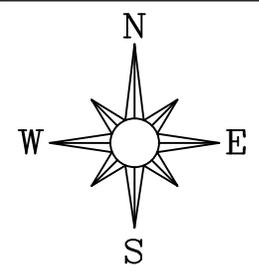
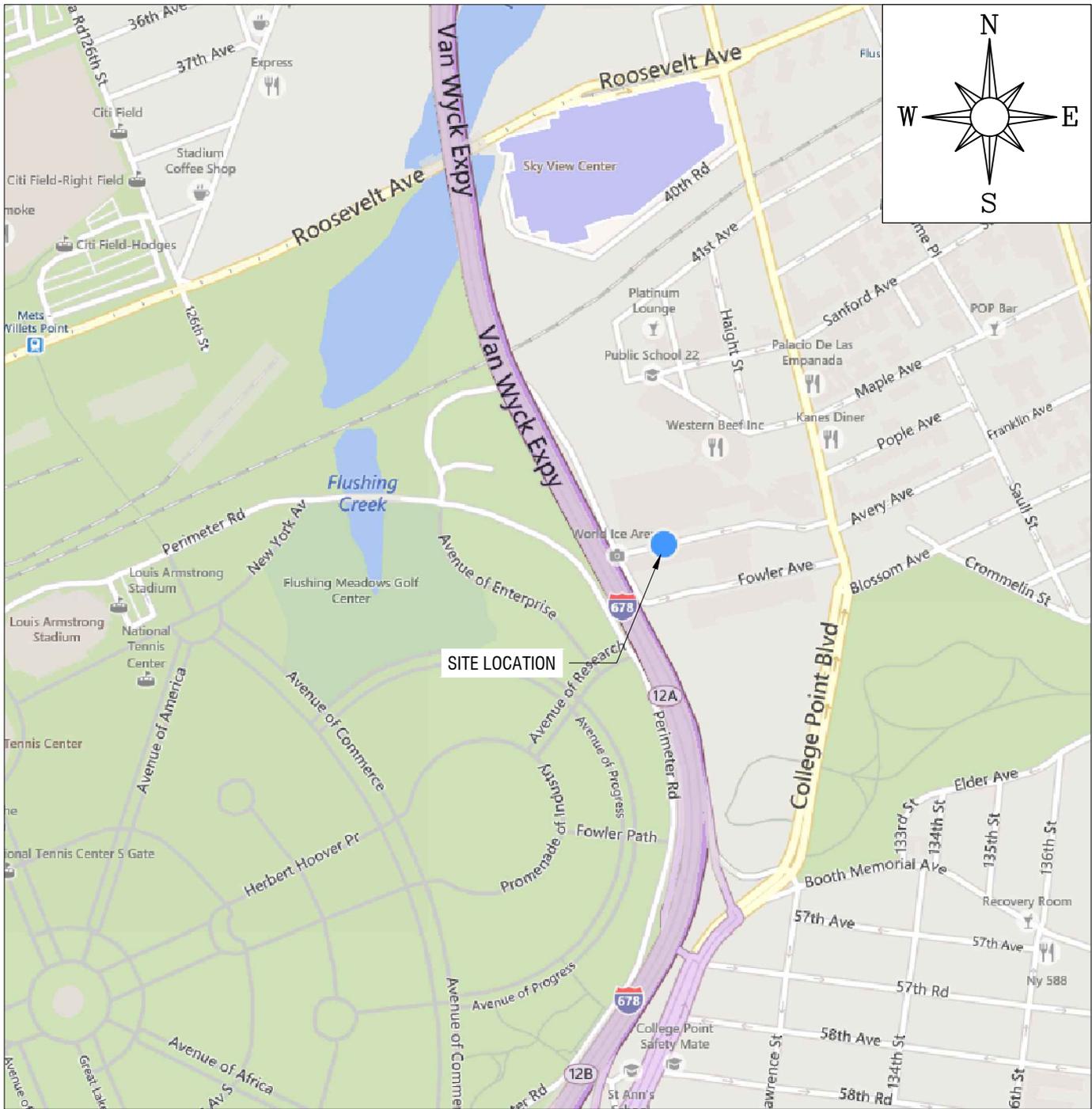


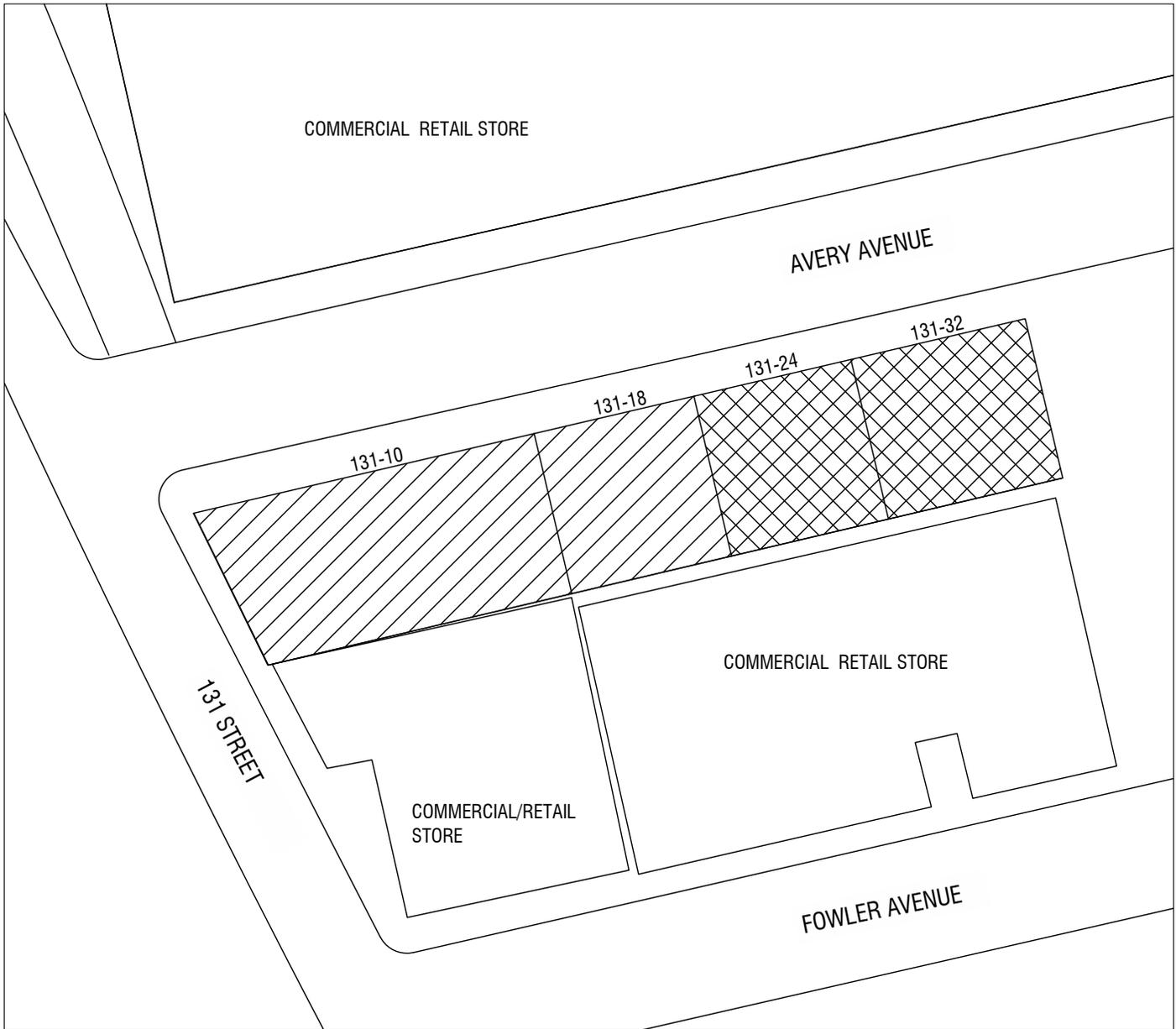
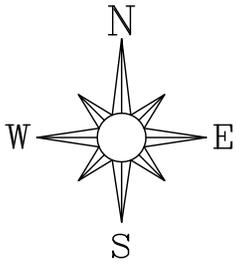
# FIGURES



Scale:  500 ft



Drawn by: ALEJANDRO MOREJON	Site Plan: 131-18 to 131-24 AVERY AVENUE FLUSHING, NY 11355
Checked by: ETHAN RAINEY	
Drawing Scale: AS NOTED	
Project No: 14-132-0587	Figure: FIGURE 1 Title: SITE LOCATION MAP
Date: May 29, 2014	

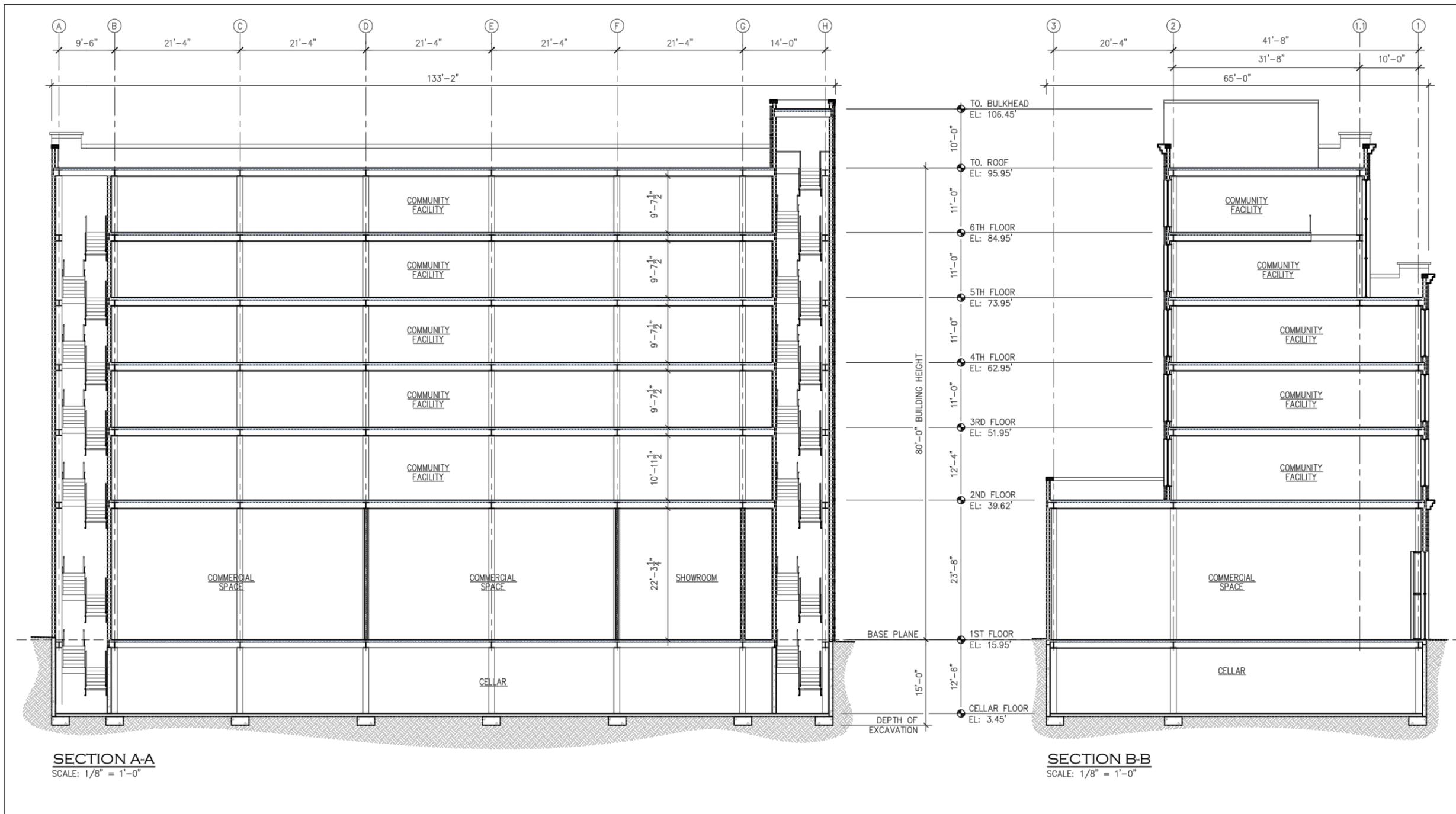


**Legend:**

	SITE A (131-10 & 131-18 AVERY AVENUE)
	SITE B (131-24 & 131-32 AVERY AVENUE)



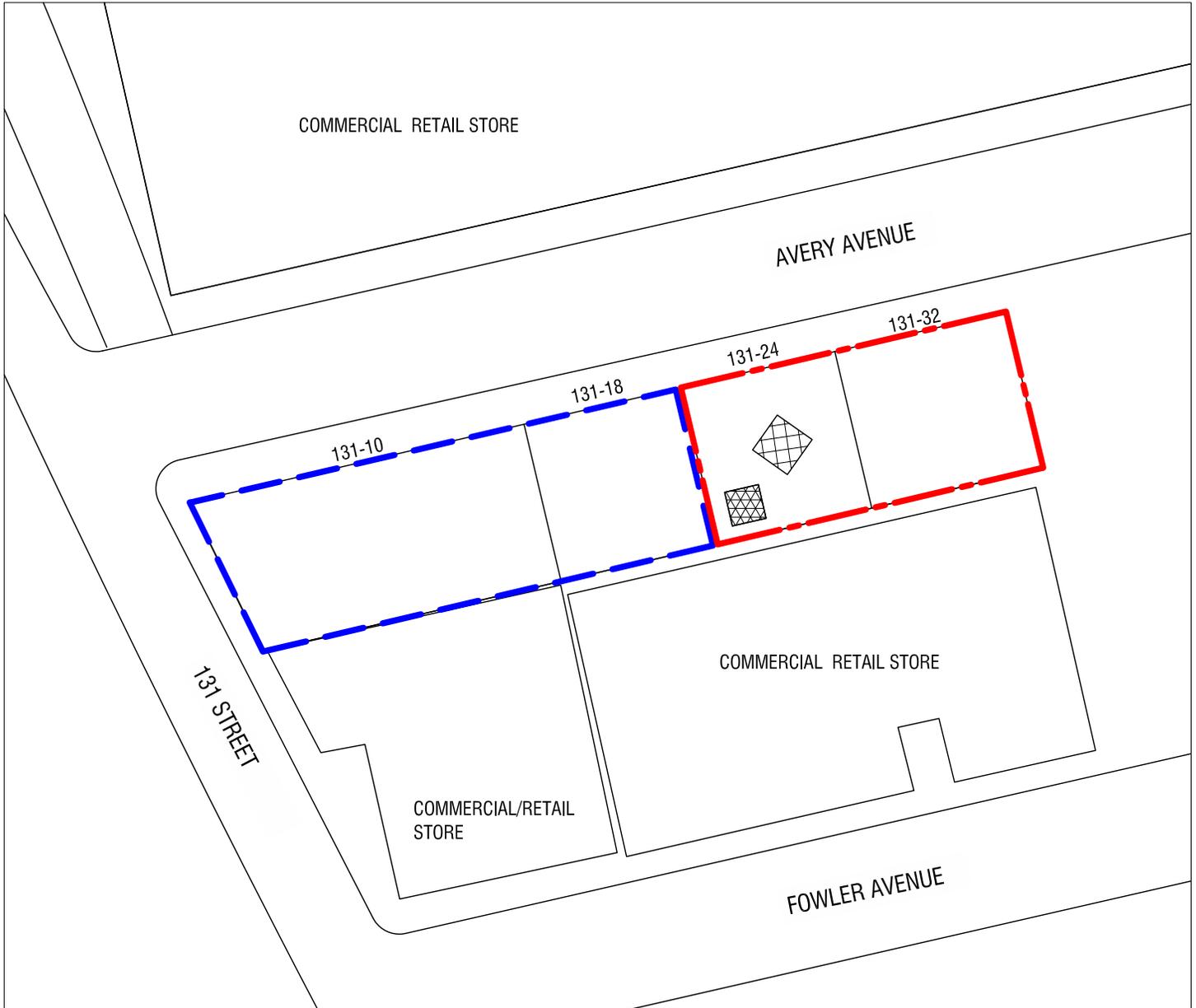
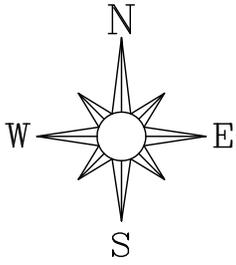
Site map:	131-10 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	2
Title:	SITE BOUNDARY MAP
Date:	JANUARY 12, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	ETHAN RAINEY
Drawing Scale:	AS NOTED
Project No.:	14-133-1270



PROPOSED REDEVELOPMENT PLAN FOR 131-24 AVERY AVENUE (SITE B)



Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	3
Title:	PROPOSED DEVELOPMENT PLAN
Date:	MARCH 06, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	N.T.S.
Project No.:	14-133-1269 & 14-133-1270

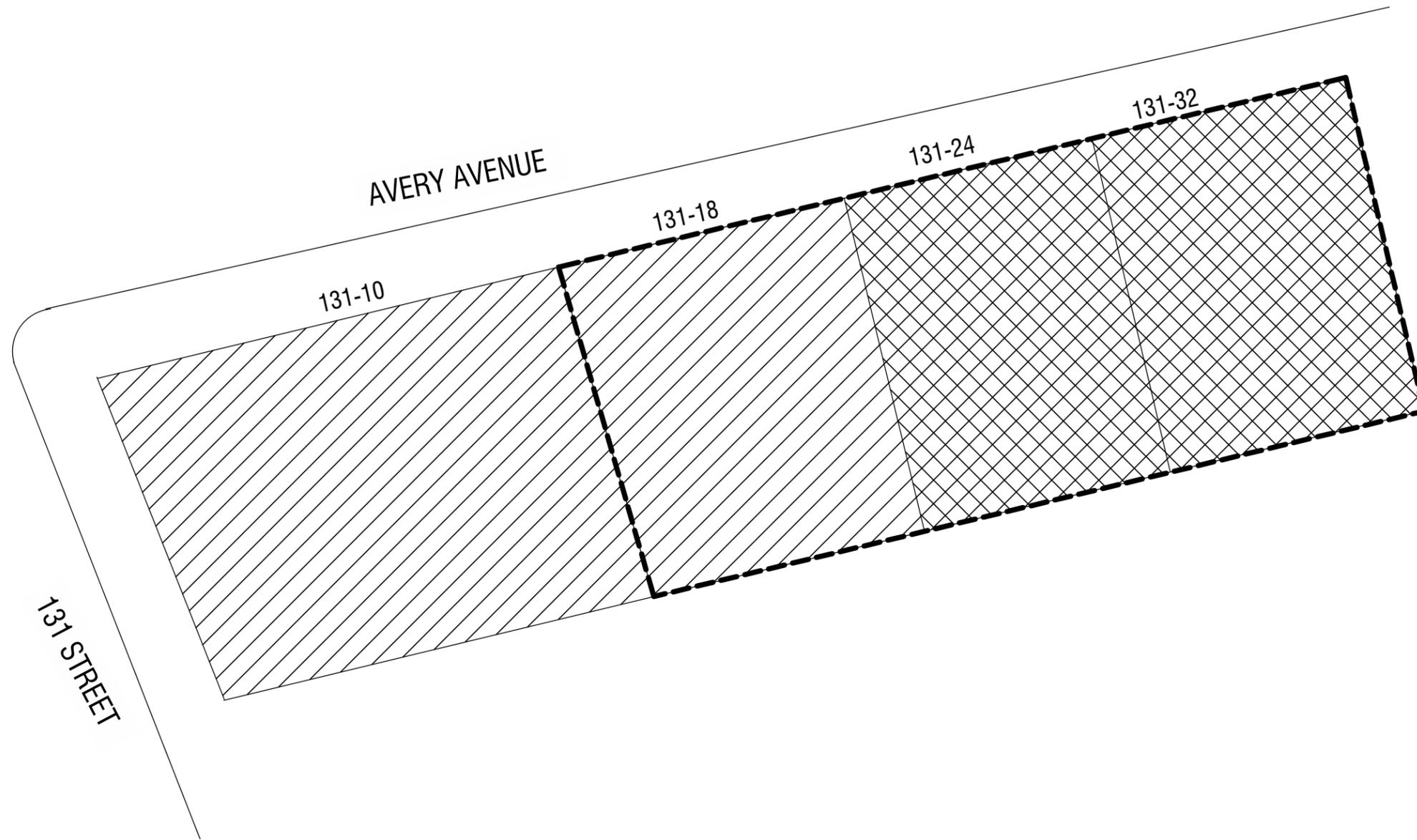
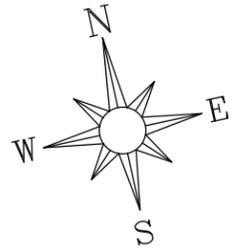


**Legend:**

	SITE A (131-10 & 131-18 AVERY AVENUE)
	SITE B (131-24 & 131-32 AVERY AVENUE)
	LOCALIZED PCB HAZARDOUS HOT-SPOT AREA IN SOIL TO 2 FEET BGS
	LOCALIZED PCE AND TCE CONTAMINATION IN SOIL TO 6 FEET BGS



Site map:	131-10 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	4
Title:	AREAS OF CONCERN FOR SOIL
Date:	MARCH 6, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	AS NOTED
Project No.:	14-133-1270 & 14-133-1269



Legend:



PROPOSED AREA OF EXCAVATION  
TO 15 FEET BELOW GRADE



SITE A (131-10 & 131-18 AVERY AVENUE)

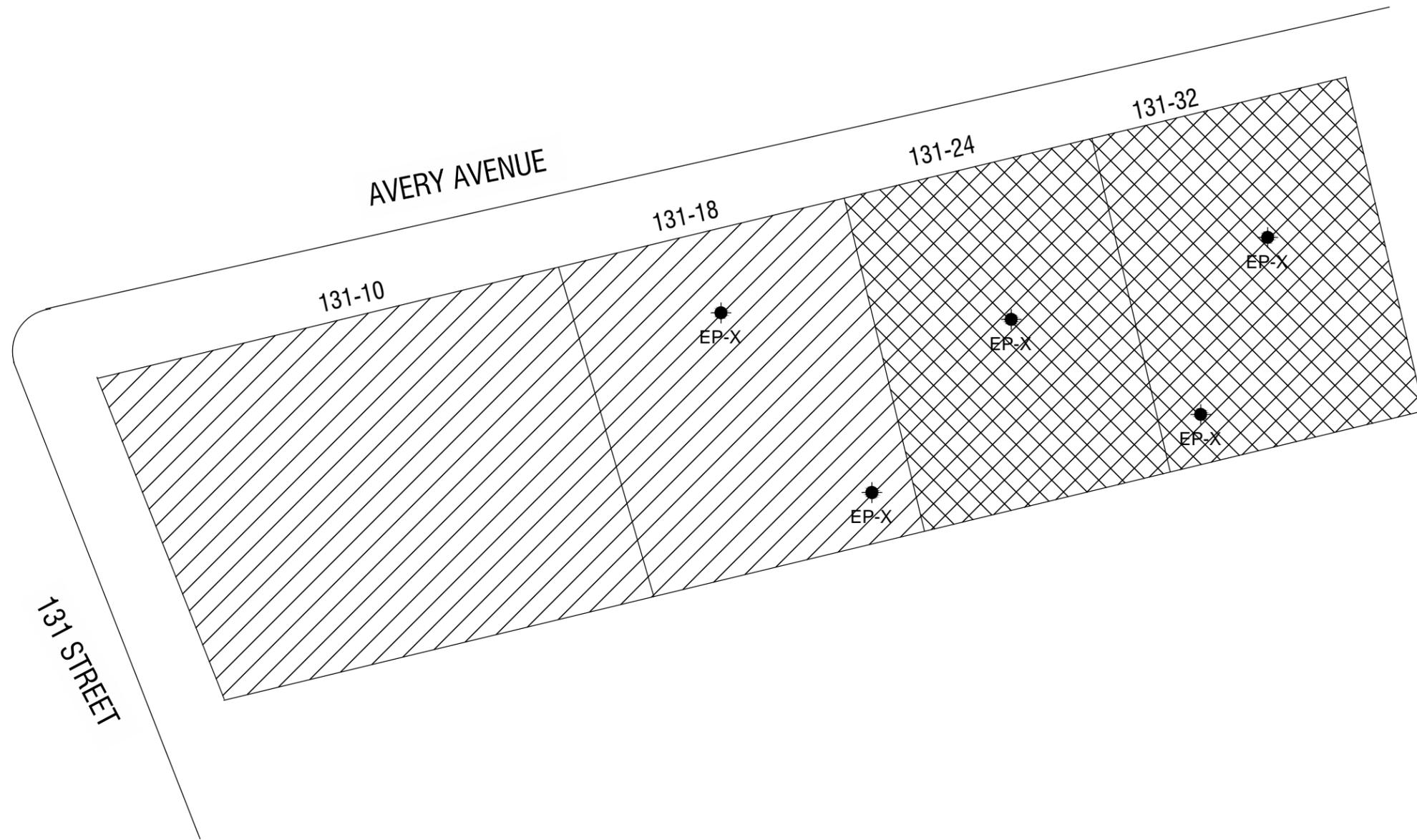
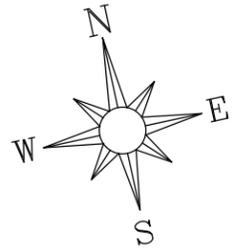


SITE B (131-24 & 131-32 AVERY AVENUE)



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SERVICES, INC.**  
Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	5
Title:	SITE EXCAVATION DIAGRAM
Date:	MARCH 23, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	N.T.S.
Project No.:	14-133-1269 & 14-133-1270



Legend:

 END POINT SAMPLING  
LOCATION AND  
DESIGNATION NUMBER

 SITE A (131-10 & 131-18 AVERY AVENUE)

 SITE B (131-24 & 131-32 AVERY AVENUE)



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ENVIRONMENTAL  
SERVICES, INC.**  
Environmental Consultants

Site map: 131-18 to 131-32 AVERY AVENUE  
FLUSHING, NY 11355

Figure: 6  
Title: END-POINT SAMPLE LOCATIONS

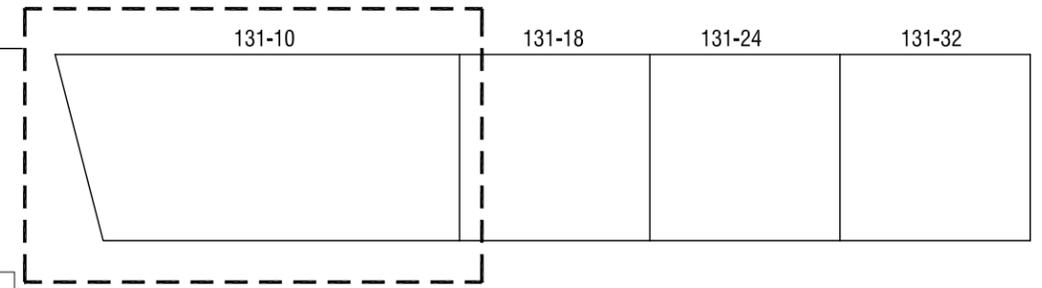
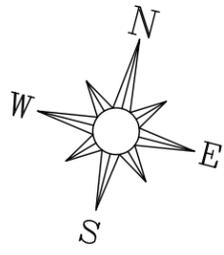
Date: MARCH 23, 2015

Drawn by: MICHAEL MANDAC

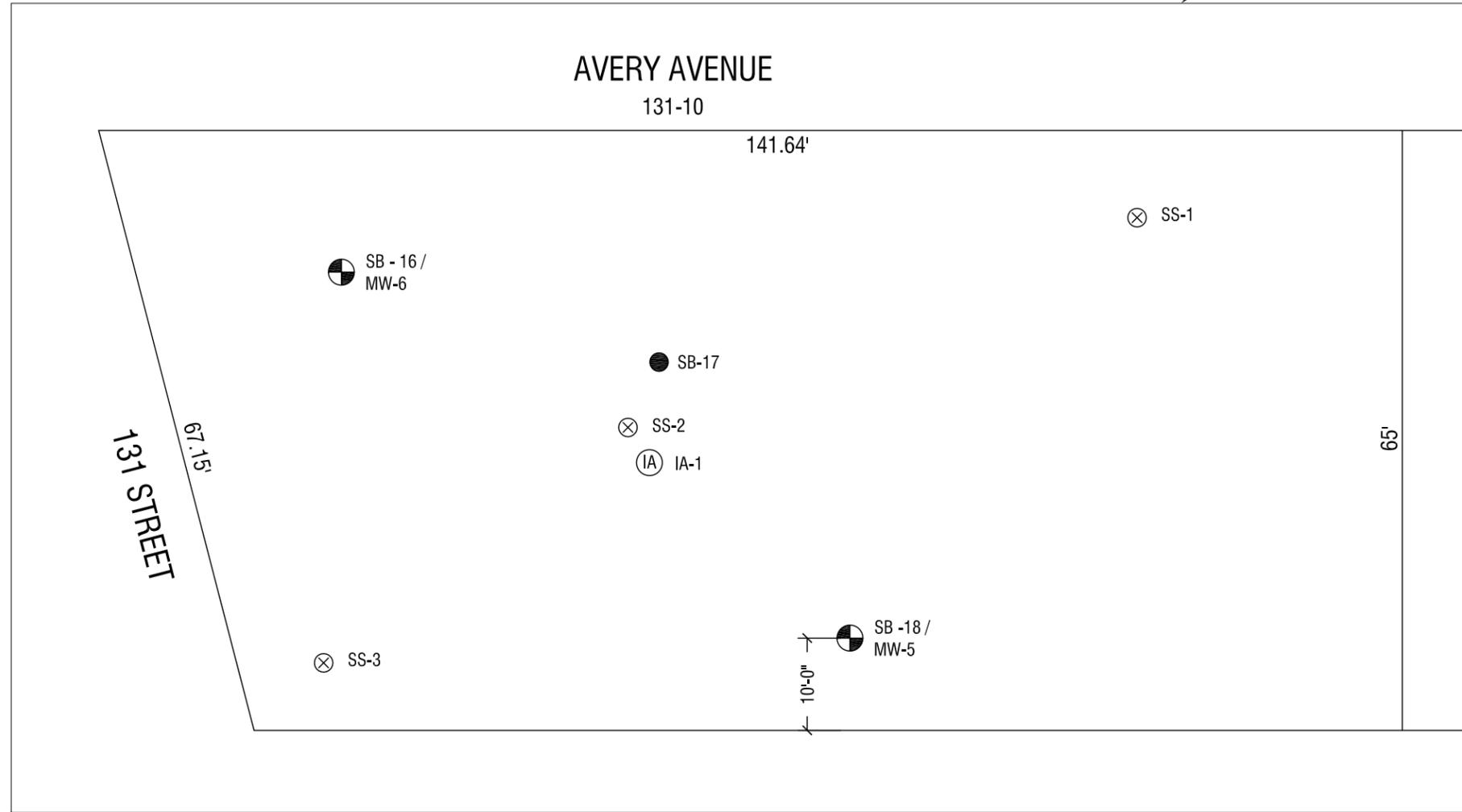
Checked by: EZGI KARAYEL

Drawing Scale: N.T.S.

Project No.: 14-133-1269 & 14-133-1270



INDEX MAP



NOTES:

1. TESTING WILL BE PERFORMED WITHIN ACCESSIBLE AREAS OF THE BASEMENT OF THE EXISTING BUILDING.
2. TESTING LOCATIONS ARE SUBJECT TO CHANGE BASED ON SITE CONDITIONS.

