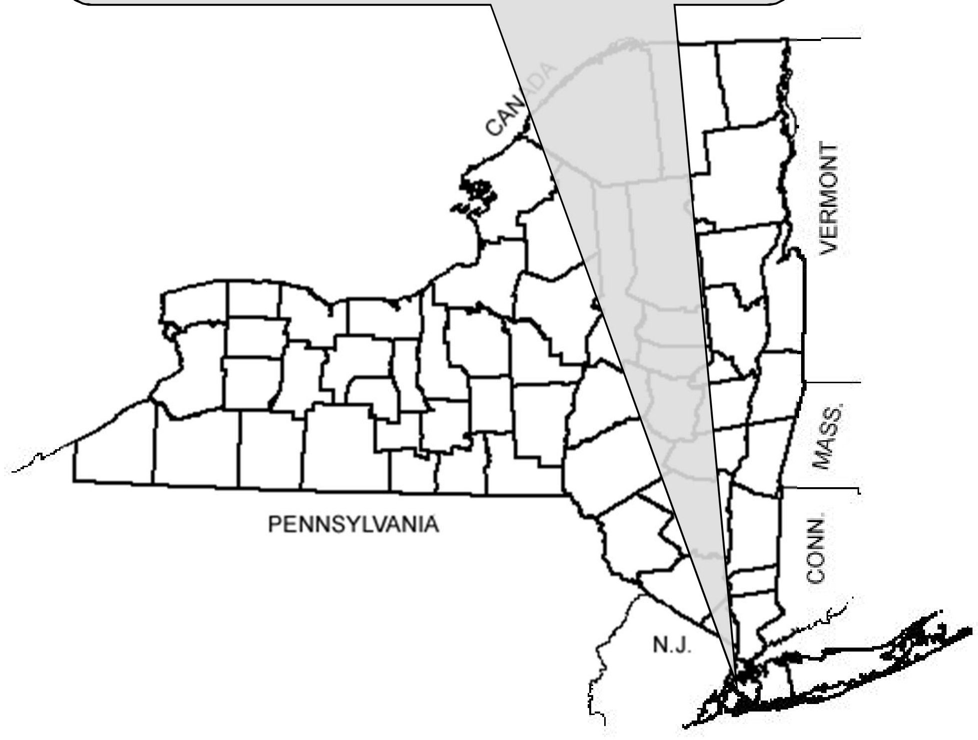
TRANSPORTATION PROJECT REPORT

FINAL DESIGN REPORT/ ENVIRONMENTAL ASSESSMENT (DR/EA) APPENDICES

January 2016

East Midtown Waterfront Esplanade and Greenway
P.I.N. X776.00 and X770.14
East 41st Street to East 60th Street on East River,
New York City



U.S. Department of Transportation Federal Highway Administration

New York State Department of Transportation

ANDREW M. CUOMO
Governor

MATTHEW J. DRISCOLL
Commissioner

Project Sponsors:

NYC Economic Development Corporation

NYC Department of Transportation

NYC Department of Parks & Recreation

APPENDICES

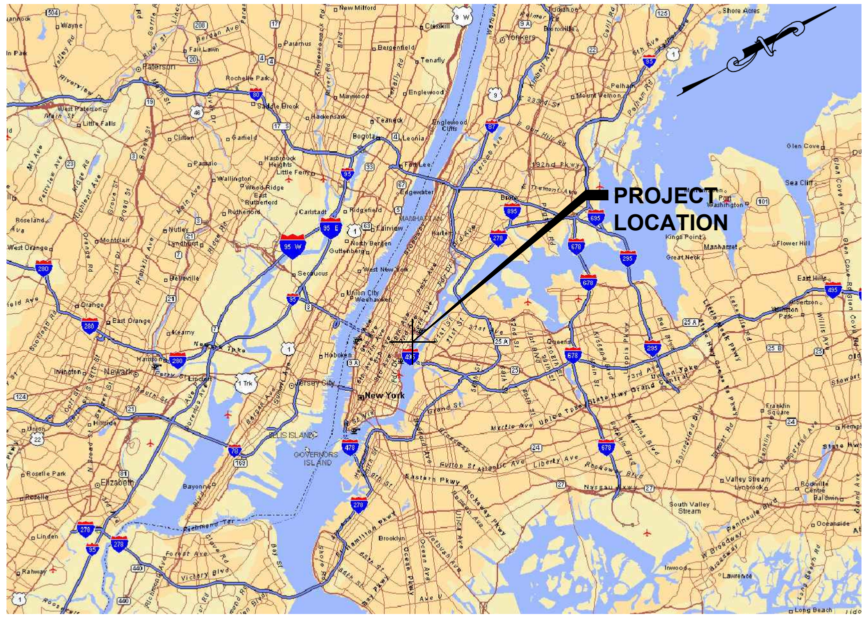
APPENDIX A

CONCEPTUAL DESIGN PLANS

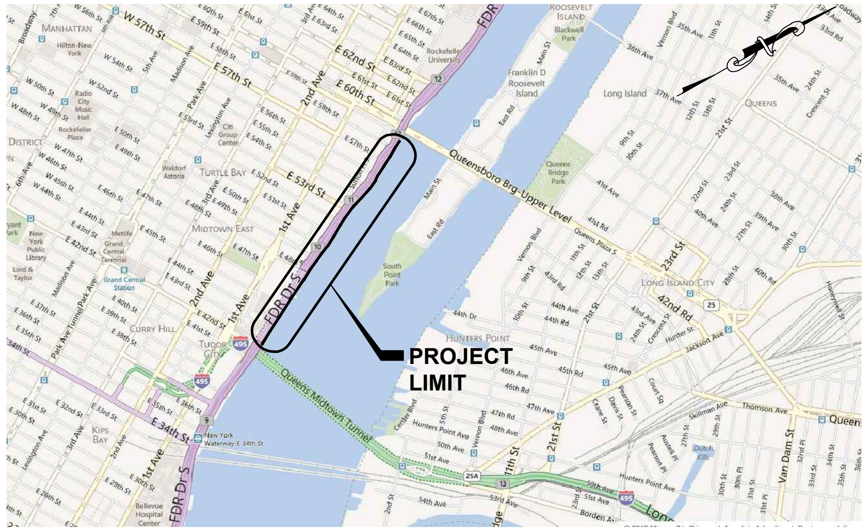
EXISTING SURVEY

NEW YORK CITY
ECONOMIC DEVELOPMENT CORPORATION

EAST MIDTOWN WATERFRONT ESPLANADE
CONCEPTUAL DESIGN PLANS



VICINITY MAP



PROJECT LOCATION

DRAWING INDEX			
DWG. NO.	DRAWING TITLE	ISSUED THIS SET	ISSUED/LAST ISSUED
X001	LOCATION PLAN AND DRAWING INDEX	x	9/27/2013
W401	ESPLANADE STRUCTURAL PLANS	x	9/27/2013
W402	ESPLANADE STRUCTURAL PLANS	x	9/27/2013
W403	ESPLANADE STRUCTURAL PLANS	x	9/27/2013
W501	ODR TRANSITION AT AHG (NEW STRUCTURE)	x	9/27/2013
W502	TYPICAL SECTIONS UN & ODR	x	9/27/2013
W503	TYPICAL SECTIONS AT AHG TRANSITION 1	x	9/27/2013
W504	TYPICAL SECTIONS AT AHG TRANSITION 2	x	9/27/2013
W505	TYPICAL SECTIONS AT AHG TRANSITION 3	x	9/27/2013
W506	TYPICAL SECTIONS AT AHG TRANSITION 4	x	9/27/2013
C001	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C002	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C003	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C004	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C005	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C006	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C007	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C008	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C009	GEOMETRIC PLAN AND PROFILE	x	9/27/2013
C101	TYPICAL SECTIONS	x	9/27/2013
C102	MEDIAN PLANTER DETAILS-1	x	9/27/2013
C103	MEDIAN PLANTER DETAILS-2	x	9/27/2013
C104	DRAINAGE DETAILS	x	9/27/2013
C105	TYPICAL UTILITY LAYOUT	x	9/27/2013
PM001	PAVEMENT MARKINGS AND SIGNAGE PLAN	x	9/27/2013
PM002	PAVEMENT MARKINGS AND SIGNAGE PLAN	x	9/27/2013
PM003	PAVEMENT MARKINGS AND SIGNAGE PLAN	x	9/27/2013
PM004	PAVEMENT MARKINGS AND SIGNAGE PLAN	x	9/27/2013
PM005	PAVEMENT MARKINGS AND SIGNAGE PLAN	x	9/27/2013
PM006	PAVEMENT MARKINGS AND SIGNAGE PLAN	x	9/27/2013
PM007	PAVEMENT MARKINGS AND SIGNAGE PLAN	x	9/27/2013
PM008	PAVEMENT MARKINGS AND SIGNAGE PLAN	x	9/27/2013

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DESIGNED BY: DK
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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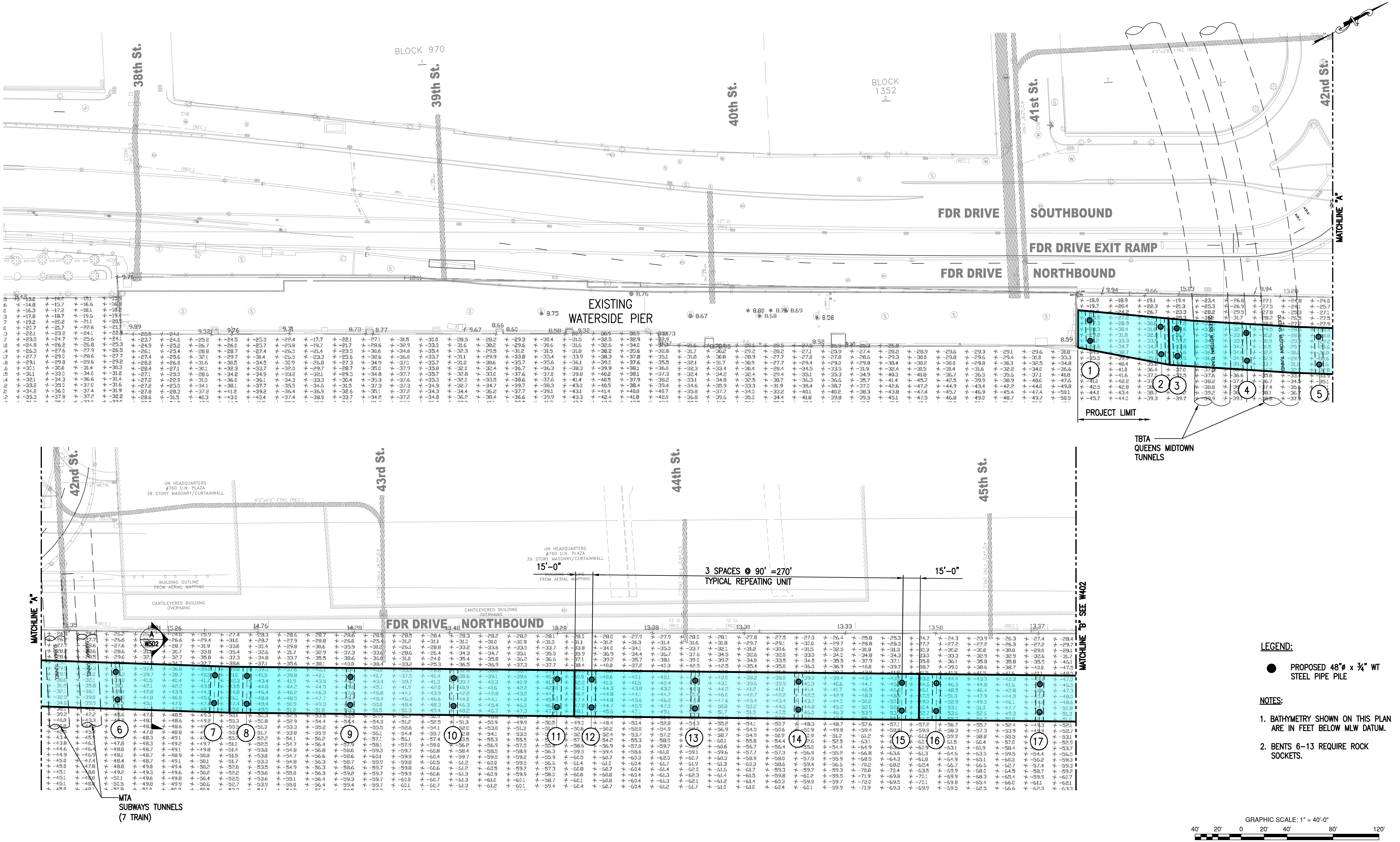
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE
CONCEPTUAL DESIGN

LOCATION PLAN & DRAWING INDEX

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: X001
DISCIPLINE/SEQUENCE: GENERAL
REVISION:
SHEET NO. 1 OF 32
SCALE: NONE



LEGEND:

● PROPOSED 48"Ø x ¾" WT STEEL PIPE PILE

NOTES:

1. BATHYMETRY SHOWN ON THIS PLAN ARE IN FEET BELOW MLW DATUM.
2. BENTS 6-13 REQUIRE ROCK SOCKETS.

REV.	DATE	DESCRIPTION	BY / SUB.	APP.
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DESIGNED BY: MWO
DRAWN BY: SN
CHECKED BY: WD
APPROVED BY: JS
SUBMITTAL DATE: 9/27/2013

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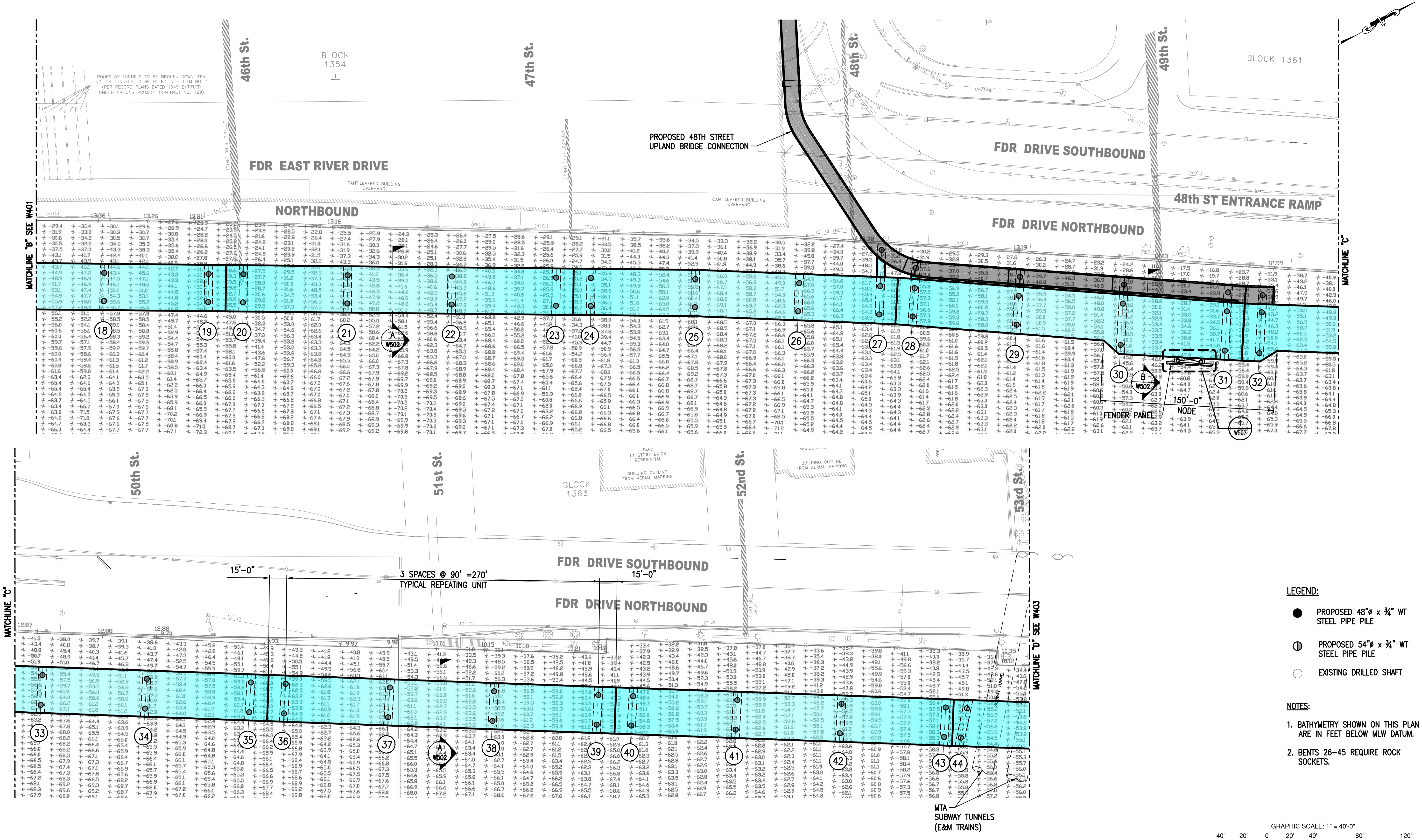
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

ESPLANADE SRUCTURAL PLANS

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT W401
DISCIPLINE/SEQUENCE MARINE
REVISION
SHEET NO. 2 OF 32
SCALE AS SHOWN



LEGEND:

● PROPOSED 48"ø x ¾" WT STEEL PIPE PILE

◐ PROPOSED 54"ø x ¾" WT STEEL PIPE PILE

○ EXISTING DRILLED SHAFT

NOTES:

1. BATHYMETRY SHOWN ON THIS PLAN ARE IN FEET BELOW MLW DATUM.
2. BENTS 26-45 REQUIRE ROCK SOCKETS.

REV.	DATE	DESCRIPTION	BY / SUB.	APP.

DESIGNED BY: MWO
DRAWN BY: SN
CHECKED BY: WD
APPROVED BY: JS
SUBMITTAL DATE: 9/27/2013

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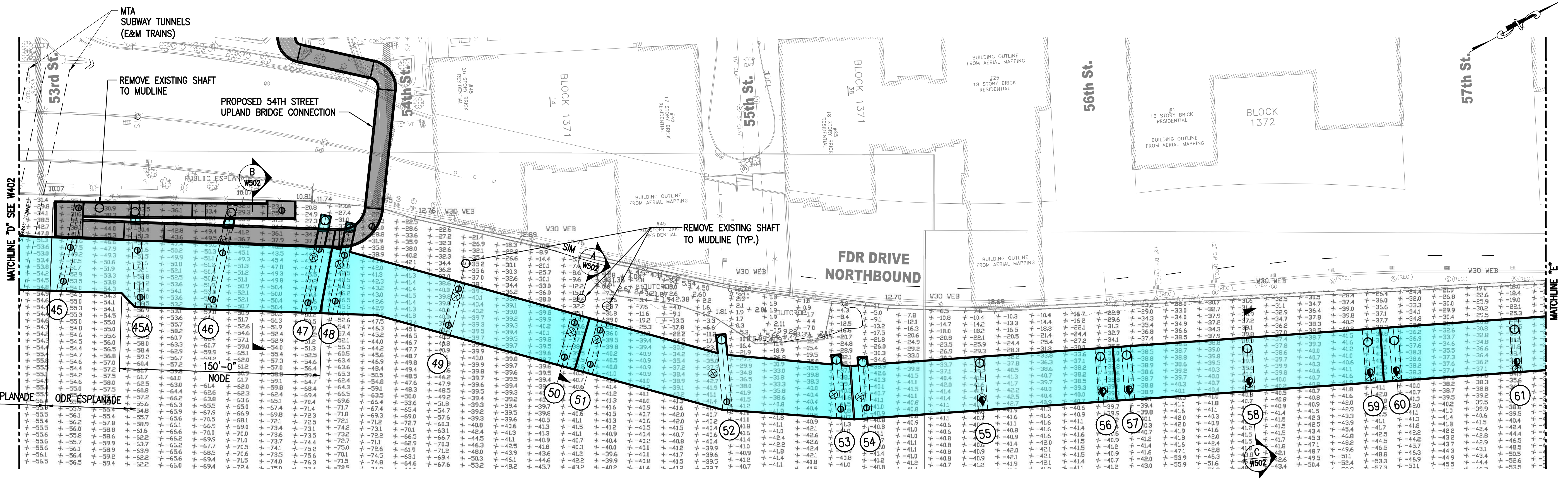
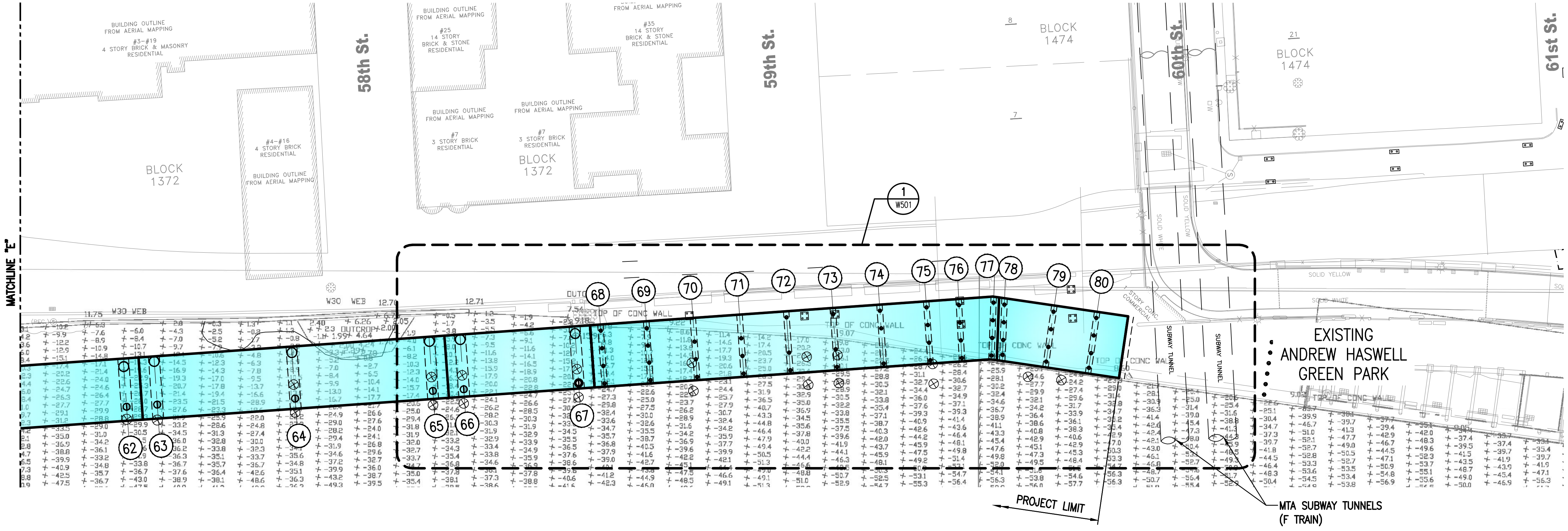
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

ESPLANADE STRUCTURAL PLANS

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT W402
DISCIPLINE/SEQUENCE MARINE
REVISION
SHEET NO. 3 OF 32
SCALE AS SHOWN





LEGEND:

- ● PROPOSED 24"øx1" WT STEEL PIPE PILE OR CASED DRILLED SHAFT (ALT.)
- ◐ PROPOSED 54"øx¾" WT STEEL PIPE PILE
- ○ EXISTING DRILLED SHAFT
- ⊗ EXISTING DRILLED SHAFT CUT-OFF AT CHANNEL BOTTOM
- ◐ PROPOSED BATTERED 54"ø x ¾" WT STEEL PIPE PILE

NOTES:

1. BATHYMETRY SHOWN ON THIS PLAN ARE IN FEET BELOW MLW DATUM.
2. BENTS 44-80 REQUIRE ROCK SOCKETS.

GRAPHIC SCALE: 1" = 40'-0"
40' 20' 0 20' 40' 80' 120'

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

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DESIGNED BY: MWO
DRAWN BY: SN
CHECKED BY: WD
APPROVED BY: JS
SUBMITTAL DATE: 9/27/2013

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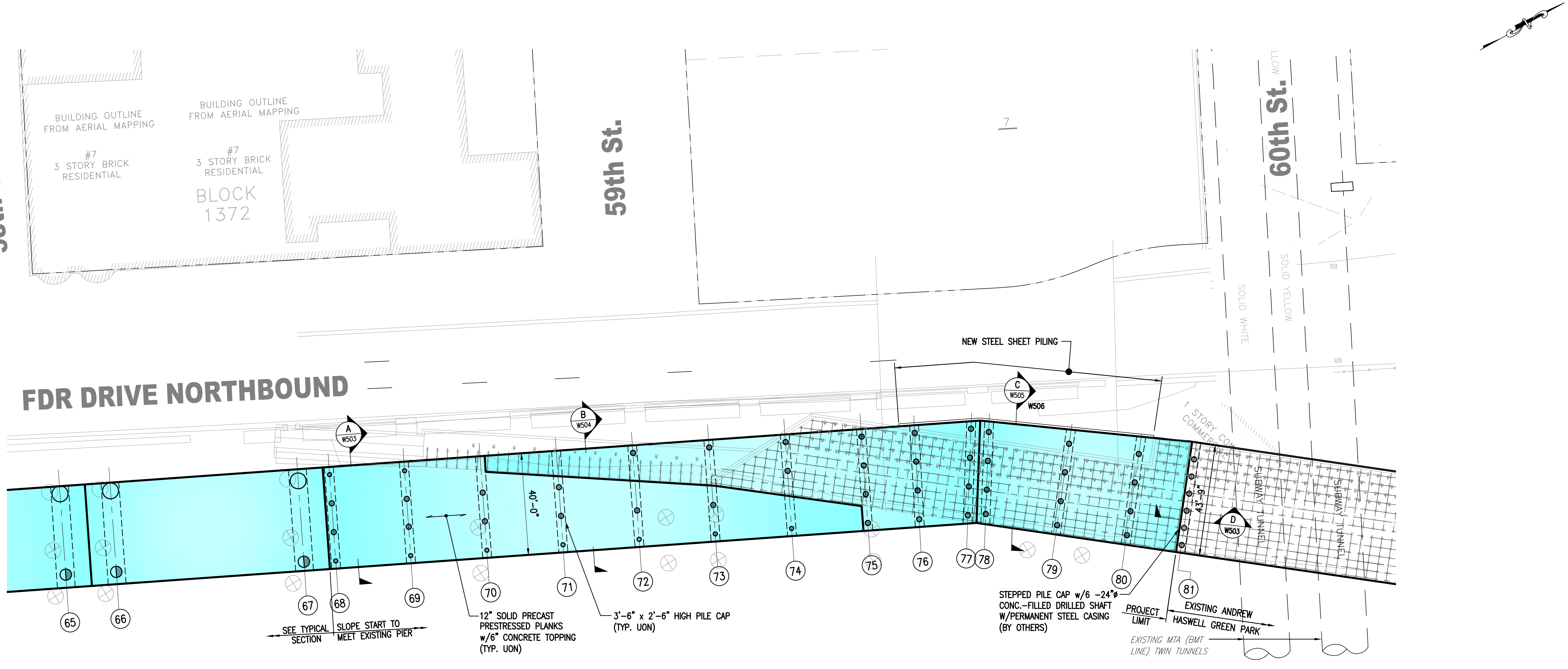
CONCEPT
PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE
CONCEPTUAL DESIGN

ESPLANADE STRUCTURAL PLANS

CONTRACT NO. 38430001
DRAWING NO.
STA/SEGMENT W403
DISCIPLINE/SEQUENCE MARINE
REVISION
SHEET NO. 4 OF 32
SCALE AS SHOWN



W303
W403
① PLAN DETAIL
SCALE: 1"= 20'-0"

LEGEND:

•	PROPOSED 24"øx1" WT STEEL PIPE PILE OR CASED DRILLED SHAFT (ALT.)
◑	PROPOSED 54"øx¾" WT STEEL PIPE PILE
○	EXISTING DRILLED SHAFT
⊠	EXISTING DRILLED SHAFT CUT-OFF AT CHANNEL BOTTOM

GRAPHIC SCALE: 1" = 20'-0"
20' 10' 0 10' 20' 40'

INFORMATION CONFIDENTIAL:

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DESIGNED BY: MWO
DRAWN BY: SN
CHECKED BY: WD
APPROVED BY: JS
SUBMITTAL DATE: 9/27/2013

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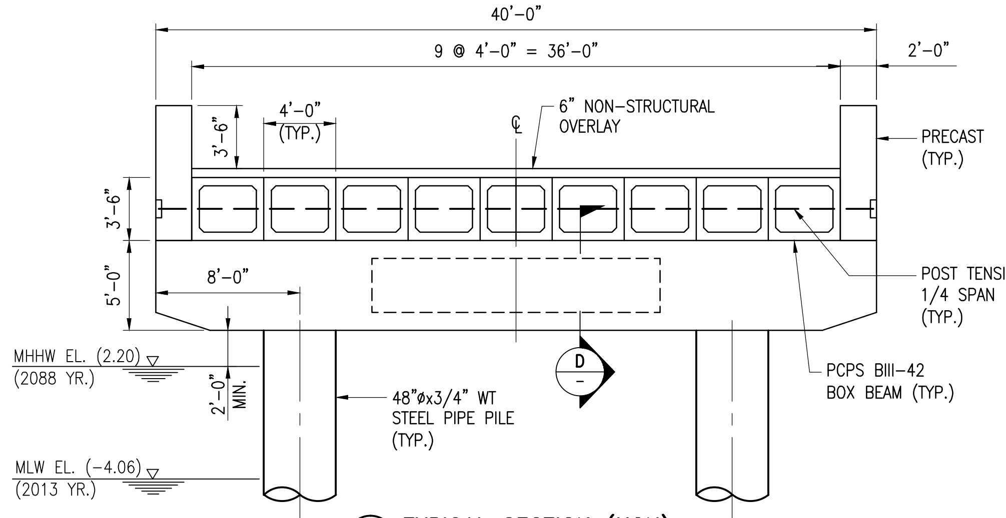
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

ODR TRANSITION AT AHG (NEW STRUCTURE)

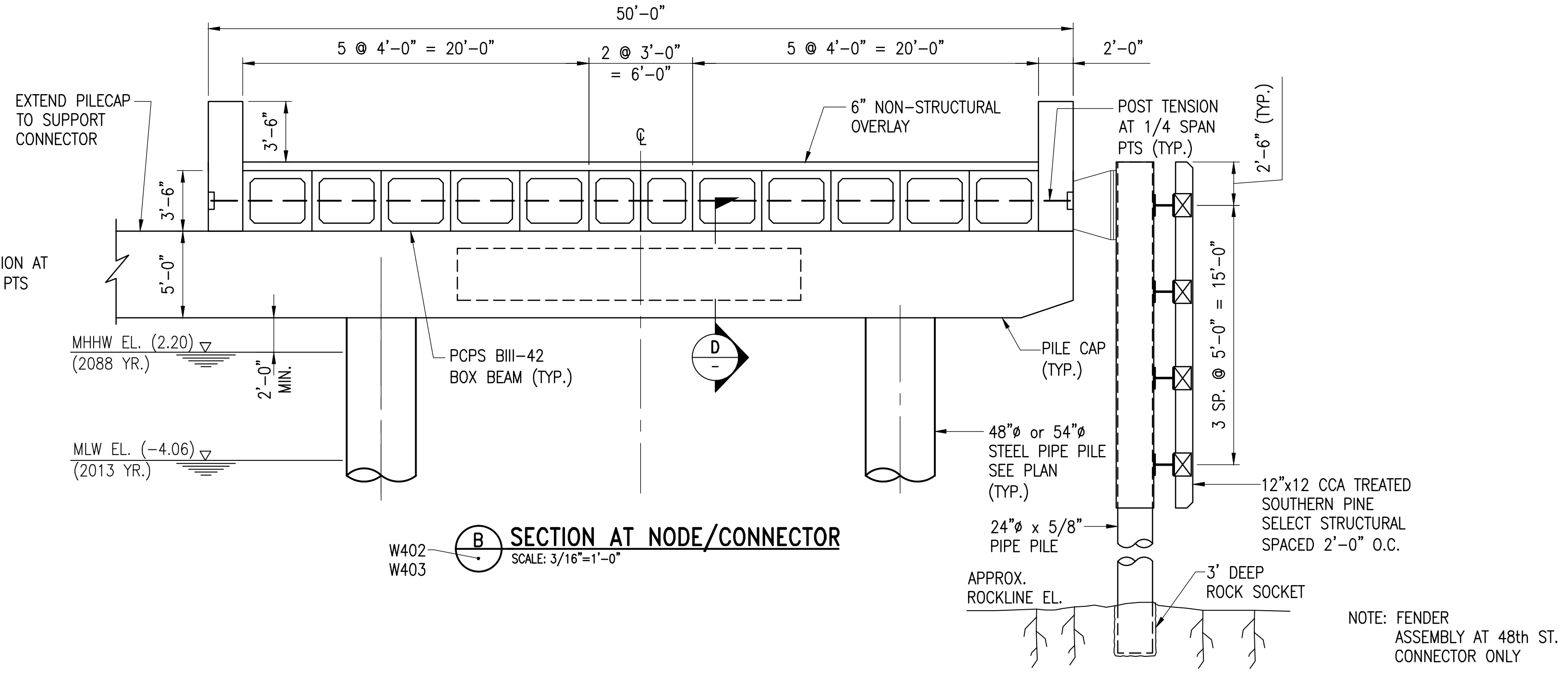
CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: W501
DISCIPLINE/SEQUENCE: MARINE
REVISION:
SHEET NO. 5 OF 32
SCALE: AS SHOWN



A TYPICAL SECTION (UON)

W401
W402

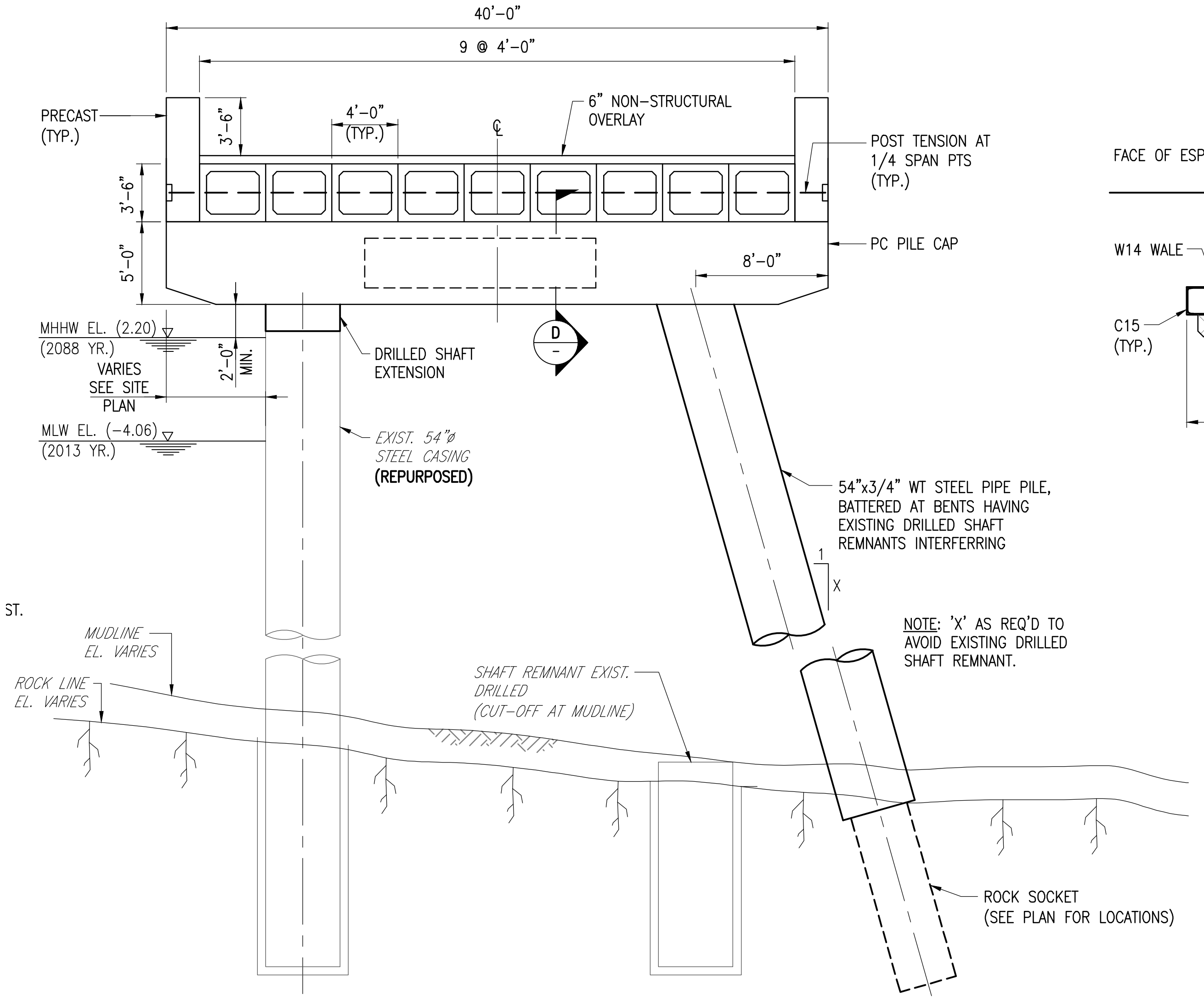
SCALE: 3/16"=1'-0"



B SECTION AT NODE/CONNECTOR

W402
W403

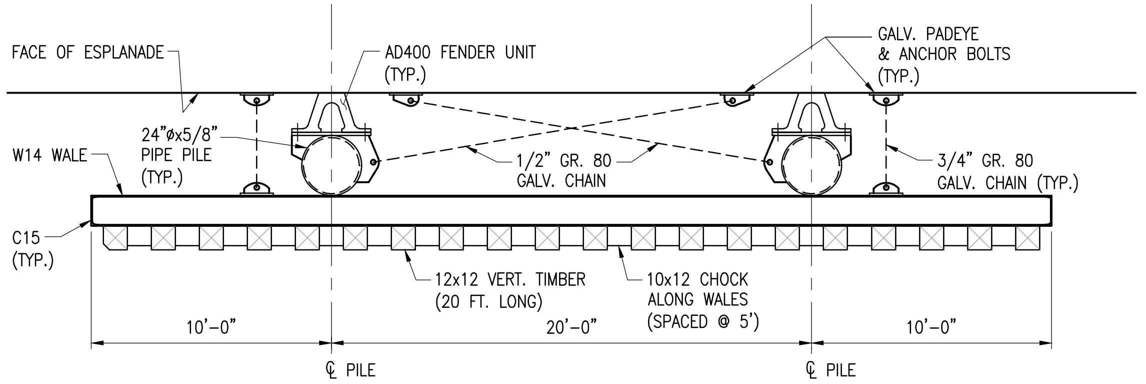
SCALE: 3/16"=1'-0"



C TYPICAL SECTION AT ODR EXISTING DRILLED SHAFT

W403

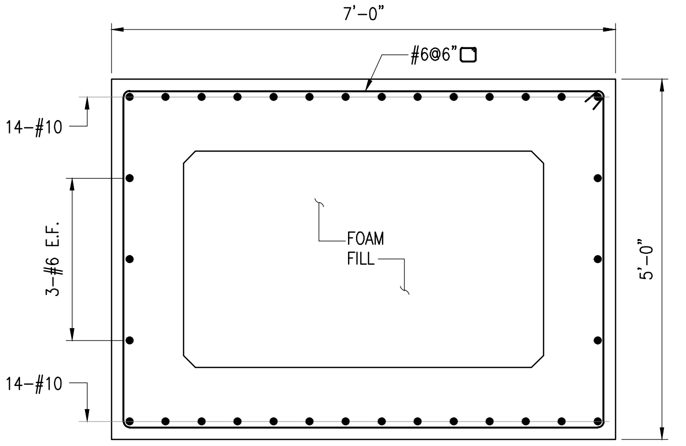
SCALE: 3/16"=1'-0"



1 DETAIL - FENDERING

W402

SCALE: 1/4"=1'-0"



D SECTION

SCALE: 3/4"=1'-0"

GRAPHIC SCALE: 1/4" = 1'-0"
5' 4' 3' 2' 1' 0 5'

GRAPHIC SCALE: 3/16" = 1'-0"
5' 0 5' 10'

GRAPHIC SCALE: 3/4" = 1'-0"
1' 6" 0' 1' 2' 3' 4'

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

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DESIGNED BY: WD
DRAWN BY: EF
CHECKED BY: WD
APPROVED BY: JMC
SUBMITTAL DATE: 9/27/2013

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CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

TYPICAL SECTIONS UN & ODR

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: W502
DISCIPLINE/SEQUENCE: MARINE
REVISION
SHEET NO. 6 OF 32
SCALE: AS SHOWN

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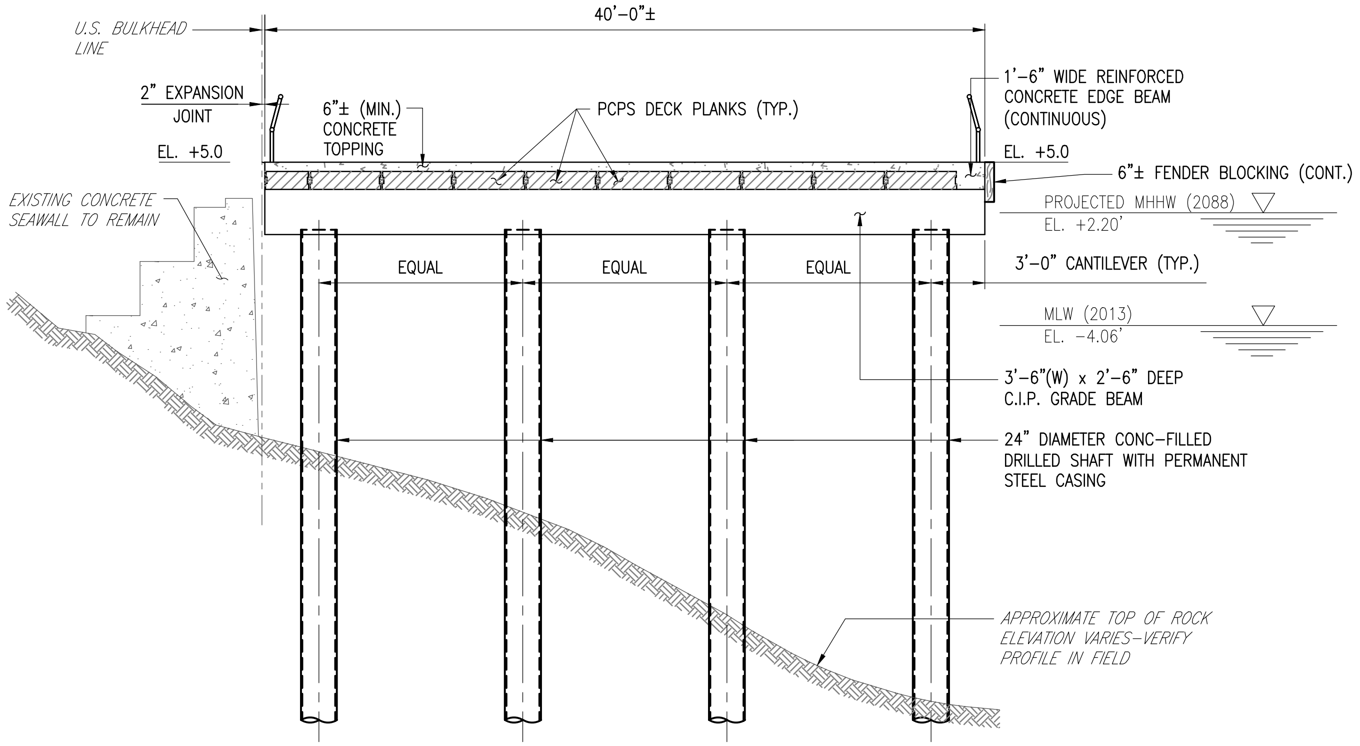
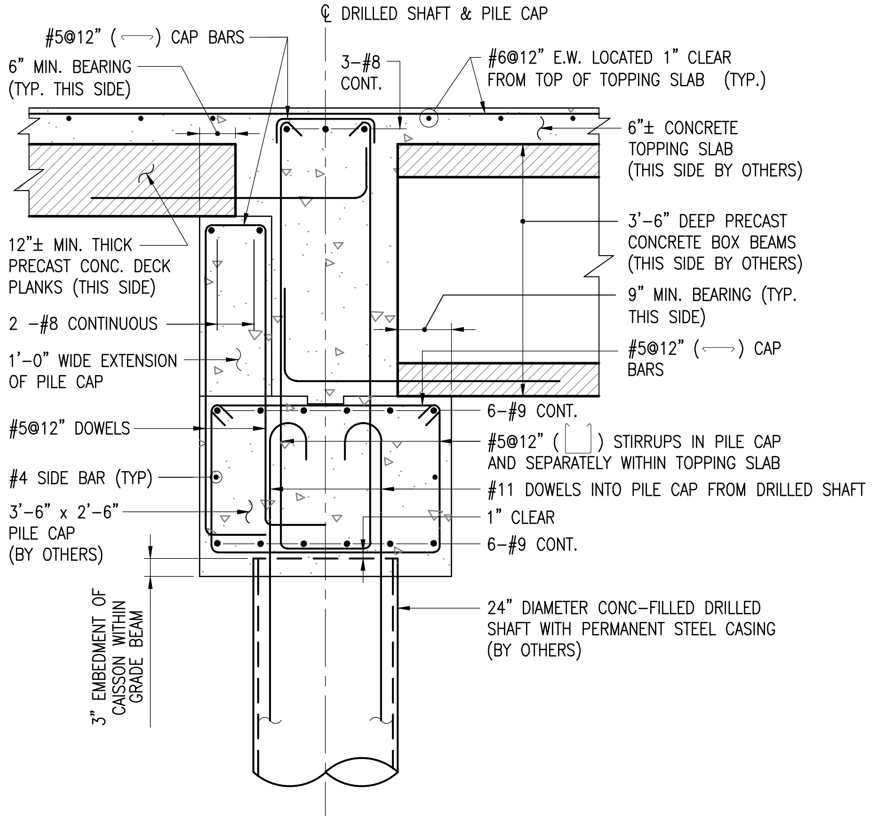
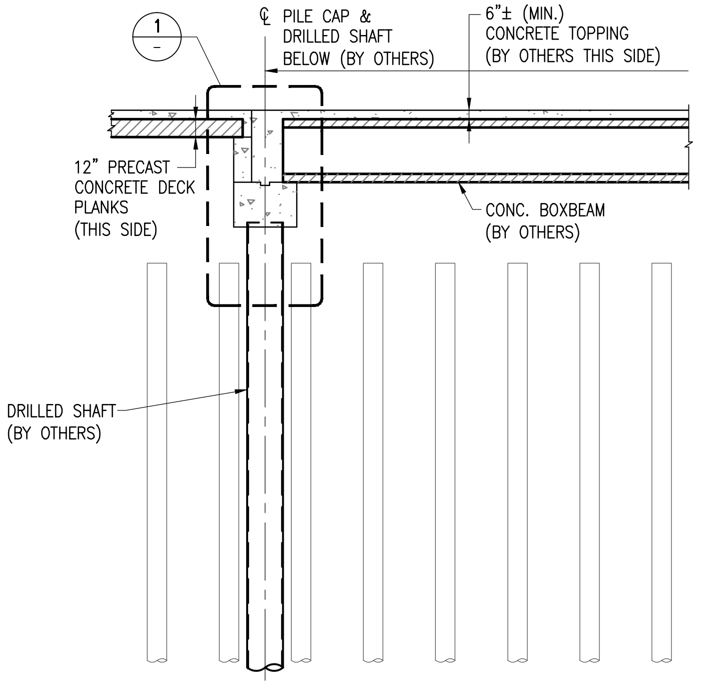


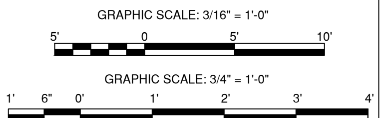
A W501 **SECTION - AT SEAWALL**
SCALE: 3/16"=1'-0"



1 - **DETAIL**
SCALE: 3/4"=1'-0"



D W501 **SECTION**
SCALE: 3/16"=1'-0"



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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

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DESIGNED BY: EG
DRAWN BY: FL
CHECKED BY: JK
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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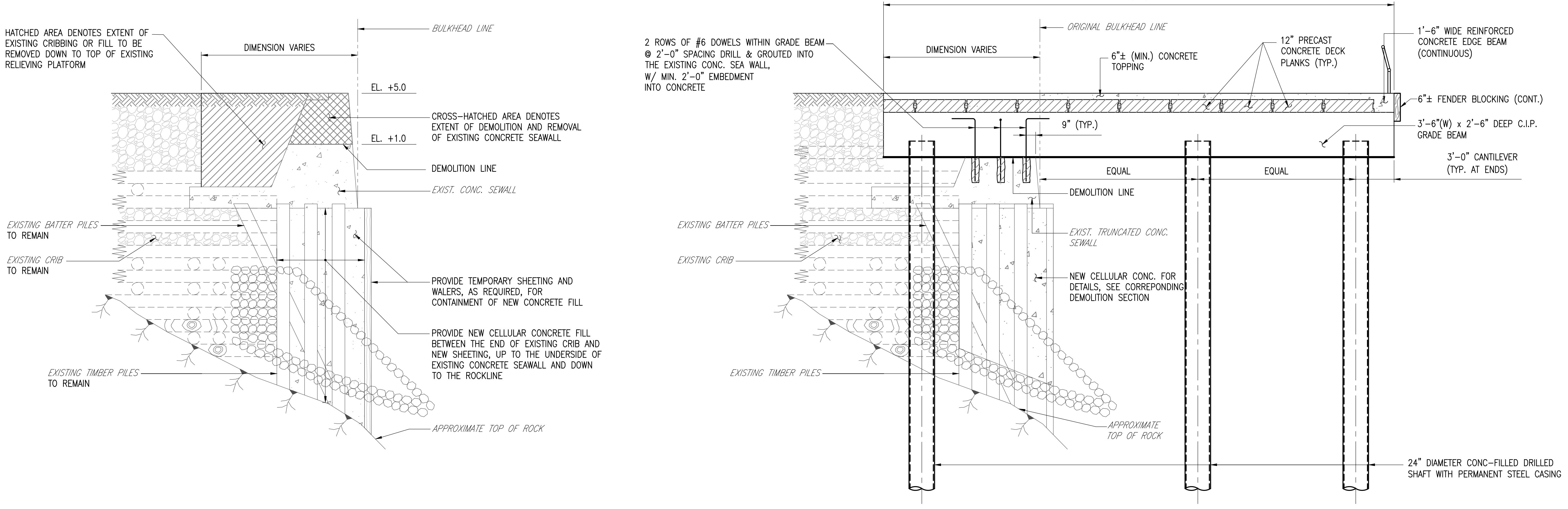
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE
CONCEPTUAL DESIGN

TYPICAL SECTIONS AT AHG TRANSITION 1

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT W503
DISCIPLINE/SEQUENCE MARINE
REVISION
SHEET NO. 7 OF 32
SCALE AS SHOWN



DEMOLITION

RECONSTRUCTION

B/W501 SECTION – AT CRIB WALL

SCALE: 1/4"=1'-0"

GRAPHIC SCALE: 1/4" = 1'-0"
5' 4' 3' 2' 1' 0 5'

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Sep 30, 2013 – 12:49pm

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

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DESIGNED BY: EG
DRAWN BY: FL
CHECKED BY: JK
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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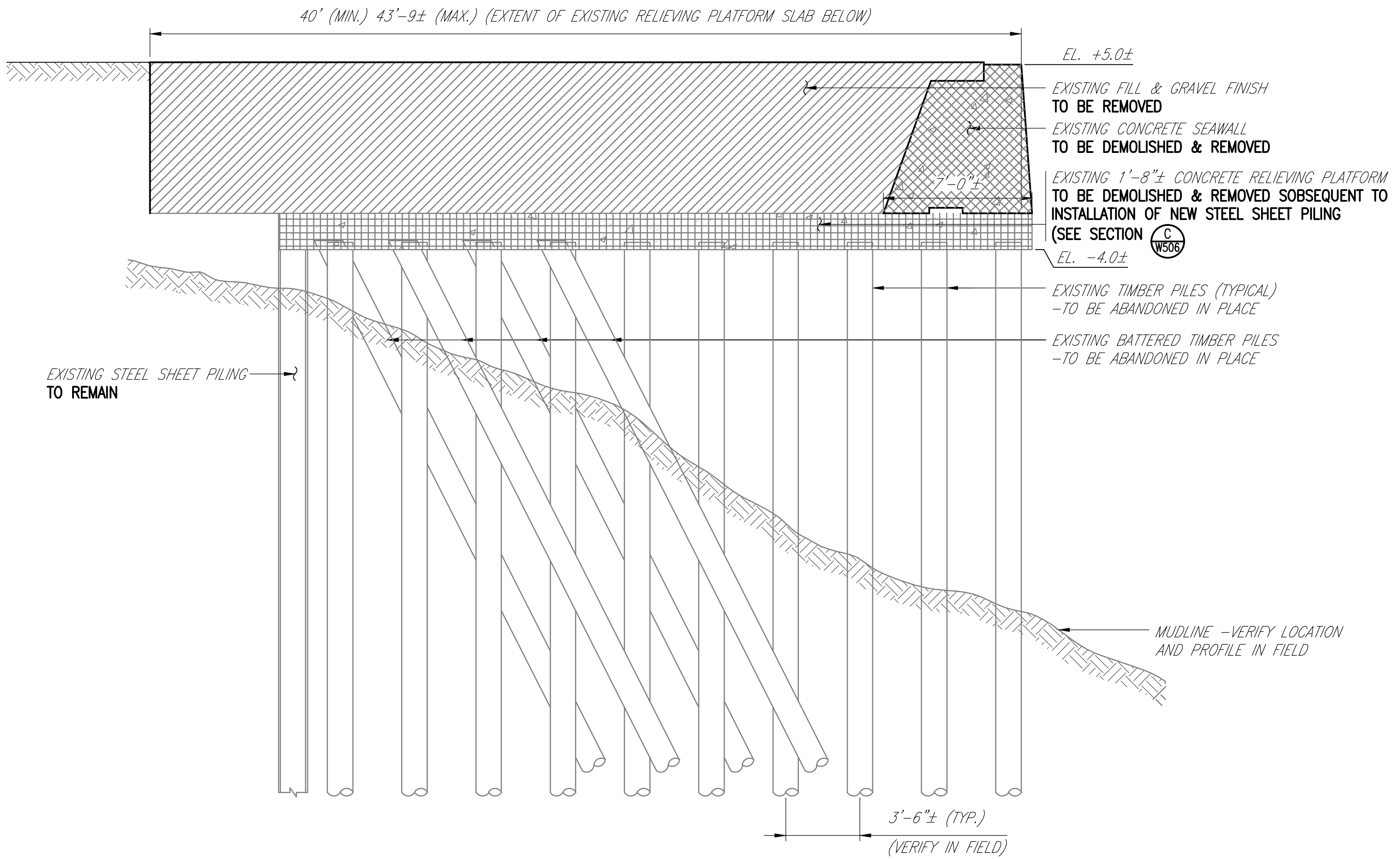
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

TYPICAL SECTIONS AT AHG TRANSITION 2

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: W504
DISCIPLINE/SEQUENCE: MARINE
REVISION
SHEET NO. 8 OF 32
SCALE: AS SHOWN



C
W501

DEMOLITION SECTION

SCALE: 1/4"=1'-0"

GRAPHIC SCALE: 1/4" = 1'-0"
5' 4' 3' 2' 1' 0 5'

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

REV.	DATE	DESCRIPTION	BY / SUB.	APP.

DESIGNED BY: EG
DRAWN BY: FL
CHECKED BY: JK
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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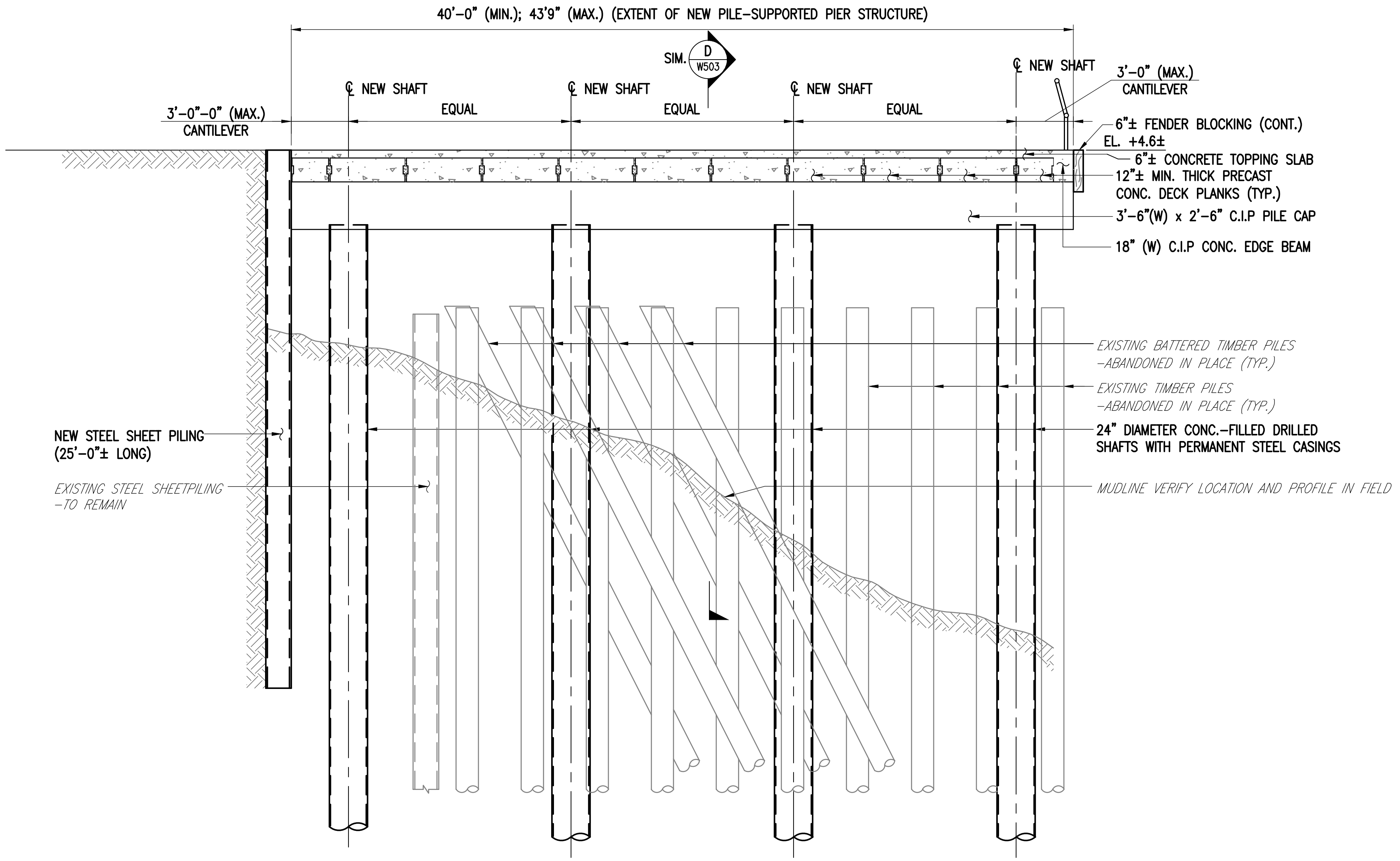
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

TYPICAL SECTIONS AT AHG TRANSITION 3

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT W505
DISCIPLINE/SEQUENCE MARINE
REVISION
SHEET NO. 9 OF 32
SCALE AS SHOWN



C W501 **RECONSTRUCTED SECTION**

SCALE: 1/4"=1'-0"

GRAPHIC SCALE: 1/4" = 1'-0"
5' 4' 3' 2' 1' 0 5'

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INFORMATION CONFIDENTIAL:

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DESIGNED BY: EG
DRAWN BY: FL
CHECKED BY: JK
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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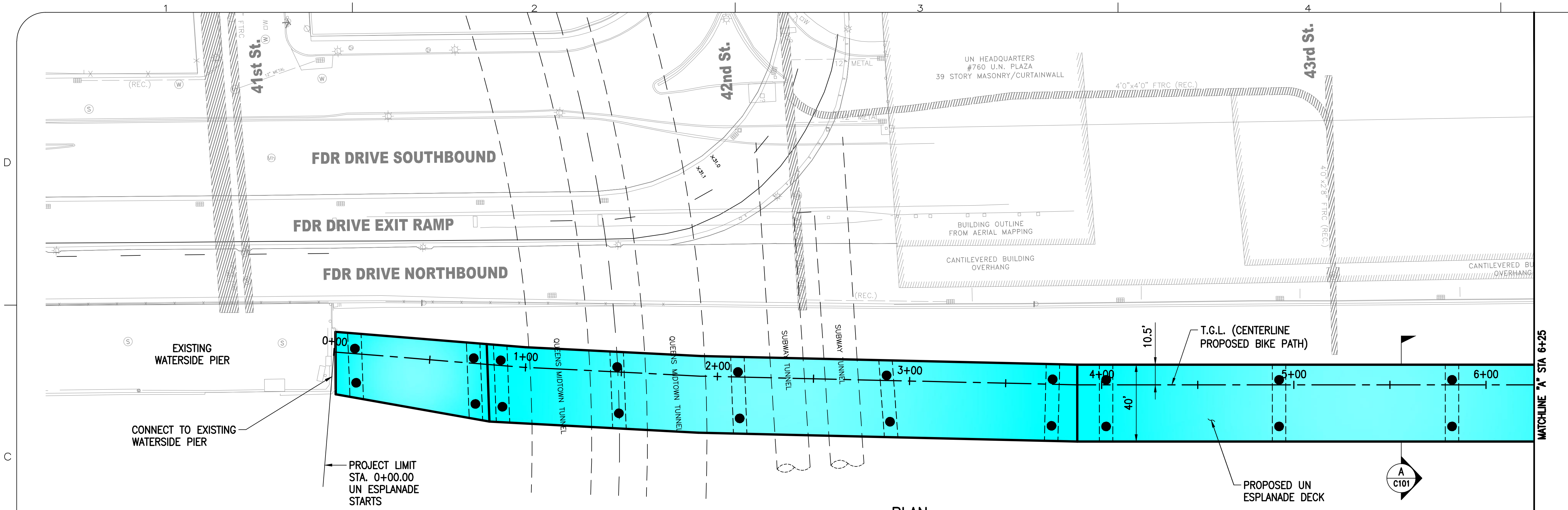
CONCEPT
PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

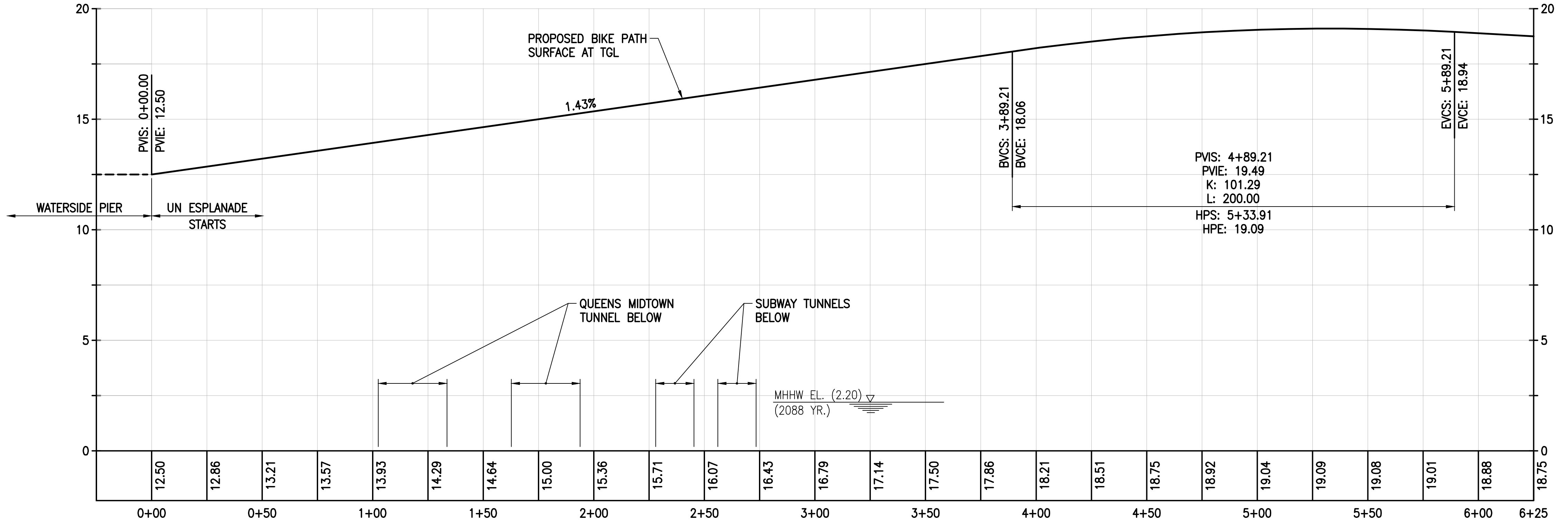
TYPICAL SECTIONS AT AHG TRANSITION 4

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: W506
DISCIPLINE/SEQUENCE: MARINE
REVISION
SHEET NO. 10 OF 32
SCALE: AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"
30' 15' 0 15' 30' 60' 90'



PROFILE

VERTICAL GRAPHIC SCALE: 1" = 3'-0"
3' 1.5' 0 1.5' 3' 6' 9'

HORIZONTAL GRAPHIC SCALE: 1" = 30'-0"
30' 15' 0 15' 30' 60' 90'

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

REV.	DATE	DESCRIPTION	BY / SUB.	APP.
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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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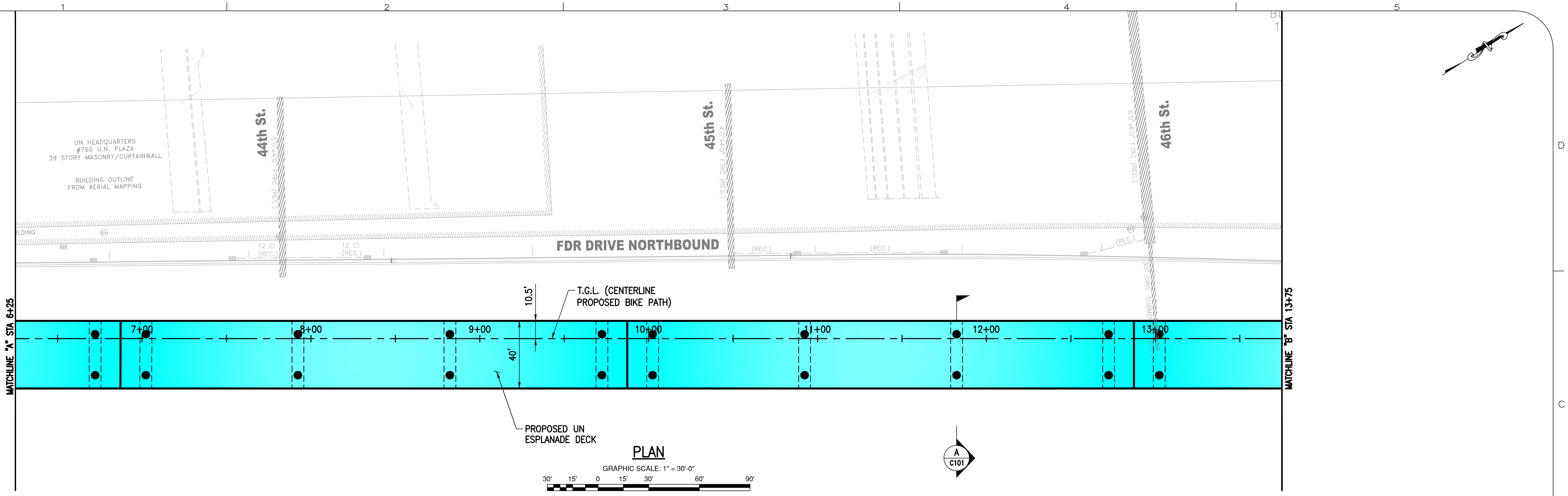
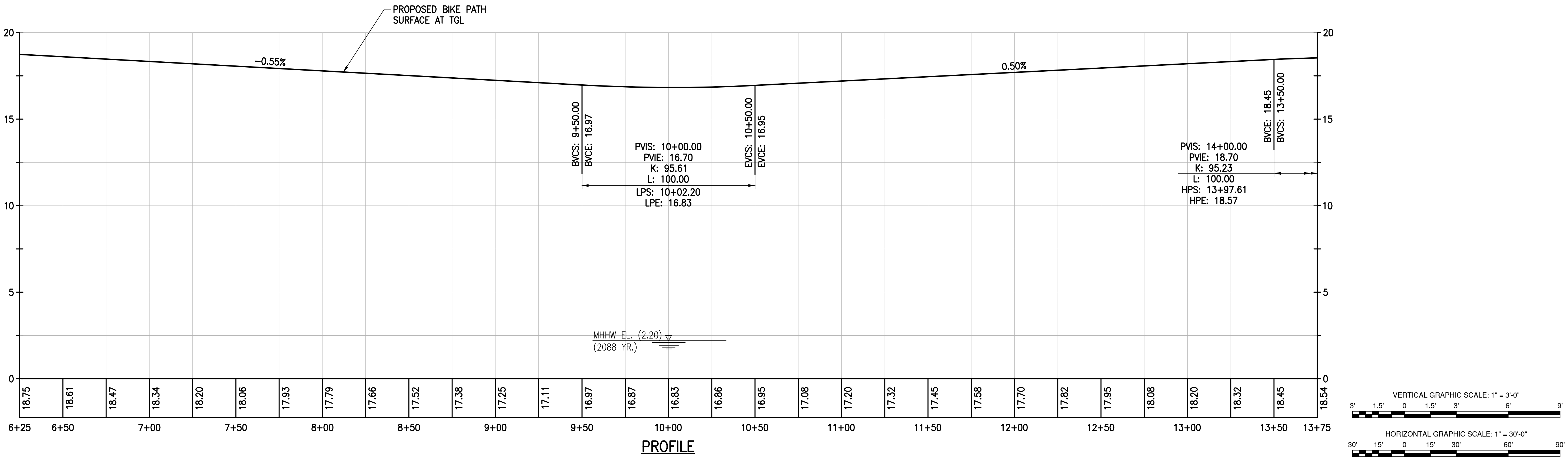
CONCEPT
PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE
CONCEPTUAL DESIGN

GEOMETRIC PLAN & PROFILE

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C001
DISCIPLINE/SEQUENCE: CIVIL
REVISION:
SHEET NO. 11 OF 32
SCALE: AS SHOWN





REV.	DATE	DESCRIPTION	BY / SUB.	APP.
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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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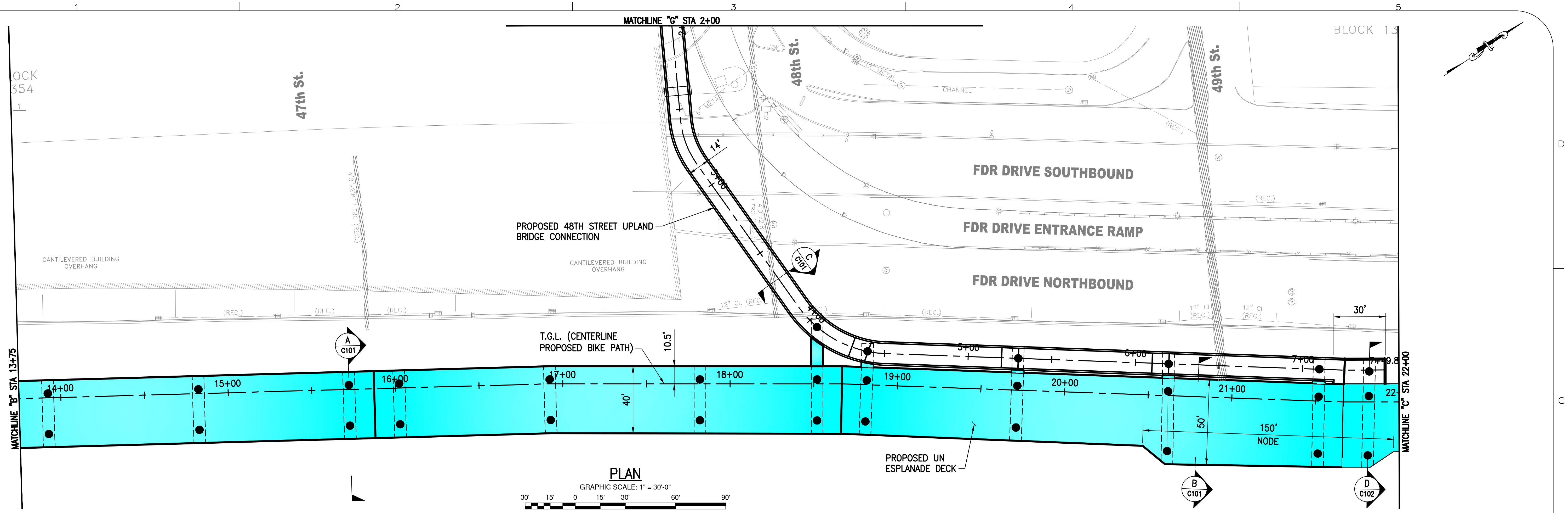
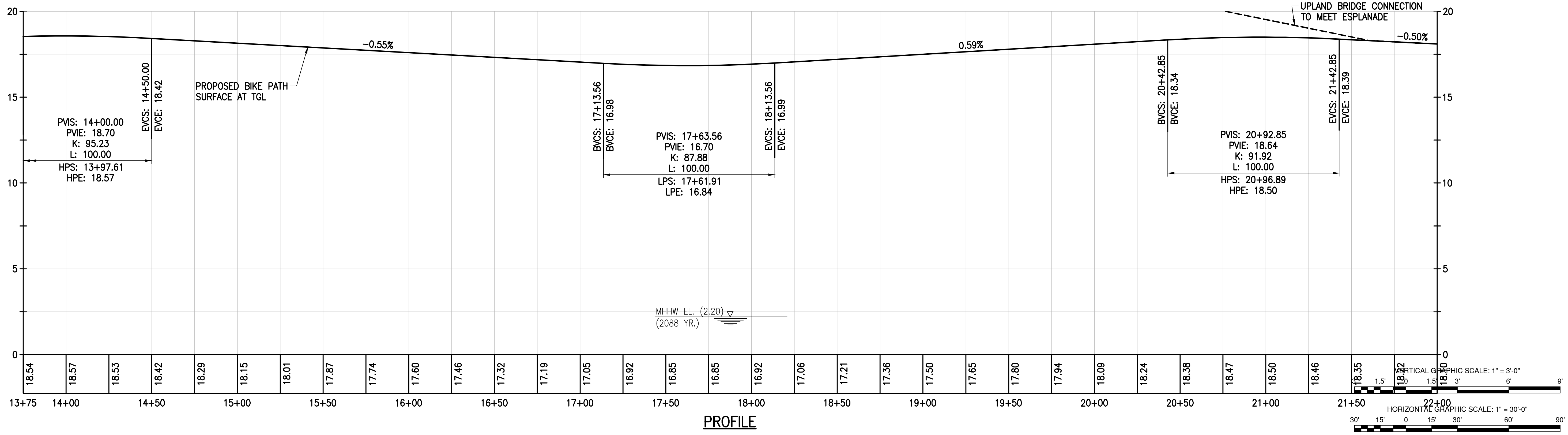
EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

GEOMETRIC PLAN & PROFILE

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT C002
DISCIPLINE/SEQUENCE CIVIL
REVISION
SHEET NO. 12 OF 32
SCALE AS SHOWN



PLAN



PROFILE

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REV.	DATE	DESCRIPTION	BY / SUB.	APP.

DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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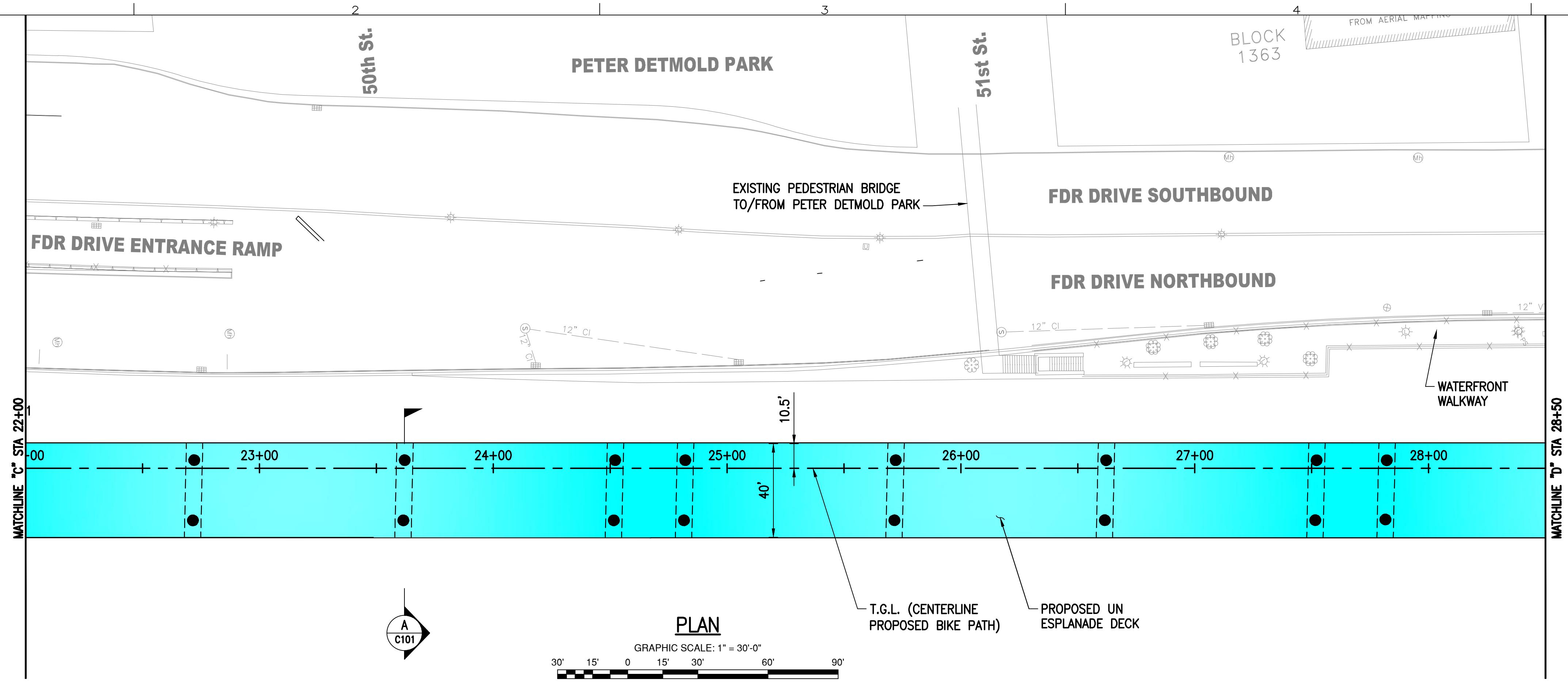
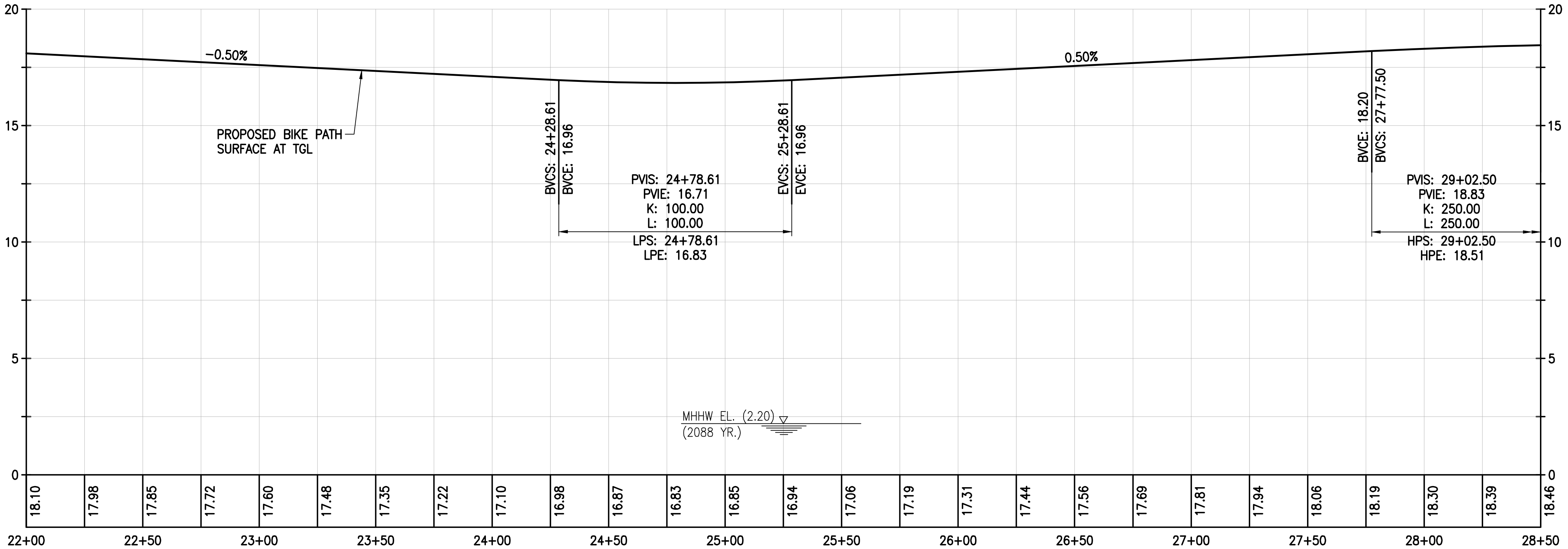
CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C003
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 13 OF 32
SCALE: AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"

30' 15' 0 15' 30' 60' 90'



PROFILE

VERTICAL GRAPHIC SCALE: 1" = 3'-0"

3' 1.5' 0 1.5' 3' 6' 9'

HORIZONTAL GRAPHIC SCALE: 1" = 30'-0"

30' 15' 0 15' 30' 60' 90'

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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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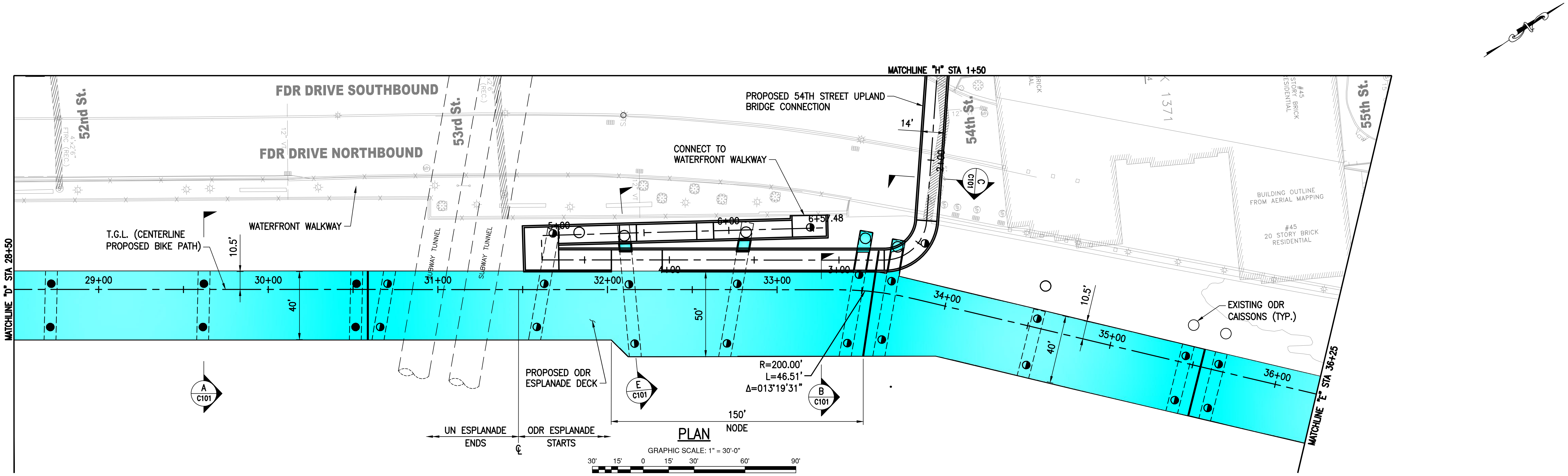
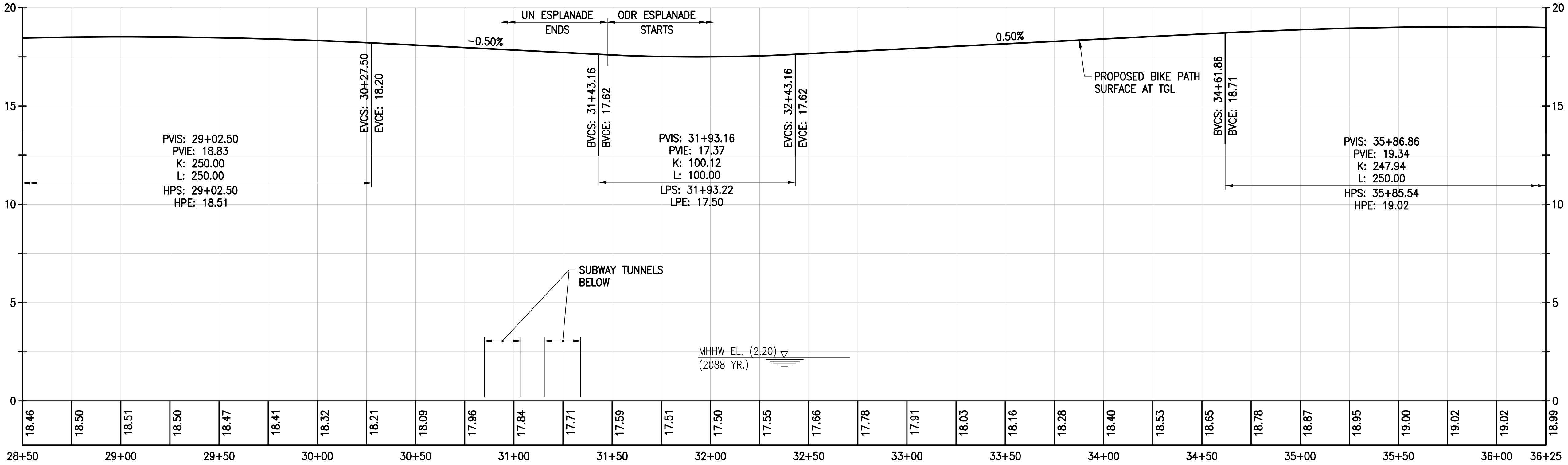
GEOMETRIC PLAN & PROFILE

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C004
DISCIPLINE/SEQUENCE: CIVIL
REVISION:
SHEET NO. 14 OF 32
SCALE: AS SHOWN



PLAN



PROFILE

VERTICAL GRAPHIC SCALE: 1" = 3'-0"
3' 1.5' 0 1.5' 3' 6' 9'

HORIZONTAL GRAPHIC SCALE: 1" = 30'-0"
30' 15' 0 15' 30' 60' 90'

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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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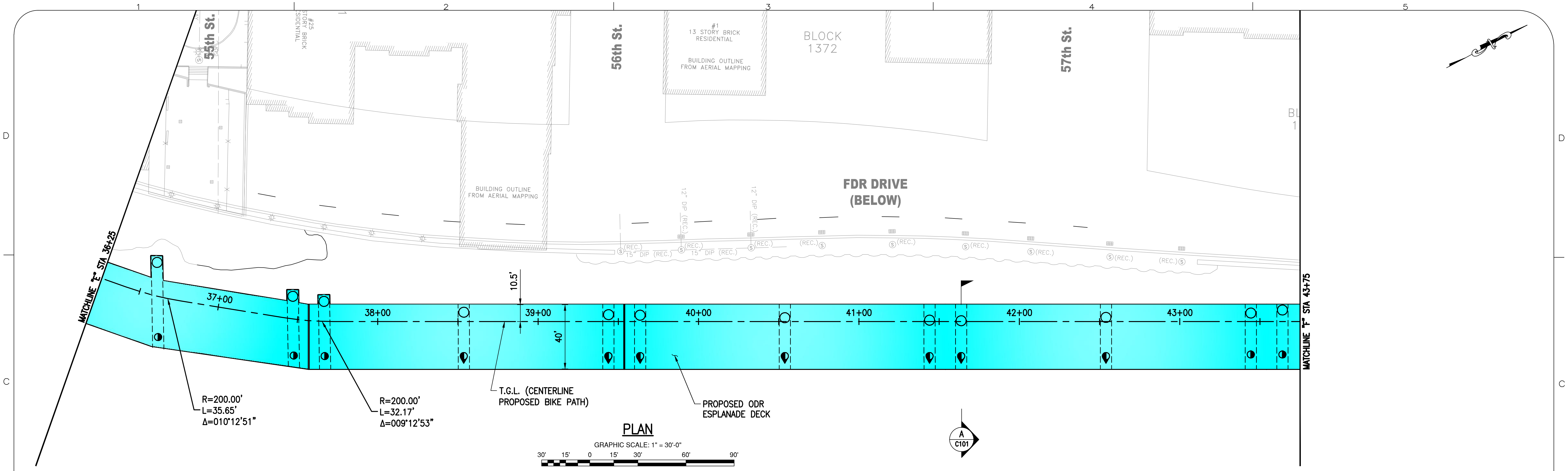
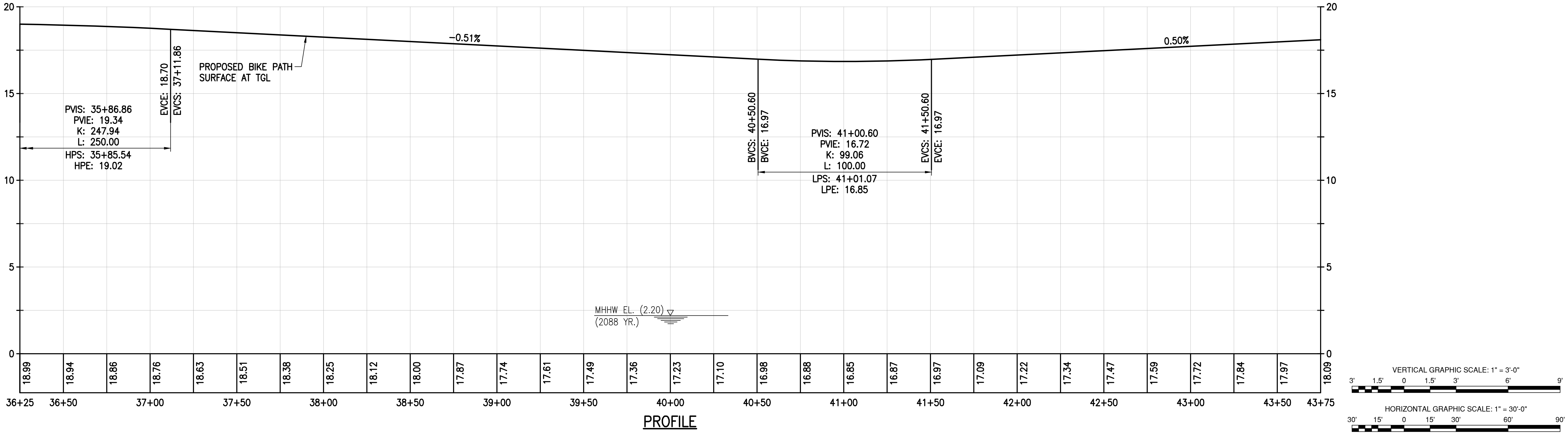
GEOMETRIC PLAN & PROFILE

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C005
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 15 OF 32
SCALE: AS SHOWN



PLAN



PROFILE

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REV.	DATE	DESCRIPTION	BY / SUB.	APP.
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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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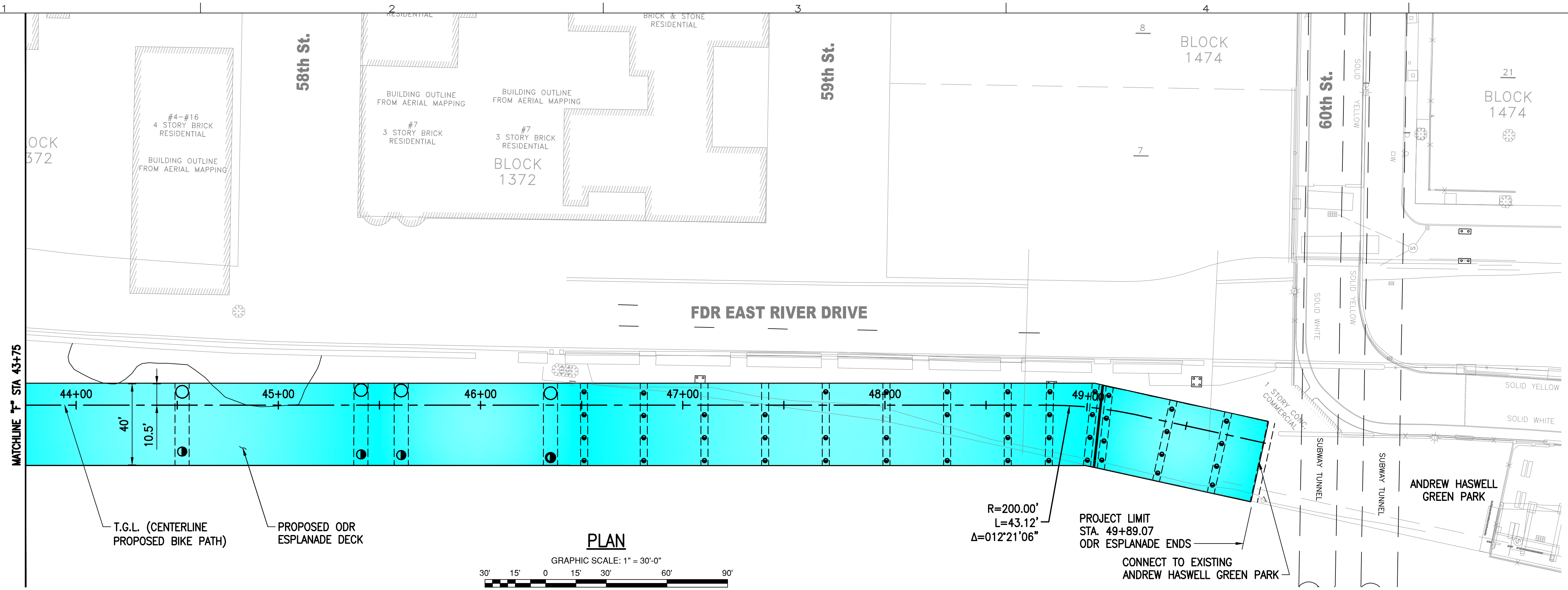
GEOMETRIC PLAN & PROFILE

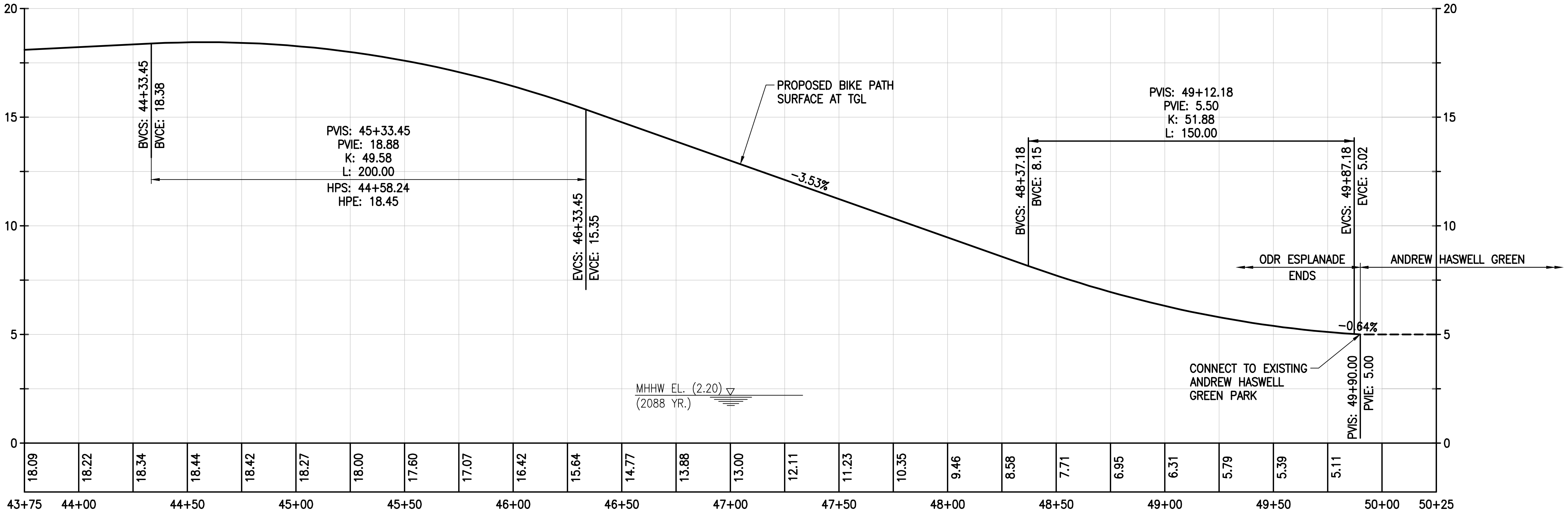
CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C006
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 16 OF 32
SCALE: AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"

30' 15' 0 15' 30' 60' 90'



PROFILE

VERTICAL GRAPHIC SCALE: 1" = 3'-0"

3' 1.5' 0 1.5' 3' 6' 9'

HORIZONTAL GRAPHIC SCALE: 1" = 30'-0"

30' 15' 0 15' 30' 60' 90'

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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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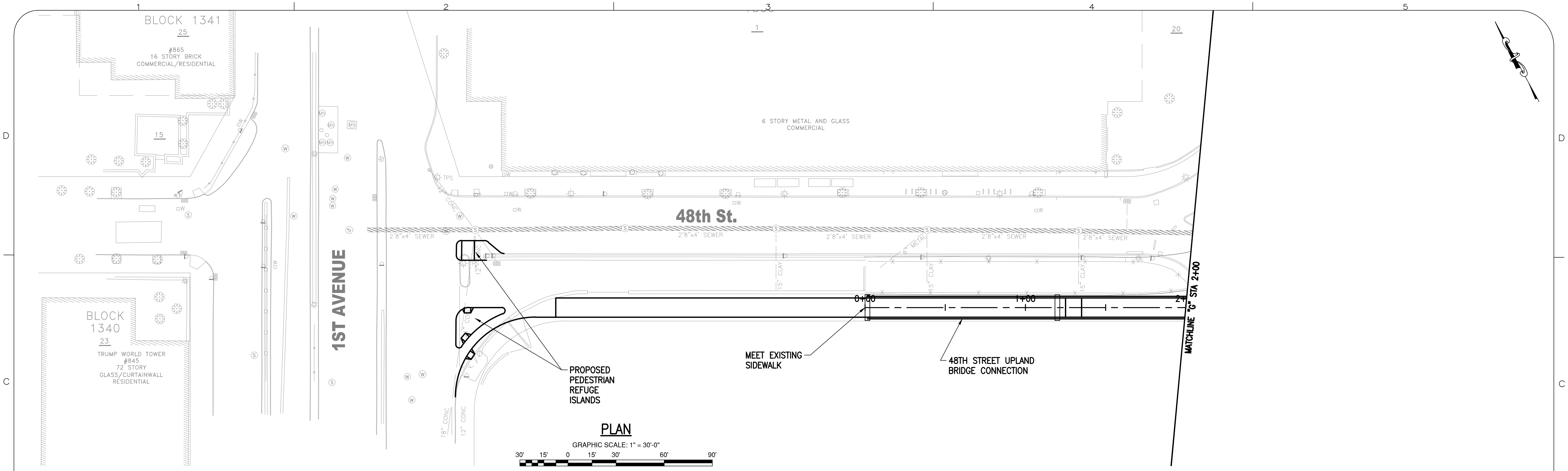
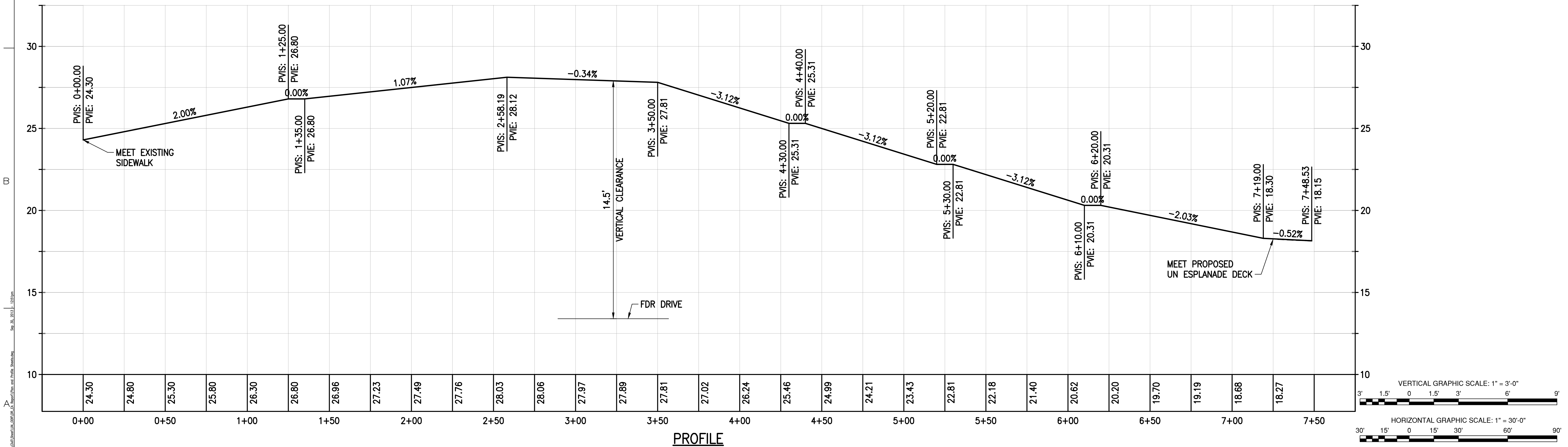
GEOMETRIC PLAN & PROFILE

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C007
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 17 OF 32
SCALE AS SHOWN



