Addendum to the Concrete Batch Plant Control Plan

Placement with Concrete Boom or Tremie Pipe Procedure:

When concrete is placed from a concrete placing boom or tremie pipe attached to a placing boom and swinging over water, either:

- A bag will be placed at the end of the hose or tube to capture potential concrete discharges when over water. The concrete plant boom operator is responsible for confirming that the bag is in place and secured before swinging over water; or
- The hose or tube will be bent and wire tied to kink the hose or tube causing a positive seal. The concrete plant boom operator is responsible for confirming that the hose or tube is kinked with wire, there is no concrete between the kink and the open end of the concrete hose and is secured before swinging over water.

Addendum to the Concrete Batch Plant Control Plan

Concrete Placement at Pier [redacted] via Pump Truck:

Delivery of concrete to Pier [redacted] will be performed by concrete trucks transiting onto a barge stationed at the end of the Rockland Trestle (“car-float barge”) via a ramp. Placement of concrete in Pier [redacted] will be completed using one, or more, concrete pump truck. Transfer of concrete from the concrete truck to the pump truck will be consistent with plans previously submitted describing concrete placement from the Rockland Trestle.

For concrete placement at Pier [redacted] the pump truck located on the car-float barge will pump concrete to the receiving pier. Concrete Quality Control and Quality Assurance concrete testing will be completed on the car-float barge within temporary containment (plastic tarpaulin or similar) to prevent discharge of concrete to the Hudson River. Skip pans or like will be available at the car-float barge next to the pump truck as well as the receiving pier to receive waste concrete in the event the concrete lines require clearing.

For concrete placement at [redacted] the car-float based pump truck would pump concrete to a second, barge-based pump truck. Concrete would be pumped directly to the second pump truck’s reservoir. The operators of both pump trucks and the receiving pier will be in direct communication with each other for proper control of concrete and ability to shut down concrete flow. The second pump truck will then deliver concrete to the receiving pier. Concrete Quality Control and Quality Assurance concrete testing will be completed on the car-float barge within temporary containment (plastic tarpaulin or similar) to prevent discharge of concrete to the Hudson River. Skip pans or like will be available at the car-float next to the first pump truck, the barge located in proximity to the second pump truck, and on the receiving pier to receive waste concrete in the event the concrete lines require clearing.

For [redacted] the pump truck boom will follow the same protocol as mentioned in the Placement with Concrete Boom or Tremie Pipe Procedure section above to mitigate potential release of fresh concrete into the Hudson River. See attached drawing CWP-231-TZC-0001 through CWP-231-TZC-0008 for reference.

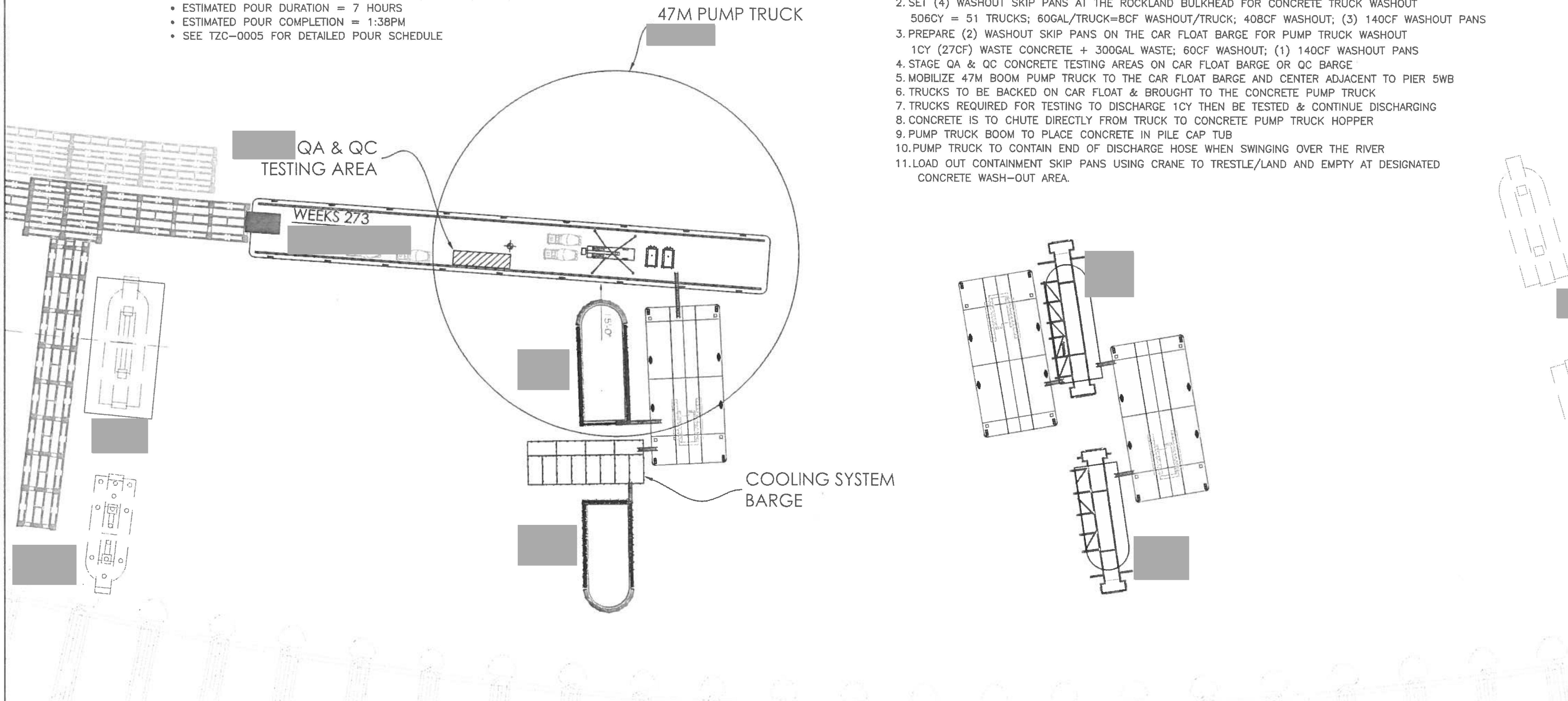
POUR SCHEDULE NOTES:

- ESTIMATED POUR QTY = 506 CY
- (1) 10 CY CONCRETE TRUCK TO TO ARRIVE AT 6:30AM
- TRUCKS TO CONTINUE AT 8 MIN SPACING (~ 72 CY/HOUR)
- ESTIMATED POUR DURATION = 7 HOURS
- ESTIMATED POUR COMPLETION = 1:38PM
- SEE TZC–0005 FOR DETAILED POUR SCHEDULE

PIER [redacted] PILE CAP

POUR SEQUENCE PLAN

1. PREPARE CAR FLOAT BARGE WITH CONTAINMENT BEAM, AT THE END OF THE HD TRESTLE
2. SET (4) WASHOUT SKIP PANS AT THE ROCKLAND BULKHEAD FOR CONCRETE TRUCK WASHOUT
   506CY = 51 TRUCKS; 60GAL/TRUCK=8CF WASHOUT/TRUCK; 408CF WASHOUT; (3) 140CF WASHOUT PANS
3. PREPARE (2) WASHOUT SKIP PANS ON THE CAR FLOAT BARGE FOR PUMP TRUCK WASHOUT
   1CY (27CF) WASTE CONCRETE + 300GAL WASTE; 60CF WASHOUT; (1) 140CF WASHOUT PANS
4. STAGE QA & QC CONCRETE TESTING AREAS ON CAR FLOAT BARGE OR QC BARGE
5. MOBILIZE 47M BOOM PUMP TRUCK TO THE CAR FLOAT BARGE AND CENTER ADJACENT TO PIER 5WB
6. TRUCKS TO BE BACKED ON CAR FLOAT & BROUGHT TO THE CONCRETE PUMP TRUCK
7. TRUCKS REQUIRED FOR TESTING TO DISCHARGE 1CY THEN BE TESTED & CONTINUE DISCHARGING
8. CONCRETE IS TO CHUTE DIRECTLY FROM TRUCK TO CONCRETE PUMP TRUCK HOPPER
9. PUMP TRUCK BOOM TO PLACE CONCRETE IN PILE CAP TUB
10. PUMP TRUCK TO CONTAIN END OF DISCHARGE HOSE WHEN SWINGING OVER THE RIVER
11. LOAD OUT CONTAINMENT SKIP PANS USING CRANE TO TRESTLE/LAND AND EMPTY AT DESIGNATED CONCRETE WASH-OUT AREA.



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SIGNATURE STAMP	SIGNATURE STAMP

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NEW YORK STATE THRUWAY AUTHORITY
DEPARTMENT OF ENGINEERING
200 SOUTHERN BLVD., ALBANY, NY 12209

TITLE OF PROJECT: THE NEW NY BRIDGE
CONTRACT NUMBER: D214134
LOCATION OF PROJECT: MILEPOST 14.67 +/- IN ROCKLAND & WESTCHESTER COUNTIES

TAPPAN ZEE CONSTRUCTORS, LLC

REVISIONS			
6			
5			
4			
3			
2			
1			
REV	DATE	BY	DESCRIPTION

DESIGNED BY: JBO
DESIGN CH'K BY: NN
DRAWN BY: JBO
DRAWING CH'K BY: NN
SUPERVISOR: NN

TITLE OF DRAWING: UNIT 2-3 - APPROACHES [redacted] PILE CAP & [redacted] PIER CAP CONCRETE POUR PLAN [redacted] - PILE CAP

DATE: 2/2/2015
DRAWING NUMBER: CWP-231-TZC-0001
REVISION: 0

DOCUMENT TRACKING CODE: CWP-0231

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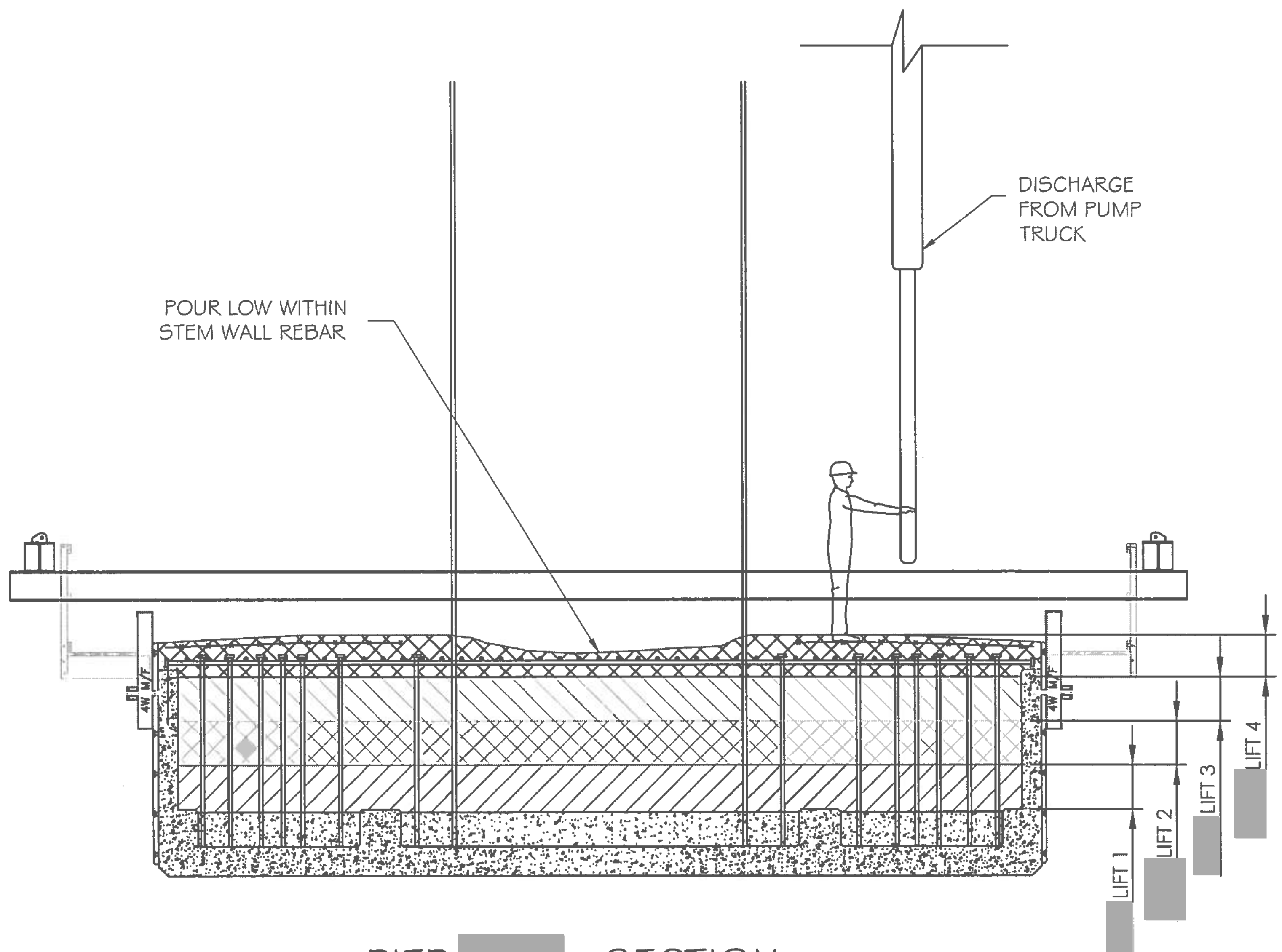

PIER [redacted] - SECTION

PLACING SCHEDULE ~5WB PILE CAP			
TIME	DESCRIPTION	CUMULATIVE YARDAGE	NOTES
6:30 AM	TRUCK 1 ARRIVE TO TRESTLE	0	HIGH DELVO DOSAGE
6:40 AM	TRUCK 1 AT PUMP, DISCHARGE 1 CY & TEST	1	
6:50 AM	DISCHARGE TRUCK 1	10	
6:58 AM	DISCHARGE TRUCK 2	20	
7:06 AM	DISCHARGE TRUCK 3	30	
7:14 AM	DISCHARGE TRUCK 4	40	
7:22 AM	DISCHARGE TRUCK 5	50	
7:30 AM	DISCHARGE TRUCK 6	60	
7:38 AM	DISCHARGE TRUCK 7	70	
7:46 AM	DISCHARGE TRUCK 8	80	
7:54 AM	DISCHARGE TRUCK 9	90	
8:02 AM	DISCHARGE TRUCK 10	100	
8:10 AM	DISCHARGE TRUCK 11	110	
8:18 AM	DISCHARGE TRUCK 12	120	
8:26 AM	DISCHARGE TRUCK 13	130	
8:34 AM	DISCHARGE TRUCK 14	140	
8:42 AM	DISCHARGE TRUCK 15	150	
8:50 AM	DISCHARGE TRUCK 16	160	
8:58 AM	DISCHARGE TRUCK 17	170	
9:06 AM	DISCHARGE TRUCK 18	180	
9:14 AM	DISCHARGE TRUCK 19	190	
9:22 AM	DISCHARGE TRUCK 20	200	
9:30 AM	DISCHARGE TRUCK 21	210	
9:38 AM	DISCHARGE TRUCK 22	220	
9:46 AM	DISCHARGE TRUCK 23	230	
9:54 AM	DISCHARGE TRUCK 24	240	
10:02 AM	DISCHARGE TRUCK 25	250	
10:10 AM	DISCHARGE TRUCK 26	260	
10:18 AM	DISCHARGE TRUCK 27	270	
10:26 AM	DISCHARGE TRUCK 28	280	
10:34 AM	DISCHARGE TRUCK 29	290	
10:42 AM	DISCHARGE TRUCK 30	300	
10:50 AM	DISCHARGE TRUCK 31	310	
10:58 AM	DISCHARGE TRUCK 32	320	
11:06 AM	DISCHARGE TRUCK 33	330	
11:14 AM	DISCHARGE TRUCK 34	340	LOWER DELVO DOSAGE
11:22 AM	DISCHARGE TRUCK 35	350	
11:30 AM	DISCHARGE TRUCK 36	360	
11:38 AM	DISCHARGE TRUCK 37	370	
11:46 AM	DISCHARGE TRUCK 38	380	
11:54 AM	DISCHARGE TRUCK 39	390	
12:02 PM	DISCHARGE TRUCK 40	400	
12:10 PM	DISCHARGE TRUCK 41	410	
12:18 PM	DISCHARGE TRUCK 42	420	
12:26 PM	DISCHARGE TRUCK 43	430	
12:34 PM	DISCHARGE TRUCK 44	440	
12:42 PM	DISCHARGE TRUCK 45	450	
12:50 PM	DISCHARGE TRUCK 46	460	
12:58 PM	DISCHARGE TRUCK 47	470	
1:06 PM	DISCHARGE TRUCK 48	480	
1:14 PM	DISCHARGE TRUCK 49	490	
1:22 PM	DISCHARGE TRUCK 50	500	
1:30 PM	DISCHARGE TRUCK 51	506	
1:38 PM	POURED OUT TO GRADE	506 CY PLACED	AVG 72 CY/HR

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NEW YORK STATE THRUWAY AUTHORITY
DEPARTMENT OF ENGINEERING
200 SOUTHERN BLVD., ALBANY, NY 12209

TITLE OF PROJECT: THE NEW NY BRIDGE
CONTRACT NUMBER: D214134
LOCATION OF PROJECT: MILEPOST 14.67 +/- IN ROCKLAND & WESTCHESTER COUNTIES

TAPPAN ZEE CONSTRUCTORS, LLC

REVISIONS

REV	DATE	BY		DESCRIPTION
6				
5				
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2				
1				

DESIGNED BY: JBO
DESIGN CH'K BY: NN
DRAWN BY: JBO
DRAWING CH'K BY: NN
SUPERVISOR: NN

TITLE OF DRAWING:
UNIT 2-3 - APPROACHES
[redacted] PILE CAP & [redacted] PIER CAP
CONCRETE POUR PLAN
PIER [redacted] - PILE CAP

DATE: 2/2/2015
DRAWING NUMBER: CWP-231-TZC-0002
REVISION: 0

DOCUMENT TRACKING CODE: CWP-0231

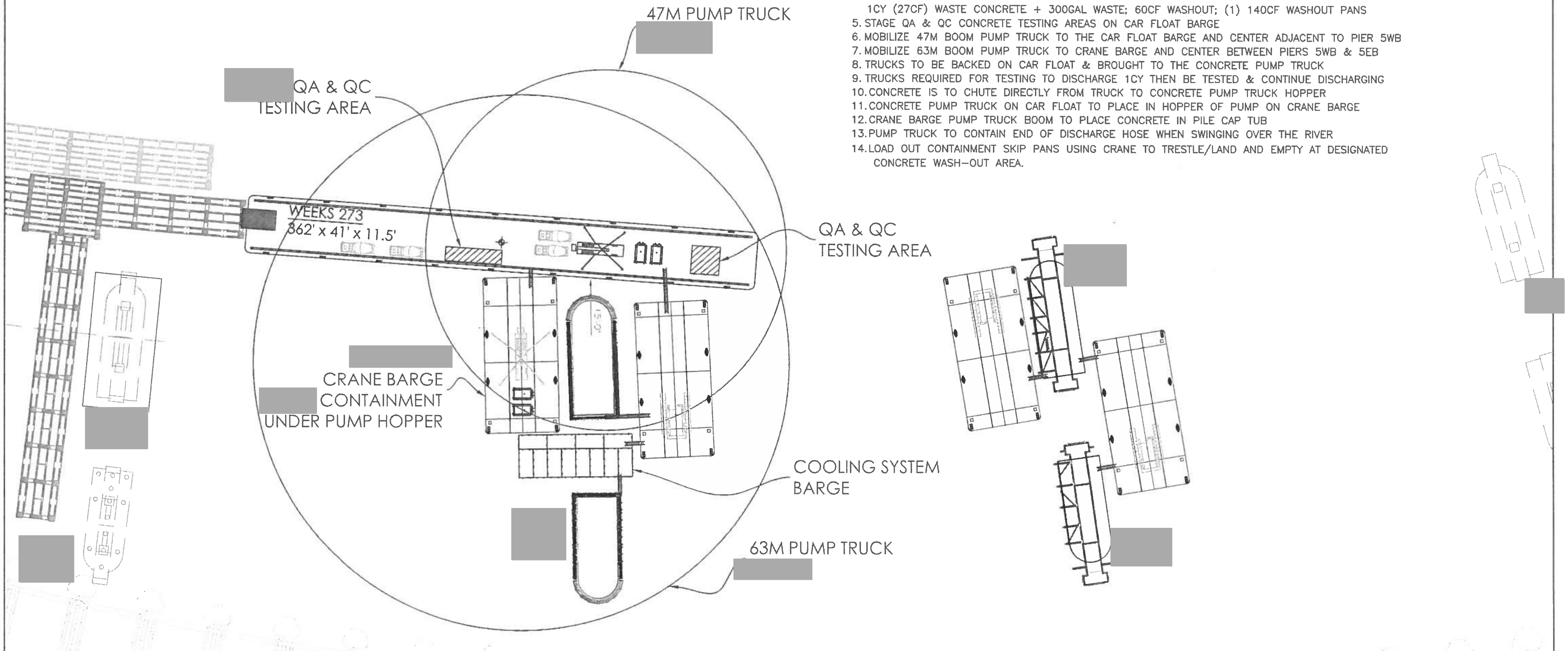
POUR SCHEDULE NOTES:

- ESTIMATED POUR QTY = 431 CY
- (1) 10 CY CONCRETE TRUCK TO TO ARRIVE AT 6:30AM
- TRUCKS TO CONTINUE AT 8 MIN SPACING (~ 72 CY/HOUR)
- ESTIMATED POUR DURATION = 6.5 HOURS
- ESTIMATED POUR COMPLETION = 1:00PM
- SEE TZC-0005 FOR DETAILED POUR SCHEDULE

PIER [redacted] PILE CAP

POUR SEQUENCE PLAN

1. PREPARE CAR FLOAT BARGE WITH CONTAINMENT BEAM, AT THE END OF THE HD TRESTLE
2. SET (4) WASHOUT SKIP PANS AT THE ROCKLAND BULKHEAD FOR CONCRETE TRUCK WASHOUT
   431CY = 44 TRUCKS; 60GAL/TRUCK=8CF WASHOUT/TRUCK; 352CF WASHOUT; (3) 140CF WASHOUT PANS
3. PREPARE (2) WASHOUT SKIP PANS ON THE CAR FLOAT BARGE FOR PUMP TRUCK WASHOUT
   1CY (27CF) WASTE CONCRETE + 300GAL WASTE; 60CF WASHOUT; (1) 140CF WASHOUT PANS
4. PREPARE (2) WASHOUT SKIP PANS ON THE PUMP TRUCK BARGE FOR PUMP TRUCK WASHOUT
   1CY (27CF) WASTE CONCRETE + 300GAL WASTE; 60CF WASHOUT; (1) 140CF WASHOUT PANS
5. STAGE QA & QC CONCRETE TESTING AREAS ON CAR FLOAT BARGE
6. MOBILIZE 47M BOOM PUMP TRUCK TO THE CAR FLOAT BARGE AND CENTER ADJACENT TO PIER 5WB
7. MOBILIZE 63M BOOM PUMP TRUCK TO CRANE BARGE AND CENTER BETWEEN PIERS 5WB & 5EB
8. TRUCKS TO BE BACKED ON CAR FLOAT & BROUGHT TO THE CONCRETE PUMP TRUCK
9. TRUCKS REQUIRED FOR TESTING TO DISCHARGE 1CY THEN BE TESTED & CONTINUE DISCHARGING
10. CONCRETE IS TO CHUTE DIRECTLY FROM TRUCK TO CONCRETE PUMP TRUCK HOPPER
11. CONCRETE PUMP TRUCK ON CAR FLOAT TO PLACE IN HOPPER OF PUMP ON CRANE BARGE
12. CRANE BARGE PUMP TRUCK BOOM TO PLACE CONCRETE IN PILE CAP TUB
13. PUMP TRUCK TO CONTAIN END OF DISCHARGE HOSE WHEN SWINGING OVER THE RIVER
14. LOAD OUT CONTAINMENT SKIP PANS USING CRANE TO TRESTLE/LAND AND EMPTY AT DESIGNATED CONCRETE WASH-OUT AREA.



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SIGNATURE STAMP	SIGNATURE STAMP

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DEPARTMENT OF ENGINEERING
200 SOUTHERN BLVD , ALBANY, NY 12209

TITLE OF PROJECT: THE NEW NY BRIDGE
CONTRACT NUMBER: D214134
LOCATION OF PROJECT: MILEPOST 14.67 +/- IN ROCKLAND & WESTCHESTER COUNTIES

TAPPAN ZEE CONSTRUCTORS, LLC

REVISIONS

REV	DATE	BY		DESCRIPTION
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DESIGNED BY	JBO
DESIGN CH'K BY	NN
DRAWN BY	JBO
DRAWING CH'K BY	NN
SUPERVISOR	NN

TITLE OF DRAWING: UNIT 2-3 - APPROACHES [redacted]ILE CAP & [redacted] PIER CAP CONCRETE POUR PLAN PIER [redacted] - PILE CAP

DATE: 2/2/2015

DRAWING NUMBER: CWP-231-TZC-0003

REVISION: 0

DOCUMENT TRACKING CODE: CWP-0231

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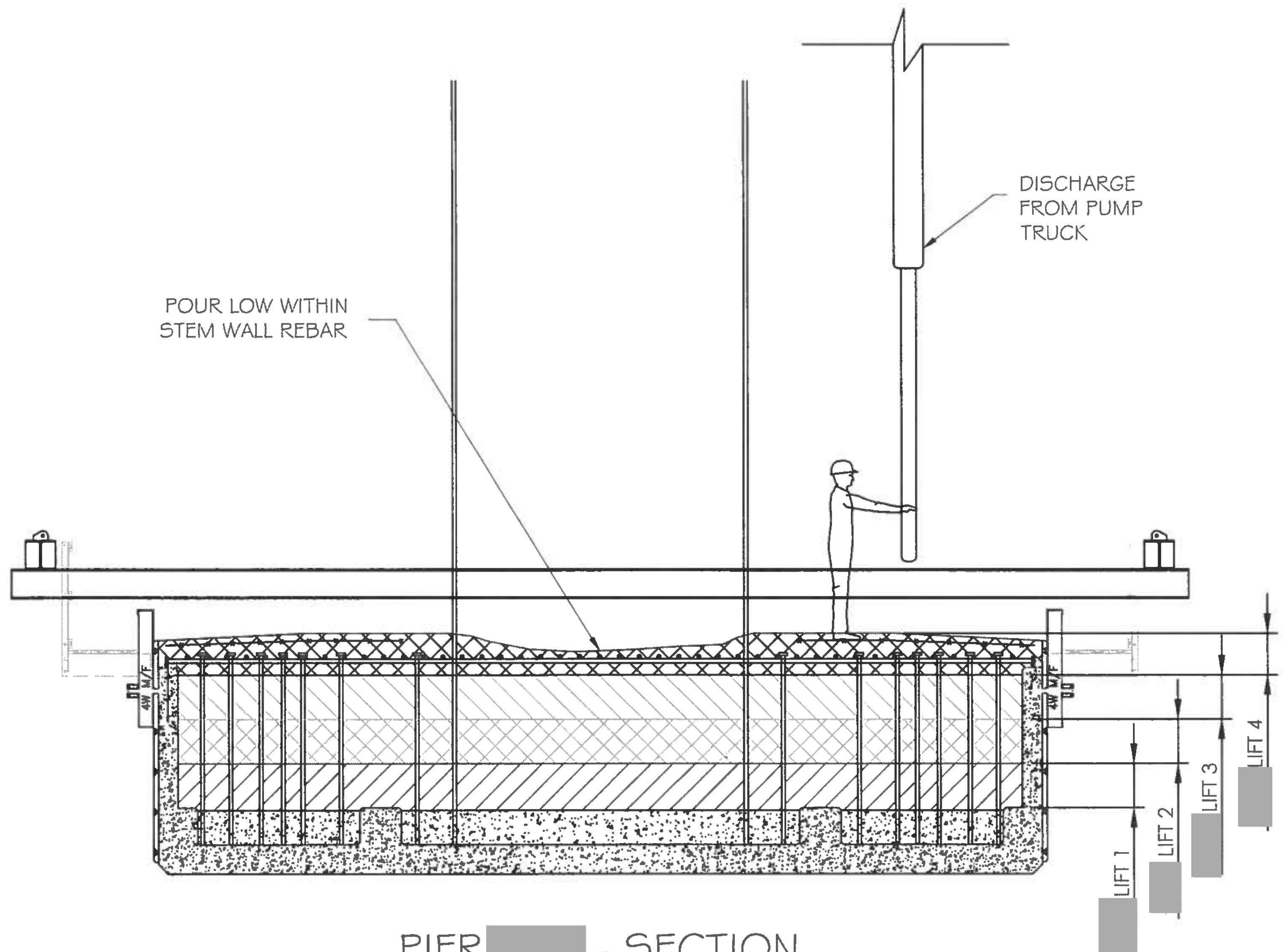

PIER [redacted] - SECTION

PLACING SCHEDULE ~ SEB PILE CAP			
TIME	DESCRIPTION	CUMULATIVE YARDAGE	NOTES
6:30 AM	TRUCK 1 ARRIVE TO TRESTLE	0	HIGH DELVO DOSAGE
6:40 AM	TRUCK 1 AT PUMP, DISCHARGE 1 CY & TEST	1	
6:50 AM	DISCHARGE TRUCK 1	10	
6:58 AM	DISCHARGE TRUCK 2	20	
7:06 AM	DISCHARGE TRUCK 3	30	
7:14 AM	DISCHARGE TRUCK 4	40	
7:22 AM	DISCHARGE TRUCK 5	50	
7:30 AM	DISCHARGE TRUCK 6	60	
7:38 AM	DISCHARGE TRUCK 7	70	
7:46 AM	DISCHARGE TRUCK 8	80	
7:54 AM	DISCHARGE TRUCK 9	90	
8:02 AM	DISCHARGE TRUCK 10	100	
8:10 AM	DISCHARGE TRUCK 11	110	
8:18 AM	DISCHARGE TRUCK 12	120	
8:26 AM	DISCHARGE TRUCK 13	130	
8:34 AM	DISCHARGE TRUCK 14	140	
8:42 AM	DISCHARGE TRUCK 15	150	
8:50 AM	DISCHARGE TRUCK 16	160	
8:58 AM	DISCHARGE TRUCK 17	170	
9:06 AM	DISCHARGE TRUCK 18	180	
9:14 AM	DISCHARGE TRUCK 19	190	
9:22 AM	DISCHARGE TRUCK 20	200	
9:30 AM	DISCHARGE TRUCK 21	210	
9:38 AM	DISCHARGE TRUCK 22	220	
9:46 AM	DISCHARGE TRUCK 23	230	
9:54 AM	DISCHARGE TRUCK 24	240	
10:02 AM	DISCHARGE TRUCK 25	250	
10:10 AM	DISCHARGE TRUCK 26	260	
10:18 AM	DISCHARGE TRUCK 27	270	
10:26 AM	DISCHARGE TRUCK 28	280	
10:34 AM	DISCHARGE TRUCK 29	290	
10:42 AM	DISCHARGE TRUCK 30	300	LOWER DELVO DOSAGE
10:50 AM	DISCHARGE TRUCK 31	310	
10:58 AM	DISCHARGE TRUCK 32	320	
11:06 AM	DISCHARGE TRUCK 33	330	
11:14 AM	DISCHARGE TRUCK 34	340	
11:22 AM	DISCHARGE TRUCK 35	350	
11:30 AM	DISCHARGE TRUCK 36	360	
11:38 AM	DISCHARGE TRUCK 37	370	
11:46 AM	DISCHARGE TRUCK 38	380	
11:54 AM	DISCHARGE TRUCK 39	390	
12:02 PM	DISCHARGE TRUCK 40	400	
12:10 PM	DISCHARGE TRUCK 41	410	
12:18 PM	DISCHARGE TRUCK 42	420	
12:26 PM	DISCHARGE TRUCK 43	430	
12:34 PM	DISCHARGE TRUCK 44	431	
12:42 PM	POURED OUT TO GRADE	431 CY PLACED	AVG 72 CY/HR

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NEW YORK STATE THRUWAY AUTHORITY
DEPARTMENT OF ENGINEERING
200 SOUTHERN BLVD , ALBANY, NY 12209

TITLE OF PROJECT: THE NEW NY BRIDGE
CONTRACT NUMBER: D214134
LOCATION OF PROJECT: MILEPOST 14.67 +/- IN ROCKLAND & WESTCHESTER COUNTIES

TAPPAN ZEE CONSTRUCTORS

REVISIONS			
REV	DATE	BY	DESCRIPTION
6			
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1			

DESIGNED BY	JBO
DESIGN CH'K BY	NN
DRAWN BY	JBO
DRAWING CH'K BY	NN
SUPERVISOR	NN

TITLE OF DR: UNIT 2-3 - APPROACHES
[redacted] PILE CAP & [redacted] PIER CAP
CONCRETE POUR PLAN
PIER [redacted] - PILE CAP

2/2/2015
CWP-231-TZC-0004
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DOCUMENT TRACKING CODE: CWP-0231

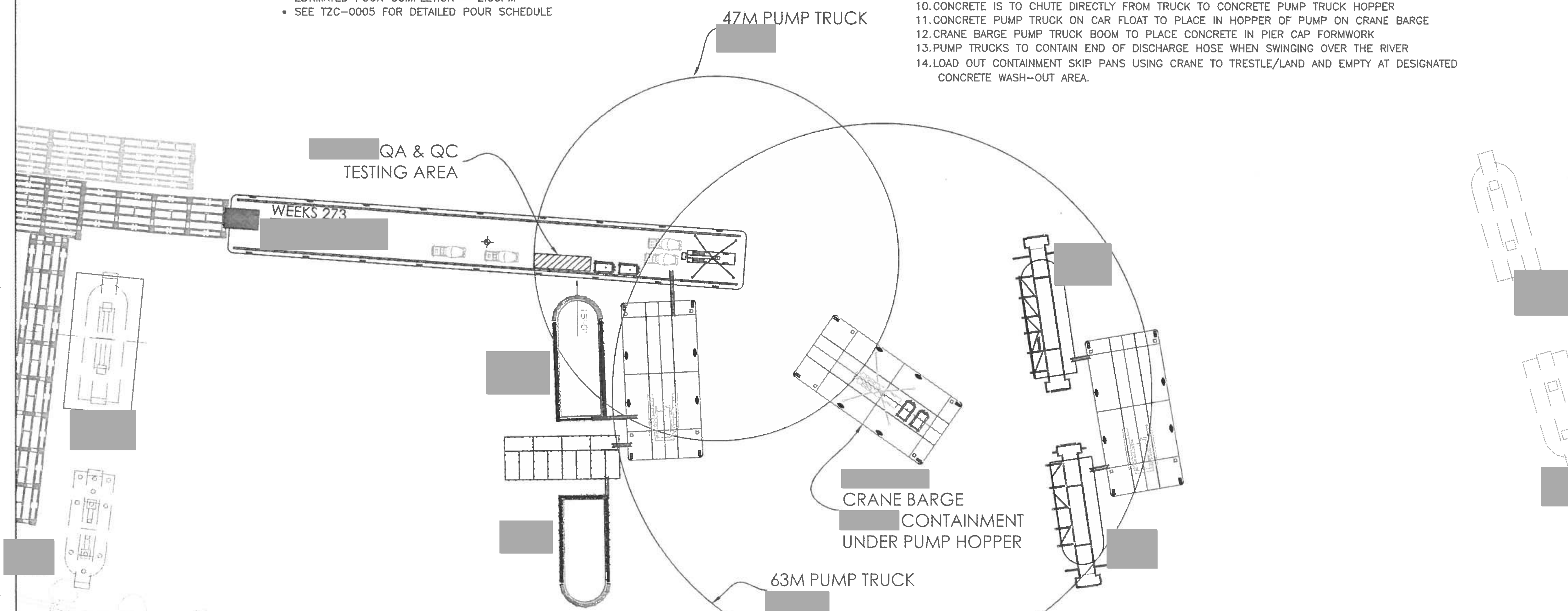
PIER [redacted] PIER CAP

POUR SEQUENCE PLAN

1. PREPARE CAR FLOAT BARGE WITH CONTAINMENT BEAM, AT THE END OF THE HD TRESTLE
2. SET (4) WASHOUT SKIP PANS AT THE ROCKLAND BULKHEAD FOR CONCRETE TRUCK WASHOUT
   534CY = 54 TRUCKS; 60GAL/TRUCK=8CF WASHOUT/TRUCK; 432CF WASHOUT; (4) 140CF WASHOUT PANS
3. PREPARE (2) WASHOUT SKIP PANS ON THE CAR FLOAT BARGE FOR PUMP TRUCK WASHOUT
   1CY (27CF) WASTE CONCRETE + 300GAL WASTE; 60CF WASHOUT; (1) 140CF WASHOUT PANS
4. PREPARE (2) WASHOUT SKIP PANS ON THE PUMP TRUCK BARGE FOR PUMP TRUCK WASHOUT
   1CY (27CF) WASTE CONCRETE + 300GAL WASTE; 60CF WASHOUT; (1) 140CF WASHOUT PANS
5. STAGE QA & QC CONCRETE TESTING AREAS ON CAR FLOAT BARGE
6. MOBILIZE 47M BOOM PUMP TRUCK TO THE END OF THE CAR FLOAT BARGE
7. MOBILIZE 63M BOOM PUMP TRUCK TO CRANE BARGE AND CENTER BETWEEN PIERS 5 & 6
8. TRUCKS ARE TO BE BACKED ON CAR FLOAT & BROUGHT TO THE CONCRETE PUMP TRUCK
9. TRUCKS REQUIRED FOR TESTING TO DISCHARGE 1CY THEN BE TESTED & CONTINUE DISCHARGING
10. CONCRETE IS TO CHUTE DIRECTLY FROM TRUCK TO CONCRETE PUMP TRUCK HOPPER
11. CONCRETE PUMP TRUCK ON CAR FLOAT TO PLACE IN HOPPER OF PUMP ON CRANE BARGE
12. CRANE BARGE PUMP TRUCK BOOM TO PLACE CONCRETE IN PIER CAP FORMWORK
13. PUMP TRUCKS TO CONTAIN END OF DISCHARGE HOSE WHEN SWINGING OVER THE RIVER
14. LOAD OUT CONTAINMENT SKIP PANS USING CRANE TO TRESTLE/LAND AND EMPTY AT DESIGNATED CONCRETE WASH-OUT AREA.