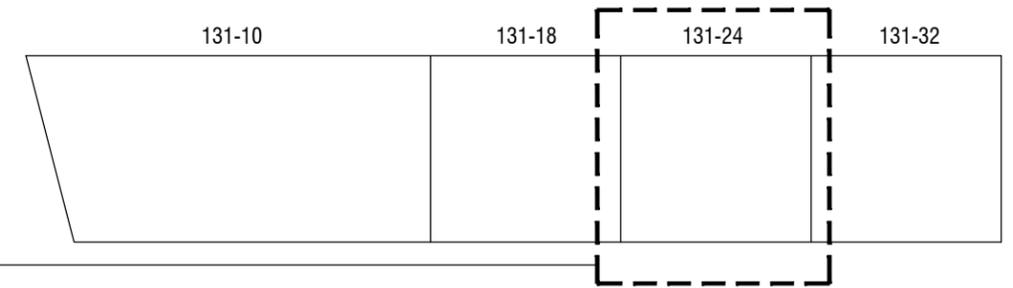
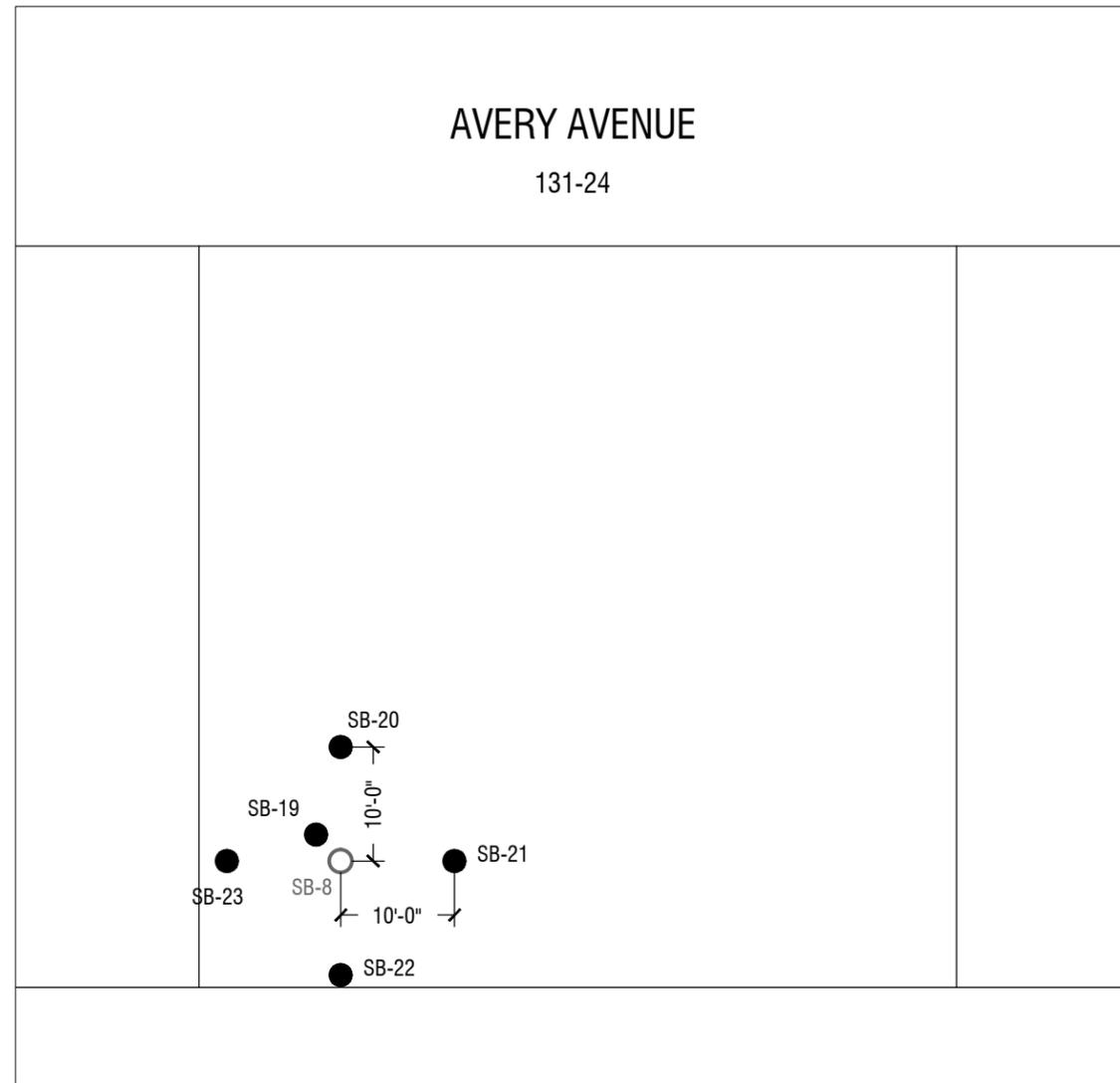
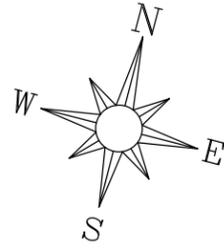
Legend:

- SB-X PROPOSED SOIL BORING LOCATION AND DESIGNATION NUMBER
- (IA) IA-X PROPOSED INDOOR AIR SAMPLING LOCATION AND DESIGNATION NUMBER
- ◐ SB-X /MW-X PROPOSED SOIL BORING / MONITORING WELL LOCATION AND DESIGNATION NUMBER
- ⊗ SS-X PROPOSED SUB-SLAB VAPOR TESTING LOCATION AND DESIGNATION NUMBER

Bar Scale:



Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure: Title:	7 SUPPLEMENTAL REMEDIAL INVESTIGATION FOR 131-10 AVERY AVENUE
Date:	APRIL 14, 2015
Drawn by:	ALEJANDRO MOREJON CORTINA
Checked by:	WILLIAM SILVERI
Drawing Scale:	1/16" = 1'-0"
Project No.:	14-133-1269 & 14-133-1270



INDEX MAP

NOTES:

1. CONCENTRATION OF PCBs IN THE SHALLOW SOIL SAMPLES (0 - 2 FEET BGS) AT BORING SB-8 WERE FOUND TO BE GREATER THAN 50 PPM.
2. PROPOSED DIRECT-PUSH BORINGS SB-19 THRU SB-23 WILL BE INSTALLED TO 4 FEET BBFS

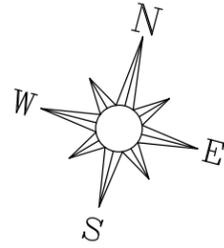
Legend:

- SB-X PROPOSED DELINEATION SOIL BORING LOCATION AND DESIGNATION NUMBER
- SB-8 PRIOR SOIL BORING LOCATION AND DESIGNATION NUMBER
- PPM PARTS PER MILLION
- PCBs POLYCHLORINATED BIPHENYLS
- BBFS BELOW BOTTOM OF SLAB

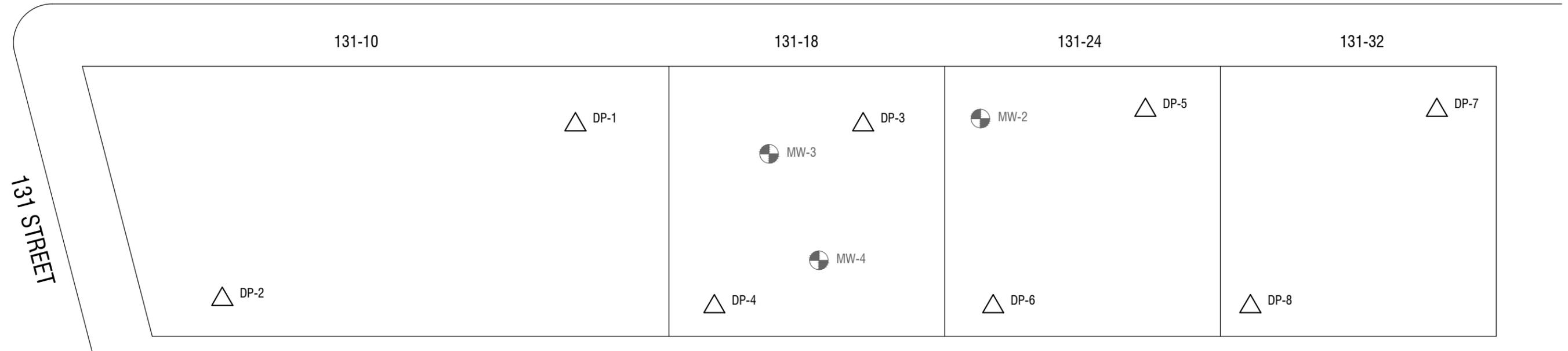
Bar Scale:



Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	8 PROPOSED DELINEATION OF SOIL BORINGS FOR PCB-CONTAMINATED HOT SPOT AREA
Date:	APRIL 08, 2015
Drawn by:	ALEJANDRO MOREJON CORTINA
Checked by:	WILLIAM SILVERI
Drawing Scale:	1/16" = 1'-0"
Project No.:	14-133-1269 & 14-133-1270



AVERY AVENUE



NOTES:

1. PROPOSED DIRECT-PUSH BORINGS WILL BE INSTALLED TO SUPPORT REMEDIAL DESIGN FOR TREATMENT OF CHLORINATED SOLVENT-RELATED GROUNDWATER CONTAMINATION.
2. DIRECT-PUSH BORINGS WILL BE INSTALLED TO A DEPTH OF 40 FEET BELOW GROUND SURFACE, WHICH IS APPROXIMATELY 20 FEET BELOW THE TOP OF GROUNDWATER.

Legend:

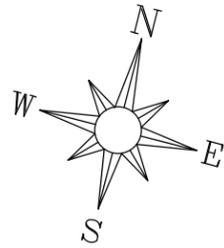
- MW-X EXISTING GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION NUMBER
- DP-X PROPOSED DIRECT-PUSH SOIL AND GROUNDWATER SAMPLING LOCATION TO SUPPORT REMEDIAL DESIGN FOR TREATMENT OF GROUNDWATER CONTAMINATION

Bar Scale:

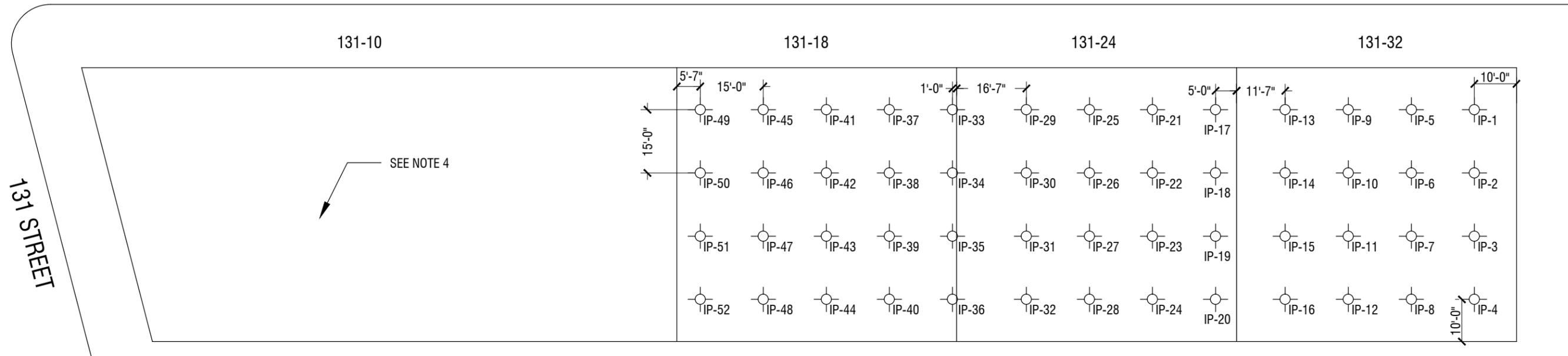


**ATHENICA  
ENVIRONMENTAL  
SERVICES, INC.**  
Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	9
Title:	PROPOSED PRE-DESIGN SAMPLING
Date:	APRIL 08, 2015
Drawn by:	ALEJANDRO MOREJON CORTINA
Checked by:	WILLIAM SILVERI
Drawing Scale:	5/128" = 1'-0"
Project No.:	14-133-1269 & 14-133-1270



## AVERY AVENUE



**NOTES:**

1. AT EACH PROPOSED INJECTION POINT, A REMEDIATION PRODUCT CONSISTING OF ELECTRON DONOR (3D ME<sup>®</sup>) WILL BE APPLIED TO THE GROUNDWATER IN ORDER TO PROMOTE CHEMICAL REDUCTION OF CHLORINATED SOLVENT-RELATED GROUNDWATER CONTAMINATION.
2. THE PRELIMINARY REMEDIAL DESIGN IS BASED ON A SPACING OF 15 FEET BETWEEN INJECTION POINTS.
3. THE NUMBER, LOCATION AND SPACING OF PROPOSED INJECTION POINTS ARE SUBJECT TO CHANGE BASED ON RESULTS OF PRE-DESIGN SAMPLING.
4. INJECTION OF THE REMEDIATION PRODUCT ALSO WILL OCCUR BENEATH THE BASEMENT FLOOR OF THE EXISTING BUILDING AT 131-10 AVERY AVENUE IF WARRANTED BY THE FINDING OF THE PRE-DESIGN SAMPLING AND ADDITIONAL TESTING AT THIS PORTION OF THE SITE.

**Legend:**



IP-X

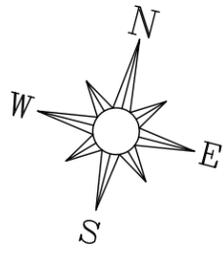
PROPOSED INJECTION POINT LOCATION  
AND DESIGNATION NUMBER

**Bar Scale:**

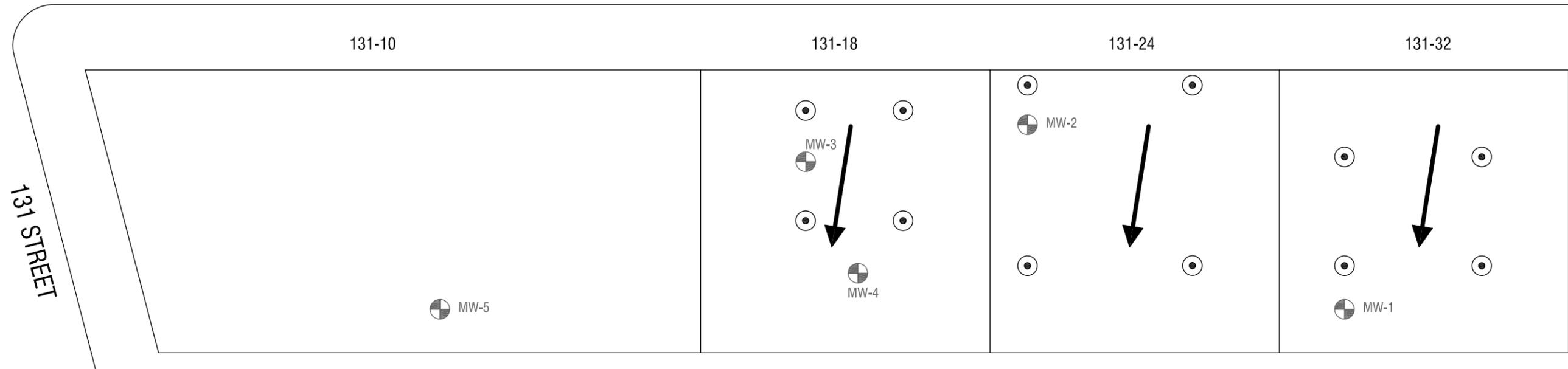


**ATHENICA  
ENVIRONMENTAL  
SERVICES, INC.,**  
Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure: Title:	10 PRELIMINARY REMEDIAL DESIGN FOR IN-SITU TREATMENT OF CHLORINATED SOLVENT-RELATED GROUNDWATER CONTAMINATION
Date:	APRIL 08, 2015
Drawn by:	ALEJANDRO MOREJON CORTINA
Checked by:	WILLIAM SILVERI
Drawing Scale:	5/128" = 1'-0"
Project No.:	14-133-1269 & 14-133-1270



EVERY AVENUE



NOTES:

1. THE POST-DEVELOPMENT REAPPLICATION POINTS WILL BE INSTALLED PRIOR TO THE INSTALLATION OF THE NEW BUILDING BASEMENT FLOOR SLAB.
2. NUMBER , LOCATION, AND DEPTH OF REAPPLICATION POINTS ARE SUBJECT TO CHANGE BASED ON RESULTS OF PRE-DESIGN SAMPLING.

Legend:

- MW-X POST-REMEDIATION GROUNDWATER MONITORING WELL AND DESIGNATION NUMBER
- GROUNDWATER FLOW DIRECTION
- RP-X POST-DEVELOPMENT REAPPLICATION POINT

Bar Scale:



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ENVIRONMENTAL  
SERVICES, INC.  
Environmental Consultants

Site map: 131-18 to 131-32 AVERY AVENUE  
FLUSHING, NY 11355

Figure: 11  
Title: POST-DEVELOPMENT REAPPLICATION POINTS

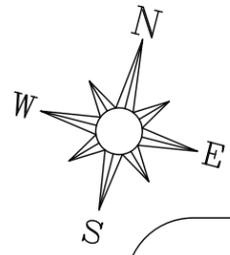
Date: APRIL 14, 2015

Drawn by: ALEJANDRO MOREJON CORTINA

Checked by: WILLIAM SILVERI

Drawing Scale:  $\frac{5}{128}$ " = 1'-0"

Project No.: 14-133-1269 & 14-133-1270



AVERY AVENUE

131-10

131-18

131-24

131-32

131 STREET

MW-5

MW-3

MW-4

MW-2

MW-1

SOUTH ADJACENT PROPERTY

NOTES:

1. ON-SITE POST-REMEDATION GROUNDWATER MONITORING WELLS MW-1, MW-2, MW-3, MW-4 AND MW-6 WILL BE SAMPLED AS PART OF THE RAWP FOR THE SITE.
2. OFF-SITE POST-REMEDATION MONITORING WELLS ON SOUTH-ADJACENT PROPERTY WILL BE SELECTED AT A FUTURE DATE AND WILL BE SAMPLED AS PART OF THE RAWP FOR THE SOUTH-ADJACENT PROPERTY.

Legend:



MW-X

POST-REMEDATION GROUNDWATER  
MONITORING WELL AND DESIGNATION NUMBER

Bar Scale:



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Site map: 131-18 to 131-32 AVERY AVENUE  
FLUSHING, NY 11355

Figure: 12  
Title: POST-REMEDATION GROUNDWATER SAMPLING

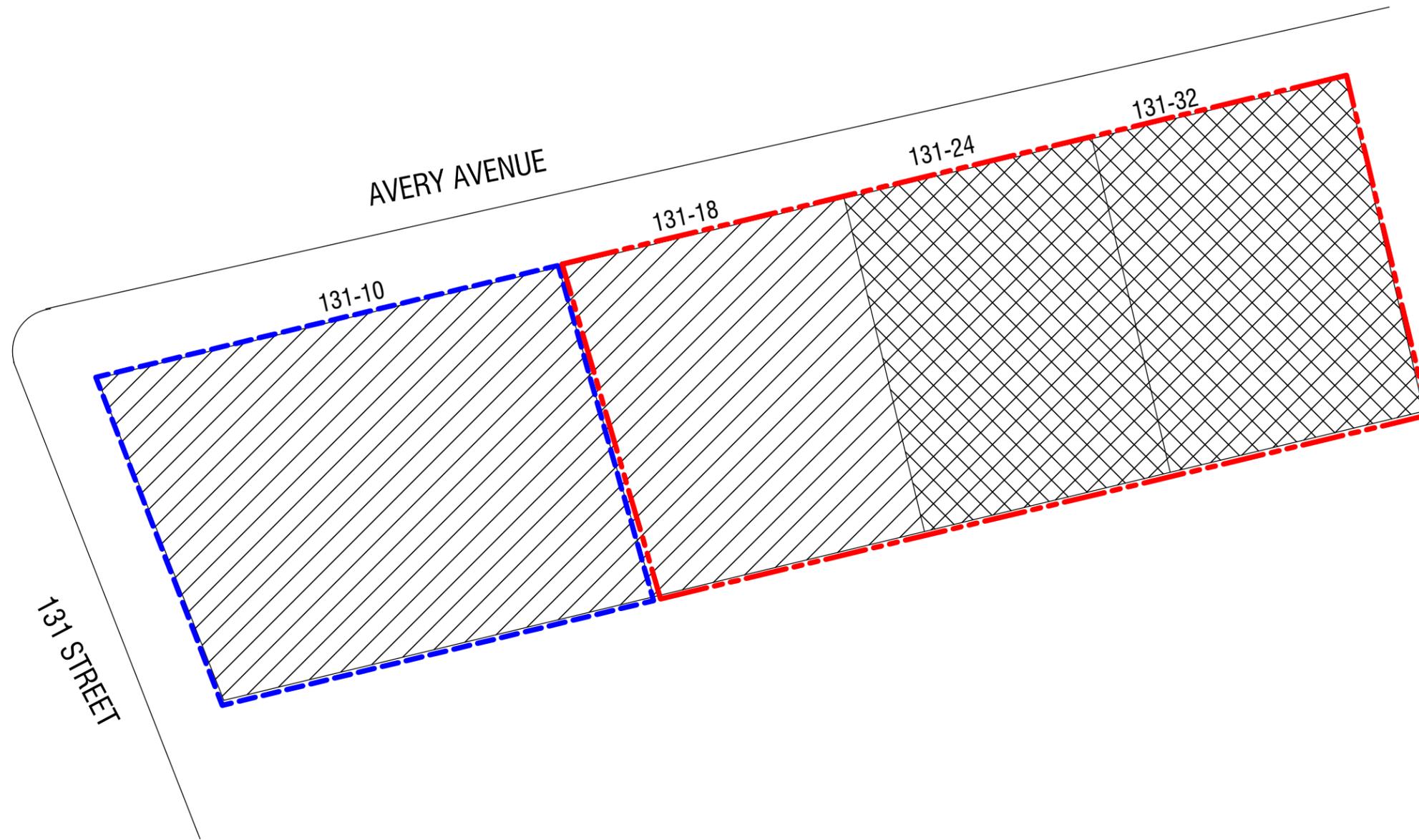
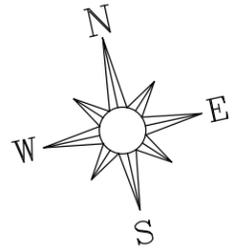
Date: APRIL 14, 2015

Drawn by: ALEJANDRO MOREJON CORTINA

Checked by: WILLIAM SILVERI

Drawing Scale:  $\frac{5}{128}$ " = 1'-0"

Project No.: 14-133-1269 & 14-133-1270



**Legend:**



6" CONCRETE SLAB BENEATH THE ENTIRE FOOTPRINT OF THE PROPOSED BUILDINGS



SITE A (131-10 & 131-18 AVERY AVENUE)



EXISTING CONCRETE BASEMENT SLAB BENEATH THE ENTIRE FOOTPRINT OF THE EXISTING BUILDING

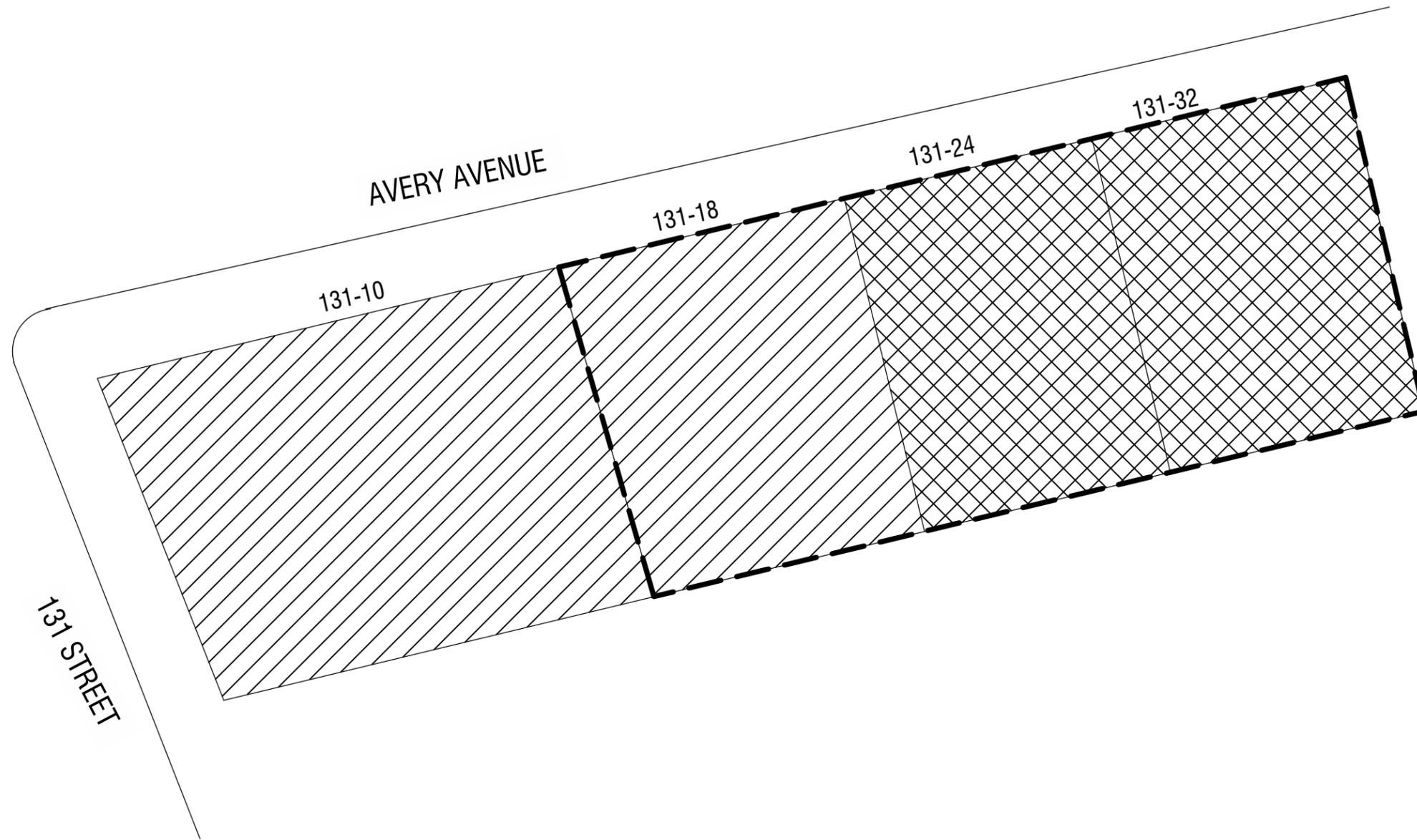
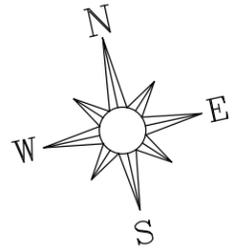


SITE B (131-24 & 131-32 AVERY AVENUE)



**ATHENICA  
ENVIRONMENTAL  
SERVICES, INC.**  
*Environmental Consultants*

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	13
Title:	COMPOSITE COVER SYSTEM
Date:	APRIL 07, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	N.T.S.
Project No.:	14-133-1269 & 14-133-1270



**Legend:**



SITE A (131-10 & 131-18 AVERY AVENUE)



SITE B (131-24 & 131-32 AVERY AVENUE)



GRACE 300R VAPOR BARRIER SYSTEM  
BENEATH THE ENTIRE 6" CONCRETE  
SLAB OF THE BUILDING



**ATHENICA  
ENVIRONMENTAL  
SERVICES, INC.**  
Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	14
Title:	VAPOR BARRIER DIAGRAM
Date:	APRIL 07, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	N.T.S.
Project No.:	14-133-1269 & 14-133-1270

# TABLES

**Table 1**  
Soil Cleanup Objectives (SCOs)

Contaminant	CAS Number	NYSDEC Part 375-6 SCOs for Unrestricted Use (ppm)
<b>Volatile Organic Compounds</b>		
1,1,1-Trichloroethane	71-55-6	0.68
1,1-Dichloroethane	75-34-3	0.27
1,1-Dichloroethene	75-35-4	0.33
1,2-Dichlorobenzene	95-50-1	1.1
1,2-Dichloroethane	107-06-2	0.02
cis-1,2-Dichloroethene	156-59-2	0.25
trans-1,2-Dichloroethene	156-60-5	0.19
1,3-Dichlorobenzene	541-73-1	2.4
1,4-Dichlorobenzene	106-46-7	1.8
1,4-Dioxane	123-91-1	0.1
Acetone	67-64-1	0.05
Benzene	71-43-2	0.06
Butylbenzene	104-51-8	12
Carbon tetrachloride	56-23-5	0.76
Chlorobenzene	108-90-7	1.1
Chloroform	67-66-3	0.37
Ethylbenzene	100-41-4	1
Hexachlorobenzene	118-74-1	0.33
Methyl ethyl ketone	78-93-3	0.12
Methyl tert-butyl ether	1634-04-4	0.93
Methylene chloride	75-09-2	0.05
n-Propylbenzene	103-65-1	3.9
sec-Butylbenzene	135-98-8	11
tert-Butylbenzene	98-06-6	5.9
Tetrachloroethene	127-18-4	1.3
Toluene	108-88-3	0.7
Trichloroethene	79-01-6	0.47
1,2,4-Trimethylbenzene	95-63-6	3.6
1,3,5-Trimethylbenzene	108-67-8	8.4
Vinyl chloride	75-01-4	0.02
Xylene (mixed)	1330-20-7	0.26
<b>Semivolatile Organic Compounds</b>		
Acenaphthene	83-32-9	20
Acenaphthylene	208-96-8	100
Anthracene	120-12-7	100
Benz(a)anthracene	56-55-3	1
Benzo(a)pyrene	50-32-8	1
Benzo(b)fluoranthene	205-99-2	1
Benzo(g,h,i)perylene	191-24-2	100
Benzo(k)fluoranthene	207-08-9	0.8
Chrysene	218-01-9	1
Dibenz(a,h)anthracene	53-70-3	0.33
Fluoranthene	206-44-0	100
Fluorene	86-73-7	30
Ideno(1,2,3-cd)pyrene	193-39-5	0.5
m-Cresol	108-39-4	0.33
Naphthalene	91-20-3	12
o-Cresol	95-48-7	0.33
p-Cresol	106-44-5	0.33
Pentachlorophenol	87-86-5	0.8
Phenanthrene	85-01-8	100
Phenol	108-95-2	0.33
Pyrene	129-00-0	100

**Table 1**  
Soil Cleanup Objectives (SCOs)

Contaminant	CAS Number	NYSDEC Part 375-6 SCOs for Unrestricted Use (ppm)
<b>Pesticides/PCBs</b>		
2,4,5-TP Acid (Silvex)	93-72-1	3.8
4,4'-DDE	72-55-9	0.0033
4,4'-DDT	50-29-9	0.0033
4,4'-DDD	72-54-8	0.0033
Aldrin	309-00-2	0.005
alpha-BHC	319-84-6	0.02
beta-BHC	319-85-7	0.036
Chlordane (alpha)	5103-71-9	0.094
delta-BHC	319-86-8	0.04
Dibenzofuran	132-64-9	7
Dieldrin	60-57-1	0.005
Endosulfan I	959-98-8	2.4
Endosulfan II	33213-65-9	2.4
Endosulfan sulfate	1031-07-8	2.4
Endrin	72-20-8	0.014
Heptachlor	76-44-8	0.042
Lindane	58-89-9	0.1
Polychlorinated biphenyls	1336-36-3	0.1
<b>Metals</b>		
Arsenic	7440-38-2	13
Barium	7440-39-3	350
Beryllium	7440-41-7	7.2
Cadmium	7440-43-9	2.5
Chromium hexavalent	18540-29-9	1
Chromium trivalent	16065-83-1	30
Copper	7440-50-8	50
Total Cyanide		27
Lead	7439-92-1	63
Manganese	7439-96-5	1600
Total Mercury		0.18
Nickel	7440-02-0	30
Selenium	7782-49-2	3.9
Silver	7440-22-4	2
Zinc	7440-66-6	109

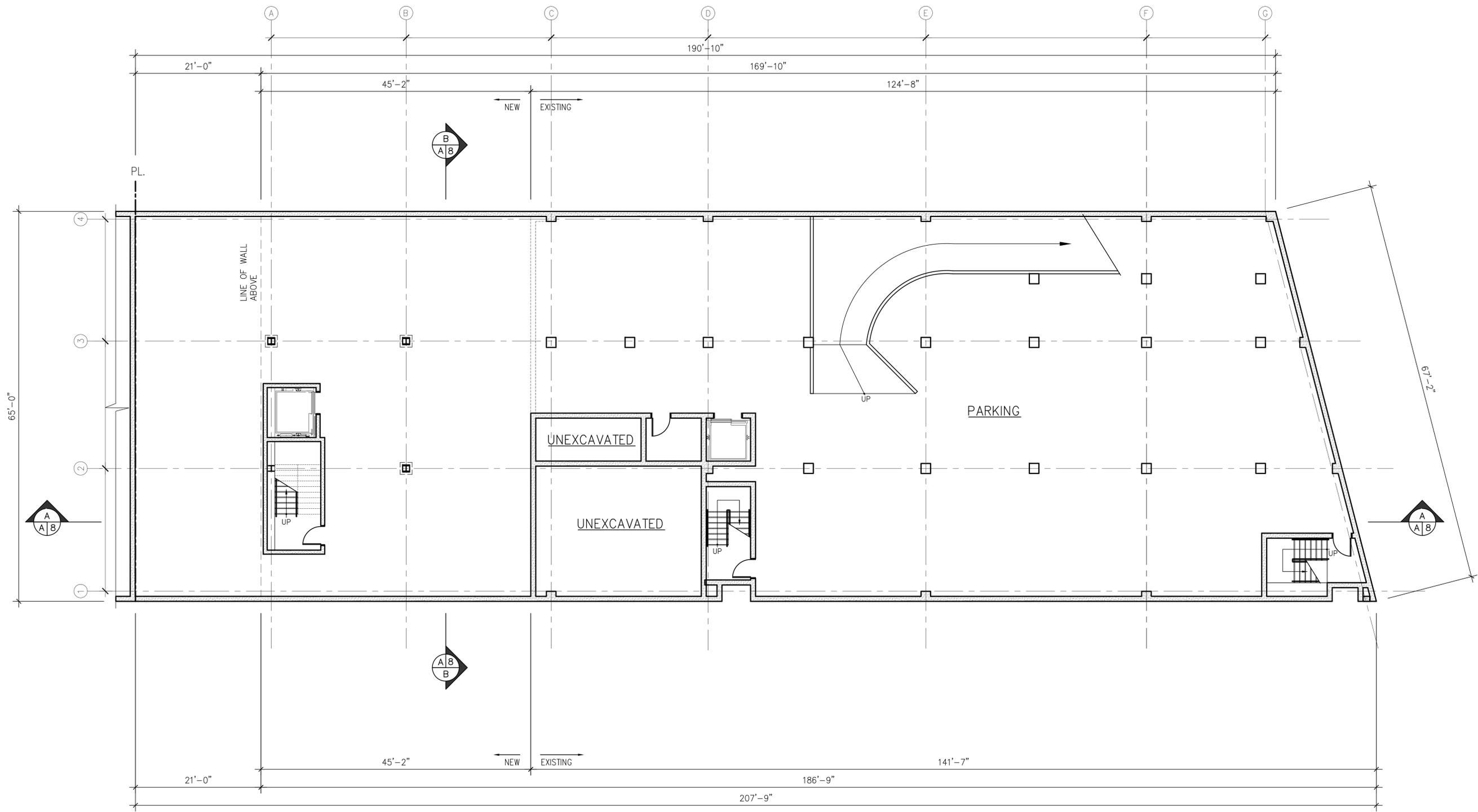
# APPENDICES

**APPENDIX 1**  
**PROPOSED DEVELOPMENT PLANS**

**131-10 TO 131-18 AVERY AVENUE**  
**&**  
**131-24 TO 131-32 AVERY AVENUE**







**CELLAR FLOOR PLAN**  
 SCALE: 1/8" = 1'-0"

**T.F. CUSANELLI & FILLETTI ARCHITECTS, P.C.**  
 145 TERRACE STREET  
 HAWORTH, N.J. 07641  
 201.384.9595  
 N.J. R.A. LIC # 07976.16378

**PROPOSED NEW:**  
**COMMERCIAL & COMM. FAC. BUILDING**  
 131-10 AVERY AVENUE  
 QUEENS, NY 11355

REVISIONS		
NO.	DESCRIPTION	DATE

NO.	TO WHOM:	DATE

ISSUES	JOB NO.