PLAN



PROFILE
48TH STREET UPLAND BRIDGE CONNECTION

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

REV.	DATE	DESCRIPTION	BY / SUB.	APP.
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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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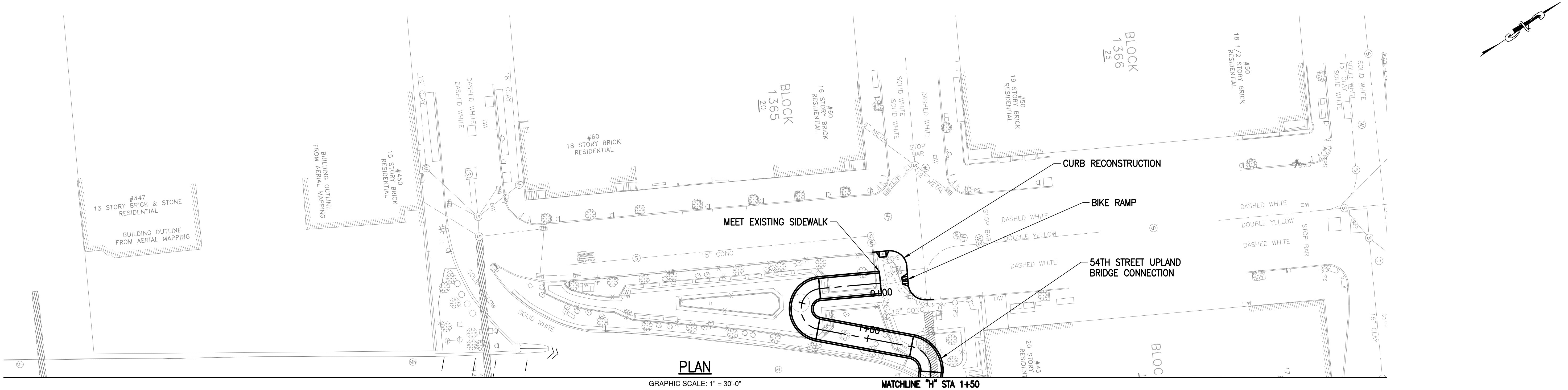
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

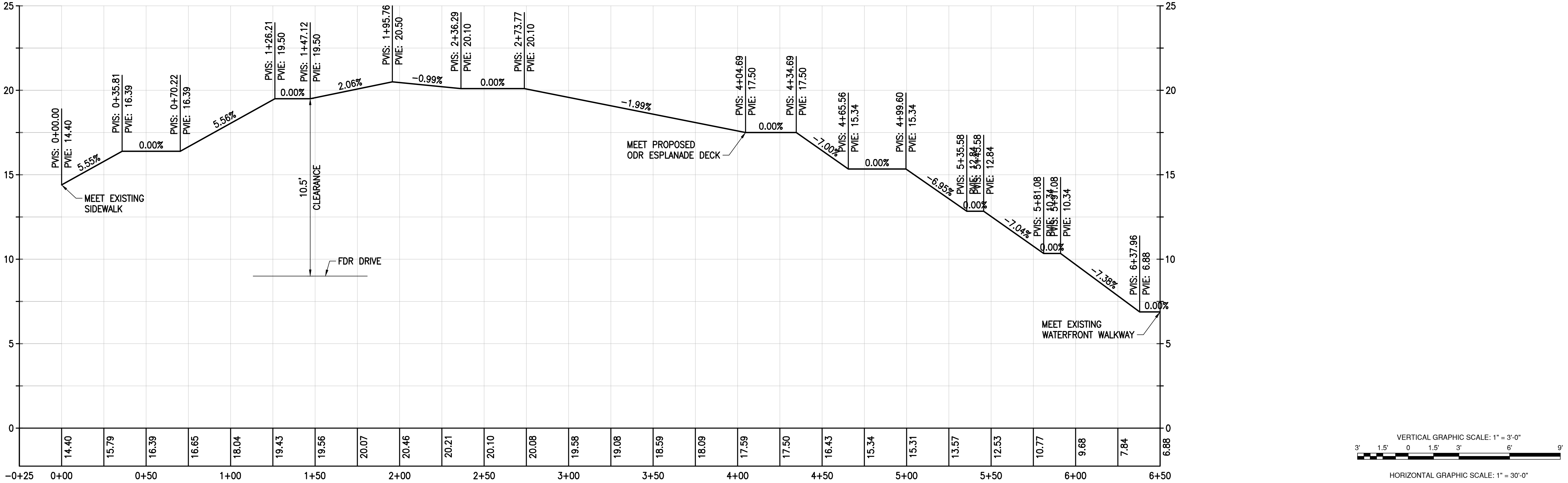
GEOMETRIC PLAN & PROFILE

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT C008
DISCIPLINE/SEQUENCE CIVIL
REVISION
SHEET NO. 18 OF 32
SCALE AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"



PROFILE

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DESIGNED BY: AC
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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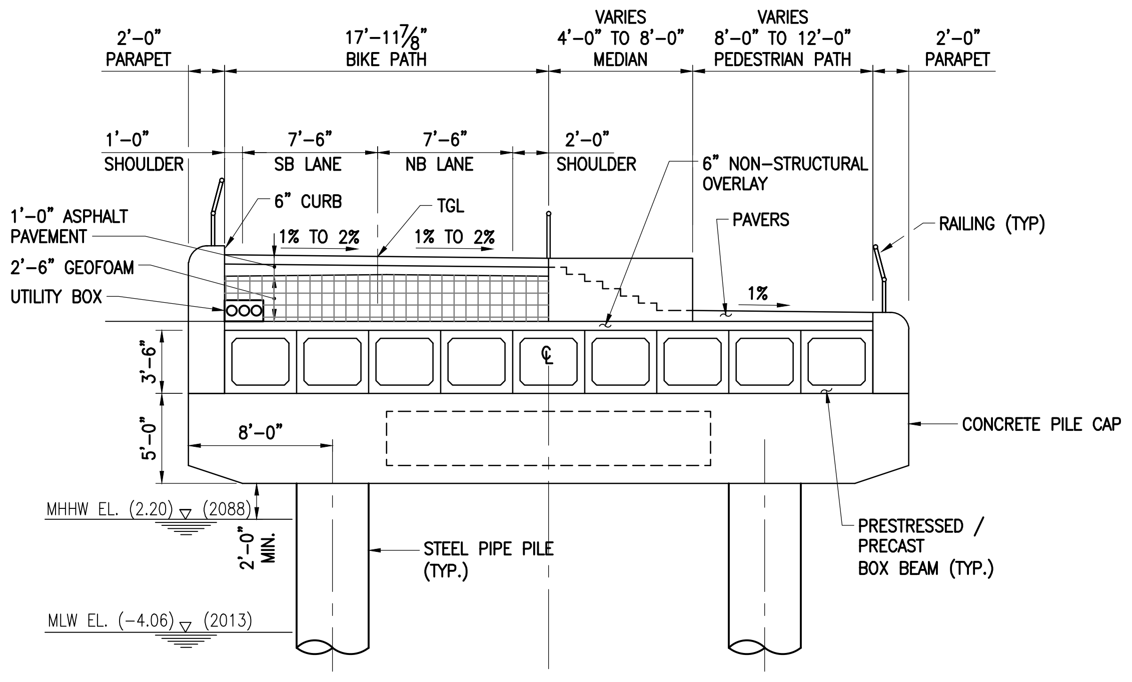
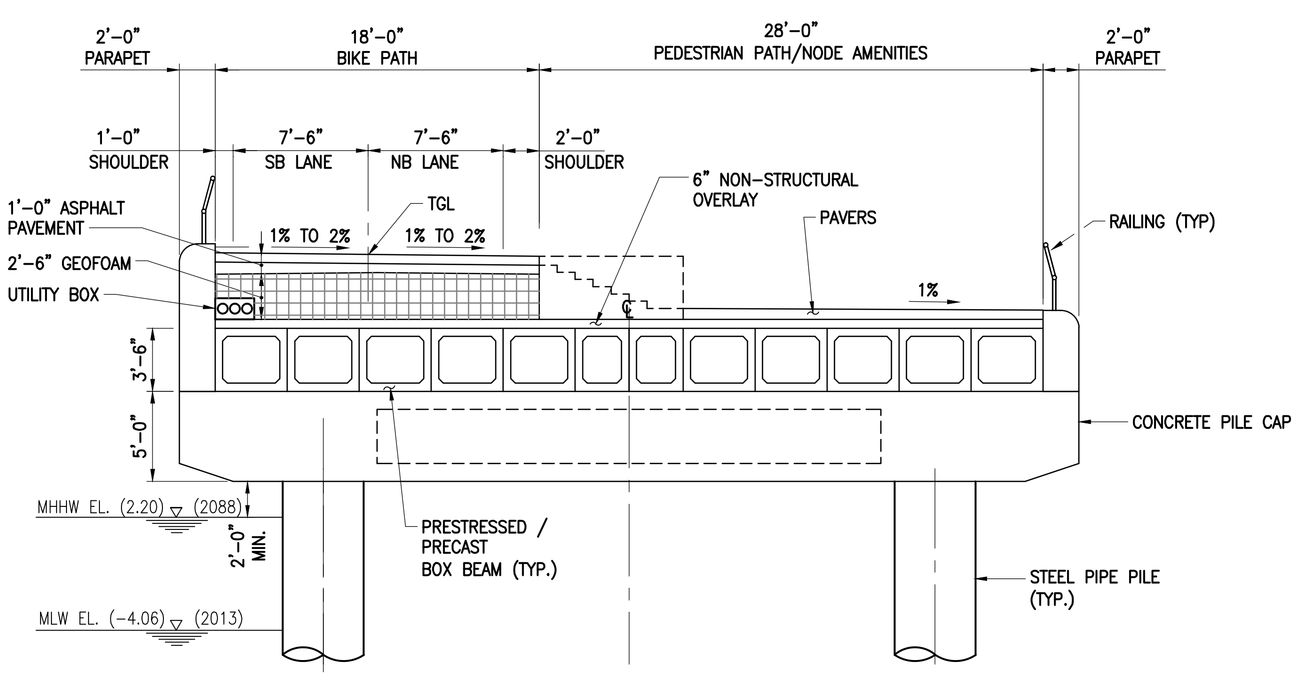
EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

GEOMETRIC PLAN & PROFILE

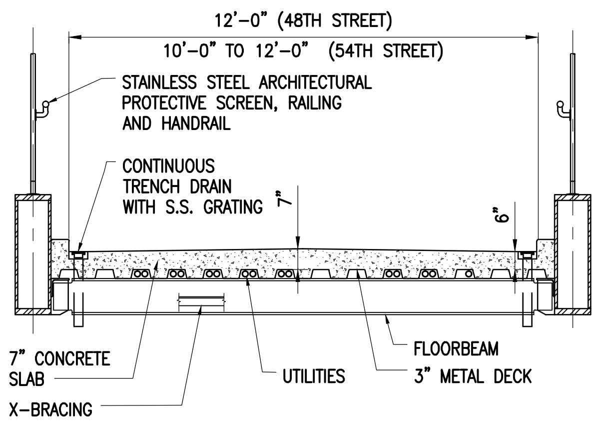
CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C009
DISCIPLINE/SEQUENCE: CIVIL
REVISION:
SHEET NO. 19 OF 32
SCALE: AS SHOWN



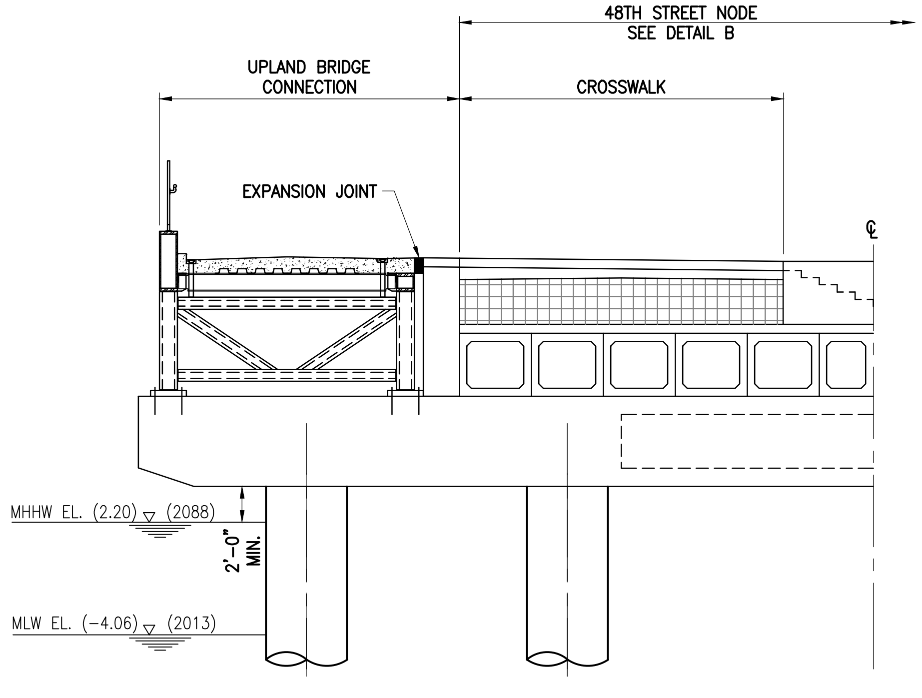
C001
TO C007
A
TYPICAL SECTION UN/ODR ESPLANADE
SCALE: 3/16"=1'-0"



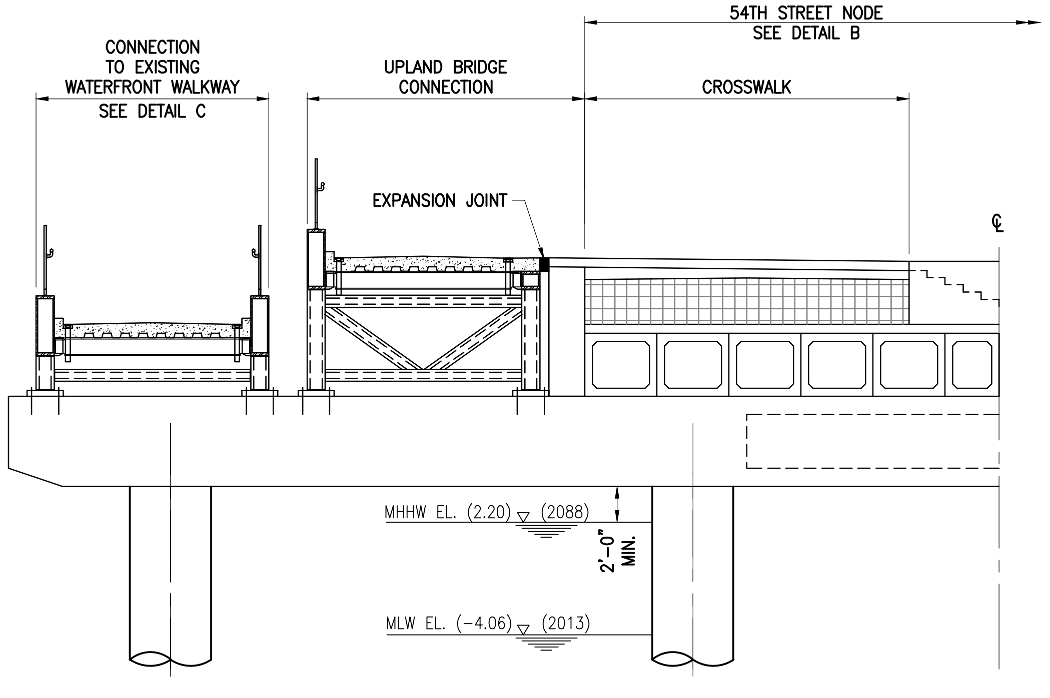
C003
C005
B
TYPICAL SECTION AT NODE
SCALE: 3/16"=1'-0"



C003
C005
C
TYPICAL SECTION UPLAND BRIDGE CONNECTION
SCALE: N.T.S.



D
C003
ESPLANADE SECTION AT 48TH STREET
UPLAND BRIDGE CONNECTION LANDING
SCALE: 3/16"=1'-0"



E
C005
ESPLANADE SECTION AT 54TH STREET
UPLAND BRIDGE CONNECTION LANDING
SCALE: 3/16"=1'-0"

GRAPHIC SCALE: 3/16" = 1'-0"
5' 0 5' 10'

INFORMATION CONFIDENTIAL:

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REV.	DATE	DESCRIPTION	BY / SUB.	APP.
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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DK
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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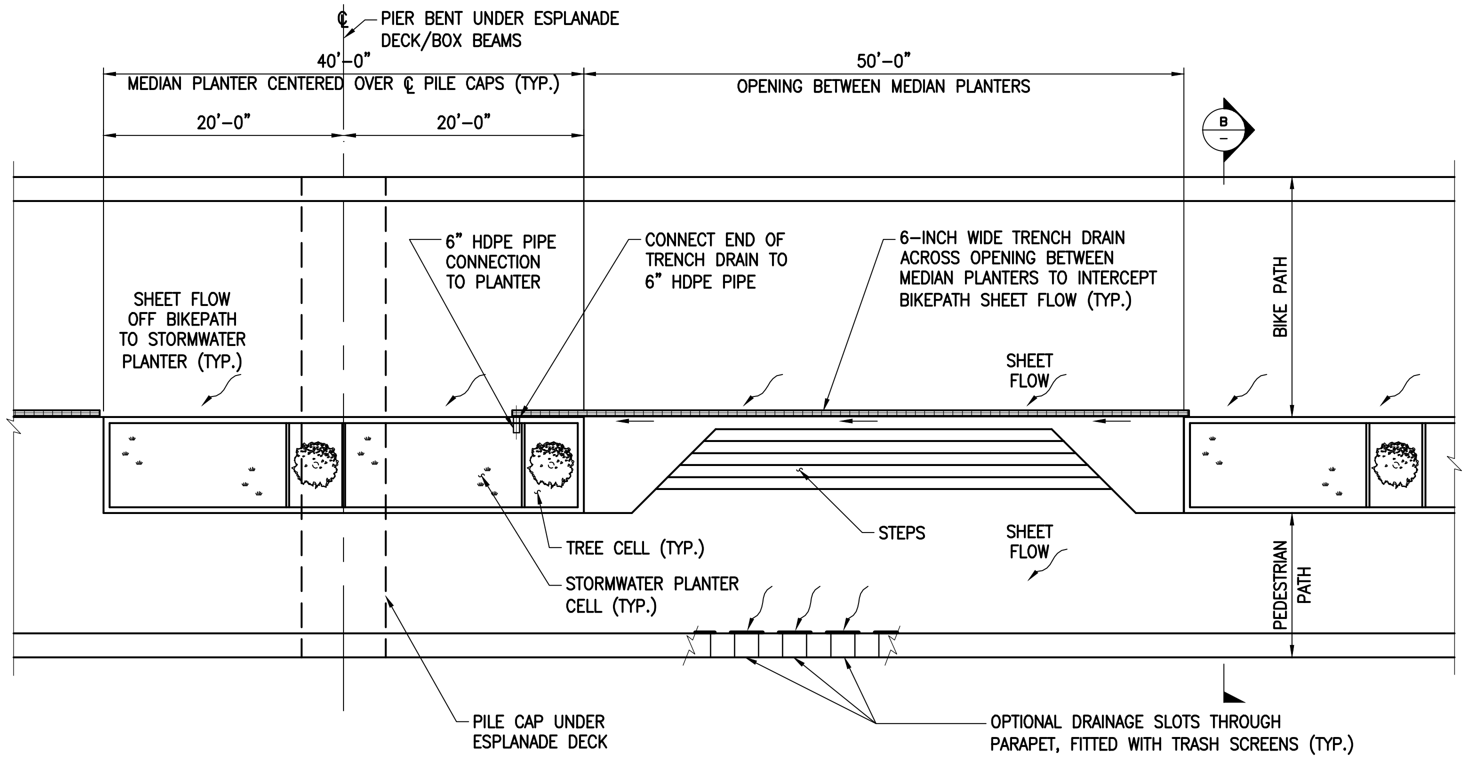
EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

TYPICAL SECTIONS

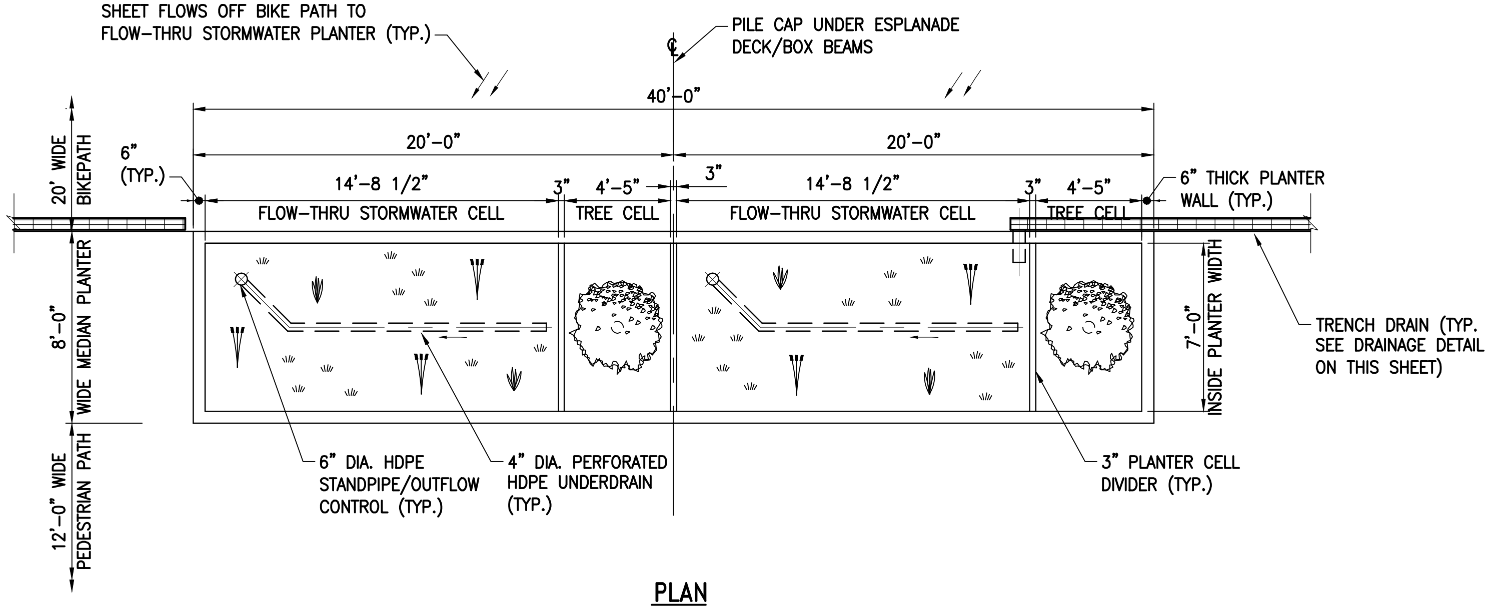
CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C101
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 20 OF 32
SCALE: AS SHOWN



PLAN
DRAINAGE BETWEEN MEDIAN PLANTERS–TYPICAL RUN

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

8' 0 8' 16' 24'



PLAN
MEDIAN PLANTER

GRAPHIC SCALE: 1/4" = 1'-0"

4' 0 4' 8' 12'

NOTES:

1. SEE DRAINAGE DETAILS SHEET FOR TRENCH DRAIN DETAILS.
2. LOCATION OF STANDPIPE/OUTFLOW CONTROL ACROSS PLANTER WIDTH MAY VARY PER STRUCTURAL REQUIREMENTS.

INFORMATION CONFIDENTIAL:

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DESIGNED BY: JM
DRAWN BY: CB
CHECKED BY: AS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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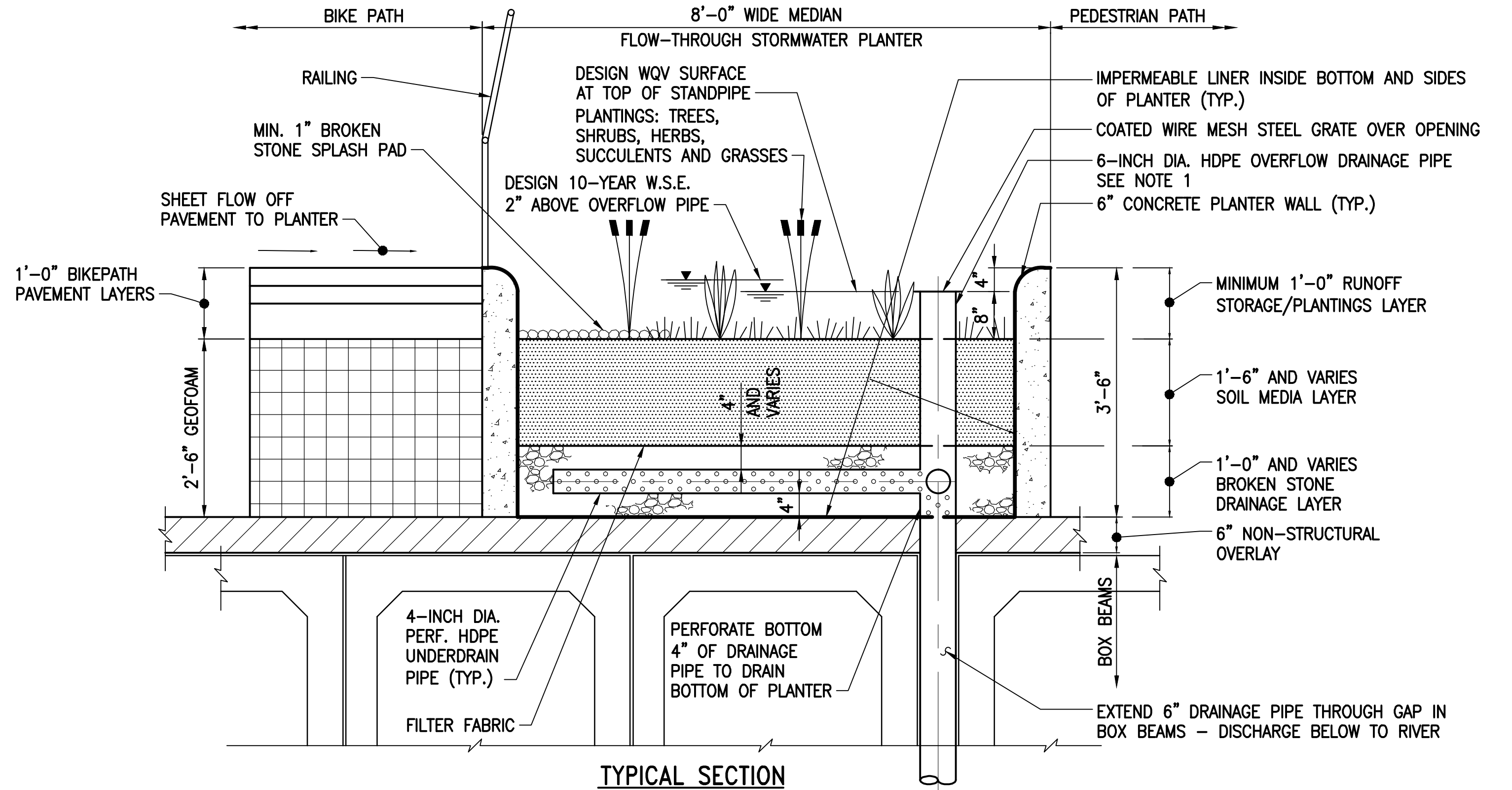
EAST MIDTOWN WATERFRONT ESPLANADE
CONCEPTUAL DESIGN

MEDIAN PLANTER DETAILS-1

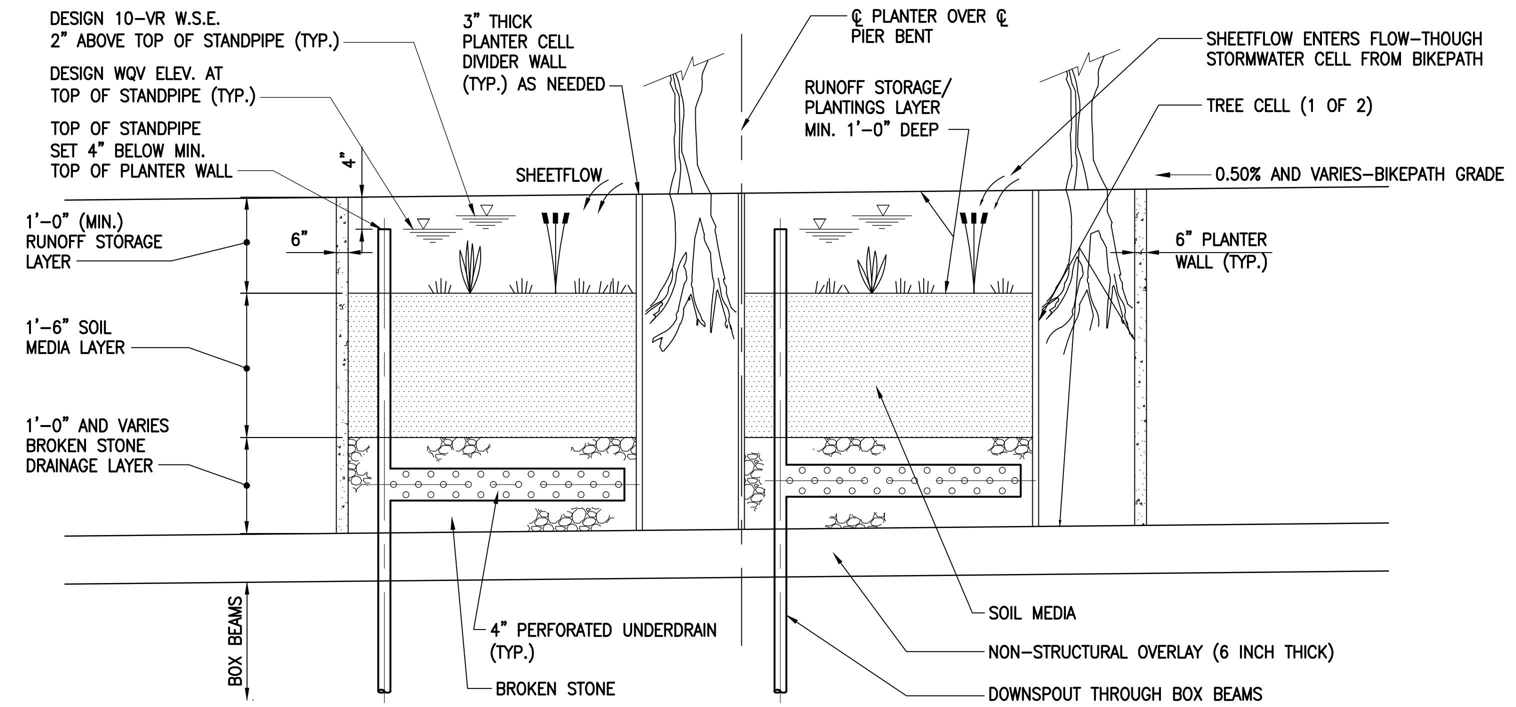
CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C102
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 21 OF 32
SCALE: AS SHOWN



TYPICAL SECTION
FLOW-THROUGH STORMWATER PLANTER

GRAPHIC SCALE: 3/4" = 1'-0"

0 1 2



PROFILE
MEDIAN PLANTER

GRAPHIC SCALE: 1/4" = 1'-0"

HORIZONTAL SCALE: 4' 0 4' 8' 12'

GRAPHIC SCALE: 1" = 1'-0"

VERTICAL SCALE: 1' 0 1' 2' 3'

NOTE:

1. SEE PLAN AND TYPICAL SECTION FOR DIMENSIONS AND DETAILS.
2. LOCATION OF OVERFLOW PIPE ACROSS PLANTER WIDTH MAY VARY PER STRUCTURAL REQUIREMENTS.

REV.	DATE	DESCRIPTION	BY / SUB.	APP.

DESIGNED BY: JM
DRAWN BY: CB
CHECKED BY: AS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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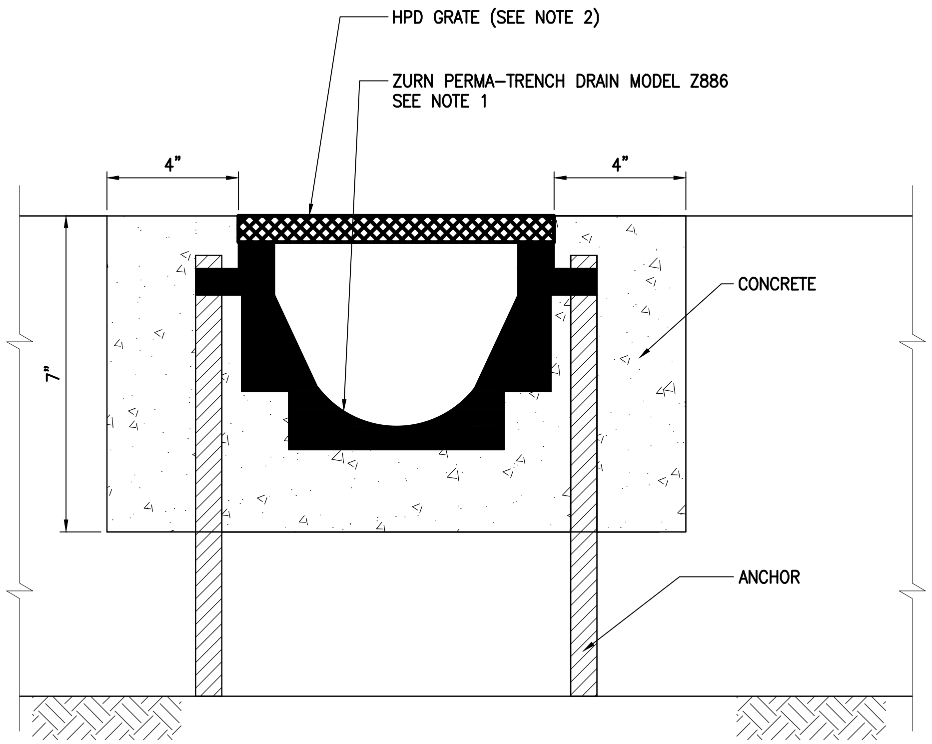
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

MEDIAN PLANTER DETAILS-2

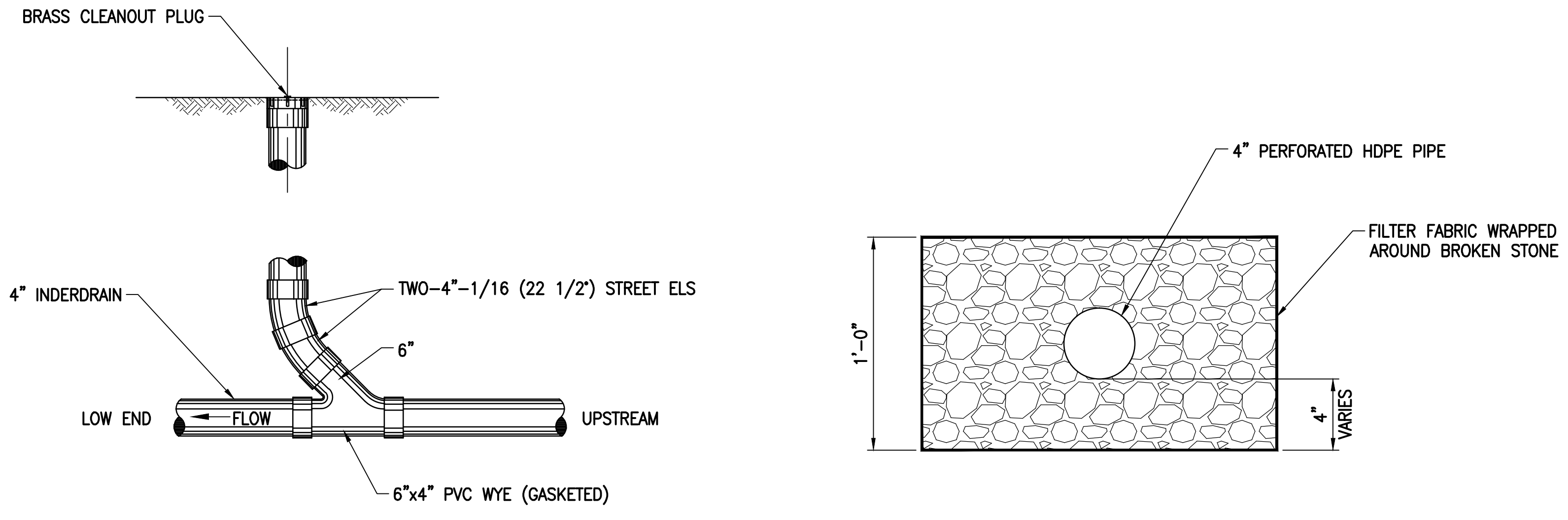
CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT C103
DISCIPLINE/SEQUENCE CIVIL
REVISION
SHEET NO. 22 OF 32
SCALE AS SHOWN



① **TRENCH DRAIN**
SCALE: NOT TO SCALE

TRENCH DRAIN NOTES:

1. ZURN PERMA-TRENCH DRAIN FLO-THRU MODEL Z886 TO BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
2. TRENCH DRAIN GRATE SHALL BE ADA COMPLIANT (HEEL SAFE) AND LIGHT VEHICLE RATED.



CLEANOUT DETAIL

UNDERDRAIN SECTION

② **UNDERDRAIN DETAILS**
SCALE: NOT TO SCALE

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

REV.	DATE	DESCRIPTION	BY / SUB.	APP.
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DESIGNED BY: JM
DRAWN BY: CB
CHECKED BY: AS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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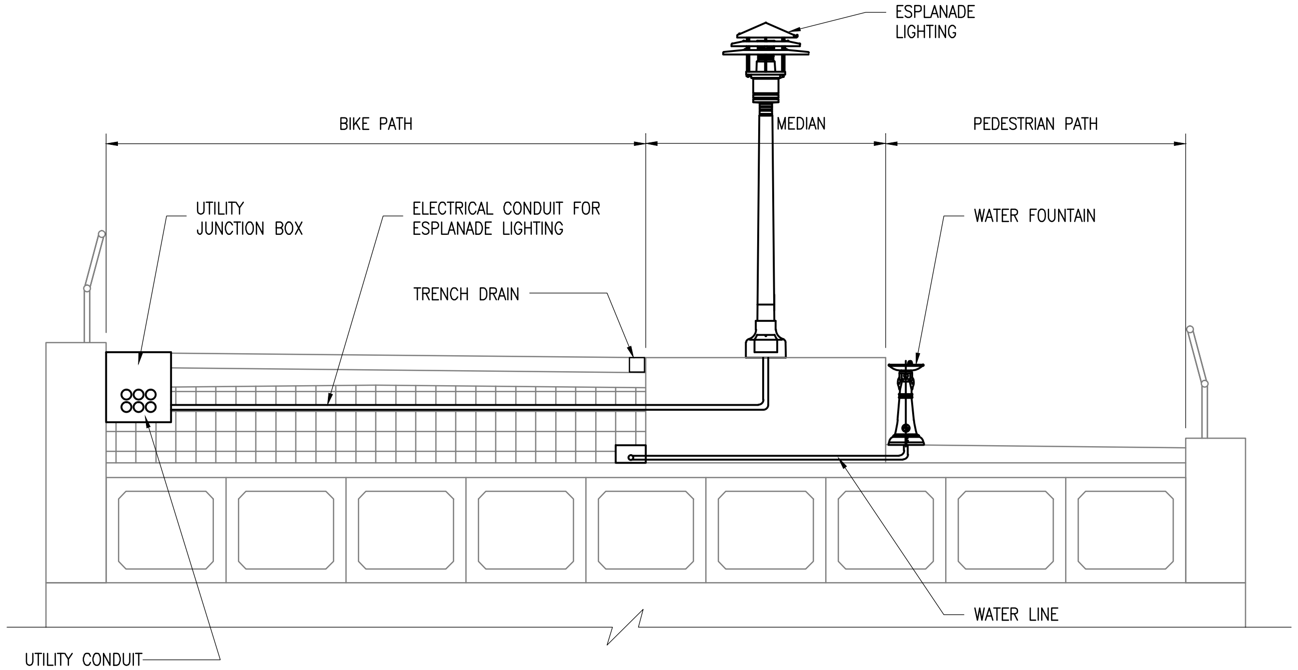
CONCEPT
PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE
CONCEPTUAL DESIGN

DRAINAGE DETAILS

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C104
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 23 OF 32
SCALE: AS SHOWN

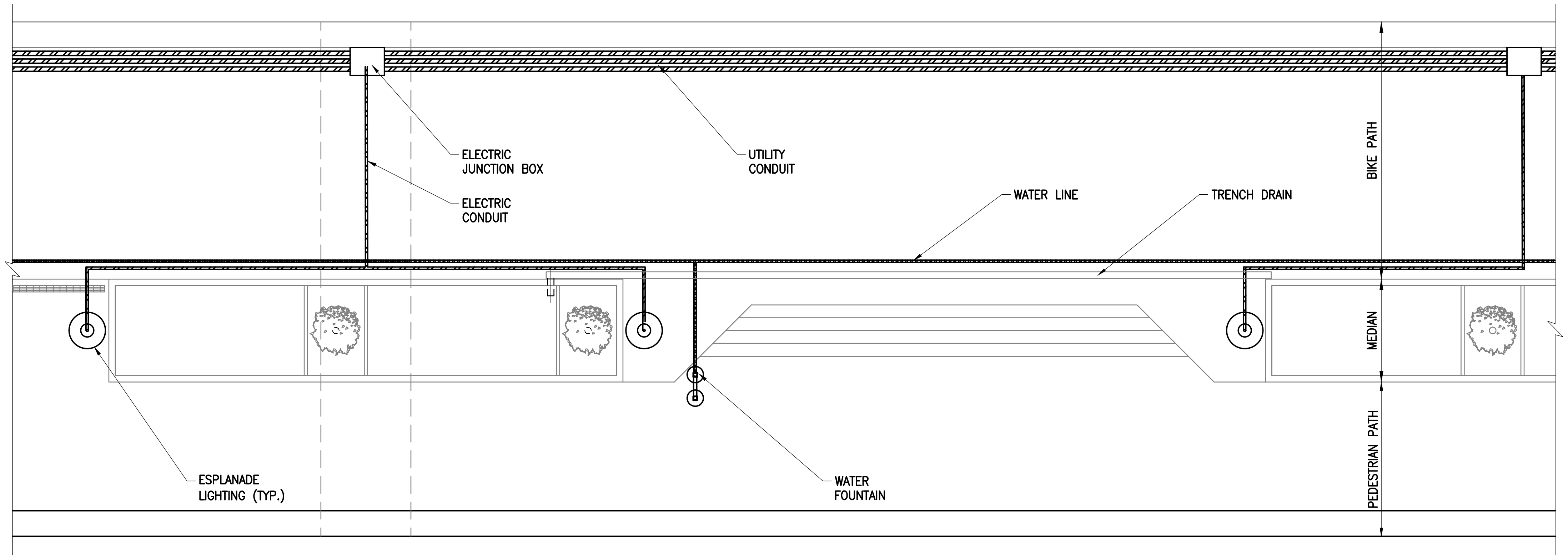


A UTILITY SECTION ACROSS ESPLANADE

SCALE: 5/16"=1'-0"

NOTES:

1. FOR TRENCH DRAIN TYPICAL LAYOUT SEE DRAINAGE DETAILS.
2. FOR MEDIAN TREATMENT SEE TYPICAL SECTIONS.



GRAPHIC SCALE: 5/16" = 1'-0"
3' 0 3' 6'

B TYPICAL UTILITY LAYOUT ON ESPLANADE

SCALE: 3/16"=1'-0"

GRAPHIC SCALE: 3/16" = 1'-0"
5' 0 5' 10'

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DESIGNED BY: JH
DRAWN BY: KJ
CHECKED BY: DK
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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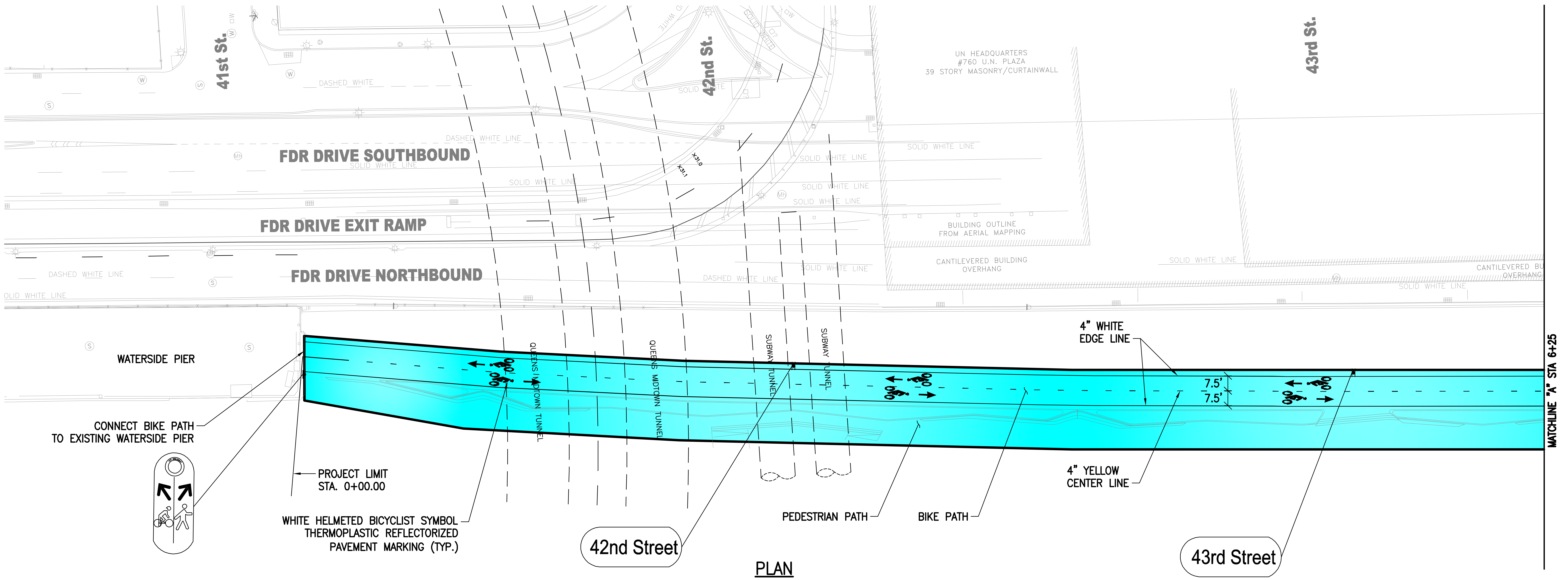
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

TYPICAL UTILITY LAYOUT

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: C105
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 24 OF 32
SCALE: AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"

30' 15' 0 15' 30' 60' 90'

INFORMATION CONFIDENTIAL:

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REV.	DATE	DESCRIPTION	BY/SUB.	APP.

DESIGNED BY: JM
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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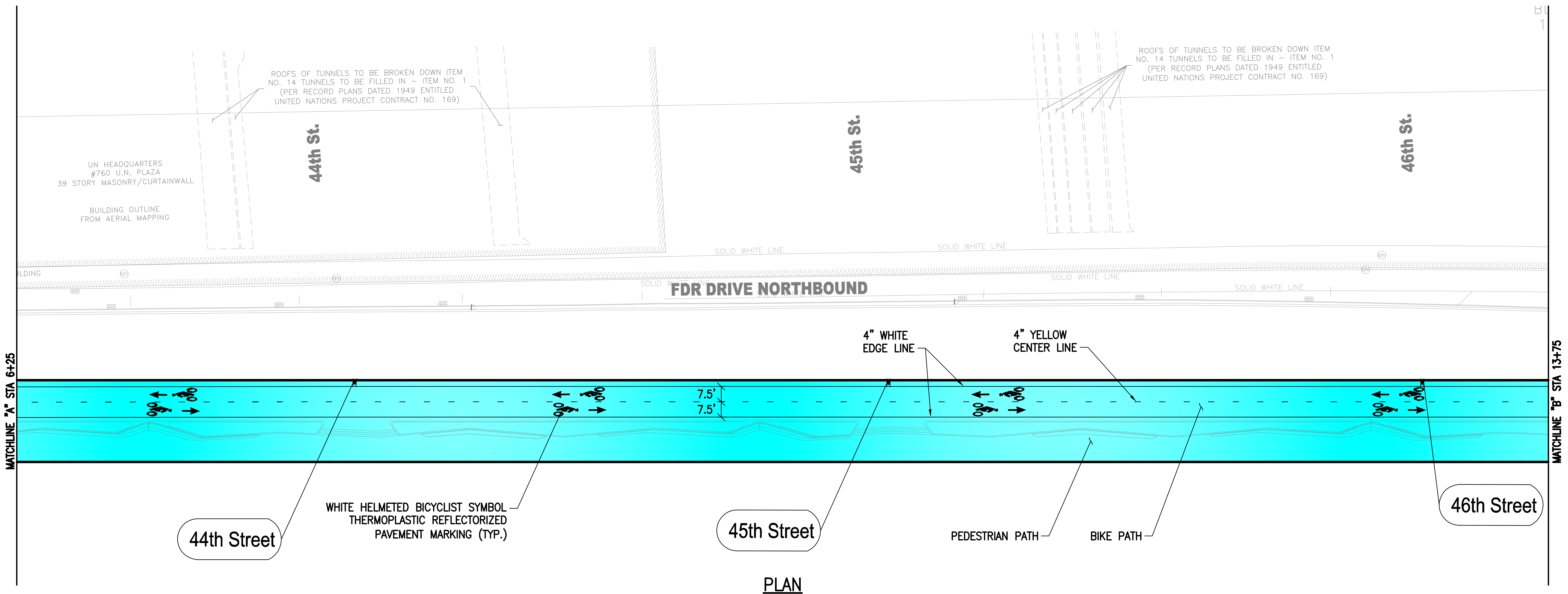
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

PAVEMENT MARKING AND SIGNAGE PLAN

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT PM001
DISCIPLINE/SEQUENCE CIVIL
REVISION
SHEET NO. 25 OF 32
SCALE AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"

30' 15' 0 15' 30' 60' 90'

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REV.	DATE	DESCRIPTION	BY / SUB.	APP.

DESIGNED BY: JM
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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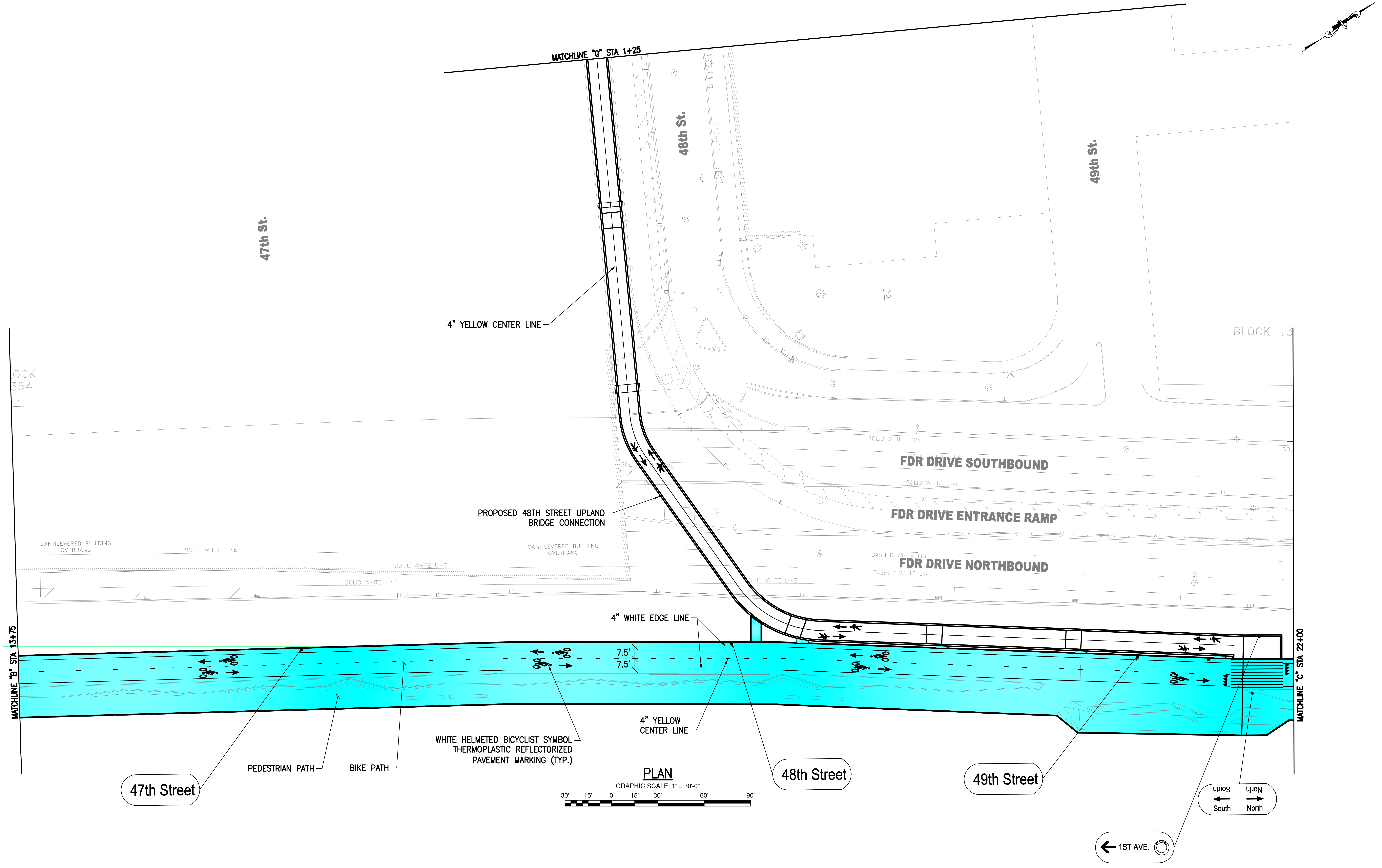
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

PAVEMENT MARKING AND SIGNAGE PLAN

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: PM002
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 26 OF 32
SCALE: AS SHOWN

J:\60221358-East_Midtown_Waterfront_Esplanade\CADD\Task 3\Civil\Sheet\UN_ODR\DR_EA Report\Pavement Marking and Signage Sheets.dwg Oct 25, 2013 - 12:09pm



PLAN

GRAPHIC SCALE: 1" = 30'-0"

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DESIGNED BY: JM
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APPROVED BY: IF
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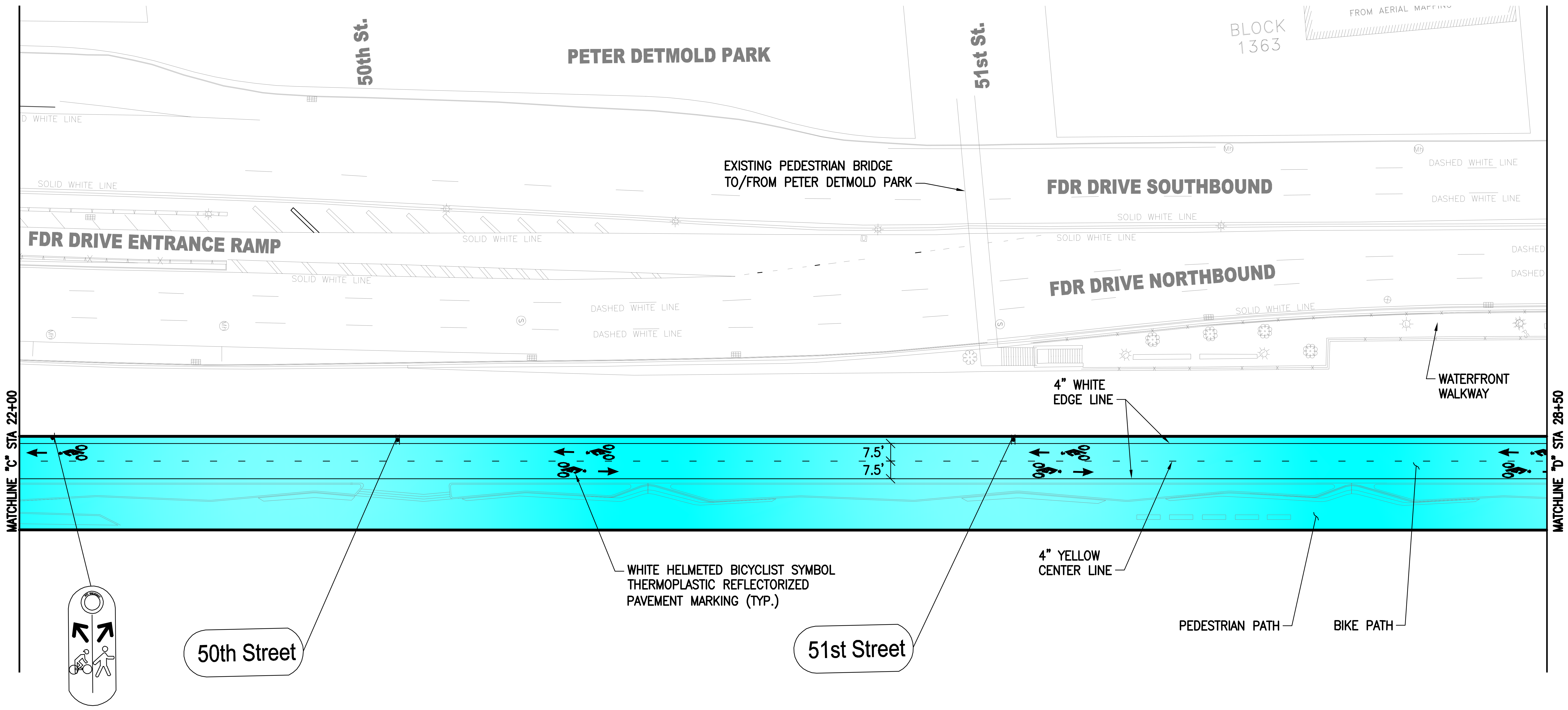
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

PAVEMENT MARKING AND SIGNAGE PLAN

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: PM003
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 27 OF 32
SCALE: AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"

30' 15' 0 15' 30' 60' 90'

INFORMATION CONFIDENTIAL:

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DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

PAVEMENT MARKING AND SIGNAGE PLAN

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: PM004
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 28 OF 32
SCALE: AS SHOWN

J:\60221358-East_Midtown_Waterfront_Esplanade\CADD\Task 3\Civil\Sheet\UN_ODR\DR_EA Report\Pavement Marking and Signage Sheets.dwg Oct 25, 2013 - 12:18pm

PLAN

GRAPHIC SCALE: 1" = 30'-0"

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CONCEPT
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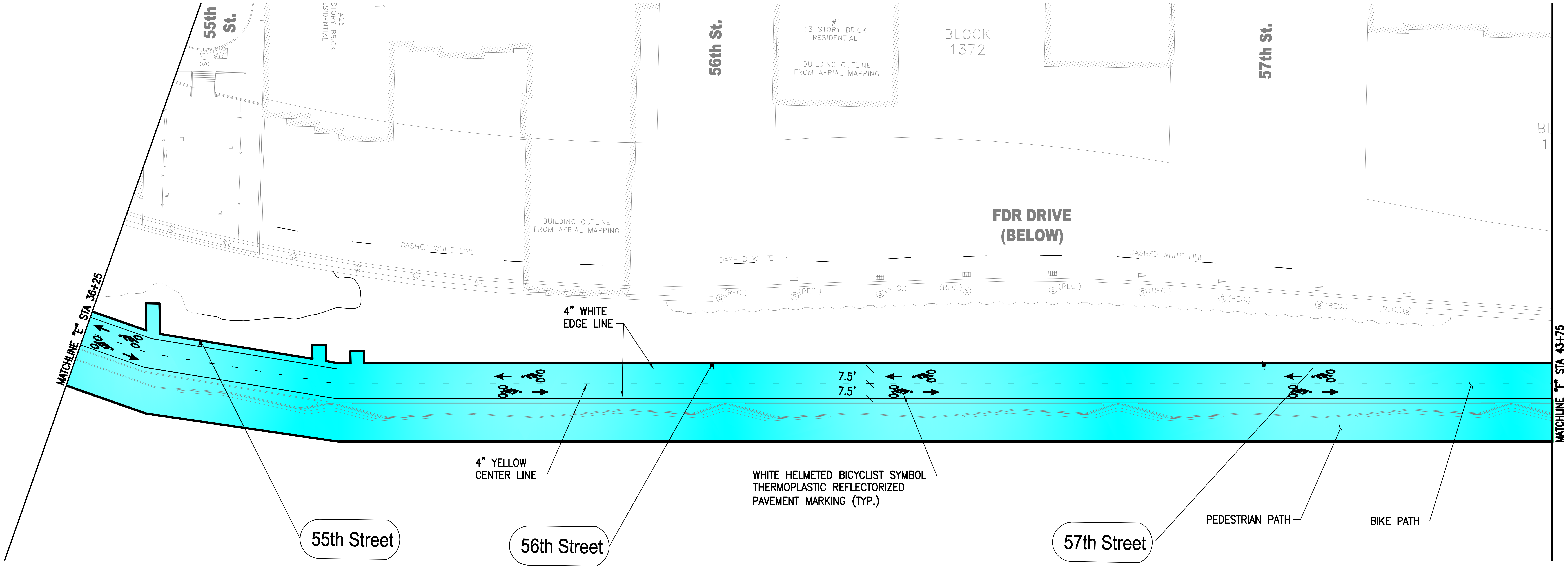
EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

PAVEMENT MARKING AND SIGNAGE PLAN

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: PM005
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 29 OF 32
SCALE: AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"

30' 15' 0 15' 30' 60' 90'

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

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DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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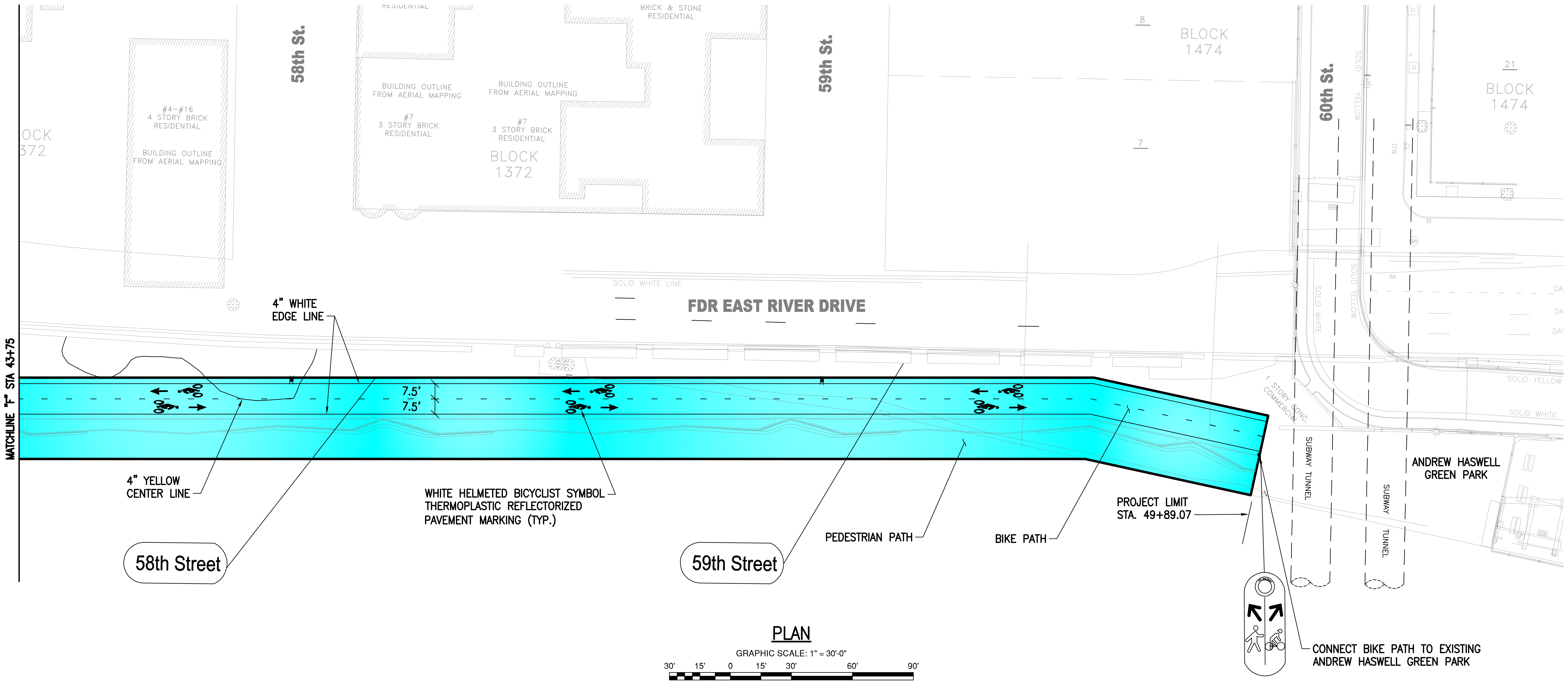
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

PAVEMENT MARKING AND SIGNAGE PLAN

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: PM006
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 30 OF 32
SCALE: AS SHOWN



PLAN

GRAPHIC SCALE: 1" = 30'-0"

INFORMATION CONFIDENTIAL:

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DESIGNED BY: JM
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

PAVEMENT MARKING AND SIGNAGE PLAN

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: PM007
DISCIPLINE/SEQUENCE: CIVIL
REVISION
SHEET NO. 31 OF 32
SCALE: AS SHOWN

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

REV.	DATE	DESCRIPTION	BY / SUB.	APP.
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DESIGNED BY: JM
DRAWN BY: KJ
CHECKED BY: DS
APPROVED BY: IF
SUBMITTAL DATE: 9/27/2013

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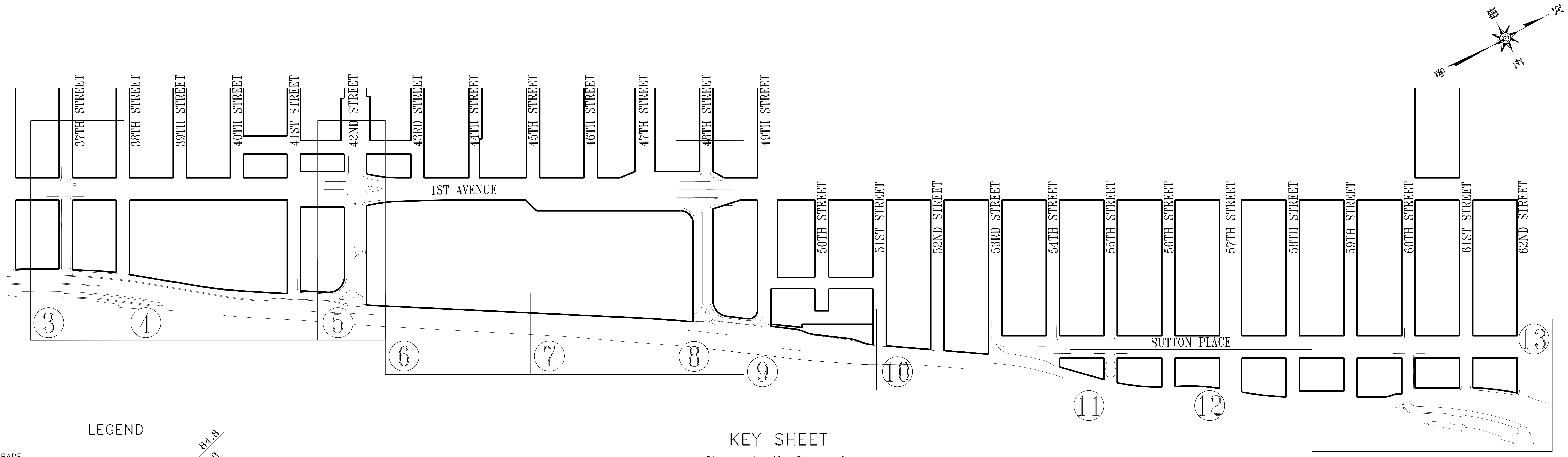
CONCEPT PROGRESS

EAST MIDTOWN WATERFRONT ESPLANADE CONCEPTUAL DESIGN

PAVEMENT MARKING AND SIGNAGE PLAN

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT PM008
DISCIPLINE/SEQUENCE CIVIL
REVISION
SHEET NO. 32 OF 32
SCALE AS SHOWN

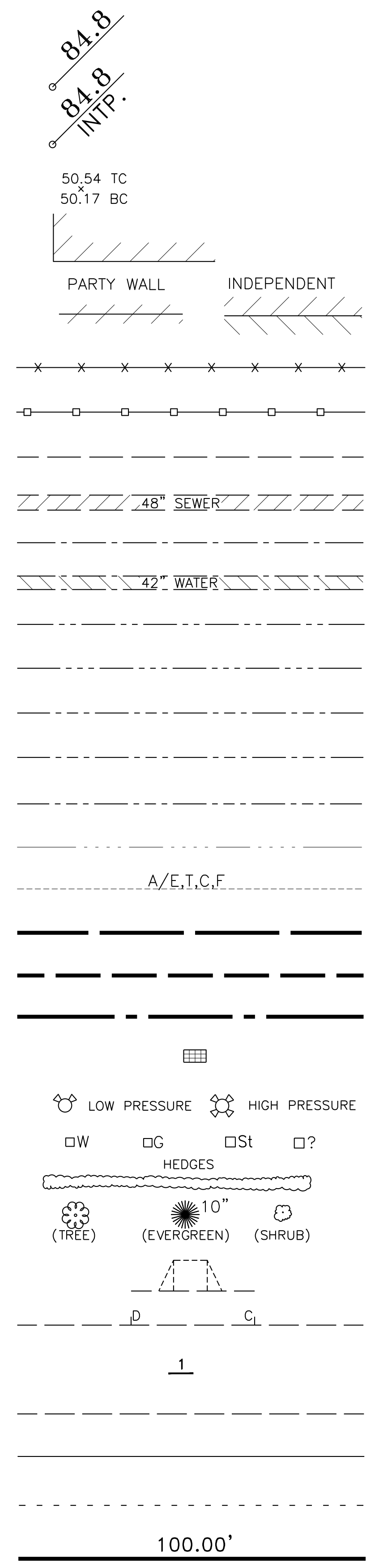


KEY SHEET

200 0 100 200 400

(IN FEET)
1 inch = 200 ft.

LEGEND



LEGAL GRADE
INTERPOLATED GRADE
EXISTING ELEVATION
BUILDING
WALLS
FENCE
GUIDE RAIL
SEWER
SEWER (24" or Greater)
WATER
WATER (24" or Greater)
GAS
ELECTRIC
TELEPHONE/FIRE ALARM
FIRE ALARM
CABLE
STEAM
AERIAL UTILITY LINE
U.S. PIERHEAD LINE
U.S. BULKHEAD LINE
U.S. PIERHEAD & BULKHEAD LINE
CATCHBASIN
FIRE HYDRANT
VALVE
HEDGES
TREE & TRUNK DIAMETER
PEDESTRIAN RAMP
DEPRESSED CURB
TAX LOT NUMBER
TAX LOT LINE
TAX BLOCK LINE
EASEMENT LINE
STREET LINE & DIMENSION

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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SECTION	SHEETS	DESCRIPTION
1	1K	KEY MAP
2	1SC	SURVEY CONTROL
2	2SC	SURVEY CONTROL
2	3SC	SURVEY CONTROL
3	3T	TOPOGRAPHICAL
3	3B	CLEAN BASE
3	3H	HIGHWAY PROFILES
3	3U	UTILITY PLAN/PROFILES
4	4T	TOPOGRAPHICAL
4	4B	CLEAN BASE
4	4U	UTILITY PLAN/PROFILES
5	5T	TOPOGRAPHICAL
5	5B	CLEAN BASE
5	5H	HIGHWAY PROFILES
5	5HR	HIGHWAY PROFILES
5	5U	UTILITY PLAN/PROFILES
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6	6B	CLEAN BASE
6	6U	UTILITY PLAN/PROFILES
7	7T	TOPOGRAPHICAL
7	7B	CLEAN BASE
7	7U	UTILITY PLAN/PROFILES
8	8T	TOPOGRAPHICAL
8	8B	CLEAN BASE
8	8H	HIGHWAY PROFILES
8	8U	UTILITY PLAN/PROFILES
9	9T	TOPOGRAPHICAL
9	9B	CLEAN BASE
9	9U	UTILITY PLAN/PROFILES
10	10T	TOPOGRAPHICAL
10	10B	CLEAN BASE
10	10H	HIGHWAY PROFILES
10	10U	UTILITY PLAN/PROFILES
11	11T	TOPOGRAPHICAL
11	11B	CLEAN BASE
11	11U	UTILITY PLAN/PROFILES
12	12T	TOPOGRAPHICAL
12	12B	CLEAN BASE
12	12U	UTILITY PLAN/PROFILES
13	13T	TOPOGRAPHICAL
13	13B	CLEAN BASE
13	13H	HIGHWAY PROFILES
13	13HR	HIGHWAY PROFILES
13	13U	UTILITY PLAN/PROFILES
	43	TOTAL SHEETS

SYMBOLS

◠	PARKING METER
○CC	COAL CHUTE
○	VENT PIPE
□F	FIRE CALL BOX
◫	TRAFFIC CONTROL BOX
□MB	MAILBOX
□TEL	PAY PHONE
▭EB	ELECTRIC BOX
○FILL	OIL FILL
⊞	MONUMENT
Y	STANDPIPE OR
¤	SPRINKLER
◍	ROUND DRAIN
▥	SQUARE DRAIN
○	SIGN
⊕	BORING HOLE
◬	MONITORING WELL
P	PLANTER
● G	GAS VENT PIPE
⇦	1—WAY DIRECTION OF TRAFFIC
⇔	2—WAY DIRECTION OF TRAFFIC
←	DIRECTION OF GRADE
○—	GUY WIRE
—Ⓤ—	WOOD UTILITY POLE
Ⓤ-F	WOOD UTILITY POLE W/ FIRE CALL BOX
Ⓤ-PS	WOOD UTILITY POLE W/ PEDESTRIAN SIGNAL
Ⓤ-T	WOOD UTILITY POLE W/ TRAFFIC SIGNAL
Ⓤ-TPS	TRAFFIC SIGNAL W/ PEDESTRIAN SIGNAL ON WOOD UTILITY POLE
✺Ⓤ	STREET LIGHT ON WOOD UTILITY POLE
✺Ⓤ-F	STREET LIGHT & FIRE CALL BOX ON WOOD UTILITY POLE
✺Ⓤ-PS	STREET LIGHT & PEDESTRIAN SIGNAL ON WOOD UTILITY POLE
✺Ⓤ-T	STREET LIGHT & TRAFFIC SIGNAL ON WOOD UTILITY POLE
✺Ⓤ-TPS	STREET LIGHT & TRAFFIC SIGNAL W/ PEDESTRIAN SIGNAL ON WOOD UTILITY POLE
✺Ⓛ	STREET LIGHT (METAL LIGHT)
✺Ⓛ-PS	STREET LIGHT W/ PEDESTRIAN SIGNAL
✺Ⓛ-T	STREET LIGHT W/ TRAFFIC SIGNAL
✺Ⓛ-TPS	STREET LIGHT & TRAFFIC SIGNAL W/ PEDESTRIAN SIGNAL
⊖T	TRAFFIC SIGNAL
⊖PS	PEDESTRIAN SIGNAL
⊖TPS	TRAFFIC SIGNAL W/ PEDESTRIAN SIGNAL

MANHOLES

ⓈSTM	STORM
ⓈCOMB	COMBINED
ⓈSAN	SANITARY
ⓈINT	INTERCEPTOR
Su	SUBWAY
Mh	MANHOLE (NO ID)
Ⓢ	FROM RECORD MAP
Ⓦ	WATER
Ⓖ	GAS
Ⓔ	ELECTRIC
Ⓕ	N.Y.F.D.
Ⓣ	TELEPHONE
E	BECO or CTES
C	CABLE TV IRON

ABBREVIATIONS

ABANDONED	ABDN.
APARTMENT	APT.
ASPHALT	ASPH.
BASEMENT	BSMT.
BITUMINOUS	BIT.
BLOCK	BLK.
BLUESTONE	B.S.
BLUESTONE CURB	B.S.C.
BLUESTONE WALK	B.S.W.
BOTTOM OF CURB	B.C.
BRICK	BRK.
BRICK SIDEWALK	BRK.SW.
BUILDING	BLDG.
BUILT	BLT.
CAST IRON	C.I.
CENTER LINE	C.L.
CHAIN LINK FENCE	C.L.F.
CHAMBER	CH.
CLASS NUMBER	CL. #
COMBINED	COMB.
COMMERCIAL	COML.
CONCRETE	CONC.
CONCRETE CURB	C.C.
CONCRETE WALK	C.W.
DIAMETER	DIA.
DOUBLE BARREL	D.B.
DOWN	DN.
DRAWING	DWG.
DUCTILE IRON PIPE	D.I.P.
EXISTING	EXIST.
EXTRA STRENGTH VITRIFIED PIPE	E.S.V.P.
FIRE ALARM	F.A.
FIRE DEPARTMENT	F.D.
FLAT TOP REINFORCED CONCRETE	F.T.R.C.
FRAME	FR.
GRANITE	GRAN.
GRANITE CURB	GRAN. C.
INTERCEPTOR	INT.
INVERT ELEVATION	INV. EL.
IRREGULAR	IRR.
MANHOLE	MH
NOT IN CONTRACT	N.I.C.
NOT TO SCALE	N.T.S.
PAVEMENT	PVMT.
POINT OF CURVATURE	P.C.
POINT OF INTERSECTION	P.I.
POINT OF TANGENCY	P.T.
PRECAST REINFORCED CONCRETE	P.R.C.
RADIUS	R
REINFORCED CONCRETE PIPE	R.C.P.
ROADWAY	RDWY.
SANITARY	SAN.
SEWER	SWR.
SIDEWALK	SWK.
STANDARD	STD.
STEAM	SM.
STEEL	STL.
STEEL FACED	ST.F.
STEEL FACED CONCRETE CURB	ST.F.C.C.
STONE	STN.
STORM	STM.
STORY	STY.
TOP OF CURB	T.C.
TRAFFIC SIGN	T.S.
VACANT	VAC.
WORKING POINT	W.P.

MISC. ABBREVIATIONS

NORTH EAST	N.E.
NORTH WEST	N.W.
SOUTH EAST	S.E.
SOUTH WEST	S.W.
EAST SIDE	E/S
NORTH SIDE	N/S
SOUTH SIDE	S/S
WEST SIDE	W/S

NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED
DRAWN M. DAMES
TRACED
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade KEY.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

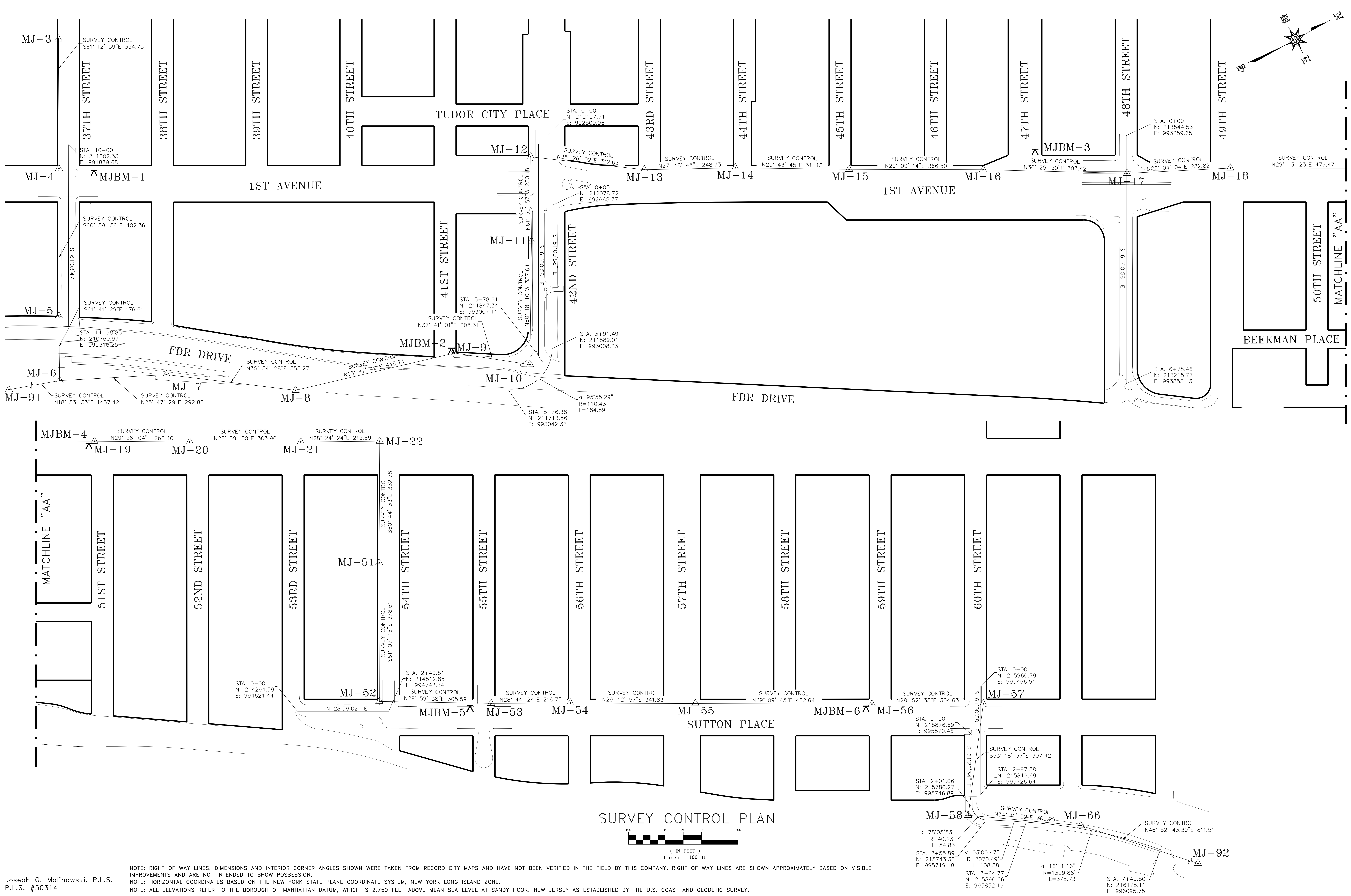
PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
EAST MIDTOWN WATERFRONT ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
KEY SHEET

3761
A

DATE: 05/24/12

SHEET OF 1K



SURVEY CONTROL PLAN

NOTE: RIGHT OF WAY LINES, DIMENSIONS AND INTERIOR CORNER ANGLES SHOWN WERE TAKEN FROM RECORD CITY MAPS AND HAVE NOT BEEN VERIFIED IN THE FIELD BY THIS COMPANY. RIGHT OF WAY LINES ARE SHOWN APPROXIMATELY BASED ON VISIBLE IMPROVEMENTS AND ARE NOT INTENDED TO SHOW POSSESSION.

NOTE: HORIZONTAL COORDINATES BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM, NEW YORK LONG ISLAND ZONE.

NOTE: ALL ELEVATIONS REFER TO THE BOROUGH OF MANHATTAN DATUM, WHICH IS 2.750 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, NEW JERSEY AS ESTABLISHED BY THE U.S. COAST AND GEODETIC SURVEY.

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED______________
DRAWN_____M. DAMES_____
TRACED______________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE_Esplanade SC.dwg__

____
GROUP LEADER

____________________P.E.
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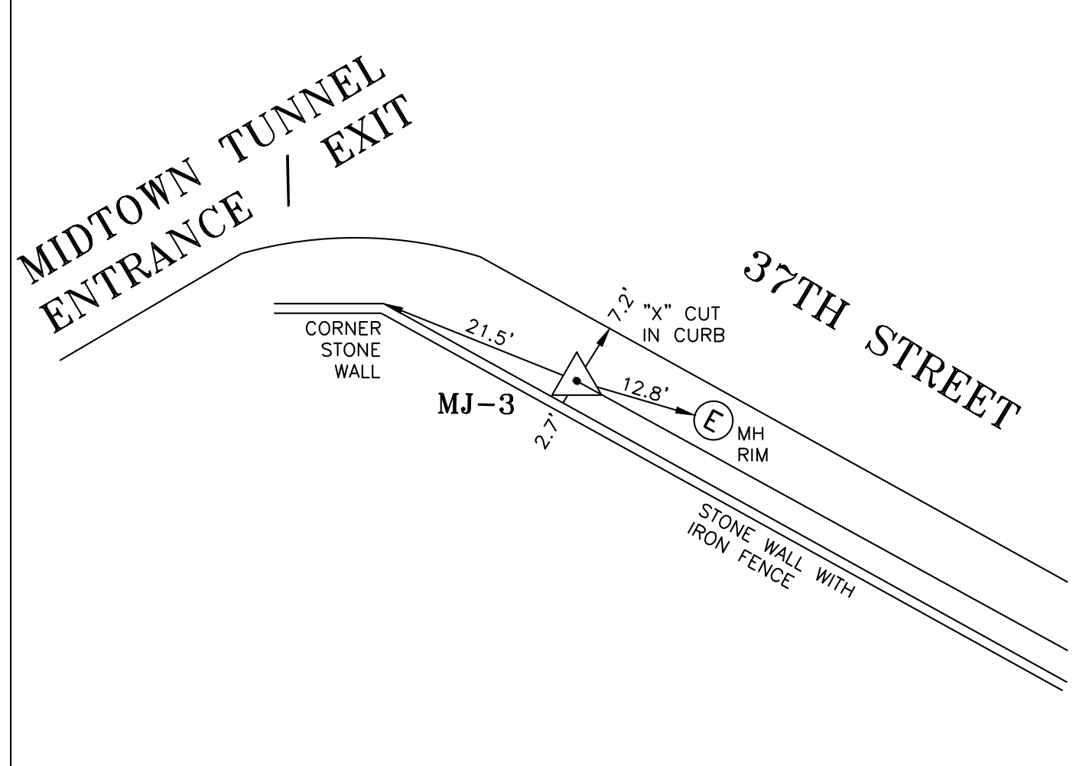
BOROUGH OF MANHATTAN
SURVEY CONTROL (1 OF 3)

3761
A

DATE: 05/24/15

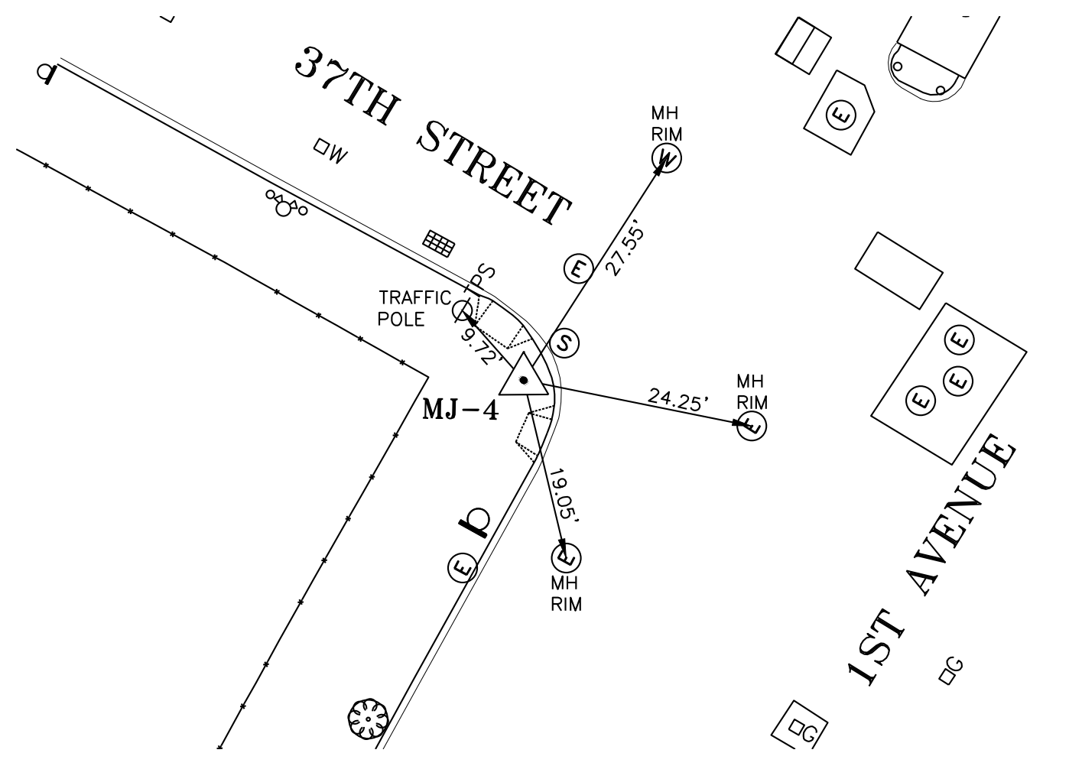
SHEET OF 1SC



MJ-3

	NORTH	EAST	ELEV.
MJ-3	211118.4249	991614.0971	13.47

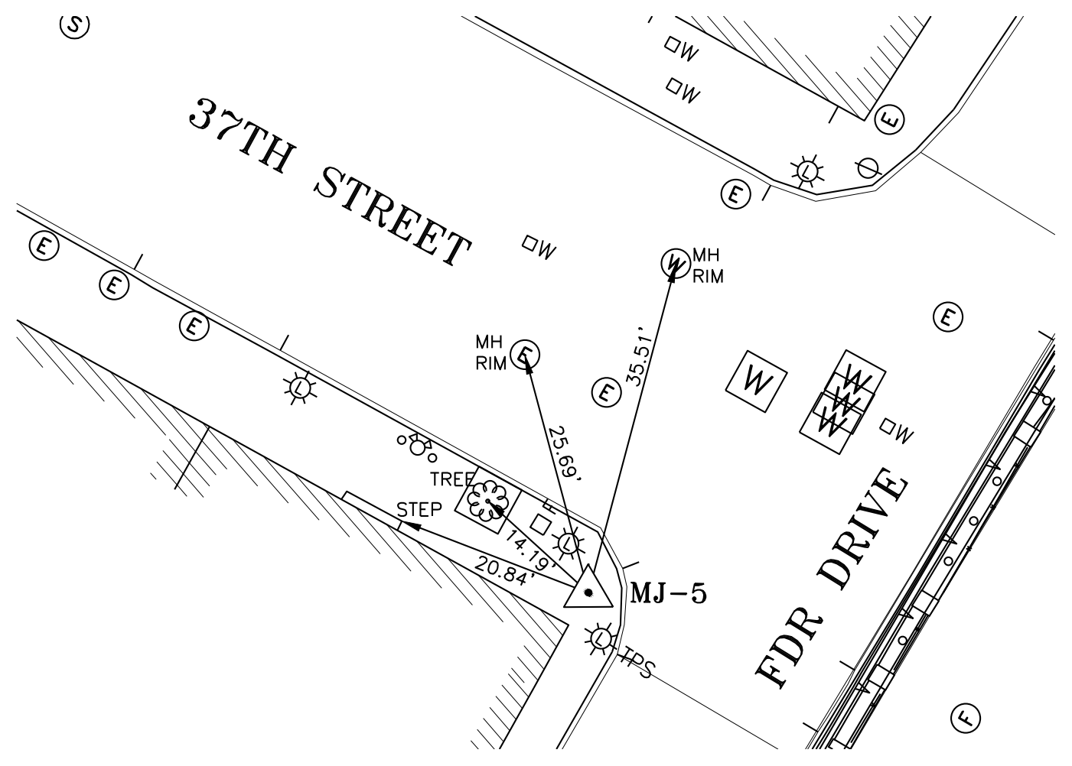
"X" CUT SET IN CONC. SIDEWALK AT THE SOUTHEASTERLY CORNER OF 37TH ST. AND ITS INTERSECTION WITH THE MIDTOWN TUNNEL ENTRANCE/EXIT. POINT IS BETWEEN 1ST AND 2ND AVE



MJ-4

	NORTH	EAST	ELEV.
MJ-4	210947.6126	991925.0135	11.68

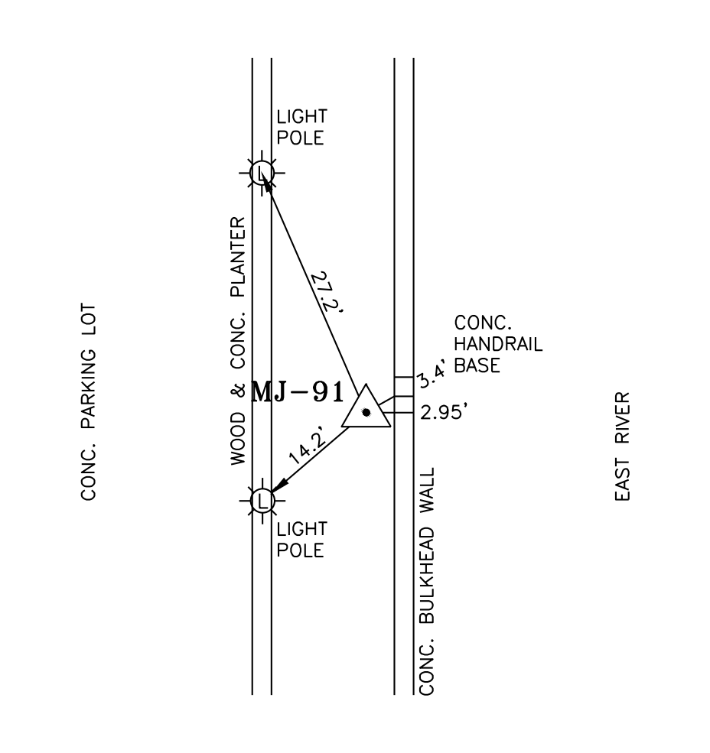
"X" CUT SET IN SOUTH WESTERLY CORNER OF 1ST AVENUE AND 37TH STREET. 27'± SOUTHERLY OF CENTERLINE OF 37TH STREET AND 40'± WESTERLY OF CENTERLINE OF 1ST AVENUE.



MJ-5

	NORTH	EAST	ELEV.
MJ-5	210752.5380	992276.9207	7.33

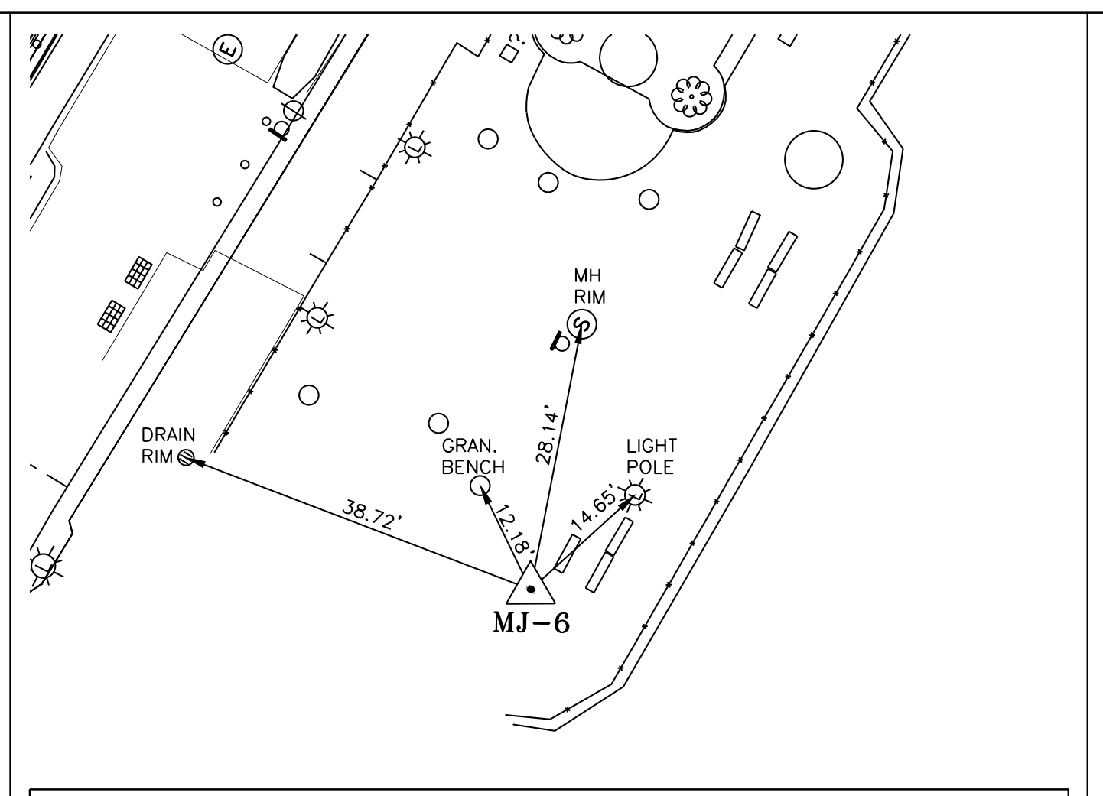
"X" CUT SET IN SOUTH WESTERLY CORNER OF FDR DRIVE AND 37TH STREET. 25'± SOUTHERLY OF CENTERLINE OF 37TH STREET AND 18'± WESTERLY OF CENTERLINE OF FDR DRIVE.



MJ-91

	NORTH	EAST	ELEV.
MJ-91	209211.4511	991933.6677	6.56

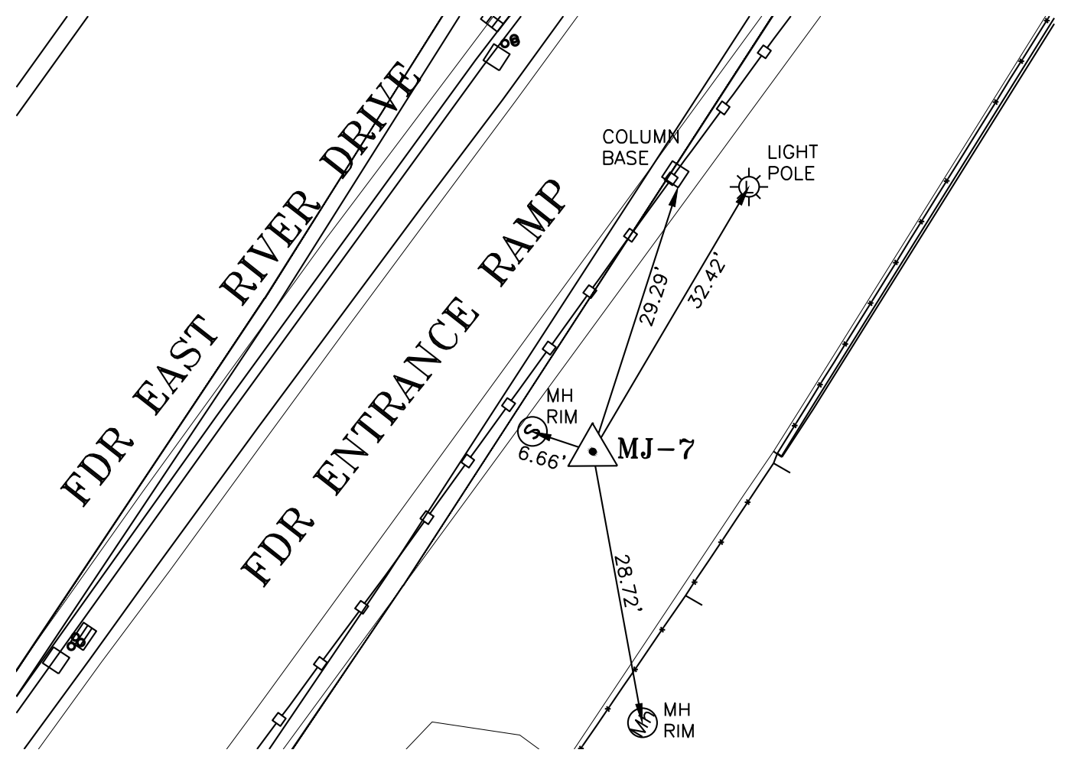
"X" CUT SET IN CONC. PAVERS ON EAST SIDE OF WALKWAY ALONG THE EAST RIVER. ±85' NORTH OF THE NORTH END OF FERRY BOAT DINING ROOM "THE WATER CLUB" ALSO ±200' NORTH OF CENTERLINE E. 30TH ST.



MJ-6

	NORTH	EAST	ELEV.
MJ-6	210668.7861	992432.4085	4.64

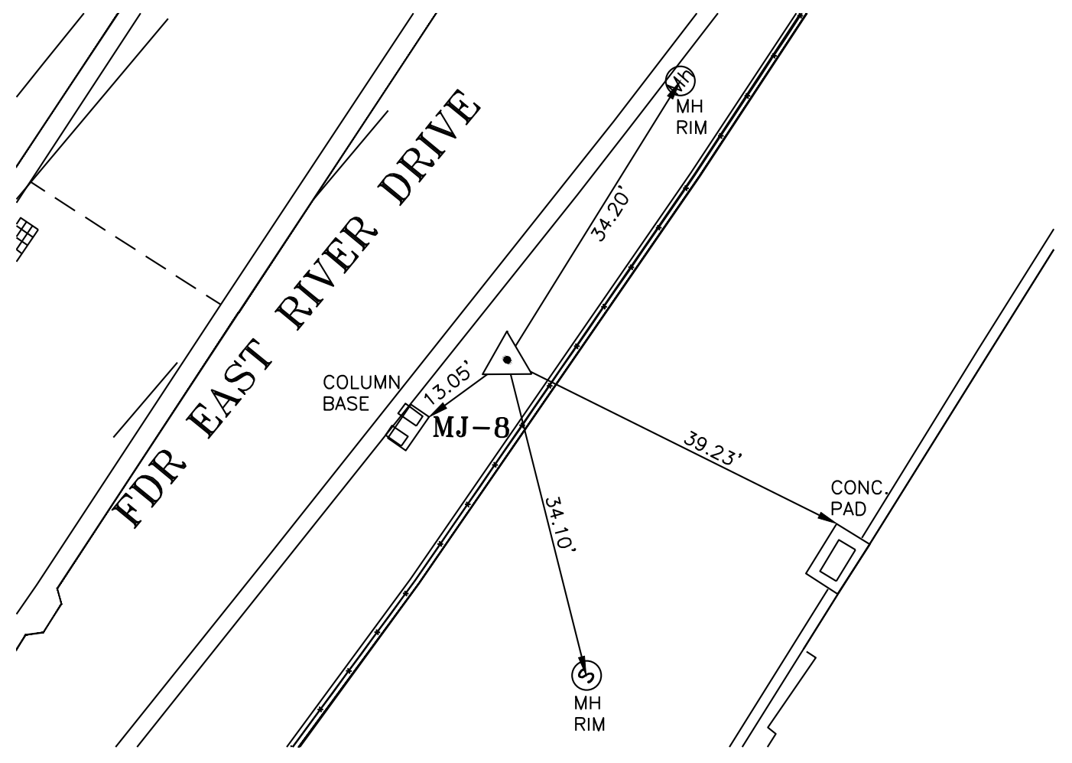
"X" CUT SET IN PAVERS/CONC. OF PARK, EAST OF FDR DRIVE AND 37TH STREET. 13'± WESTERLY OF BULKHEAD OF EAST RIVER AND 160'± EASTERLY OF CENTERLINE OF FDR DRIVE.



