

February 4, 2019

Mr. John Miller, PE
New York State Department of Environmental Conservation
Division of Environmental Remediation, Remedial Bureau C
625 Broadway, 11th Floor
Albany, New York 12233-7014

Re: Remedial Design Addendum No. 1
Revised Anchor Design for Parcel III Bulkhead Barrier Wall
Former Citizens Gas Works Manufactured Gas Plant Site
Carroll Gardens/Public Place
Borough of Brooklyn, Kings County, New York
Site No. C224012

Dear Mr. Miller:

Please find enclosed for your information Addendum No. 1 to the *100% Remedial Design Report* (Remedial Design) for Parcels I (Block 471, Lot 1), II (Block 471, Lot 100), and III (Block 471, Lot 200) of the former Citizens Gas Works manufactured gas plant site (hereinafter, the “Site”) located in Brooklyn, New York. Addendum No. 1 comprises several new and revised drawings that incorporate a revised anchor design for the section of bulkhead barrier wall to be installed along Parcel III of the Site. The revised design reduces the overall length of the tieback anchors on Parcel III from approximately 75 feet (as presented in the Remedial Design) to approximately 50 feet based on discussions with the property owner. The location and alignment of the bulkhead headwall, as well as the basis of design for the bulkhead barrier wall, as summarized in Section 3.3 and Table 1 of the Remedial Design, remain unchanged.

The revised bulkhead anchor design is generally shown on the following drawings, which are attached hereto:

- New Design Drawing S-103A, Site Bulkhead Barrier Wall Plan, which replaces former Design Drawing S-103;
- New Design Drawing S-104A, Bulkhead Barrier Wall Plan Sta. 0+00 to Sta. 2+25, which replaces former Design Drawing S-104;
- New Design Drawing S-105A, Bulkhead Barrier Wall Plan Sta. 2+25 to Sta. 4+75, which replaces former Design Drawing S-105;

- New Design Drawing S-308A, Bulkhead Barrier Wall Sections, which replaces former Design Drawing S-308;
- New Design Drawing S-311, Bulkhead Barrier Wall Sections;
- New Design Drawing S-503A, Bulkhead Barrier Wall Details, which replaces former Design Drawing S-503;
- Revised Design Drawing S-504, Bulkhead Barrier Wall Details; and
- Revised Design Drawing S-507, Bulkhead Barrier Wall Details.

Minor revisions have also been made to the following drawings as part of this Addendum No. 1 to update drawing/section/detail references, correct call-outs/labels, or otherwise incorporate the revised anchor design for the Parcel III bulkhead barrier wall:

- Design Drawing G-001, Cover Sheet, Location Map, and List of Drawings;
- Revised Design Drawing C-106, Hydraulic Relief System Plan and Profile Sta. 0+00 to Sta. 4+75;
- Revised Design Drawing S-102, Parcel III Remedial Excavation Shoring Plan and Construction Sequence;
- Revised Design Drawing S-106, Bulkhead Barrier Wall Plan Sta. 4+75 to Sta. 7+25;
- Revised Design Drawing S-107, Bulkhead Barrier Wall Plan Sta. 7+25 to Sta. 8+79;
- Revised Design Drawing S-201, Bulkhead Barrier Wall Profile Sta. 0+00 to Sta. 2+25;
- Revised Design Drawing S-202, Bulkhead Barrier Wall Profile Sta. 2+25 to Sta. 4+75;
- Revised Design Drawing S-203, Bulkhead Barrier Wall Profile Sta. 4+75 to Sta. 7+25;
- Revised Design Drawing S-204, Bulkhead Barrier Wall Profile Sta. 7+25 to Sta. 8+79; and
- Revised Design Drawing S-310, Bulkhead Barrier Wall Sections.

Revised items on each drawing are denoted with a revision triangle and are summarized in the revision block at the bottom of the drawing.

If you have any questions, please call me at (516) 545-2578, or contact me by e-mail at patrick.vanrossem@nationalgrid.com.

Sincerely,



Patrick J. Van Rossem
Project Manager
Site Investigation & Remediation

Enclosure

cc: C. Doroski, NYSDOH
C. Tsiamis, USEPA
T. Leissing, National Grid
A. Prophete, National Grid
J. Alonzo, de maximis
C. Young, de maximis
T. Young, PE, Arcadis
M. Benoit, PE, Arcadis

CITY: SYRACUSE, NY; DIV: GROUP; ENVCAD: DE: K.SARTORI; B: DECLERO; J: HARRIS; PIC: JPM; M: BENOIT; TM: A. GEORGE; C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\NATIONAL GRID\FORMER CITIZENS GAS WORKS\MCP SITE\2019\B0036728_0001\01-DWG\G36728_G-001.dwg; LAYOUT: COVER; COVER: SAVER; 1/24/2019 8:48 AM; ACADVER: 21.05 (LMS TECH); PAGES: 21; PLOT: PLOT; PLOTCONT: CTB; PLOTTED: 2/3/2019 11:49 AM; BY: HARRIS, JESS; XREFS: IMAGES: 36728\02.TIF; Citizens-regional.jpg

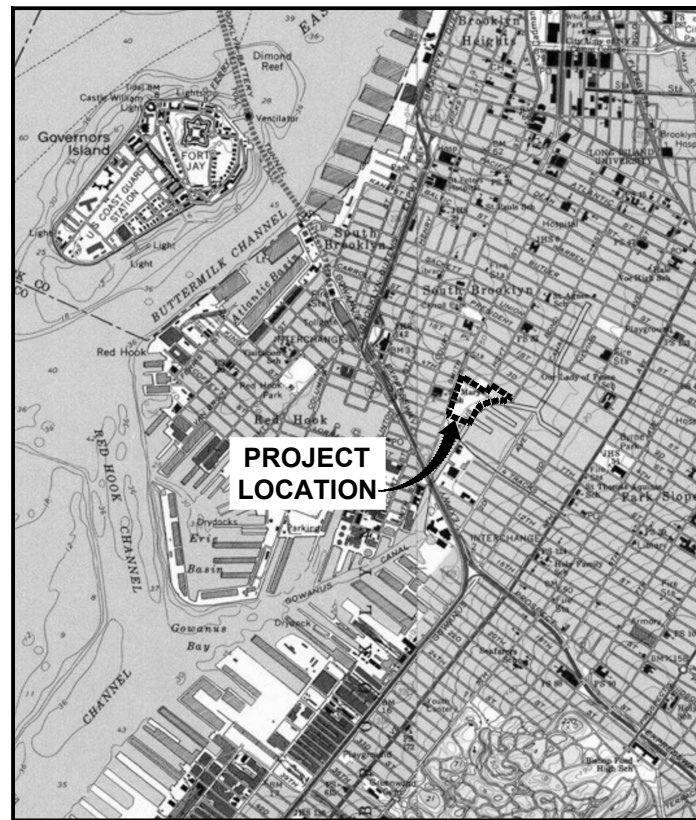
DESIGN DRAWINGS

SITE

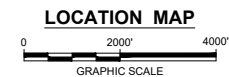
REMEDICATION

FORMER CITIZENS GAS WORKS MANUFACTURED GAS PLANT SITE CARROLL GARDENS/PUBLIC PLACE BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK

DATE ISSUED
NOVEMBER 2017



REFERENCE: U.S.G.S. TOPOGRAPHIC MAPS, 1:24,000, BROOKLYN, NY, 1995 AND JERSEY CITY, NJ, 1981. MAP CREATED WITH TOPO! © 2001 NATIONAL GEOGRAPHIC (WWW.NATIONALGEOGRAPHIC.COM/TOPO).



No.	Date	Revisions	By	Ckd
1	2/4/2019	ADDED NEW SHEETS TO LIST OF DRAWINGS	RPK	MJB



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LIST OF DRAWINGS

GENERAL

- G-001 COVER SHEET, LOCATION MAP, AND LIST OF DRAWINGS
- G-002 GENERAL NOTES, REFERENCE DRAWINGS, ABBREVIATIONS, AND LEGEND
- G-101 EXISTING SITE PLAN
- G-102 EXISTING PARCEL I PLAN
- G-103 EXISTING PARCEL II PLAN
- G-104 EXISTING PARCEL III PLAN
- G-105 EXISTING SITE UTILITY PLAN
- G-106 EXISTING PARCEL I UTILITY PLAN
- G-107 EXISTING PARCEL II UTILITY PLAN
- G-108 EXISTING PARCEL III UTILITY PLAN
- G-109 EXISTING SITE BULKHEAD PLAN
- G-110 HISTORICAL SITE PLAN
- G-111 EXISTING SOIL BORING, TEST PIT, AND WELL PLAN
- G-112 SITE UTILIZATION PLAN
- G-113 TRUCK TRAFFIC PLAN
- G-501 EXISTING BULKHEAD DETAILS
- G-502 EXISTING SEWER DETAILS
- G-601 WELL CONSTRUCTION SCHEDULES

CIVIL

- C-101 FACILITY DEMOLITION PLAN
- C-102 SITE PREPARATION PLAN
- C-103 SITE REMEDIAL EXCAVATION PLAN
- C-106 HYDRAULIC RELIEF SYSTEM PLAN AND PROFILE STA. 0+00 TO STA. 4+75
- C-107 HYDRAULIC RELIEF SYSTEM PLAN AND PROFILE STA. 4+75 TO STA. 9+07
- C-108 SITE SUBGRADE GRADING PLAN
- C-109 SITE RESTORATION AND FINAL GRADING PLAN
- C-501 TEMPORARY EROSION AND SEDIMENT CONTROL DETAILS
- C-502 TEMPORARY CONSTRUCTION DETAILS
- C-503 FENCING DETAILS
- C-504 HYDRAULIC RELIEF SYSTEM DETAILS
- C-505 HYDRAULIC RELIEF SYSTEM DETAILS
- C-506 STORM DRAINAGE DETAILS
- C-507 SITE RESTORATION DETAILS

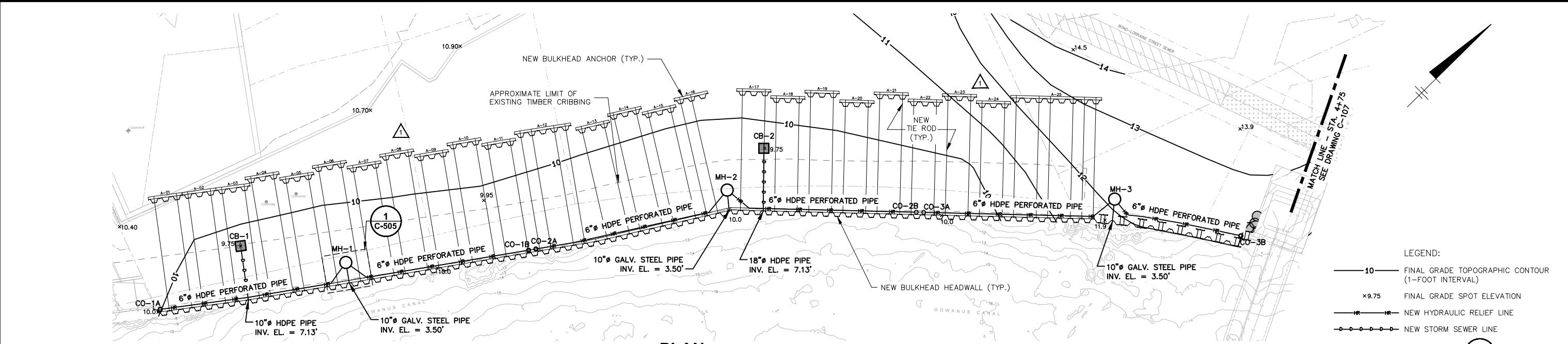
STRUCTURAL

- S-101 PARCEL I REMEDIAL EXCAVATION SHORING PLAN AND CONSTRUCTION SEQUENCE
- S-102 PARCEL III REMEDIAL EXCAVATION SHORING PLAN AND CONSTRUCTION SEQUENCE
- △ S-103A SITE BULKHEAD BARRIER WALL PLAN
- △ S-104A BULKHEAD BARRIER WALL PLAN STA. 0+00 TO STA. 2+25
- △ S-105A BULKHEAD BARRIER WALL PLAN STA. 2+25 TO STA. 4+75
- S-106 BULKHEAD BARRIER WALL PLAN STA. 4+75 TO STA. 7+25
- S-107 BULKHEAD BARRIER WALL PLAN STA. 7+25 TO STA. 8+79
- S-201 BULKHEAD BARRIER WALL PROFILE STA. 0+00 TO STA. 2+25
- S-202 BULKHEAD BARRIER WALL PROFILE STA. 2+25 TO STA. 4+75
- S-203 BULKHEAD BARRIER WALL PROFILE STA. 4+75 TO STA. 7+25
- S-204 BULKHEAD BARRIER WALL PROFILE STA. 7+25 TO STA. 8+79
- S-301 PARCEL I REMEDIAL EXCAVATION SHORING SECTION
- S-302 AREA 1 REMEDIAL EXCAVATION SHORING SECTION
- S-303 AREA 2 REMEDIAL EXCAVATION SHORING SECTION
- S-304 AREA 3 REMEDIAL EXCAVATION SHORING SECTION
- S-305 AREA 4 REMEDIAL EXCAVATION SHORING SECTION
- S-306 PARCEL III REMEDIAL EXCAVATION SHORING SECTION
- S-307 PARCEL III REMEDIAL EXCAVATION SHORING SECTION
- S-308 BULKHEAD BARRIER WALL SECTIONS
- S-309 BULKHEAD BARRIER WALL SECTIONS
- S-310 BULKHEAD BARRIER WALL SECTIONS
- △ S-311 BULKHEAD BARRIER WALL SECTIONS
- S-501 REMEDIAL EXCAVATION SHORING DETAILS
- S-502 REMEDIAL EXCAVATION SHORING DETAILS
- △ S-503A BULKHEAD BARRIER WALL DETAILS
- S-504 BULKHEAD BARRIER WALL DETAILS
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- S-506 BULKHEAD BARRIER WALL DETAILS
- S-507 BULKHEAD BARRIER WALL DETAILS

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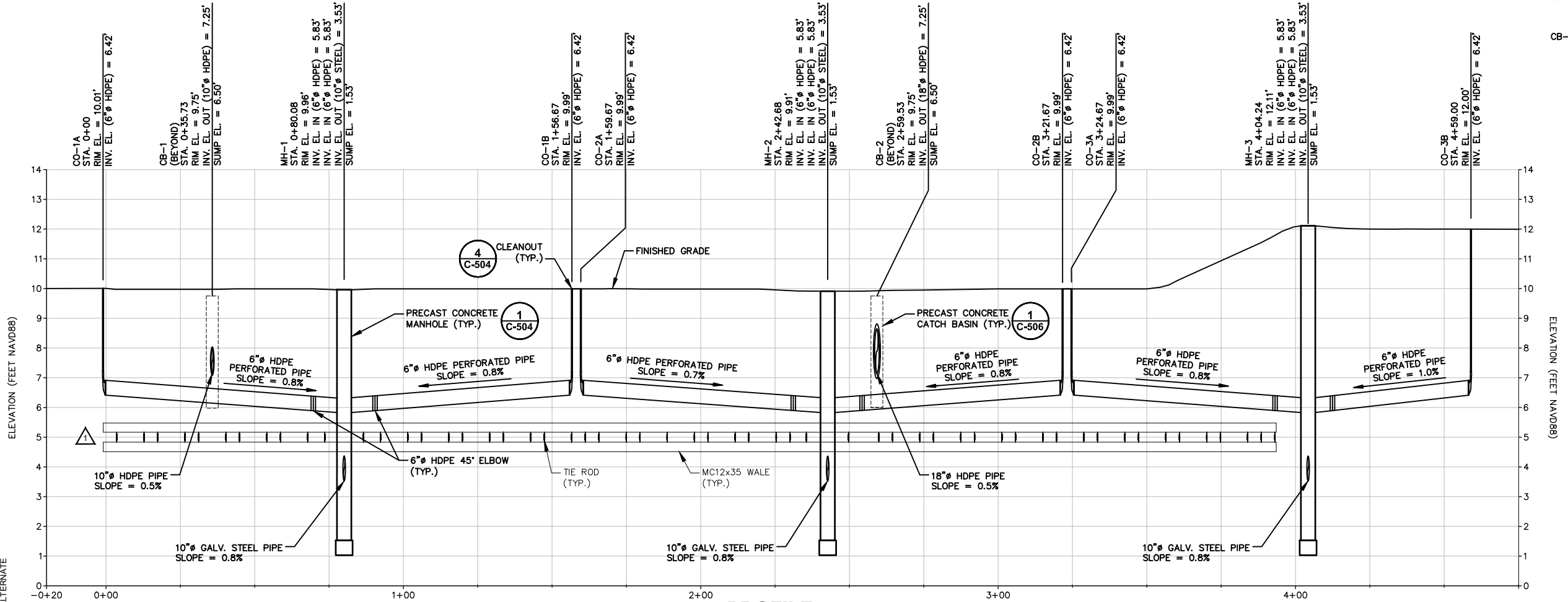
- D-601 TEMPORARY WASTEWATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM
- D-602 TEMPORARY WASTEWATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM

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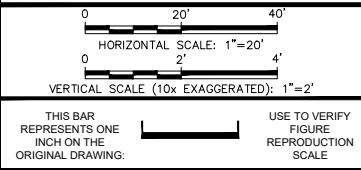


PLAN
SCALE: 1"=20'

- LEGEND:
- 10 — FINAL GRADE TOPOGRAPHIC CONTOUR (1-FOOT INTERVAL)
 - x9.75 FINAL GRADE SPOT ELEVATION
 - — — — — NEW HYDRAULIC RELIEF LINE
 - o — o — o — o — NEW STORM SEWER LINE
 - MH-1 ○ NEW MANHOLE (1 C-504)
 - CO-1B ○ NEW CLEANOUT (4 C-504)
 - CB-1 ■ NEW CATCH BASIN (1 C-506)



PROFILE
SCALE: H: 1"=20' V: 1"=2'



No.	Date	Revisions	By	Ckd
1	2/4/2019	REVISED BULKHEAD ANCHORS TO REFLECT NEW DESIGN	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
074847
 State
NY
 Date Signed
11/30/2017
 Project Mgr.
MJB
 Designed by
JSB
 Drawn by
MJW
 Checked by
BRT



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 CARROLL GARDENS/PUBLIC PLACE
 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
 SITE REMEDIATION
HYDRAULIC RELIEF SYSTEM PLAN AND PROFILE
STA. 0+00 TO STA. 4+75

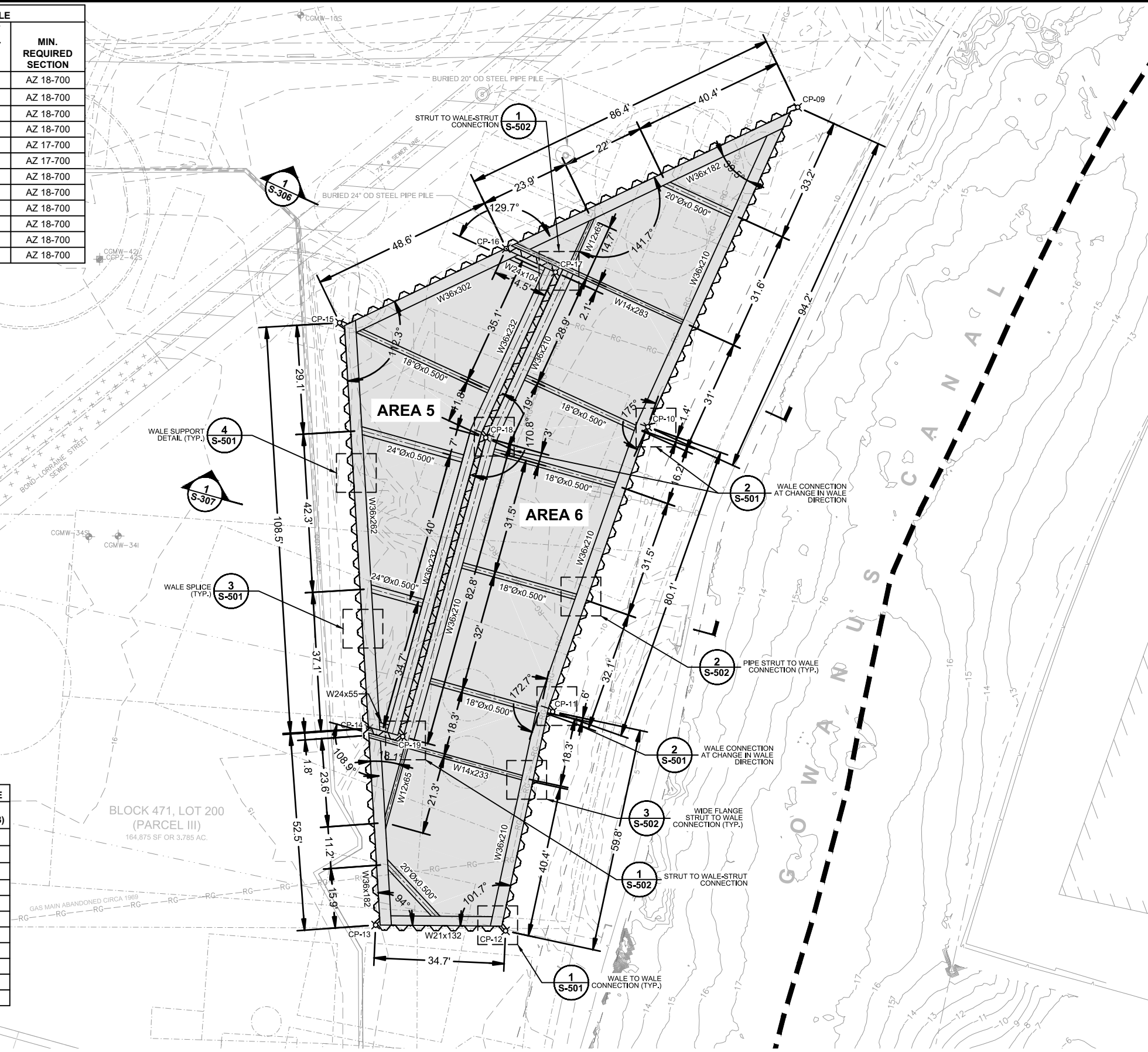
Arcadis Project No.
B0036728.0001.00003
 Date
NOVEMBER 2017
 Arcadis
One Lincoln Center
110 West Fayette Street, Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

C-106

CITY: SYRACUSE, NY DIV: GROUP: ENV/CAD DB: B GETTIS, B DECLERO, L POSENAUER, J HARRIS
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PARCEL III SHEET PILE SCHEDULE				
WALL ALIGNMENT		LENGTH OF WALL (LF)	MIN. SHEET PILE TIP EL. (FEET NAVD88)	MIN. REQUIRED SECTION
FROM	TO			
CP-09	CP-10	94.2	-25.0	AZ 18-700
CP-10	CP-11	80.1	-25.0	AZ 18-700
CP-11	CP-12	59.8	-25.0	AZ 18-700
CP-12	CP-13	34.7	-25.0	AZ 18-700
CP-13	CP-14	52.5	-24.0	AZ 17-700
CP-14	CP-15	108.5	-24.0	AZ 17-700
CP-15	CP-16	48.7	-25.0	AZ 18-700
CP-16	CP-09	86.4	-25.0	AZ 18-700
CP-16	CP-17	14.5	-25.0	AZ 18-700
CP-17	CP-18	47.9	-25.0	AZ 18-700
CP-18	CP-19	82.8	-25.0	AZ 18-700
CP-19	CP-14	9.3	-25.0	AZ 18-700

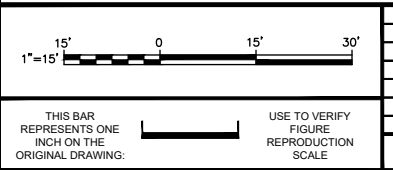
PARCEL III PILE CONTROL POINT SCHEDULE		
CONTROL POINT ID	EASTING (FEET NAD83)	NORTHING (FEET NAD83)
CP-09	632134.69	671500.26
CP-10	632067.94	671433.83
CP-11	632018.12	671371.10
CP-12	631986.30	671320.46
CP-13	631954.26	671333.76
CP-14	631970.51	671383.68
CP-15	632000.19	671488.02
CP-16	632048.73	671491.41
CP-17	632058.90	671481.02
CP-18	632026.34	671445.90
CP-19	631978.25	671378.54



- LEGEND:**
- APPROXIMATE LIMIT OF EXISTING CRIBBING
 - SHEET PILE
 - CP-15 X PILE CONTROL POINT
 - W14x283 WIDE FLANGE WALE OR STRUT
 - 18"Øx0.500" PIPE STRUT
 - REMEDIAL EXCAVATION AREA

- GENERAL CONSTRUCTION SEQUENCE:**
- PRE-TRENCH SHEET PILE ALIGNMENTS OF AREAS 5 AND 6 TO NOT LESS THAN 8.0 FEET BELOW EXISTING GRADE.
 - DRIVE SHEET PILING AT THE LOCATIONS AND TO THE MINIMUM TIP ELEVATIONS SHOWN OR INDICATED.
 - INSTALL TEMPORARY FRAMED FABRIC STRUCTURE OVER REMEDIAL EXCAVATION AREAS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
 - EXCAVATE AREA 5 TO ELEVATION +3.0 FEET AND INSTALL INTERNAL BRACING.
 - EXCAVATE AREA 5 TO ELEVATION -10.0 FEET.
 - BACKFILL AREA 5 TO ELEVATION +3.0 FEET AND REMOVE INTERNAL BRACING.
 - BACKFILL AREA 5 TO SUBGRADE ELEVATIONS SHOWN OR INDICATED ON DRAWING C-108.
 - EXCAVATE AREA 6 TO ELEVATION +3.0 FEET AND INSTALL INTERNAL BRACING.
 - EXCAVATE AREA 6 TO ELEVATION -10.0 FEET.
 - BACKFILL AREA 6 TO ELEVATION +3.0 FEET AND REMOVE INTERNAL BRACING.
 - BACKFILL AREA 6 TO SUBGRADE ELEVATIONS SHOWN OR INDICATED ON DRAWING C-108.
 - REMOVE TEMPORARY FRAMED FABRIC STRUCTURE.
 - PULL ALL SHEET PILING.
 - INSTALL NEW BULKHEAD AND HYDRAULIC RELIEF SYSTEM IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
 - RESTORE REMEDIAL EXCAVATION AREAS AND OTHER DISTURBED AREAS TO THE FINAL GRADES AND CONDITIONS SHOWN OR INDICATED ON DRAWING C-109.

- NOTES:**
- COMPLY WITH SPECIFICATIONS SECTIONS 31 23 00 (EXCAVATION AND FILL) AND 31 50 00 (EXCAVATION SUPPORT AND PROTECTION).
 - COORDINATE PILE DRIVING OPERATIONS WITH SELECTIVE DEMOLITION AND REMEDIAL EXCAVATION OPERATIONS.
 - BEFORE PROCEEDING WITH PILE DRIVING OPERATIONS, LOCATE, IDENTIFY, AND REMOVE OR RELOCATE OBSTRUCTING STRUCTURES AND UNDERGROUND FACILITIES. COMPLY WITH SPECIFICATIONS SECTION 02 41 19 (SELECTIVE DEMOLITION) FOR DEMOLITIONS AND REMOVALS.
 - TEMPORARY STOCKPILES ARE PROHIBITED WITHIN 25 FEET OF REMEDIAL EXCAVATION AREAS DURING REMEDIAL EXCAVATION AND BACKFILLING OPERATIONS.



No.	Date	Revisions	By	Ckd
1	2/4/2019	REVISED STEP 13 OF GENERAL CONSTRUCTION SEQUENCE	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State
 NY
 Date Signed
 11/30/2017
 Project Mgr.
 MJB
 Designed by
 RPK
 Drawn by
 JLH
 Checked by
 APC

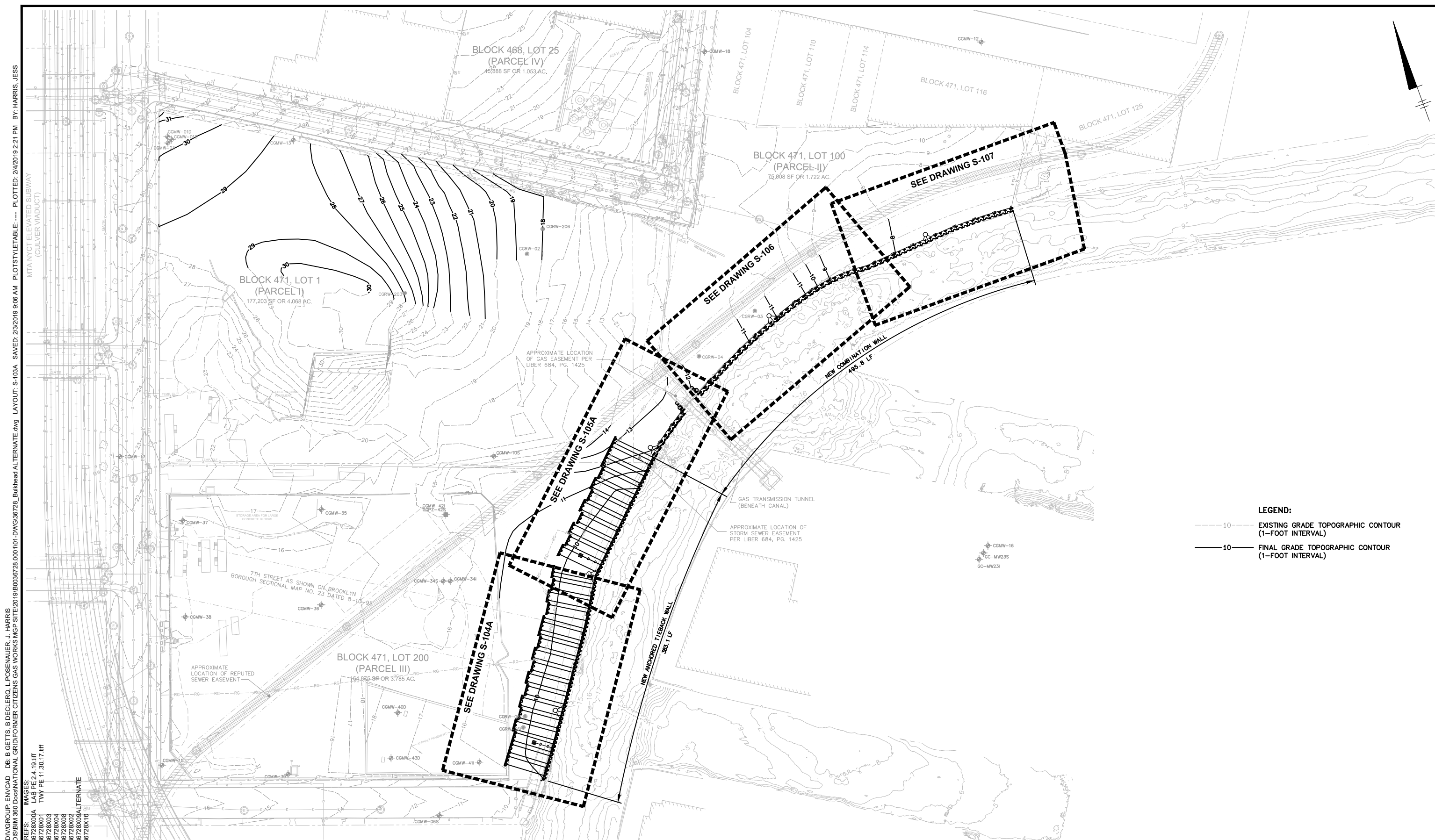


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 CARROLL GARDENS/PUBLIC PLACE
 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
 SITE REMEDIATION
PARCEL III REMEDIAL EXCAVATION SHORING PLAN AND CONSTRUCTION SEQUENCE

Arcadis Project No.
 B0036728.0001.00003
 Date
 NOVEMBER 2017
 Arcadis
 One Lincoln Center
 110 West Fayette Street, Suite 300
 Syracuse, NY 13202
 Tel. 315.446.9120

S-102

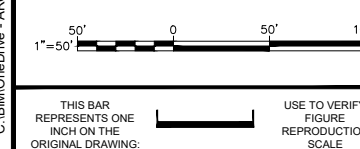


LEGEND:

--- 10 --- EXISTING GRADE TOPOGRAPHIC CONTOUR (1-FOOT INTERVAL)

— 10 — FINAL GRADE TOPOGRAPHIC CONTOUR (1-FOOT INTERVAL)

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No.	Date	Revisions	By	Ckd
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Professional Engineer's Name
TERRY W. YOUNG

Professional Engineer's No.
074847

State
NY

Date Signed
2/4/2019

Project Mgr.
MJB

Designed by
RPK

Drawn by
JLH

Checked by
APC



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 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
 SITE REMEDIATION
SITE BULKHEAD BARRIER WALL PLAN