ISSUES	DATE

DRAWN BY:	JOB NO.
JM	1433NJ

CHECKED BY:	DATE
VF	09.23.14

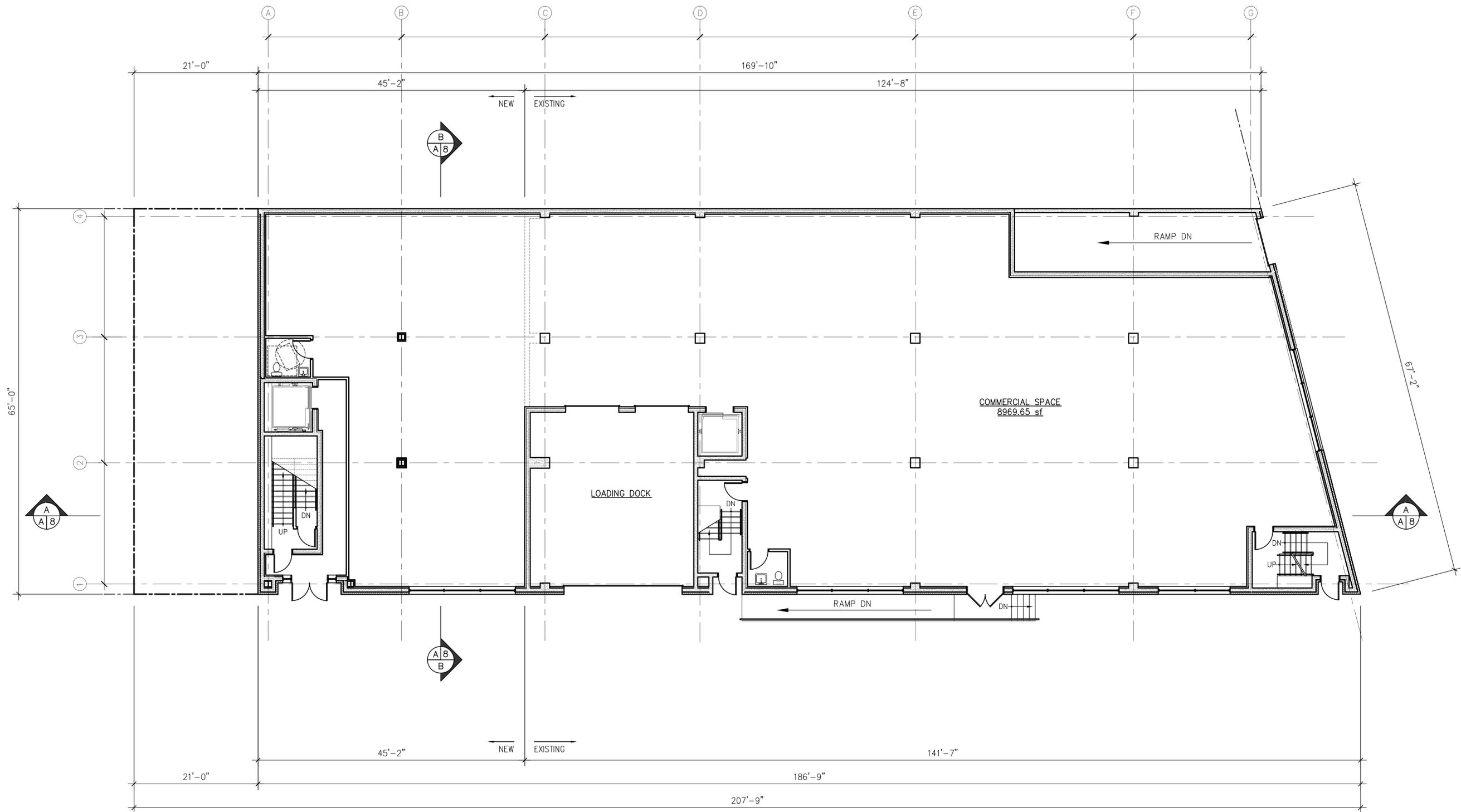
DWG. TITLE :
CELLAR/ FOUNDATION FLOOR PLAN & DETAILS

PAGE NUMBER
3 OF 11

Z:\Client\1433NJ\Comm\Construction Drawings\1433NJ\_C03.dwg 2/25/2015 10:54 AM

A-001.00.



**FIRST FLOOR PLAN**  
 SCALE: 1/8" = 1'-0"

**T.F. CUSANELLI & FILLETTI ARCHITECTS, P.C.**  
 145 TERRACE STREET  
 HAWORTH, N.J. 07641  
 201.384.9595  
 N.J. R.A. LIC # 07976, 16378



**PROPOSED NEW:**  
**COMMERCIAL & COMM. FAC. BUILDING**  
 131-10 AVERY AVENUE  
 QUEENS, NY 11355

REVISIONS		
NO.	DESCRIPTION	DATE

NO.	TO WHOM:	DATE

ISSUES	JOB NO.

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JM	1433NJ

CHECKED BY:	DATE:
VF	09.23.14

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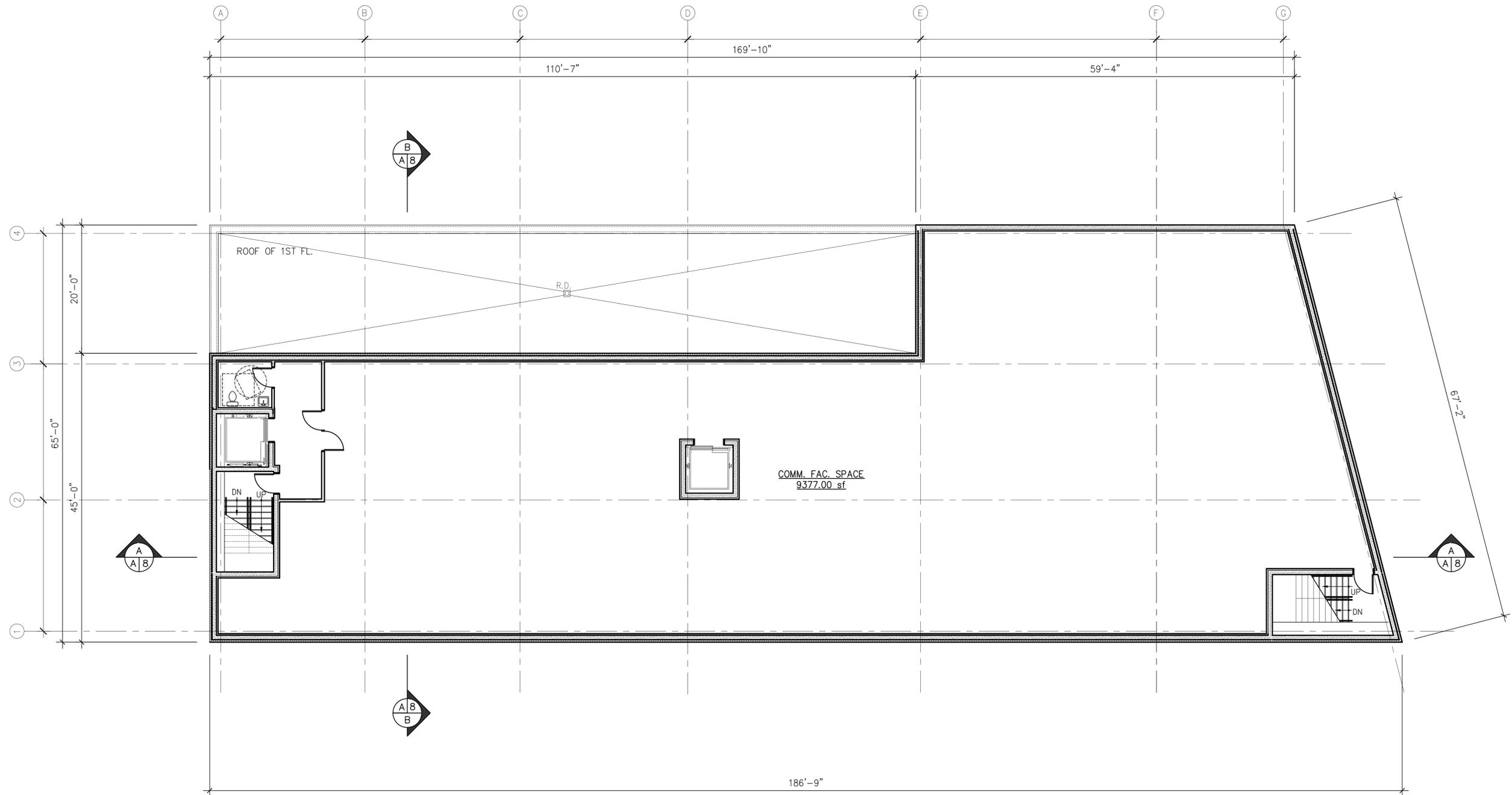
**1ST FLOOR PLAN & DETAILS**

PAGE NUMBER  
4 OF 11

BSCAN STICKER

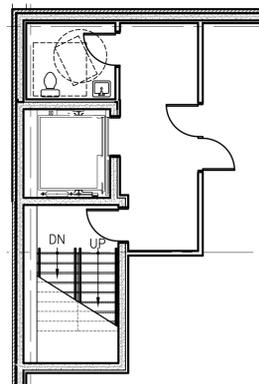
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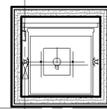
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SCALE: 1/8" = 1'-0"



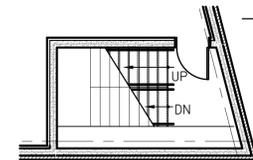
**PARTIAL 3RD FLOOR PLAN**

SCALE: 1/8" = 1'-0"



**PARTIAL 3RD FLOOR PLAN**

SCALE: 1/8" = 1'-0"



**PARTIAL 3RD FLOOR PLAN**

SCALE: 1/8" = 1'-0"

**T.F. CUSANELLI & FILLETTI ARCHITECTS, P.C.**  
 145 TERRACE STREET  
 HAWORTH N.J. 07641  
 201.384.9595  
 N.J. R.A. LIC # 07976.16378

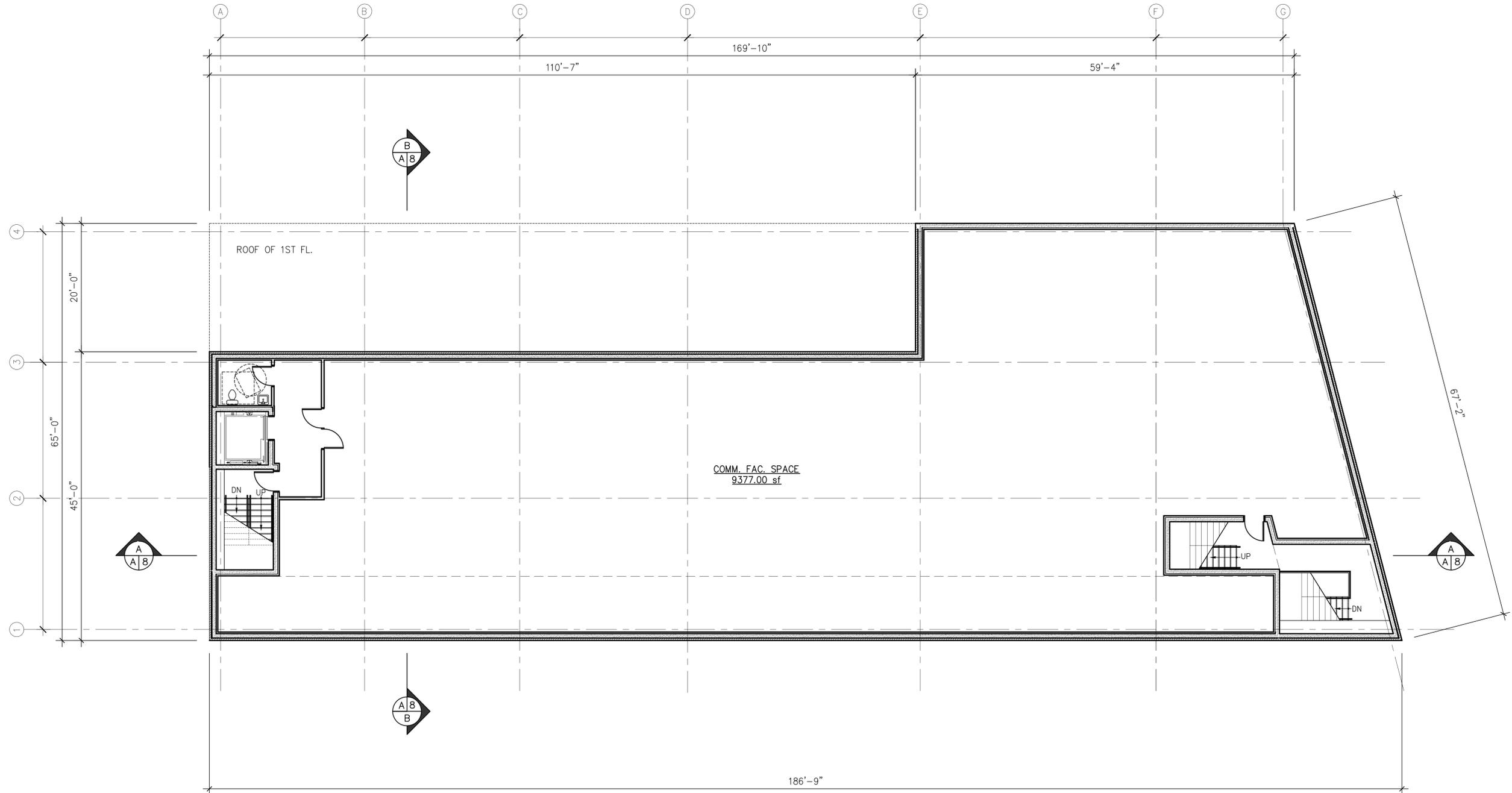


**PROPOSED NEW:**  
**COMMERCIAL & COMM. FAC. BUILDING**  
 131-10 AVERY AVENUE  
 QUEENS, NY 11355

REVISIONS		
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2ND - 3RD FLOOR PLANS		
PAGE NUMBER		
5 OF 11		

BSCAN STICKER



**4TH FLOOR PLAN**  
 SCALE: 1/8" = 1'-0"

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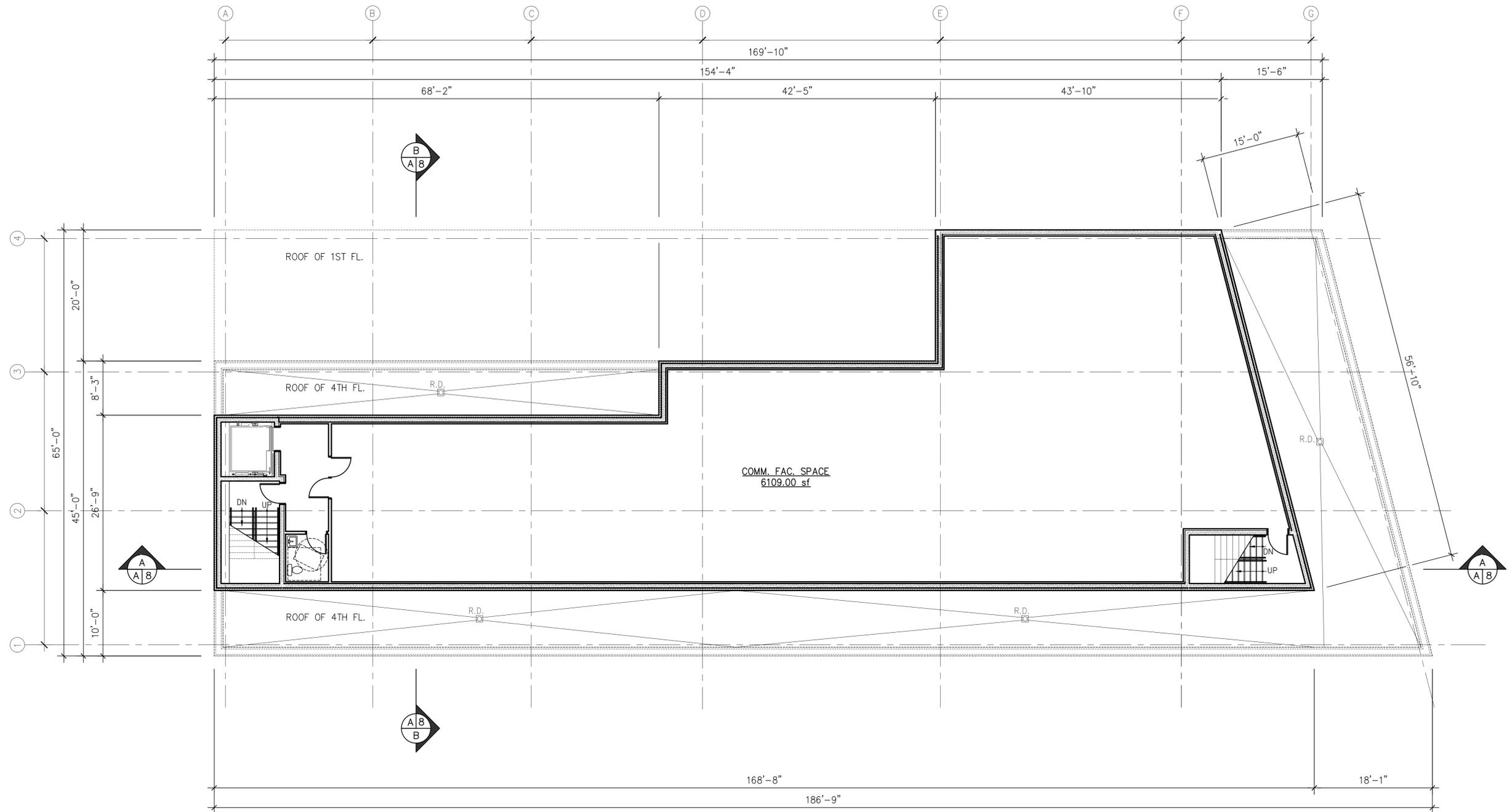
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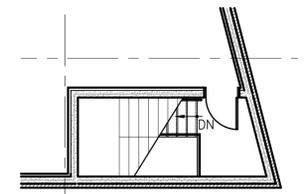
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 6 OF 11

BSCAN STICKER

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**5TH - 6TH FLOOR PLAN**  
 SCALE: 1/8" = 1'-0"



**PARTIAL 6TH FLOOR PLAN**  
 SCALE: 1/8" = 1'-0"

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REVISIONS		
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**5TH - 6TH FLOOR PLANS**

PAGE NUMBER  
 7 OF 11

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**FRONT (AVERY AVE.) ELEVATION**  
 SCALE: 1/8" = 1'-0"

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**PROPOSED NEW :**  
**COMMERCIAL & COMM. FAC. BUILDING**  
 131-10 AVERY AVENUE  
 QUEENS, NY 11355

REVISIONS		
NO.	DESCRIPTION	DATE

NO.	TO WHOM:	DATE

ISSUES	JOB NO.

ISSUES	DATE

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JM	1433NJ

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FRONT BUILDING ELEVATION

PAGE NUMBER  
9 OF 11

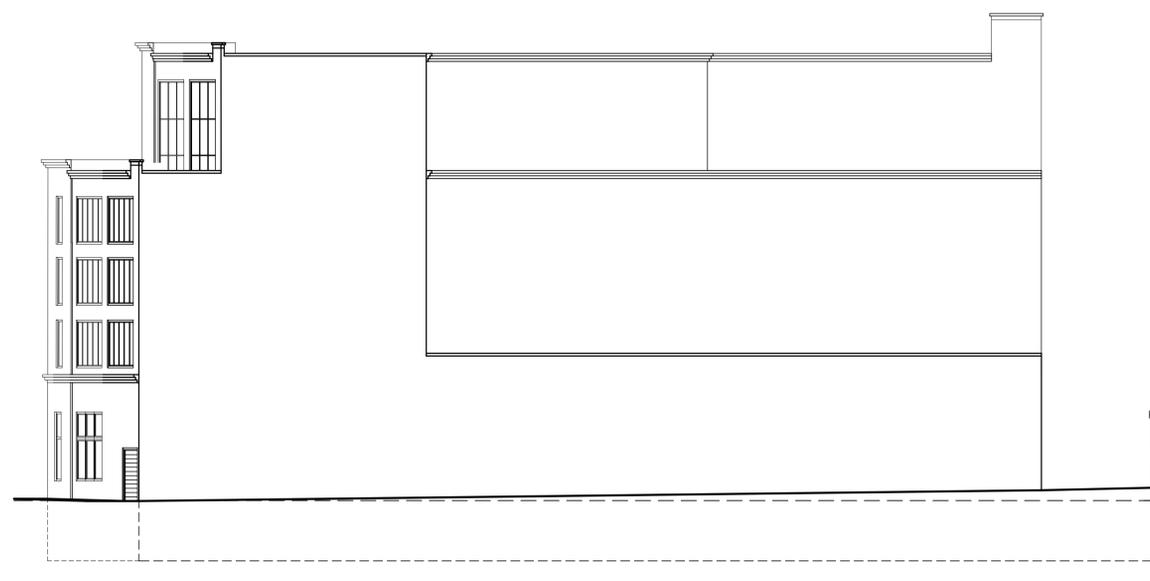
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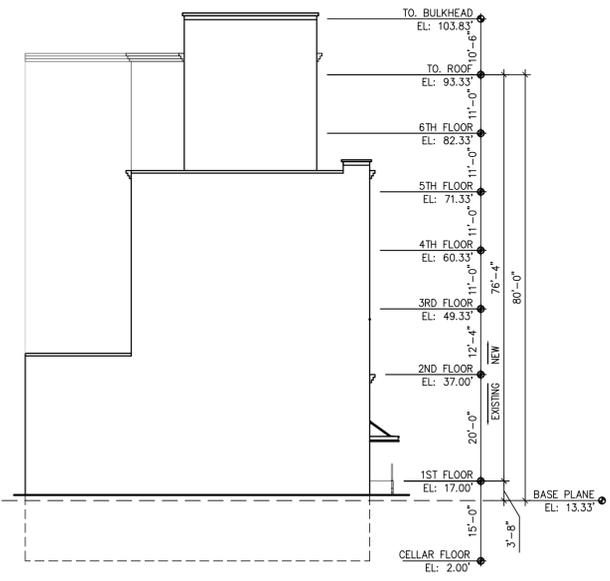
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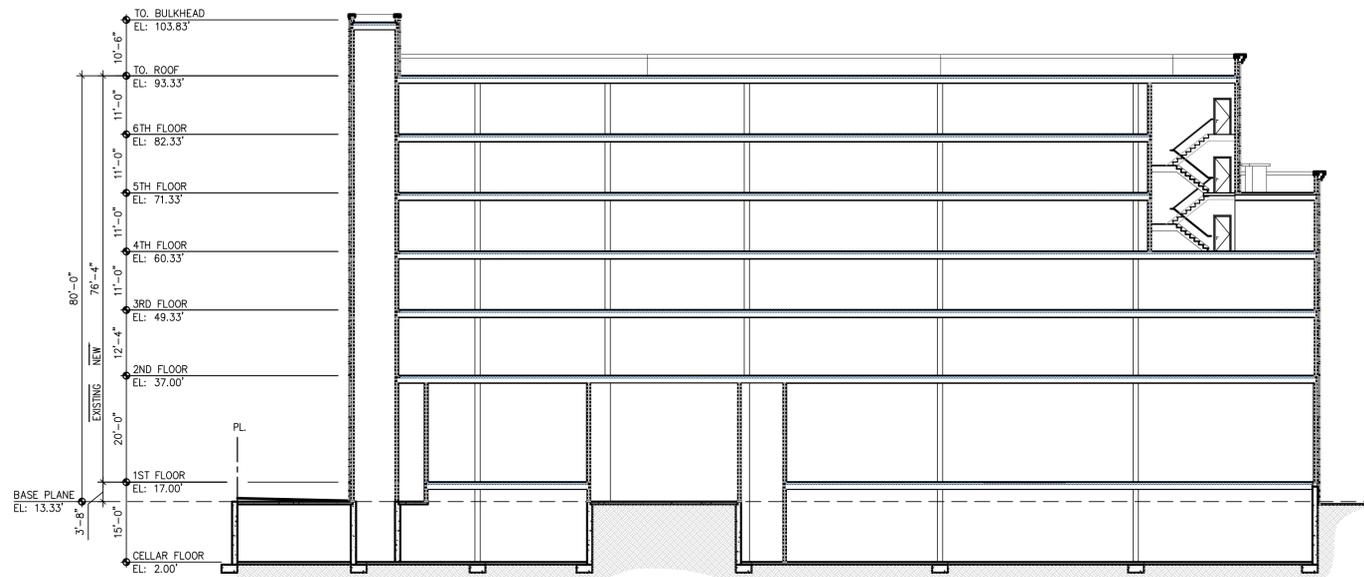
**RIGHT (131ST ST.) ELEVATION**  
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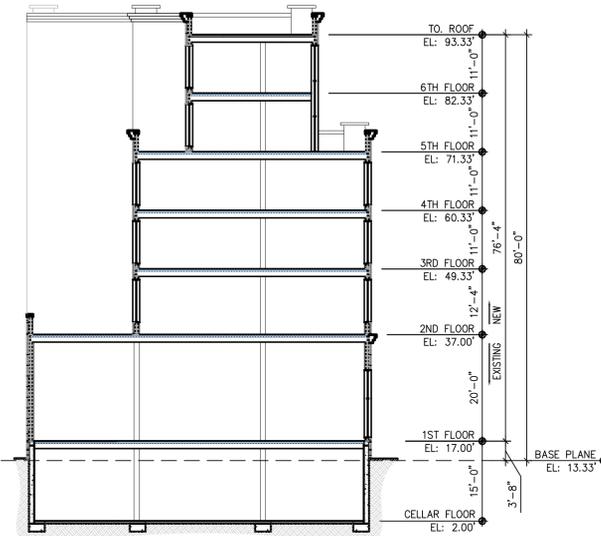
**REAR ELEVATION**  
 SCALE: 1/16" = 1'-0"



**LEFT (EAST) ELEVATION**  
 SCALE: 1/16" = 1'-0"



**SECTION A-A**  
 SCALE: 1/16" = 1'-0"



**SECTION B-B**  
 SCALE: 1/16" = 1'-0"

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**PROPOSED NEW:**  
**COMMERCIAL & COMM. FAC. BUILDING**  
 131-10 AVERY AVENUE  
 QUEENS, NY 11355

REVISIONS		
NO.	DESCRIPTION	DATE

NO.	TO WHOM	DATE

DRAWN BY:	JM	JOB NO.	1433NJ
CHECKED BY:	VF	DATE:	09.23.14

DWG. TITLE :  
**BUILDING ELEVATIONS & SECTIONS**

PAGE NUMBER  
 10 OF 11

**A-008.00.**



PERPSECTIVE NOTE:  
RENDERING IS FOR ILLUSTRATION PURPOSES ONLY AND NOT  
TO BE USED FOR CONSTRUCTION.

PROPOSED NEW:  
MIXED USE BUILDING  
131-32 AVERY AVE.  
QUEENS, NY 11355

D R A W I N G L I S T

- |  |   |   |
|--|---|---|
| 1. T-001.00 - TITLE SHEET                            | 5. A-003.00 - 2ND-4TH FLOOR PLANS               | 9. A-007.00 - REAR & LEFT BUILDING ELEVATIONS |
| 2. Z-001.00 - ZONING INFO, PLOT PLAN & LEGENDS       | 6. A-004.00 - 5TH-6TH FLOOR PLAN                | 10. A-008.00 - BUILDING SECTIONS              |
| 3. A-001.00 - CELLAR/FOUNDATION FLOOR PLAN & DETAILS | 7. A-005.00 - ROOF PLAN & BULKHEAD DETAILS      | 11. P-001.00 - PLUMBING RISER & GAS RISER     |
| 4. A-002.00 - 1ST FLOOR PLAN & DETAILS               | 8. A-006.00 - FRONT & RIGHT BUILDING ELEVATIONS | 12. N-001.00 - GENERAL NOTES                  |

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ARCHITECTS, P.C.



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N.J. R.A. LIC # 07976, 16378

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131-32 AVERY AVENUE  
QUEENS, NY 11355

REVISIONS

NO.	DESCRIPTION	DATE

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TITLE SHEET

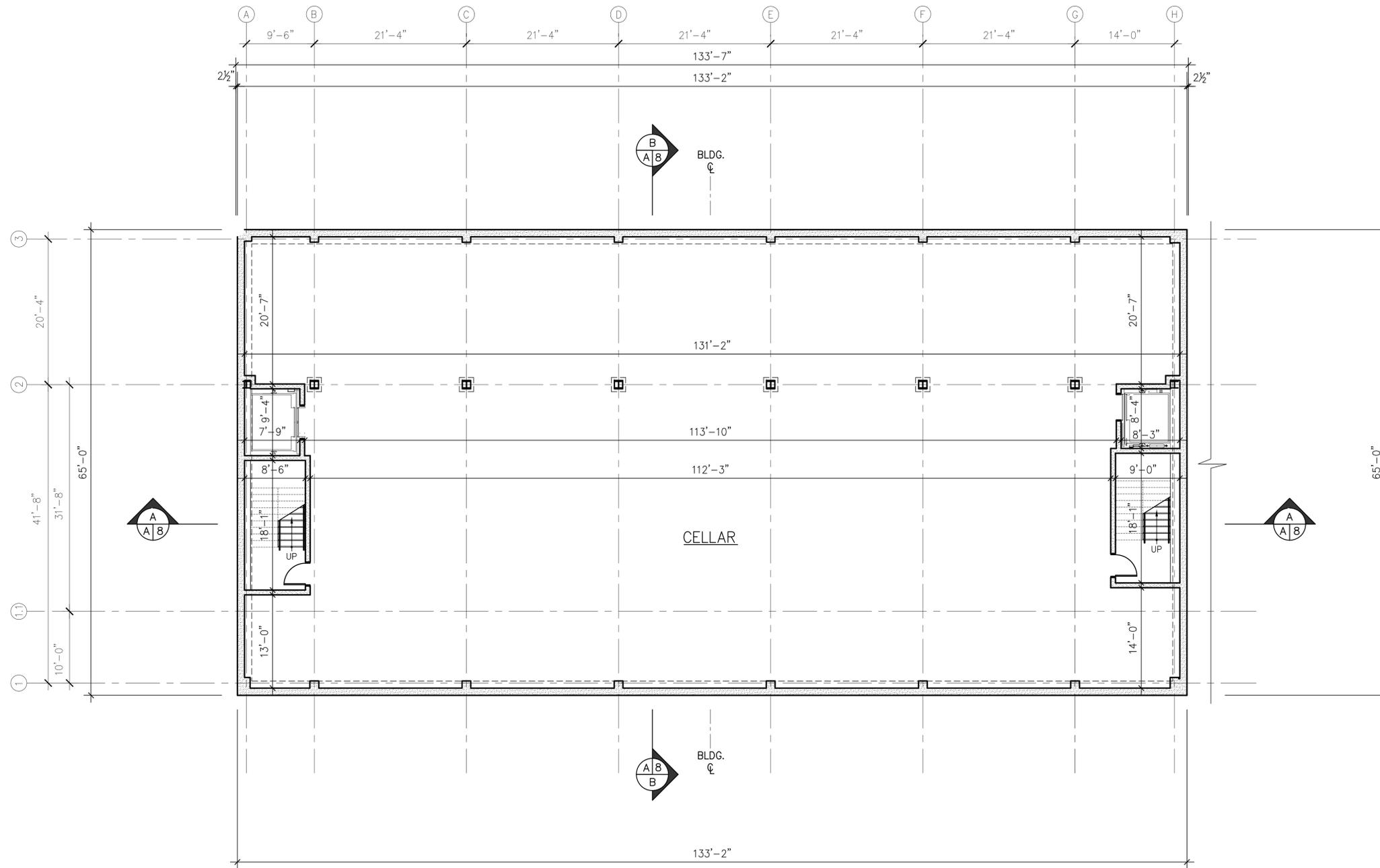
PAGE NUMBER

1 OF 12

BSCAN STICKER

T-001.00





**CELLAR FLOOR PLAN**  
 SCALE: 1/8" = 1'-0"

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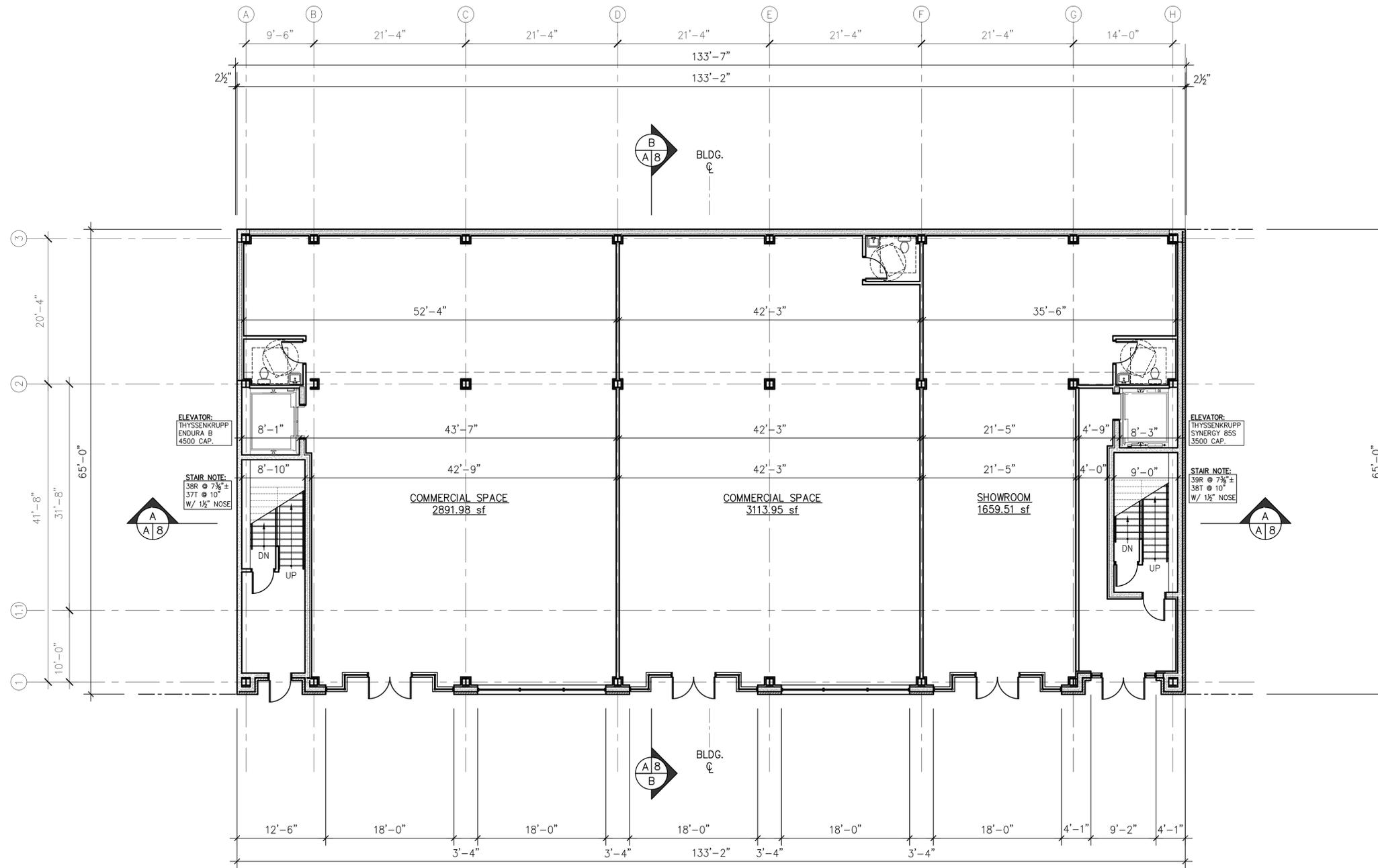
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DWG. TITLE:  
 CELLAR/  
 FOUNDATION  
 FLOOR PLAN &  
 DETAILS

