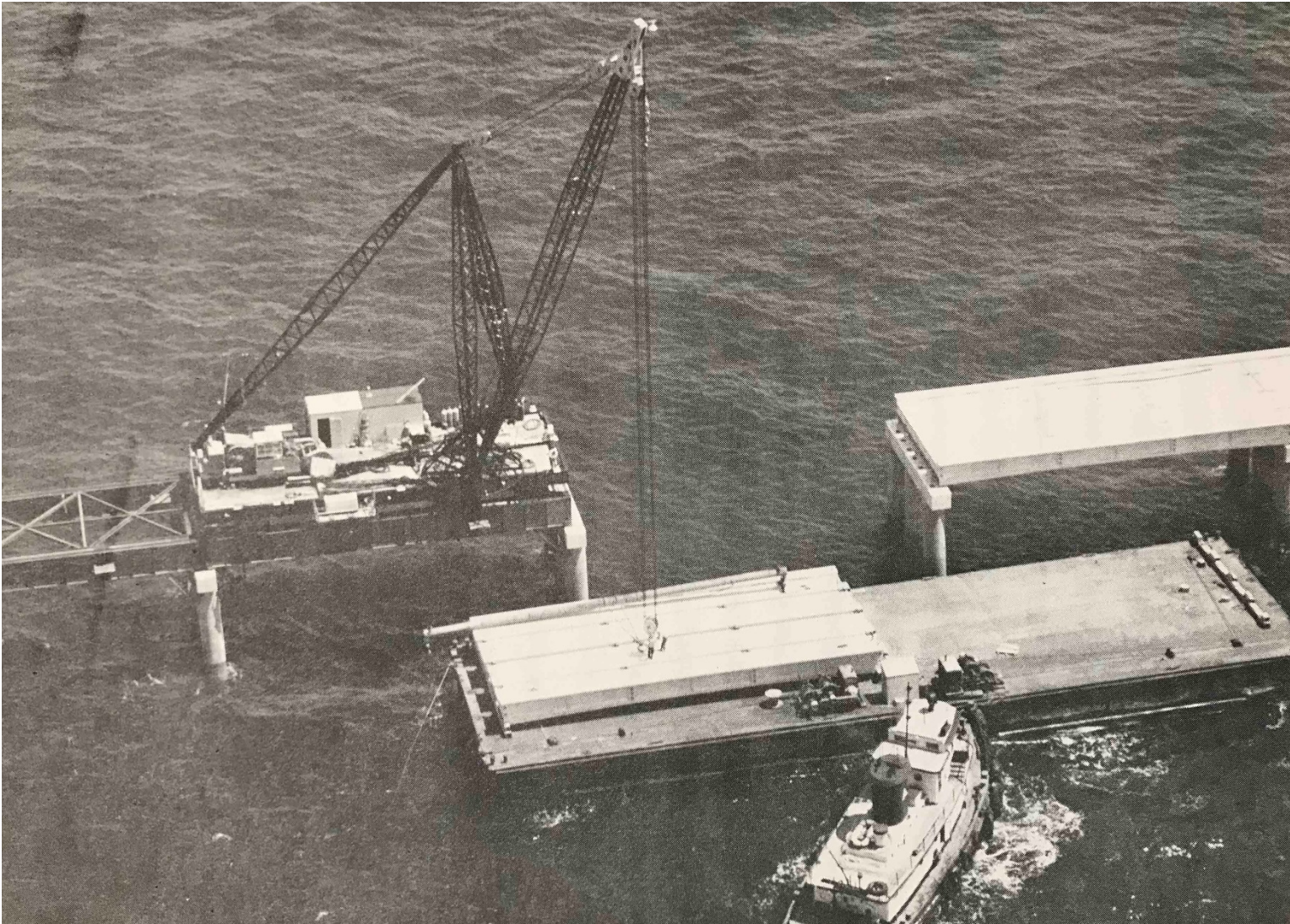
# The Original Crossing



# The Original Crossing



# The Original Crossing



# The Original Crossing

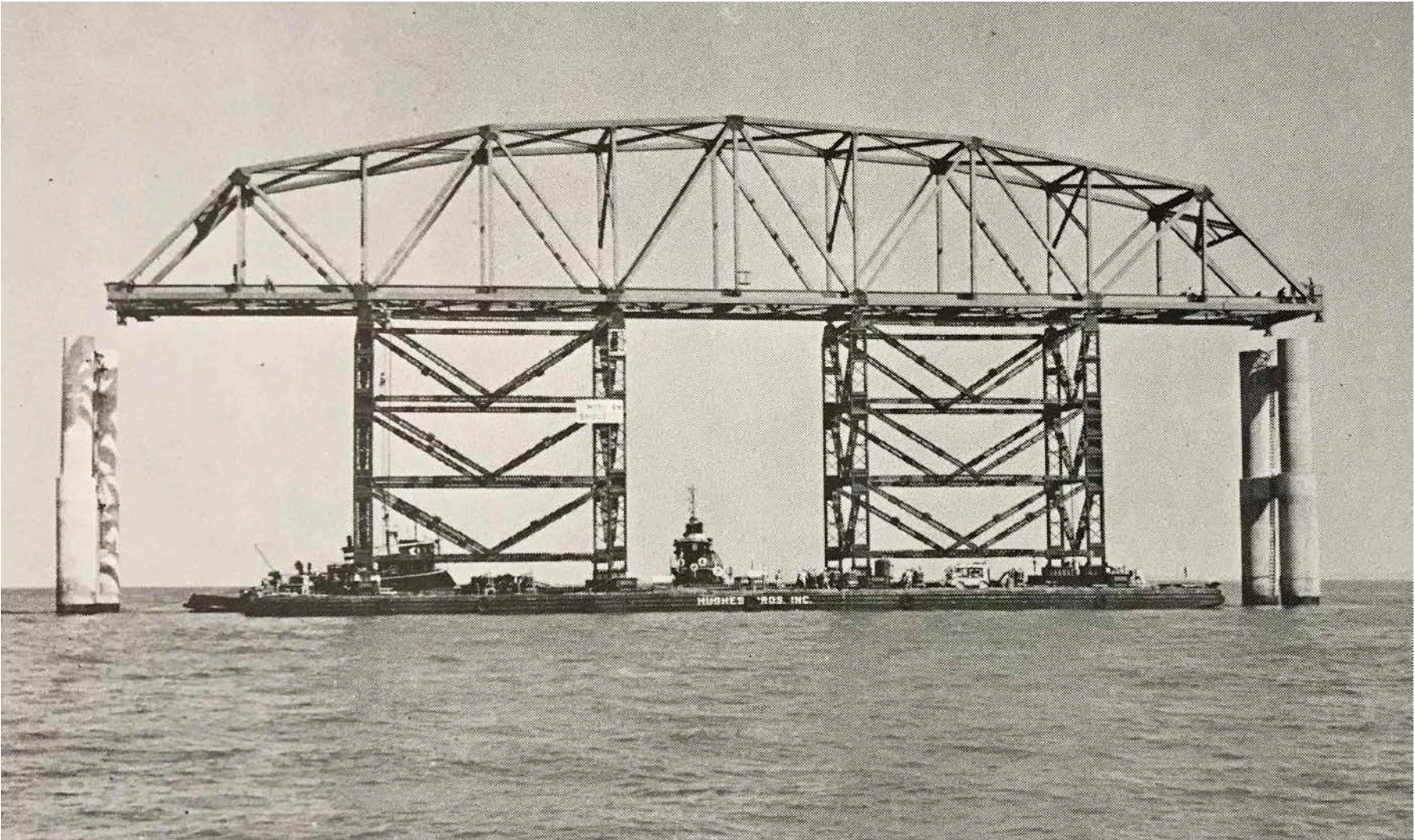




# The Original Crossing



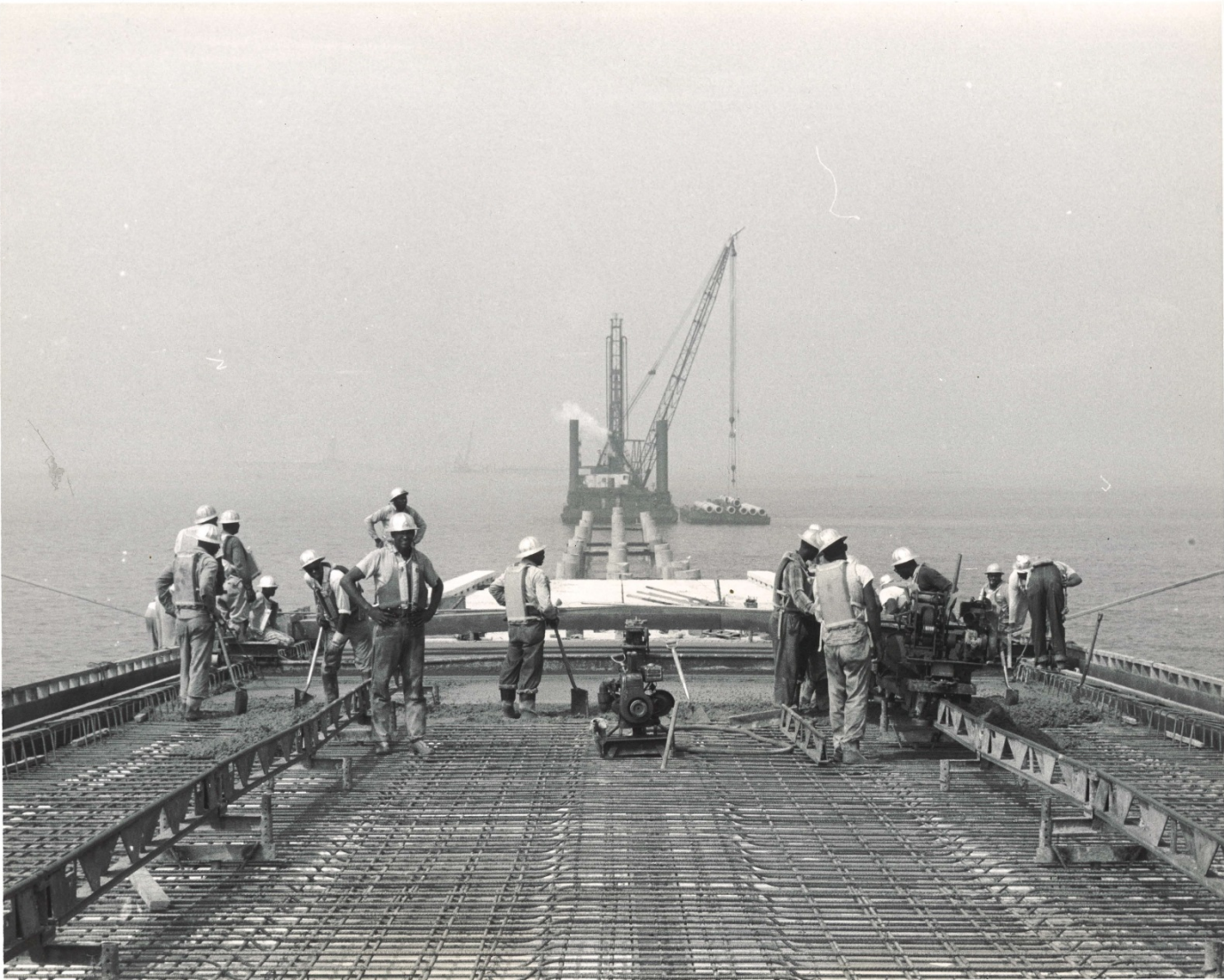
# The Original Crossing



# The Original Crossing



# The Original Crossing



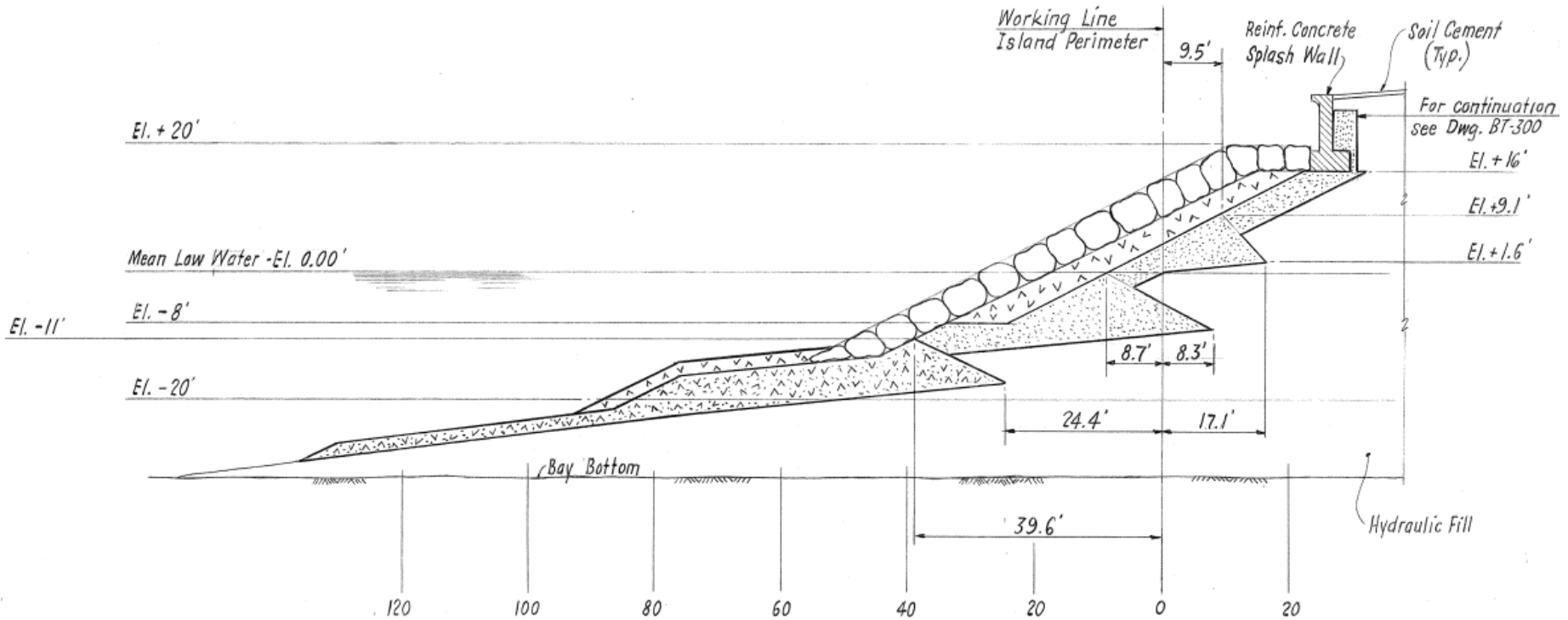
# The Original Crossing



# The Original Crossing



# The Original Crossing



CROSS SECTION THRU ISLAND - SCHEME I  