MJ-7

	NORTH	EAST	ELEV.
MJ-7	210932.4219	992559.8064	5.20

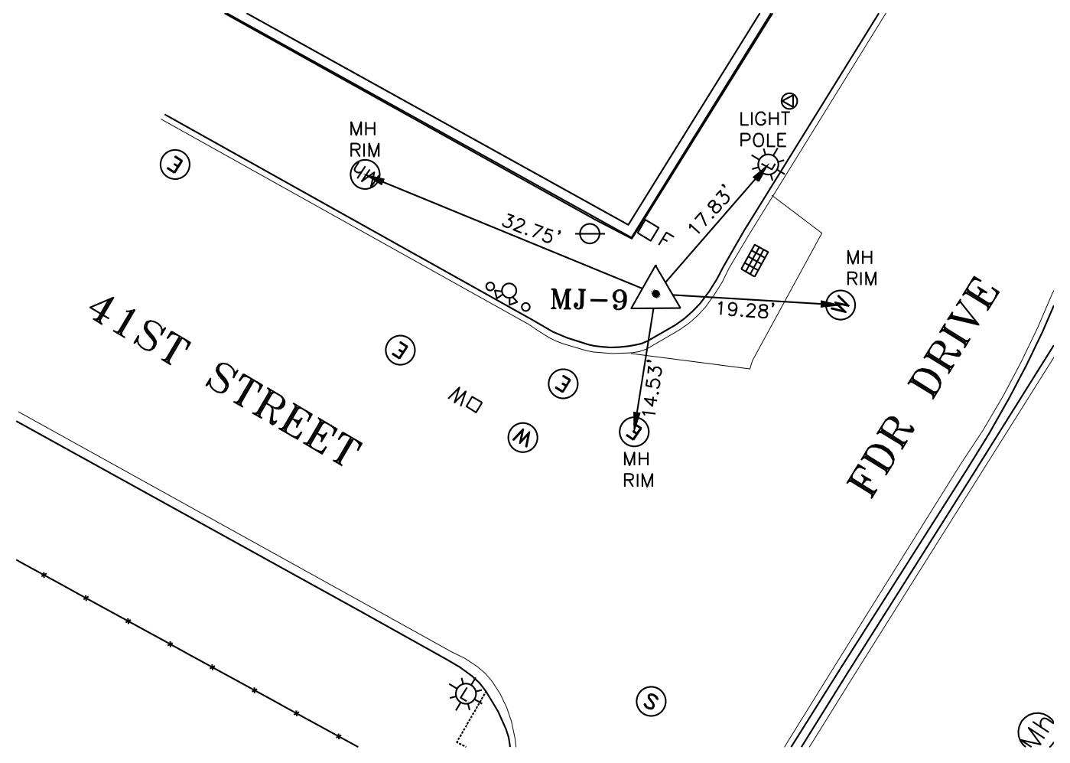
PK NAIL SET IN ASPHALT EAST OF 38TH STREET AND FDR EAST RIVER DRIVE, 18'± EASTERLY OF CENTERLINE OF FDR ENTRANCE RAMP AND 68'± WESTERLY OF BULKHEAD OF EAST RIVER.



MJ-8

	NORTH	EAST	ELEV.
MJ-8	211220.1748	992768.1646	8.37

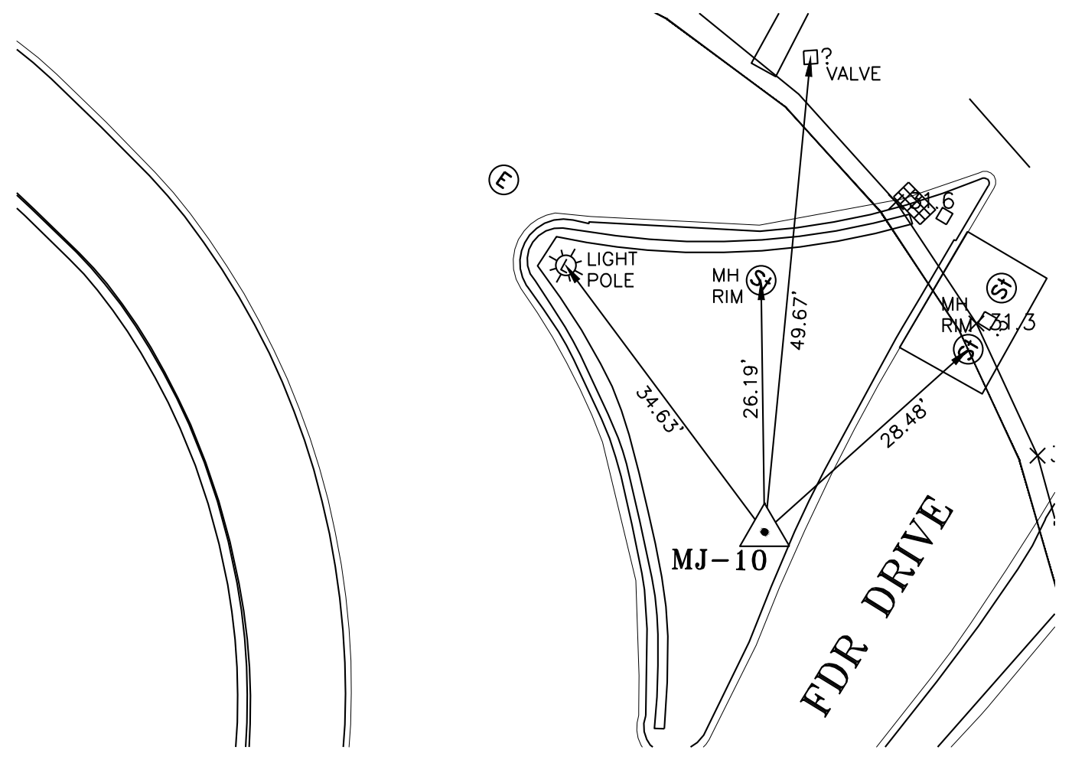
"X" CUT SET IN CONC. 418± SOUTH EASTERLY OF THE INTERSECTION OF 41ST STREET AND FDR DRIVE', 7'± EASTERLY OF EAST EDGE OF PAVEMENT OF FDR DRIVE AND 42'± WESTERLY OF BULKHEAD OF EAST RIVER.



MJ-9

	NORTH	EAST	ELEV.
MJ-9	211650.0425	992889.7794	10.04

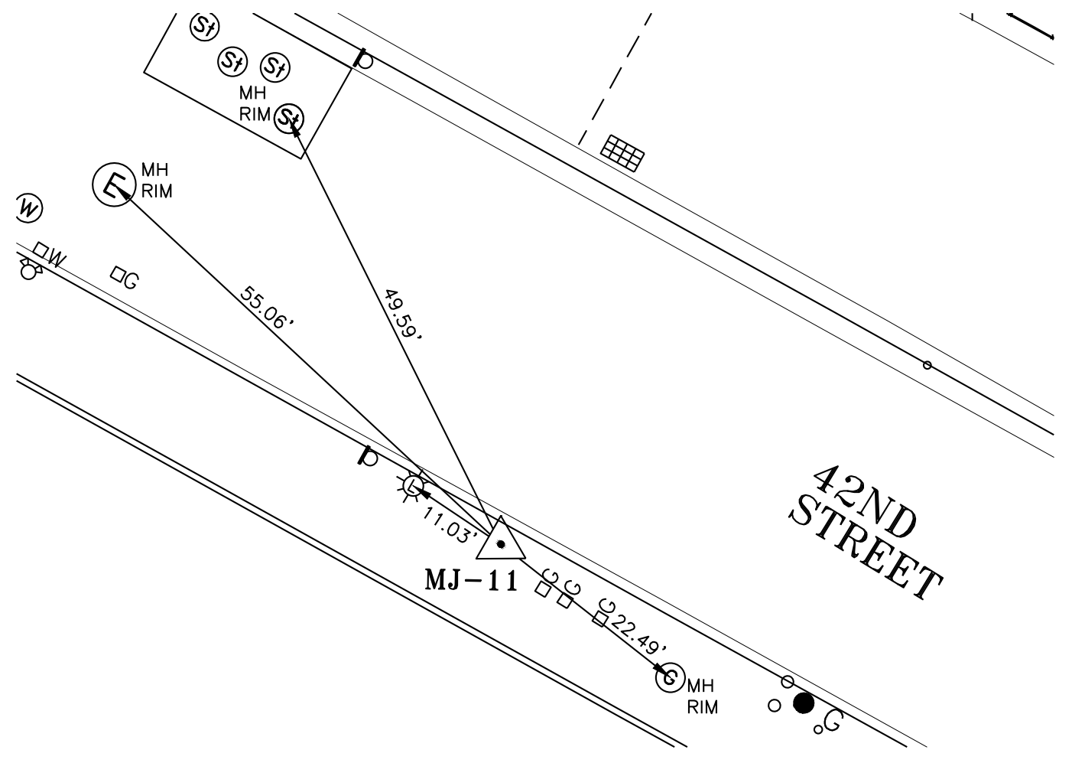
"X" CUT SET IN NORTH WESTERLY CORNER OF 41ST STREET AND FDR DRIVE. 24'± NORTHERLY OF CENTERLINE OF 41ST STREET AND 22'± WESTERLY OF CENTERLINE OF FDR DRIVE.



MJ-10

	NORTH	EAST	ELEV.
MJ-10	211814.8972	993017.1182	11.54

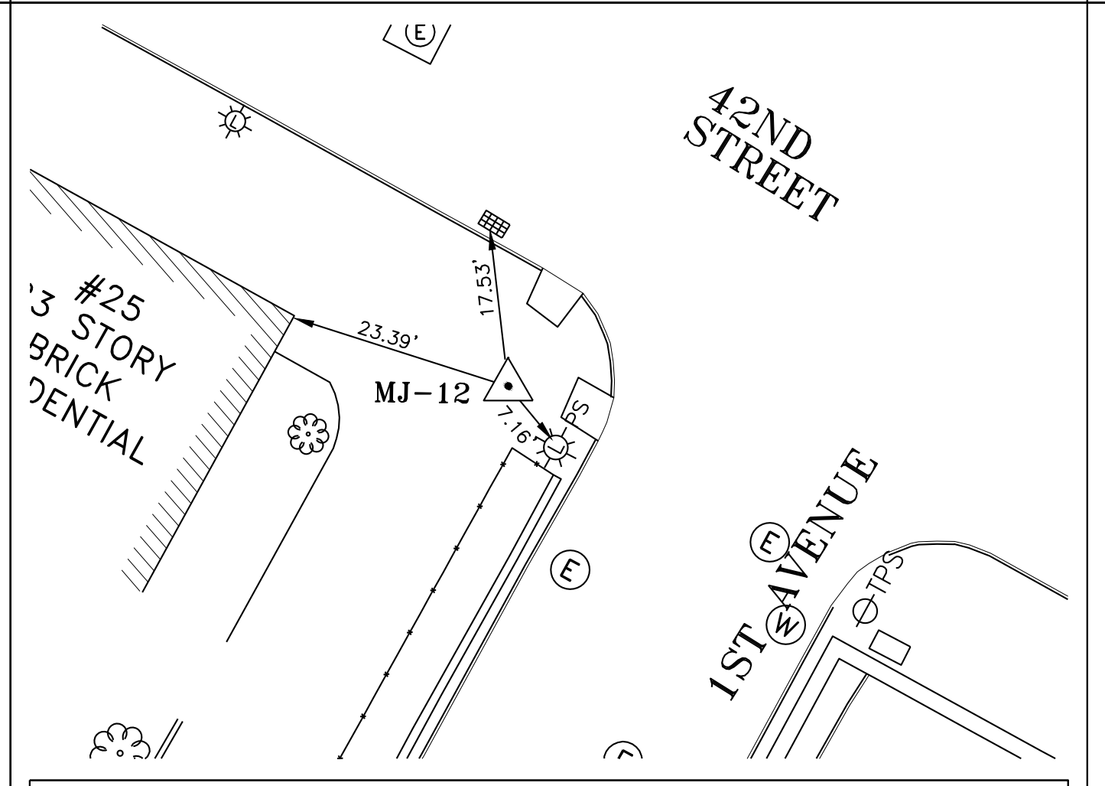
"X" CUT SET IN CONC. ISLAND OF 42ND STREET AND FDR DRIVE. 23'± SOUTHERLY OF CENTERLINE OF 42ND STREET AND 14'± WESTERLY OF CENTERLINE OF FDR DRIVE.



MJ-11

	NORTH	EAST	ELEV.
MJ-11	211982.1706	992723.8249	29.13

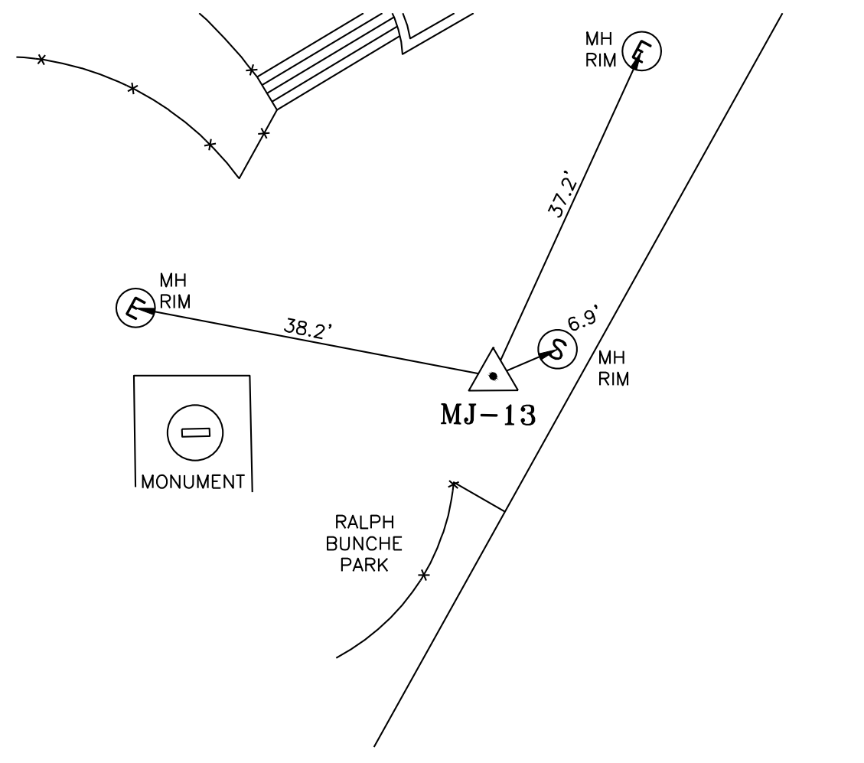
"X" CUT SET IN SOUTHERLY CONC. SIDEWALK OF 42ND AVENUE. 20'± SOUTHERLY OF CENTERLINE OF 42ND STREET AND 93'± EASTERLY OF EAST EDGE OF PAVEMENT OF 1ST AVENUE.



MJ-12

	NORTH	EAST	ELEV.
MJ-12	212091.9487	992521.5055	36.40

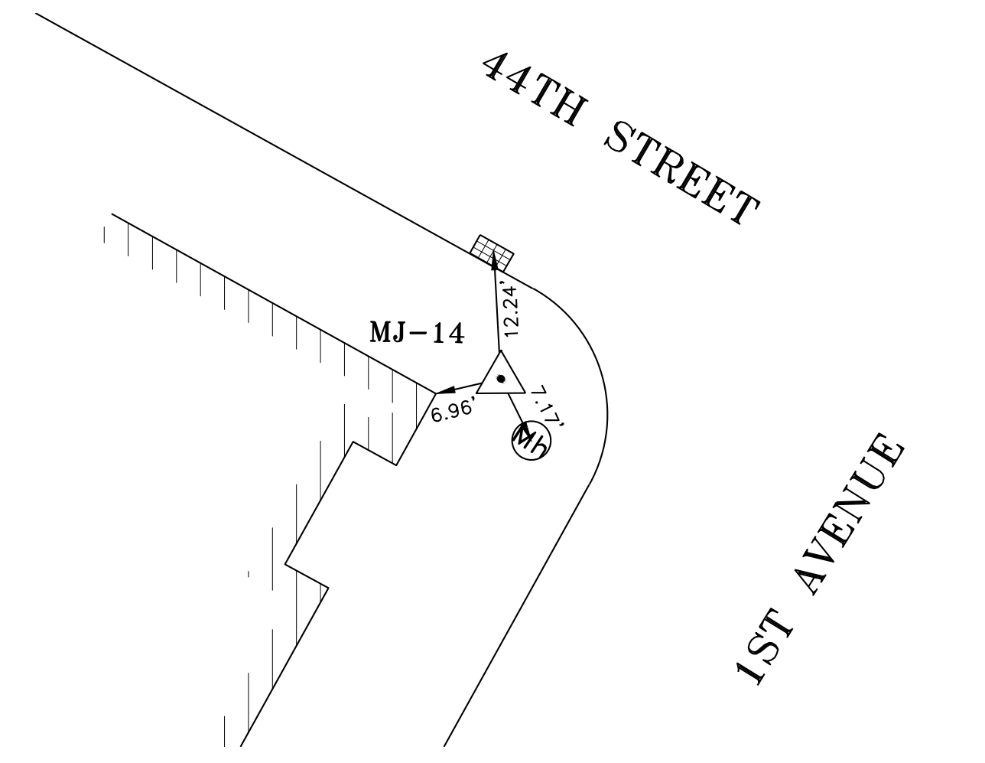
"X" CUT SET IN SOUTH WESTERLY CORNER OF 42ND STREET AND 1ST AVENUE.



MJ-13

	NORTH	EAST	ELEV.
MJ-13	212346.6765	992702.7584	38.97

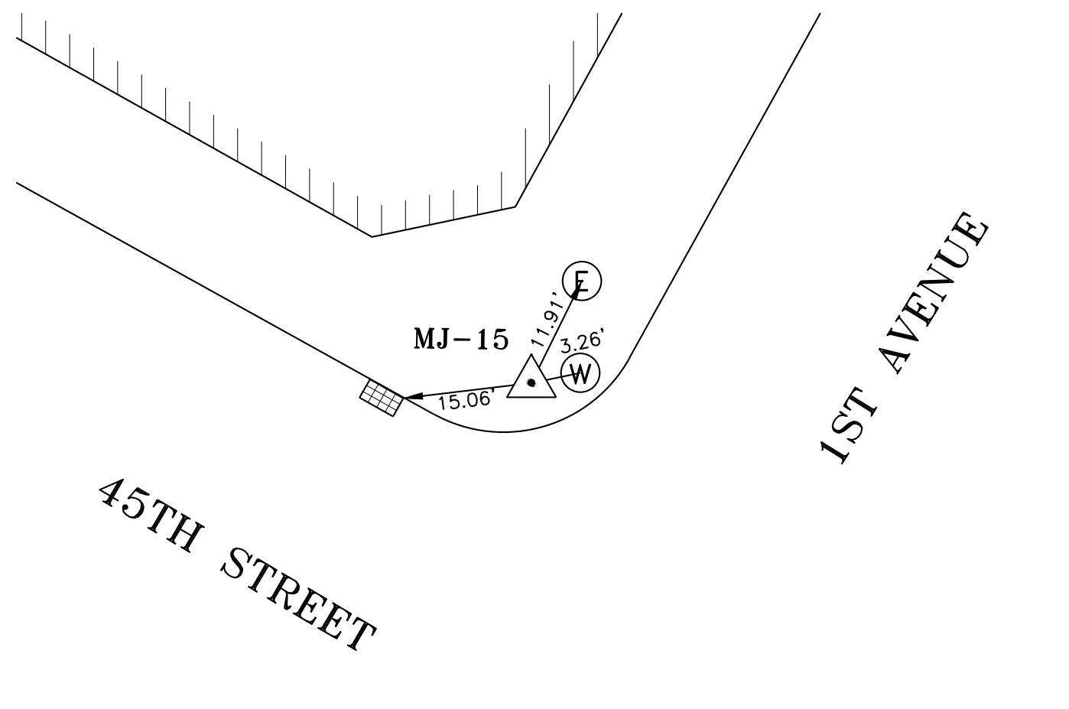
"X" CUT IN SLATE WALKWAY ±10' WEST OF THE WESTERLY CURB LINE OF 1ST AVE AND ±240' NORTH OF THE NORTHERLY CURB LINE OF E. 42ND ST. LOCATES AT THE RALPH BUNCHE PARK



MJ-14

	NORTH	EAST	ELEV.
MJ-14	212566.6730	992818.8147	38.75

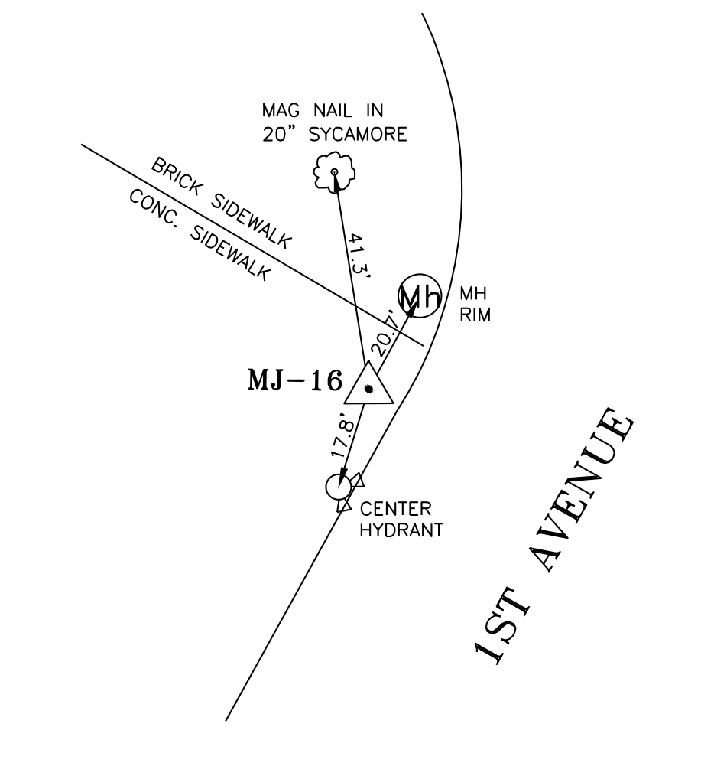
"X" CUT SET IN GRANITE SIDEWALK AT SOUTH WESTERLY CORNER OF 44TH STREET AND 1ST AVENUE.



MJ-15

	NORTH	EAST	ELEV.
MJ-15	212836.8555	992973.1068	34.91

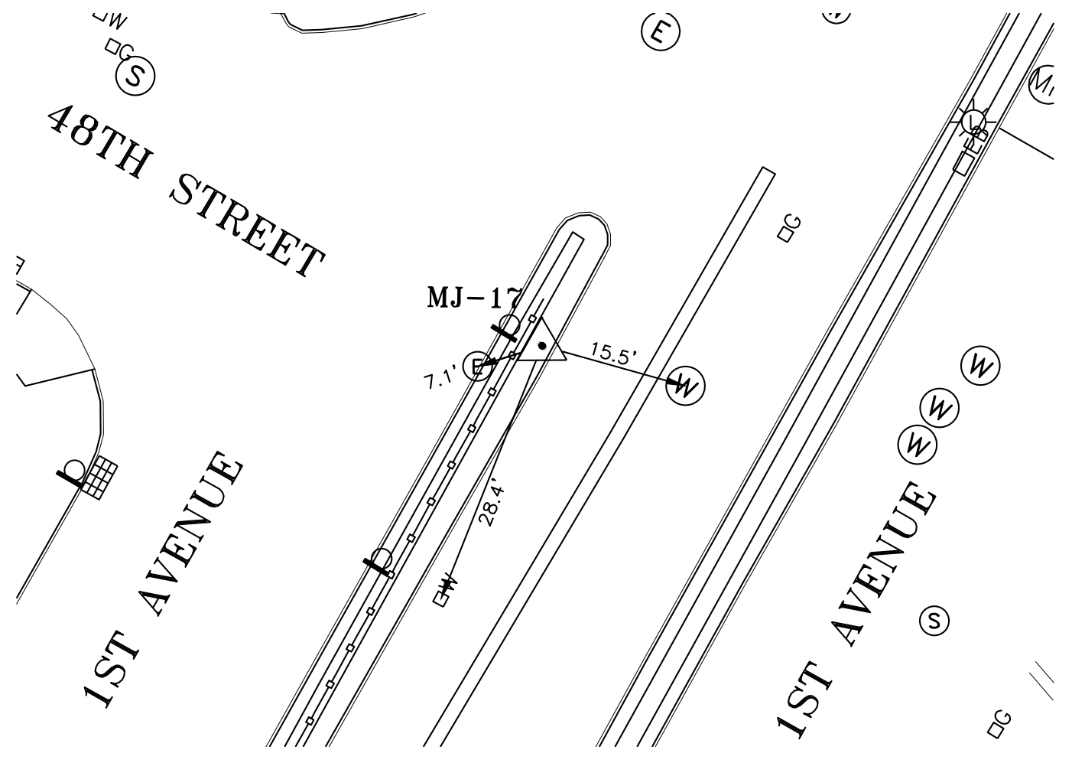
"X" CUT SET IN CONCRETE SIDEWALK AT NORTH WESTERLY CORNER OF 45TH STREET AND 1ST AVENUE.



MJ-16

	NORTH	EAST	ELEV.
MJ-16	213156.9246	993151.6489	30.56

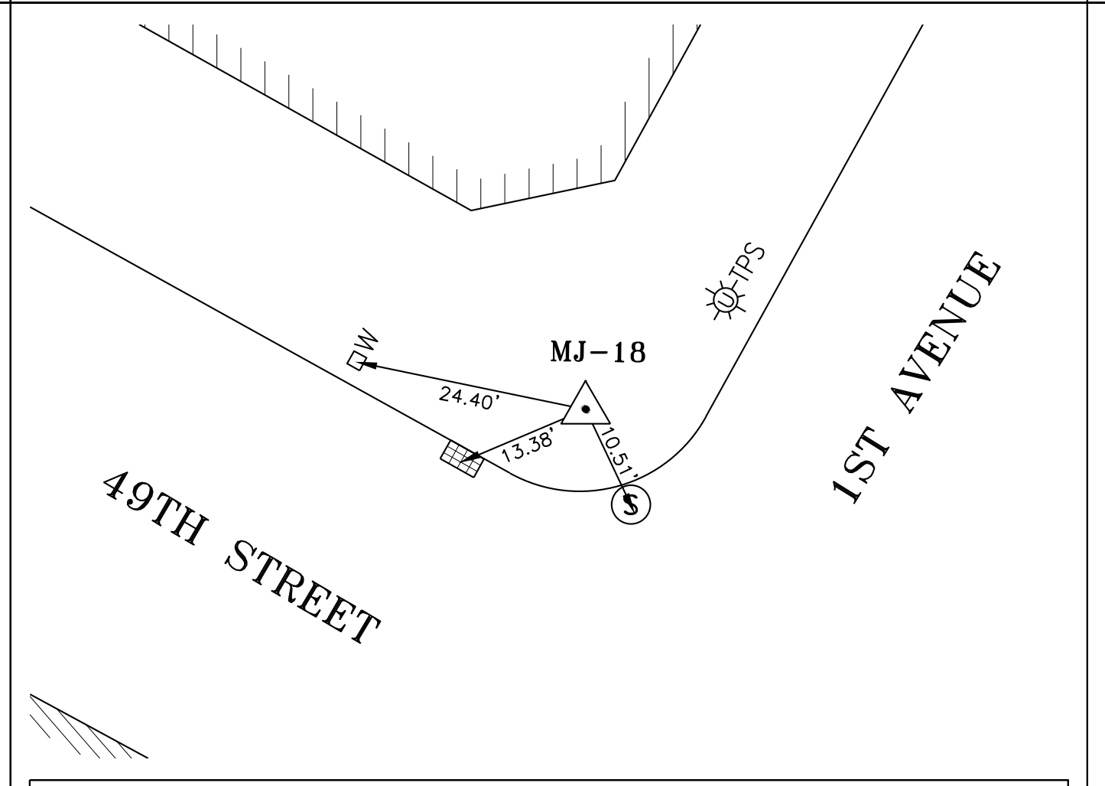
"X" CUT IN CONCRETE SIDEWALK WESTERLY OF 1ST AVE. BEING ±115' NORTHERLY OF THE NORTH EDGE OF PAVEMENT E. 46TH STREET.



MJ-17

	NORTH	EAST	ELEV.
MJ-17	213496.1499	993350.9146	20.73

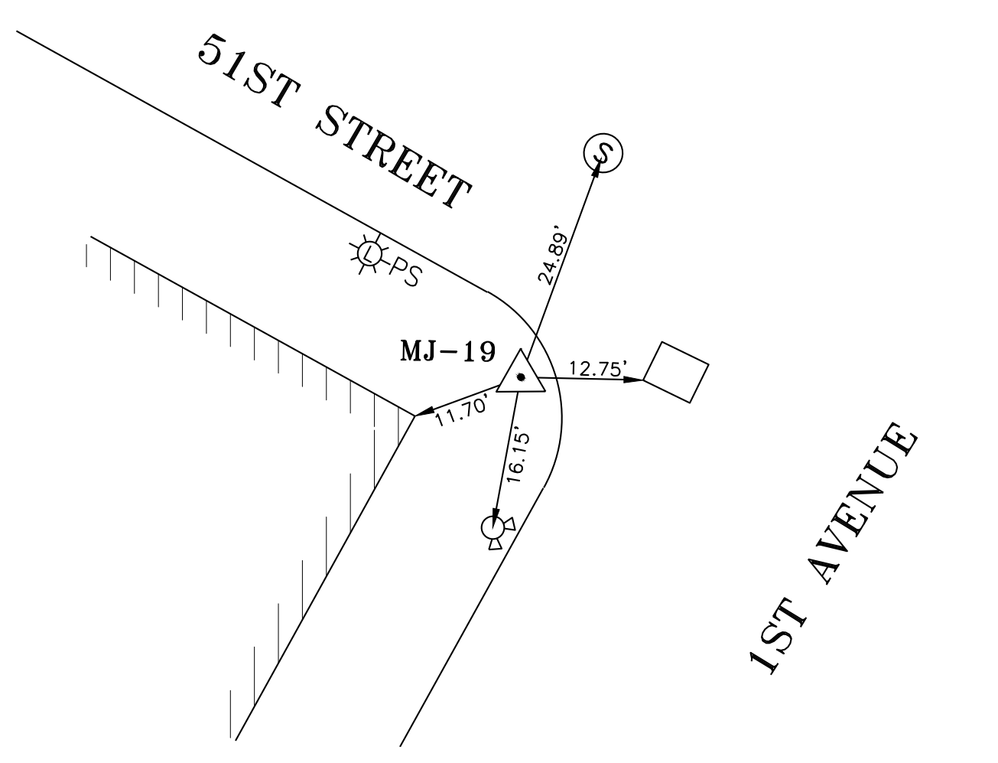
"X" CUT ON CONC. ISLAND AT E. 48TH ST BETWEEN THE 1ST AVE TUNNEL EXIT AND THE 1ST AVE. SERVICE RD. BEING ±1.7' EAST OF THE BARRIER.



MJ-18

	NORTH	EAST	ELEV.
MJ-18	213750.2000	993475.1948	22.06

"X" CUT SET IN CONCRETE SIDEWALK AT NORTH WESTERLY CORNER OF 49TH STREET AND 1ST AVENUE. 7'± WEST OF WESTERLY CURB OF 1ST AVENUE AND 10'± NORTH OF NORTHERLY CURB OF 49TH STREET.



MJ-19

	NORTH	EAST	ELEV.
MJ-19	214166.6988	993706.5999	45.19

"X" CUT SET IN CONCRETE SIDEWALK AT SOUTH WESTERLY CORNER OF 51ST STREET AND 1ST AVENUE. 6'± WEST OF WESTERLY CURB OF 1ST AVENUE AND 7'± SOUTH OF SOUTHERLY CURB OF 51ST STREET.

LOCATIONS, EXTENT AND SIZES OF UNDERGROUND UTILITIES AND SUBSTRUCTURES HAVE BEEN DETERMINED FROM RECORD INFORMATION, SUPPLEMENTED BY DATA OBTAINED IN THE FIELD. ACCURACY OF THIS UTILITY DATA IS NOT GUARANTEED, NOR IS THERE ANY GUARANTEE THAT ALL EXISTING UTILITIES AND SUBSTRUCTURES, WHETHER FUNCTIONAL OR ABANDONED, ARE SHOWN ON THIS MAP.

"ONLY COPIES FROM THE ORIGINAL OF THIS SURVEY MARKED WITH AN ORIGINAL OF THE LAND SURVEYOR'S BLUE INKED OR EMBOSSED SEAL SHALL BE CONSIDERED TO BE A TRUE VALID COPY"

"UNAUTHORIZED ALTERATIONS OR ADDITION TO A LAND SURVEYING DRAWING BEARING A LICENSED PROFESSIONAL LAND SURVEYOR'S SEAL IS A VIOLATION OF ARTICLE 145, SECTION 7209, PARAGRAPH 2 OF THE NEW YORK STATE EDUCATION LAW"

FIELD SURVEY WAS COMPLETED IN: JANUARY, 2012

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED______________
DRAWN_____M. DAMES_____
TRACED________________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE_Esplanade SC.dwg__

____
GROUP LEADER

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ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
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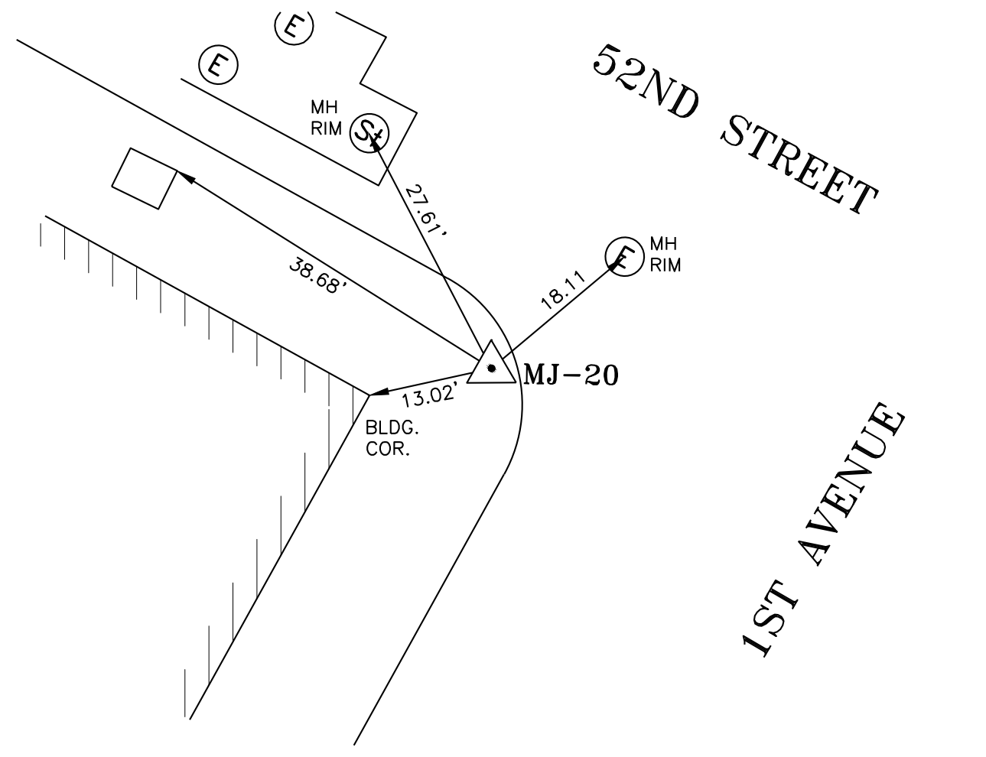
BOROUGH OF MANHATTAN
SURVEY CONTROL (2 OF 3)

3761
A

DATE: 05/24/12

SHEET OF

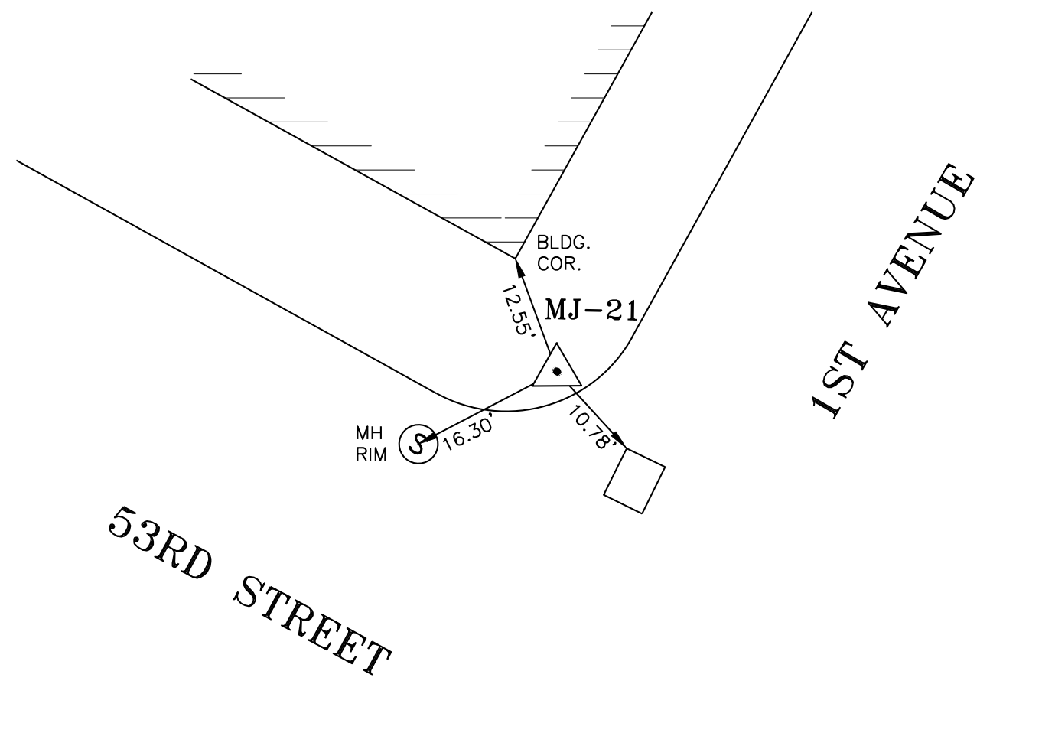
2SC



MJ-20

NORTH	EAST	ELEV.
214393.4864	993834.5683	40.24

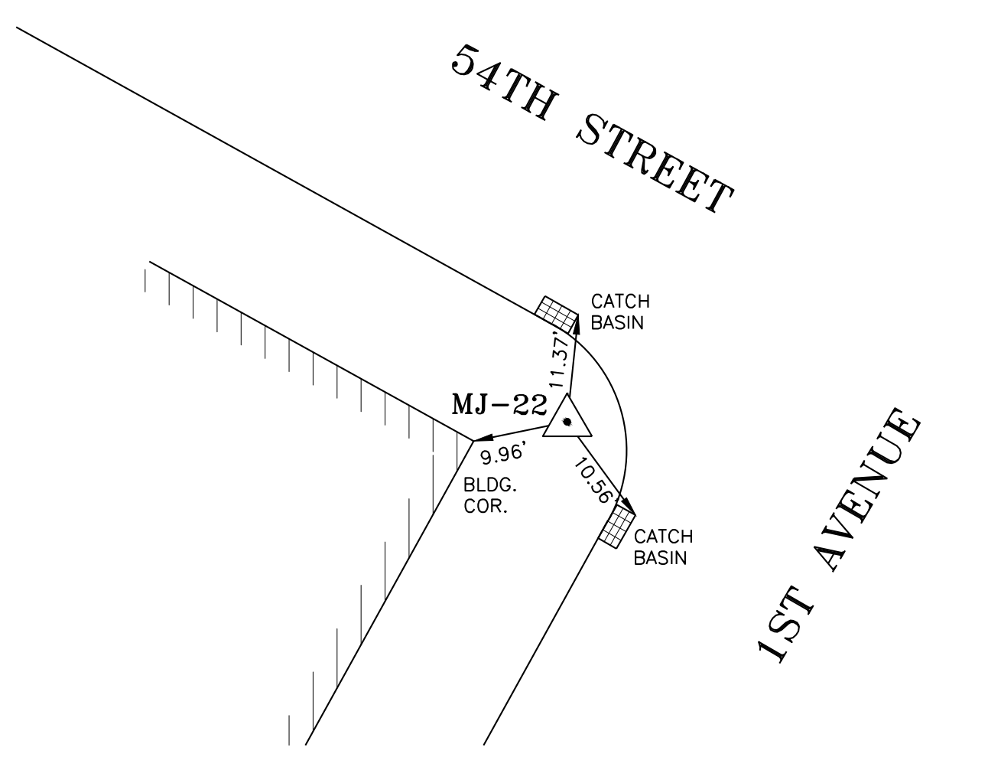
BOUROUGH MONUMENT AT SOUTH WESTERLY CORNER OF 52ND STREET AND 1ST AVENUE.



MJ-21

NORTH	EAST	ELEV.
214659.2919	993981.8895	33.43

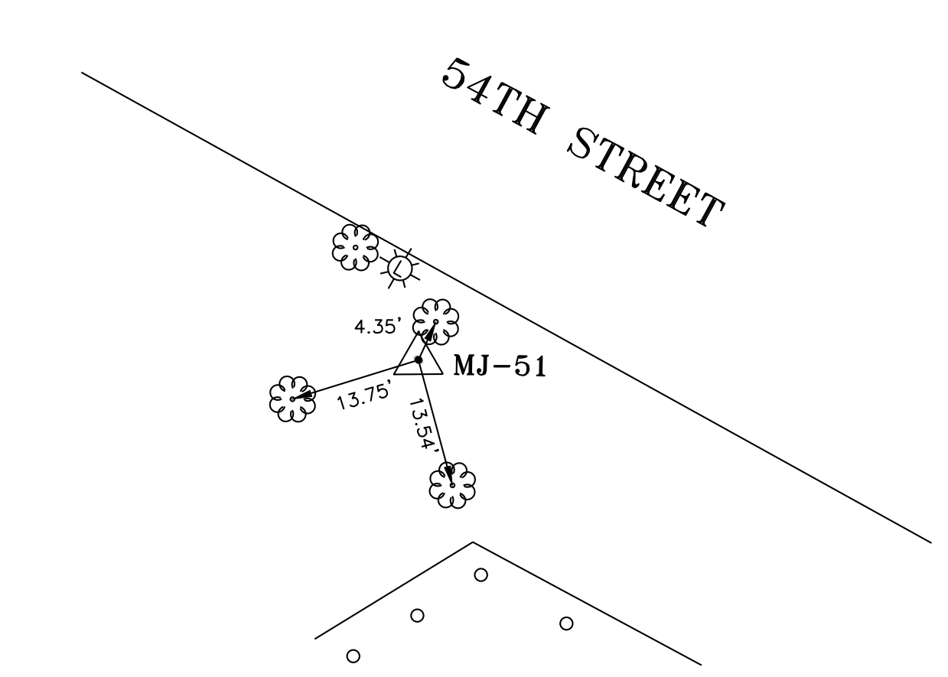
BOUROUGH MONUMENT AT NORTH WESTERLY CORNER OF 53RD STREET AND 1ST AVENUE.



MJ-22

NORTH	EAST	ELEV.
214849.0105	994084.4987	31.21

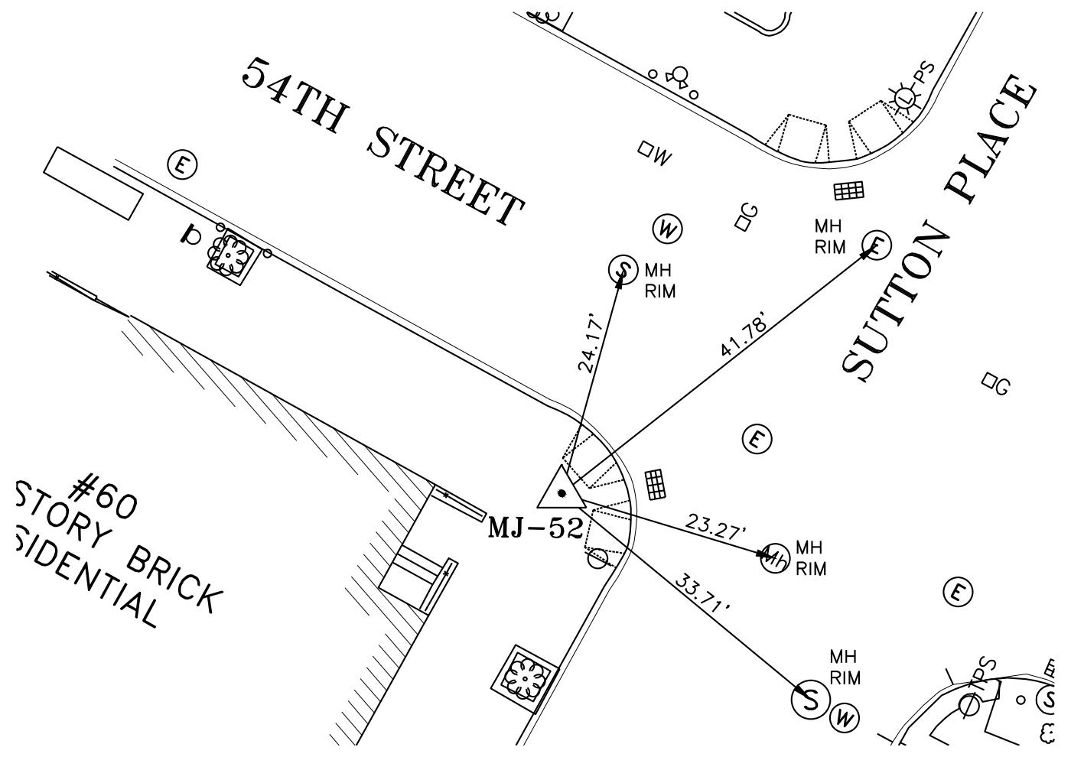
"X" CUT SET IN SOUTH WESTERLY CORNER OF 54TH STREET AND 1ST AVENUE. 7'± SOUTH OF SOUTHERLY CURB OF 54TH STREET AND 8'± WEST OF WESTERLY CURB OF 1ST AVENUE.



MJ-51

NORTH	EAST	ELEV.
214686.3681	994374.8292	24.56

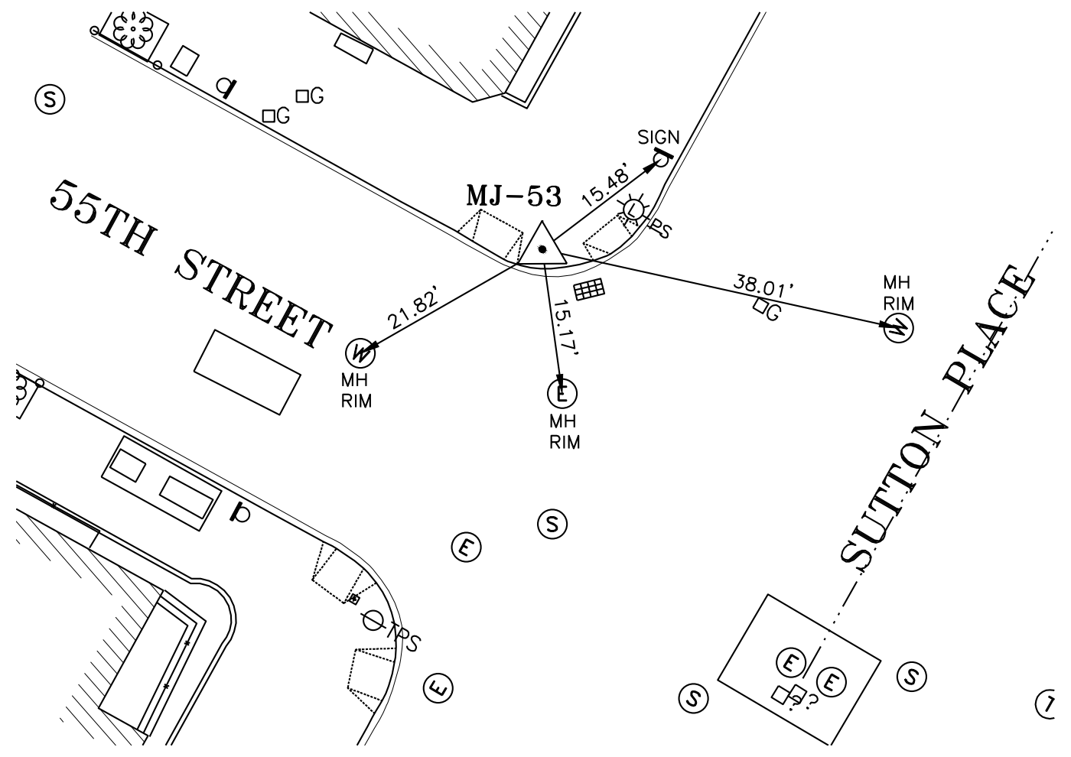
"X" CUT SET IN BRICK SIDEWALK IN FRONT OF BUILDING #420 AT 54TH STREET. 9'± SOUTH OF SOUTHERLY CURB OF 54TH STREET AND 254'± EAST OF EASTERLY CURB OF 1ST AVENUE.



MJ-52

NORTH	EAST	ELEV.
214503.5121	994706.3603	15.31

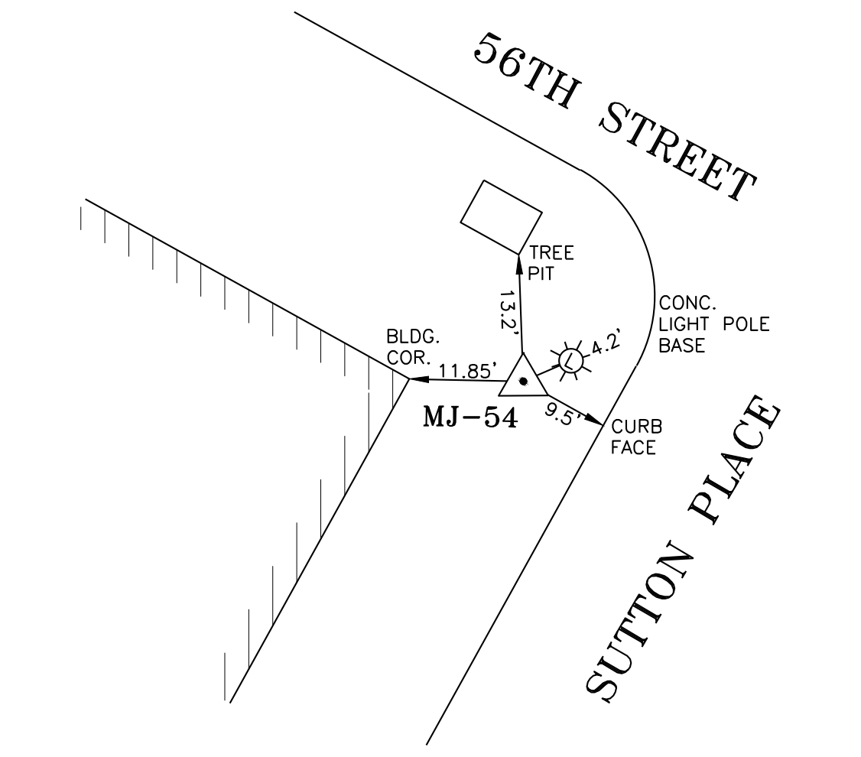
"X" CUT SET IN SOUTH WESTERLY CORNER OF 54TH STREET AND SUTTON PLACE. 24'± SOUTHERLY OF CENTERLINE OF 54TH STREET AND 27'± WESTERLY OF CENTERLINE OF SUTTON PLACE.



MJ-53

NORTH	EAST	ELEV.
214768.1805	994859.1296	25.84

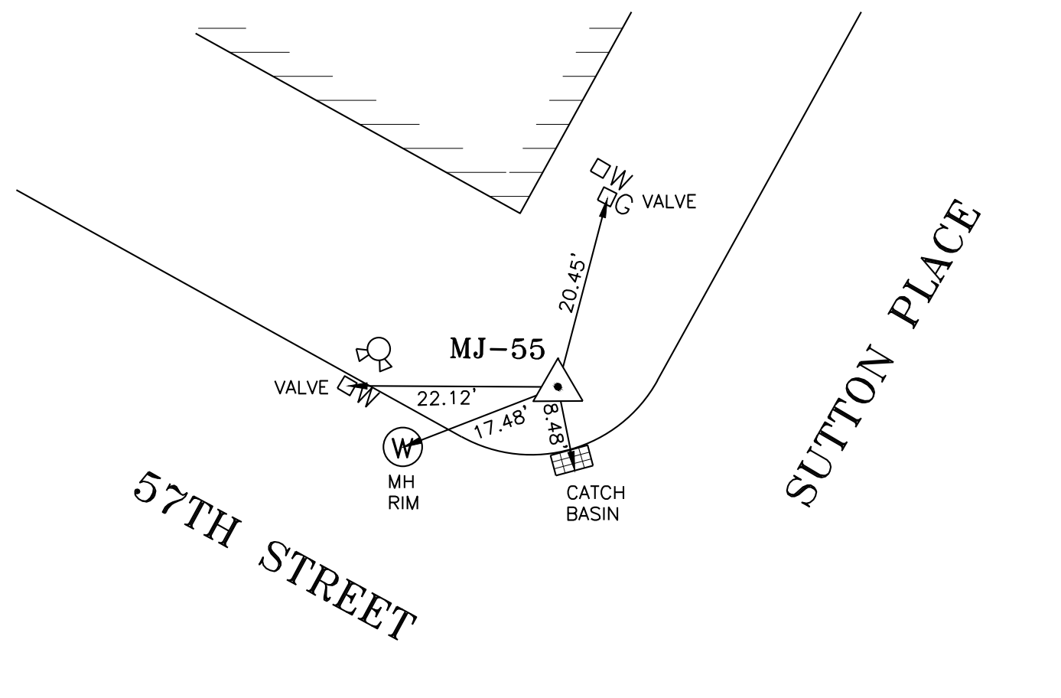
"X" CUT SET IN NORTH WESTERLY CORNER OF 55TH STREET AND SUTTON PLACE. 20'± NORTHERLY OF CENTERLINE OF 55TH STREET AND 38'± WESTERLY OF CENTERLINE OF SUTTON PLACE.



MJ-54

NORTH	EAST	ELEV.
214958.2261	994963.3488	35.61

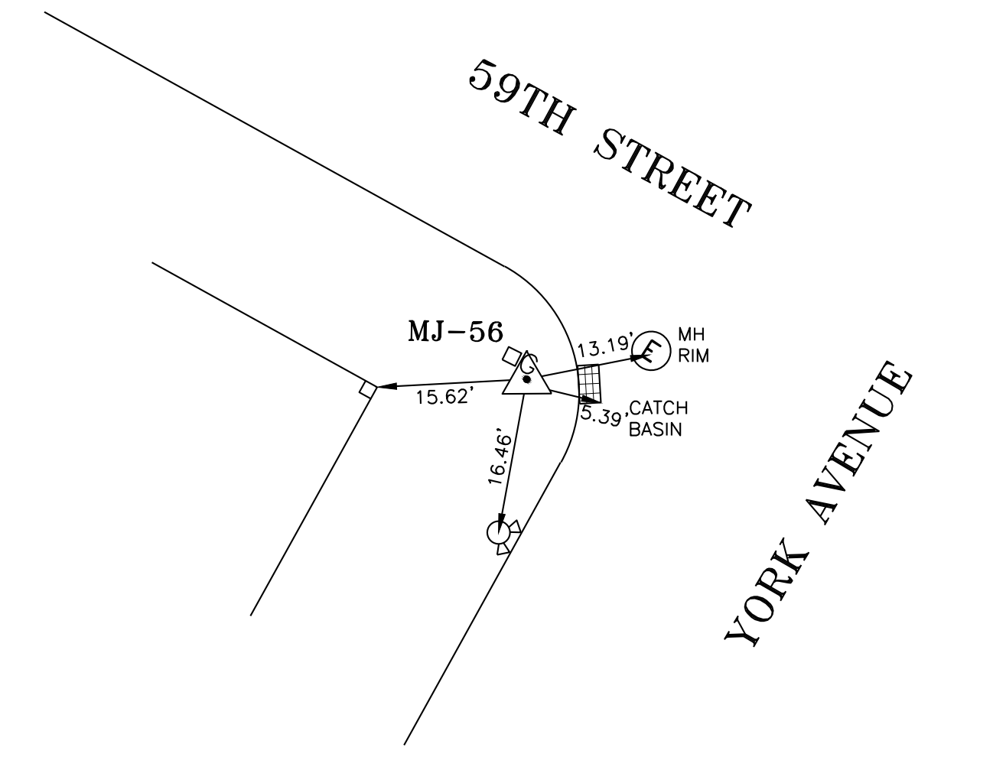
"X" CUT IN CONC. SIDEWALK AT THE SOUTHWEST CORNER OF THE INTERSECTION OF SUTTON PL. AND 56TH STREET. BEING ±9.5' WEST OF THE WESTERLY EDGE OF PAVEMENT SUTTON PL.



MJ-55

NORTH	EAST	ELEV.
215256.5665	995130.1943	45.00

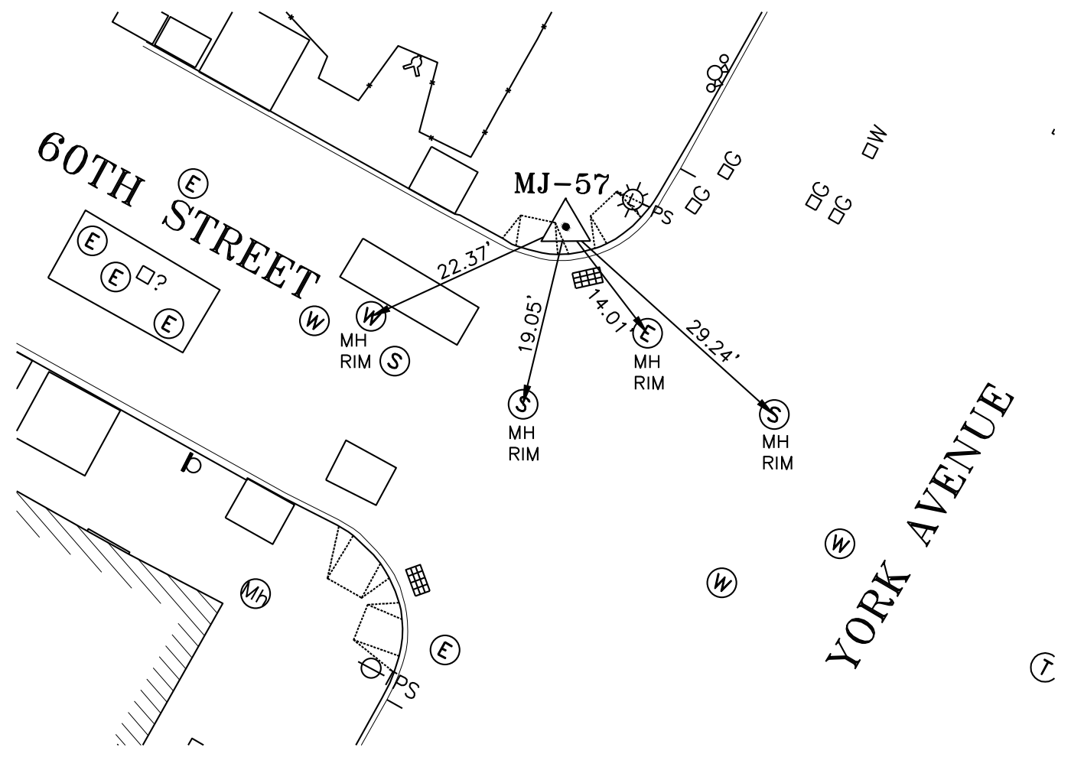
"X" CUT SET IN NORTH WESTERLY CORNER OF 57TH STREET AND SUTTON PLACE. 8'± NORTH OF NORTHERLY CURB OF 57TH STREET AND 8'± WEST OF WESTERLY CURB OF SUTTON PLACE.



MJ-56

NORTH	EAST	ELEV.
215678.0253	995365.3768	45.23

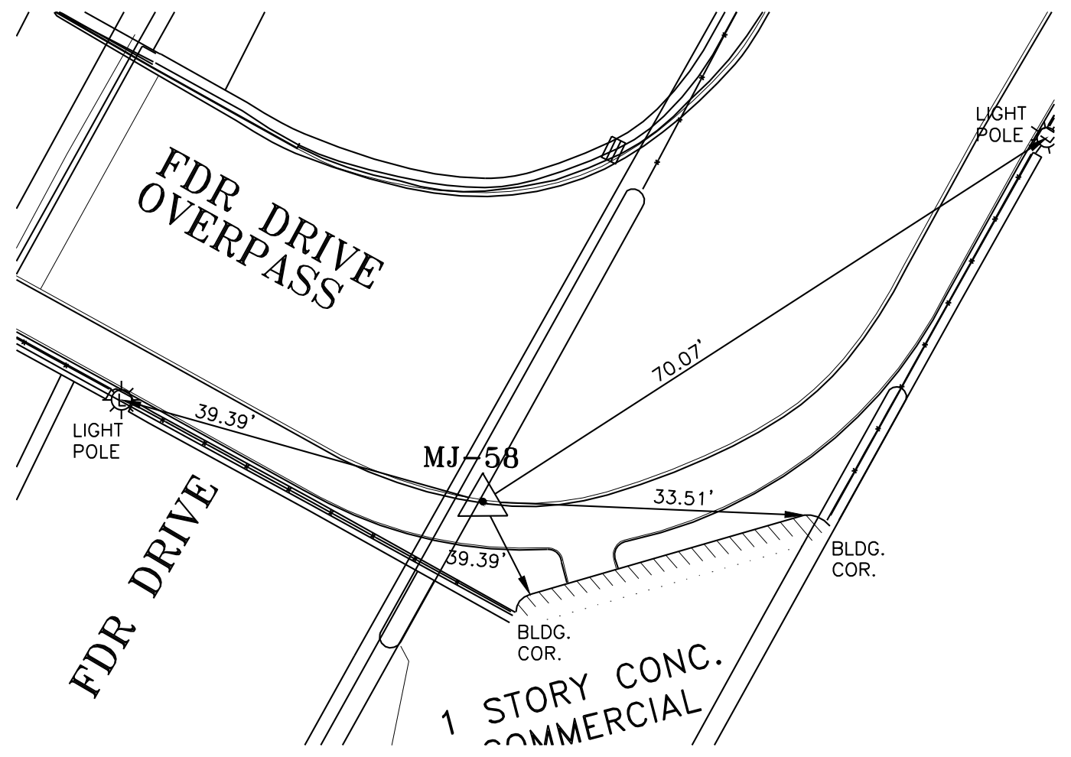
"X" CUT SET IN SOUTH WESTERLY CORNER OF 59TH STREET AND YORK AVENUE. 7'± SOUTH OF SOUTHERLY CURB OF 59TH STREET AND 7'± WEST OF WESTERLY CURB OF YORK AVENUE.



MJ-57

NORTH	EAST	ELEV.
215944.7746	995512.4871	21.71

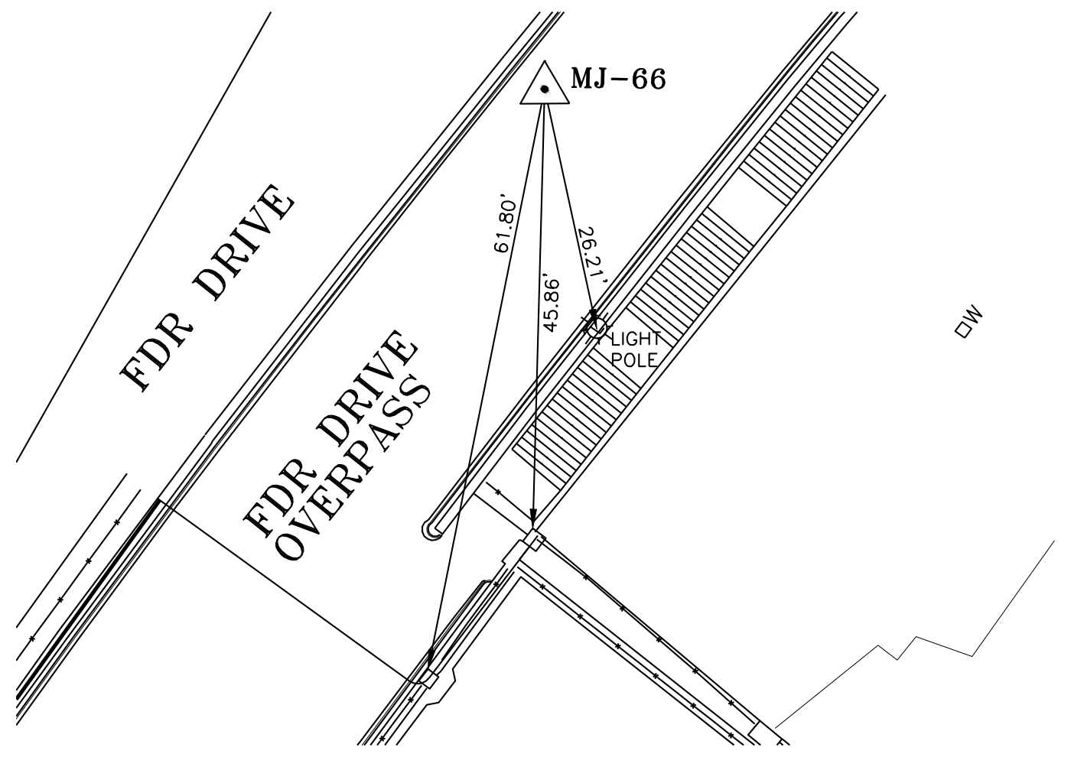
"X" CUT SET IN NORTH WESTERLY CORNER OF 60TH STREET AND YORK AVENUE. 22'± NORTHERLY OF CENTERLINE OF 60TH STREET AND 38'± WESTERLY OF CENTERLINE OF YORK AVENUE.



MJ-58

NORTH	EAST	ELEV.
215761.0946	995759.0054	39.68

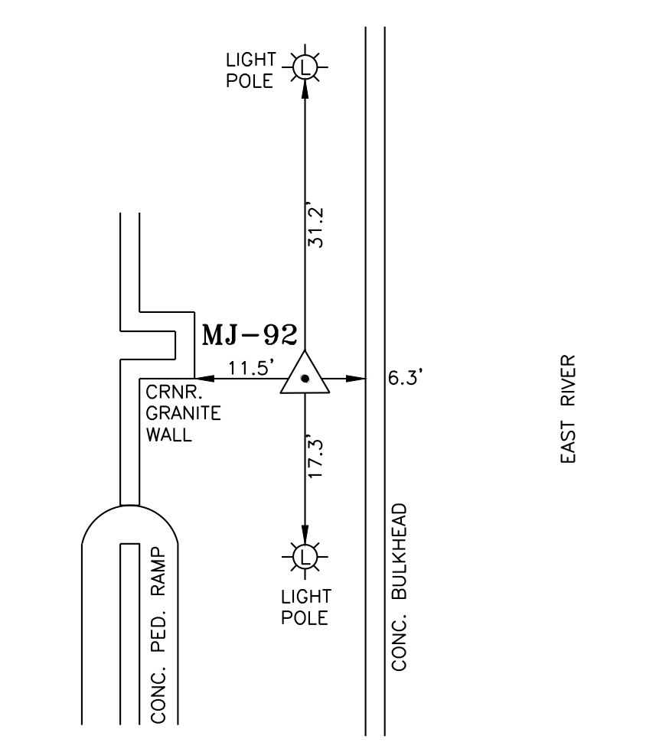
"X" CUT SET IN SOUTHERLY CONCRETE SIDEWALK OF FDR DRIVE OVERPASS. 269'± EASTERLY OF INTERSECTION OF YORK AVENUE AND 60TH STREET AND 17'± SOUTHERLY OF CENTERLINE OF FDR DRIVE OVERPASS



MJ-66

NORTH	EAST	ELEV.
216016.9131	995932.8444	29.82

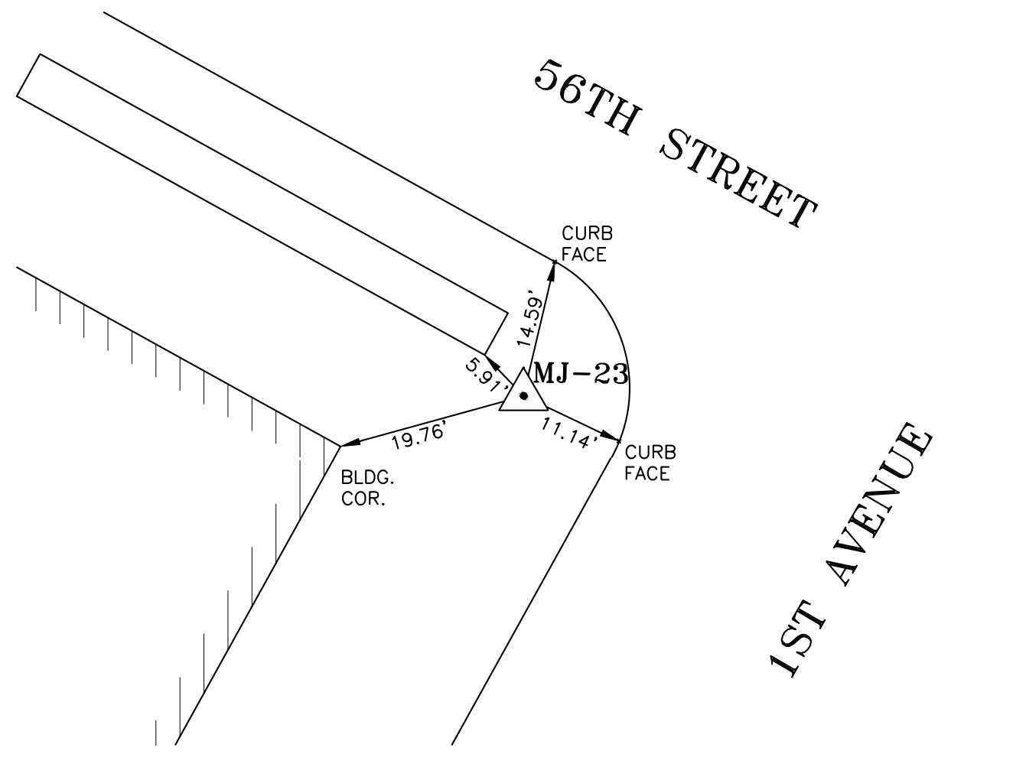
"X" CUT SET IN ASPHALT OF FDR DRIVE OVERPASS. 4'± EASTERLY OF EAST EDGE OF PAVEMENT OF OVERPASS AND 19'± WESTERLY OF WEST EDGE OF PAVEMENT OF OVERPASS.



MJ-92

NORTH	EAST	ELEV.
216571.6178	996525.1731	6.89

"X" CUT SET IN CONC. PAVERS BEING ±300' NORTH OF E. 63RD STREET AT THE EXTENSION OF THE CENTERLINE OF 64TH STREET.



MJ-23

NORTH	EAST	ELEV.
215300.2108	994330.6265	50.55

"X" CUT SET IN SOUTH WESTERLY CORNER OF 56TH STREET AND 1ST AVENUE. 15'± SOUTH OF SOUTHERLY CURB OF 56TH STREET AND 11'± WEST OF WESTERLY CURB OF 1ST AVENUE.

BENCHMARK TABLE

BENCHMARK	ELEVATION	DESCRIPTION
BM 623	28.49	⌐ CUT ON TOP OF WALL AT SOUTH EAST CORNER OF EAST 37TH STREET AND 2ND AVENUE. 4.8' ABOVE SIDEWALK.
BM 680	41.49	⊤ CUT ON SOUTH FACE OF GRANITE FOUNDATION ON SOUTH WEST CORNER OF 42ND STREET AND 1ST AVENUE. CUT IS 4.0' ABOVE SIDEWALK.
BM 801	53.871	LETTER "D" OF STANDPIPE AT #1026-28 1ST AVENUE 41.0'± NORTH OF NORTH EAST CORNER OF EAST 56TH STREET AND 1ST AVENUE. 3.1' ABOVE SIDEWALK.
BM 847	53.35	⊤ CUT ON CORNER OF CURVED GRANITE BASE OF SOUTH END OF WEST ABUTMENT OF ARCH OF QUEENS BOROUGH BRIDGE ON WEST B/L OF 1ST AVENUE. 54'± NORTH OF NORTH WEST CORNER OF 59TH STREET.
BM 879	23.665	⊓ CUT ON GRANITE BASE OR COPING FOR FENCE AT NORTH EAST CORNER OF 64TH STREET AND YORK AVENUE. CUT IS 7.0' NORTH OF CORNER OF FENCE AND 1.50' ABOVE SIDEWALK.
BM 802	45.577	¬ CUT ON WATER TABLE AT NORTH P/L OF #4 SUTTON PLACE ON E/S SUTTON PLACE BETWEEN EAST 57TH STREET AND EAST 58TH STREET. 1.98' ABOVE SIDEWALK.
BM 878	53.61	LETTER "D" IN WORD STANDPIPE ON STANDPIPE IN FRONT OF #304-310 EAST 64TH STREET. 31.4' EAST OF WEST P.L., 156'± EAST OF SOUTH EAST CORNER OF 2ND AVENUE.
MJBM-1	15.67	"X" CUT ON FIRE HYDRANT AT NORTH WEST CORNER OF 1ST AVENUE AND 37TH STREET 41±' WESTERLY OF CENTERLINE OF 1ST AVENUE AND 67±' NORTHERLY OF CENTERLINE OF 37TH STREET.
MJBM-2	13.70	"X" CUT ON FIRE HYDRANT ±2' NORTHERLY OF NORTHERN STEEL FACE CURB OF 41ST STREET AT THE NORTHWESTERLY CORNER OF INTERSECTION OF 41ST STREET AND FDR DRIVE.
MJBM-3	29.65	"X" CUT ON NORTH BOLT OF FIRE HYDRANT AT NORTH WEST CORNER OF 47TH STREET AND 1ST AVENUE. ±2' NORTHERLY OF NORTHERN EDGE OF PAVEMENT OF 47TH STREET. 1.7' ABOVE CONCRETE SIDEWALK.
MJBM-4	47.00	"X" CUT ON EAST BOLT OF FIRE HYDRANT AT SOUTH WEST CORNER OF 51ST STREET AND 1ST AVENUE. ±2' WESTHERLY OF WESTERN EDGE OF PAVEMENT OF 1ST AVENUE. 2' ABOVE CONCRETE SIDEWALK.
MJBM-5	26.19	"X" CUT ON FIRE HYDRANT AT SOUTH WEST CORNER OF SUTTON PLACE AND 55TH STREET 39±' SOUTHERLY OF CENTERLINE OF 55TH STREET AND 32±' EASTERLY OF CENTERLINE OF SUTTON PLACE.
MJBM-6	47.17	"X" CUT ON EAST BOLT OF FIRE HYDRANT AT SOUTH WEST CORNER OF 59TH STREET AND SUTTON PLACE. ±2' WESTHERLY OF WESTERN EDGE OF PAVEMENT OF SUTTON PLACE. 2' ABOVE CONCRETE SIDEWALK.

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FIELD SURVEY WAS COMPLETED IN: JANUARY, 2012

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED_______________
DRAWN____M. DAMES____
TRACED_______________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE Esplanade SC.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

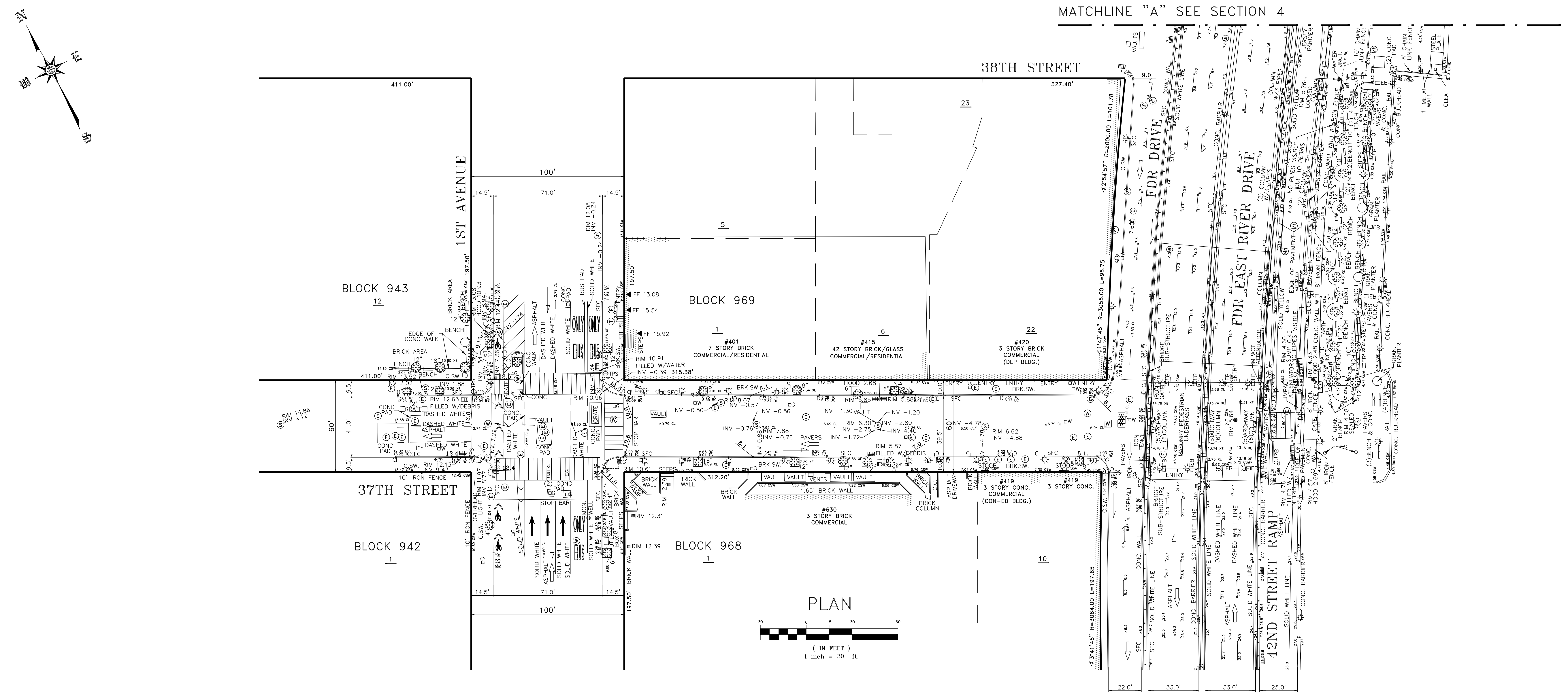
PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
EAST MIDTOWN WATERFRONT ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
SURVEY CONTROL (3 OF 3)

3761
A

DATE: 05/24/12

SHEET OF 3SC



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DRAWN_____M. DAMES_____
TRACED______________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE_Esplanade 3T.dwg__

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
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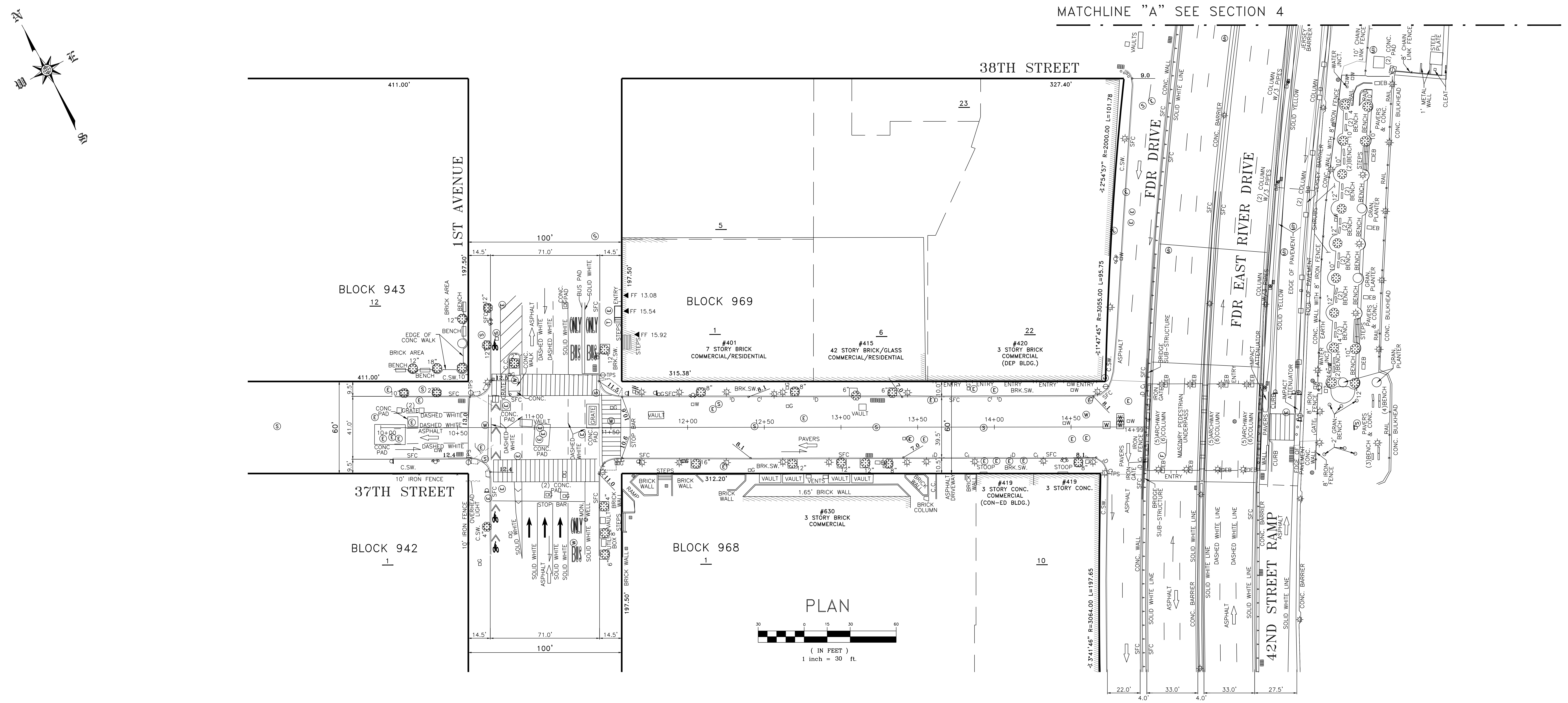
BOROUGH OF MANHATTAN
TOPOGRAPHICAL PLAN

3761
A

DATE: 05/24/12

SHEET OF 3T



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DRAWN____M. DAMES____
TRACED_______________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE Esplanade 3B.dwg

____
GROUP LEADER

_______________ P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
EAST MIDTOWN WATERFRONT ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
CLEAN BASE

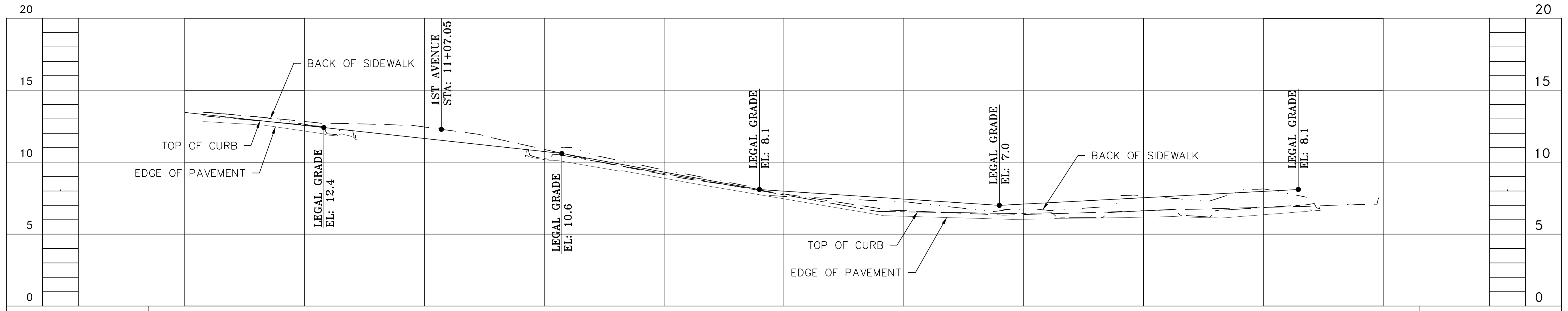
3761
A

DATE: 05/24/12

SHEET OF 38

LEGEND:

— — — — —	EXISTING GRADE
—·—·—·—	TOP OF CURB
———————	EDGE OF PAVEMENT
—··—··—··—	BACK OF SIDEWALK

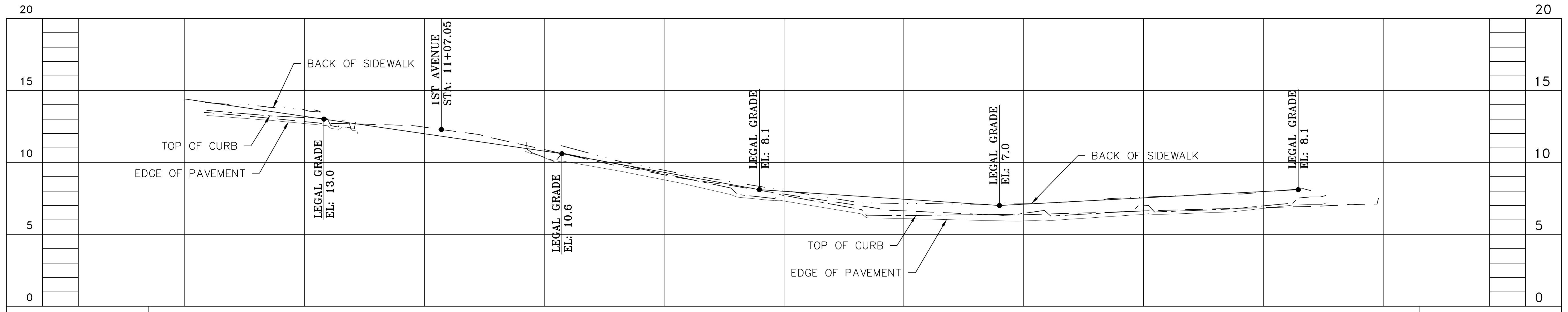


EXISTING GRADE		12.82	12.44	10.88	9.13	7.79	6.63	6.36	6.62	6.85		EXISTING GRADE
EDGE OF PAVEMENT		12.16		10.18	8.88	7.45	6.24	6.03	6.18	6.34		EDGE OF PAVEMENT
TOP OF CURB		12.59		10.24	9.21	7.72	6.55	6.44	6.62	6.84		TOP OF CURB
BACK OF SIDEWALK		12.63			9.45	7.62	7.24	6.74	7.66	8.15		BACK OF SIDEWALK
STATION	10+00	10+50	11+00	11+50	12+00	12+50	13+00	13+50	14+00	14+50	15+00	STATION

HIGHWAY PROFILE ALONG 37TH STREET LOOKING SOUTH

30 0 15 30 60
(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10
(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE



EXISTING GRADE		12.82	12.44	10.88	9.13	7.79	6.63	6.36	6.62	6.85		EXISTING GRADE
EDGE OF PAVEMENT		12.69		10.32	8.78	7.32	6.09	5.93	6.39	6.80		EDGE OF PAVEMENT
TOP OF CURB		13.11		10.35	9.20	7.70	6.31	6.45	7.02	6.97		TOP OF CURB
BACK OF SIDEWALK		13.64			9.45	8.05	7.15	7.17	7.58	7.93		BACK OF SIDEWALK
STATION	10+00	10+50	11+00	11+50	12+00	12+50	13+00	13+50	14+00	14+50	15+00	STATION

HIGHWAY PROFILE ALONG 37TH STREET LOOKING NORTH

30 0 15 30 60
(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10
(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

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Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED______________
DRAWN_____M. DAMES_____
TRACED______________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE Esplanade 3H.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

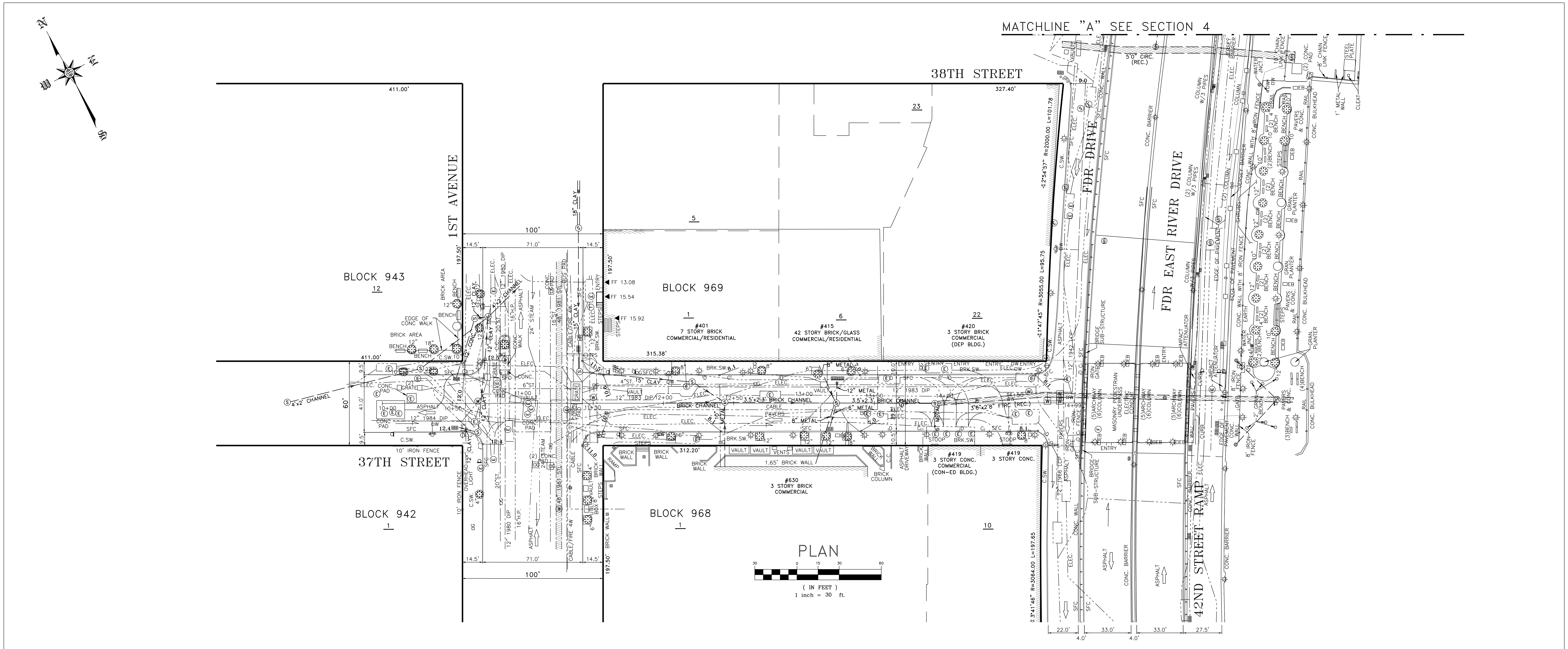
SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
DIVISION OF TECHNICAL SUPPORT
BUREAU OF SITE ENGINEERING
TOPOGRAPHICAL SECTION

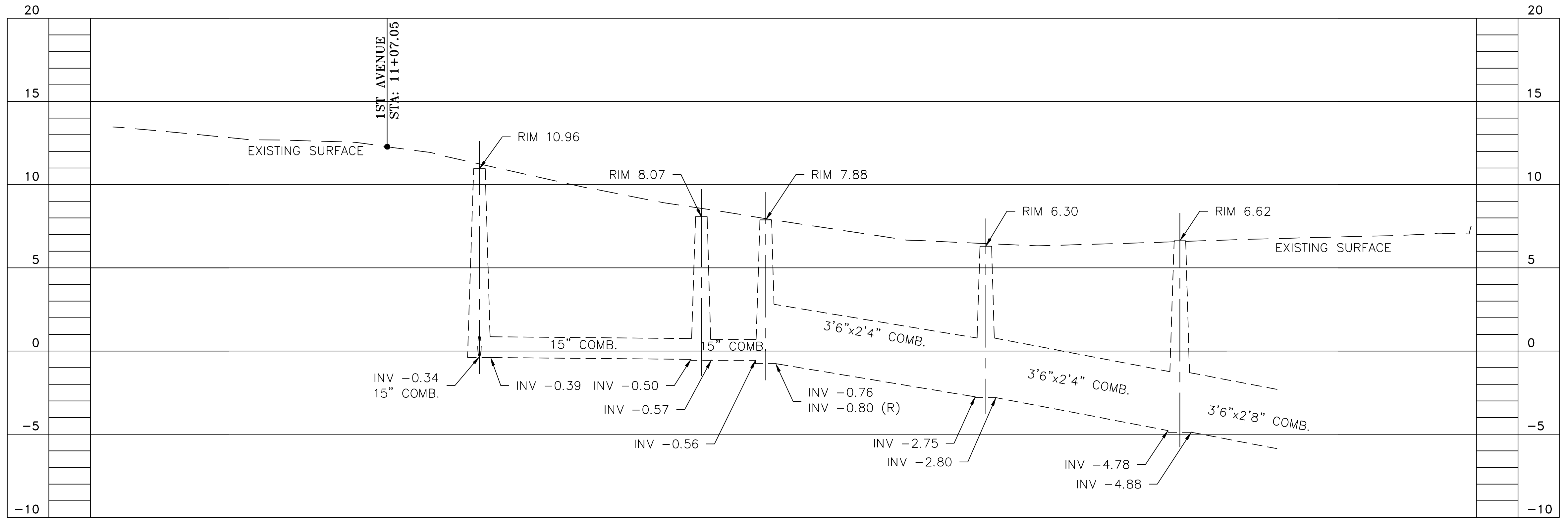
PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
EAST MIDTOWN ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
HIGHWAY PROFILES

3761
A
DATE: 05/24/12

SHEET OF 3H



PLAN



UTILITY PROFILE ALONG 37TH STREET

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED
DRAWN M. DAMES
TRACED
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 3U.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
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BOROUGH OF MANHATTAN
UTILITY PLAN

3761
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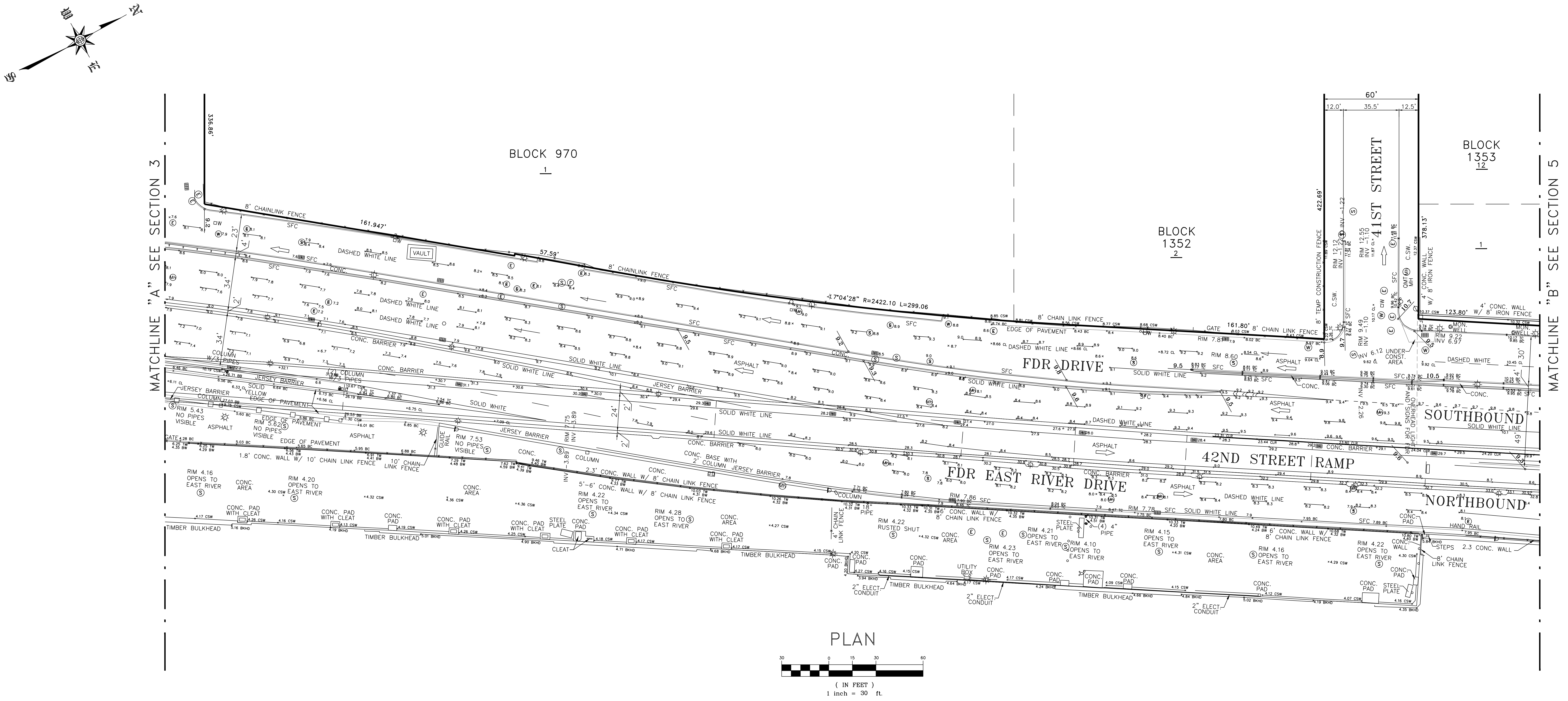
DATE: 05/24/12

SHEET OF 3U



PLAN

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REVISIONS

DESIGNED
DRAWN M. DAMES
TRACED
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 4T.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

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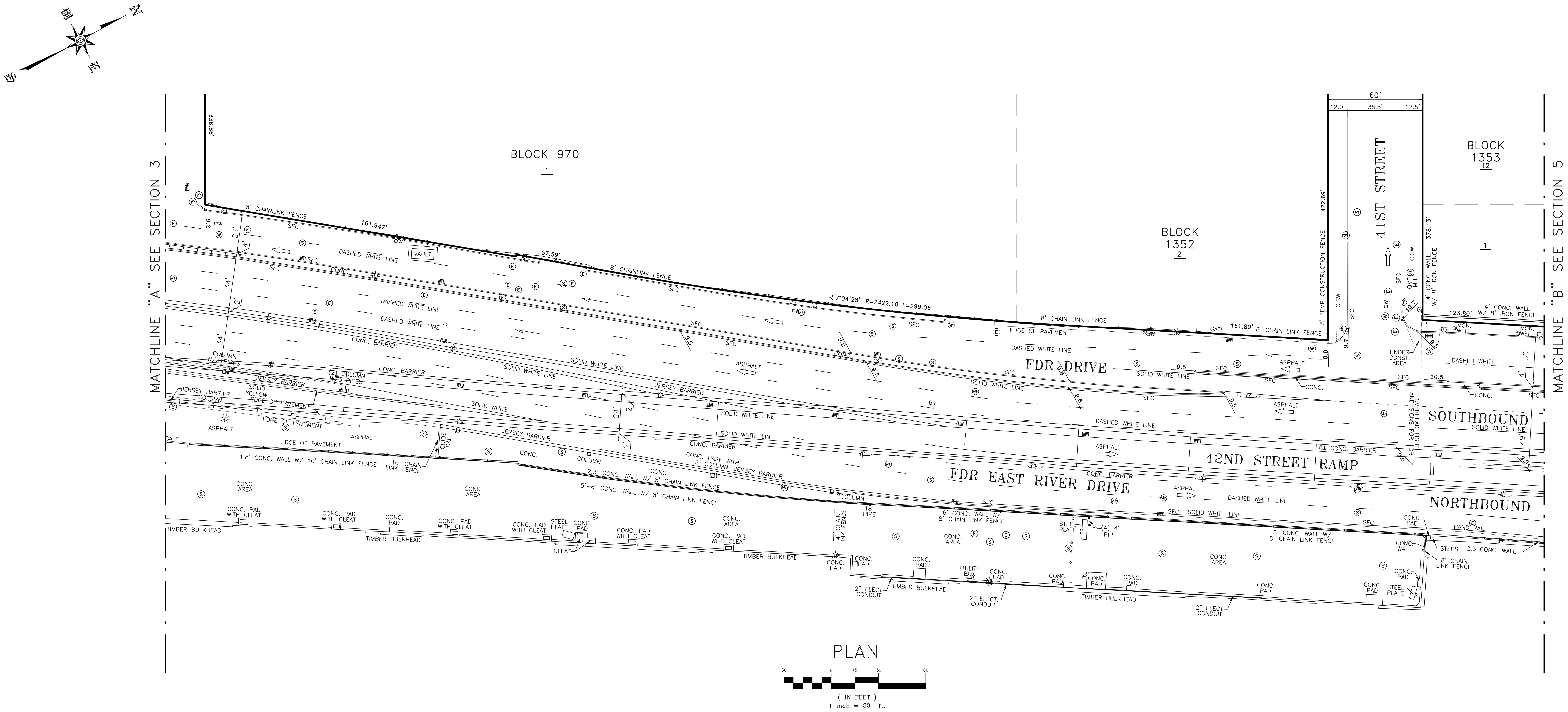
BOROUGH OF MANHATTAN
TOPOGRAPHICAL PLAN

3761
A

DATE: 05/24/12

SHEET OF 4T



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DESIGNED________________
DRAWN_____M. DAMES_____
TRACED________________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE_Esplanade 4B.dwg_

____
GROUP LEADER

______________________P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

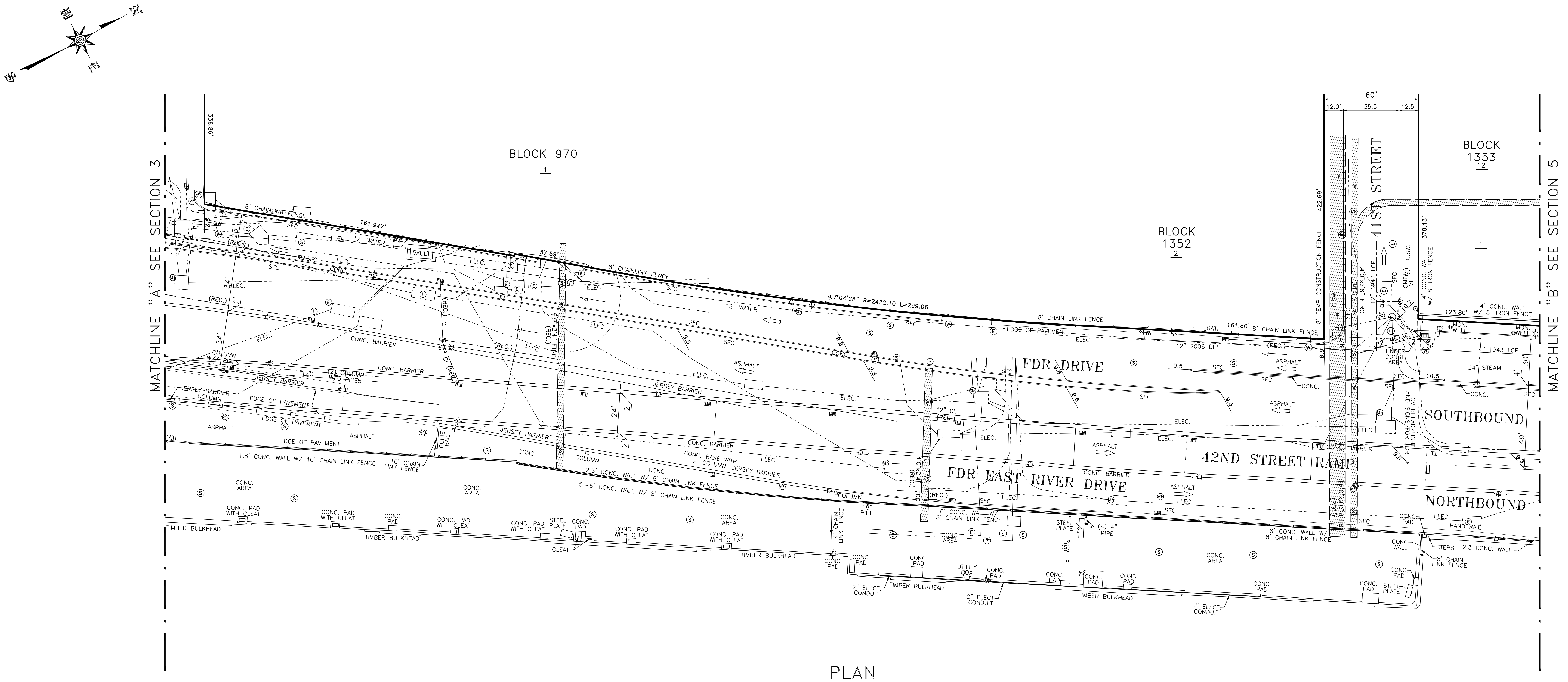
PREPARED FOR:
DIVISION OF TECHNICAL SUPPORT
BUREAU OF SITE ENGINEERING
TOPOGRAPHICAL SECTION

PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
EAST MIDTOWN WATERFRONT ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
CLEAN BASE

3761
A

DATE: 05/24/12

SHEET OF 4B



PLAN

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"UNAUTHORIZED ALTERATIONS OR ADDITION TO A LAND SURVEYING DRAWING BEARING A LICENSED PROFESSIONAL LAND SURVEYOR'S SEAL IS A VIOLATION OF ARTICLE 145, SECTION 7209, PARAGRAPH 2 OF THE NEW YORK STATE EDUCATION LAW"

FIELD SURVEY WAS COMPLETED IN: JANUARY, 2012

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

NOTE: RIGHT OF WAY LINES, DIMENSIONS AND INTERIOR CORNER ANGLES SHOWN WERE TAKEN FROM RECORD CITY MAPS AND HAVE NOT BEEN VERIFIED IN THE FIELD BY THIS COMPANY. RIGHT OF WAY LINES ARE SHOWN APPROXIMATELY BASED ON VISIBLE IMPROVEMENTS AND ARE NOT INTENDED TO SHOW POSSESSION.