PAGE NUMBER  
 3 OF 12

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**FIRST FLOOR PLAN**  
SCALE: 1/8" = 1'-0"

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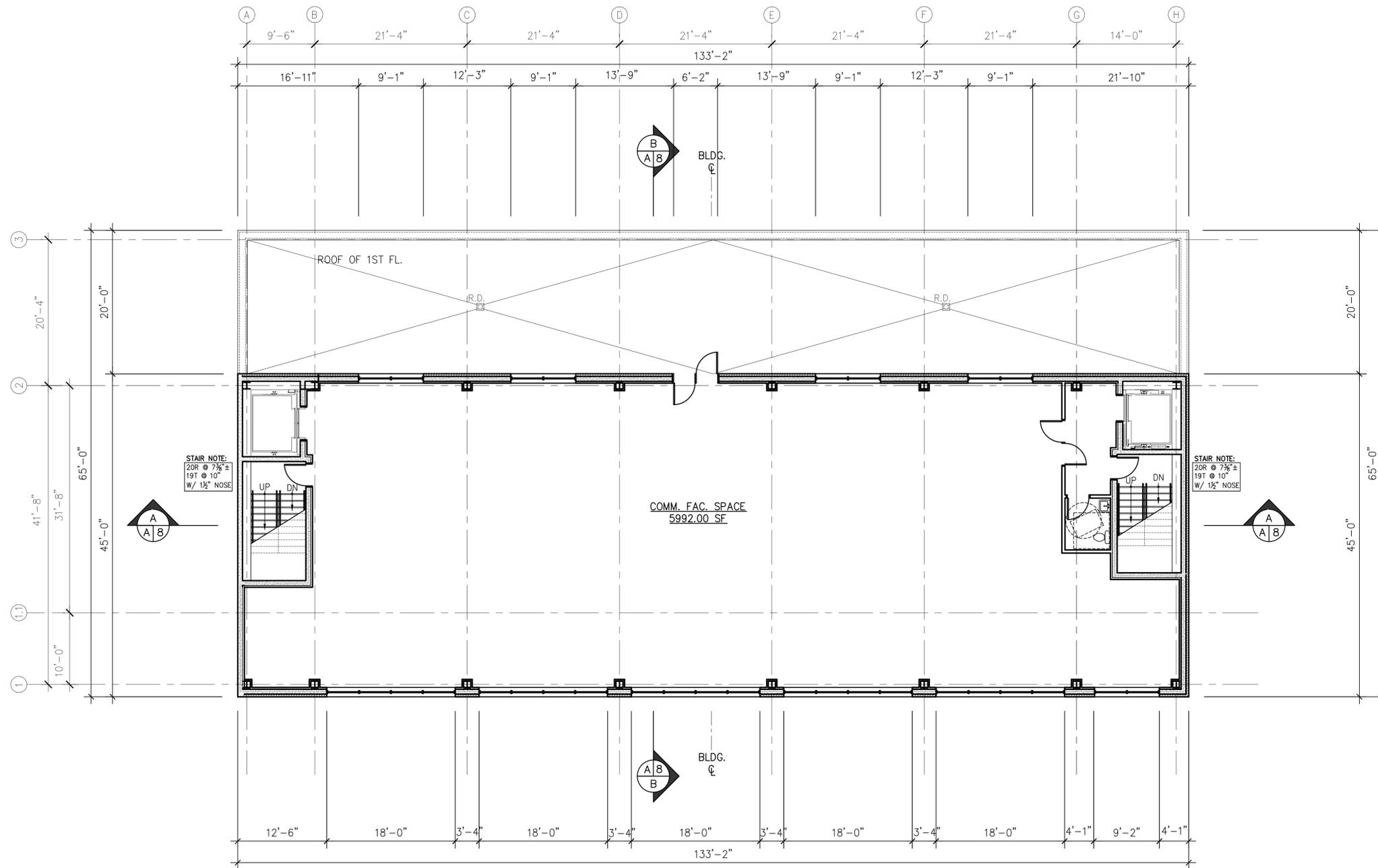
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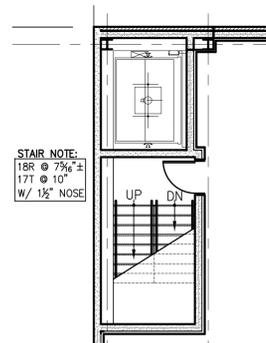
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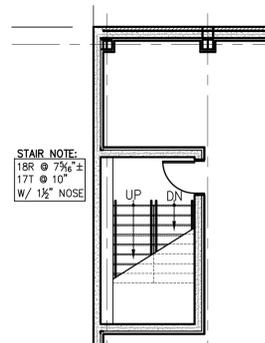
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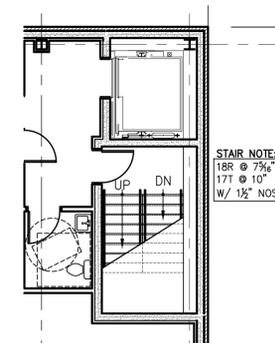
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SCALE: 1/8" = 1'-0"



**PARTIAL 3RD FLOOR PLAN**  
SCALE: 1/8" = 1'-0"



**PARTIAL 4TH FLOOR PLAN**  
SCALE: 1/8" = 1'-0"



**PARTIAL 3RD - 4TH FLOOR PLAN**  
SCALE: 1/8" = 1'-0"

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131-32 AVERY AVENUE  
QUEENS, NY 11355

REVISIONS		
NO.	DESCRIPTION	DATE

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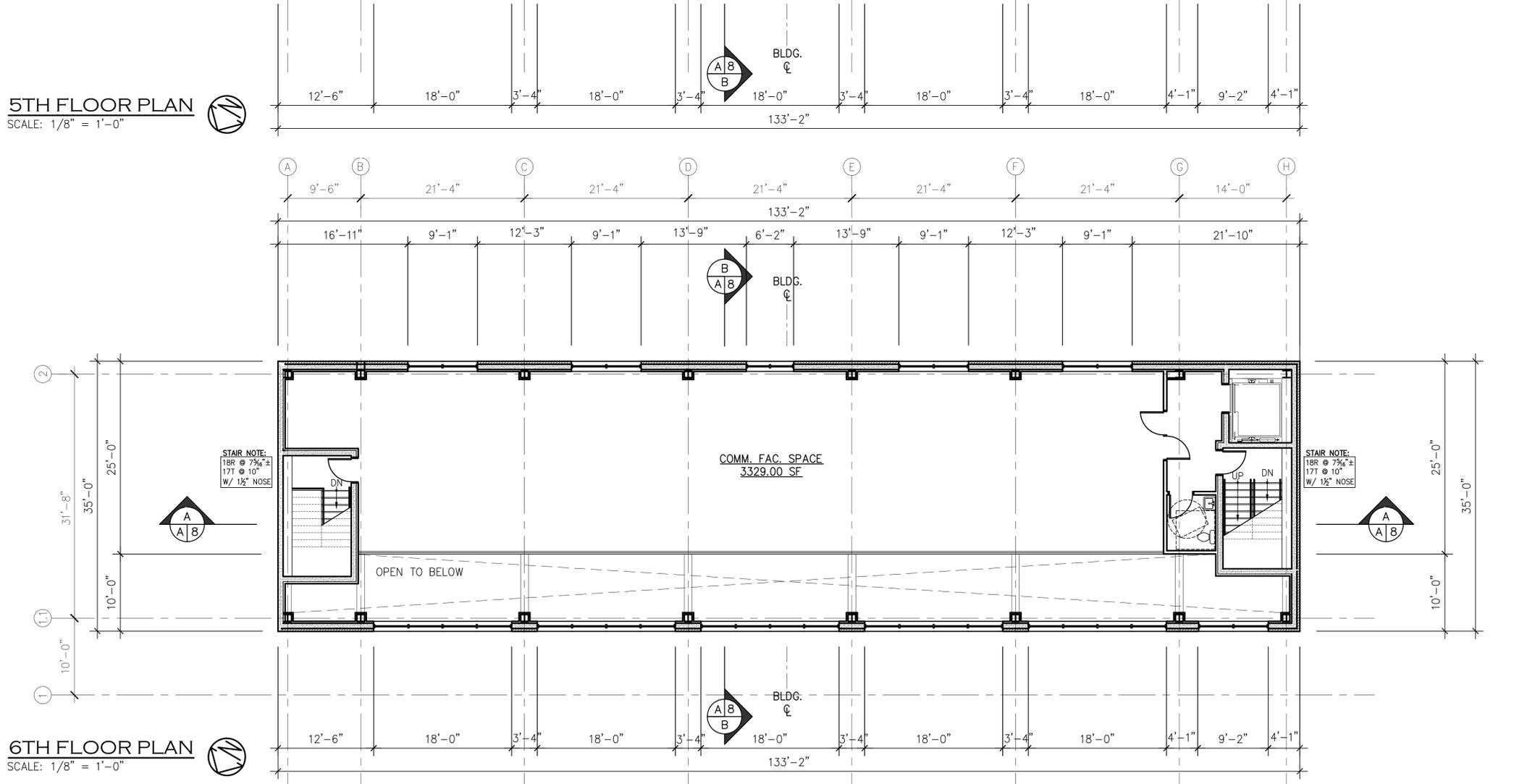
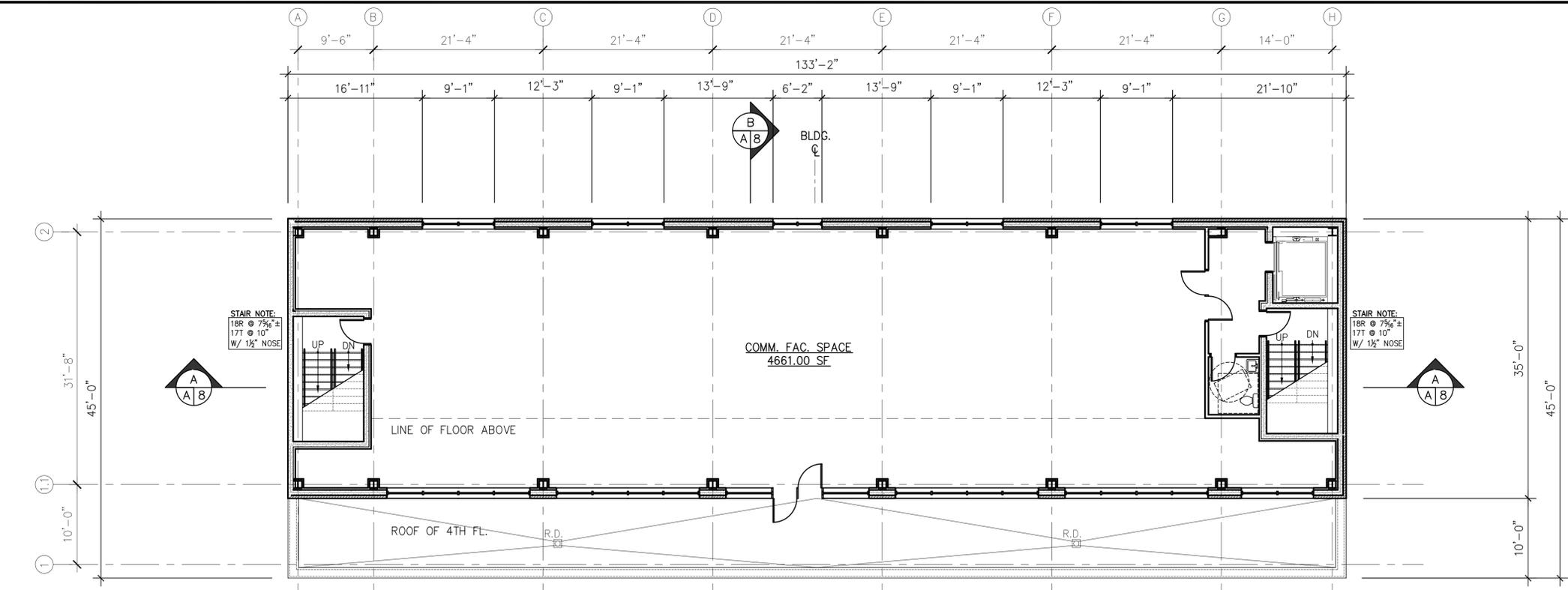
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2ND - 4TH FLOOR PLANS

PAGE NUMBER  
5 OF 12

BSCAN STICKER

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131-32 AVERY AVENUE  
QUEENS, NY 11355

REVISIONS		
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ISSUES	JOB NO.

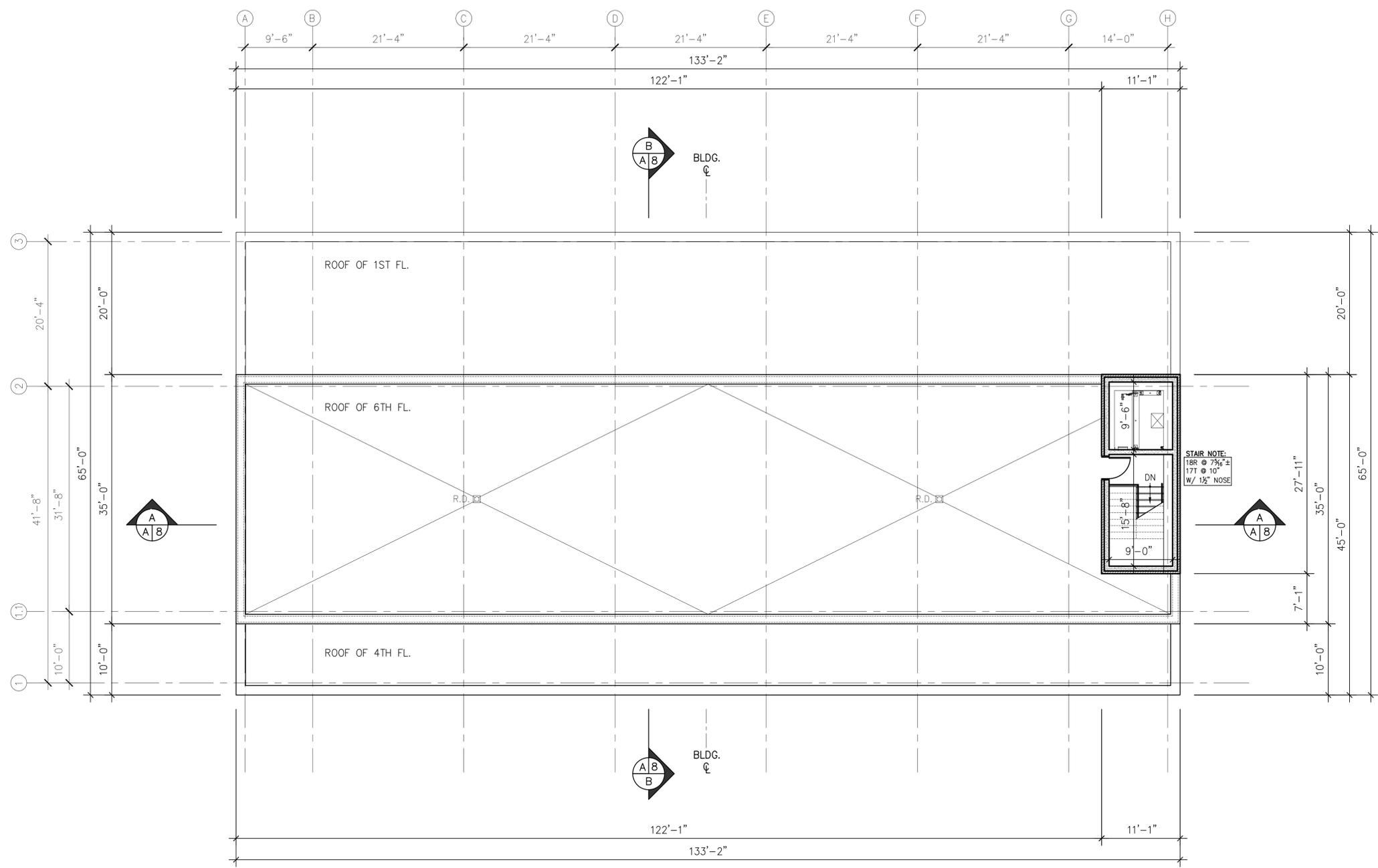
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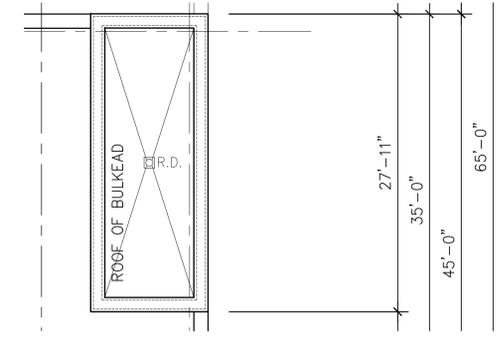
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5TH - 6TH FLOOR PLANS

PAGE NUMBER  
6 OF 12

BSCAN STICKER



**ROOF PLAN**  
 SCALE: 1/8" = 1'-0"



**BULKHEAD ROOF PLAN**  
 SCALE: 1/8" = 1'-0"

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REVISIONS		
NO.	DESCRIPTION	DATE

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CHECKED BY:	VF	DATE:	09.23.14

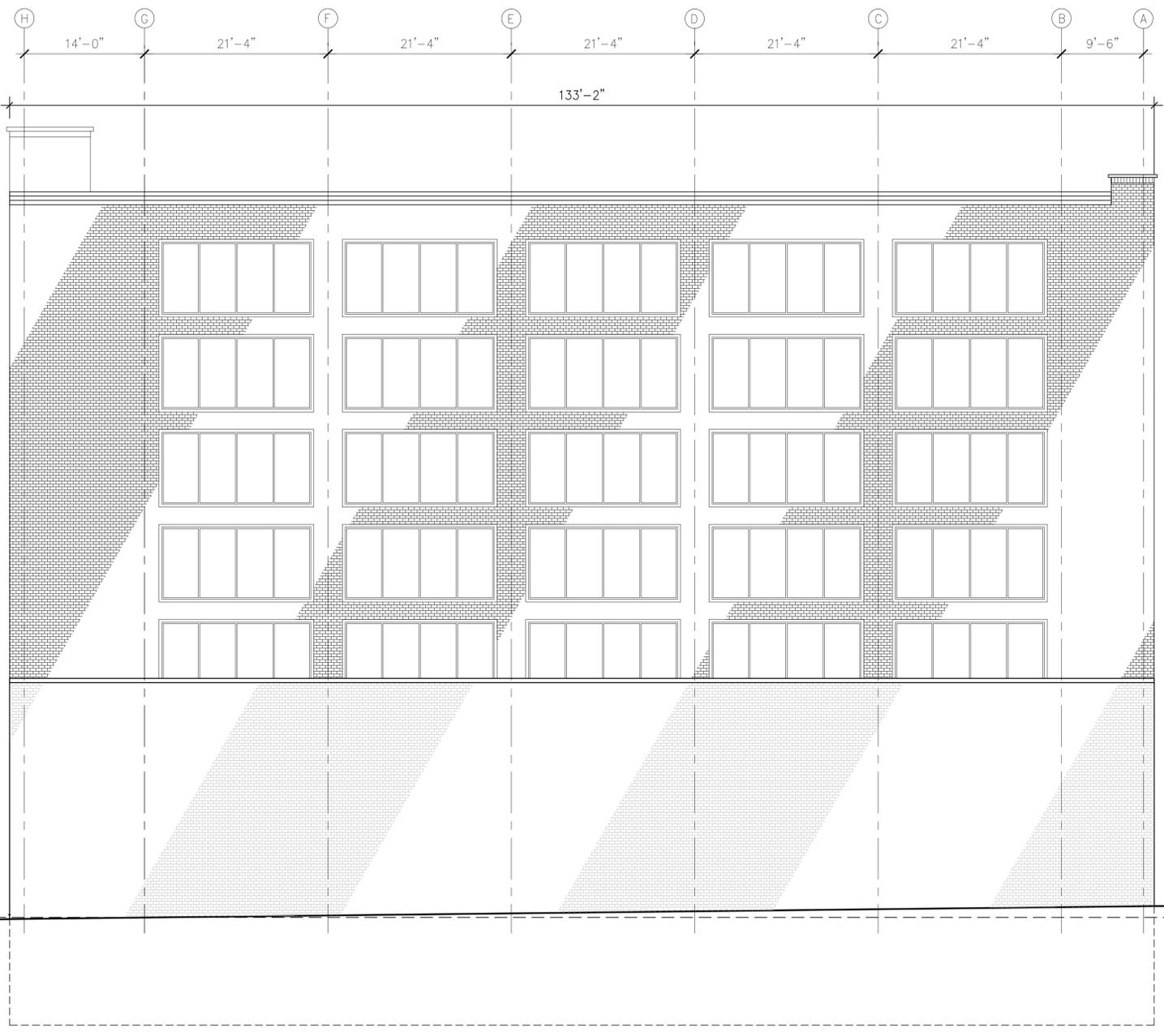
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**BULKHEAD PLAN & ROOF DETAILS**

PAGE NUMBER  
 7 OF 12

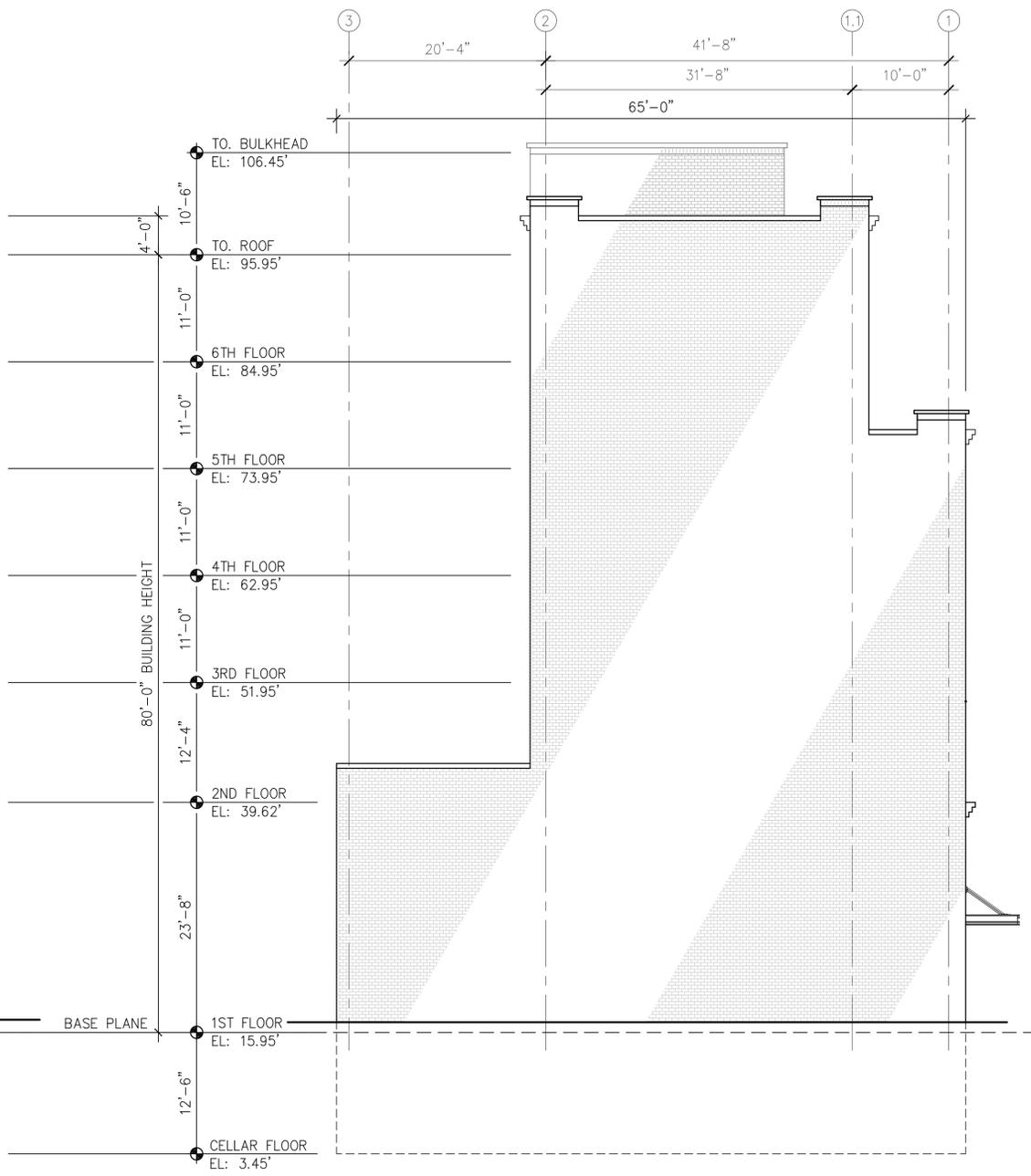
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**REAR ELEVATION**  
SCALE: 1/8" = 1'-0"



**LEFT (EAST) SIDE ELEVATION**  
SCALE: 1/8" = 1'-0"

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NO.	DESCRIPTION	DATE

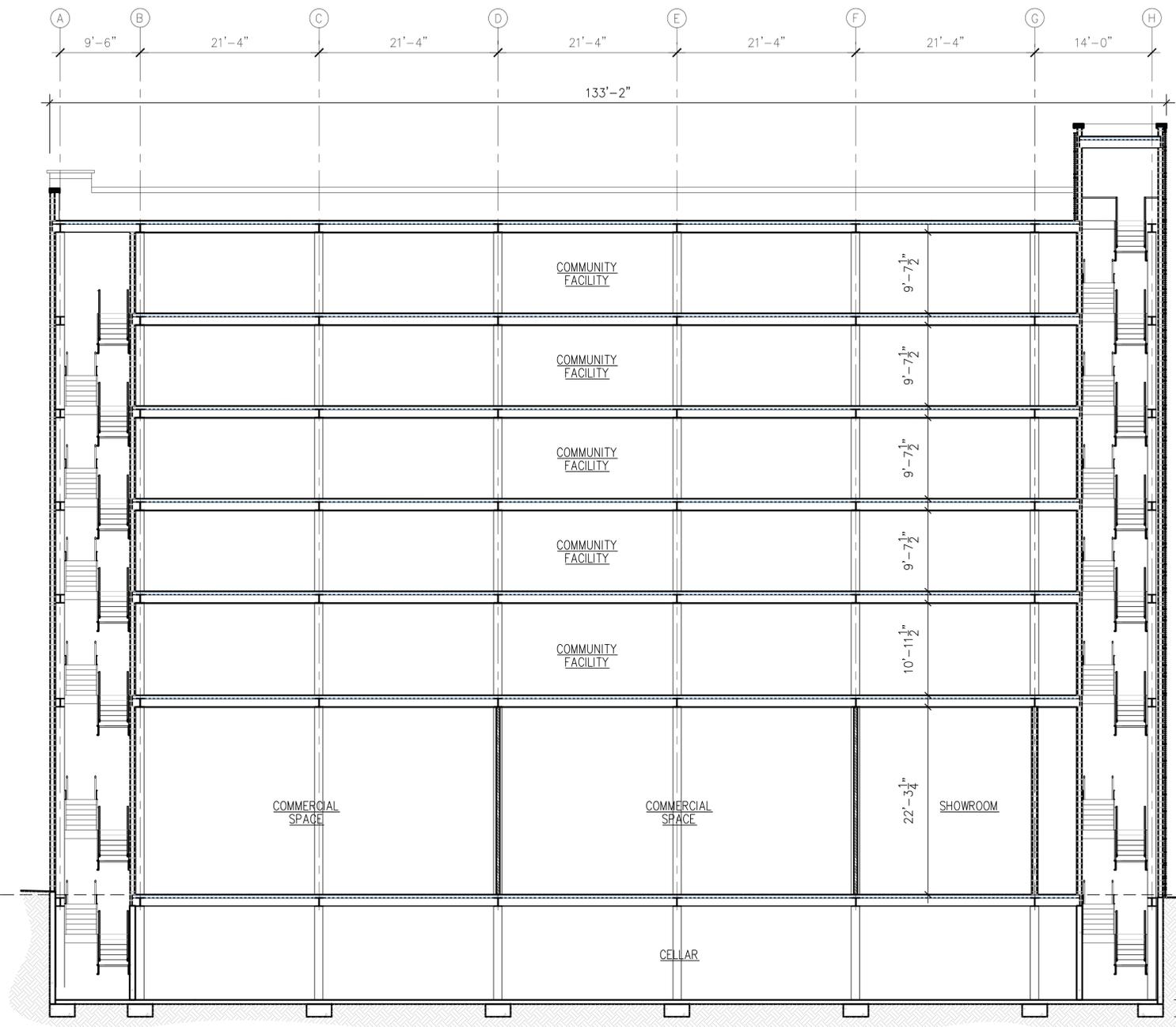
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CHECKED BY:	VF	DATE: 09.23.14

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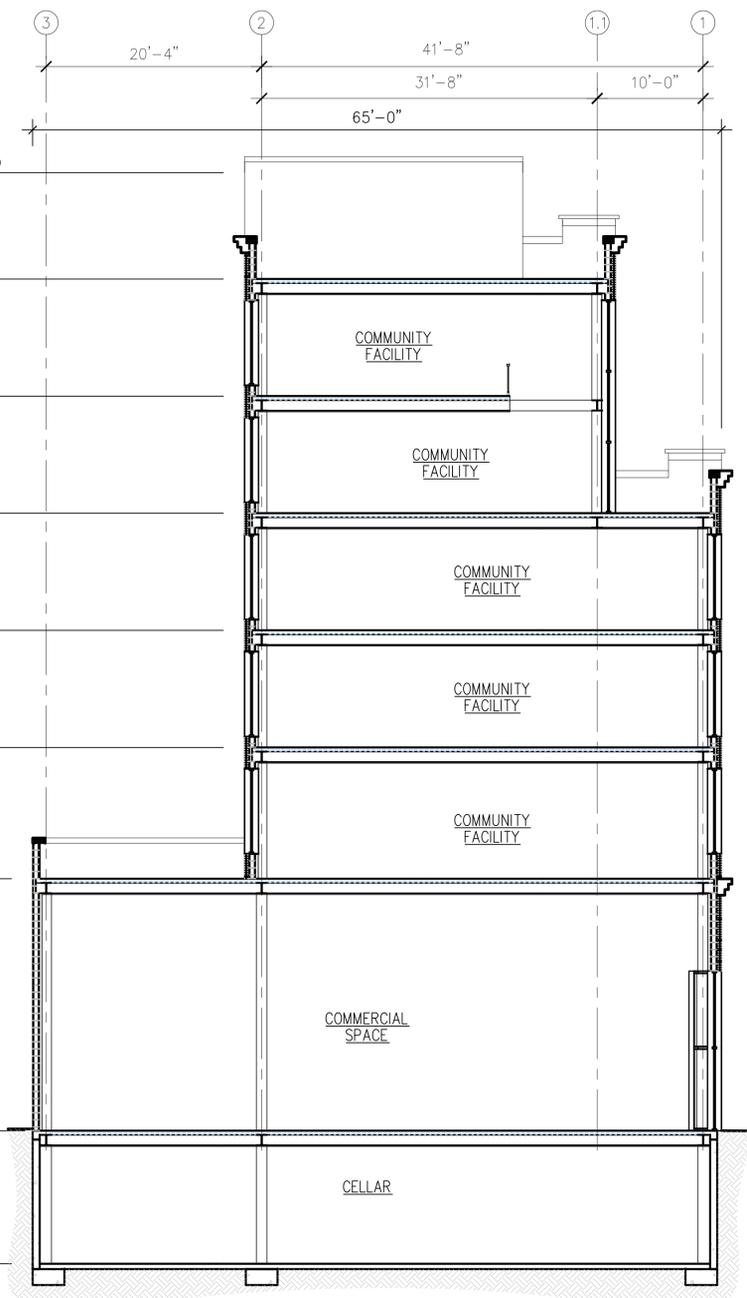
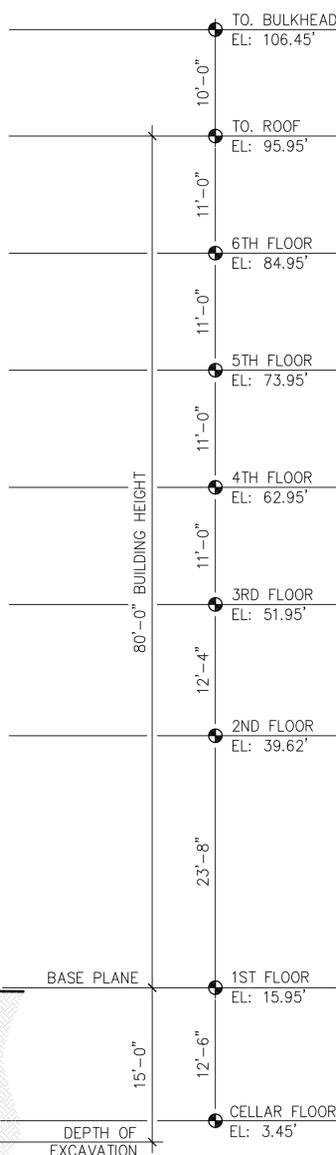
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9 OF 12