TOE OF SLOPE PROTECTION

# The Original Crossing



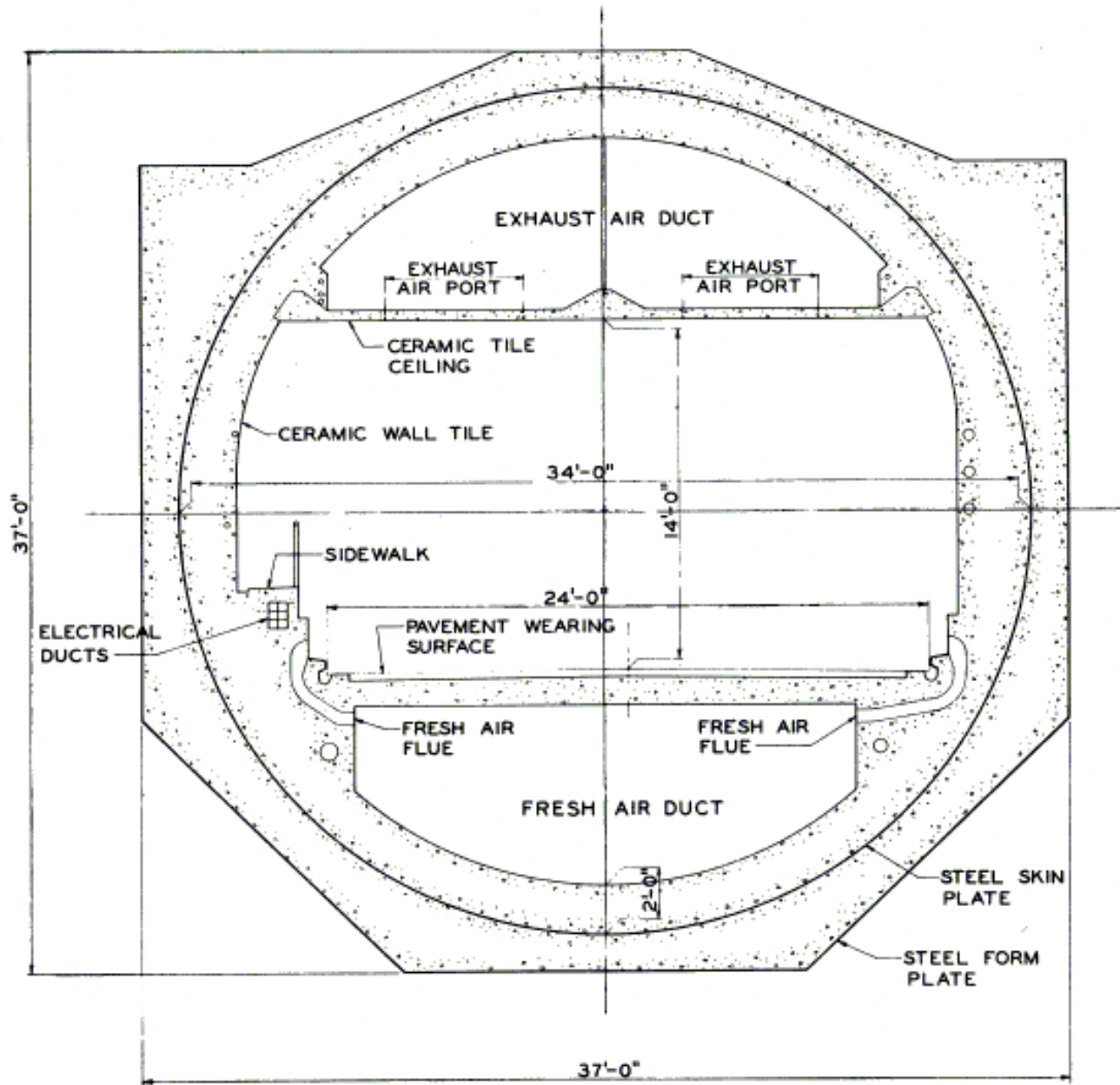


# The Original Crossing



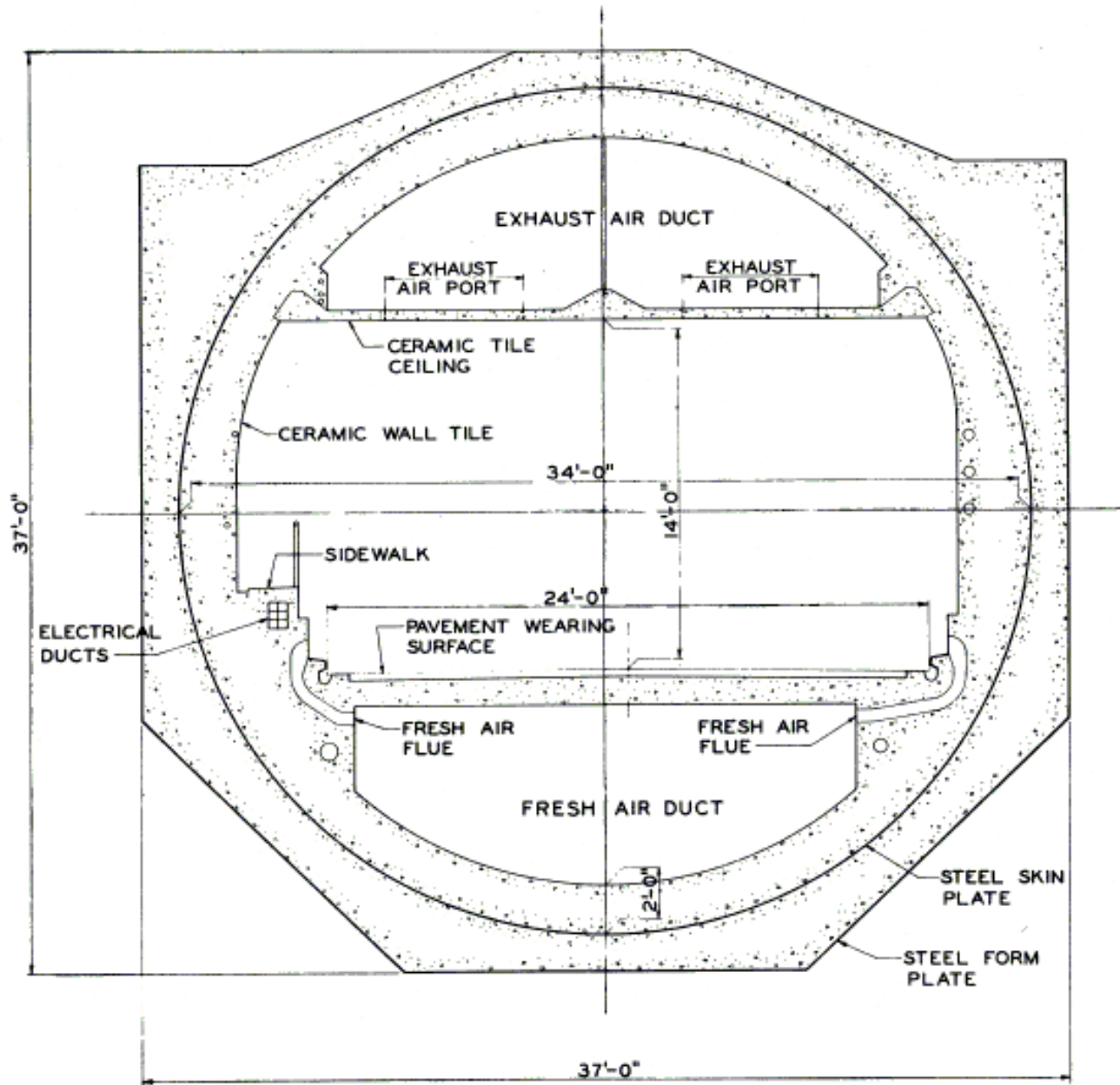
# The Original Crossing





# The Original Crossing





# The Original Crossing

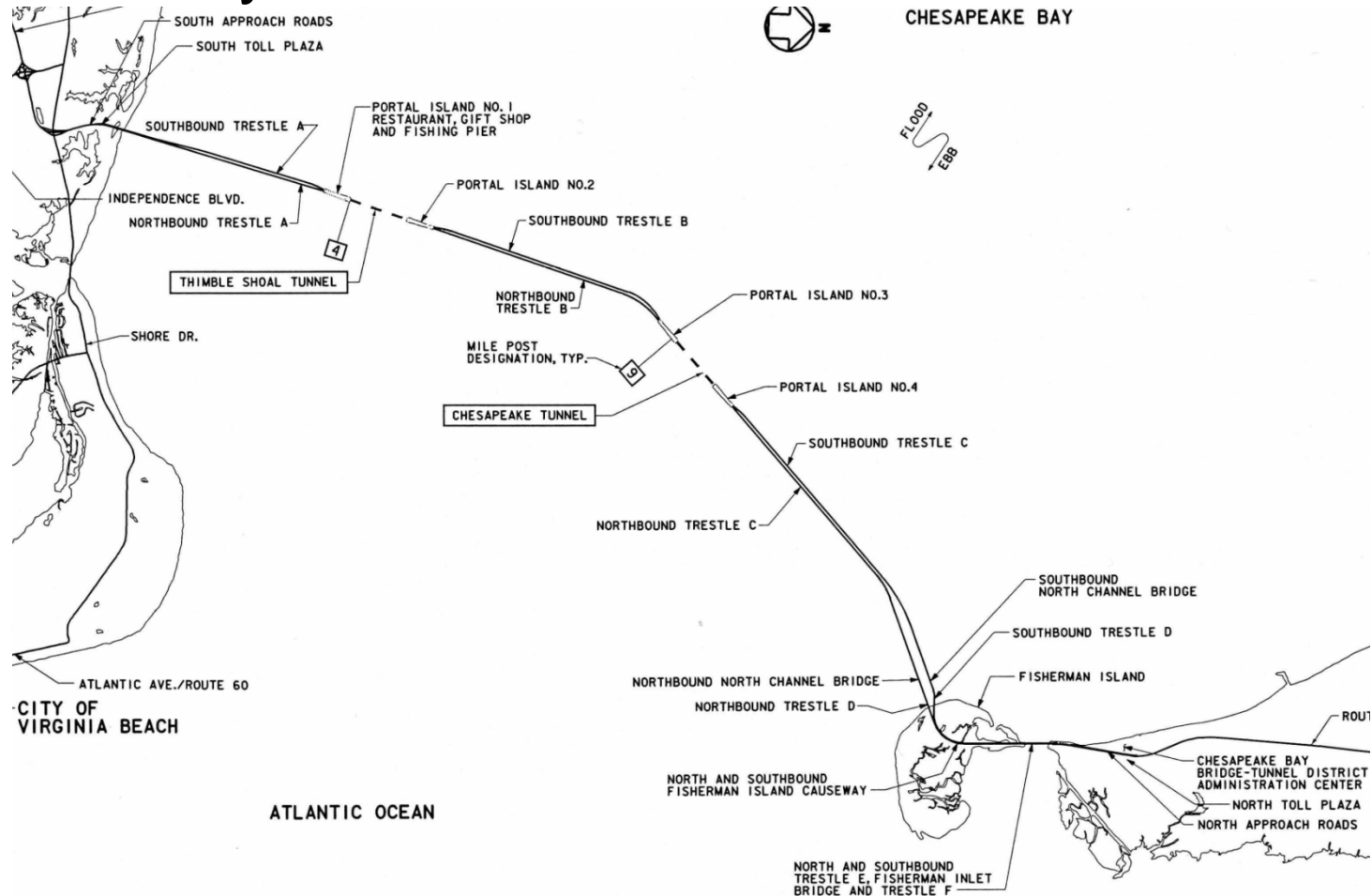


# The Original Crossing



# The Parallel Crossing

- Mid 1980's need for expansion considered
- Safety, maintenance & seasonal traffic