Arcadis Project No.
B0036728.0001.00003

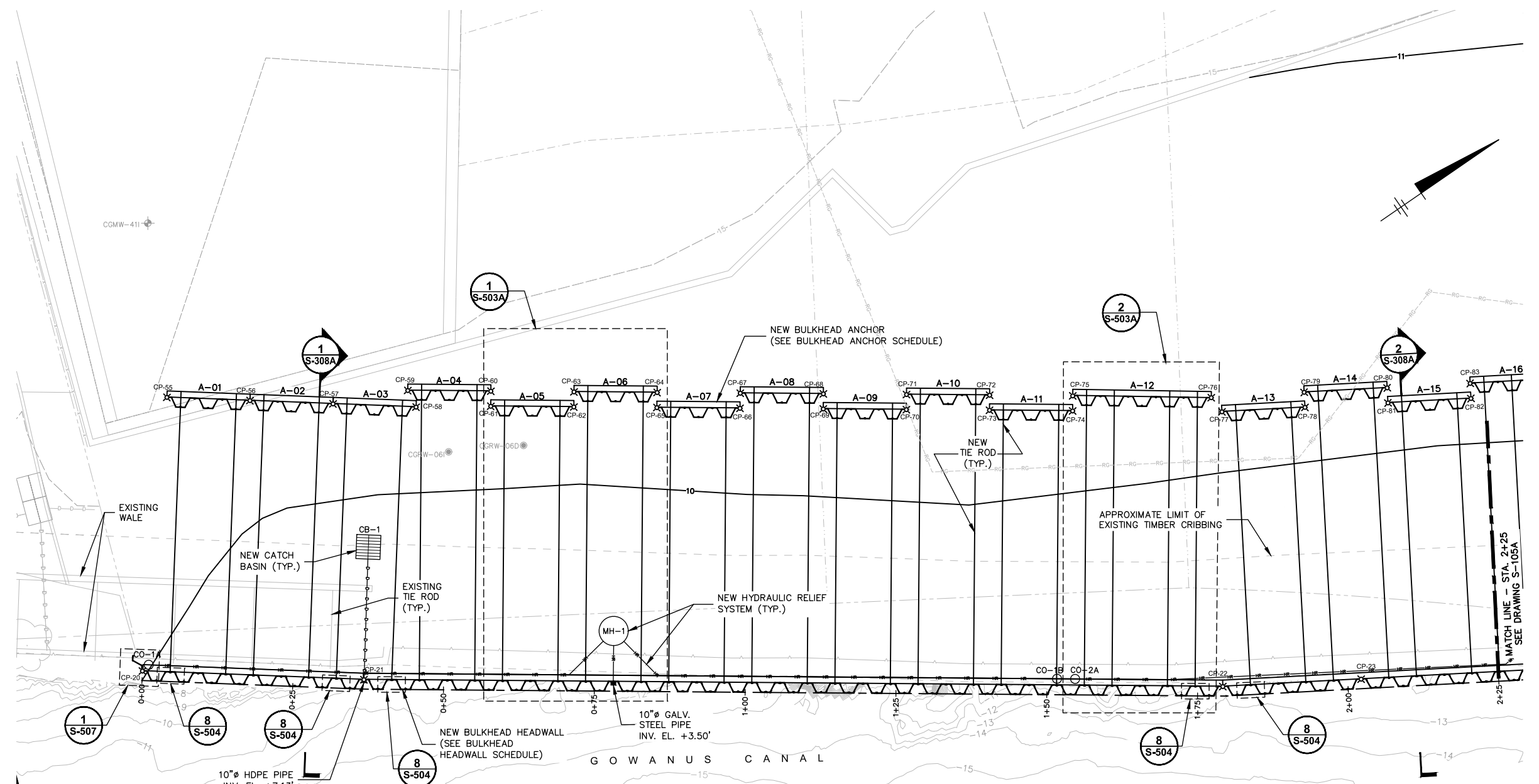
Date
FEBRUARY 2019

Arcadis
One Lincoln Center
110 West Fayette Street, Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

S-103A

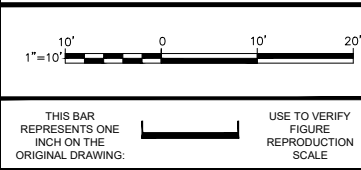
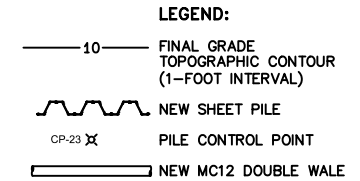
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HEADWALL & ANCHOR PILE CONTROL POINT SCHEDULE		
CONTROL POINT ID	EASTING (FEET NAD83)	NORTHING (FEET NAD83)
CP-19	631978.25	671378.54
CP-20	631947.08	671211.16
CP-21	631969.10	671240.58
CP-22	632050.82	671357.16
CP-23	632062.82	671376.73
CP-55	631912.02	671240.25
CP-56	631920.28	671251.28
CP-57	631928.53	671262.31
CP-58	631936.79	671273.34
CP-59	631933.74	671273.77
CP-60	631941.85	671285.05
CP-61	631943.70	671283.61
CP-62	631951.61	671294.90
CP-63	631949.56	671296.33
CP-64	631957.47	671307.61
CP-65	631959.51	671306.16
CP-66	631967.42	671317.44
CP-67	631965.38	671318.90
CP-68	631973.29	671330.18
CP-69	631975.34	671328.74
CP-70	631983.25	671340.03
CP-71	631981.20	671341.46
CP-72	631989.11	671352.75
CP-73	631991.15	671351.31
CP-74	631999.06	671362.59
CP-75	631997.02	671364.03
CP-76	632010.29	671382.76
CP-77	632013.23	671382.89
CP-78	632020.43	671394.64
CP-79	632018.30	671395.95
CP-80	632025.50	671407.70
CP-81	632027.63	671406.39
CP-82	632034.83	671418.13
CP-83	632032.70	671419.44



BULKHEAD HEADWALL SCHEDULE							
WALL ALIGNMENT	LENGTH OF WALL (LF)	WALL TYPE	REQUIRED SECTION	MIN. SHEET PILE TIP EL. (FEET NAVD88)	MIN. KING PILE TIP EL. (FEET NAVD88)	PILE CUT-OFF EL. (FEET NAVD88)	
							FROM
CP-20	CP-25	346.5	ANCHORED TIEBACK WALL	AZ 42-700N	-43.0	--	10.0

BULKHEAD ANCHOR SCHEDULE					
ANCHOR NO.	REQUIRED SECTION	ANCHOR OFFSET (FEET)	MIN. SHEET PILE TIP EL. (FEET NAVD88)	TIE ROD/WALE EL. (FEET NAVD88)	PILE CUT-OFF EL. (FEET NAVD88)
A-01 TO A-03	AZ 36-700N	45.5	-27.0	5.0	7.0
EVEN ANCHORS FROM A-04 TO A-16	AZ 36-700N	48.0	-27.0	5.0	7.0
ODD ANCHORS FROM A-05 TO A-15	AZ 36-700N	45.5	-27.0	5.0	7.0
A-17, A-19, A-21, AND A-23	AZ 36-700N	48.0	-27.0	5.0	7.0
A-18, A-20, A-22, AND A-24	AZ 36-700N	45.5	-27.0	5.0	7.0
A-25	AZ 36-700N	48.0	-18.0	5.0	7.0



No.	Date	Revisions	By	Ckd

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State
 NY
 Date Signed
 2/4/2019
 Project Mgr.
 MJB
 Designed by
 RPK
 Drawn by
 JLH
 Checked by
 APC



ARCADIS Design & Consultancy for natural and built assets
 ARCADIS OF NEW YORK, INC.
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 FORMER CITIZENS GAS WORKS MANUFACTURED GAS PLANT SITE
 CARROLL GARDENS/PUBLIC PLACE
 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
 SITE REMEDIATION
BULKHEAD BARRIER WALL PLAN
STA. 0+00 TO STA. 2+25

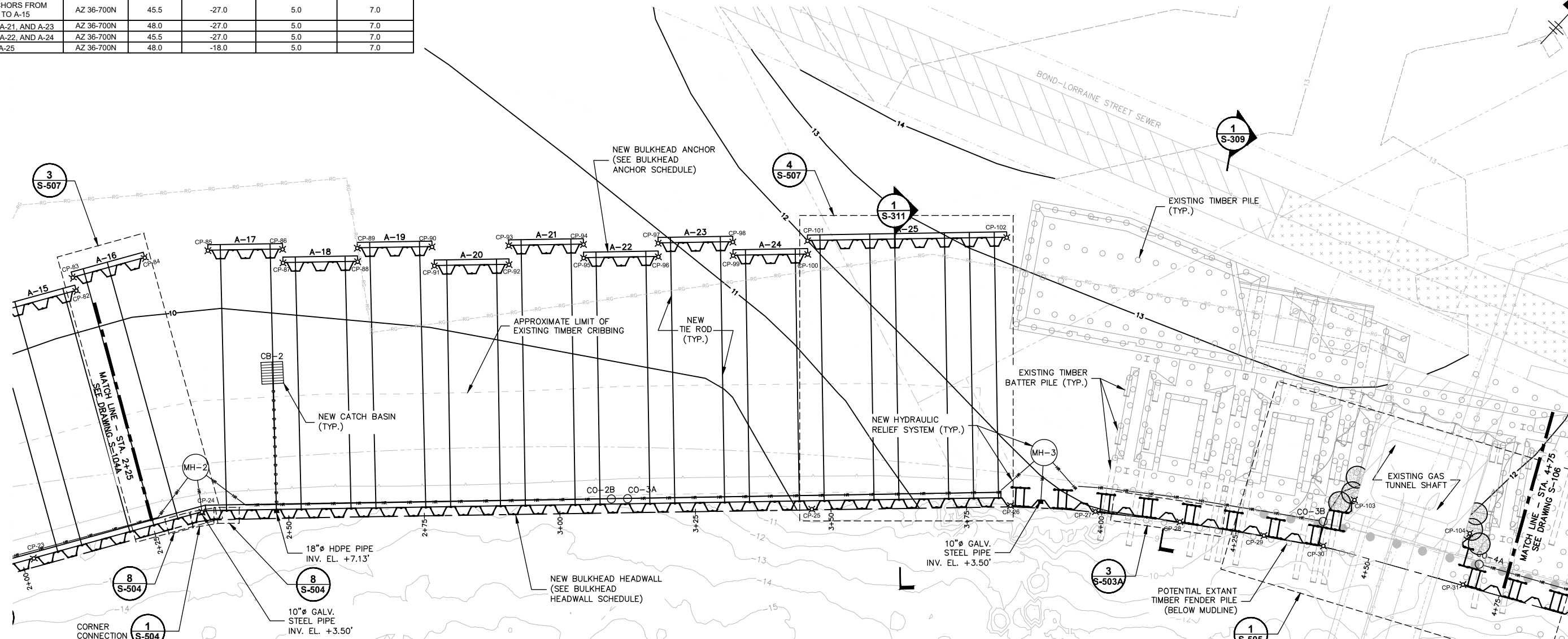
Arcadis Project No.
 B0036728.0001.00003
 Date
 FEBRUARY 2019
 Arcadis
 One Lincoln Center
 110 West Fayette Street, Suite 300
 Syracuse, NY 13202
 Tel. 315.446.9120

S-104A

CITY: SYRACUSE, NY DIV: GROUP: ENV/CAD DB: B GETTIS, B DECLERO, L POSENAUER, J HARRIS C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\NATIONAL GRID\FORMER CITIZENS GAS WORKS MGP SITE\2019\B0036728.000\101-DWG\36728_Bulkhead ALTERNATE.dwg LAYOUT: S-105A_SAVED: 2/22/2019 12:23 PM PLOTSTYLETABLE: PLOTTED: 2/22/2019 9:05 AM BY: HARRIS, JESS

BULKHEAD ANCHOR SCHEDULE					
ANCHOR NO.	REQUIRED SECTION	ANCHOR OFFSET (FEET)	MIN. SHEET PILE TIP EL. (FEET NAVD88)	TIE ROD/WALE EL. (FEET NAVD88)	PILE CUT-OFF EL. (FEET NAVD88)
A-01 TO A-03	AZ 36-700N	45.5	-27.0	5.0	7.0
EVEN ANCHORS FROM A-04 TO A-16	AZ 36-700N	48.0	-27.0	5.0	7.0
ODD ANCHORS FROM A-05 TO A-15	AZ 36-700N	45.5	-27.0	5.0	7.0
A-17, A-19, A-21, AND A-23	AZ 36-700N	48.0	-27.0	5.0	7.0
A-18, A-20, A-22, AND A-24	AZ 36-700N	45.5	-27.0	5.0	7.0
A-25	AZ 36-700N	48.0	-18.0	5.0	7.0

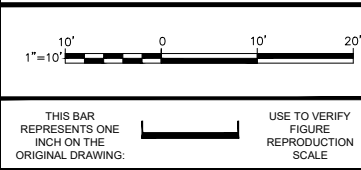
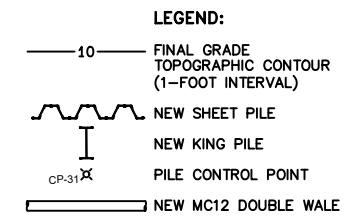
NOTE:
 1. EXISTING GAS TRANSMISSION TUNNEL AND SHAFT TO BE FILLED AND MODIFIED BY OTHERS (NOT PART OF THIS CONTRACT) TO ACCOMMODATE FINAL SITE GRADES. DO NOT INITIATE BULKHEAD DEMOLITION OR PILE DRIVING OPERATIONS UNTIL TUNNEL/SHAFT FILLING AND MODIFICATION ACTIVITIES ARE COMPLETE. OWNER'S GAS DEPARTMENT WILL CONFIRM STABILITY OF GAS TRANSMISSION TUNNEL AND SHAFT BASED ON POST-REMEDIAION DESIGN LOADS PURSUANT TO SEPTEMBER 14, 2017 MEETING.



HEADWALL & ANCHOR PILE CONTROL POINT SCHEDULE		
CONTROL POINT ID	EASTING (FEET NAD83)	NORTHING (FEET NAD83)
CP-23	632062.82	671376.73
CP-24	632079.62	671404.15
CP-25	632161.40	671481.39
CP-26	632187.89	671506.90
CP-27	632199.87	671516.81
CP-28	632212.55	671526.06
CP-29	632225.60	671534.79
CP-30	632234.89	671540.89
CP-31	632258.58	671553.27
CP-82	632034.83	671418.13
CP-83	632032.70	671419.44
CP-84	632039.90	671431.19
CP-85	632047.49	671440.11
CP-86	632057.39	671449.69
CP-87	632059.14	671447.90
CP-88	632069.05	671457.48

HEADWALL & ANCHOR PILE CONTROL POINT SCHEDULE		
CONTROL POINT ID	EASTING (FEET NAD83)	NORTHING (FEET NAD83)
CP-89	632067.30	671459.26
CP-90	632077.21	671468.84
CP-91	632079.91	671466.58
CP-92	632089.81	671476.16
CP-93	632087.38	671478.68
CP-94	632097.29	671488.25
CP-95	632099.03	671486.45
CP-96	632108.93	671496.03
CP-97	632107.20	671497.83
CP-98	632117.11	671507.40
CP-99	632118.84	671505.61
CP-100	632128.75	671515.18
CP-101	632127.01	671516.97
CP-102	632153.43	671542.51
CP-103	632233.31	671550.98
CP-104	632253.05	671561.02

BULKHEAD HEADWALL SCHEDULE								
WALL ALIGNMENT	FROM	TO	LENGTH OF WALL (LF)	WALL TYPE	REQUIRED SECTION	MIN. SHEET PILE TIP EL. (FEET NAVD88)	MIN. KING PILE TIP EL. (FEET NAVD88)	PILE CUT-OFF EL. (FEET NAVD88)
CP-25	CP-26	36.6	ANCHORED TIEBACK WALL	AZ 46-700N	-43.0	--	12.0	
CP-26	CP-27	15.7	COMBINATION WALL	HZ 1180M C M-26 / AZ 19-700	-40.0	-83.0	12.0	
CP-27	CP-30	42.5	COMBINATION WALL	HZ 1180M D M-26 / AZ 19-700	-40.0	-83.0	12.0	
CP-31	CP-38	172.9	COMBINATION WALL	HZ 1180M D M-26 / AZ 19-700	-40.0	-83.0	12.0	



No.	Date	Revisions	By	Ckd

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Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State
 NY
 Date Signed
 2/4/2019
 Project Mgr.
 MJB
 Designed by
 RPK
 Drawn by
 JLH
 Checked by
 APC