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**SECTION A-A**  
SCALE: 1/8" = 1'-0"



**SECTION B-B**  
SCALE: 1/8" = 1'-0"

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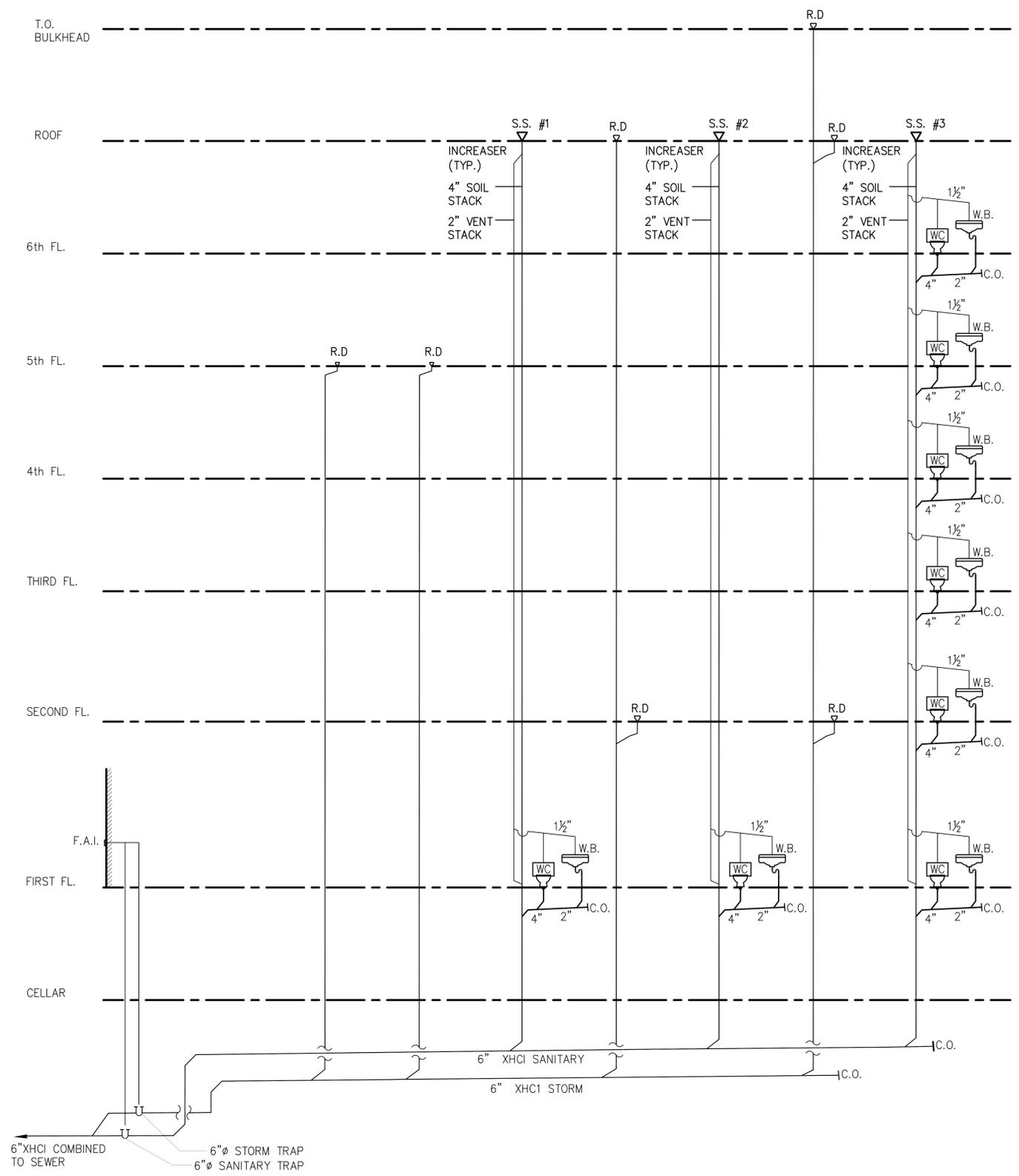
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CHECKED BY:	VF	DATE: 09.23.14

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**BUILDING SECTIONS**

PAGE NUMBER  
10 OF 12

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**A-008.00**



**PLUMBING RISER DIAGRAM**  
SCALE: N.T.S.

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REVISIONS		
NO.	DESCRIPTION	DATE

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ISSUES	JOB NO.

ISSUES	DATE

DRAWN BY:	JOB NO.
JM	1433NJ

CHECKED BY:	DATE
VF	09.23.14

DWG. TITLE :
PLUMBING & GAS RISERS

PAGE NUMBER
10 OF 12

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A-009.00

## **APPENDIX 2**

### **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and Avery Group LLC & Wilson Realty Management LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, Avery Group LLC & Wilson Realty Management LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Sarah Pong, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

**Project Contact List** OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project

manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at [brownfields@cityhall.nyc.gov](mailto:brownfields@cityhall.nyc.gov).

**Repositories** A document repository is maintained online. Internet access to view OER's document repositories is available at public libraries. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. The library nearest the Site is:

Queens Library – Flushing Branch  
41-17 Main Street, Flushing, New York 11355  
718-661-1200

Monday: 9:00 AM to 9:00 PM  
Tuesday: 1:00 AM to 9:00 PM  
Wednesday: 9:00 AM to 9:00 PM  
Thursday: 9:00 AM to 9:00 PM  
Friday: 9:00 AM to 7:00 PM  
Saturday: 9:00 AM to 7:00 PM  
Sunday: 12:00 AM to 5:00 PM

**Digital Documentation** NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

**Identify Issues of Public Concern** No issues of concern are anticipated for this project.

**Public Notice and Public Comment** Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by Avery Group LLC & Wilson Realty Management LLC, reviewed and approved by OER prior to distribution and mailed by Avery Group LLC & Wilson Realty Management LLC. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary

Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

**Citizen Participation Milestones** Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

## **APPENDIX 3**

### **SUSTAINABILITY STATEMENT**

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

**Reuse of Clean, Recyclable Materials** Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

**Reduce Consumption of Virgin and Non-Renewable Resources** Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

**Reduced Energy Consumption and Promotion of Greater Energy Efficiency** Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

**Conversion to Clean Fuels** Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

**Recontamination Control** Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

**Stormwater Retention** Stormwater retention improves water quality by lowering the rate of combined stormwater and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced stormwater retention capability of the redevelopment project will be included in the RAR.

**Linkage with Green Building** Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

**Paperless Brownfield Cleanup Program** Avery Group LLC & Wilson Realty Management LLC is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

**Low-Energy Project Management Program** Avery Group LLC & Wilson Realty Management LLC is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

**Trees and Plantings** Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

## **APPENDIX 4**

### **SOIL/MATERIALS MANAGEMENT PLAN**

#### **1.1 SOIL SCREENING METHODS**

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

#### **1.2 STOCKPILE METHODS**

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

#### **1.3 CHARACTERIZATION OF EXCAVATED MATERIALS**

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

## **1.4 MATERIALS EXCAVATION, LOAD-OUT, AND DEPARTURE**

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

## **1.5 OFF-SITE MATERIALS TRANSPORT**

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will

be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are will be reported to OER once determined. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

## **1.6 MATERIALS DISPOSAL OFF-SITE**

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in Queens, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RAR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

### **1.7 MATERIALS REUSE ON-SITE**

Soil and fill that is derived from the property that meets the Soil Cleanup Objectives (SCOs) established in this plan may be reused on-Site. Although reuse of excavated materials on-Site is not anticipated for this project, the SCOs for on-Site reuse are Track 1 Unrestricted Use SCOs and are found in Table 1. ‘Reuse on-Site’ means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed. If excavated materials are re-used on the Site, the location for placement of reused material will be shown in the Remedial Action Report.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

### **1.8 DEMARCATION**

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials

beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

### **1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES**

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in Section 4.2.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence

that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

### **Source Screening and Testing**

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

### **1.10 FLUIDS MANAGEMENT**

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department

of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

### **1.11 STORMWATER POLLUTION PREVENTION**

Applicable laws and regulations pertaining to stormwater pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

### **1.12 CONTINGENCY PLAN**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found

during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

### **1.13 ODOR, DUST, AND NUISANCE CONTROL**

#### **Odor Control**

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying the Remedial Action Report.

#### **Dust Control**

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

### **Other Nuisances**

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

## **APPENDIX 5**

# **CONSTRUCTION HEALTH AND SAFETY PLAN**

***CONSTRUCTION HEALTH & SAFETY PLAN***

131-10 TO 131-18 (SITE A) AVERY AVENUE AND  
131-24 TO 131-32 (SITE B) AVERY AVENUE  
QUEENS, NEW YORK

Prepared for:

Avery Group LLC & Wilson Realty Management LLC  
P.O. Box 815, Plandome, NY 11030

Prepared by:



ATHENICA ENVIRONMENTAL  
SERVICES, INC.

**Environmental Consultants**

45-09 GREENPOINT AVENUE  
LONG ISLAND CITY, NY 11104

## TABLE OF CONTENTS

<b>1.0</b>	<b>GLOSSARY OF TERMS.....</b>	<b>1-1</b>
<b>2.0</b>	<b>INTRODUCTION.....</b>	<b>2-3</b>
2.1	SITE HISTORY .....	2-4
2.2	SCOPE OF WORK.....	2-5
<b>3.0</b>	<b>KEY PERSONNEL .....</b>	<b>3-7</b>
3.1	PROJECT MANAGER (PM).....	3-7
3.2	CONSTRUCTION SUPERINTENDENT (CS).....	3-7
3.3	HEALTH AND SAFETY OFFICER (HSO).....	3-8
3.4	PROJECT SAFETY MANAGER (PSM).....	3-8
3.5	EMPLOYEE SAFETY RESPONSIBILITIES .....	3-9
<b>4.0</b>	<b>ACTIVITY HAZARD ANALYSIS .....</b>	<b>4-1</b>
4.1	CHEMICAL HAZARDS .....	4-1
4.2	PHYSICAL HAZARDS .....	4-3
4.3	ENVIRONMENTAL HAZARDS .....	4-3
4.3.1	Heat Stress .....	4-4
4.3.2	Exposure to Cold.....	4-6
	<b>4.3.2.1</b> Cold Stress Conditions and Symptoms.....	4-6
	<b>4.3.2.2</b> Monitoring and Preventative Actions .....	4-8
4.3.3	Biological Hazards.....	4-11
4.3.4	Noise .....	4-11
4.4	VEHICLE AND HEAVY EQUIPMENT SAFETY.....	4-11
4.4.1	Vehicle Safety.....	4-11
4.4.2	Heavy Equipment Safety .....	4-11
4.5	TASK-SPECIFIC ACTIVITY HAZARD ANALYSES (AHA).....	4-12
<b>5.0</b>	<b>WORK AND SUPPORT AREAS.....</b>	<b>5-1</b>
5.1	EXCLUSION ZONE (EZ).....	5-1
5.2	CONTAMINATION - REDUCTION ZONE (CRZ).....	5-1
5.3	SUPPORT ZONE (SZ).....	5-1
5.4	SITE CONTROL LOG .....	5-1
5.5	GENERAL.....	5-2
<b>6.0</b>	<b>PROTECTIVE EQUIPMENT .....</b>	<b>6-1</b>
6.1	ANTICIPATED PROTECTION LEVELS .....	6-1
6.2	PROTECTION LEVEL DESCRIPTIONS.....	6-2
	6.2.1 Level D.....	6-2
<b>7.0</b>	<b>DECONTAMINATION PROCEDURES.....</b>	<b>7-1</b>
7.1	PERSONNEL DECONTAMINATION .....	7-1

---

7.1.1	Suspected Contamination.....	7-1
7.1.2	Personal Hygiene .....	7-1
7.2	EQUIPMENT DECONTAMINATION.....	7-1
7.3	DISPOSAL OF WASTES .....	7-2
7.4	DUST /EROSION CONTROL.....	7-2
<b>8.0</b>	<b>AIR MONITORING.....</b>	<b>8-1</b>
8.1	WORK AREA AIR MONITORING.....	8-1
8.1.1	Direct Reading Air Monitoring.....	8-1
8.1.2	Instrumentation .....	8-1
8.1.3	Use And Maintenance Of Survey Equipment.....	8-1
8.1.4	Air Monitoring Recordkeeping.....	8-2
8.1.5	Action Levels .....	8-2
<b>9.0</b>	<b>EMERGENCY RESPONSE AND CONTINGENCY PLAN (ERCP) .....</b>	<b>9-4</b>
9.1	PRE-EMERGENCY PLANNING.....	9-4
9.2	EMERGENCY RECOGNITION AND PREVENTION.....	9-5
9.3	EMERGENCY TELEPHONE NUMBERS .....	9-5
9.4	PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATIONS.....	9-8
9.4.1	Responsibilities and Duties.....	9-8
9.4.2	On-Site Emergency Coordinator Duties .....	9-8
9.5	SAFE DISTANCES AND PLACES OF REFUGE.....	9-10
9.6	EVACUATION ROUTES AND PROCEDURES .....	9-11
9.6.1	Evacuation Signals and Routes.....	9-11
9.6.2	Evacuation Procedures.....	9-11
9.7	EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT .....	9-12
9.7.1	Notification Procedures .....	9-12
9.7.2	Procedure for Containing/Collecting Spills.....	9-13
9.7.3	Emergency Response Equipment .....	9-14
9.7.4	Emergency Spill Response Clean-Up Materials and Equipment .....	9-14
9.8	EMERGENCY CONTINGENCY PLAN .....	9-15
9.9	MEDICAL EMERGENCY CONTINGENCY MEASURES .....	9-15
9.9.1	Response .....	9-15
9.9.2	Notification .....	9-16
9.10	FIRE CONTINGENCY MEASURES.....	9-17
9.10.1	Response .....	9-17
9.11	HAZARDOUS WEATHER CONTINGENCY MEASURES .....	9-18
9.11.1	Response .....	9-18
9.11.2	Notification .....	9-18
9.12	SPILL/RELEASE CONTINGENCY MEASURES .....	9-18
9.12.1	Response .....	9-18

<b>10.0</b>	<b>TRAINING REQUIREMENTS .....</b>	<b>10-1</b>
10.1	SITE-SPECIFIC TRAINING ORIENTATION .....	10-1
10.2	DAILY SAFETY MEETINGS.....	10-1

---

***FIGURES***

---

FIGURE 2-1	SITE LOCATION MAP
FIGURE 9-1	DIRECTIONS AND HOSPITAL ROUTE MAP

***TABLES***

---

TABLE 4-1	CHEMICAL DATA
TABLE 4.3.2A	COLD WEATHER INJURIES
TABLE 4.3.2B	COLD STRESS PREVENTION
TABLE 4.3.2C	COLD WEATHER CLOTHING REQUIREMENTS
TABLE 4.3.2D	COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS EQUIVALENT TEMPERATURE
TABLE 4.3.2E	TLV WORK/WARMUP SCHEDULE FOR FOUR-HOUR SHIFT
TABLE 9-1	EMERGENCY TELEPHONE NUMBERS

***APPENDICES***

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APPENDIX A	HEALTH AND SAFETY PLAN CERTIFICATION HEALTH & SAFETY PLAN ACKNOWLEDGEMENT NOTICE OF SAFETY VIOLATION PRE-JOB SAFETY CHECKLIST
APPENDIX B	HEALTH AND SAFETY PLAN AMENDMENTS AND DOCUMENTATION FORM
APPENDIX C	SAFETY MEETING FORMS AIR MONITORING FORMS

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## **1.0**     *GLOSSARY OF TERMS*

AHA:	Activity Hazard Analysis
BZ:	Breathing Zone
C:	Ceiling Limit
CNS	Central Nervous System
CTPV:	Coal tar pitch volatiles
CRZ:	Contamination Reduction Zone
CSP:	Construction Superintendent
CZ:	Clean Zone
dBA:	Decibels Adjusted
ERCP:	Emergency Response and Contingency Plan
EZ:	Exclusion Zone
FDNY:	New York City Fire Department
GI:	Gastrointestinal
HSO:	Health & Safety Officer
IP:	Ionization Potential
Mg/m <sup>3</sup> :	Micrograms per cubic meter
MPH:	Miles per hour
NIOSH:	National Institute for Occupational Safety and Health
OSHA:	Occupational Health and Safety Administration

Owner:	Crescent Owners, LLC
PAHs:	Poly aromatic hydrocarbons
PEL:	Permissible Exposure Limit
PM:	Project Manager
PPE:	Personal Protective Equipment
PPM:	Parts per Million
PSM:	Project Safety Manager
SHASP:	Site-Specific Health and Safety Plan:
SITE:	131-10 to 131-32 Avery Avenue, Queens, NY
STEL:	Short-term exposure limit (15 minutes)
SZ:	Support Zone
TLV:	Threshold Limit Value
TWA:	Time-weighted average (8 hours)
USEPA:	United States Environmental Protection Agency
VP:	Vapor Pressure at approximately 68 F° in mm Hg

## **2.0**     *INTRODUCTION*

The Sites are located at 131-10 to 131-24 (Site A) and 131-24 to 131-32 (Site B) in Queens, New York (the “Sites”). Site A is identified as Block 5076 and Lots 61 and 65, while Site B is identified as Block 5076 and Lots 69 and 75. The four tax lots in total consist of 21,640-square feet and are bounded by Avery Avenue to the north, a 1-story commercial building to the east, a 1-story commercial building to the south, and 131st Street to the west. Currently, the Sites are unoccupied but were most recently used as four separate commercial retail stores and contain four 1-story structures. Only the building on Lot 61 has a basement; the other three buildings do not have a basement. A map of the site boundary is shown in Figure 2-1.

This Site-Specific Construction Health and Safety Plan (CHASP) has been developed by Athenica Environmental Services (“Athenica”) for specific activities associated with the construction of a new residential building at the Site.

This CHASP documents the policies and procedures which will protect workers from potential chemical hazards associated with the soils and/or fill at this Site. Other plans and documentation will establish the policies and procedures that will protect workers from potential physical hazards associated with traditional demolition and construction activities at the Site.

This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise during the disturbance of soil/fill at the Site. This CHASP was prepared by the general contractor’s Environmental Consultant, Athenica Environmental Services (Athenica). The general contractor and its subcontractors will be required to utilize this plan when working at the site.

Although this plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Conditions may change and unforeseen situations may arise that require modifications from the original plan. Therefore, Athenica only makes representations or warranties as to the adequacy of this CHASP for currently anticipated activities and conditions. This flexibility allows modification by authorized personnel, e.g. Project Manager, Project Safety Manager. All changes to procedures in this plan will be documented in writing using the form provided in Appendix B.

Refusal or failure to comply with this CHASP or violation of any safety procedures by field personnel and/or subcontractors may result in immediate removal from the Site following consultation with the Project Safety Manager (PSM) and the Project Manager (PM).

It is expected that this CHASP will be implemented at a multi-employer work site. Information and references within this plan shall in no way imply or alleviate any other Site contractor from their responsibility to comply with any and all applicable State or Federal statutes or regulations regarding the completion of this project. It is the responsibility of each employer to communicate and coordinate work planning so as to prevent their work activities from becoming a potential hazard to other workers at the project site. Failure to communicate will not alter an employer's responsibilities or obligations for any resulting injuries to their employees.

## **2.1 SITE HISTORY**

Based upon the review of the Phase I Environmental Site Assessment (ESA) Report prepared by SAI Environmental Consultants in July 2014, the Site history was established.

The Site consists of a 9,000 square-foot lot that is currently developed with two 2-story commercial buildings both with basements. Historic Sanborn Maps show the Site as unoccupied in 1898 and 1915. The 1936 Sanborn Map shows the Site as developed with one 2-story commercial structure at 38-11 31<sup>st</sup> Street, noted for "Pressing Finishing" and two 2-story dwellings with parking in the rear of the Lot. 38-11 31<sup>st</sup> Street was also listed on a 1939 city directory as "Cosmopolitn Cleaners & Dryers Inc." The 1950 Sanborn Map shows no structural changes but designated the Site commercial structure as "Machinery and Assembling". This property is listed on city directories from 1945 to 1970 as "Metropolitan Welding Supply Company" and "Metroweld Distributors". The 1979 Sanborn Map designated the commercial structure as "Welding Supplies". From 1983 to 2000 "Empire Rollers Inc" and "Arrow Rollers Inc". The 1985 Sanborn Map shows the two dwellings as vacant Lots with the commercial structure designated for Manufacturing. The 1986 Sanborn Map shows the Site developed with an additional 2-story commercial structure at 38-19 31<sup>st</sup> Street. The Site has remained unchanged to present. From 2005 to 2008 38-11 31<sup>st</sup> Street is listed on city directories as "Van Gogh Painting Corp and as "All State Banners. This property was listed as "R Wholesale Corp" in 2013. 38-17 31<sup>st</sup> Street was listed on city directories as occupied by private residents between 1934 and 1970 and 38-19 31<sup>st</sup> Street for private residents between 1934 and 1976. The Phase I ESA Report was previously submitted to OER.

Summary of work performed under the Remedial Investigation is as follows:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Performed a GPR survey;

3. Installed six (6) soil borings across the entire project Site, and collected thirteen (13) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed two (2) groundwater monitoring wells throughout the Site and collected two (2) groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installed four (4) sub-slab soil vapor probes around Site perimeter and collected four (4) samples for chemical analysis.

Based on the findings of the Remedial Investigation at the Site, chlorinated solvents are present in groundwater and soil vapor beneath the Site. Several PAHs, Metals and Pesticides were also detected at elevated levels in shallow soil throughout the Site.

## **2.2 SCOPE OF WORK**

Although the construction of the new residential and commercial mix use building involves many different activities, only those activities associated with the disturbance and handling of urban fill are addressed in this CHASP.

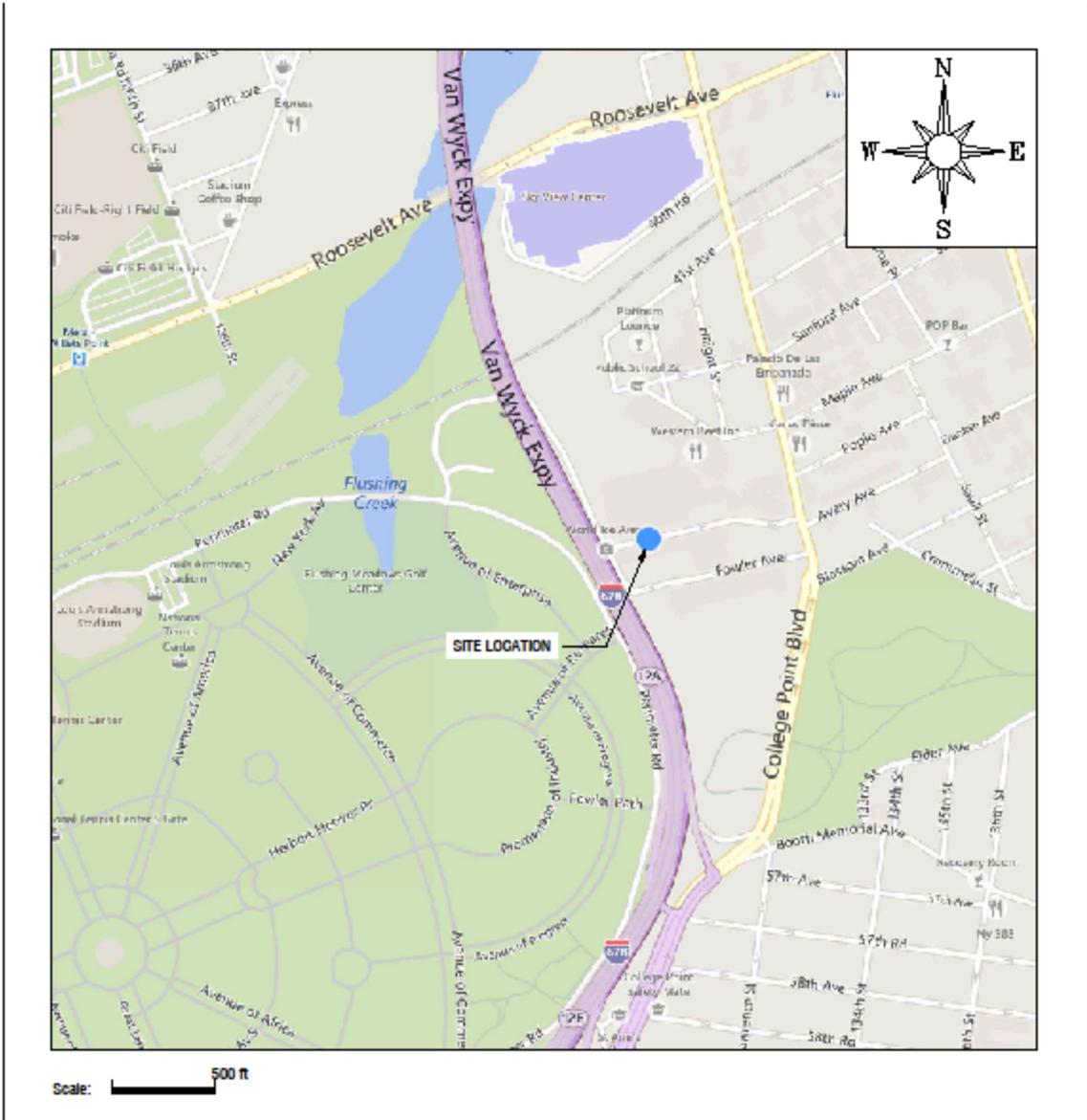
The principal tasks covered in this HASP include the following:

- Mobilization/demobilization,
- Sheeting and shoring,
- Excavation of urban fill and/or soil,
- Loading of urban fill into trucks for disposal,
- Installation of footings for new building, and
- Heavy equipment decontamination

Activity Hazard Analyses for these tasks are provided in Section 4.5.

This CHASP has been prepared and approved for the above scope of work. In order to remain approved, any changes to the scope of work will require amendment of the plan. The Site Health and Safety Amendment Documentation form (Appendix B) will be used for all revisions/amendments to this plan.

**FIGURE 2-1  
 SITE LOCATION MAP**



	Drawn by: <b>ALEJANDRO MOREJON</b>	Site Plan: 131-18 to 131-24 AVERY AVENUE FLUSHING, NY 11355
	Checked by: <b>ETHAN RAINEY</b>	
	Drawing Scale: <b>AS NOTED</b>	Figure: <b>FIGURE 1</b> Title: <b>SITE LOCATION MAP</b>
	Project No: <b>14-132-0587</b> Date: <b>May 29, 2014</b>	

## **3.0**     *KEY PERSONNEL*

The Project Manager (PM), Construction Superintendent (CS), Health & Safety Officer (HSO), and Project Safety Manager (PSM) all share responsibilities for formulating and enforcing health and safety requirements, and assuring that the CHASP is implemented as intended. This section outlines the responsibilities for each of these positions. Responsibilities for site employees and subcontractor personnel are also outlined in this section. The General Contractor and/or other authorized personnel may also be involved and identified in future CHASP documents, as appropriate.

### **3.1**     **PROJECT MANAGER (PM)**

The PM has the overall responsibility for the project and to assure that the requirements of the contract are attained in a manner consistent with the CHASP requirements. The PM will coordinate with the CS and the HSO to assure that the work is completed in a manner consistent with the HASP. The PM will supervise the allocation of resources and staffing to implement specific aspects of the HASP and may delegate authority to expedite and facilitate any application of the program. This role will be filled by the General Contractor or Excavation Subcontractor. OER will be notified in the future who the PM will be for this project.

### **3.2**     **CONSTRUCTION SUPERINTENDENT (CS)**

The CS is responsible for field implementation of the CHASP and Site Emergency Response and Contingency Plan and will act as the HSO in his/her absence. This role will be filled by the general contractor or primary subcontractor. OER will be notified in the future who the CS will be for this project.

Specific responsibilities for the CS include:

- Ensures that the CHASP is implemented;
- Ensures that field work is scheduled with adequate equipment to complete the job safely;
- Enforces site health and safety rules;
- Ensures that proper personal protective equipment is utilized;
- Ensures that the PSM is informed of project changes which require modifications to the CHASP;
- Ensures that the procedure modifications are implemented;
- Investigates incidents;
- Conducts the daily site safety briefing;
- Reports to PSM to provide summaries of field operations and progress; and

- Acts as Emergency Coordinator.

### **3.3 HEALTH AND SAFETY OFFICER (HSO)**

The HSO is authorized to administer the HASP. The HSO's primary operational responsibilities include personal and environmental monitoring, selection and monitoring of personal protective equipment, assignment of protection levels, coordination/review of work permits and observation of work activities. The HSO is authorized to stop work when an imminent health or safety risk exists. The HSO will review the essential safety requirements with all on-site personnel and will facilitate the daily safety meetings. OER will be notified in the future who the HSO will be for this project.

Specific responsibilities for HSO performance include:

- Monitoring workers for signs of stress, such as cold stress, heat stress, and fatigue. Reevaluating site conditions on an on-going basis.
- Coordinating protective measures including engineering controls, work practices and personal protective equipment.
- Assisting the CS in the preparation, presentation and documentation of daily safety meetings.
- Conducting and preparing reports of daily safety inspections of work processes, site conditions, and equipment conditions. Discussing any necessary corrective actions with the CS and reviewing new procedures.
- Initiating revisions of the CHASP as necessary for new tasks or modifications of existing operations and submitting to the Project Safety Manager for approval (see Appendix B).
- Performing air monitoring as required by the CHASP.
- Assisting the PM and CS in incident investigations.
- Preparing permits for special operations, e.g., hot work, confined spaces, line breaking, etc.
- Maintaining site safety records.
- Conducting inspections of all fire extinguishers, first-aid kits and eye washes on a regular basis.
- Informing subcontractors of the elements of the CHASP.

### **3.4 PROJECT SAFETY MANAGER (PSM)**

The Project Safety Manager (PSM) is responsible for developing/reviewing the CHASP and ensuring that it is complete and accurate. The PSM provides technical and administrative support

and will be available for consultation when required. If necessary, the PSM will direct modifications (Appendix B) to specific aspects of the HASP to adjust for on-site changes that affect safety. The HSO will coordinate with the PSM on necessary modifications to the HASP. The PSM may make periodic visits to the project site to review implementation of this HASP. This role is role will be filled by the General Contractor's representative.

### **3.5 EMPLOYEE SAFETY RESPONSIBILITIES**

Each employee is responsible for personal safety as well as the safety of others in the work area and is expected to participate fully in the site safety and health program. Employees will use all equipment provided in a safe and responsible manner as directed by the CS. Employees shall report any hazardous conditions which might affect the health and safety of site personnel to the CS and/or HSO. To protect the health and safety of all personnel, site employees that knowingly disregard safety policies/procedures will be subject to removal.

Specific requirements include:

- Reading the CHASP and any amendments prior to the start of on-site work.
- Providing documentation of any applicable medical surveillance and training to the CS/HSO prior to the start of work.
- Attending the pre-entry briefing prior to beginning on-site work as well as other scheduled safety meetings.
- Asking any questions or reporting concerns regarding the content of the CHASP to the CS/HSO prior to the start of work.
- Reporting all potentially dangerous situations, incidents, injuries, and illnesses, regardless of their severity, to the CS/HSO.
- Complying with the requirements of this CHASP and the requests of the CS/HSO.

## **4.0**     *ACTIVITY HAZARD ANALYSIS*

This section outlines the potential chemical and physical hazards which workers may be exposed to during work on this project. The assessment of chemical hazards in this section is based on the results provided on the Remedial Investigation by Athenica for the Site. This is a representative list of contaminants that have been identified through extensive soil and groundwater testing at this site.

### **4.1**     **CHEMICAL HAZARDS**

Based on review of the Remedial Investigation, workers at this Site have the potential to be exposed to chemicals in soil PAHs, total PCBs, and several metals including copper, lead, and mercury. Additionally, workers have the potential to be exposed to tetrachloroethylene and trichloroethylene in groundwater and soil vapor.

