



Maryland
Transportation
Authority

Wes Moore, Governor
Aruna Miller, Lt. Governor
Paul J. Wiedefeld, Chairman

Board Members:
Dontae Carroll Cynthia D. Penny-Ardinger
William H. Cox, Jr. Jeffrey S. Rosen
W. Lee Gaines, Jr. Samuel D. Snead, MCP, MA
Mario J. Gangemi, P.E. John F. von Paris

Bruce Gartner, Executive Director

June 24, 2024

Mr. Jake Holness
Maryland Department of the Environment
Regulatory Services Section
Montgomery Park Business Center, Suite 430
1800 Washington Boulevard

Dear Mr. Holness,

The Maryland Transportation Authority (MDTA) is submitting an Emergency Authorization Package for portions of the over-water demolition work associated with the I-695 Francis Scott Key Bridge Demolition project, located in Baltimore/Dundalk, Maryland. Required emergency The project is within the Baltimore Harbor Maryland 8-digit Watershed (02130903). The emergency authorization information follows.

Applicant: Maryland Transportation Authority
Location: Baltimore/Dundalk, Maryland, Baltimore Harbor, Maryland 8-digit Watershed (02130903)
Site Photos: See Attached
Extent of Work: Removal of remaining parapet, median, and deck over water spans, mechanically
Removal of remaining girders on the water spans, mechanically
Anticipated Impact: There will be no permanent impacts to tidal wetlands or waterways resulting from these demolition activities. Temporary impacts associated with the installation of temporary piles to secure crane and work barges may be necessary. No more than 50 temporary piles 36 inches in diameter or less are anticipated resulting in no more than 89 square feet of temporary impact.
Nature of Emergency: The collapse of the Francis Scott Key Bridge is a catastrophe, and the welfare of Maryland citizens will be jeopardized by the time delay of a public notice. The emergency work is the first element of the overall demolition project, and needs to be started as soon as possible to keep the project on schedule.

The following additional information is attached to this letter to facilitate your review.

- Additional Project Information Document
- Vicinity Map
- Site Photographs
- Impact Plates, Demolition Plans, and Procedures

If you need further assistance, please contact our authorized agent Mr. Justin Reel at (703) 338-4139 or via email at jreel@rkk.com.

Sincerely,



Brian Wolfe

Director of Project Development, Maryland Transportation Authority

CC: Joseph DaVia, Nicole Nasteff, Rob Lewis, Kathy Anderson - US Army Corps of Engineers
Jitesh Parikh, Alex Bienko, Melissa Toni - FHWA
Hal Pitts - USCG
Karen Green, Brian Hopper, Jonathan Watson - NOAA Fisheries
Tammy Roberson, Danielle Spendiff, Matt Wallach - MDE
Melissa Williams, Julie McCarthy, Carl Chamberlin - MDTA
Eric Almquist, Rick Maddox, Justin Reel – RK&K
Scott Miller, Leyla Lange – JMT
Caryn Brookman, Stacy Hawver – Blackwater

Attachment A: Additional Project Information

The emergency authorization request includes removal of portions of the FSK Bridge in preparation for bridge reconstruction. The FSK Bridge was a 1.6-mile-long structure over the Patapsco River in Baltimore/Dundalk, Maryland, which was struck by a cargo ship leaving the Port of Baltimore resulting in the collapse of the bridge into the Patapsco River in March 2024. This emergency authorization request includes two distinct demolition activities associated with the overall project.

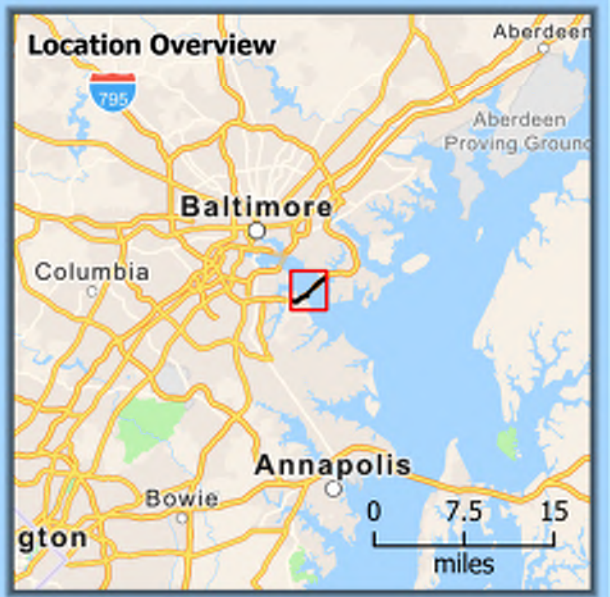
1. Mechanical removal of parapet, median, and deck over water – working from the end of the existing structures towards the land, the parapet, median, and decking will be saw cut into manageable pieces, loaded onto trucks and trucked down the structure to an upland processing site.
2. Mechanical removal of existing girders on the six (6) remaining water spans – using barge mounted cranes, the existing girders will be cut into manageable pieces, lowered onto a barge, and transported to an existing marine terminal for off-loading and processing.

All of the removal activities shall be undertaken with minimal disruption to the federal navigation channel. Work will occur over land and/or above tidal waters and will not result in any permanent wetland or waterway impacts. Temporary impacts associated with the installation of temporary piles to secure crane and work barges could be necessary. No more than 50 temporary piles 36 inches in diameter or less are anticipated resulting in no more than 89 square feet of temporary impact.

During the initial bridge collapse response, three temporary mooring buoys were installed in the Patapsco River near Trade Point Atlantic. These mooring buoys may be used to stage barges during the emergency activities. The locations of these buoys are shown on the impact plates.

Fishery, water quality, and benthic aquatic resource impacts will be avoided to the extent practicable. Barges will be positioned under the mechanical removal of the parapet, median, and deck to catch any falling debris. Bridge scuppers will be plugged to prevent saw cutting slurry from entering the water, and vac trucks will be used to remove the slurry from the bridge deck. These protection measures will ensure the emergency authorization activities will not result in any discharge to tidal water and limited temporary disruption to the river bottom.

ATTACHMENT B: FIGURES





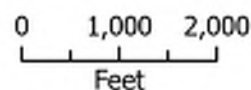
Francis Scott Key Bridge Rebuild Project

Vicinity Map

Baltimore City and Baltimore County, Maryland
June 2024



-  Study Area
-  County Boundaries

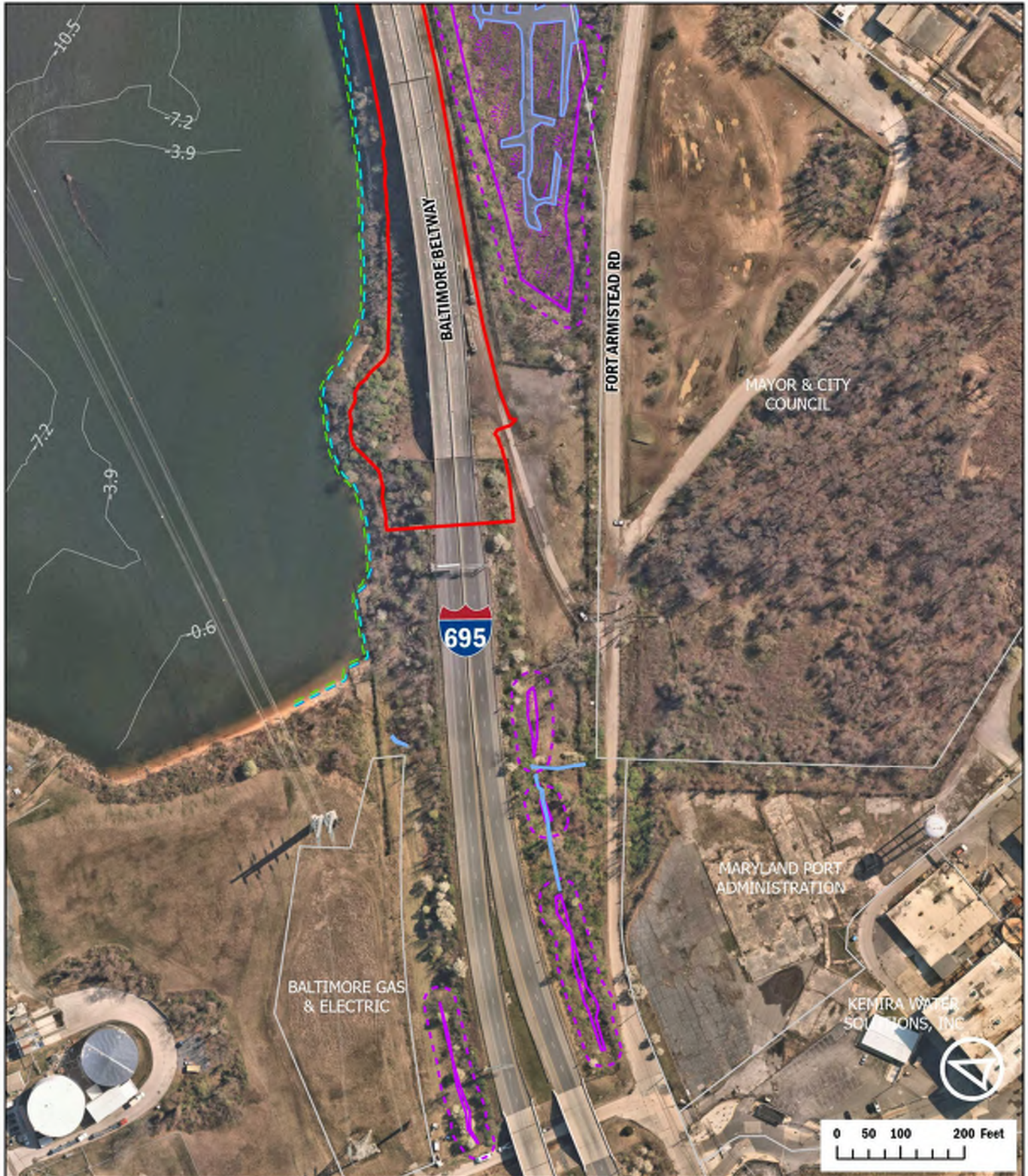


Site Photographs



Site Photographs

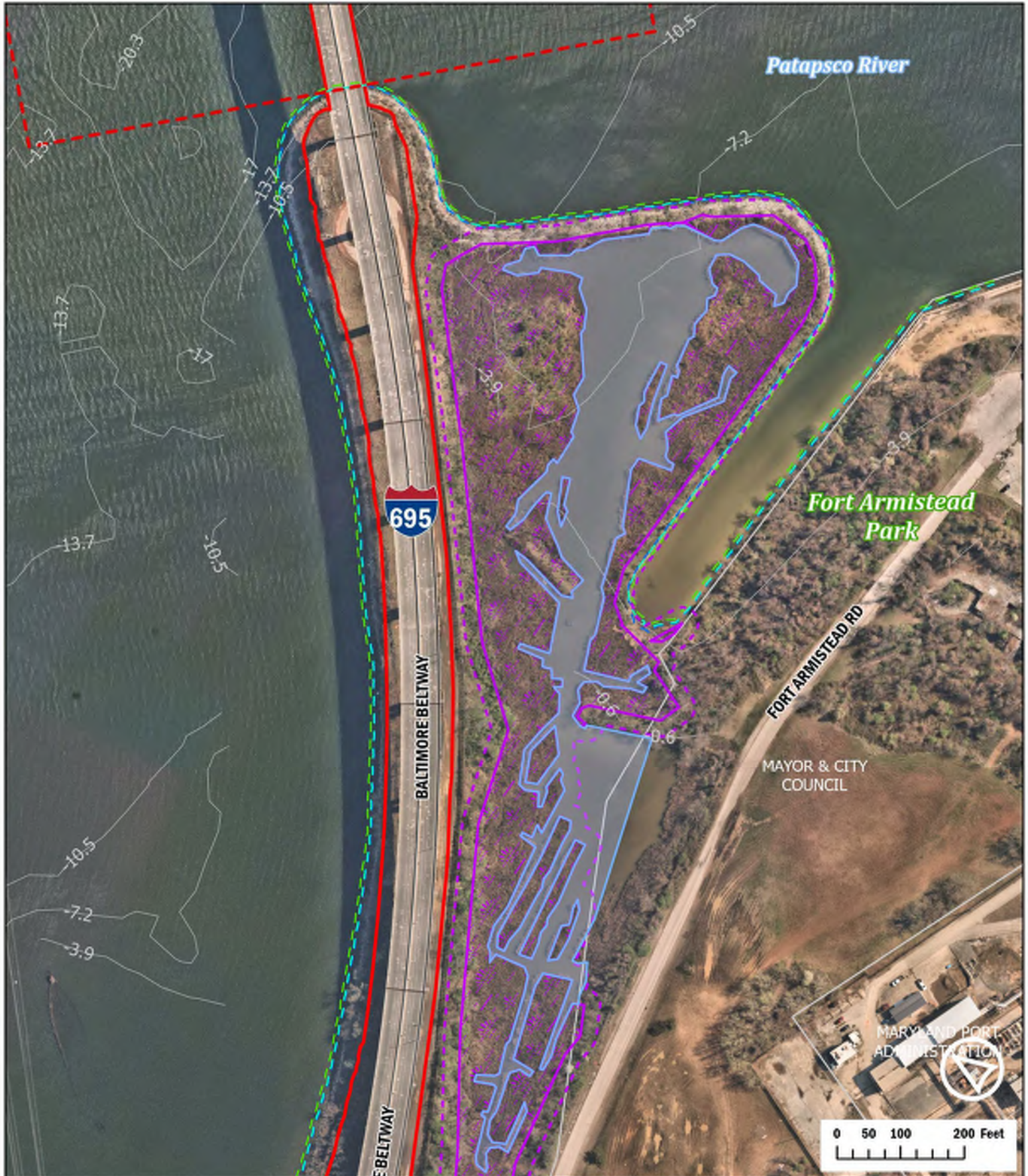




- | | | |
|-----------------------|----------------------|--------------|
| Limits of Disturbance | MHHW Line | Mooring Buoy |
| Temporary Pile Area | MHW Line | Green |
| Streams | Bathymetry Contours | Red |
| Wetlands | Property Parcels | |
| 25ft Wetland Buffer | Municipal Boundaries | |
| Approximate MLW Line | | |