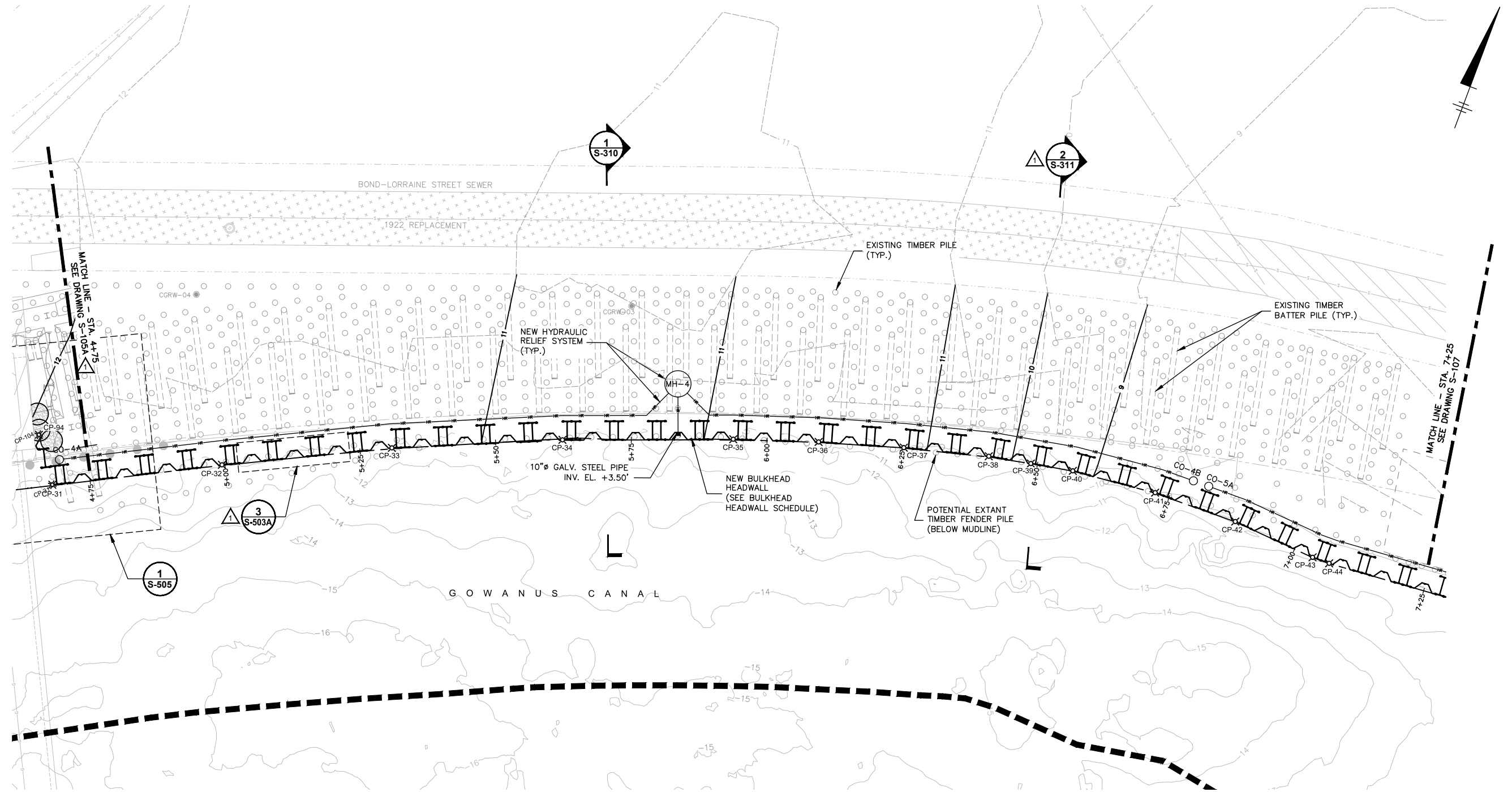
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NATIONAL GRID USA • BROOKLYN, NEW YORK
 FORMER CITIZENS GAS WORKS MANUFACTURED GAS PLANT SITE
 CARROLL GARDENS/PUBLIC PLACE
 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
 SITE REMEDIATION
BULKHEAD BARRIER WALL PLAN
STA. 2+25 TO STA. 4+75

ArCADIS Project No.
 B0036728.0001.00003
 Date
 FEBRUARY 2019
 ArCADIS
 One Lincoln Center
 110 West Fayette Street, Suite 300
 Syracuse, NY 13202
 Tel. 315.446.9120

S-105A

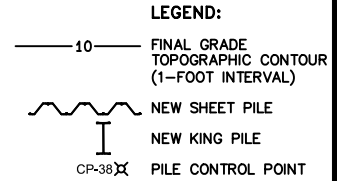
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HEADWALL & ANCHOR PILE CONTROL POINT SCHEDULE		
CONTROL POINT ID	EASTING (FEET NAD83)	NORTHING (FEET NAD83)
CP-31	632258.58	671553.27
CP-32	632286.55	671567.63
CP-33	632314.76	671581.50
CP-34	632343.66	671593.87
CP-35	632373.08	671604.97
CP-36	632387.97	671610.00
CP-37	632403.03	671614.51
CP-38	632418.23	671618.49

HEADWALL & ANCHOR PILE CONTROL POINT SCHEDULE		
CONTROL POINT ID	EASTING (FEET NAD83)	NORTHING (FEET NAD83)
CP-39	632425.96	671619.94
CP-40	632433.66	671621.39
CP-41	632449.27	671622.94
CP-42	632464.95	671623.12
CP-43	632480.58	671621.93
CP-44	632483.82	671621.96
CP-94	632097.29	671488.25

BULKHEAD HEADWALL SCHEDULE							
WALL ALIGNMENT		LENGTH OF WALL (LF)	WALL TYPE	REQUIRED SECTION	MIN. SHEET PILE TIP EL. (FEET NAVD88)	MIN. KING PILE TIP EL. (FEET NAVD88)	PILE CUT-OFF EL. (FEET NAVD88)
FROM	TO						
CP-31	CP-38	172.9	COMBINATION WALL	HZ 1180M D M-26 / AZ 19-700	-40.0	-83.0	12.0
CP-38	CP-46	101.9	COMBINATION WALL	HZ 1080M B M-26 / AZ 19-700	-40.0	-76.0	10.0



IMAGES:
 LAG PE 11.30.17.riff
 TWY PE 11.30.17.riff



No.	Date	Revisions	By	Ckd
1	2/4/2019	ADDED NEW SECTION AND REVISED DRAWING AND DETAIL REFERENCES	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State NY Date Signed 11/30/2017 Project Mgr. MJB
 Designed by RPK Drawn by JLH Checked by APC



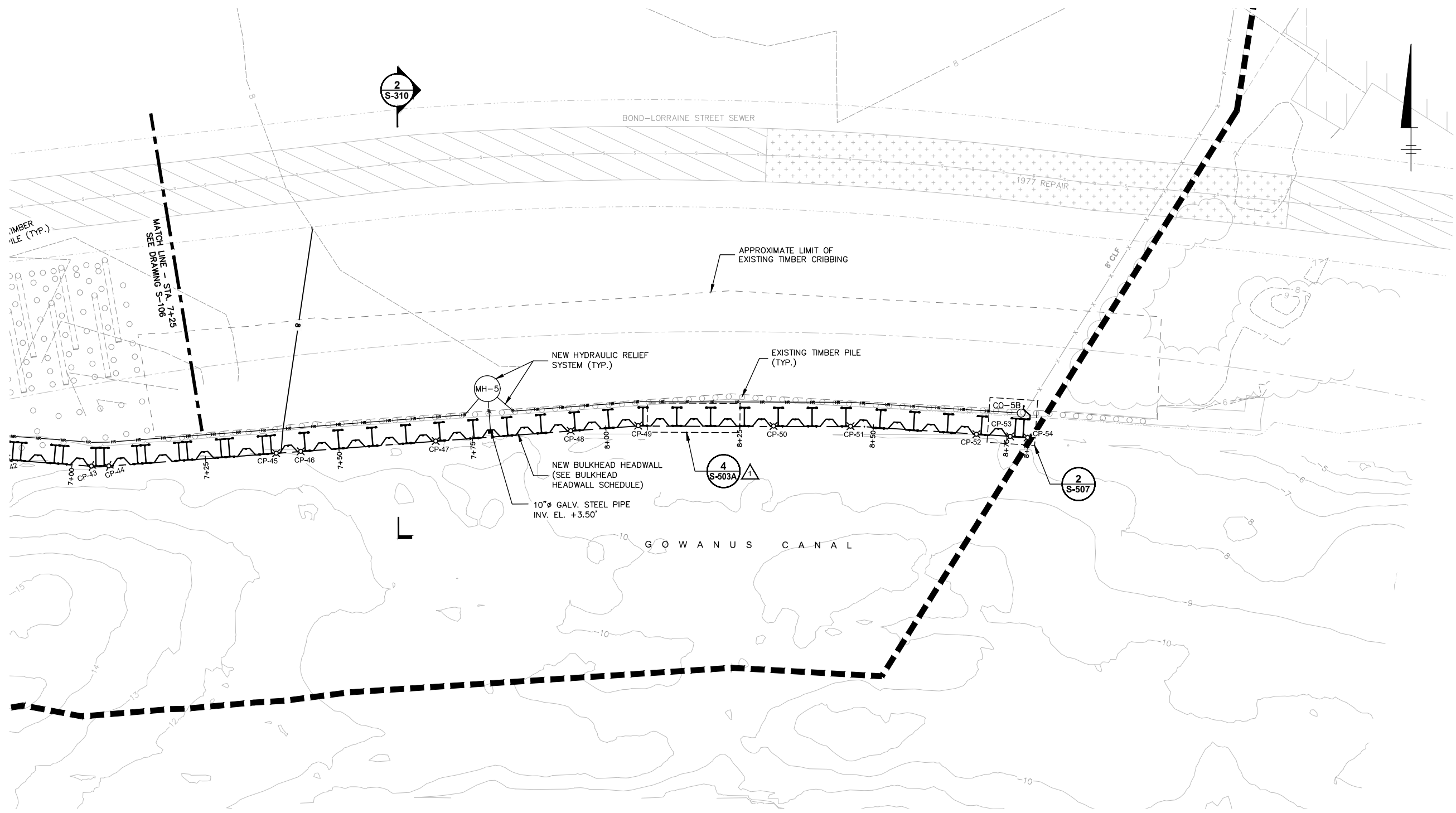
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 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SITE REMEDIATION
BULKHEAD BARRIER WALL PLAN
STA. 4+75 TO STA. 7+25

Arcadis Project No. B0036728.0001.00003
 Date NOVEMBER 2017
 Arcadis One Lincoln Center 110 West Fayette Street, Suite 300 Syracuse, NY 13202 Tel. 315.446.9120

S-106

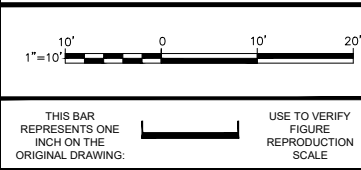
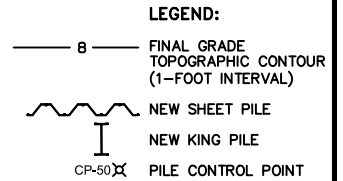
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HEADWALL & ANCHOR PILE CONTROL POINT SCHEDULE		
CONTROL POINT ID	EASTING (FEET NAD83)	NORTHING (FEET NAD83)
CP-43	632480.58	671621.93
CP-44	632483.82	671621.96
CP-45	632515.09	671624.37
CP-46	632519.67	671624.72
CP-47	632544.89	671626.66
CP-48	632570.10	671628.60
CP-49	632582.71	671629.57

HEADWALL & ANCHOR PILE CONTROL POINT SCHEDULE		
CONTROL POINT ID	EASTING (FEET NAD83)	NORTHING (FEET NAD83)
CP-50	632608.00	671629.53
CP-51	632622.37	671629.50
CP-52	632645.89	671628.02
CP-53	632652.20	671627.63
CP-54	632655.45	671627.42

BULKHEAD HEADWALL SCHEDULE							
WALL ALIGNMENT		LENGTH OF WALL (LF)	WALL TYPE	REQUIRED SECTION	MIN. SHEET PILE TIP EL. (FEET NAVD88)	MIN. KING PILE TIP EL. (FEET NAVD88)	PILE CUT-OFF EL. (FEET NAVD88)
FROM	TO						
CP-38	CP-46	101.9	COMBINATION WALL	HZ 1080M B M-26 / AZ 19-700	-40.0	-76.0	10.0
CP-46	CP-53	132.8	COMBINATION WALL	HZ 1180M C M-14 / AZ 19-700	-40.0	-78.0	8.0
CP-53	CP-54	3.3	KING PILE	HZ 1180M C M-26	-	-78.0	8.0



No.	Date	Revisions	RPK	MJB
1	2/4/2019	REVISED DETAIL REFERENCE	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State: NY Date Signed: 11/30/2017 Project Mgr.: MJB
 Designed by: RPK Drawn by: JLH Checked by: APC



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 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SITE REMEDIATION
BULKHEAD BARRIER WALL PLAN
STA. 7+25 TO STA. 8+79

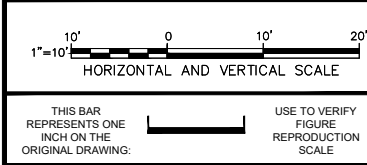
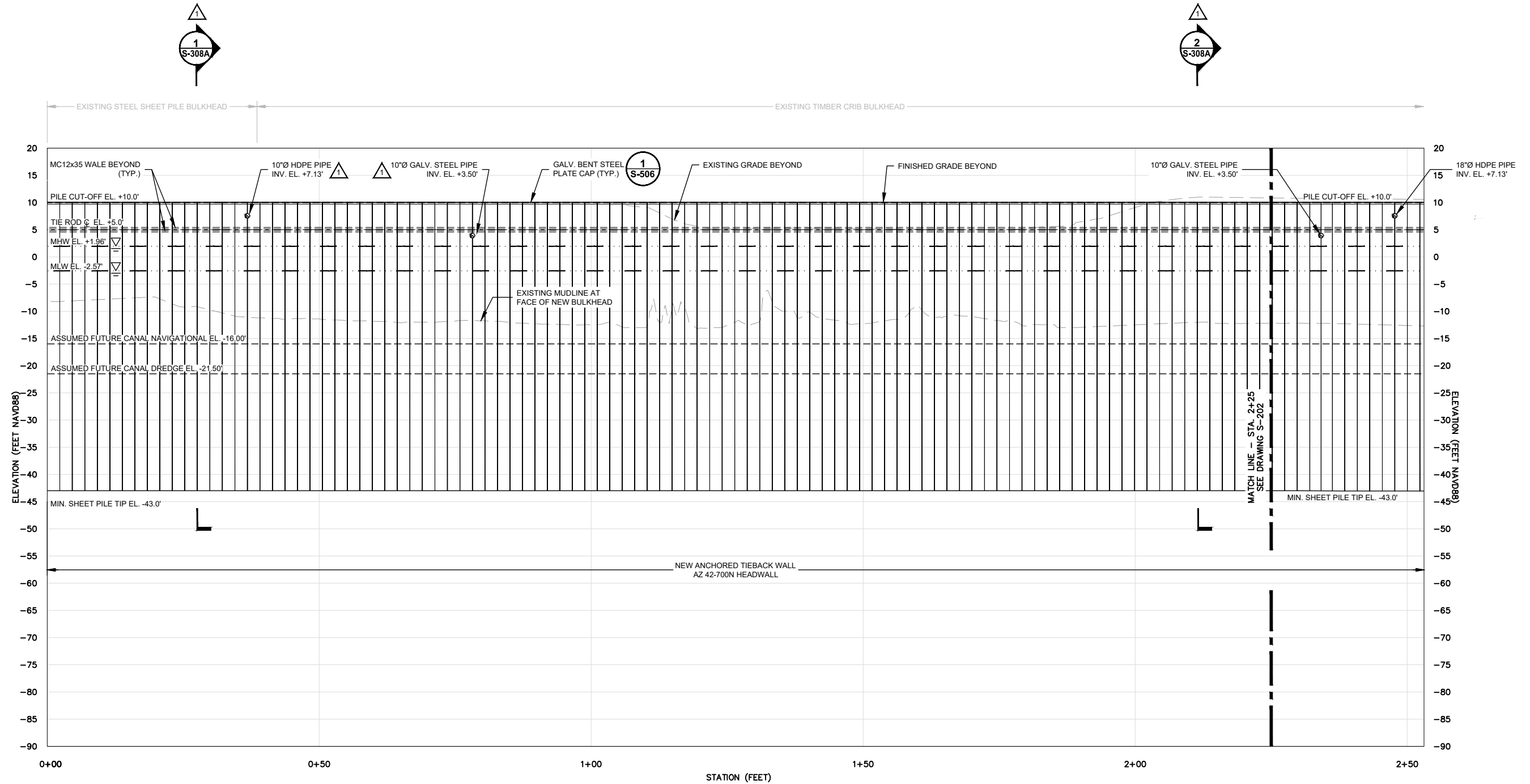
Arcadis Project No. B0036728.0001.00003
 Date: NOVEMBER 2017
 Arcadis One Lincoln Center 110 West Fayette Street, Suite 300 Syracuse, NY 13202 Tel. 315.446.9120

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No.	Date	Revisions	By	Ckd
1	2/4/2019	REVISED PIPE MATERIALS AND SECTION REFERENCES	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State: NY Date Signed: 11/30/2017 Project Mgr.: MJB
 Designed by: RPK Drawn by: JLH Checked by: APC



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 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
 SITE REMEDIATION
**BULKHEAD BARRIER WALL PROFILE
 STA. 0+00 TO STA. 2+25**