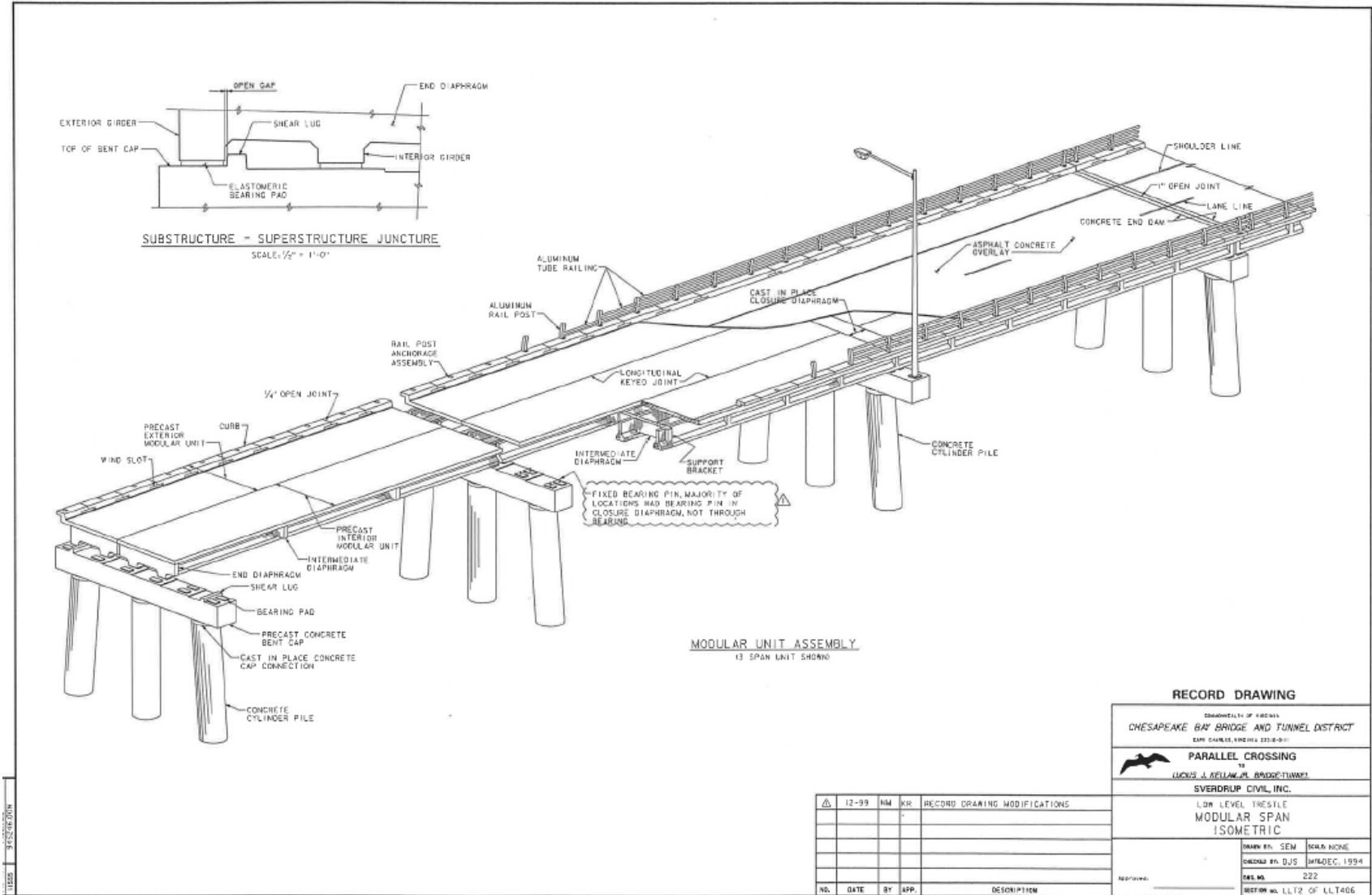




# The Parallel Crossing

- New construction on West (Bay) side
- 36-ft roadway
- Two 12-ft lanes, 10-ft and 2-ft shoulders
- 250-ft Typical separation between old and new trestles, 64 ft at south end leaving Virginia Beach
- Typical 100-ft trestle spans, 12 miles
- Two high-level bridges – NCB & FIB
- 800-ft separation at North Channel to minimize scour effects relative to each other
- Expanded toll plazas