**Francis Scott Key
 Bridge
 Demolition**
**Emergency Authorization
 Plates**
 Page 1 of 6 June 2024

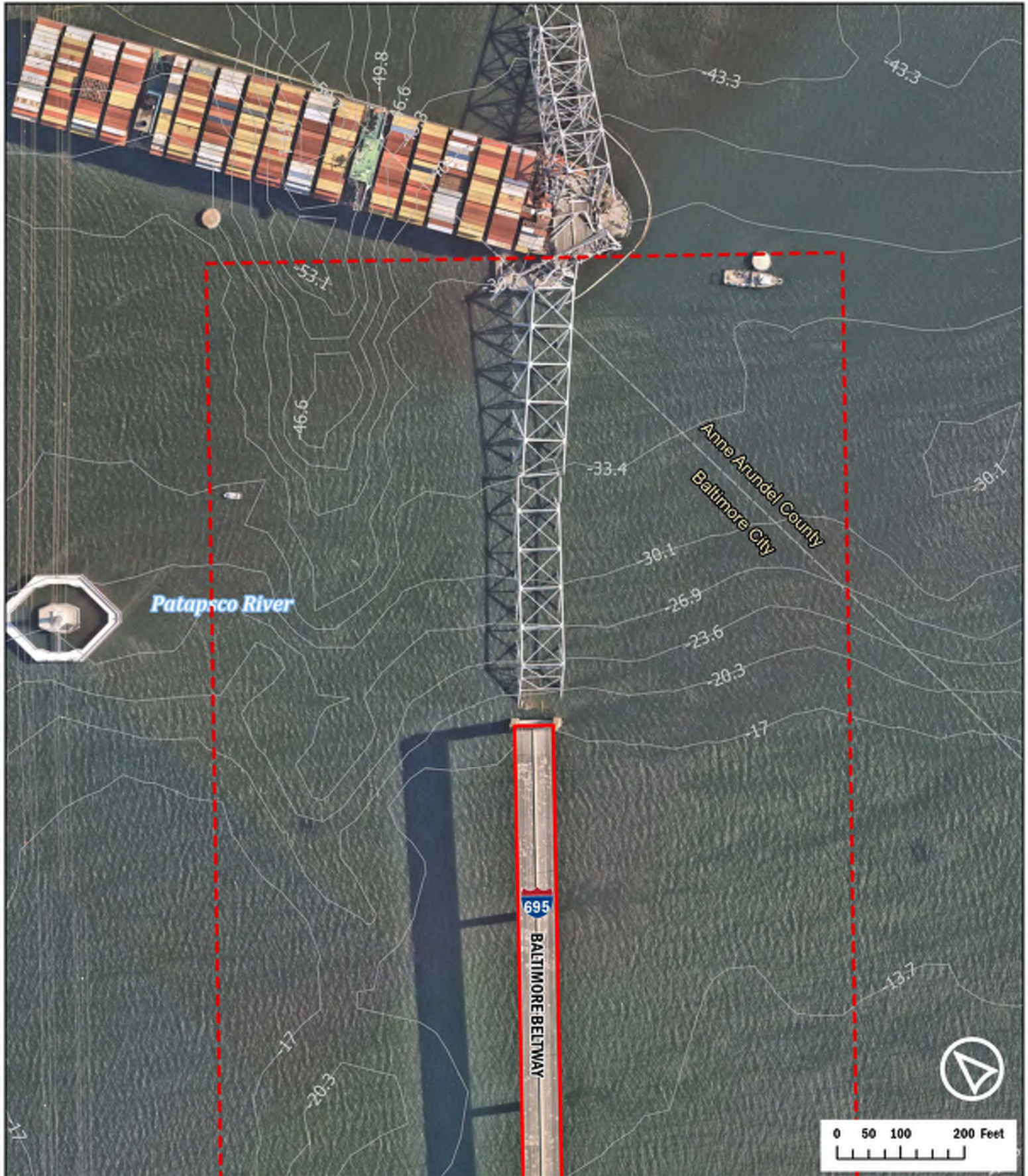





- ▭ Limits of Disturbance
- - - Temporary Pile Area
- ▭ Streams
- ▭ Wetlands
- - - 25ft Wetland Buffer
- - - Approximate MLW Line
- - - MHHW Line
- - - MHW Line
- - - Bathymetry Contours
- ▭ Property Parcels
- - - Municipal Boundaries
- Mooring Buoy
- Yellow
- Green
- Red



**Francis Scott Key
Bridge
Demolition
Emergency Authorization
Plates**

Page 2 of 6 June 2024



-  Limits of Disturbance
-  Temporary Pile Area
-  Streams
-  Wetlands
-  25ft Wetland Buffer
-  Approximate MLW Line
-  MHHW Line
-  MHW Line
-  Bathymetry Contours
-  Property Parcels
-  Municipal Boundaries
- Mooring Buoy**
-  Yellow
-  Green
-  Red



**Francis Scott Key
Bridge
Demolition**

**Emergency Authorization
Plates**

Page 3 of 6 June 2024



- | | | |
|-----------------------|----------------------|---------------------|
| Limits of Disturbance | MHHW Line | Mooring Buoy Yellow |
| Temporary Pile Area | MHW Line | Mooring Buoy Green |
| Streams | Bathymetry Contours | Mooring Buoy Red |
| Wetlands | Property Parcels | |
| 25ft Wetland Buffer | Municipal Boundaries | |
| Approximate MLW Line | | |



**Francis Scott Key
 Bridge
 Demolition**
**Emergency Authorization
 Plates**
 Page 4 of 6 June 2024

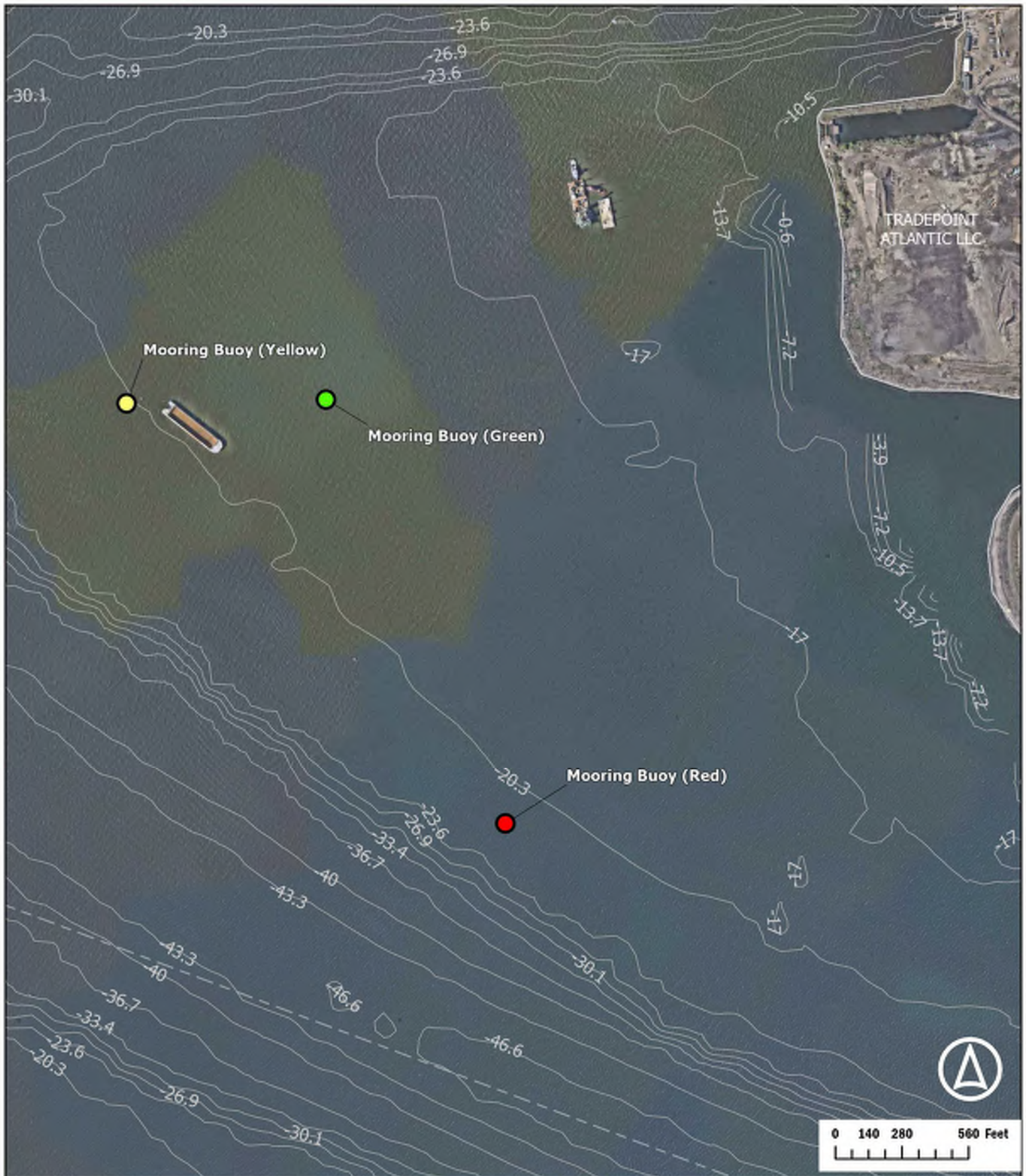


- Limits of Disturbance
- Temporary Pile Area
- Streams
- Wetlands
- 25ft Wetland Buffer
- Approximate MLW Line
- MHHW Line
- MHW Line
- Bathymetry Contours
- Property Parcels
- Municipal Boundaries
- Mooring Buoys**
- Yellow
- Green
- Red



**Francis Scott Key
Bridge
Demolition
Emergency Authorization
Plates**

Page 5 of 6 June 2024

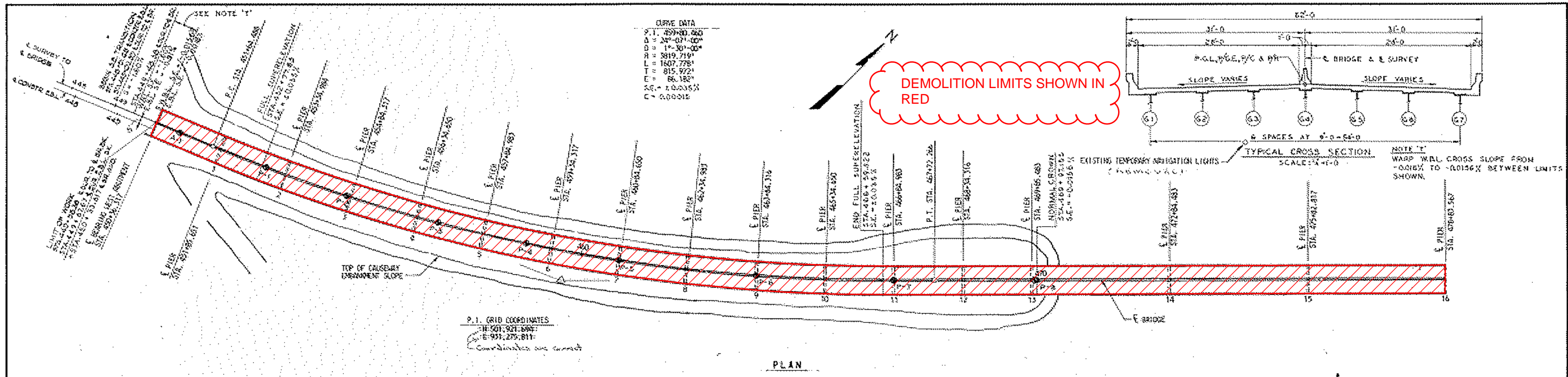


- Limits of Disturbance
- Temporary Pile Area
- Streams
- Wetlands
- 25ft Wetland Buffer
- Approximate MLW Line
- MHHW Line
- MHW Line
- Bathymetry Contours
- Property Parcels
- Municipal Boundaries
- Mooring Buoy Yellow
- Mooring Buoy Green
- Mooring Buoy Red



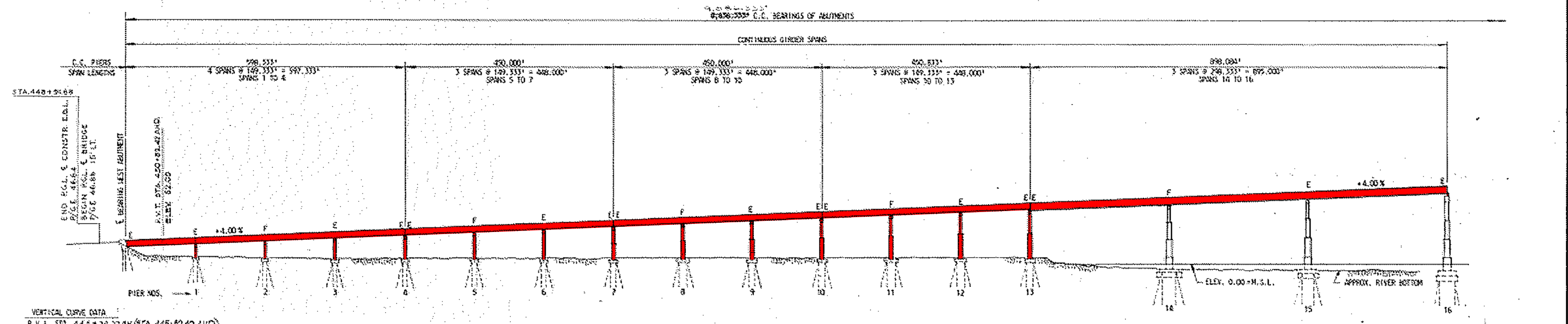
**Francis Scott Key
Bridge
Demolition
Emergency Authorization
Plates**

Page 6 of 6 June 2024



DEMOLITION LIMITS SHOWN IN RED

PLAN



ELEVATION

Demolition Limits Covered By Emergency Authorization include Bridge Deck from West Abutment through Pier 16, West Abutment, and Piers 1 through 13.

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
BALTIMORE, MD.

**BALTIMORE HARBOR OUTER CROSSING
PATAPSCO RIVER BRIDGE
BRIDGE DEMOLITION PLAN
(EMERGENCY AUTHORIZATION)**

SCALE: 1"=100' DATE: JAN 1972 CONTRACT: QT-10

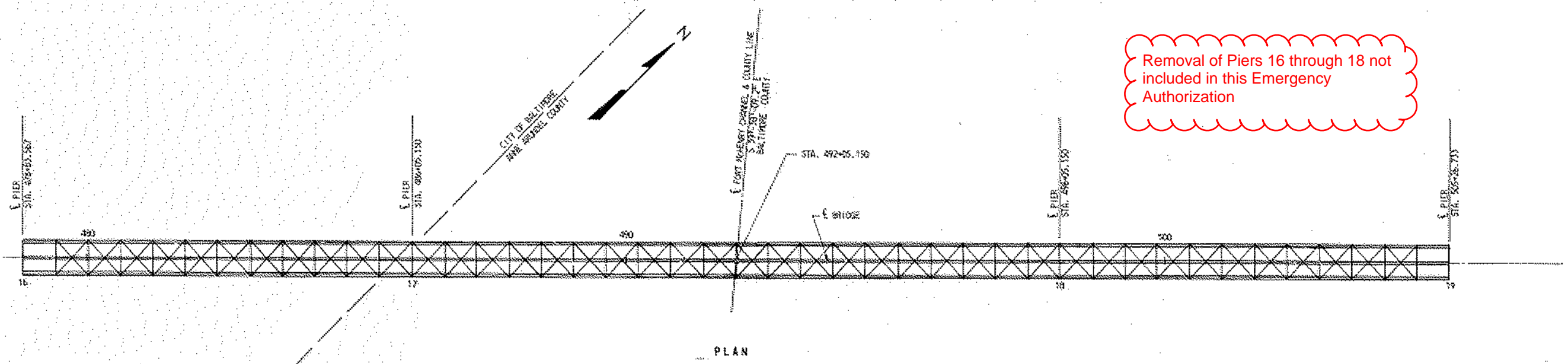
MADE BY: ERA
TRACED BY: ERA
CHECKED BY: SJS

ZOLLMAN ASSOC. INC.
AND
SINGSTAD, KEHART
NOVEMBER AND MIRKA
A JOINT VENTURE
BALTIMORE, MD.

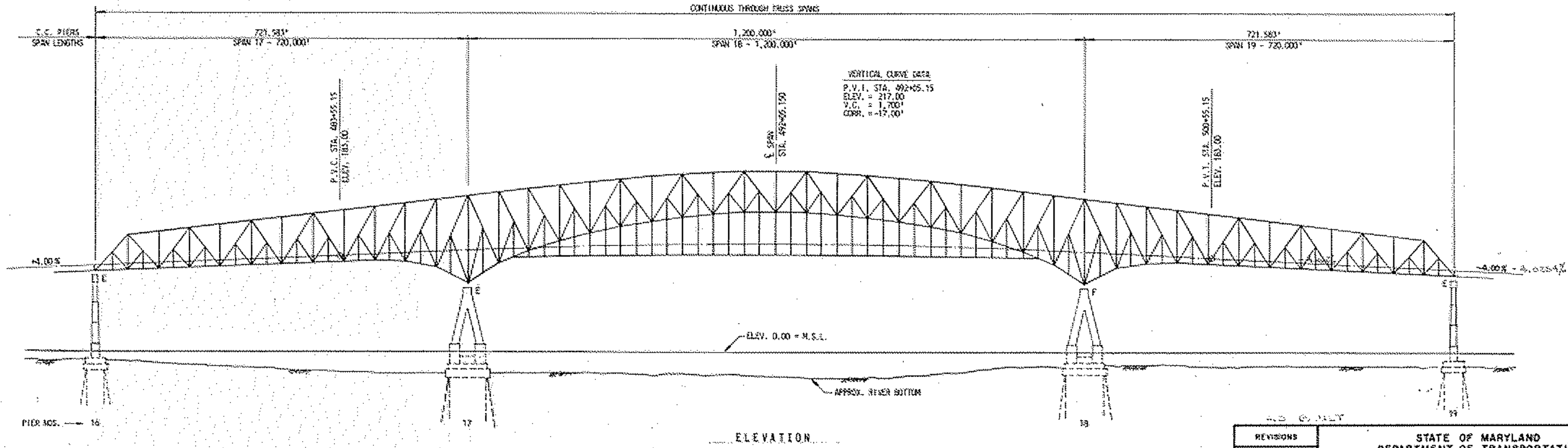
DRAWING NO. C-3
SHEET NO. 07
INDEXED

File No. Pocket No. Folder No.