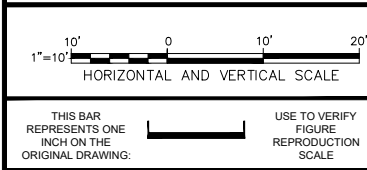
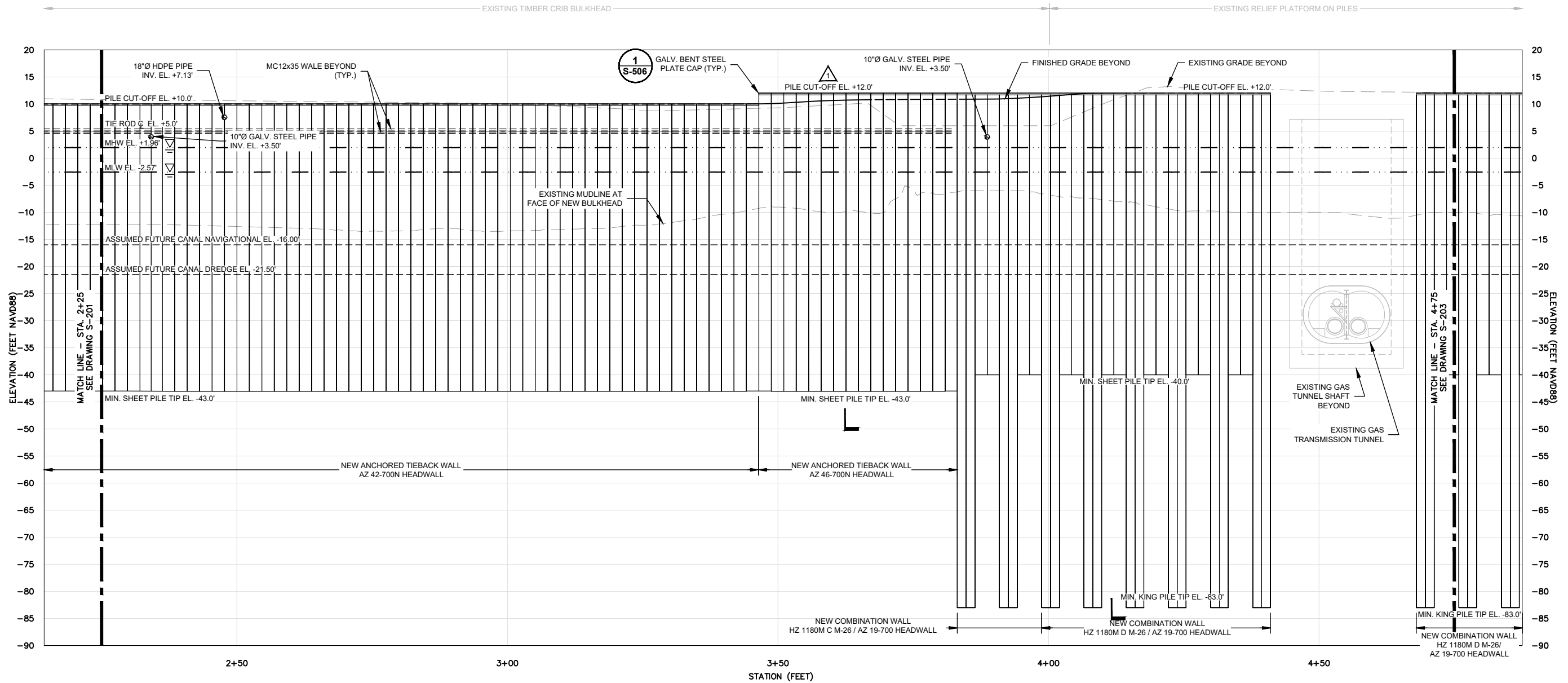
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 One Lincoln Center
 110 West Fayette Street, Suite 300
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 Tel. 315.446.9120

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No.	Date	Revisions	By	Ckd
1	2/4/2019	DELETED DUPLICATE SECTION, ADDED NEW SECTION, & REVISED PILE CUT-OFF EL. FROM CP-25 TO CP-26	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State
 NY
 Date Signed
 11/30/2017
 Project Mgr.
 MJB
 Designed by
 RPK
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 JLH
 Checked by
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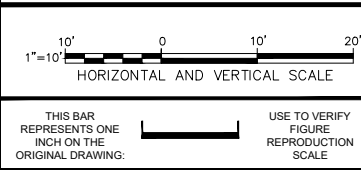
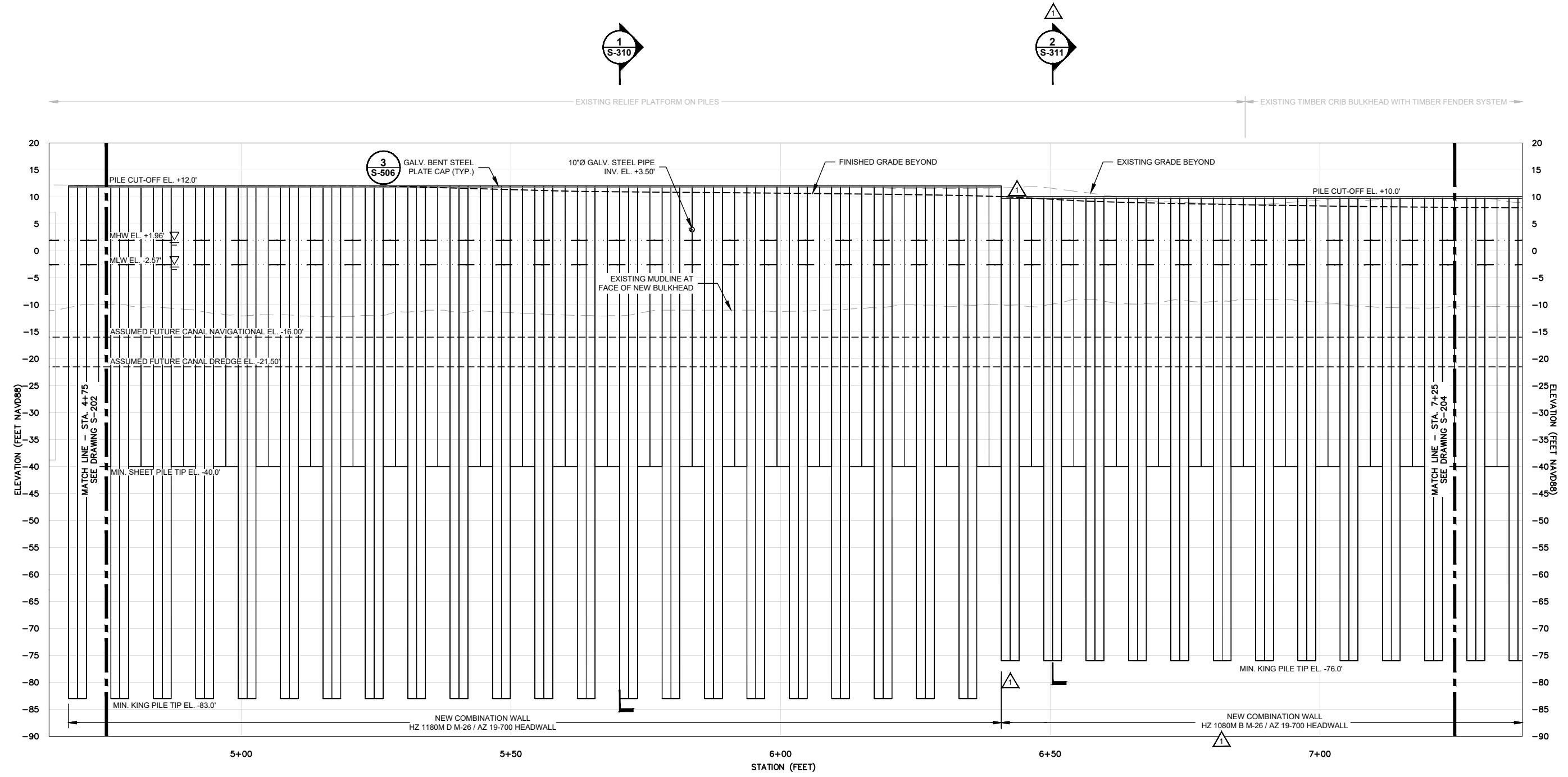
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 FORMER CITIZENS GAS WORKS MANUFACTURED GAS PLANT SITE
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SITE REMEDIATION
BULKHEAD BARRIER WALL PROFILE
STA. 2+25 TO STA. 4+75

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 Tel. 315.446.9120

S-202

CITY: SYRACUSE, NY DIV: GROUP: ENV: CAD DB: B GETTIS, B DECLERO, L POSENAUER, J, HARRIS C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\NATIONAL GRID\FORMER CITIZENS GAS WORKS MGP SITE\2019\B0036728_000\101-DWG\36728_Bulkhead.dwg LAYOUT: S-203 SAVED: 2/22/2019 12:26 PM PLOTTED: 2/22/2019 9:28 AM BY: HARRIS, JESS

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 36728X09(ALT)
 36728X10



No.	Date	Revisions	By	Ckd
1	2/4/2019	ADDED NEW SECTION, CORRECTED HEADWALL TRANSITION AT CP-38, & CORRECTED REQ'D KING PILE SECTION FROM CP-38 TO CP-46	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State
 NY
 Date Signed
 11/30/2017
 Project Mgr.
 MJB
 Designed by
 RPK
 Drawn by
 JLH
 Checked by
 APC



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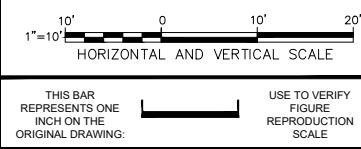
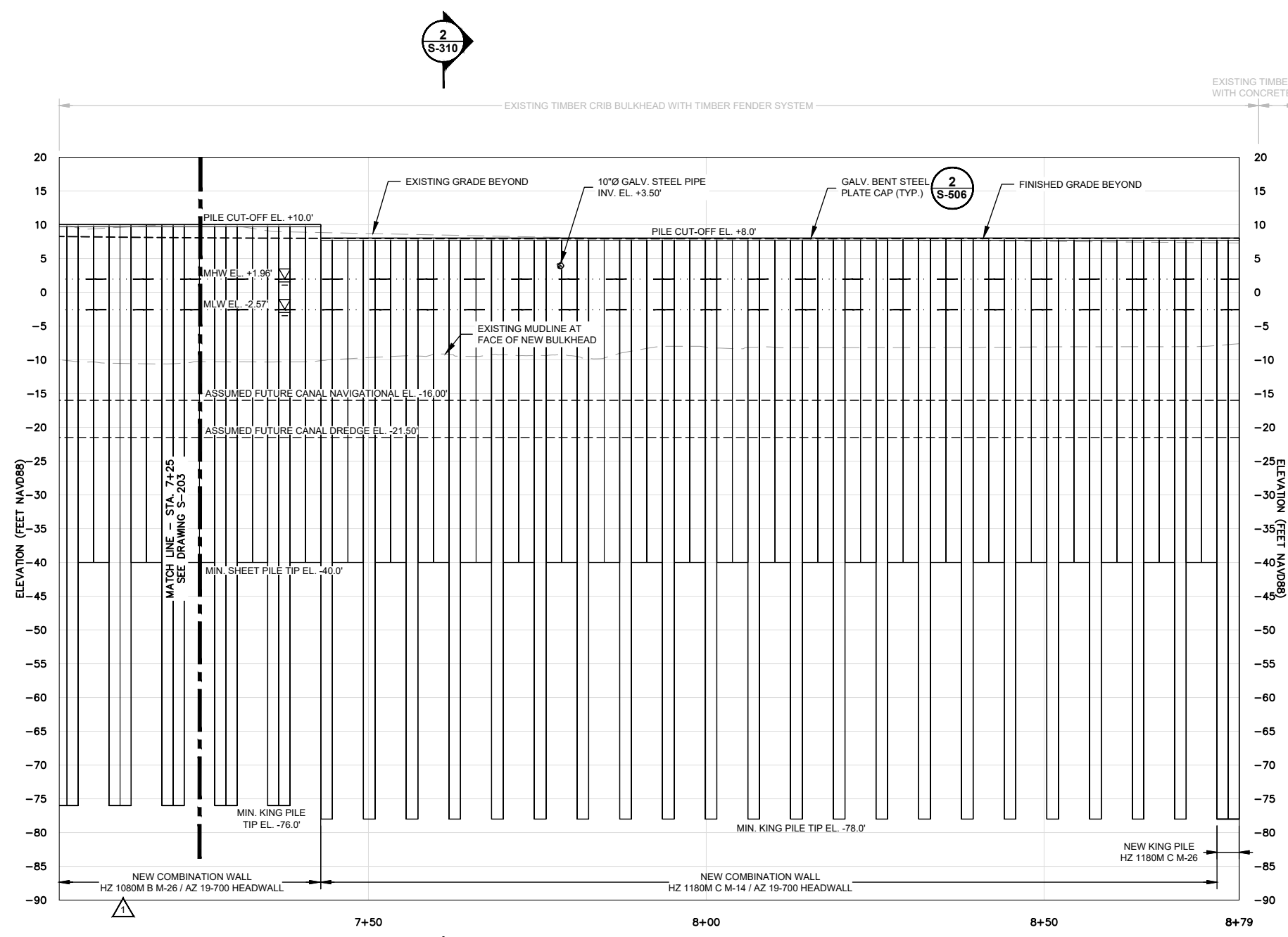
NATIONAL GRID USA • BROOKLYN, NEW YORK
 FORMER CITIZENS GAS WORKS MANUFACTURED GAS PLANT SITE
 CARROLL GARDENS/PUBLIC PLACE
 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SITE REMEDIATION
BULKHEAD BARRIER WALL PROFILE
STA. 4+75 TO STA. 7+25

Arcadis Project No.
 B0036728.0001.00003
 Date
 NOVEMBER 2017
 Arcadis
 One Lincoln Center
 110 West Fayette Street, Suite 300
 Syracuse, NY 13202
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S-203

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 36728X07
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 36728X10



No.	Date	Revisions	By	Ckd
1	2/4/2019	CORRECTED REQ'D KING PILE SECTION FROM CP-38 TO CP-46	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
 Professional Engineer's No.
 074847
 State
 NY
 Date Signed
 11/30/2017
 Project Mgr.
 MJB
 Designed by
 RPK
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 JLH
 Checked by
 APC



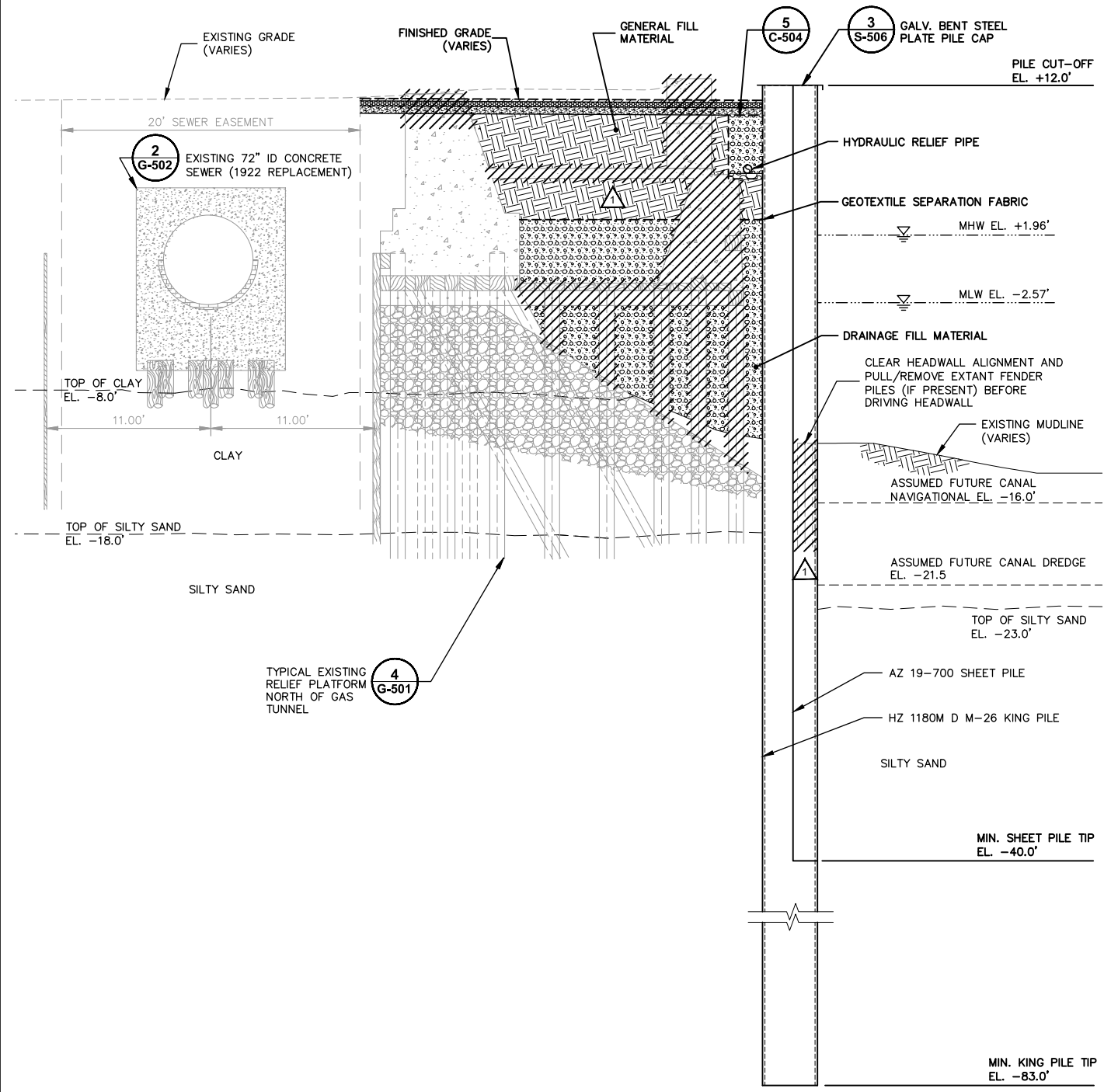
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 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SITE REMEDIATION
BULKHEAD BARRIER WALL PROFILE
STA. 7+25 TO STA. 8+79