POUR SCHEDULE NOTES:

- ESTIMATED POUR QTY = 534 CY
- (1) 10 CY CONCRETE TRUCK TO TO ARRIVE AT 6:30AM
- TRUCKS TO CONTINUE AT 8 MIN SPACING (~ 72 CY/HOUR)
- ESTIMATED POUR DURATION = 7.5 HOURS
- ESTIMATED POUR COMPLETION = 2:00PM
- SEE TZC-0005 FOR DETAILED POUR SCHEDULE



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200 SOUTHERN BLVD., ALBANY, NY 12209

TITLE OF PROJECT: THE NEW NY BRIDGE
CONTRACT NUMBER: D214134
LOCATION OF PROJECT: MILEPOST 14.67 +/- IN ROCKLAND & WESTCHESTER COUNTIES

TAPPAN ZEE CONSTRUCTORS, LLC

REVISIONS

REV	DATE	BY		DESCRIPTION
6				
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DESIGNED BY	JBO
DESIGN CH'K BY	NN
DRAWN BY	JBO
DRAWING CH'K BY	NN
SUPERVISOR	NN

TITLE OF DRAWING: UNIT 2-3 - APPROACHES [redacted] PILE CAP & [redacted] PIER CAP CONCRETE POUR PLAN PIER [redacted] - PIER CAP

DATE: 2/2/2015
DRAWING NUMBER: CWP-231-TZC-0005
REVISION: 0

DOCUMENT TRACKING CODE: CWP-0231

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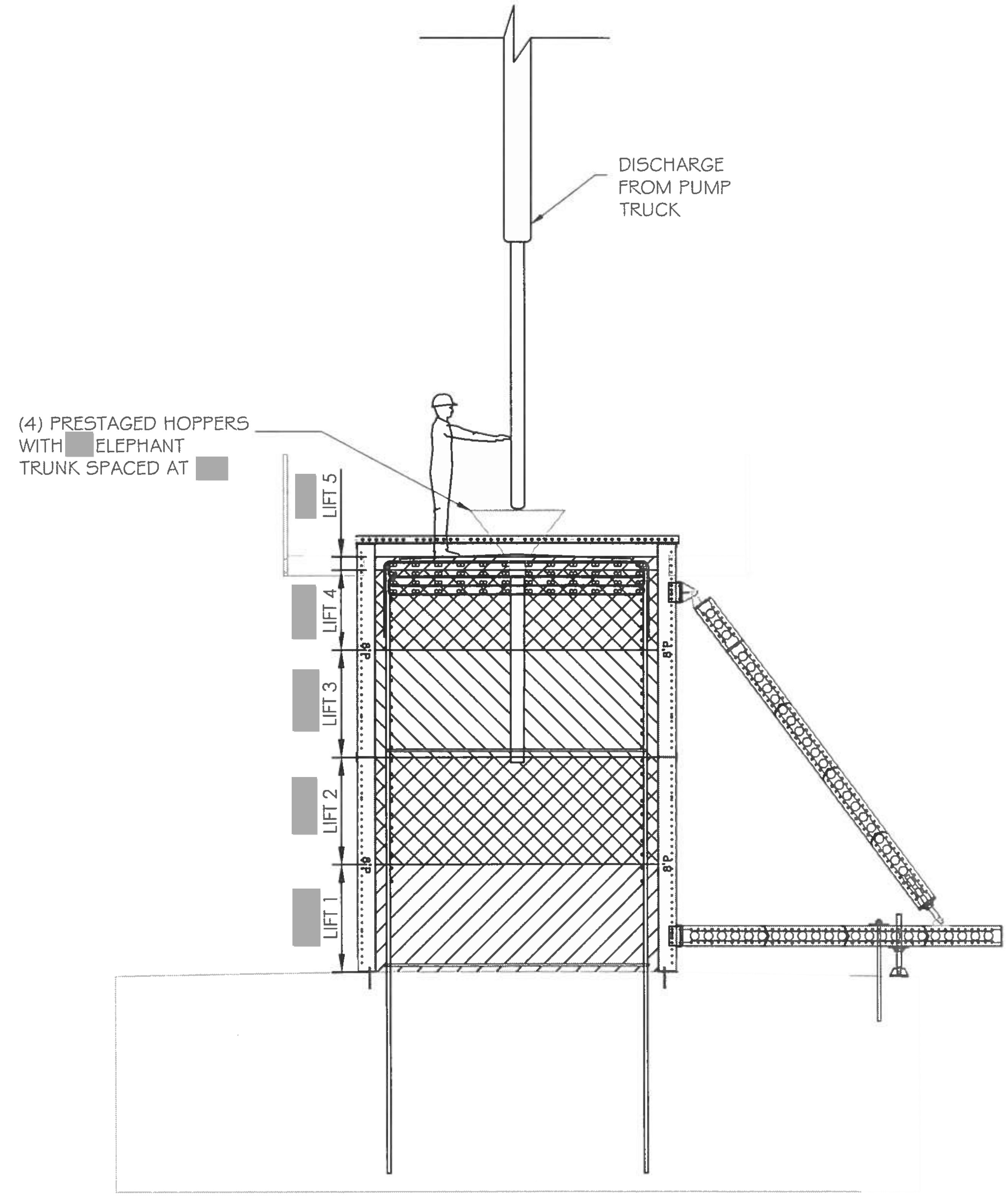

PIER [redacted] - SECTION

PLACING SCHEDULE ~ 6WB PIER CAP			
TIME	DESCRIPTION	CUMULATIVE YARDAGE	NOTES
6:30 AM	TRUCK 1 ARRIVE TO TRESTLE	0	LOW DELVO DOSAGE
6:40 AM	TRUCK 1 AT PUMP, DISCHARGE 1 CY & TEST	1	
6:50 AM	DISCHARGE TRUCK 1	10	
6:58 AM	DISCHARGE TRUCK 2	20	
7:06 AM	DISCHARGE TRUCK 3	30	
7:14 AM	DISCHARGE TRUCK 4	40	
7:22 AM	DISCHARGE TRUCK 5	50	
7:30 AM	DISCHARGE TRUCK 6	60	
7:38 AM	DISCHARGE TRUCK 7	70	
7:46 AM	DISCHARGE TRUCK 8	80	
7:54 AM	DISCHARGE TRUCK 9	90	
8:02 AM	DISCHARGE TRUCK 10	100	
8:10 AM	DISCHARGE TRUCK 11	110	
8:18 AM	DISCHARGE TRUCK 12	120	
8:26 AM	DISCHARGE TRUCK 13	130	
8:34 AM	DISCHARGE TRUCK 14	140	
8:42 AM	DISCHARGE TRUCK 15	150	
8:50 AM	DISCHARGE TRUCK 16	160	
8:58 AM	DISCHARGE TRUCK 17	170	
9:06 AM	DISCHARGE TRUCK 18	180	
9:14 AM	DISCHARGE TRUCK 19	190	
9:22 AM	DISCHARGE TRUCK 20	200	
9:30 AM	DISCHARGE TRUCK 21	210	
9:38 AM	DISCHARGE TRUCK 22	220	
9:46 AM	DISCHARGE TRUCK 23	230	
9:54 AM	DISCHARGE TRUCK 24	240	
10:02 AM	DISCHARGE TRUCK 25	250	
10:10 AM	DISCHARGE TRUCK 26	260	
10:18 AM	DISCHARGE TRUCK 27	270	
10:26 AM	DISCHARGE TRUCK 28	280	
10:34 AM	DISCHARGE TRUCK 29	290	
10:42 AM	DISCHARGE TRUCK 30	300	
10:50 AM	DISCHARGE TRUCK 31	310	
10:58 AM	DISCHARGE TRUCK 32	320	
11:06 AM	DISCHARGE TRUCK 33	330	
11:14 AM	DISCHARGE TRUCK 34	340	
11:22 AM	DISCHARGE TRUCK 35	350	
11:30 AM	DISCHARGE TRUCK 36	360	
11:38 AM	DISCHARGE TRUCK 37	370	
11:46 AM	DISCHARGE TRUCK 38	380	
11:54 AM	DISCHARGE TRUCK 39	390	
12:02 PM	DISCHARGE TRUCK 40	400	
12:10 PM	DISCHARGE TRUCK 41	410	
12:18 PM	DISCHARGE TRUCK 42	420	
12:26 PM	DISCHARGE TRUCK 43	430	
12:34 PM	DISCHARGE TRUCK 44	440	
12:42 PM	DISCHARGE TRUCK 45	450	
12:50 PM	DISCHARGE TRUCK 46	460	
12:58 PM	DISCHARGE TRUCK 47	470	
1:06 PM	DISCHARGE TRUCK 48	480	
1:14 PM	DISCHARGE TRUCK 49	490	
1:22 PM	DISCHARGE TRUCK 50	500	
1:30 PM	DISCHARGE TRUCK 51	510	
1:38 PM	DISCHARGE TRUCK 52	520	
1:46 PM	DISCHARGE TRUCK 53	530	
1:54 PM	DISCHARGE TRUCK 54	534	
2:02 PM	POURED OUT TO GRADE	534	AVG 72 CY/HR

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DEPARTMENT OF ENGINEERING
200 SOUTHERN BLVD., ALBANY, NY 12209

TITLE OF PROJECT: THE NEW NY BRIDGE
CONTRACT NUMBER: D214134
LOCATION OF PROJECT: MILEPOST 14.67 +/- IN ROCKLAND & WESTCHESTER COUNTIES

TAPPAN ZEE CONSTRUCTORS

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3			
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1			
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DESIGNED BY	JBO
DESIGN CH'K BY	NN
DRAWN BY	JBO
DRAWING CH'K BY	NN
SUPERVISOR	NN

UNIT 2-3 - APPROACHES
[redacted] PILE CAP & [redacted] PIER CAP
CONCRETE POUR PLAN
PIER [redacted] - PIER CAP

2/2/2015
CWP-231-TZC-0006
0

DOCUMENT TRACKING CODE: CWP-0231

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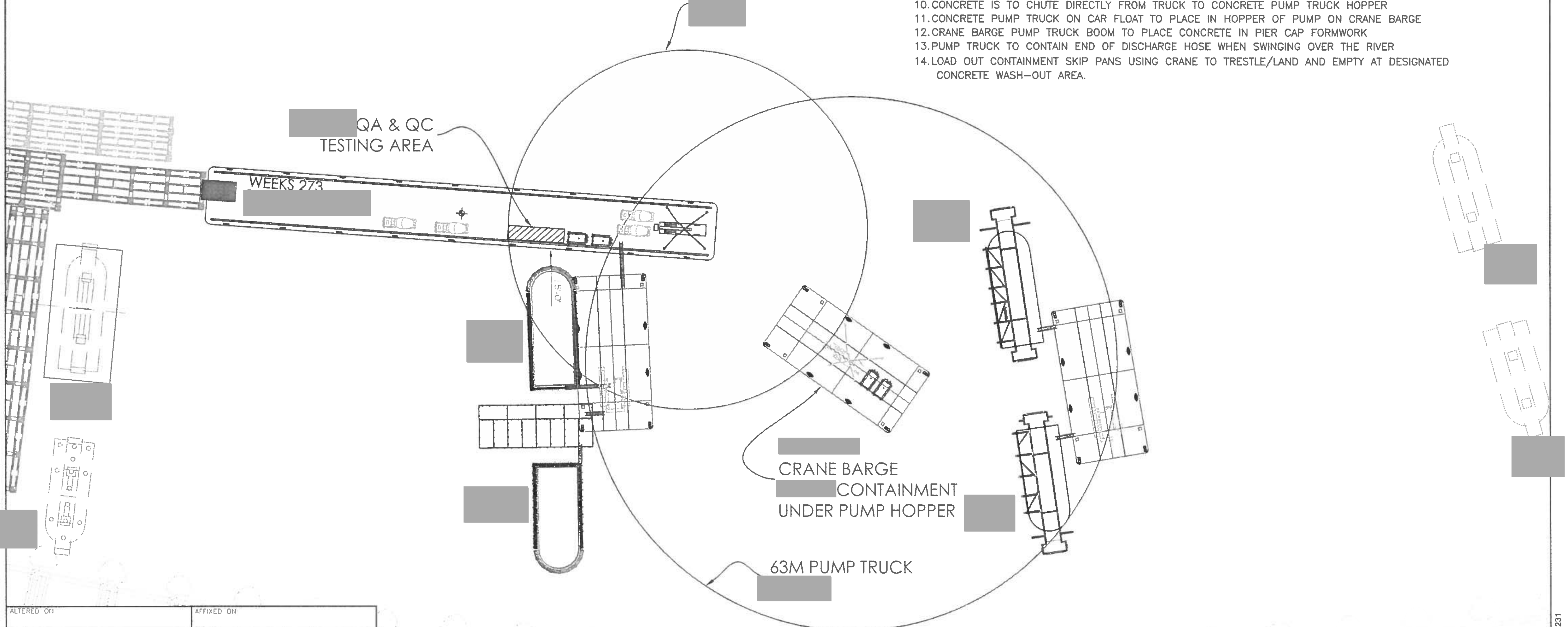
PIER [redacted] PIER CAP

POUR SEQUENCE PLAN

1. PREPARE CAR FLOAT BARGE WITH CONTAINMENT BEAM, AT THE END OF THE HD TRESTLE
2. SET (4) WASHOUT SKIP PANS AT THE ROCKLAND BULKHEAD FOR CONCRETE TRUCK WASHOUT
   496CY = 50 TRUCKS; 60GAL/TRUCK=8CF WASHOUT/TRUCK; 400CF WASHOUT; (3) 140CF WASHOUT PANS
3. PREPARE (2) WASHOUT SKIP PANS ON THE CAR FLOAT BARGE FOR PUMP TRUCK WASHOUT
   1CY (27CF) WASTE CONCRETE + 300GAL WASTE; 60CF WASHOUT; (1) 140CF WASHOUT PANS
4. PREPARE (2) WASHOUT SKIP PANS ON THE PUMP TRUCK BARGE FOR PUMP TRUCK WASHOUT
   1CY (27CF) WASTE CONCRETE + 300GAL WASTE; 60CF WASHOUT; (1) 140CF WASHOUT PANS
5. STAGE QA & QC CONCRETE TESTING AREAS ON CAR FLOAT BARGE
6. MOBILIZE 47M BOOM PUMP TRUCK TO THE END OF THE CAR FLOAT BARGE
7. MOBILIZE 63M BOOM PUMP TRUCK TO CRANE BARGE AND CENTER BETWEEN PIERS 5 & 6
8. TRUCKS ARE TO BE BACKED ON CAR FLOAT & BROUGHT TO THE CONCRETE PUMP TRUCK
9. TRUCKS REQYURED FOR TESTING TO DISCHARGE 1CY THEN BE TESTED & CONTINUE DISCHARGING
10. CONCRETE IS TO CHUTE DIRECTLY FROM TRUCK TO CONCRETE PUMP TRUCK HOPPER
11. CONCRETE PUMP TRUCK ON CAR FLOAT TO PLACE IN HOPPER OF PUMP ON CRANE BARGE
12. CRANE BARGE PUMP TRUCK BOOM TO PLACE CONCRETE IN PIER CAP FORMWORK
13. PUMP TRUCK TO CONTAIN END OF DISCHARGE HOSE WHEN SWINGING OVER THE RIVER
14. LOAD OUT CONTAINMENT SKIP PANS USING CRANE TO TRESTLE/LAND AND EMPTY AT DESIGNATED CONCRETE WASH-OUT AREA.

POUR SCHEDULE NOTES:

- ESTIMATED POUR QTY = 496 CY
- (1) 10 CY CONCRETE TRUCK TO TO ARRIVE AT 6:30AM
- TRUCKS TO CONTINUE AT 8 MIN SPACING (~ 71 CY/HOUR)
- ESTIMATED POUR DURATION = 7 HOURS
- ESTIMATED POUR COMPLETION = 1:30PM
- SEE TZC-0005 FOR DETAILED POUR SCHEDULE



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TITLE OF PROJECT: THE NEW NY BRIDGE — CONTRACT NUMBER: D214134

LOCATION OF PROJECT: MILEPOST 14.67 +/- IN ROCKLAND & WESTCHESTER COUNTIES

TAPPAN ZEE CONSTRUCTORS, LLC

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DESIGN CH'K BY	NN
DRAWN BY	JBO
DRAWING CH'K BY	NN
SUPERVISOR	NN

TITLE OF DRAWING: UNIT 2-3 - APPROACHES [redacted] PILE CAP & [redacted] PIER CAP CONCRETE POUR PLAN PIER [redacted] - PIER CAP

DATE: 2/2/2015

DRAWING NUMBER: CWP-231-TZC-0007

REVISION: 0

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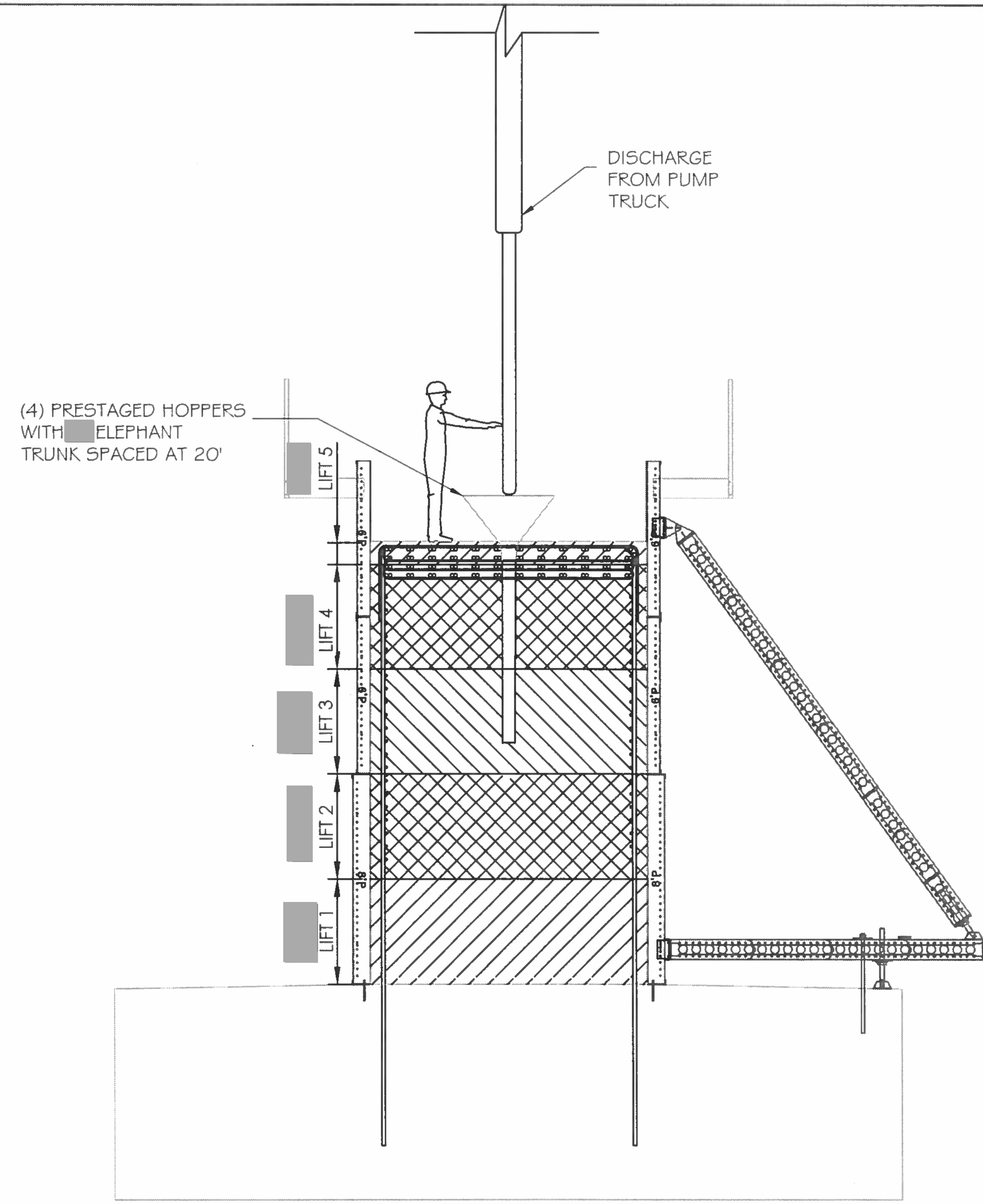

PIER [redacted] - SECTION

PLACING SCHEDULE ~ 6EB PIER CAP			
TIME	DESCRIPTION	CUMULATIVE YARDAGE	NOTES
6:30 AM	TRUCK 1 ARRIVE TO TRESTLE	0	LOW DELVO DOSAGE
6:40 AM	TRUCK 1 AT PUMP, DISCHARGE 1 CY & TEST	1	
6:50 AM	DISCHARGE TRUCK 1	10	
6:58 AM	DISCHARGE TRUCK 2	20	
7:06 AM	DISCHARGE TRUCK 3	30	
7:14 AM	DISCHARGE TRUCK 4	40	
7:22 AM	DISCHARGE TRUCK 5	50	
7:30 AM	DISCHARGE TRUCK 6	60	
7:38 AM	DISCHARGE TRUCK 7	70	
7:46 AM	DISCHARGE TRUCK 8	80	
7:54 AM	DISCHARGE TRUCK 9	90	
8:02 AM	DISCHARGE TRUCK 10	100	
8:10 AM	DISCHARGE TRUCK 11	110	
8:18 AM	DISCHARGE TRUCK 12	120	
8:26 AM	DISCHARGE TRUCK 13	130	
8:34 AM	DISCHARGE TRUCK 14	140	
8:42 AM	DISCHARGE TRUCK 15	150	
8:50 AM	DISCHARGE TRUCK 16	160	
8:58 AM	DISCHARGE TRUCK 17	170	
9:06 AM	DISCHARGE TRUCK 18	180	
9:14 AM	DISCHARGE TRUCK 19	190	
9:22 AM	DISCHARGE TRUCK 20	200	
9:30 AM	DISCHARGE TRUCK 21	210	
9:38 AM	DISCHARGE TRUCK 22	220	
9:46 AM	DISCHARGE TRUCK 23	230	
9:54 AM	DISCHARGE TRUCK 24	240	
10:02 AM	DISCHARGE TRUCK 25	250	
10:10 AM	DISCHARGE TRUCK 26	260	
10:18 AM	DISCHARGE TRUCK 27	270	
10:26 AM	DISCHARGE TRUCK 28	280	
10:34 AM	DISCHARGE TRUCK 29	290	
10:42 AM	DISCHARGE TRUCK 30	300	
10:50 AM	DISCHARGE TRUCK 31	310	
10:58 AM	DISCHARGE TRUCK 32	320	
11:06 AM	DISCHARGE TRUCK 33	330	
11:14 AM	DISCHARGE TRUCK 34	340	
11:22 AM	DISCHARGE TRUCK 35	350	
11:30 AM	DISCHARGE TRUCK 36	360	
11:38 AM	DISCHARGE TRUCK 37	370	
11:46 AM	DISCHARGE TRUCK 38	380	
11:54 AM	DISCHARGE TRUCK 39	390	
12:02 PM	DISCHARGE TRUCK 40	400	
12:10 PM	DISCHARGE TRUCK 41	410	
12:18 PM	DISCHARGE TRUCK 42	420	
12:26 PM	DISCHARGE TRUCK 43	430	
12:34 PM	DISCHARGE TRUCK 44	440	
12:42 PM	DISCHARGE TRUCK 45	450	
12:50 PM	DISCHARGE TRUCK 46	460	
12:58 PM	DISCHARGE TRUCK 47	470	
1:06 PM	DISCHARGE TRUCK 48	480	
1:14 PM	DISCHARGE TRUCK 49	490	
1:22 PM	DISCHARGE TRUCK 50	496	
1:30 PM	POURED OUT TO GRADE	496	AVG 71 CY/HR