# The Parallel Crossing

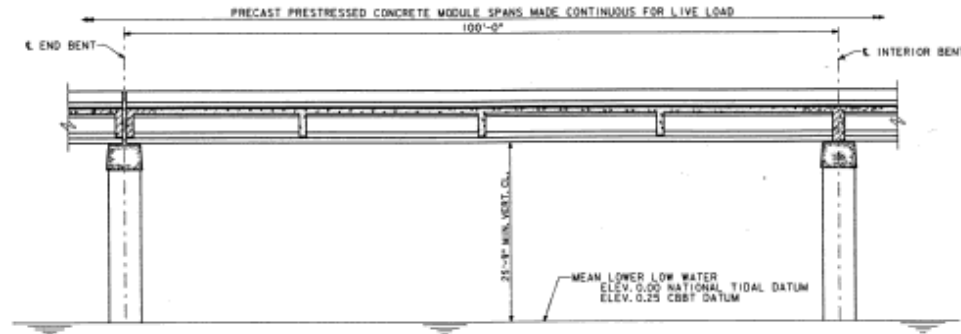


**RECORD DRAWING**

DRAWN BY: SEM		SCALE: NONE
CHECKED BY: DJS		DATE: 12/DEC, 1994
DES. NO. 222		
SECTION NO. LL12		OF LL1406

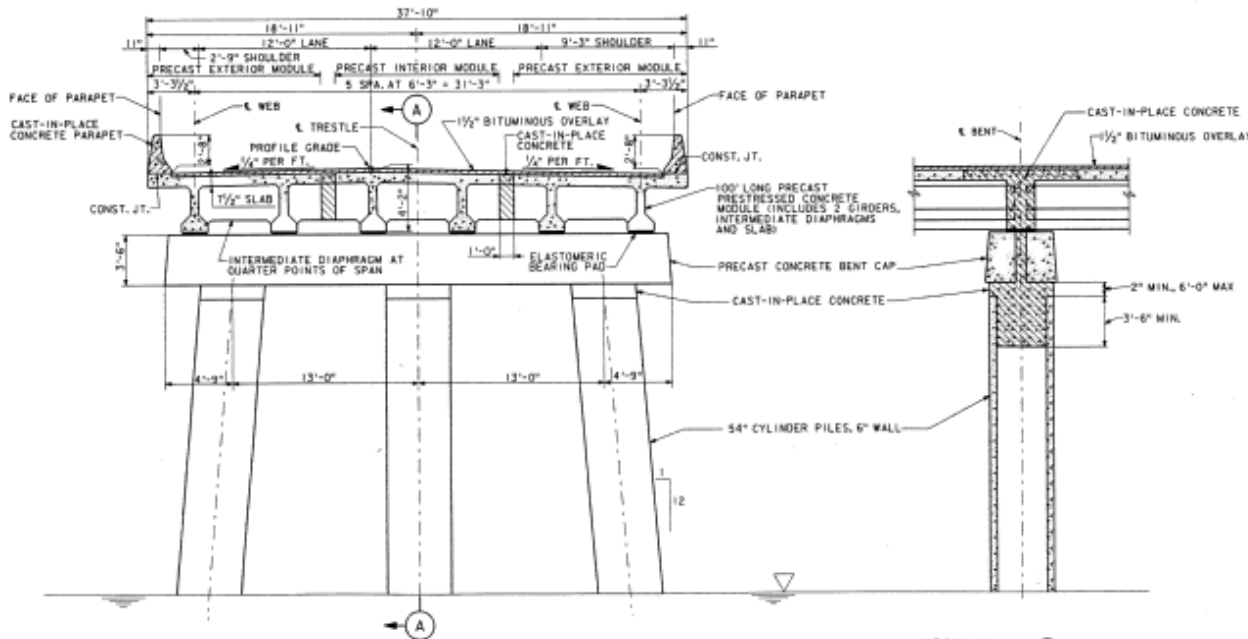
NO.	DATE	BY	APP.	DESCRIPTION
12-99	NM	KR		RECORD DRAWING MODIFICATIONS

# The Parallel Crossing



LONGITUDINAL SECTIONAL ELEVATION

SCALE:  $\frac{1}{8}'' = 1'-0''$

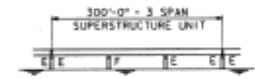


TRANSVERSE SECTIONAL ELEVATION

SCALE:  $\frac{1}{4}'' = 1'-0''$   
NOTE: LOOKING SOUTH

SECTION A

SCALE:  $\frac{1}{4}'' = 1'-0''$



CONCEPTUAL CONFIGURATION  
SCALE: NONE

PARALLEL  
CHESAPEAKE BAY  
BRIDGE AND TUNNEL  
LOW LEVEL TRESTLE  
ALTERNATE 3-PRECAST PRESTRESSED  
CONCRETE MODULE SPANS

**JACOBS**

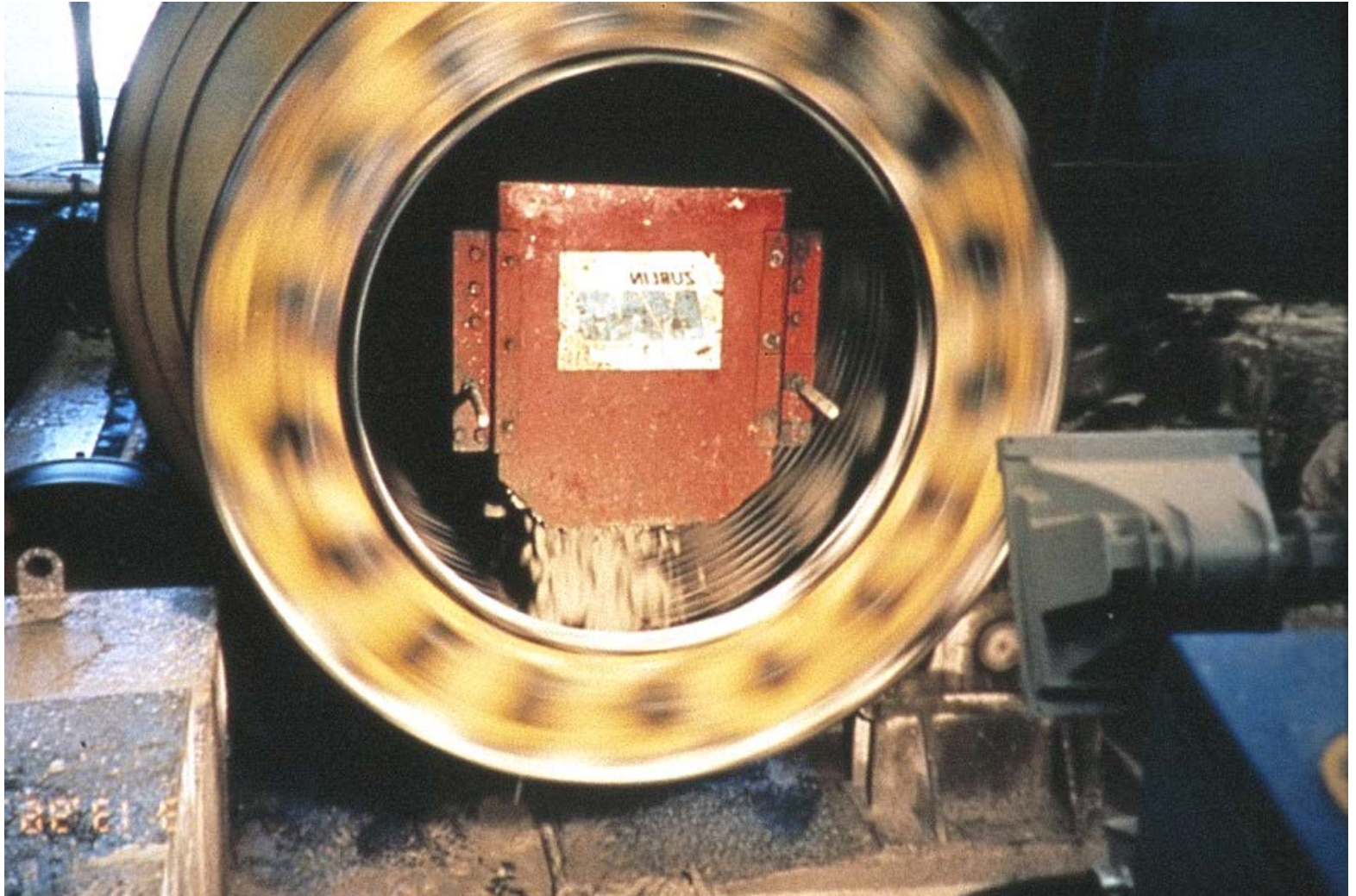
# The Parallel Crossing

- 18-ft or 23-ft Segments
- Fabricate spiral cage
- Place cage in cylindrical form with P/T ducts



# The Parallel Crossing

- Place concrete from conveyor as spinning



## The Parallel Crossing

- Centrifugal spin at 200 RPM for 20 minutes
  - Centrifugal force = higher density and improves durability and decreases permeability



# The Parallel Crossing – Piles

- Steam cure for 3 hours nominal
- Strip forms
- Yard storage until P/T
- Place segments in P/T bed
- Epoxy joints between segments, P/T segments and grout ducts
- Release at 4 ksi (grout) – Less than 24 hrs.