Removal of Piers 16 through 18 not included in this Emergency Authorization



PLAN
 1/8" = 1'-0"
 3/32" = 3/32" C.C. BEARINGS OF ABUTMENTS

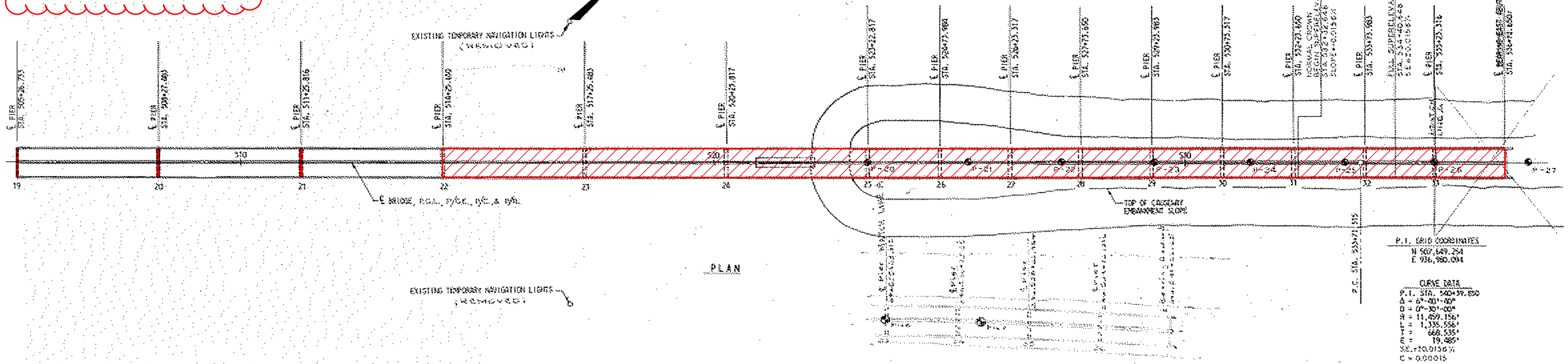


Salvage Operations for Continuous Truss Spans and Piers 17 and 18 By Others

NOTE:
 ALL DIMENSIONS & SPAN LENGTHS SHOWN ARE HORIZONTAL.
 ALL elevations here shall be subject to the 12 Day 1972 Contract at 574.

REVISIONS		STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION BALTIMORE, MD.	
		BALTIMORE HARBOR OUTER CROSSING PATAPSCO RIVER BRIDGE BRIDGE DEMOLITION PLAN (EMERGENCY AUTHORIZATION)	
SCALE: 1" = 100'		DATE: JAN. 1972	CONTRACT: OT-10
MADE BY: E.R.A.		ZOLEMAN ASSOC. INC. AND SINGSTAR, KEHART NOVEMBER AND BURKA A JOINT VENTURE BALTIMORE, MD.	
TRACED BY: E.R.A.		DRAWING NO. C-2	
CHECKED BY: S.J.S.		SHEET NO. OF	
File No.	Packet No.	Folder No.	INDEXED

DEMOLITION LIMITS SHOWN IN RED

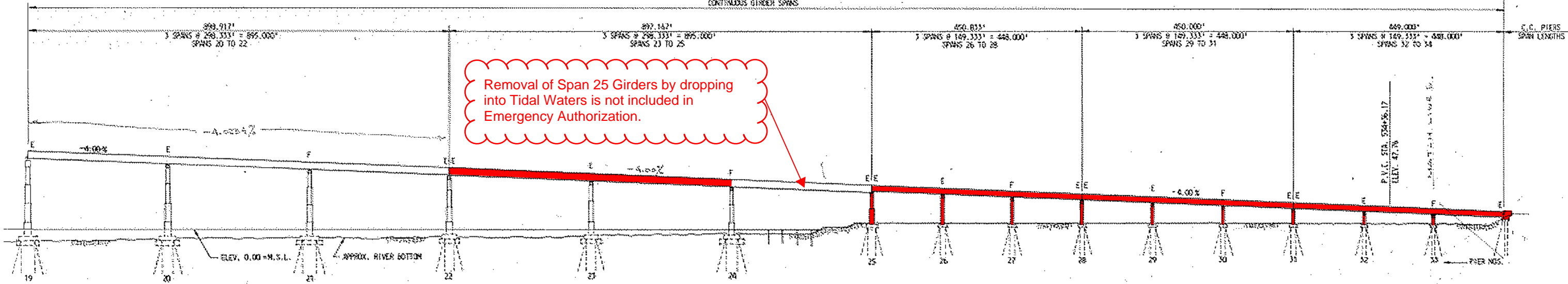


P.I. GRID COORDINATES
 N 507,549.254
 E 936,980.004

CURVE DATA
 P.V.I. STA. 500+39.800
 Δ = 6°-00'-00"
 D = 0°-30'-00"
 R = 11,459.156'
 L = 1,338.556'
 Δ = 688.535'
 Δ = 19.485'
 Δ = 20.01367%
 C = 0.00016

1.000:1.000
 37500:3333 C.C. DIMENSIONS OF BRIDGES

CONTINUOUS GIRDER SPANS



Removal of Span 25 Girders by dropping into Tidal Waters is not included in Emergency Authorization.

Demolition Limits Covered By Emergency Authorization include Bridge Superstructure (Parapets, Deck and Girders) from Pier 22 to East Abutment; Piers 25 through 36, and East Abutment.

VERTICAL CURVE DATA
 P.V.I. STA. 839+36.128
 ELEV. = 27.78
 V.C. = 1000'
 CORR. +4.00%
 GRADES -4.00%
 -0.00%

NOTES:
 ALL DIMENSIONS & SPAN LENGTHS SHOWN ARE HORIZONTAL.
 ● DENOTES LOCATION OF TEST BORING.

East Abutment

REVISIONS		STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION BALTIMORE, MD. BALTIMORE HARBOR OUTER CROSSING PATAPSCO RIVER BRIDGE BRIDGE DEMOLITION PLAN (EMERGENCY AUTHORIZATION)	
SCALE: 1" = 100'		DATE: JAN. 1972	
MADE BY: E.R.A. TRACED BY: E.R.A. CHECKED BY: S.E.S.		CONTRACT: OT-10 ZOLLMAN ASSOC. INC. SINGSTAD, REHART NOVEMBER AND HURKA A JOINT VENTURE Baltimore, Md. DRAWING NO. C-5 SHEET NO. OF INDEXED	
File No.		Pocket No.	

DEMOLITION PROCEDURE

FOR

MDTA BRIDGE NO. BCZ472 FRANCIS SCOTT KEY BRIDGE I-695 OVER THE PATAPSCO RIVER

Project: Francis Scott Key Bridge Project
MDTA Contract No. KB-4903-0000

REVISION 1

June 5, 2024

PROCEDURES REDLINED TO INCLUDE ONLY
THOSE ITEMS INCLUDED IN EMERGENCY
AUTHORIZATION

TABLE OF CONTENTS:

DEMOLITION PROCEDURE

<u>SCOPE</u>	3
<u>GENERAL OPERATIONS STATEMENT</u>	3
<u>SITE MAINTENANCE</u>	3
<u>RECYCLING</u>	3
<u>LIST OF PROPOSED RECYCLING FACILITIES</u>	3
<u>GENERAL NOTES:</u>	4
<u>EQUIPMENT TO BE UTILIZED AND/OR AVAILABLE</u>	4
<u>WORK REQUIRED PRIOR TO DEMOLITION:</u>	4
DEMOLITION SEQUENCE	4
NOTES.....	4
<u>REMAINDER OF FSK BRIDGE DEMOLITION</u>	4
NOTES.....	5
Deck, Parapet, and Median Removal (Water)	5
Deck, Parapet, and Median Removal (Land)	5
Girder Removal (Water).....	6
Girder & Pier Removal (Land).....	6
Pier Above Water Removal.....	7
Pier Below Water Removal.....	7
Abutment Removal	7
Pier 18 Strut & Column Removal	8
Pier 17 & 18 Lower Strut, Column, and Footing Removal	8
Dolphins A, B, C, & D Removal.....	8
Salt Shed Removal	9

REDLINED ITEMS NOT INCLUDED IN EMERGENCY
AUTHORIZATION.

SCOPE:

The work consists of the demolition of the remaining portions of the Francis Scott Key Bridge carrying I-695 over the Patapsco River. The limits of removal include the bridge superstructure from the west abutment through Span 16 and from Pier 22 to the east abutment. The superstructure shall be fully demolished. The substructure removal includes both abutments, Piers 1 through 13 and 25 through 36 on land, and ~~Piers 14, 15, 16, 17, 18, 22, 23, and 24 along with the remainders of Piers 19, 20 and 21 in the Patapsco River. The substructure shall also be removed to two (2) feet below grade or as directed by the United States Coast Guard (USCG) or the United States Army Corps of Engineers (USACE).~~

The existing bridge median barrier, parapet, and deck shall be removed utilizing hydraulic excavators operating on the bridge deck. The steel spans over the water shall be removed utilizing a ringer crane on a barge. The steel spans over land shall be removed by felling the piers and dropping the steel spans. The abutments shall be removed utilizing hydraulic excavators equipped with hydraulic hammers. ~~The water piers shall be removed utilizing explosive demolition.~~

GENERAL OPERATIONS STATEMENT:

All work performed by Demolition Contractor will be done in strict accordance with local, state, and federal safety requirements. A Site-Specific Health and Safety Plan is required to be prepared by the Contractor for this demolition phase, and the Competent Person will convene a safety meeting prior to starting work at which all operatives shall be present. The Competent Person shall review the Site-Specific Safety Plan on a daily basis and ensure that all persons present understand the demolition procedure, all pertinent safety issues, including fall protection and what is required of them.

SITE MAINTENANCE:

During demolition operations, the site shall be maintained in a neat and orderly fashion. Truck drivers and on-site personnel shall coordinate deliveries and disposal operations to alleviate traffic issues.

Operations will be conducted in a manner that will minimize disturbance to the public in areas adjacent to the work.

At no time will unauthorized personnel be allowed in work areas. At no time will the work be left unattended without proper safety protection.

RECYCLING:

- All concrete and asphalt will be recycled at an approved facility.
- All steel and non-ferrous metals will be transported to an approved facility.
- All other demolition debris will be disposed of at an approved disposal site.

LIST OF PROPOSED RECYCLING FACILITIES:

Ferrous & Non-Ferrous Metals	TBD
Concrete	TBD

GENERAL NOTES:

- Demolition Contractor shall not allow debris, tools, or incidental equipment to swing over areas where there is vehicular or pedestrian traffic. Any debris or tools that enter the River shall be retrieved.
- Dust control shall be provided during demolition operations and consist of water hose(s) equipped with spray nozzles to wet down debris as required.

EQUIPMENT TO BE UTILIZED AND/OR AVAILABLE:

Excavator(s)	Ringer Crane(s)
Crawler Crane(s)	Triaxle Dump Trucks
Tractors and Dump Trailers	Hydraulic Hammers
Hydraulic Shears	
Core Cut or Husqvarna Walk-Behind Concrete Saw, Wall Saw & Wire Saw	
Grapples, Slab Bucket, Universal Processer, Concrete Pulverizer, and Miscellaneous Small Tools	

WORK REQUIRED PRIOR TO DEMOLITION:

Prior to demolition, the following work shall be completed:

- Communication will be established with the MDTA prior to the commencement of any demolition.
- Longitudinal and transverse cut lines will be laid out and painted on the deck.
- Prior to deck removal over the water, barges shall be placed beneath that portion of deck to act as a shield to eliminate any debris or slurry from entering the water.

DEMOLITION SEQUENCE:

1. Remove parapet, median, and deck over land and water.
2. Remove existing girders on the six (6) remaining water spans.
3. Remove existing land spans and land piers using explosives to fell the piers.
4. ~~Remove water piers and dolphins using explosives.~~

NOTES:

- The equipment included in the demolition procedure below may be replaced by an alternative piece of equipment that has the capability to perform the intended

REDLINED ITEMS NOT INCLUDED IN EMERGENCY AUTHORIZATION.

operation (subject to the Engineer's approval).

- No demolition work shall proceed without authorization by MDTA.
- Demolition Contractor personnel shall always utilize fall protection PPE when working at or near a leading edge where no barrier, handrails, or fall restraints are in place. Fall protection PPE will be in accordance with OSHA Standards and include the use of harnesses, self-retracting lifelines lanyards, concrete fall arrest anchors, and other approved means.
- At the end of each shift of work, Demolition Contractor will ensure that all leading edges are secured and protected.

REMAINDER OF FSK BRIDGE DEMOLITION

NOTES:

- Erosion controls shall be in place on both approaches prior to removing any deck or dropping any steel.
- Shielding barges will be positioned beneath span being removed to prevent any slurry or debris from entering the waterway.

Deck, Parapet, and Median Removal (Water)

1. The existing median barrier will be removed by hammering it every ten (10) feet to create sections. The barrier will then be hammered where it meets the deck. Cut any rebar and move each section down the bridge.
2. Parapet will be removed by sawcutting techniques.
3. Core holes in the parapet to allow rigging to be inserted.
4. Make plunge cuts every ten (10) feet to create sections.
5. Finally, make a longitudinal cut adjacent to the bottom of the barrier.
6. Lift the sections and place them on the deck.
7. Drag the sections out of the way to the laydown area.
8. Next, the concrete deck will be removed. The concrete deck is non-composite so sawcutting techniques will also be utilized for this removal operation.
9. The size of the deck panels shall be six (6) feet long and nine (9) feet wide (this is the spacing of the girders.)
10. Make the sawcuts in the span to be removed. Sawcut down the center of the existing girders.
11. Once the deck is sawcut, begin to remove the deck sections.
12. Deck sections shall be moved off the span and down to the laydown yard.
13. The concrete deck and parapet sections will be downsized and then shall be loaded into trucks for recycling at an approved recycling facility.

Deck, Parapet, and Median Removal (Land)

1. The existing median barrier will be removed by hammering it every ten (10) feet to create sections. The barrier will then be hammered where it meets the deck. Cut

- any rebar and move each section down the bridge.
2. Parapet will be removed by sawcutting techniques.
3. Core holes in the parapet to allow rigging to be inserted.
4. Make plunge cuts every ten (10) feet to create sections.
5. Finally, make a longitudinal cut adjacent to the bottom of the barrier.
6. Lift the sections and place them on the deck.
7. Drag the sections out of the way to the laydown area.
Next, the concrete deck will be removed. The concrete deck is non-composite so sawcutting techniques will also be utilized for this removal operation.
8. The size of the deck panels shall be six (6) feet long and nine (9) feet wide (this is the spacing of the girders.)
9. Make the sawcuts in the span to be removed. Sawcut down the center of the existing girders.
10. Once the deck is sawcut, begin to remove the deck sections.
11. Deck sections shall be moved off the span and down to the laydown yard.
12. The concrete deck and parapet sections will be downsized and then shall be loaded into trucks for recycling at an approved recycling facility.

Girder Removal (Water)

1. The existing continuous span girders shall be removed either in pairs or as a single unit (there are seven (7) beams in each span.)
2. Position the Ringer Crane into position and spud down. A material barge shall be placed alongside the crane barge.
3. Remove the first section of steel by cutting holes in the web to insert the chain through. A spreader bar will be utilized as these spans are 300 feet long.
4. Lift the section of steel with the crane and place it on the material barge.
5. Multiple material barges may be required due to the span length.
6. Continue in each span until all the beams are removed.
7. Move to the adjacent span and repeat the process.
8. The operation will then be moved to the opposite approach to remove those spans.
9. The material barges will be pushed to the laydown yard where they will be offloaded.
10. Once the steel is offloaded, it will be subsequently downsized with a combination of hydraulic shears and oxygen/propane torches.
11. Load steel into trucks to be recycled at facility listed above.

