



Howard P. Milstein
Chairman

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New York State Canal Corporation

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Thomas J. Madison, Jr.
Executive Director

December 28, 2012

Re: NYSDEC Permit No. 3-9903-
00043/00011
New NY Bridge Project (formerly
known as the Tappan Zee
Hudson River Crossing Project)
Supplement to the March 26,
2012 Joint Permit Application:
Pile Load Testing Program

Dear Mr. Ferguson:

Attached you will find the additional materials on the Pile Load Testing Program (also known as the Pile Installation Demonstration Program 2 [PIDP 2]) that you requested during our December 19, 2012 meeting. This includes the Pile Load Testing Program drawings showing the locations of the test piles. A detailed description of work, including the removal of test piles and adherence to Environmental Performance Commitments, which specify the use of best management practices (BMPs) and sound attenuation systems, are provided below.

As discussed at our meeting and briefly outlined in our cover letter to NYSDEC on December 17, 2012, the PIDP 2 activities are included in the overall project. This includes the installation of 18 piles, 15 of which are in-water. The best management practices (BMPs) and sound attenuation systems to be used during the Pile Load Testing Program will be similar to those tested during the spring 2012 PIDP. Sound attenuation monitoring systems will also be similar to ensure that Environmental Performance Commitments and permit conditions are met. The Pile Load Testing is scheduled to occur from May 2013 to June 2013.

The Pile Load Testing Program (PIDP2)

The Pile Load Testing Program will include a combination of static and dynamic load testing. The deep foundations fall into two categories:

- Friction piles in the deep clay/silt strata; and

- End-bearing piles in glacial till or on bedrock and drilled shafts in bedrock.

Similar to the PIDP program undertaken in spring 2012, fully instrumented test piles and ancillary piles will be installed using a combination of vibratory and impact hammering. For the Static Axial Load Tests, weight will be applied to test the vertical capacity of the piles. For the Lateral Load Tests, pairs of piles will be jacked against each other to determine the horizontal resistance of the piles. The number of test piles and load strikes is summarized in Table 1.

Table
Number of Test Piles and Load Strikes

1

Pile Type	Zone	Static Axial Load Tests	Static Lateral Load Tests	Number of Piles
H-piles, End Bearing*	1	1	1	2*
4-ft Dia. End Bearing	1,3,4,6,7	5	1	6
4-ft Dia. Friction	2,3	6	0	6
6-ft Dia. End Bearing	5	2	1	3
3.5-ft Dia. Drilled Shaft*	7	1	N/A	1*
Totals		15	3	18
Notes: (*) Denotes that piles will be located on land. This Pile Load Testing Program includes one dynamic test at the end of the initial drive and one re-strike. Additional re-strikes may be required pending the outcome of prior re-strikes.				

Removal of Test Piles and Ancillary Piles

After completion of a pile load test, the piles will be cut to at least two feet below the mudline, except those piles within the footprint of the dredge prism, which will be cut to the dredge elevation.¹

For any ancillary support piles / reaction piles used in the pile tests, the same requirements for removal will apply. The Design-Builder (Tappan Zee Constructors) will record the plan location, depth and type (including diameter and thickness) of any test piles and ancillary piles or fragments thereof left in situ, and shall report this information to the Authority in the final performance test result report.

¹ These tests will be conducted before dredging begins.

Environmental Performance Commitments:

The Environmental Performance Commitments will include the following:

- Use of bubble curtains, cofferdams, isolation casings, double-layer constrained bubble curtains, or other technologies to achieve a reduction of at least 10 dB of noise attenuation.
- Use of pile tapping (i.e. a series of minimal energy strikes) for an initial period at the start of pile installation to encourage fish to move from the immediate area of pile driving activity.
- Use of vibratory pile installation methods to the extent feasible, particularly for the initial pile segment of any pile that shall be field-spliced from two sub-sections.
- Limiting the periods of pile driving to no more than 12-hours per day, and predominantly within daytime hours (for example 7am to 7pm). In rare circumstances, and after notifying the Authority Project Manager, it is possible that piling may extend further than 12 hours depending on the practicality of driving.
- Impactive pile driving in waters deeper than 5.5m (18ft) shall be restricted to 5 hours per day from April 1 to August 1 (which is the period of spawning migration for shortnose sturgeon [*Acipenser brevirostrum*] and Atlantic sturgeon [*Acipenser oxyrinchus*]).
- At all times, maintaining an acoustic corridor having a total length of at least 5000 feet across the Hudson River (east-west) that is free from any active impact hammer pile driving. The sound level within the acoustic corridor shall be less than the 187 dB re 1 μ Pa_{2s} cSEL criterion. The acoustic corridor shall be continuous to the maximum extent possible but at no point shall any section contributing to the total length of the corridor be smaller than 1500 feet. The location of the acoustic corridor can vary.