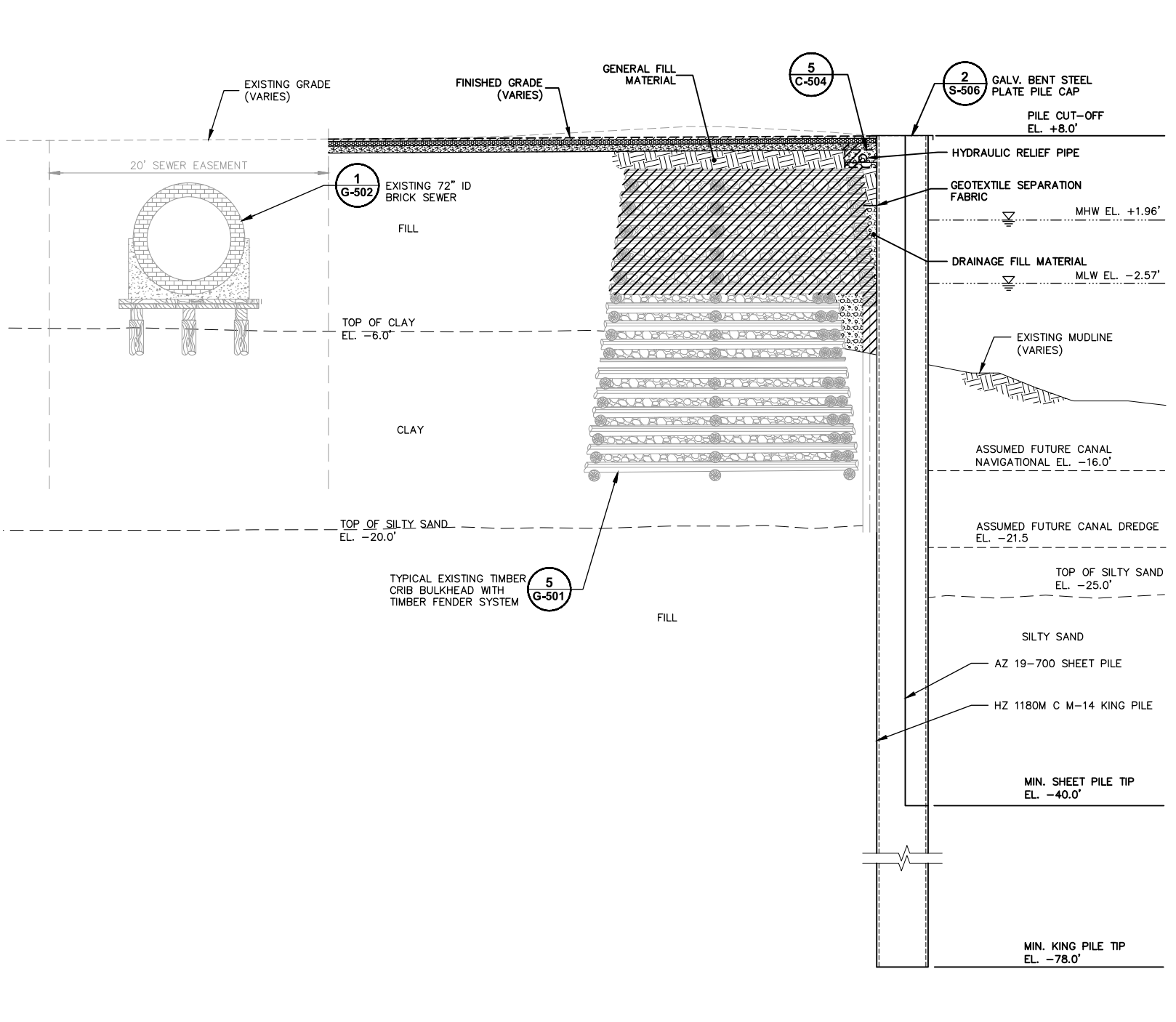
Arcadis Project No.
 B0036728.0001.00003
 Date
 NOVEMBER 2017
 Arcadis
 One Lincoln Center
 110 West Fayette Street, Suite 300
 Syracuse, NY 13202
 Tel. 315.446.9120

S-204

CITY: SYRACUSE, NY DIV: GROUP: ENV: CAD DB: B GETTIS, B DECLERO, L POSENAUER, J HARRIS
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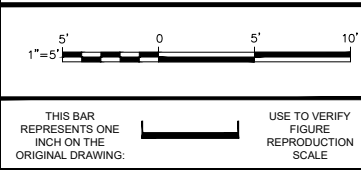
COMBINATION WALL CP-31 TO CP-38 ①



COMBINATION WALL CP-46 TO CP-53 ②

- NOTES:
- SOIL TYPES AND GEOLOGIC CONTACTS ARE APPROXIMATE AND ARE INTERPOLATED BETWEEN SOIL BORING LOCATIONS. ACTUAL SUBSURFACE CONDITIONS MAY BE DIFFERENT THAN THOSE SHOWN OR INDICATED.
 - ADDITIONAL STRUCTURES AND UNDERGROUND FACILITIES MAY BE PRESENT THAT ARE NOT SHOWN OR INDICATED.

- LEGEND:
- INTERPOLATED GEOLOGIC CONTACT
 - ////// EXISTING FEATURE TO BE DEMOLISHED/REMOVED



No.	Date	Revisions	By	Ckd
1	2/4/2019	REVISED FILL HATCH AND EXISTING FENDER PILE	RPK	MJB

Professional Engineer's Name
TERRY W. YOUNG
Professional Engineer's No.
074847
State
NY
Date Signed
11/30/2017
Project Mgr.
MJB
Designed by
RPK
Drawn by
JLH
Checked by
APC



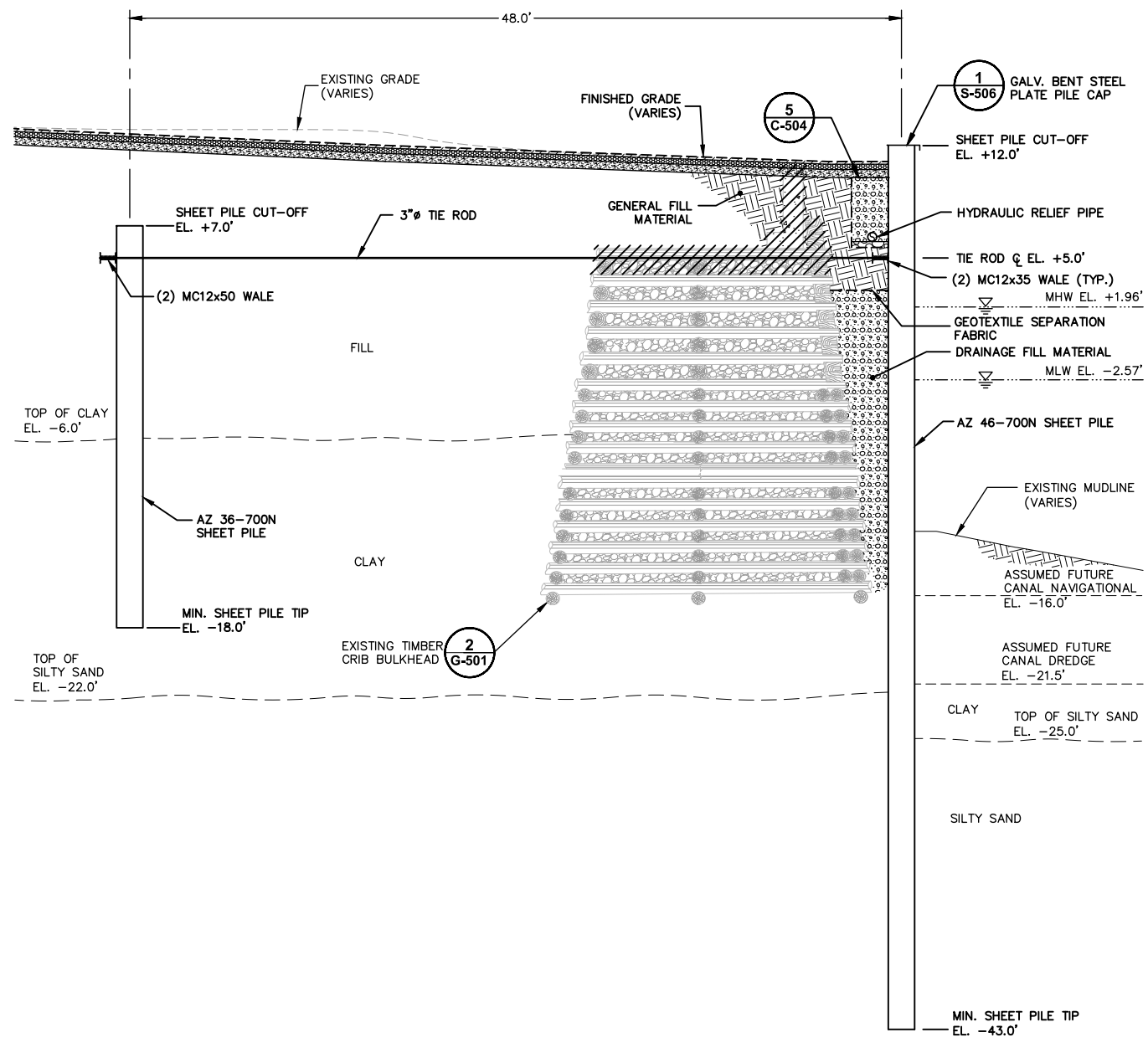
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CARROLL GARDENS/PUBLIC PLACE
BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SITE REMEDIATION
BULKHEAD BARRIER WALL SECTIONS

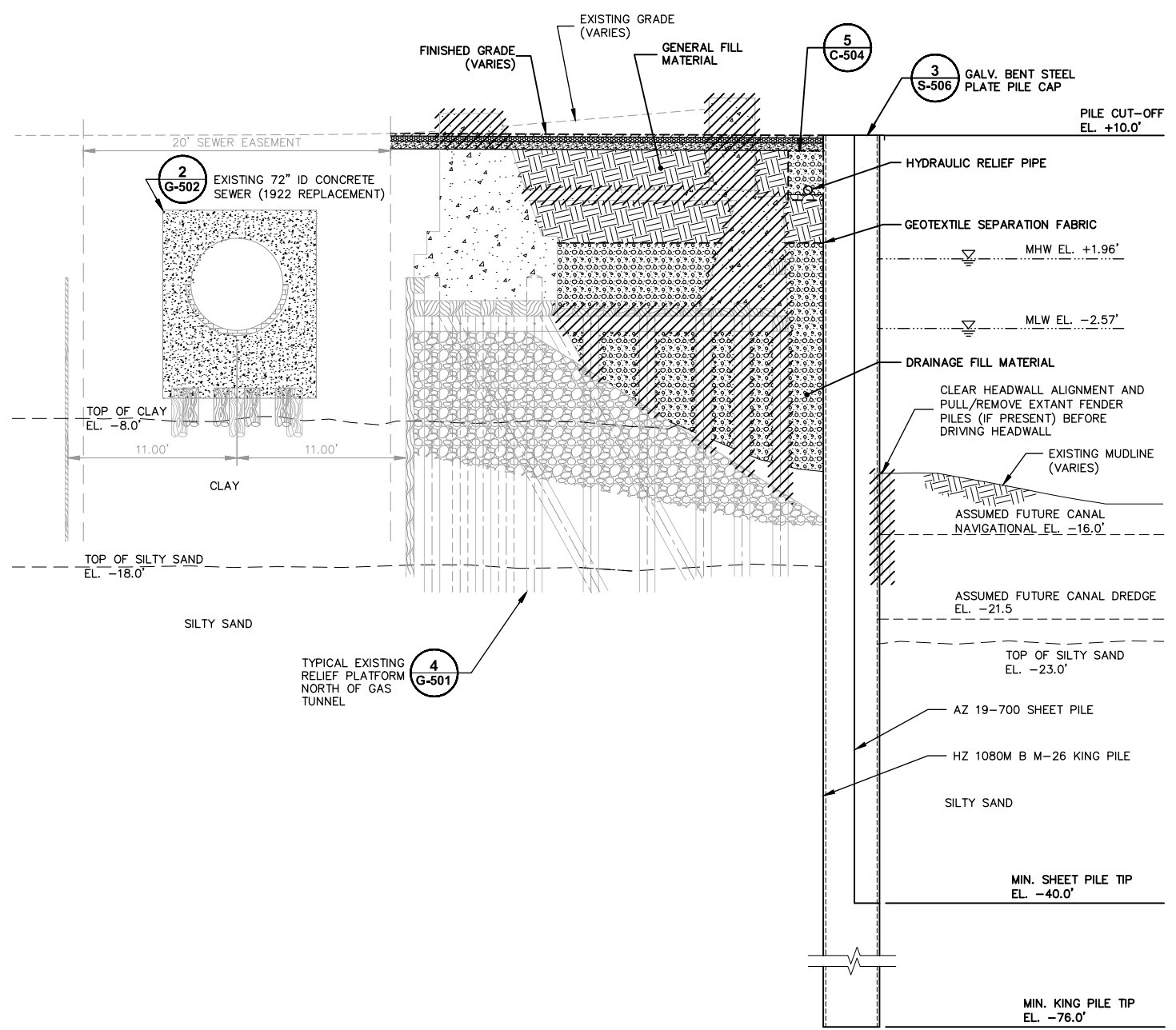
Arcadis Project No.
B0036728.0001.00003
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Arcadis
One Lincoln Center
110 West Fayette Street, Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

S-310

CITY: SYRACUSE, NY DIV: GROUP: ENV: CAD DB: B GETTIS, B DECLERO, L POSENAUER, J HARRIS C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\NATIONAL GRID\FORMER CITIZENS GAS WORKS MGP SITE\2019\B0036728.000\101-DWG\G36728_S-311.dwg LAYOUT: S-311 SAVED: 2/3/2019 1:38 PM PLOT: STYL: LETALE... PLOTTED: 2/4/2019 7:16 AM BY: HARRIS, JESS



ANCHORED TIEBACK WALL
CP-25 TO CP-26 **1**



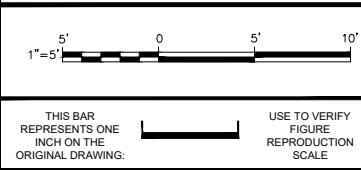
COMBINATION WALL
CP-38 TO CP-46 **2**

NOTES:

- SOIL TYPES AND GEOLOGIC CONTACTS ARE APPROXIMATE AND ARE INTERPOLATED BETWEEN SOIL BORING LOCATIONS. ACTUAL SUBSURFACE CONDITIONS MAY BE DIFFERENT THAN THOSE SHOWN OR INDICATED.
- ADDITIONAL STRUCTURES AND UNDERGROUND FACILITIES MAY BE PRESENT THAT ARE NOT SHOWN OR INDICATED.