Girder & Pier Removal (Land) – Piers 1 through 13 & 25 through 36

1. The existing land spans and piers shall be removed by felling the piers and allowing the steel girders to drop.
2. The existing column legs, caps, and struts shall be drilled to allow charges to be placed.
3. Once all charges are placed, explosive demolition shall fell the piers which will bring

the steel girders down to the ground.

4. Once the steel girders and piers are on the ground, process the materials. Any remaining portions of the piers shall be hammered with a hydraulic excavator equipped with a hydraulic hammer.
5. Multiple spans will be felled at once since the spans are continuous.
6. Repeat the process for the remaining land spans.
7. Load concrete and steel into trucks to be recycled at facility listed above.

Pier Above Water Removal – Piers 14 through 16 & 22 through 24

1. The portion of the piers above the water for the remaining piers (14, 15, 16, and 22, 23, 24) shall be removed using explosives.
2. The existing pier caps, columns, and struts shall be drilled to allow charges to be placed.
3. Once the charges are placed, the explosives will fail the piers and allow them to fall into the water.
4. They will be cleaned up with the portions of the piers that are below water.

Pier Below Water Removal – Piers 14 through 16 & 19 through 24

1. The portions of the existing piers that are below water (14, 15, 16, 19, 20, 21, 22, 23, and 24) shall be removed utilizing explosives.
2. The piers shall either be drilled from on top of the pier or from a barge.
3. Divers will be sent down to inspect the footing to check for any cofferdams that may have been left in place. If they are found, the sheets will be cut vertically every eight (8) feet.
4. Once the drilling is completed, the explosives will be placed and the piers will be imploded.
5. Once they are imploded, the river bottom will be cleaned up with a combination of hydraulic excavators and duty cycle cranes equipped with clamshell buckets.
6. Place material on barges and push to trestle or offloading yard.
7. Offload all the debris from the barges then move the barge back to each pier until the cleanup is complete.
8. Piers shall be removed to two (2) feet below existing mudline or as directed by the United States Coast Guard (USCG) or the United States Army Corps of Engineers (USACE). Approximate elevations of mudline:
 - a. Pier 14 – EL -16
 - b. Pier 15 – EL -16
 - c. Pier 16 – EL -20
 - d. Pier 19 – EL -25
 - e. Pier 20 – EL -24
 - f. Pier 21 – EL -24
 - g. Pier 22 – EL -19
 - h. Pier 23 – EL -13

- ~~i. Pier 24 EL 15~~
- ~~9. Load concrete into trucks to be recycled at facility listed above.~~

Abutment Removal

1. The existing abutments and wingwalls shall be completely removed.
2. Hammer the abutments and wingwalls with a hydraulic excavator equipped with a hydraulic hammer.
3. Load concrete into trucks to be recycled at an approved facility.

Pier 18 Strut & Column Removal (Above Water)

1. The portion of Pier 18 above the water shall be removed using explosives.
2. The existing pier caps, columns, and struts shall be drilled to allow charges to be placed.
3. Once the charges are placed, the explosives will fail the piers and allow them to fall into the water.
4. They will be cleaned up with the portions of the piers that are below water.

Pier 17 & 18 Lower Strut, Column, and Footing Removal (Below Water)

1. The portions of the existing Piers 17 and 18 that are below water shall be removed utilizing explosives.
2. The piers shall either be drilled from on top of the pier or from a barge.
3. Divers will be sent down to inspect the footings/tremies to check for any cofferdams that may have been left in place. If they are found, the sheets will be cut vertically every eight (8) feet.
4. Once the drilling is completed, the explosives will be placed and the piers will be imploded.
5. Once they are imploded, the river bottom will be cleaned up with a combination of hydraulic excavators and duty cycle cranes equipped with clamshell buckets.
6. Place material on barges and push to trestle or offloading yard.
7. Offload all the debris from the barges then move the barge back to each pier until the cleanup is complete.
8. Pier 17 and 18 shall be removed to the top of the (footing) foundation concrete unless otherwise directed by MDTA.
9. Load concrete into trucks to be recycled at facility listed above.

Dolphins A, B, C, & D Removal

1. The top portion of each of the dolphins from EL 4 to EL 0 shall be hammered in place utilizing hydraulic excavators equipped with hydraulic hammers operating on barges.
2. Concrete shall fall into water and will be cleaned up after the remainder of the dolphins are removed.
3. The dolphins shall be drilled from a barge.
4. Divers will be sent down to inspect the sheets. The sheets will be cut vertically

every eight (8) feet.

5. Once the drilling is completed, the explosives will be placed and the dolphins will be imploded.
6. Once they are imploded, the river bottom will be cleaned up with a combination of hydraulic excavators and duty cycle cranes equipped with clamshell buckets.
7. Place material on barges and push to trestle or offloading yard.
8. Offload all the debris from the barges then move the barge back to each dolphin until the cleanup is complete.
9. Dolphins shall be removed to two (2) feet below existing mudline. Approximate elevations of the mudline – A & C EL -40 – B & D EL -26
10. Load concrete into trucks to be recycled at facility listed above.

Salt Shed Removal

1. The existing wood framed salt shed shall be demolished systematically starting at the top and working towards the bottom.
2. Once the upper portion is removed, any existing slabs, foundations, or sonotubes shall be removed to two (2) feet below ground level.
3. Load concrete and construction/demolition debris into trucks to be recycled at an approved facility.

BLASTING PLAN EXAMPLE

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

Francis Key Scott Bridge Recovery Project



Piers 19-21 Conceptual Blast Plan

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

April, 2024

Francis Scott Key Bridge Piers 19-21 Removal

Conceptual Blast Plan

As part of the recovery of the collapsed Francis Scott Bridge and the opening of the navigable waterway piers 19, 20 and 21 will need to be removed. One option is to remove the piers to the top of the tremie concrete. The second option would be to remove the pier columns to the top of footing (foundation concrete) only. The drilling and blasting methodology for option 1, complete removal, is outlined in this conceptual plan. The piers will be drilled vertically from the top using a hydraulic drill rig with an onboard dust collection system and electronic hole alignment. The drill will be staged on a barge. A template will be constructed for each pier that will facilitate the use of casing pipes as guides for the drilling of the holes in the footings and foundations. Holes will be drilled to the required depths and will be spaced to miss the vertical steel piles.

Once the drilling of each hole is completed a liner pipe will be placed in the hole and the casing pipe will be removed to be re-used at adjacent hole locations. The liner pipes will facilitate loading of explosives from above water.

The loading of explosives will begin on a predetermined date. All agencies will be informed of the delivery date and time of the explosives by the explosive distributor. The explosives will be placed in magazines at an USCG approved temporary onland location, the magazines will then be placed on the USCG approved "powder barge" and pushed to the pier, where it will be secured. The loading of the blast will commence and will continue until the structure is loaded. All unused explosive material will be brought back to shore, placed back in the distributors approved truck and returned to their magazine site. Once all excess explosive material has been removed the hole to hole surface connections will be made and blast mats will be placed where the Blaster in Charge deems necessary.

There will be three separate blast events, one for each pier. The waterway will be secured for a 1500 foot radius ½ hour prior to the predetermined shot time. Once it has been secure and all unnecessary personnel are removed from the safety zone the final initiation hook up will be made. The Blaster will exit the safety zone to the dedicated barge from which the blast will be detonated. Five minutes prior to blast time the 5 minute warning will be sounded and the safety zone will be confirmed secure and clear the imminent blast warning will be sounded 1 minute prior to blast time. Once again the safety zone will be confirmed secure and clear. The Blaster will detonate the blast and upon feeling the blast detonated as planned the All Clear will be sounded allowing the waterway to be reopened.

5 minute warning = 3 short blasts of the air horn

Imminent blast warning = 2 short blasts of the air horn

All Clear = 1 long blast of the air horn.

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

As an alternative method the columns of each pier could be removed conventionally to the top of the footings and each pier could have a coffer dam constructed around it. Once constructed and de-watered the footing and foundation could be drilled in the “dry” by placing the drill rig on top of the footing inside the coffer cell. The loading of explosives could also be conducted inside the cell in the dry. Once the structure is loaded the cell could be flooded to allow the water to act as confinement for the blast debris.

All other drill / blast parameters would remain the same but there would be no requirement for templates, casing pipe or liner pipes.

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

Piers 19-21 Blast Parameters

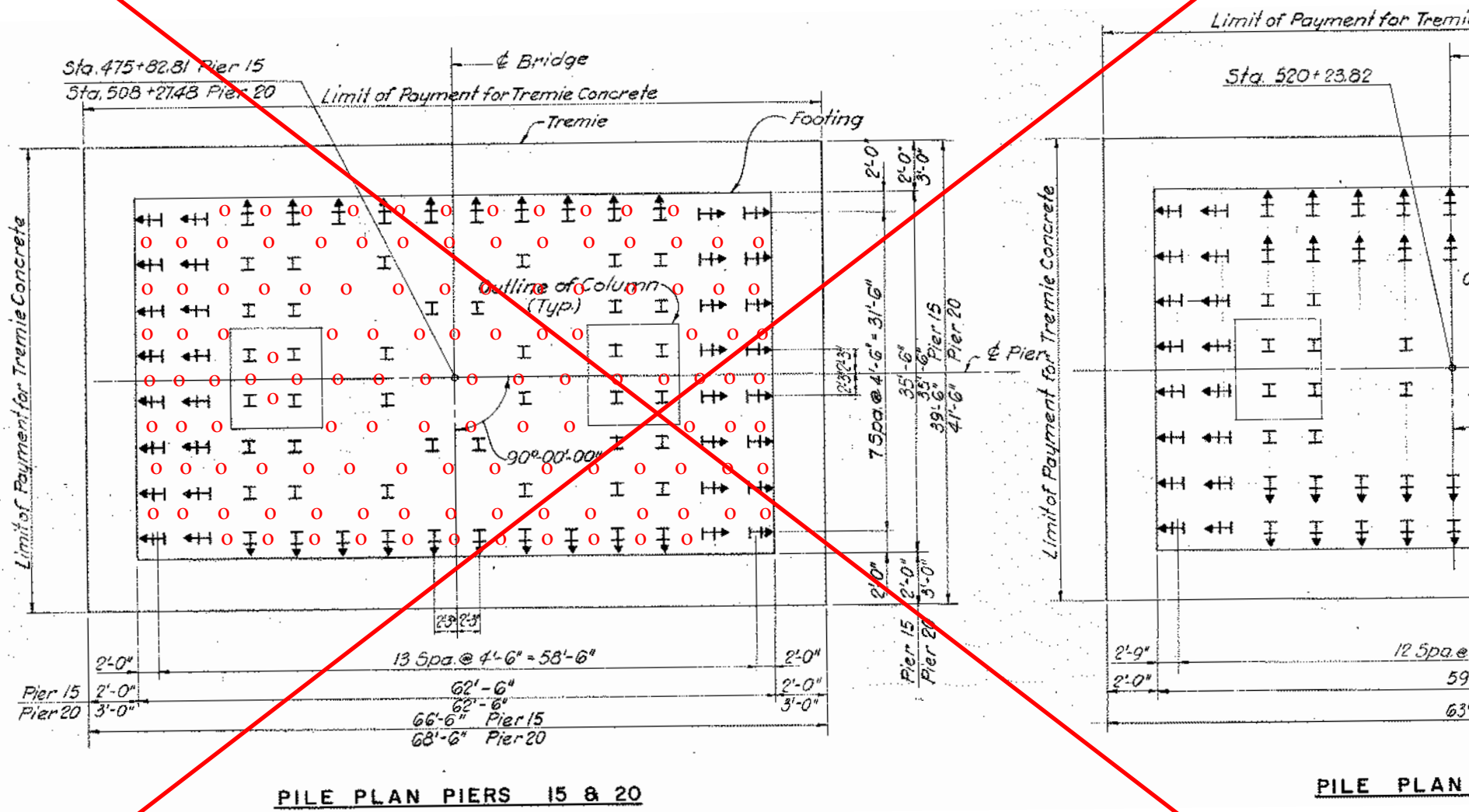
	<u>P19</u>	<u>P20</u>	<u>P21</u>
Number of holes	180	126	163
Hole depth (ft)	36	34	34
Hole diameter(in)	2.75	2.75	2.75
Spacing(ft)	5	4.5	4.5
Burden(ft)	4.5	4.5	4.5
Number of holes	180	126	163
Max. decks per hole	2	2	2
Max. explosives /delay(lb)	30	24	26
Approx. Total explosive(lb)	5500	3000	4300
Average powder factor	1.75	1.75	1.75
Minimum delay (ms)	9	9	9

Estimated Peak Particle Velocity (in/sec) at Utility Trench

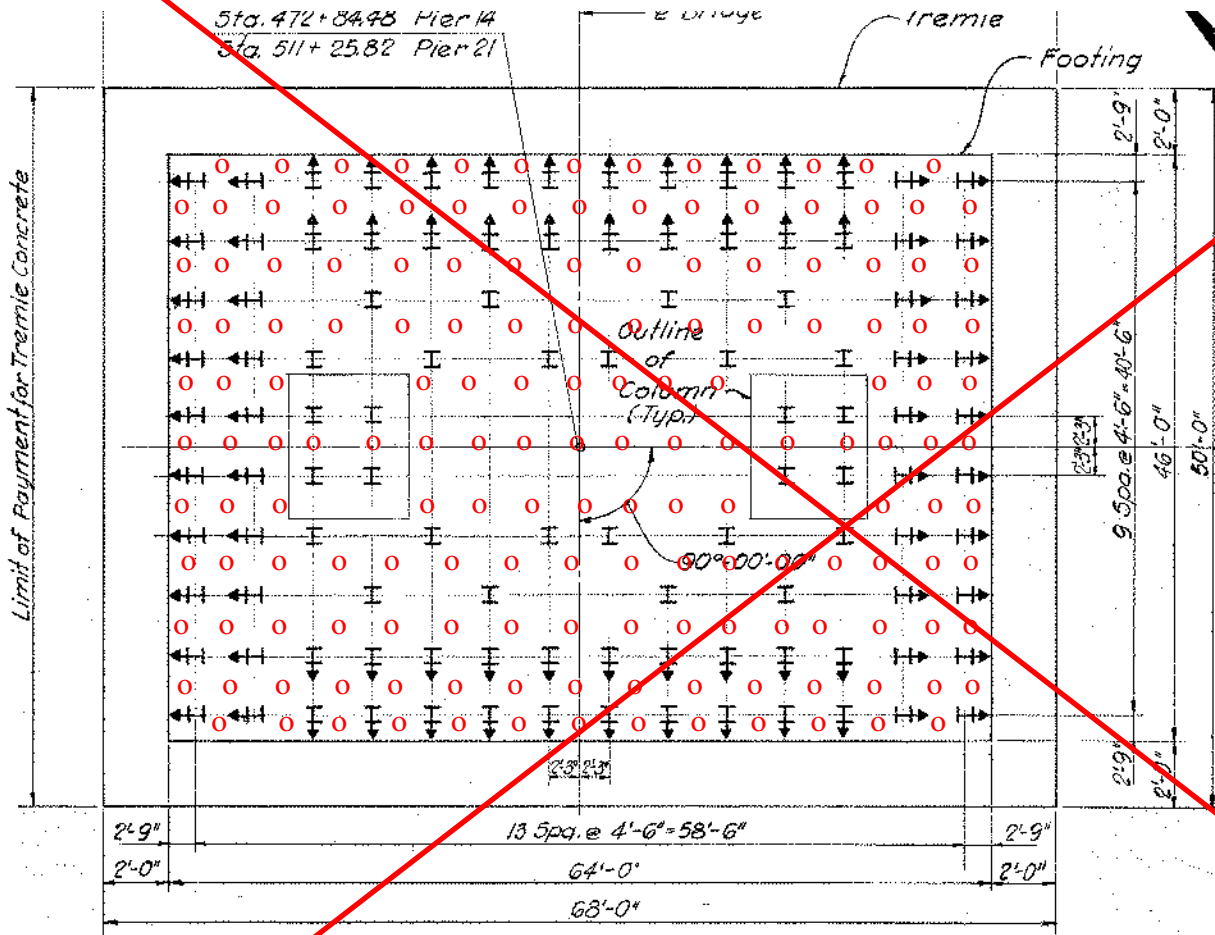
Structure	Distance(ft)	lb/delay	K = 24.2	160	240	300
Pier 19	~230	30	0.061	0.405	0.607	0.795
Pier 20	~230	24	0.051	0.338	0.508	0.635
Pier 21	~230	26	0.058	0.383	0.574	0.718

** K value indicates level of confinement of the blast with 24.2 being unconfined and 300 being extremely confined (as a sinking cut in solid bedrock).