The Environmental Performance Commitments will also include hydro-acoustic monitoring. The Tappan Zee Constructors will be responsible for:

- Monitoring underwater noise resulting from installation of piles in the Hudson River.
- Continuously monitor, during the period of pile driving, hydroacoustic noise at a suitable range of offset distances and locations configured to enable the determination of the peak sound pressure level (SPL) and cumulative sound exposure levels, including sufficient monitoring points to allow determination of the offset distances at which the hydroacoustic sound exposure levels (SEL) are at 150 dB re 1 μ Pa rms and 206 dB re 1 μ Pa peak and a cumulative SEL of 187dB re 1 μ Pa_{2s}.
- Reporting hydroacoustic monitoring results on a monthly basis.

Should you have any questions or require additional information, please do not hesitate to contact me at Elizabeth.Novak@thruway.ny.gov or (518) 436-3190.

Sincerely,

A handwritten signature in dark ink, appearing to read "Elizabeth Novak", written in a cursive style.

Elizabeth Novak

John Ferguson
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233

Attachments:
Pile Load Test Plans

cc: M. Toni and J. Burns (FHWA); P. Casper and M. Shamma (NYSTA); M. Anderson and K. Edwards (NYSDOT); J. Zappieri (NYSDOS); E. McTiernan (NYSDEC); R. Conway (AKRF); D. Paget and A. Stolorow (SPR)

- NOTES:
1. DYNAMIC LOAD TESTS AT EOID WILL BE REQUIRED FOR ALL STATIC AXIAL LOAD TESTS IN ZONES 1, 4-7.
 2. DYNAMIC LOAD TESTS AT BOR WILL BE REQUIRED FOR ALL STATIC AXIAL LOAD TESTS IN ZONES 2 & 3. ASSUME 3 BOR TESTS PER TEST PILE.



REVISIONS DESCRIPTION OF ALTERATIONS:	
0 PROPOSAL SUBMISSION 07/27/12	
1 ADDED LOAD TESTS IN FRICTION PILE AREA	11/8/12
.	