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED
DRAWN M. DAMES
TRACED
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 4U.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
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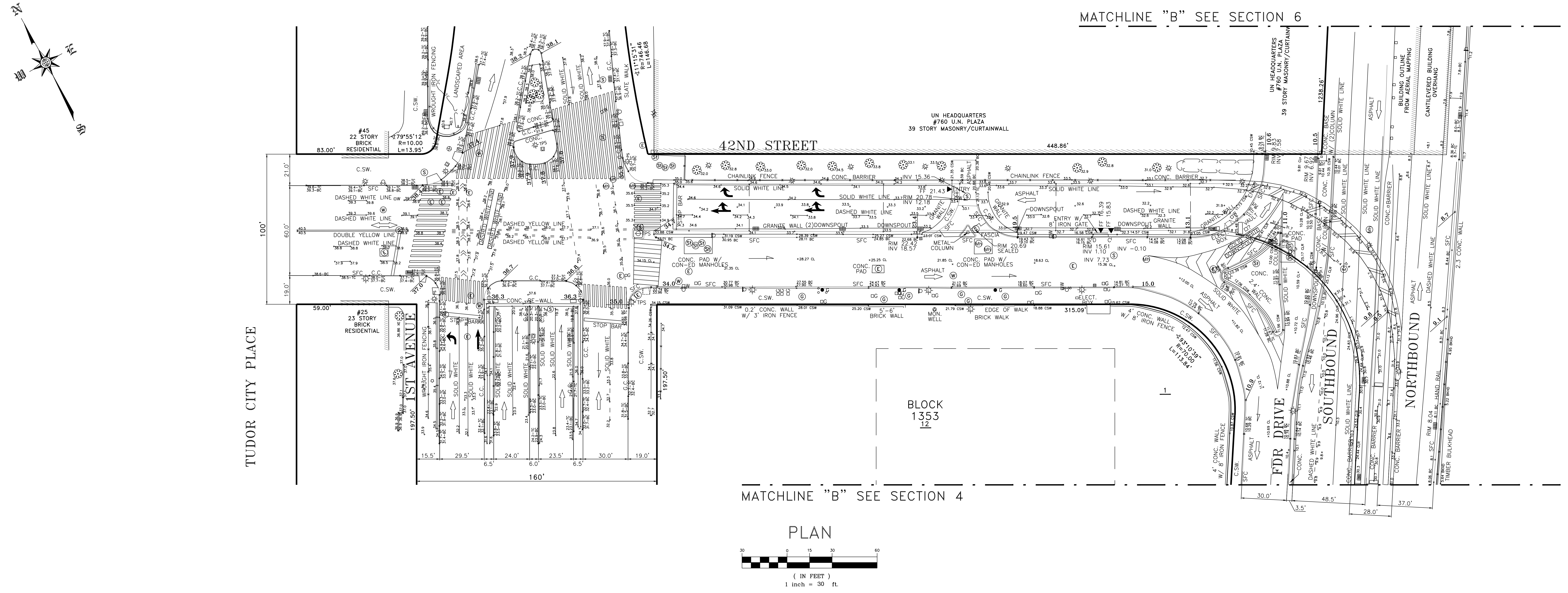
BOROUGH OF MANHATTAN
UTILITY PLAN

3761
A
DATE: 05/24/12

SHEET OF 4U



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DRAWN_____M. DAMES____
TRACED_______________
CHECKED___A. HURLEY____

SCALE
AS SHOWN

CADD FILE Esplanade 5T.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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1533 CRESCENT ROAD
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BOROUGH OF MANHATTAN
TOPOGRAPHICAL PLAN

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A

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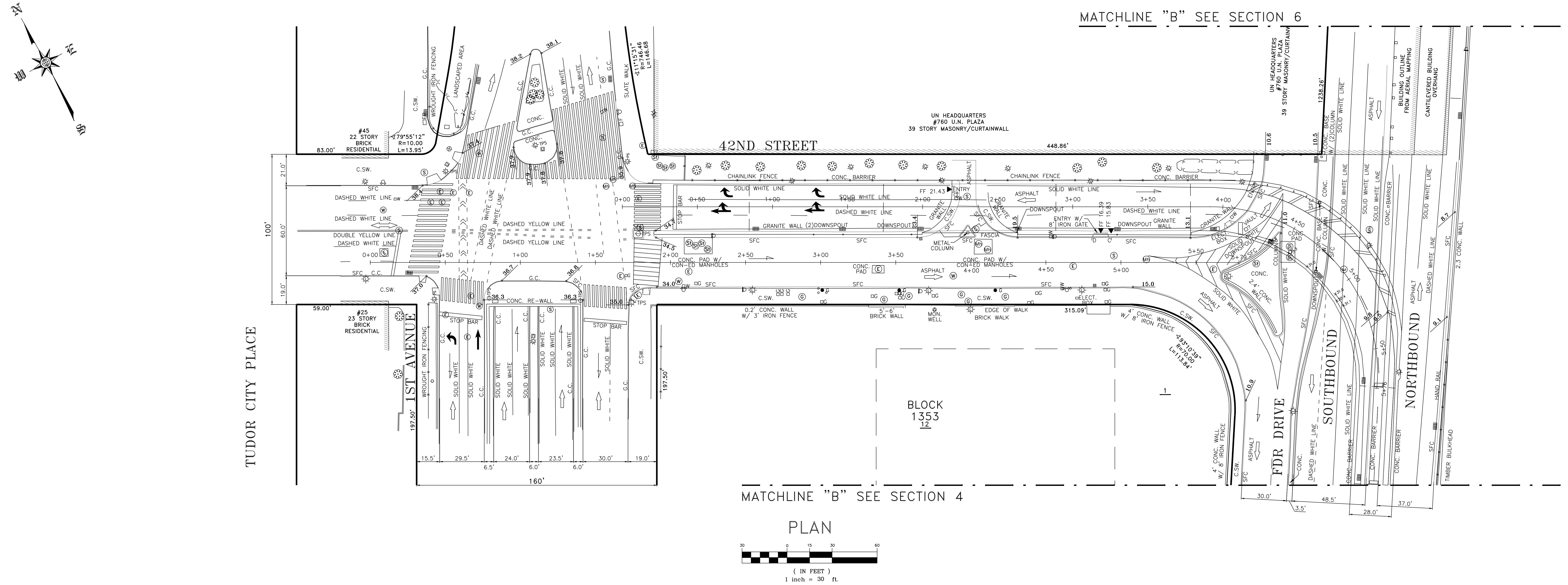
SHEET OF 5T



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DRAWN_____M. DAMES____
TRACED________________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE Esplanade 5B.dwg

______________ GROUP LEADER

______________ P.E.
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CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
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BOROUGH OF MANHATTAN
CLEAN BASE

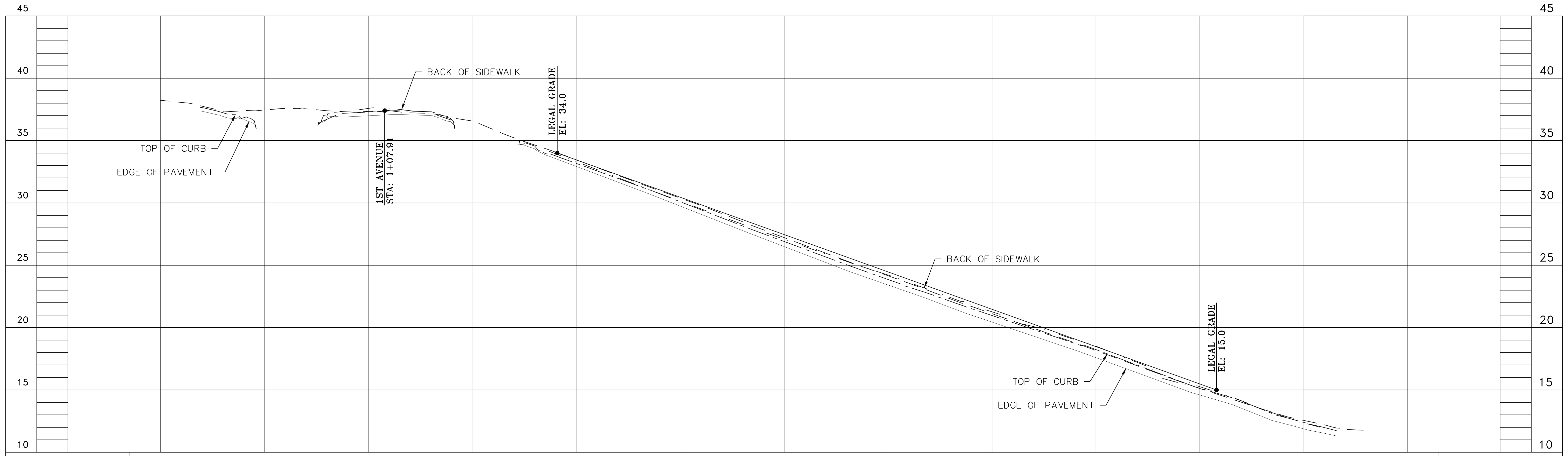
3761
A

DATE: 05/24/12

SHEET OF 5B

LEGEND:

— — — — — EXISTING GRADE
—·—·— TOP OF CURB
——— EDGE OF PAVEMENT
— · · — BACK OF SIDEWALK

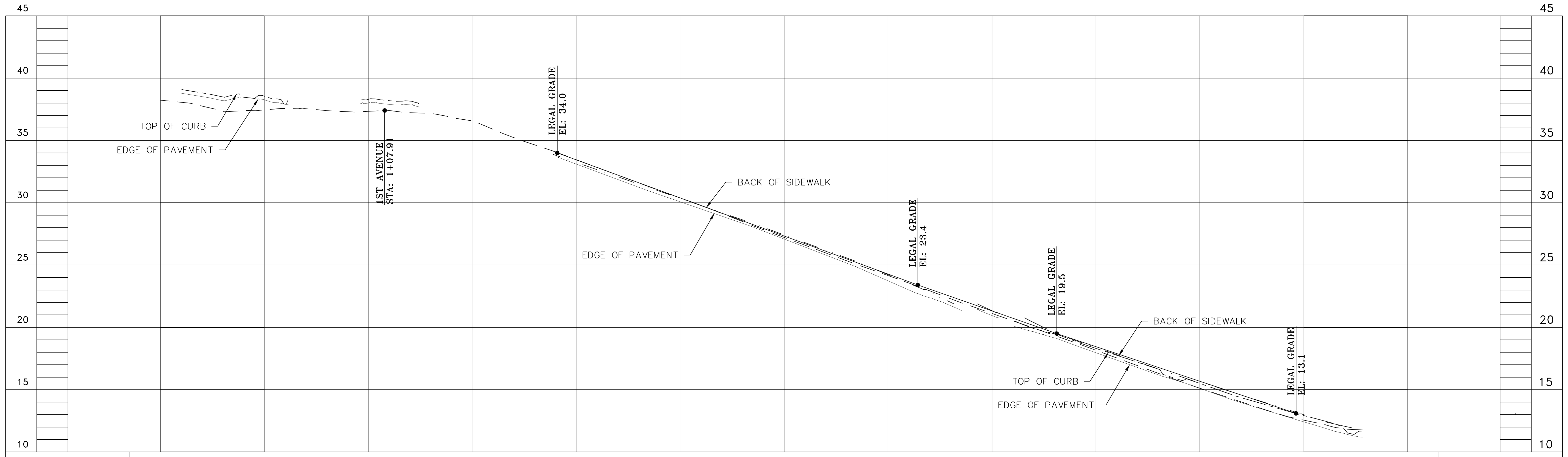


EXISTING GRADE	38.23	37.45	37.33	36.57	33.46	30.39	27.22	24.16	21.12	18.17	15.12	12.56		EXISTING GRADE
EDGE OF PAVEMENT			36.98		32.93	29.74	26.50	23.42	20.45	17.59	14.59	11.88		EDGE OF PAVEMENT
TOP OF CURB			37.28		33.17	30.10	26.91	23.86	20.97	18.24	15.14	12.39		TOP OF CURB
BACK OF SIDEWALK			37.58		33.31	30.14	27.09	24.22	21.27	18.51	15.25	12.35		BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00	5+50	6+00	STATION

HIGHWAY PROFILE ALONG 42ND STREET LOOKING SOUTH

30 0 15 30 60
(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10
(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE



EXISTING GRADE	38.23	37.45	37.33	36.57	33.46	30.39	27.22	24.16	21.12	18.17	15.12	12.56		EXISTING GRADE
EDGE OF PAVEMENT		38.26	38.00		33.11	30.08	27.09	23.74	20.95	17.97	15.11	12.42		EDGE OF PAVEMENT
TOP OF CURB		38.55	38.29						21.34	18.31	15.50	12.92		TOP OF CURB
BACK OF SIDEWALK					33.24	30.35	27.42	24.23		18.38	15.64	12.99		BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00	5+50	6+00	STATION

HIGHWAY PROFILE ALONG 42ND STREET LOOKING NORTH

30 0 15 30 60
(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10
(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

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Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED________________
DRAWN_____M. DAMES_____
TRACED________________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE_Esplanade 5H.dwg_

____
GROUP LEADER

______________________P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
DIVISION OF TECHNICAL SUPPORT
BUREAU OF SITE ENGINEERING
TOPOGRAPHICAL SECTION

PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
EAST MIDTOWN ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
HIGHWAY PROFILES

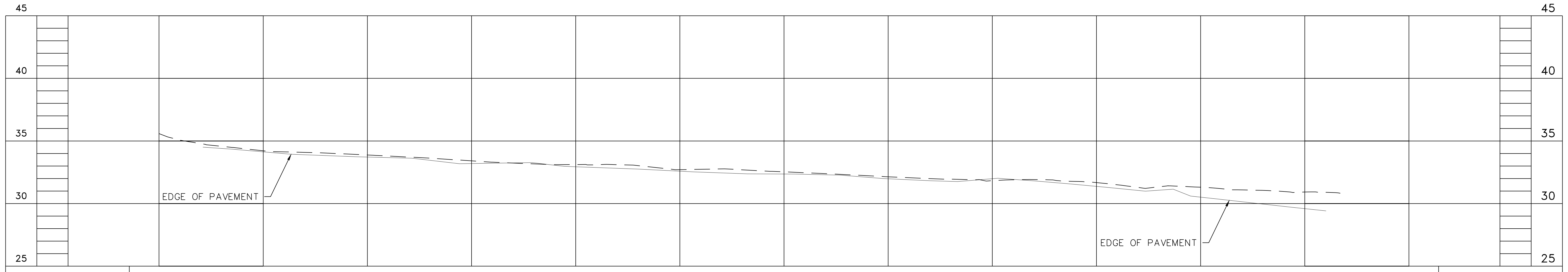
3761
A

DATE: 05/24/12

SHEET OF 5H

LEGEND:

— — — — — —	EXISTING GRADE
—-—-—-—	TOP OF CURB
———————	EDGE OF PAVEMENT
—··—··—··—	BACK OF SIDEWALK



EXISTING GRADE	35.59	34.22	33.88	33.41	33.12	32.71	32.53	32.14	31.83	31.68	31.30	30.92		EXISTING GRADE
EDGE OF PAVEMENT		34.13	33.72	33.19	32.94	32.59	32.36	31.98	31.99	31.38	30.51	29.60		EDGE OF PAVEMENT
TOP OF CURB														TOP OF CURB
BACK OF SIDEWALK														BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00	5+50	6+00	STATION

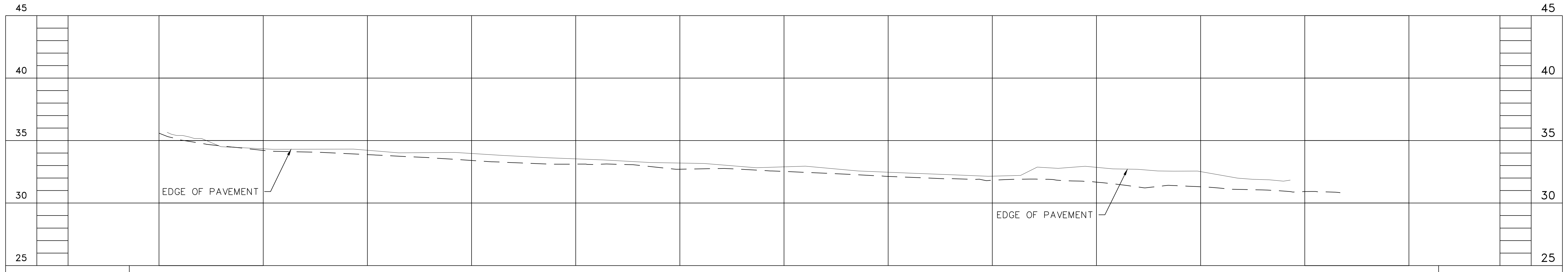
HIGHWAY PROFILE ALONG 42ND STREET RAMP LOOKING SOUTH

30 0 15 30 60

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10

(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE



EXISTING GRADE	35.59	34.22	33.88	33.41	33.12	32.71	32.53	32.14	31.83	31.68	31.30	30.92		EXISTING GRADE
EDGE OF PAVEMENT		34.34	34.23	33.97	33.54	33.20	32.90	32.47	32.15	32.86	32.52			EDGE OF PAVEMENT
TOP OF CURB														TOP OF CURB
BACK OF SIDEWALK														BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00	5+50	6+00	STATION

HIGHWAY PROFILE ALONG 42ND STREET RAMP LOOKING NORTH

30 0 15 30 60

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10

(IN FEET)
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VERTICAL SCALE

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED
DRAWN M. DAMES
TRACED
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 5H.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

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HIGHWAY PROFILES

3761
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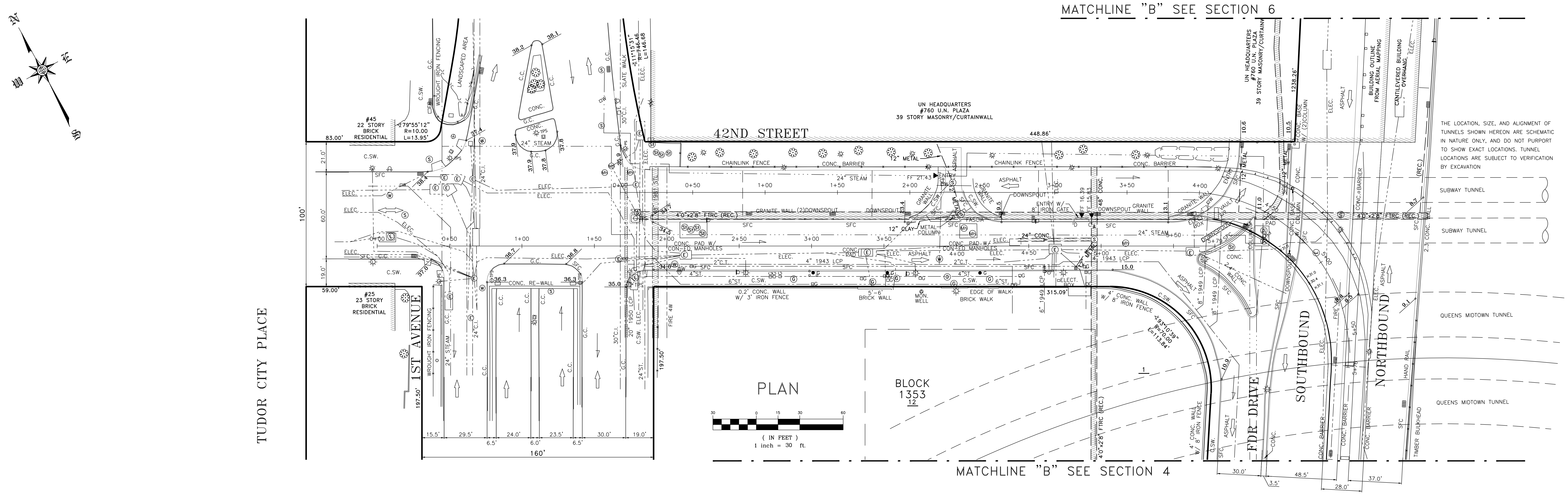
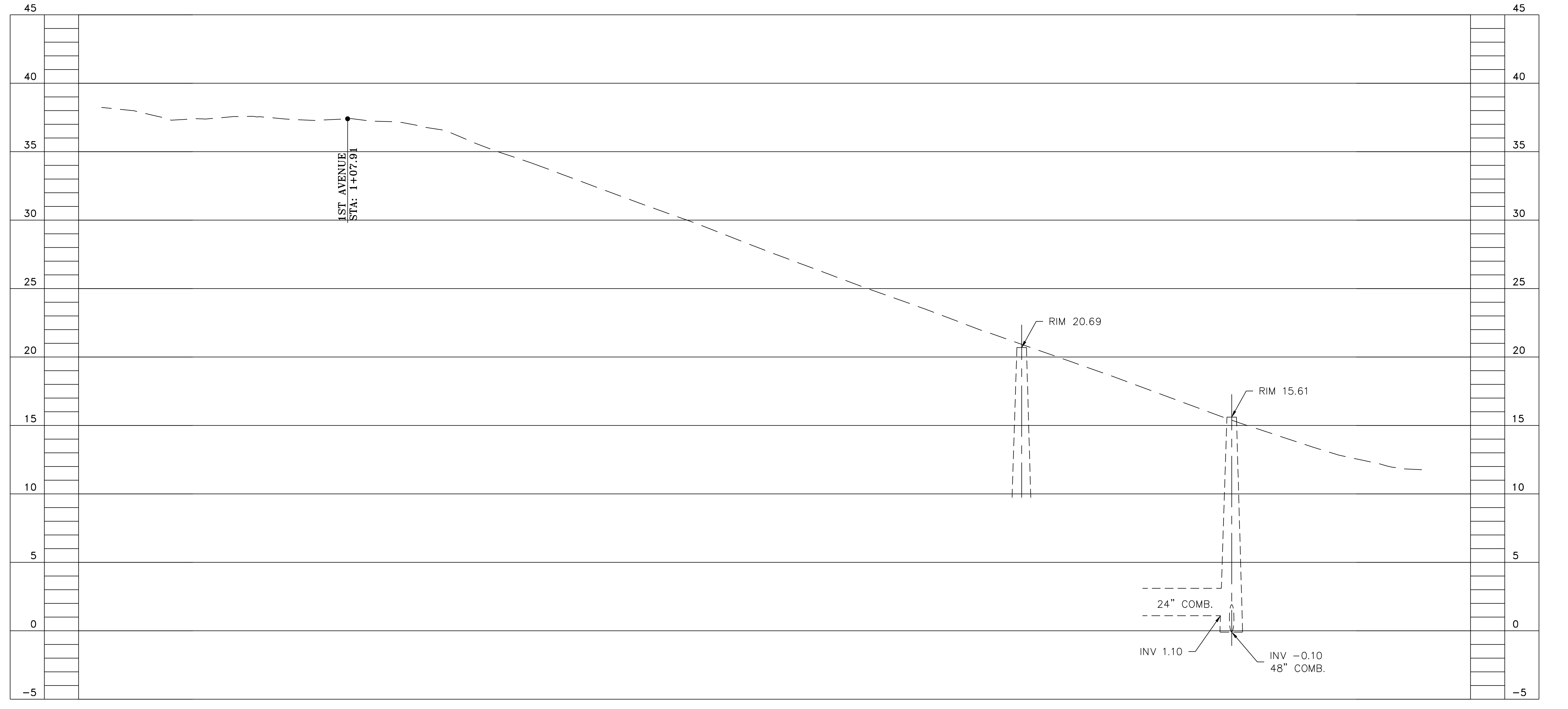
SHEET OF SHR



THE LOCATION, SIZE, AND ALIGNMENT OF TUNNELS SHOWN HEREON ARE SCHEMATIC IN NATURE ONLY, AND DO NOT PURPORT TO SHOW EXACT LOCATIONS. TUNNEL LOCATIONS ARE SUBJECT TO VERIFICATION BY EXCAVATION



UTILITY PROFILE ALONG 42ND STREET

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

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CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 5U.dwg

GROUP LEADER

P.E.
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CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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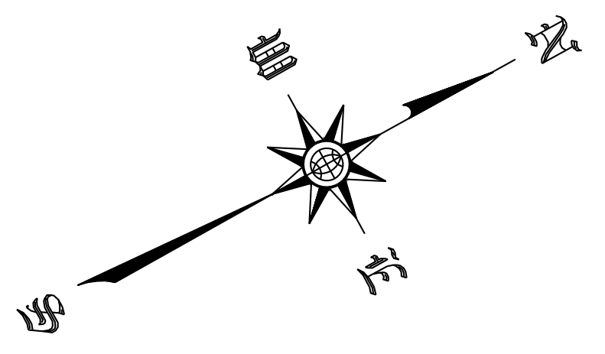

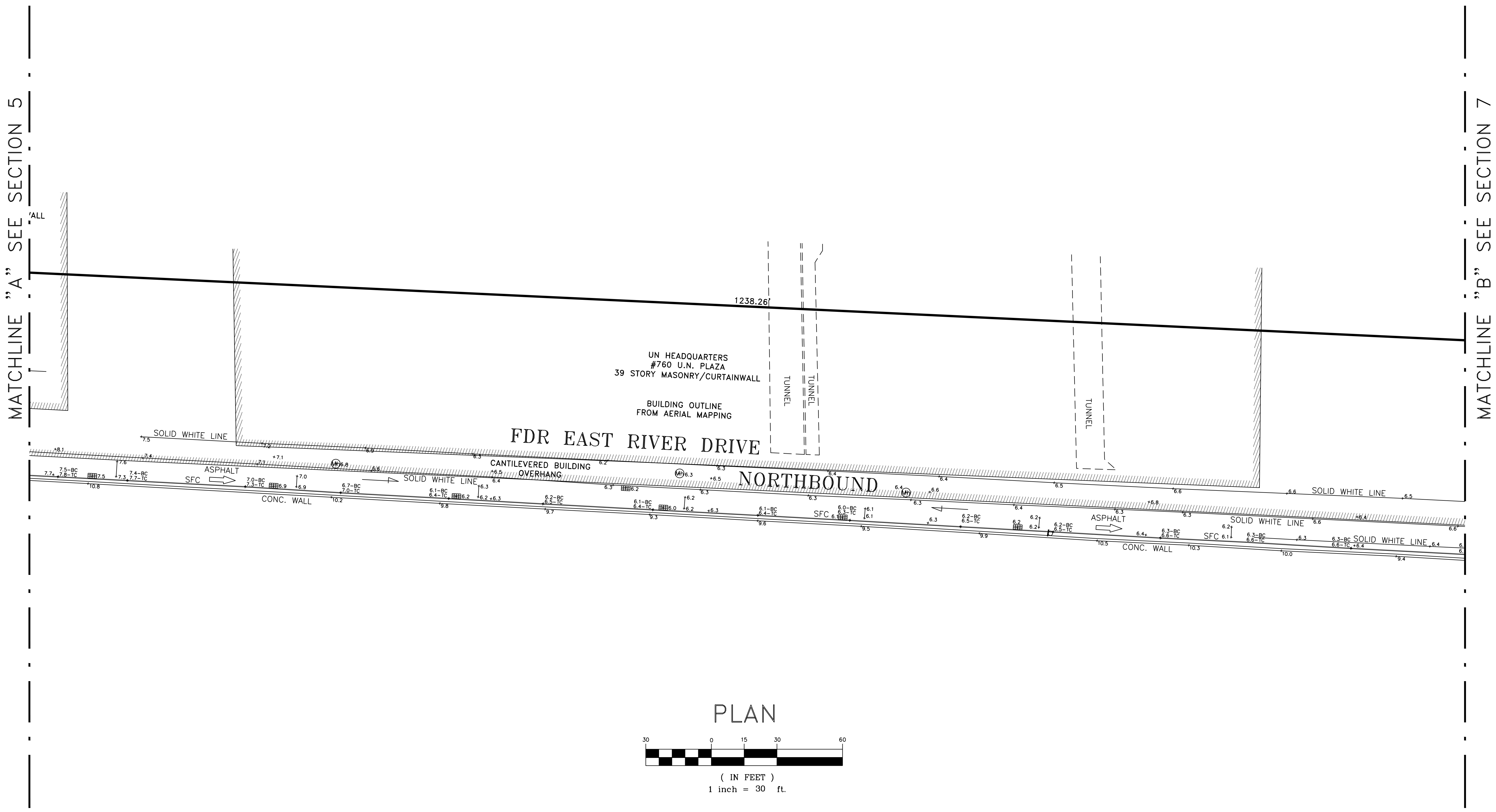

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P.L.S. #50314

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED__________
DRAWN M. DAMES
TRACED__________
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 6T.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

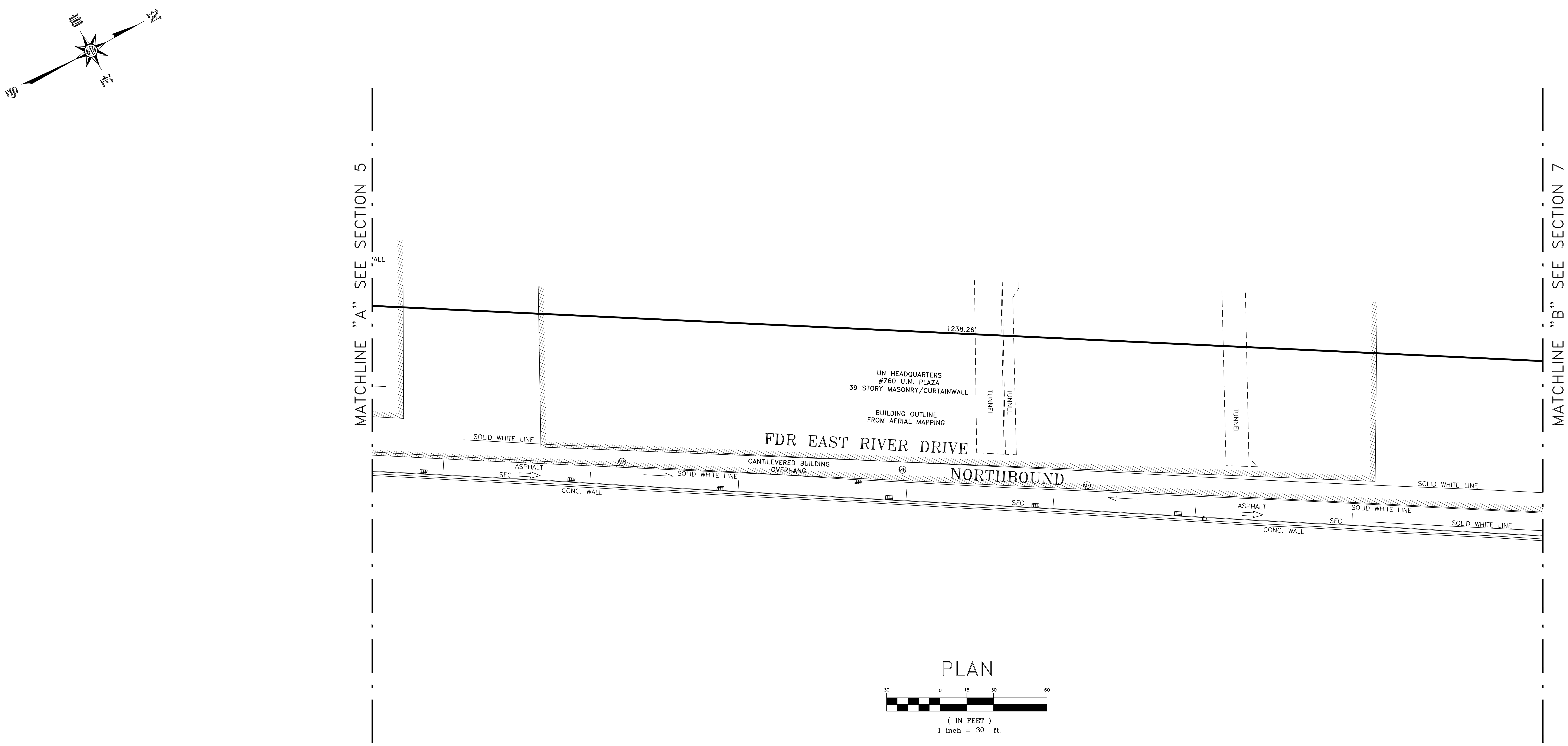
SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
EAST MIDTOWN WATERFRONT ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
TOPOGRAPHICAL PLAN

3761
A
DATE: 05/24/12

SHEET OF 6T



PLAN

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FIELD SURVEY WAS COMPLETED IN: JANUARY, 2012

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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TRACED
CHECKED A. HURLEY

SCALE
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CADD FILE Esplanade 6B.dwg

GROUP LEADER

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CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

SURVEY PREPARED BY:
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1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
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BUREAU OF SITE ENGINEERING
TOPOGRAPHICAL SECTION

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3761
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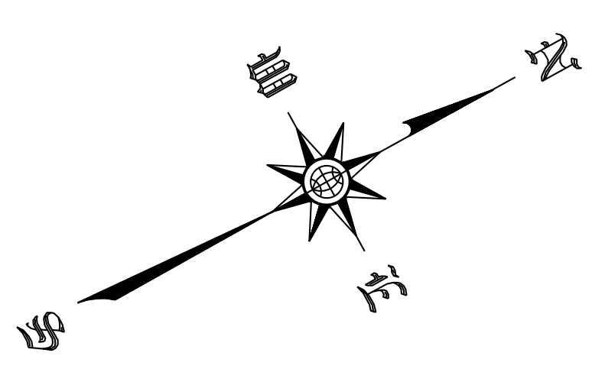
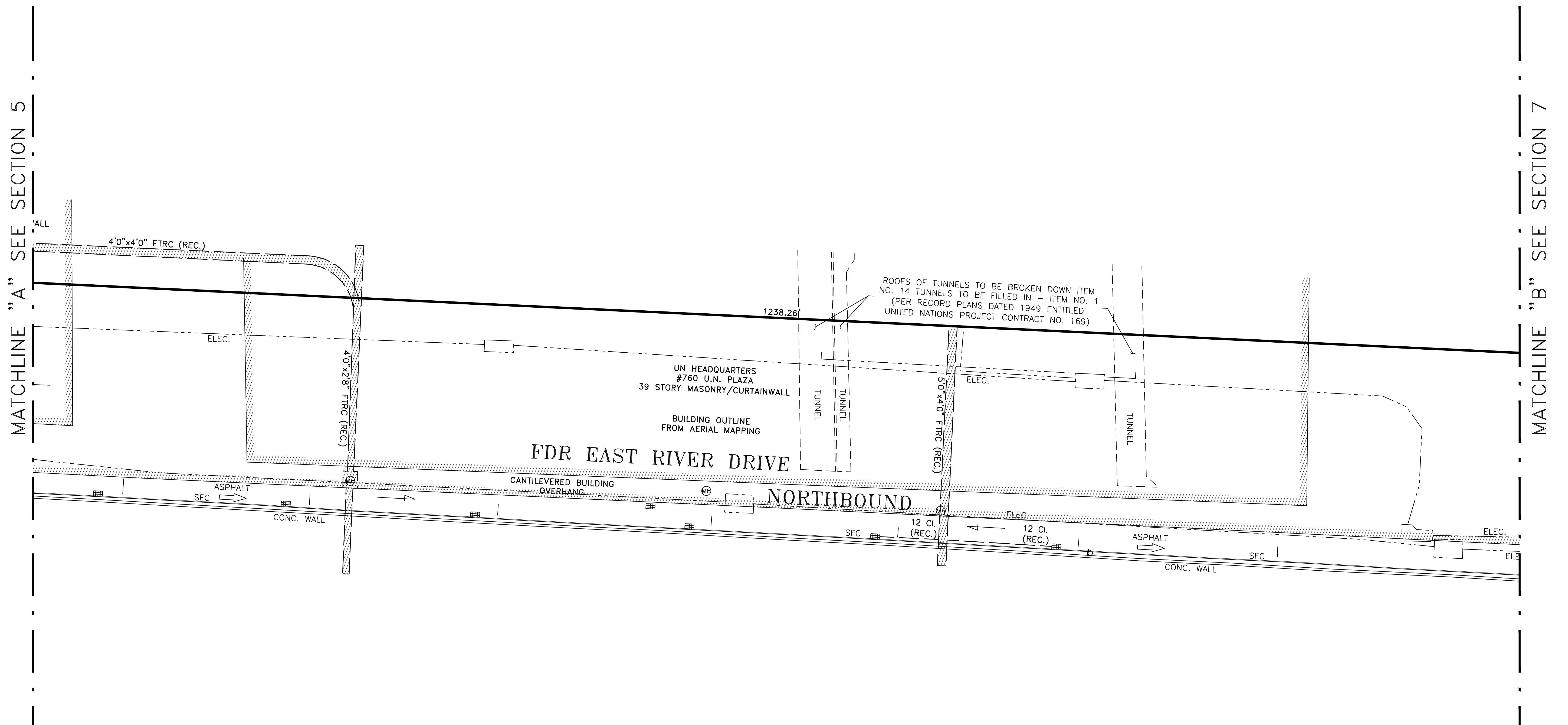
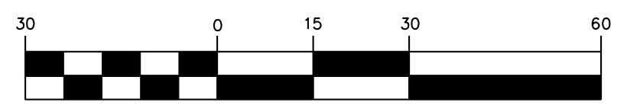




PLAN



(IN FEET)
1 inch = 30 ft.

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SCALE
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CADD FILE_Esplanade 6U.dwg_

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CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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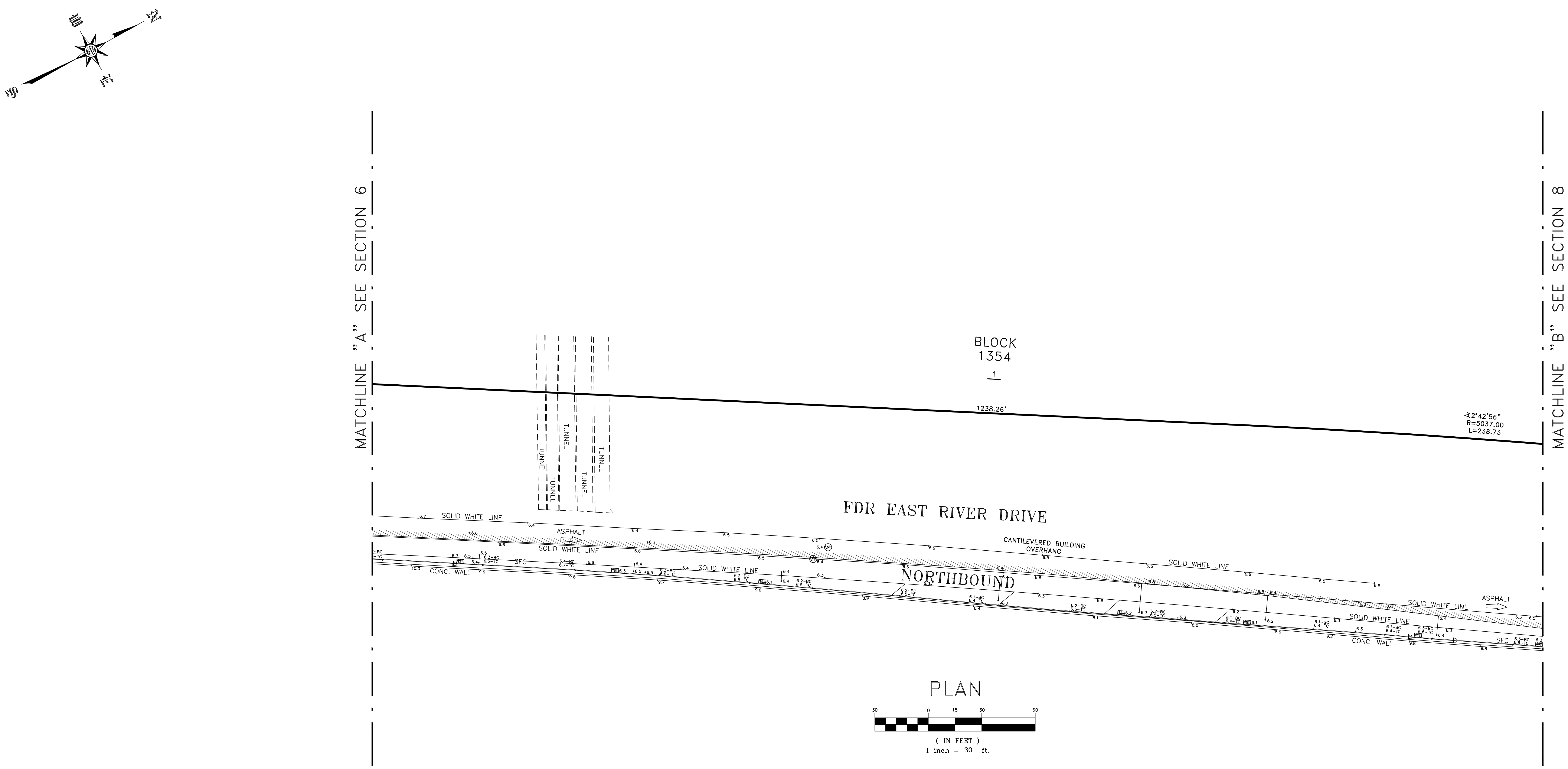

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NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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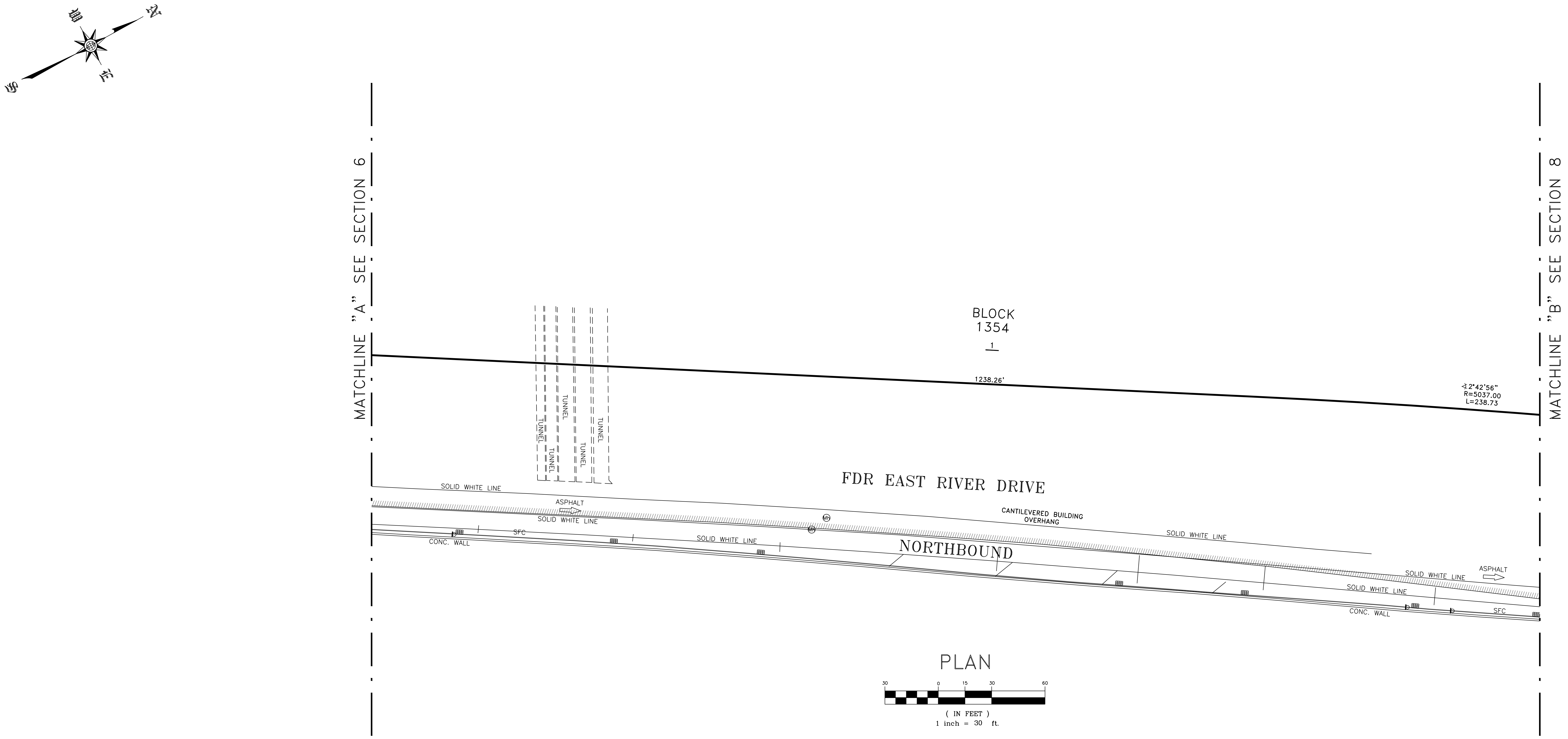

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DEPARTMENT OF DESIGN AND CONSTRUCTION

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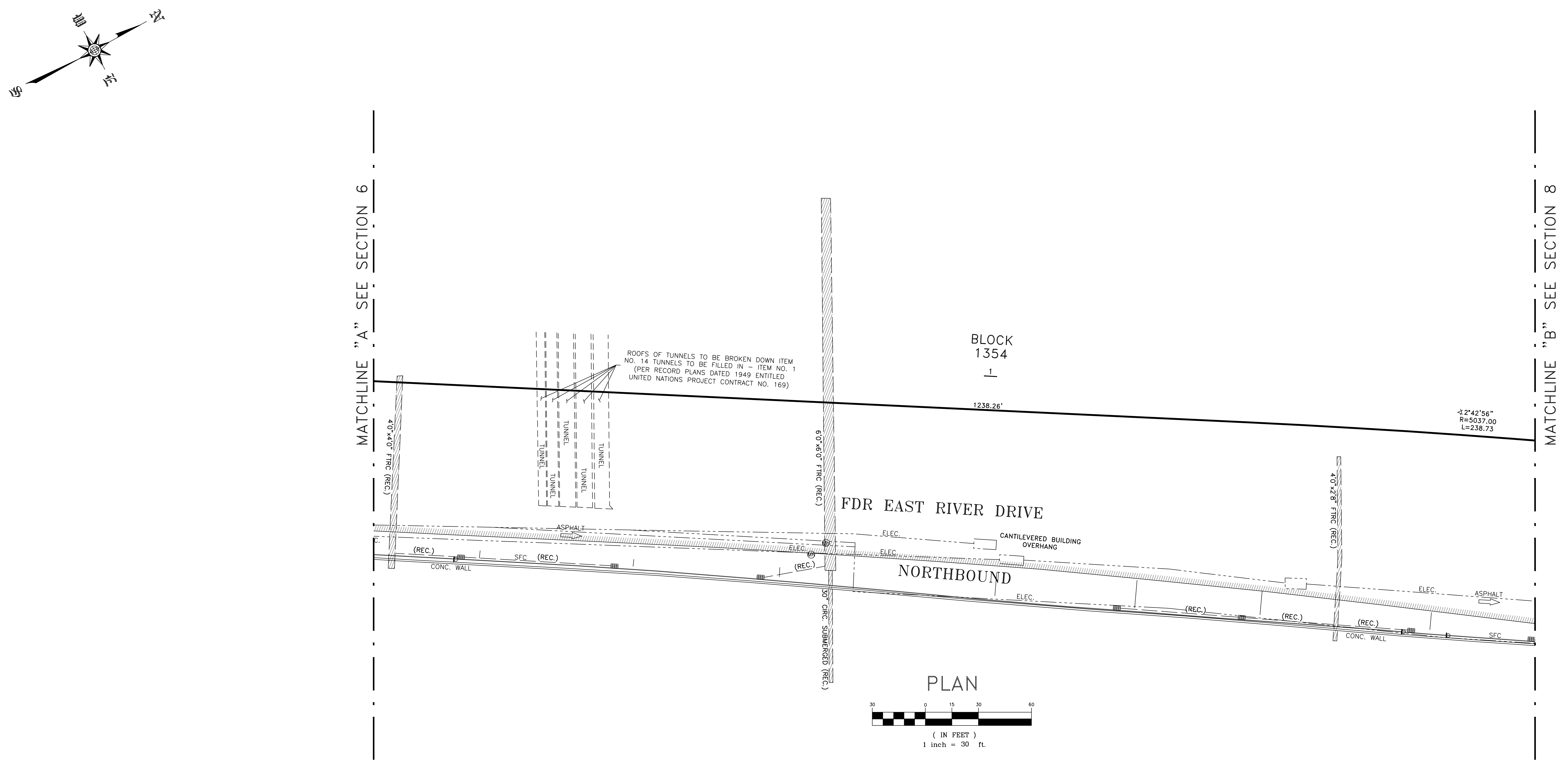

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SCALE
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CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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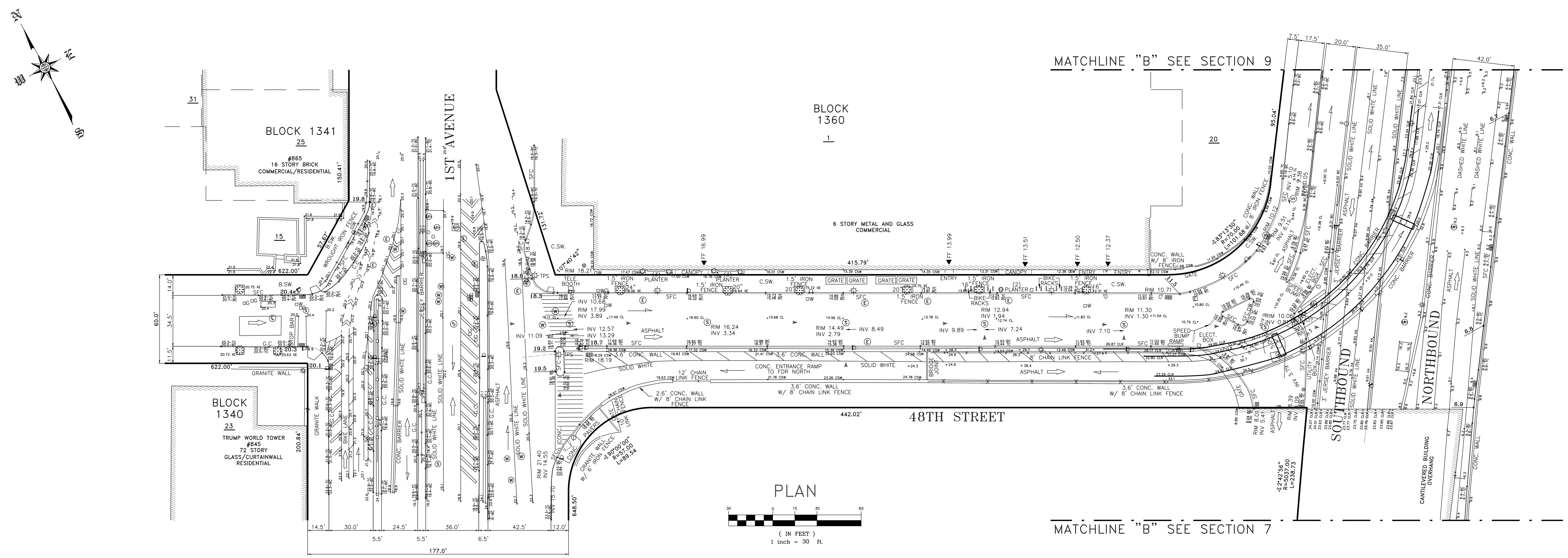

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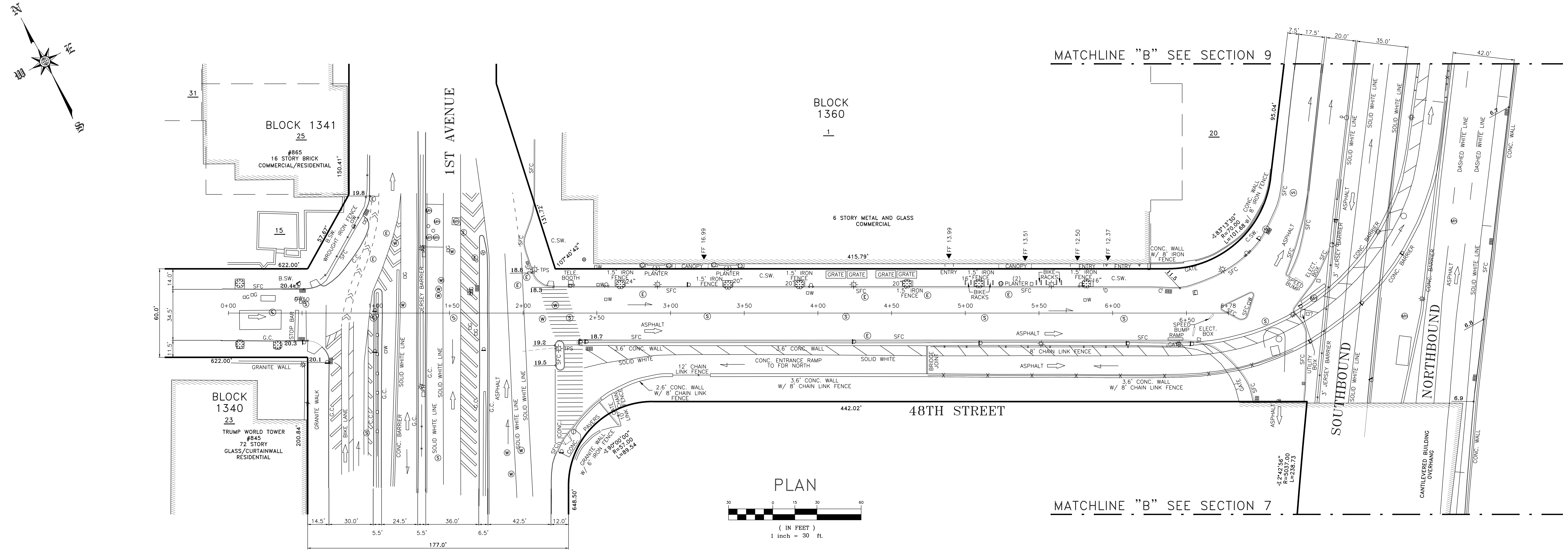

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CLEAN BASE

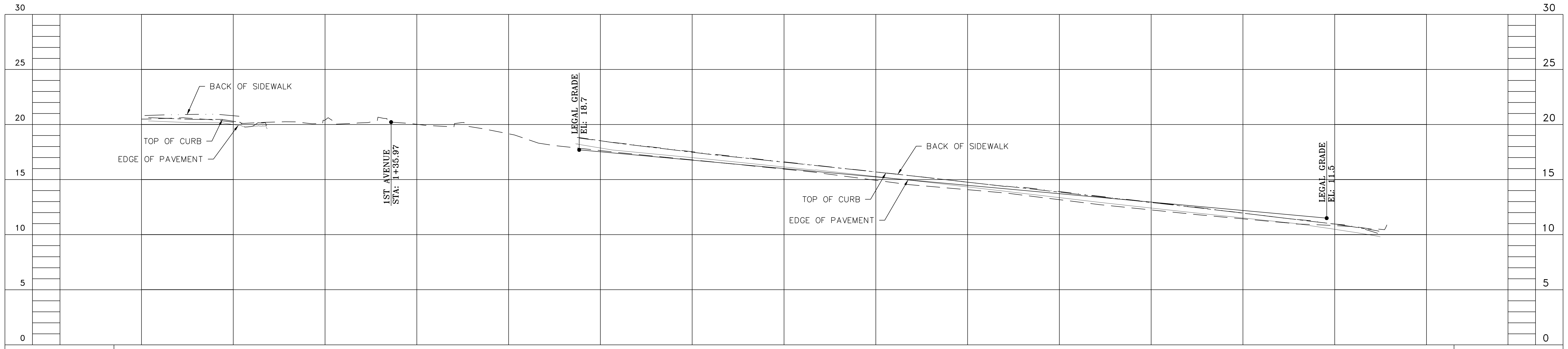
3761
A

DATE: 05/24/12

SHEET OF 8B

LEGEND:

- — — — — — EXISTING GRADE
- —·——·——·— TOP OF CURB
- ———————— EDGE OF PAVEMENT
- —··—··—··— BACK OF SIDEWALK

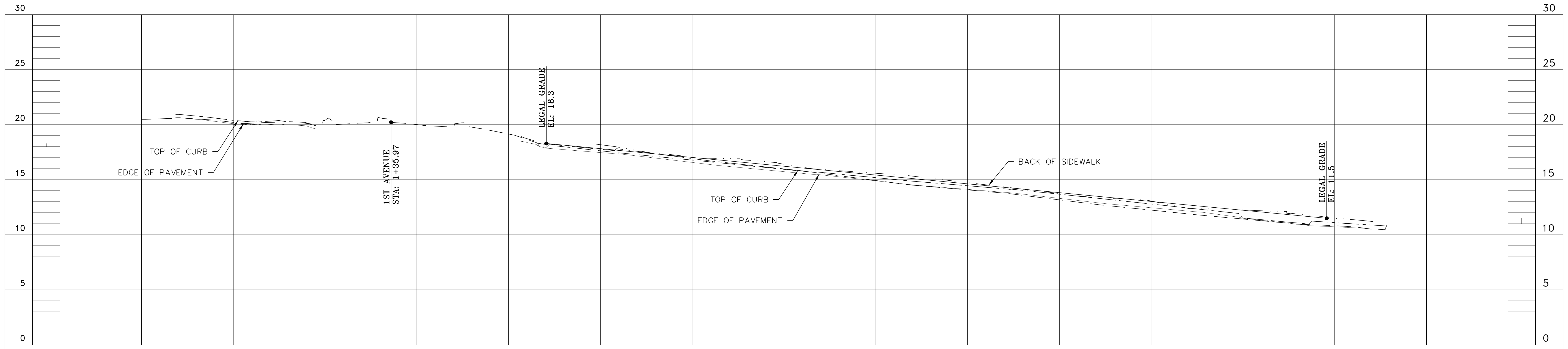


EXISTING GRADE	20.50	20.21	20.41	20.02	19.16	17.64	16.79	15.95	14.94	14.08	13.18	12.25	11.44	10.82		EXISTING GRADE
EDGE OF PAVEMENT		20.00				17.87	17.00	16.15	15.29	14.34	13.36	12.42	11.52	10.49		EDGE OF PAVEMENT
TOP OF CURB		20.30				18.53	17.49	16.58	15.69	14.77	13.86	12.92	11.96	10.96		TOP OF CURB
BACK OF SIDEWALK		20.80				18.53	17.53	16.61	15.71	14.77	13.92	12.96	11.96	10.97		BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00	5+50	6+00	6+50	7+00	STATION

HIGHWAY PROFILE ALONG 48TH STREET LOOKING SOUTH

30 0 15 30 60
(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10
(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE



EXISTING GRADE	20.50	20.21	20.41	20.02	19.16	17.64	16.79	15.95	14.94	14.08	13.18	12.25	11.44	10.82		EXISTING GRADE
EDGE OF PAVEMENT		20.10				17.47	16.58	15.74	14.91	14.13	13.32	12.46	11.50	10.73		EDGE OF PAVEMENT
TOP OF CURB		20.40				17.47	16.58	15.74	14.91	14.13	13.32	12.46	11.50	10.73		TOP OF CURB
BACK OF SIDEWALK						18.19	17.03	16.42	15.59	14.74	13.76	13.07	12.27	11.50		BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00	5+50	6+00	6+50	7+00	STATION

HIGHWAY PROFILE ALONG 48TH STREET LOOKING NORTH

30 0 15 30 60
(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10
(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

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FIELD SURVEY WAS COMPLETED IN: JANUARY, 2012

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED_______________
DRAWN_____M. DAMES_____
TRACED________________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE Esplanade 8H.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

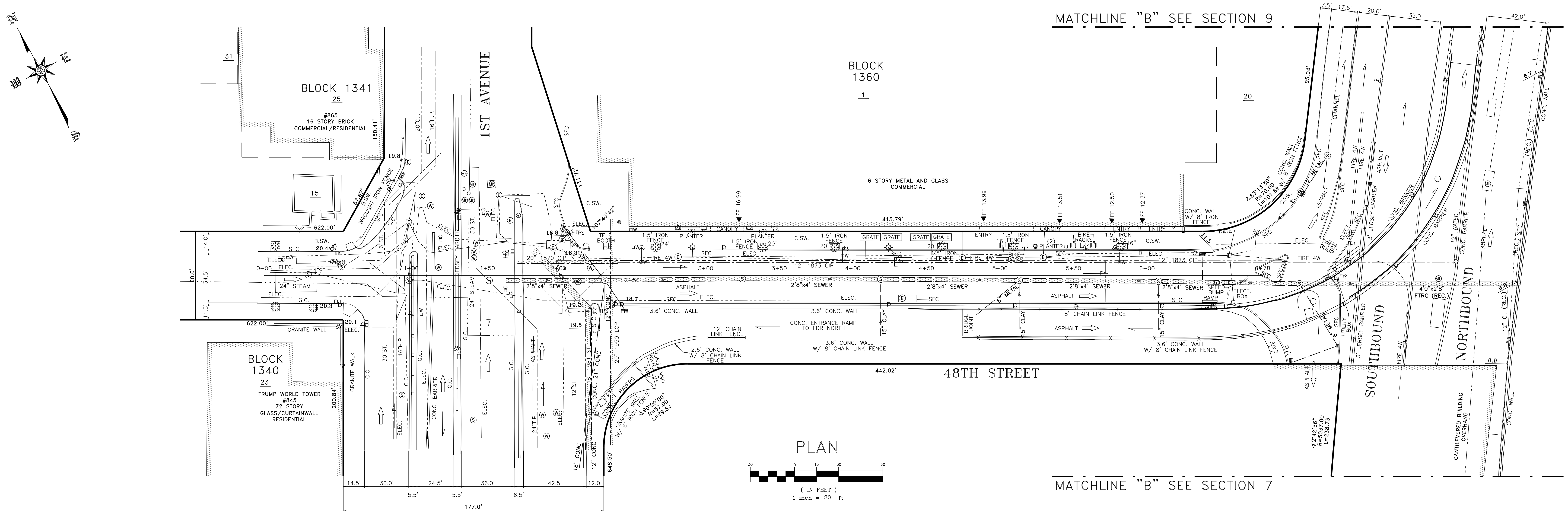
SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
DIVISION OF TECHNICAL SUPPORT
BUREAU OF SITE ENGINEERING
TOPOGRAPHICAL SECTION

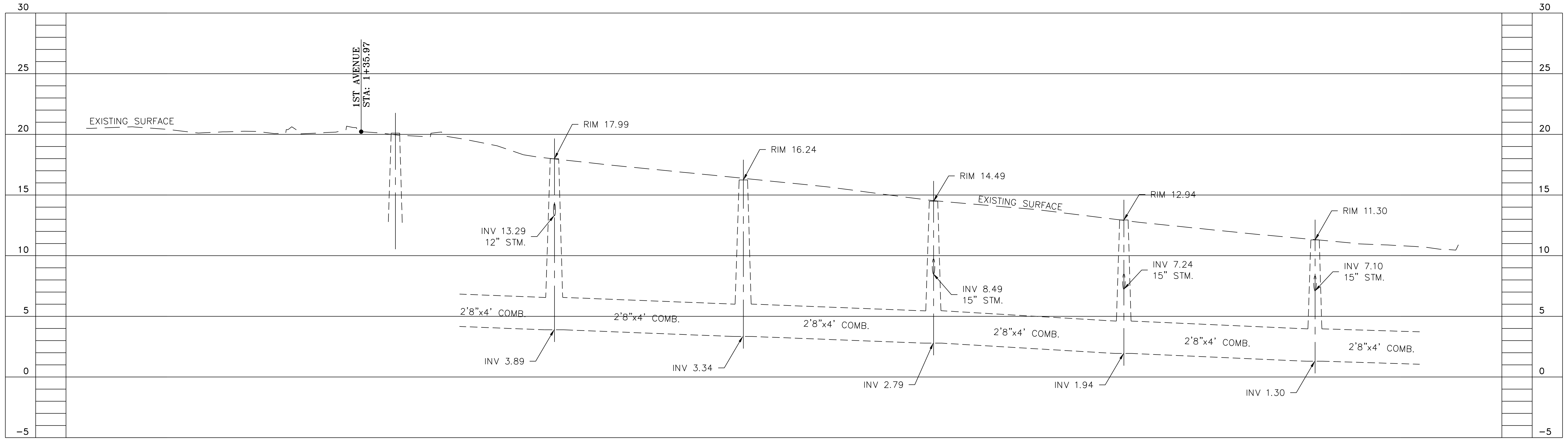
PROJECT ID#
FOR THE CONSTRUCTION OF
EAST MIDTOWN ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
HIGHWAY PROFILES

3761
A
DATE: 05/24/12

SHEET OF 8H



PLAN



UTILITY PROFILE ALONG 48TH STREET

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

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DESIGNED_______________
DRAWN M. DAMES
TRACED_______________
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 8U.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

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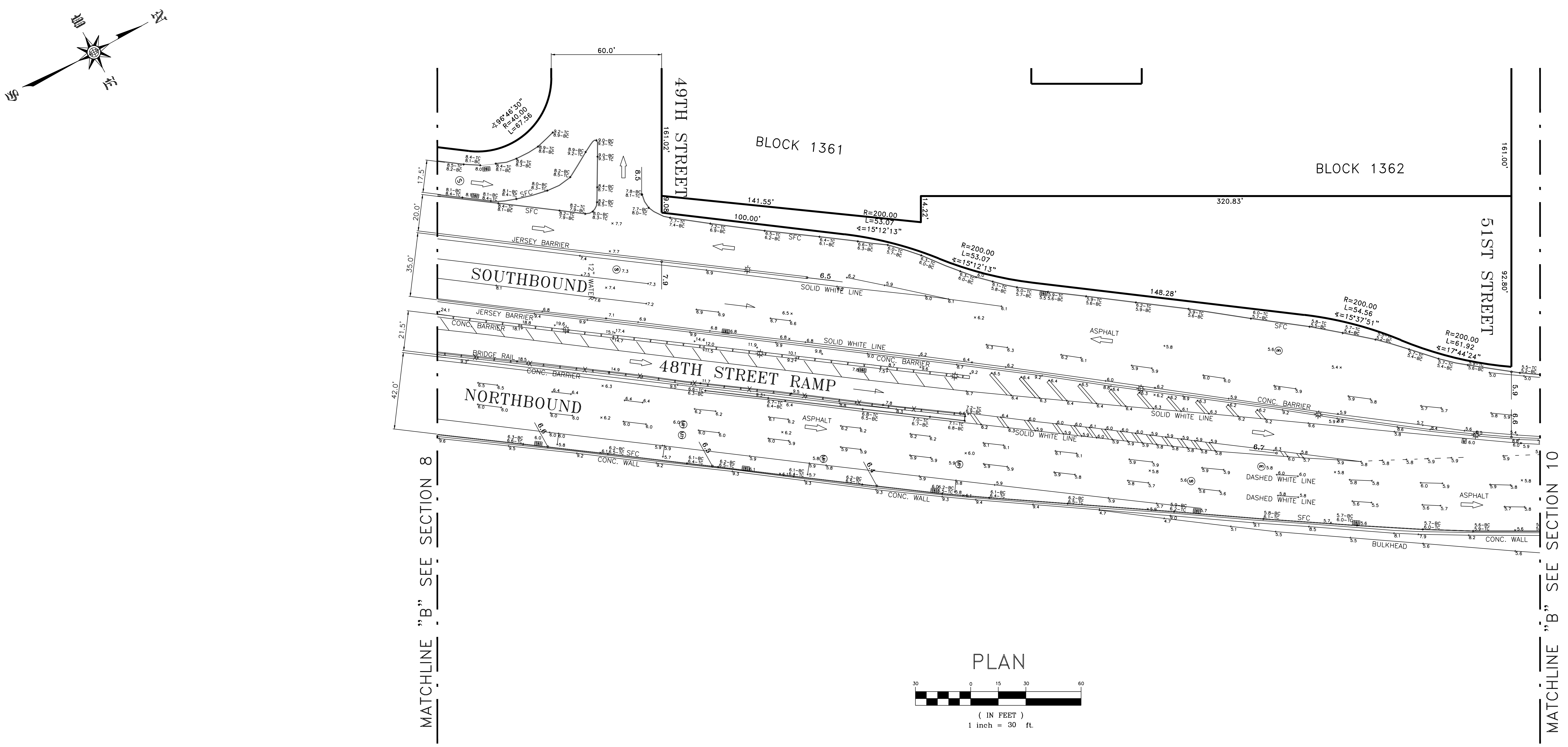
BOROUGH OF MANHATTAN
UTILITY PLAN

3761
A
DATE: 05/24/12

SHEET OF 8U



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DRAWN M. DAMES
TRACED
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 9T.dwg

GROUP LEADER

P.E.
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CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

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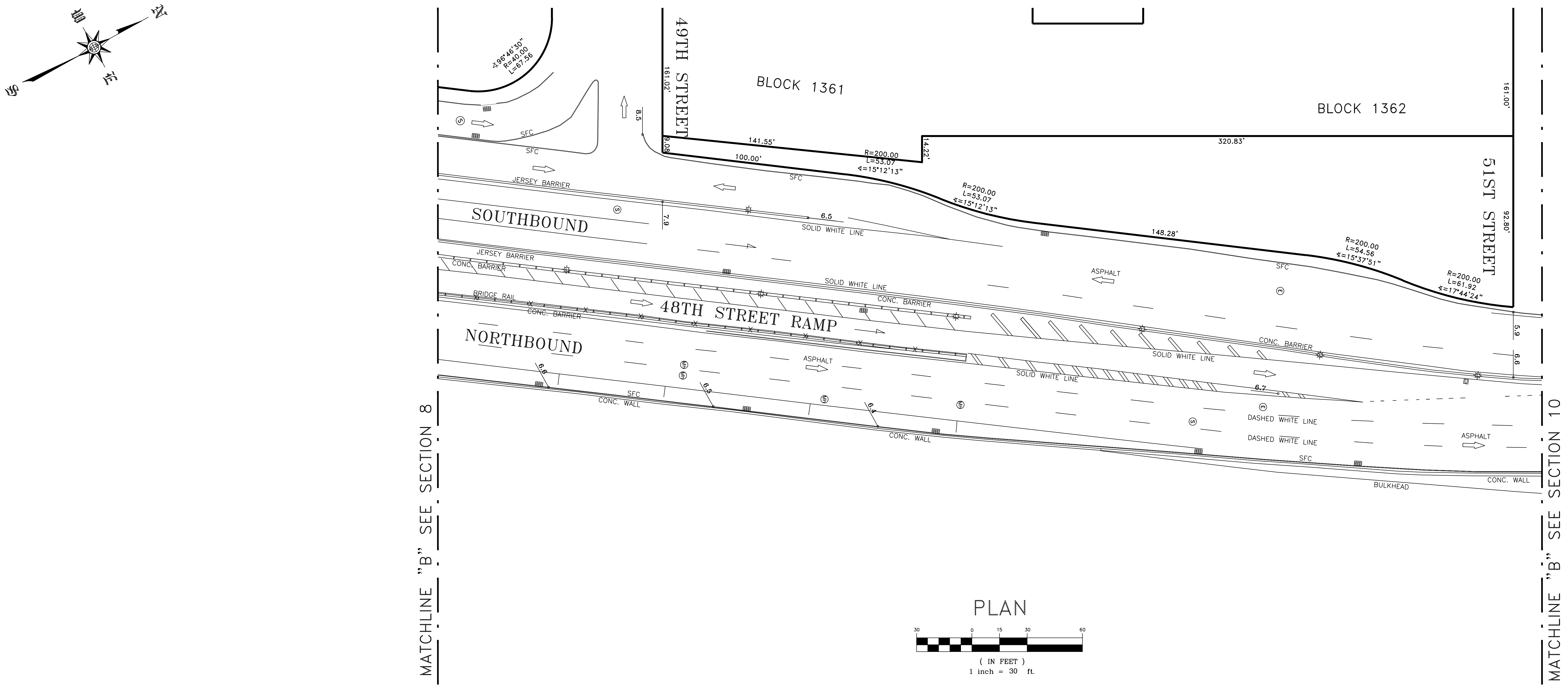
BOROUGH OF MANHATTAN
TOPOGRAPHICAL PLAN

3761
A

DATE: 05/24/12

SHEET OF 9T



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DRAWN M. DAMES
TRACED______________
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 9B.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

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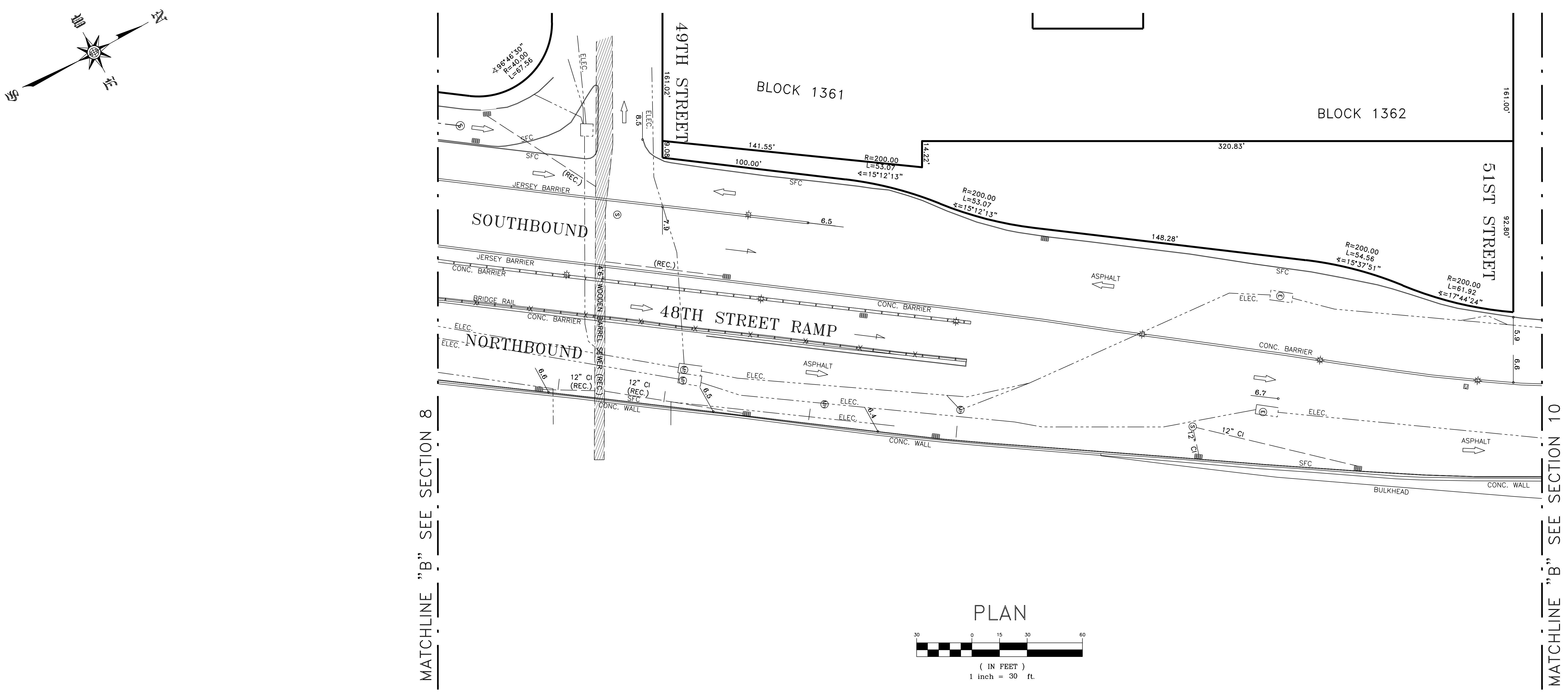
BOROUGH OF MANHATTAN
CLEAN BASE

3761
A

DATE: 05/24/12

SHEET OF 9B



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DRAWN_____M. DAMES_____
TRACED________________
CHECKED___A. HURLEY____

SCALE
AS SHOWN

CADD FILE_Esplanade 9U.dwg_

GROUP LEADER
P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
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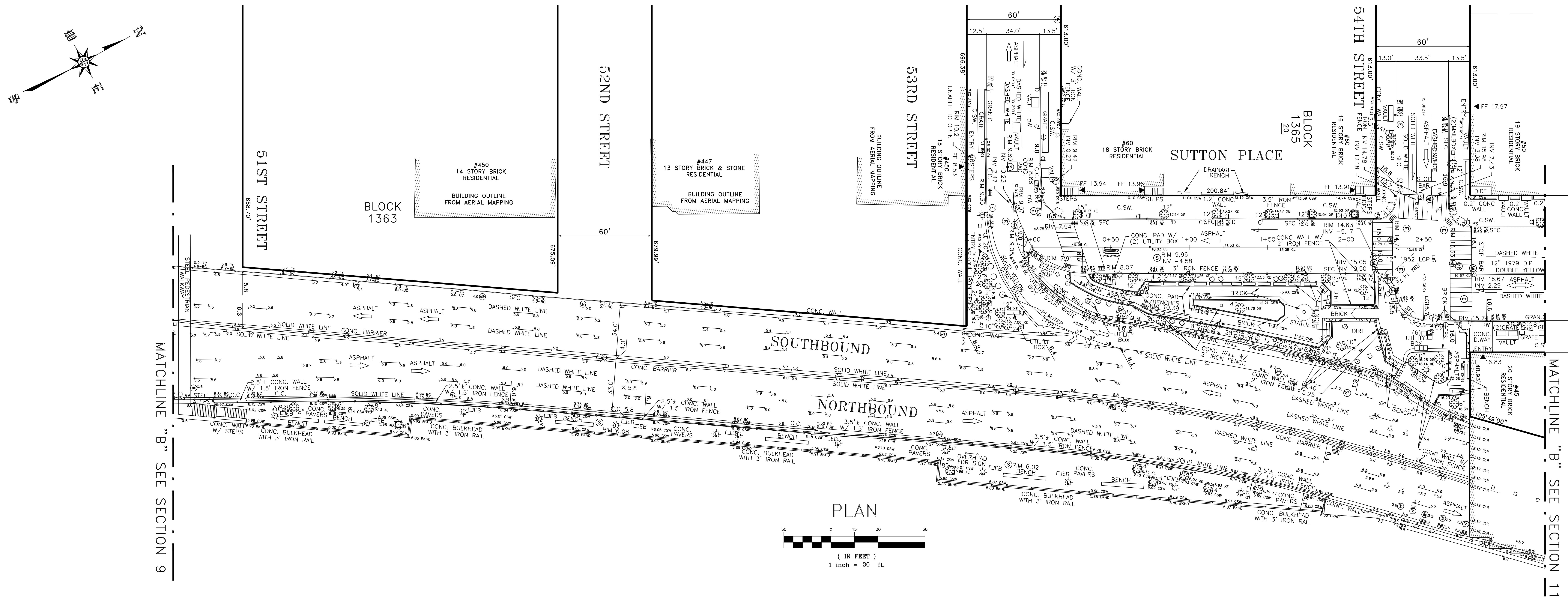
SHEET OF 9U



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TRACED_________________
CHECKED___A. HURLEY____

SCALE
AS SHOWN

CADD FILE_Esplanade 10T.dwg_

____
GROUP LEADER

___________________________P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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3761
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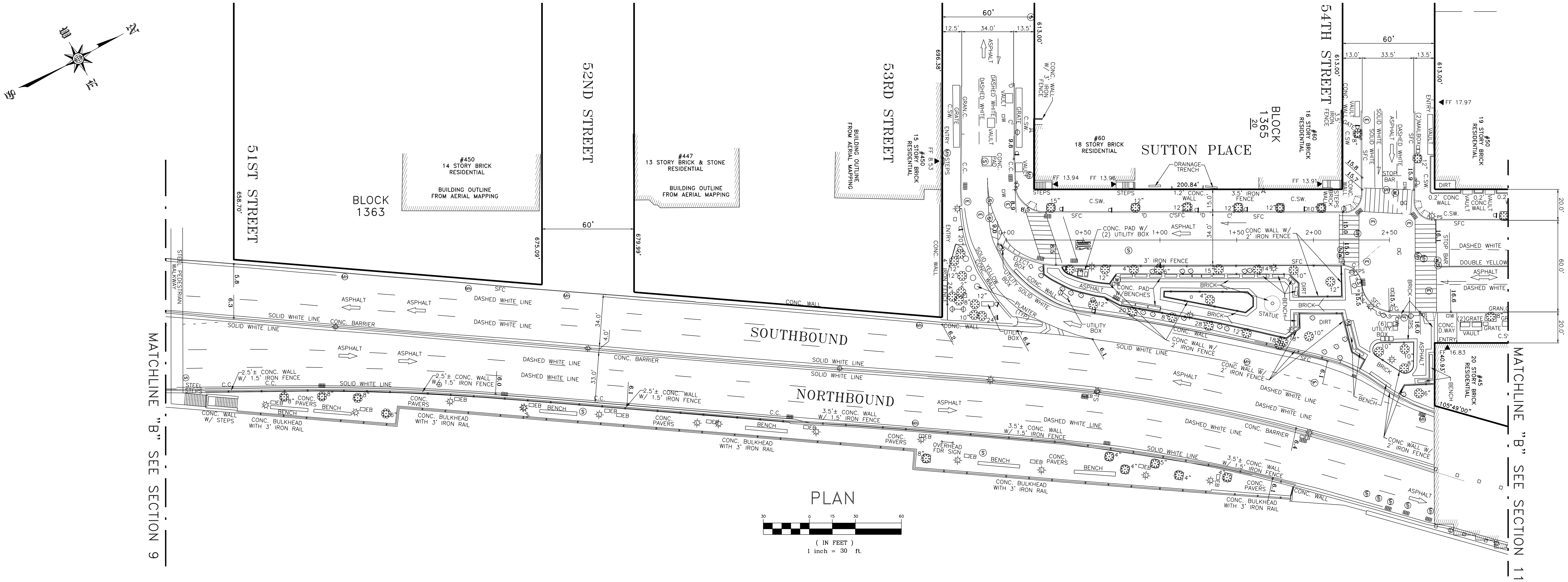
SHEET OF 10T



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DRAWN M. DAMES
TRACED
CHECKED A. HURLEY

SCALE
AS SHOWN

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GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

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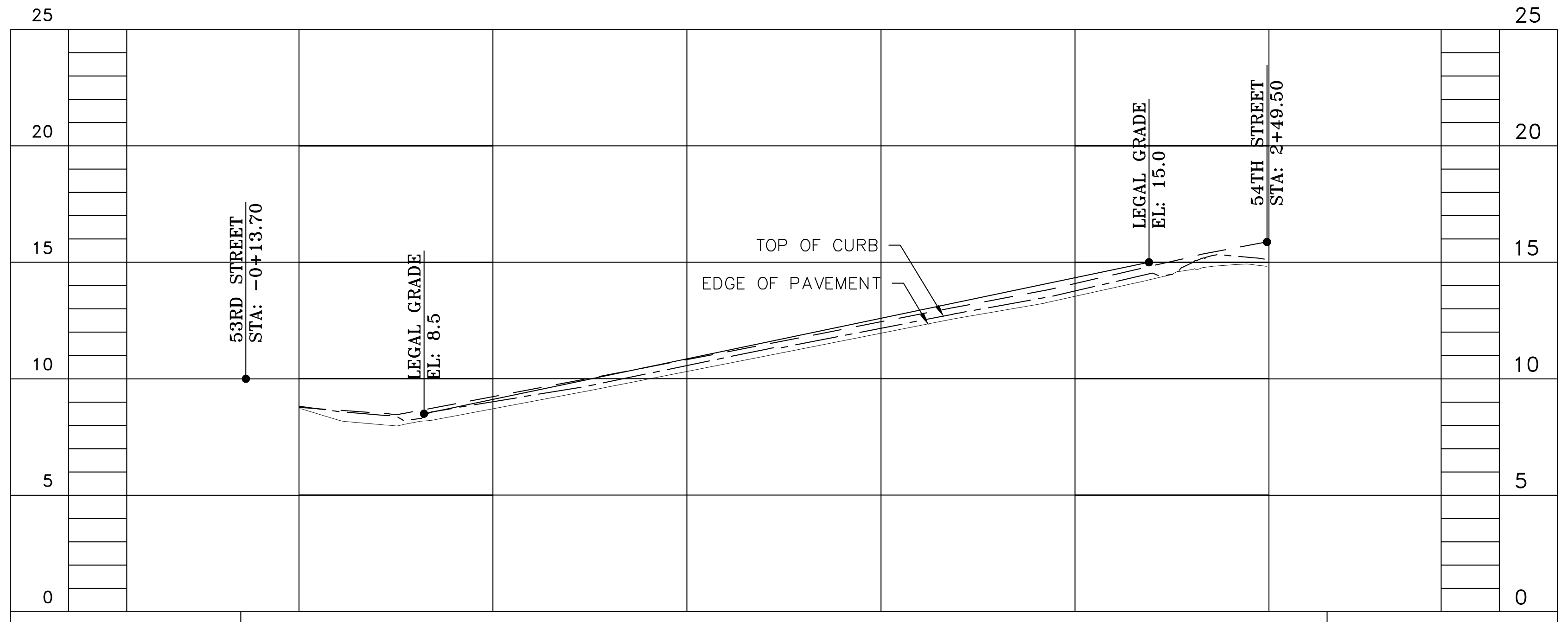
CLEAN BASE

3761
A
DATE: 05/24/12

SHEET OF 10B

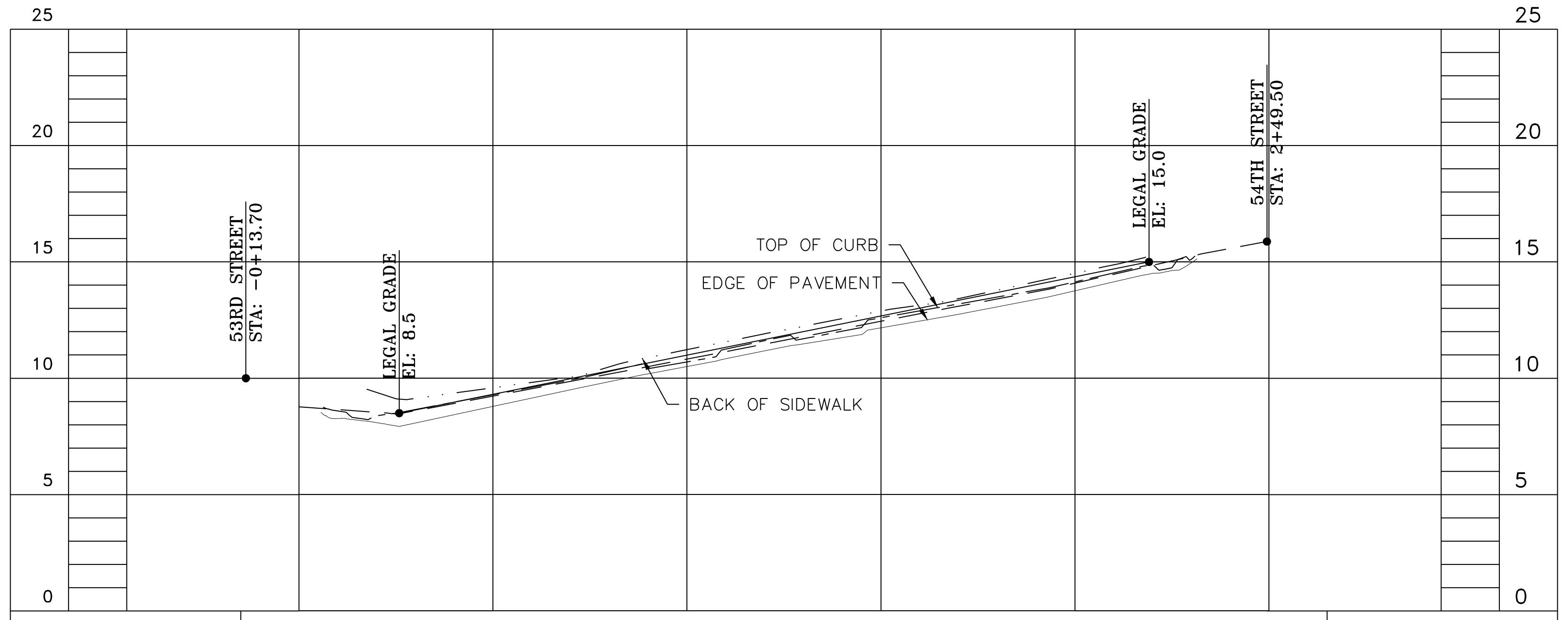
LEGEND:

— — — — — —	EXISTING GRADE
—— - —— - —— -	TOP OF CURB
————————	EDGE OF PAVEMENT
— - — — - - — — - -	BACK OF SIDEWALK



EXISTING GRADE	8.77	9.23	10.82	12.45	14.09		EXISTING GRADE
EDGE OF PAVEMENT		8.71	10.31	11.95	13.54		EDGE OF PAVEMENT
TOP OF CURB		9.01	10.57	12.17	13.77		TOP OF CURB
BACK OF SIDEWALK							BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	STATION

HIGHWAY PROFILE ALONG SUTTON PLACE LOOKING EAST



EXISTING GRADE	8.77	9.23	10.82	12.45	14.09		EXISTING GRADE
EDGE OF PAVEMENT		8.79	10.50	12.17	13.76		EDGE OF PAVEMENT
TOP OF CURB		9.29	10.70	12.60	14.14		TOP OF CURB
BACK OF SIDEWALK		9.59	11.23	12.89	14.52		BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	STATION

HIGHWAY PROFILE ALONG SUTTON PLACE LOOKING WEST

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DRAWN_____M. DAMES_____
TRACED______________
CHECKED___A. HURLEY___

SCALE
AS SHOWN

CADD FILE_Esplanade 10H.dwg_

____
GROUP LEADER

______________________P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
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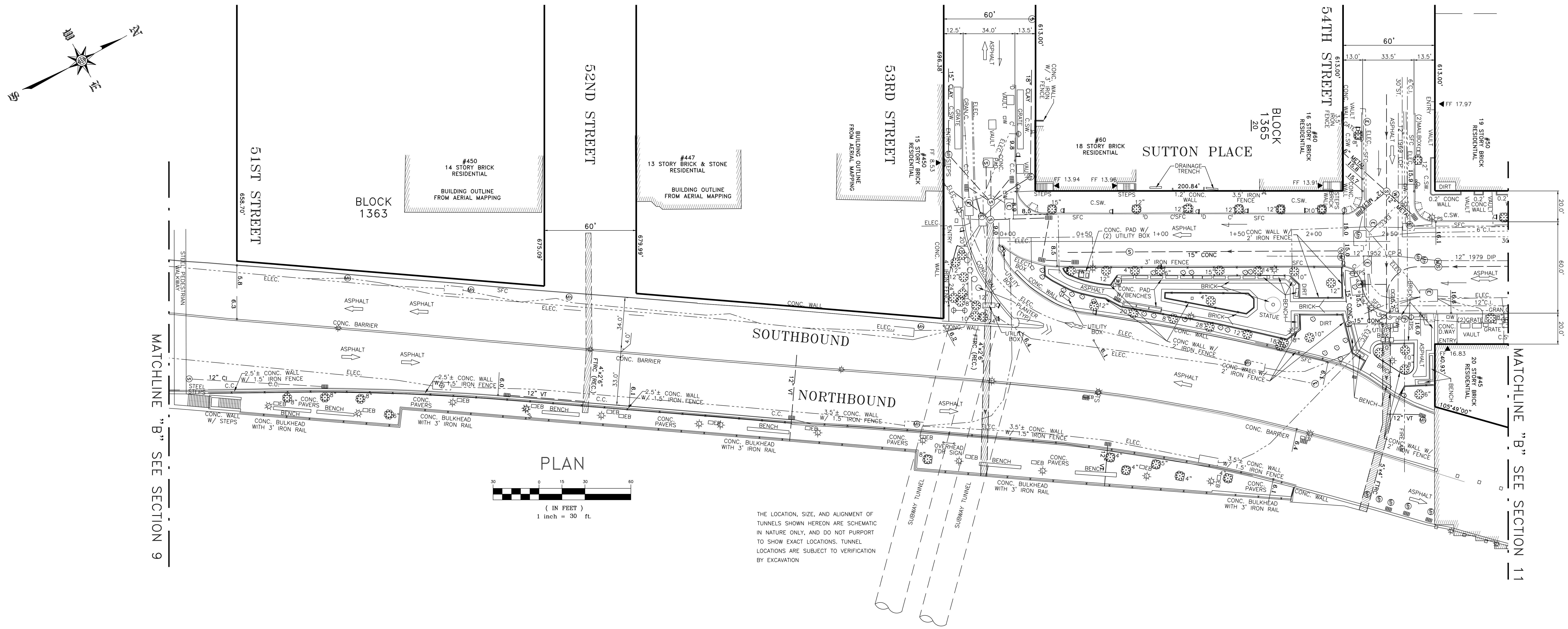
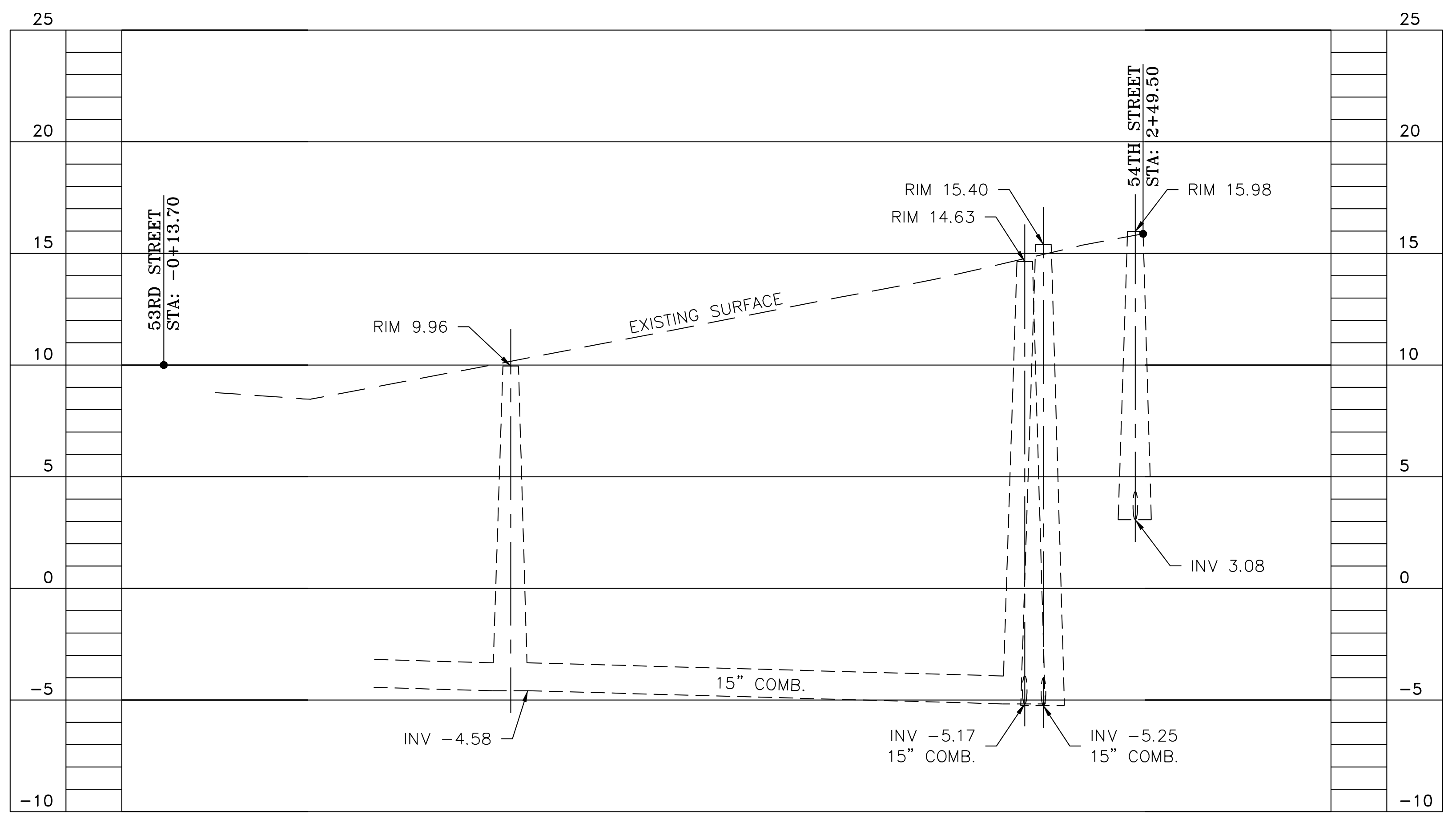


PLAN

(IN FEET)
1 inch = 30 ft.