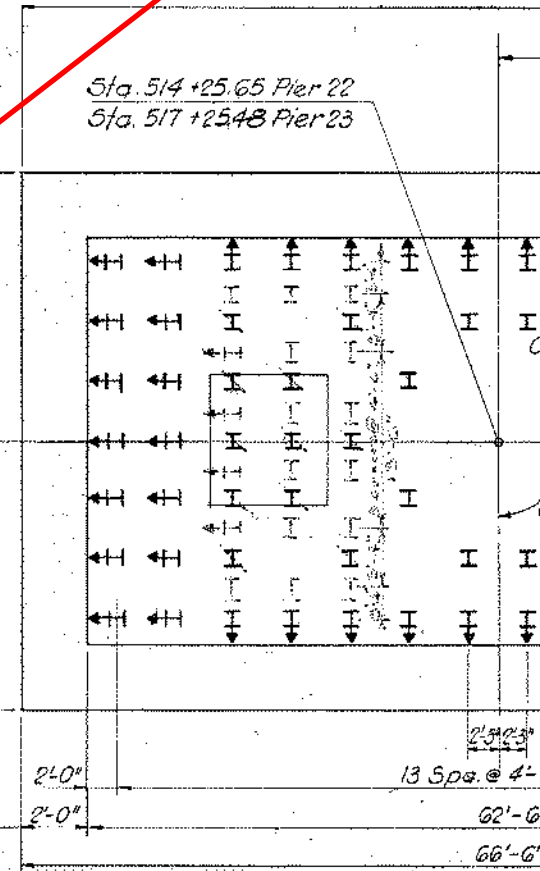
WORK ON THIS PAGE IS NOT INCLUDED IN
 EMERGENCY AUTHORIZATION.



WORK ON THIS PAGE IS NOT INCLUDED IN
 EMERGENCY AUTHORIZATION.



PILE PLAN PIERS 14 & 21

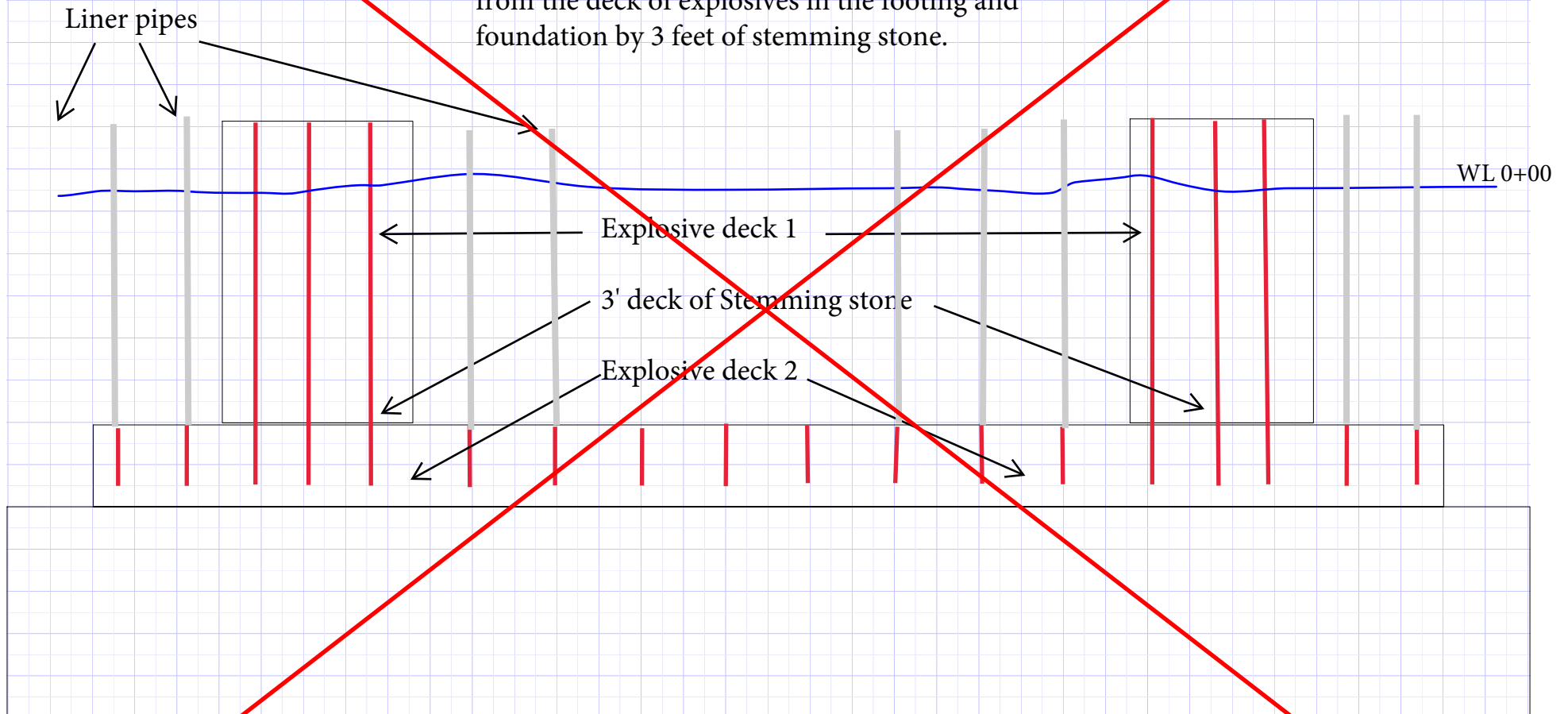


PILE PLAN PIERS 22 & 23

WORK ON THIS PAGE IS NOT INCLUDED IN EMERGENCY AUTHORIZATION.

Typical cross sectional view of drilled piers

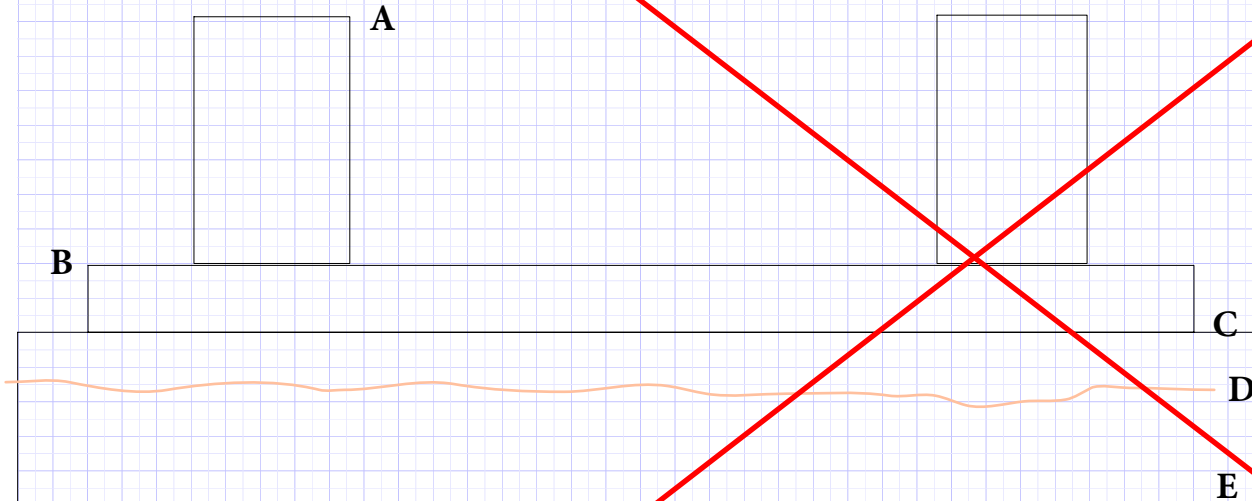
Columns will have a deck of explosives separated from the deck of explosives in the footing and foundation by 3 feet of stemming stone.



Holes in footing and foundation will be drilled using a template and casing pipes. Once the holes are drilled liner pipes will be placed in each hole to facilitate loading of explosives from above the water.

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

Typical Elevations



A - Top of pier
P19 = ~+4
P20 = ~+1
P21 = ~+1

B - Top of footing
P19 = -15
P20 = -15
P21 = -15

C - Top of foundation
P19 = -21
P20 = -23
P21 = -23

D - Mud line (per as built)
P19 = -25
P20 = -24
P21 = -24

E - Bottom of foundation
P19 = -35
P20 = -26
P21 = -36

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

Francis Key Scott Bridge Recovery Project



Dolphin B Conceptual Blast Plan

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

April, 2024

Francis Scott Key Bridge Dolphin B Removal Conceptual Blast Plan

As part of the recovery of the collapsed Francis Scott Bridge and opening a usable shipping channel Dolphin B must be removed. Conventional demolition methods and drilling and blasting will be employed to facilitate removal of the structure. Conventional demolition methods will be used to remove the reinforced and top section of the structure including the sheet pile leaving top of structure at elevation +4. The remaining sheet pile will be pre-cut by divers from +4 to mud line (-26) with vertical cuts on 6 ft spacings and horizontal cuts on 8 ft spacings. The Dolphin will be drilled vertically from the top using a Sandvik DX800 drill rig with an onboard dust collection system and electronic hole alignment. The drill will be staged on a barge. Holes will be drilled 32 feet from the top of the Dolphin and will be 2.75" in diameter. The holes in the outer most ring will be spaced to miss intercepting the vertical steel piles.

Once all drilling is complete the loading of explosives will begin on a predetermined date. All agencies will be informed of the delivery date and time of the explosives by the explosive distributor. The explosives will be placed in magazines at an USCG approved temporary onland location, the magazines will then be placed on the USCG approved "powder barge" and pushed to the Dolphin where it will be secured. The loading of the blast will commence and will be completed that day. All unused explosive material will be brought back to shore, placed back in the distributors approved truck and returned to their magazine site. Once all excess explosive material has been removed the surface connections will be made and blast mats will be placed over the top of the Dolphin.

The waterway will be secured for a 1500' radius ½ hour prior to the predetermined shot time. Once it has been secure and all unnecessary personnel are removed from the safety zone the final initiation hook up will be made. The Blaster will exit the safety zone to the dedicated barge from which the blast will be detonated. Five minutes prior to blast time the 5 minute warning will be sounded and the safety zone will be confirmed secure and clear the imminent blast warning will be sounded 1 minute prior to blast time. Once again the safety zone will be confirmed secure and clear. The Blaster will detonate the blast and upon feeling the blast detonated as planned the All Clear will be sounded allowing the waterway to be reopened.

5 minute warning = 3 short blasts of the air horn

Imminent blast warning = 2 short blasts of the air horn

All Clear = 1 long blast of the air horn.

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

The blast will initiate at the furthest point away from the buried/submerged utilities to help minimize impact from blast induced ground vibrations. The Dolphin is essentially “free standing” and vibrations generated in the substrate will be much less than seen from blasting in situ rock. The predicted PPV for the maximum weight of explosives per delay are listed below. The K value is an indicator of confinement used in the established PPV prediction equation $PPV = ((\text{distance}/\text{explosive wt}^{0.5})^{-1.6}) * K$.

Industry established K values:


24.2 = little or no confinement, 160 = typical confinement, 240 = heavy confinement

Predicted vibration for 49 lbs / delay

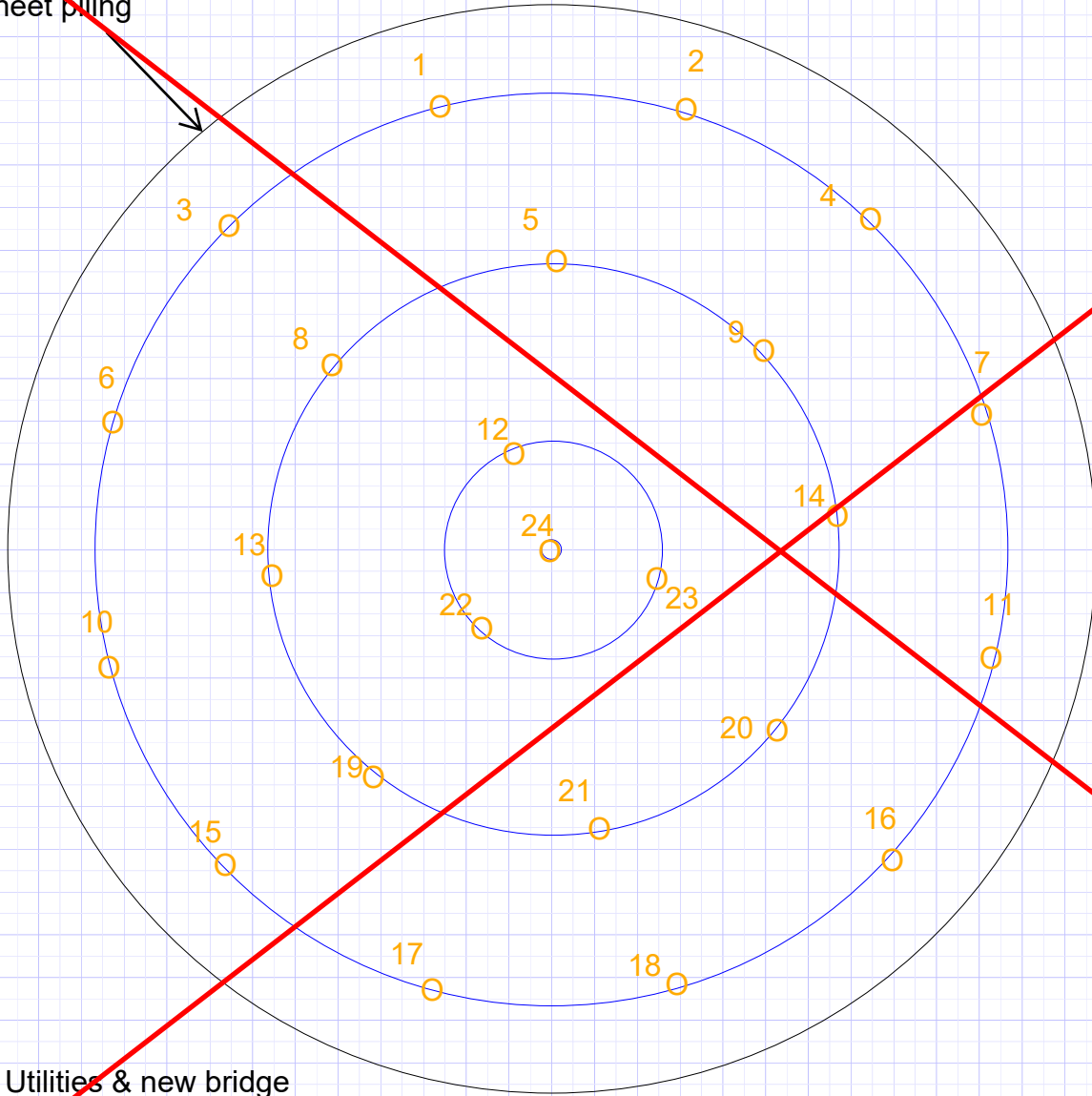
Structure	Distance from blast (ft)	PPV (ips) K=24.2	K=160	K=240
Utility lines	150	0.187	1.187	1.781
Hydro tower base	450	0.031	0.250	0.307

WORK ON THIS PAGE IS NOT INCLUDED IN EMERGENCY AUTHORIZATION.