LEGEND:

- INTERPOLATED GEOLOGIC CONTACT
- ////// EXISTING FEATURE TO BE DEMOLISHED/REMOVED



No.	Date	Revisions	By	Ckd

Professional Engineer's Name
TERRY W. YOUNG
Professional Engineer's No.
074847
State
NY
Date Signed
2/4/2019
Project Mgr.
MJB
Designed by
RPK
Drawn by
JLH
Checked by
APC



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ARCADIS OF NEW YORK, INC.
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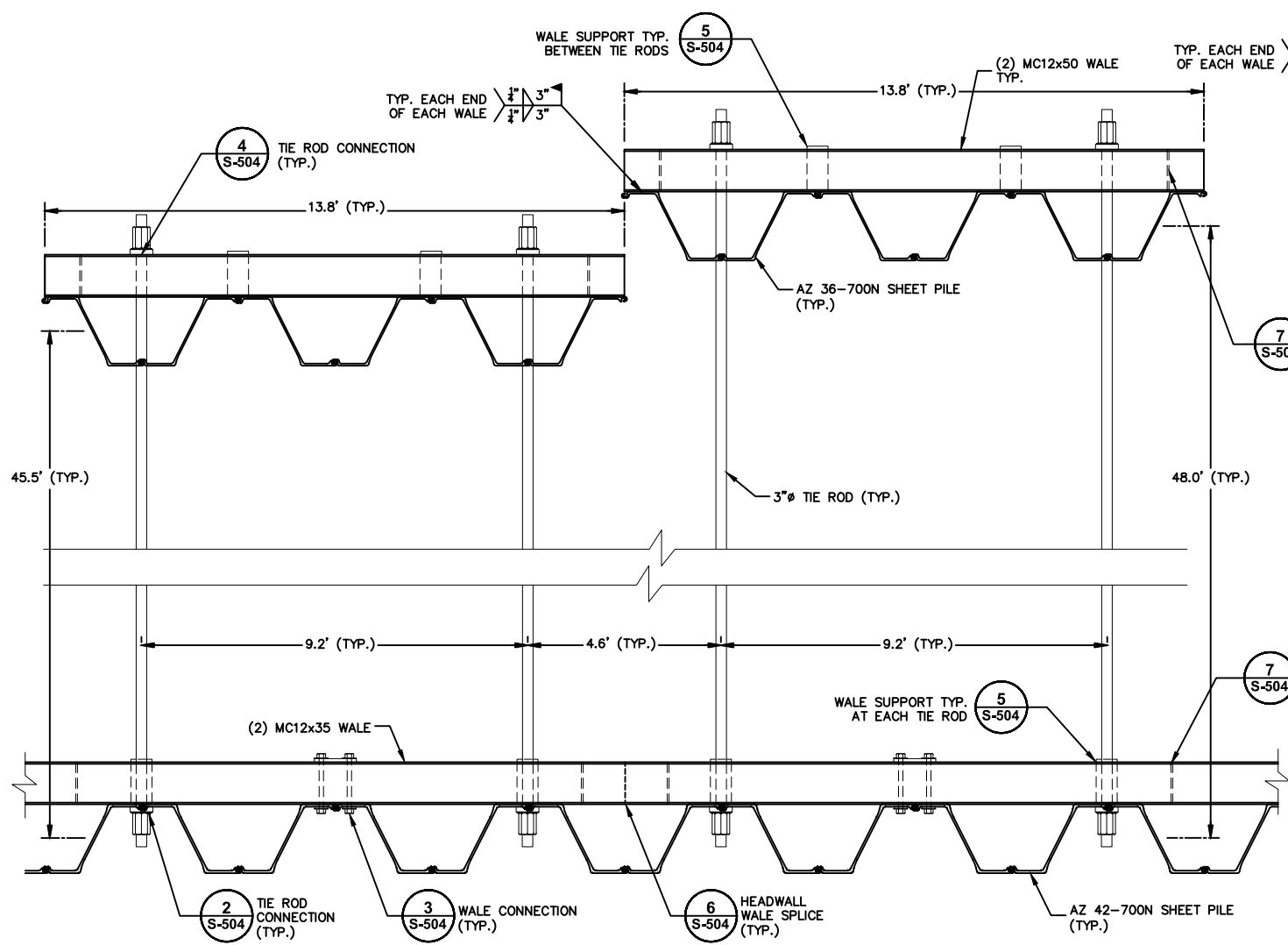
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FORMER CITIZENS GAS WORKS MANUFACTURED GAS PLANT SITE
CARROLL GARDENS/PUBLIC PLACE
BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SITE REMEDIATION

BULKHEAD BARRIER WALL SECTIONS

Arcadis Project No.
B0036728.0001.00003
Date
FEBRUARY 2019
Arcadis
One Lincoln Center
110 West Fayette Street, Suite 300
Syracuse, NY 13202
Tel. 315.446.9120

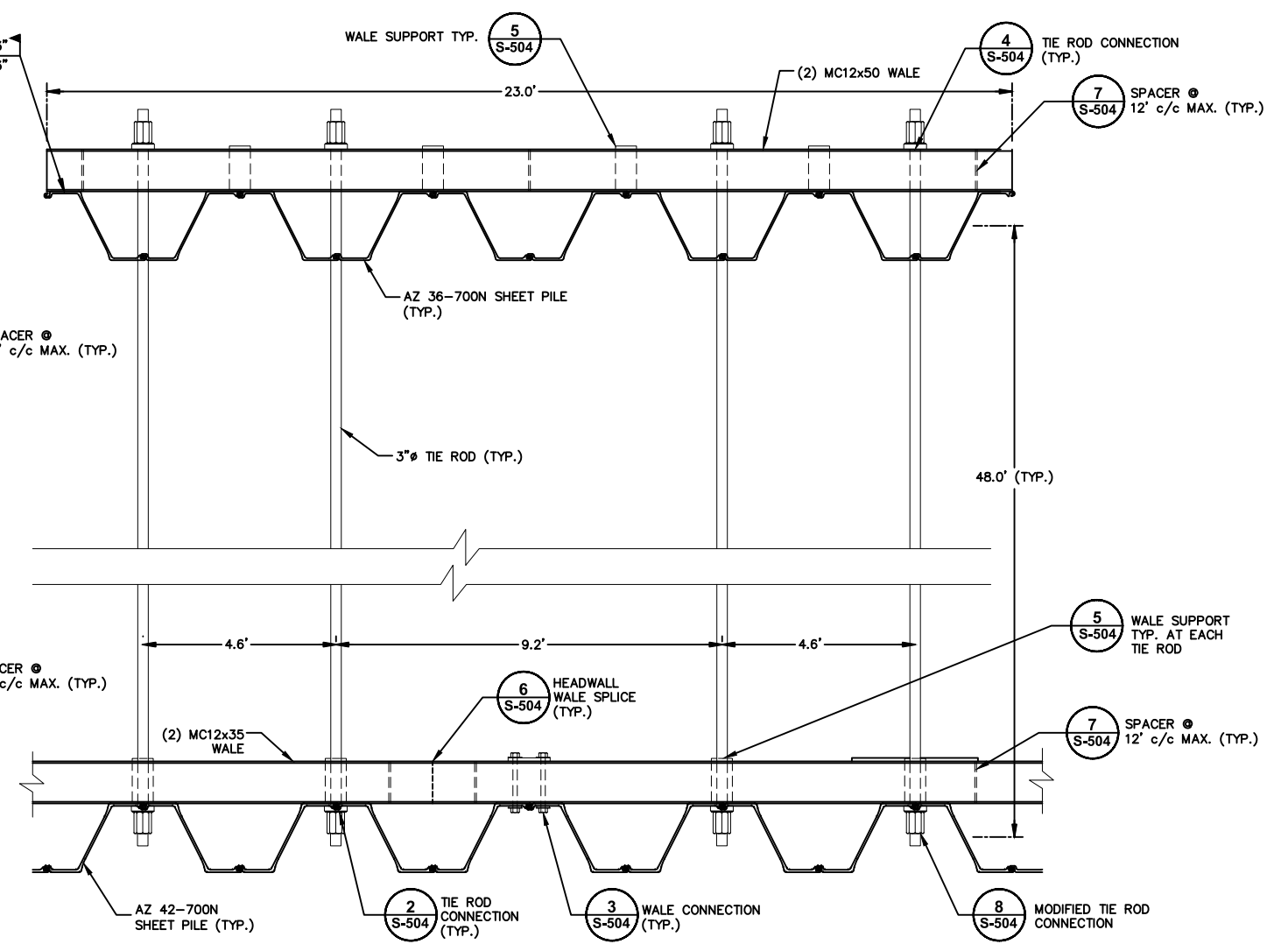
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CITY: SYRACUSE, NY DIV: GROUP: ENVCAD DR: B: GETTIS, B: DECLERQ, L: POSENAUER, J: HARRIS
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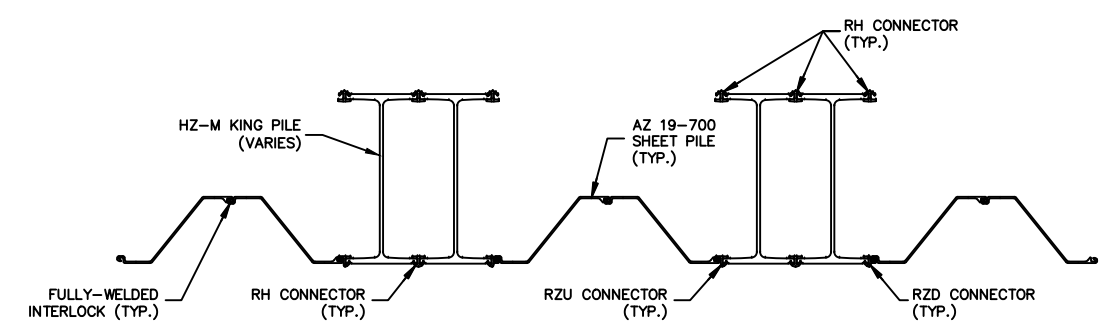


- NOTES:
- ANCHOR OFFSET FOR ANCHOR NOS. A-01, A-02, AND A-03 IS 45.5 FEET.
 - WALES BETWEEN ANCHOR NOS. A-01, A-02, AND A-03 DO NOT NEED TO BE CONTINUOUS.

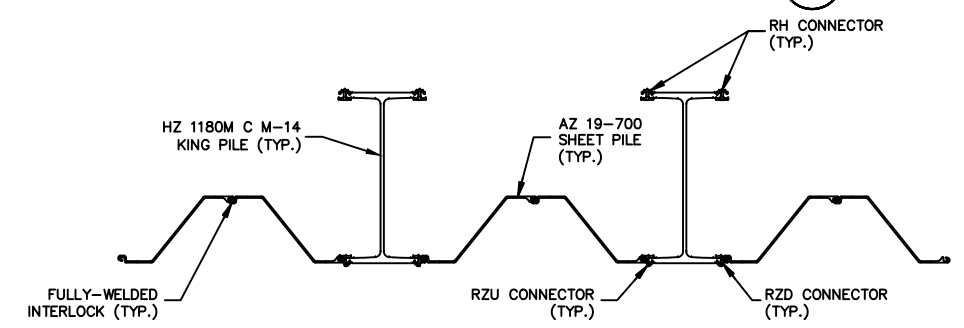
PARTIAL ANCHORED TIEBACK WALL PLAN
ANCHOR NOS. A-01 TO A-11, A-13 TO A-15, AND A-17 TO A-24 ①



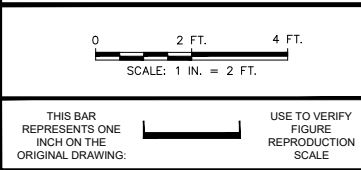
PARTIAL ANCHORED TIEBACK WALL PLAN
ANCHOR NO. A-12 ②



PARTIAL COMBINATION WALL PLAN
CP-26 TO CP-46 ③



PARTIAL COMBINATION WALL PLAN
CP-46 TO CP-53 ④



No.	Date	Revisions	By	Ckd

Professional Engineer's Name
LISA A. BOWE
 Professional Engineer's No.
 086254
 State
 NY
 Date Signed
 2/4/2019
 Project Mgr.
 MJB
 Designed by
 LAB
 Drawn by
 JLH
 Checked by
 APC



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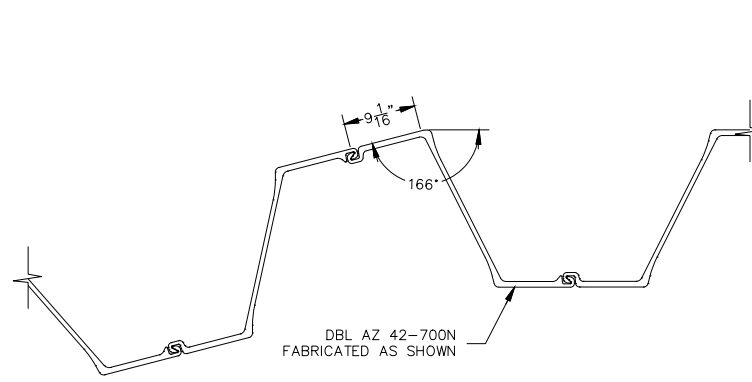
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 CARROLL GARDENS/PUBLIC PLACE
 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SITE REMEDIATION

BULKHEAD BARRIER WALL DETAILS

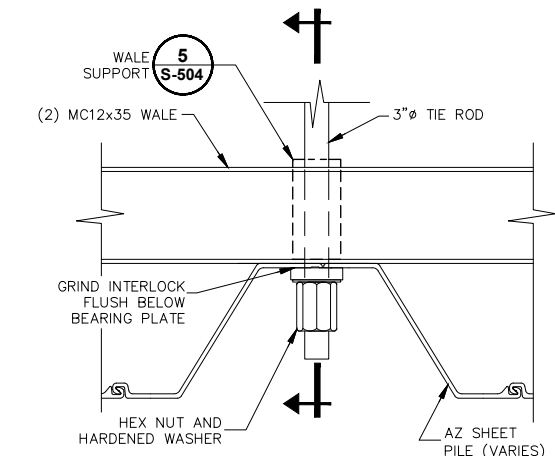
Arcadis Project No.
 B0036728.0001.00003
 Date
 FEBRUARY 2019
 Arcadis
 One Lincoln Center
 110 West Fayette Street, Suite 300
 Syracuse, NY 13202
 Tel. 315.446.9120

S-503A

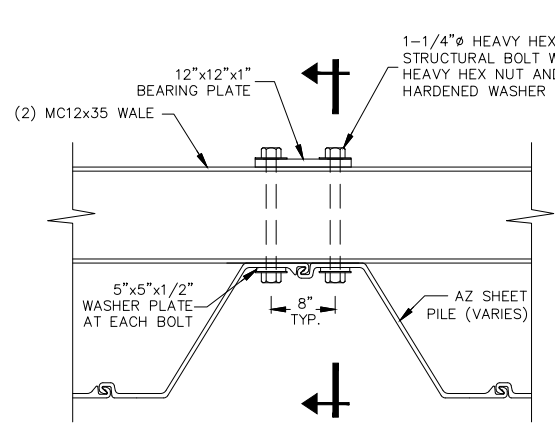
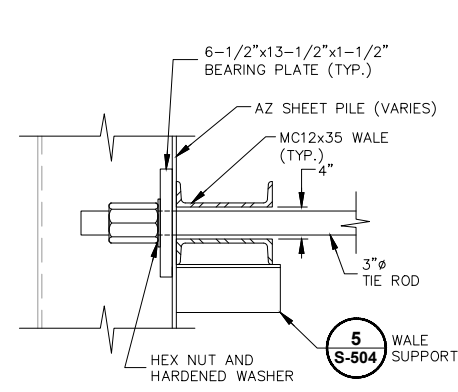
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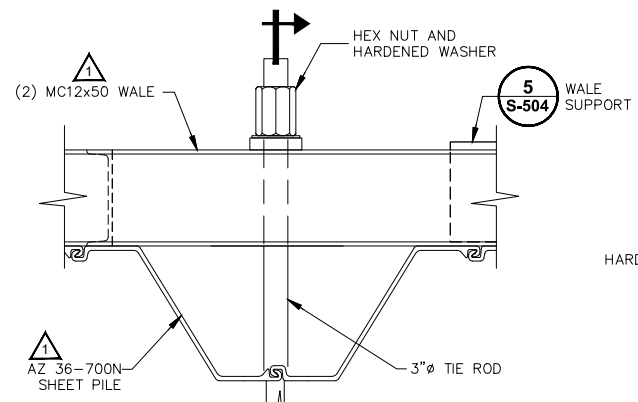
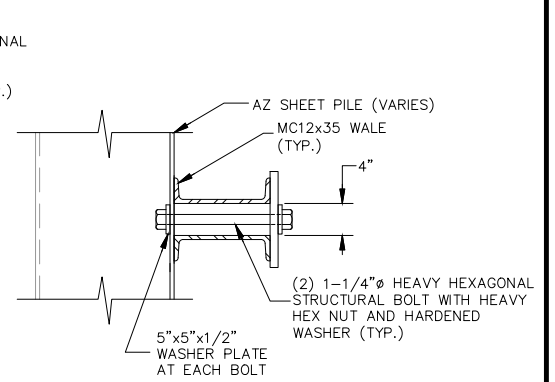
PLAN
CORNER DETAIL 1
 0 1 FT. 2 FT.
 SCALE: 1 IN. = 1 FT.



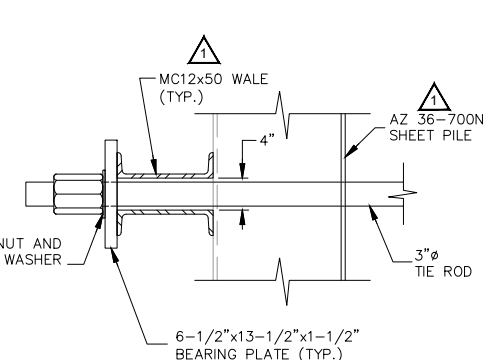
PLAN
TIE ROD CONNECTION TO SHEET PILE HEADWALL 2
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 SCALE: 1 IN. = 1 FT.



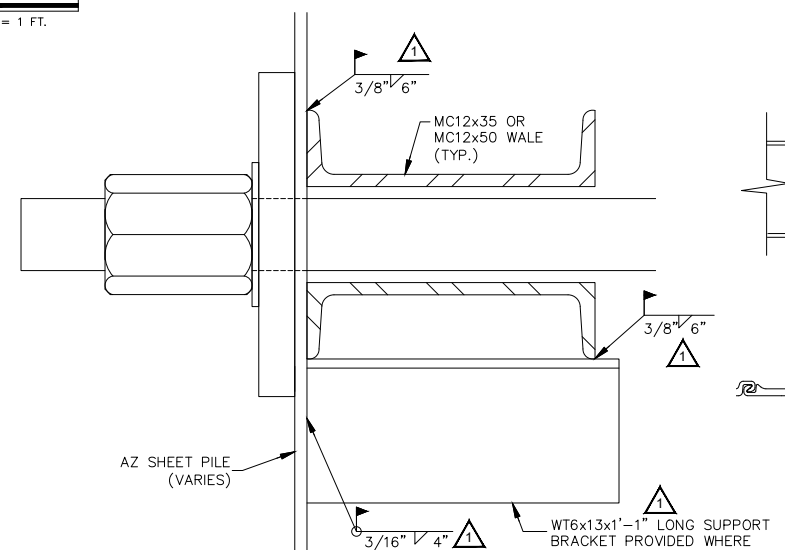
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WALE CONNECTION TO SHEET PILE HEADWALL 3
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 SCALE: 1 IN. = 1 FT.