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200 SOUTHERN BLVD., ALBANY, NY 12209

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CONTRACT NUMBER: D214134
LOCATION OF PROJECT: MILEPOST 14.67 +/- IN ROCKLAND & WESTCHESTER COUNTIES

TAPPAN ZEE CONSTRUCTORS, LLC

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DESIGNED BY: JBO
DESIGN CH'K BY: NN
DRAWN BY: JBO
DRAWING CH'K BY: NN
SUPERVISOR: NN

TITLE OF DRAWING: UNIT 2-3 - APPROACHES [redacted] PILE CAP & [redacted] PIER CAP CONCRETE POUR PLAN PIER [redacted] - PIER CAP

DATE: 2/2/2015
DRAWING NUMBER: CWP-231-TZC-0008
REVISION: 0

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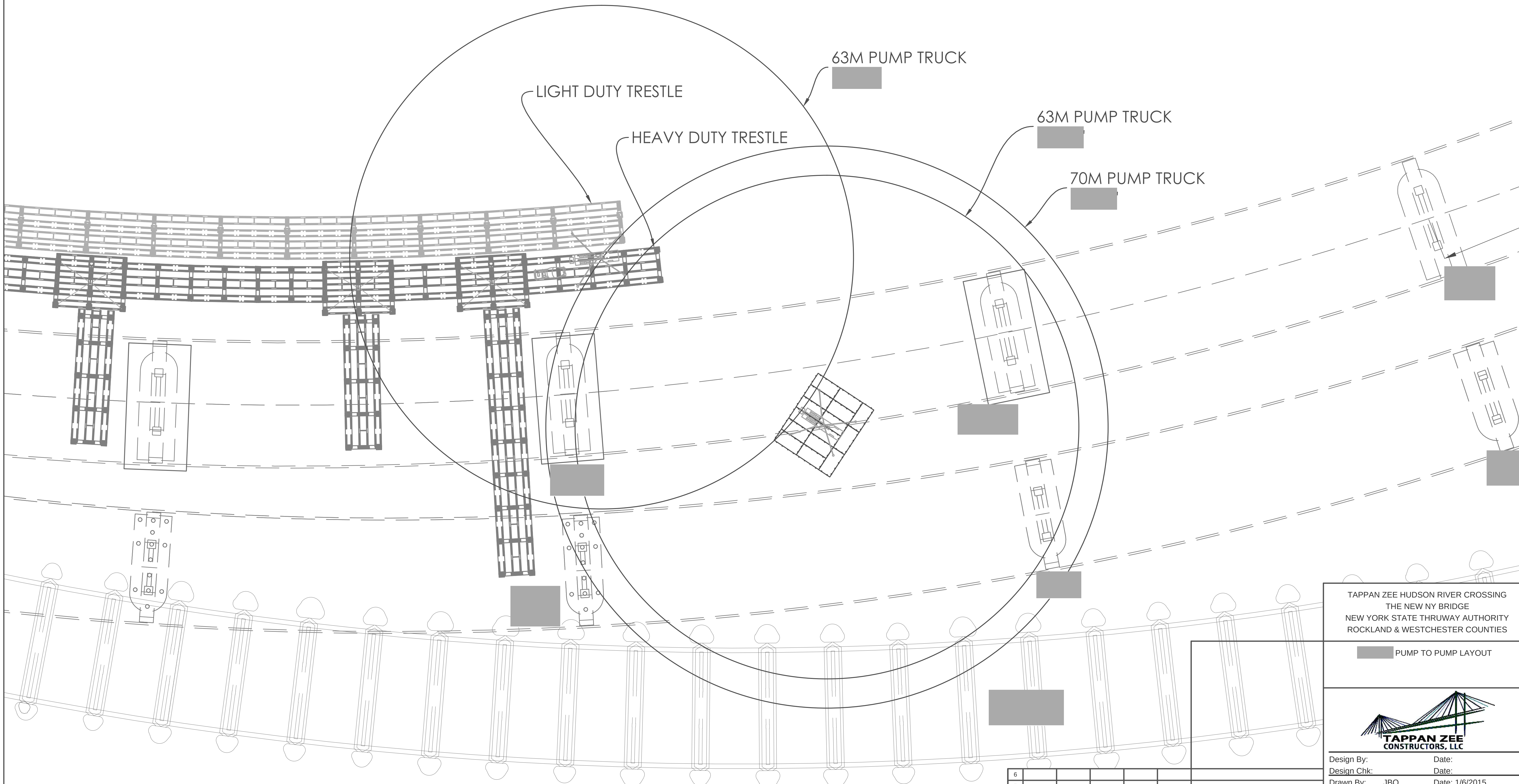

TAPPAN ZEE HUDSON RIVER CROSSING
THE NEW NY BRIDGE
NEW YORK STATE THRUWAY AUTHORITY
ROCKLAND & WESTCHESTER COUNTIES

PUMP TO PUMP LAYOUT

TAPPAN ZEE CONSTRUCTORS, LLC

Design By:	Date:
Design Chk:	Date:
Drawn By: JBO	Date: 1/6/2015
Drawing CHK:	Date:
In Charge Of:	
NYSTA Contract Number D214134	Sheet No. TZC-0001
Scale:	Revision:

REV	DATE	DWG BY	DWG CHK	DSGN BY	DSGN CHK	DESCRIPTION
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Addendum to the Concrete Batch Plant Control Plan

Mass Concrete Pour Cooling Water System Description:

The cooling system is designed to control temperature differences between the interior and the surface of mass concrete pours to avoid cracking and other potential temperature-related damage that may occur during concrete placement. Thermal control can be accomplished through a variety and combination of methods, such as precooling of the concrete, cooling pipe installation and operation, and insulation and temperature monitoring equipment. The size (thickness) of the mass concrete placements required for the Tappan Zee Bridge pile cap and main span tower legs necessitates the use of exterior thermal insulation, interior cooling pipe installation, and temperature monitoring.

The cooling system capacity and configuration varies by location (e.g., Main Span, Approach Span) but generally consists of multiple 3/4-in or 1-in diameter plastic pipes (composed of PEX, schedule 40 PVC, or pressure-rated polyethylene) embedded 2-4 feet on-center within the interior of the concrete pour. See Figures 1–3 sketches and details of the cooling system.

At both Main Span and Approach locations a submersible pump, control valve and manifold system will withdraw river water through a cylindrical screen with 6 x 6 mm square mesh located approximately 2-3 feet below mean low water (MLW) (see Photograph 1). System flows were designed to achieve a temperature rise (ΔT) of the water within the cooling system and discharge water no more than 3 degrees Fahrenheit (°F) above ambient through the return pipes located 1 foot below the surface. At Approach Span, Main Span Pile Caps and Main Span Anchor Piers the individual return pipes will discharge directly to the river. At the Main Span Tower Leg locations the individual return pipes will be combined into a single 4-in diameter pipe or hose prior to discharge to the river due to the height of the system above the water surface (up to 60 feet or more above the water surface). Cooling system design flows may be revised based on initial system testing and/or additional thermal control modeling but these revisions would not have measurable or detectable effect on the analyses or conclusions discussed in this letter.

Initial system design flows and anticipated operating schedule are summarized in Table 1. The anticipated schedule is highly dependent on weather and other related construction activities and may change on a monthly basis, but these changes would not affect the anticipated number of cooling systems in operation. Up to two Approach Span locations (e.g., WB and EB at same pier) and one Main Span location (e.g., Main Span Tower Leg) may be cooled simultaneously; however this would not occur regularly due to other construction schedule constraints. Use of a once-through cooling system is not anticipated at landside bridge abutments or piers or piers located in very shallow water

TZC began testing and implementing a mass concrete pour once-through cooling system at the [redacted] pile cap on November 20, 2014. Initial leak testing and flow adjustments were completed on November 20, 2014 and the concrete mass pour began and was completed on November 21, 2014.

Cooling system flows were adjusted to deliver approximately 5-6 gallons per minute (GPM) per cooling pipe or approximately 0.259 MGD to the system. Initial system testing confirmed flow was 5-6 GPM per cooling pipe throughout the system. Hourly concrete and cooling system intake and discharge temperature monitoring began on November 21, 2014 and continued until November 28, 2014.

Overall, the once-through cooling system at [redacted] achieved the desired results by providing effective thermal control of the temperature difference between the interior and the surface of the mass concrete pour; thereby avoiding cracking and other potential temperature related damage to the concrete. Based on these results, TZC moved forward testing and evaluating similar systems operations at other Approach Span locations, including potential refinements to system operations based on the knowledge gained during testing (as described below).

TZC initiated similar system testing at [redacted] beginning November 25, 2014 and at [redacted] on December 4, 2014 and December 5, 2014, respectively. Cooling system testing included modifications to the discharge configuration (multiple-point discharge vs. a single-point discharge) and temperature monitoring system (improved thermistor accuracy).

Results of the system testing are summarized in Table 2. These data indicate that over the 12 full days of system operations, the change in daily average temperature between the intake and discharge never exceeded 3 °F. This temperature difference is expected to remain the same regardless of the ambient temperature. In addition, no aquatic life was observed on or near the submersible pump screen or points of discharge.

The previously anticipated schedule for approach span cooling system operations during February thru March 2015 is provided in Table 3. Approach span and main span cooling system operating schedules will change as weather permits and other construction activities allow, but these changes would not affect the anticipated number of cooling systems in operation.

Design and Operational Features that Avoid Impacts

Although the proposed cooling system will occur in a portion of the river that overlaps with the distribution of shortnose and Atlantic sturgeon, no individuals of these threatened and endangered species or other fish species are likely to be exposed to the effects of the cooling system; if individuals are exposed, their responses will almost certainly be biologically or ecologically insignificant or discountable. No impacts to sturgeon prey are anticipated because sturgeon forage on benthic (bottom) organisms and the cooling system intake and discharges are surface based.

Velocities through the intake screen would be 2.76 feet per second (fps). Assuming worst case conditions (i.e., the highest anticipated withdrawal rate modeled at slack tide), velocities associated with this intake are expected to decline to about 0.5 fps within 1.2 inches of the intake screen and to about 0.1 fps within 6 inches of the screen (see the AOI in Appendix A). During field surveys conducted for the project, peak vertically averaged tidal currents in the navigational channel near the Tappan Zee Bridge were about 2.5 fps; peak velocities during the spring freshet were as high as 3 fps. Based on NOAA data on current velocities for the Tappan Zee area, the lowest current velocities between January and July 2012 ranged from 0.84 fps to 1.52 fps with daily maximum velocities ranging from 2.5 to 4.7 fps. With background currents in this range, fish are not likely to detect or orient to flows associated with the intake screen. In the unlikely event of a juvenile sturgeon or other fish species occurring within the AOI of the intake screen, it would be capable of reaching swimming speeds that would prevent any risk of entrainment or impingement (Appendix B). Therefore, impacts on sturgeon and other fish species associated with the cooling water intake are expected to be insignificant and additional engineering measures (e.g., a secondary cage surrounding the intake), would not be required in order to avoid impacts.

Finally, the cooling system is designed to keep temperature increases (ΔT) between the intake and discharge to below 3 °F. For the discharged cooling water, the area influenced by the thermal discharge can be defined as the area where the change in temperature from ambient river levels is equal to the minimum observed daily water temperature variation (i.e., 0.4 °F) or is at a non–detectable level (i.e., less than 0.1 °F). Based on the modeling presented in Appendix A, the thermal influence area is expected to be limited to surface waters 0.3-1.4 feet below the surface within approximately 1-11 feet from the end of the Approach Span return lines, occupying an approximate area of 400 square feet at each pier (based on up to 30 individual discharge return lines). Similarly, the thermal influence area of the Main Span cooling system will be limited to surface waters 2.1-7.7 feet below the surface within approximately 17-57 feet from the end of the Main Span Tower Leg return lines, occupying an approximate area of 1000 square feet (see Appendix A, Drawing 1). Modeling results reflect the anticipated worst-case operating scenario (i.e., two Approach Span locations and one Main Span location cooled simultaneously), assuming the maximum design discharge (ΔT of 3°F) and plume occurs during the entire system operating period – six days at each Approach Span pier and eight days at the Main Span. In actuality the daily average ΔT during system testing at Approach Span piers P6WB and P7EB never reached 3°F (Table 2).

The small volume of water affected by this temperature differential will remain near the river surface due to the buoyancy of the thermal discharge until it is vertically mixed and will not occur near the river bottom. In addition, the cooling system maximum discharge flow of 0.216 MGD (0.33 cfs) for the Approach Span and 0.403 MGD (0.62 cfs) for the Main Span Tower Leg locations represents less than 0.01% of the average monthly Hudson River flow. Since these discharge flows are negligible in comparison to the Hudson River flow, far-field thermal effects will be absent and any near-field thermal effects will be mixed within a short distance from the point of discharge as indicated by the modeling presented in Appendix A. The temperatures changes associated with the discharge of the cooling system (i.e., maximum discharge ΔT of 3 °F and river ΔT levels of 0.4 °F or 0.1 °F) are well within the range of variability that occur in the Hudson River and that would be experienced by sturgeon or other fish species on a daily basis. Therefore, sturgeon and other fish species are not expected to avoid nor be attracted to this thermal differential; it would have no effect on their biology, ecology, or behavior. Hudson River temperature data from USGS Gauge 01376269 (Piermont NY), about 2 miles downstream from the bridge, from December 3, 2013 through December 10, 2014, indicate that the minimum daily change in temperature was 0.4 °F and the maximum was 13.0 °F with an average of 4.1 °F. Therefore, thermal impacts on sturgeon and other fish species are expected to be insignificant due to the operation of the cooling water discharge system.

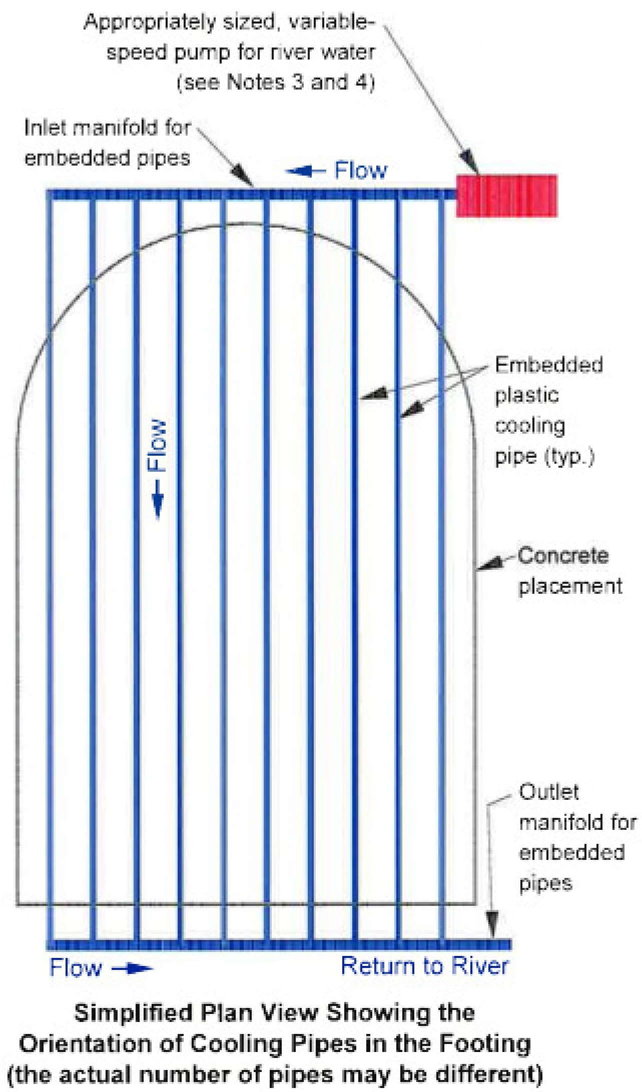


Figure 1. Simplified plan view showing the orientation of cooling pipes in the Approach Span pile cap (Not to Scale). Note: Discharge outlet subsequently modified to a multiple-point discharge.

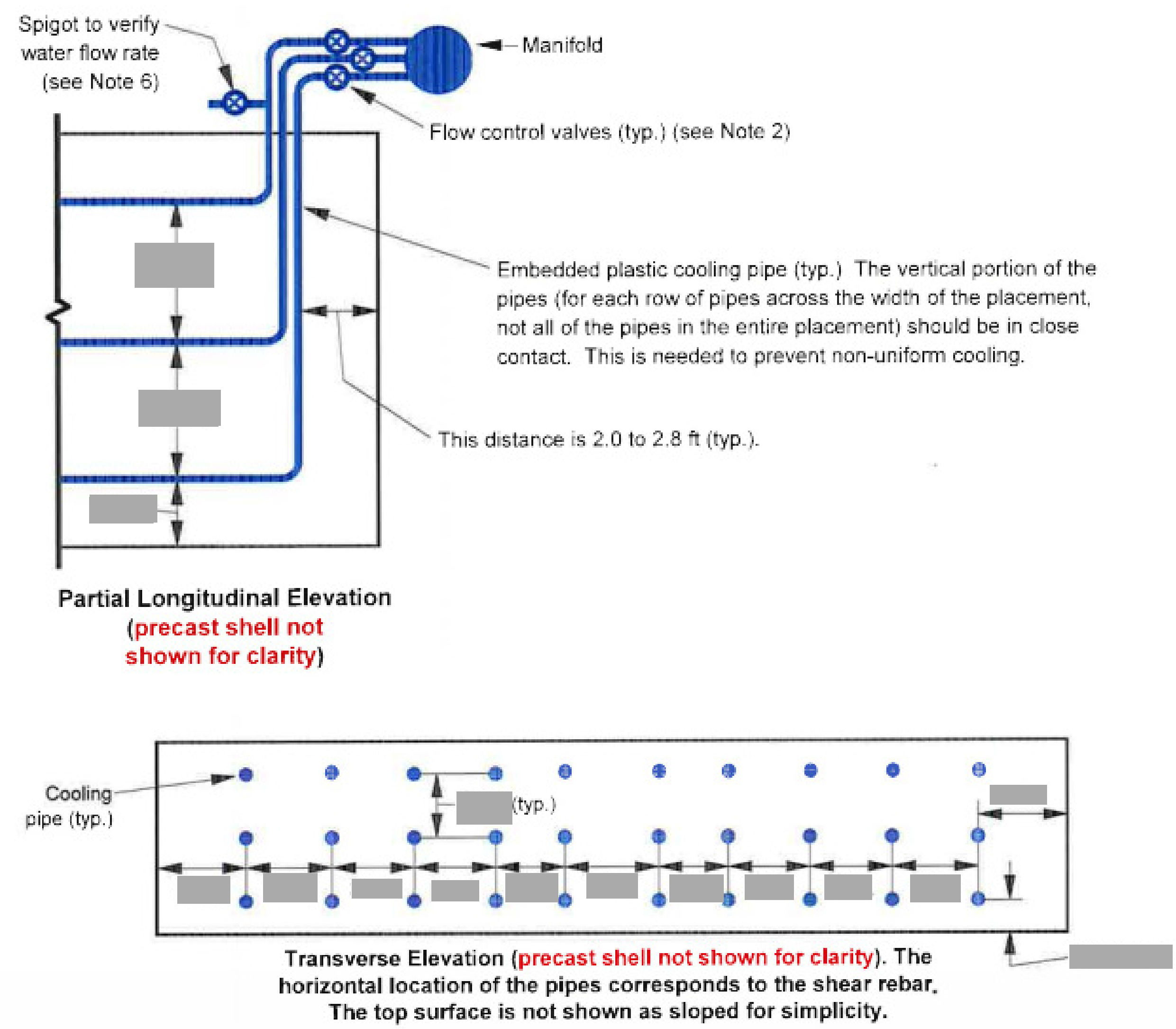


Figure 2. Partial longitudinal elevation and transverse elevation of the Approach Span pile cap cooling system (Not to Scale).