TAPPAN ZEE
HUDSON RIVER CROSSING
COUNTY: ROCKLAND/WESTCHESTER

PIN

BRIDGES

CULVERTS

ALL DIMENSIONS IN ft UNLESS OTHERWISE NOTED
PILE LOAD TEST SCHEDULE

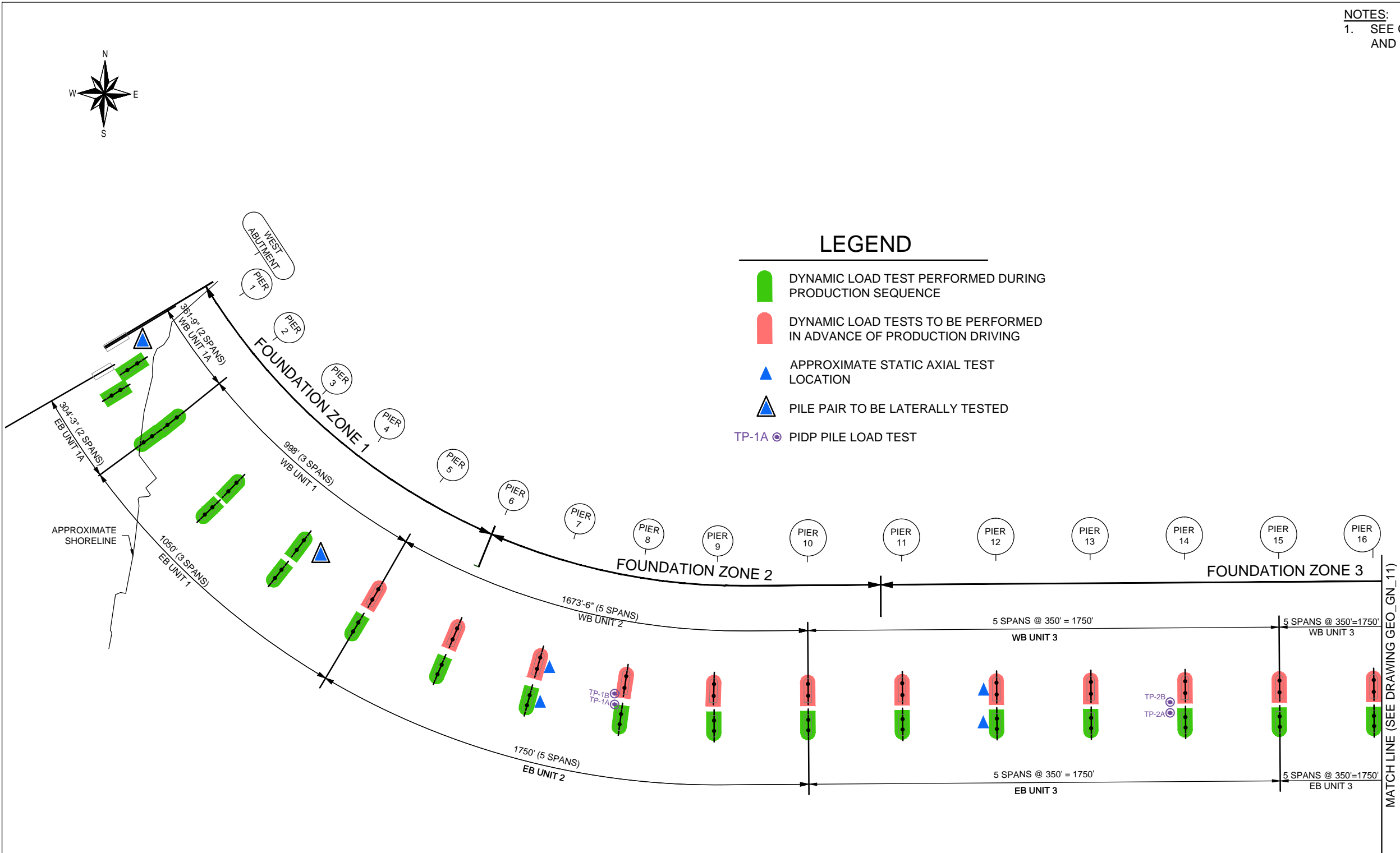
CONTRACT NUMBER	
D214134	
DRAWING NO. GEO_GN_401	
SHEET NO. 1 OF 4	

PILE INFORMATION								LOAD TEST QUANTITIES				
PIER TYPE	FOUNDATION ZONE	BRIDGE BENT	CAP LOCATION	PILE	PILE TYPE	NOMINAL RESISTANCE (KIPS)	MAXIMUM APPLIED TEST LOAD (KIPS)	STATIC AXIAL	STATIC LATERAL	DYNAMIC		
										EOID	BOR*	
APPROACH	1	Abut	W	None	N/A	N/A						
		01	EB	HP 14x117	End Bearing	1100	1375			2		
		01	WB	HP 14x117	End Bearing	1100	1375	1	1	2		
		02	EB	4'x1" Pipe	End Bearing	5850	7300			2		
		02	WB	4'x1" Pipe	End Bearing	5850	7300			2		
		03	EB	4'x1" Pipe	End Bearing	5850	7300			2		
		03	WB	4'x1" Pipe	End Bearing	5850	7300			2		
		04	EB	4'x1" Pipe	End Bearing	5850	7300			2		
		04	WB	4'x1" Pipe	End Bearing	5850	7300	1	1	2		
		05	EB	4'x1" Pipe	End Bearing	5850	7300			2		
		05	WB	4'x1" Pipe	End Bearing	5850	7300			2		
	2	06	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		06	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		07	EB	4'x1" Pipe	Friction	4750	5950	1		2	2	
		07	WB	4'x1" Pipe	Friction	4750	5950	1		2	2	
		08	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		08	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		09	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		09	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		10	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		10	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		11	EB	4'x1" Pipe	Friction	4750	5950			2	2	
	3	11	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		12	EB	4'x1" Pipe	Friction	4750	5950	1		2	2	
		12	WB	4'x1" Pipe	Friction	4750	5950	1		2	2	
		13	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		13	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		14	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		14	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		15	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		15	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		16	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		16	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		17	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		17	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		18	EB	4'x1" Pipe	Friction	4750	5950	1		2	2	
		18	WB	4'x1" Pipe	Friction	4750	5950	1		2	2	
		19	EB	4'x1" Pipe	Friction	4750	5950			2	2	
		19	WB	4'x1" Pipe	Friction	4750	5950			2	2	
		20	EB	4'x1" Pipe	End Bearing	5850	7300			2		
		20	WB	4'x1" Pipe	End Bearing	5850	7300			2		
		21	EB	4'x1" Pipe	End Bearing	5850	7300			2		
		21	WB	4'x1" Pipe	End Bearing	5850	7300	1		2		
EOID - End of Initial Drive dynamic test (ASTM D4945) with signal matching												
BOR - Beginning of Re-strike												
Static Axial - Axial compressive load test (ASTM D1143) performed outside cap limits on sacrificial piles												
Lateral - Lateral load test (ASTM D3966) requires two (2) adjacent piles												
O-cell - Osterberg Cell Load Test (ASTM D1143)												
* Assume 2 weeks between EOID and BOR tests. Actual schedule may vary with test results. Additional BOR tests may be required on the same piles in Zones 2/3 depending on the results of the first BOR.												