Potential exposure to the contaminants of concern may occur during intrusive soil activities or where direct contact with the contaminated soil takes place. Metals and PAHs are primarily inhalation hazards and exposure can be minimized with simple dust control measures. A summary of hazard information is listed in Table 4-1

**TABLE 4-1  
 CHEMICAL DATA**

COMPOUND	ACGIH TLV	OSHA PEL	ROUTE OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
Tetrachloroethylene	170 mg/m <sup>3</sup>	670 mg/m <sup>3</sup>	Inhalation Skin absorption	Irritate eyes, skin; headache, vertigo, visual distortion, fatigue, giddiness, tremor, nausea, vomiting; dermatitis; cardiac arrhythmia, liver damage	Eyes, skin, respiratory system, heart, liver, CNS,	Colorless liquid (unless dyed blue) with chloroform-like odor.
Trichloroethylene	67.8 mg/m <sup>3</sup>	535 mg/m <sup>3</sup>	Inhalation Skin absorption	Irritation of eyes, skin; headache; visual disturbance; lassitude (weakness, exhaustion), dizziness; tremor; drowsiness, nausea; vomiting; dermatitis; cardiac arrhythmias; paresthesia; liver injury	Kidneys, liver, eyes, skin, CNS, cardiovascular system	Colorless liquid (unless dyed blue) with a chloroform-like odor.
PAHs	0.2 mg/m <sup>3</sup>	0.2 mg/m <sup>3</sup>	Inhalation Ingestion Skin contact	Headache, nausea, vomiting, and diaphoresis	Genitourinary system, Hematopoietic system, GI Tract, Respiratory system, eyes, skin	Liquid, gas and solid, can be combustible
Copper	1.0 mg/m <sup>3</sup>	1.0 mg/m <sup>3</sup>	Inhalation Ingestion Skin contact	Irritant to skin	Lungs, mucous membrane	Bluish lustrous metal, Noncombustible Solid
Lead	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	Inhalation Ingestion Skin contact	Weakness, lassitude, insomnia; facial pallor; eye irritation, anorexia, low-weight, malnutrition; constipation; abdominal pain; colic; hypertension, anemia; gingival lead line; tremors; paralysis of wrist, ankles; encephalopathy; neuropathy	GI Tract, CNS, kidneys, blood, gingival tissue	Noncombustible Solid
Mercury	0.25 g/m <sup>3</sup>	0.1 mg/m <sup>3</sup>	Inhalation Ingestion Skin contact	Inflammation of eyes and skin; coughing; choking; shortness of breath; death	Blood, kidneys, liver, brain, peripheral nervous system, CNS	Non-combustible Liquid

Abbreviations

ACGIH = American Conference of Governmental Industrial Hygienists

C = Ceiling Unit

CNS = Central Nervous System

CVS = Cardiovascular System

GI = Gastrointestinal

TLV = Threshold Level Value

mg/m<sup>3</sup> = milligrams per cubic meter

OSHA = Occupational Safety and Health Administration

PNS = Peripheral Nervous System

ppm = parts per million

PEL – Permissible Exposure Level

The following general symptoms may indicate exposure to a hazardous material. Personnel will be removed from the work site and provided immediate medical attention should any of the following symptoms occur:

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Euphoria
- Chest pains and coughing
- Rashes or burns

#### **4.2 PHYSICAL HAZARDS**

To minimize physical hazards, standard safety protocols will be followed at all times. Failure to follow safety protocols may result in removal of the employee from the site. All personnel shall be familiar with the physical hazards presented by each of the tasks they perform. Task specific hazard analyses are provided in Section 4.5. These hazard analyses shall be reviewed prior to beginning each task and periodically throughout the task. It must be noted that these activity hazard analyses are general in nature. It is the responsibility of the CS to revise and adapt them as necessary to reflect site-specific conditions.

The CS and HSO will observe the general work practices of each crew member and enforce safe procedures. Work areas will be inspected by the crew leaders, CS and HSO. All hazards will be corrected in a timely manner. A variety of physical hazards may be encountered during work activities at this site. Activity Hazard Analyses will be developed for each principal activity and will identify all major hazards to which employees may be exposed. Hard hats, safety glasses, and steel-toe safety boots are required in all work areas of the site. Site-specific hazards and all necessary precautions will be discussed at the daily safety meetings. The General Contractor's Safety Manual will be maintained at the project site as a reference document.

#### **4.3 ENVIRONMENTAL HAZARDS**

Environmental factors such as weather, wild animals, insects, and irritant plants may pose a hazard when performing outdoor tasks. The HSO and CS will take necessary actions to alleviate these hazards should they arise.

### 4.3.1 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. Heat stress disorders include:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages, e.g. Gatorade™. Heat stress can be prevented by assuring an adequate work/rest schedule. Guidelines are presented below.

The CS and HSO will determine the specific work-rest schedule based on project specific conditions. In addition, workers are encouraged to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the HSO and CS. The CS and HSO will determine the specific work-rest schedule based on project specific conditions. In addition, workers are encouraged to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the HSO and CS.

Heat stress can be prevented by assuring an adequate work/rest schedule and adequate fluid consumption. A guide for work-rest schedules for various protection levels (defined in Section 5.0) is given below. The number of hours before a work-rest period is based on experience with similar work. The time periods should be considered maximum. It must also be remembered that individual physical variability and differences in physical work activities may require revisions to site plans. This table should be used as a guide. Professional judgment (evaluation of individual work load, ambient weather conditions, worker acclimatization and PPE levels) of the CS and HSO is necessary to assure a fully protective plan to prevent heat stress disorders.

<b>GUIDELINES FOR WORK-REST PERIODS FOR VARIOUS PROTECTION LEVELS (A-D) NUMBER OF HOURS BEFORE REST PERIOD</b>				
<b>Temperature</b>	<b>Level D</b>	<b>Level C</b>	<b>Level B</b>	<b>Level A</b>
90+ F*	2.0	1.5	1.0	0.5
87.5 F	2.5	2.0	1.5	1.0
82.5 F	3.0	2.5	2.0	1.5
77.5 F	3.5	3.0	2.5	1.5
72.5	4.0	3.5	2.5	1.5

*\*Work above 100 F will be reviewed with the Project Safety Manager to determine specific requirements.*

Alternately the work/rest schedule can be calculated based on heat stress monitoring results. Monitoring consists of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. The frequency of monitoring is described below.

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by 1/3 and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, increase the following rest period by 1/3. The initial rest period should be at least 5 minutes.

Body temperature, measured orally or through the ear canal, may also be monitored to assess heat stress. Workers should not be permitted to continue work when their body temperature exceeds 100.4 F (38C). Monitoring should be conducted at the beginning of each break period as noted above.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 72.5 degrees Fahrenheit when wearing chemical protective clothing (Level C, B, A), or 80 degrees Fahrenheit for site activities performed with no chemical protective clothing (Level D). Monitoring should include pulse rate, weight loss, oral/ or ear canal temperature, signs and symptoms of heat stress and fluid intake.

An additional measure that can be employed to minimize heat stress is through the utilization of Heat Stress Relief Stations. A Heat Stress Relief Station (HSRS) is a location inside the exclusion zone where workers can partially remove their personal protective equipment, rest and take in fluids. Since the HSRS is established inside the exclusion zone, it is imperative that its use be closely monitored and controlled to ensure that workers do not ingest contamination during use.

The following is a detailed description of the Heat Stress Relief Station:

- Location- The HSRS should be located in an area of the exclusion zone where it will be predominantly upwind of site activities. This can typically be adjacent to the contamination reduction zone.
- Delineation- The HSRS must be separated from the exclusion zone by temporary fencing and must be labeled as “Heat Stress Relief Station”.
- Elements- The HSRS contains several elements:
  - A tarp or tent for shade;
  - A bench or chairs for workers to sit on;
  - A wash station;
  - A table for fluids, cups and clean personal protective equipment (PPE); and
  - A trash can for contaminated PPE.
- Set-Up- Proper set up of the HSRS is imperative its successful use.

- In the Support Zone, prepare the water cooler with ice and water or Gatorade.
- The person bringing the items to the HSRS must don the appropriate PPE required for the Exclusion Zone.
- Bring the following items to the HSRS:
  - Cooler;
  - Clean disposable cups;
  - Disinfectant wipes;
  - A clean trash bag;
  - Surgical gloves; and
  - Duct tape.
- Ensure the wash station has clean water and paper towels for drying hands/face.
- Procedure for Use- In order for the HSRS to be effective, it must be properly used. It is imperative that workers decontaminate properly before drinking fluids so that ingestion of site contaminants does not take place. The following are the steps to properly use the HSRS:
  - Upon entering the HSRS:
    - If wearing a Tyvek, remove duct tape on wrists and unzip and tie around waist;
    - Remove your outer gloves and surgical gloves; set outer gloves aside and throw surgical gloves into trash;
    - Wash hands and/or face at Wash Station;
    - Use disinfectant wipe on hands;
    - Get drink and/or rest on bench/chair.
  - Before re-entering the Exclusion Zone:
    - Dispose of cups in trash;
    - Put on a clean pair of surgical gloves;
    - If wearing a Tyvek, pull up and rezip;
    - Re-apply duct tape to wrists;
    - Put on outer gloves.
- Monitoring- The CS and HSO are both responsible for monitoring the use of the Heat Stress Relief Station. The HSO should review the procedures for use of the HSRS with the workers before its use begins to ensure that everyone understands the parameters for proper use.

### **4.3.2 Exposure to Cold**

With outdoor work in the winter months, the potential exists for hypothermia and frostbite. Several forms of cold stress as well as preventative measures are described in this section of the HASP.

#### **4.3.2.1 Cold Stress Conditions and Symptoms**

Typical cold stress conditions are included in the tables below, including symptoms and first aid precautions. If cold stress conditions develop, professional medical attention will be sought.

<b>TABLE 4.3.2A COLD WEATHER INJURIES</b>		
<b>Cause</b>	<b>Symptoms</b>	<b>First Aid</b>
<b>Frostbite</b>		
Freezing of tissue, normally due to exposure below 32°F	Numbness in affected area. Tingling, blistered, swollen or tender areas. Pale, yellowish waxy-looking skin.	Warm affected area with direct body heat. Consult with medical personnel ASAP. <b>Do not</b> thaw frozen area if treatment will be delayed. <b>Do not</b> massage or rub affected area. <b>Do not</b> wet area or rub with snow or ice.
<b>Chilblain</b>		
Repeated exposure of bare skin for prolonged periods to temperatures 20° to 60°F (for those not acclimated to cold weather).	Swollen, red skin. Tender, hot skin, usually accompanied by itching.	Warm affected area with direct body heat. <b>Do not</b> massage or rub. <b>Do not</b> wet area or rub with snow or ice. Do not expose affected area to open fire, stove or any other intense heat source.
<b>Immersion Foot (Trench Foot)</b>		
Prolonged exposure of the feet to wet conditions at temperatures between 32° to 50°F. Inactivity and damp socks (or tightly laced boots that impair circulation) speed onset and severity.	Cold numb feet may progress to hot with shooting pains. Swelling redness and bleeding.	Rewarm feet by exposing them to warm air. Evacuate victim to a medical facility. <b>Do not</b> massage, rub, moisten or expose affected area to extreme heat source.
<b>Dehydration</b>		
Depletion of body fluids.	Dizziness. Weakness.	Replace lost water. Water should be sipped not gulped. Get medical treatment.
<b>Hypothermia</b>		
Prolonged cold exposure and body heat loss. May occur at well above freezing, especially when a person is immersed in water.	Lack of shivering. Drowsiness, mental slowness, lack of coordination. Can progress to unconsciousness, irregular heartbeat and death.	Strip off clothing and wrap victim in blankets or a sleeping bag. Get victim to a heated location and medical treatment as soon as possible.

In cold weather, the potential for frostbite exists, especially in body extremities. Personnel will be instructed to pay particular attention to hands, feet, and any exposed skin when dressing. Personnel will be advised to obtain more clothing if they begin to experience loss of sensation due to cold exposure.

**4.3.2.2 Monitoring and Preventative Actions**

Typical cold stress monitoring procedures are included in the tables below, including temperatures to initiate monitoring, protective clothing uses and administrative practices to prevent or reduce the potential for cold stress related injury/illness. For weather conditions below -43 °C or -45 °F with no wind and/or similar conditions (see Work/Warm-up Table) all work will cease.

<b>TABLE 4.3.2B COLD STRESS PREVENTION*</b>		
	<b>Temperature</b>	<b>Preventative Action</b>
1	<61°F	Use thermometer to measure ambient temperature.
2	<40°F	Cold weather protective clothing available; check core body temperature at breaks using oral or ear canal thermometer. Maintain core body temperature above 96.8°F to avoid hypothermia.
3	<30°F	Record ambient temperature and wind speed every 4 hours; compare to wind chill chart when below 19.4°F.
4	<19°F	Provide and use heated warming shelters for work breaks and when cold stress symptoms appear.
5	<10°F	Constant observation of workers, i.e. “buddy system”; rest in heated shelters (see work-rest schedule); dry clothing available for change-out; acclimate new workers.
6	<0°F/ >5 mph winds	Obtain medical certification for workers subject to hypothermia risk.

\* Based on “2009 ACGIH Threshold Limit Values... for Physical Agents.”  
 Note: refer to wind-chill and work-warmup charts in Table 4.3.2E

<b>TABLE 4.3.2C COLD WEATHER CLOTHING REQUIREMENTS</b>	
1	If wind chill is a factor at a work location, the cooling effect of the wind shall be reduced by shielding the work area or providing employees an outer windbreak layer garment.
2	Extremities, ears, toes, and nose shall be protected from extreme cold by protective clothing.
3	Employees performing light work whose clothing may become wet shall wear an outer layer of clothing which is impermeable to water.
4	Employees performing moderate to heavy work whose clothing may become wet shall wear an outer layer of clothing which is impermeable to water.
5	Outer garments must provide for ventilation to prevent wetting of inner clothing by sweat, or if not possible, a heated shelter for warming/drying clothing, or a change of clothing, shall be provided prior to returning to work in a cold environment.

Protective clothing greatly reduces the possibility of hypothermia in workers. However, personnel will be instructed to wear warm clothing and to stop work to obtain more clothing if they become too cold. Employees will also be advised to change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation.

Employees will be instructed to use heated shelters on site, at regular intervals, depending upon the severity of ambient temperatures. Symptoms of cold stress, including heavy shivering, excessive fatigue, drowsiness, irritability, or euphoria necessitate immediate return to the shelter.

TABLE 4.3.2D COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS EQUIVALENT TEMPERATURE (under calm conditions)*												
Actual Temperature Reading ( F )												
Estimated Wind Speed (in MPH)	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
Equivalent Chill Temperature (F)												
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind Speeds greater than 40 mph have little additional effect.)	<b>Little Danger</b> In < hr with dry skin. Maximum danger of false sense of security			<b>Increasing Danger</b> Danger of freezing of exposed flesh within one minute.				<b>Great Danger</b> Flesh may freeze within 30 seconds.				
Trench foot and immersion foot may occur at any point on this chart.												

\*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA. (Shaded area) Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36 C (98.6 F) per cold stress TLV.

TABLE 4.3.2E TLV WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT*											
Air Temperature – Sunny Sky		No Noticeable Wind		5 mph wind		10 mph wind		15 mph wind		20 mph wind	
C (appx.)	F (appx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26 to -28	-15 to -19	Normal	1	Normal	1	75 min	2	55 min	3	40 min	4
-29 to -31	-20 to -24	Normal	1	75 min	2	55 min	3	40 min	4	30 min	5
-32 to -34	-25 to -29	75 min	2	55 min	3	40 min	4	30 min	5	Non-Emergency work should cease	
-35 to -37	-30 to -34	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38 to -39	-35 to -39	40 min	4	30 min	5	Non-emergency work should cease					
-40 to -42	-40 to -44	30 min	5	Non-emergency work should		cease					

**TABLE 4.3.2E  
 TLV WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT\***

Air Temperature – Sunny Sky	No Noticeable Wind		5 mph wind		10 mph wind		15 mph wind		20 mph wind	
	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
C (appx.) F (appx.)										
< -43      < -45	Non-emergency work should cease		cease							

\* Adapted from Occupational Health and Safety Division, Saskatchewan Department of Labor

### 4.3.3 Biological Hazards

The contractor will be required to monitor and control insects, rodents, and other pests identified on site. Standing water will not be allowed on-site, in an effort to control insects. Pest control procedures used by the contractor will include bait, trap, spray, or other means to abate pest problems that develop on site during disruption activities.

### 4.3.4 Noise

Hearing protection is required for workers operating or working near heavy equipment, where the noise level is greater than 85 dbA (Time Weighted Average) as well as personnel working around heavy equipment. The HSO will determine the need and appropriate testing procedures, (i.e., sound level meter and/or dosimeter) for noise measurement. The provisions for noise protection for workers are presented in other safety-related documents for the Site.

## 4.4 VEHICLE AND HEAVY EQUIPMENT SAFETY

### 4.4.1 Vehicle Safety

Motor vehicle incidents are the number one cause of occupational fatalities, accounting for one in three deaths. The safety provisions for vehicle use at the Site are presented in other safety-related documents for the Site.

### 4.4.2 Heavy Equipment Safety

The use of backhoes, front-end loaders, etc. for excavation and other material handling equipment will present various physical hazards. The safety provisions for heavy equipment use at the Site are presented on other safety-related documents for the Site.

#### **4.5 TASK-SPECIFIC ACTIVITY HAZARD ANALYSES (AHA)**

This section of the HASP provides a breakdown of the hazards and control measures for each principal task. These Activity Hazard Analyses (AHAs) are general in nature and must be made project specific by the Construction Superintendent prior to each task. The AHAs will be field checked by the supervisor on an ongoing basis and revised as necessary. All revisions will be communicated to the work crew.

<b>Project Identification</b> 131-10 through 131-32 Avery Avenue	<b>Location</b> Queens, NY	<b>Estimated Dates</b> May – August 2015
<b>Phase of Work</b> Mobilization/ Demobilization		<b>Analysis Approved by</b> Spiro Dongaris
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Mobilization and demobilization of equipment site tools, personnel.  2. Set up/remove staging and decontamination areas.	Slips/trips/falls	<ul style="list-style-type: none"> <li>• Maintain alertness to slip/trip/fall hazards</li> <li>• Maintain good housekeeping</li> <li>• Walk, do not run</li> <li>• Wear footwear with soles that grip</li> </ul>
	Manual lifting/ material handling	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (50 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>
	Temperature extremes	<ul style="list-style-type: none"> <li>• Drink plenty of fluids</li> <li>• Train personnel of signs/symptoms of cold/heat stress</li> <li>• Monitor air temperatures when extreme weather conditions are present</li> <li>• Stay in visual and verbal contact with your buddy</li> </ul>
	Hand tool usage	<ul style="list-style-type: none"> <li>• Daily inspections will be performed</li> <li>• Remove broken or damaged tools from service</li> <li>• Use the tool for its intended purpose</li> <li>• Use in accordance with manufacturer instructions.</li> </ul>
	Biological hazards	<ul style="list-style-type: none"> <li>• Be alert to the presence of biological hazards</li> <li>• Wear insect repellent</li> <li>• CS/HSO should be aware of on-site personnel with allergic reactions in insect bites and stings.</li> </ul>

<b>Project Identification</b> 131-10 through 131-32 Avery Avenue	<b>Location</b> Queens, NY	<b>Estimated Dates</b> May – August 2015
<b>Phase of Work</b> Trenching/Excavation		<b>Analysis Approved by</b> Spiro Dongaris
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Trenching and excavation. 2. Install shoring/sheeting protective system.	Chemical hazards	<ul style="list-style-type: none"> <li>• Wear appropriate PPE per Section 5.1</li> <li>• Practice contamination avoidance</li> <li>• Conduct real-time air monitoring per section 7.1.1</li> <li>• Follow proper decontamination procedures</li> <li>• Wash hands/face before eating, drinking, smoking</li> </ul>
	Cave-in	<ul style="list-style-type: none"> <li>• Do not allow entry into the trench unless approved protective system is in place and has been inspected by the competent person.</li> <li>• Follow OSHA excavation regulations</li> <li>• Place ladder or entry device every 25 feet of lateral travel</li> </ul>
	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate potential equipment swing areas</li> <li>• Make eye contact with vehicle operators before approaching/crossing high traffic areas</li> <li>• Understand and review hand signals</li> <li>• Use a spotter to direct equipment movement in high traffic areas</li> <li>• Audible back-up alarms on equipment</li> <li>• Operator inspects equipment daily for safety defects, including the braking system</li> </ul>
	Slips/trips/falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment and tools</li> <li>• Mark, identify, or barricade other obstructions</li> <li>• Use barricades or fencing for trenches greater than 6 feet deep</li> <li>• Maintain alertness to slip/trip/fall hazards</li> <li>• Maintain good housekeeping</li> <li>• Walk, do not run</li> <li>• Wear footwear with soles that grip</li> </ul>
	Electrical hazards	<ul style="list-style-type: none"> <li>• Maintain 10 foot minimum clearance to any overhead power lines</li> <li>• Call for Utility mark out prior to digging</li> </ul>

<b>Project Identification</b> 131-10 through 131-32 Avery Avenue	<b>Location</b> Queens, NY	<b>Estimated Dates</b> May – August 2015
<b>Phase of Work</b> Trenching/Excavation		<b>Analysis Approved by</b> Spiro Dongaris
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Trenching and excavation. 2. Install shoring/ sheeting protective system.	Hand and power tool usage	<ul style="list-style-type: none"> <li>• Daily inspections will be performed on tools and cords</li> <li>• Ensure all guards are in place</li> <li>• Remove broken or damaged tools from service</li> <li>• Use the tool for its intended purpose</li> <li>• Use in accordance with manufacturer instructions</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Hearing protection mandatory at or above 85 dBA.</li> <li>• Instruct personnel how to properly wear hearing protective devices.</li> <li>• Disposable ear plugs or other hearing protection required while around noisy equipment.</li> </ul>
	Manual lifting/ Material handling	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (50 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>
	Temperature extremes.	<ul style="list-style-type: none"> <li>• Drink plenty of fluids;</li> <li>• Train personnel of signs/symptoms of cold/heat stress;</li> <li>• Monitor air temperatures when extreme weather conditions are present;</li> <li>• Stay in visual and verbal contact with your buddy; and</li> <li>• Use procedures in Sections 3.3.1 and 3.3.2</li> </ul>

<b>Project Identification</b> 131-10 through 131-32 Avery Avenue	<b>Location</b> Queens, NY	<b>Estimated Dates</b> May – August 2015
<b>Phase of Work</b> Loading of Trucks		<b>Analysis Approved by</b> Spiro Dongaris
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Load trucks with contaminated soils. 2. Cover and clean trucks.	Chemical hazards	<ul style="list-style-type: none"> <li>• Wear appropriate PPE per Section 6.1</li> <li>• Practice contamination avoidance</li> <li>• Conduct real-time air monitoring per section 8.1.1</li> <li>• Follow proper decontamination procedures</li> <li>• Wash hands/face before eating, drinking, smoking</li> </ul>
	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate potential equipment swing areas</li> <li>• Make eye contact with vehicle operators before approaching/crossing high traffic areas</li> <li>• Understand and review hand signals</li> <li>• Use a spotter to direct equipment movement in high traffic areas</li> <li>• Audible back-up alarms on equipment</li> <li>• Operator inspects equipment daily for safety defects, including the braking system</li> </ul>
	Slips/trips/falls	<ul style="list-style-type: none"> <li>• Maintain alertness to slip/trip/fall hazards</li> <li>• Maintain good housekeeping</li> <li>• Walk, do not run</li> <li>• Wear footwear with soles that grip</li> </ul>
	Manual lifting/ material handling	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (50 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>
	Temperature extremes	<ul style="list-style-type: none"> <li>• Drink plenty of fluids</li> <li>• Train personnel of signs/symptoms of cold/heat stress</li> <li>• Monitor air temperatures when extreme weather conditions are present</li> <li>• Stay in visual and verbal contact with your buddy</li> <li>• Use procedures in Sections 4.3.1 and 4.3.2</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Hearing protection mandatory at or above 85 dBA.</li> <li>• Instruct personnel how to properly wear hearing protective devices.</li> <li>• Disposable ear plugs or other hearing protection required while around noisy equipment.</li> </ul>

<b>Project Identification</b> 131-10 through 131-32 Avery Avenue	<b>Location</b> Queens, NY	<b>Estimated Dates</b> May – August 2015
<b>Phase of Work</b> Installation of Footers		<b>Analysis Approved by</b> Spiro Dongaris
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
<ol style="list-style-type: none"> <li>1. Build forms.</li> <li>2. Pour concrete.</li> <li>3. Remove forms.</li> </ol>	Chemical hazards	<ul style="list-style-type: none"> <li>• Wear appropriate PPE per Section 6.1</li> <li>• Practice contamination avoidance</li> <li>• Conduct real-time air monitoring per section 8.1.1</li> <li>• Follow proper decontamination procedures</li> <li>• Wash hands/face before eating, drinking, smoking</li> </ul>
	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate potential equipment swing areas</li> <li>• Make eye contact with vehicle operators before approaching/crossing high traffic areas</li> <li>• Understand and review hand signals</li> <li>• Use a spotter to direct equipment movement in high traffic areas</li> <li>• Audible back-up alarms on equipment</li> <li>• Operator inspects equipment daily for safety defects, including the braking system</li> </ul>
	Concrete pumper	<ul style="list-style-type: none"> <li>• Make sure nozzle man has eye contact with pump truck operator.</li> <li>• Ensure steady control over nozzle</li> </ul>
	Splashing concrete	<ul style="list-style-type: none"> <li>• Ensure eye protection is worn and other PPE as required by Section 6.1</li> <li>• A portable eyewash will be maintained in the work area</li> </ul>
	Falls from heights	<ul style="list-style-type: none"> <li>• Fall protection is required over 6 feet when removing forms</li> <li>• Use PFAS where needed</li> <li>• OSHA required training before use of PFAS, scaffold or lift</li> <li>• Competent person inspects PFAS and scaffold</li> </ul>
	Sharp Objects	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects being handled</li> <li>• Maintain all hand and power tools in a safe condition</li> <li>• Keep guards in place during use</li> </ul>

<b>Project Identification</b> 131-10 through 131-32 Avery Avenue	<b>Location</b> Queens, NY	<b>Estimated Dates</b> May – August 2015
<b>Phase of Work</b> Installation of Footers		<b>Analysis Approved by</b> Spiro Dongaris
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Build forms. 2. Pour concrete. 3. Remove forms.	Hand and power tool usage	<ul style="list-style-type: none"> <li>• Daily inspections will be performed on tools and cords</li> <li>• Ensure all guards are in place</li> <li>• Remove broken or damaged tools from service</li> <li>• Use the tool for its intended purpose</li> <li>• Use in accordance with manufacturer instructions</li> </ul>
	Noise	<ul style="list-style-type: none"> <li>• Hearing protection mandatory at or above 85 dBA.</li> <li>• Instruct personnel how to properly wear hearing protective devices.</li> <li>• Disposable ear plugs or other hearing protection required while around noisy equipment.</li> </ul>
	Manual lifting/ material handling	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (50 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>
	Slips/trips/falls	<ul style="list-style-type: none"> <li>• Maintain alertness to slip/trip/fall hazards</li> <li>• Maintain good housekeeping</li> <li>• Walk, do not run</li> <li>• Wear footwear with soles that grip</li> </ul>
	Temperature extremes.	<ul style="list-style-type: none"> <li>• Drink plenty of fluids:</li> <li>• Train personnel of signs/symptoms of cold/heat stress;</li> <li>• Monitor air temperatures when extreme weather conditions are present;</li> <li>• Stay in visual and verbal contact with your buddy; and</li> <li>• Use procedures in Sections 4.3.1 and 4.3.2</li> </ul>

<b>Project Identification</b> 131-10 through 131-32 Avery Avenue	<b>Location</b> Queens, NY	<b>Estimated Dates</b> May – August 2015
<b>Phase of Work</b> Heavy Equipment Decontamination		<b>Analysis Approved by</b> Spiro Dongaris
<b>TASKS</b>	<b>HAZARDS</b>	<b>CONTROL MEASURES</b>
1. Pressure wash or steam clean heavy equipment and vehicles.	Chemical hazards	<ul style="list-style-type: none"> <li>• Wear appropriate PPE per Section 6.1</li> <li>• Practice contamination avoidance</li> <li>• Conduct real-time air monitoring per section 8.1.1</li> <li>• Follow proper decontamination procedures</li> <li>• Wash hands/face before eating, drinking, smoking</li> </ul>
	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate potential equipment swing areas</li> <li>• Make eye contact with vehicle operators before approaching/crossing high traffic areas</li> <li>• Understand and review hand signals</li> <li>• Use a spotter to direct equipment movement in high traffic areas</li> <li>• Audible back-up alarms on equipment</li> <li>• Operator inspects equipment daily for safety defects, including the braking system</li> </ul>
	Steam/heat/splashing	<ul style="list-style-type: none"> <li>• Wear face shield + safety glasses</li> <li>• Stay out of splash radius to minimize exposure</li> <li>• Do not direct steam/spray at anyone</li> </ul>
	Hand and power tool usage	<ul style="list-style-type: none"> <li>• Daily inspections will be performed on tools and cords</li> <li>• Ensure all guards are in place</li> <li>• Remove broken or damaged tools from service</li> <li>• Use the tool for its intended purpose</li> <li>• Use in accordance with manufacturer instructions</li> </ul>
	Slips/trips/falls	<ul style="list-style-type: none"> <li>• Maintain alertness to slip/trip/fall hazards</li> <li>• Maintain good housekeeping</li> <li>• Walk, do not run</li> <li>• Wear footwear with soles that grip</li> </ul>
	Temperature extremes	<ul style="list-style-type: none"> <li>• Drink plenty of fluids</li> <li>• Train personnel of signs/symptoms of cold/heat stress</li> <li>• Monitor air temperatures when extreme weather conditions are present</li> <li>• Stay in visual and verbal contact with your buddy</li> <li>• Use procedures in Sections 4.3.1 and 4.3.2</li> </ul>

## **5.0**      *WORK AND SUPPORT AREAS*

To prevent migration of contamination from personnel and equipment, work areas will be clearly specified as designated below prior to beginning operations. Each work area will be clearly identified using signs or physical barriers.

### **5.1**      **EXCLUSION ZONE (EZ)**

The EZ is the area suspected of contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the mandated level of protection for that area. In certain instances, different levels of protection will be required depending on the tasks and monitoring performed within that zone. The EZ for this project will include the excavation areas, any stockpiling/staging areas, and areas where disturbance of urban fill is likely occurring.

### **5.2**      **CONTAMINATION - REDUCTION ZONE (CRZ)**

The CRZ or transition zone will be established between the EZ and support zone (SZ). In this area, personnel will begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the EZ through the CRZ. The CRZ for this project will be the access/egress routes to/from the EZ and the personnel and equipment decontamination stations.

### **5.3**      **SUPPORT ZONE (SZ)**

The SZ serves as a clean, control area. Operational support facilities are located within the SZ. Normal work clothing and support equipment are appropriate in this zone. Contaminated equipment or clothing will not be allowed in the SZ. There will be a clearly marked controlled access point from the SZ into the CRZ and EZ that is monitored closely by the HSO and the CS to ensure proper safety protocols are followed. The SZ will be any office areas/trailers and the parking and visitor access ways to the project site.

### **5.4**      **SITE CONTROL LOG**

A log of all personnel visiting, entering or working on the site shall be maintained in the main office location. The log will record the date, name, company or agency, and time entering or exiting the site.

No visitor will be allowed in the EZ without showing proof of training and compliance with applicable medical monitoring requirements. Visitors will supply their own protective equipment, including hard hat, boots and respiratory equipment, if required. Visitors will attend a site orientation given by the HSO and sign the HASP.

## 5.5 GENERAL

The following items are requirements to protect the health and safety of workers and will be discussed in the safety briefing prior to initiating work on the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of contamination is prohibited in the EZ and CRZs.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and smoking or other activities which may result in ingestion of contamination.
- During site operations, each worker will consider himself as a safety backup to his partner. All personnel will be aware of dangerous situations that may develop.
- Visual contact will be maintained between workers on site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any site personnel, who do not comply with safety policy, as established by the HSO or the CS, will be dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All site workers are authorized to stop work if they observe unsafe actions of workers or other unsafe conditions on site which may cause an imminent danger.
- All workers and visitors must sign in and out of the site.

## 6.0 *PROTECTIVE EQUIPMENT*

This section specifies the levels of personal protective equipment (PPE) which are or may be required for each principal activity performed at this site. All site personnel must be trained in the use of all PPE utilized.

### 6.1 ANTICIPATED PROTECTION LEVELS

The following protection levels have been established for the site work activities based on site information concerning the levels of contaminants and the scope of work. Results of site air monitoring and visual inspection of the work activities may indicate the need for changes in final PPE level(s). Changes in the initial PPE Levels prescribed in the Table below require completion of the HASP amendment form in Appendix B.

<b>Task</b>	<b>Initial PPE Level</b>	<b>Upgrade/ Downgrade PPE Level</b>	<b>Skin Protection</b>	<b>Respiratory Protection</b>	<b>Other PPE</b>
General Support Zone Activities	Level D	—	Generally none	None	Hard-hat, Steel-toe work boots, safety glasses, safety vests. Leather work gloves as needed. Hearing protection when >85 dBA.
Mobilization/ Demobilization	Level D	—	Generally none	None	Hard-hat, Steel-toe work boots, safety glasses, safety vests. Leather work gloves as needed. Hearing protection when >85 dBA.
Excavation, Loading of Trucks with Contaminated Soil/Fill, Equipment Decontamination	Level D		Generally none,	Initial: None (See Section 7)	Hard-hat, Steel-toe work boots, safety glasses, leather work gloves for material handling, hearing protection >85 dBA

## **6.2 PROTECTION LEVEL DESCRIPTIONS**

This section lists the minimum requirements for each protection level. Modification to these requirements may have been noted in the Table shown above.

### **6.2.1 *Level D***

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather
- Leather work gloves when material handling

## **7.0**     ***DECONTAMINATION PROCEDURES***

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

### **7.1**     **PERSONNEL DECONTAMINATION**

Decontamination procedures will ensure that material which workers may have contacted in the EZ does not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedures for Level D. The specific stages will vary depending on the site, the task, the protection level, etc. Dry decontamination may be used if there is insufficient space to support a full decontamination station as delineated with the steps below and approved by the HSO. The CS and the HSO will ensure that the decontamination procedures are adequate.

#### ***Level D Decontamination***

1. Go to end of EZ
2. Cross into CRZ
3. Wash face and hands

#### **7.1.1**   ***Suspected Contamination***

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination area. Here the worker will remove clothing and don clean clothing. Medical attention will be provided as determined by the degree of injury.

#### **7.1.2**   ***Personal Hygiene***

Personnel will wash hands, arms, neck and face, following decontamination and before any eating, smoking, or drinking.