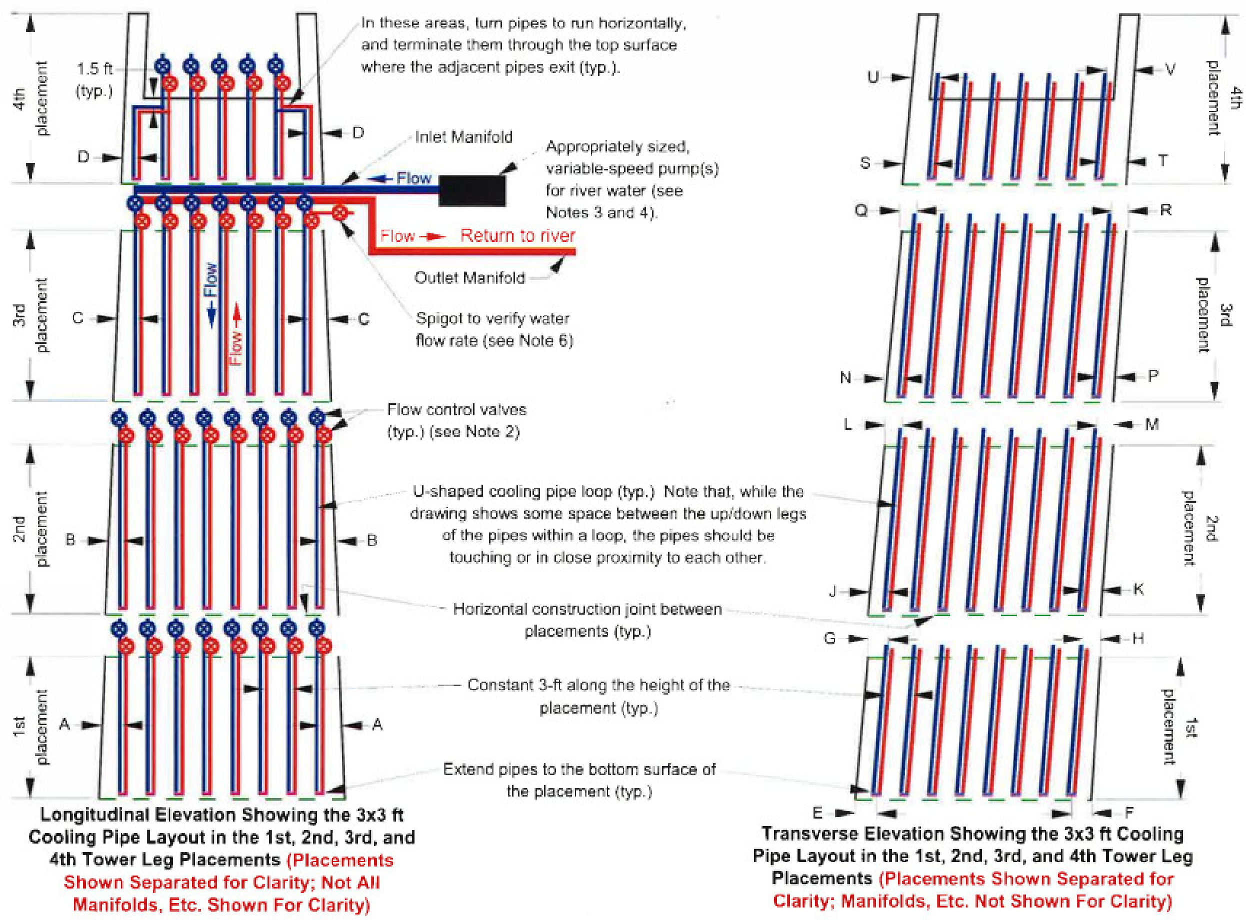


Figure 3. Longitudinal and transverse elevations of the Main Span tower leg cooling system(s) (Not to Scale).

Table 1. Initial cooling system design flow by location

Location	Design Flow (MGD)	No. of Operating Days	MG per Location	30-Day Average (GPD)	Total No. of Locations/ Pours	Schedule
[redacted] (Approach Span)	0.216	6	1.296	43,000	33	1Q thru 2Q 2015
[redacted] (Approach Span)	0.216	6	1.296	43,000	30	1Q thru 2Q 2015
[redacted] (Approach Span)	0.216	6	1.296	43,000	6	2017
[redacted] (Main Span) Pile Cap	0.230	8	1.843	61,440	4	1Q2015
[redacted] (Main Span) Pile Cap	0.230	8	1.843	61,440	4	1Q2015
[redacted] (Main Span) Anchor Pier	0.115	8	0.922	27,660	4	3Q2015
[redacted] (Main Span) Anchor Pier	0.115	8	0.922	27,660	4	3Q2015
[redacted] (Main Span) Tower Leg	0.403	8	3.226	107,520	12	2Q2015
[redacted] (Main Span) Tower Leg	0.403	8	3.226	107,520	12	2Q2015

Note(s): WB – Westbound; EB – Eastbound; MGD – million gallons per day; GPD – gallons per day; MG – Million Gallons; [redacted] are complete. Up to two Approach Span locations (e.g., WB and EB at same pier) and one Main Span location may be cooled simultaneously; however this would not occur regularly due to other construction schedule constraints. Approach Span and Main Span Pile Cap and Anchor Pier discharges consist of up to 30 individual ¾-in diameter pipes. Two systems will be used simultaneously to achieve 0.403 MGD per location at the Main Span Tower Legs (i.e., two individual intake locations and two individual 4-in diameter pipe discharge locations).

Table 2. Average daily intake temperature, discharge temperature, and average daily change in temperature between the intake and discharge by date and location.

Location	Date	Volume (MG)	Daily Average Intake Temperature °F	Daily Average Discharge Temperature °F	Daily Average Δ°F
	Nov 21	E 0.108	46.1	47.2	1.1
	Nov 22	E 0.259	44.8	46.5	1.6
	Nov 23	E 0.259	45.0	47.2	2.2
	Nov 24	E 0.259	47.4	49.3	1.9
	Nov 25	E 0.259	48.2	49.9	1.7
	Nov 26	E 0.259	47.2	47.8	0.5
	Nov 27	E 0.259	46.1	46.4	0.3
	Nov 28	E 0.259	45.1	45.9	0.8
	Nov 29	E 0.086	NA	NA	NA
	Dec 5	E 0.130	44.1	45.4	1.4
	Dec 6	E 0.259	44.3	46.8	2.5
	Dec 7	E 0.259	44.2	47.1	2.9
	Dec 8	E 0.259	44.2	44.5	2.2

Note(s): MG – million gallons; Flow estimated using a nominal flow of 6 gpm per cooling pipe and 30 cooling pipes per system and hourly pump operation.

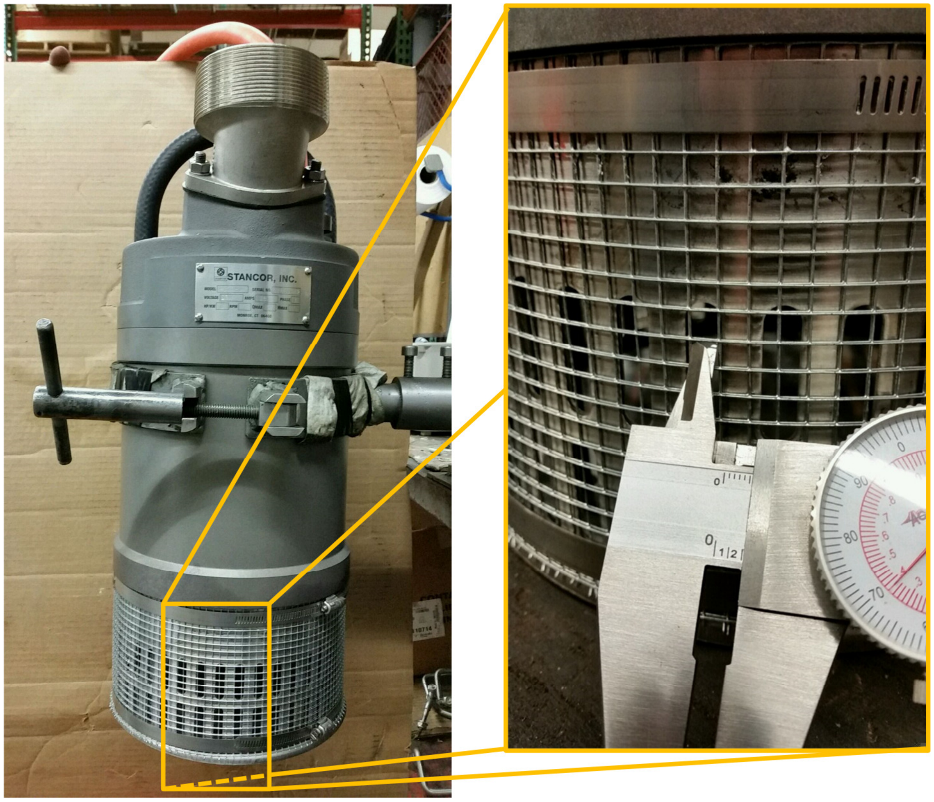
– Hourly intake and discharge temperatures were recorded at +/- 1 °C (+/- 1.8 °F). Hourly intake and discharge temperature recordings were not available for 11/29/2014. The maximum hourly intake and discharge temperature rise was 3.6 degree F; recorded intermittently on November 23 and 24, 2014.

– Hourly intake and discharge temperatures were recorded at +/- 0.2 °C (+/- 0.36 °F). Hourly intake and discharge temperatures through December 8, 2014, system continues to operate to December 11, 2014.

Table 3. Anticipated Approach Span cooling system operating schedule – February thru March 2015

Location	Scheduled Start Date	Flow MGD	Volume MG
[redacted]	2/2/2015	E 0.259	1.56
[redacted]	3/2/2015	E 0.259	1.56
[redacted]	3/3/2015	E 0.259	1.56
[redacted]	3/4/2015	E 0.259	1.56
[redacted]	2/23/2015	E 0.259	1.56
[redacted]	2/24/2015	E 0.259	1.56
[redacted]	3/2/2015	E 0.259	1.56
[redacted]	3/3/2015	E 0.259	1.56
[redacted]	3/9/2015	E 0.259	1.56
[redacted]	3/10/2015	E 0.259	1.56
[redacted]	3/16/2015	E 0.259	1.56
[redacted]	3/16/2015	E 0.259	1.56
[redacted]	2/16/2015	E 0.259	1.56
[redacted]	2/17/2015	E 0.259	1.56
[redacted]	2/9/2015	E 0.259	1.56
[redacted]	2/10/2015	E 0.259	1.56
[redacted]	3/24/2015	E 0.259	1.56

Note(s): Flow estimated using a nominal flow of 6 GPM per cooling pipe and 30 cooling discharge pipes per system and hourly pump operation for six days (144 hours).



Photograph 1. Strainer used at the Point of Withdrawal.

Photograph 2. Cooling system intake delivery manifold (Note 4-in. dia. intake line in background).

Photograph 3. Cooling system discharge lines (1-in. dia black tubes) (Red arrow denotes discharge temperature monitoring location 1-gal bucket).

Photograph 4. Submersible pump intake location

Appendix A – Area of Influence (AOI) and Thermal Discharge Evaluation Calculations

Withdrawal (Velocity)

Desktop calculations of the AOI of a cooling water intake are based on the principles of conservation of mass and continuity and require simplified assumptions such as average water depth. For tidal systems, a low water elevation and zero ambient velocity at slack tides would provide a conservative (i.e., worst case) estimate of AOI. Below are shown the calculation steps for estimating the AOI. By definition, Area of Influence (AOI) or Hydraulic Zone of Influence (HZI) is the location where the velocity induced by the intake is equal to a specified threshold velocity. These calculations use 0.5 feet per second (fps) as a reference point, partially because EPA considered these flows to allow fish to swim freely and avoid impingement. Deslaurier and Kieffer (2012) reported that juvenile sturgeon (about 3.9-inches in length) should be able to escape flows equal to or less than these velocities.

The radius of HZI (R_{HZI}) can be estimated from a continuity equation:

$Qi = 2 \times \pi \times R_{HZI} \times d \times V$------------------(1)

Where Q_i = Intake Flow
R_{HZI} = Radius of Hydraulic Zone of Influence
d = Average Depth of Waterbody at R_{HZI}
V = Threshold Velocity where it equals the induced velocity by intake at R_{HZI}

Rearranging terms in equation (1) gives:

$R_{HZI} = Qi /(2 \times \pi \times d \times V)$------------------(2)

Using an ambient water depth affected by the intake of 2 feet (as a conservative assumption) and 280 gpm (0.403 MGD) rated capacity of the cooling water pump, the radius of HZI is calculated using the Eq. (2).

Threshold Velocity (fps)	Radius of HZI (ft)
0.50	0.10
0.40	0.12
0.30	0.17
0.20	0.25
0.10	0.50
0.02	2.48

The calculated radius of HZI above is assuming the uniform velocity at a specified threshold velocity along the distance from the cooling water intake pump and considered to be conservative because the intake velocity would decrease exponentially with the distance from the through screen velocity in reality. Therefore, impingement as a result of cooling water withdrawal is highly unlikely.

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Discharge (Thermal)

A CORMIX initial dilution model was used to characterize the thermal plume that is likely to occur from operation of the once-through non-contact cooling water system for discharge from a typical Approach Span pile cap and typical Main Span Tower Leg thermal discharge. CORMIX is a steady-state initial dilution model that can be used to predict thermal plume behavior in receiving water bodies. To complete the modeling, we used the following model inputs:

- a maximum discharge flow of 0.216 MGD for a typical Approach Span thermal discharge (analysis completed for one ¾-inch discharge pipe – up to 30 individual cooling discharge pipes will operate per system),
- a maximum discharge flow of 0.403 MGD for a typical Main Span Tower Leg discharge (analysis completed for one 4-inch discharge pipe – individual cooling discharge pipes will manifold to a single discharge outlet per system – up to 2 systems will be used simultaneously to achieve 0.403 MGD per Main Span Tower Leg location),
- discharge pipes located 1 ft below the water surface in a water depth of 10 feet,
- discharge angles of 0° (horizontally away from pier) and 45° downward (toward bottom) to represent potential discharge angles,
- a maximum design temperature increase (ΔT) at the discharge of 3 degrees Fahrenheit (°F),
- an ambient temperature of 45 °F,
- a salinity of 7.5 ppt, and
- an ambient current speed of 1 cm/sec (roughly representing slack tide) with the current running perpendicular to the discharge.

These model inputs are considered a worst-case condition since the assigned ambient velocities are low (1 cm/sec), which leads to minimal ambient mixing in the river. In addition, the maximum design discharge flows and highest design discharge ΔT were used, which represents the largest thermal discharge design and results in the largest thermal plume area.

The table below presents the calculated distances from the thermal discharge location (i.e., Approach Span or Main Span Tower Leg) where a temperature rise in the river of 0.4 °F and 0.1 °F is reached. These results indicate that the 0.4 °F and 0.1 °F temperature rise in the river due to the cooling water systems is reached within approximately 1-11 feet from the end of the Approach Span return line and within approximately 17-57 feet from the end of the tower leg return lines. These calculated temperature increases are at the surface of the water with plume depths ranging from 0.3-1.4 feet for the Approach Span discharge and from 2.1-7.7 feet for the Main Span Tower Leg discharge. The calculated thermal plume widths range from 0.6-2.9 feet for the Approach Span discharge and from 4.2-15.4 feet for the Main Span Tower Leg discharge. The attached drawing depicts the approximate extent of the 0.4 °F and 0.1 °F discharge at typical Approach Span [redacted] and Main Span Tower Leg locations. Up to two Approach

Span locations [redacted] and one Main Span location [redacted] may be cooled simultaneously.

The distances to achieve the temperature rises of 0.4 °F and 0.1 °F is relatively short compared to the Hudson River width at the bridge location and the spatial area of the thermal discharge plumes is also very small as compared to surrounding river area. Therefore, based on the thermal modeling results for the approach span and tower leg cooling system discharges, the thermal discharges associated with the cooling systems is not anticipated to adversely impact sturgeon.

Thermal Discharge Modeling Results		
Cooling System	**Distance to achieve Temperature Rise (ft)**	
	0.4 °F	**0.1 °F**
Approach Span (horizontal discharge)	3.2	10.6
Approach Span (45° downward discharge)	1.7	5.8
Tower Leg[1] (horizontal discharge)	17.2	56.7
Tower Leg[1] (45° downward discharge)	17.2	56.7
1 – Model results for the two discharge angles are the same due to the buoyancy and momentum of the discharge.		

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Appendix B – Life History and Swim Speed Information for Atlantic and Shortnose Sturgeon

Shortnose and Atlantic sturgeon life-histories in the Hudson River, including spawning and migratory movements, are well studied. Shortnose sturgeon spawn more than 60 miles upstream of the cooling water intake in the area between Coeymans, New York (river mile 135) and the Federal Dam at Troy, New York (river mile 150), generally from April through May (Dovel et al. 1992). Shortnose sturgeon eggs are benthic, adhesive, and hatch in 8 to 13 days. Larvae gradually disperse downstream. Shortnose sturgeon larvae captured in the Hudson River were associated with deep waters and strong currents (Hoff et al. 1988 as cited in Bain 1997). Yearling juvenile sturgeon grow rapidly and transition to juvenile at 20 mm Total Length (TL) (approximately 30 days) and disperse downriver to approximately river mile 35 by fall (Bain et al. 2000). Older juveniles are distributed throughout the mid-river region during the summer and move back into the Haverstraw Bay region during the late fall. After spawning, adults disperse quickly down river into their summer range. The broad summer range occupied by adult shortnose sturgeon extends from just south of Catskill, New York, downriver to the Palisades area near the border of New York and New Jersey. Similar to non-spawning adults, most juveniles occupy the broad region of Haverstraw Bay by late fall and early winter (Dovel et al. 1992).

Atlantic sturgeon generally spawn between May and July at multiple sites within the Hudson River; near river mile 63 at New Hamburg, NY, river mile 80 near Hyde Park, NY and river mile 113 near Catskill, NY (Bain 1997, Bain et al. 2000). Spawning sites in a given year can be influenced by the position of the salt wedge (where the salt water from the estuary meets the fresh water of the river) (Dovel and Berggren 1983 and Van Eenennaam et al. 1996 as cited in Bain 1997, Kahnle et al. 1998). Eggs are adhesive and demersal and attach to the substrate within 20 minutes; therefore, sturgeon eggs occur only on the spawning grounds (Hildebrand and Schroeder 1928, Jones et al. 1978). Larvae are demersal and occur from June through August in the vicinity of the spawning area (Bath et al. 1981, Bain et al. 2000, Kynard and Horgan 2002). Larvae transition into the juvenile phase at approximately 30 mm total length (TL) and move further downstream into brackish waters, developing a tolerance to salinity. Eventually they become residents in estuarine waters for months to years before emigrating to open ocean (ASSRT 2007, ASMFC 2012). Yearling juvenile Atlantic sturgeon have been recorded in the Hudson River between Kingston, New York (river mile 90) and north of Haverstraw Bay (river mile 41), which includes some brackish waters; however, larvae must remain upstream of the salt wedge because of their low salinity tolerance (Kahnle et al. 1998, Bain et al. 2000). Catches of immature sturgeon (age 1 and older) suggest that juveniles use the estuary from Kingston to the Tappan Zee Bridge. Bain (1997) report that from July through September juvenile sturgeon use deep channels in the Hudson River.

Although the through-screen velocity is 2.76 feet per second (fps) the flow field declines to about 0.5 fps within 1.2 inches of the intake screen and about 0.1 fps within 6 inches of the screen. Intake locations will likely be at least 40 feet or more apart so the flow fields will not interact. In order for impingement to happen, a fish must be overcome by the intake or approach velocity. Shortnose and Atlantic sturgeon are known to occur in the vicinity of cooling water intake. The swimming capabilities of shortnose, green, and white sturgeon are well studied and are expected to have

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swimming capabilities representative of Atlantic Sturgeon due to their similar morphology. Juvenile and adult shortnose sturgeon (body lengths greater than 58.1 cm) can avoid impingement at intakes with velocities as high as 3.0 feet per second (Kynard et al. 2005 as cited in NMFS 2013). Shortnose sturgeon with body lengths greater than 28 cm have been demonstrated to avoid impingement at intakes with velocities of 1.0 fps (Kynard et al. 2005 as cited in NMFS 2014). Critical swimming velocity for 22.1 cm and 22.2-cm green sturgeon has been reported as 1.58 (20 minutes) and 1.73 fps (5 minutes), respectively (Verhille et al. 2014). Critical swimming velocity ranged from 0.2 fps to 2.6 fps for 20 to 30 minutes for larger green sturgeon (34.7 cm to 68.3 cm). All green sturgeon were tested at 18-191/4C. Critical swimming velocity for larger white sturgeon (24.8 cm to 38.3 cm) ranged from 1.9 fps to 2.27 fps (for 20-30 minutes. White sturgeon were tested at 11-12.5 1/4C and 18-191/4C. Absolute swimming capacity increased with size. Poletto et al. (2013) reported that green sturgeon (29.6 cm fork length [FL] and 150-198 days after hatching) contacted fish exclusion screens more frequently than white sturgeon (27.4 cm FL and 170-192 days after hatching) as simulated intake flow velocity increased. However, the majority of the fish never became impinged: impingement events per fish ranging from 0 to 15 for green sturgeon and 0 to 1 for white sturgeon. Fish were tested at flows of 0.67 and 1.2 fps. There were 0.68 impingements per fish for green sturgeon and 0.02 impingements for fish for white sturgeon; the weighted proportion of fish impinged in the study was 0.09 (weighting using the inverse of variance; Borenstein et al. 2009). Juvenile shortnose sturgeon in the Tappan Zee are expected to be 20 cm TL or greater and juvenile Atlantic sturgeon are expected to be 30 cm TL or greater. Adult shortnose sturgeon are expected to be 50 cm TL or greater. Adult Atlantic sturgeon are expected to be 135 cm FL or greater (Bain et al. 2000). Earlier life stages (eggs and larvae) are not present in the Tappan Zee area.