DOLPHIN B


Hydro tower 

Sheet piling 

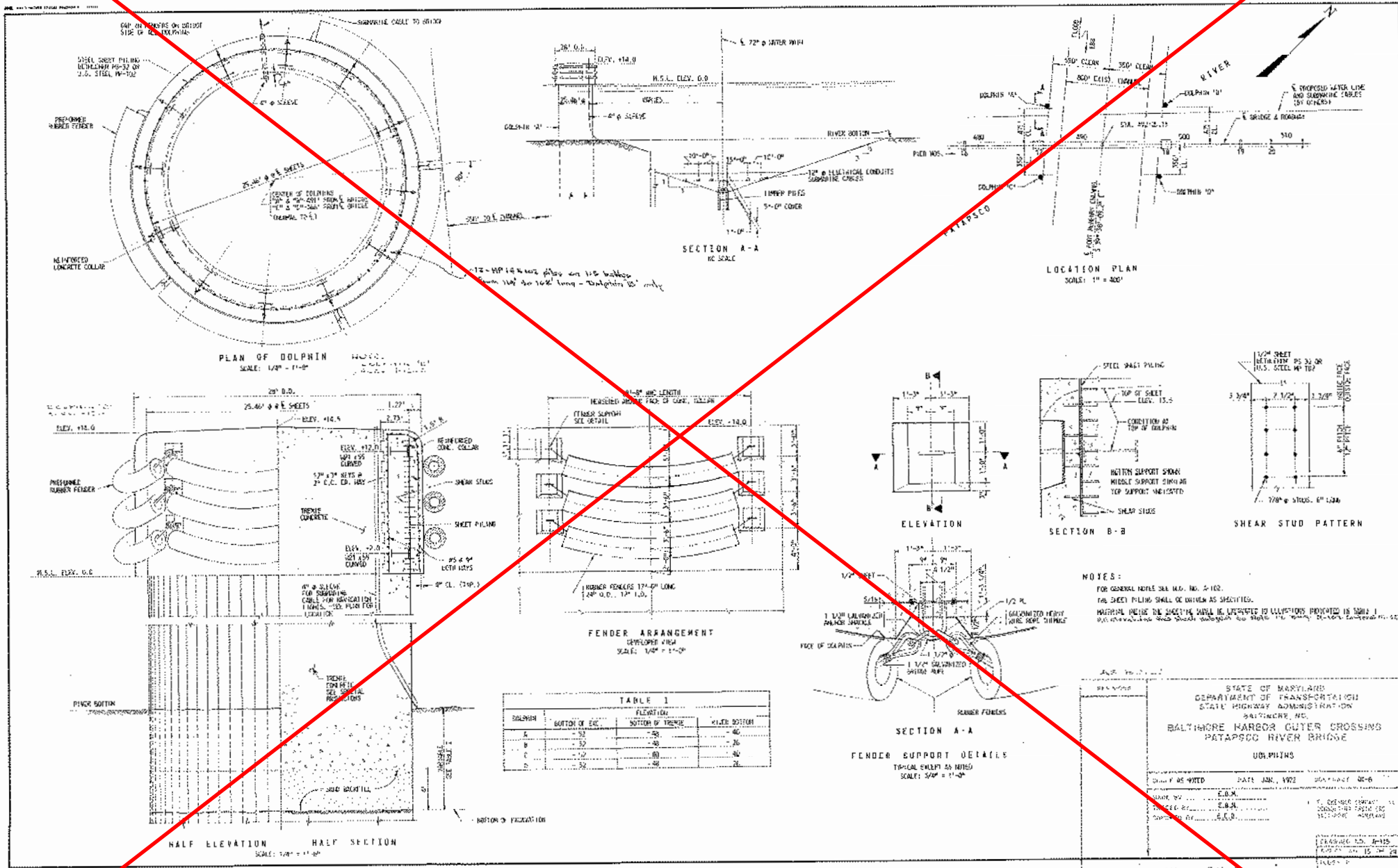


Blast Parameters

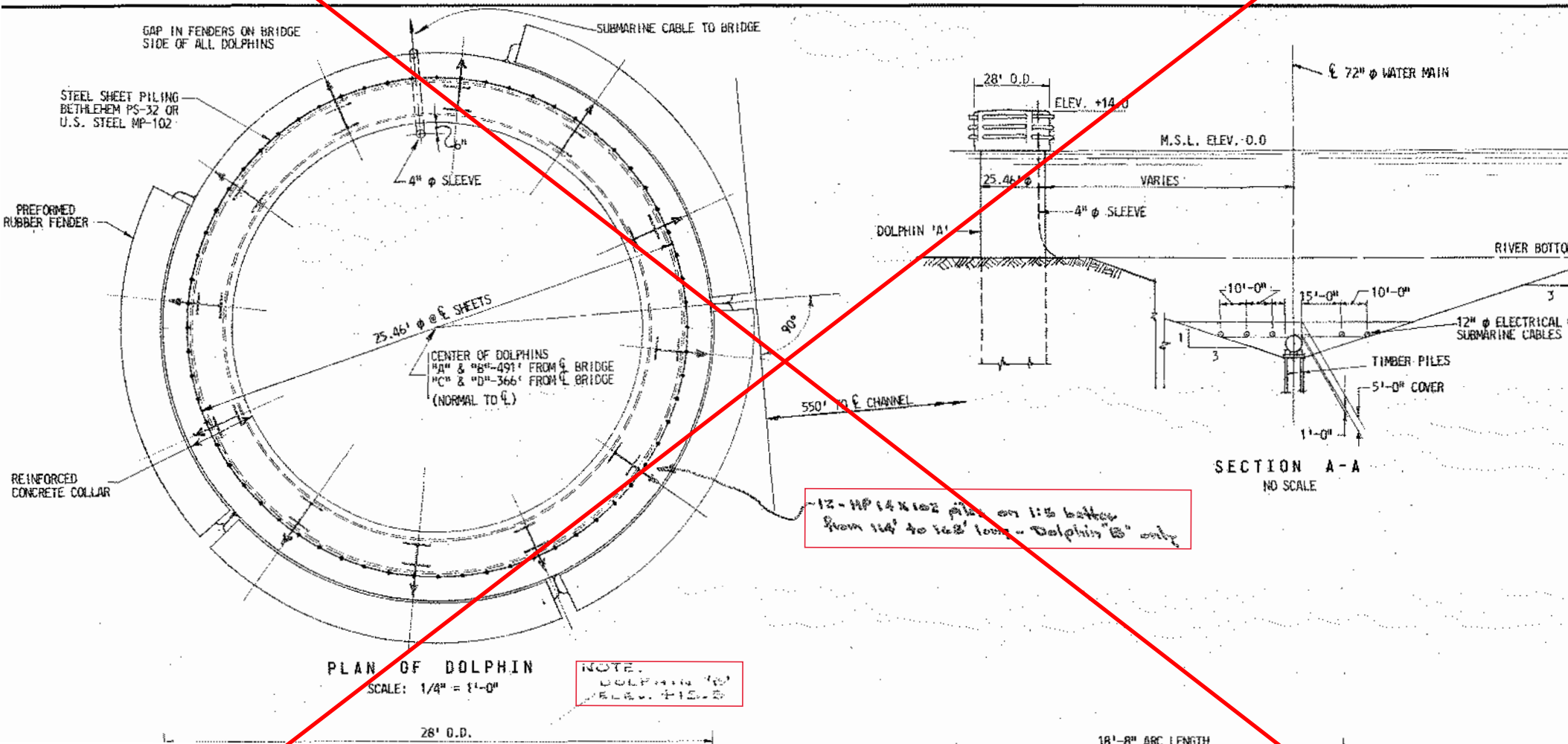
- Number of holes = 24
- Hole diameter = 2.75"
- Hole depth = 32'
- Spacing = 5.5'
- Burden = 4 - 4.5'
- Collar height = 4'
- Explosive column = 28'
- Approx. total explosives wt. = ~1123 lb
- Max. explosive / delay = 47 lb
- Overall powder factor = 1.8 (ranges 1 - 2)
- Delay between detonations = 17ms Total shot duration = 391ms
- Initiation - Nonel dual delay detonators.
- Explosive - Dynamax Pro.
- Shot sequence as numbered on sketch.
- All explosive columns will be double primed, one detonator in bottom and one near the top for redundancy.
- Sheet pile to be Pre-cut.

Utilities & new bridge 

WORK ON THIS PAGE IS NOT INCLUDED IN EMERGENCY AUTHORIZATION.



WORK ON THIS PAGE IS NOT INCLUDED IN EMERGENCY AUTHORIZATION.



-12-HP 14X102 piles on 1:6 batter from 114' to 142' long - Dolphin "B" only

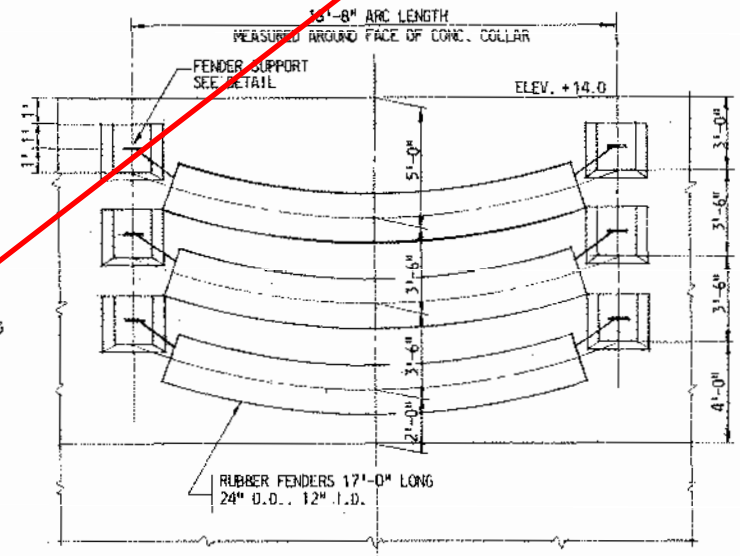
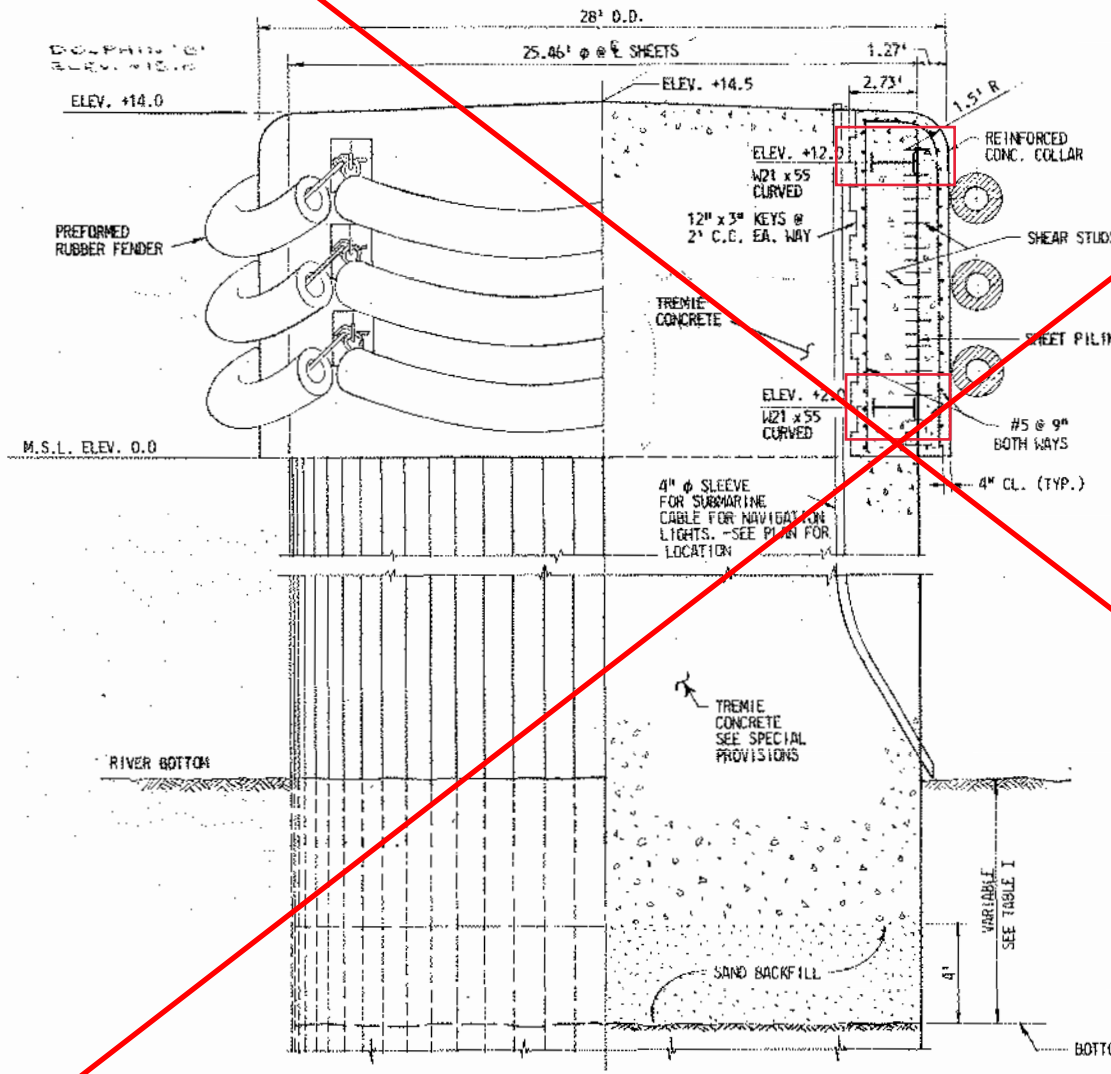
NOTE:
DOLPHIN TO
ELEV. +15.0

PLAN OF DOLPHIN
SCALE: 1/4" = 1'-0"

WORK ON THIS PAGE IS NOT INCLUDED IN EMERGENCY AUTHORIZATION.

PLAN OF DOLPHIN
SCALE: 1/4" = 1'-0"

NOTE:
DOLPHIN TO
ELEV. +14.0

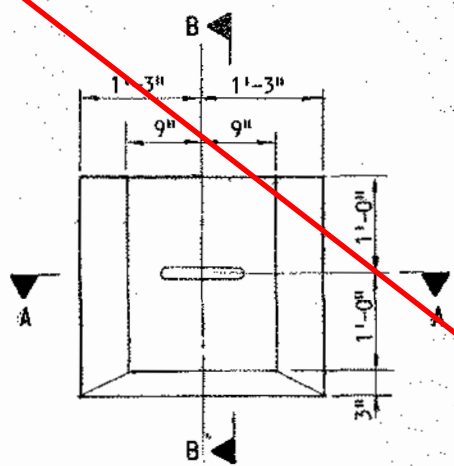
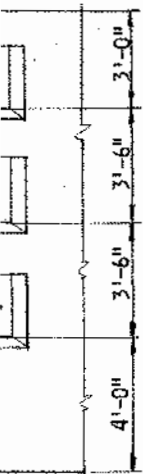


FENDER ARRANGEMENT
DEVELOPED VIEW
SCALE: 1/4" = 1'-0"

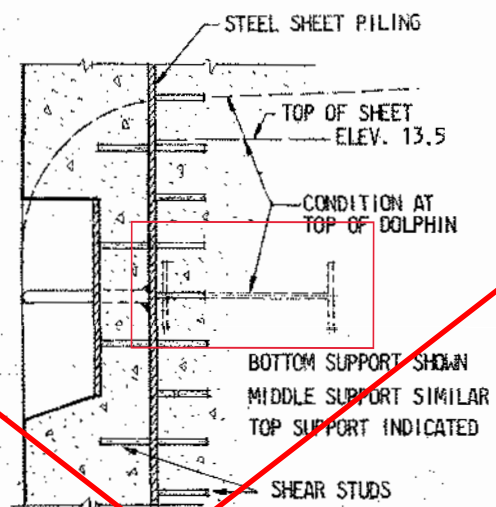
TABLE I

DOLPHIN	ELEVATION		
	BOTTOM OF EXC.	BOTTOM OF TREMIE	RIVER BOTTOM
A	- 52	- 48	- 40
B	- 52	- 48	- 26
C	- 52	48	- 40
D	- 52	- 48	- 26

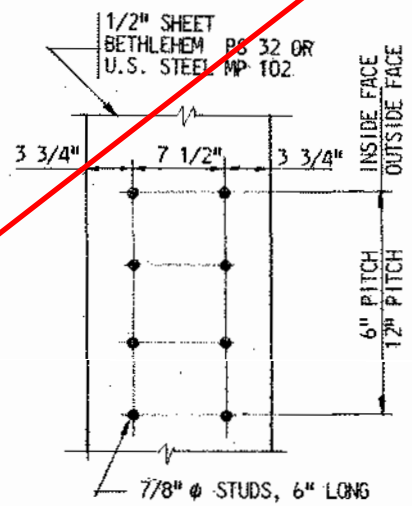
WORK ON THIS PAGE IS NOT INCLUDED IN EMERGENCY AUTHORIZATION.