### **7.2**     **EQUIPMENT DECONTAMINATION**

Heavy equipment and other vehicles operated within the EZ will be decontaminated before being removed from the site. Workers operating the equipment/vehicles will move the equipment to a gross decontamination location near the exit of the EZ. Following gross decontamination the equipment/vehicle will be moved to the decontamination pad. Equipment decontamination will be performed on the pad until the equipment is visually clean. Following decontamination

activities equipment will be inspected by the HSO or CS prior to leaving the site. Once the equipment is inspected it will be removed from the site.

#### Heavy Equipment / Vehicle Decontamination

1. Equipment operator will move the heavy equipment / vehicle to a position near the EZ / CRZ interchange
2. Worker will use manual equipment (shovel, track spade) to remove gross contamination from tracks, bucket, dump box, and vehicle undercarriage (as required)
3. Following removal of gross decontamination equipment will be moved onto the decontamination pad and pressure washed / steam cleaned until equipment / vehicle is visually clean.
4. Equipment / vehicle decontaminated for removal from the site will be moved to a clean area for the HSO / CS inspection.
5. Once the equipment / vehicle is inspected and approved it will be removed from the site. Vehicles that fail inspection will be returned to the decontamination pad for further cleaning and re-inspected.

### **7.3 DISPOSAL OF WASTES**

Wastes will be disposed according to applicable Local, State and Federal regulations.

### **7.4 DUST / EROSION CONTROL**

The contractor will control dust and implement erosion control measures to be protective of nearby ecologically sensitive areas and sensitive receptors.

## **8.0**     ***AIR MONITORING***

Air monitoring will be conducted in order to characterize personnel exposures and fugitive emissions from site contaminants. Principal contaminants of concern are listed in Section 4.0 of this HASP. The target compounds selected for air monitoring purposes for this site include particulates. Results of air monitoring will be used to ensure the proper selection of protective clothing and equipment, including respiratory protection, to protect on-site personnel and off-site receptors from exposure to unacceptable levels of site contaminants. Descriptions of air monitoring strategies, procedures and equipment are provided below. Modification of this plan, including additional monitoring, may be considered as judged necessary by the PSM, in conjunction with the HSO.

### **8.1**     **WORK AREA AIR MONITORING**

Work area air monitoring will include direct reading methods and personal exposure monitoring. Air monitoring will be conducted during soil/waste excavation, transportation, relocation and/or staging, and any other intrusive activities.

#### **8.1.1**    ***Direct Reading Air Monitoring***

During active sifting operations, direct reading air monitoring will be performed to determine the potential for worker exposure to airborne hazards. A summary of air monitoring information is provided in section 8.1.5. Real-time air samples will be taken at least four times each 8-hour worker shift in the workers breathing zone (BZ).

#### **8.1.2**    ***Instrumentation***

The following is a description of the air monitoring equipment to be used:

- MIE PDR-1000 Personal DataRAM, Dust trak or equivalent unit for real-time measuring particulates.

#### **8.1.3**    ***Use And Maintenance Of Survey Equipment***

All personnel using field survey equipment must have training in its operation, limitations, and maintenance. Maintenance and internal or electronic calibration will be performed in accordance with manufacturer recommendations by individuals familiar with the devices before their use on site. Repairs, maintenance, and internal or electronic calibration of these devices will be recorded in an equipment maintenance logbook. The equipment maintenance logbook for each instrument will be kept in that instrument's case. For rented monitoring equipment, repairs and

maintenance will be conducted by the rental company. Daily calibration records will be documented on a log sheet found in Appendix D.

Air monitoring equipment will be calibrated before work begins. Only basic maintenance (such as changing batteries) will be performed by on-site personnel. Any additional maintenance or repairs will be performed by a trained service technician.

#### 8.1.4 Air Monitoring Recordkeeping

The HSO will ensure that all air-monitoring data is recorded on a data sheet found in Appendix D. The PSM may periodically review this data.

#### 8.1.5 Action Levels

During soil/waste excavation, transportation, relocation and/or staging or any intrusive activities, direct reading air monitoring will be performed in the EZ to determine exposure to workers. A summary of air monitoring information is provided in the table below.

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	Action
pDr-1000 (Dust)	Soil excavation areas/laborers, technicians, equipment operators	Four times every 8-hour shift during soil disturbance activities	<5.0 mg/m <sup>3</sup> * ≥5.0 mg/m <sup>3</sup> *	Level D  Stop work; notify PSM  Implement dust suppression measures and resume work after dust levels are below action level

\* Sustained levels in the breathing zone for 5 minutes

As indicated by the below calculations, the action level for PAHs and the metals of concern was selecting based on the OSHA PEL for respirable dust, which was found to be significantly lower than the calculated actions levels for PAHs and copper, lead, mercury, and zinc based on utilizing the highest concentrations of these contaminants found in soil.

- OSHA PEL for respirable dust: 5 mg/m<sup>3</sup>,
- Maximum concentration of PAHs found in soil is 1.2 ppm or 0.00012%.
  - 5.0 mg/m<sup>3</sup> multiplied by 0.00012% = 0.000006 mg/m<sup>3</sup>
  - OSHA PEL for PAHs is 0.2 mg/m<sup>3</sup>
- Maximum concentration of Lead found in soil is 412 ppm or 0.0412%.
  - 5.0 mg/m<sup>3</sup> multiplied by 0.0412% = 0.00206 mg/m<sup>3</sup>

- OSHA PEL for lead is  $0.05 \text{ mg/m}^3$
- Maximum concentration of Mercury found in soil is 1.76 ppm or 0.000176%.
  - $5.0 \text{ mg/m}^3$  multiplied by 0.000176% =  $0.0000088 \text{ mg/m}^3$
  - OSHA PEL for PAHs is  $0.1 \text{ mg/m}^3$
- Maximum concentration of Copper found in soil is 669 ppm or 0.0669%.
  - $5.0 \text{ mg/m}^3$  multiplied by 0.0669% =  $0.003345 \text{ mg/m}^3$
  - OSHA PEL for PAHs is  $0.1 \text{ mg/m}^3$

## 9.0 *EMERGENCY RESPONSE AND CONTINGENCY PLAN (ERCP)*

### 9.1 PRE-EMERGENCY PLANNING

Prior to engaging in construction/remediation activities at the site, the CS will plan for possible emergency situations and have adequate supplies and manpower to respond. In addition, site personnel will be briefed on proper emergency response procedures during the site orientation.

The following situations would warrant implementation of the emergency plan:

Fire/Explosion	<ul style="list-style-type: none"> <li>• The potential for human injury exists.</li> <li>• Toxic fumes or vapors are released.</li> <li>• The fire could spread on site or off site and possibly ignite other flammable materials or cause heat-induced explosions.</li> <li>• The use of water and/or chemical fire suppressants could result in contaminated run-off.</li> <li>• An imminent danger of explosion exists.</li> </ul>
Spill or Release of Hazardous Materials	<ul style="list-style-type: none"> <li>• The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.</li> <li>• The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health.</li> </ul>
Natural Disaster	<ul style="list-style-type: none"> <li>• A rain storm exceeds the flash flood level.</li> <li>• The facility is in a projected tornado path or a tornado has damaged facility property.</li> <li>• Severe wind gusts are forecasted or have occurred and have caused damage to the facility.</li> </ul>
Medical Emergency	<ul style="list-style-type: none"> <li>• Overexposure to hazardous materials.</li> <li>• Trauma injuries (broken bones, severe lacerations/bleeding, burns).</li> <li>• Eye/skin contact with hazardous materials.</li> <li>• Medical Conditions e.g., loss of consciousness, heat stress (heat stroke), heart attack, respiratory failure, allergic reaction.</li> </ul>

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.

- It will be the responsibility of the CS/HSO to brief on site personnel on anticipated hazards at the site. The CS/HSO shall also be responsible for anticipating and requesting equipment that will be needed for response activities.

Communications will be established prior to commencement of any activities at the remediation site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. A telephone will be available to summon assistance in an emergency.

Primary communication with local responders in the event of an emergency will be accomplished using commercial telephone lines.

## 9.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the CS and Health & Safety Officer (HSO), through daily site inspections and employee feedback to recognize and identify hazards that are found at the site. These may include:

Chemical Hazards	<ul style="list-style-type: none"> <li>• Materials at the site</li> <li>• Materials brought to the site</li> </ul>
Physical Hazards	<ul style="list-style-type: none"> <li>• Fire/explosion</li> <li>• Slip/trip/fall</li> <li>• Electrocution</li> <li>• Confined space</li> <li>• IDLH atmospheres</li> <li>• Excessive noise</li> </ul>
Mechanical Hazards	<ul style="list-style-type: none"> <li>• Heavy equipment</li> <li>• Stored energy system</li> <li>• Pinch points</li> <li>• Electrical equipment</li> <li>• Vehicle traffic</li> </ul>
Environmental Hazards	<ul style="list-style-type: none"> <li>• Electrical Storms</li> <li>• High winds</li> <li>• Heavy Rain/Snow</li> <li>• Heat Stress</li> <li>• Vehicle traffic</li> </ul>

## 9.3 EMERGENCY TELEPHONE NUMBERS

Emergency telephone numbers can be found in Table 9-1. The emergency numbers will be posted in all site trailers.

Figure 9-1 is the Hospital Route Map with directions to the nearest hospital. Only in a non-emergency situation are personnel to be transported to the hospital by site representatives.

**FIGURE 9-1**

**TABLE 9-1  
 EMERGENCY TELEPHONE NUMBERS**

Emergency Medical Service.....	911
<u>Police</u> : New York City Police Department (NYPD).....	911
<u>Hospital</u> : New York Hospital Queens.....	718-670-2000
<u>Fire</u> : New York City Fire Department (FDNY).....	911
New York City Office of Emergency Management.....	911
National Response Center.....	(800) 424-8802
Poison Control Center.....	(800) 222-1222
Chemtrec.....	(800) 262-8200
Center for Disease Control.....	(800) 311-3435
USEPA( Region II).....	(212) 637-5000
NYSDEC Emergency Spill Response.....	(800) 457-7362
Contractor Emergency Numbers.....	(718) 472-0830

**DIRECTIONS AND HOSPITAL ROUTE MAP**

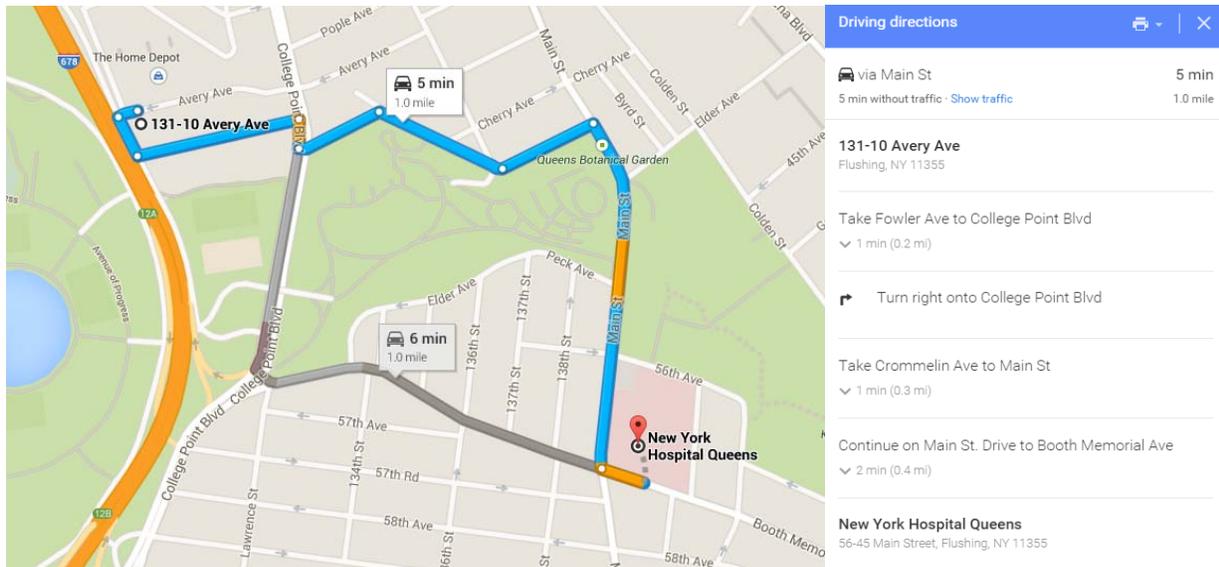
**FIGURE 1 – HOSPITAL ROUTE PLAN**

**Site Location:** 131-10 Avery Avenue, Queens, NY 11355

**Hospital Location:** New York Hospital Queens, 56-45 Main Street, Flushing, NY 11355

**Information Line:** 718-670-2000

Steps	Maneuvers	Dist.
1	Head north on 31 <sup>st</sup> Street toward 38 <sup>th</sup> Avenue	1.1 mi
2	Turn left on to 30 <sup>th</sup> Avenue	0.2 mi
3	Follow signs to the Emergency Room	
<b>Total Est. Time: 4 minutes</b>		<b>Total Est. Distance: 1.3 miles</b>



Once a hazard has been recognized, the CS and/or the HSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting
- Task-specific training prior to commencement of activity
- Personal Protective Equipment (PPE) selection/use
- Written and approved permits for hot work, confined space
- Trenching/shoring procedure

- Air monitoring
- Following all standard operating procedures

#### **9.4 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATIONS**

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary emergency coordinator for this site is the CS. In the event an emergency occurs and the emergency coordinator is not on site, the HSO will serve as the emergency coordinator until the CS arrives. The emergency coordinator will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The emergency coordinator will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment.

Immediately after being notified of an emergency incident, the emergency coordinator or his designee will evaluate the situation to determine the appropriate action.

##### **9.4.1 *Responsibilities and Duties***

This section describes the responsibilities and duties assigned to the emergency coordinator.

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. Personnel will follow procedures as directed by the fire department, LEPC, State and Federal Agencies as required.

##### **9.4.2 *On-Site Emergency Coordinator Duties***

The on-site emergency coordinator is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the emergency coordinator. Specific duties are as follows:

- Identify the source and character of the incident, type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.
- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site. While operations are dormant, monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, where safe and appropriate.

- Notify the Client Representative and local Emergency Response Teams if their help is necessary to control the incident. Table 9-1 provides telephone numbers for emergency assistance.
- Direct on-site personnel to control the incident until, if necessary, outside help arrives. Specifically: Ensure that the building or area where the incident occurred and the surrounding area are evacuated and shut off possible ignition sources, if safe and appropriate. The Emergency Response Coordinator is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.
- If fire or explosion is involved, notify local Fire Department.
- Have protected personnel, in appropriate PPE, on standby for rescue.

If the incident may threaten human health or the environment outside of the site, the emergency coordinator should immediately determine whether evacuation of area outside of the site may be necessary and, if so, notify the Police Department and the Office of Emergency Management.

When required, notify the National Response Center. The following information should be provided to the National Response Center:

- Name and telephone number
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved, if known
- Extent of injuries
- Possible hazards to human health or the environment outside of the facility.

The emergency telephone number for the National Response Center is 800-424-8802.

If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.
- Containers of waste are removed or isolated from the immediate site of the emergency.
- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.
- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.

- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.
- Notify the USEPA Regional Administrator that cleanup procedures have been completed and that all emergency equipment is fit for its intended use before resuming operations in the affected area of the facility. The USEPA Regional Administrator's telephone number is included in the Emergency Contacts.
- Record date, time, details of the incident, and submit a written report to the USEPA Regional Administrator. The report is due to the USEPA within 15 days of the incident.

## **9.5 SAFE DISTANCES AND PLACES OF REFUGE**

The emergency coordinator for all activities will be the CS. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies which could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the emergency coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

If a major incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The emergency coordinator, or his designee will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 9-1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the site entrance, unless the emergency coordinator determines otherwise. It is the responsibility of the emergency coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the emergency coordinator.

## **9.6 EVACUATION ROUTES AND PROCEDURES**

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the emergency coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The emergency coordinator is responsible for determining which situations require site evacuation.

### **9.6.1 *Evacuation Signals and Routes***

Two-way radio communication or equivalent will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. As necessary, each crew supervisor will have a two-way radio. Total site evacuation will be initiated only by the emergency coordinator, however, in his absence, decision to preserve the health and safety of employees will take precedence.

### **9.6.2 *Evacuation Procedures***

In the event evacuation is necessary the following actions will be taken:

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- ALL on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the emergency coordinator.
- ALL persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders. Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.

- During exit, the crew leader should try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the emergency coordinator.
- Contract personnel and visitors will also be accounted for.
- The names of emergency response team members involved will be reported to the emergency coordinator.
- A final tally of persons will be made by the emergency coordinator or designee. No attempt to find persons not accounted for will involve endangering lives of site personnel by re-entry into emergency areas.
- In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the Construction Superintendent.
- Personnel will be assigned by the emergency coordinator to be available at the main gate to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance is given by the emergency coordinator. At his direction, a signal or other notification will be given for re-entry into the facility.

## **9.7 EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT**

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table 9-1 provide a quick reference guide to follow in the event of a major spill.

### **9.7.1 *Notification Procedures***

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site emergency coordinator.

On-site Emergency Coordinator will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release or spillage of hazardous material.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill, vapor or smoke release is heading.

- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site emergency coordinator to assess the magnitude and potential seriousness of the spill or release.

### **9.7.2 Procedure for Containing/Collecting Spills**

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If for some reason a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 ft. in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 ft. in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible the area will be roped or otherwise blocked off.

If the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation will be necessary. In general an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled. (Consult the DOT Emergency Response Guide for isolation distances for listed hazardous materials.)

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site emergency coordinator will inform the proper agencies in the event this is necessary. (Refer to Table 9-1)

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or TSCA shall be reported.

Clean up personnel will take the following measures:

- Make sure all unnecessary persons are removed from the hazard area.

- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.
- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.
- If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.
- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.
- Spray the spill area with foam, if available, if volatile emissions may occur.
- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.

For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank.

### **9.7.3 *Emergency Response Equipment***

The following equipment will be staged in the support zone and throughout the site, as needed, to provide for safety and first aid during emergency responses.

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Portable eyewash

### **9.7.4 *Emergency Spill Response Clean-Up Materials and Equipment***

A sufficient supply of appropriate emergency response clean-up and personal protective equipment will be available as needed.

The materials listed below may be kept on site for spill control, depending on the types of hazardous materials present on site. The majority of this material will be located in the support zone, in a supply trailer or storage area. Small amounts, as necessary, will be placed on pallets and located in the active work areas.

- Sand or clay to solidify/absorb liquid spills.

- \* **Note: All contaminated soils, absorbent materials, solvents and other materials resulting from the clean-up of spilled or discharged substances shall be properly stored, labeled, and disposed of off-site.**

## **9.8 EMERGENCY CONTINGENCY PLAN**

This section of the ERCP details the contingency measures the Site Contractor will take to prepare for and respond to fires, explosions, spills and releases of hazardous materials, hazardous weather, and medical emergencies.

## **9.9 MEDICAL EMERGENCY CONTINGENCY MEASURES**

The procedures listed below will be used to respond to medical emergencies. A minimum of one First-Aid/CPR trained personnel should be available on site.

### **9.9.1 *Response***

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the on-site emergency coordinator to alert him of a medical emergency situation. The supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the emergency, if known

The Emergency Coordinator will notify the Health & Safety Officer. The following actions will then be taken depending on the severity of the incident:

- *Life-Threatening Incident* – If an apparent life-threatening condition exists, the crew supervisor will inform the emergency coordinator by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. Any injury within the EZ will be evacuated by personnel to a clean area for treatment by EMS personnel. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.
- *Non Life-Threatening Incident* – If it is determined that no threat to life is present, the Health & Safety Officer will direct the injured person through decontamination

procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

- \* **Note: The area surrounding an accident site must not be disturbed until the scene has been cleared by the Health & Safety Officer.**

Any personnel requiring emergency medical attention will be evacuated from exclusion and contamination reduction zones if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

If decontamination cannot be performed, observe the following procedures:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.
- Alert emergency and off-site medical personnel to potential contamination, instruct them about specific decontamination procedures.
- Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

All injuries, no matter how small, will be reported to the HSO or the CS. An accident/injury/illness report will be completely and properly filled out and submitted to the Corporate Health and Safety Manager.

A list of emergency telephone numbers is given in Table 9.1.

### **9.9.2 Notification**

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS
- On-site Emergency Coordinator
- Workers in the affected areas
- Client Representative

## **9.10 FIRE CONTINGENCY MEASURES**

Because flammable/combustible materials are present at this site, fire is an ever-present hazard. Safety personnel are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the emergency coordinator by radio and vacate the structure or area. The emergency coordinator will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.
- The air will be monitored for explosivity before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- "No smoking" signs will be conspicuously posted in areas where flammable materials are present.
- Fire extinguishers will be placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

### **9.10.1 *Response***

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify their supervisor who will then contact the Emergency Coordinator by radio. The emergency coordinator will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a small fire has been extinguished by a worker, the emergency coordinator will be notified.

## **9.11 HAZARDOUS WEATHER CONTINGENCY MEASURES**

Operations outside will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy Rains/Snow
- High Winds

### **9.11.1 *Response***

- Excavation/soil stock piles will be covered with plastic liner.
- All equipment will be shut down and secured to prevent damage.
- Personnel will be moved to safe refuge. The emergency coordinator will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

### **9.11.2 *Notification***

The emergency coordinator will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- Site workers and subcontractors
- Client Representative
- Local Emergency Management Agency

## **9.12 SPILL/RELEASE CONTINGENCY MEASURES**

In the event of release or spill of a hazardous material the following measures will be taken:

### **9.12.1 *Response***

Any person observing a spill or release will act to remove and/or protect injured/contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

First aid will be administered to injured/contaminated personnel. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons. Attempt to stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve or temporarily sealing a hole with a plug.

The emergency coordinator will be notified of the spill/release, including information on material spilled, quantity, personnel injuries and immediate life threatening hazards. Air monitoring will be implemented by the emergency coordinator and HSO to determine the potential impact on the surrounding community. Notification procedures will be followed to inform on-site personnel and off-site agencies. The emergency coordinator will make a rapid assessment of the spill/release and direct confinement, containment and control measures. Depending upon the nature of the spill, measures may include:

- Construction of a temporary containment berm utilizing on-site clay absorbent earth
- Digging a sump, installing a polyethylene liner and
- Diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground
- Transferring the material from its original container to another container

The emergency coordinator will notify the Client Representative of the spill and steps taken to institute clean-up. Emergency response personnel will clean-up all spills following the spill clean-up plan developed by the emergency coordinator. Supplies necessary to clean up a spill may include, but are not limited to:

- Shovel, rake
- Clay absorbent
- Polyethylene liner
- Personal safety equipment
- Steel drums
- Pumps and miscellaneous hand tools

The emergency coordinator will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the Client Representative. If necessary, soil, water or air samples may be taken and analyzed to demonstrate the effectiveness of the spill clean-up effort. The emergency coordinator will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The emergency coordinator will review the cause with the Client Representative and obtain his concurrence with the remedial action plan.

## 10.0 TRAINING REQUIREMENTS

All personnel entering the exclusion zone will be trained in the provisions of this site safety plan and be required to sign the CHASP Acknowledgment form in Appendix A.

### 10.1 SITE-SPECIFIC TRAINING ORIENTATION

Outlines of the orientation for site workers, subcontractor personnel and visitors are presented below:

CONTRACTOR WORKERS	VISITORS
<ul style="list-style-type: none"> <li>• HASP sign off</li> <li>• Sign in/out procedures</li> <li>• Site background/characterization</li> <li>• Chain of command</li> <li>• Rules and regulations</li> <li>• Hours of work</li> <li>• Absences</li> <li>• Personal Protective Equipment/respirator fit test (if applicable)</li> <li>• Emergency Information               <ul style="list-style-type: none"> <li>• Emergency signal</li> <li>• Gathering point</li> <li>• Responsibilities/roles</li> <li>• Emergency phone numbers</li> </ul> </li> <li>• Site Control/Work Zones</li> <li>• Hazards/AHAs</li> <li>• Air Monitoring Program</li> <li>• Forms, site-specific</li> <li>• Incident Reporting</li> <li>• Lead Awareness (Appendix C)</li> </ul>	<ul style="list-style-type: none"> <li>• Sign in/out procedures</li> <li>• Site Background/Characterization</li> <li>• Review of Site map</li> <li>• Work Zones in progress</li> <li>• Emergency plan/signals</li> <li>• Training/medical requirements</li> <li>• Zones/areas open to visitors</li> </ul>

### 10.2 DAILY SAFETY MEETINGS

A safety meeting will be conducted by the CS and the HSO before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

## **APPENDIX A**

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- ***HEALTH AND SAFETY PLAN CERTIFICATION***
- ***GENERAL/SUB-CONTRACTOR HEALTH & SAFETY PLAN ACKNOWLEDGEMENT***
- ***NOTICE OF SAFETY VIOLATION***
- ***PRE-JOB SAFETY CHECKLIST***



**NOTICE OF SAFETY VIOLATION**

**TO:** \_\_\_\_\_ (Name of Contractor/Subcontractor Supervisor)  
**FROM:** \_\_\_\_\_ (Name of Owner/Contractor's Project Manager)  
**DATE:** \_\_\_\_\_  
**SUBJECT:** *Notice of Safety Violations*

The following Safety Violations were observed at the Name of Site/Project on Date.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

You are requested to take the necessary corrective action to alleviate these safety violations by \_\_\_\_\_ (Date).

Please notify \_\_\_\_\_ (Name of Contractor/Subcontractor's Project Manager) when you have completed this corrective action.

Thank you in advance for your cooperation in this effort.

CONTRACTOR/SUBCONTRACTOR  
PRE-JOB SAFETY CHECKLIST

JOB:

SUBCONTRACTOR:

LOCATION:

PROJECT NO.

		<u>Yes</u>	<u>No</u>
1.	Standard emergency signals fully understood?	<input type="checkbox"/>	<input type="checkbox"/>
2.	Subcontractor responsibility in time of emergency understood?	<input type="checkbox"/>	<input type="checkbox"/>
3.	Fire and ambulance telephone numbers known?	<input type="checkbox"/>	<input type="checkbox"/>
4.	Areas for possible evacuation designated?	<input type="checkbox"/>	<input type="checkbox"/>
5.	Special safety rules for the plant or area known?	<input type="checkbox"/>	<input type="checkbox"/>
6.	Nature of Chemical or special hazards for area reviewed with safety officer?	<input type="checkbox"/>	<input type="checkbox"/>
7.	Special safety equipment for the area of job known?	<input type="checkbox"/>	<input type="checkbox"/>
8.	Safety shower and eye wash locations known?	<input type="checkbox"/>	<input type="checkbox"/>
9.	Smoking area designated?	<input type="checkbox"/>	<input type="checkbox"/>
10.	Have you been advised of potential hazards, protective Measures and availability of hazard information? e.g. Health & Safety Plan	<input type="checkbox"/>	<input type="checkbox"/>
11.	Do you understand you are required to provide your employees with the information in (10) above?	<input type="checkbox"/>	<input type="checkbox"/>
12.	Have you provided MSDSs to Athenica for any hazardous material you intend to bring on site?	<input type="checkbox"/>	<input type="checkbox"/>
13.	Have you submitted training/medical certification records?	<input type="checkbox"/>	<input type="checkbox"/>
14.	Are your subcontractors aware of the above rules?	<input type="checkbox"/>	<input type="checkbox"/>

Remarks: (Explain all No Answers) \_\_\_\_\_

\_\_\_\_\_  
Subcontractor's Supervisor

\_\_\_\_\_  
Date

\_\_\_\_\_  
Contractor's Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Contractor's Project Supervisor

\_\_\_\_\_  
Date

\_\_\_\_\_  
Health & Safety Officer

\_\_\_\_\_  
Date

**APPENDIX B**

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***HEALTH AND SAFETY PLAN AMENDMENTS AND DOCUMENTATION FORM***

**SITE-SPECIFIC HEALTH AND SAFETY PLAN  
AMENDMENT DOCUMENTATION**

**Project Name:** \_\_\_\_\_ **Project No.:** \_\_\_\_\_

**Amendment No.:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Amendment Page(s):** \_\_\_\_\_ **Revises:** \_\_\_\_\_ **Section(s):** \_\_\_\_\_

**Task(s) Amendment Affects:\*** \_\_\_\_\_

\_\_\_\_\_  
*\*(Attach new/revised Job Safety Analyses)*

**Reason For Amendment:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Amendment:** *(Attach separate sheet(s) as necessary)*

\_\_\_\_\_  
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\_\_\_\_\_

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**Completed by:** \_\_\_\_\_ **Approved by:** \_\_\_\_\_

**SITE-SPECIFIC HEALTH AND SAFETY PLAN  
AMENDMENT DOCUMENTATION**

**Project Name:** \_\_\_\_\_ **Project No.:** \_\_\_\_\_

**Amendment No.:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Amendment Page(s):** \_\_\_\_\_ **Revises:** \_\_\_\_\_ **Section(s):** \_\_\_\_\_

**SITE-SPECIFIC HEALTH AND SAFETY PLAN  
AMENDMENT DOCUMENTATION**

**Project Name:** \_\_\_\_\_ **Project No.:** \_\_\_\_\_

**Amendment No.:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Amendment Page:** \_\_\_\_\_ **Revises:** \_\_\_\_\_ **Section:** \_\_\_\_\_

**Task(s) Amendment Affects:\*** \_\_\_\_\_

\_\_\_\_\_  
*\*(Attach new/revised Job Safety Analyses)*

**Reason For Amendment:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Amendment:** *(Attach separate sheet(s) as necessary)*

\_\_\_\_\_  
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**Completed by:** \_\_\_\_\_ **Approved by:** \_\_\_\_\_

**APPENDIX C**

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*DAILY SAFETY REPORT FORM*

*AIR MONITORING FORMS*









	pDR-1500, Dusttrack or equivalent			Filter			
	pDR-1500, Dusttrack or equivalent			Filter			
	pDR-1500, Dusttrack or equivalent			Filter			
	pDR-1500, Dusttrack or equivalent			Filter			
	pDR-1500, Dusttrack or equivalent			Filter			

Calibration gases: 1. 100 ppm isobutylene, 2. 50% LEL methane, 3. 50 ppm CO, 4. 25 ppm H<sub>2</sub>S

**APPENDIX D**

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***TAILGATE SAFETY MEETING FORM***

## Daily Safety Meeting Report

Project Name:

Location:

Date:

Today's Tasks/Activities:

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Potential Chemical/Physical Hazards:

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Personal Protective Equipment:

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Attendees:

<hr/>	<hr/>

HSO: \_\_\_\_\_ Const. Supt:  
\_\_\_\_\_  
(Signature) (Signature)



## **APPENDIX 6**

# **VAPOR BARRIER SPECIFICATIONS AND MANUFACTURER'S COMPATIBILITY LETTER**

## PREPRUFE® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

### Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

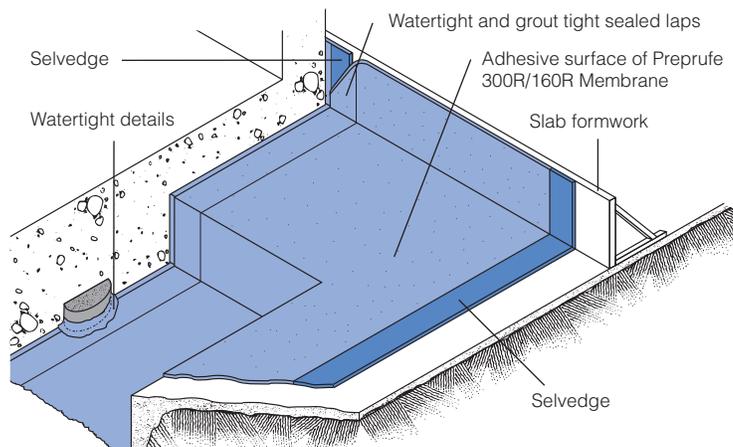
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor™ ES**—waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers**—preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

### Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered watertight laps** and detailing
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **BBA Certified** for basement Grades 2, 3, & 4 to BS 8102:1990
- **Zero permeance** to moisture
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack



Drawings are for illustration purposes only. Please refer to [graceconstruction.com](http://graceconstruction.com) for specific application details.

## Installation

The most current application instructions, detail drawings and technical letters can be viewed at [graceconstruction.com](http://graceconstruction.com). For other technical information contact your local Grace representative.

Preprufe 300R & 160R membranes are supplied in rolls 4 ft (1.2 m) wide, with a selvage on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

### Substrate Preparation

**All surfaces**—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

**Horizontal**—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.

**Vertical**—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

### Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions 55°F (<13°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe LT data sheet for more information.

**Horizontal substrates**—Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed (see Figure 2).

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvage. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Refer to Grace Tech Letter 15 for information on suitable rebar chairs for Preprufe.

**Vertical substrates**—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvage using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner.

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to

overlap. Roll firmly to ensure a watertight seal.

**Roll ends and cut edges**—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 3). Immediately remove printed plastic release liner from the tape.

### Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit [graceconstruction.com](http://graceconstruction.com). This manual gives comprehensive guidance and standard details.

### Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvage has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

### Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe membrane and tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

### Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to Grace Tech Letter 17 for information on removal of formwork for Preprufe.