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Addendum to the Concrete Batch Plant Control Plan

Appendix F – Pile Caps

Pipe Pile Seals for 72-inch Diameter Piles:

Appendix F of the Concrete Batch Plant Control Plan has been revised to include updated drawings of the [redacted] fiberglass sleeves and the soffit panel work plan.

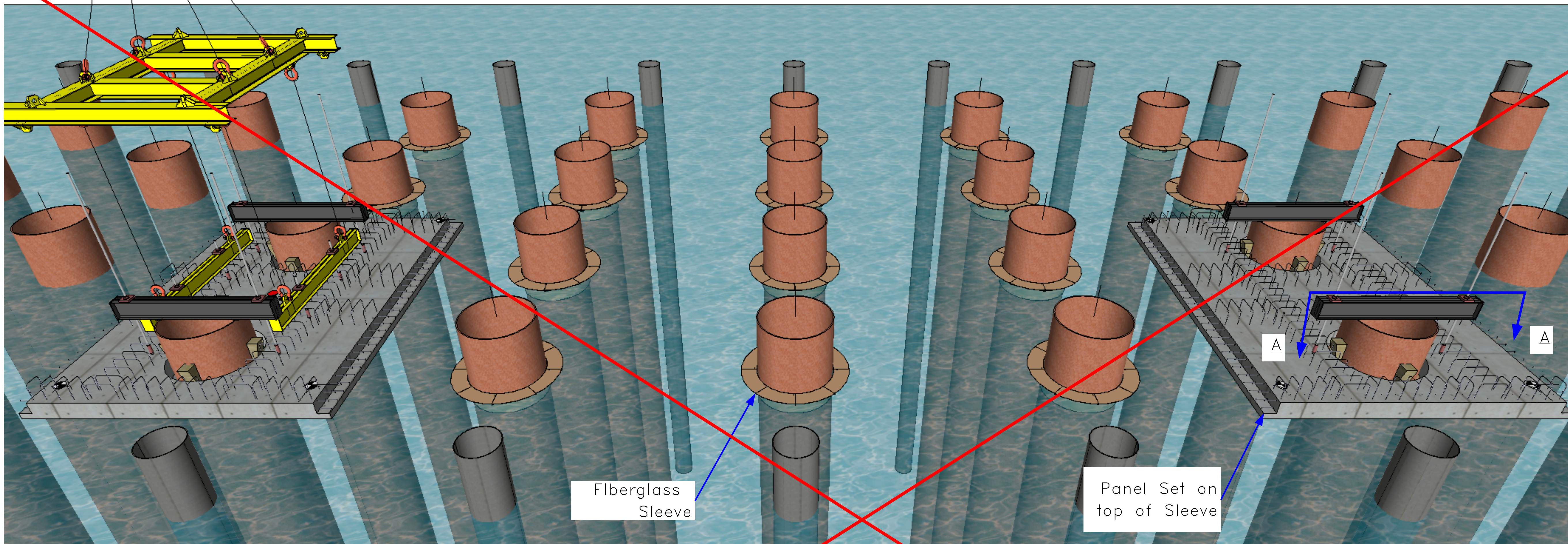
The following procedure will be used to secure the fiberglass sleeves to the pre-cast concrete soffit panels:

1. Preference is to have the fiberglass sleeves set immediately prior to setting pre-cast panels. Sleeves must be secured to pre-cast panels with minimum four of the eight angles before end of shift.
2. Fiberglass sleeve will be supported by eight ½-inch diameter coil rods, connected through a 5/8" diameter hole in the flange of the sleeve and a three-inch steel channel below.
3. Prior to placing concrete the fiberglass sleeve will be inspected using a diver to confirm the fiberglass sleeve is properly placed and affixed to the soffit panel per the plan.
    a. If, based on the inspection by the diver, a void is observed the diver will place additional backer rod or similar prior to placement of concrete.
    b. If, based on the inspection by the diver, the fiberglass sleeve shows evidence of large deflection and/or displacement a friction collar or similar will utilized to support the fiberglass sleeve in the proper position prior to placement of concrete.
4. A diver will continue to inspect the fiberglass sleeve during placement of concrete to confirm that the engineering controls are effective and functional.
5. Observations of turbidity extending outside of the fiberglass seal will be communicated to the site foreman who will implement corrective actions as appropriate. Corrective actions that could be taken are, but not limited to, the following:
    a. Stop placement of concrete
    b. Add additional backer rod, rope, or similar to fill observed gaps
    c. Tighten coil rods
    d. Install friction collar below sleeve
    e. Pre-inspection of upcoming piles for evidence of gaps and voids

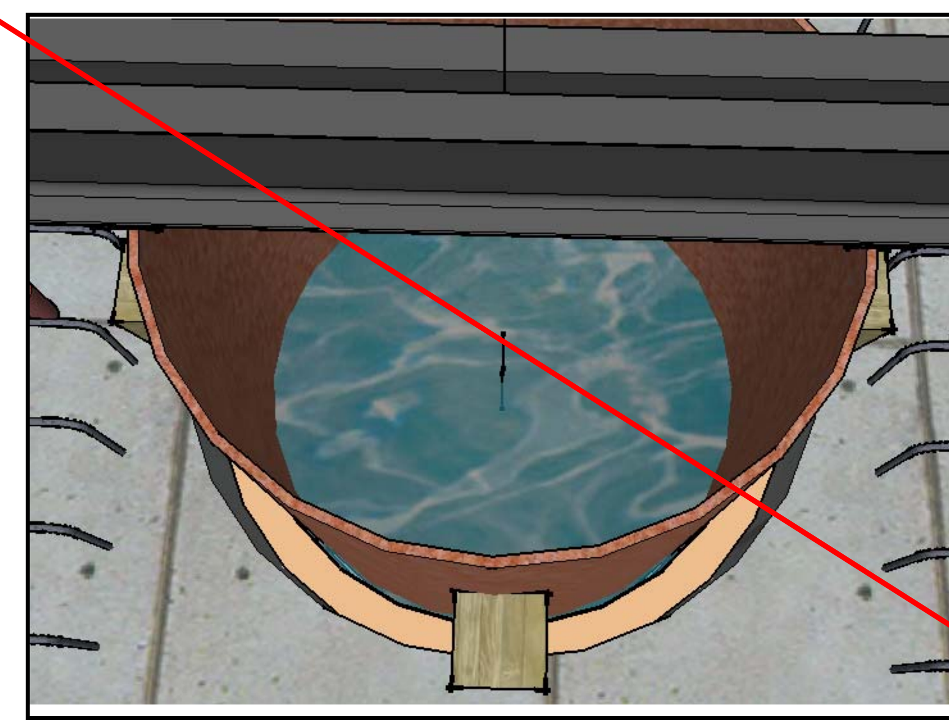
APPENDIX F

Pile Caps

1. **Pipe Pile Seals**
   a. **Superseded Soffit Panel Detail**
   b. **Revised Soffit Panel Detail**
   c. **Revised Fiberglass Soffit Detail**
2. **Main Span Soffit Slab Joints**
   a. **Slab Pour Detail**
3. **Main Span Soffit Perimeter Curb**
   a. **Superseded Perimeter Curb Detail**
   b. **Revised Perimeter Curb Detail**
4. **Main Span Pile Cap Soffit Secondary Slab**
   a. **Pile Cap Soffit Secondary Slab Detail**
5. **Main Span Pile Plugs – TBD**
6. **Main Span Pile Cap - TBD**



Footing Precast Panel Annualr Seal around Piles



Section A–A

REVISIONS

REMARKS

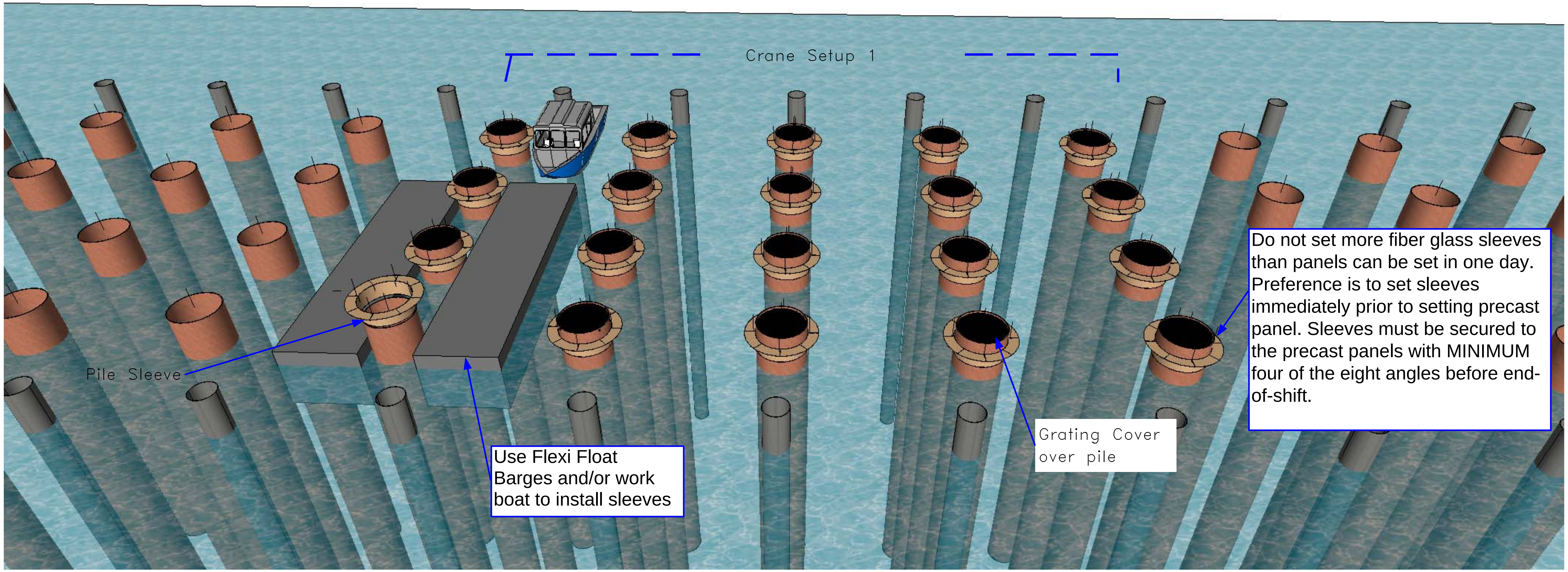
MM/DD/YY

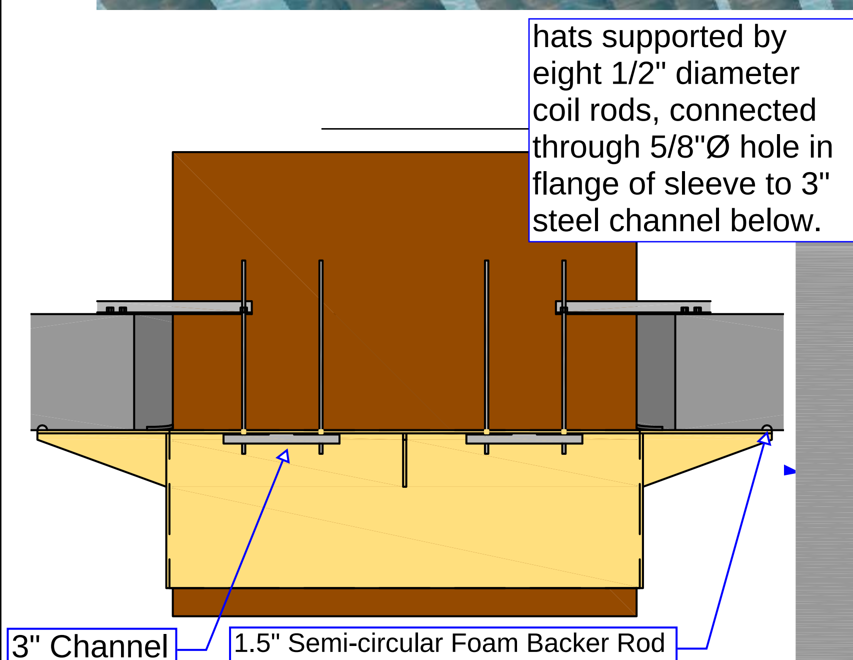
PRELIMINARY DRAWINGS

Tappan Zee Bridge: Main Span

Soffit Panel Work Plan:
Install Panels

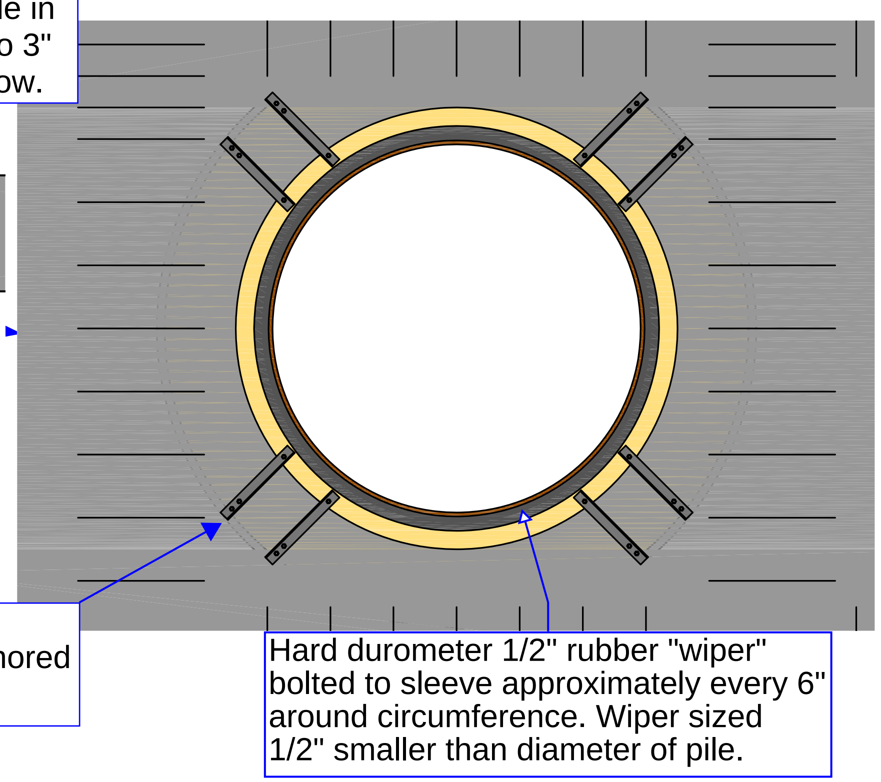
1

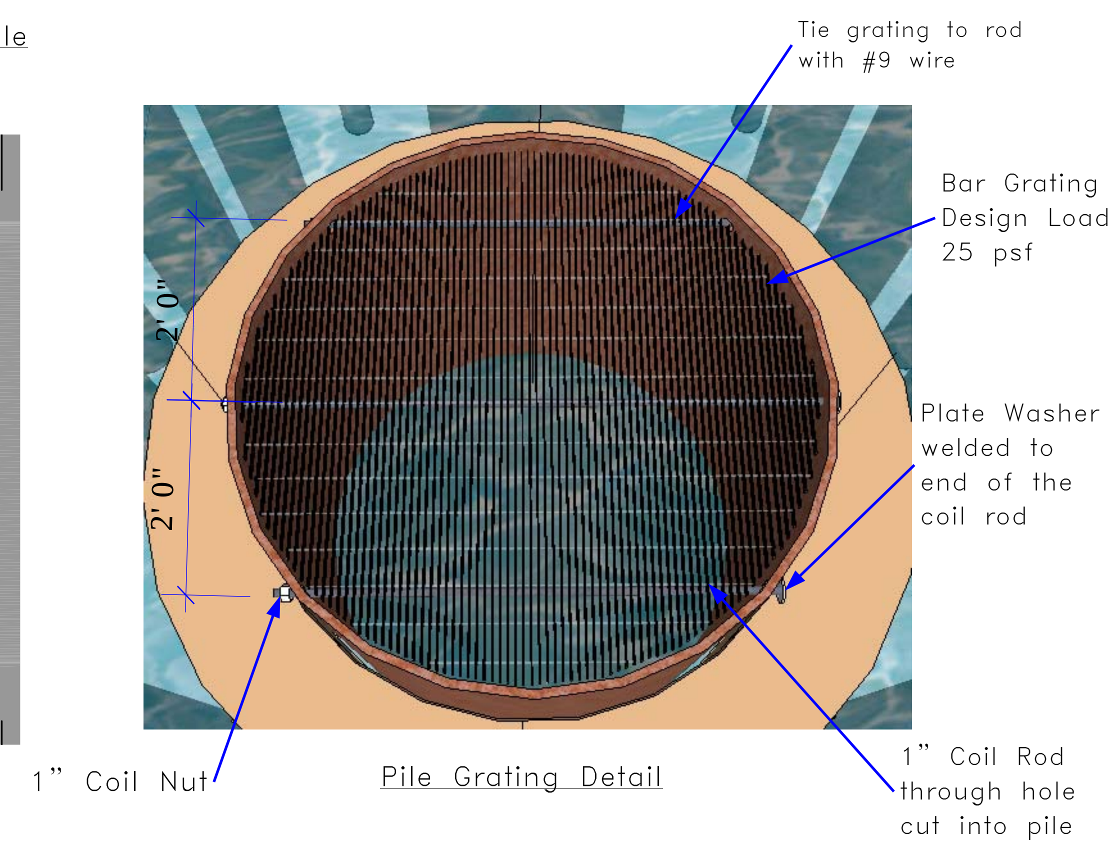




Fiberglass Pile Sleeve

Install Pile Sleeves and Grating on Pile





Pile Grating Detail

REVISIONS

	MM/DD/YY	REMARKS
1	11/19/13	Added Pile Grating to Plan
2	__/__/__	...
3	__/__/__	...
4	__/__/__	...
5	__/__/__	...