THE LOCATION, SIZE, AND ALIGNMENT OF TUNNELS SHOWN HEREON ARE SCHEMATIC IN NATURE ONLY, AND DO NOT PURPORT TO SHOW EXACT LOCATIONS. TUNNEL LOCATIONS ARE SUBJECT TO VERIFICATION BY EXCAVATION



UTILITY PROFILE ALONG SUTTON PLACE

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

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"UNAUTHORIZED ALTERATIONS OR ADDITION TO A LAND SURVEYING DRAWING BEARING A LICENSED PROFESSIONAL LAND SURVEYOR'S SEAL IS A VIOLATION OF ARTICLE 145, SECTION 7209, PARAGRAPH 2 OF THE NEW YORK STATE EDUCATION LAW"

FIELD SURVEY WAS COMPLETED IN: JANUARY, 2012

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED________
DRAWN M. DAMES
TRACED________
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 10U.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

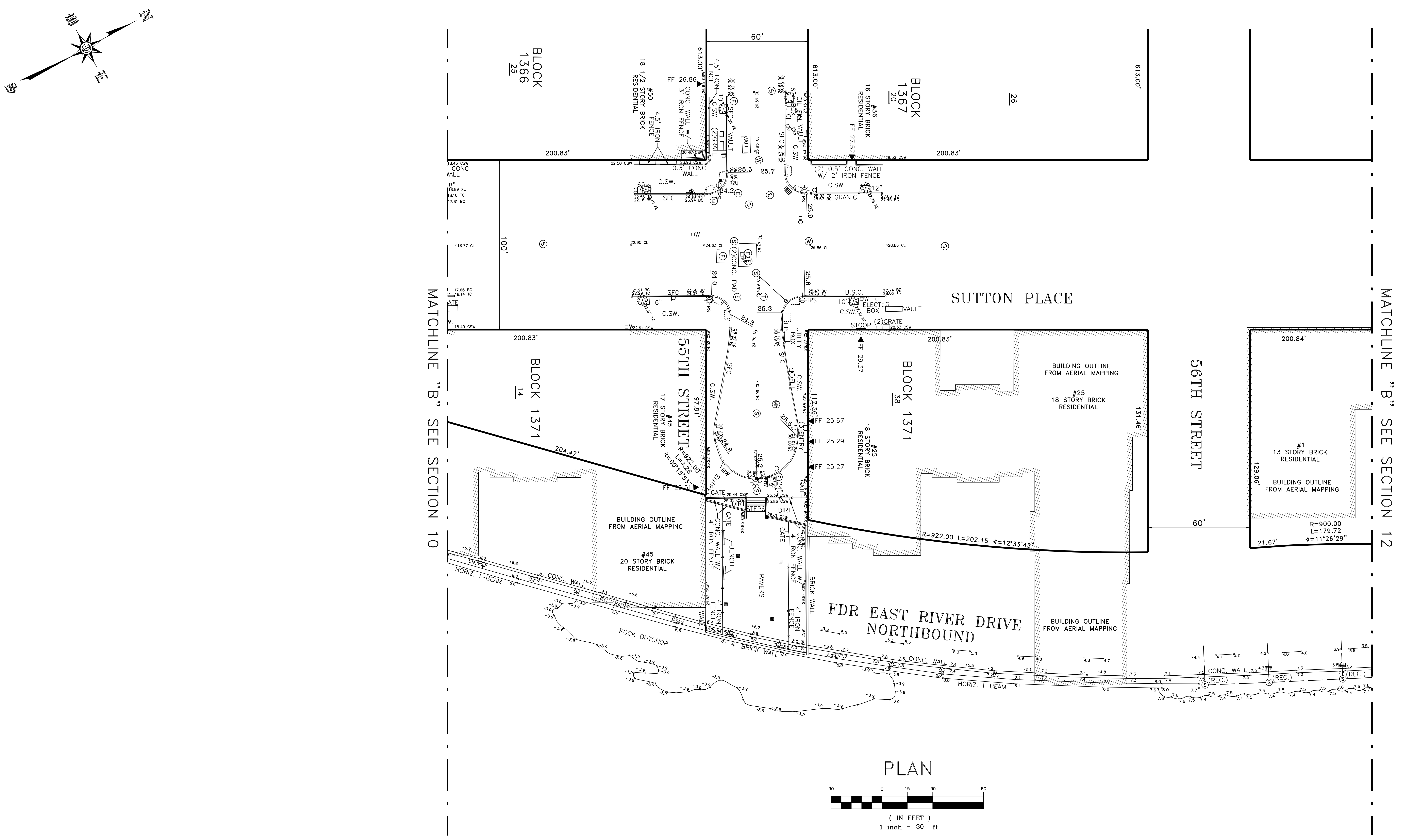
PREPARED FOR:
DIVISION OF TECHNICAL SUPPORT
BUREAU OF SITE ENGINEERING
TOPOGRAPHICAL SECTION

PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
EAST MIDTOWN WATERFRONT ESPLANADE
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
UTILITY PLAN

3761
A

DATE: 05/24/12

SHEET OF 10U



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SCALE
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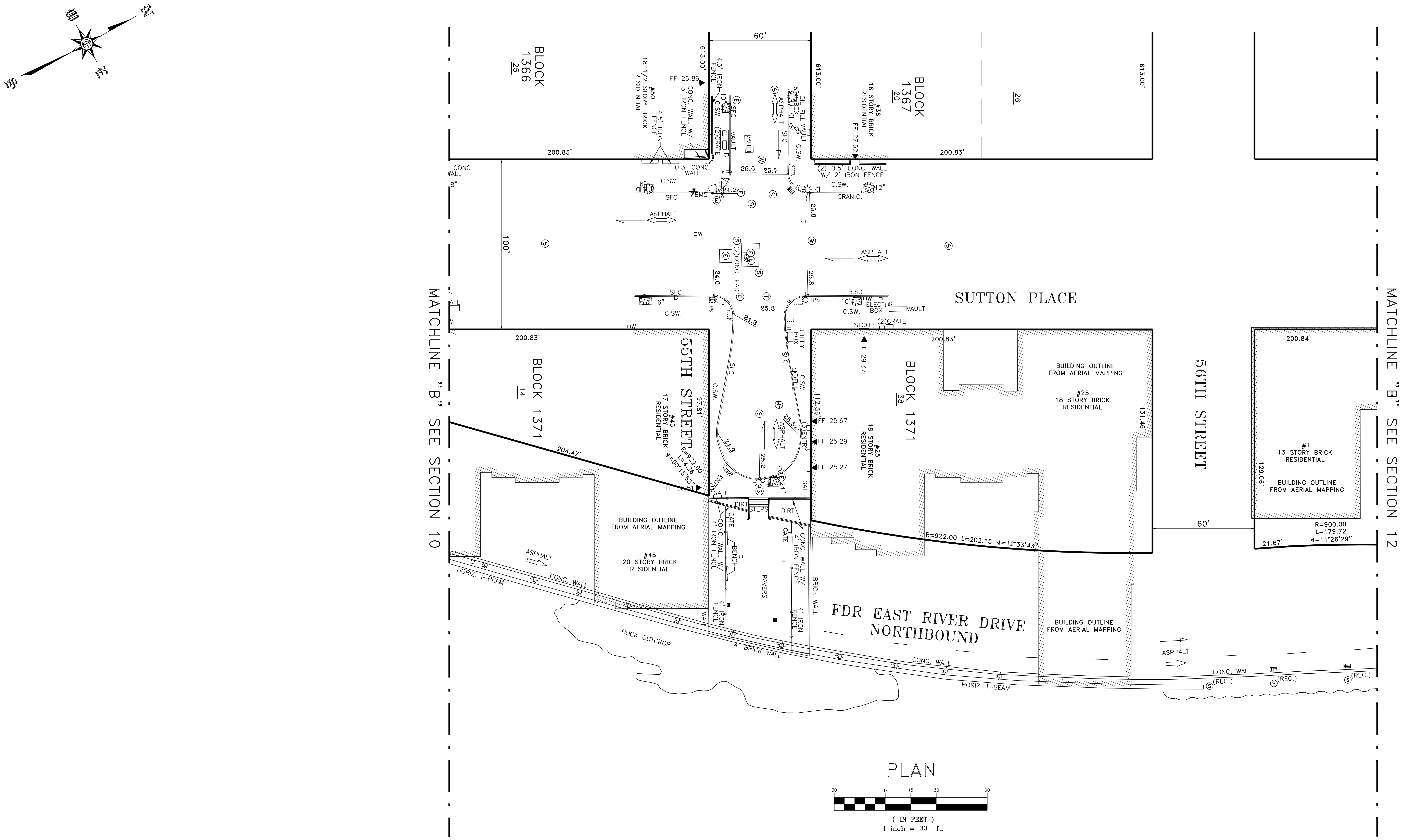
BOROUGH OF MANHATTAN
TOPOGRAPHICAL PLAN

3761
A
DATE: 05/24/12

SHEET 11T OF



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SCALE
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CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

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BOROUGH OF MANHATTAN
CLEAN BASE

3761
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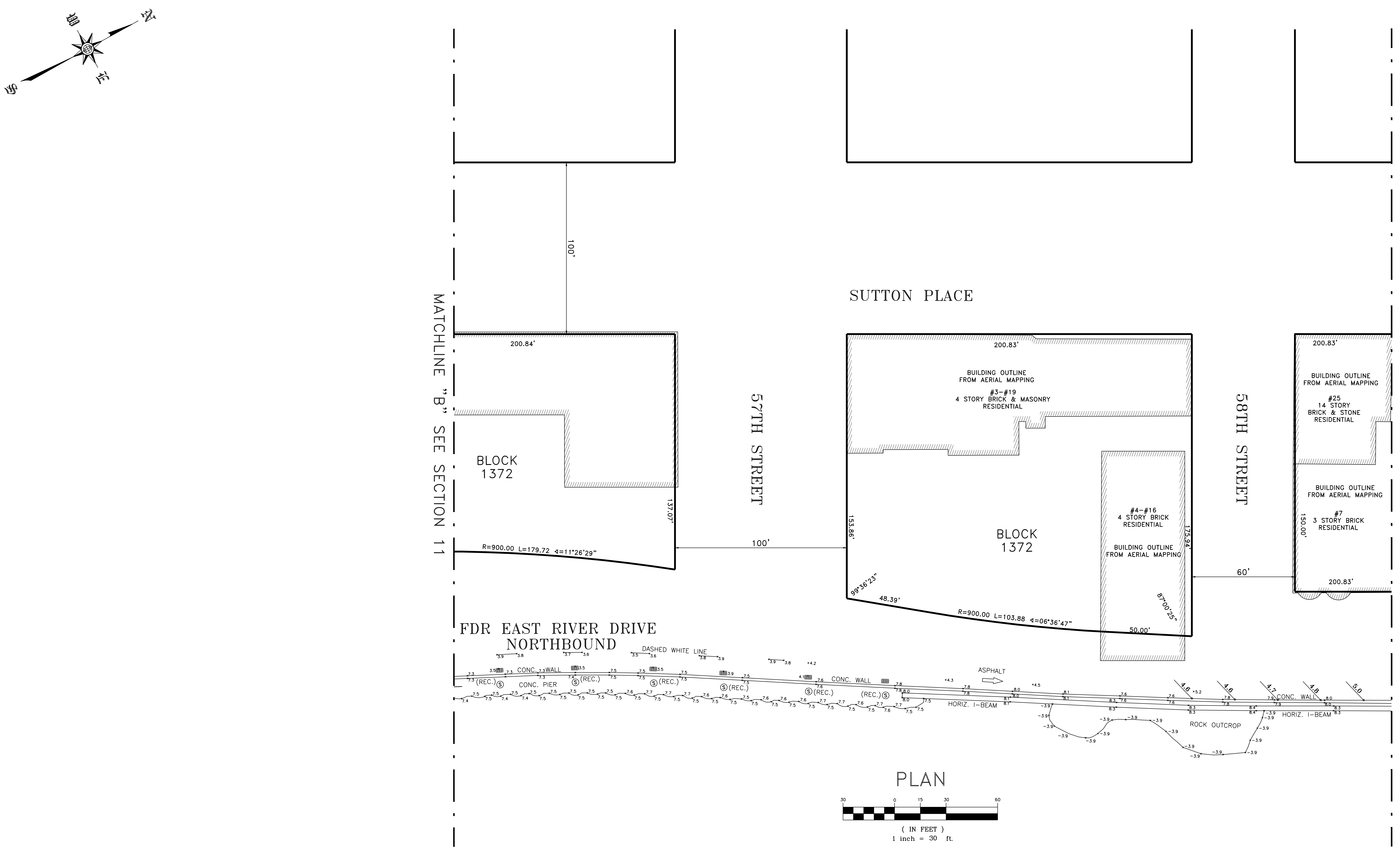
SHEET OF 11B



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DRAWN_____M. DAMES_____
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SCALE
AS SHOWN

CADD FILE_Esplanade 12T.dwg_

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GROUP LEADER

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ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

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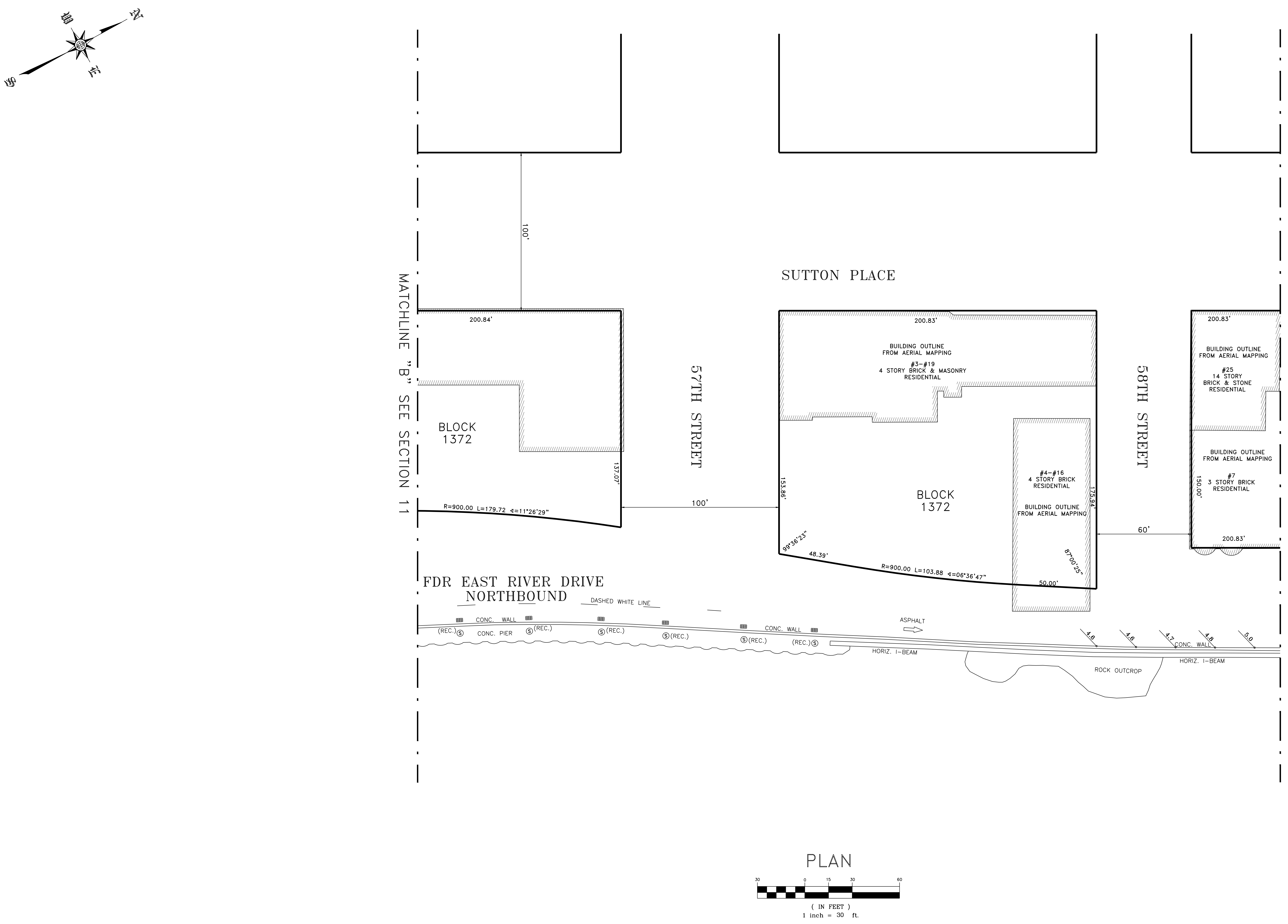
BOROUGH OF MANHATTAN
TOPOGRAPHICAL PLAN

3761
A

DATE: 05/24/12

SHEET OF 12T



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SCALE
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CADD FILE_Esplanade 12B.dwg_

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GROUP LEADER

______________________P.E.
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CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

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BOROUGH OF MANHATTAN
CLEAN BASE

3761
A

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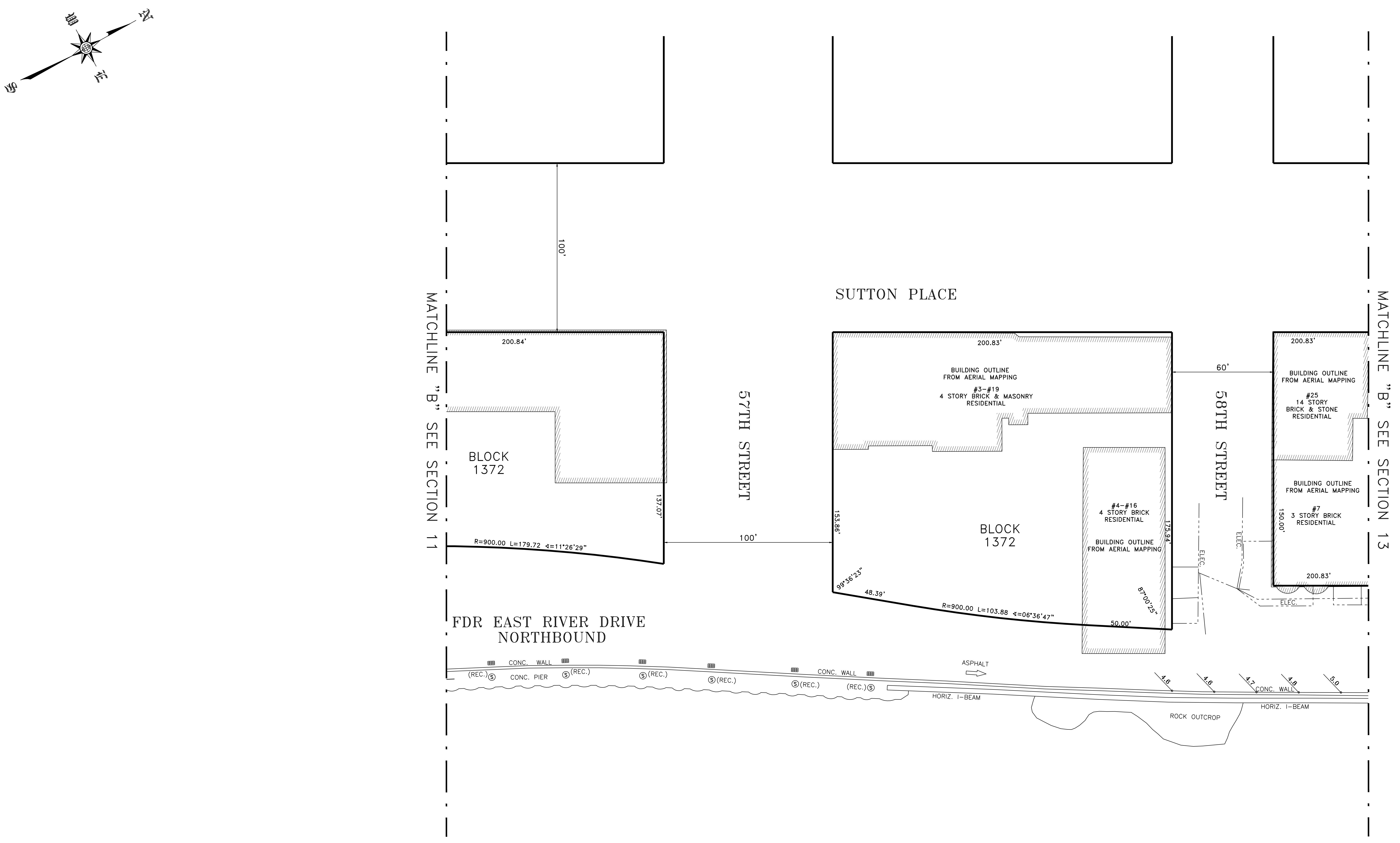
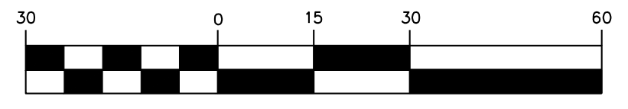
SHEET OF 12B



PLAN



(IN FEET)
1 inch = 30 ft.

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DRAWN_____M. DAMES_____
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SCALE
AS SHOWN

CADD FILE Esplanade 12U.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
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CLIFTON PARK, NY 12065

PREPARED FOR:
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BOROUGH OF MANHATTAN
UTILITY PLAN

3761
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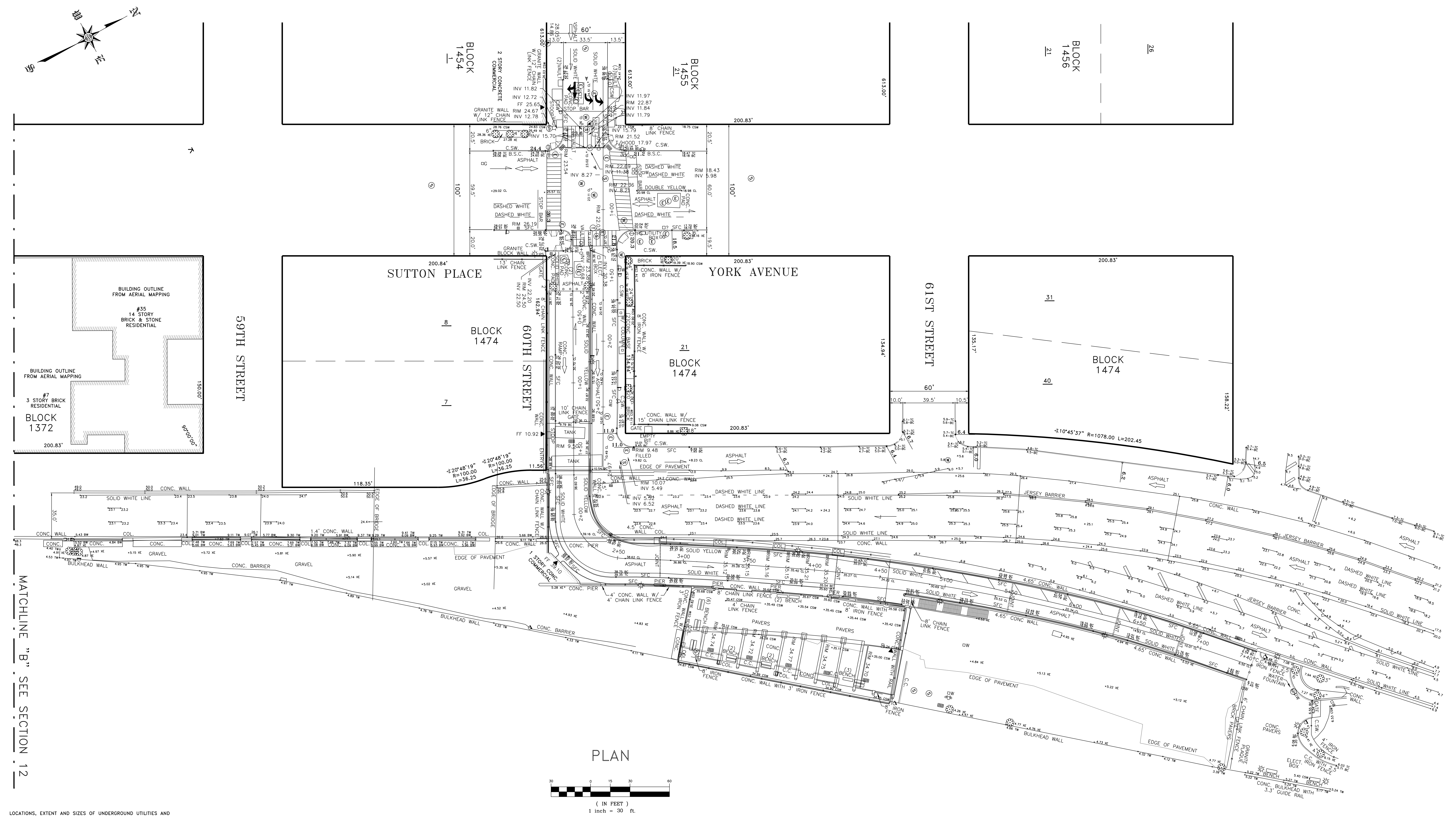
SHEET OF 12U



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CHECKED A. HURLEY

SCALE
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CITY OF NEW YORK
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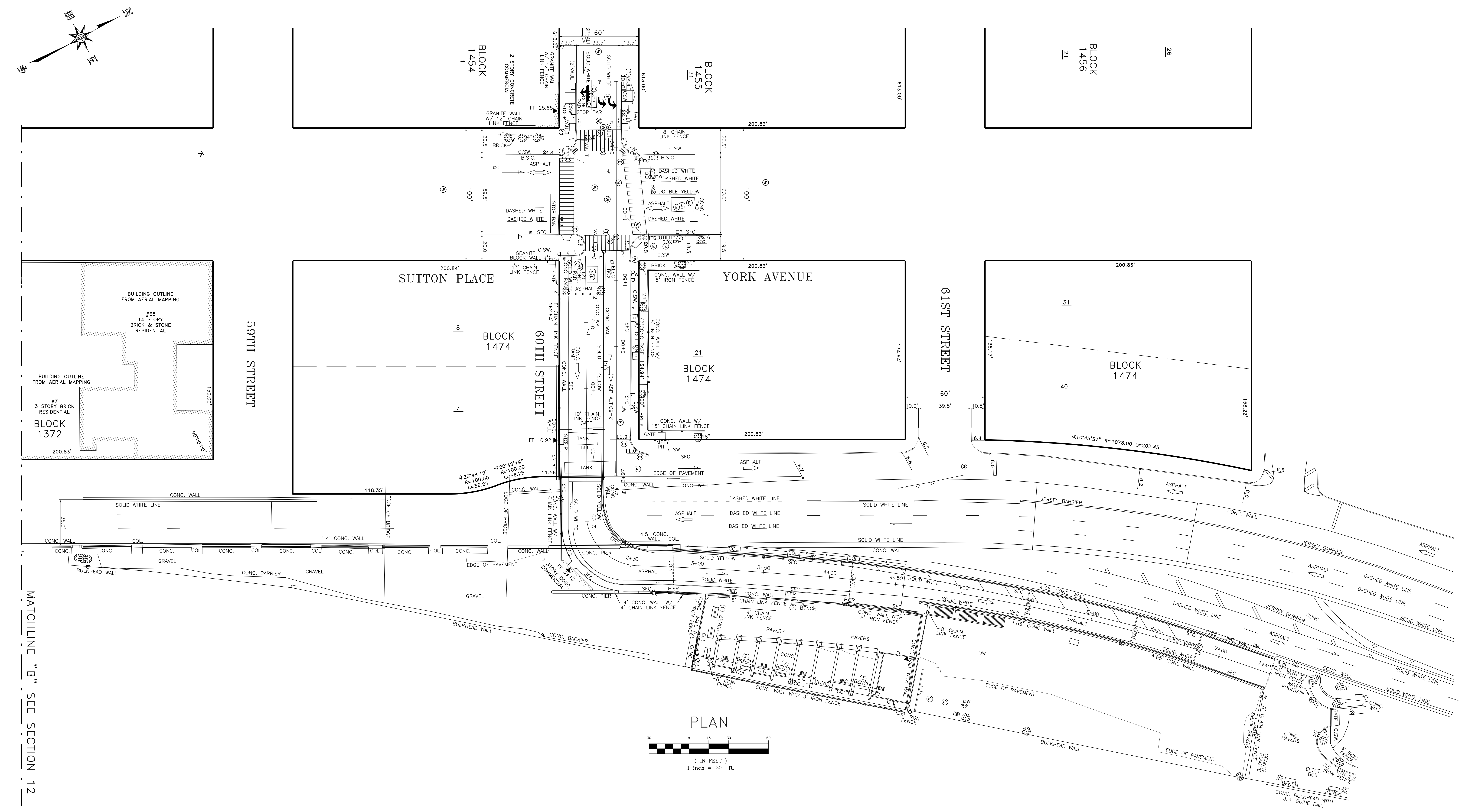

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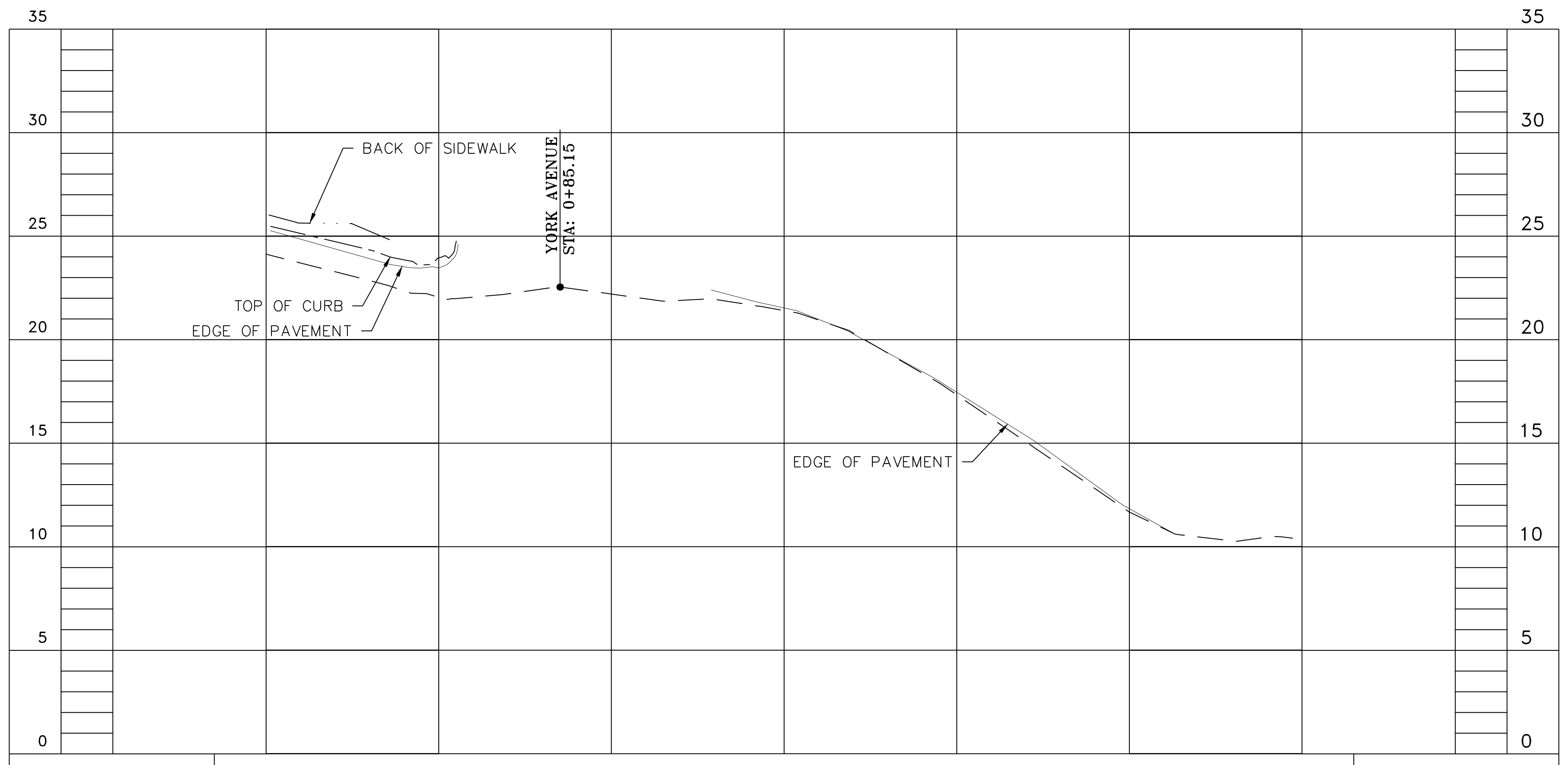
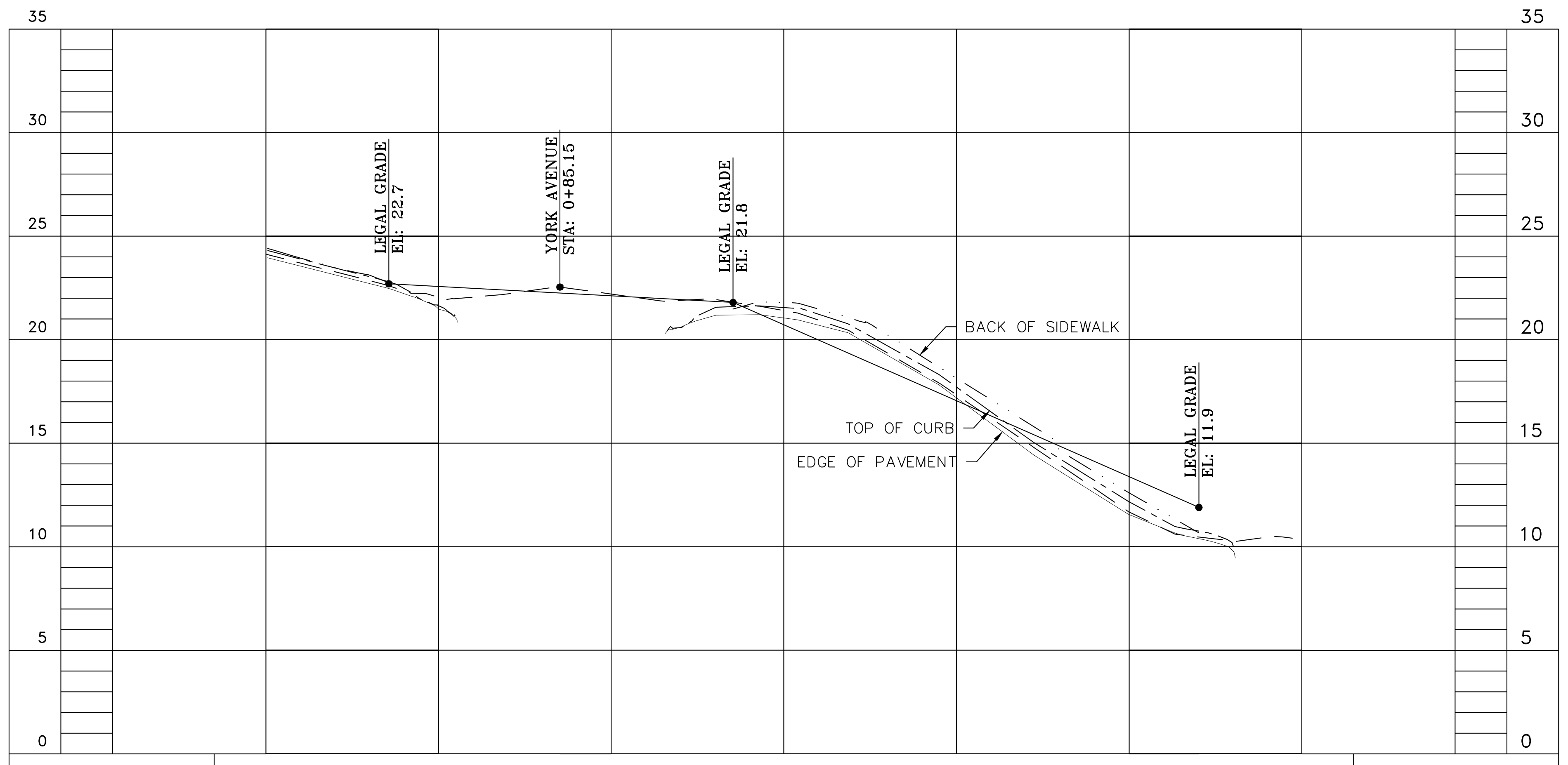


EXISTING GRADE	24.14	22.06	22.21	21.41	17.34	11.68		EXISTING GRADE
EDGE OF PAVEMENT		23.47		21.54	17.47	11.84		EDGE OF PAVEMENT
TOP OF CURB		23.96						TOP OF CURB
BACK OF SIDEWALK								BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	3+00	STATION

HIGHWAY PROFILE ALONG 60TH STREET LOOKING SOUTH

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE



EXISTING GRADE	24.14	22.06	22.21	21.41	17.34	11.68		EXISTING GRADE
EDGE OF PAVEMENT		21.49		21.05	17.19	11.55		EDGE OF PAVEMENT
TOP OF CURB		21.64		21.56	17.71	12.17		TOP OF CURB
BACK OF SIDEWALK				21.80	18.15	12.60		BACK OF SIDEWALK
STATION	0+00	0+50	1+00	1+50	2+00	2+50	3+00	STATION

HIGHWAY PROFILE ALONG 60TH STREET LOOKING NORTH

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

LEGEND:

— — — — — EXISTING GRADE
—— - —— - —— TOP OF CURB
———————— EDGE OF PAVEMENT
— · · — · · — BACK OF SIDEWALK

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FIELD SURVEY WAS COMPLETED IN: JANUARY, 2012

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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NO.	DATE	DESCRIPTIONS	BY	APPR'D

REVISIONS

DESIGNED_______________
DRAWN M. DAMES
TRACED_______________
CHECKED A. HURLEY

SCALE
AS SHOWN

CADD FILE Esplanade 13H.dwg

GROUP LEADER

P.E.
ENGINEER IN CHARGE, IN HOUSE DESIGN

CITY OF NEW YORK
NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SURVEY PREPARED BY:
M.J. ENGINEERING & LAND SURVEYING, P.C.
1533 CRESCENT ROAD
CLIFTON PARK, NY 12065

PREPARED FOR:
NYCEDC
NEW YORK CITY ECONOMIC
DEVELOPMENT CORP.

PROJECT ID# 38430001
FOR THE CONSTRUCTION OF
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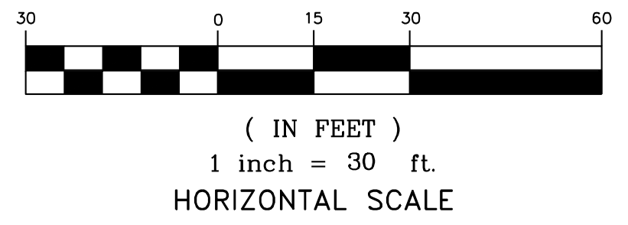
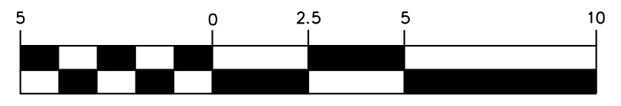
FROM THE INTERSECTION OF 37TH STREET AND 1ST AVENUE TO 60TH STREET AND SUTTON PLACE
BOROUGH OF MANHATTAN
HIGHWAY PROFILES

3761
A
DATE: 05/24/12

SHEET OF 13H



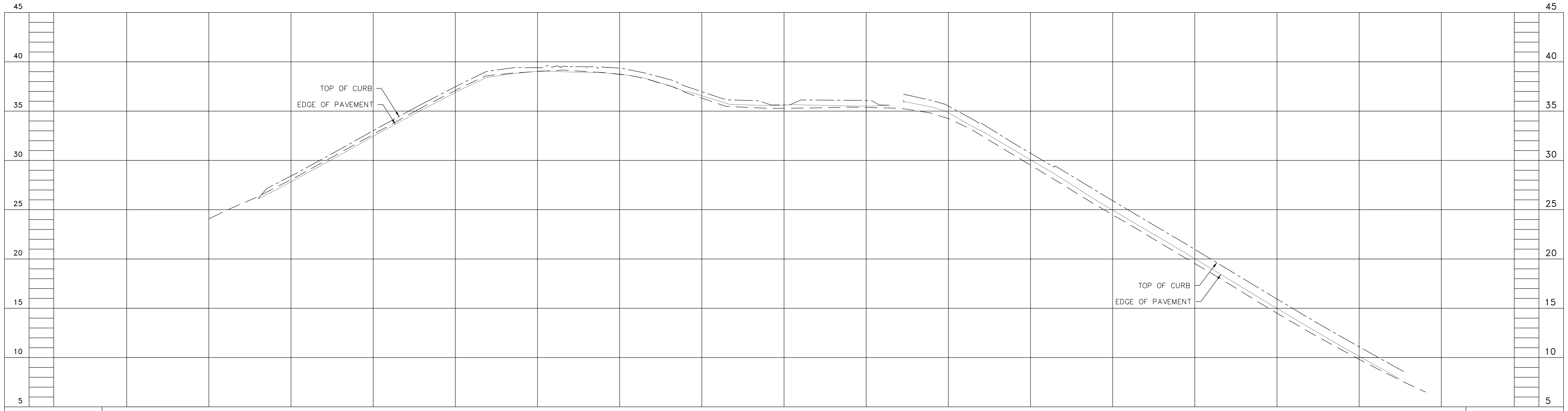
(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE



(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

LEGEND:

- — — — — — EXISTING GRADE
- —·—·—·— TOP OF CURB
- ———— EDGE OF PAVEMENT
- — ·· — ·· — BACK OF SIDEWALK



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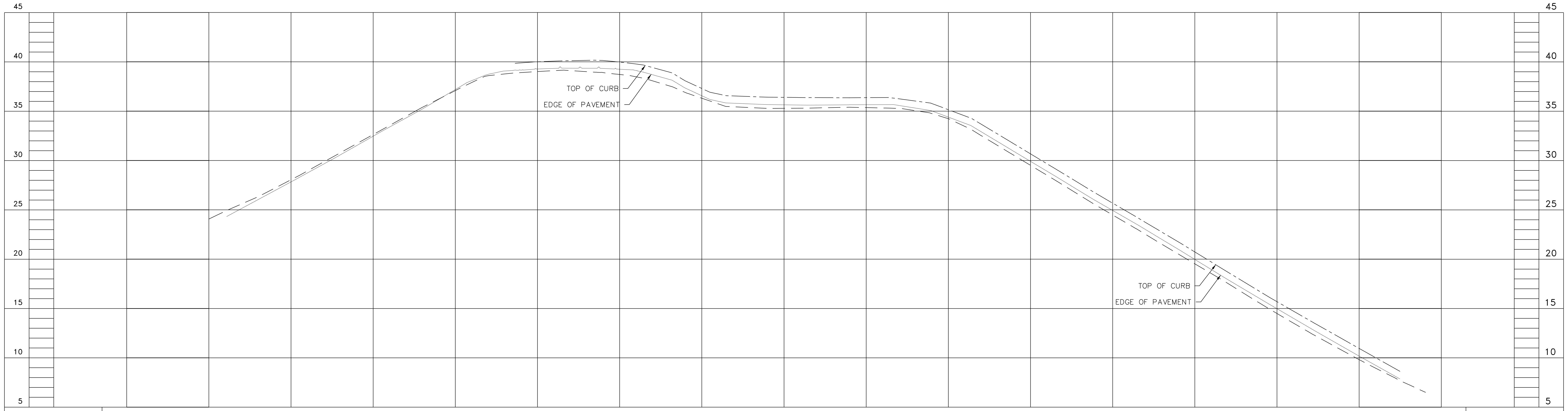
EDGE OF PAVEMENT			27.83	32.43	36.88	39.04	38.76	36.55	35.61	35.50	34.83	30.07	24.97	20.03	14.99	10.13		EDGE OF PAVEMENT
TOP OF CURB			28.42	33.01	37.47	39.40	39.36	36.97	35.62	36.09	35.52	30.73	25.92	20.98	15.94	11.10		TOP OF CURB
BACK OF SIDEWALK																		BACK OF SIDEWALK
STATION	−0+50	0+00	0+50	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00	5+50	6+00	6+50	7+00	7+50	STATION

HIGHWAY PROFILE ALONG 60TH STREET RAMP LOOKING SOUTH



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EDGE OF PAVEMENT			27.83	32.47	37.20	39.28	39.25	36.57	35.64	35.65	34.40	29.92	24.94	19.98	14.98	10.18		EDGE OF PAVEMENT
TOP OF CURB						40.01	39.98	37.30	36.40	36.37	35.16	30.68	25.68	20.74	15.70	10.96		TOP OF CURB
BACK OF SIDEWALK																		BACK OF SIDEWALK
STATION	−0+50	0+00	0+50	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00	5+50	6+00	6+50	7+00	7+50	STATION

HIGHWAY PROFILE ALONG 60TH STREET RAMP LOOKING NORTH

Joseph G. Malinowski, P.L.S.
P.L.S. #50314

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REVISIONS

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DRAWN_____M. DAMES_____
TRACED______________
CHECKED___A. HURLEY____

SCALE
AS SHOWN

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______________ GROUP LEADER

______________ P.E.
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3761
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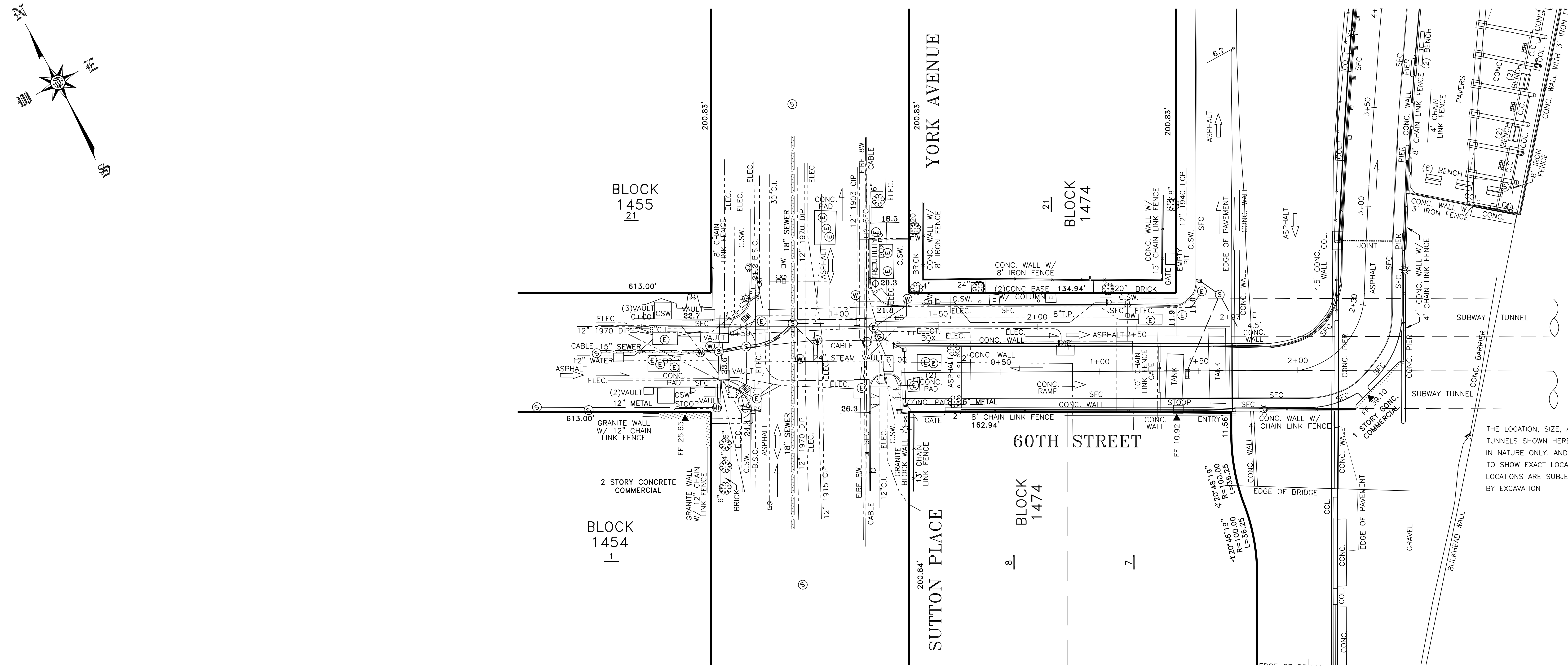

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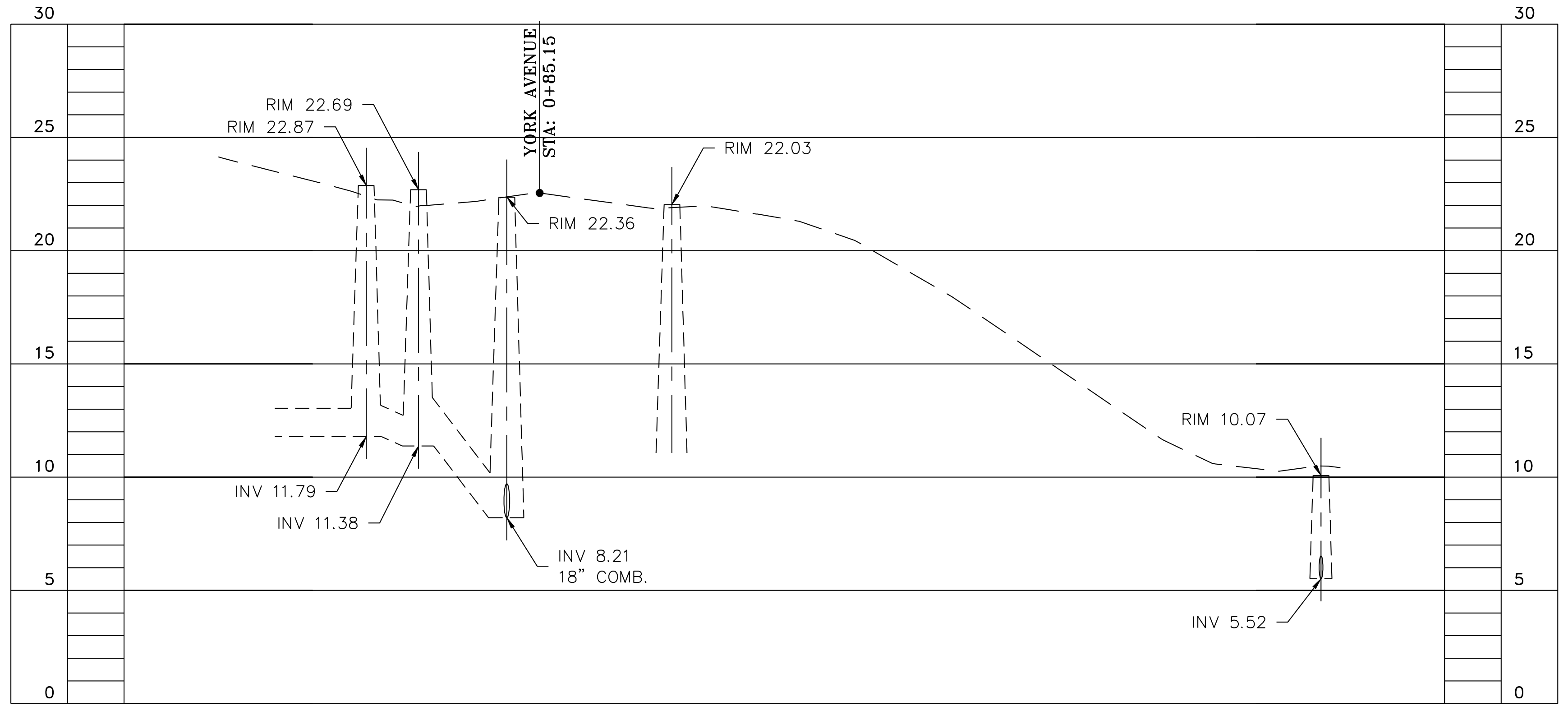
PLAN

30 0 15 30 60

(IN FEET)
1 inch = 30 ft.



UTILITY PROFILE ALONG 60TH STREET

30 0 15 30 60

(IN FEET)
1 inch = 30 ft.
HORIZONTAL SCALE

5 0 2.5 5 10

(IN FEET)
1 inch = 5 ft.
VERTICAL SCALE

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UTILITY PLAN

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SHEET OF 13U

APPENDIX B
Environmental Information

Table of Contents

AQUATIC CONDITIONS BASELINE REPORT

FOR THE

EAST MIDTOWN WATERFRONT ESPLANADE PROJECT
MANHATTAN, NY

AUGUST 27, 2013

Submitted To:
New York City Economic Development Corporation

Submitted By:
AECOM

TABLE OF CONTENTS

APPENDICES

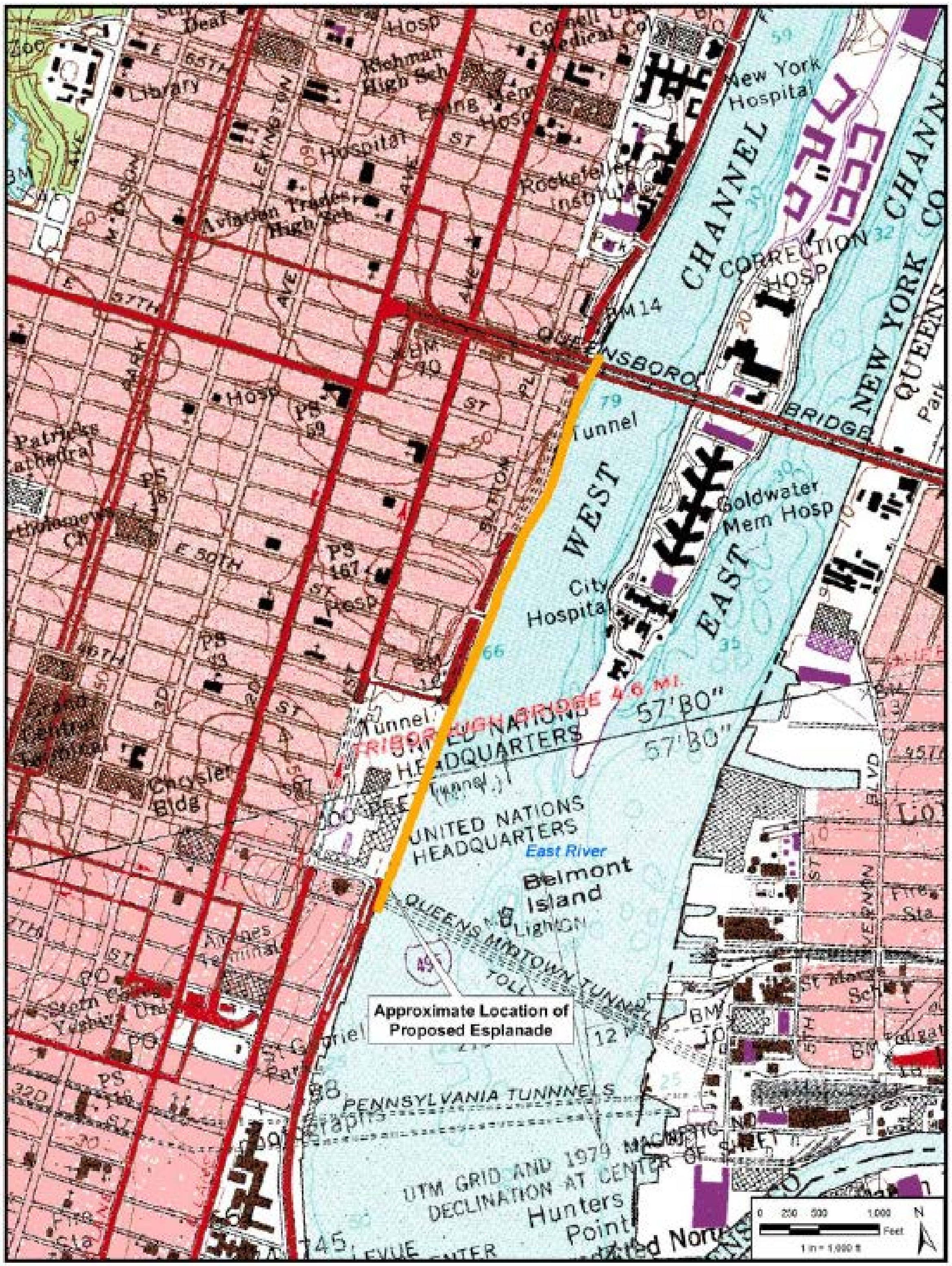
1.0 INTRODUCTION

The New York City Economic Development Corporation (NYCEDC), in partnership with the New York City Department of Transportation (NYCDOT) and the New York City Department of Parks and Recreation (NYCDPR), is proposing to construct the East Midtown Waterfront Esplanade (EMWE) between East 41st and East 60th Streets in Manhattan (see Figure 1). The EMWE will fill a major gap in the Manhattan Waterfront Greenway, while improving access to the East River, enhancing bicycle and pedestrian connectivity, and creating waterfront amenities for public use and enjoyment, in accordance with *Vision 2020: New York City Comprehensive Waterfront Plan* and PlaNYC.

This Aquatic Conditions Baseline Report establishes a baseline of the existing conditions of the aquatic habitat for the EMWE project site to provide supporting documentation for various regulatory permits for over-water and in-water construction, including project related improvements. The report will provide information on the EMWE site bathymetry; substrate and sediment; tides and currents; water quality; and fish and benthic species. Other environmental conditions documents have and are being prepared for this project, including an Environmental Assessment, Essential Fish Habitat study, and a Biological Assessment. These documents contain information to meet specific regulatory requirements and submissions; much of the information contained in those documents is also contained in this report.

In general, the report documents the poor aquatic habitat conditions in the EMWE project area. The waters are deep and subject to strong currents with a shoreline that is largely made up of bulkheads with outfalls. Higher value shallow water habitats (mudflats, SAV beds, etc.) are not present in the project area and the substrate was observed to be either silt and rubble or bedrock. Water quality is impacted based on the existence of combined sewer overflows, municipal discharges, other sanitary discharges, urban storm runoff, and toxins and other contaminates from current and former industrial activities. While many fish species utilize the East River to transit between lower New York Harbor, Long Island Sound, and the Harlem River over to the Hudson River, and undoubtedly some fish utilize the floral and faunal organisms on the bulkheads and rock outcrops for prey species, these existing vertical structures provide limited resources along the shoreline in the project area to attract fish. Moreover, the lack of shallow shoals likely makes the area unattractive habitat for species that spawn over these habitats (e.g., winter flounder).

Figure 1 – Project Site Location Map



2.0 EAST RIVER HISTORY

Formed during the last ice age, the East River is a 16-mile long tidal strait that connects the Upper New York Harbor, the Harlem River, and the western portion of the Long Island Sound. The River separates Manhattan from the boroughs of Queens and Brooklyn. Several tidal inlets (e.g., Newtown Creek, Flushing Creek, and the Gowanus Canal, etc.) flow into the East River. In general, the River consists of two distinct sections, each approximately 8 miles long:

- upper section – positioned on a roughly east-west axis between Hell Gate and the Throgs Neck Bridge; and
- lower section – positioned on a north to south axis, bounded by Hell Gate and the Battery. At the southern tip of Manhattan, the East River meets Upper New York Harbor.

The EMWE project site falls within the lower section; hence, this section and specific project area conditions will be the focus of this report.

2.1 LOWER SECTION

The lower section of the East River has transformed dramatically since pre-European settlement. Up to the 1600's, the shoreline was varied and complex, with many wetlands and stream inlets/outlets that created a rich tapestry of flora and fauna. Oysters, finfish, and salt grasses provided nourishment for the Native Americans and early European settlers. Dutch settlements in the early 1600s built compact structures that harnessed the tidal power of the River for grinding grain into flour, and public access along the banks of the river was required by City courts.

Into the 19th Century, as the City rapidly industrialized, the River's shoreline was progressively hardened with seawalls that created linear edges, and the channel was dredged deeper and flattened to accommodate its growing use for navigable shipping passage. The practice of dumping garbage and waste into the River by individuals and corporations continued under weak law enforcement and the health of the River suffered as oysters and other natural water filters began to disappear. By this time, the River had become the largest repository for industrial waste and pollution from factories and slaughter houses that lined the waterfront. Furthermore, in the midst of the degradation of the health of the River, public use of the waterfront was most active, as a plethora of waterfront markets were erected for the convenience of both farmer and consumer, as shipments could come and go by ferry. In the last quarter of the 19th Century before bridges and tunnels were built, water-based transportation (ferries, barges, and cargo ships) were yet another peaking source of pollution.

By the early 20th Century, the East River was in its worst condition. Turbulence increased to as much as 4 knots due to continuous dredging to accommodate larger steel ships. The City's health was endangered by sewage accumulation, which had become deposits of thick, poisonous sludge along the River bottom. The NY Bay Pollution Commission, a regulating agency at that time, stated that the quantity of sewage that the City discharged into the River had reached 1 billion gallons per day. The spread of disease from eating shellfish began to alarm health officials.

Further linearization of the shoreline for berthing and land development contributed to erosion, sedimentation, and decrease in aquatic habitat. Heavy industry lined the waterfronts and public access became more limited. The 111-year old Con Edison steam generation plant (located approximately at East 35th Street) took up four City blocks with a 34,000 square foot pier structure that was built to receive coal deliveries for the plant. The Manhattan Riverwall, a concrete bulkhead-wall construction from East 34th Street to East 86th Street, was also completed in 1905 to provide wharf access. The FDR Drive was constructed along the shoreline of the East River and a section of the FDR Drive was constructed on top of the Riverwall bulkhead. The United Nations Headquarters was constructed between East 42nd and East 48th St between 1st Avenue and the FDR. A former estuary was also filled in to create the Turtle Bay and Sutton Place neighborhoods.

The Federal Water Pollution Control Act of 1948, which formed the basis for the Clean Water Act of 1972, began to regulate discharge of pollutants into waters, water quality standards, and the filling of waterways. Based on the changes made to meet the regulations, the River's ecosystem began to show signs of improvement. The River soon became cleaner than it had been for decades. Finfish, benthic organisms, and birds were returning and an increasing number of programs and institutions around the City began promoting restoration of the native Atlantic oysters. As the City moved into the 21st century, efforts were made to improve the City's relationship with and connection to the River. Sections of greenways have been gradually built along its length for pedestrians, bicyclists, and other recreation seekers to enjoy the water's edge. In 2000, Con Edison announced plans to tear down their waterside plant to make way for future waterfront development of the 9.2 acre swath of land.

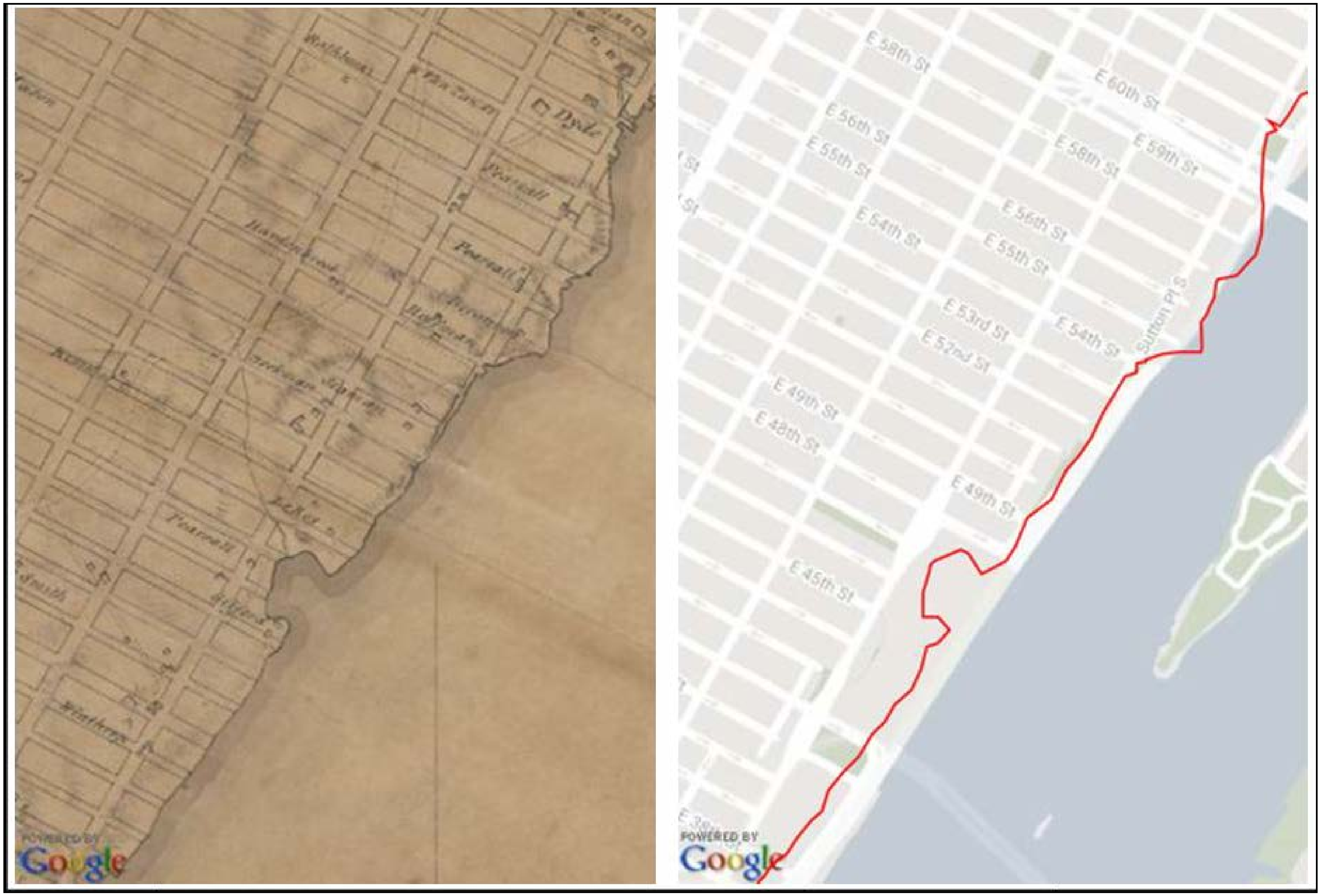
2.2 PROJECT AREA SEGMENT

The proposed design for the EMWE has a width of 40 feet with two 50 foot nodes located at approximately East 48th and East 53rd Streets and there will be an offset between the bulkhead and the western edge of the proposed esplanade of approximately 30 feet. In the EMWE project area, the River is generally 0.5 miles wide. From East 47th Street to East 86th Street, the presence of Roosevelt Island causes the river to flow into two separate channels - the East Channel, and West Channel. The West Channel and East Channel are each approximately 900 to 1,000 feet in width.

In the project area, the Manhattan shoreline has undergone significant development over the last few centuries (Figure 2). The development has expanded the shoreline waterward and filled and removed the shallow bays and creeks that were once present. Dredging for navigation of large ships and barges has continued. Today, the shoreline is largely comprised of concrete facades and sheetpile bulkheads with adjacent water depths in excess of 30 feet, including almost 60 feet north of East 58th Street. Many storm sewer and road drainage conveyances empty into the project area (see Photos 1 and 2). Two rock out-crops, which are remnants of small bluffs, are located near East 55th and East 58th Streets.

The shorelines of eastern Roosevelt Island and western Queens are less developed. In the East Channel, shallow shoals are present along Roosevelt Island's shoreline and the Queens shoreline. Several of these shoals are extensive, extending almost half of the width of the channel. The Queens shoreline is comprised of pile supported piers, riprap, bulkheads, inlets, and formerly developed areas that have become dilapidated and now consist of sediments, rocks, and debris.

Figure 2 – Project Area Shoreline: 1811 and Today



Note – The red line is the 1811 shoreline superimposed on today's shoreline.

Photo 1 – View of Concrete Facades and Caisson from the Former ODR

Photo 2 – View of the Sheet Pile Bulkhead. Note outfall between the two caissons.

In 2004, the ODR was constructed from East 54th Street to East 63rd Street, extending 25 feet over the River to serve as a temporary bypass section while the FDR Drive was being refurbished. When repair of the FDR Driveway was completed, one of the two rows of caissons that supported the ODR structure was left intact for anticipated future use.

3.0 EXISTING PROJECT AREA CONDITIONS

The proposed EMWE project area is approximately 1 mile long, stretching along the eastern shoreline of the East River, from East 41st Street to just south of the Ed Koch Queensboro Bridge at East 60th Street. The EMWE is defined by two segments that will be built in separate phases: United Nation, and ODR (see Figure 3). The United Nations segment runs along the United Nations Campus from East 41st to East 53th Streets. The ODR segment is located from East 53th to East 60th Streets, where it will connect to the existing Andrew Haswell Green area. Currently, within the project boundaries, there is limited public waterside access from a narrow footbridge on East 51st Street leading to the existing 1,800 square foot Peter Detmold Park.

3.1 BATHYMETRY

North of the EMWE project site, where Roosevelt Island divides the River almost equally between east and west, the channels have considerably different physical structures. In general, the Manhattan shoreline of the West Channel is bulkheaded with water depths adjacent to the shoreline reaching over 30 feet. The center of the West Channel has depths over 100 feet and the bottom is largely comprised of rocky material. The East Channel is much shallower, with maximum depths of only 40 feet (see Figure 4).

The EMWE project site is located south of the east and west channel divide. A bathymetric survey of the project site was performed in October 2011 by E W Finley to assess channel depths at the project site. The survey was conducted from East 38th to East 60th Streets along the Manhattan shoreline of the East River and extended up to 250 feet from the existing bulkhead. Outside of the rock outcroppings, river bottom elevations for the EMWE project site ranged from -16.8 feet Manhattan Borough Datum (MBD) along the shoreline to -76.6 feet at the waterward extent of the survey, except for the very northern portion of the site where depths reached up to -102.6 feet. The rock outcroppings topped out at elevations of 6.76 feet.

Refer to Appendix A for the bathymetric survey data, including the surveys and datums and control methodology memo. The memo includes descriptions of the vertical datums, including tidal datums, used to for the bathymetric survey.

3.2 SUBSTRATE & SEDIMENT

The formation of wetlands in this region began 8,000 to 10,000 years ago when the last advance of the Wisconsin Glacier began to melt and retreat northward. At the height of the last ice age the Wisconsin Ice Sheet covered all of Canada and much of the northern United States. The glacier stopped its advance in New York City. The ice sheet covered all of Manhattan and continued as far as northern Staten Island. The terminal moraine, known as the "Harbor Hill Moraine", stretches from Staten Island, through Brooklyn and Queens and out across Long Island to the tip of Montauk Point. This terminal moraine of the glacier created a large inland lake, Glacial Lake Hackensack, which persisted for several thousand years on the north and western shores of Staten Island, Manhattan and parts of New Jersey.

The Hudson and East Rivers formed as this terminal moraine was breached at the Verrazano Narrows and have run on their present course for thousands of years. The waterfront edge however varied over time. In the last 300 years, the waterfront in the study area has been filled with man-made fill to form the current bulkhead line. Along the study area, particularly in the south, considerable fill has been added along the waterfront to create the present shoreline. At the north end of the study area, the shoreline more closely resembles the native shoreline and the rock is nearly at the surface at the water's edge.

The borings done in this contract were performed by Warren George Inc., from March 19th, 2012 to May 28th, 2012, from a jacked barge fitted with a truck based drill rig. All borings were cased below the mudline and supported with bentonite as needed to maintain an open hole. All borings were drilled to rock and rock cores performed to collect rock recovery data and determine the rock quality designation as required by the NYC building code to classify the rock foundation design properties. The boring program consisted of drilling a total of 15 water borings and 3 land borings. The boring program was designed to supplement the available data in the north of the site. There were 28 borings available along the proposed alignment of the esplanade, all of which occurred in the north section of the project. These record borings and the newly performed boring were combined to characterize the soil along the proposed alignment.

Soil samples were collected at 5 foot intervals from the mudline down to bedrock and samples were characterized according to NYC Building Code criteria. Samples were collected using a 2inch outside diameter Split Spoon Sampler with Standard Penetration Tests (SPT's) in accordance with ASTM D-1586. The number of blows per foot of penetration (N values) were recorded on the boring logs and are shown on the soil profiles. Rock was cored using a 2.375-inch outside diameter NX core barrel in accordance with ASTM D-2113 to ensure the boring was completed in competent bedrock. The percent of recovery (REC) and Rock Quality Designation (RQD) were recorded on the boring logs and are shown on the soil profiles.

All borings were inspected full time by a professionally licensed AECOM Geotechnical Engineer. Conditions encountered varied throughout the site; the following is a discussion of the conditions observed at each segment of the project site.

The soil condition varies along the project site (see Appendix B for the soil boring location maps and soil profiles indicating the stratigraphy of the site).

Figure 3 – Project Phasing

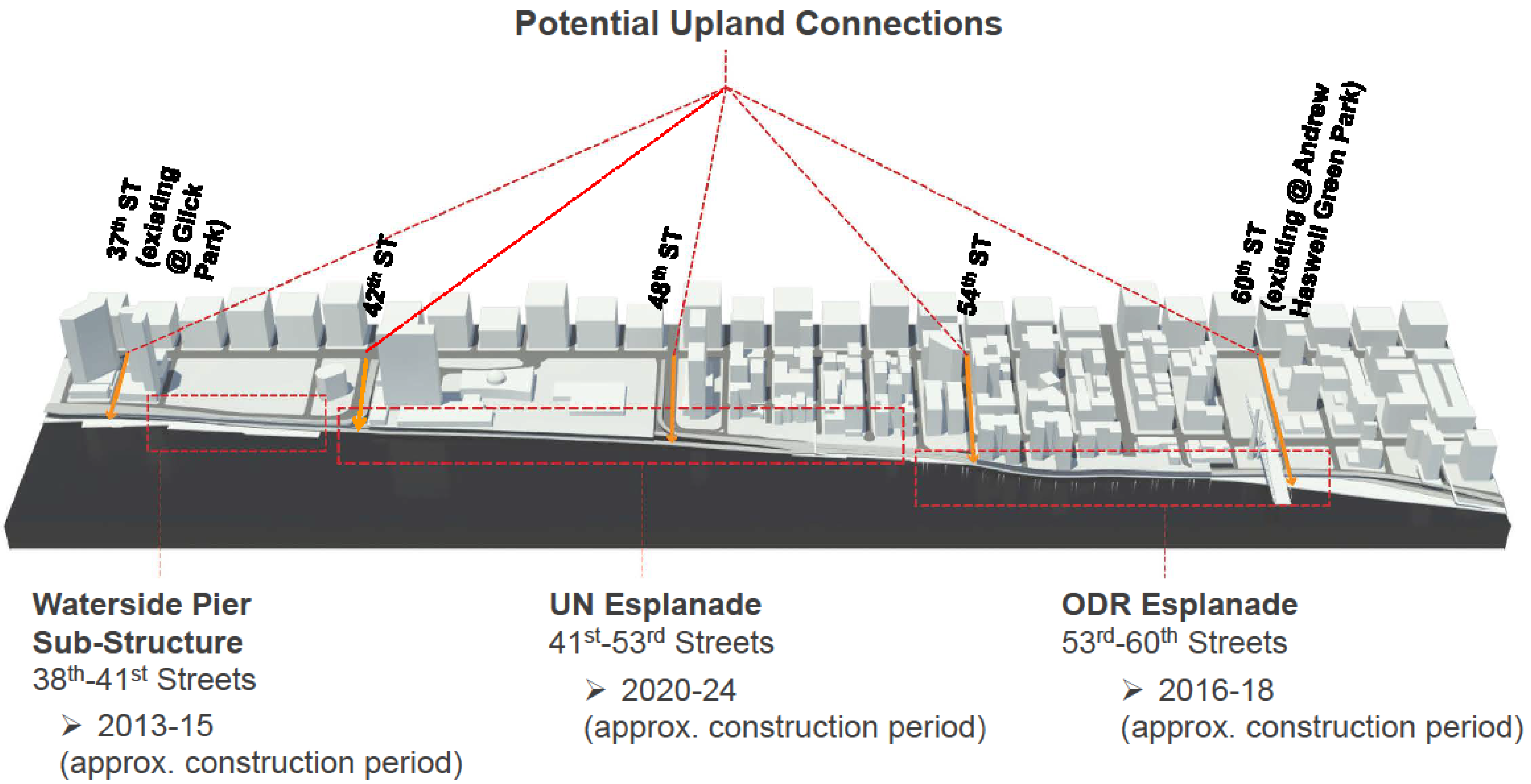
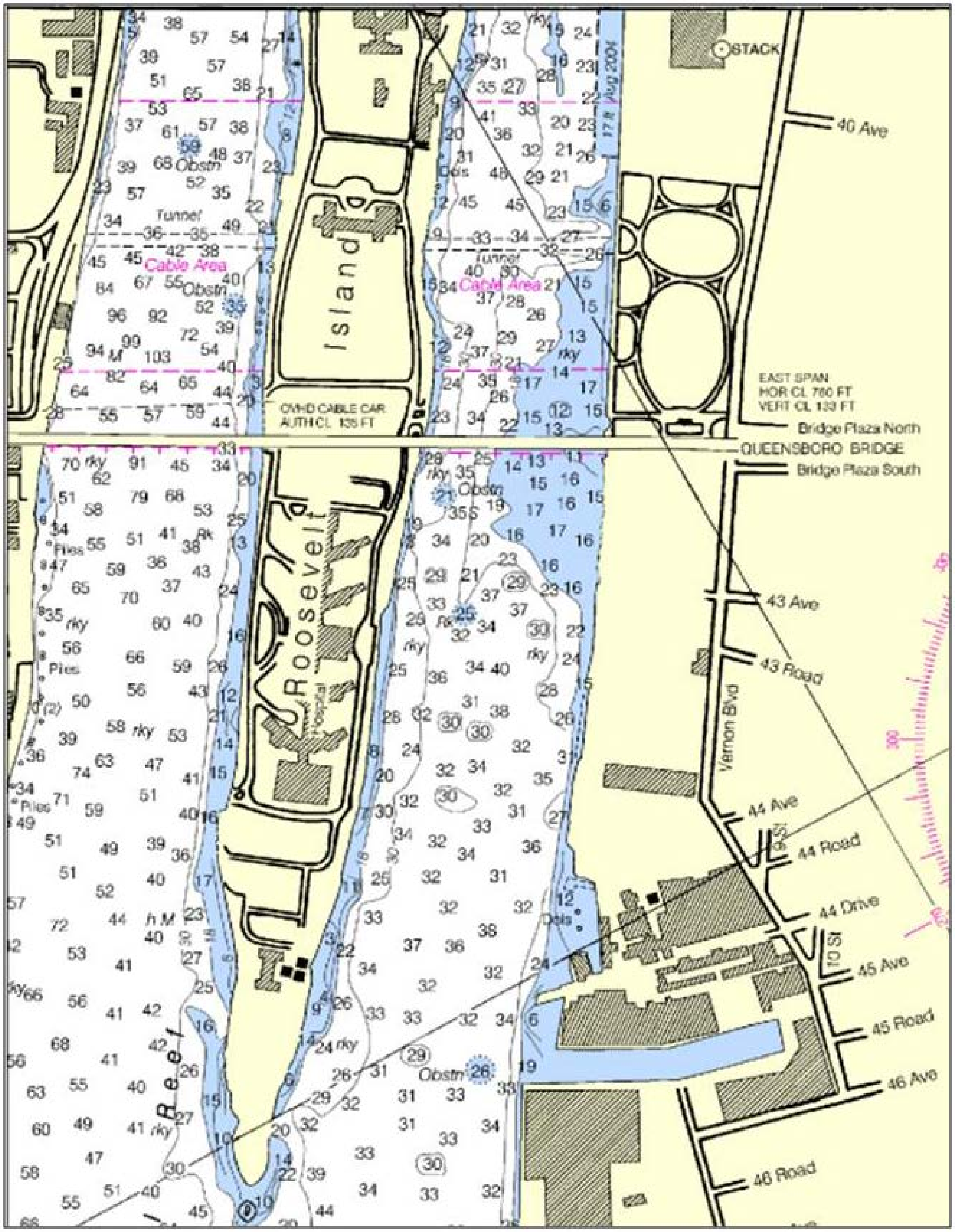


Figure 4 – Water Depths in the East and West Channels



3.3 TIDES & CURRENTS

Complex tidal flow patterns exist along the length of the East River, with influences coming from both the Upper Bay and Long Island Sound interacting with the generally southern movement of water from the Hudson River and Harlem River. Strong currents further compound the flow patterns, including conditions at Hell Gate, a narrow tidal strait just north of the project area where the East River and the Harlem River meet at the southern tip of Randall’s Island. In the vicinity of the Queensboro Bridge, the current in the West Channel can reach approximately 5.2 knots. Currents in the East Channel are less, up to 4 knots (NOAA, 2013).

Table 1 shows the tidal datums for the project site.

Table 1 – Project Area Tidal Datum

Datum	Elevation in feet Manhattan Borough Datum
Spring High Tide	1.74
Mean Higher High Water (MHHW)	0.57
Mean High Water (MHW)	0.24
Mean Tide Level	1.9
Mean Low Water (MLW)	-4.06
Mean Lower Low Water (MLLW)	-4.26

3.4 WATER QUALITY

Water quality parameters are influential in determining the spatial and temporal distribution of marine populations. The East River water quality is affected by temperature, rainfall, stormwater runoff, and waste influx.

The East River is listed on New York State’s List of Section 303(d) Priority Waters. The water quality is stressed largely due to combined sewer overflow, municipal discharges (e.g. Newtown Creek Waste Water Treatment Plant), and other sanitary discharges. Also impacting the water are toxins and other contaminates from current and former industrial activities as well as urban storm runoff (NYSDEC, 2011).

3.4.1 Temperature, pH, and Salinity

Site-specific data on temperature, pH, and salinity was garnered from two past studies conducted in the vicinity of the project area. In 1998, as part of the ODR project, the New York State Department of Transportation (NYSDOT) collected data between August and December (NYSDOT, 1999). Also, as part of scientific studies, water quality data was collected at the Astoria Generating Station throughout 2006. The Astoria Generating Station is located slightly upriver of Hell Gate on the East River.

Temperature and pH

Data collected throughout 2006 showed average daily water temperature ranging from 34.5°F to 76.5°F with highest values observed during the summer season, peaking in August, and lowest temperatures occurring during the winter months (ENSR, 2007). Average daily pH ranged from 7.23 to 9.25 with highest values occurring during the months of January through March.

In 1998, data collected within close proximity to the United Nations, showed a relatively constant temperature between samples collected at a depth of approximately 3 feet and 50 feet indicating the absence of a thermocline during those months and a well-mixed water body (NYSDOT, 1999). Also, the pH of the sample areas averaged 7.4 in the warmer months and higher in the colder months at 8.45 in December.

Salinity

Salinity measurements presented in the 1998 study ranged between 20.7 ppt in August to 25.0 ppt in December when temperatures were lowest. Data indicated that there was very little variability in salinity, pH, and dissolved oxygen values regardless of depth (NYSDOT, 1999).

3.4.2 Best Usage Classification and Harbor Water Quality Monitoring

Best Usage Classification

The best water usage classification for the East River is Class I (fishing or boating and secondary recreation contact). The New York State Department of Health (NYSDOH) has issued health advisories recommending limiting consumption of North American eel, gizzard, shad or crab hepatopancreas and no more than one meal per month of Atlantic needlefish, bluefish, rainbow smelt, striped bass or white perch from these waters due to possible elevated levels of PCBs. The source of this contamination is considered to be contaminated sediment, the result of past industrial discharges. Under Class I designation, shell fishing is not considered an appropriate use (NYSDEC, 2013).

Harbor Water Quality Monitoring Program

The New York Department of Environmental Protection (NYCDEP) conducts water quality evaluations of waters within New York City as part of their City-Wide Long-Term CSO Control Planning Project, including the East River. The results of this sampling indicate that the impact of CSOs, wastewater discharges, urban stormwater runoff and dry weather sanitary flows cause periodic low dissolved oxygen (DO) levels that do not meet water quality standards. Pathogen levels in East River typically meet applicable criteria (NYCDEP, 2011)

As previously noted, the East River is impaired due to urban runoff and wastewater which contributes to low dissolved oxygen (DO). Table 2 below identifies the NYCDEP's Water Quality Monitoring data for surface water DO at the closest monitoring station (NYCDEP station) to the project area, Station E2, located near East 23rd Street in the East River (NYCDEP, 2013). Also for comparison, the following other locations are shown:

- E4, located approximately 2 miles north of the project area, east of Wards Island near Hell Gate;
- E10, located in Long Island Sound, approximately 1 mile east of the East River's confluence with Long Island Sound;
- N6, located south of the battery in New York Harbor; and
- N16, located in the Atlantic Ocean approximately 1 mile south of Rockaway Point.

Table 2 – Dissolved Oxygen Readings – Surface Water

Date	E2 (mg/L)	E4 (mg/L)	E10 (mg/L)	N6 (mg/L)	N16 (mg/L)
Jan Wk 2	7.59	7.59	9.90	9.03	7.86
Feb Wk 2	10.68	10.69	11.47		10.56
Mar Wk 1	10.55	12.06	12.94	10.83	10.64
Apr Wk 1	8.94	-	10.84	-	9.67
May Wk 4	6.15	6.08	7.72	7.50	8.04
June Wk 1	6.92	6.46	7.48	7.09	7.82
June Wk 2	5.77	5.39		7.23	-
June Wk 3	6.82	5.62	9.40	7.50	7.64
June Wk 4	4.57	5.27	6.02	6.16	6.90
July Wk 1	5.02	-	-	-	6.47
July Wk 2	5.73	5.38	6.50	6.98	8.10
July Wk 3	-	3.86	6.12	5.37	5.25
July Wk 4	4.47	4.05	6.47		7.00
Aug Wk 1	4.03	4.30	5.33	4.80	8.29
Aug Wk 2	3.94	3.40	5.81	5.81	3.82
Aug wk 3	3.72	2.93	3.49	3.83	7.12
Aug Wk 4	4.48	4.60	6.19	4.93	5.69
Sept Wk 1	4.08	3.63	4.04	5.66	5.90
Sept Wk2	3.62	2.37	4.92	4.97	5.20
Sept Wk3	4.94	5.10	5.20		4.74
Sept Wk 4	5.55	5.69	6.88	5.51	6.81
Oct Wk 1	5.60	5.30	6.26	6.06	6.76
Nov Wk 2	8.46	8.46	-	8.71	-
Nov Wk 2	8.18	8.67	9.11	8.12	-
Nov Wk 3	8.24	8.13	-	8.87	-
Dec Wk 1	9.10	8.92	-	10.06	9.26
Dec Wk 2	8.99	NS	9.63	8.88	9.37
Dec Wk 3	10.54	8.79	9.39	9.17	-

Table 3 identifies the DO reading for waters near the bottom at locations E2, E4, N6, E10, and N16. The data presented in Table 3 shows that the DO in the two East River locations (E2, E4) is typically lower than the other presented locations.

Table 3 – Dissolved Oxygen Readings – Bottom

Date	E2 (mg/L)	E4 (mg/L)	E10 (mg/L)	N6 (mg/L)	N16 (mg/L)
Jan Wk 2	8.61	8.61	10.32	9.12	7.18
Feb Wk 2	10.80	11.38	11.94	-	10.19
Mar Wk 1	10.89	12.03	12.07	10.03	10.92
Apr Wk 1	8.95		9.60	-	-
May Wk 4	6.07		7.08	6.52	-
June Wk 1	6.22	6.39	7.25	7.51	7.34
June Wk 2	5.30	5.09	-	5.95	-
June Wk 3	6.55	5.35	4.93	5.60	6.93
June Wk 4	4.65	5.23	4.04	6.10	5.91
July Wk 1	4.86	-	5.12	-	6.23
July Wk 2	5.25	5.37	2.17	5.20	6.34
July Wk 3	-	3.74	-	4.90	5.75
July Wk 4	4.24	4.05	3.38	-	6.34
Aug Wk 1	4.02	4.32	2.39	4.79	5.32
Aug Wk 2	4.03	3.77	1.65	4.46	3.76
Aug Wk 3	3.70	2.63	2.52	4.05	6.62
Aug Wk 4	3.99	4.11	3.93	5.34	5.00
Sept Wk 1	4.21	4.41	4.03	5.05	5.57
Sept Wk2	3.80	2.80	2.22	3.60	5.06
Sept Wk3	4.95	4.92	4.87	-	5.69
Sept Wk 4	5.54	5.94	6.24	5.53	6.81
Oct Wk 1	5.55	5.40	6.12	5.99	6.87
Nov Wk2	8.12	9.41	-	-	-
Nov Wk 2	8.20	8.49	9.05	8.21	-
Nov Wk 3	8.20	8.39	-	8.50	-
Dec Wk 1	-	-	-	9.22	10.14
Dec Wk 2	8.74	9.00	9.24	8.64	9.50
Dec Wk 3	9.25	8.79	9.41	8.92	-

The NYCDEP monitors select water quality parameters within the East River at several stations. The NYCDEP monitors the levels of Fecal Coliform and *Enterococcus* bacteria within the East River, south of the project area, near the existing Waterside Pier.

Table 4 identifies the Fecal Coliform and *Enteroccuss* bacteria at Station E2. For comparative purposes location N16 is included in the table. Review of the data clearly shows the impact of urbanization on the water of the East River as fecal coliform was measured dramatically higher rates than N16, when compared to water of the open ocean. Maximum levels of *Enterococcus* in 2012 were reported as exceeding 800/100ml, though numbers under 100/100ml were more common.

Table 4 – Fecal Coliform and Enterococcus – Results of NYCDEP Water Monitoring

Location E2			Location N16		
Sample Date	**Fecal Coliform (#100 mg/L)**	**Enterococcus (#100 mg/L)**	**Sample Date**	**Fecal Coliform (#100 mg/L)**	**Enterococcus (#100 mg/L)**
01/09/2012	32	1	01/11/2012	1.00	2.00
02/13/2012	3	2	02/14/2012	1	1
03/05/2012	14	4	03/7/2012	4	1
04/02/2012	NS	NS	04/4/2012	1	1
04/03/2012	29	2	-	-	-
05/29/2012	11	1	05/31/2012	40	1
06/04/2012	100	46	06/06/2012	1	1
06/11/2012	22	1	06/13/2012		
06/18/2012	47	10	06/20/2012	1	8
06/25/2012	122	4	06/27/2012	9	2
07/02/2012	NS	2	07/05/2012	11	1
07/09/2012	254	2	07/11/2012	1	1
07/16/2012	800	20	07/18/2012	1	1
07/23/2012	128	1	07/24/2012	2	2
07/30/2012	176	6	-	-	-
08/06/2012	790	60	08/08/2012	1	1
08/13/2012	48	1	08/15/2012	3	1
08/20/2012	42	2	08/22/2012	9	1
08/27/2012	156	47	08/29/2012	484	2
09/04/2012	25	2	09/06/2012	5	2
09/10/2012	300	3	09/12/2012	2	1
09/17/2012	6	2	09/19/2012	1	2
09/24/2012	45	4	09/26/2012	1	1
10/01/2012	50	5	10/03/2012	1	2
11/10/2012	233	32	-	-	-
11/13/2012	3	4	11/15/2012		
11/19/2012	5	1	-	-	-
12/03/2012	2	1	12/05/2012	1	1
12/10/2012	2000	800	12/12/2012	11	2
12/17/2012	22	16	12/19/2012		

In addition to industrial discharges and combined sewer overflow, the East River and Western Long Island Sound region receive treated sewage from 18 wastewater treatment plants located in New York and the southern Connecticut area. A study conducted by Sweeney et al. showed that about 83 percent of this effluent is discharged into the East River and the River had elevated levels of lead, phosphates, silver, copper, cadmium, and nitrates. There were also a number of inorganic pollutants in the waterway (Sweeney, 2004).

3.4.3 Visibility

For over 100 years, the NYCDEP has conducted a water quality monitoring program throughout New York Harbor. Results of the water quality program have shown over the last three decades, while the water quality of New York Harbor is improving, many of the Harbor's water bodies are impaired. As part of the monitoring program, the NYCDEP collects seawater samples for analysis at 62 locations throughout the harbor. The closest monitoring station (NYCDEP station) to the project area is Station E2, located near East 23rd Street in the East River.

A Secchi disk is used to estimate the clarity of surface waters. High Secchi transparency (greater than 5.0 feet, or 1.5 meters) is indicative of clear water, with declines in transparency typically due to high suspended solids concentrations or plankton blooms. Low Secchi readings (less than 3.0 feet or about 1 meter) are typically associated with degraded waters. These conditions are indicative of light-limiting conditions, which in turn affect primary productivity and nutrient cycling.

Visibility for location E2 is provided in Table 5, which presents the results in metric measurements. Also, for comparative purposes, location N16 is presented. Location N16 is located approximately 1 mile south of Rockaway Point and represents a less-impacted environment. During 2012, the visibility at location E2 varied from 0.6 to 1.5 meters. At location N16, visibility ranged from 0.9 to 6.1 meters. The average seasonal salinity at location E2 was 0.8 meters in the spring, 0.9 meters in the summer and fall, and 1.2 meters in the winter.

Table 5 – Visibility Readings at Sample Stations E2 and N16 during 2012

Location E2		**Location N16**	
Sample Date	**Transparency (m)**	**Sample Date**	**Transparency (m)**
01/09/2012	1.1	01/11/2012	3.4
02/13/2012	0.9	02/14/2012	3.8
03/05/2012	0.9	03/07/2012	2.4
-	-	04/04/2012	4.1
04/03/2012	1.1	-	-
05/29/2012	0.6	05/31/2012	3.4
06/04/2012	0.8	06/06/2012	2.1
06/11/2012	0.8	06/13/2012	--
06/18/2012	0.9	06/20/2012	2.4
06/25/2012	1.1	06/27/2012	3.4
07/02/2012	0.8	07/05/2012	3.7
07/09/2012	0.9	07/11/2012	1.8
07/16/2012	0.9	07/18/2012	6.1
07/23/2012	0.8	07/24/2012	4.1
07/30/2012	1.1	-	-
08/06/2012	1.1	08/08/2012	1.8
08/13/2012	0.9	08/15/2012	2.1
08/20/2012	1.2	08/22/2012	4.0
08/27/2012	0.8	08/29/2012	2.0
09/04/2012	0.9	09/06/2012	2.9
09/10/2012	1.4	09/12/2012	2.1
09/17/2012	1.2	09/19/2012	1.2
09/24/2012	0.9	09/26/2012	1.8
10/01/2012	1.2	10/03/2012	2.7
11/10/2012	1.2	-	-
11/13/2012	1.2	11/15/2012	-
11/19/2012	0.8	-	-
-	-	12/05/2012	1.2
12/10/2012	1.5	12/12/2012	0.9
12/17/2012	1.2	12/19/2012	-
Seasonal Average	E2 (visibility in meters)	N16 (visibility in meters)	
Winter	0.9	3.2	
Spring	0.8	3.0	
Summer	0.9	2.9	
Fall	1.2	1.7	

3.5 FISH AND BENTHIC SPECIES

3.5.1 Fish

The East River is anthropogenically stressed due to degraded water quality and urban development. The populations of fish change seasonally with varying salinity levels as they move between the Long Island Sound, the East River and the Hudson River. Only a few species are residents of the East River.

Over the past decades, surveys have been conducted to assess the fish community of the East River and associated bays and inlets of Eastern Long Island Sound. The data indicates that over 80 finfish species on average inhabit in the Lower Hudson Area (Woodhead, 1994). In addition, a year-long impingement and entrainment survey conducted between 2006 and 2007 in the East River at Astoria, Queens (ENSR, 2007) identified 71 species of finfish. Dominant species found during that survey were scup (*Stenotomus chrysops)*, tautog (*Tautoga onitis)*, cunner (*Tautogolabrus adspersus)*, bay anchovy (*Anchoa mitchilli)*, Atlantic menhaden (*Brevoortia tyrannus)*, northern pipefish (*Syngnathus fuscus)*, naked goby (*Gobiosoma bosci)*, Atlantic butterfish (*Peprilus triacanthus)*, conger eel (*Conger oceanicus)*, oyster toadfish (*Opsanus tau)*, and Atlantic silverside (*Menidia menidia)*.

The Hudson/Raritan Rivers and Long Island Sound typically have the greatest fish biomass and production during the warmer months of the year (LMS, 2000). Anadromous species, such as American shad (*Alosa sapidissima***),** striped bass, and blueback herring, utilize the East River as a migratory corridor during the spring and fall. Marine-brackish water spawners such as weakfish, winter flounder, bay anchovy, bluefish, and Atlantic menhaden, also commonly utilize coastal bays, straits such as the East River, and estuaries as juvenile nursery areas (LMS, 2000). Surveys conducted by LMS (1983, 1986, and in 1989 for Parish & Weiner), Malcolm Pirnie Inc. (1984), and Woodward-Clyde (1986) have documented seasonal abundances and migratory patterns. The most abundant species for these surveys were: winter flounder, striped bass, Atlantic tomcod, and grubby with several other species varying among the different surveys that comprised the remaining species. In addition, the 316(b) Impingement and Entrainment study performed at Astoria, Queens (ENSR, 2007) also documented fish use by life stage. Table 6 shows seasonality of species collected during the ENSR 2007 Impingement and Entrainment Study performed at the Astoria Generating Station.

Table 6 – Seasonal Distribution of Fish Species in the East River

January - March	April - June	July - September	October- December
Alewife	**Alewife**	Alewife	Alewife
3-Spined Stickleback	3-Spined Stickleback	Atlantic Herring	Atlantic Silverside
Atlantic Herring	**Atlantic Herring**	Atlantic Menhaden	Bay Anchovy
Atlantic Menhaden	Atlantic Silverside	**Atlantic Silverside**	Blueback Herring
Atlantic Silverside	**Atlantic Tomcod**	Atlantic Tomcod	Conger Eel
Atlantic Tomcod	Bay Anchovy*	Bay Anchovy	Cunner
Bay Anchovy*	**Blueback Herring**	Blueback Herring	Grubby
Blueback Herring	Butterfish	Bluefish	Naked Goby
Conger Eel	**Conger Eel**	**Butterfish**	Northern Pipefish
Cunner	Cunner	Conger Eel	Rainbow Smelt
Fourbeard Rockling	**Fourbeard Rockling**	Cunner	Red Hake
Grubby	**Grubby**	Fourbeard Rockling	Rock Gunnel
Northern Pipefish	Naked Goby	Grubby	Seabord Goby
Rainbow Smelt**	**Northern Pipefish**	Northern Pipefish	Spotted Hake
Red Hake	Northern Puffer	Northern Puffer	Striped Bass
Rock Gunnel	Rainbow Smelt	Rainbow Smelt	**Striped Searobin**
Seabord Goby	Red Hake	Rock Gunnel	Weakfish
Silver Hake	**Rock Gunnel**	Silver Hake	Windowpane
Spotted Hake	Seabord Goby	**Striped Bass**	Winter Flounder
Striped Bass	Silver Hake	Striped Searobin	
Weakfish	Spotted Hake	Weakfish	
Windowpane	Striped Bass	Windowpane	
Winter Flounder	Windowpane	Winter Flounder	
	Winter Flounder		
Bold text represents peak presence * No presence recorded in March or April **Peak January – April			

3.5.2 Benthic and Epibenthic

Benthic invertebrate and epibenthic community composition and biodiversity within the HRE and the East River are dependent on a number of environmental and physical factors such as substrate type, attachment availability, water quality, and water current. In a benthic study performed in 1972 within the HRE, it was determined that salinity was one of the most important factors affecting benthic species spatial distribution and community extent (Ristich, Crandall, and Fortier, 1977). That survey identified 105 benthic and epibenthic taxa and included sampling stations that were polyhaline, mesohaline, and oligohaline. In 1980, Hazen & Sawyer collected 44 species in the East River during a benthic study, finding sand worms and tunicates to be the dominant species on hard-bottom areas, with clams and mudworms dominating the softer sediments. Hazen & Sawyer further concluded the benthic community of the East River was limited in diversity due to its rocky substrate and swift currents. Similar results were found for other East River benthic community studies by LMS (LMS, 1986, 1989), indicating polychaetes and oligochaetes as the most numerically abundant groups with little biodiversity.

In 1983 and 1984, LMS performed bottom trawls in the East River to assess the benthic macroinvertebrates of the East River (Parish & Weiner, 1989). A total of nine species were collected including: rock crab (*Cancer irroratus*), lady crab (*Ovalipes ocellatus*), sand shrimp (*Crangon sp.*), horseshoe crab (*Limulus polyphemus*), marine mud crab (*Neopanope sayi*), grass shrimp (*Palaemonetes sp.*), green crab (*Carcinus maenus*), white-fingered mud crab (*Rithropanopeus harrisii*), and the common spider crab (*Libinia dubia*). Of the nine aforementioned species, sand shrimp was the most abundant along with rock crabs and marine mud crabs also occurring regularly in the study area. During the same study, LMS used an epibenthic sled to assess the epibenthic community. Mysids, cumaceans, and amphipods were among the most abundant along with polychaete worms. A bottom trawl survey by LMS in 1989 confirmed past benthic and epibenthic results with the exception that blue crabs were found to be most abundant.

Table 7 provides a list of larval and juvenile benthic and epibenthic species identified during the ENSR 2007 Impingement and Entrainment Survey, as well as species identified by ENSR in 2006 during a bioaccumulation inspection of aquatic filter barrier cartridges at Astoria Generating Station.

Table 7 – Larval and Juvenile Benthic and Epibenthic Species Identified During a 2006 Bioaccumulation Inspection and a 2007 Impingement and Entrainment Survey

Unidentified Porifera	*Cliona sp.*
Golden star tunicate	*Botryllus schlosseri*
Red beard sponge	*Microciona prolifera*
Frilled anemone	*Metridium senile*
Unidentified hydroid	
Unidentified bushy bryozoan	
Unidentified bryozoan	
Ivory barnacle	*Balanus eburneus*
Clam worm	*Nereis* species
Unidentified spionid polychaete	*Family Spionidae*
Unidentified tubiculous polychaete	
Corophid amphipod	*Monocorophium acherusicum*
Corophid amphipod	*Monocorophium insidiosum*
Corophid amphipod	*Monocorophium sextonae*
Corophid amphipod	*Jassa marmorata*
sand shrimp	*Crangon septemspinosa*
common shore shrimp	*Palaemonetes vulgaris*
grass shrimp	*Hippolyte sp.*
mantis shrimp	*Squilla empusa*
blue mussel	*Mytilus edulis*
Eastern oyster	*Crassostrea virginica*
chestnut astarte	*Astarte castanea*
sea grape	*Molgula manhattensis*
soft shell clam	*Mya arenaria*
Japanese shore crab	*Hemigrapsus sanguineus*
black-fingered mud crab	*Panopeus herbstii*
white-fingered mud crab	*Rithopanopeus harrissi*
common spider crab	*Libinia emarginata*
Green crab	*Carcinus maenas*
blue crab	*Callinectes sapidus*
American lobster	*Homarus americanus*

3.6 SITE-SPECIFIC SURVEYS

There are two aquatic species surveys that have recently occurred within the project site: A seasonal fish and benthic invertebrate survey was conducted in 1999 for NYSDOT as part of the ODR project and a 2011 Dive Survey conducted by AECOM and Fathom Solutions LLC.

1999 NYSDOT ODR Survey

The 1999 survey performed fish surveys (otter trawls) in both the East and West Channels between East 52nd and East 57th Streets. During the trawling events that occurred over a 2-day event in the early summer/late fall of 1998, no fish were recovered in the West Channel. This would suggest that the West Channel near the project area does not serve as attractive habitat for large schools of fish. In the East Channel, several species common to the HRE were recovered (e.g., tautog, flounder, etc.), but generally in very low numbers. Scrapings of the bulkhead along the Manhattan shoreline and benthic invertebrate sampling identified organisms common to the New York Estuary. Species observed included; green algae (*Ulva lattuca* and *Codium sp.*), Brown algae (*Fucus sp.*), as well as hydroids, sponges, barnacles, etc. (NYSDOT, 1999). The survey also used artificial substrate samplers and detected decapods, isopods and other motile organisms within the area.

2011 AECOM and Fathom Solutions LLC Dive Survey

From October 3rd through October 5th 2011, AECOM and Fathom Solutions LLC performed a dive survey in the project area. The survey was conducted along the eastern shoreline of the East River between East 38th Street and East 61st Street. Over the 3-day period, the survey was conducted by a tethered, in-water commercial hard-hat diver equipped with 150-foot air hose umbilical, ship to diver communication, and video with real-time streaming from the diver's helmet to a support boat with an onboard monitor. These measures allowed the onboard marine biologist to assess habitat and species composition first-hand and direct the diver to areas in need of further observation. Recorded video was stored on DVDs by survey date. See Appendix C for the full dive survey report.