Figure 1

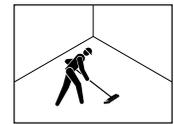


Figure 2

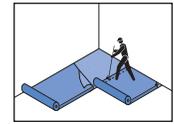
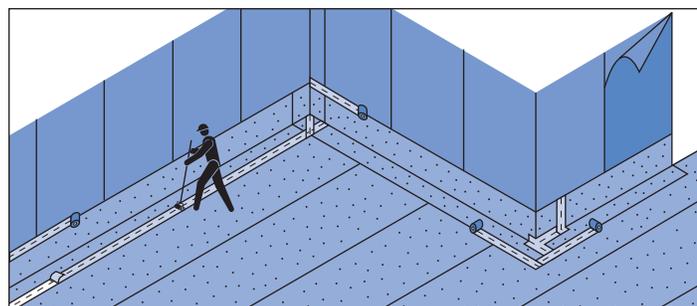
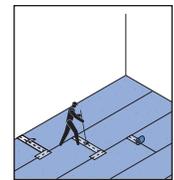


Figure 3

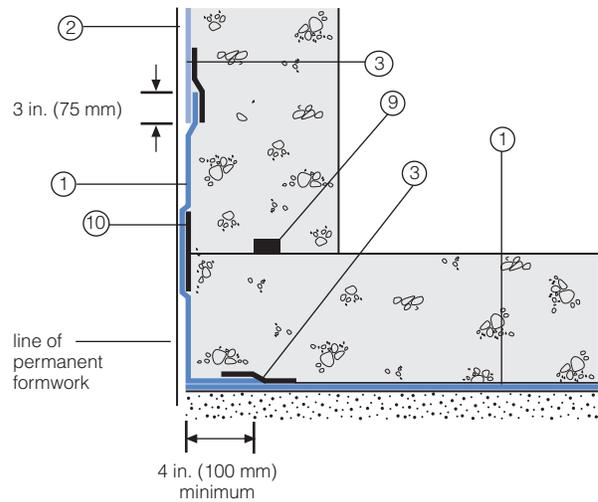


## Detail Drawings

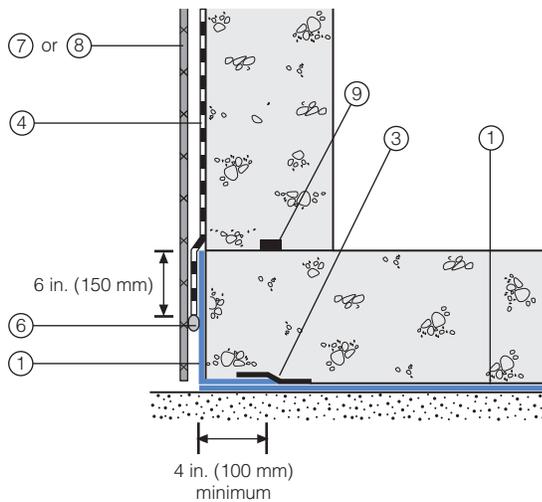
Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [graceconstruction.com](http://graceconstruction.com).

For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

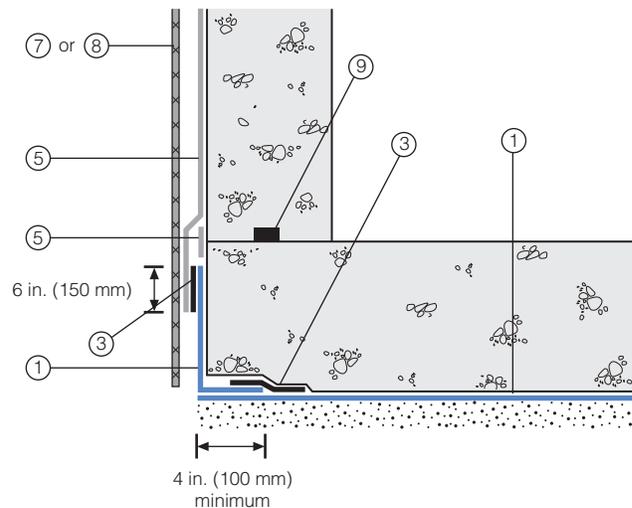
### Wall base detail against permanent shutter



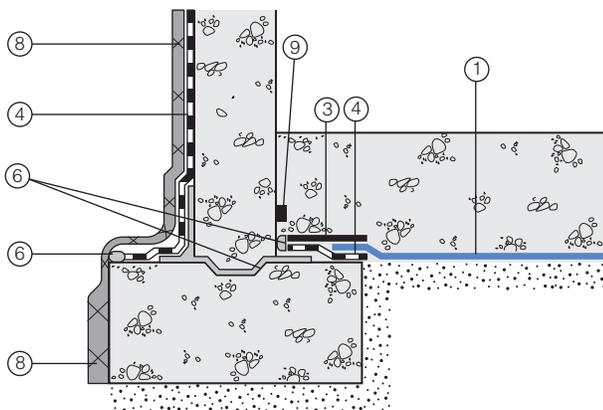
### Bituthene wall base detail (Option 1)



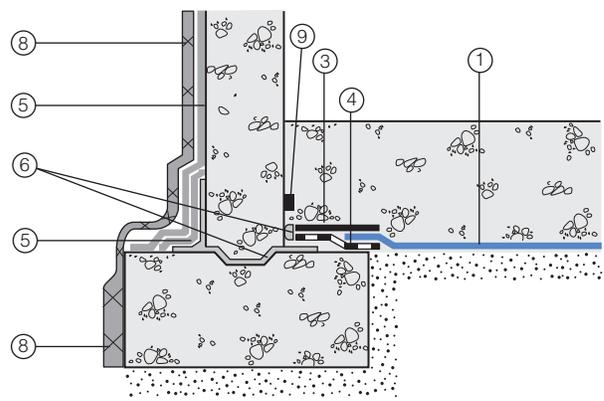
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



- 1 Preprufe 300R
- 2 Preprufe 160R
- 3 Preprufe Tape
- 4 Bituthene

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Protection

- 8 Hydroduct®
- 9 Adcor ES
- 10 Preprufe CJ Tape

## Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	4 ft x 98 ft (1.2 m x 30 m)	4 ft x 115 ft (1.2 m x 35 m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft <sup>2</sup> (36 m <sup>2</sup> )	460 ft <sup>2</sup> (42 m <sup>2</sup> )	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)
* LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C)) HC denotes Hot Climate (50°F (>+10°C))			
<b>Ancillary Products</b>			
Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)			

## Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	ASTM D3767
Lateral Water Migration Resistance	Pass at 231 ft (71 m) of hydrostatic head pressure	Pass at 231 ft (71 m) of hydrostatic head pressure	ASTM D5385, modified <sup>1</sup>
Low temperature flexibility	Unaffected at -20°F (-29°C)	Unaffected at -20°F (-29°C)	ASTM D1970
Resistance to hydrostatic head	231 ft (71 m)	231 ft (71 m)	ASTM D5385, modified <sup>2</sup>
Elongation	500%	500%	ASTM D412, modified <sup>3</sup>
Tensile strength, film	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -9.4°F (-23°C), 100 cycles	Unaffected, Pass	Unaffected, Pass	ASTM C836
Puncture resistance	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D903, modified <sup>4</sup>
Lap peel adhesion	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D1876, modified <sup>5</sup>
Permeance to water vapor transmission	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	ASTM E96, method B
Water absorption	0.5%	0.5%	ASTM D570

### Footnotes:

- Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
- Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
- Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
- Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
- The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute.

### Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

### Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

[www.graceconstruction.com](http://www.graceconstruction.com)

For technical assistance call toll free at 866-333-3SBM (3726)

Adcor is a trademark and Preprufe, Bituthene and Hydroduct are registered trademarks of W. R. Grace & Co.—Conn. Procor is a U.S. registered trademark of W. R. Grace & Co.—Conn., and is used in Canada under license from PROCOR LIMITED.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents or patents pending.  
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**GRACE**

## BITUTHENE® 3000 AND BITUTHENE LOW TEMPERATURE

Self-adhesive, rubberized asphalt/polyethylene waterproofing membranes for basements and sub-structures

### Description

Bituthene® 3000 and Bituthene Low Temperature are self-adhesive, rubberized asphalt/polyethylene waterproofing membranes used in basements and sub-structures.

### Advantages

- **Waterproof**—high hydrostatic head resistance
- **Cross laminated film**—provides dimensional stability, high tear strength, puncture and impact resistance
- **Cold applied**—no flame hazard; self-adhesive overlaps ensure continuity
- **Chemically resistant**—provides effective external protection against aggressive soils and ground water
- **Flexible**—accommodates minor settlement and shrinkage movement
- **Controlled thickness**—factory made sheet ensures constant, non-variable site application
- **Wide application window**—
  - **Bituthene Low Temperature** surface and ambient temperatures between 25°F (-4°C) and 60°F (16°C)
  - **Bituthene 3000** surface and ambient temperatures at 40°F (5°C) or above

- **Ripcord® split release on demand**—faster application in the straight-aways, ease of membrane positioning in detailed areas

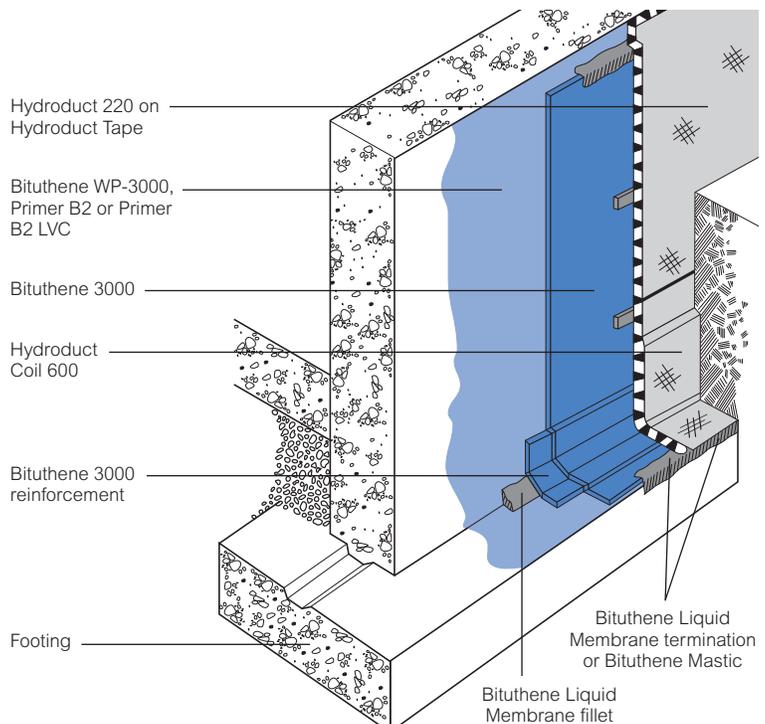
### Use

Bituthene is ideal for waterproofing concrete, masonry and wood surfaces where in-service temperatures will not exceed 130°F (54°C). It can be applied to foundation walls, tunnels, earth sheltered structures and split slab construction, both above and below grade. (For above grade applications, see *Above Grade Waterproofing Bituthene 3000 and Bituthene Low Temperature.*)

Bituthene is 1/16 in. (1.5 mm) thick, 3 ft (0.9 m) wide and 66.7 ft (20 m) long and is supplied in rolls. It is unrolled sticky side down onto concrete slabs or applied onto vertical concrete faces primed with Bituthene Primer WP-3000, Primer B2 or Primer B2 LVC. Continuity is achieved by overlapping a minimum 2 in. (50 mm) and firmly rolling the joint.

### Product Advantages

- Waterproof
- Cross laminated film
- Cold applied
- Chemically resistant
- Flexible
- Controlled thickness
- Wide application window
- Ripcord split release on demand



Drawings are for illustration purposes only. Please refer to [graceconstruction.com](http://graceconstruction.com) for specific application details.

Bituthene is extremely flexible. It is capable of bridging shrinkage cracks in the concrete and will accommodate minor differential movement throughout the service life of the structure.

## Application Procedures

### Safety, Storage and Handling Information

Bituthene products must be handled properly. Vapors from solvent-based primers and mastic are harmful and flammable. For these products, the best available information on safe handling, storage, personal protection, health and environmental considerations has been gathered. Material Safety Data Sheets (MSDS) are available at [graceconstruction.com](http://graceconstruction.com) and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.

### Surface Preparation

Surfaces should be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Concrete must be properly dried (minimum 7 days for normal structural concrete and 14 days for lightweight structural concrete).

**If time is critical, Bituthene Primer B2 or Bituthene Primer B2 LVC may be used to allow priming and installation of membrane on damp surfaces or green concrete. Priming may begin in this case as soon as the concrete will maintain structural integrity.** Use form release agents which will not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane. Cure concrete with clear, resin-based curing compounds which do not contain oil, wax or pigment. Except with Primer B2 or Primer B2 LVC, allow concrete to thoroughly dry following rain. Do not apply any products to frozen concrete.

Repair defects such as spalled or poorly consolidated areas. Remove sharp protrusions and form match lines. On masonry surfaces, apply a parge coat to rough concrete block and brick walls or trowel cut mortar joints flush to the face of the concrete blocks.

### Temperature

- Apply Bituthene 3000 Membrane only in dry weather and at air and surface temperatures of 40°F (5°C) and above.
- Apply Bituthene Low Temperature Membrane only in dry weather and when air and surface temperatures are between 25°F (-4°C) and 60°F (16°C).
- Apply Bituthene Primer WP-3000 in dry weather above 40°F (5°C).

- Apply Bituthene Primer B2 in dry weather above 25°F (-4°C). (See separate product information sheet.)

### Priming

- Apply Bituthene Primer WP-3000 by spray or roller at a coverage rate of 500–600 ft<sup>2</sup>/gal (12–15 m<sup>2</sup>/L). Allow to dry one hour or until concrete returns to original color.
- Apply Bituthene Primer B2 by a lamb's wool roller at a coverage rate of 250–350 ft<sup>2</sup>/gal (6–8 m<sup>2</sup>/L). Allow primer to dry one hour or until tack-free.
- Apply Bituthene Primer B2 LVC by a lamb's wool roller at a coverage rate of 325–425 ft<sup>2</sup>/gal (7.5–10 m<sup>2</sup>/L). Allow primer to dry one hour or until tack free.
- Dry time may be longer in cold temperatures. Reprime areas if contaminated by dust. If the work area is dusty, apply membrane as soon as the primer is dry.
- **Do not apply any primer to Bituthene membrane.**

### Corner Details

The treatment of corners varies depending on the location of the corner. For detailed information on Bituthene Liquid Membrane, see separate product information sheet.

- At wall to footing inside corners—
  - Option 1:** Apply membrane to within 1 in. (25 mm) of base of wall. Treat the inside corner by installing a ¾ in. (20 mm) fillet of Bituthene Liquid Membrane. Extend Bituthene Liquid Membrane at least 2½ in. (65 mm) onto footing, and 2½ in. (65 mm) onto wall membrane.
  - Option 2:** Treat the inside corner by installing a ¾ in. (20 mm) fillet of Bituthene Liquid Membrane. Apply 12 in. (300 mm) wide strip of sheet membrane centered over fillet. Apply wall membrane over inside corner and extend 6 in. (150 mm) onto footing. Apply 1 in. (25 mm) wide troweling of Bituthene Liquid Membrane over all terminations and seams within 12 in. (300 mm) of corner.
- At footings where the elevation of the floor slab is 6 in. (150 mm) or more above the footing, treat the inside corner either by the above two methods or terminate the membrane at the base of the wall. Seal the termination with Bituthene Liquid Membrane.

### Joints

Properly seal all joints with waterstop, joint filler and sealant as required. Bituthene membranes are not intended to function as the primary joint seal. Allow sealants to fully cure. Pre-strip all slab and wall cracks over ¼ in. (1.5 mm) wide and all construction and control joints with 9 in. (230 mm) wide sheet membrane strip.

## Application on Horizontal Surfaces

(Note: Preprufe® pre-applied membranes are strongly recommended for below slab or for any application where the membrane is applied before concreting. See Preprufe product information sheets.)

Apply membrane from the low point to the high point so that laps shed water. Overlap all seams at least 2 in. (50 mm). Stagger all end laps. Roll the entire membrane firmly and completely as soon as possible. Use a linoleum roller or standard water-filled garden roller less than 30 in. (760 mm) wide, weighing a minimum of 75 lbs (34 kg) when filled. Cover the face of the roller with a resilient material such as a ½ in. (13 mm) plastic foam or two wraps of indoor-outdoor carpet to allow the membrane to fully contact the primed substrate. Seal all T-joints and membrane terminations with Bituthene Liquid Membrane at the end of the day.

## Protrusions and Drains

Apply membrane to within 1 in. (25 mm) of the base of the protrusion. Apply Bituthene Liquid Membrane 0.1 in. (2.5 mm) thick around protrusion. Bituthene Liquid Membrane should extend over the membrane a minimum of 2½ in. (65 mm) and up the penetration to just below the finished height of the wearing course.

## Vertical Surfaces

Apply membrane in lengths up to 8 ft (2.5 m). Overlap all seams at least 2 in. (50 mm). On higher walls apply membrane in two or more sections with the upper overlapping the lower by at least 2 in. (50 mm). Roll all membrane with a hand roller.

Terminate the membrane at grade level. Press the membrane firmly to the wall with the butt end of a hardwood tool such as a hammer handle or secure into a reglet. Failure to use heavy pressure at terminations can result in a poor seal. A termination bar may be used to ensure a tight seal. Terminate the membrane at the base of the wall if the bottom of the interior floor slab is at least 6 in. (150 mm) above the footing. Otherwise, use appropriate inside corner detail where the wall and footing meet.

## Membrane Repairs

Patch tears and inadequately lapped seams with membrane. Clean membrane with a damp cloth and dry. Slit fishmouths and repair with a patch extending 6 in. (150 mm) in all directions from the slit and seal edges of the patch with Bituthene Liquid Membrane. Inspect the membrane thoroughly before covering and make any repairs.

## Drainage

Hydroduct® drainage composites are recommended for both active drainage and protection of the membrane. See Hydroduct product information sheets.

## Protection of Membrane

Protect Bituthene membranes to avoid damage from other trades, construction materials or backfill. Place protection immediately in temperatures above 77°F (25°C) to avoid potential for blisters.

- On vertical applications, use Hydroduct 220 Drainage Composite. Adhere Hydroduct 220 Drainage Composite to membrane with Hydroduct Tape. Alternative methods of protection are to use ¼ in. (6 mm) asphalt impregnated board or 1 in. (25 mm) extruded polystyrene. Such alternatives do not provide positive drainage to the system. Adhere protection board with an adhesive or Hydroduct Tape.
- In mud slab waterproofing, or other applications where positive drainage is not desired and where reinforced concrete slabs are placed over the membrane, the use of ¼ in. (6 mm) hardboard or 2 layers of ⅛ in. (3 mm) hardboard is recommended.

## Insulation

Always apply Bituthene membrane directly to primed or conditioned structural substrates. Insulation, if used, must be applied over the membrane. Do not apply Bituthene membranes over lightweight insulating concrete.

## Backfill

Place backfill as soon as possible. Use care during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added and compacted in 6 in. (150 mm) to 12 in. (300 mm) lifts.

For areas which cannot be fully compacted, a termination bar is recommended across the top termination of the membrane.

## Placing Steel

When placing steel over properly protected membrane, use concrete bar supports (dobies) or chairs with plastic tips or rolled feet to prevent damage from sharp edges. Use special care when using wire mesh, especially if the mesh is curled.

## Approvals

- City of Los Angeles Research Report RR 24386
- U.S. Department of Housing and Urban Development (HUD) HUD Materials Release 628E

## Warranty

Five year material warranties covering Bituthene and Hydroduct products are available upon request. Contact your Grace sales representative for details.

## Technical Services

Support is provided by full time, technically trained Grace representatives and technical service personnel, backed by a central research and development staff.

## Supply

<b>Bituthene 3000 or Bituthene Low Temperature</b>	3 ft x 66.7 ft roll (200 ft <sup>2</sup> ) [0.9 m x 20 m (18.6 m <sup>2</sup> )] Roll weight 83 lbs (38 kg) gross Palletization 25 rolls per pallet Storage Store upright in dry conditions below 95°F (+35°C).
<b>Ancillary Products</b>	
Bituthene WP-3000	5 gal (18.9 L) pail/24 pails per pallet
Bituthene Primer B2	5 gal (18.9 L) pail/48 pails per pallet
Bituthene Primer B2 LVC	5 gal (18.9 L) pail/48 pails per pallet
Bituthene Liquid Membrane	1.5 gal (5.7 L) pail/100 pails per pallet or 4 gal (15.1 L) pail/24 pails per pallet
Hydroduct Tape	1 in. x 200 ft (2.5 cm x 61.0 m) roll/6 rolls per carton
Bituthene Mastic	Twelve 30 oz (0.9 L) tubes/carton or 5 gal (18.9 L) pail/36 pails per pallet

**Equipment by others:** Soft broom, utility knife, brush or roller for priming

## Physical Properties for Bituthene Membrane

Property	Typical Value	Test Method
Color	Dark gray-black	
Thickness	1/16 in. (1.5 mm) nominal	ASTM D3767—method A
Flexibility, 180° bend over 1 in. (25 mm) mandrel at -25°F (-32°C)	Unaffected	ASTM D1970
Tensile strength, membrane, die C	325 lbs/in. <sup>2</sup> (2240 kPa) minimum	ASTM D412 modified <sup>1</sup>
Tensile strength, film	5,000 lbs/in. <sup>2</sup> (34.5 MPa) minimum	ASTM D882 modified <sup>1</sup>
Elongation, ultimate failure of rubberized asphalt	300% minimum	ASTM D412 modified <sup>1</sup>
Crack cycling at -25°F (-32°C), 100 cycles	Unaffected	ASTM C836
Lap adhesion at minimum application temperature	3000: 4 lbs/in. (700 N/m) Low Temp: 5 lbs/in. (880 N/m)	ASTM D1876 modified <sup>2</sup>
Peel strength	9 lbs/in. (1576 N/m)	ASTM D903 modified <sup>3</sup>
Puncture resistance, membrane	50 lbs (222 N) minimum	ASTM E154
Resistance to hydrostatic head	200 ft (60 m) of water	ASTM D5385
Permeance	0.05 perms (2.9 ng/m <sup>2</sup> sPa) maximum	ASTM E96, section 12—water method
Water absorption	0.1% maximum	ASTM D570

### Footnotes:

1. The test is run at a rate of 2 in. (50 mm) per minute.
2. The test is conducted 15 minutes after the lap is formed and run at a rate of 2 in. (50 mm) per minute at 40°F (5°C).
3. The 180° peel strength is run at a rate of 12 in. (300 mm) per minute.

[www.graceconstruction.com](http://www.graceconstruction.com)

**For technical assistance call toll free at 866-333-3SBM (3726)**

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We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents or patents pending.  
BIT-210F Printed in U.S.A. 9/08

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FA/LVI/1M

**GRACE**

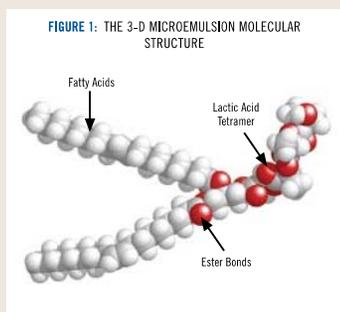
**APPENDIX 7**

**PROPOSED GROUNDWATER REMEDIATION  
PRODUCT MSDS & BROCHURE**

Achieve wide-area, rapid and sustained reductive dechlorination with continuous distribution and staged hydrogen release

PRODUCT FEATURES

- **Three Stage Electron Donor Release – Immediate, Mid-Range and Long-Term Hydrogen Production**
  - Provides free lactic acid, controlled-release lactic acid and long release fatty acids for effective hydrogen production for periods of up to 3 to 5 years.
- **Low-Cost**
  - 3-D Microemulsion is 25¢ to 42¢ per pound as applied
- **Maximum and Continuous Distribution via Micellar Transport**
  - Unlike oil products, 3DMe forms micelles which are mobile in groundwater and significantly enhance electron donor distribution after injection.
- **Wide-Area/High Volume Microemulsion Application**
  - High volume application increases contact with contaminants and reduces number of injection points required for treatment – minimizes overall project cost.



MORE ON APPLICATIONS



3-D Microemulsion is delivered in 55 gallon drums, 300 gallon totes, tankers or buckets.



The microemulsion is easily prepared on-site and applied in high-volumes for maximum subsurface distribution.



3-D Microemulsion is typically applied through permanent wells or by using direct-push injection.

3-D Microemulsion (3DMe)™ is a form of HRC Advanced® and has a molecular structure specifically designed to maximize the cost-effective anaerobic treatment of contaminants in subsurface soils and groundwater. This structure (patent pending) is composed of free lactic acid, controlled-release lactic acid (polylactate) and certain fatty acid components which are esterified to a carbon backbone molecule of glycerin (Figure 1).

3DMe produces a sequential, staged release of its electron donor components. The immediately available free lactic acid is fermented rapidly while the controlled-release lactic acid is metabolized at a more controlled rate. The fatty acids are converted to hydrogen over a mid to long-range timeline giving 3DMe an exceptionally long electron donor release profile (Figure 2). This staged fermentation provides an immediate, mid-range and very long-term, controlled-release supply of hydrogen (electron donor) to fuel the reductive dechlorination process.

Typical 3DMe single application longevity is rated at periods of up to 3 to 5 years. With 5 years occurring under optimal conditions, e.g. low permeability, low consumption environments.



PRODUCT COMPOSITION

APPLICATION AND DISTRIBUTION

3DMe applications can be configured in several different ways including: **grids, barriers and excavations.** The material itself can be applied to the subsurface through the use of **direct-push injection, hollow-stem auger, existing wells or re-injection wells.**

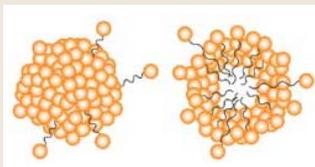
3DMe is typically applied in high-volumes as an emulsified, micellar suspension (microemulsion). The microemulsion is easily pumped into the subsurface and is produced on-site by mixing specified volumes of water and delivered 3DMe concentrate. Detailed preparation and installation instructions are available at [www.regensis.com](http://www.regensis.com).

3DMe is usually applied throughout the entire vertical thickness of the determined treatment area. Once injected, the emulsified material moves out into the subsurface pore spaces via micellar transport, eventually coating most all available surfaces. Over time the released soluble components of 3-D Microemulsion are distributed within the aquifer via the physical process of advection and the concentration driven forces of diffusion.

**MORE ON MICELLES**

Micelles (Figure 3) are groups (spheres) of molecules with the hydrophilic group facing out to the water and the "tails" or lipophilic moiety facing in. They are formed during the 3-D Microemulsion emulsification process and provide the added benefit of increased distribution via migration to areas of lower concentration.

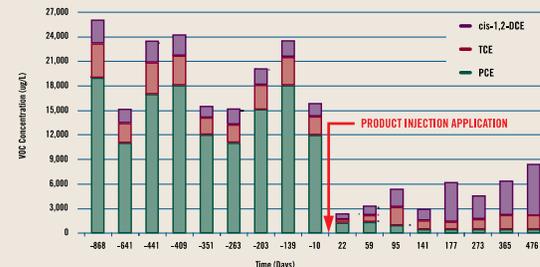
**FIGURE 3: MICELLE REPRESENTATION**



**PERFORMANCE**

**Case Study #1**

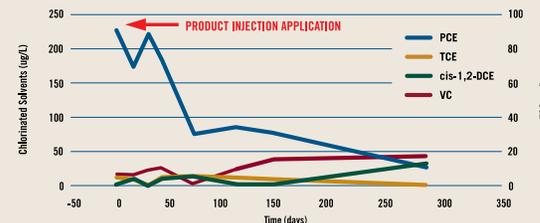
A site in Massachusetts showed high levels of PCE and its daughter products TCE and cis-DCE which had been consistently present for more than two years. 3DMe was applied in a grid configuration around monitoring well #16. In Figure 4, the contaminant concentration results indicate a rapid decrease in the parent product PCE and evidence of reductive dechlorination as demonstrated by the relative increases in daughter products TCE and cis-DCE.



PERFORMANCE

**Case Study #2**

A site in Florida was characterized with PCE contamination approaching 225 µg/L. A total of 1,080 pounds of 3DMe was applied via 16 direct-push injection points to reduce PCE concentrations. Monitoring results in well MW-103 indicated a PCE reduction of approximately 67% within 75 days of the 3DMe application. PCE concentrations continued to decline by 96% one year after application and daughter products remained at low levels. Total Organic Carbon (TOC) levels remained elevated at 17-19 mg/L after 275 days demonstrating the longevity of 3DMe (Figure 5).



**3-D Microemulsion (3DMe)<sup>TM</sup>**  
**MATERIALS SAFETY DATA SHEET**

Last Revised: March 26, 2007

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**Section 1 – Material Identification**

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**Supplier:**



**REGENESIS**

1011 Calle Sombra  
San Clemente, CA 92673

**Phone:** 949.366.8000

**Fax:** 949.366.8090

**E-mail:** info@regenesis.com

**Chemical Name(s):**

- Glycerides, di-, mono [2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]propanoates]
- Propanoic acid, 2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]-1,2,3-propanetriyl ester
- Glycerol

**Chemical Family:** Organic Chemical

**Trade Name:** 3-D Microemulsion (3DMe)<sup>TM</sup>

**Synonyms:** HRC Advanced<sup>TM</sup> HRC-PED (Hydrogen Release Compound – Partitioning Electron Donor)

**Product Use:** Used to remediate contaminated groundwater (environmental applications)

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**Section 2 – Chemical Identification**

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<u>CAS#</u>	<u>Chemical</u>
823190-10-9	HRC-PED
61790-12-3 or 112-80-1	Fatty Acids (neutralized)
201167-72-8	Glycerol Tripolylactate
56-81-5	Glycerol

**Section 3 – Physical Data**

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<b>Melting Point:</b>	<b>Not Available (NA)</b>
<b>Boiling Point:</b>	<b>Not determined (ND)</b>
<b>Flash Point:</b>	<b>&gt; 200 °F using the Closed Cup method</b>
<b>Density:</b>	<b>0.9 -1.1 g/cc</b>
<b>Solubility:</b>	<b>Slightly soluble in acetone. Insoluble in water.</b>
<b>Appearance:</b>	<b>Amber semi-solid.</b>
<b>Odor:</b>	<b>Not detectable</b>
<b>Vapor Pressure:</b>	<b>None</b>

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**Section 4 – Fire and Explosion Hazard Data**

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**Extinguishing Media:** Use water spray, carbon dioxide, dry chemical powder or appropriate foam to extinguish fires.

**Water May be used to keep exposed containers cool.**

**For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.**

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**Section 5 – Toxicological Information**

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**Acute Effects:** May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of the 3-D Microemulsion have not been investigated. Listed below are the toxicological information for glycerol, lactic acid and fatty acid.

**RTECS#** MA8050000  
Glycerol

<b>Irritation Data:</b>	<b>SKN-RBT 500 MG/24H MLD</b>	<b>85JCAE-,207,1986</b>
	<b>EYE-RBT 126 MG MLD</b>	<b>BIOFX* 9-4/1970</b>
	<b>EYE-RBT 500 MG/24H MLD</b>	<b>85JCAE-,207,1986</b>

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**Section 5 – Toxicological Information (cont)**

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<b>Toxicity Data:</b>	ORL-MUS LD50:4090 MG/KG	FRZKAP (6),56,1977
	SCU-RBT LD50:100 MG/KG	NIIRDN 6,215,1982
	ORL-RAT LD50:12,600 MG/KG	FEPRA7 4,142,1945
	IHL-RAT LC50: >570 MG/M3/1H	BIOFX* 9-4/1970
	IPR-RAT LD50: 4,420 MG/KG	RCOCB8 56,125,1987
	IVN-RAT LD50:5,566 MG/KG	ARZNAD 26,1581,1976
	IPR-MUS LD50: 8,700 MG/KG	ARZNAD 26,1579,1978
	SCU-MUS LD50:91 MG/KG	NIIRDN 6,215,1982
	IVN-MUS LD50:4,250 MG/KG	JAPMA8 39,583,1950
	ORL-RBT LD50: 27 MG/KG	DMDJAP 31,276,1959
	SKN-RBT LD50: >10 MG/KG	BIOFX* 9-4/1970
	IVN-RBT LD50: 53 MG/KG	NIIRDN 6,215,1982
ORL-GPG LD50: 7,750 MG/KG	JHTAB 23,259,1941	

**Target Organ Data:** Behavioral (headache), gastrointestinal (nausea or vomiting), Paternal effects (spermatogenesis, testes, epididymis, sperm duct), effects of fertility (male fertility index, post-implantation mortality).

Only selected registry of toxic effects of chemical substances (RTECS) data is presented here. See actual entry in RTECS for complete information on lactic acid and glycerol.

**Fatty Acids**

Acute oral (rat) LD50 value for fatty acids is 10000 mg/kg. Aspiration of liquid may cause pneumonitis. Repeated dermal contact may cause skin sensitization.

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**Section 6 – Health Hazard Data**

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One should anticipate the potential for eye irritation and skin irritation with large scale exposure or in sensitive individuals. Product is not considered to be combustible. However, after prolonged contact with highly porous materials in the presence of excess heat, this product may spontaneously combust.

**Handling:** Avoid continued contact with skin. Avoid contact with eyes.

In any case of any exposure which elicits a response, a physician should be consulted immediately.

**First Aid Procedures**

**Inhalation:** Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.

**Ingestion:** No effects expected. Do not give anything to an unconscious person. Call a

**physician immediately. DO NOT induce vomiting.**

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**Section 6 – Health Hazard Data (cont)**

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**Skin Contact:** Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.

**Eye Contact:** Wash eyes with plenty of water for at least 15 minutes lifting both upper and lower lids. Call a physician.

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**Section 7 – Reactivity Data**

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**Conditions to Avoid:** Strong oxidizing agents, bases and acids

**Hazardous Polymerization:** Will not occur.

**Further Information:** Hydrolyses in water to form lactic acid, glycerol and fatty acids.

**Hazardous Decomposition Products:** Thermal decomposition or combustion may produce carbon monoxide and/or carbon dioxide.

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**Section 8 – Spill, Leak or Accident Procedures**

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**After Spillage or Leakage:** Neutralization is not required. The material is very slippery. Spills should be covered with an inert absorbent and then be placed in a container. Wash area thoroughly with water. Repeat these steps if slipperiness remains.

**Disposal:** Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material may be disposed of in solid waste. Material is readily degradable and hydrolyses in several hours.

No requirement for a reportable quantity (CERCLA) of a spill is known.

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**Section 9 – Special Protection or Handling**

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Should be stored in plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

**Protective Gloves:** Vinyl or Rubber

**Eyes:** Splash Goggles or Full Face Shield. Area should have approved means of washing eyes.

**Ventilation:** General exhaust.

**Storage:** Store in cool, dry, ventilated area. Protect from incompatible materials.

**Section 10 – Other Information**

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**This material will degrade in the environment by hydrolysis to lactic acid, glycerol and fatty acids. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.**

**The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.**