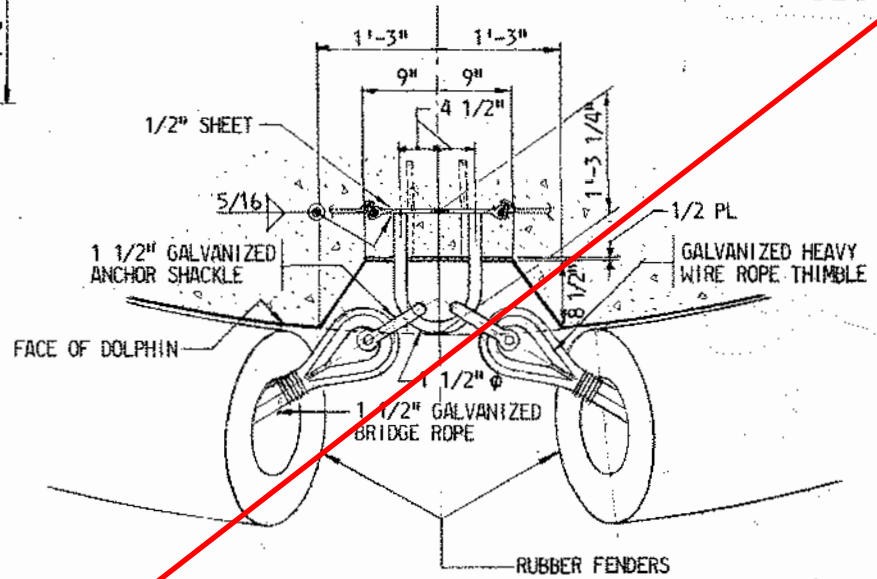
ELEVATION



SECTION B-B



SHEAR STUD PATTERN



SECTION A-A

NOTES :

FOR GENERAL NOTES SEE DWG. NO. A-102.

THE SHEET PILING SHALL BE DRIVEN AS SPECIFIED.

MATERIAL INSIDE THE SHEETING SHALL BE EXCAVATED TO ELEVATIONS INDICATED IN TABLE I.
All elevations this sheet subject to Note 12, Comp. A-102, Contract 01-329.

AS BUILT

REVISIONS

STATE OF MARYLAND
 DEPARTMENT OF TRANSPORTATION
 STATE HIGHWAY ADMINISTRATION
 BALTIMORE, MD.
 BALTIMORE HARBOR OUTER CROSSING

WORK ON THIS PAGE IS NOT INCLUDED IN EMERGENCY AUTHORIZATION.

12" ϕ WATER MAIN

10'-0"

12" ϕ ELECTRICAL CONDUITS
SUBMARINE CABLES

TIMBER PILES

5'-0" COVER

A

PIER NOS. 16 18 19 20

PATAPSCO

FORT McHENRY CHANNEL
S 39°-38'-09.2" E

LOCATION PLAN
SCALE: 1" = 400'

FLOOD
EBB

550' CLEAR

550' CLEAR

800' EXIST. CHANNEL

RIVER

DOLPHIN 'A'

DOLPHIN 'B'

DOLPHIN 'C'

DOLPHIN 'D'

STA. 492+05.15

480

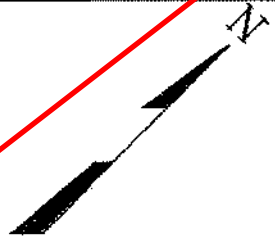
490

500

510

BRIDGE & ROADWAY

PROPOSED WATER LINE
AND SUBMARINE CABLES
(BY OTHERS)



B

STEEL SHEET PILING

1/2" SHEET
BETHLEHEM PS 32 OR
U.S. STEEL MP 102.

FACE
FACE

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

PIER HAMMERING EXAMPLE

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

HIGH REACH
EXCAVATOR WITH
150' OF REACH

145'-3 $\frac{11}{16}$ "

WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

SCALE 1" = 20'

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THE DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER/ARCHITECT AS APPLICABLE. THE ALTERING ENGINEER/ARCHITECT SHALL AFFIX HIS/HER SEAL AND THE NOTATION 'ALTERED BY' FOLLOWED BY HIS/HER SIGNATURE AND DATE OF ALTERATION.

OWNER:
MDTA
2310 BROENING HIGHWAY
BALTIMORE, MD 21224

DEMOLITION CONTRACTOR:

DRAFTER
CHECKER
SUPERVISOR

4	
3	
2	
1	
0	
NO.	DATE

FRANCIS SCOTT KEY BRIDGE
REMAINING DEMOLITION
PIER 16 SHOWN

PIER REMOVAL
HAMMERING

DWG. NO.
D-1

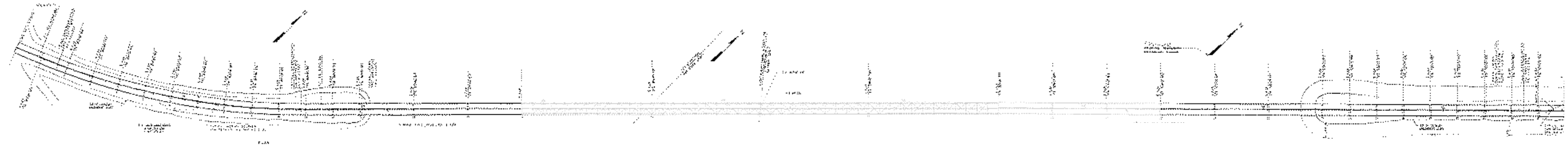
SAMPLE ENGINEERED WORK PLAN

KEY BRIDGE
KEY BRIDGE DEMOLITION

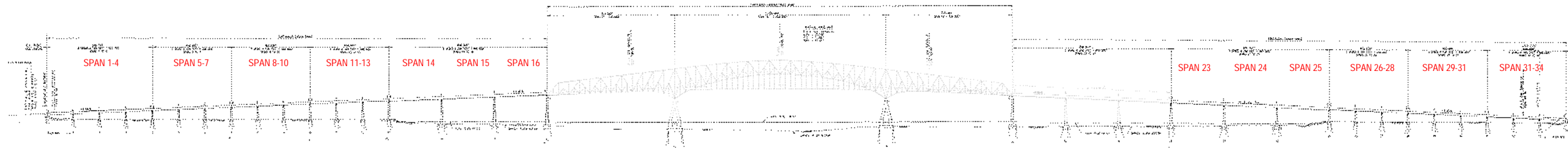
PRELIMINARY
NOT FOR CONSTRUCTION

△			
△			
△			
NO.	DATE	REMARKS	BY

TITLE PAGE KEY BRIDGE DEMOLITION	
DRAWN BY	CHK'D BY
DATE	
PROJECT	SHEET NO.



PLAN

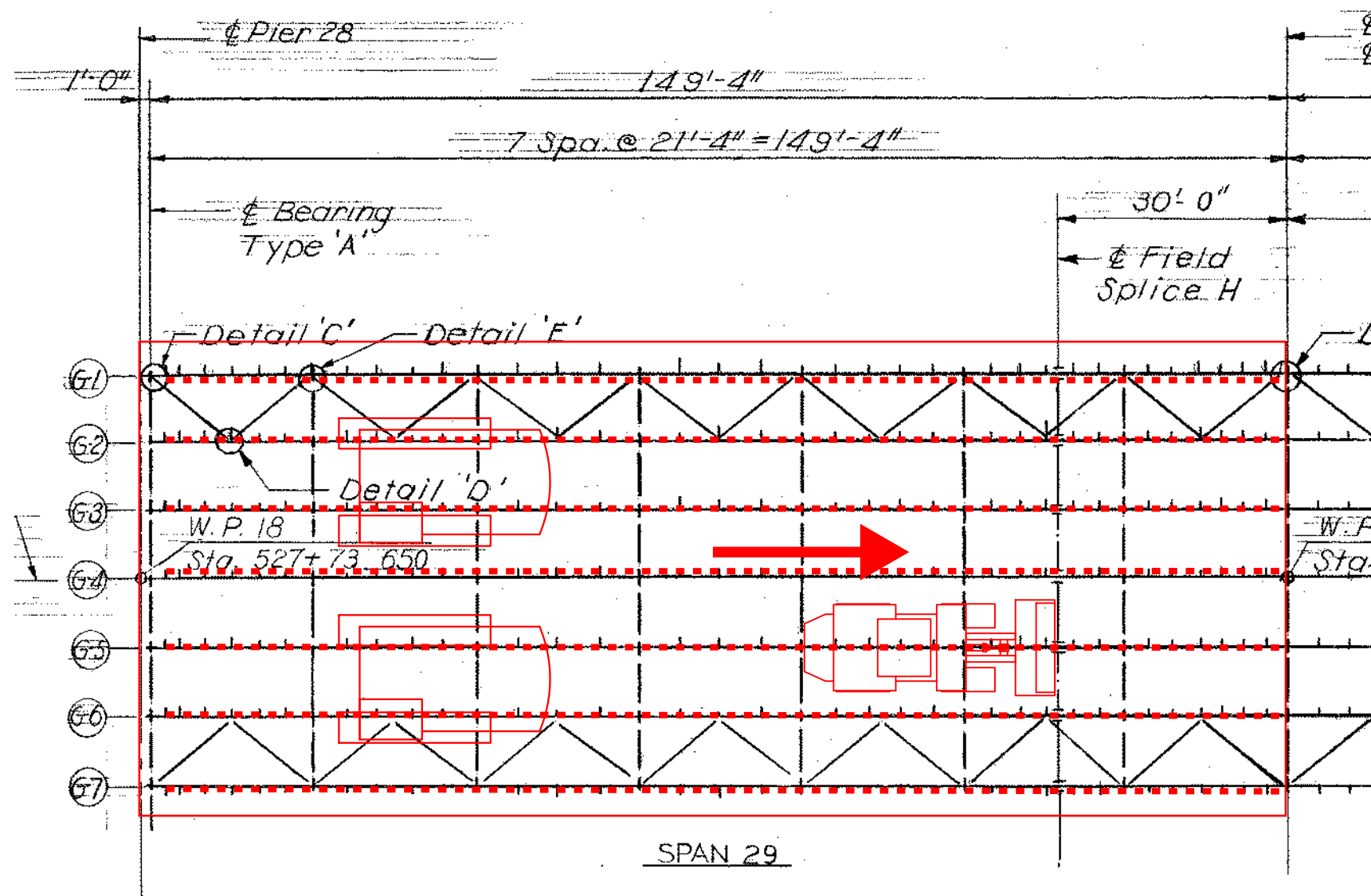
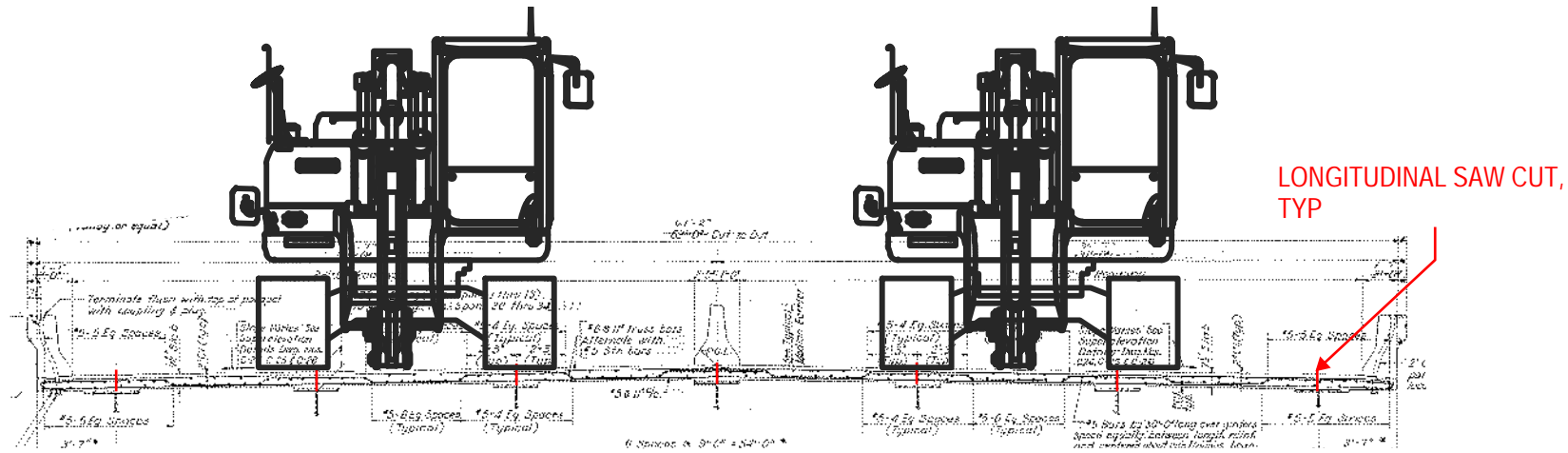


ELEVATION

PRELIMINARY
NOT FOR CONSTRUCTION

NO.	DATE	REMARKS	BY
△			
△			
△			

GENERAL LAYOUT KEY BRIDGE DEMOLITION	
DRAWN BY	CHK'D BY
DATE	
PROJECT	SHEET NO.



- DECK DEMOLITION SEQUENCE**
1. SAW AND REMOVE OVERHANG BARRIER AND DECK
 2. LONGITUDINAL SAW DECK
 3. WITH EXCAVATOR, PULL BACK SECTION OF DECK, CUT/BREAK REBAR, HAUL PANEL OFF DECK WITH LOADER

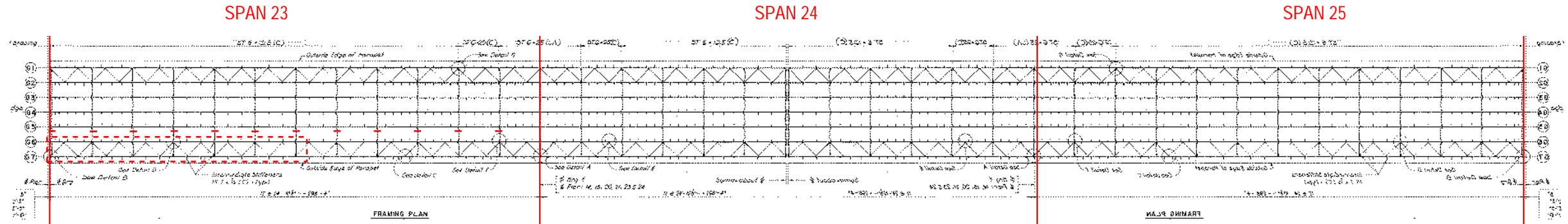
REPEAT FOR ENTIRE DECK

PRELIMINARY
NOT FOR CONSTRUCTION

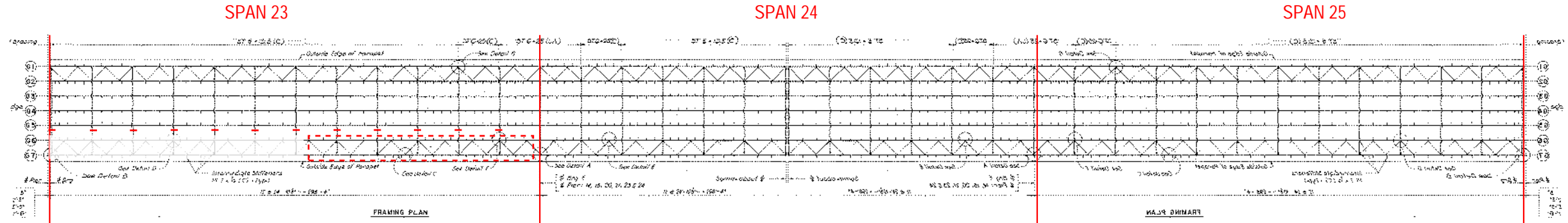
△			
△			
△			
NO.	DATE	REMARKS	BY

GENERAL DECK DEMOLITION KEY BRIDGE DEMOLITION	
DRAWN BY	CHK'D BY
DATE	
PROJECT	SHEET NO.