Tappan Zee Bridge: Main Span

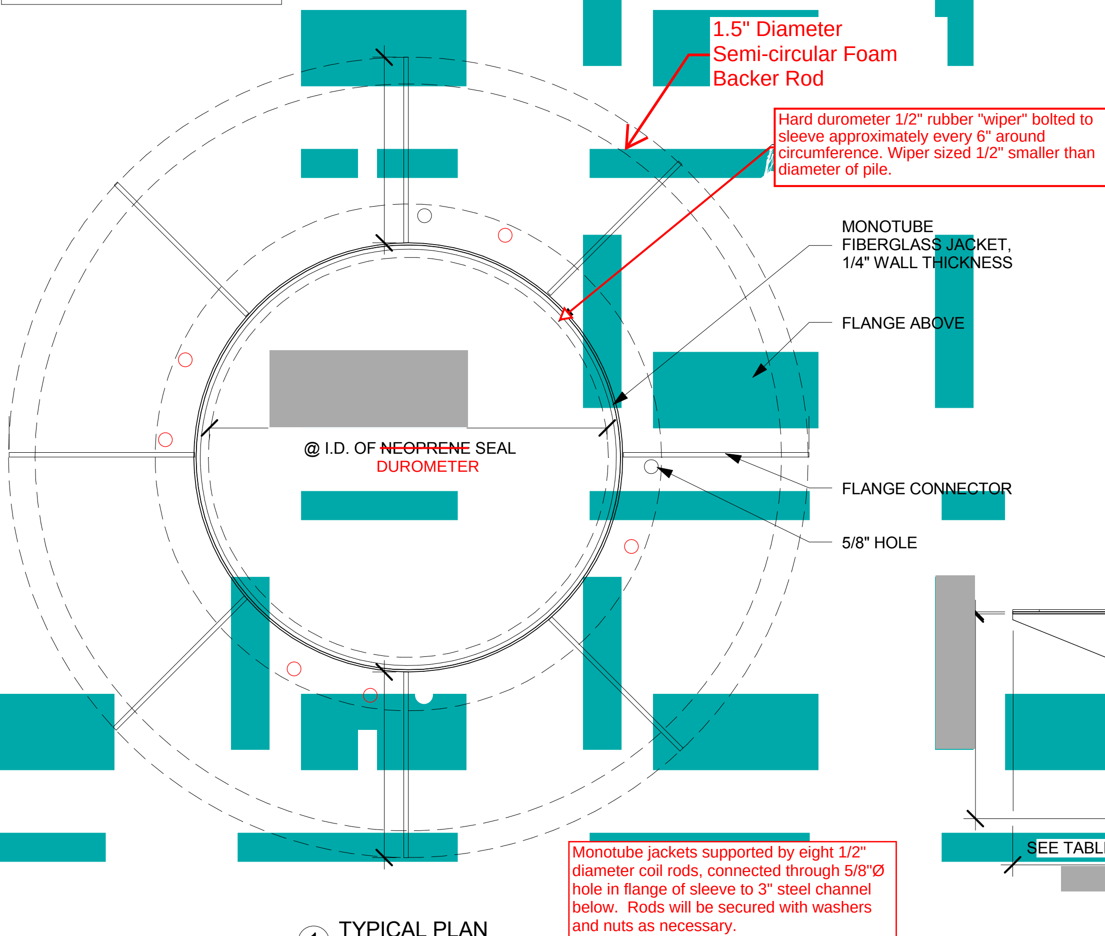
Soffit Panel Work Plan: Install Pile Sleeve and Grating

A 001

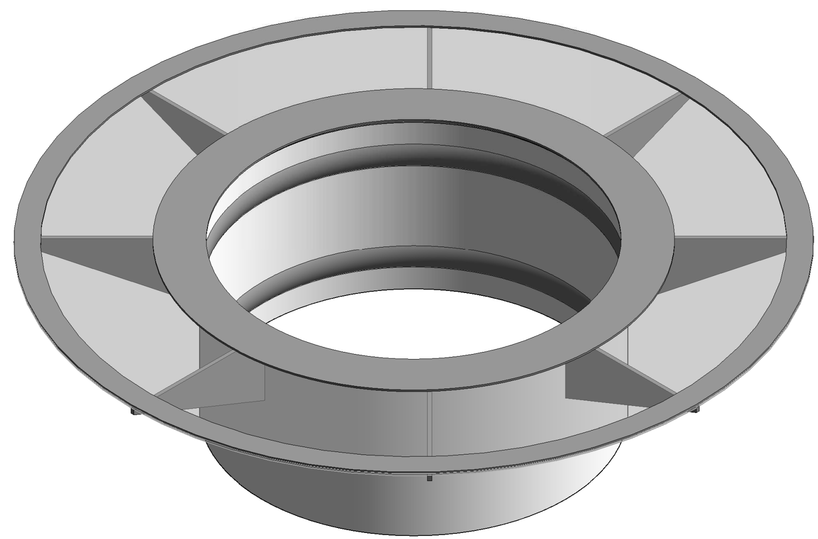
NOTE:

~~48" PILE = 49.5" I.D. + 20" FLANGE~~

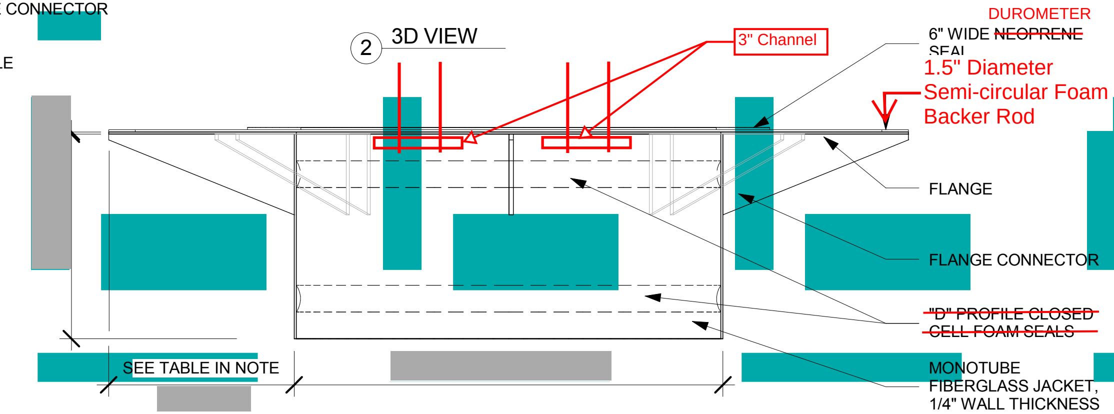
72" PILE = 73.5" I.D. + 15" FLANGE



1 TYPICAL PLAN



2 3D VIEW



3 TYPICAL ELEVATION

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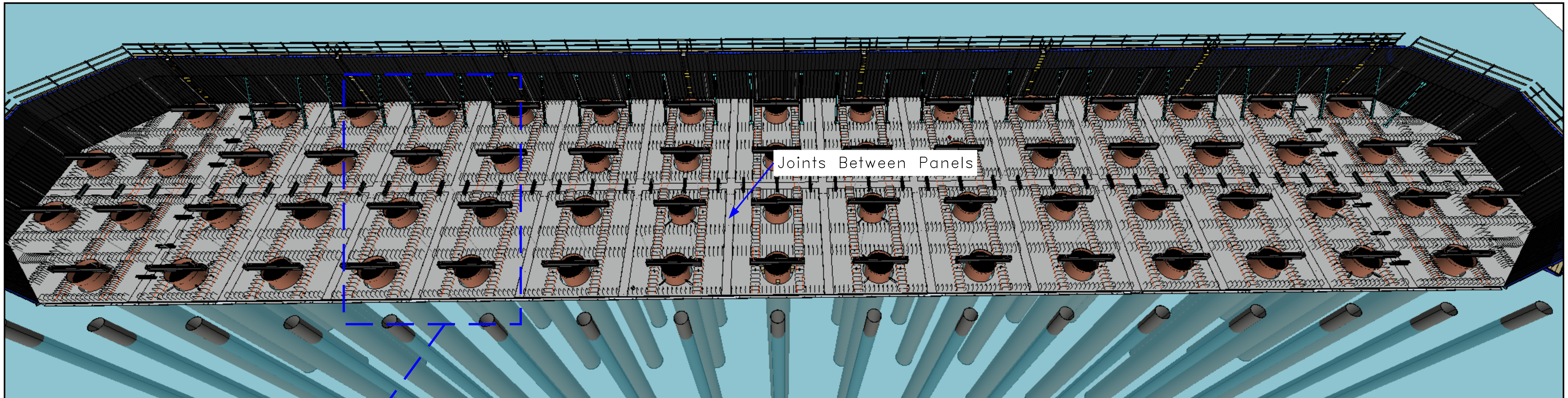
TAPPAN ZEE CONSTRUCTORS
A Consortium of Fluor, American Bridge, Granite, and Traylor Bros.

New York State Thruway Authority

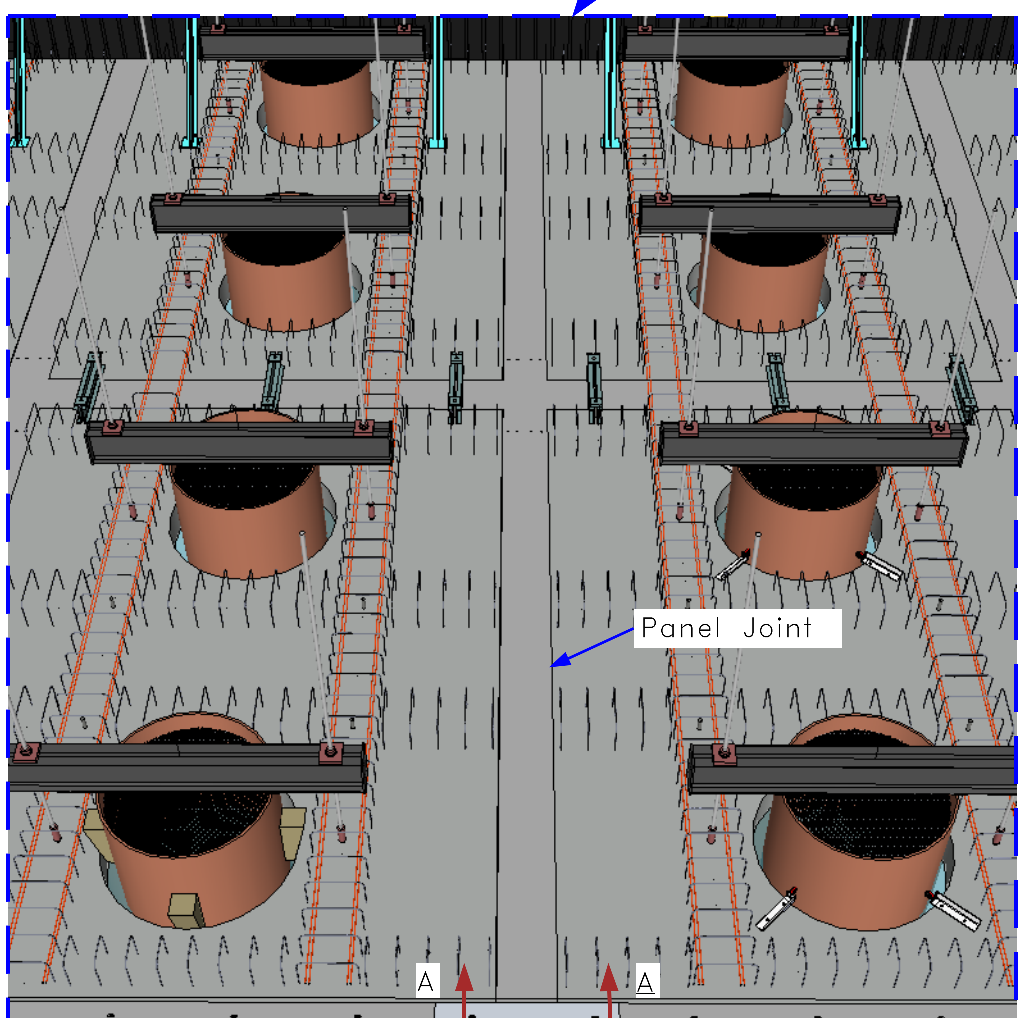
TAPPAN ZEE BRIDGE: HUDSON RIVER CROSSING

MONOTUBE JACKET WITH NEOPRENE CONNECTION, OPTION 2

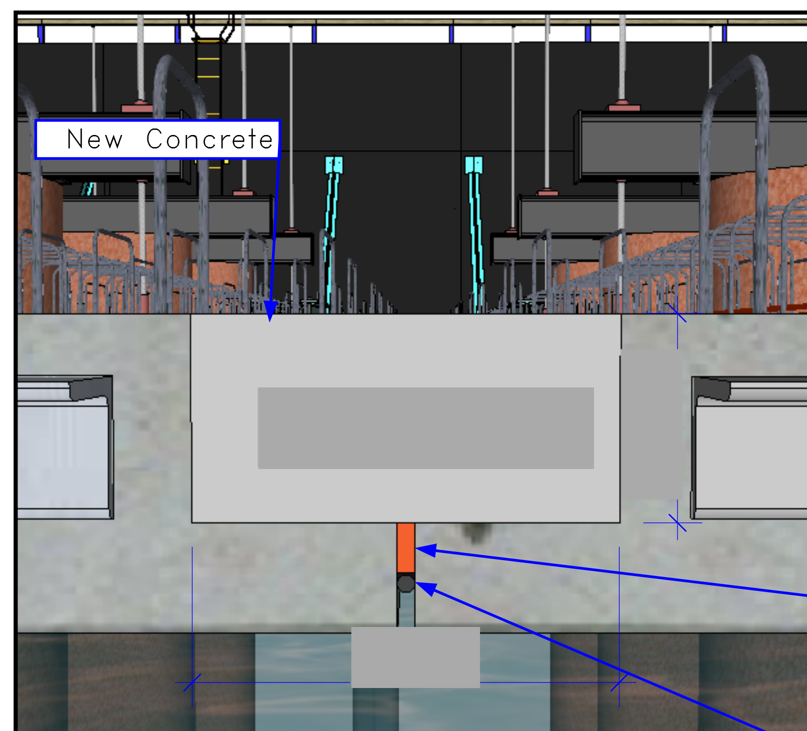
AL Project #	051 REVISITED	Customer Approval:
Date	10.08.13	
Drawn by	ASL	



Step 6: Pour Panel Joints



Panel Joint Detail



Section A–A

Sikaflex will be used to seal the joints between panels

1.5" Tight Fitting Foam Backer Rod to contain Sikaflex

Concrete Takeoff

Joint Area = 1.95 ft2

Total Joints= 1201.2 LF Joint

Total Volume = 86.75 yd3

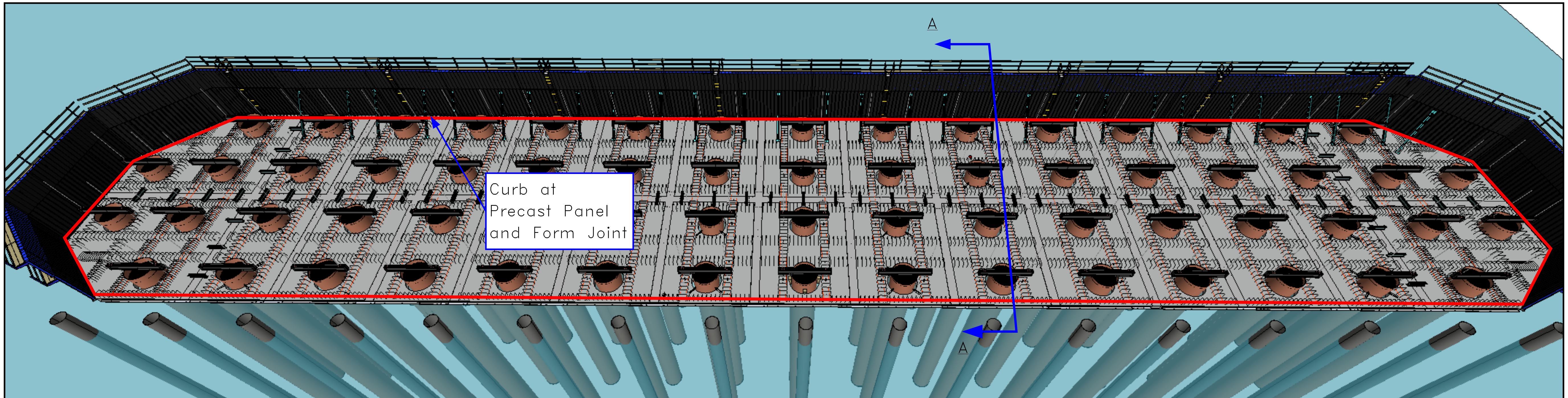
REVISIONS

	MM/DD/YY	REMARKS
1	--/--/--	...
2	--/--/--	...
3	--/--/--	...
4	--/--/--	...
5	--/--/--	...