A total of 17 transects were completed directly parallel and adjacent to the existing bulkhead/pier to a riverward distance of 50 feet within an area spanning a distance of 1.3 miles and covering 0.012 square miles. An additional 2 bisecting transects approximately 50 feet in length were completed underneath the existing Waterside Pier to determine changes (if any) in spatial distribution, species abundance, and species composition on individual pilings as the diver moved underneath the pier structure and away from direct sunlight (see Figure 5). Table 8 provides the sampling transect locations between East 38th and East 61st Streets, including date sampled and average water depth in feet to bottom.

Table 8 – Transect Identification and Information

Transect ID	Date Surveyed	Start Time	Approximate Coordinates (start) Latitude/Longitude	Average Depth (ft)
1003-1	10/3/2011	9:00 AM	Southern edge of pier	25
Pile South Pier	10/3/2011	9:15 AM	Southern edge of pier	15-25
1003-2	10/3/2011	9:35 AM	14th pile to south edge of dock	25
1003-1A	10/3/2011	10:00 AM	40°44.753'/73°58.172'	25
1003-2A	10/3/2011	10:13 AM	40°44.753'/73°58.172'	30
Pile Mid Pier	10/3/2011	11:45 AM	40°44.774'/73°58.149'	ND
1003-1B	10/3/2011	12:10 PM	40°44.774'/73°58.149'	30
1003-1C	10/3/2011	12:50 PM	40°44.774'/73°58.150'	25
1003-1D	10/3/2011	2:25 PM	40°44.828'/73°58.111'	25
1004-1	10/4/2011	9:15 AM	40°44.860'/73°58.095'	15-17
1004-2	10/4/2011	11:00 AM	40°44.882'/73°58.069'	25-30
1004-3	10/4/2011	12:30 PM	40°44.986'/73°57.987'	21
1004-4	10/4/2011	1:20 PM	40°45.015'/73°57.961'	24
1005-A	10/5/2011	7:45 AM	40°45.527'/73°57.570'	6-43
1005-B	10/5/2011	8:54 AM	40°45.473'/73°57.552'	6-20
1005-C	10/5/2011	10:45 AM	40°45.354'/73°57.636'	2-UNK
1005-D	10/5/2011	11:30 AM	40°45.334'/73°57.669'	40
1005-E	10/5/2011	12:32 PM	40°45.204'/73°57.788'	35-UNK
1005-F	10/5/2011	1:10 PM	40°45.272'/73°57.735'	43

Notes:

- *Depth does not include tide difference*
- *Range of depth indicates either shallow depth under pier to river's edge of pier or depth of bulkhead to a riverward distance of up to 50 feet*
- *ND – Not determined as it was similar to Pile South Pier Transect*
- *UNK – Outer depth unknown and not determined to promote safety of diver*

Figure 5 – 2011 Dive Survey Transet Map

AECOM

NYSDEC
East Midtown Waterfront
Esplanade Manhattan, NY

Dive Survey
Study Area

Prior to the daily underwater survey, a Secchi disk was used to determine visibility depth. Diver visibility ranged from approximately 6 inches to 3 feet and was dependent on tide. Visibility was better around the ebb tide but diminished as the tide flooded and current increased. It should be noted that the 1st Quarter Moon Phase occurred on October 3rd and 4th, 2011 and therefore, both days experienced neap tides. (Neap tides are defined as tides that occur at the first or last quarter of the moon when the tide-generating forces of the sun and moon oppose each other and produce the smallest rise and fall in tidal level.) A tide table for the survey dates is provided in Table 9. Tide data is given for East 41st Street, New York City and based on data from NOAA New York Battery Station 4911.

Table 9 – Tides: East 41st Street, New York City, during 2011 Dive Survey

Date	High	Elevation (feet)	Low	Elevation (feet)
3-Oct-11	2:35:00 AM	4.3	8:24:00 AM	0.7
	3:01:00 PM	5.0	9:19:00 PM	0.6
4-Oct-11	3:38:00 AM	4.2	9:34:00 AM	0.9
	4:01:00 PM	4.8	10:25:00 PM	0.7
5-Oct-11	4:40:00 AM	4.1	10:41:00 AM	1.0
	17:03:00 PM	4.6	11:23:00 PM	0.6

Light attenuation along the edge of the bulkhead or pier riverward differed from Secchi readings and was estimated to a depth of approximately 11 feet for all 3 days. Light attenuation depth was confirmed by the diver. Natural light was observed to be present underneath the pier to a distance of 40 to 50 feet shoreward, but surficial distance was tide dependent and lessened as the tide flooded.

Habitat assessment characteristics including slope, percent coverage, depth of surficial substrate, relief, existing structure, and general habitat health were visually assessed and results based on the diver and the onboard marine biologist's observations. Within the EMWE project area along the Manhattan shoreline, the following habitats were observed:

- **Piling/Open Water Edge Habitat**. Along the edge of the existing bulkhead of the FDR Drive East 41st Street to East 53rd Street, water depths ranged from 15 to 25 feet at the time of survey. Substrate consisted of low relief habitat (1- to 2-feet high) with riprap-sized rocks (approximately 1 foot in diameter), concrete rubble, and an occasional sandy pocket. Some anthropogenic debris (e.g. steel, rebar) was observed. The slope was relatively flat. The substrate was mostly silt and rubble. On the northern side of the tunnel, substrate became more silty with some rock and concrete. Debris was less prevalent. The bottom habitat had very little observed benthic community coverage and was sparsely populated by sponges and gastropods (approximately 3-5 percent overall coverage). An occasional blue crab was observed. Overall condition of bottom habitat was poor.

  Pilings were positioned approximately 6 feet apart and were 10% covered from the bottom to a depth of 12 feet. At approximately 12 feet, where light was observed to attenuate, tubiculous polychaete castings were evident, making up about 60 percent of total piling coverage to the surface. Blue mussels were observed within the upper 12 feet of the water column but they were not as prevalent as sea grapes and sponges. Other species observed were similar to those found at the edge habitat of the under-pier habitat. Overall, pile habitat was similar to that of the under-pier habitat and condition was poor to moderate.

- **Natural Bedrock Outcrop and Caissons Habitat**. From East 53rd Street to East 61st Street, aquatic habitat included 2 natural rock outcrops with a tide pool located adjacent to the FDR Drive between East 57th Street and East 59th Street and encrusting habitat on the caissons slightly riverward (approximately 50 feet) of the shoreline. Depth varied between 2 feet in the tide pool to depths greater than 40 feet at the rock wall. Slope on bedrock was steep at about a 90 degree vertical drop. Substrate was either bedrock or small rock (approximately 1 foot in diameter) with little or no silt layer. Percent coverage of benthic organisms varied by depth along the bedrock, but overall coverage was approximately 40 to 50 percent.

  Species observed included species common to the harbor including: green sea fern (*Bryopsis plumose*), Agardh's red weed (*Agardhiella tenera*), red beard sponge (*Microciona prolifera*), hydroids, striped anemone (*Haliplanella luciae*), Loosanoff's haliclona (Haliclona loosanoffi), dogwinkles (*Thais lapillus*), periwinkles (*Littorina spp.*), oysters, and blue mussel (*Mytilus edulis*), etc. Overall, habitat condition and biodiversity was highest along natural outcrops with overall rating of moderate to fair. The substrate riverward was mostly silt and rubble and of poor quality. Species composition found on the caissons was similar although mussels or oysters were observed.

No submerged aquatic vegetation (SAV) beds were observed in the project area. The lack of SAV is most likely due to water depth, absence of preferred substrate, current, and depth of light attenuation.

A total of 19 species were identified onboard via real-time video and through collection of samples (e.g. macroalgae at bedrock) when identification could not be confirmed via video. Species were identified to lowest practicable taxonomic level and identification was further confirmed by reviewing the DVDs. The low number of species is likely due to the currents and limited habitat opportunities for fish. Observations of the bulkheads and rock outcrops identified some foraging opportunities for fish and the near vertical makeup of the bulkheads provides limited cover for fish. Bulkheads have been found to provide limited habitat due to the lack of cover (Gothues and Able, 2010; Ianuzzi and Ludwig 2004). In the project area, fish species generally utilize the area as a transit corridor. The East Channel may be favored due to its habitat diversity (shallow waters, limited sheet pile bulkheads and large shoals). Table 10 lists the species observed.

Table 10 – October 2011 Dive Survey Species List

Species	Common Name
Bryopsis plumosa	Green sea fern
Rhodymenia palmate	Dulse
Agardhiella tenera	Agardh's red weed
Haliclona loosanoffi	Loosanoff's haliclona
Microciona prolifera	Red beard sponge
Haliplanella luciae	Striped anemone
Class Hydrozoa	Hydroids
Molgula manhattensis	Sea grape
Balanus spp.	Barnacles
Littorina spp.	Periwinkle spp.
Thais lapillus	Dogwinkles
Mytilus edulis	Blue mussel
Crassostrea virginica	Eastern Oyster
Unknown mud crab	Unknown mud crab
Callinectes sapidus	Blue crab
Anchoa mitchilli	Bay anchovy
Myoxocephalus aenaeus	Grubby sculpin
Tautogolabrus adspersus	Cunner
Unknown flounder	Unknown flounder

In general, habitat conditions for the Piling/Open Water Edge were poor. Species diversity at the Natural Bedrock Outcrop and Caissons Habitat appeared to be of higher quality than the other two habitat areas investigated. Bottom habitats had little to no visible macrobenthic or encrusting communities. Pilings had moderate colonization, but it appeared the majority of colonization occurred only to depths of surface light attenuation. The dominant species on the piles was sea grape, followed by blue mussels and sponges. No SAV was observed and it is most likely not present due to water depth, absence of preferred substrate, current, and depth of light attenuation. Oysters were present on natural bedrock but were not observed in other bottom substrates, under-pier, or on piling edge habitat. Offshore habitat was surveyed out to 50 feet from the shoreline; it consisted mostly of sand/silt and some riprap with species diversity and occurrence decreasing further into the channel.

3.7 EXISTING CONDITIONS SUMMARY

Overall, the habitat conditions in the EMWE project area are poor. The waters are deep and subject to strong currents. The shoreline is largely bulkheaded with outfalls. In areas where rock outcrops extend into the East River, the rock faces are often steep; higher value shallow water habitats (mudflats, SAV beds, etc.) are not present in the project area. The substrate was observed to be either silt and rubble or bedrock and these bottom habitats had little to no visible encrusting biological communities. Water quality is impacted based on the existence of combined sewer overflows, municipal discharges, other sanitary discharges, urban storm runoff, and toxins and other contaminates from current and former industrial activities.

Fish in the project area vary seasonally; species vary from schooling baitfish that occur in the upper portions of the water column to demersal fish that occur on benthic habitats, as well as predatory species (e.g., blue fish, striped bass) that may be found at all depths. While many fish species utilize the East River to transit between lower New York Harbor, Long Island Sound, and the Harlem River over to the Hudson River, the lack of shallow shoals likely makes the area unattractive habitat for species that spawn over these habitats (e.g., winter flounder).

Species diversity in the project area was highest at the natural rock outcrops and habitat condition appeared to be of higher quality than the sheetpile bulkheads, which provide little, if any, habitat value. Undoubtedly some fish utilize the floral and faunal organisms on the bulkheads and rock outcrops for prey species; however, these vertical structures provide limited resources along the shoreline in the project area to attract fish. By comparison, the shorelines of Roosevelt Island and the East Channel are shallower with various structures that provide more attractive habitat resources for fish than the EMWE project area.

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APPENDIX A

BATHYMETRIC SURVEY DATA

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PROJECT NORTH

MICHAEL W. FINKBEINER
PROFESSIONAL LAND SURVEYOR
LICENSE NO. 050352-1

PRELIMINARY

REVISION DATE

DATE OF SURVEY
Oct 3–17, 2011

DATE OF DWG.
Oct. 31, 2011

JOB: NO.
2062

BATHYMETRIC SURVEY

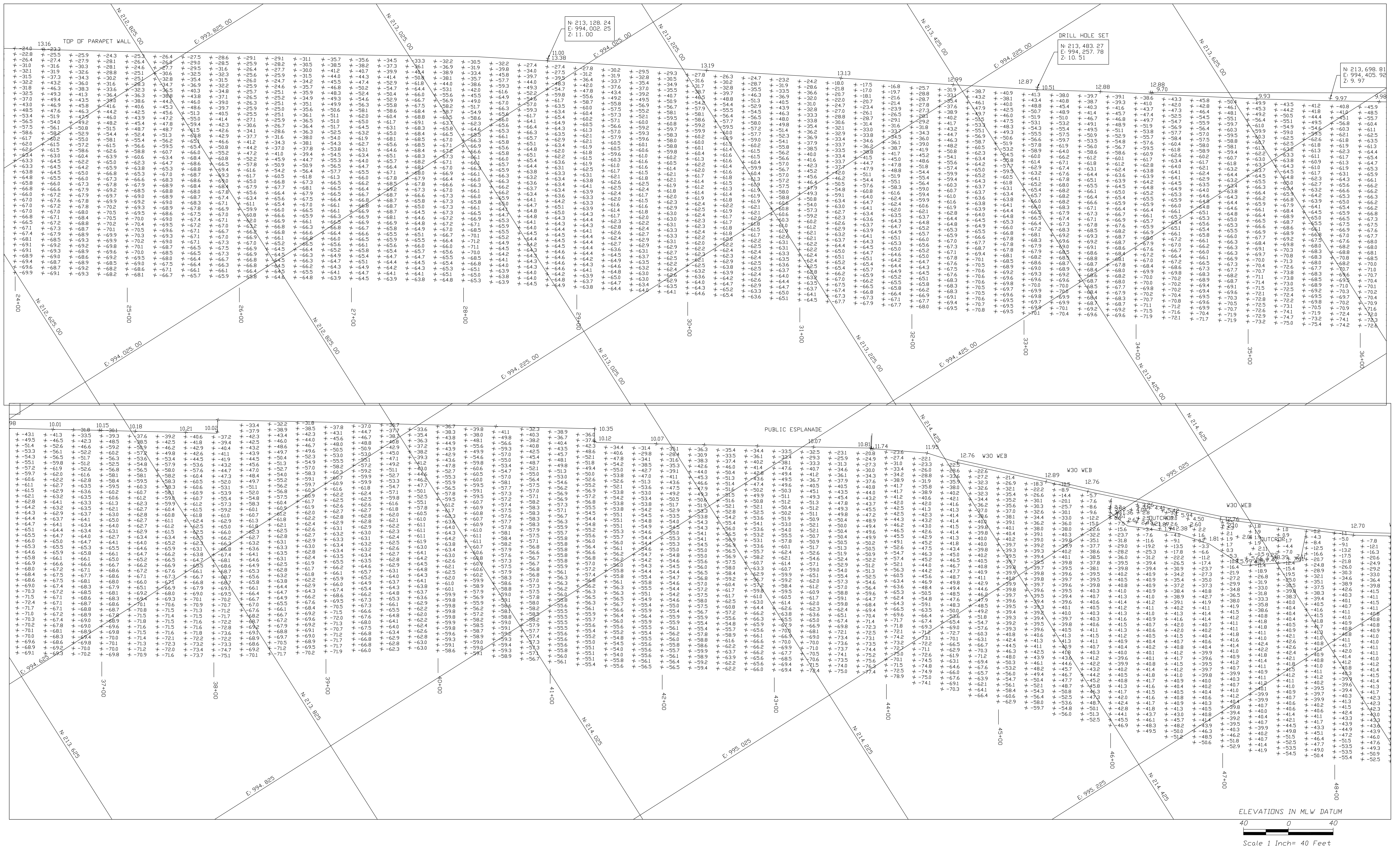
EAST RIVER ESPLANADE

FDR Drive from 37th St. to 61 St. NEW YORK, NY

DRAWN BY: MWF

CHECKED BY:

SHEET 1 OF 3



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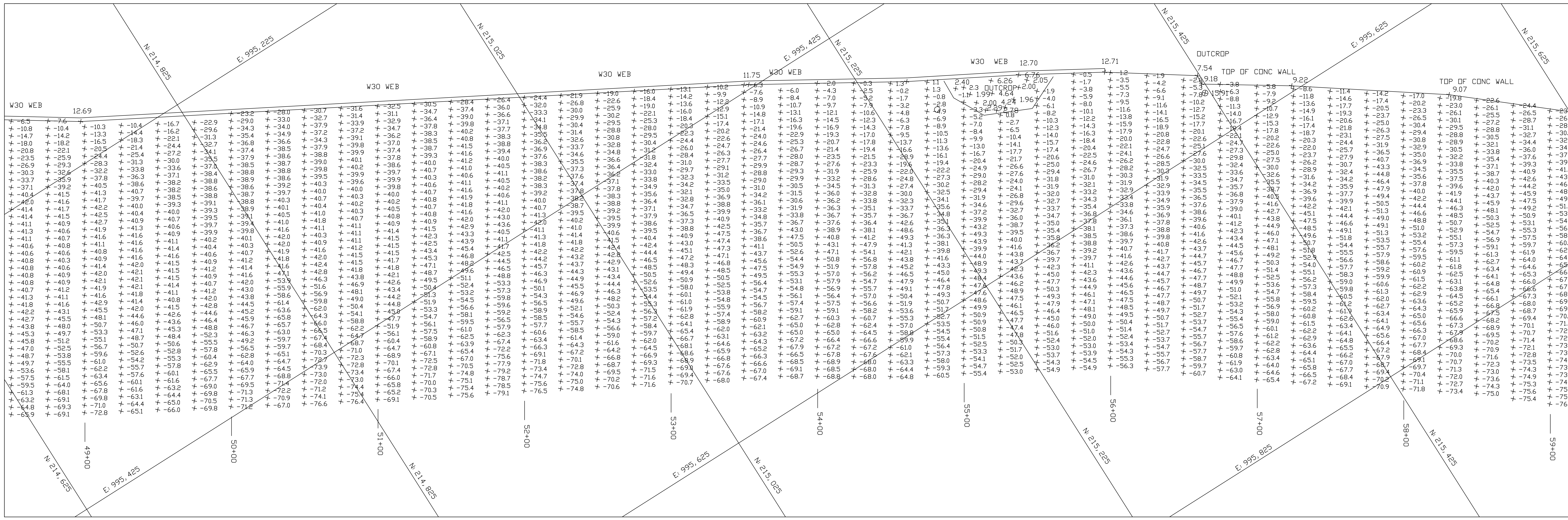
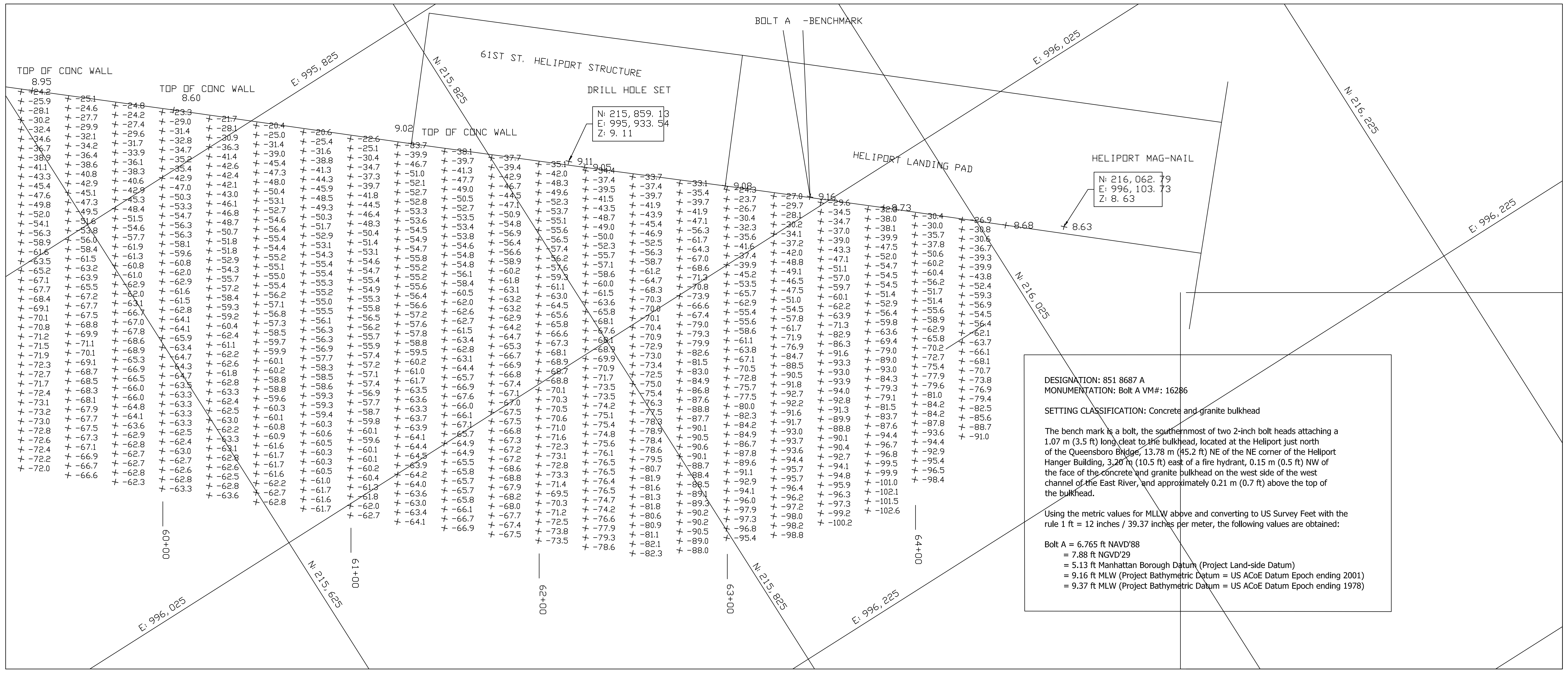
CHECKED BY:

SHEET 2 OF 3





DESIGNATION: 851 8687 A
MONUMENTATION: Bolt A VM#: 16286

SETTING CLASSIFICATION: Concrete and granite bulkhead

The bench mark is a bolt, the southernmost of two 2-inch bolt heads attaching a 1.07 m (3.5 ft) long cleat to the bulkhead, located at the Heliport just north of the Queensboro Bridge, 13.78 m (45.2 ft) NE of the NE corner of the Heliport Hanger Building, 3.20 m (10.5 ft) east of a fire hydrant, 0.15 m (0.5 ft) NW of the face of the concrete and granite bulkhead on the west side of the west channel of the East River, and approximately 0.21 m (0.7 ft) above the top of the bulkhead.

Using the metric values for MLLW above and converting to US Survey Feet with the rule 1 ft = 12 inches / 39.37 inches per meter, the following values are obtained:

Bolt A = 6.765 ft NAVD'88
= 7.88 ft NGVD'29
= 5.13 ft Manhattan Borough Datum (Project Land-side Datum)
= 9.16 ft MLW (Project Bathymetric Datum = US ACoE Datum Epoch ending 2001)
= 9.37 ft MLW (Project Bathymetric Datum = US ACoE Datum Epoch ending 1978)

SURVEY NOTES:

Survey controls and bathymetric methodology are described in detail in a Memo by Michael W. Finkbeiner,PLS of E.W.Finley, PC dated Oct 31, 2011, which is made a part of this survey.

Elevations refer to Mean Low Water of the Tidal Epoch Ending 2001 MLW 0.0 = Manhattan Borough Datum -4.03 ft.

Coordinates refer to NAD 83 NY-Long Island Zone, referenced to NYBP CORS at Battery Park.

Elevational relationships are based on NOAA values published for Battery Park Tide Disc No.7 for tidal epochs ending 1978 and 2001.

ELEVATIONS IN MLW DATUM

40 0 40

Scale 1 Inch= 40 Feet

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CHECKED BY:

SHEET 3 OF 3

Michael W. Finkbeiner, PLS
E. W. Finley, PC
Engineers and Land Surveyors

Project East River Esplanade - Bathymetrics from 37th St to 61st Streets
Memo on Datums and Control Methodolgy
revised to Oct. 31th, 2011

Project Vertical Datums: Landside – Manhattan Borough Datum and Bathymetric-Mean Low Water

There are five vertical datums of importance to the Project. The relationship between them is defined by Federal documentation from NOAA (National Oceanic and Atmospheric Administration) at the southern end of Manhattan. Port Authority Chief of Surveys, Scott Zelenak PLS, published a study of Borough datums in 2001 connection with the WTC mapping and reconstruction. Zelenak noted that the Randel Farm Survey of 1812 recorded elevation data for the Borough Street Grid of 1811 map of the Commissioners' Plan and the Randel Farm Maps. Interestingly, Randel used two separate datums for each survey. Whereas the Farm Maps datum was taken at "a medium between high and low tide water," the 1811 map datum was "above high water mark," as Randel himself noted on his 1811 map.

The 1811 Commissioner's Plan Datum is now known as the Manhattan Borough Datum. It has long been taken to be 2.75 ft above the "Mean Sea Level at Sandy Hook, NJ", also known as the National Geodetic Vertical Datum of 1929 (or NGVD), a mid-tide datum. MBD is therefore a "high-tide" datum, representing elevations above the high tide line. On the other hand, the Bathymetric values are in Mean Low Water (MLW), representing clear depth to bottom from the "low-tide" values. It is the conclusion of this study that the difference between the datums is 4.03 feet, representing the approximate tide range of the East River.

The 1929 datum was adjusted or warped to hold mean tides at the Coast Guard Station at Sandy Hook at the ocean end of NY Harbor. Since 1929, tides have been recorded in long-series detail at Alpine, NJ opposite the Yonkers Ferry Terminal, Battery Park NY in lower Manhattan, and at the Bronx/Westchester boundary in Long Island Sound at New Rochelle.

Since Babylonian times, the sun/moon eclipse cycle is known to repeat at 19-year intervals. Thus tides are now averaged with daily readings over the full 19 years in combinations of lower low, both lows daily, both highs daily, and higher high daily tide. The last two tidal epochs used for determination of tidal datums ended respectively in 1978 and 2001. In 1988 the North American Vertical Datum superseded NGVD of 1929, and removed the distortions of the adjustments to match sea levels at various tide stations, including a principal station at Sandy Hook NJ. Thus NAVD-1988 is a fixed datum, run by level networks, but without a constrained adjustment based on tides.

The Tide Gage station at Battery Park at the Coast Guard Station presents the following data for tidal datum in the epoch ending 1978 (later superseded by the epoch ending 2001), expressed in feet in relationship to NGVD. Discs 3 & 7 are noted, due to their value for GPS occupation and tie to the project.

			US-FT
Tide Disc NO 7 1975 (over MLLW)		**=**	**14.88**
Tide Disc NO 3 (over MLLW)		**=**	**14.25**
MEAN HIGHER HIGH WATER	MHHW	=	5.12

MEAN HIGH WATER MHW = 4.78
\+ Manhattan Borough Datum 1811 MBD = 4.63
MEAN TIDE LEVEL MTL = 2.50
* NATIONAL GEODETIC VERTICAL DATUM NGVD29 = 1.88
MEAN LOW WATER (USACoE) MLW = 0.22
MEAN LOWER LOW WATER MLLW = 0.00

* NGVD is based on elevations published in Quad 400741, December 1982 and NOS leveling of April 1984.

\+ MBD is based on its accepted vertical position 2.75 ft above NGVD

SOURCE: http://tidesandcurrents.noaa.gov/data_menu.shtml?stn=8518750%20The%20Battery,%20NY&type=Superseded%20Bench%20Mark

With the adoption of the North American Vertical Datum of 1988 and the new tidal epoch ending 2001, NOAA restated values of individual tidal benchmarks at Battery Park, all in meters.

LENGTH OF SERIES: 19 YEARS
TIME PERIOD: January 1983 - December 2001
TIDAL EPOCH: 1983-2001

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:

Bench Mark Elevation Information		In METERS above MLLW:	in US-FT
Tide Disc NO 7 1975		= 4.468m	14.659
Tide Disc NO 3		= 4.276m	14.029
MEAN HIGHER HIGH WATER	MHHW	= 1.541m	5.056
MEAN HIGH WATER	MHW	= 1.443m	4.734
North American Vertical Datum	NAVD88	= 0.847m	2.779
MEAN SEA LEVEL	MSL	= 0.783m	2.569
MEAN TIDE LEVEL	MTL	= 0.753m	2.470
MEAN LOW WATER	MLW	= 0.063m	0.207
MEAN LOWER LOW WATER	MLLW	= 0.000m	0.000

Source: http://tidesandcurrents.noaa.gov/data_menu.shtml?stn=8518750%20The%20Battery,%20NY&type=Bench%20Mark%20Data%20Sheets

By comparison of the fixed tide discs to the fixed datums, we see the relationship of the datums as well as the effects of rising sea levels since 1811, as fixed in 1929 (NGVD), 1978 (tidal epoch end), 1988(NAVD), and 2001(tidal epoch end).

Using Tide Disc 7 for calculation (on the loading dock at the south corner of the Coast Guard Building at Battery Park), its elevation in US Ft in the various datums is calculated as:

MLLW (epoch ending 1978) = 14.88 ft
MLLW (epoch ending 2001) = 14.659 ft
MLW (epoch ending 1978) = 14.66 ft
MLW (epoch ending 2001) = 14.45 ft
NVGD-29 = 13.00 ft
NAVD-88 = 11.88 ft
Manhattan Borough Datum = 10.25 ft

Recovery of Tide Marks in the Project Area:

41st ST Pier Tide Disc 8695B

BENCH MARK STAMPING: 8695 B 1979

The bench mark is set in concrete on top of the concrete retaining wall along the north face of the pier, 12.5 feet (3.8 m) from the east end of the smaller wall, 3.5 feet (1.1 m) above the level of the parking lot, and 2 feet (0.6 m) from the retaining wall of Franklin D. Roosevelt Drive.

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in FEET:

8695 B 1979 = in local tidal datum over MLLW = 12.49
HIGHEST OBSERVED WATER LEVEL (05/04/1981) = 6.86

MEAN HIGHER HIGH WATER MHHW = 4.89
MEAN HIGH WATER MHW = 4.55
MEAN TIDE LEVEL MTL = 2.40
MEAN LOW WATER MLW = 0.24
MEAN LOWER LOW WATER MLLW = 0.00
LOWEST OBSERVED WATER LEVEL (04/06/1981) = -2.20

Recovery of Tide Marks in the Project Area:

Therefore, Disc B has an elevation of 12.25 ft MLW (tidal epoch ending 1978). Based on the tidal datum change at Battery Park to the epoch ending 2001, with sea level rise of 0.21 ft from 1978 to 2001 in MLW levels at Tidal Disc No.7, the adjusted elevation value of Disc B at 41st ST. Pier is 12.04 ft MLW (epoch ending 2001.)

The published datum for this mark does not relate to either the chosen waterside or land-side datums. Therefore, bathymetric survey work was referenced to the tidal benchmark with published data in current datums, which was found at the 61st Heliport property in good condition.

The following data is published by NOAA at:
http://tidesandcurrents.noaa.gov/data_menu.shtml?stn=8518687%20Queensboro%20Bridge,%20NY&type=Bench%20Mark%20Data%20Sheets

Station ID: 8518687 PUBLICATION DATE: 04/21/2003
Name: QUEENSBORO BRIDGE, EAST RIVER

Tidal datums at QUEENSBORO BRIDGE, EAST RIVER based on:
LENGTH OF SERIES: 3 Months
TIME PERIOD: August 2001 - October 2001
TIDAL EPOCH: 1983-2001
CONTROL TIDE STATION: 8519483 BERGEN POINT WEST REACH, KILL VAN KULL

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:
BENCHMARK 851 8687 A over MLLW (BOLT A) = 2.856 meters

MEAN HIGH WATER MHW = 1.383
North American Vertical Datum NAVD88 = 0.794
MEAN TIDE LEVEL MTL = 0.724
MEAN LOW WATER MLW = 0.064
MEAN LOWER LOW WATER MLLW = 0.000

BENCH MARK STAMPING:
DESIGNATION: 851 8687 A
ALIAS: NO STAMPING 1

MONUMENTATION: Bolt A VM#: 16286
AGENCY: Martek Inc. PID:
SETTING CLASSIFICATION: Concrete and granite bulkhead

The bench mark is a bolt, the southernmost of two 2-inch bolt heads attaching a 1.07 m (3.5 ft) long cleat to the bulkhead, located at the Heliport just north of the Queensboro Bridge, 13.78 m (45.2 ft) NE of the NE corner of the Heliport Hanger Building, 3.20 m (10.5 ft) east of a fire hydrant, 0.15 m (0.5 ft) NW of the face of the concrete and granite bulkhead on the west side of the west channel of the East River, and approximately 0.21 m (0.7 ft) above the top of the bulkhead.

Using the metric values for MLLW above and converting to US Survey Feet with the rule 1 ft = 12 inches / 39.37 inches per meter, the following values are obtained:

Bolt A = 6.765 ft NAVD'88
= 7.88 ft NGVD'29
= 5.13 ft Manhattan Borough Datum (Project Land-side Datum)
= 9.16 ft MLW (Project Bathymetric Datum = US ACoE Datum)

The primary mark, BOLT A, was sighted by a Leica Robotic Total Station Model 1203 from Roosevelt Island's west shore opposite 53rd Street, and tied to Disc B at the 41st St. pier, as well as other control points along the FDR. Horizontal control points were established in NAD-1983 State Plane Co-ordinates in the NY-LI Lambert Zone by static GPS processing. Horizontal Control Points were established adjacent to the vertical tidal control points, and used for bathymetric control.

In order to establish survey grade ties to Battery Park CORS at the Coast Guard Station, static GPS occupations were performed at horizontal control points adjacent to both tide marks. These were post-processed with dual-frequency RINEX files obtained from NYBP CORS.

Mark	NY-LI-North	NY-LI-EAST in US Ft.
Heliport-Mag	216062.795	996103.732
Roosevelt-Mag1	213732.583	995567.204
Roosevelt-South	213158.777	995386.113
bolt-41st	211608.149	993022.375
NYBP CORS	194691.967	980279.571 (Control Value NAD83-NY-LI FT)

Horizontal precision 0.013 ft

Total Station survey (by Leica 1203 Robotic) was used to establish a control network along the FDR Drive with multiple intervisible control points suitable for total station occupation. Additionally, top of wall and river bottom soundings were established at regular intervals along the FDR from the centerline extension of 37th Street to 62nd Street.

Three areas of rock outcroppings along the building covered portion of the FDR and several of the four-foot diameter steel pilings off-shore of the outcroppings were individually surveyed for control purposes.

Hydrographic Methodology:

Bathymetric Soundings were taken by a transom-mounted transducer on a Zodiac style inflatable boat, with a Leica 360-degree prism mounted directly over the transducer.

The Leica 1203 Robotic Total Station was set on one a the control points, with a locked sight on the prism. The 5 ft. height of the prism pole was added in real-time to the sounder depth, with XYZ values calculated in NY-Long Island Zone Grid horizontal co-ordinates and vertical values in Mean Low Water datum.

The project specification called for scan lines of bathymetric readings 200 ft from the hard shoreline of the FDR drive at 25 foot spacings from 37th St to 61st Street.

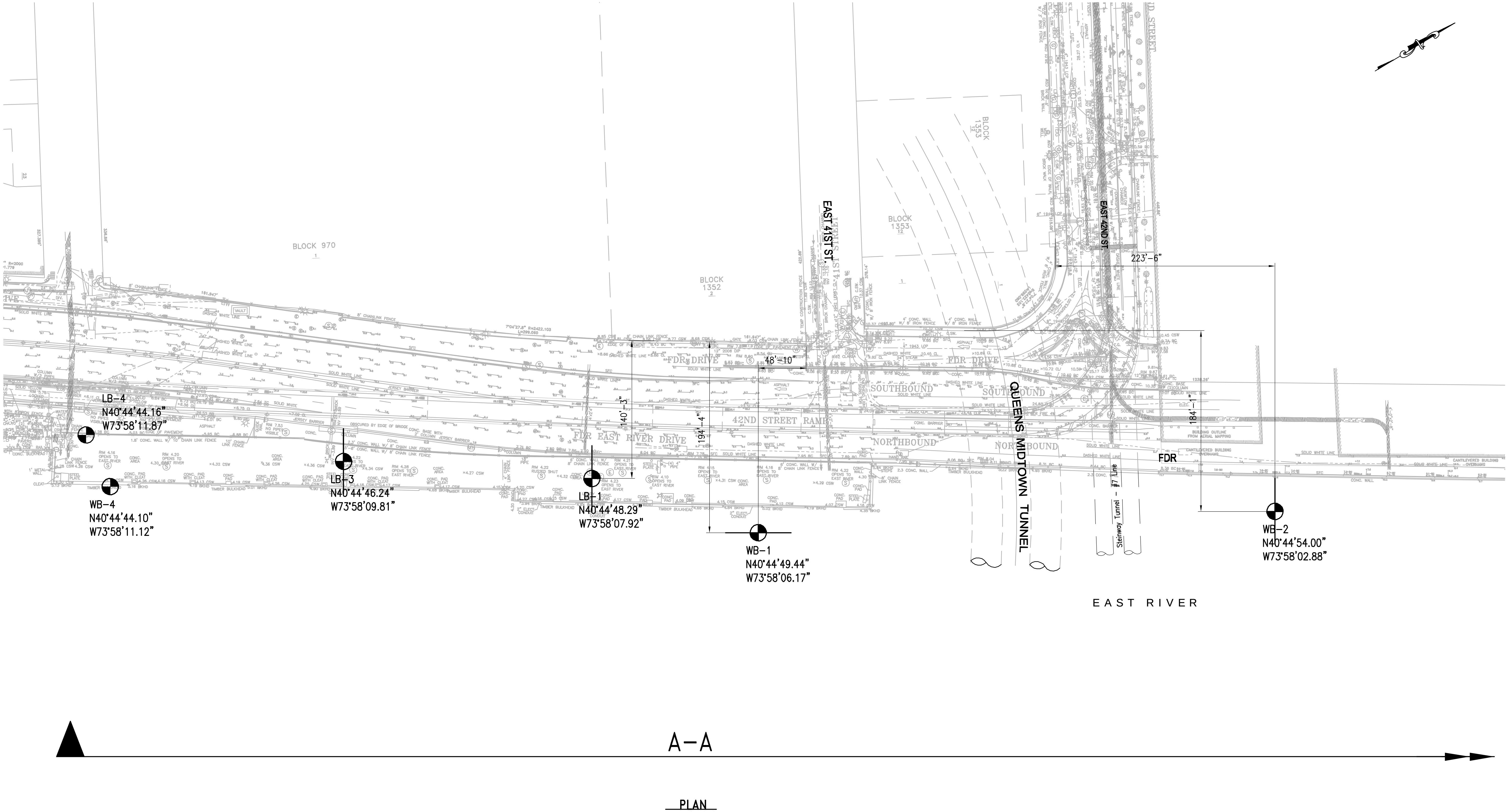
Calibration readings were taken by a 6-pound iron weight on a Lufkin tape, read by the total station as a rod height from the Leica prism. Current levels ranged from northward at 3.5 knots to southward at 4.2 knots. Most of the in-water survey work was performed around periods of slack tide.

Michael W. Finkbeiner, PLS
NYS Land Surveyor # 050352
Oct 31st, 2011

MICHAEL WALTER FINKBEINER
050352-1

APPENDIX B

SOIL BORING INFORMATION



PLAN

SCALE: 1"=30'-0'

GRAPHIC SCALE: 1" = 50'-0"

50' 25' 0 25' 50' 100' 150'

INFORMATION CONFIDENTIAL:

It is a violation of the professional license law for any person to alter this drawing in any way, unless acting under the direction of a licensed engineer/registered architect. The altering engineer/architect shall affix his/her seal and the notation "altered by followed by his/her signature and date of alteration.

Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

REV.	DATE	DESCRIPTION	BY / SUB.	APP.
__				
__				
__				
__				
__				
__				

DESIGNED BY: K.ARMFIELD
DRAWN BY: F.LIZANO
CHECKED BY: K.ARMFIELD
APPROVED BY:
SUBMITTAL DATE: 6/20/2012

NYCEDC
New York City Economic Development Corporation

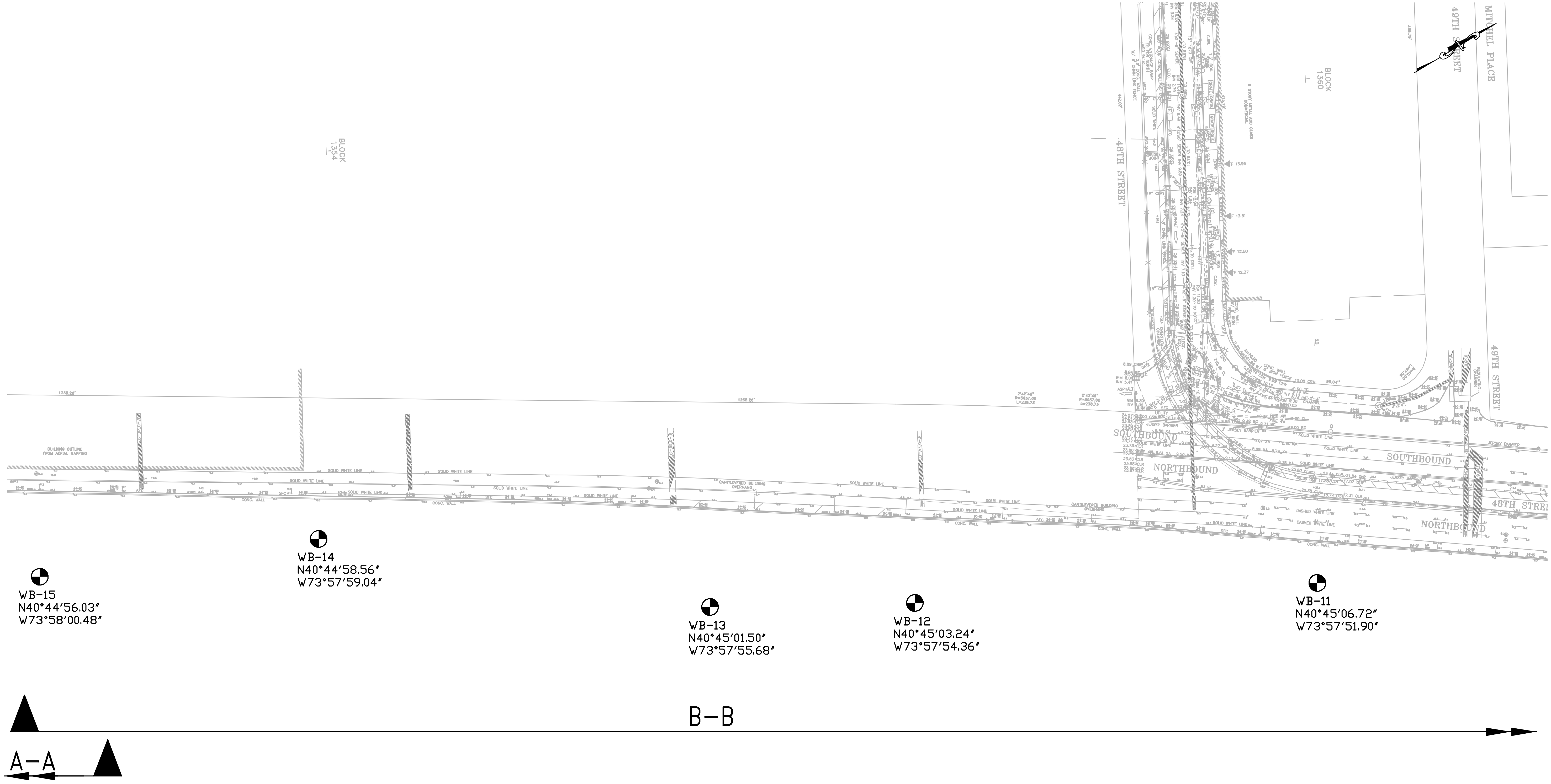
AECOM

AECOM USA, Inc.
605 Third Avenue
New York, NY 10158
T 212.973.2900 F 212.973.3058
www.aecom.com

EAST MIDTOWN WATERFRONT ESPLANADE AND GREENWAY

BORING LOCATION PLAN 1

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT: ___
DISCIPLINE/SEQUENCE: B-001
REVISION: ___
SHEET NO. 1 OF 4
SCALE: 1"=50'



PLAN
SCALE: 1"=30'-0"

GRAPHIC SCALE: 1" = 50'-0"
50' 25' 0 25' 50' 100' 150'

INFORMATION CONFIDENTIAL:

It is a violation of the professional license law for any person to alter this drawing in any way, unless acting under the direction of a licensed engineer/registered architect. The altering engineer/architect shall affix his/her seal and the notation "altered by followed by his/her signature and date of alteration.

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REV.	DATE	DESCRIPTION	BY/SUB.	APP.

DESIGNED BY: K.ARMFIELD
DRAWN BY: F.LIZANO
CHECKED BY: K.ARMFIELD
APPROVED BY:
SUBMITTAL DATE: 6/20/2012

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www.aecom.com

EAST MIDTOWN WATERFRONT ESPLANADE AND GREENWAY

BORING
LOCATION PLAN 2

CONTRACT NO. 38430001
DRAWING NO.
STA/SEGMENT: ____
DISCIPLINE/SEQUENCE: B-002
REVISION: ____
SHEET NO. 2 OF 4
SCALE 1"=50'

PLAN

SCALE: 1"=30'-0"

GRAPHIC SCALE: 1" = 50'-0"

50' 25' 0 25' 50' 100' 150'

INFORMATION CONFIDENTIAL:

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Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

REV.	DATE	DESCRIPTION	BY/SUB.	APP.
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DESIGNED BY: K.ARMFIELD
DRAWN BY: F.LIZANO
CHECKED BY: K.ARMFIELD
APPROVED BY: ____________
SUBMITTAL DATE: 6/20/2012

NYCEDC
New York City Economic Development Corporation

AECOM

AECOM USA, Inc.
605 Third Avenue
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www.aecom.com

EAST MIDTOWN WATERFRONT ESPLANADE AND GREENWAY

BORING LOCATION PLAN 3

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT ____ DISCIPLINE/SEQUENCE B-003
REVISION ____
SHEET NO. 3 OF 4
SCALE 1"=50'

PLAN
SCALE: 1"=30'-0"

GRAPHIC SCALE: 1" = 50'-0"
50' 25' 0 25' 50' 100' 150'

INFORMATION CONFIDENTIAL:

It is a violation of the professional license law for any person to alter this drawing in any way, unless acting under the direction of a licensed engineer/registered architect. The altering engineer/architect shall affix his/her seal and the notation "altered by" followed by his/her signature and date of alteration.

Current AECOM Cadd Standards, Guidelines And Criteria Shall Be Followed To The Greatest Extent Practicable For Engineering Design And Plan Preparation

REV.	DATE	DESCRIPTION	BY/SUB.	APP.
__	______	______	___	___
__	______	______	___	___
__	______	______	___	___
__	______	______	___	___
__	______	______	___	___
__	______	______	___	___

DESIGNED BY: K.ARMFIELD
DRAWN BY: F.LIZANO
CHECKED BY: K.ARMFIELD
APPROVED BY: ________
SUBMITTAL DATE: 6/20/2012

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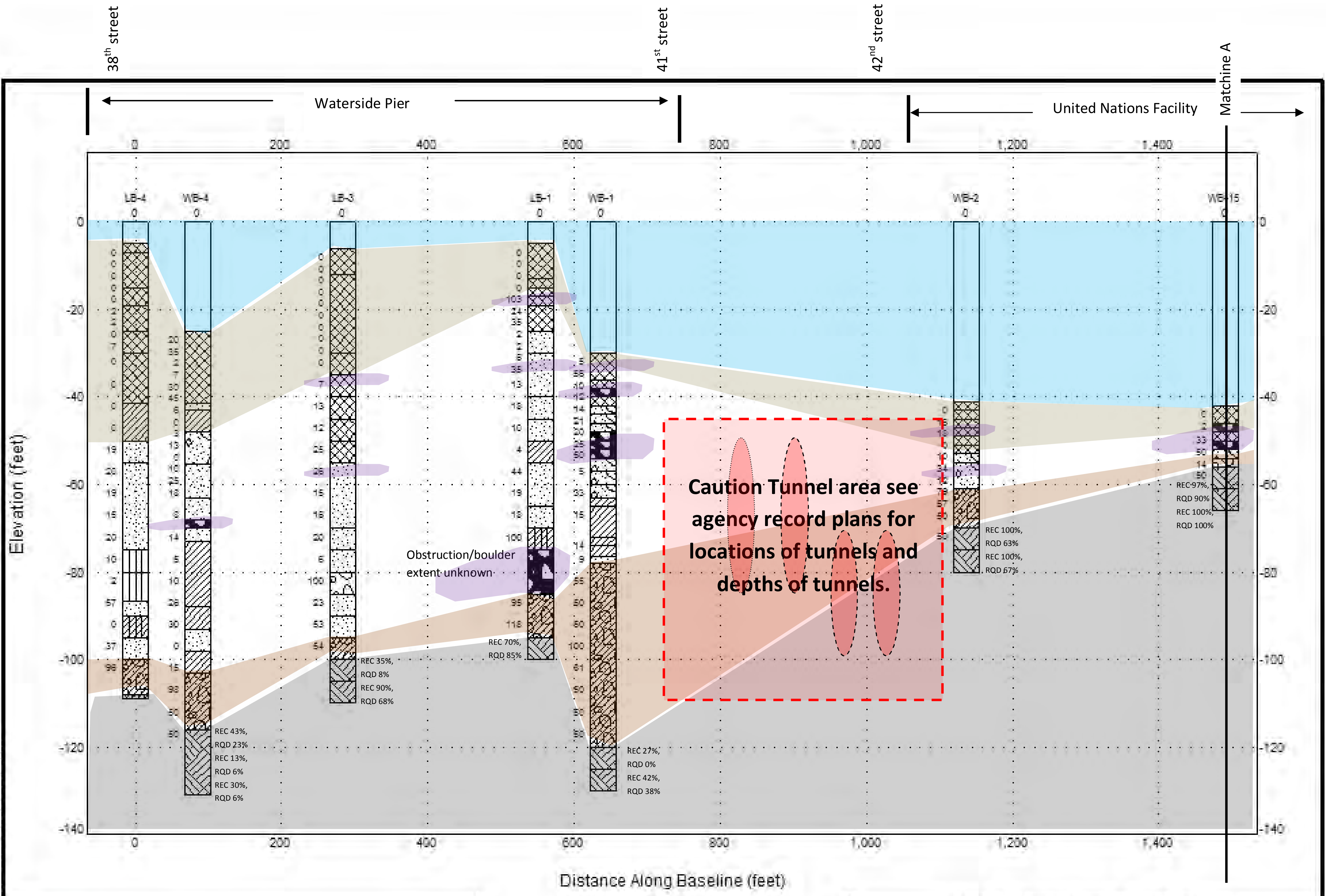
EAST MIDTOWN WATERFRONT ESPLANADE AND GREENWAY

BORING
LOCATION PLAN 4

CONTRACT NO. 38430001
DRAWING NO. STA/SEGMENT ____
DISCIPLINE/SEQUENCE B-001
REVISION ____
SHEET NO. 4 OF 4
SCALE 1"=50'



Notes:

1. Caution, multiple tunnels transect the project site; record drawings from Agencies should be reviewed to determine exact depths and locations. Locations shown herein are approximate.

2. Multiple outfalls also transect the project site, see Civil drawings for details.

3. Multiple obstructions were encountered during the boring program; Contactor should anticipate obstructions during pile driving. There may be additional obstruction beyond those identified during the boring program.

4. Note that rock varies significantly over short distances throughout this site, both in the north -south and in the east-west directions.

5. Street locations are approximate; see plan view for locations of borings.

6. Weathered rock was present above hard rock, note REC/RQD values.

7. Note, boring contactor had difficulty setting barge, due to rock variability and shallow overburden in some locations.

- 🟪 Obstruction extent unknown
- 🟦 Water
- ▩ Rock
- 🟫 Glacial Till
- ▨ Very Soft Clay/Silt
- □ Silty Clayey Sand Mixture

AECOM

AECOM
20 Exchange Place, NY, NY 10005
Client: EDC

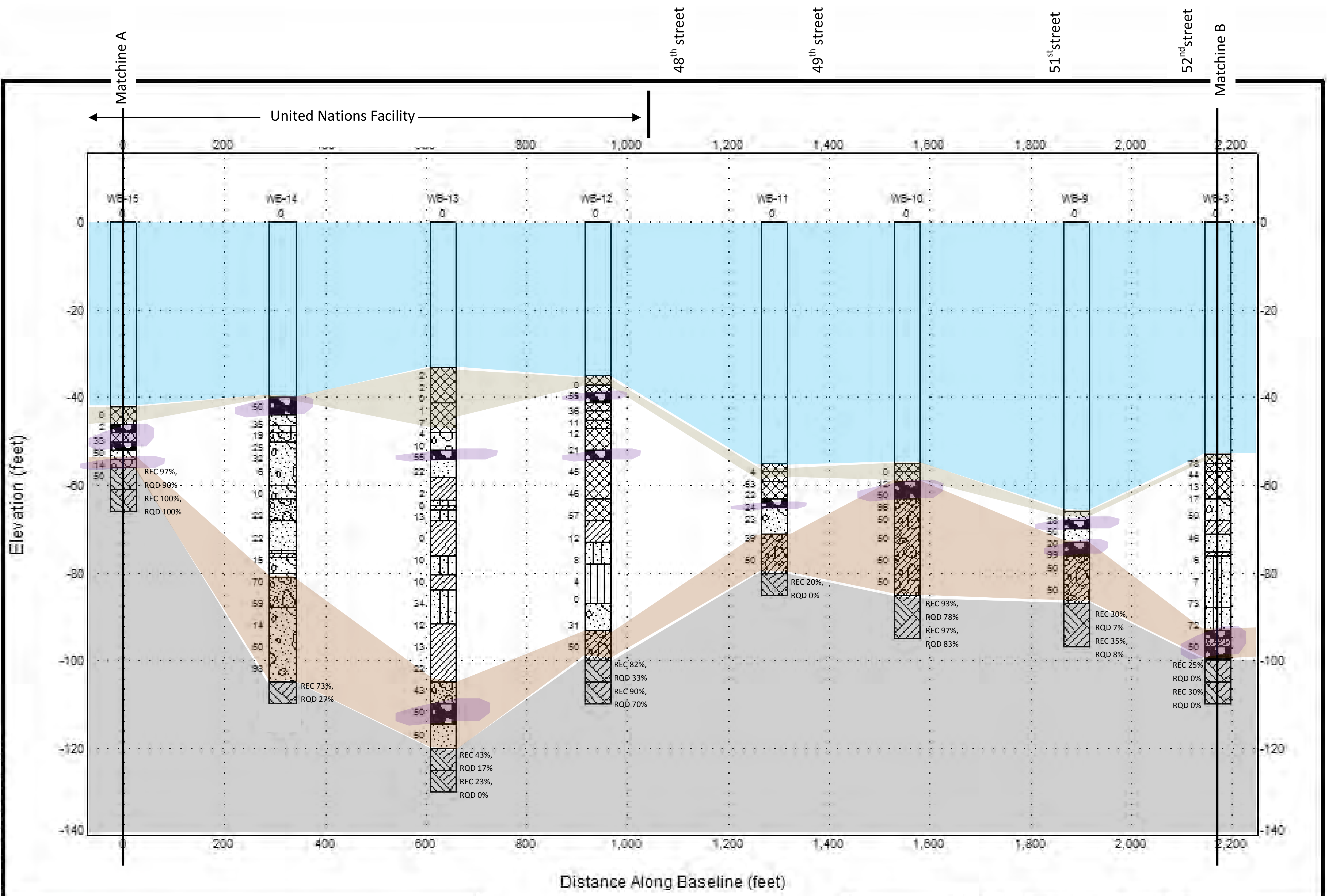
SOIL PROFILE A-A

SUBSURFACE DIAGRAM

Project: East Midtown Waterfront Esplanade and Greenway

Location: New York, NY

US FENCE EMWEG-PROFILES.GPJ US EVAL.GDT 6/1/12



SOIL PROFILE B-B

Notes:

1. Caution, multiple tunnels transect the project site; record drawings from Agencies should be reviewed to determine exact depths and locations. Locations shown herein are approximate.

2. Multiple outfalls also transect the project site, see Civil drawings for details.

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4. Note that rock varies significantly over short distances throughout this site, both in the north -south and in the east-west directions.

5. Street locations are approximate; see plan view for locations of borings.

6. Weathered rock was present above hard rock, note REC/RQD values.

7. Note, boring contactor had difficulty setting barge, due to rock variability and shallow overburden in some locations.

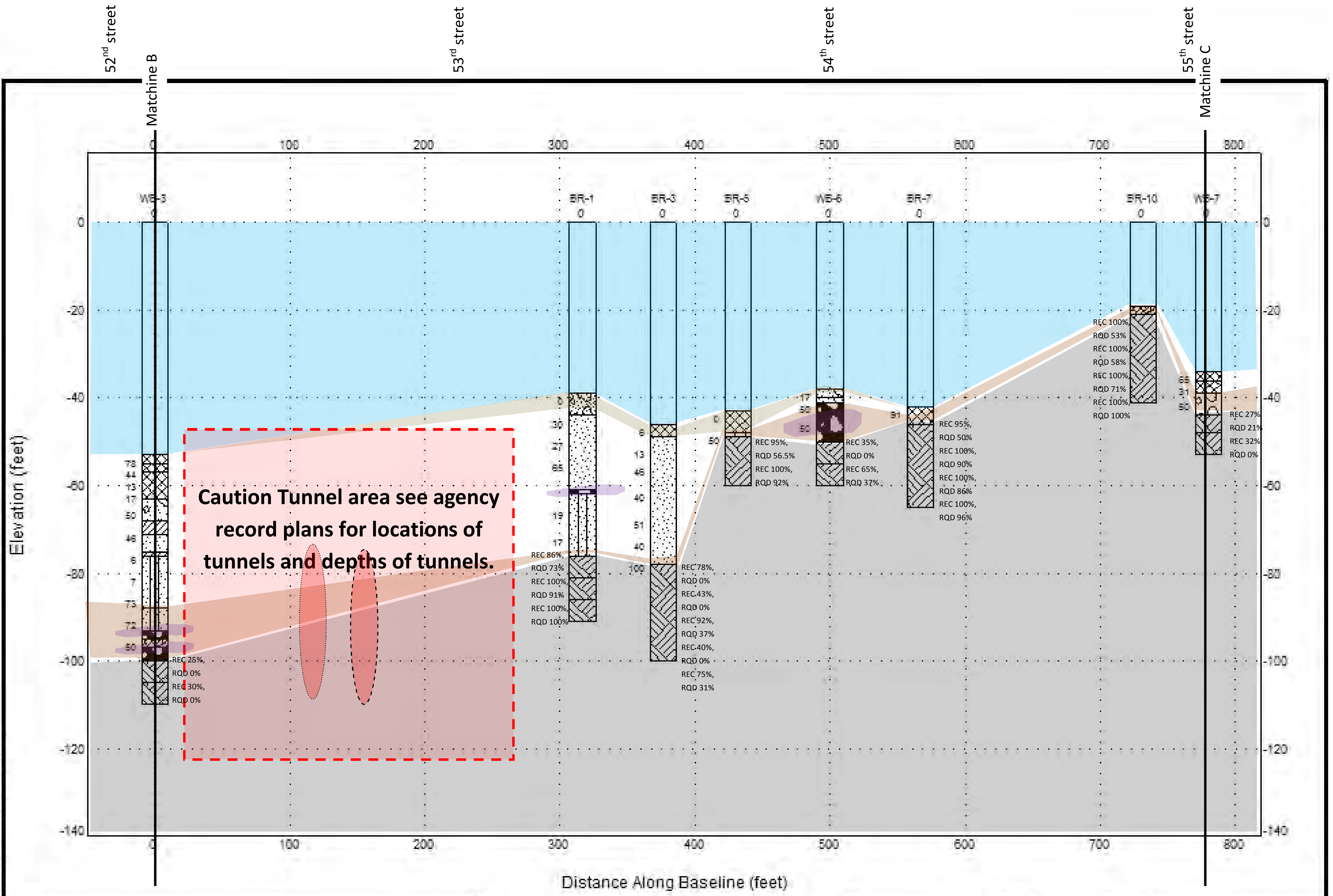
US FENCE EMWEG-PROFILES.GPJ US EVAL.GDT 6/1/12

AECOM

AECOM
20 Exchange Place, NY, NY 10005
Client: EDC

SUBSURFACE DIAGRAM

Project: East Midtown Waterfront Esplanade and Greenway
Location: New York, NY



Notes:

1. Caution, multiple tunnels transect the project site; record drawings from Agencies should be reviewed to determine exact depths and locations. Locations shown herein are approximate.

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7. Note, boring contactor had difficulty setting barge, due to rock variability and shallow overburden in some locations.

🟪	Obstruction extent unknown
🟦	Water
⬜	Rock
🟫	Glacial Till
⬜	Very Soft Clay/Silt
☐	Silty Clayey Sand Mixture

US FENCE EMWEG-PROFILES.GPJ US EVAL.GDT 6/1/12

AECOM

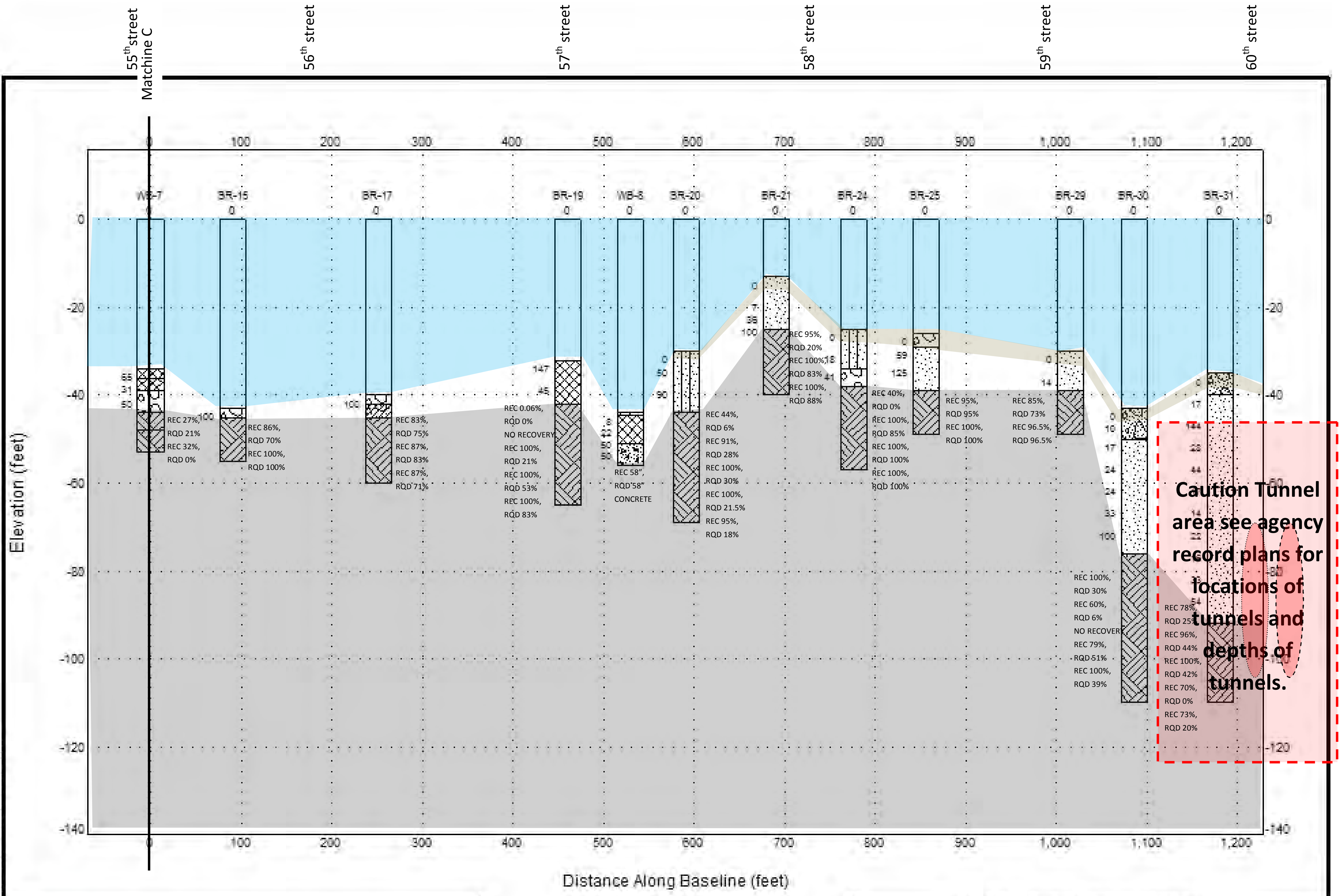
AECOM
20 Exchange Place, NY, NY 10005
Client: EDC

SOIL PROFILE C-C

SUBSURFACE DIAGRAM

Project: East Midtown Waterfront Esplanade and Greenway

Location: New York, NY



Caution Tunnel area see agency record plans for locations of tunnels and depths of tunnels.

US FENCE EMWEG-PROFILES.GPJ US EVAL.GDT 6/1/12

Notes:

1. Caution, multiple tunnels transect the project site; record drawings from Agencies should be reviewed to determine exact depths and locations. Locations shown herein are approximate.

2. Multiple outfalls also transect the project site, see Civil drawings for details.

3. Multiple obstructions were encountered during the boring program; Contactor should anticipate obstructions during pile driving. There may be additional obstruction beyond those identified during the boring program.

4. Note that rock varies significantly over short distances throughout this site, both in the north -south and in the east-west directions.

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6. Weathered rock was present above hard rock, note REC/RQD values.

7. Note, boring contactor had difficulty setting barge, due to rock variability and shallow overburden in some locations.

🟪 Obstruction extent unknown

🟦 Water

⬜ Rock

🟫 Glacial Till

⬜ Very Soft Clay/Silt

⬜ Silty Clayey Sand Mixture

AECOM

AECOM
20 Exchange Place, NY, NY 10005
Client: EDC

SOIL PROFILE D-D

SUBSURFACE DIAGRAM

Project: East Midtown Waterfront Esplanade and Greenway

Location: New York, NY

APPENDIX C

DIVE SURVEY REPORT

AECOM
30 Knightsbridge Road, Suite 520
Piscataway, New Jersey 08854

732-564-3600 tel
732-369-0122 fax

Memorandum

To	John Seaboldt	Page	1
CC	James Mansky, Karen Appell, and Indhira Figuereo		
Subject	East Midtown Waterfront Esplanade (EMWE) - Ecological Underwater Survey		
From	Capt. Aleksandr Modjeski		
Date	January 3, 2011		

SUMMARY

An Ecological Underwater Survey was performed as part of the preliminary baseline assessment necessary for identifying potential ecological impacts from the construction of the EMWE and on-site mitigation opportunities along the eastern shoreline of the East River between East 38th Street and East 61st Street in Manhattan from October 3rd through October 5th, 2011.

The survey consisted of the following:

- Visual dive survey performed parallel to shoreline to a distance of 50 feet riverward from the existing bulkhead or Waterside Pier (located between East 38th and East 41st Street) documenting: observed habitat types, size, and general locations; general health of habitat; species presence and visual density (biodiversity); substrate type; and any other anomalies that could assist in assessing impacts from construction and potential on-site mitigation design.
- Piling survey at two locations underneath the Waterside Pier to determine changes (if any) in spatial distribution, biodiversity, and abundance of species moving shoreward and away from direct sunlight.
- Submerged aquatic vegetation (SAV) presence/absence survey.
- Identification of types, size, and general location of micro-habitats/habitats present riverward to 50 feet (depth permitting) of existing infrastructure (documented with video).
- Identification of observed marine/estuarine species, and
- Video documentation of density, type, and spatial distribution of encrusting organisms underneath the Waterside Pier, bordering pilings along the steel bulkhead, two bedrock outcrops located along the northern portion of the survey area, and the existing caissons installed as part of the construction of the FDR Drive Outboard Detour Roadway.

Attached documents include: field logbook (#60221358.2.3), field notes, Figure 1 showing sample transect locations by date, and seven (7) DVDs of underwater observations taken along the various transects parallel to shore. Table 1 summarizes the period of the survey, type of equipment used, field team members, logbook ID, vessel/navigation equipment, and weather/conditions during sampling effort.

Table 1: Field Sampling Summary

Mobilization	3-Oct-11
Demobilization	5-Oct-11
Equipment Used	Commercial hard hat diving gear, umbilical, wetsuit, secchi disk, helmet mounted video camera and light, and communications box.
Field Team	Capt. Alek Modjeski (AECOM), Kevin Shepherd (Fathom Solutions LLC), Ted Barnes (Fathom Solutions LLC), Sam Townsen (Fathom Solutions LLC)
Logbook ID	60221358.2.3
Vessel and Navigation	1968 20' black and white Monarch I/O 100 Hp - Vessel # CT3977AA, On board GPS
Weather/Conditions	October 3, 2011 - Partly cloudy, light wind from SW, with temperatures in the 60's.
	October 4, 2011 - Partly cloudy, moderate NW winds, highs in the low 60's
	October 5, 2011 - Clear, light wind with highs in the 70's.

SURVEY METHODOLOGY

Safety inspection of gear and vessel; safety briefings, and USCG pre- and post dive notifications were performed daily. Prior to the daily underwater survey, a secchi disk was used to determine visibility depth. Visibility was further confirmed by the diver. Diver visibility ranged from approximately six (6) inches to three (3) feet and was dependent on tide. Visibility was better around the ebb tide but diminished as the tide flooded and current increased. It should be noted that the 1st Quarter Moon Phase occurred on October 3rd and 4th, 2011 and therefore, both days experienced neap tides[1]. A tide table for the survey dates is provided in Table 2. Tide data is given for East 41st Street, New York City and based on data from NOAA New York Battery Station 4911.

Table 2: Tides: East 41st Street, New York City

Date	High	Elevation (feet)	Low	Elevation (feet)
3-Oct-11	2:35:00 AM	4.3	8:24:00 AM	0.7
	3:01:00 PM	5.0	9:19:00 PM	0.6
4-Oct-11	3:38:00 AM	4.2	9:34:00 AM	0.9
	4:01:00 PM	4.8	10:25:00 PM	0.7
5-Oct-11	4:40:00 AM	4.1	10:41:00 AM	1.0
	17:03:00 PM	4.6	11:23:00 PM	0.6

Mean Range: 4.3 feet Mean Tide: 2.4 feet

Light attenuation along the edge of the bulkhead or pier riverward differed from secchi readings and was estimated to a depth of approximately 11 feet for all three (3) days. Light attenuation depth was

---

[1] *Tides that occur at the first or last quarter of the moon when the tide-generating forces of the sun and moon oppose each other and produce the smallest rise and fall in tidal level.*

confirmed by the diver. Natural light was observed to be present underneath the pier to a distance of 40 to 50 feet shoreward but surficial distance was tide dependent and lessened as the tide flooded.

The Ecological Underwater Survey was a three (3) day event performed by a tethered, in-water commercial hard-hat diver equipped with 150 foot air hose umbilical, ship to diver communication, and video with real-time streaming to an onboard monitor; an onboard dive assistant; an onboard dive coordinator/health and safety officer; and a marine ecologist/field manager. The underwater survey was conducted along the eastern shoreline of the East River between East 38th Street and East 61st Street in Manhattan from October 3rd, 2011 through October 5th, 2011. A total of 17 transects were completed directly parallel and adjacent to the existing bulkhead/pier to a riverward distance of 50 feet (depth permitting for safe diving) within a swath spanning a distance of 1.3 miles and covering an area of 0.012 square miles. All transects were videoed and stored on DVDs.

Dependent on the start position, tide, and current, each transect spanned the length of the umbilical (approximately 100 to 150 feet) or 300 feet to include two umbilical lengths (one up current and one down current from the starting point). For each individual transect, the shore-side survey was performed first and involved descending down a piling or existing structure to bottom and then proceeding upcurrent to the length of the umbilical. Once the shore-side bulkhead or pier structure dive transect was complete, the diver was instructed to move riverward approximately 50 feet (depth permitting for diver safety) and use the current to survey the bottom in a zigzag pattern back and forth towards the bulkhead or pier in a downriver direction and then riverward again until area was completely surveyed. The vessel was moored to the existing structure. Once the diver passed the vessel, he continued in a like manner to the length of the umbilical. Upon completion of the river-side transect, the diver was retrieved and the vessel was repositioned for the next shore-side transect. In addition, two (2) additional transects were completed underneath and perpendicular to shore starting from the riverward edge of the existing Waterside Pier and continuing landward approximately 40 to 50 feet underneath the pier to record changes in biological diversity or abundance on the pilings as the diver moved underneath and away from direct sunlight. Transects by date are shown in Figure 1. Table 3 provides: the sampling transect locations between East 38th and East 61st streets; date sampled; and average water depth in feet to bottom.

RESULTS

A total of 17 underwater transects were completed parallel to shore out to a distance of 50 feet spanning a distance of 1.3 miles along the shore. An additional two (2) bisecting transects approximately 50 feet in length were completed underneath the Waterside Pier to determine changes (if any) in spatial distribution, species abundance, and species composition on individual pilings as the diver moved underneath the pier structure and away from direct sunlight. Real-time video streaming from the diver’s helmet to an onboard monitor, in conjunction with diver to ship communication, allowed the onboard marine biologist to assess habitat and species composition first-hand and direct the diver to areas in need of further observation. Recorded video was stored on DVDs by survey date and archived for later reference. A total of 19 species were identified onboard via real-time video and through collection of samples (e.g. macroalgae at bedrock) when identification could not be confirmed via video. Species were identified to lowest practicable taxonomic level and identification was further confirmed by reviewing the DVDs. Habitat assessment characteristics including slope, percent coverage, depth of surficial substrate, relief, and general habitat health were visually assessed and results based on the diver and the onboard marine biologist’s observations.

Table 3: Transect Identification, Date Surveyed, Coordinates, and Average Water Depth in Feet

Transect ID	Date Surveyed	Start Time	Approximate Coordinates (Start) Latitude/Longitude	Average Depth (ft)
1003-1	10/3/2011	9:00 AM	Southern edge of pier	25
Pile South Pier	10/3/2011	9:15 AM	Southern edge of pier	15-25
1003-2	10/3/2011	9:35 AM	14th pile to south edge of dock	25
1003-1A	10/3/2011	10:00 AM	40°44.753'/73°58.172'	25
1003-2A	10/3/2011	10:13 AM	40°44.753'/73°58.172'	30
Pile Mid Pier	10/3/2011	11:45 AM	40°44.774'/73°58.149'	ND
1003-1B	10/3/2011	12:10 PM	40°44.774'/73°58.149'	30
1003-1C	10/3/2011	12:50 PM	40°44.777'/73°58.150'	25
1003-1D	10/3/2011	2:25 PM	40°44.828'/73°58.111'	25
1004-1	10/4/2011	9:15 AM	40°44.860'/73°58.095'	15-17
1004-2	10/4/2011	11:00 AM	40°44.882'/73°58.069'	25-30
1004-3	10/4/2011	12:30 PM	40°44.986'/73°57.987'	21
1004-4	10/4/2011	1:20 PM	40°45.015'/73°57.961'	24
1005-A	10/5/2011	7:45 AM	40°45.527'/73°57.570'	6-43
1005-B	10/5/2011	8:54 AM	40°45.473'/73°57.552'	6-20
1005-C	10/5/2011	10:45 AM	40°45.354'/73°57.636'	2-UNK
1005-D	10/5/2011	11:30 AM	40°45.334'/73°57.669'	40
1005-E	10/5/2011	12:32 PM	40°45.204'/73°57.788'	35-UNK
1005-F	10/5/2011	1:10 PM	40°45.272/73°57.735'	43

Depth does not include tide difference

Range of depth indicates either shallow depth under pier to river's edge of pier or depth of bulkhead to a riverward distance of up to 50 feet

ND – Not determined as it was similar to Pile South Pier Transect

UNK – Outer depth unknown and not determined to promote safety of diver

Overall, four (4) different habitat types were identified based on differences in structure present, substrate type, species composition and distribution, and include:

- **Under-Pier Bottom Habitat** located underneath the Waterside Pier consisting of a low-relief rubble and anthropogenic debris and multiple wooden and concrete coated pilings;
- **Piling/Open Water Edge Habitat** that consisting of riprap/rubble substrate with less debris than that of the Under-Pier habitat and wooden pilings;
- **Natural Bedrock Outcrops and Caissons** located in the northern portion of the study area consisting of large rocks and bedrock substrate and the surface of the metal caissons; and
- **Offshore Habitat** to 50' from existing shoreline consisting mostly of sand/silt and some riprap. Offshore habitat will be include in each of the aforementioned habitat types and not discussed separately as substrate type was usually a function of corresponding shore-side habitat. For all habitat types, no submerged aquatic vegetation (SAV) was observed. A brief description of each is given below and further detailed in the attached logbook. Table 4 provides a list of species.

Under-Pier Bottom Habitat

The Under-Pier Bottom Habitat was located along the edge and underneath the Waterside Pier located between East 38th Street and East 41st Street and consisted of seven (7) parallel transect and two (2) perpendicular under-pier piling transects (Figure 1). Depth along the edge of the pier was relatively uniform and ranged from 25 to 30 feet. Bottom habitat consisted of a low relief (1 to 2 feet high) layer of concrete rubble, rebar, and other anthropogenic debris associated with the pier construction. The bottom was covered by a one (1) to two (2) inch silt veneer. Along transect 1A, between East 39th Street and East 40th Street; the substrate had small pockets of sand and a 10 to 20 foot wide area of a coal-like material. The slope to the back of pier was moderate for the majority of the pier at about 30 degrees but the slope at the mid-piling transect was steeper with an approximately 45 degree incline. In addition, cribbing and timber littered the bottom in areas where the pier was in disrepair. Except for the occasional blue crab (*Callinectes sapidus)* and sponge, no benthic organisms were observed attached or using the bottom substrate or timber. Total bottom coverage underneath the pier by benthic organisms is estimated to be less than 5%. An unknown juvenile flounder and two cunners (*Tautogolabrus adspersus*) were observed on the bottom. Overall condition of bottom habitat was poor. A complete species list is given in Table 4. The substrate was mostly silt and rubble and of poor quality.

Unlike the bottom habitat, outer and inner piles along the edge of and underneath the Waterside Pier did have encrusting organisms. Outer piles along the length of the pier were visually surveyed and were approximately 30 to 65% encrusted with sessile organisms. Inner piles were similar in species composition and diversity. On the average, the upper 12 feet of the pilings had the most diversity with sea grapes (*Molgula manhattensis*) being most dominant entire length of submerged piling.

Table 4 – Species List

Species	**Common Name**
Bryopsis plumosa	green sea fern
Rhodymenia palmata	dulse
Agardhiella tenera	Agardh's red weed
Haliclona loosanoffi	Loosanoff’s haliclona
Microciona prolifera	red beard sponge
Haliplanella luciae	striped anemone
Class Hydrozoa	hydroids
Molgula manhattensis	sea grape
Balanus spp.	barnacles
Littorina spp.	periwinkle spp.
Thais lapillus	dogwinkles
Mytilus edulis	blue mussel
Crassostrea virginica	oyster
unknown mud crab	unknown mud crab
Callinectes sapidus	blue crab
Anchoa mitchilli	bay anchovy
Myoxocephalus aenaeus	grubby sculpin
Tautogolabrus adspersus	cunner
unknown flounder	unknown flounder

Barnacles inhabited the intertidal strata but were not as common 5 to 8 feet below water's surface and comprised approximately 10-15% of piling community population. Blue mussel (*Mytilus edulis*) distribution was patchy from piling to piling and contributed approximately 20-30% of overall population. Sea grapes or squirts were approximately 50%-55% of the coverage. Other species observed on the pilings contributed roughly 5 to 10% of coverage included: green sea fern (*Bryopsis plumose*), Agardh's red weed (*Agardhiella tenera*), red beard sponge (*Microciona prolifera*), hydroids, striped anemone (*Haliplanella luciae*), Loosanoff's haliclona (*Haliclona loosanoffi*), dogwinkles (*Thais lapillus*), periwinkles (*Littorina spp*.), and grubby sculpin (*Myoxocephalus aenaeus*). Overall condition of piling habitat at Waterside Pier was marginal.

Piling/Open Water Edge Habitat

Piling/Open Water Edge Habitat was located along the edge of the existing bulkhead along the FDR Drive in the vicinity of the Queens Midtown Tunnel Entrance from East 43rd Street to East 53rd Street and consisted of six (6) transects surveyed on October 4th and 5th, 2011. Depth ranged from 15 to 25 feet at the time of survey. Substrate located nearest East 43rd Street consisted of low relief habitat (1-2-feet high) with riprap-sized rocks (approximately a foot in diameter), concrete rubble, and an occasional sandy pocket. Some anthropogenic debris (e.g. steel, rebar) was observed. The slope was relatively flat. On the northern side of the tunnel, substrate became more silty with some rock and concrete. Debris was less prevalent than observed at the under-pier habitat. Bottom habitat had very little benthic community coverage and was sparsely populated by sponge or dogwhelk (approximately 3-5% overall coverage). Occasional blue crab was observed. Overall condition of bottom habitat was poor.

Pilings were positioned approximately six (6) feet apart and were 10% covered from the bottom to a depth of 12 feet. At approximately 12 feet, where light was observed to attenuate, tubiculous polychaete castings were evident making up about 60% of total piling coverage to the surface. Blue mussels were observed within the upper 12 feet of the water column but they are not as prevalent as sea grapes and sponges. Other species observed were similar to those found at the edge habitat of the under-pier habitat. Overall, pile habitat was similar to that of the under-pier habitat and condition was poor to moderate. The substrate was mostly silt and rubble and of poor quality.

Natural Bedrock Outcrops and Caissons Habitat

Natural Bedrock Outcrop and Caissons Habitat was located north of East 53rd Street with terminus at East 61st Streets. A total of four (4) transects were completed to characterize the habitat. Habitat included two large natural rock outcrops with a tide pool located adjacent to the FDR Highway between East 57th Street and East 59th Street and encrusting habitat on the caissons slightly riverward (approximately 50 feet) of the shoreline. Depth varied between two feet in the tide pool to depths greater than 40 feet at the rock wall. Slope on bedrock was steep at about a 90 degree vertical drop. Substrate was either bedrock or small rock (approximately 12 inches in diameter) with little or no silt layer. Percent coverage varied by depth along the bedrock but overall coverage was approximately 40 to 50%. Species observed included: green sea fern, dulse, Agardh's red weed, Loosanoff's haliclona, red beard sponge, striped anemones, hydroids, sea grapes, barnacles, dogwinkles, blue mussel, oysters (*Crassostrea virginica*), blue crab, bay anchovy, and cunner. Caisson species composition was similar to that of the under-pier and piling open water habitats. Overall, habitat condition and biodiversity was best along natural outcrops with overall rating of moderate to fair. The substrate riverward was mostly silt and rubble and of poor quality.

SUMMARY

In general, habitat conditions for the Under-Pier Bottom Habitat, Piling/Open Water Edge Habitat, and Offshore Habitat were poor and could provide on-site mitigation opportunities. Species diversity was best at the natural outcrops and habitat condition appeared to be of higher quality than the other three habitat areas investigated. Bottom habitats had little to no visible macrobenthic or encrusting communities. Pilings did have moderate colonization but it appeared the majority of colonization started where light attenuated. The dominant species on the piles was sea grape, followed by blue mussels and sponges. No SAV was observed and it is most likely not present due to water depth, absence of preferred substrate, current, and depth of light attenuation. Oysters were present on natural bedrock but were not observed in other bottom substrates, under-pier, or on piling edge habitat.

Sincerely yours,

Capt. Aleksandr Modjeski
Aleksandr.modjeski@aecom.com

ATTACHMENTS

LOGBOOK

OTHER FIELD FORMS AND NOTES

FIGURE

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outcrop/oysters
55th ; 57th 250' - 300' long
30 x 40 wide
Parmosky 908-670-1036 -

CONTENTS

PAGE	REFERENCE	DATE

AECOM

AL MODJESKI - 732-589-5116
K. Appell - 646-708-3288
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NYPD HARBOR DIVISION

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Bathy - EWELL W. FINLEY

Steve Holdaway - 646-279-7316

TIDES - H or L & elevation
CURRENT vel. -
weather -
START LOCATION -
STOP LOCATION -
TRASECT # -
Transect description -
photos - # & description
video taken - Y or N
substrate type / composition
structures present
type structures
microhabitat types & loc
water temp -
sketch
species encountered
- visibility depth
underpier structures
distance
composition
encrustment cover % -

Habitat types (CMECS)

1) ESTUARINE SHALLOW WATER TIDAL (SW)
~~RIVERINE~~ subtidal - below
MLLW to depth of 4M
2) ESTUARINE (SW) TIDAL ~~[illegible]~~ INTERTIDAL
MLLW to MHHW
3) ESTUARINE DEEPWATER - >4M
Subtidal

NOAA Benthic Class

- UNCONSOLIDATED - sand/mud/silt
- SAV
- MACROALGAE
- PATCH ROCK/RUBBLE
- PAVEMENT
- BEDROCK
- STRUCTURAL
- anthropogenic
- boulder
- oyster

INC - slope of bank when possible

10/3/11

0 ARRIVE ON-site. Gave safety briefing. weather - partly cloudy 60° WIND light SW Low tide 0824. 0.7'

Bill DEMUTH & Andrew Dunning ON-site. Going to start survey once diver is checked and geared up. Going to work w/ tide but going to start in front of pier at 3EM and work upriver.

5 Notified USCG that we will start work momentarily Prepping gear: monitoring VHF Channel 13. Light extends all the way to bulkhead under Cont'd Pier (0820) since tide is so low. Piles have encrustment to

0915 – complete edge of south pier now heading North along edge of pier to see habitat changes. Filled out sheet 1 and 2 data edge habitat consisting of rock, wood, rebar, small diameter pipe, etc. Bottom relatively the same throughout. Sea squirts on bottom. Most diversity between 0-12'-14' below MLW. Bottom still w/ pipe and somewhat dimensionable. Blue crab Piping encrusted

Corner South piles - 2 or 3 w/ blue mussel @ 1-2". No more after. Coverage to bottom

Other piles - squirts dominate

Diversity decreases on edge @ 1/2 way down piles. Heading shoreward piles remained 50 - 80% encrusted. Not much different from edge habitat. Going to go ahead and do next segment.

5 Repositioning @ 16th pile where concrete bulkhead starts w/ pile row in front. 27.4' deep at Transect 1A moving downriver for edge

N - 40° 44'.753
W 73° 58.172 (19' for diver)

00 START 1A - center pier A4 last finish pt we have more timber on bottom. NO fish seen. Bottom not

like 3 feet or more in pockets between debris - some may be large. Appears to be some coal as well.

1012 - Transect 1A 25' off SHORE from 1st capstan to 4th capstan roughly. Habitat has a little more relief but pockets of silt/sand also encountered. Entire pocket of clay balls @ 75' ~~[illegible]~~ from bow of boat (see coordinates) at 25' off. NO SAV. 1/2 way between capstan 1 & 2 there is concrete wall located behind piles. STEEL DEBRIS 25' off close to capstan 4. sand/silt/clam shell - NO spat -

- Walking downriver from capsten 4 - rubble fields along vertical transect. Small pile field (4 piles) situated near area. Vertical piles not as encrusted as those observed southern section Capstan 2 - mussels on pile @ 9 to 10' down at Capsten 4 molgula, sponge, hydroids sp. Wall concrete not all the way to bottom. Inside is metal/concrete encased piles (wall @ 2-3' under current depth. Edge habitat cement columns go all the way down. Concrete caissons sparsely encrusted at bottom w/ sponges. Located on few horizontal piles. Area with wall (capstan 2

this edge habitat. Piles not as encrusted but still have same species squirts, barnacles, sponges.

1104 - Complete transect 1A. Average vertical height of debris field and rubble about 1-2'. Coal found as well. possibly from barge in the past. Diver said there was about a barge full near coordinates on page 6 near where fender damage is between capstan 2 and 3.

1105 - Repositioned to start next transect 1B - edge - 1B 25' Boat at 40°44.774 (N) W 73° 58.149 @ 30' upriver of 5th Capstan. Video working

we will do another
transect under pier to
see coverage of piles
and spatial distribution.
from front towards roadway
Will go down 1 then up next
and alternate direction w/
each pile. Concrete wall
stops at Capstone 4/5). 1B
Diver Down for Transect 2A
starting approximately 40'
downriver of coordinates (s)
at concrete wall and then
working edge habitat upriver after
piling check and then will
zigzag between 25' & 50' off
for offshore transects to
accomodate current. 1B
Diver T. Barnes. Transect 2A
Pile has (at boat) mussels
which get somewhat thicker

DISC #2 Start w/ pile survey

consists of rock debris w/ 1-2'
high relief w/ some fill
debris. Moving to west piling
there is some silt & muck
depth to 2'+. Inner pile
has tunicates at bottom w/
a depth at bulkhead @ 14.5'
50% slope so almost 45° ∡
1135 Diver heading south to last
termination point along edge
of dock. Encountered some
horiz. piles w/ tunicates and
snails along w/ blue crabs
Timber on bottom. Some
small rubble piles @ 1'-2'
high w/ other debris
Most bottom is silt covered.
Habitat similar to habitat
encountered along edge south
of concrete bulkhead.

Current increasing. I have
encountered Habitat dent
for corner (saw another one)
w/ mix of small sheetpile
Now at termination point
at concrete caisson @
capstan 4. Concrete has
evidence of tube polychaetes.
Piles to check at Capstan
4 about 3 in from (upriver) of
Capstan 4. (26') depth
- Start piling check Bank
slope steep. Substrate
Rocky Rubble w/ silt veneer.
2nd pile in - a bottom
10-20% coverage. Depth 8' away
@ bulkhead (~~@ 20' ft~~) 11' deep.
Barnacles on surface 10-15%
coverage to a depth to
2-3 feet. (1' at at mid
tile to 4-5' w/ 15-

Bulkhead also has @ 40% molgula

1st inner pile - sloped
Barnacles 40% to 2' below surface
then tunicates @ 30% w/
evidence of tube worms.
2nd pile 9' to ~~6~~ 4' @ 40%
coverage by tunicates some
anemones (sparse along w/
barnacles @ @ 4' below
surface. Barnacles above waterline
3rd pile 50% above to a 1 foot
below barnacles less coverage
to 3' then sporadic. To bottom
is molgula & sponge @ 30-
40% coverage.
4th pile - molgula/sponge bottom to
@ 4' under surface 30-40%
coverage Then barnacle again
80%. Another species of fish

No oyster spat on pilings yet.

5th pile - scattered barnacles to deeper depths w/ tunicates 30-40% biotic coverage

6th pile - snails on bottom 40-30% coverage up to 6' from bottom. Coverage slightly increasing. Biodiversity about the same. Barnacles to 5' deep from MHW → surface to MHW another 1 foot.

7th pile - Barnacles to @ 840 feet down pile - sporadic w/ 20% cover - 50% coverage molgula to bottom for 8' below. Sponge sporadic.

8th pile - mussels top 1/3 w/ barnacles. Patchy - 20% w/ molgula dominating bottom

1210 - Starting 1-B @ start on coordinates moving upriver w/ current. Current Fast. Habitat similar w/ woody debris, rock and little to none marine life observed. Much of substrate silt covered, hard bottom rock. Sporadic sponges on rock. Vertical relief 1-2 feet high. Tires, bottles, and other debris evident. No life in tire. Small patch of mussels and some snails observed. Habitat condition POOR

Ar ~~35'~~ deep at location w/ 6-8'
25' | drop observed near pile
@ ~~30' upriver of~~ coordinates
Tough to get location due to current.

1220 - Still debris, metal, rock

5 - No change in habitat
type along edge of dock
@20' upriver coordinates debris
lessening w/ more rock. Visibly
diminishing due to increase in
current velocity. More
homogenous riprap. Mussles
observed to bottom on pile
w/ patchy coverage. @ 6th
Capstan. More debris again
Appears vertical habitat more
diverse than bottom habitat
for sessile organisms. Even
though hard bottom, not
much of anything attaching except
to piles. Pile check — no
oyster spat. Only shellfish
is mussel. Finished transect
1B along edge habitat at
~~3rd~~ 4th lightpost heading south
from north pier end.

1236 - Bringing diver in. Current strong
Almost complete w/ Pier.
Need to stand down in
open water until current slows.

1241 - Diver up, repositioning for
continuation of edge habitat
survey.

1250 - DIVER DOWN FOR TRANSECT
1C @ 50' from coordinates
downriver start 40° 44.777
73°58.150
Going down at stern and
going to endpt of 1B edge.
Boat at station 5+50.
OUTER Pile check - Barnacles
@ 20%, molgula below 4.5'
from MLW w/ sponge. Barnacles
mostly in tidal range.
Bottom: timber, rock,
debris, sheet metal/piles.

Observed a flounder but unable
to see species. Otherwise
K habitat similar to
what we have been
encountering - low relief
habitat. Pilings South of JTSO
have mussels, barnacles, molgula,
and sponge. Mussels nearly
20% coverage to bottom.
Molgula dominant. Visibility
poor (6"). Mussels to
bottom of pilings. Not
much on substrate. mostly
silt covered hard bottom.
+ saw 2 mud crabs on 2 pilings +
No SAV. @ 25' deep.

20

30 Based on habitat type encountered
under and along dock, we
will perform remainder of
edge work along 100'

pretty much homogenous, we
will not do a detailed inch
by inch survey. Open water
can still be performed in a
zig/zag or live-boat drift
along either 25' and 50'
foot transect or zig zag
between 25' and 50' to get
better idea of habitat
and presence/absence of
structure.

1330. Continuing on transect under
boat. No change in
habitat variability, biodiversity,
or coverage of pilings. Seeing
more patches of mussel periodically
on piles ~~subs~~. Ar Looks like
+ another sculpin or toadfish on
pile. Will look at video
cable [illegible] observed

7' from bottom are mussels and barnacles (sporadic) - pile coverage at bottom around 20%. Barnacles @ 15' from bottom. Visibility @ 4". NO SPAT FOR oyster. We did see some line in the water but none had any encrusting organisms. NO SAV (too deep). Saw some bryozoans on a pile or two back at 1B.

40. Substrate still same w/ silt near 2ND TO LAST facing upriver light post.

2 Complete 1C.

Diver up.

3 Repositioned to START 1D. Current slowing. N - 40° 44.828'
W - 73° 58.111

OFFSET @ 50 upriver - survey downriver 50'.

TRANSECT	START	STOP	10/3/11
1	0900	0935	
1A	1004	1013	
1B	~~1122~~ 1210	1241	
1C	1250	1342	
2	0935	1000	
2A	1013	1100	
Pile transect -		1145	1210 (mid)
Pile transect -		0915 - 0935	(south)
1D	1425	1510	

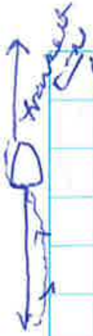
(cont) visibility poor. START DISK 3. No Changes in coverage or biodiversity. No spat or SAV. Depth @ 25'. Slope increases rapidly from pier.

Pilings covered w/ molgula on bottom thick 50% and then @ 6' up start mussel and barnacles w/ @ 30%

more sponge and crab (blue) seen on pilings. Appears that mussels have a preference to which side of pile (southern side more mussels) (northern side more squirts). EVIDENCE OF TUBICULOUS worms.

15- Rock/rubble bottom. No growth, covered w/ silt. Complete 1st phase at 1D terminus and coming back to work from coordinates upriver.

51 Diver going back down to finish 1D transect. More blue mussels on pilings at coordinates (30% coverage). Rocky hardbottom again w/ some debris. Majority of Disk 3 not good due to poor visibility. Voice recording and though makes a



low relief. May provide some habitat for demersal but not many species observed except for cunner and blue crab. NO burrowing shellfish observed only shells (soft clam)

1510 Dive complete. Going to scout upriver to show where transects will be for tomorrow's survey.

1535 - Went over dive tomorrow and locations. Heading to shore. Called USCG.

5OCT 2010

AM ON-SITE. REVIEWED DAYS NOTES. Checked USCG to make sure we can still work due to helicopter accident. 30° slope w/ 12" rock rubble w/ veneer of silt w/ little dimension. GAVE H+S.

ARRIVE ON station underneath bridge between 59th & 60th ST.

LAT: 40° 45.527
W: 73° 57.570'

Will do on edge transect

SAW 3 rock outcrops between 57th & 59th. Will investigate.

Weather - clear, light wind @ 56° w/ highs today in 70's

Low - 1014 1.0'
High - 1703 4.6'

Yesterday - majority of substrate

Diver did encounter some mussels attached to substrate but nothing of significance.

0745 Diver in at new transect 1-A-1005. Will work downriver w/ ebb to a distance to about where 1st bedrock outcrop is between 3 and 4th caisson (N to S). Secchi disk reading 36". Doing edge habitat. Depth 26.5 ft.

Diver down on bulkhead. Some encrustment (maybe 10%) w/ barnacles. Some relief where bulkhead is corroding w/ mud crab. Piles @ 70% encrusted w/ sponge, squirts, bryozoan (patchy)

Bottom low relief 12"
Rip rap layer @ 1' deep.
Not much fish habitat for
adult species but
moderate for juveniles.
Cunner seen (juvenile)
using habitat. Some
encrustment on rock,
Not very silty at all.
Some concrete slabs
located that provide better
relief and habitat along
FOR where concrete is
missing or has fallen.
1/2 way through transect
it looks like coverage on
piles @ bottom to 7'
is decreasing @ 20%
coverage mostly tunicates
NO coverage on rocks
@ 75 South of coordinate

Some encrustment by barnacles
(sporadic but large) underneath
wall along 12 x 12 timber and
concrete bottom edge of wall
Seeing more sponge midway
through transects Observed
3-4 gobies 22 (10 later)
on bottom. So habitat is
a little more diverse and
seems to be better utilized
Than under pier.
0815 @ 15' N of caisson
transect 1A-1005 - 6' deep
of bulkhead. Transect complete
@ 150' in distance. Working
out 25' to 50' to check
substrate and depth 14'.
Substrate unchanged (rubble)
current increasing. Habitat
being used by cunner

Found 1 oyster attached to bottom so potential exploits for oyster reef colonization - located @ 25' offshore on rock bottom mid transect. (1st disc 10/5) Observed an eel (anguilla) in rubble observed 2 blue crabs offshore More light availability due to shallower depth. Complete offshore transect off 1A-1005. (25'-50'). 43' hole directly under bridge / boat coordinates. Next transect will start (1B-1005) at Northern most caisson from bulkhead riverward @ 10' past caisson. Tieing up to 2nd caisson as it appears to be safer

then south. Some large caissons laid on bottom (concrete) under bridge area near last coords.

Transect 1B-1005

OFFSET 50' N of
N 40°45.473'
W 73°57.552'

Depth 6' at 2ND caisson on coordinates. Some attachment by barnacles from MHW to a few feet below MLW on caissons, bulkhead, and bedrock walls. @ 40% coverage.

0854 - Diver down. START 1B-1005. Walking upriver to 1st caisson Area somewhat sheltered. Mostly bedrock underneath oyster attached to bedrock bottom near caisson #2.

1st caisson - 10'-15' off 12" rocks @ 18' deep. Some snails and occasional barnacle & another caisson on bottom. Some gravelly spots/pockets. Edg habitat has slight veneer of silt. 1 dead cunner. No SAV. 2 small 1m patches of macroalgae. (green) Again blue crabs, snails, cunner edge - 2', 3' of H_2O at depth by 2nd caisson. Majority of substrate rock on top of bedrock shallow as it is 3-6' deep at dead low. Light probably attenuates to bottom majority of time.

Habitat somewhat diverse near near rock pile. Drill holes in one rock so seems there is more dimension to habitat. Depth off rockpile @ 6' to about 10-15' offshore caisson line. Stopped transect at middle of rockpile to reposition in order to keep diver safe. Per diver, habitat condition along transect 1B-1005 same as what he has been seeing past 2 days. He feels that visually, there was less attached to wall and rocks than at other downriver sites.

0930 Back in at 5th caisson. Depth 14' at caisson. Rocks on bottom covered w/ silt veneer. 16' OFFSHORE CAISSON

Another oyster close (1') or
so from other oyster.
Near tie-up location
N 40° 45.443'
W 73° 57.574'
NO SAV yet, SAW 1 blue
crab doubler. by 6th
caisson. No change in
habitat condition are change
to sheet pile bulkhead from
concrete at 6th caisson.
Pretty low relief rock cover.
Less attachment on bulkhead
(steel) vs. concrete. NOT much
debris – mostly rock bottom
w/ silt veneer. up to 12"x12"
IN AREA. Another oyster attached
to bottom. At end of rig.
Going offshore transect to @
25 - 50' off bulkhead / 10' off

in slope.
1000 - Arrive AT Southern most outcrop
near E. 56th ST. Large outcrop
that extends from 2nd piling
set after sheetpile (s) to
4 ~~3~~ piles (caissons) S. [illegible]
about to caisson line riverward
NO SAV observed from vessel.
There is H2O behind outcrop near
bulkhead (now concrete). Will
investigate to see if tidal pool
or Not.
1045 - Transect IC-1005
START ROCK OUTCROP ~~here~~ as well
Diver Down. Going to do
possible tidalpool first then
outside perimeter of outcrop
N 40° 45.354'
W 73° 57.636'
B[illegible] off .

outcrop has red and green seaweed. Back pool sandy about 2' deep at current tide level. Water in tidal pool turbid w/ quite a bit of debris. Green/red algae in tide pool. NO SAV.

Rock wall outer perimeter 30% sponge 5% barnacle, relatively shallow ledge.

Video shows moving north

All transects downriver today

SCHOOL OF SILVERSIDES OR ANCHOVIES (check video).

oyster attachment seen (1) ON outcrop midway between North caisson (at coord) and next downriver caisson.

anemones and bryozoans also on rock face. Few

This area along wall has most biodiversity than any other section of river investigated. Also have mussels wedged between grooves in rock. Also just found some oyster spat, hydroid

ANOTHER OYSTER w/ in a few feet of last one. It appears this section of river w/ outcrop has more opportunity for habitat ~~and~~ ATTACHMENT TO w/ folds in rock. Similar to layer cake artificial reef ball.