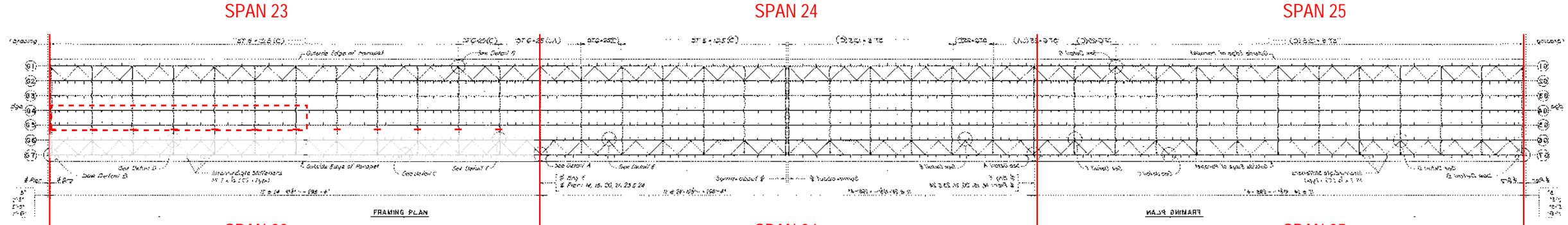
STEP 1 -
CUT CROSSFRAMES BETWEEN G6 & G5
HOIST G6&G7. APPROX WT = 100 TNS



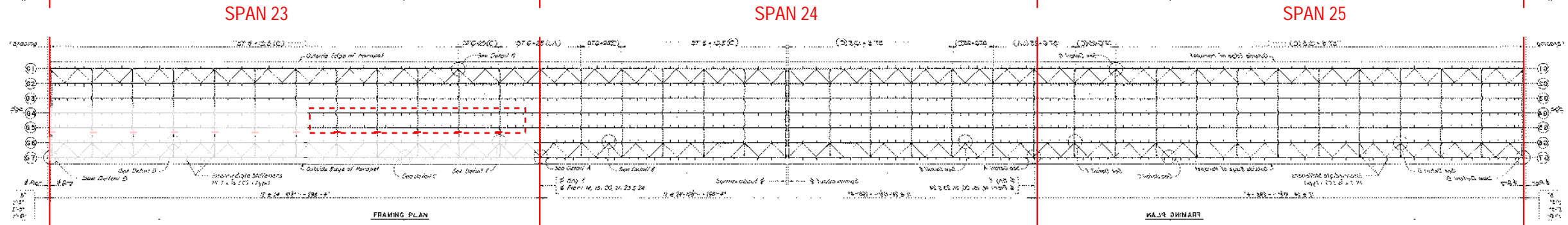
STEP 2 -
CUT CROSSFRAMES BETWEEN G6 & G5
HOIST G6&G7. APPROX WT = 75 TNS



STEP 3 -
CUT CROSSFRAMES BETWEEN G3 & G4
HOIST G4&G5. APPROX WT = 100 TNS



STEP 4 -
CUT CROSSFRAMES BETWEEN G3 & G4
HOIST G4&G5. APPROX WT = 75 TNS



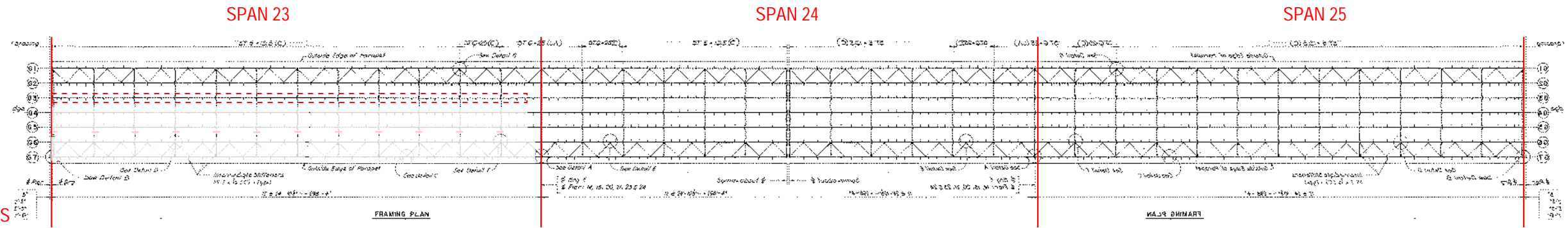
PRELIMINARY
NOT FOR CONSTRUCTION

NO.	DATE	REMARKS	BY

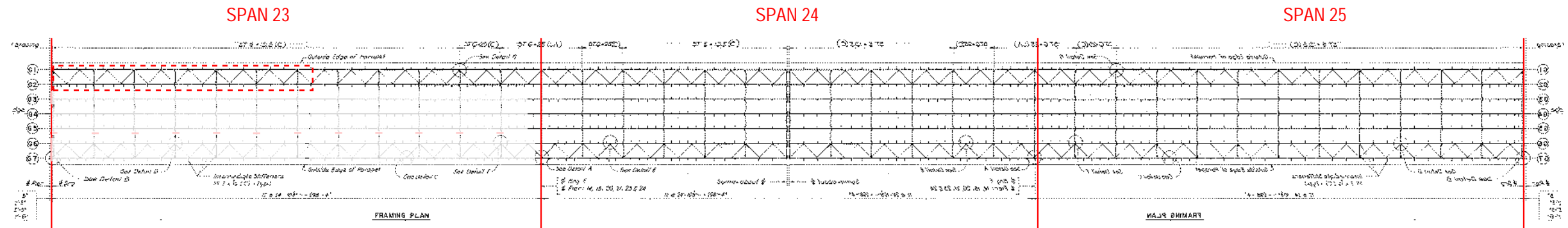
STEEL DEMOLITION SPANS 23-25 KEY BRIDGE DEMOLITION	
DRAWN BY	CHK'D BY
DATE	
PROJECT	SHEET NO.

STEP 5 -
RIG TO G3 WITH SPREADER
CUT CROSSFRAMES BETWEEN G3 & G2
HOIST G3. APPROX WT = 90 TNS

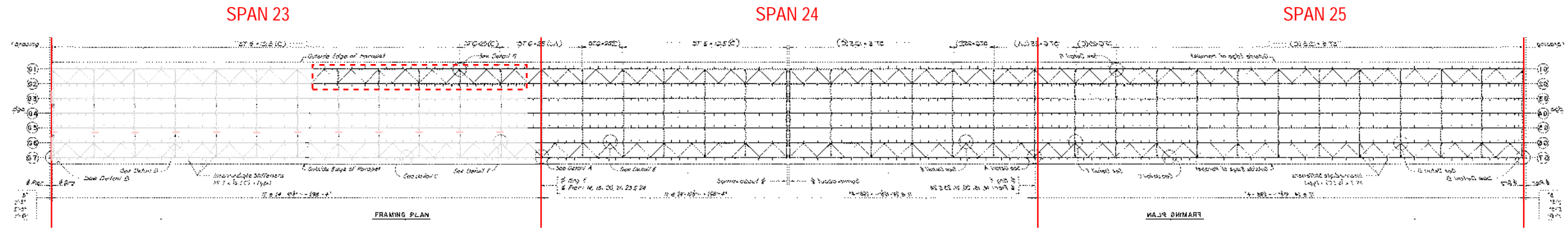
MAY ALSO TAKE PARTIAL LENGTH AND
KEEP CONNECTED WITH CROSSFRAMES



STEP 6 -
HOIST G1&G2. APPROX WT = 100 TNS



STEP 7 -
HOIST G1&G2. APPROX WT = 75 TNS



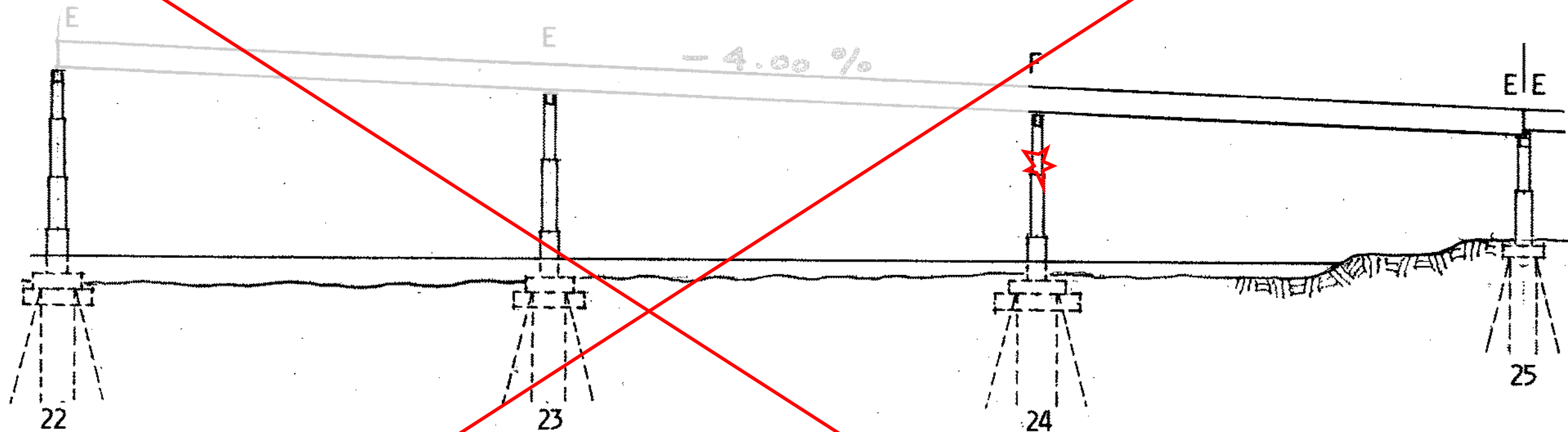
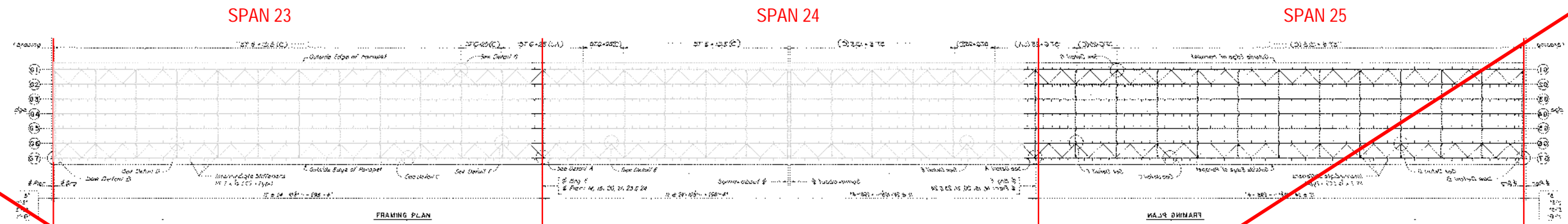
REPEAT SAME STEPS FOR SPAN 24

PRELIMINARY
NOT FOR CONSTRUCTION

NO.	DATE	REMARKS	BY
△			
△			
△			

STEEL DEMOLITION SPANS 23-25 KEY BRIDGE DEMOLITION	
DRAWN BY	CHK'D BY
DATE	
PROJECT	SHEET NO.

STEP 8-
BLAST PIER 24 AND DROP SPAN 25
RETRIEVE WITH DREDGE

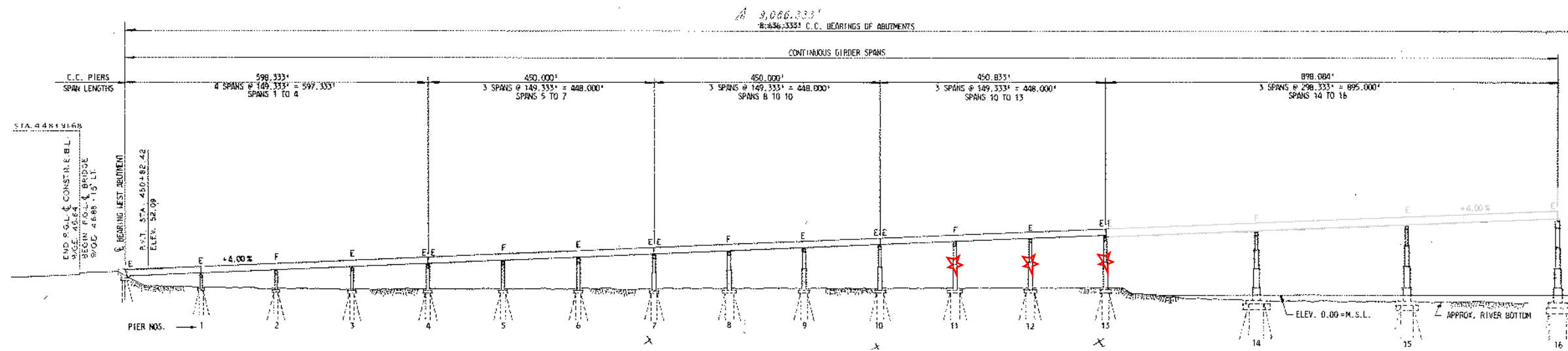


PRELIMINARY
NOT FOR CONSTRUCTION

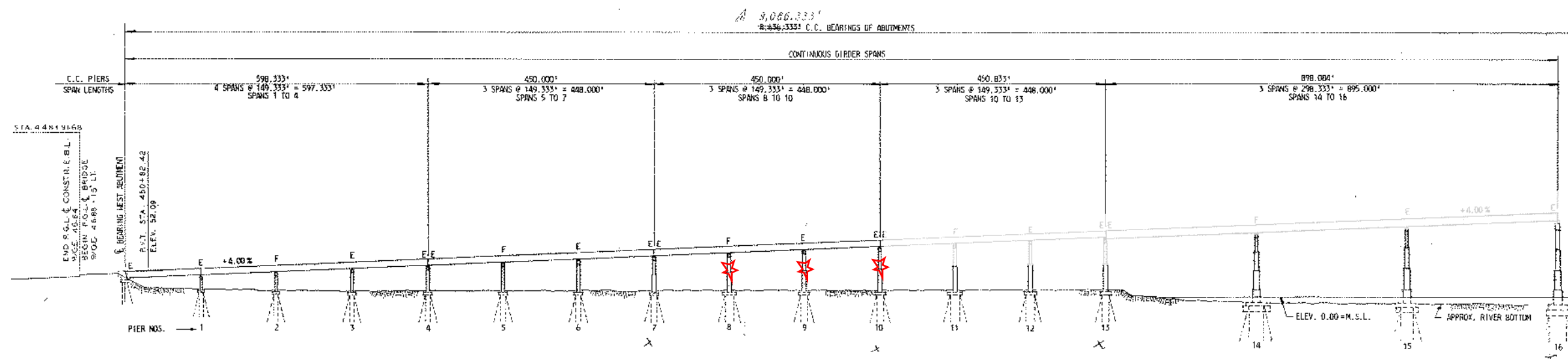
WORK ON THIS PAGE IS NOT INCLUDED IN
EMERGENCY AUTHORIZATION.

NO.	DATE	REMARKS	BY
△			
△			
△			

STEEL DEMOLITION SPANS 23-25 KEY BRIDGE DEMOLITION	
DRAWN BY	CHK'D BY
DATE	
PROJECT	SHEET NO.



STEP 1
 BLAST PIERS 11, 12, 13 TO
 DROP SPANS 11, 12, & 13
 RETRIEVE WITH DREDGE



STEP 2
 BLAST PIERS 8, 9, 10 TO
 DROP SPANS 8, 9, & 10
 RETRIEVE WITH DREDGE

REPEAT FOR ALL REMAINING
 APPROACH SPANS

SIMILAR FOR SPANS 26 - 34

PRELIMINARY
 NOT FOR CONSTRUCTION

NO.	DATE	REMARKS	BY

STEEL DEMOLITION SPANS 1-13 KEY BRIDGE DEMOLITION	
DRAWN BY	CHK'D BY
DATE	
PROJECT	SHEET NO.