# The Parallel Crossing





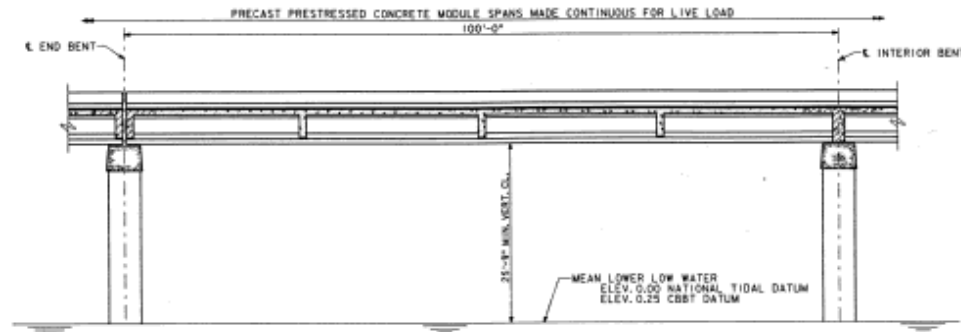
# The Parallel Crossing



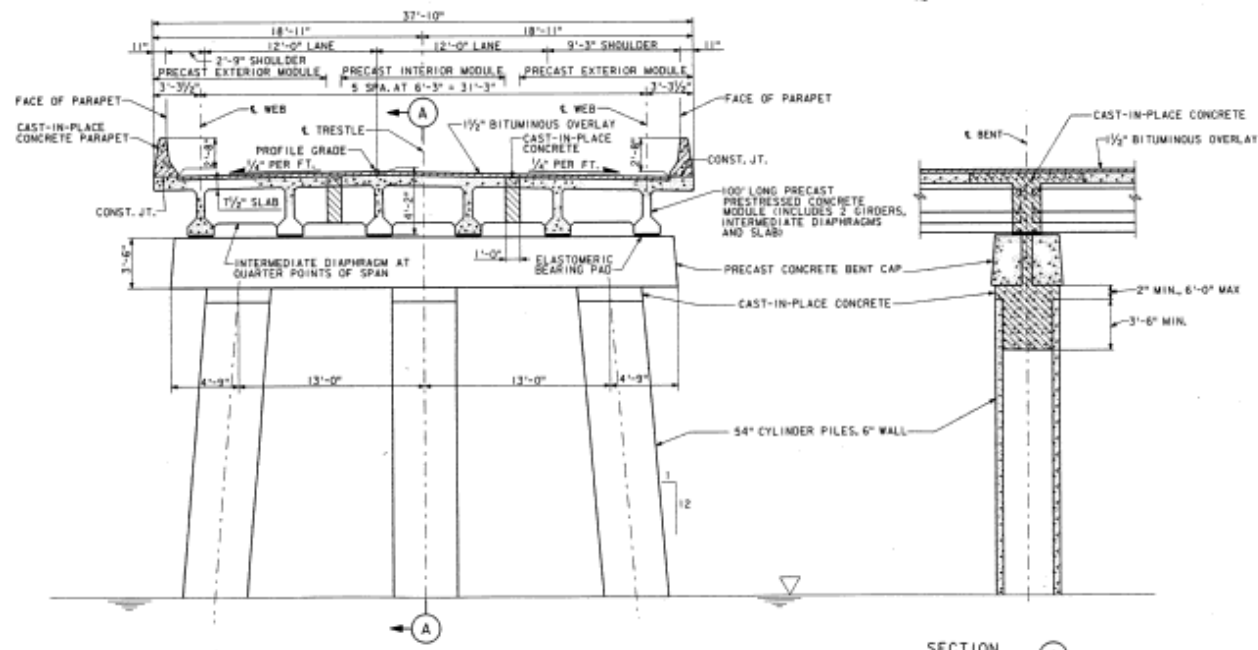
# The Parallel Crossing



# The Parallel Crossing

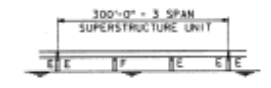


LONGITUDINAL SECTIONAL ELEVATION  
SCALE: 1/8" = 1'-0"



TRANSVERSE SECTIONAL ELEVATION  
SCALE: 1/4" = 1'-0"  
NOTE: LOOKING SOUTH

SECTION A  
SCALE: 1/4" = 1'-0"



CONCEPTUAL CONFIGURATION  
SCALE: NONE

PARALLEL  
CHESAPEAKE BAY  
BRIDGE AND TUNNEL  
LOW LEVEL TRESTLE  
ALTERNATE 3-PRECAST PRESTRESSED  
CONCRETE MODULE SPANS



# The Parallel Crossing



# The Parallel Crossing



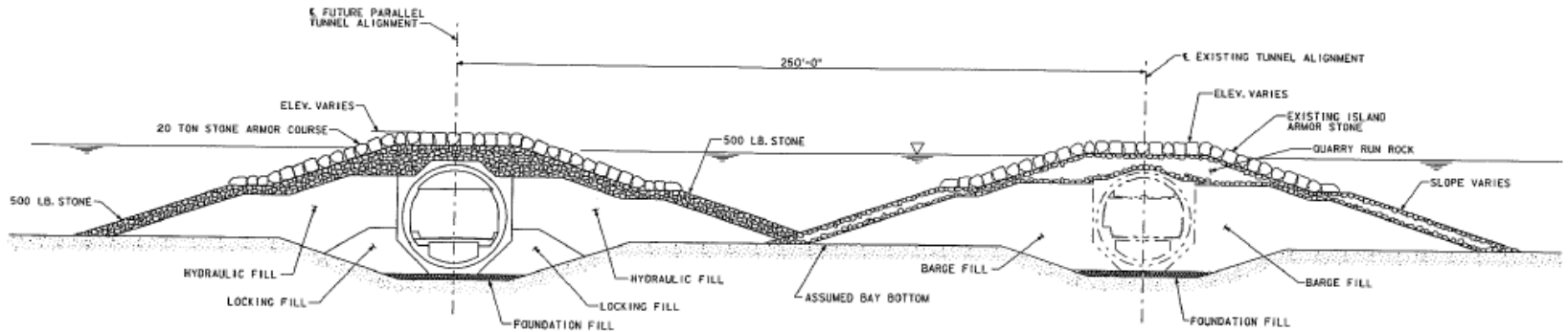
# The Parallel Crossing



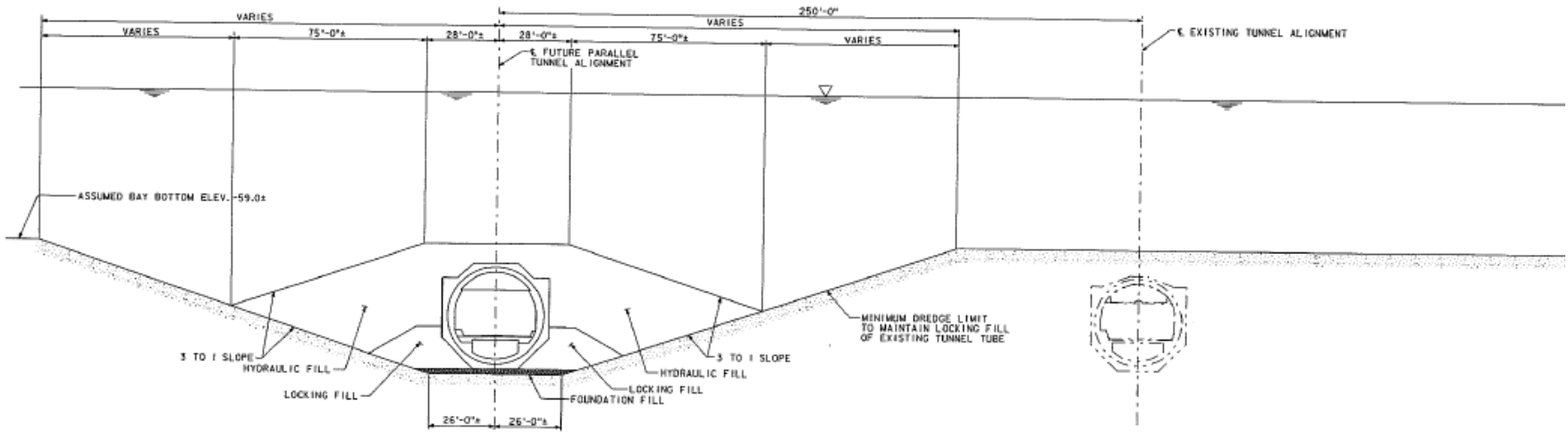
# The Parallel Crossing



# The Parallel Crossing



SECTION THRU TUNNELS NEAR PORTAL ISLANDS  
SCALE: 1" = 40'



SECTION THRU TUNNELS AT MID - CHANNEL  
SCALE: 1" = 40'

PARALLEL  
CHESAPEAKE BAY  
BRIDGE AND TUNNEL



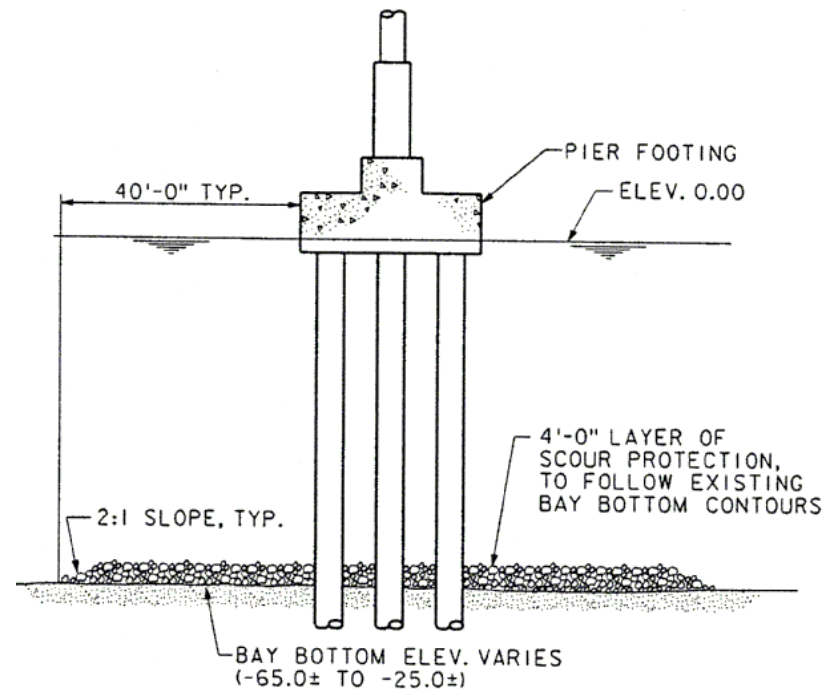
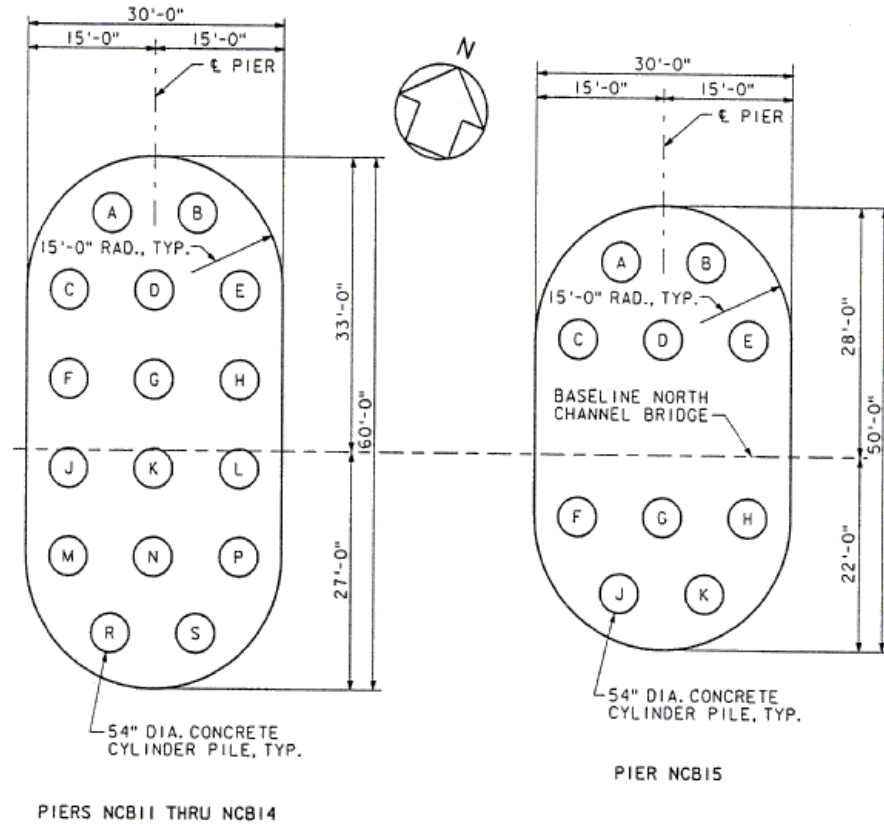
# The Parallel Crossing