1125 - Complete transect K-1005 moving to southern side of outcrop

1130 - Transect ID = 1005 at 5th caisson Fm south. Going to go north and

to @ 150-180' downriver.
At coordinates, 5'x5'
granite blocks w/ a drop
To 40' off wall (@). Kept
some specimens of seaweed
for 10. I know what they
are but want to confirm.
Hydroids present in colonies
Habitat same as last transect
Along rockface. Observing
shallow habitat at first
where light attenuates and
Then deeper. Larger barnacles
located @ 12 below current
surface: Mussels present
Some tunicates seen @ 10'
down in patches Not dominant
species. Sponge is. Mussels
single not in clumps. spaced
anywhere from 6" to a

and going to continue transect
to a distance of 150' to 180'
feet down river. Sporadic
clusters of small finger tip (finger tip)
size anemones. Depth at wall
@ 20' fm coordinates (downriver)
is 5'. hardbottom granite

1150 Stop Transect survey to fix
comm.

1200 comm fixed. Diver start
at last spot & continuing
downriver. Outcrop ends @
50'-60' fm caisson (downriver
fm caisson) To 25' offshore
substrate rock/riprap to
depth of @ 15'. wall here
goes all the way to substrate.
Similar to other habitats
excluding rock outcrops.

Transect continuing fm 6th caisson
or 4th set downriver. From
5th set to 4th set (looking
upriver), habitat ~~availability~~ condition
decreased quickly and substrate
* changed → Depth at 4th set
of caisson 40'. Substrate
silt covered construction debris
concrete, etc. Slope rather
gradual - 20° ∡ to 30 ∡.
OFFSHORE complete for 1D-1005
and diver coming up. Caught
on rebar w/ rigging but done
once free. Going to reposition
to do end of caissons to
concrete since habitat is
similar and composition is
const. debris, low relief
majority of the way.
ARRIVE AT START FOR TRANSECT
1E-1005.

North length of rigging. Visibility
going as well so this may
be last transect. Start
video and dive.
Bulkhead concrete over 12"x12"
wooden timber sponges and
mussels on pile 50-60 mussel
coverage w/ 10% barnacle some
bryozoans and sponge. Down to
35' and not on bottom. Seeing
some tunicates as well. Total
coverage pile fm surface to
bottom @ 60%. Bottom
rocky granite @ 12" Area
silt covered and barnacles
occasionally on bottom
some construction debris so
very similar habitat/substrate
type. Decent piling coverage
here. Better than 1st day

Light to about 14-15'. Anemones around 12' (patches) barnacles dominant on cross timber. No SAV or oyster spat. Piles more diverse here w/ blue mussel dominant - roughly coverage between 60-70% mussels to bottom, other species squirts, Anemones, bryozoan, sponge, balanus some hydroids, Deeper barnacles approx. 25¢ size. Depth at 35' @ 50-75' upriver of coordinates. Rocks here @ cm silt on top. Mussels also attached in between rock in small 1' diameter patches - sporadic. Piles @ 5' apart. @ 12 up from bottom most mussels & barnacles evident mussels in nice clusters

If and how far out substrate changes. 45' deep at terminus along bulkhead at end of transect. Looks to be mostly debris out to 25' from bulkhead too deep to go further out safely. No change.

1300 Complete 1E-1005. Will reposition upriver and do 1 more transect to base of caissons. Substrate type similar to what was encountered yesterday from N pier to here.

1310 START 1F-1005 FINAL TRANSECT FOR DAY DUE TO DEPTHS ENCOUNTERED.

40° 45.272' start
73° 57.735'

Going to drift upriver to 1st st of southernmost

Visibility back to @ 2' or so. Thought it was decreasing but it was not. Window most likely closing though. START LOCATION @ 75' from southernmost caisson. hydroids, ~~bryozoans~~, barnacles mussels (dominant) 65-75% pile coverage. to @ 25-35' deep. Depth at site from stern is 43'. On surface where cross timber is located directly under concrete some mussels wedged into gap split. Calling end of transect as this area is consistent w/ habitat we have seen already to south. Bottom most likely rip rap, silt covered debris. No oyster, no

DATE 10/3 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

South perimeter

Transect #/Direction 1/upriver **Streets** 38th → 1st vent
Transect GPS Start Lat/Long: /
Transect GPS End Lat/Long: /
Transect Length
Divers T. Barnes
Co./State Kings/NY
Other
High Tide 1510
Tide [✓ ebb] or → flood
Water depth 25'
Video taken? [✓ Y] or N

Location East River, Manhattan side
Start Time 0900
Completion Time 0935
Low Tide 0824
Low Tide Elevation MLW 0.7'
Estimated Current Speed slack
Photos Taken Y or N

WEATHER DATA

Temperature See
Wind Direction
Wind Speed Log Book
Overcast/Clear/Rain

WATER DATA

Temperature 65° +
Secchi Disk/Turbidity N/A
Visibility @ 18"
Estimated Water Depth

Other Comments
underpiles / outside piles. Outside piles - barnacles 90%. 5% redbeard sponge. 5% molgula from surface to MHW mark.

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
under pier	entire pier	rocky	N			X		
		50 to 100lb rocks						
		piping ~~tires~~						
		slabs						

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*
enthic Coverage - *A = Absent, L = Light, H = Heavy inc %*

Light to back wall @ 40-50 from bulkhead edge. Also existing bulkhead south of E 38th is scarred below H2O line.

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
baitfish either anchovy or silverside
mussels 4' underwater w/ sea grapes more abundant w/ depth from wake zone

60% pile. - NOT much diversity after @ 10-12'
On bottom - not encrusted - some small gastropods
metal I beams, anemones (1%)

②

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

3rd pile S →

Transect #/Direction 1

Streets 1st vent → 2nd pile

Transect GPS Start Lat/Long: /

Transect GPS End Lat/Long: /

Transect Length

Divers T Berres

Co./State Kings/NY

Other

High Tide

Tide ebb or [✓ flood]

Water depth 25'

Video taken? [✓ Y] or N

Location East River, Manhattan side

Start Time

Completion Time

Low Tide

Low Tide Elevation MLW

Estimated Current Speed

Photos Taken Y or [✓ N]

WEATHER DATA

Temperature

Wind Direction

Wind Speed

Overcast/Clear/Rain

WATER DATA

Temperature

Secchi Disk/Turbidity

Visibility

Estimated Water Depth

Other Comments

Concrete w/ rebar, 4x4' under deck @ 5' IN
tunicates/sponges to bottom of piles, lots of bottles
hard bottom - blue mussel - 10-20% blue mussel
to bottom

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*

eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*

egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*

enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED (Benthic and Pelagic)

bottom substrate silty veneer w/ debris - NO cover.

15' deep at back wall - last pile so moderately sloped.

(3)

DATE 6/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction ____________ **Streets** 39th north to → 10th pile
Transect GPS Start Lat/Long: ____________ / ____________
Transect GPS End Lat/Long: ____________ / ____________
Transect Length ____________
Divers ____________
Location East River, Manhattan side
Co./State Kings/NY
Start Time ____________
Other ____________
Completion Time ____________
High Tide ____________
Low Tide ____________
Tide ebb or flood
Low Tide Elevation MLW ____________
Water depth ____________
Estimated Current Speed ____________
Video taken? Y or N
Photos Taken Y or N

WEATHER DATA

Temperature ____________
Wind Speed ____________
Wind Direction ____________
Overcast/Clear/Rain ____________

WATER DATA

Temperature ____________
Visibility ____________
Secchi Disk/Turbidity ____________
Estimated Water Depth ____________

Other Comments Edge habitat - pipe, Rock, concrete, debris, buckets etc, tires, piping encrusted - More Rock w/ silt
2" silt covering rocks. cable & timbers

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

***abitat Type** - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
***eneral Substrate Type** - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
***egetation Coverage** - A = Absent, L = Light, H = Heavy inc. %*
***enthic Coverage** - A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
Blue crab, snails, sea squirts, blue mussel,
some macroalgae.

④

DATE Oct 3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction 1 **Streets** 10th pile →
Transect GPS Start Lat/Long: /
Transect GPS End Lat/Long: /
Transect Length 3rd → 14 pile
Divers T. Burnes **Location** East River, Manhattan side
Co./State Kings/NY **Start Time** 0900
Other **Completion Time** 0935
High Tide **Low Tide** 0824
Tide ebb or [✓ flood] **Low Tide Elevation MLW** 0.7'
Water depth 25' **Estimated Current Speed** slack
Video taken? [✓ Y] or N **Photos Taken** Y or N

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain

WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth

Other Comments
20' to 30' timber at 10th pile creating cribbing corner in piles - I beam 13th pile 6x12'
Blue crabs (3 or 4) at edge habitat on bottom

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*
enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
12th pile - NO rock crusted sand / very soft to 6ft deep plus - blue crab, squirts, barnacles, sponge,

⑧

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction #2 **Streets** ~~34~~ 14th pile → E 39th
Transect GPS Start Lat/Long: 25' off /
Transect GPS End Lat/Long: /
Transect Length
Divers T. Bres **Location** East River, Manhattan side
Co./State Kings/NY **Start Time** 0935
Other **Completion Time**
High Tide **Low Tide**
Tide ebb or flood **Low Tide Elevation MLW**
Water depth **Estimated Current Speed**
Video taken? Y or N **Photos Taken** Y or N

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain

WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth

Other Comments
silty, soft bottom w/ patches of rock and pipe. at 9th pile some oyster shell on bottom shell looks to be relict. NO SPAT. Also some thin clam (~~soft~~) soft

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
silty	transect	silt to 6"+	NO	NO	NO	NO	NO	POOR

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
eneral Substrate Type - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling
egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc.%

SPECIES ENCOUNTERED **(Benthic and Pelagic)**

⑥

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction 1A
Streets mid pier (39th to 40th)
Transect GPS Start Lat/Long: in logbook /
Transect GPS End Lat/Long: /
Transect Length
Divers T. Bursa
Location East River, Manhattan side
Co./State Kings/NY
Start Time 1000
Other
Completion Time
High Tide
Low Tide
Tide ebb or [✓ flood]
Low Tide Elevation MLW 0.7'
Water depth
Estimated Current Speed p/u since slack
Video taken? [✓ Y] or N
Photos Taken Y or [✓ N]

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain

WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth

Other Comments
silt over rubble, rock, debris, bottom void of much life, chain link fence, pockets of sand.

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
rocky								
rubble								
sand patch		~6" soft	in sand	(5	timber	in	from	lost pile

***abitat Type -** Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
***eneral Substrate Type** - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
***egetation Coverage** - A = Absent, L = Light, H = Heavy inc. %*
***enthic Coverage** - A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED (Benthic and Pelagic)
snails, tunicates, barnacles, sponge

DATE 10/3 ⑦ 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction DA **Streets** 25' off
Transect GPS Start Lat/Long: /
Transect GPS End Lat/Long: /
Transect Length see sheet ⑥
Divers **Location** East River, Manhattan side
Co./State Kings/NY **Start Time** 1013
Other **Completion Time**
High Tide **Low Tide**
Tide ebb or [✓ flood] **Low Tide Elevation MLW**
Water depth ~~[illegible]~~ 30' **Estimated Current Speed**
Video taken? [✓ Y] or N **Photos Taken** Y or [✓ N]

WEATHER DATA

Temperature Wind Speed
Wind Direction Overcast/Clear/Rain

WATER DATA

Temperature Visibility
Secchi Disk/Turbidity Estimated Water Depth

Other Comments
debris, relict (sparse) oyster. rock, pipe, debris
covered in sponge, car springs

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
debris, treeds	to 25'	a, t, silt	N	N	N	NA	N	poor

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
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egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc.%

SPECIES ENCOUNTERED (Benthic and Pelagic)
RELICT CLAM shells

0

DATE 10/3/11 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction 2A upriver off 25' Streets 1A - at Lat/Long (steel) 6
Transect GPS Start Lat/Long: (cont.) / to 4th capstan
Transect GPS End Lat/Long: /
Transect Length
Divers
Co./State Kings/NY
Other
High Tide
Tide ebb or flood
Water depth 30'
Video taken? Y or N

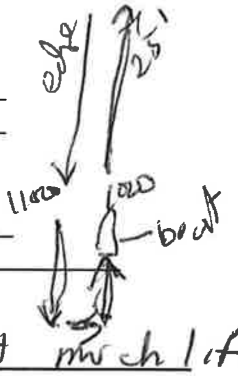
Location East River, Manhattan side
Start Time ~~1000~~ 1013
Completion Time 1100
Low Tide
Low Tide Elevation MLW
Estimated Current Speed
Photos Taken Y or N

WEATHER DATA

Temperature
Wind Direction
Wind Speed
Overcast/Clear/Rain

WATER DATA

Temperature
Secchi Disk/Turbidity
Visibility
Estimated Water Depth



Other Comments
rock pile then some debris, steel, not much life encountered. cement, etc. (between 3rd and 4th capstan

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
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egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc.%

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
Small pockets of dead clams - more abundant as they move riverward - 1 live crab
Capstan 4 - steel debris (clean)

10-4-11

mid
4044.860
7358.095

Station ① Just North of Pier

100' in each direction

start 915.

① Starting in the corner Just north of con ED pier (15' water)
Sandy bottom large chunk of concrete Misc. Debris close to FDR aprox 2' High off Sandy bottom

at start of tunnel there was 17' of water

over the tunnel area we found Brick and small Stone

on the pile's in the center section of tunnel we found small musels squirts a atached But dead oyster shell

24' of water in the center of the tunnel area steel debris rock bottom rope and cable soft Coral growing on debris

on the north side cason we have musells snails sponges squirts and a small 2' fish

10' out off the wall going from the end of the tunnel Heading South to the con ED pier

found 2 oyster shells (Dead) a very lively Blue crab and a baby blue crab the bottom is made up of aprox 12" stone

2 Small fish aprox 25' off the wall in the middle of tunnel area

past the tunnel area the rock tapers off to a bottom made of mud and debris very few sighns of life a few snails and sponges

4'-5' Deep pile of debris including Rope 3" ruber hose ect in the corner by the con ED pier sponges seem to be doing well

end at 10:20

start 4044.846
7358.105

end 4044872
7358085

Station ② located between tunnel# and

UN Intake 4044 ~~9~~882

Start 11:00 7358 ~~00~~69

Heading north along the wall
Just North of the tunel Starting under the outflow ㉕'
we find musles and snails on the pilings a rocky Bottom
that looks like armor stone or rip rap
much less debris not much for life on the bottom other
than sponges bottom grade drops off quickly
pile bents are aprox 5-6' apart

light seams to penatrate aprox 12' and thats
where the muscles are most dense

this section was much more consistant

~~16-13~~
15-25' out Heading South (29')
Same rocky bottom a few snails a dead blue crab
very light debris a few old pilings and one
pice of pipe one 5-6" blue crab and 2 small fish

4" blue crab
3-4' squar area of sand

aprox 50' out in 30' of water we found a blue crab
and a collony of musles

end 1206 4044 909

7358 067

UN Intake
4044 940
7358 030

star
1230 Station ③ due to curent we decided to just do the north side of the boat instead of going Both ways

Start 4044986
7357987

21' deep very light marine growth rocky/Hard (concrete)
× Bottom

small patches of soft mud w/mussels on top most muddy patches are found just under the platform

most life is on the piles ~~and~~ consisting of squirts mussels and snails

④ 1320 Ended @ 4045.015
7357.961 due to wave action

we then moved the Boat to this location and continued North

similer conditions found 24' of water

hard bottom of 12" dia stone (avg) | Broken off piling

light mud mixed in with the Rock

very consistant

on the incoming tide the daylight seams to penatrate aprox 11'

sea squirts and sponges seam to be the most prevelent

steap slope

15'-25' out Rocky bottom w/crushed shells and silt

end @ 1400 4045043
7357953

Legend

▨ Survey Area (25-50 ft from shoreline)

⊢⊣ Transects

— Shoreline

Survey Date

🟨 10/03/2011

🟩 10/04/2011

🟪 10/05/2011

0 225 450 Feet

N

Notes:
1. State Plane NAD83 Coordinates, U.S. Survey Feet;
2. Basemap data sourced from City of New York Department of City Planning

Transect Locations
Midtown Esplanade

East River
Ecological Dive Survey
New York, NY

FIGURE
1

AECOM

Draft

Biological Assessment

East Midtown Waterfront Esplanade Project

PIN X776.00 and PIN X770.14

Prepared for

New York State Department of Transportation-Region 11
Hunters Point Plaza
47-40 21st Street
Long Island City, New York

and

New York City Economic Development Corporation
110 William Street
New York, New York

Prepared by

AECOM
20 Exchange Place
New York, New York

September 2013

Contents

List of Appendices

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List of Acronyms and Abbreviations

ASMFC	Atlantic States Marine Fisheries Commission
BA	Biological Assessment
BRT	Biological Review Team
cm	Centimeter
db	Decibels
DPS	Distinct Population Segment
El	Elevation
EMWE	East Midtown Waterfront Esplanade
ESA	Endangered Species Act
FMP	Fishery Management Plan
FHWA	Federal Highway Administration
ft	Feet
kg	Kilogram
MBD	Manhattan Borough Datum
MHW	Mean High Water
MLW	Mean Low Water
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NYCDEP	New York City Department of Environmental Protection
NYCEDC	New York City Economic Development Corporation
NYSDEC	New York State Department of Environmental Conservation
ODR	Outboard Detour Roadway
PSAT	Pop-up Satellite Archival Transmitters
PCPS	Precast Pre-Stressed
psf	Pounds Per Square Foot

RITE	Roosevelt Island Tidal Energy
RM	River Mile
rms	Root Mean Squared
SCDNR	South Carolina Department of Natural Resources
SELcum	Cumulative Sound Exposure Level
SPL	Sound Pressure Level
UN	United Nations
USACE	United States Army Corp of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service

Executive Summary

The New York City Economic Development Corporation (NYCEDC), working with the New York State Department of Transportation (NYSDOT) is proposing the construction of a new approximately 0.96 mile long waterfront esplanade over the East River, between East 41st and East 60th streets in the Borough of Manhattan, New York City (**Figure ES-1**). The construction of the East Midtown Waterfront Esplanade (EMWE), or the Proposed Action, would accomplish several critical policy goals established by the City in Vision 2020: NYC Comprehensive Waterfront Plan (2011), the Manhattan Waterfront Greenway Master Plan (2004), and other planning documents.

The EMWE is defined in two sections: the proposed United Nations (UN) Esplanade beginning at East 41st Street and extending northward past the UN Headquarters to approximately East 53rd Street; and the Outboard Detour Roadway (ODR) Esplanade, which will extend from approximately East 53rd Street to East 60th Street. These sections will be served by several upland connections. To the south of the proposed EMWE, the existing Waterside Pier is separately planned to be reconstructed and will provide continuous connections southward through the existing Glick Park. See **Figures ES-2** through **ES-3** for project component overview.

The Proposed Action is currently anticipated to be built in the following phases:

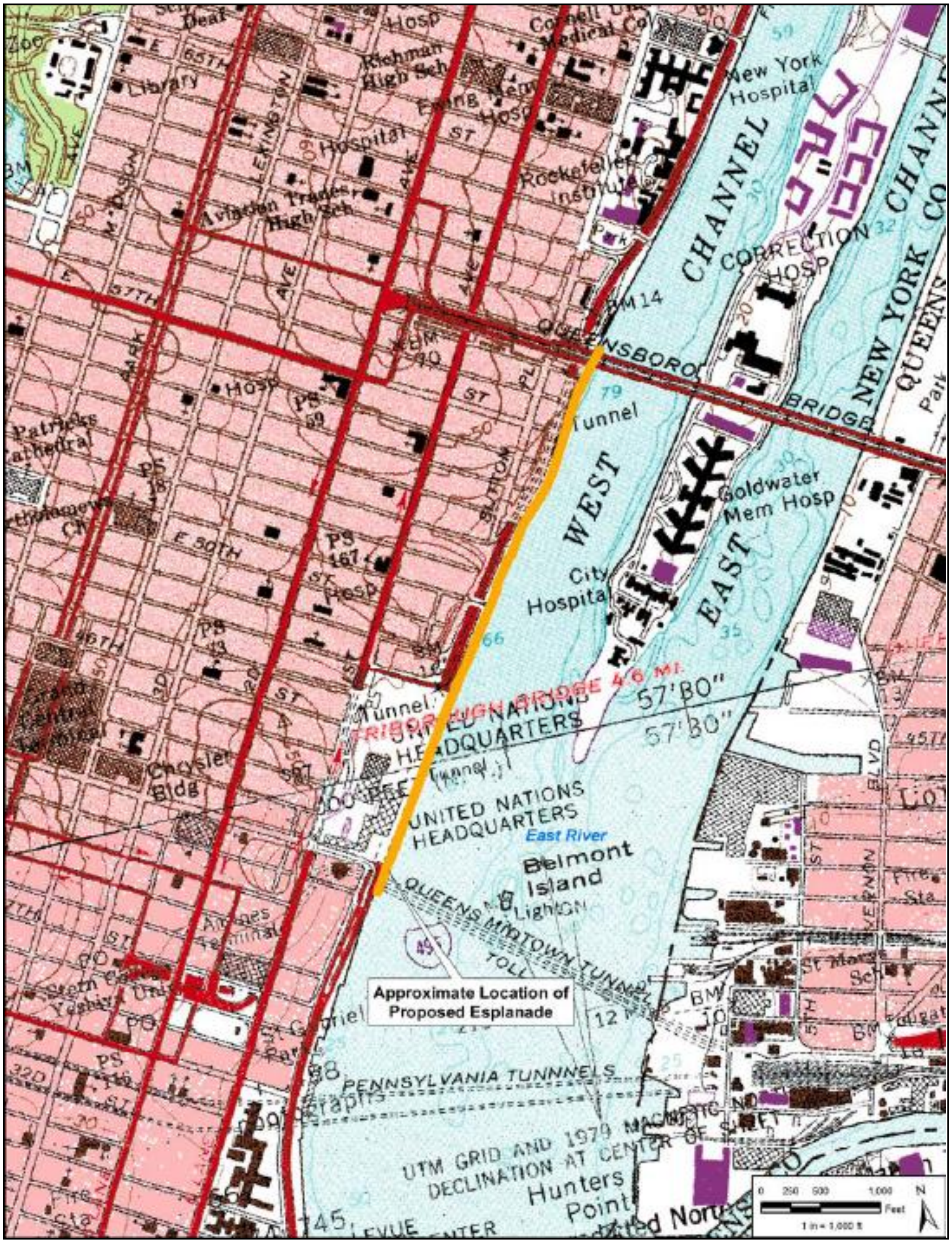
- Phase 1: The ODR Esplanade is estimated to be completed by 2018; and
- Phase 2: The UN Esplanade is estimated to be completed by 2024, including all potential upland connections as funding becomes available.

The Proposed Action includes three proposed upland connections or pedestrian and cyclist bridges to connect the landside (west of the FDR Drive) to the esplanade (east of the FDR Drive). The proposed upland connections will cross the FDR Drive at East 48th and East 54th Streets. Other access points include existing connections at East 37th Street (through Glick Park and the reconstructed Waterside Pier), at East 51st Street, and at East 60th Street. Another connection, at East 42nd Street is currently under evaluation as a potential component of this project.

The UN Esplanade will encompass approximately three acres of total area. The scope of work involves the installation of approximately 99 48-inch diameter and three 54-inch diameter piles whose length on average will be approximately 64 feet with a 5/8-inch thick wall. The EMWE would be off-set approximately 30 feet from the bulkhead of the FDR Drive to improve light distribution for marine flora and fauna, the potential for enhanced United Nations security, re-use of the caissons from the former Outboard Detour Roadway, as well as enhanced user experience away from the FDR Drive. Approximately 85 of the piles will require rock sockets and will be drilled into the bedrock.

Construction of the UN esplanade will occur over a 60 month time period. The pile driving portion of this work is anticipated to take approximately three months to complete if performed continuously. Work below the Spring High Tide Line, including pile driving will only occur during seasons/periods of the year as permitted by NYSDEC. Permanent benthic disturbance from pile installation is calculated at 1,293 square feet or 0.03 acres.

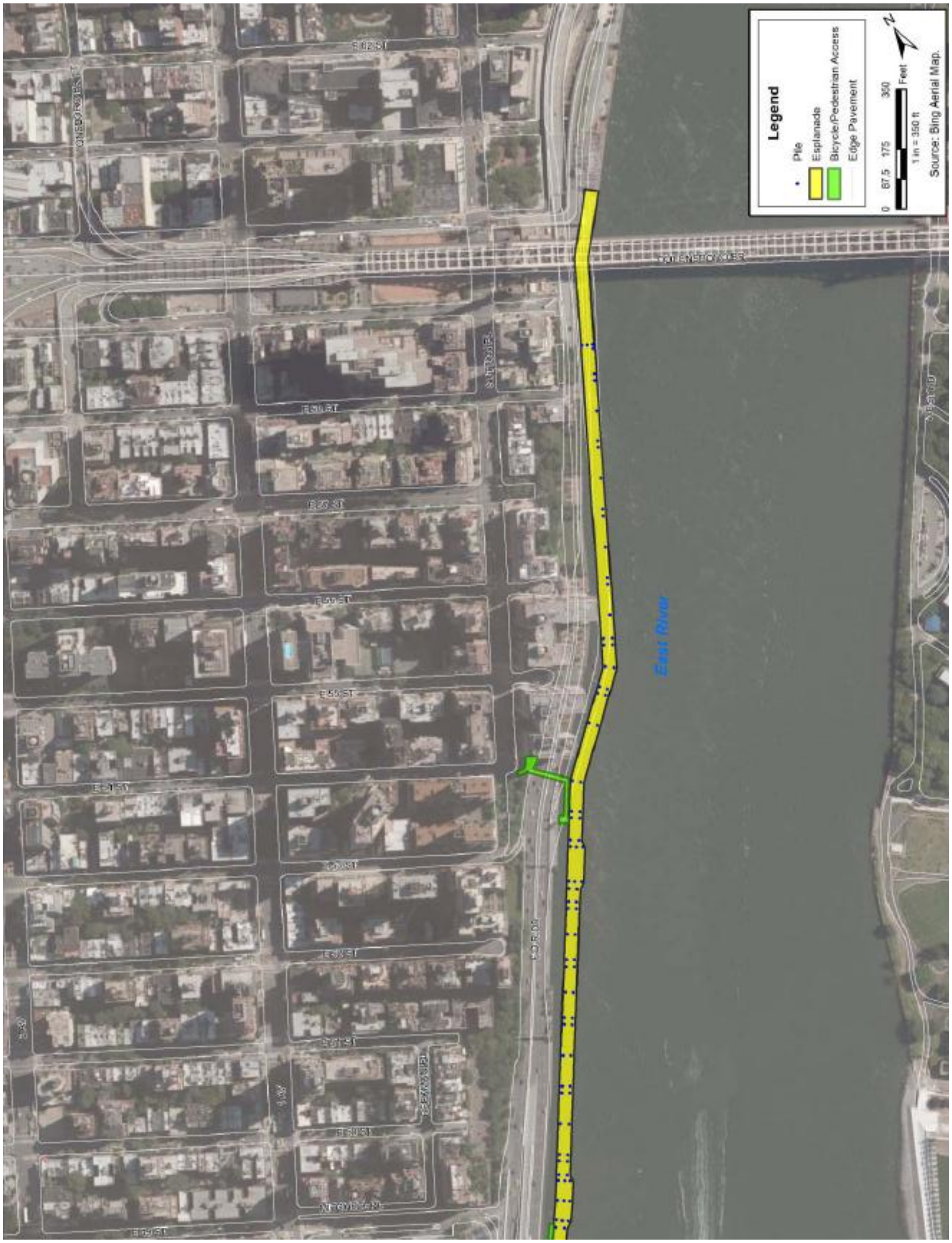
Figure ES-1 Project Area Location Map



Note: Project Area Location on Portions of USGS Central Park, N.Y./N.J. and Brooklyn, N.Y. 7.5. Minute Quadrangles (2000).

Figure ES-2 UN Esplanade

Figure ES-3 ODR Esplanade



The ODR Esplanade will encompass a total area of approximately two acres. The deck will be offset where applicable as there are two existing bedrock outcrops along the existing bulkhead. The ODR portion of the esplanade will be supported by approximately 71 new piles:

- 24 54-inch diameter steel piles with a 5/8-inch thick wall approximately 60 feet in length;
- 47 24-inch" diameter steel piles with a 5/8-inch thick wall approximately 60 feet in length; and

Construction of the ODR esplanade will occur over a 30-month time period. The pile driving portion of this work is anticipated to take approximately three months to complete if performed continuously. All of the piles will require rock sockets and will be drilled into the bedrock. Permanent benthic impact is estimated to be approximately 529 square feet or 0.01 acres**.**

Total benthic impact from each esplanade collectively is 1,820 square feet or 0.04 acres. It was observed during a dive survey performed in October 2012 that light within the proposed esplanade area attenuates between 10 and 12 feet below the river's surface. This portion of the water column where light penetrated had the more dense populations of sessile organisms. It is estimated that installation of new piles on the ODR structure will provide an additional 18,102 square feet (sq ft) (0.4 acres [ac]) surface for attachment of encrusting organisms. The UN will provide and an additional 61,905 sq ft (1.4 ac) of hard surfaces for attachment of organisms. Collectively, the EMWE would provide an estimated 80,000 s(1.8 ac) of hard substrate for encrusting organisms.

This Biological Assessment (BA) has been prepared pursuant to Section 7 of the Endangered Species Act (ESA), as amended, to evaluate the effect of the Proposed Action on ESA-listed species (listed as endangered or threatened under the ESA), or their designated critical habitat. This document details the expected effects on these species which include: shortnose sturgeon (*Acipenser brevirostrum*), five Distinct Population Segments (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus*), one DPS of loggerhead sea turtle (*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempii*), green sea turtle (*Chelonia mydas*), and leatherback turtle (*Dermochelys coriacea*). Designated critical habitat is not present within the project area for these listed species.

This BA will focus on potential direct and indirect effects on the aforementioned species, the species population, and associated critical habitat (if applicable) in the Project Area. The effects evaluated in this BA include those associated with expected pile driving and drilling, the re-suspension of sediment, increased vessel traffic associated with construction, and effects associated with the addition of permanent structure within the East River (e.g. shading).

As shown in later in the BA, no designated critical habitat for any of the aforementioned species and their corresponding population segments exists within the Project Area.

In order to limit the amount of potential impacts during construction, it is anticipated that the following reasonable and prudent measures would be implemented:

- Use of silt management techniques and soil erosion practices to limit the downriver transport of re-suspended sediment;
- Observance of seasonal restriction and special permit conditions associated with anadromous fish migration if required by regulatory agencies;
- No over-loading of barges relative to water depth;
- Use of high propeller support vessels;
- Limited movement of barges once at a particular location;
- Stockpiled materials would have appropriate containment measures;
- When possible, the contractor would work with pre-cast materials over the water;

- Any landside work would be performed in accordance with a sediment and erosion control plan; and,
- Contractors would only refuel vehicles in designated areas that have appropriate containment systems to capture accidental spills.

The results of this BA are described below:

1. The majority of piles will be drilled into place. Only a small number of piles (approximately 20 piles) will be installed by vibratory hammer. Based on the results of other projects, it is anticipated that drilling and vibratory hammers would produce a cumulative sound exposure level (SELcum) that is less than the 187dB re 1µPa2-s. Impact hammers can produce a single strike above 206 dB re 1 μPa_{Peak} and noise above 187 dB_{cSEL} re $1\mu Pa^{2\text{-}s}$; however, the only time an impact hammer will be used during the construction of the EMWE is to set the pile into the rock. To set a pile, it is anticipated that impact hammering would only require a low blow count and lower energies than compared to normal pile driving operations where a pile is being driven through the sediments. Although field conditions are not expected to necessitate any instances of impact hammering at levels that would exceed the impact criteria, noise attenuating devices (e.g., isolation casing) could be employed if necessary. Impacts from seating the pile are therefore considered insignificant and discountable.

2. Pile driving will be minimized through the use of drilling, vibratory installation methods, and noise attenuating measures (if needed) and thus, would have insignificant and discountable effects to shortnose and Atlantic sturgeon and the aforementioned four species of marine turtles during foraging activities.

3. Vessels will be limited to tugs and barges. Tug movement will be mostly contained within the work area once barges are secure. Crane barges will use spuds and will need to be repositioned throughout the project duration. Incidental vessel strikes will not affect the shortnose and Atlantic sturgeon as they are generally found within three feet of the bottom and the tug and barge drafts will not reach that depth. Turtle strikes are possible though extremely unlikely as barges will be moored and moved only short distances. The proposed project area is not considered preferred foraging habitat for any of the aforementioned species.

4. Indirect effects from re-suspended sediments are not expected to jeopardize species due to use of best management practices and the settlement rates associated with the strong currents in the East River.

5. No critical habitat exists for Atlantic sturgeon, shortnose sturgeon, or the four marine turtle species within the Project Area.

6. Addition of pile habitat and loss of benthic habitat could be compensated through on-site habitat enhancement and offsite project related improvements.

Based on the analysis provided in this BA, while the EMWE may have the potential to adversely affect individual transient shortnose and Atlantic sturgeon and marine turtles in the immediate vicinity of pile placement resulting in an incidental take, the Proposed Action is not likely to jeopardize the continued existence of their corresponding populations.

1 INTRODUCTION

The purpose of the ESA is to provide a means for conserving the ecosystems upon which endangered and threatened species depend and maintain a program for the conservation of such species. The ESA directs all Federal agencies to participate in conserving these species. Specifically, Section 7(a)(1) of the ESA charges Federal agencies to aid in the conservation of listed species, and Section 7 (a)(2) requires the agencies to ensure that their activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats.

The following BA has been prepared pursuant to Section 7 of ESA, as amended. The purpose of BA is to evaluate the effects of the Proposed Action on ESA-listed species (listed as endangered or threatened under the ESA) or their designated critical habitat. Information provided in this BA has been prepared under the direction of a federal agency to determine whether the Proposed Action is likely to: (1) adversely affect listed species or designated critical habitat; (2) jeopardize the continued existence of species that are proposed for listing; or (3) adversely modify proposed critical habitat. Per 50 CFR § 402.02, 50 CFR § 402.12, the outcome of this BA will determine whether formal consultation or a conference is necessary.

Because work will occur adjacent to and within the East River, it has the potential to impact the following ESA-listed marine species that occur in the area and/or their habitat: Atlantic sturgeon, shortnose sturgeon, loggerhead sea turtle, Kemp's ridley sea turtle, green sea turtle, and leatherback turtle.

1.1 Federal Nexus

Since the Federal Highway Administration (FHWA) provided a portion of the funding for the EMWE, they have been designated as the lead Federal Sponsor with NYSDOT serving as their project representative.

Under section 7 of the ESA (16 U.S.C. § 1536(a)(2)), the FHWA, as the lead federal agency for the EMWE, is required to consult with the National Marine Fisheries Service (NMFS) for marine and anadromous species and/or the United States Fish and Wildlife Service (USFWS) for aquatic and wildlife species, if they are proposing an "action" that may affect listed species or their designated habitat. Action is defined broadly to include funding, permitting, and other regulatory actions (50 C.F.R. § 402.02).

The regulations promulgated pursuant to the ESA require federal agencies to:

> "ensure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat" (50 CFR § 402.01).

Based on review of the *Federally Listed Endangered and Threatened Species and Candidate Species in New York (By County)* for Kings and New York Counties; except for the occasional transient individuals, no federally-listed or proposed endangered or threatened species, or candidate species under the jurisdiction of the USFWS are known to exist in these counties. ESA-listed species that may occur in the Project Area are limited to marine species under the jurisdiction of NMFS and include: Atlantic sturgeon, shortnose sturgeon, loggerhead sea turtle, Kemp's ridley sea turtle, green sea turtle, and leatherback turtle. As a result, consultation is limited to NMFS.

1.2 Project Area and Setting

The Project Area, and the East River, are located slightly south of the Narrows Habitat Complex (USFWS, 1997). The Narrows constitutes the westernmost section of Long Island Sound between Hells Gate, at the convergence of the Harlem and East Rivers, and the Hempstead Sill, a major shoal area extending north and south across the Sound from Matinecock Point on Long Island, near Glen Cove, Nassau County, to the New York-Connecticut boundary. This complex also includes a small area of southwestern coastal Connecticut in the vicinity of Greenwich.

The East River is a 14-mile tidal strait that connects the Long Island Sound with New York Upper Bay and separates the western end of Long Island from the New York mainland. Confluence with Long Island Sound is located between Throgs Neck and Willets Point; whereas the confluence at the Upper Bay is located between the Battery at the tip of Manhattan Island and Governors Island. Hells Gate, which is situated approximately halfway between the Battery and Governors Island and slightly north of the proposed project area, is known for its strong tidal currents and numerous shipwrecks. The Harlem River extends northward from the East River at Hells Gate to the Hudson River.

The East River is predominantly brackish but does have some freshwater influence associated with runoff originating from the Harlem River at its confluence at Hells Gate and some direct drainage from the surrounding city boroughs. The mean tide level is variable over the course of the river and is greatest at the northern portion of the river above Hells Gate. Mean tide at East 41st Street is 2.4 feet with a mean range of 4.31 feet. Average maximum flood current velocity at East 41st Street is 1.5 knots, and the average maximum ebb current velocity is 2.1 knots (NOAA, 2012). Average speed of flow in the river is around 2.2 knots and direction of flow is dependent on tide which can also cause periods of little to no flow for short times. Maximum predicted tidal current velocity obtained from a stationary recording Acoustic Doppler Current Profiler (ADCP) during 2008 for the Roosevelt Island Tidal Energy (RITE) Project located approximately two miles north of the project area measured approximately 5.2 knots (Verdant, 2010).

River width at the Project Area varies in distance and is approximately 0.5 miles near the proposed UN esplanade and half that along the proposed ODR esplanade due to the presence of Roosevelt Island. Depth varies between 25 and 45 feet along the entire length. The Project Area is adjacent to a federally managed channel approximately 550 feet wide and maintained by the United States Army Corp of Engineers (USACE) at a depth of 35 feet. Vessel traffic consists of daily commercial and municipal vessel and barge traffic.

The New York State Department of Environmental Conservation (NYSDEC) classifies the East River in the vicinity of the proposed project area as a Class I Saline Surface Water, with intended uses to be secondary contact recreation and fishing. Water quality studies performed by the New York City Department of Environmental Protection (NYCDEP) near the proposed Project Area showed average annual salinities between 2008 and 2011 south of Wards Island of 22.2 percent at the surface and 22.4 percent near the bottom. NYCDEP measurements for dissolved oxygen averaged 5.27mg/l with 62 percent saturation and temperatures in the river averaging 18.67° Celsius from 2008 through 2011 (NYCDEP, 2012).

New York Riverkeeper surface water quality monitoring performed annually from May through October at two sites near the proposed project area recorded average salinities for 2011 and 2012 at the East 23rd Street and Roosevelt Island Stations of 22.8 percent with a range between 13.7 to 33.7 percent. Highest salinities were recorded in July and August. Turbidity averaged 24.12 NTU and ranged between 8.1 NTU and 160 NTU with elevated values in May. Dissolved oxygen saturation averaged 66.7% and ranged between 52.8 and 95 percent (Riverkeeper, 2012).

In addition to basic water quality measurements and industrial discharges and combined sewer overflow, the East River and Western Long Island Sound region receive treated sewage from 18 wastewater treatment plants located in New York and the southern Connecticut area. About 83 percent of this effluent is discharged into the East River (Sweeney, 2004). The NYCDEP monitors the levels of *Fecal Coliform* and *Enterococcus* bacteria within the East River near the proposed Project. Maximum levels of *Enterococcus* in 2012 were reported as exceeding 4000/100ml, though numbers under 100/100ml were more common. *Fecal Coliform* bacteria were also recorded in highly varying quantities. A study conducted by Sweeney *et al.* showed that the East River had elevated levels of lead, phosphates, silver, copper, cadmium, and nitrates as well (Sweeney, 2004).

1.3 Consultation History

The FHWA, in consultation with the USFWS and/or NMFS, is required to ensure that any action it authorizes, funds, or carries out will not jeopardize the continued existence of a federally listed species or species proposed for federal listing. As the lead federal agency, the FHWA is responsible for requirements outlined in section 7(c) of the ESA of 1973, as amended. As described in Section 1.1, ESA-listed species that may occur in the Project Area are limited to marine species under the jurisdiction of NMFS, and as a result, consultation with the USFWS is not required.

Preliminary consultation with NMFS was initiated through a telephone conversation, written correspondence, and a meeting as summarized below:

- Telephone conservation with Diane Rusanowsky of NMFS held on August 3, 2012;

- Information request letter dated August 21, 2012 sent to NMFS Protected Resource Division in Gloucester, Massachusetts with response received on September 8, 2012 (**Appendix A**); and

- A meeting at the Milford Connecticut Laboratory with Diane Rusanowsky on November 20, 2012 discussing project details, EFH, protected resources, possible mitigation, and next steps (**Appendix B**).

- Telephone conversation with Ms. Danielle Palmer and Ms. Diane Rusanowsky of NMFS held on July 30, 2013. Issues discussed during the conversation included: project details, hydroacoustic impact criteria, EFH, protected resources, and next steps.

By letter dated September 8, 2012, NMFS identified federally listed species that may occur in the East River and their status (Tables ES-1 and 3.1), including:

- Shortnose sturgeon (endangered);
- Gulf of Maine Distinct Population Segment (DPS) of Atlantic sturgeon (threatened);
- New York Bight DPS of Atlantic sturgeon (endangered);
- Chesapeake Bay DPS of Atlantic sturgeon (endangered);
- Carolina DPS of Atlantic sturgeon (endangered);
- South Atlantic DPS of Atlantic sturgeon (endangered);
- Northwest Atlantic Ocean DPS of loggerhead sea turtle (threatened);
- Kemp’s ridley sea turtle (endangered);
- Green sea turtle (endangered); and
- Leatherback turtle (endangered).

This BA, prepared by AECOM on behalf of NYCEDC, addresses the Proposed Action in compliance with Section 7(c) of the ESA of 1973, as amended.

1.4 Project Purpose and Need

The proposed EMWE is intended to close a critical gap in the Manhattan Waterfront Greenway along the East River from East 41st to East 60th Street and would provide waterfront access, open space and new recreation amenities to the East Midtown community. Public access would be provided to the waterfront, and new open space for the densely populated communities of East Midtown would be created where virtually no access currently exists. A safe recreation area for a wide range of users would be provided, including children, the disabled and elderly. Opportunities would be provided for water-related uses, and to promote esplanade users' understanding of and relationship to the East River/Hudson River Estuary as a natural feature and historical landscape.

2 Description of the Proposed Action and Project Area

2.1 Proposed Action

Per 50 CFR § 402.02, an "action' is defined as all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- Actions intended to conserve listed species or their habitat;
- The promulgation of regulations;
- The granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or
- Actions directly or indirectly causing modifications to the land, water, or air.

The EMWE is an action that would directly modify both land and water. The Proposed Action consists of a new esplanade approximately 0.96 miles long, consisting of new platforms over new pilings, located along the Manhattan side over the East River, adjacent to the FDR Drive (see **Figure ES-1**). The EMWE is defined in two sections: the proposed UN Esplanade that extends from East 41st at the northern terminus of the existing Waterside Pier northward past the UN Headquarters to East 53rd Street (**Figure ES-2**); and the ODR Esplanade that will extend from East 53rd Street to East 60th Street (**Figure ES-3**). The Proposed Action is currently anticipated to be built in the following phases; however this may change if funding becomes available:

- Phase 1: The ODR Esplanade is estimated to be completed by 2018.
- Phase 2: The UN Esplanade is estimated to be completed by 2024, including potential upland connections as funding is available.

2.1.1 UN Esplanade

The southern boundary of the proposed UN Esplanade would start at East 41st Street, adjacent to the Waterside Pier which runs from East 38th to East 41st Streets. The proposed esplanade would connect to the Waterside Pier, which is separately planned to be reconstructed as an open space, and provide continuous connections southward through the existing Glick Park. The proposed EMWE would be constructed northward from the Waterside Pier over the East River past the United Nations Headquarters. The EMWE would be located approximately 30-feet away from (i.e., off-set) from the bulkhead of the FDR Drive and UN Headquarters which would improve light distribution for marine flora and fauna and to add security value for the UN. The deck is estimated to be approximately 40 feet in width.

Construction of the UN esplanade will occur over a 60-month time period. The pile driving portion of this work is anticipated to take approximately three months to complete if performed continuously. It is anticipated that pile installation will include the addition of approximately 99 48-inch diameter and three 54-inch diameter piles. These piles will be steel piles whose length on average will be approximately 64 feet with a 5/8-inch thick wall. Individual pile lengths will vary depending on rock elevations. Approximately 85 of the piles will require rock sockets and will be drilled into the bedrock. Once seated on rock, the piles will be fitted with a drilling rig capable of drilling within the pile to the required rock socket depth. After the piles are driven into place, and any required sockets are drilled, reinforcing cages will be lowered into the socket and approximately 160 cubic feet of grout/concrete will be poured into each pile. The remaining 17 piles will not require rock sockets and will be vibrated into the sediment to the top of rock. It is anticipated that these piles will be vibrated into place over the course of a three month period during permitted months. Permanent benthic disturbance from pile installation is calculated at approximately 1,270 square feet or 0.03 acres.

2.1.2 ODR Esplanade

The ODR Esplanade will encompass a total area of approximately two acres. The deck will be offset up to 30 feet where applicable and design would avoid two existing bedrock outcrops along the existing bulkhead. The ODR portion of the esplanade will include a 40-foot wide deck and the placement of up to 71 piles. The ODR Esplanade will reuse 16 existing caissons and four piles. New piles needed if rehabilitation is not possible include:

- 24 54-inch diameter steel piles with a 5/8-inch thick wall approximately 60 feet in length;
- 47 24-inch" diameter steel piles with a 5/8-inch thick wall approximately 60 feet in length; and

Permanent benthic impact associated with the no rehabilitation option is estimated to be approximately 530 square feet or 0.01 acres.

Construction of the ODR esplanade will occur over a 30 month time period. . The pile driving portion of this work is anticipated to take approximately three months to complete if performed continuously. All of the piles will require rock sockets and will be drilled into the bedrock.

2.1.3 Upland connections

The EMWE would be approximately one mile in length with as many as five connection points from the shore. Potential connections include the existing esplanade access points at East 37th,, East 51st and East 60th Streets, as well as the potential connection at East 42nd Street and the proposed connections at East 48th and East 54th Streets.

The upland connections are further discussed below, as follows:

- *East 37th Street* – The southern boundary of the proposed esplanade would start at East 41st Street, where the existing Waterside Pier is situated on pilings over the river from East 38th to East 41st Streets. The proposed esplanade would be connected to the Waterside Pier, which is separately planned to be reconstructed as an open space, and provide continuous connections southward through the existing Glick Park, which provides user access underneath the FDR Drive at the terminus of East 37th Street.

- *East 42nd Street* – At East 42nd Street, a new ramp for pedestrians and cyclists will be explored for potential connection to the existing elevated roadway ramp. The new ramp will extend from the northernmost vehicle travel lane of three existing lanes that currently provide egress for vehicles exiting the FDR Drive. The new ramp would be placed at the terminus of the existing elevated roadway and extend over the FDR Drive and then turn southward as it descends to the esplanade near East 41st Street. The ramp will require additional support pilings to be placed within the river and on the western side of the FDR Drive, as well as some ground disturbance at the terminus of East 42nd Street. The connection at East 42nd Street may be removed as a component of the EMWE if not feasible but is being evaluated as a potential component of this project.

- *East 48th Street* – At East 48th Street, a new ramp to the esplanade is anticipated to be provided from the southern side of the terminus of the roadway adjacent to the United Nations Headquarters. The ramp would continue over the FDR Drive and descend to the proposed esplanade connecting to its western side near East 49th Street. The ramp will require additional support pilings to be placed within the river, as well as some ground disturbance at the terminus of East 48th Street.

- *East 51st Street* – At East 51st Street, east of Sutton Place, there is a stairway and pedestrian bridge across the FDR Drive connecting the neighborhood to a small park along the East River. The proposed esplanade will connect to this existing esplanade on the eastern edge of the FDR Drive.

- *East 54th Street* – At East 54th Street, a new ramp to the esplanade is anticipated to be provided from the terminus of the roadway where existing park amenities exist. The ramp would continue over the FDR Drive and descend to the proposed esplanade connecting within the river to its western side.

- East 60th Street – At York Avenue and East 60th Street, an existing roadway ramp over the FDR Drive provides shared access for bicycles and pedestrians to an existing waterside esplanade that extends north along the East River, which is expected to be redeveloped in the future.

2.1.4 Equipment

The equipment that will be used for the pile installation is listed in **Table 2-1**.

Pile installation will be accomplished by as many as two crews operating at a time, working an eight hour workday, and utilizing up to four barges. Two of the barges will hold 250-ton cranes. At least one additional barge will be used if needed for materials. Two barges may be placed next to each other, extending up to 135 feet (15 feet of buffer, plus 60 feet by 60 feet) into to the East River beyond the edge of the esplanade under construction. The crane barges will be jack-up barges with four spud piles driven into the riverbed. The materials barge will tie up to the crane barge, or will set anchors to maintain position during construction. The equipment required is expected as follows:

Table 2-1
Equipment Required for Pile Installation/ ODR and UN Esplanade

Equipment	Required
Barge Mounted 250 Ton Crane	2
Sheetpile Vibratory Hammer	1
Pile Vibratory Hammer	1
Compressors	2
Generators	2
Rock Socket Drilling Rig	1
Tugboats	2
Flat Deck Barges	2
Concrete Delivery Barges	1
Concrete Pumping Barges	1

Equipment	Required
Pile Delivery Barges	1
Hopper Scow	1
Dump Scow	1

It is anticipated that concrete will be produced offsite and delivered to the work place by barge and pumped. It is also anticipated that after the piles are filled, the pile caps and all other structural members that occur above the spring high tide line would be constructed offsite and put in place on site with by a 250-ton crane operating from a barge. At least one additional barge would be used during this phase for materials. Subsequent phases of esplanade construction which will include concrete and asphalt placement, furniture placement and landscaping could be supplied by trucks.

It is anticipated that pile driving and pier construction for the ODR will begin from the north end of the project. Subsequent phases of ODR esplanade construction will include concrete and asphalt placement, furniture placement and landscaping. **Table 2-2** describes the equipment that will be necessary for EMWE construction. It is anticipated that materials for the esplanade will be supplied by trucks and that there would be less than ten trips during the peak period per day by trucks delivering materials and workers to the Project Site. **Table 2-3** summarizes the number of anticipated daily one way peak construction trips in-land to a waterfront staging area.

Table 2-2
Equipment Required for Esplanade Construction, ODR and UN Esplanade

Equipment	Required
Compressors for surface tools	2
Concrete pump	1
Crane 100 ton	1
Excavator	1
Mini Excavator	1
Front End loader	1
Generators	2
Water Pumps	1
Forklift	2
Vibratory Compactor Roller	1
Truck Concrete	1
Truck- delivery and haul away	1
Pickup trucks	2

Table 2-3
Daily One Way Peak Construction Trips In-land to Waterfront staging area

Item	# Peak Daily Trips to Staging Area
Concrete Trucks	4
Heavy Equipment- I.E Excavator	2
Trucks –for Deliveries	4
Trucks – for Haul away	4
Pick-up Trucks	8
Crew vehicles	2

2.2 Limits of the Project Area

The Project Area includes all areas affected either directly or indirectly by the Proposed Action, not simply the area where project activity will occur. This action area is based primarily on the limits of direct effects associated with the pile driving activities. Other impacts associated with the pile driving include noise and re-suspended sediment. Because of the limited scope of the pile installation (only 20 piles of 48-inch diameter to be driven by vibratory hammer), the underwater extent of project-related vessel movement and re-suspension of sediment is confined to a much smaller area than the area affected by the acoustic profile of the pile driving. Consequently, the limits of the project action area are based on the area affected by the acoustic footprint generated by the pile installation.

The limits of the Project Area have been estimated by comparing acoustic modeling given in the BA for the Tappan Zee Hudson River Crossing Pile Installation Demonstration (PDIP) (AECOM, 2012) and results from Verdant's RITE Pre-and Post-Deployment Studies (Verdant, 2010) performed in the East River slightly east of the Project Area. Verdant identified a number of additional underwater noise sources to include subway, vessel traffic, and vehicular traffic. Their post study also showed that noise decreased approximately 20dB from its source at a distance of 450 meters (1,476 feet north and south). In determining the maximum spatial extent (in feet) of the underwater acoustic pressures and energies that have been proposed to potentially cause behavioral effects, AECOM (2012) used acoustic modeling of pile driving operations to determine action area as defined by the areal extent of potential acoustic effects above the 150 dB re 1 µPa (rms) behavioral criterion from driving an 8-foot and 10-foot diameter piles which presented the largest area for defining potential impacts without employment of noise attenuation systems. Their results for the smallest diameter pile (four feet) indicated 2,525 foot extent to the north and south and 2,500-foot extent to the east and west for 187dB $\mathrm{SEL}_{\mathrm{cum}}$ footprint (without noise reduction systems in place). It is anticipated that since only 20 piles will be driven with vibratory hammer with the remainder being drilled and socketed into bedrock that this footprint will be further reduced. For the purposes of this BA and based on AECOM's modeling for the Tappan Zee Bridge, the smallest diameter pile (four feet) was conservatively used since pile diameters for the EMWE being driven are 48 inches in diameter however acoustic footprint is estimated to be much smaller due to the use of the vibratory hammer.

2.3 Beneficial Components of the Project

In an effort to minimize, reduce, or eliminate potential permanent impacts associated with the action, the following mitigation measures were incorporated into the design of the EMWE:

- Height of decking above MLW was designed to maximize light penetration and spatial distribution under the pier; and
- Pile placement and material composition were selected to promote circulation and epibenthic biodiversity.

To minimize, reduce, or eliminate potential temporary impacts associated with the action (e.g. construction), the following are being proposed to be incorporated into the Proposed Action:

- The use of silt management techniques and soil erosion (where applicable);
- Seasonal restrictions to ensure anadromous migration is not impeded; and
- Best management practices.

In addition, on-site habitat enhancement opportunities have the potential to be incorporated into project design as part of a phased pilot approach to offset actions and determine if selected enhancements function and provide improved habitat to include:

- Habitat protection;
- Wave attenuation;
- Structural enhancement;
- Improved lighting;
- Daylighting; and
- Removal of low relief anthropogenic materials and the addition of more dimensional bottom structure.

It was observed during a dive survey performed in October 2012 that light within the proposed esplanade area attenuates between 10 and 12 feet below the river's surface. This portion of the water column where light penetrated had the more dense populations of marine algae and sessile fauna. It is estimated that installation of new piles on the ODR structure will provide an additional 18,102 square feet (sq ft) (0.4 acres)[1] surface for attachment of encrusting organisms. The UN will provide and an additional 61,905 sq ft (1.45 acres) of hard surfaces for attachment of organisms. Collectively, the EMWE would provide an estimated 80,000 (1.8 acres) of hard substrate for encrusting organisms.

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[1] Encrusting area calculated from the mudline to the high tide line.

3 Listed Species & Critical Habitat in the Project Area

As shown previously in **Table ES-1** and again in **Table 3-1** below, and listed in a response letter from NMFS dated September 18, 2012 (Appendix A), the following ESA-listed marine species may occur within the action area, or may be affected by the proposed action:

Table 3-1
ESA-listed Species that may Occur within the Action Area

Common Name	Scientific Name	Status	Distinct Population Segment (DPS)
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	Threatened Endangered Endangered Endangered Endangered	Gulf of Maine New York Bight Chesapeake Bay Carolina South Atlantic
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	NA
Loggerhead sea turtle	*Caretta caretta*	Threatened	Northwest Atlantic Ocean
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	NA
Green sea turtle	*Chelonia mydas*	Endangered	NA
Leatherback turtle	*Dermochelys coriacea*	Endangered	NA

No designated critical habitat exists for the shortnose, Atlantic sturgeon, or the four aforementioned marine turtles species within the vicinity of the Project Area. The following provides species descriptions, habitat requirements, documented behavior, population characterizations, and possible presence near the Project Area.

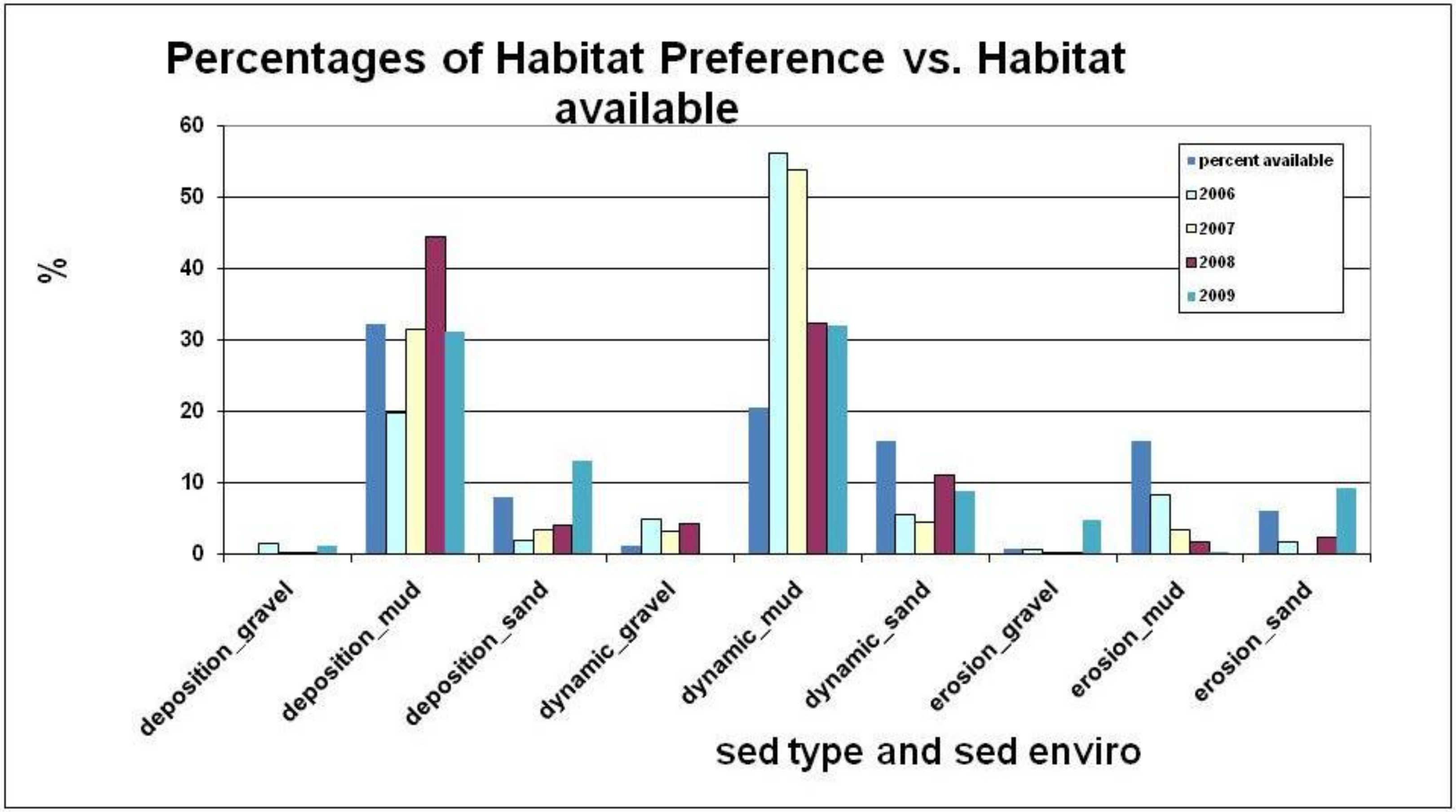
3.1 Atlantic Sturgeon

3.1.1 Life History

Atlantic sturgeon are a demersal, anadromous species found along the Atlantic coast of North America. As juveniles, they may spend several years in freshwater riverine habitat before leaving their natal grounds to spend the majority of their time foraging in calm estuarine and coastal waters, only returning to spawn in their natal rivers. Data indicates they primarily occupy shallow inshore areas of the continental shelf, in water less than 60 meters (Stein *et al*., 2004). In winter, they migrate south to warmer waters and occupy nearshore waters at depths less than 18 meters (Laney *et al*., 2007). Preferred substrate varies by life stage (Gilbert, 1989). Mature sturgeons in the Hudson River showed a strong affinity for fine-grained/muddy substrate (**Figure 3-1**) (NYSDEC, 2013).

Limited information is available on the seasonal and long-term movement, distribution, and habitat needs of mature Atlantic sturgeon during their coastal phase. Recent research conducted using pop-up satellite archival transmitter (PSAT) tags attached to adult sturgeon in the Hudson River indicated adult Atlantic sturgeon travel great distances, as far as Nova Scotia to Georgia, when in coastal waters (Erickson *et al*., 2011). Juvenile sturgeon migrate to overwintering sites off the coast of North Carolina and near the mouth of the Hudson River (Laney *et al,* 2007 and Savoy and Pacillo, 2003). Additionally, in a study conducted on adult Atlantic sturgeon in the Delaware River, results indicated that a majority of the tagged individuals

Figure 3-1 Adult Atlantic Sturgeon Habitat Preference



Source: **http://www.dec.ny.gov/animals/37121.html** utilized a narrow strip (less than seven kilometers offshore) of coastal waters when migrating north in the summer and south in the winter (Fox and Breece, 2010).

Atlantic sturgeons are opportunistic benthic feeders that prey on polychaetes, isopods, decapods crustaceans, amphipods, gastropods, bivalves and fishes (Scott and Crossman, 1973). Atlantic sturgeons suck food into a ventrally-located protruding mouth (Bigelow and Schroeder, 1953 and Collette and MacPhee, 2002). Four barbels in front of the mouth assist the sturgeon in locating prey (Bigelow and Schroeder, 1953 and Collette and MacPhee, 2002). Diets of adult and migrant sub-adult Atlantic sturgeon include mollusks, gastropods, amphipods, annelids, decapods, isopods, and arid fish such as sand lance (Bigelow and Schroeder, 1953; Collette and MacPhee, 2002; ASSRT, 2007; Guilbard *et al.*, 2007; Savoy, 2007). Juvenile Atlantic sturgeon feed on aquatic insects, insect larvae, and other invertebrates (Bigelow and Schroeder, 1953; ASSRT, 2007; Guilbard *et a*l., 2007). Prey items of Atlantic sturgeon within the Long Island Sound were reported to be predominantly polychaetes and pea crabs (Savoy, 2007).

Atlantic sturgeon may reach sizes of 430 centimeters and weigh upwards of 363 kilograms. They are long lived, reaching ages in excess of 60 years for females and about 30 years for males; however, faster growth and earlier maturation occurs further south (ASSRT, 2007). Egg production increases with age and body size and ranges from 800,000 to 3.76 million eggs (Collette and MacPhee, 2002). Atlantic sturgeon eggs are highly adhesive and are deposited on the bottom substrate, usually on hard surfaces (Gilbert, 1989, Smith and Clugston, 1997). Spawning typically occurs where currents are fairly strong (Gilbert, 1989). Eggs hatch one week after they have been fertilized.

Within the New York/New Jersey Harbor Estuary it is generally believed that the juveniles live in the riverine to estuarine environment for one to six years and then move out to the ocean, returning only to spawn. In the Hudson River maturity occurs at nine years for males and ten years for females. Atlantic sturgeon in the Hudson River migrate into the estuary and then into the Hudson River, going just upstream of the saltwater front to spawn from April to June. Males arrive on breeding grounds earlier than females (Collette and MacPhee, 2002) and females breed less frequently (once every two to five years for females and one to five years for males). Males migrate upstream as water temperatures reach approximately six degree Celsius, while females follow once temperatures reach approximately 12 degrees Celsius. After spawning, females migrate out of the river, while males remain upstream until fall (Gilbert, 1989). Each year, larval and juvenile Atlantic sturgeon in the Hudson remain upstream from May to July, then traveling downstream to deeper water once temperatures drop below 20 degrees Celsius (Gilbert,1989).

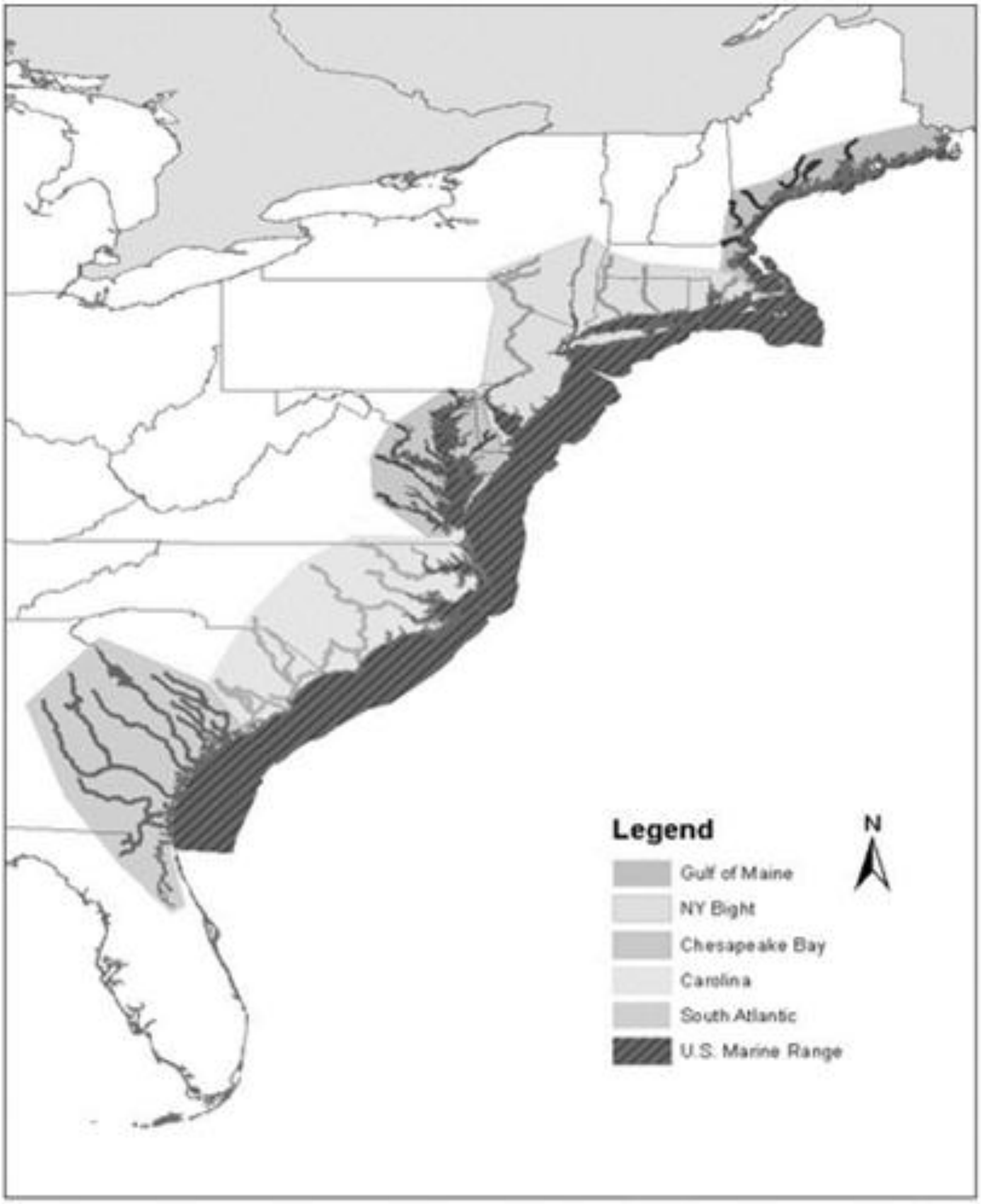
3.1.2 Range-wide Status

Genetic studies conducted on Atlantic sturgeon have found seven to ten distinct population segments (DPSs) (ASSRT, 2007). The following DPSs of Atlantic sturgeon are listed endangered or threatened by NMFS as of February 2012:

- Endangered (New York Bight DPS;
- Chesapeake Bay DPS;
- Carolina DPS;
- South Atlantic DP; and
- Threatened (Gulf of Maine DPS).

The boundaries of these five Atlantic sturgeon DPS is provided in **Figure 3-2**. However, genetic data as well as tracking and tagging data demonstrate sturgeon from each DPS occur throughout the full range of the subspecies. Therefore, sturgeon originating from any of the five DPSs can be affected by threats in the marine, estuarine, and riverine environment that occur far from natal spawning rivers.

Figure 3-2 US Atlantic Sturgeon DPSs



Source: 75 FR 61871

Notes: U.S. Atlantic sturgeon DPSs showing rivers (up to the first dam where known) in which the species are known to occur.

Atlantic sturgeon were historically reported in approximately 38 rivers in the United States from St. Croix, Maine to the Saint Johns River, Florida, of which 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently extant in approximately 32 of these rivers, and spawning occurs in at least 20 of them (ASSRT, 2007). The overall population declined drastically in the late 1800s and early 1900s and to a lesser extent into the 1900s and is apparently extirpated from some areas to include some Maryland tributaries of Chesapeake Bay; St. Mary’s River, Florida-Georgia; and possibly St. Johns River, Florida (NatureServe, 2012). Prior to 1890, there were an estimated 180,000 adult females in the Delaware Bay, and approximately 20,000 in Chesapeake Bay, 29,000 in the southern Atlantic states (North Carolina, South Carolina, Georgia, Florida), and 6,000 in the Hudson River (NatureServe 2012).

Overfishing through the mid-1990s led to population declines. However, bycatch remains a threat as well as estuarine and freshwater habitat degradation from human activities such as dredging and habitat impediments such as locks and dams. Vessel strikes are also a known threat in shallow waters.

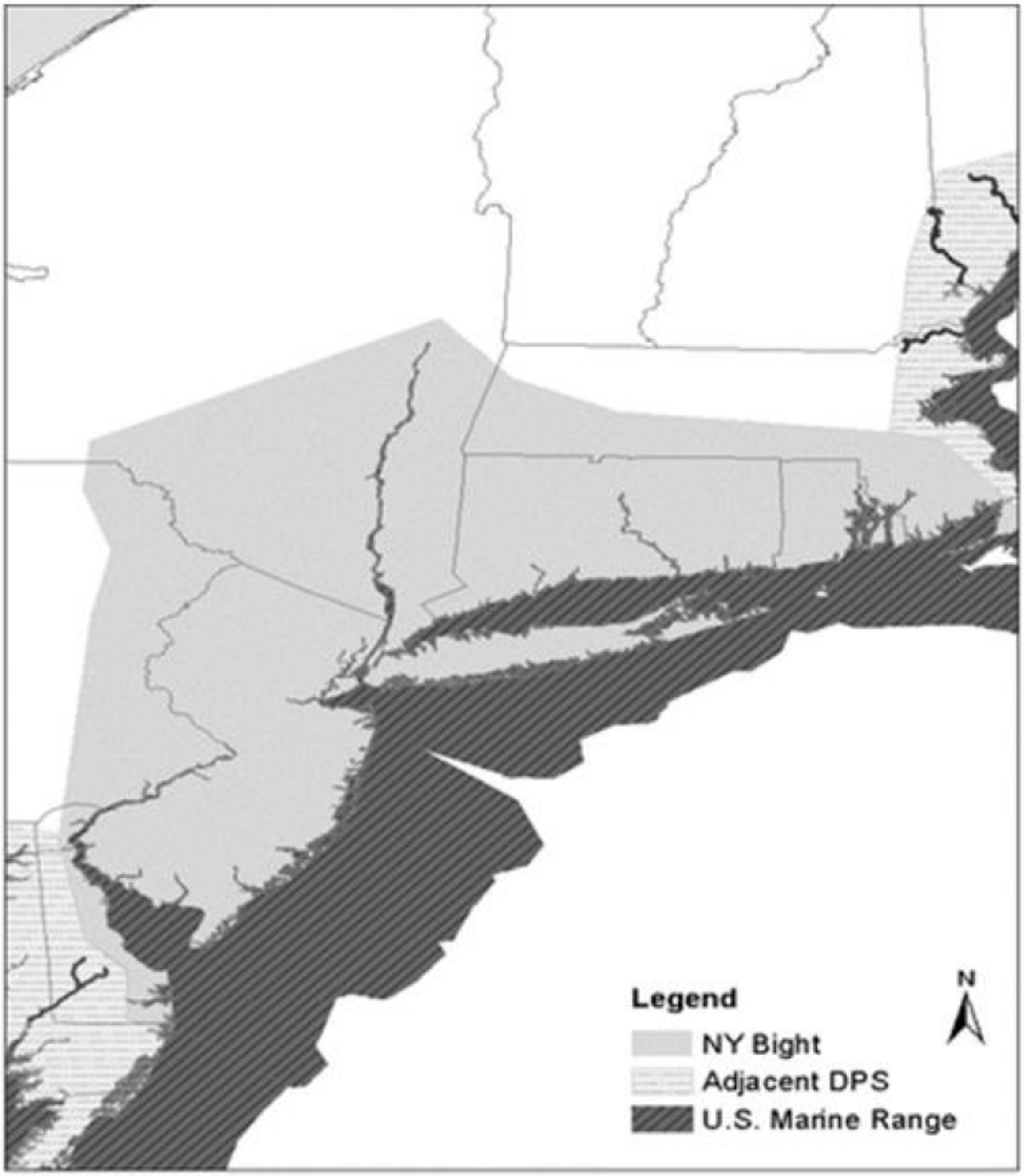
Current population estimates are limited. In the Atlantic and Gulf Coast spawning population (including the Hudson River), there are approximately 10,000 to 100,000 adults, including both male and female (NatureServe, 2012). In 1995, 9,500 juveniles were estimated in the Hudson River, of which 4,900 were hatchery stocked. Approximately 4,600 are estimated to be wild. Additionally, 870 were estimated to be spawning adults, including both male and female. The Altamaha River in Georgia appears to support the healthiest population with over 2,000 sub-adults captured during research studies (ASSRT, 2007).

The Atlantic sturgeon is managed under a Fishery Management Plan (FMP) implemented by the Atlantic States Marine Fisheries Commission (ASMFC). In 1998, the ASFMC instituted a coast-wide moratorium on the harvest of Atlantic sturgeon, which is to remain in effect until there are at least 20 protected age classes in each spawning stock (anticipated to take up to 40 or more years). NMFS followed the ASMFC moratorium with a similar moratorium for Federal waters. Amendment 1 to ASMFC's Atlantic sturgeon Fishery Management Plan also includes measures for preservation of existing habitat, habitat restoration and improvement, monitoring of bycatch and stock recovery, and breeding/stocking protocols.

3.1.3 Status in the Action Area

The New York Bight DPS **(Figure 3-3)** includes all Atlantic sturgeon that spawn in watersheds draining to coastal waters from Chatham, MA to the Delaware-Maryland border on Fenwick Island, within which they are known to occur throughout the Long Island Sound, the Hudson River, the Delaware River, and at the mouth of the Connecticut and Taunton Rivers. Spawning is only known to occur in the Hudson and Delaware Rivers; however spawning areas in most U.S. rivers have not been well defined. However, a recent study identified a potential spawning area near Diamond Reef which lies in the entrance to the East River between Governor's Island and Lower Manhattan (Erickson *et al.* 2011). Information on the presence of Atlantic sturgeon in the East River is extremely limited. However, as noted in Savoy and Pacileo (2003), the East River may be used by juvenile Atlantic sturgeon to migrate from the Hudson to western Long Island Sound; however, there is no information on the number likely to be present in the river.

Figure 3-3 New York Bight DPS



Source: 75 FR 61871

Notes: New York Bight DPS Showing Rivers (up to the first dam where known) in which the species is known to occur.

The population of Atlantic sturgeon in the New York Bight DPS has remained extremely low over the past 100 years in comparison to historic level. Currently, the existing spawning population in the Hudson River is estimated to have 870 adults spawning each year (600 males and 270 females). All available data on abundance of juvenile Atlantic sturgeon in the Hudson River Estuary indicates a substantial drop in production of young since the mid 1970's (Kahnle et aI., 1998). No abundance estimates exist for the Delaware River population, however studies conducted in 2009 on capture of young-of-the-year (Fisher, 2011) provides evidence that successful spawning is still occurring in the Delaware River, but the relatively low numbers suggest the existing riverine population is limited in size. There is currently not enough information regarding any life stage to establish a trend for the Hudson River or Delaware River populations.

The New York Bight DPS is bounded to the north by the Gulf of Maine DPS and to the south by the Chesapeake DPS. Further south are the Carolina and South Atlantic DPS. While some mixing of individuals between the New York Bight and more southern DPS has been shown to occur in the southern portion of the New York Bight DPS (i.e., Delaware Bay; Waldman *et al*,. 1996 and Fox and Breece, 2010), nearly all Atlantic sturgeon (up to 99 percent) from further north in the New York Bight DPS are considered to be endemic to this DPS based on genetic analyses (Waldman *et al*., 1996). Fewer than four percent of Atlantic sturgeon in coastal waters of the New York Bight are likely to originate from more southern DPSs. Based on genetic analysis by Waldman *et al*. 1996, no individuals from the Gulf of Maine DPS have move south into the New York Bight DPS.

Although Atlantic sturgeon are capable of ranging widely along the Atlantic coast and of movement throughout DPS (Erickson *et al*., 2011), tagging and genetic studies indicate high site fidelity in natal rivers and very low gene flow among populations (Dovel and Berggren, 1983; Savoy and Pacileo, 2003; Grunwald *et al*., 2008). The fact that adult sturgeon return to their natal river to spawn reduces the likelihood of impacting individuals from the four other DPSs. Furthermore, the infrequency with which Atlantic sturgeon spawn further reduces the potential effects of project construction on Atlantic sturgeon from the New York Bight DPS, since only a subset of adults migrate to spawn in a given year. Use of the Hudson River by sturgeon from DPS outside of the New York is a possibility (ASSRT, 2007); however, the abundance of these individuals in the Hudson River relative to sturgeon from the New York Bight DPS is likely to be low.

Based on the best available information, the potential impacts of the Proposed Action on Atlantic sturgeon are greatest for individuals from the New York Bight DPS and much less likely for individuals from the four other DPS. Support for this conclusion comes primarily from recent tagging studies demonstrating that the majority of Atlantic sturgeon from the Hudson River remain within the New York Bight and coastal Chesapeake DPS and from genetic studies that have shown distinct populations among DPS, low gene flow among populations, and high site fidelity for natal rivers (AECOM, 2012).

Atlantic Surgeon Recorded in the East River

As stated earlier, the RITE project occurs in the East River approximately two miles north of the EMWE. As part of the FERC licensing requirements, the Verdant must monitor for monitor for rare, threatened and endangered species in the project area (Verdant 2012). To monitor for rare, threatened and endangered species, Verdant installed three (3) VEMCO VR2W receivers in and around the RITE Project. Two of the receivers, were deployed in May 2011, in the East Channel of the East River from existing buoys at the current RITE Project site. The third receiver, was deployed in August 2011, in the West Channel of the East River using a concrete bottom mount, adjacent to an unused water taxi pier on Roosevelt Island Verdant, 2012).

Review of the 2012 monitoring report indicates that from May 2011 through 2012, a total of only four individual tagged sturgeon were recorded. One individual sturgeon was recorded in the East and West

Channel on the same day. The other three sturgeon were each recorded once in the project area. These limited recordings of sturgeon in the project area suggests that Atlantic sturgeon spend very brief periods of time in the project area.

3.1.4 Critical Habitat

No critical habitat has been designated for Atlantic sturgeon near the Project Area.

3.2 Shortnose Sturgeon

3.2.1 Life History

Shortnose sturgeon are benthic fish primarily found in deep channel sections of large rivers. They are long-lived and lifespan varies with latitude; individuals in northern populations (from the Delaware River and north) are reported to live 30 to 67 years, whereas individuals in southern populations (from the Cape Fear River and south) live 10 to 25 years (Kynard, 1997). Additionally, maturity occurs at later age in the north (males at five to ten years and females at seven to 13 years). Seasonal distribution within the rivers where shortnose sturgeons occur appears to depend on life stage, reproductive state, and latitude (Bain, 1997; Buckley, 1982; Dadswell, 1979; Dovel, 1981; Keiffer and Kynard, 1993; Squires and Smith, 1979).

Shortnose sturgeon feed on crustaceans, insects, worms, and small mollusks; and it has been observed feeding on plant surfaces (Dadswell *et al.*, 1984; NMFS, 1998). Small mollusks are the primary food item for adults in the Saint John River, New Brunswick, but do not appear to be as important for juvenile shortnose sturgeon as for adults (Dadswell, 1979). Carlson and Simpson (1987) examined gut contents of juvenile shortnose sturgeon from the Hudson River estuary and found that young-of-the-year and yearlings caught in the summer contained mostly midge larvae and amphipods.

Although once believed to be anadromous, the shortnose sturgeon is not a truly anadromous species, as it spends only a limited amount of time at sea. Those occurring in the Hudson River spend the majority of their life cycle in the Hudson River and occasionally move out to the coastal waters of New York and New Jersey (Dovel, 1979). Dadswell *et al.* (1984) reported that shortnose sturgeon caught in the Atlantic Ocean were within a few miles of shore. This represents an important difference from the Atlantic sturgeon and migratory reaches for each.

Specific habitat requirements for the shortnose sturgeon are complex and vary depending on life stage and season. They are known to occur at depths up to approximately 100 feet but generally found at depths less than 65 feet (Dadswell *et al.*, 1984; Dadswell, 1979). They are also highly tolerant of a wide range of salinities (McCleave *et al.*, 1977).

From late fall until early April, pre-spawning adults overwinter in a torpid state in the deep channel habitats of the Hudson River near Sturgeon Point (River Mile (RM) 86) and Kingston, New York (RM 94) (Bain 1997) with juveniles overwintering in Haverstraw Bay (RM 33 to 38) (**Figure 3-4**). In mid-April, the fish move upstream to spawning grounds between Coxsackie (RM 120) and the Federal Dam, Troy, NY (RM 154) (**Figure 3-4**). Spawning generally occurs from mid-April to mid-May when freshwater temperatures reach approximately eight to nine degree Celsius. Shortnose sturgeon have a negative phototaxis and have been documented to stay near the middle of the channel in deep water (20 feet or greater) to avoid well-lit waters (Bain, 2003). One known exception to this is the spawning area near the Federal Dam, where the sturgeon will remain on shallow shoals (less than 20 feet) in the middle of the channel during low-water years. They are believed to spawn at discrete sites within a river (Kieffer and Kynard,, 1993).

Spawning occurs primarily over channel habitats containing gravel, rubble, or rock-cobble substrates (Dadswell *et al*., 1984; NMFS, 1998) in areas of relatively fast-moving water. Fertilized eggs of shortnose sturgeon are adhesive and demersal (Meehan, 1910, as cited in Crance, 1986). The eggs hatch in eight days at about 17 degrees Celsius. After two days, the yolk-sac fry seek concealment and avoid light (Buckley and Kynard, 1981). Twelve days after hatching, the yolk sac is completely absorbed and the fry feed on zooplankton (Buckley and Kynard, 1981). During this time, the fry begin to disperse downstream in the Hudson River. They are found primarily in fast, deep waters of the Hudson River and are associated with the spawning areas between RMs 120 and 154. Juveniles initially prefer to remain above the saltwater/freshwater interface (approximately RM 62), but by late fall/early winter, most of the older juveniles are present near Haverstraw Bay (RM 36) (**Figure 3-4**). Non-spawning adults summer in the same range as spawning adults. As water temperature drops in late fall, the fish move to one of two wintering areas near Kingston (RM 94) or Haverstraw Bay (RM 33 to 38) (Dovel *et al.* 1992; Bain 1997). It is estimated that females spawn every three to five years while males spawn approximately every two years.

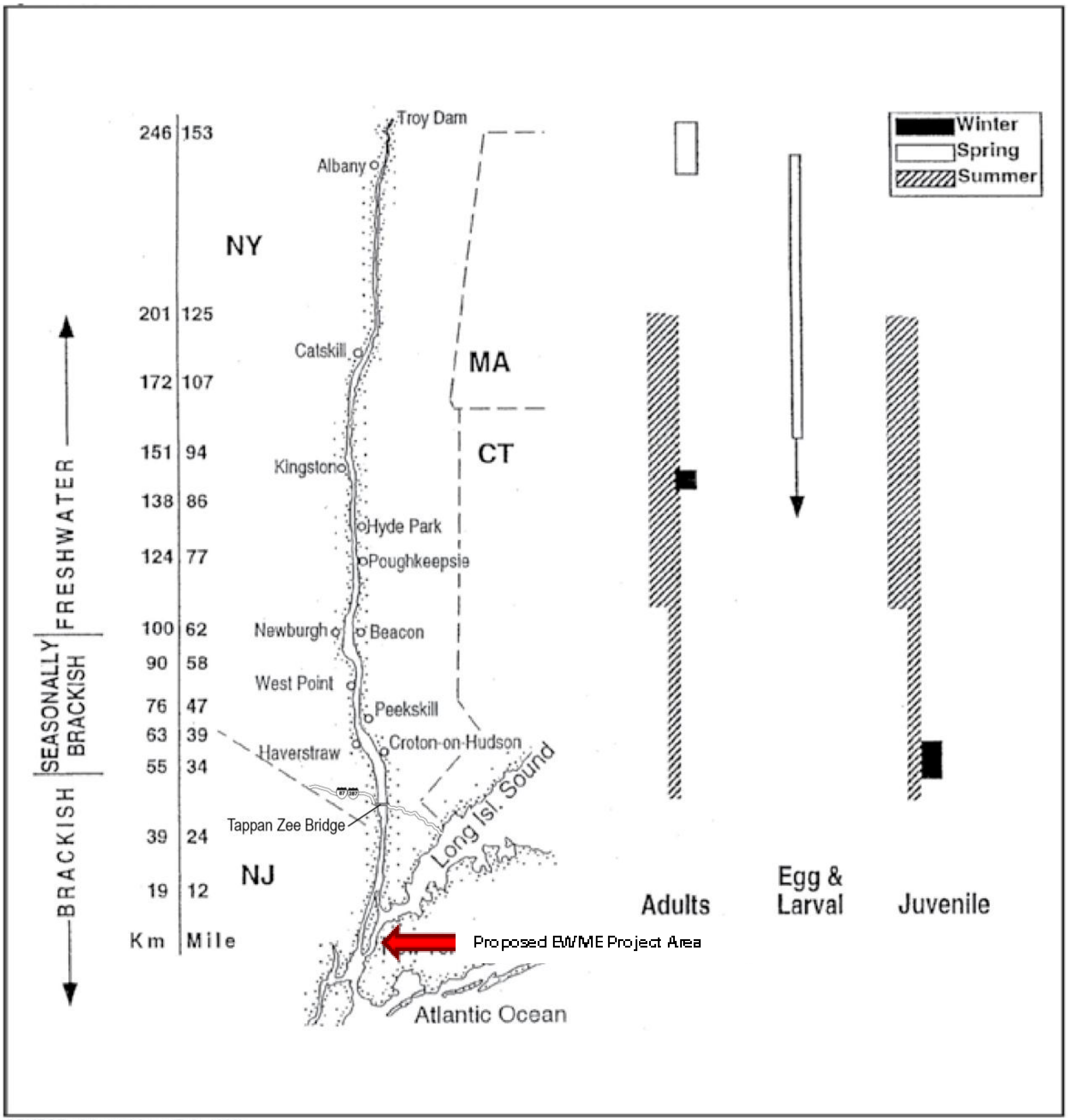
3.2.2 Range-wide Status

The shortnose sturgeon originally was listed as an endangered species by the U.S. Department of Interior in March 1967 (32 FR 4001), and it remained on the Federal Endangered Species List following enactment of the ESA in 1973. The shortnose sturgeon inhabits large coastal rivers of eastern North America. NMFS recognizes 19 spawning populations of shortnose sturgeon found in 25 river systems, ranging from the Saint John River in New Brunswick, Canada, to the Saint Johns River in northeastern Florida (NMFS, 1998).

In the late nineteenth and early twentieth century, shortnose sturgeons were commonly taken in a commercial fishery for the closely related and commercially valuable Atlantic sturgeon (*Acipenser oxyrinchus*). More than a century of extensive fishing for sturgeon contributed to the decline of shortnose sturgeon along the east coast. Heavy industrial development during the twentieth century in rivers inhabited by sturgeon impaired water quality and impeded these species' recovery; possibly resulting in substantially reduced numbers of shortnose sturgeon within portions of the species' ranges (e.g., southernmost rivers of the species range: Santilla, St. Marys and St. Johns Rivers). A shortnose sturgeon recovery plan was published in December 1998 to promote the conservation and recovery of the species (NMFS, 1998).

Although shortnose sturgeons are listed as endangered range-wide, in the final recovery plan NMFS recognized 19 separate populations occurring throughout the range of the species. These populations and corresponding number of populations within a given area are: New Brunswick, Canada (1); Maine (2); Massachusetts (1); Connecticut (1); New York (1); New Jersey/Delaware (1); Maryland and Virginia (1); North Carolina (1); South Carolina (4); Georgia (4); and Florida (2). NMFS has not formally recognized distinct population segments (DPS) of shortnose sturgeon under the ESA. Although genetic information within and among shortnose sturgeon occurring in different river systems is largely unknown, life history studies indicate that shortnose sturgeon populations from different river systems are substantially reproductively isolated (Kynard, 1997) and, therefore, should be considered discrete. The 1998 Recovery Plan indicates that while genetic information may reveal that interbreeding does not occur between rivers that drain into a common estuary, at this time, such river systems are considered a single population compromised of breeding subpopulations (NMFS, 1998).

Figure 3-4 Distribution and Life History Pattern of Shortnose Sturgeon in the Hudson River Estuary by Major Life Stage and Season



SOURCE: Adapted from (Bain 1998)

Studies conducted since the issuance of the Recovery Plan have provided evidence that suggests that years of isolation between populations of shortnose sturgeon have led to morphological and genetic variation. Walsh *et al*. (2001) examined morphological and genetic variation of shortnose sturgeon in three rivers (Kennebec, Androscoggin, and Hudson). The study found that the Hudson River shortnose sturgeon population differed markedly from the other two rivers for most morphological features (total length, fork length, head and snout length, mouth width, interorbital width and dorsal scute count, left lateral scute count, and right ventral scute count). Significant differences were found between fish from Androscoggin and Kennebec Rivers for interorbital width and lateral scute counts which suggests that even though the Androscoggin and Kennebec Rivers drain into a common estuary, these rivers support largely discrete populations of shortnose sturgeon. The study also found significant genetic differences among all three populations indicating substantial reproductive isolation among them and that the observed morphological differences may be partly or wholly genetic.

Grunwald *et al*. (2002) examined mitochondrial DNA (mtDNA) from shortnose sturgeon in 11 river populations. The analysis demonstrated that all shortnose sturgeon populations examined showed moderate to high levels of genetic diversity as measured by haplotypic diversity indices. The limited sharing of haplotypes and the high number of private haplotypes are indicative of high homing fidelity and low gene flow. The researchers determined that glaciation in the Pleistocene Era was likely the most significant factor in shaping the phylogeographic pattern of mtDNA diversity and population structure of shortnose sturgeon. The Northern glaciated region extended south to the Hudson River while the southern non-glaciated region begins with the Delaware River. There is a high prevalence of haplotypes restricted to either of these two regions and relatively few are shared; this represents a historical subdivision that is tied to an important geological phenomenon that reflects historical isolation. Analyses of haplotype frequencies at the level of individual rivers showed significant differences among all systems in which reproduction is known to occur. This implies that although higher level genetic stock relationships exist (e.g., southern vs. northern and other regional subdivisions), shortnose sturgeon appear to be discrete stocks, and low gene flow exists between the majority of populations. Waldman *et al.* (2002) also conducted mtDNA analysis on shortnose sturgeon from 11 river systems and identified 29 haplotypes. Of these haplotypes, 11 were unique to northern, glaciated systems and 13 were unique to the southern non-glaciated systems. Only five were shared between the two. This analysis suggests that shortnose sturgeon show high structuring and discreteness and that low gene flow rates indicated strong homing fidelity.

Wirgin *et al*. (2005) also conducted mtDNA analysis on shortnose sturgeon from 12 rivers (St. John, Kennebec, Androscoggin, Upper Connecticut, Lower Connecticut, Hudson, Delaware, Chesapeake Bay, Cooper, Pee Dee, Savannah, Ogeechee and Altamaha). This analysis suggested that most population segments are independent and that genetic variation among groups was high.

The best available information demonstrates differences in life history and habitat preferences between northern and southern river systems. Given the species’ anadromous breeding habits, the rare occurrence of migration between river systems, and the documented genetic differences between river populations, it is unlikely that populations in adjacent river systems interbreed with any regularity. The lack of interbreeding likely accounts for the failure of shortnose sturgeon to repopulate river systems from which they have been extirpated, despite the geographic closeness of persisting populations. This characteristic of shortnose sturgeon also complicates recovery and persistence of this species in the future because, if a river population is extirpated in the future, it is unlikely that this river will be re-colonized. Consequently, the nineteen separate populations of shortnose sturgeon are viewed as subpopulations (one of which occurs in the Project Area).

Historically, shortnose sturgeon are believed to have inhabited nearly all major rivers and estuaries along nearly the entire east coast of North America. The range extended from the St John River in New

Brunswick, Canada to the Indian River in Florida. Today, only 19 populations remain ranging from the St. Johns River, Florida (possibly extirpated from this system) to the Saint John River in New Brunswick, Canada. Shortnose sturgeon are large, long lived fish species. The present range of shortnose sturgeon is disjunctive, with northern populations separated from southern populations by a distance of about 400 km. Population sizes vary across the species' range. From available estimates, the smallest populations occur in the Cape Fear (approximately eight adults; Moser and Ross 1995) in the south and Merrimack and Penobscot rivers in the north (~ several hundred to several thousand adults depending on population estimates used (AECOM, 2012), while the largest populations are found in the Saint John (approximately 18,000; Dadswell, 1979) and Hudson Rivers (approximately 61,000; Bain *et al.*, 1998). As indicated in Kynard (1996), adult abundance is less than the minimum estimated viable population abundance of 1,000 adults for five of 11 surveyed northern populations and all natural southern populations. Kynard (1996) indicated that all aspects of the species' life history show that shortnose sturgeon should be abundant in most rivers. As such, the expected abundance of adults in northern and north-central populations should be thousands to tens of thousands of adults. Expected abundance in southern rivers is uncertain, but large rivers should likely have thousands of adults. The only river systems likely supporting populations of these sizes are the St John, Hudson, and possibly the Delaware and the Kennebec Rivers.

3.2.3 Status in the Action Area

Shortnose sturgeon occupy the lower Hudson River from late spring through early fall, shortnose sturgeon are dispersed throughout the deep, channel habitats of the freshwater and brackish reaches of the river (Bain, 1997). Mollusks, insects and crustaceans make up 25 to 50 percent of their diet. In the late fall, most or all adult shortnose sturgeon congregate at a single wintering site near Sturgeon Point (RM 87) (Bain, 1997). In the spring, the sturgeons migrate upstream to spawn and then migrate back downstream to the estuary to forage.

Hudson River shortnose sturgeon spawn in late-April to early May below Troy Dam (Bain, 1997) in turbid and shallow water between RM 124 and RM 153 (**Figure 3-4**). Eggs adhere to the river bottom, as do the newly hatched larvae (Buckley and Kynard, 1981). Hatching size ranges from 7 to 11 mm (Buckley and Kynard, 1981). Larvae then move downstream to the Hudson River Estuary (Hoff *et al*., 1988). Juvenile shortnose sturgeons use the tidal reach of the Hudson River.

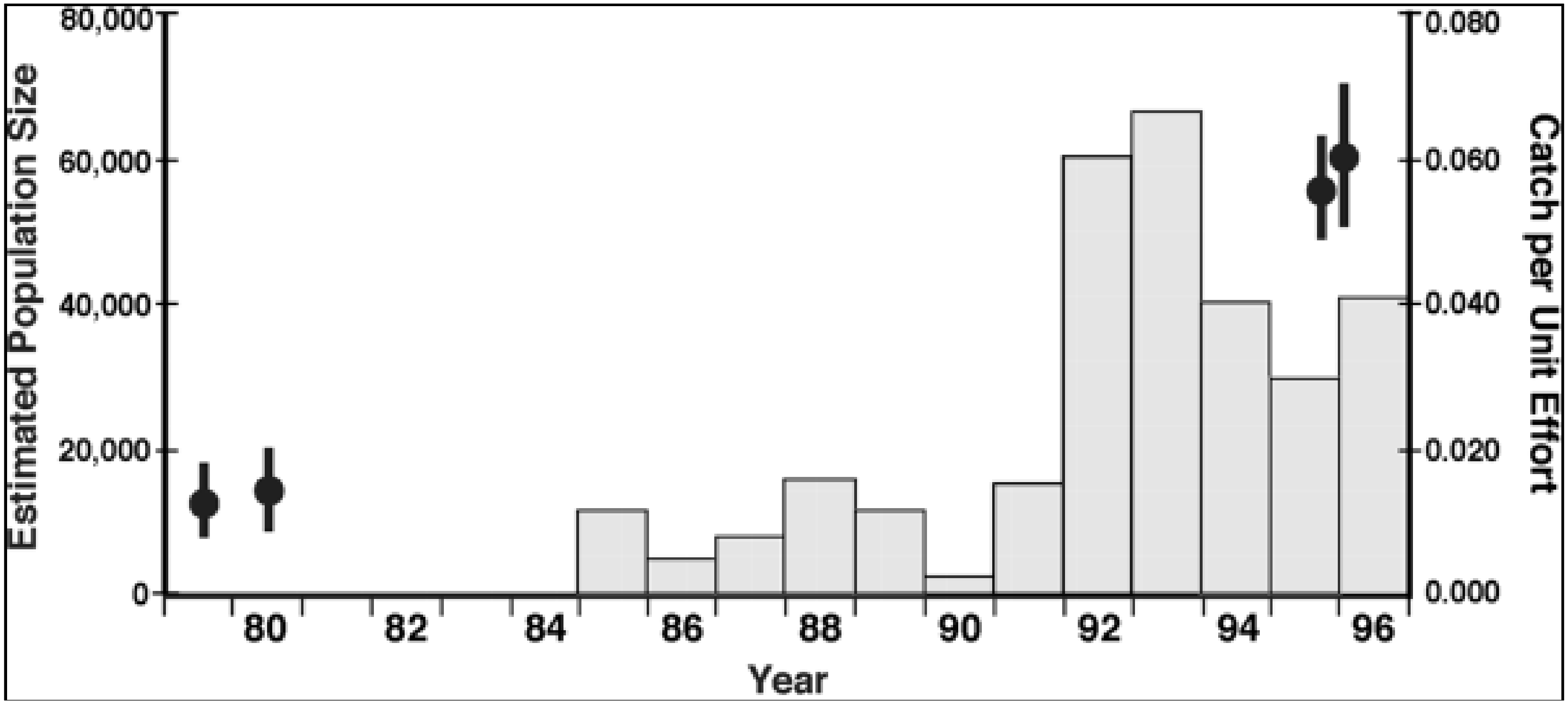
Data on the shortnose sturgeon population in the Hudson River estuary **(Figure 3-5)** were obtained from a field studies conducted from 1994 to 1997, a shortnose sturgeon population study conducted by William Dovel and others during the 1970s, and a standardized fish monitoring program by the Hudson River electric utilities (Central Hudson Gas and Electric Corporation, Consolidated Edison Corporation of New York, New York Power Authority, Niagara Mohawk Power Corporation, and Southern Energy New York) (Bain *et al*., 2007). The studies provide shortnose sturgeon data and include population estimates and relative abundance data. Population estimates made in the late 1990s (about 60,000 fish with adults comprising less than 90 percent of the population) were compared to those made in the late 1970s and it was concluded the Hudson River population had increased by more than 400 percent over the period. Data from the Hudson River electric utilities annual trawl survey (1986 to 1997) also indicate more than a fourfold increase in abundance mainly in the adult segment of the population (Bain *et al*., 2007). It was concluded that Hudson River supports the largest population of shortnose sturgeon, and the system may harbor most individuals of the species (Bain *et al*,. 2007). Most shortnose sturgeon captured in the Hudson River estuary in research and monitoring programs have been adults. The spawning and wintering habitats of shortnose sturgeon in the Hudson River have been well known since the late 1800s when an intense sturgeon fishery operated in the estuary. The juvenile wintering habitat has been described, but the spatial extent of summer sturgeon habitat had not been documented (Bain *et al.,* 2007).

Shortnose sturgeon have been captured near the confluence of the East River and New York Harbor and two shortnose sturgeon tagged in the Hudson River were recaptured in the lower Connecticut River (Savoy, 2004). The presence of Hudson River tagged shortnose sturgeon in the Connecticut River may indicate some movement through the East River; however this is only one potential route between the two rivers.
As part of the RITE project annual monitoring, no shortnose sturgeon were recorded in the project area.

3.2.4 Critical Habitat

No critical habitat has been designated for shortnose sturgeon.

Figure 3-5 Estimated Population Size of Shortnose Sturgeon in the Hudson River from 1979 to 1996



Source: Bain et al 2007

3.3 Loggerhead Sea Turtle

3.3.1 Life History

Loggerhead sea turtles have a large distribution range and are found in temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans (Dodd, 1988). Dependent on the stage of their life cycle, loggerheads inhabit a variety of habitats including open ocean, continental shelves, lagoons, bays, estuaries, and river mouths (NatureServe, 2012).

Loggerhead sea turtles reach sexual maturity at 20 to 30 years of age (Frazer and Ehrhart, 1985). In southeastern United States, sexually active adults migrate to shallow waters, adjacent to their nesting beaches, to mate from March to June (Fritts *et al*., 1983). Within the continental U.S., a large number of nesting beaches are present along the southeastern coast of the United States, North Carolina, South Carolina, Georgia, Florida, and Alabama (Conant *et al*., 2009) (**Figure 3-6**). Nesting occurs from April through September, with a peak from June through August (Richardson and Richardson, 1982). Loggerheads prefer nesting in subtropical ocean beaches and occasionally on estuarine shorelines with suitable sand. The lay their eggs between the high tide line and the dune front (Routa, 1968, Hailman and Elowson 1992). The mean clutch size varies from 100 to 126 eggs (Dodd 1988), with incubation periods varying between 42 to 75 days, dependent on nest temperatures (Mrosovsky, 1980). Emergence success rates range from 55 to 75 percent (Witherington, 1986).

Once emerged, post-hatchlings swim immediately offshore to live a pelagic existence. Loggerhead hatchlings from the Northwestern Atlantic float along the North Atlantic gyre to forage (USFWS Factsheet), where they feed on copepods and hydroids in sargassum communities (Witherington, 2002; Carr, 1987). The neritic stage of the loggerhead lasts approximately weeks to months long (Witherington, 2002) where juveniles then transition to their oceanic stage.