PILE INFORMATION								LOAD TEST QUANTITIES			
PIER TYPE	FOUNDATION ZONE	BRIDGE BENT	CAP LOCATION	PILE	PILE TYPE	NOMINAL RESISTANCE (KIPS)	MAXIMUM APPLIED TEST LOAD (KIPS)	STATIC AXIAL	STATIC LATERAL	DYNAMIC	
										EOID	BOR*
SHIP IMPACT	4	22	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		22	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		23	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		23	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		24	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		24	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		25	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		25	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		26	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		26	WB	4'x1" Pipe	End Bearing	5850	7300	1		2	
		27	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		27	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		28	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		28	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		29	EB	6'x1" Pipe	End Bearing	8500	10600			2	
		29	WB	6'x1" Pipe	End Bearing	8500	10600			2	
MAIN SPAN	5	30		6'x1" Pipe	End Bearing	8500	10600			2	
		31		6'x1" Pipe	End Bearing	8500	10600	1		2	
		32		6'x1" Pipe	End Bearing	8500	10600	1	1	3	
		33		6'x1" Pipe	End Bearing	8500	10600			3	
		34	EB	6'x1" Pipe	End Bearing	8500	10600			2	
SHIP IMPACT	6	34	WB	6'x1" Pipe	End Bearing	8500	10600			2	
		35	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		35	WB	4'x1" Pipe	End Bearing	5850	7300	1		2	
		36	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		36	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		37	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		37	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		38	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		38	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		39	EB	4'x1" Pipe	End Bearing	5850	7300			2	
APPROACH	7	39	WB	4'x1" Pipe	End Bearing	5850	7300	1		2	
		40	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		40	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		41	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		41	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		42	EB	4'x1" Pipe	End Bearing	5850	7300			2	
		42	WB	4'x1" Pipe	End Bearing	5850	7300			2	
		43	EB	3'-6" Drilled Shaft	Rock Socket	4600	5750				
		43	WB	3'-6" Drilled Shaft	Rock Socket	4600	5750				
		44	EB	3'-6" Drilled Shaft	Rock Socket	4600	5750				
		44	WB	3'-6" Drilled Shaft	Rock Socket	4600	5750	1 (O-cell)			
		Abut	E	3'-6" Drilled Shaft	Rock Socket	4600	5750				

FILE NAME = PILE LOAD TEST PLAN OPTION 1.DWG
DATE/TIME = 07/09/2012
USER = DANIEL GAGNE

DESIGN SUPERVISOR JOB MANAGER R. PALERMO DESIGN CHECK A. JONES DRAFTING D. GAGNE CHECK S. SPINK PROJECT MANAGER



NOTES:
1. SEE GEO_GN_401 FOR PILE LOAD TESTING NOTES AND SCHEDULE OF TESTS TO BE PERFORMED.