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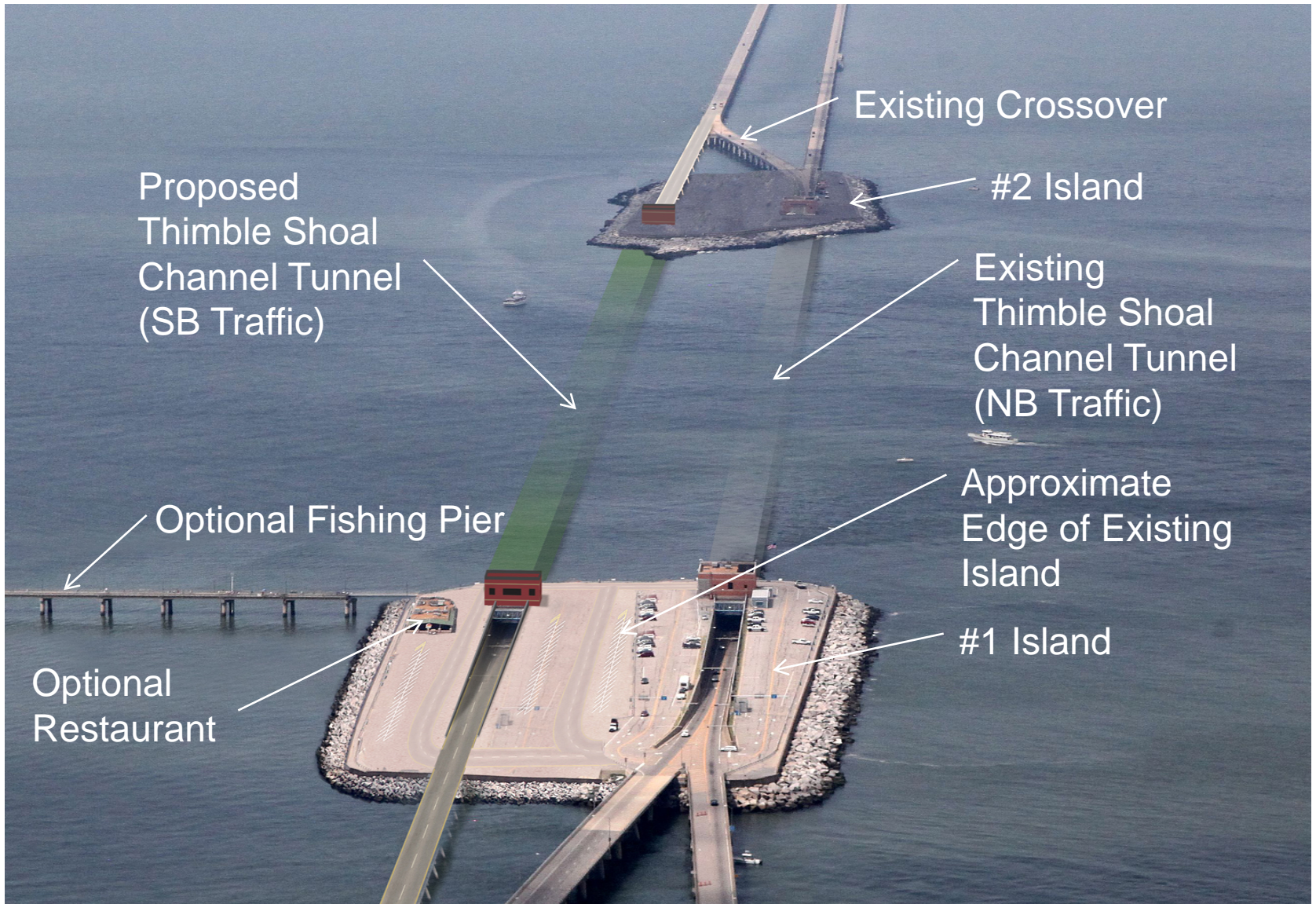


# The Parallel Thimble Shoal Tunnel – Why?

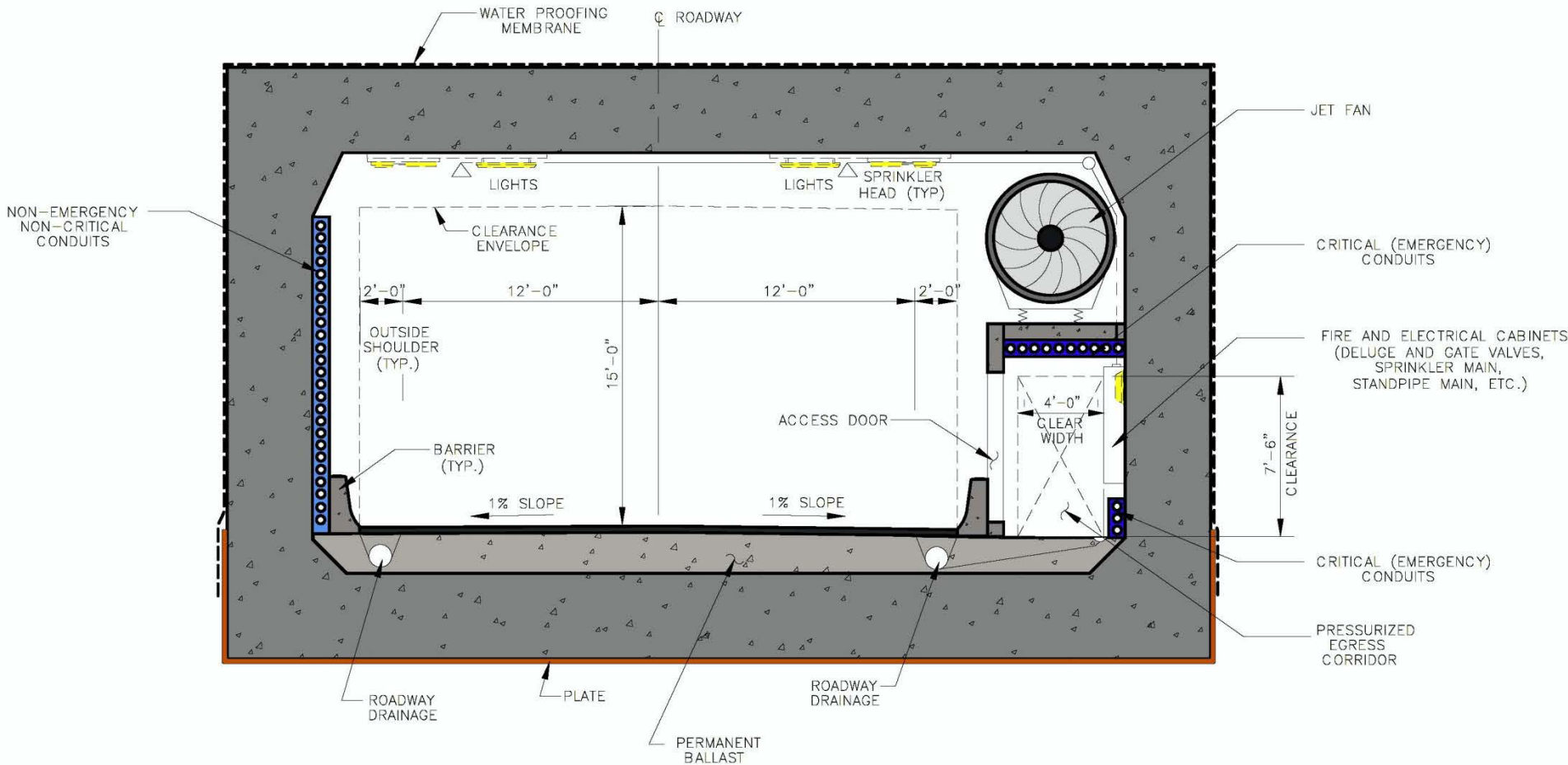
- Route 13 Corridor is a Corridor of Statewide Significance
- Lack of viable alternative route
- Lane closures for oversized escort loads
- Lane closures for ordinary maintenance work
- Age of existing tunnels
- Improvement in levels of service and safety