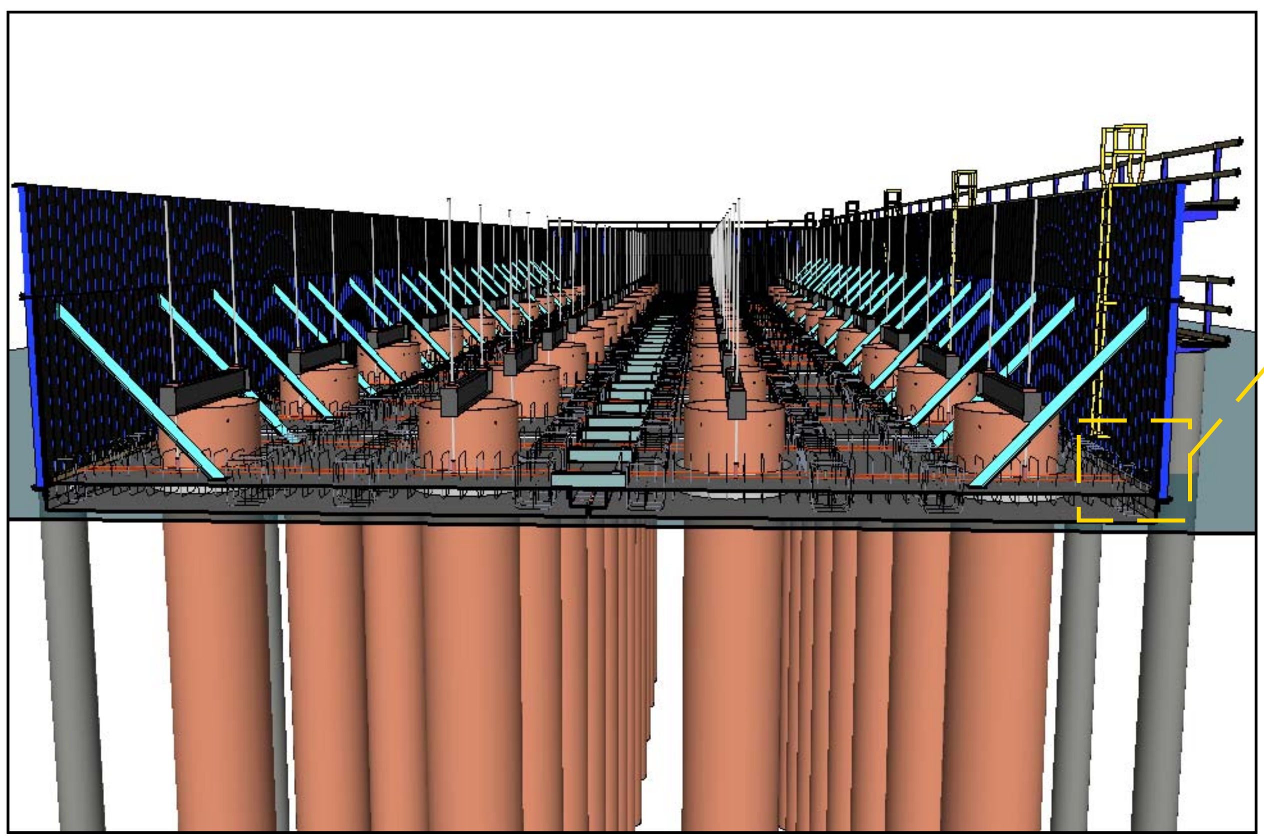
Tappan Zee Bridge: Main Span

Soffit Panel Work Plan: Pour Panel Joints

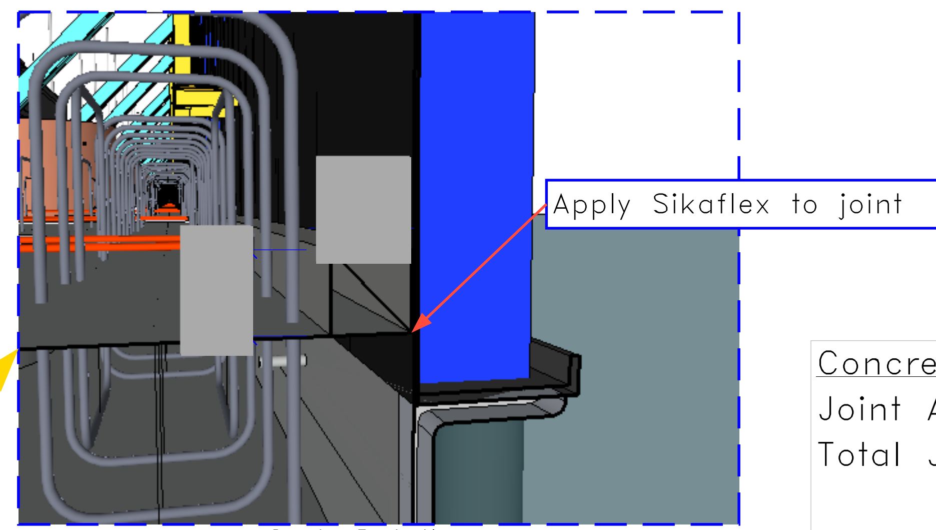
A 008



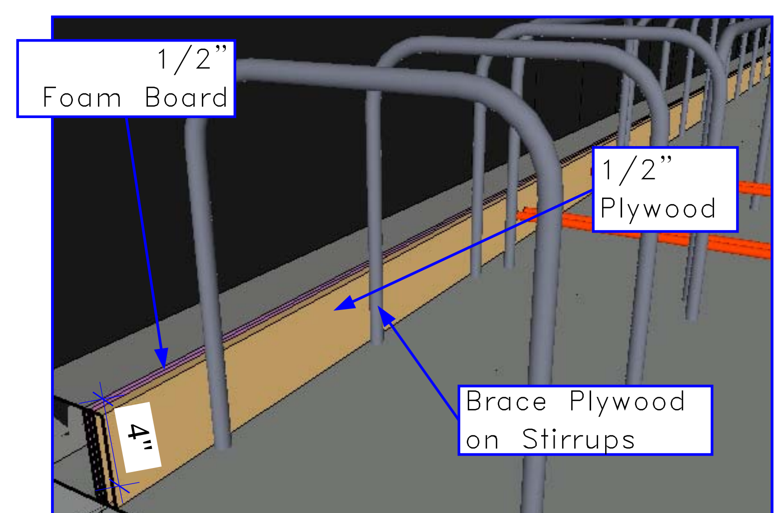
Step 7: Pour Curb



Section A–A



Curb Detail



Form Detail

Concrete Takeoff

Joint Area = .11 ft2

Total Joints= 803 LF Joint

Total Volume = 3.3 yd3

* 1/2" Foam will be used make it easier to strip the form

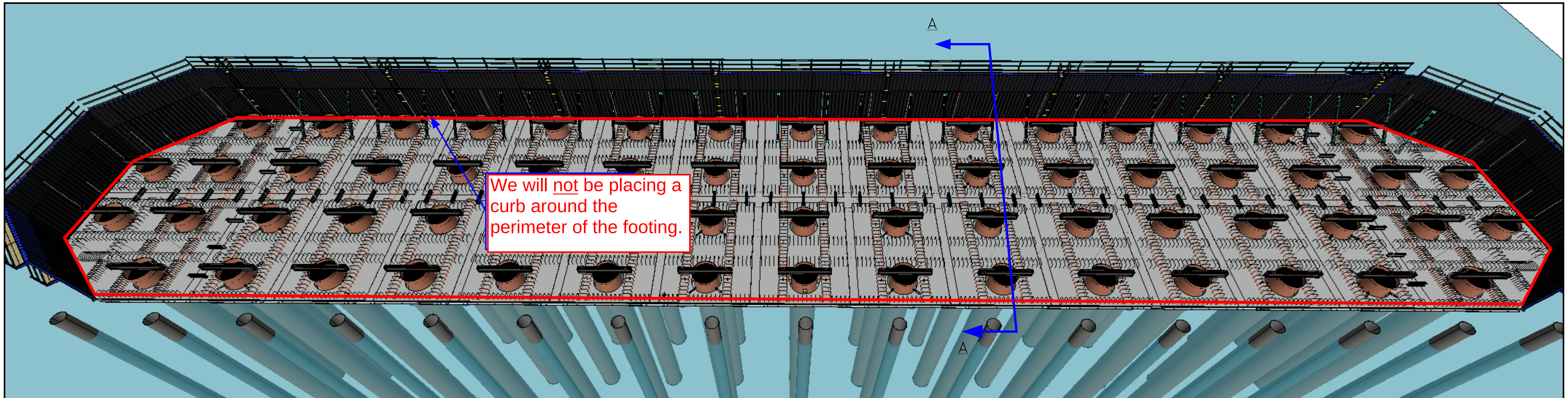
REVISIONS

	MM/DD/YY	REMARKS
1	02/25/14	Corrected Concrete Takeoff
2	__/__/__	...
3	__/__/__	...
4	__/__/__	...
5	__/__/__	...

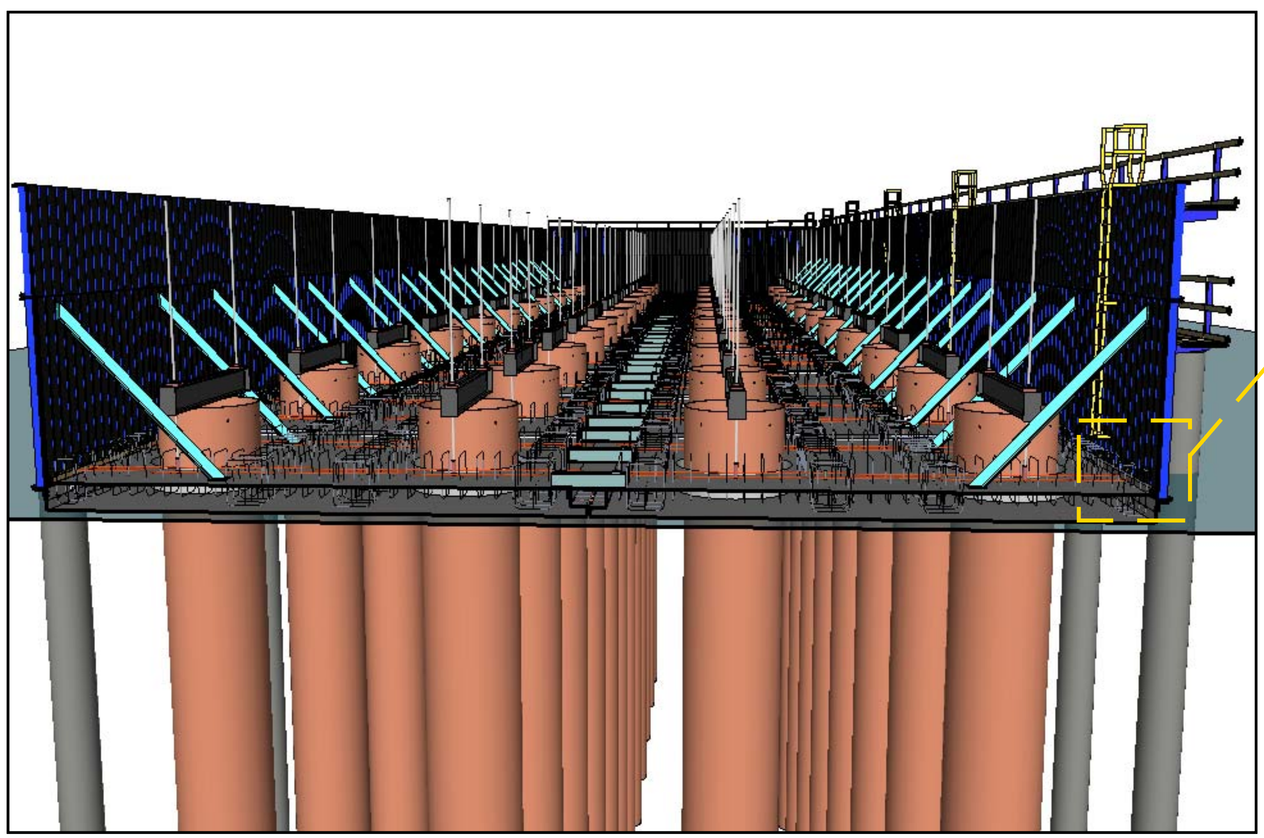
Tappan Zee Bridge: Main Span

Soffit Panel Work Plan:
Pour Curb

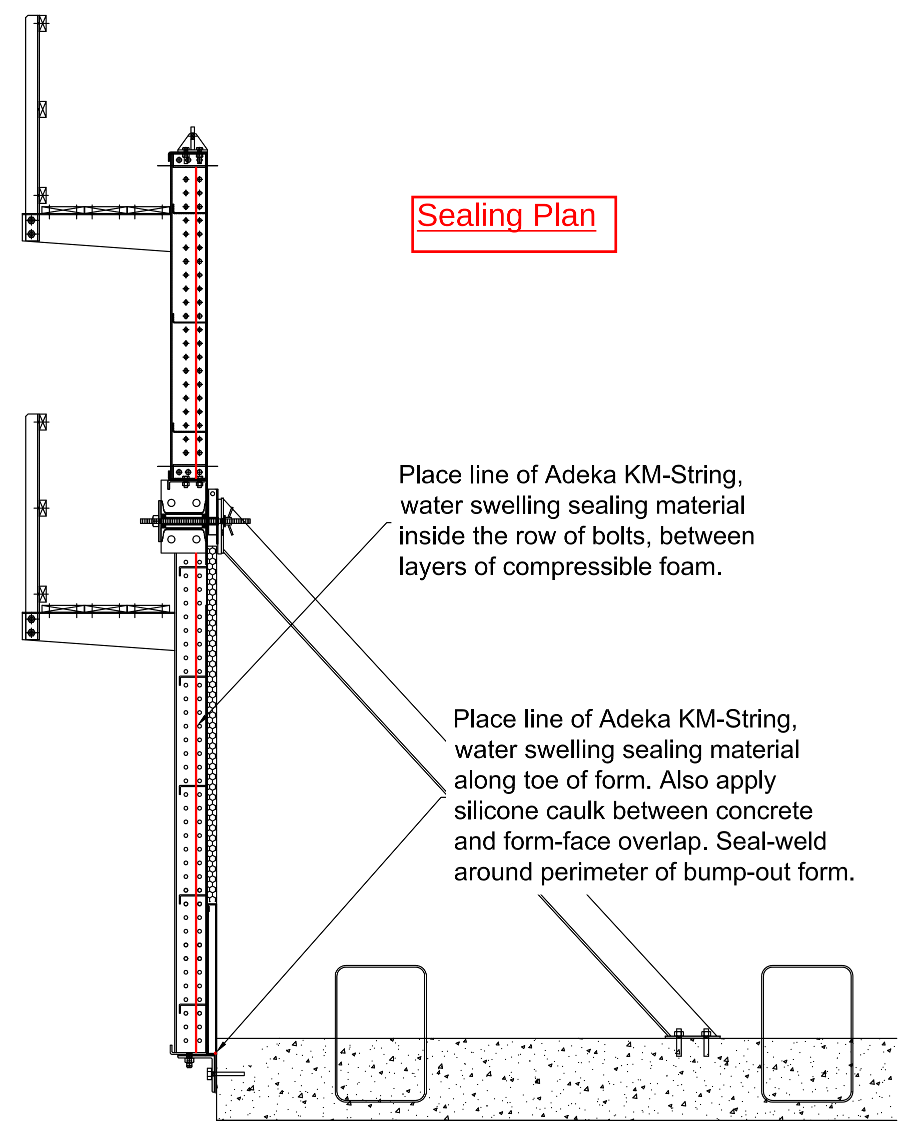
A 009



Step 7: Pour Curb



Section A–A



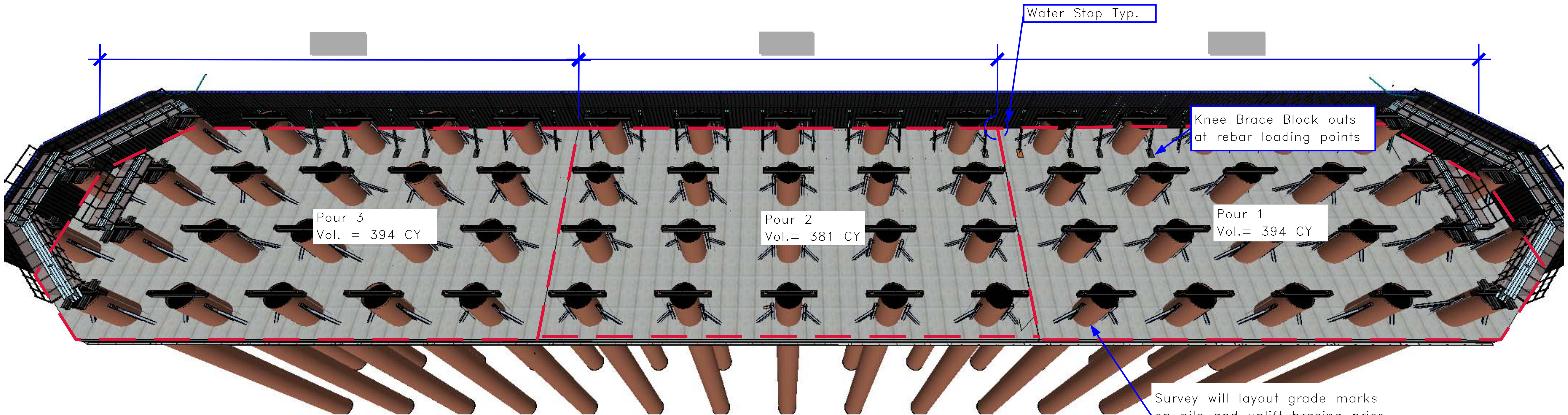
Form Detail

REVISIONS	MM/DD/YY	REMARKS
1	02/25/14	Corrected Concrete Takeoff
2	__/__/__	...
3	__/__/__	...
4	__/__/__	...
5	__/__/__	...

Tappan Zee Bridge: Main Span

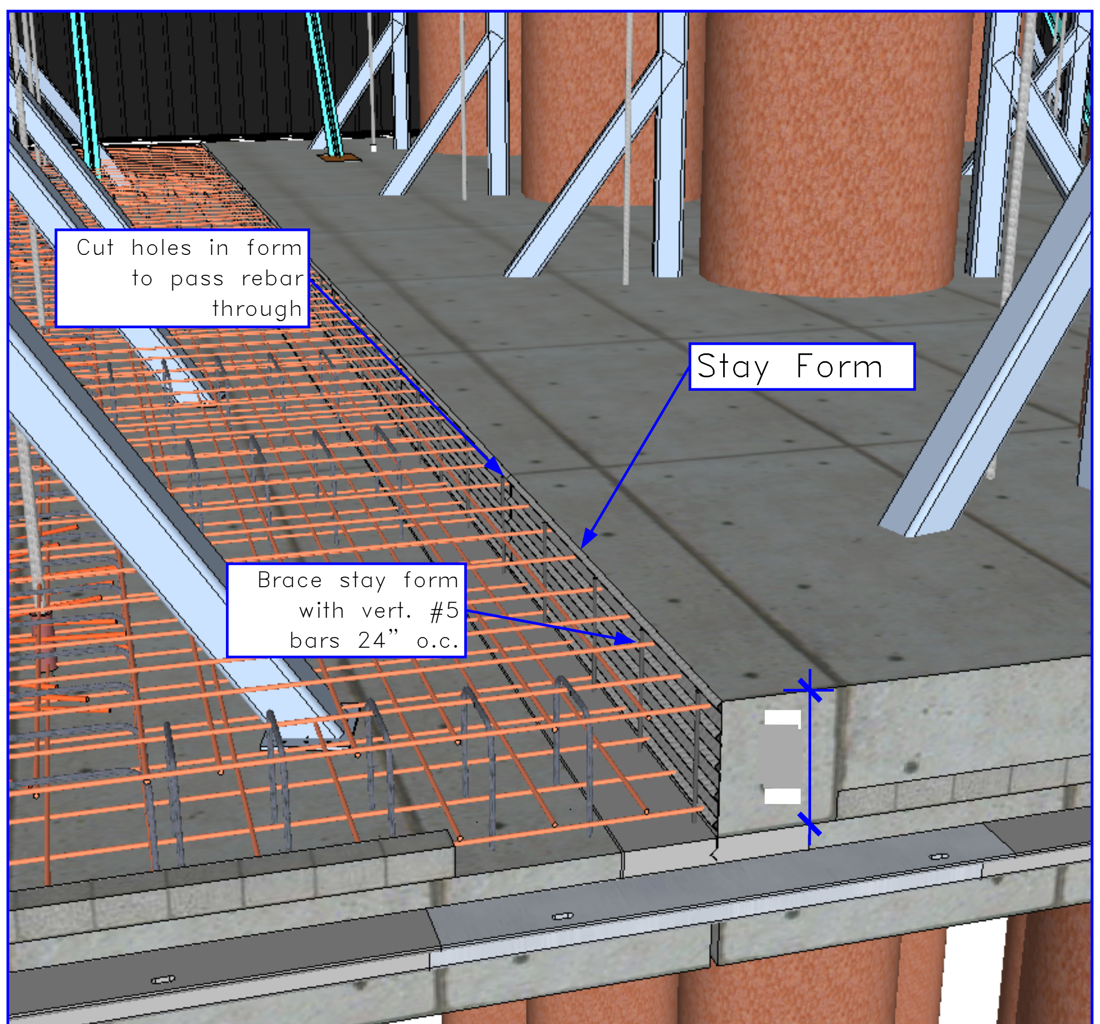
Soffit Panel Work Plan: Pour Curb

A 009

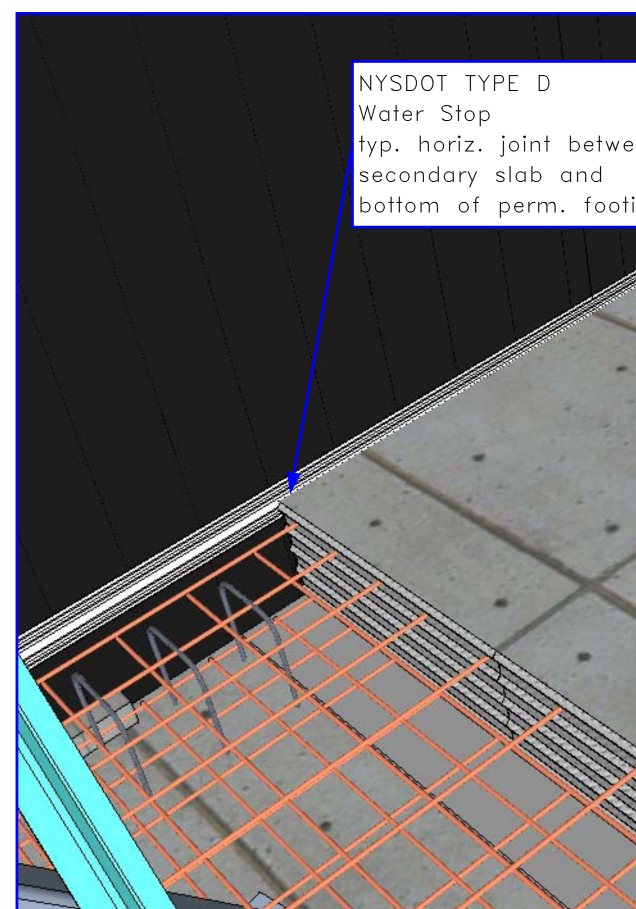


*Footing Forms not shown for clarity

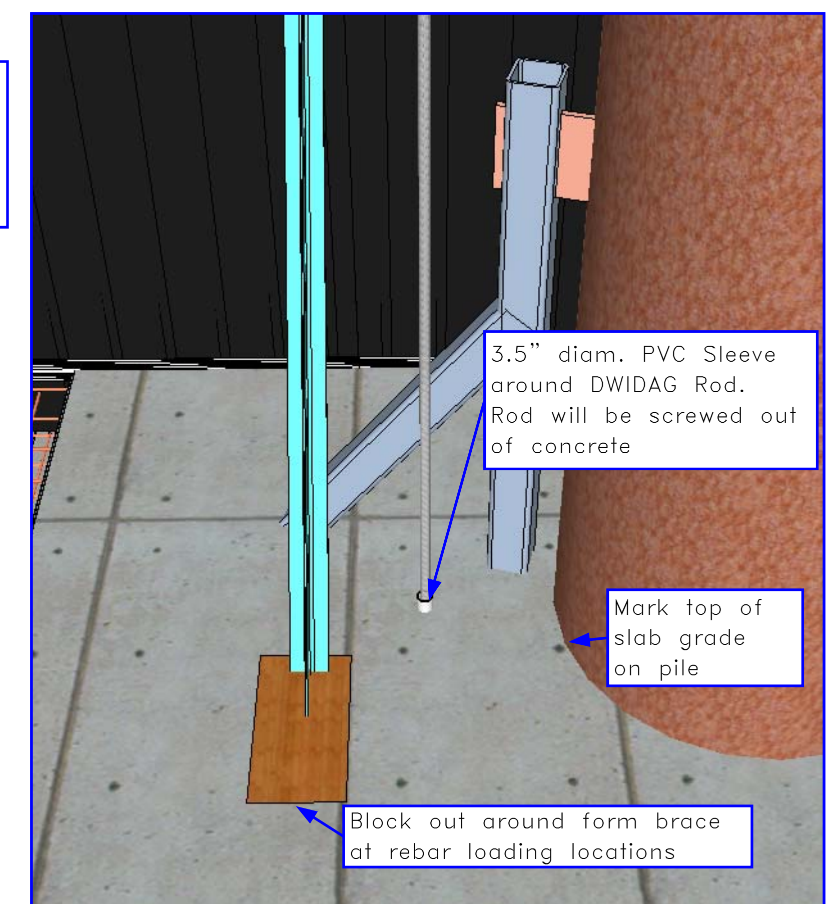
Step 9: Pour Seconday Slab



Temporary Bulkhead Detail



Water Stop Detail



Block Out Detail

REVISIONS

	MM/DD/YY	REMARKS
1	__/__/__	...
2	__/__/__	...
3	__/__/__	...
4	__/__/__	...
5	__/__/__	...

Tappan Zee Bridge: Main Span

Soffit Panel Work Plan:
Pour Seconday Slab

D 009