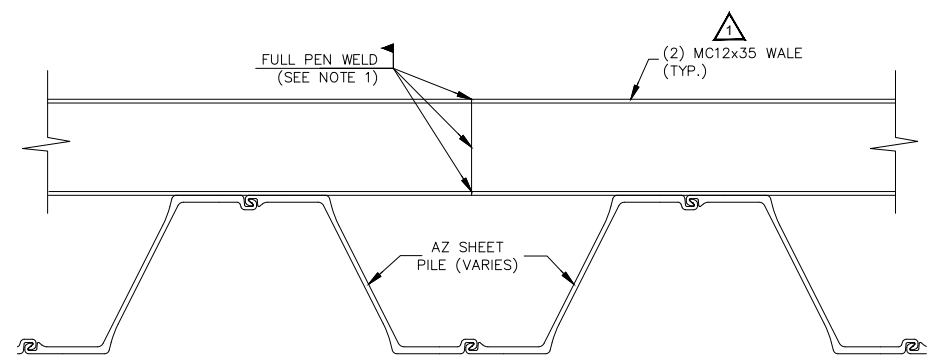
PLAN
TIE ROD CONNECTION TO SHEET PILE ANCHOR 4
 0 1 FT. 2 FT.
 SCALE: 1 IN. = 1 FT.



SECTION
TIE ROD CONNECTION TO SHEET PILE ANCHOR 4

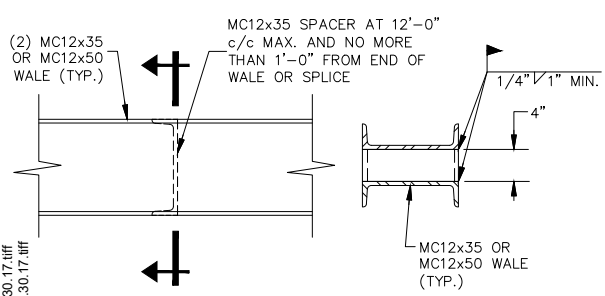


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WALE SUPPORT 5
 0 4 IN. 8 IN.
 SCALE: 3 IN. = 1 FT.

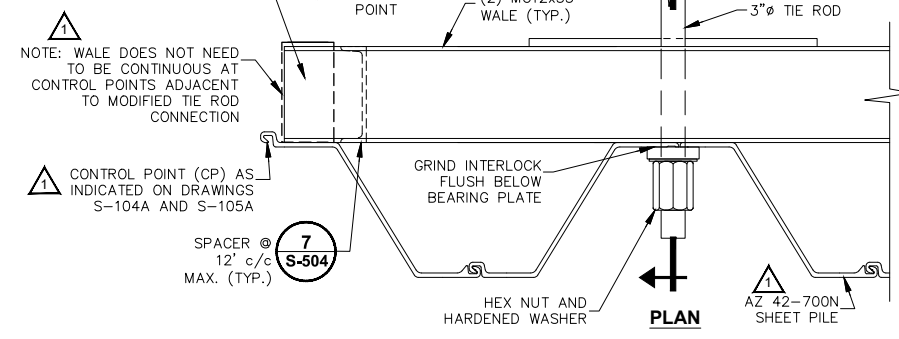


NOTE:
 1. PROVIDE FULL PENETRATION FIELD WELD SPLICES OF WALE BEAMS WHERE NEEDED TO ACCOMMODATE WALE PLACEMENT AND SHIPPING. CONTRACTOR MAY PROVIDE ALTERNATE CONTRACTOR-DESIGNED SPLICE DETAIL FOR PARTIAL LOADING. SUBMIT SIGNED AND SEALED CALCULATIONS BY A PROFESSIONAL ENGINEER SHOWING LOAD CAPACITIES FOR ALTERNATE SPLICE DETAIL WITH SHOP DRAWINGS FOR COORDINATION.

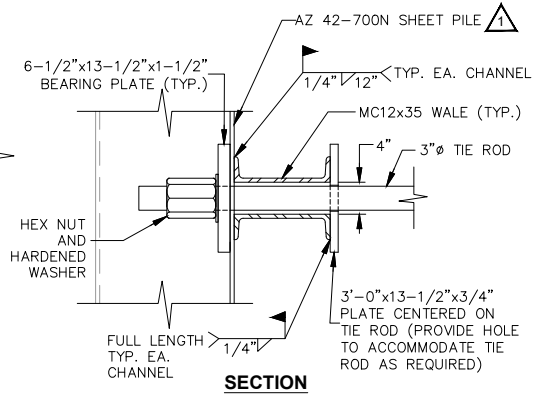
PLAN
HEADWALL WALE SPLICE 6
 0 1 FT. 2 FT.
 SCALE: 1 IN. = 1 FT.



PLAN
SECTION
WALE SPACER 7
 0 1 FT. 2 FT.
 SCALE: 1 IN. = 1 FT.



PLAN
MODIFIED TIE ROD CONNECTION TO SHEET PILE HEADWALL 8
 SEE DRAWINGS S-104A AND S-105A FOR LOCATIONS.
 0 1 FT. 2 FT.
 SCALE: 1 IN. = 1 FT.



SECTION
MODIFIED TIE ROD CONNECTION TO SHEET PILE HEADWALL 8

SCALE AS INDICATED

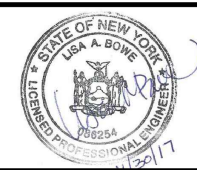
THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.

USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	2/4/2019	REMOVED DETAIL 9 & REVISED REMAINING DETAILS TO REFLECT NEW ANCHOR DESIGN	RPK	MJB

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Professional Engineer's Name LISA A. BOWE	
Professional Engineer's No. 086254	Date Signed 11/30/2017
State NY	Project Mgr. MJB
Designed by LAB	Checked by APC
Drawn by JLH	



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 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SITE REMEDIATION

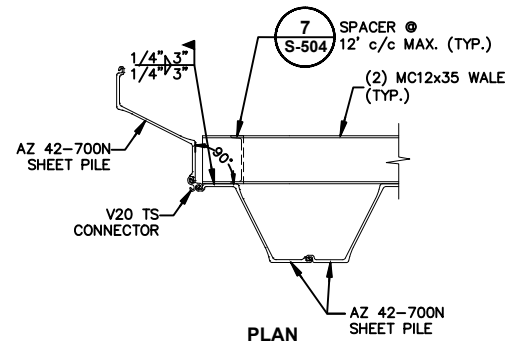
BULKHEAD BARRIER WALL DETAILS

Arcadis Project No. B0036728.0001.00003
Date NOVEMBER 2017
Arcadis One Lincoln Center 110 West Fayette Street, Suite 300 Syracuse, NY 13202 Tel. 315.446.9120

S-504

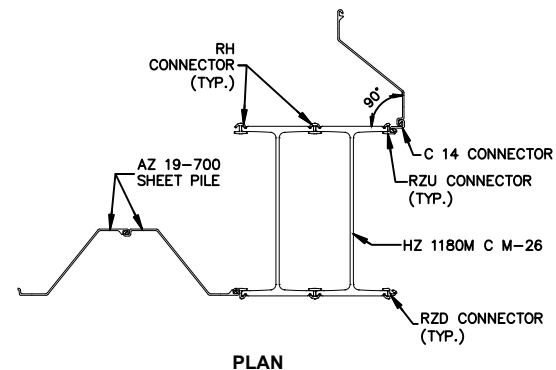
CITY: SYRACUSE, NY DIV: GROUP: ENV: CAD DB: B GETTIS, B DECLERO, L POSENAUER, J HARRIS C:\BIM\OneDrive - ARCADIS\BIM 360 Docs\NATIONAL GRID\FORMER CITIZENS GAS WORKS MGP SITE\2019\B0036728.000\101-DWG\36728_S-507.dwg LAYOUT: S-507 PLOTTED: 2/4/2019 7:18 AM BY: HARRIS, JESS

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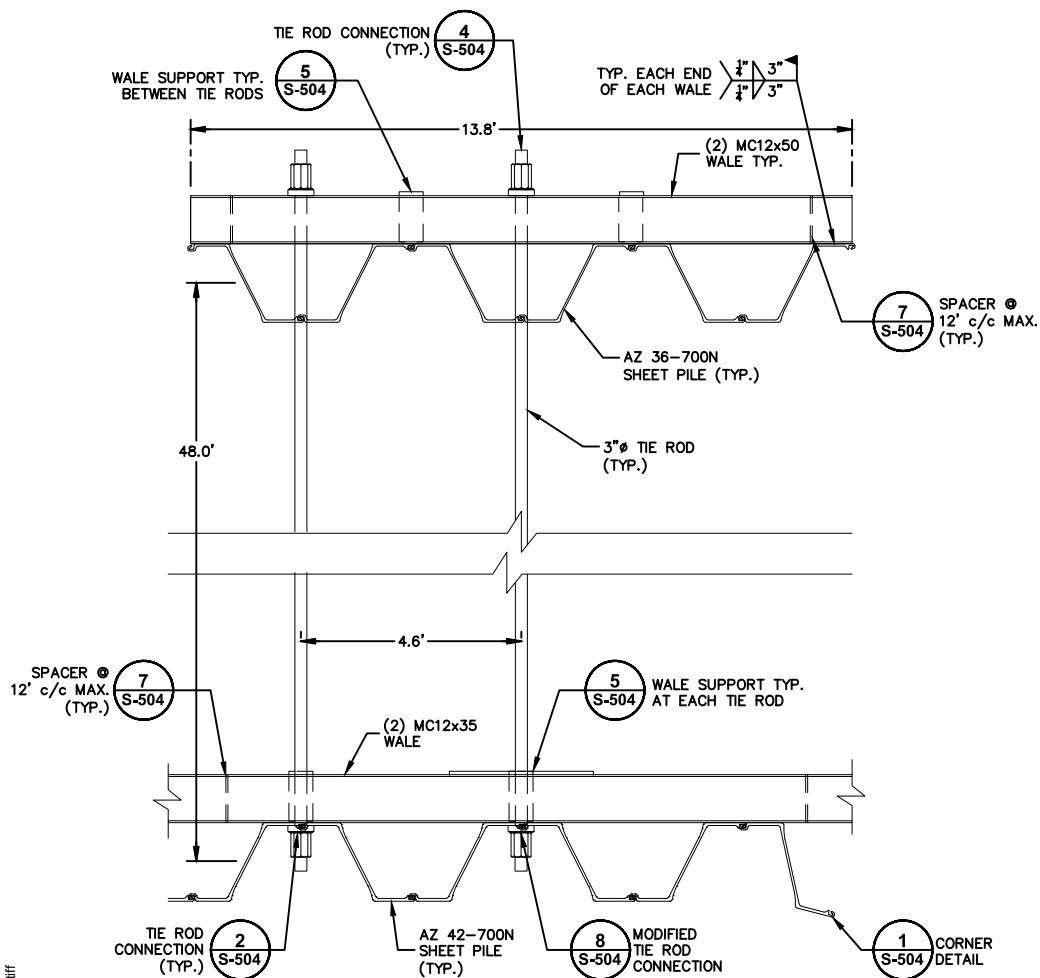
NOTE:
1. FINAL ANGLE, SHEETING WIDTH, AND ORIENTATION TO BE FIELD-DETERMINED. INSTALL SHEETING TO CREATE TIGHT SEAL BETWEEN NEW AND EXISTING BULKHEADS.

BULKHEAD BARRIER WALL TERMINATION 1



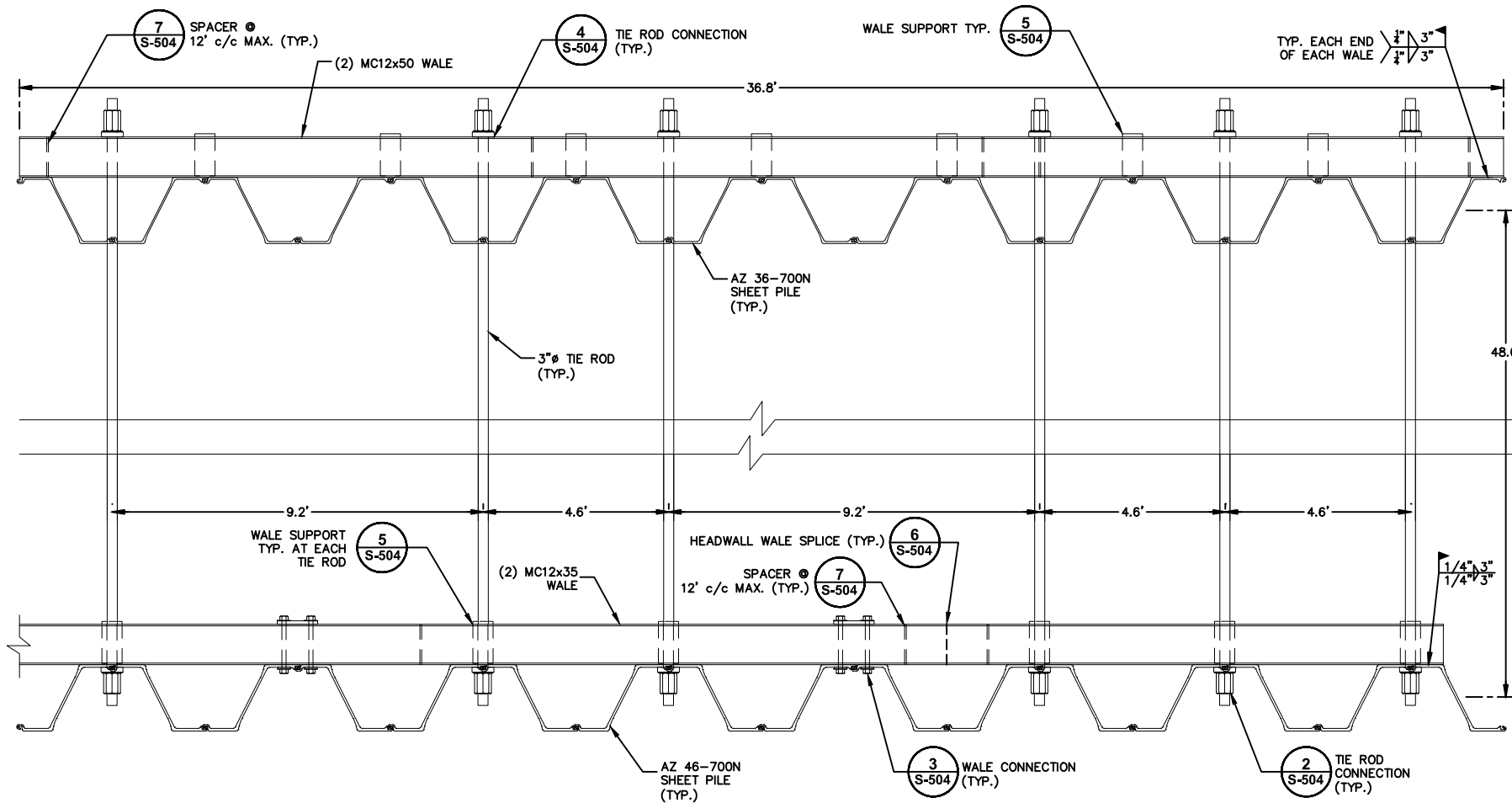
NOTE:
1. FINAL ANGLE, SHEETING WIDTH, AND ORIENTATION TO BE FIELD-DETERMINED. INSTALL SHEETING TO CREATE TIGHT SEAL BETWEEN NEW AND EXISTING BULKHEADS.

BULKHEAD BARRIER WALL TERMINATION 2



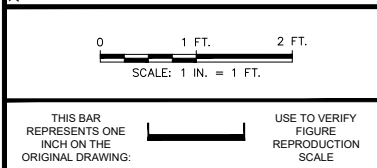
PARTIAL ANCHORED TIEBACK WALL PLAN ANCHOR NO. A-16

3



PARTIAL ANCHORED TIEBACK WALL PLAN ANCHOR NO. A-25

4



No.	Date	Revisions	By	Ckd
1	2/4/2019	ADDED NOTE TO DETAILS 1 & 2 AND ADDED NEW DETAILS 3 & 4	RPK	MJB

Professional Engineer's Name TERRY W. YOUNG	
Professional Engineer's No. 086254	Date Signed 11/30/2017
State NY	Project Mgr. MJB
Designed by LAB	Checked by APC



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BULKHEAD BARRIER WALL DETAILS

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