LEGEND

- DYNAMIC LOAD TEST PERFORMED DURING PRODUCTION SEQUENCE
- DYNAMIC LOAD TESTS TO BE PERFORMED IN ADVANCE OF PRODUCTION DRIVING
- APPROXIMATE STATIC AXIAL TEST LOCATION
- PILE PAIR TO BE Laterally TESTED
- TP-1A PIDP PILE LOAD TEST



REVISIONS DESCRIPTION OF ALTERATIONS:	
0 PROPOSAL SUBMISSION 07/27/12	
1 ADDED 2 AXIAL LOAD TESTS AT PIERS 7 AND 12 AND DELETED AXIAL LOAD TESTS AT PIERS 6 AND 11	11/8/12

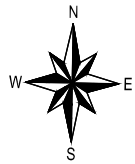
TAPPAN ZEE	PIN
HUDSON RIVER CROSSING	
COUNTY: ROCKLAND/WESTCHESTER	

BRIDGES	CULVERTS

ALL DIMENSIONS IN ft UNLESS OTHERWISE NOTED	CONTRACT NUMBER	
PILE LOAD TEST PLAN	D214134	
	DRAWING NO. GEO_GN_402 SHEET NO. 2 OF 4	

FILE NAME = PILE LOAD TEST PLAN OPTION 1.DWG
DATE/TIME = 07/09/2012
USER = DANIEL GAGNE

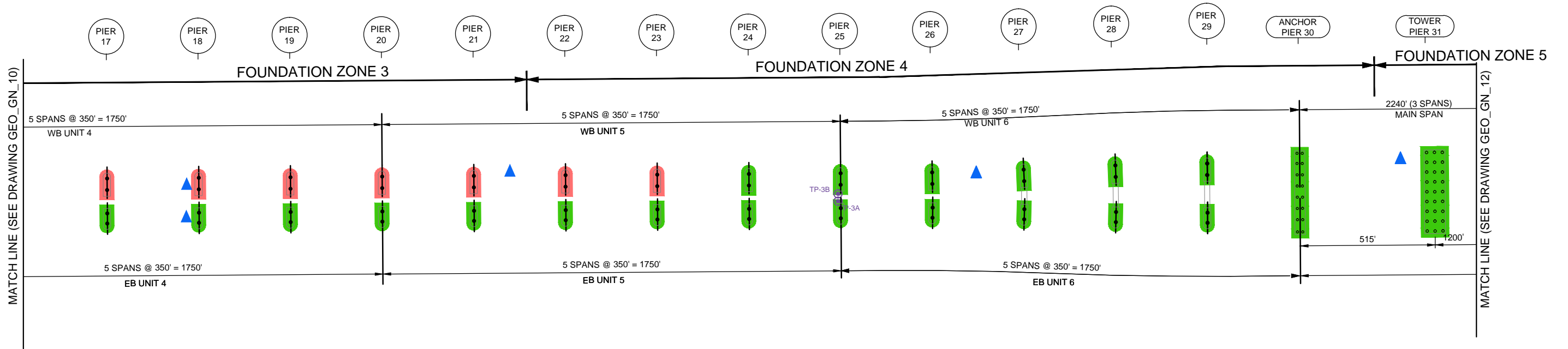
DESIGN SUPERVISOR
JOB MANAGER
R. PALERMO
DESIGN
CHECK
A. JONES
DRAFTING
D. GAGNE
CHECK
S. SPINK
PROJECT MANAGER



NOTES:
1. SEE GEO_GN_401 FOR PILE LOAD TESTING NOTES AND SCHEDULE OF TESTS TO BE PERFORMED.

LEGEND

- DYNAMIC LOAD TEST PERFORMED DURING PRODUCTION SEQUENCE
- DYNAMIC LOAD TESTS TO BE PERFORMED IN ADVANCE OF PRODUCTION DRIVING
- APPROXIMATE STATIC AXIAL TEST LOCATION
- PILE PAIR TO BE LATERALLY TESTED
- TP-1A PIDP PILE LOAD TEST