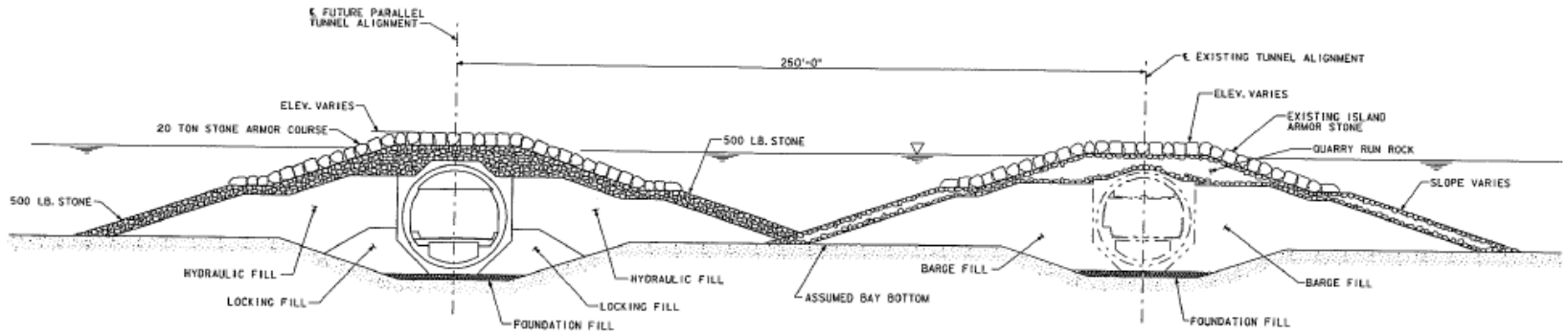
# The Parallel Thimble Shoal Tunnel



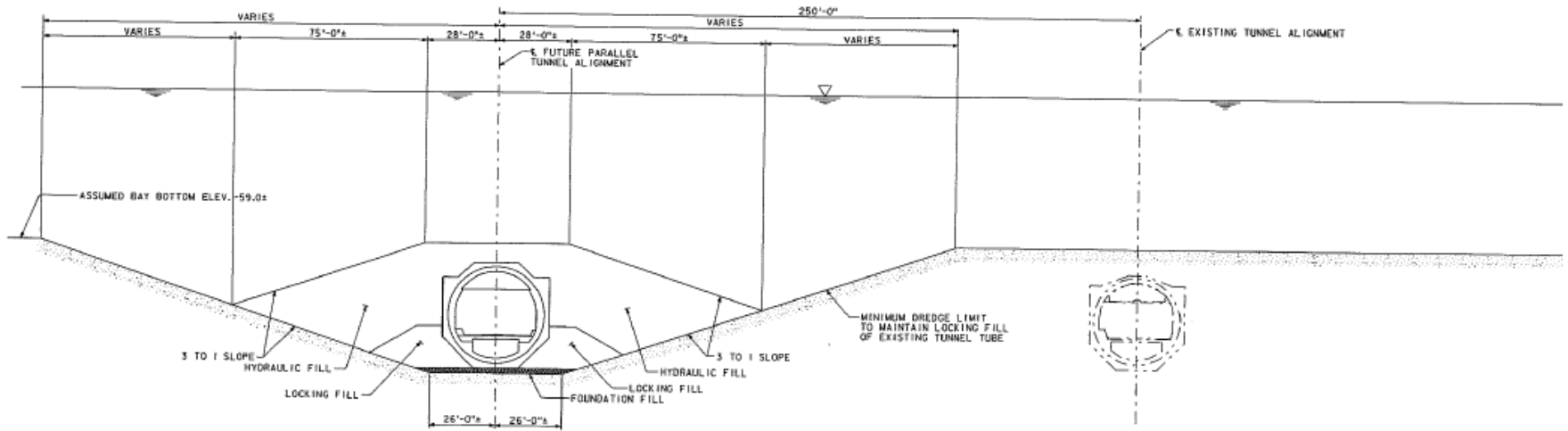
# PTST – Immersed Tube Tunnel Option



# The Parallel Crossing



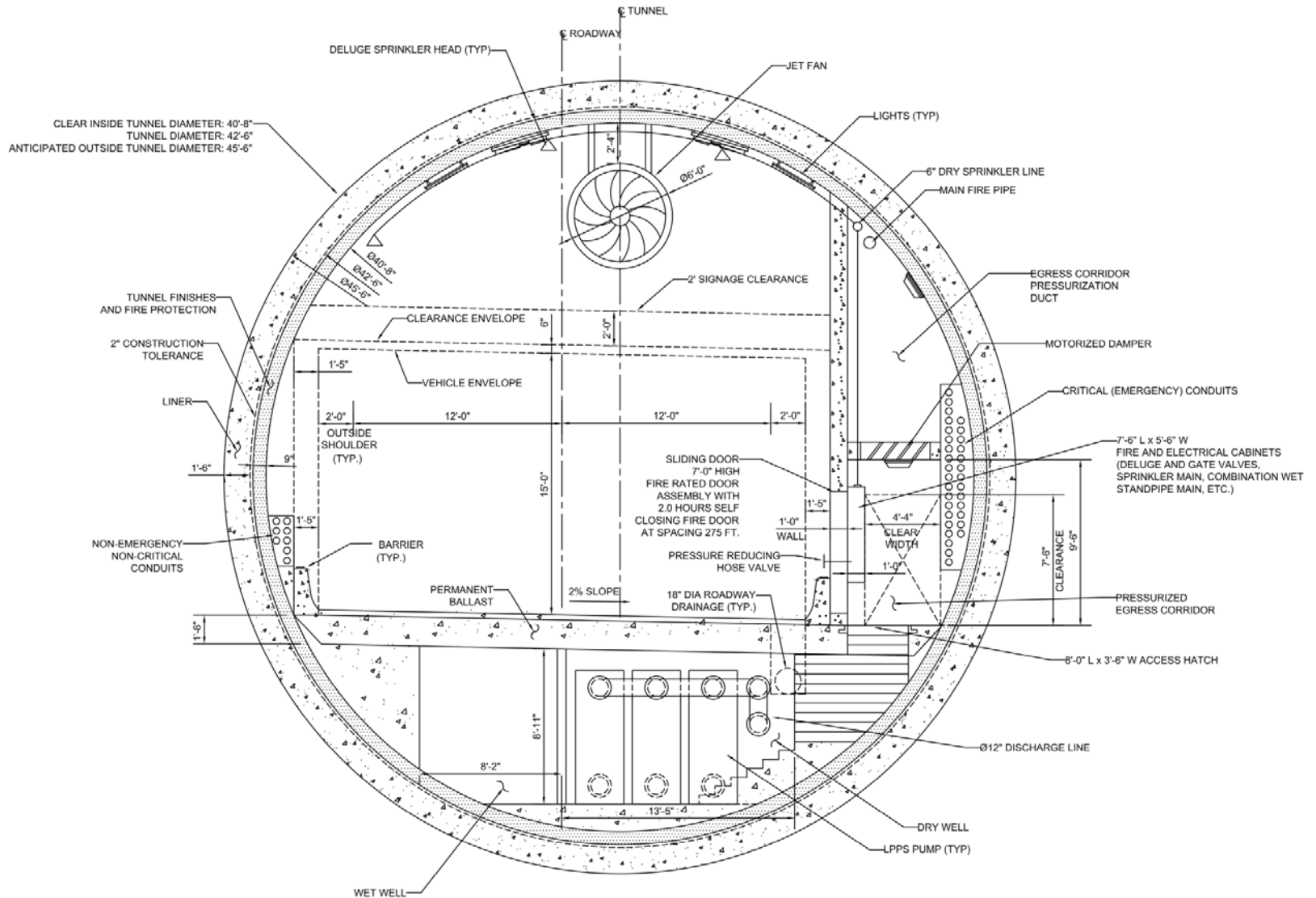
SECTION THRU TUNNELS NEAR PORTAL ISLANDS  
SCALE: 1" = 40'



SECTION THRU TUNNELS AT MID-CHANNEL  
SCALE: 1" = 40'

PARALLEL  
CHESAPEAKE BAY  
BRIDGE AND TUNNEL

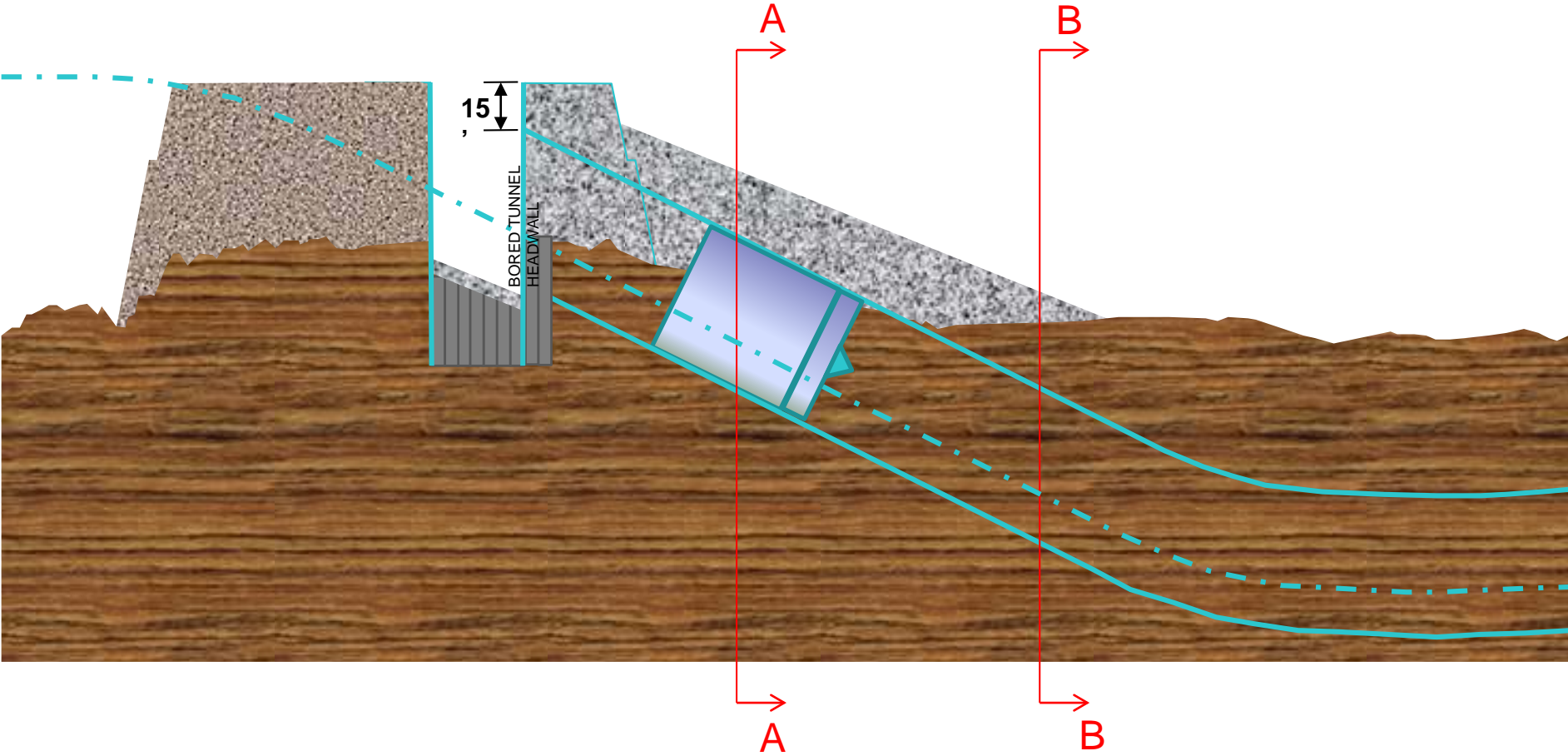
# PTST – Bored Tunnel Option



# The Parallel Crossing

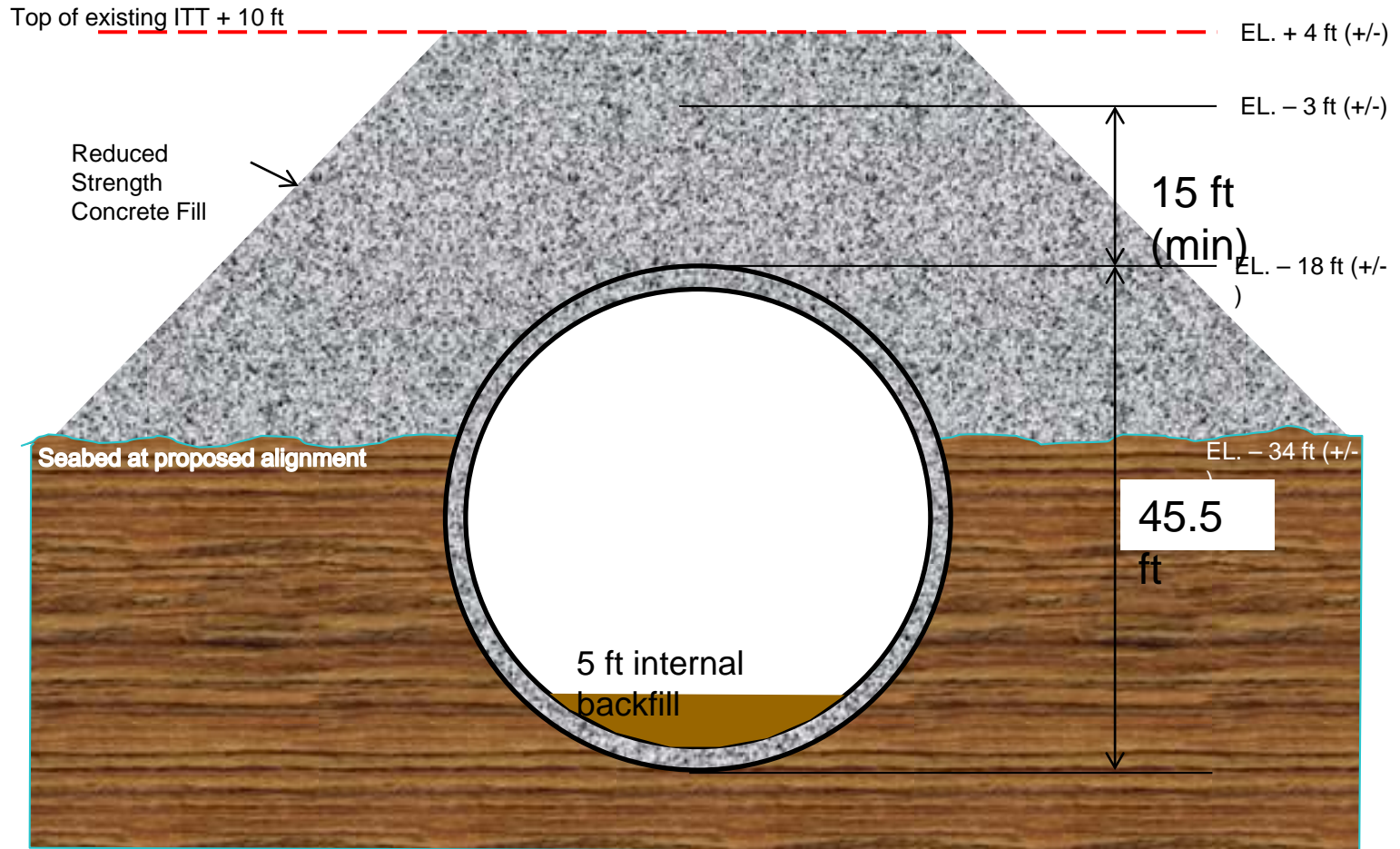


# The Parallel Thimble Shoal Tunnel



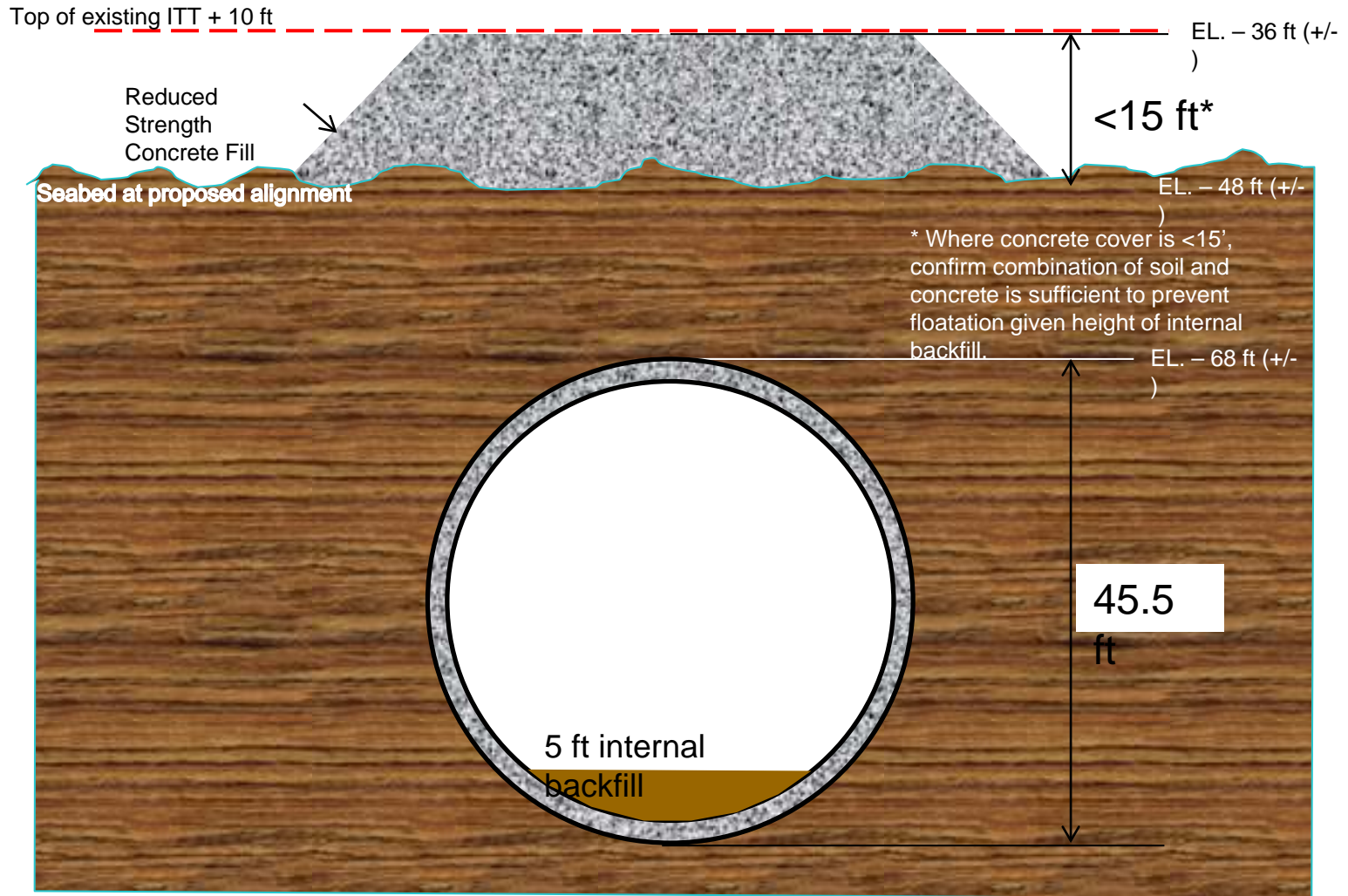


# The Parallel Thimble Shoal Tunnel



Section A-A @ Sta.295+00

# The Parallel Thimble Shoal Tunnel



## Cost / Construction Information

- Original Crossing - \$200M, 42 months
- Parallel Crossing - \$197M, 48 months
- Parallel Thimble Shoal Tunnel - \$756M, TBD

# Significant Impacts and Repairs



# Significant Impacts and Repairs



# Significant Impacts and Repairs



# Significant Impacts and Repairs

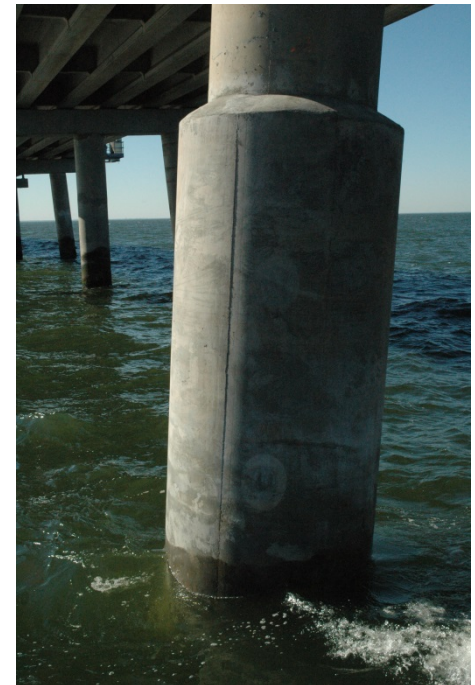


# Significant Impacts and Repairs





# Significant Impacts and Repairs





**Thank You!**

Chris Williams, P.E.  
[Christopher.Williams@jacobs.com](mailto:Christopher.Williams@jacobs.com)

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