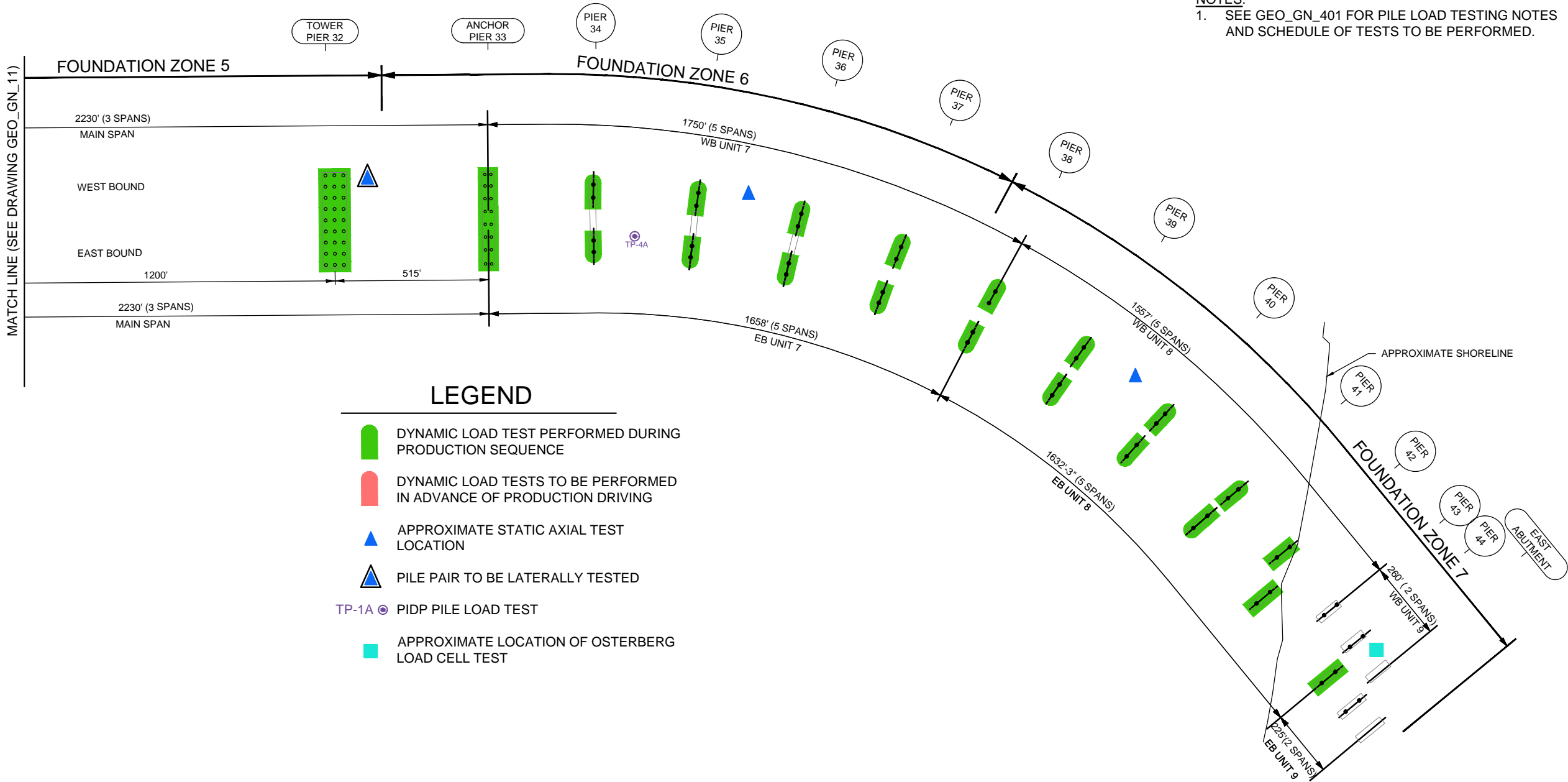
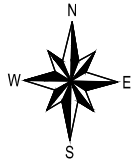


REVISIONS DESCRIPTION OF ALTERATIONS:		
0 PROPOSAL SUBMISSION	07/27/12	
1 ADDED 2 STATIC LOAD TESTS AT PIER 18		11/8/12
2		
3		

TAPPAN ZEE	PIN	BRIDGES	CULVERTS	ALL DIMENSIONS IN ft UNLESS OTHERWISE NOTED	CONTRACT NUMBER D214134	DRAWING NO. GEO_GN_403 SHEET NO. 3 OF 4
HUDSON RIVER CROSSING						
COUNTY: ROCKLAND/WESTCHESTER						

FILE NAME = PILE LOAD TEST PLAN OPTION 1.DWG
DATE/TIME = 07/09/2012
USER = DANIEL GAGNE

DESIGN SUPERVISOR JOB MANAGER R. PALERMO DESIGN CHECK A. JONES DRAFTING D. GAGNE CHECK S. SPINK PROJECT MANAGER



REVISIONS DESCRIPTION OF ALTERATIONS:	
0 PROPOSAL SUBMISSION	07/27/12

TAPPAN ZEE	PIN	BRIDGES	CULVERTS	ALL DIMENSIONS IN ft UNLESS OTHERWISE NOTED	CONTRACT NUMBER D214134	DRAWING NO. GEO_GN_404 SHEET NO. 4 OF 4
HUDSON RIVER CROSSING						
COUNTY: ROCKLAND/WESTCHESTER						