The oceanic juvenile stage of the loggerhead begins when they enter the oceanic zone in the North Atlantic. These turtles are epipelagic spending most of their time within the top five meters of the water column. They have been recorded to dive down to as far as 200 meters deep feeding primarily on benthic prey consisting of coelenterates, salps, *Janthina* spp., barnacles, and crustacean (Bjorndal, 1997). The duration of the oceanic juvenile stage varies between seven to 11.5 years (Bjorndal *et al.*, 2000).

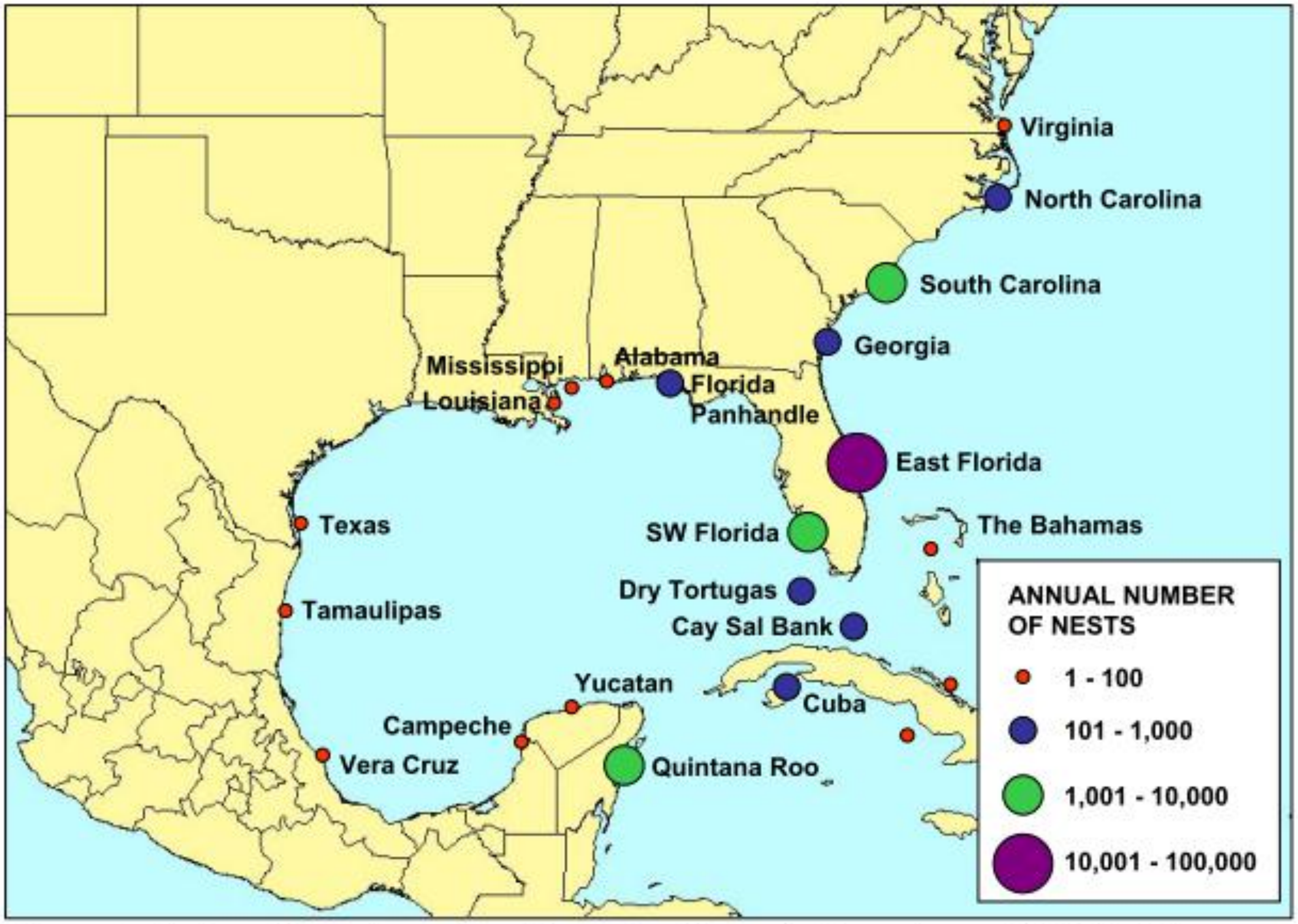
At the end of the oceanic juvenile stage, loggerheads begin to transition to the neritic zone. Neritic juveniles then become benthic feeders foraging in lagoons, estuaries, bays, river mouths, and shallow coastal waters. Juvenile loggerheads in the North Atlantic mainly inhabit the continental shelf migrating north to south from Cape Cod Bay, Massachusetts, south through Florida, the Bahamas, Cuba, and the Gulf of Mexico. Estuarine habitats include areas along the Long Island Sound, Delaware Bay, Chesapeake Bay, Pamlico and Core Sounds, open sounds in South Carolina and Georgia, Mosquito and Indian River Lagoons, Biscayne Bay, Florida Bay, and a number of embayment’s along the Gulf of Mexico (Musick and Limpus, 1997, Spotila *et al.*, 1997, Hopkins-Murphy *et al.*, 2003). Juvenile loggerheads feed on a variety of benthic organisms including mollusks and crabs. The duration of this life stage is estimated around 13 to 20 years (Bjorndal *et al.*, 2001).

3.3.2 Range-wide Status

In 1978, loggerhead sea turtles were globally listed as threatened under the ESA of 1973. The ESA requires a review of listed species at least once in every five years to determine whether the status has changed or if the species should be delisted or classified as different than its current status.

Source: Dodd 1988

Figure 3-6 Estimated Annual Number of Loggerhead Nests in the Southeast U.S., The Bahamas (Cay Sal Bank), Cuba, and Mexico, 2001-2008



The most current status review to date for the loggerhead turtle is the August 2009 Review from NMFS Loggerhead Biological Review Team (BRT) (Conant *et al*., 2009).

The NFMS and USFWS have identified nine DPS for loggerheads. Each discrete population segment was delineated based on ecological, behavior, and oceanographic factors. The nine DPSs identified by the BRT include the:

1. North Pacific Ocean DPS,
2. South Pacific Ocean DPS,
3. North Indian Ocean DPS,
4. Southeast Indo-Pacific Ocean DPS,
5. Southwest Indian Ocean DPS,
6. Northwest Atlantic Ocean DPS,
7. Northeast Atlantic Ocean DPS,
8. Mediterranean Sea DPS, and
9. South Atlantic Ocean DPS (Conant *et al*., 2009).

According to the 2009 review, loggerhead turtle DPSs have the potential to decline in the future therefore, no change was warranted in the species' listing status. Although there are increasing trends at nesting beaches in the Southwest Indian and the South Atlantic Oceans, the threat matrix analysis indicated a great potential for future decline in the North Indian Ocean, Northwest Atlantic Ocean, Northeast Atlantic Ocean, Mediterranean Sea, and South Atlantic DPSs (Conant *et al*., 2009).

Based on population models completed for the 2009 review, the Northwest Atlantic Ocean DPS is likely to continue to decline despite having the lowest anthropogenic mortality rates. These declines are largely due to the mortality of juvenile and adult loggerheads from fishery bycatch that occur throughout the North Atlantic Ocean. Efforts have been made to reduce loggerhead bycatch; however it is unlikely that this source of mortality can be sufficiently reduced due to the magnitude of the North Atlantic fisheries and the lack and use of bycatch reduction technologies. The review has concluded that the Northwest Atlantic Ocean DPS is currently under risk of extinction (Conant *et al*., 2009).

NMFS and USFWS have designated five recovery units for the Northwest Atlantic population of loggerhead sea turtles. These include the Northern Recovery Unit, Peninsular Florida Recovery Unit, Dry Tortugas Recovery Unit, Northern Gulf of Mexico Recovery Unit, and the Greater Caribbean Recovery Unit. Turtles from the Long Island area are a component of the Northern Recovery Unit. The Northern Recovery Unit is defined as loggerheads originating from nesting beaches from the Florida-Georgia border through southern Virginia. This is considered the second largest nesting aggregation in the Northwest Atlantic. The average annual nest totals within this recovery unit are approximately 5,215 nests based on data from 1989-2008. Based on daily ground surveys, nesting trends have shown a significant decline of 1.3 percent annually. Additionally aerial surveys conducted by the South Carolina Department of Natural resources (SCDNR) showed a 1.9 percent annual decline for nesting beaches in South Carolina since 1980. Overall, there is strong statistical evidence suggesting a long-term decline for the Northern Recovery Unit (NMFS and USFWS, 2008).

3.3.3 Status in the Action Area

Between June and October, a number of juvenile loggerheads immigrate to New York's estuarine waters, utilizing shallow bays of the Long Island Sound and eastern Long Island (Sadove and Cardinale, 1993). Due to their sexually immaturity, turtles entering this area during the summer exhibit high residency rates in areas that provide suitable temperatures (15 degrees Celsius or higher), an abundance of food, and that do not require much energy expenditure, such as enclosed estuaries and embayments (Morreale pers. comm.). The preferred diet of the juvenile loggerhead is the spider crab (*Libinia emarginata*). The spider crab can be found in areas with fine substrates, indicative of calmer waters (Perry and Larson, 2004). The lack of suitable substrate in the East River for the turtle's most prolific food source would suggest that the turtles would not prefer the river as foraging habitat.

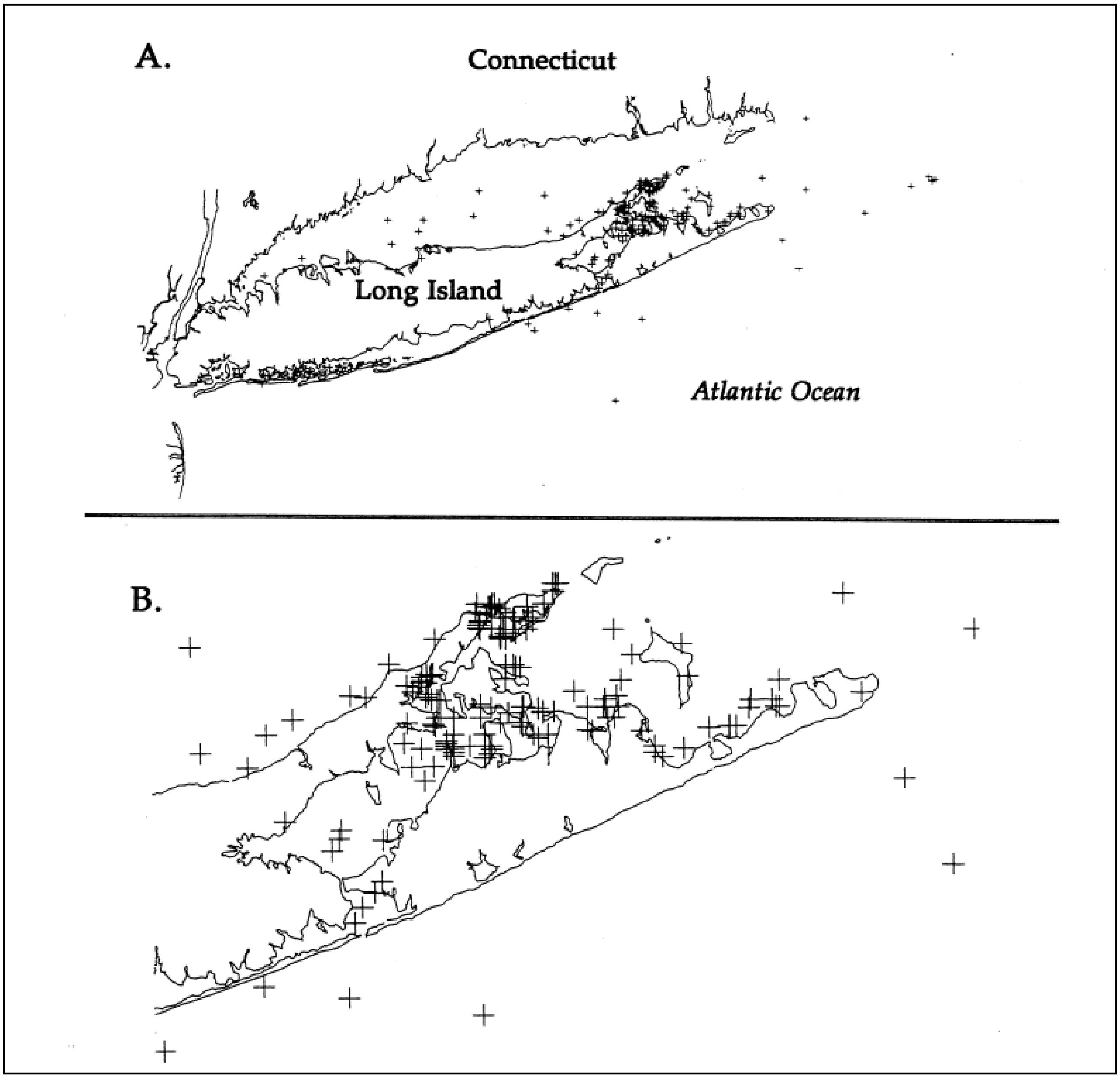
When water temperatures drop in the fall, many juvenile turtles migrate away from Long Island Sound and those that do not migrate may succumb to cold shock (Morreale *et al.*, 1992). Based on GPS tracking of several individual turtles in the Long Island Sound, it was determined that the turtles migrated out to the Atlantic Ocean and either headed out into the pelagic zone or migrated south along the coast of Long Island (Morreale and Standora, 1998). No migratory routes have been documented within the East River.

The population of turtles using the Long Island Sound area is likely declining. As discussed in Morreal *et al.*, (2005), turtles were collected from established pound nets throughout Long Island Sound during a in a study conducted from 1987 to 1992 (**Figure 3-7**). Additional research from 2002-2004 used a subset of pound nets sampled during the earlier study period. Comparisons across the two study periods revealed a sharp decline in the percentage of turtle captures from 59 percent of total captures from 1987 to 1992 to less than four percent of total captures during 2002 to 2004. Additionally, the absolute number of loggerheads captures also declined. Only two loggerhead sea turtles were captured over a three year period. Potential explanations for this decline include shifts in loggerhead foraging areas and/or increased mortality in pelagic or early benthic stage/age classes (Morreal *et al.*, 2005).

3.3.4 Critical Habitat

No critical habitat has been designated for the loggerhead sea turtle.

Figure 3-7 Geographic Distribution of Live Sea Turtles Captured



Source: Morreale and Standora 1988

Notes: (A) Geographic distribution of live sea turtles captured in New York waters from 1987 through 1992. Crosses represent individual captures at that location.

(B) A close-up view of high concentration of captures in eastern Long Island reflecting, for the most part, the locations of pound nets

3.4 Kemp's Ridley Sea Turtle

3.4.1 Life History

Kemp's ridley sea turtle is the smallest and most endangered member of the sea turtle family. Adults grow to a length of 28 inches and weigh up to 110 pounds. Longevity in the wild is unknown, but in captivity Atlantic ridley sea turtles may live to more than 20 years of age. Near-shore waters of 120 feet or less provide the primary marine habitat for adults, although it is not uncommon for adults to venture into deeper waters (Byles, 1989a; Mysing and Vanselous, 1989; Renaud *et al.*, 1996; Shaver *et al.*, 2005; Shaver and Wibbels, 2007). Suitable foraging habitat is variable and includes seagrass beds, oyster reefs, sandy bottoms and mud bottoms, and rock outcrops (NMFS and USFWS, 2007).

Kemp's ridley' diet consists mainly of swimming crabs, but may also include fish, jellyfish, and an array of mollusks. Kemp's ridley sea turtles can dive from a few seconds in duration to well over two and a half hours, although most dives are from 16 to 34 minutes (Mendonca and Pritchard, 1986; Renaud, 1995). Individuals spend the vast majority of their time underwater; over 12-hour periods, 89 to 96 percent of their time is spent below the surface (Byles, 1989b; Gitschlag, 1996).

Adult Kemp's ridley turtles are restricted to the Gulf of Mexico in shallow near shore waters, although adult-sized individuals sometimes are found on the eastern seaboard of the United States. Females rarely leave the Gulf of Mexico and adult males do not migrate. Juveniles feed along the east coast of the United States up to the waters off Cape Cod, Massachusetts (Spotila 2004). A small number of individuals reach European waters (Spotila 2004; Brongersma,, 1972) and the Mediterranean (Pritchard and Mtirquez, 1973). Preferred habitats include sheltered areas along the coastline, such as large estuaries, bays and lagoons.

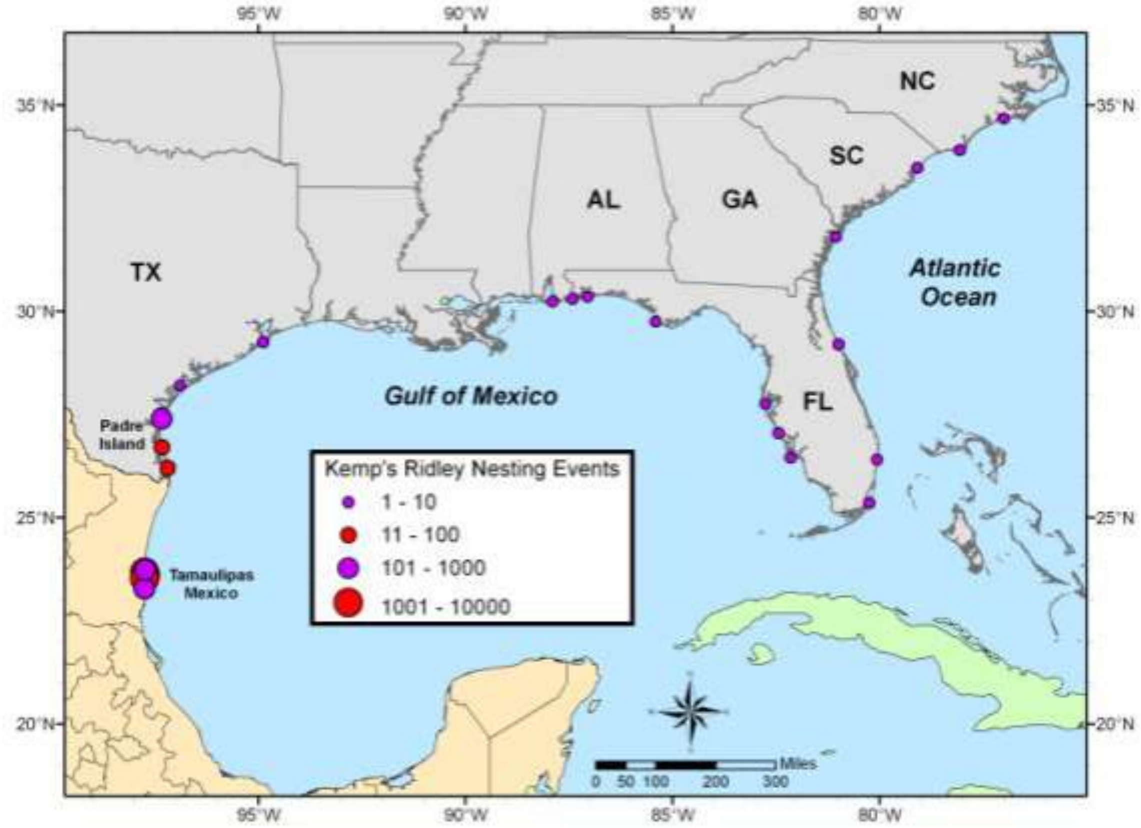
Migratory corridors for mature Kemp's ridleys appear to extend throughout the coastal areas of the Gulf of Mexico and most turtles appear to travel in waters less than roughly 164 feet in depth. Turtles that headed north and east traveled as far as southwest Florida; whereas those that headed south and east traveled as far as the Yucatan Peninsula, Mexico (Morreale *et al.*, 2007). Following migration, Kemp's ridley sea turtles settle into resident feeding areas for several months (Byles and Plotkin, 1994; Morreale *et al.*, 2007).

Benthic coastal waters of Louisiana and Texas seem to be preferred foraging areas for Kemp's ridley sea turtles (particularly passes and beachfronts), although individuals may travel along the entire coastal margin of the Gulf of Mexico (Landry and Costa, 1999; Landry *et al.*, 1996; Renaud, 1995). Sightings are less frequent during winter and spring, but this is likely due to lesser sighting effort during these times (Shoop and Kenney, 1992; Keinath *et al.*, 1996). Females may begin returning along relatively shallow migratory corridors toward the nesting beach in the winter in order to arrive at the nesting beach by early spring.

Mating is believed to occur about three to four weeks prior to the first nesting (Rostal, 2007), or late March through early to mid-April. It is presumed that most mating takes place near the nesting beach (Morreale *et al.*, 2007; Rostal, 2007). Females initially ovulate within a few days after successful mating and lay the first clutch approximately two to four weeks later; if a turtle nests more than once per season, subsequent ovulations occur within approximately 48 hours after each nesting (Rostal, 2007).

Approximately 60 percent of Kemp's ridley nesting occurs along an approximate 25-mile stretch of beach near Rancho Nuevo, Tamaulipas, Mexico from April to July, with limited nesting to the north (100 nests along Texas in 2006) and south (several hundred nests near Tampico, Mexico in 2006 (USFWS 2006) (**Figure 3-8**).

Figure 3-8 Major Nesting Beaches of Kemp's Ridley Sea Turtles in Tamaulipas, Mexico



Notes: Major nesting beaches in the State of Tamaulipas, Mexico, and proportion of total nests documented for each beach in 2007 (*Source*: J. Pena, GPZ), and location of nests recorded in U.S. (*Source:* Padre Island National Seashore, FWS, Florida Marine Research Institute, Georgia Department of Natural Resources, South Carolina Department of Natural Resources, and North Carolina Wildlife Resources Commission).

Nesting at this location may be particularly important because hatchlings can more easily migrate to foraging grounds (Putman *et al.*, 2010). Females deposit eggs in aggregations called "arribadas" (meaning arrival) between April and mid-August on days when the weather is cloudy and relatively cool, with a strong northern wind. The period between Kemp's ridley arribadas averages approximately 25 days, but the precise timing of the arribadas is unpredictable (Rostal *et al.*, 1997; Bernardo and Plotkin, 2007). Like all sea turtles, Kemp's ridley sea turtles nest multiple times in a single nesting season. The most recent analysis suggests approximately 3.1 nests per nesting season per female (Rostal, 2007). The annual average number of eggs per nest (clutch size) is 94 to 100 and eggs typically take 45 to 58 days to hatch, depending on temperatures (Marquez-M., 1994; USFWS, 2000; USFWS, 2001; USFWS, 2002; USFWS, 2003; USFWS, 2004; USFWS, 2005; USFWS, 2006; Rostal, 2007). The period between nesting seasons for each female is approximately 1.8 to 2.0 years (Marquez *et al.*, 1989; Rostal, 2007; TEWG, 2000). The nesting beach at Rancho Nuevo may produce a "natural" hatchling sex ratio that is female-biased, which can potentially increase egg production as those turtles reach sexual maturity (Wibbels, 2007; Coyne and Landry Jr., 2007).

Young turtles upon hatching head towards the open ocean and are carried by currents throughout the Gulf of Mexico. Some of these individuals will be caught in the Gulf Stream and be transported by the current along the eastern coast of the United States. While in the open ocean, the hatchlings feed on a combination of sargassum and associated invertebrates. The juvenile turtles that are carried on the gulf stream are considered a separate population from those that remain in the Gulf of Mexico (Collard and Ogren, 1990).

Kemp's ridleys require approximately 1.5 to two years to grow from a hatchling to a size of approximately 7.9 inches long, at which size they are capable of making a transition to a benthic coastal immature stage, but can range from one to four years or more (Ogren, 1989; Caillouet *et al.*, 1995; Zug *et al.*, 1997; Schmid, 1998; Schmid and Witzell, 1997; TEWG, 2000; Snover *et al.*, 2007).

Benthic immature juveniles forage in warm, shallow water that is mostly sheltered and is near the shore where there is an abundance of benthic crustaceans and mollusks for the turtles to feed on (NMFS, 2010). These areas are also usually accompanied by sea grasses and mud or sand substrates. Stranding data indicate that immature turtles in their benthic stage are found in coastal habitats of the entire Gulf of Mexico and U.S. Atlantic coast (TEWG, 2000; Morreale *et al.*, 2007). These foraging juveniles will migrate north and south following optimal feeding conditions until sexual maturity, at which point they begin migrations to rejoin the main population in the Gulf of Mexico. Based on the size of nesting females, it is assumed that turtles must attain a size of approximately 23.6 inches prior to maturing (Marquez- M., 1994). Growth models based on mark-recapture data suggest that a time period of seven to nine years would be required for this growth from benthic immature to mature size (Schmid and Witzell, 1997; Snover *et al.*, 2007). Currently, age to sexual maturity is believed to range from approximately 10 to 17 years for Kemp's ridleys (Snover *et al.*,2007). However, estimates of 10 to 13 years predominate in previous studies (Caillouet *et al.*,1995; Schmid and Witzell, 1997; TEWG, 2000).

Developmental habitats for juveniles occur throughout the entire coastal Gulf of Mexico and U.S. Atlantic coast northward to New England (Schmid, 1998; Wibbels *et al.*, 2005; Morreale *et al.*, 2007). Key foraging areas in the Gulf of Mexico include Sabine Pass, Texas; Caillou Bay and Calcasieu Pass, Louisiana; Big Gulley, Alabama; Cedar Keys, Florida; and Ten Thousand Islands, Florida (Carr and Caldwell, 1956; Ogren, 1989; Coyne *et al.*, 1995; Schmid, 1998; Schmid *et al.*, 2002; Witzell *et al,* 2005). Foraging areas studied along the Atlantic coast include Pamlico Sound, Chesapeake Bay, Long Island Sound, Charleston Harbor, and Delaware Bay.

Juvenile Kemp’s ridley sea turtles are the second most abundant sea turtle in the mid-Atlantic region from New England, New York, and the Chesapeake Bay, south to coastal areas of North Carolina. Juvenile Kemp’s ridley sea turtles migrate into the region during May and June (Keinath *et al*,.1987; Musick and Limpus, 1997). Burke *et al.* (1993) reported juvenile individuals beginning to arrive and forage in the Long

Island area in July. In the fall, they migrate south along the coast, forming one of the densest concentrations of Kemp's ridley sea turtles outside of the Gulf of Mexico (Musick and Limpus, 1997).

3.4.2 Range-wide Status

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970 (35 FR 18319). Internationally, the Kemp's ridley is considered the most endangered sea turtle (National Research Council, 1990). Previously abundant populations were depleted in the 1940's when the turtles' meat, leather, and eggs became valuable. Additionally, predation by coyotes and humans on the nesting beach and fishing for the turtles contributed to their decline. More recently, threats include loss or disturbance of coastal beach habitat, pollution, and drowning in fishing nets (NYDEC Fact Sheet).

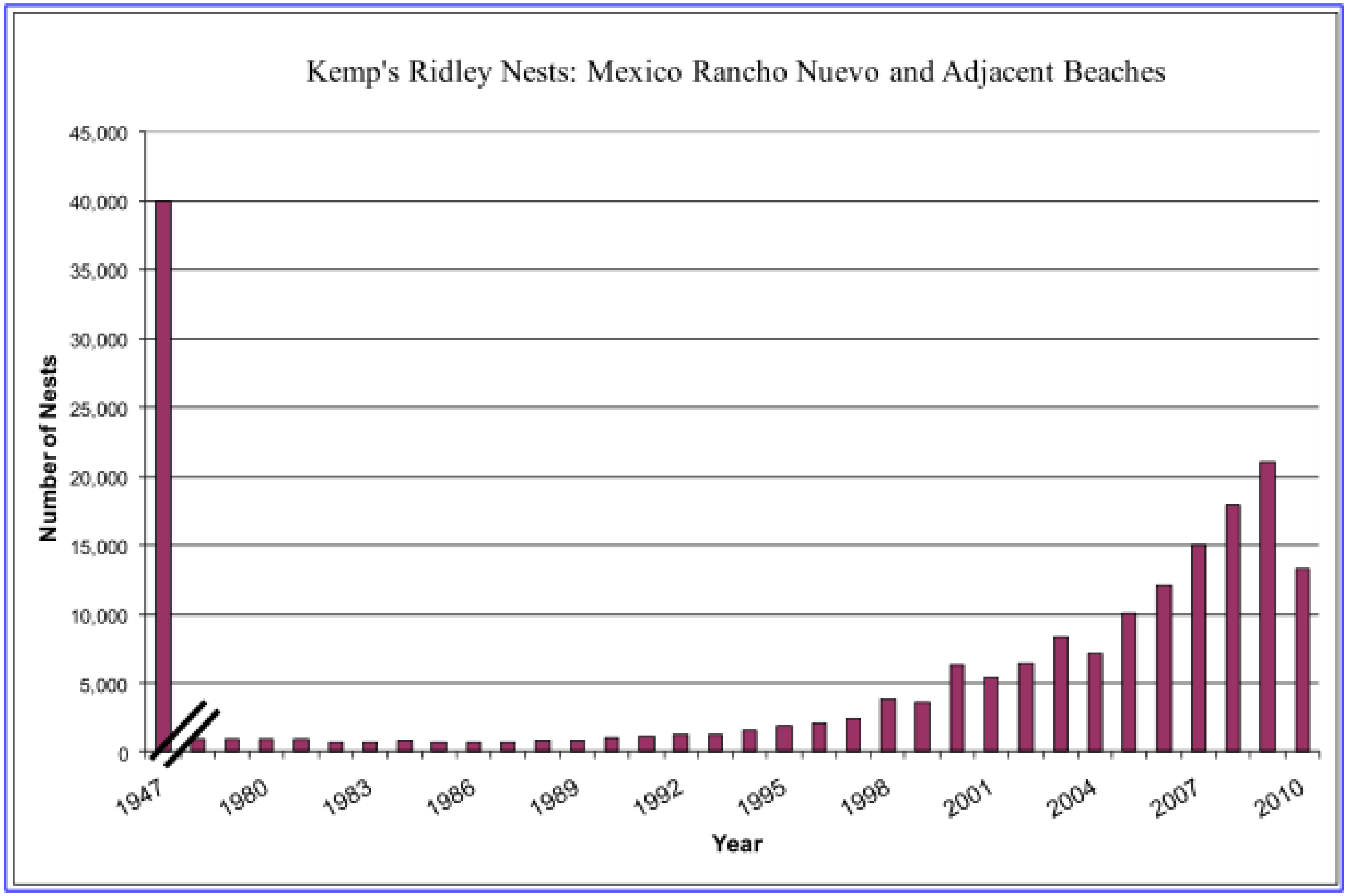
Approximately 60 percent of Kemp's ridley nesting occurs along an approximate 40-km stretch of beach near Rancho Nuevo, Tamulipas, Mexico (USFWS, 2006). In the 1940s, nesting females were estimated to be over 40,000 at Rancho Nuevo. Between the late 1940s to mid-1980s, ridley populations experienced a devastating decline. By 1985, the population had declined to 702 nests. Since the mid-1980s, the number of nests observed at Rancho Nuevo and nearby beaches has increased from 14 to 16 percent per year (Heppell *et al*., 2005). In 2009, the total number of nests recorded at Rancho Nuevo and adjacent camps exceeded 20,000 (**Figure 3-9**). For Texas, from 2002-2009, a total of 771 Kemp's ridley nests have been documented along the coast. This represents a large increase from the 81 nests that were known from 1948-2001 (Shaver and Caillouet, 1998, Shaver, 2005) (**Figure 3-10**). Population models predict that the population will grow from 12 to 16 percent per year, assuming current survival rates within each life stage remain constant. The population could attain at least 10,000 nesting females in a season by 2015, which is the first recovery goal for the species (NMFS *et al*., 1992) (**Figure 3-11**).

3.4.3 Status in the Action Area

Between June and October, a large number of juvenile Kemp's ridleys migrate to New York's estuarine waters (Morreal and Standora, 1998). The heaviest used areas include the bays and inlets on the eastern side of Long Island; but other bays along the Long Island Sound and Atlantic coast are also used (Sadove and Cardinale, 1993). Similar to the loggerhead turtle, the Kemp's ridley feeds primarily on spider crabs which prefer sandy muddy substrate (Perry and Larson, 2004; Burke *et al.*, 1993). These types of benthic substrates are not readily available within the East River. The lack of foraging habitat suggests that Kemp's ridleys may not use the East river for foraging.

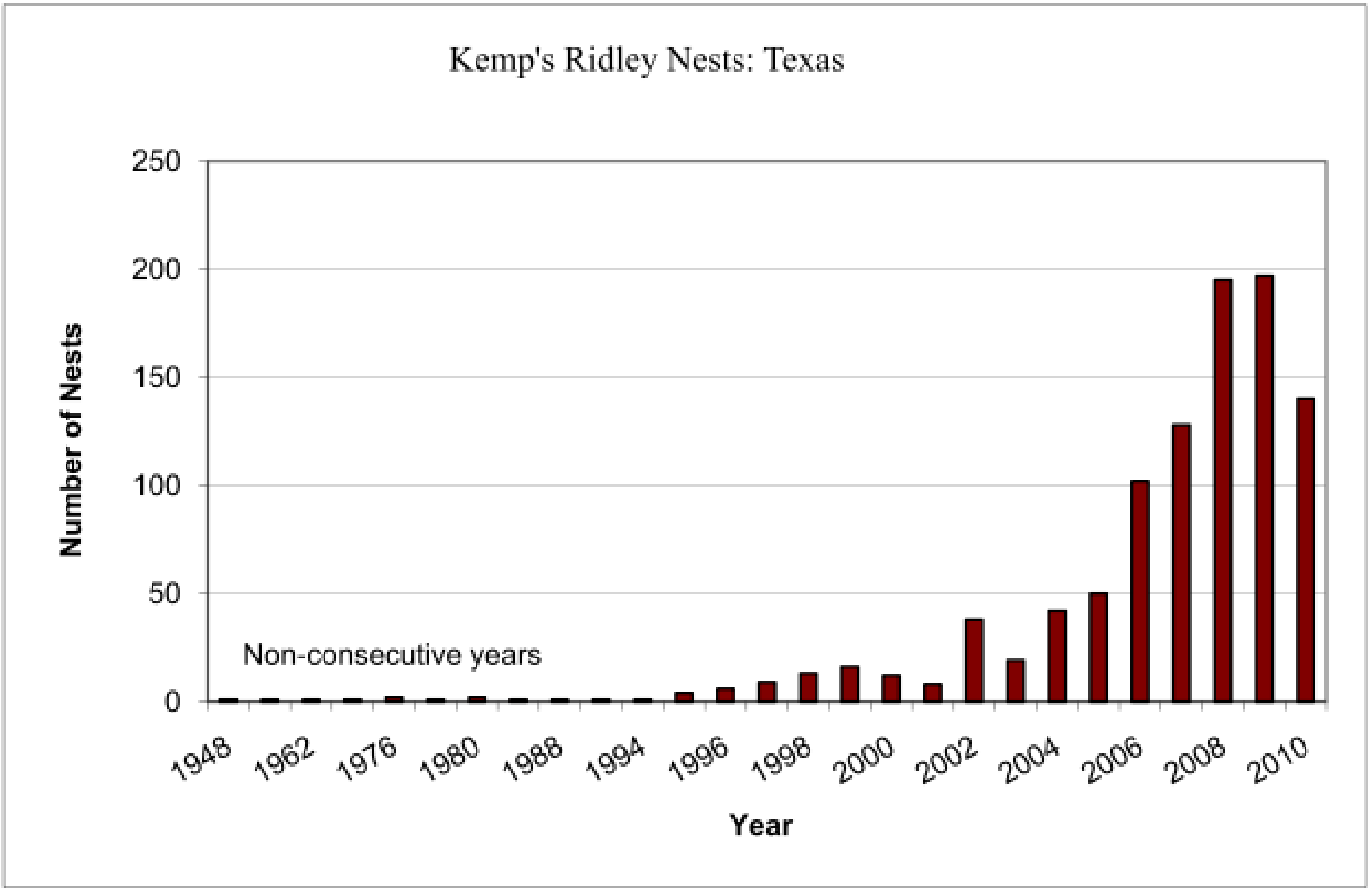
Although the nesting population of Kemp's Ridley turtles has increased, the juvenile population in the waters around Long Island has not yet grown. In studies completed from 1987 to 1992, Kemp's ridley turtles were captured at a rate of four to 14 turtles per annum. Mark and recapture studies from 1987 through 1992 and follow-up studies in 2003 revealed that in spite of a growing nesting population, juveniles in the vicinity of Long Island remained low (Morreale *et al.*, 2005). The low capture rate was attributed to a shift in foraging territory or perhaps unknown mortalities to the post-hatchling and oceanic juvenile phase. Kemp's ridley sea turtles remain the second most abundant sea turtle in the Long Island area.

Figure 3-9 Number of Nests Recorded During Surveys of Nesting Beaches at Tamaulipas and Veracruz, Mexico



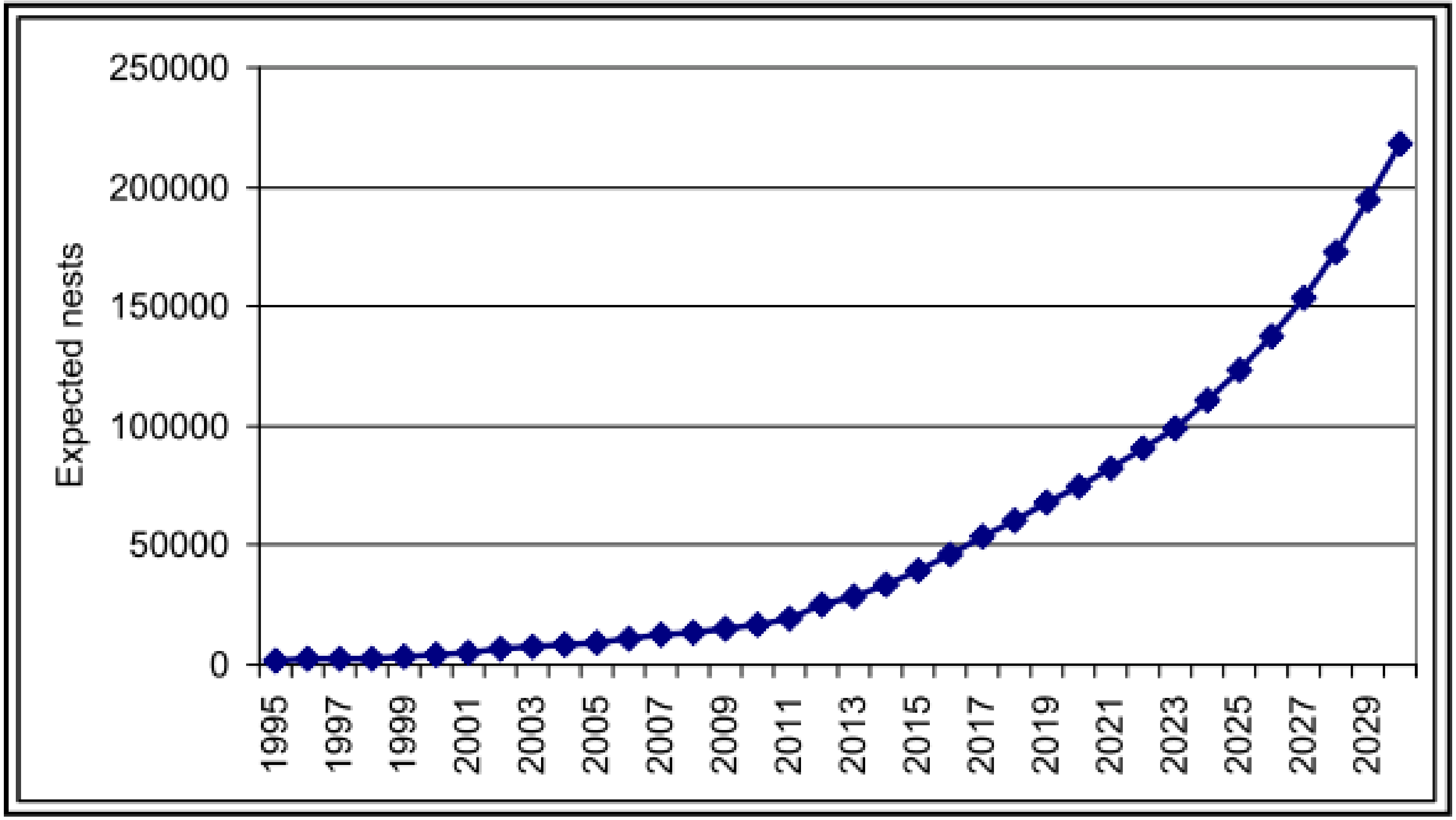
Source: NFWS, USFWS, &SEMARNAT 2011

Figure 3-10 Number of Nests Recorded on Nesting Beach in Texas, US



Source: NFWS, USFWS, &SEMARNAT 2011

Figure 3-11 Expected Number of Nests Predicted in the Model for Past and Future Years, Based on the Assumption of Continued High Egg Survival Rates



Source: NFWS, USFWS, &SEMARNAT 2011

3.4.4 Critical Habitat

Even though being listed as federally endangered on December 2, 1970, critical habitat has never been designated for this species. On February 17, 2010, NOAA and USFWS were jointly petitioned to designate critical habitat for Kemp’s ridley. Proposed critical habitat designations included known nesting beaches along the Texas coast; key occupied or unoccupied potential nesting areas along the U.S. Gulf Coast and Atlantic Coast; known feeding grounds of juvenile Kemp’s ridleys in the Gulf of Mexico and Atlantic Ocean; and near shore feeding ground of adult females, to a water depth of 40 meters off the coast of all nesting grounds (WildEarth Guardians, 2010). Currently, this petition is still under review.

3.5 Green Sea Turtle

3.5.1 Life History

Green sea turtles have a circumglobal distribution, occurring throughout tropical, subtropical waters, and, to a lesser extent, temperate waters. Green turtles appear to prefer waters that usually remain around 20 degrees Celsius in the coldest month, but may be found considerably north of these regions during warm-water events, such as El Niño. Further, green sea turtles seem to occur preferentially in drift lines or surface current convergences, probably because of the prevalence of cover and higher prey densities that associate with flotsam. For example, in the western Atlantic Ocean, drift lines commonly containing floating *Sargassum* spp. are capable of providing juveniles with shelter (NMFS and USFWS, 1998a). Underwater resting sites include coral recesses, the underside of ledges, and sand bottom areas that are relatively free of strong currents and disturbance. Available information indicates that green sea turtle resting areas are near feeding areas (Bjorndal and Bolten, 2000).

Age at maturity for green sea turtles is estimated to be between 20 to 50 years (Balazs, 1982; Frazer and Ehrhart, 1985; Seminoff, 2004). As is the case with the other sea turtle species described above, adult females may nest multiple times in a season (average three nests per season with approximately 100 eggs per nest) and typically do not nest in successive years (NMFS and USFWS, 1991; Hirth, 1997).

Estimates of reproductive longevity range from 17 to 23 years (Fitzsimmons *et al.*, 1995; Carr *et al.*, 1978; Chaloupka *et al.*, 2004). Considering that mean duration between females returning to nest ranges from two to five years (Hirth, 1997), these reproductive longevity estimates suggest that a female may nest from three to 11 seasons over the course of her life. Based on reasonable means of three nests per season and 100 eggs per nest (Hirth, 1997), a female may deposit nine to 33 clutches during her lifetime.

Once hatched, sea turtles emerge and orient towards a light source, such as light shining off the ocean. They enter the sea in a “frenzy” of swimming activity, which decreases rapidly in the first few hours and gradually over the first several weeks (Okuyama *et al.*, 2009). Factors in the ocean environment have a major influence on reproduction (Chaloupka, 2001; Solow *et al.*, 2002; Limpus and Nicholls, 1988). It is also apparent that during years of heavy nesting activity, density dependent factors (beach crowding and digging up of eggs by nesting females) may affect hatchling production (Tiwari *et al.*, 2005; Tiwari *et al.*, 2006). Precipitation, proximity to the high tide line, and nest depth can also significantly affect nesting success (Cheng *et al*,2009).

Precipitation can also be significant in sex determination, with greater nest moisture resulting in a higher proportion of males (Leblanc and Wibbels, 2009). Green sea turtles often return to the same foraging areas following nesting migrations (Broderick *et al.*, 2006; Godley *et al.*, 2002). Once there, they move within specific areas or home ranges, where they routinely visit specific localities to forage and rest (Seminoff *et al.*, 2002; Seminoff and Jones, 2006; Godley *et al.*, 2003; Makowski *et al.*, 2006; Taquet *et al.*, 2006). However, it is also apparent that some green sea turtles remain in pelagic habitats for extended periods, perhaps never recruiting to coastal foraging sites (Pelletier *et al.*, 2003).

In general, survivorship tends to be lower for juveniles and sub-adults than for adults. Adult survivorship has been calculated to range from 0.82-0.97 of mortality (estimated to die) versus 0.58-0.89 for juveniles (Seminoff *et al.*, 2003; Chaloupka and Limpus, 2005; Troëng and Chaloupka, 2007), with lower values coinciding with areas of human impact on green sea turtles and their habitats (Bjorndal *et al*, 2003; Campbell and Lagueux, 2005).

Green sea turtles are highly mobile and undertake complex movements through geographically disparate habitats during their lifetimes (Plotkin, 2003; Musick and Limpus, 1997). The periodic migration between nesting sites and foraging areas by adults is a prominent feature of their life history. After departing as hatchlings and residing in a variety of marine habitats for 40 or more years (Limpus and Chaloupka, 1997), green sea turtles make their way back to the same beach from which they hatched (Meylan *et al*., 1990; Carr *et al.*, 1978). However, green sea turtles spend the majority of their lives in coastal foraging grounds. These areas include both open coastline and protected bays and lagoons. While in these areas, green sea turtles rely on marine algae and seagrass as their primary dietary constituents, although some populations also forage heavily on invertebrates. There is some evidence that individuals move from shallow seagrass beds during the day to deeper areas at night (Hazel, 2009).

While offshore and sometimes in coastal habitats, green sea turtles are not obligate plant- eaters as widely believed, and instead consume invertebrates such as jellyfish, sponges, sea pens, and pelagic prey (Seminoff *et al.*, 2002; Hatase *et al.*, 2006; Heithaus *et al.*, 2002; Godley *et al.*, 1998; Parker and Balazs, 2008). However, a shift to a more herbivorous diet occurs when individuals move into neritic habitats, as vegetable material replaces an omnivorous diet at around 23 inches in carapace length off Mauritania (Cardona *et al.*, 2009). Localized movement in foraging areas can be strongly influenced by tidal movement (Brooks *et al.*, 2009).

Based on the behavior of post-hatchlings and juvenile green turtles raised in captivity, it is presumed that those in pelagic habitats live and feed at or near the ocean surface, and that their dives do not normally exceed several feet in depth (NMFS and USFWS, 1998; Hazel *et al.*, 2009). The maximum recorded dive depth for an adult green turtle was just over 350 feet (Berkson, 1967).

3.5.2 Range-wide Status

Green sea turtle populations are distinguished by ocean basin and more specifically by nesting location. Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are endangered (43 FR 32800). Because breeding populations may occur in the same range as other populations while away from the nest, all are considered endangered.

Current nesting abundance is known for 46 nesting sites worldwide. These include both large and small rookeries and are believed to be representative of the overall trends for their respective regions. Based on the mean annual reproductive effort, 108,761 to 150,521 females nest each year among the 46 sites. Additionally, an assessment of 23 nesting sites conducted as part of a five year status review indicated a positive trend of increasing nesting in the Pacific, western Atlantic, and central Atlantic; while Southeast Asia, eastern Indian Ocean, and possible the Mediterranean were doing relatively poorly (NMFS and USFWS 2007). Overall, of the 26 sites for which data enable an assessment of current trends, 12 nesting populations are increasing, ten are stable, and four are decreasing. In the western Atlantic, the most important nesting concentration for green sea turtles occurs at Tortuguero, Costa Rica and nesting has increased dramatically since the 1970s (Seminoff, 2004; NMFS and USFWS, 2007). Overall trends however should be viewed cautiously as trend data are available for just over half of all sites examined and very few data sets span a full green sea turtle generation (Seminoff, 2004).

Green sea turtles are largely affected by incidental fisheries mortality. In the Atlantic, a mean estimate of 137,700 bycatch interactions of sea turtles, of which 4,500 were mortalities, has occurred annually (since implementation of bycatch mitigation measures), of which 300 were green sea turtles (Finkbeiner *et al.*, 2011). Other threats include direct take from foraging grounds and nesting beaches. Green sea turtles are also susceptible to fibropapillomatosis, which may result in impaired foraging, breathing, or swimming ability; leading potentially to death (George, 1997). Other activities such as channel dredging, marine debris, pollution, vessel strikes, power plant impingement, and habitat destruction account for an unquantifiable level of other mortality. Stranding reports indicate that between 200 and 400 green sea turtles strand annually along the eastern U.S. coast from a variety of causes most of which are unknown (STSSN database). Global climate change is also implicated in increasing female bias in hatchlings as well as placing nesting areas at risk from rising water level (NMFS and USFWS, 2007).

3.5.3 Status in the Action Area

In the western Atlantic, large juvenile and adult green sea turtles occur in habitats containing benthic algae and seagrasses from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean (Wynne and Schwartz, 1999). Some of the principal feeding areas in the western Atlantic Ocean include the upper west coast of Florida, the Florida Keys, and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida; Florida Bay; the Culebra archipelago and other Puerto Rico coastal waters; the south coast of Cuba; the Mosquito Coast of Nicaragua; the Caribbean coast of Panama; and scattered areas along Colombia and Brazil (Hirth, 1971). The waters surrounding the island of Culebra, Puerto Rico, and its outlying keys are designated critical habitat for the green sea turtle.

Green sea turtles occur seasonally in Mid-Atlantic and Northeast waters such as Chesapeake Bay and Long Island Sound (Musick and Limpus, 1997; Morreale and Standora, 1998; Morreale *et al*,.2005), which serve as foraging and developmental habitats. Juvenile green turtles are found in the eastern bays and inlets of Long Island (Sadove and Cardinale, 1993). Mark and recapture sea turtle studies conducted from 1987 to 1992 and followed-up in 2003/2004 indicated that the juvenile green turtle population in Long Island has increased (possibly due to increased nesting observed in Florida, from 1,700 in 1989 to 7,000 in 2002) (Morreale *et al.*, 2005).

Migratory routes that were tracked for juvenile sea turtles including the green turtle in the Long Island Sound indicated that most migrate to the Atlantic Ocean to either the pelagic zone or south along the coast of Long Island (Morreale and Standora, 1998) (**Figure 3-12**). No migratory routes have been documented within the East River. Hypothermia occurs when sea turtles do not migrate and are exposed to cold waters (Morreale *et al.*,1992). Once they become adults, they do not seem to use the Long Island area for habitat (Morreale *et al.*, 2005).

3.5.4 Critical habitat

On September 2, 1998, critical habitat for green sea turtles was designated in coastal waters surrounding Culebra Island, Puerto Rico (63 FR 46693). Aspects of these areas that are important for green sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for green sea turtle prey. The proposed project does not take place in designated green sea turtle critical habitat.

3.6 Leatherback Turtle

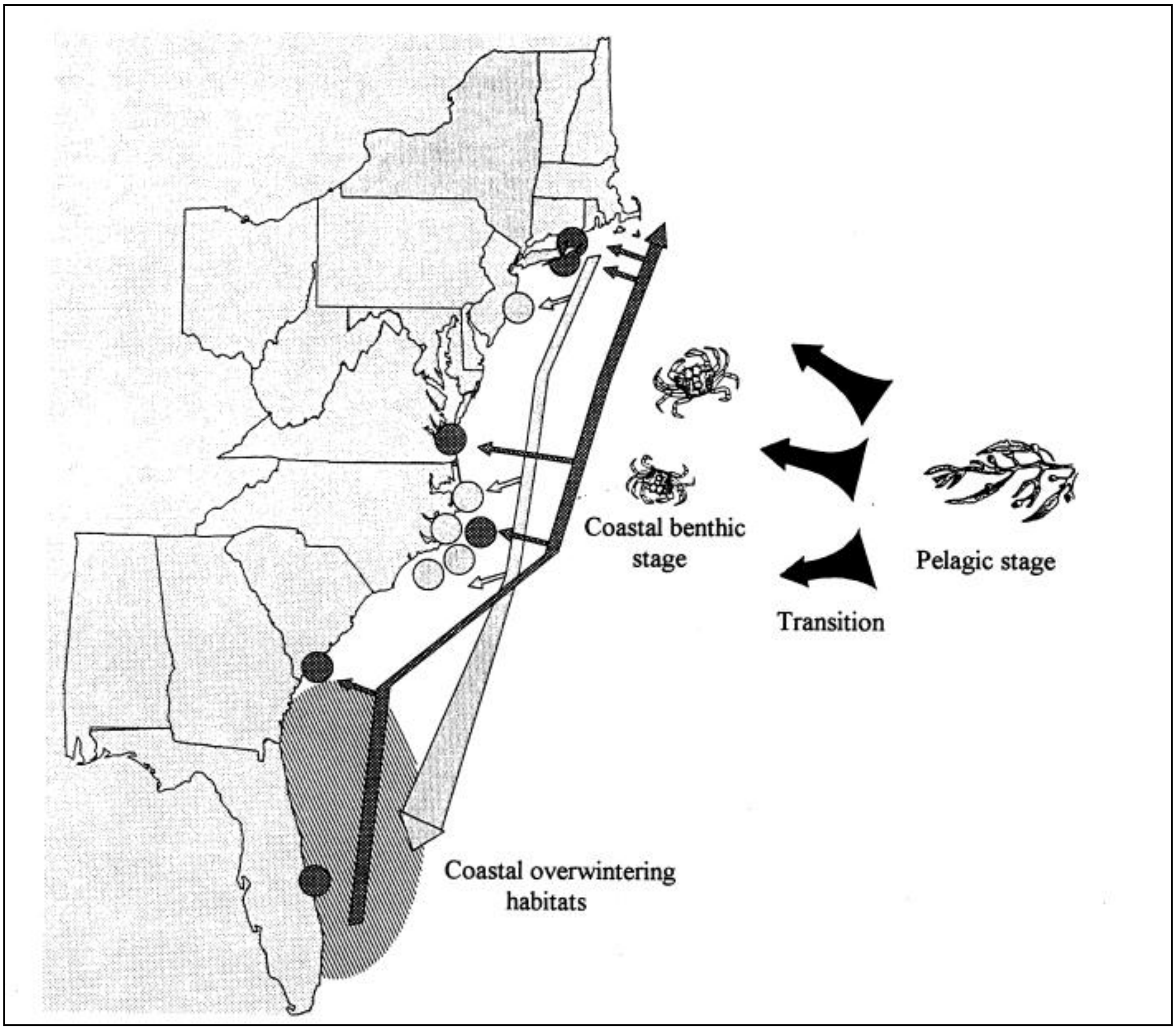
3.6.1 Life History

Leatherback sea turtles, *Dermochelys coriacea*, occur worldwide, with the largest range of any reptile, and are distributed from Labrador to Argentina and the Gulf of Mexico in the western Atlantic (Marquez, 1990; Ernst *et al.*, 1994). As a result of several physiological and behavioral adaptations, this species can inhabit cold water, occurring from latitudes as high as 71° North. and 47° South. These include a countercurrent circulatory system (Greer *et al.*, 1973), a thick layer of insulating fat (Goff and Lien, 1988; Davenport *et al.*, 1990), gigantothermy (Paladino *et al.*, 1990), and the ability to elevate body temperature through increased metabolic activity (Southwood *et al.,* 2005; Bostrom and Jones, 2007).

The species typically forages in temperate waters and nests on tropical and subtropical beaches of the Atlantic, Indian, and Pacific Oceans. In the Atlantic, leatherback sea turtles are found regularly off the coast of New England, in Long Island New York waters, and in the Gulf of Mexico, as well as along the shores of Canada, the British Isles, Iceland, Europe and Spain. Nesting occurs on the South and Central American coasts of the Caribbean, as well as on islands throughout the Caribbean including the U.S. Virgin Islands and Puerto Rico. Nesting also occurs on the Atlantic coast of Florida and possibly Georgia (NMFS and USFWS, 1992). The distribution and developmental habitats of juvenile leatherbacks are unclear. In an analysis of available sightings (Eckert, 2002), researchers found that leatherback turtles smaller than 100 cm carapace length were only sighted in waters 26°C or warmer; while adults were found in waters as cold as 0 to 15 degrees Celsius off Newfoundland (Goff and Lean, 1988). Leatherback hatchlings inhabit floating sargassum beds found in the open-ocean.

The leatherback life cycle includes: egg/hatchling; post-hatchling; juvenile; sub-adult; and adult. Age of reaching sexual maturity remains unclear. Early research resulted in a diversity of sexual maturity estimates from two years up to 14 years of age (Pritchard and Trebbau, 1984: 2-3 years; Rhodin, 1985: 3-6 years; Zug and Parham, 1996: 13-14 years for females; Dutton *et al.*, 2005: 12-14 years for leatherbacks nesting in the U.S. Virgin Islands). Recent studies report maturity at 29 years of age (Avens *et al.*, 2009). Females nest every two (2) to four years on sandy, tropical beaches (McDonald and Dutton, 1996; Garcia and Sarti, 2000; Spotila *et al.*, 2000) producing roughly 100 eggs per clutch with multiple clutches per season. Females may nest at more than one beach in a single season (Eckert *et al.,* 1989; Keinath and Musick, 1993; Steyermark *et al.*, 1996; Dutton et al., 2005). Nesting occurs from March to July in the United States and the Caribbean.

Figure 3-12 Hypothesized Transition between Early Life Stages and a Generalized Scheme of Subsequent Migration Patterns of Juvenile Sea Turtles along the Coastal US



Source: Morreale and Standora 1988

Notes: Stippled circles represent within-season recovery locations of turtles tagged in New York; arrow represents their probable emigration route based on satellite telemetry data. Crosshatched symbols represent recoveries in a subsequent season and probable paths of migration northward from over wintering sites.

Migratory routes have been investigated in recent satellite telemetry studies that have documented long distance transoceanic migrations up to thousands of miles between nesting beaches and foraging areas in the Atlantic and Pacific Ocean basins (Ferraroli *et al.*, 2004; Hays *et al*., 2004; James *et al.*, 2005; Eckert, 2006; Eckert *et al.*, 2006; Benson *et al.*, 2007; Benson *et al.*, 2011). Leatherbacks nesting in Central America and Mexico migrate to waters of the South Pacific (Eckert and Sarti, 1997; Shillinger *et al.*, 2008). Those nesting in Jamursba-Medi, Indonesia migrate through central and eastern North Pacific, westward to the Sulawasi and Sulu and South China Seas, or northward to the Sea of Japan (Benson *et al.*, 2007; Benson *et al.*, 2011). Migrations appear to be associated with the presence of seasonal aggregations of jellyfish (Shenker, 1984; Suchman and Brodeur, 2005; Graham, 2009, Bowlby, 1994; Starbird *et al.*, 1993; Benson *et al*., 2007)

In addition to jellyfish, they also forage on siphonophores and, to a lesser extent, tunicates (NMFS and USFWS, 1998), and will opportunistically utilize open-ocean and coastal habitats where prey species are most concentrated (Morreale *et al.*, 1994; Eckert, 1998; 1999; Benson *et al*., 2011).

Results from satellite tagged individuals indicate that 10 to 41 percent of the time, leatherbacks are at the surface, depending on the migratory cycle (James *et al*., 2005).

3.6.2 Range-wide Status

Leatherback sea turtles were listed as endangered throughout their entire range on June 2, 1970. An estimated 115,000 adult female leatherback sea turtles exist from 19 known nesting beaches, of which only four nesting populations contain more than 1,000 females (Pritchard, 1982). More recent estimates suggested 34,000 to 94,000 adult leatherbacks (Turtle Expert Working Group, 2007).

The Pacific coast of Mexico provides nesting habitat to 60 percent of the worldwide population (NMFS and USFWS, 2007). Leatherback abundance on nesting beaches in the Pacific Ocean has declined significantly in the past 20 years as a result of human activities (NMFS and USFWS, 2007). Trends for Indian Ocean populations are not available. Additionally, though present, no nesting is known to occur in the Mediterranean Sea (NMFS and USFWS, 2007).

Within the Atlantic Ocean, nest counts within the largest nest sites (Suriname and French Guiana) indicate an increase in leatherback numbers in the region (NMFS and USFWS, 2007). Major nesting beaches in the western Atlantic Ocean occur in Florida; St. Croix, U.S. Virgin Islands; Puerto Rico; Costa Rica; Panama; Colombia; Trinidad and Tobago; Guyana; Suriname; French Guiana; and southern Brazil (NMFS and USFWS, 2007).

The most significant threat is from human predation as a result of egg collection. Fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like pollution and habitat destruction account for an unknown level of other mortality. Low genetic diversity in several populations may also threaten recovery (NMFS and USFWS, 2007).

3.6.3 Status in the Action Area

Leatherbacks found in Long Island are typically adults and are considered a rare occurrence (Morreale and Standora, 1998). The species is a pelagic foraging species that is infrequently observed using open water areas off of the coast of Long Island. The shallower waters of the Long Island Sound or the East River do not provide suitable foraging habitat therefore occurrences of the species are exceedingly rare and unlikely to occur within the proposed project area (Sadove and Cardinale, 1993).

3.6.4 Critical Habitat

Critical habitat is listed as the waters adjacent to Sandy Point, St. Croix, U. S. Virgin Islands, portions of the US West Coast including approximately 16,910 square miles along the California coast from Point Arena to Point Arguello; and 25,004 square miles stretching from Cape Flattery, Washington to Cape Blanco, Oregon.

4 Environmental Baseline Conditions

NMFS has reviewed a number of proposed actions within the Hudson Raritan Estuary (i.e., dredging, shoreline stabilization and docks, pollution discharge permits, and submerged pipelines and transmission cable crossings) that could potentially affect shortnose and Atlantic sturgeon as well as the aforementioned species of sea turtles. NMFS has often specified protection measures such as construction timing and design changes to protect the species (Bain *et al*. 2007). Overall, the approach to recovery for each species in the in the Hudson Raritan Estuary has been to minimize interference with natural population processes and maintain habitat conditions able to support the species (Bain *et al*. 2007). Other potential sources of impacts in the action area include incidental take in scientific studies, contaminants, water quality from both point and non-point sources, invasive species, dams, hydroelectric and steam electric power plants and future climate change. The following details current condition within the proposed Project Site and action area.

4.1 Habitat

The following provides existing habitat conditions observed at or adjacent to the proposed EMWE Project during AECOM's ecological dive survey conducted October 3rd to 5th, 2011. A copy of the dive survey is located in **Appendix C**. Video recorded of the dive is available upon request. For all habitat types, no submerged aquatic vegetation (SAV) was observed.

A total of 17 underwater transects were completed parallel to the Manhattan shoreline out to a distance of approximately 50 feet and spanning a distance of 1.3 miles along the shore from East 38th Street to East 60th Street. An additional two bisecting transects approximately 50 feet in length were completed underneath the Waterside Pier to determine changes (if any) in epibenthic spatial distribution, species abundance, and species composition on individual pilings as the diver moved underneath the pier structure and away from direct sunlight. Overall, four different habitat types were identified based on differences in structure present, substrate type, species composition and distribution, and included:

- **Under-Pier Bottom Habitat** was located underneath pier and bulkhead structures adjacent to the ODR and United Nations. Habitat generally consisted of multiple wooden and concrete coated pilings and a low relief (one to two feet high) layer of concrete rubble, rebar, and other anthropogenic debris associated with the pier construction. The bottom was also covered by a one to two inch silt veneer and lacked established macrobenthic communities. The substrate had small pockets of sand and a 10 to 20 foot wide area of a coal-like material. Except for the occasional blue crab (*Callinectes sapidus)* and sponge, no benthic organisms were observed attached or using the bottom substrate or timber. Total bottom coverage underneath the pier by benthic organisms was estimated to be less than five percent. Outer piles along the length of the pier were visually surveyed and were approximately 30 to 65 percent encrusted with sessile organisms. Inner piles were similar in species composition and diversity. Sea grapes (*Molgula manhattensis*) were most dominant entire length of submerged piling. Blue mussel (*Mytilus edulis*) distribution was patchy from piling to piling and contributed approximately 20 to 30 percent of overall population. Sea grapes or squirts were approximately 50 to 55 percent of the coverage. Other species observed on the pilings contributed roughly fvie to ten percent of coverage included: green sea fern (*Bryopsis plumose*), Agardh's red weed (*Agardhiella tenera*), red beard sponge (*Microciona prolifera*), hydroids, striped anemone (*Haliplanella luciae*), Loosanoff's haliclona (*Haliclona loosanoffi*), dogwinkles (*Thais lapillus*), periwinkles (*Littorina spp*.), and grubby sculpin (*Myoxocephalus aenaeus*).

- **Piling/Open Water Edge Habitat** depth ranged from 15 to 25 feet at the time of survey. Substrate located nearest East 43rd Street consisted of low relief habitat (one to two feet high) with riprap-sized rocks (approximately one foot in diameter), concrete rubble, and an occasional sandy pocket. Some anthropogenic debris (e.g. steel, rebar) was observed. The slope was relatively flat. Debris was less prevalent than observed at the under-pier habitat. Bottom habitat had very little benthic community coverage and was sparsely populated by sponge or dogwhelk (approximately three to five percent overall coverage). Biota and species distribution on piles was similar in composition and distribution to that of the under-pier habitat observed at Waterside Pier.

- **Natural Bedrock Outcrop and Caissons Habitat** was located north of East 53rd Street with terminus at East 61st Street. A total of four transects were completed to characterize the habitat. Habitat included two large natural rock outcrops with a tide pool located adjacent to the FDR Highway between East 57th Street and East 59th Street and encrusting habitat on the caissons slightly riverward (approximately 50 feet) of the shoreline. Depth varied between two feet in the tide pool to depths greater than 40 feet at the rock wall. Slope on bedrock was steep at about a 90 degree vertical drop. Substrate was either bedrock or small rock (approximately 12 inches in diameter) with little or no silt layer. Percent coverage varied by depth along the bedrock but overall coverage was approximately 40 to 50 percent. Species observed included: green sea fern, dulse (*Rhodymenia palmate)*, Agardh’s red weed, Loosanoff’s haliclona, red beard sponge, striped anemones, hydroids, sea grapes, barnacles, dogwinkles, blue mussel, oysters (*Crassostrea virginica*), blue crab, bay anchovy (*Anchoa mitchilli*), and cunner (*Tautogolabrus adspersus*). Caisson species composition was similar to that of the under-pier and piling open water habitats. Overall, habitat condition and biodiversity was better along natural outcrops with overall rating of moderate to fair. The substrate riverward was mostly silt and rubble and of poor quality.

- **Offshore Habitat** to 50 feet from existing shoreline consisted mostly of sand/silt and some riprap. Substrate type was usually a function of corresponding shore-side habitat.

In general, habitat conditions for the Under-Pier Bottom Habitat, Piling/Open Water Edge Habitat, and Offshore Habitat were poor. Species diversity was best at the natural outcrops and habitat condition appeared to be of better quality at the bedrock outcrops than the other three habitat areas investigated. Bottom habitats had little to no visible macrobenthic or encrusting communities. Pilings did have moderate colonization but it appeared the majority of colonization ended where light attenuated. The dominant species on the piles was sea grape, followed by blue mussels and sponges. A small number of individual distributed oysters were present on natural bedrock but were not observed in other bottom substrates, under-pier, or on piling edge habitat. Though the possibility for anthropogenic debris to function as preferred habitat within the confines of the proposed project area may exist for certain species by life stage (e.g. red hake), other areas of the Hudson-Raritan Estuary are most likely more suitable (e.g. Raritan Bay).

4.2 Water Quality

The East River is tidally influenced along its entire length from the battery of Manhattan to its origin at Long Island Sound. The East River is predominantly brackish but does have some freshwater influence from the Harlem River at its confluence at Hell Gate and some direct drainage from the surrounding city boroughs. The mean tide level is variable over the course of the river and is greatest at the northern portion of the river above Hell Gate. Mean tide at East 41st Street is 2.4 feet with a mean range of 4.31 feet. Average maximum flood current velocity at East 41st Street is 1.5 knots, and the average maximum ebb current velocity is 2.1 knots (NOAA, 2012). Average speed of flow in the river is around 2.2 knots and direction of flow is dependent on tide which can also cause periods of little to no flow for short times. Maximum predicted tidal current velocity obtained from a stationary recording Acoustic Doppler Current Profiler (ADCP) during 2008 for the Roosevelt Island Tidal Energy (RITE) Project located slightly north of Waterside Pier measured approximately 5.2 knots (Verdant, 2010).

Water quality parameters are influential in determining the spatial and temporal distribution of marine populations when identifying preferred habitat. East River water quality is affected by temperature, rainfall, stormwater runoff, and waste influx. The New York City Department of Environmental Protection (NYCDEP) monitors select water quality parameters within the East River at several stations. The average annual salinity between 2008 and 2011 south of Wards Island was 22.2 ‰ (parts per thousand [PPT]) at the surface and 22.4 ‰ PPT near the bottom. NYCDEP measurements for dissolved oxygen averaged 5.27mg/l with 62 percent saturation and temperatures in the river averaged 18.67°C from 2008 through 2011 (NYCDEP, 2012).

The New York River keeper also conducts surface water quality monitoring annually from May through October at two (2) sites near the proposed project area. Sample sites are located mid-channel of the East River adjacent to East 23rd Street in New York City and slightly north of the proposed Project Site at Roosevelt Island. Average salinities for 2011 and 2012 at the East 23rd and Roosevelt Island Stations was 22.8 ‰ and ranged between 13.7 to 33.7 ‰. Highest salinities were recorded in July and August. Turbidity averaged 24.12 NTU and ranged between 8.1 NTU and 160 NTU with elevated values in May. Dissolved oxygen saturation averaged 66.7 percent and ranged between 52.8 and 95 percent (Riverkeeper, 2012).

Data collected throughout 2006 at Astoria Generating Station located slightly upriver of Hells Gate on the East River (ENSR, 2007) showed average daily water temperature ranging from 1.42 to 24.71 degrees Celsius with highest values observed during the summer season, peaking in August, and lowest temperatures occurring during the winter months. Average daily pH ranged from 7.23 to 9.25 with highest values occurring during the months of January through March. Average daily salinity ranged from 16.78 to 26.07 ‰ with lower readings associated with rainfall/runoff events. Average daily dissolved oxygen ranged from 1.86 to 23.77 mg/l and values reflected seasonality as highest values occurred during the colder winter months and lowest values with the summer months.

Data collected between August and November, 1998 by the NYSDOT relative to the construction of FDR Drive and within close proximity to the Project, showed a relatively constant temperature between samples collected at approximately three feet and 45 feet indicating the absence of a thermocline during those months and a well-mixed waterbody. Salinity ranged between 20.7 ‰ in August to 25 ‰ in December when temperatures were lowest. The pH of the sample areas averaged 7.4 with dissolved oxygen levels lower in the warmer months (3.7 to 4.2 mg/l in August) and higher in the colder months (8.45 to 9.34 mg/l in December). Data indicated that there was very little variability in salinity, pH, and dissolved oxygen values regardless of depth.

In addition to industrial discharges and combined sewer overflow, the East River and Western Long Island Sound region receive treated sewage from 18 wastewater treatment plants located in New York and the southern Connecticut area. About 83 percent of this effluent is discharged into the four mile long East River (Sweeney, 2004). The NYCDEP monitors the levels of *Fecal Coliform* and *Enterococcus* bacteria within the East River near the proposed Project. Maximum levels of *Enterococcus* in 2012 were reported as exceeding 4000/100ml, though numbers under 100/100ml were more common. *Fecal Coliform* bacteria are also recorded in highly varying quantities. There are also a number of inorganic pollutants in the waterway. A study conducted by Sweeney et al. showed that the East River had elevated levels of lead, phosphates, silver, copper, cadmium, and nitrates (Sweeney, 2004).

4.3 Sediment Characteristics

The number of benthic surveys in the East River is limited. This is most likely a result of the frequent strong currents associated with the waterway. The substrate of the East River is mostly rock and gravel due to the strong currents associated with the tidal activity. On top of this is often a thin layer of finer substrate that changes frequently with the tides. Sand, cobble, and gravel are the main components with a smaller amount of silt being found interstitially in the main channel of the waterway. Sources of the substrate are variable and a combination of anthropogenic and natural input. (AKRF, 2008) A dive survey was conducted in 2011 in order to determine surficial substrate and assess possible habitats in the construction area. Divers observed mostly hard bottom substrate that was covered in a silt veneer that was up to two inches thick. The hard bottom was composed of rock as well as a large amount of anthropogenic media including metals, concretes, and wood. These surfaces can serve as settling areas for spat of several mollusks. Small pockets of sand were also noted in voids between rocks and debris.

A number of contaminants are found in the sediment of the East River including PCBs, DDTs, and several pesticides. The concentrations of these chemicals are found to be higher in the East River than in other nearby coastal areas. (AKRF, 2008) Inorganic substances are also of note in the East River substrates. Lead and mercury are two metals that appear in particularly high concentration within the river. Of the toxins discussed; mercury, PCBs, and Chlordane are the most commonly recorded at levels of biological concern (Adams *et al*, 1998).

5 Effects of the Proposed Action

The assessment of effects focuses on potential direct and indirect effects on the shortnose and Atlantic sturgeon populations and the four aforementioned species of marine turtle in the Project Area. The purpose of the environmental baseline is to provide the context for the impacts of the proposed action with regard to the impacts of all the other human activities that are also affecting the listed species. Although the impacts described in this section are limited to those in the Project Area, it should be noted that additional impacts outside the Action Area can affect the same individuals and populations that are affected in the Project Area.

5.1 Direct Effects

Direct effects are considered to be any adverse effects arising from project activities that could result in immediate effects on shortnose and Atlantic sturgeon and loggerhead, green, Kemp's ridley and leatherback sea turtles or changes to their habitat. These effects are defined as physical injury or death, disruption of migration or spawning, and direct alteration of existing habitat. Direct effects to shortnose and Atlantic sturgeons, and the aforementioned sea turtles, relatable to the EMWE, may be the result of physical disturbance to adults and juveniles from pile driving and increased vessel traffic occurring during the period of in-river work. The following sections describe direct effects.

5.1.1 Acoustic Effects

5.1.1.1 Hydroaccoustics and Marine Life

Sound in water follows the same physical principles as sound in air. The major difference is that due to the density of water, sound in water travels about 4.3 times faster than in air (approx. 4,900 ft/s vs. 1,100 ft/s), and attenuates much less rapidly than in air. As a result, the wavelength of a particular sound frequency is about 4.3 times longer in water than in air.

Sound is a critical source of environmental information for most vertebrates (e.g., Fay and Popper, 2000). The ability to hear allows organisms to sense the "acoustic scene". In water, where visibility (i.e., line of sight) is much reduced, the acoustic scene provides a three-dimensional, long distance sense. Fish use sound to learn about their general environment, the presence of predators and prey, and, in many species, for acoustic communication. As a consequence, sound is important for fish survival, and anything that significantly impedes the ability of fish to detect a biologically relevant sound could decrease survival.

An increase in underwater noise can have both lethal and/or injurious effects on marine life. Barotrauma may occur if sound waves are generated at levels high enough to damage fish tissues. The damaging of fish tissue may lead to instant or rapid mortality, or render a fish with diminished auditory capacity, thus lessening a fish's ability to sense the acoustic scene. Finally, the increase in localized noise may alter a fishes behavior resulting in further perturbations.

5.1.1.2 NMFS Criteria for Impact

The criteria were established in June 12, 2008 and are referred to as the interim West Coast criteria (reviewed in Woodbury and Stadler, 2008; Stadler and Woodbury, 2009). It should be noted, that these are onset of physiological effects (Stadler and Woodbury 2009), and not levels at which fish are mortally damaged. It is possible that the onset of physiological effects may be minimal changes in fish tissues that have no biological consequence (Halvorsen *et al*., 2011). The interim criteria are:

- Injury (Dual Criteria): 206 dB re 1 µPa_{Peak} and 187 dB_{cSEL}
- Behavioral Modification: 150 dB re 1µPa_{RMS}

Additionally, as sea turtles may be present in the action area, NMFS believes that underwater noise at, or above, the following levels have the potential to cause injury or behavioral modification to sea turtles:

- Injury: 207dB re 1µPa_{RMS}
- Behavioral Modification:166 dB re 1µPa_{RMS}

The levels of noise that causes damage in sea turtles is not well researched, however, it has been reported that physical injury or hearing loss in adult turtles is likely at 240 dB re 1 µPa and behavioral responses are likely to be elicited at levels around 120 dB re 1 µPa (BHP Billiton 2011). A study conducted on immature loggerhead, green, and Kemp's ridley sea turtles indicated measurable variation in response to underwater noise by life stage and species (Ketten, D.R. and Bartol, 2006). O'Hara and Wilcox (1990) studied the response of loggerheads to low frequency (25 to 1000 Hz) air guns and revealed significant avoidance behavior. Therefore, it is possible that pile driving activities may trigger avoidance behavior in sea turtles; however should they remain and become habituated, injury or hearing loss could occur if in close proximity to the source.

5.1.1.3 Sturgeon and Recent Biological Assessments near the Project Area

No information is available on the auditory ability of Atlantic and shortnose sturgeon; however, data collected on the closely related lake sturgeon (*Acipenser fulvescens)* suggests that they primarily detect sound as a function of particle motion rather than pressure as reported by Lovell *et al*., (2005) and Meyer *et al*. (2010 and 2011). Additionally, sturgeons are known to have small swim bladders (Beregi *et al*., 2001). Based on the information gleaned from the above review of studies conducted on behavioral responses of fish (indicating generally low response by various species at 150 dB re 1 µPa) and the known information on lake sturgeon sensitivity to sounds as well as the fact that sturgeon are known to have small swim bladders (suggesting lesser sensitivity to sound); it seems unlikely that Atlantic or shortnose sturgeons will neither detect nor respond to sounds at or below the 150 dB re 1 µPa NMFS sound pressure criteria.

A one-year gill net study conducted as part of the Tappan Zee Hudson River Crossing Pile Installation Demonstration Project consisted of 476 gill net collections which captured 12 shortnose sturgeon and no Atlantic sturgeon (AECOM, 2012). The estimated number of shortnose sturgeon potentially affected by installation of four-foot diameter piles was calculated at 1.8 fish in sediment and 0.4 fish in rocky substrate without noise attenuation practices and 0.95 and 0.21 respectively with use of 10 dB broadband noise attenuation (AECOM, 2012). Atlantic sturgeon potentially affected was estimated using best available data, to be much lower than shortnose, less than 11 at risk of exposure to SELcum greater than 187 dB re 1 µPa with a majority of effects anticipated to be minor injuries (AECOM, 2012).

5.1.1.4 Ambient Noise of the East River

It should also be noted that ambient sound levels in the marine environment are quite variable. Sound in the open ocean have been measured at 74 – 100 dB (CALTRANS, 2009; Kim, et al. 2009) while sounds within an urban estuary may be much higher. A recent study conducted by Reine et al., 2012, measured ambient noise in the mouth of the East River, near the southern tip of Manhattan, approximately 2 miles south of the project area. The ambient underwater noise averaged 125 dB.

There is a considerable amount of noise in New York Harbor due to tidal action, vessel traffic, subway tunnels, local geomorphology, and vibrations from bridges and roadways. Although no sound measurements were conducted at the project site, it is anticipated that the ambient average noise would be similar to the 125 db. This is attributed to the confining geometry of the west channel, the FDR Drive (a heavily used six-lane highway structure that is built into the water), the numerous and large vessels that transit through the west channel, and sound radiating from subway tunnels.

5.1.1.5 Project Generated Underwater Noise and Potential Effects

Construction of the EMWE

Piles will be installed with drilled shafts and vibratory hammers. Impact piling would only occur to seat the pile (if necessary). It is anticipated that only 2-3 piles would be erected each day (approximately 3-4 days a week) in 3-month period for both the UN and ODR esplanades. The build years for the UN and ODR esplanades would be separated by at least four years.

Drilling of Shafts

The impacts of drilling shafts into the bottom of the East River is anticipated to have insignificant effects on fish populations. As per the Biological Assessment produced for the Tappan Zee Bridge Project NMFS indicated "*noise generated during drilling will be well below the noise levels likely to result in physiological or behavioral effects (i.e., 206 dB re 1 ~Pa peak and 187 dB re 1 ~Pa2 -s cSEL for physiological effects and 150 dB re 1 ~Pa RMS for behavioral effects). This conclusion is supported by analysis completed by NMFS Northwest Region on bridge projects carried out in Washington State where NMFS concluded that oscillating and rotating steel casements for drilled shafts are not likely to elevate underwater sound to a level that is likely to cause injury or noise that would cause adverse changes to fish behavior*." The depth and size of piles required for the EMWE is much less than Tappan Zee Bridge, as such, impacts from drilling of shafts is considered to be insignificant.

Vibratory Hammers

In May of 2012, a Pile Installation Demonstration Project (PIDP) was conducted for the Tappan Zee Bridge Project in the Hudson River. For the PIDP, the installation of 4-, 8-, and 10- ft piles by both vibratory and impact hammers were monitored. As part of the monitoring, short and long range acoustic monitors were placed approximately 35 and 1,000 feet from the demonstration piles. Monitoring during the vibratory hammering indicated that at the short range piles, the SPL varied between 169.6 and 185.2 (dB re 1 μPa) and the SPLs and the long range monitors 106.3 and 129.8 (dB re 1 μPa). Monitoring of the SEL (dB re 1 μPa^2·s) recorded values of 177.1 to 197.4 dB at the short range monitors and 128 to 154 dB at the long range monitors.

In a study conducted as part of the Richmond Inner Harbor in California (CalDOT, 2012), the vibratory driving of1 72-inch pile (1.5 to 2 ft greater in diameter than piles to be driven for the EMWE), the dB re 1 μPa^2·s of SPL, SEL and RMS were recorded at 10 m was recorded as 183 dB, 170 dB, and 170 dB, respectively. Other projects to (Columbia River Crossing Project, Explosive Handling Wharf-2 (EHW-2) project located at Naval Base Kitsap at Bangor, Washington) have to monitored vibratory piles and determined that the SPL is below the interim West Coast criteria and the SEL is rarely exceeded at a few meters from the pile.

In the Biological Opinion for the Tappan Zee Bridge project, NMFS states the following: *Installation of piles with a vibratory hammer will not result in peak noise levels greater than 206 dB re 1 μPa or cSEL greater than 187 dB re 1 μPa2 -so Thus, there is no potential for physiological effects due to exposure to* *this noise. Given the extremely small footprint of the, area where noise greater than 150 dB re 1 μPa RMS will be experienced (i.e., within 10 meters of the pile being installed), it is extremely unlikely that the behavior of any individual sturgeon would be affected by noise associated with the installation of piles with a vibratory hammer. Even if a sturgeon was within 10 meters. of the pile being installed, we expect that the behavioral response would, at most, be limited to movement outside the area where noise greater than 150 dB re 1 ~Pa RMS would be experienced (i.e., moving to an area at least 10 meters from the pile). Because this area is very small and it would take very little energy to make these movements, the effect to any individual sturgeon would be insignificant. Based 'on this analysis, all effects to shortnose and Atlantic sturgeon exposed to noise associated with the installation of piles with a vibratory hammer will be insignificant and discountable.*

Given that the East River, and especially the project area, are not regularly utilized by sturgeons, nor do they provide attractive habitat for sturgeon foraging and are not spawning areas, it is anticipated that any impacts to sturgeon resulting from this project would be very minor and insignificant.

Impact Hammer

The required energy to drive 48- and 54-inch piles, without noise attenuating systems, has been determined to exceed the interim criteria. However, the criteria are exceeded as piles are driven with an impact hammer through the undisturbed substrate, for the EMWE, impact hammering, if necessary, would only be used to finally seat the pile. It is anticipated that if impact hammering is utilized it would only require a few “taps” of the pile at a lower pressure. Thus, the potential to exceed the criteria is greatly reduced.

If an unexpected field condition requires instances of impact hammering at levels that would exceed the SPL or SEL impact criteria, the contractor could employ a noise attenuating device (e.g., isolation casing) to attenuate the level of sound propagation below the impact criteria levels. Impacts from seating the pile are considered insignificant and discountable.

Vessel Traffic

Boat engines, barge mounted machinery, vibrations from nearby structures (e.g., train tunnels, etc.) have the potential to impact fish and other marine fauna. The noise levels generated by these entities are not great enough to result in the death or mortality of organisms, but may affect behavior. For instance, the noise vibrations may mask other aquatic sounds or alter the fishes’ behavior in another way.

New York Harbor is one of the busiest harbors in the world. Large ocean-going freighters and other vessels routinely sail within in several hundred feet of the project area. During construction, vessel traffic will be limited to several jack-up barges, a push or tug boat and a crew boat. With water depths average approximately 30 ft in the project area, However, given the size of the West Channel, and the depth of the water, and the high volume of marine traffic that occurs daily in the East River, it is anticipated that acoustic noise generated from these vessels will have limited, if any, impacts to EFH or EFH designated species.

Acoustic Impacts Summary

Large fish populations and/or fish aggregating structures are not present in the project area. Moreover, the project area and New York Harbor have ambient noise levels much higher than the ambient levels in the ocean. The placement of piles for the EMWE would not have significant impacts to ESA listed species or other marine fauna in the project area. Pile driving would only occur few a few minutes each day, approximately 3-4 days a week during a 90 day period. Pile driving will largely be accomplished with drilled shafts. Of the approximately 173 piles that would comprise the EMWE, it is anticipated that approximately 153 piles would be drilled into place and only 20 piles would be installed with vibratory hammers. Impact hammers would only be used to seat the pile (if necessary).

Thus, any exceedence of the SPL and SEL criteria would be extremely localized and temporary. Noise levels above 150 dB RMS would be localized too. It should be mentioned again, that presence of Roosevelt Island in the center of the East River would create a barrier to sound propagation. No elevated noise levels above any of the criteria would be anticipated in the East Channel, which provides more attractive fish habitat than the West Channel.

Once completed, the EMWE would be used as a recreational esplanade. There would be no sound producing objects on the esplanade that would transmit sound into the water at or above the interim West Coast criteria. Thus, impacts to ESA species resulting from hydroaccoustics construction and/or operation of the EMWE would be very minimal.

5.1.2 Increased Vessel Traffic

Due to proposed construction, there is expected to be a slight increase in vessel traffic at the project area. Construction will be performed from the water using floating equipment. The equipment that will be used for the pile installation is bulleted below:

- Two Barge Mounted 250 Ton Cranes;
- One Sheet-pile Vibratory Hammer;
- One Pile Vibratory Hammer;
- Two Compressors;
- Two Generators ;
- One Rock Socket Drilling Rig;
- Two Tugboats;
- One Flat Deck Barge;
- One Concrete Delivery Barge;
- One Concrete Pumping Barge;
- One Pile Delivery Barge;
- One Hopper Scow; and
- One Dump Scow.

Pile installation will be accomplished by as many as two crews operating at a time, working an eight hour workday, and utilizing up to four barges. Two of the barges will hold 250 ton cranes and at least one barge will be used for materials. Two barges may be placed next to each other, extending up to 135 feet (15-foot buffer, plus 60 feet wide and 60 feet long) into to the East River beyond the edge of the esplanade under construction. The crane barges will be jack-up barges with four spud piles driven into the riverbed. The materials barge will tie up to the crane barge, or will set anchors to maintain position during construction.

It is anticipated that concrete will be produced offsite and delivered to the work place by barge and pumped. After the piles are filled, the pile caps and all other structural members that occur above the spring high tide line would be constructed offsite and put in place on site with by a 250 ton crane operating from a barge. A second barge would be used during this phase for materials. Subsequent phases of esplanade construction which will include concrete and asphalt placement, furniture placement, and landscaping would be supplied by trucks. With the motorized vessels present, there is a chance for strikes to turtles and sturgeons. Vessel strikes on sturgeons are rare but have been recorded in some instances. The 2007 Status Review and the proposed rule noted that in certain geographic areas vessel strikes have been identified as a threat to Atlantic sturgeon. While the exact number of Atlantic sturgeon killed as a result of being struck by boat hulls or propellers is unknown, it is an area of concern in the Delaware and James Rivers. Brown and Murphy

(2010) examined 28 dead Atlantic sturgeon observed in the Delaware River from 2005-2008. Fifty percent of the mortalities resulted from apparent vessel strikes and 71 percent of these (10 of 14) had injuries consistent with being struck by a large vessel (Brown and Murphy, 2010). Eight of the 14 vessel struck sturgeon were adult-sized fish (Brown and Murphy, 2010). The factors relevant to determining the risk to Atlantic sturgeon from vessel strikes are currently unknown, but they may be related to size and speed of the vessels, navigational clearance (i.e., depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of Atlantic sturgeon in the area (e.g., foraging, migrating, etc.). Unique geographic features in the Delaware and James Rivers (e.g., potentially narrow migration corridors combined with shallow/narrow river channels) likely increase the risk of interactions between vessels and Atlantic sturgeon at these locations. The risk of vessel strikes between Atlantic sturgeon and project construction vessels operating in the East River is likely to be low given that the vessels are likely to be operating at low speeds, vessel drafts will be shallow and will not impede movement in the lower strata of the water column, and there are no restrictions forcing Atlantic sturgeon into close proximity with the vessel as may be present in some rivers.

Shortnose sturgeons are not known to reside in the East River. Additionally, no transient shortnose sturgeons have ever been documented in the East River. Information on movements outside of the natal river by this species is extremely limited. There are only two documented occurrences of shortnose sturgeon from the Hudson River being detected outside of the Hudson River. The East River is a tidal strait with habitat that is not consistent with the types of habitat known to be used by shortnose sturgeon. The rarity of shortnose sturgeon in the East River reduces the exposure that shortnose sturgeon would have to the vessel strikes (Verdant, 2010).

The overall potential for vessel strikes on marine turtles remains much higher than that of the sturgeon. Due to a turtle's need to surface for air, it can be positioned at or near the water's surface where it could be in danger of being struck by the hull or propeller of a vessel. While vessel strikes are a known cause of sea turtle mortality (Magnuson *et al*., 1990), there have been few studies that focus solely on the interaction between sea turtles and marine vessels. Thomas *et al*. (2008) found that 23 percent of the sea turtle strandings on the Mediterranean coast of Spain were caused by interactions with humans, with 9% of the strandings a result of vessel strikes. The problem of vessel strikes on sea turtles is of increasing concern, especially in the United States, where increased development along the coasts has resulted in increased recreational boat traffic. In the United States, the percentage of strandings that were attributed to vessel strikes has increased from approximately ten percent in the 1980's to a high of 20.5 percent in 2004 (NMFS 2007).

Sea turtles are occasionally documented in western Long Island Sound and few individuals have been documented in New York Harbor. There have been no documented sea turtles in the East River and it is not likely to be a high use area for these species. In New York waters, sea turtles are most likely to be present in areas with sandy substrates, depths of 15 to 49 feet, current of less than 2 knots, and with high concentrations of sea turtle forage (Ruben and Morreale, 1999). The project area has depths of approximately 15 to 35 feet MLW, making it consistent with the depths likely to be utilized by sea turtles in New York waters. However, the substrate at the project location consists mostly of hard bottom substrate covered in a thin silt veneer. The hard bottom is composed of rock as well as a large amount of anthropogenic debris. Overall, habitat quality was characterized as poor (AECOM, 2011). Additionally, current in the area is tidally influenced resulting in variable velocity, however often exceeding two knots. Based on the lack of evidence of sea turtles in the East River, the lack of suitable habitat, and the numerous other vessels that routinely travel within the waters of New York Harbor, it is reasonable to conclude that impacts to sea turtles from vessels associated with this project would be insignificant and discountable.

5.2 Indirect Effects

Indirect effects are defined as any effects that are caused by or will result from the proposed action later in time, but which are still reasonably certain to occur (50 CFR § 402.02). These effects are defined as water/sediment quality impairment and indirect alteration of habitat, inclusive of burial of spawning substrates by resuspension of material during vessel movements. Increased turbidity and sedimentation from pile installation activities can result in indirect impacts on the habitat of adult and juvenile demersal and pelagic fish and sessile organisms. Turbidity can decrease water clarity, which could affect foraging behavior of visual predators and filter feeders. Other impacts associated with sedimentation include gill clogging and burial. Recent studies suggest that long term sedimentation impacts due to either maintenance dredging (Sheridan, 2004) or pipeline trenching (Badalamenti *et al*., 2006), do not extend over large distances (less than 15 to 30 feet). Due to known current velocities within the East River (two to five knots), dispersion of re-suspended sediments, is expected to occur quickly thereby reducing any increase in re-suspended sediment concentrations to background levels within a short distance from the source. As an aside, sturgeons are routinely found in turbid waters (Dadswell, 1984) indicating a tolerance of relatively high levels of suspended sediment. Additionally, impacts of sedimentation on benthic and pelagic communities will be avoided or minimized through use of drilling rather than pile driving and implementation of specific monitoring and mitigation strategies. These effects will be minimized by employing diversionary measures during demolition of previous structures and installation of new structures.

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6 Cumulative Effects

Cumulative effects are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR § 402.02). They involve only future non-federal actions; in this case, those that are expected to occur after the 2018 and 2024 completion years of the proposed EMWE.

Currently, the rehabilitation and reconstruction of the Waterside Pier project is being performed directly adjacent to (south of) the Project Area. The reconstruction and rehabilitation of the Waterside Pier is expected to be completed by 2015 and the new design and construction activities would have limited impacts on the ecological resources of the East River. Effects directly associated with the Waterside Pier by that project's 2015 completion year have been previously documented under separate environmental reports. The rehabilitation of the Andrew Haskell Green Park (AHGP) may occur during the construction of the ODR. For that project an existing deck will be refurbished and new piles installed. Depending on the design ultimately selected, it is anticipated that 100-360 piles would be installed. The piles to be installed are envisioned to be less than 2-ft in diameter, and installed through drilled shaft technology and/or vibratory methods. The installation of small diameter piles by drilled shafts or vibratory methods would produce very small acoustic footprints. It is therefore anticipated that the cumulative effect of the upgrade to AHGP and the construction of the EMWE would have negligible additional impacts on the fauna of the East River. There are no other anticipated future New York State or private activities.

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7 Effects Determination

The results of this Biological Assessment are:

1. The East River does not provide attractive habitat for shortnose and Atlantic sturgeon and the loggerhead, Kemp Ridley, green, or leatherback turtles. The Proposed Action is also not likely to result in an adverse effect on critical habitat for these species.

2. Pile driving would have insignificant and discountable effects to shortnose and Atlantic sturgeon and the loggerhead, Kemp Ridley, Green, or leatherback turtles during foraging and migratory activities;

3. Incidental vessel strikes will not affect the shortnose and Atlantic sturgeon as they are generally found within one meter of the bottom. Although vessel strikes may affect loggerhead, Kemp Ridley, Green, or leatherback turtles, the likelihood of impacts resulting from vessels associated with the project are insignificant and discountable. Each day there are numerous vessels that routinely travel within the waters of New York Harbor, which have the potential to interact with sea turtles. Moreover, the strong currents of the West Channel (in the area of the project) would greatly reduce the potential for turtles to utilize the project area;

4. Indirect effects from resuspended sediments are not expected to jeopardize any ESA species; and

7.1 Effect Determination for Critical Habitat

Critical habitat for the shortnose sturgeon has not been designated in the Hudson River. The Proposed Action will take place in a reach of the river that is neither a spawning area nor primary overwintering area for the shortnose or Atlantic sturgeon or the loggerhead, Kemp's ridley, green, or leatherback turtles.

7.2 Reasonable and Prudent Measures

In order to limit the amount of incidental take, the applicant is committed to implementing reasonable and prudent measures including:

- Use of silt management techniques and soil erosion practices to limit the downriver transport of re-suspended sediment;
- Observance of seasonal restriction and special permit conditions associated with anadromous fish migration if required by regulatory agencies;
- No over-loading of barges relative to water depth;
- Use of high propeller support vessels;
- Limited movement of barges once at a particular location;
- Stockpiled materials would have appropriate containment measures;
- When possible, the contractor would work with pre-cast materials over the water;

- Any landside work would be performed in accordance with a sediment and erosion control plan; and

  Contractors would only refuel vehicles in designated areas that have appropriate containment systems to capture accidental spills.

7.3 Making Overall Effect Determinations

Overall, effects of the Proposed Action are summarized in the **Table 7-1**, which lists all affected species and all project elements, and the effect determinations associated with each. The determination of effects is based on NMFS documentation that categorizes effects as either No Effect; May Affect – is not likely to adversely affect; or May Affect - is likely to adversely affect (NMFS, 2013a). The Overall Effect Determination reflects the greatest degree of effect projected for any one of the four categories of potential impact.

A description of these terms is provided below.

- “No Effect” is the appropriate conclusion when a listed species will not be affected, either because the species will not be present or because the project does not have any elements with the potential to affect the species. “No effect” does not include a small effect or an effect that is unlikely to occur: if effects are insignificant (in size) or discountable (extremely unlikely), a “may affect, but not likely to adversely affect” determination is appropriate. A “no effect” determination does not require written concurrence from the Service and ends ESA consultation requirements (NMFS, 2013a).
- “May Affect - Is Not Likely To Adversely Affect” (NLAA) means that all effects are beneficial, insignificant, or discountable. Beneficial effects have concurrent positive effects without any adverse effects to the species or habitat (i.e., there cannot be “balancing,” wherein the benefits of the project would be expected to outweigh the adverse effects - see “May Affect Is Likely To Adversely Affect” below). Insignificant effects relate to the magnitude or extent of the impact (i.e., they must be small and would not rise to the level of a take[2] of a species). Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. A “NLAA” determination by the action agency requires written concurrence from the Service (NMFS, 2013a).
- “May Affect - Is Likely To Adversely Affect” means that all adverse effects cannot be avoided. A combination of beneficial and adverse effects is still “likely to adversely affect,” even if the net effect is neutral or positive. Adverse effects do not qualify as discountable simply because there may be uncertainty if they will occur. The probability of occurrence must be extremely small in order to be discountable. Likewise, adverse effects do not meet the definition of insignificant because they are less than major. If the adverse effect can be detected in any way or if it can be meaningfully articulated in a discussion of the results, then it is not insignificant, it is likely to adversely affect. This requires formal consultation with the Service (NMFS, 2013a).

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[2] Defined *under the Endangered Species Act* as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (NMFS, 2013b).”

The impacts presented in Chapter 5 would be considered insignificant and discountable based on the construction methods (i.e., drilling of shafts, vibratory pile driving, etc.). As identified in Chapter 5, NMFS determined that similar construction techniques for other projects, with larger magnitudes of construction, were insignificant and discountable. Impact pile driving is anticipated to only be used to seat a pile which would require a couple of blows at low energy. If an unforeseen field condition occurs where higher energies would be required to seat the pile, mitigation measures (e.g., isolation casing, etc.) could be employed to reduce and/or eliminate potential acoustic impacts.

Given that the project area does not provide attractive habitat for these species the likelihood of adverse impacts is significantly reduced. In **Table 7-1**, the project "may affect – is not likely to adversely affect" has been identified for all species. It is anticipated that the presence of endangered species in the project area would be infrequent, and effects, if any, would generally be minor behavioral changes on individuals that have been previously identified as insignificant and discountable.

Based on the analysis provided in this BA, while the EMWE may affect ESA species, the potential to adversely affect individual transient shortnose and Atlantic sturgeon and marine turtles in the immediate project area is insignificant and discountable. The Proposed Action is not likely to jeopardize the continued existence of their corresponding populations.

Table 7-1
Overall Impact Determination for the Proposed Action

Jurisdiction	Common Name	Distinct Population Segment (DPS)	Federal Status	Effect Determination for Pile Driving*	Effect Determination for Vessel Traffic	Effect Determination for Sediment Suspension	Effect Determination for Designated Habitat	Overall Effect Determination
NMFS	Atlantic sturgeon	Gulf of Maine New York Bight Chesapeake Bay Carolina South Atlantic	Threatened Endangered Endangered Endangered Endangered	May Affect Is Not Likely To Adversely Affect	No effect	No effect	No effect	May Affect Is Not Likely To Adversely Affect
NMFS	Shortnose sturgeon	NA	Endangered	May Affect Is Not Likely To Adversely Affect	No effect	No effect	No effect	May Affect Is Not Likely To Adversely Affect
NMFS	Loggerhead sea turtle	Northwest Atlantic Ocean	Threatened	May Affect Is Not Likely To Adversely Affect	May Affect Is Not Likely To Adversely Affect	No effect	No effect	May Affect Is Not Likely To Adversely Affect
NMFS	Kemp's ridley sea turtle	NA	Endangered	May Affect Is Not Likely To Adversely Affect	May Affect Is Not Likely To Adversely Affect	No effect	No effect	May Affect Is Not Likely To Adversely Affect
NMFS	Green sea turtle	NA	Endangered	May Affect Is Not Likely To Adversely Affect	May Affect Is Not Likely To Adversely Affect	No effect	No effect	May Affect Is Not Likely To Adversely Affect
NMFS	Leatherback turtle	NA	Endangered	May Affect Is Not Likely To Adversely Affect	May Affect Is Not Likely To Adversely Affect	No effect	No effect	May Affect Is Not Likely To Adversely Affect

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Appendices

Appendix A

NMFS Consultation Response Letter

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

SEP 18 2012

Capt. Aleksandr Modjeski
Senior Marine Ecologist
AECOM
30 Knightsbridge Road, Suite 520
Piscataway, New Jersey 08854

Re: New York City Economic Corporation
East Midtown Waterfront Esplanade Project
Borough of Manhattan, New York County, New York
Essential Fish Habitat (EFH) and Threatened or Endangered Species Consultation
Request for Pre-application Meeting

Dear Capt. Modjeski,

In your letter dated August 21, 2012, you requested information about the presence of federally listed species in the vicinity of NYCEDC's proposed East Midtown Waterfront Esplanade Project, in the East River, Borough of Manhattan, New York, under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS).

The following listed species may occur in the East River:

Species	**Status**
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Gulf of Maine Distinct Population Segment (DPS) of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)	Threatened
New York Bight DPS of Atlantic sturgeon	Endangered
Chesapeake Bay DPS of Atlantic sturgeon	Endangered
Carolina DPS of Atlantic sturgeon	Endangered
South Atlantic DPS of Atlantic sturgeon	Endangered
Northwest Atlantic Ocean DPS of loggerhead sea turtle (*Caretta caretta*)	Threatened
Kemp's ridley sea turtle (*Lepidochelys kempi*)	Endangered

Green sea turtle (*Chelonia mydas*)	Endangered
Leatherback turtle (*Dermochelys coriacea*)	Endangered

Conclusions

As listed species of sea turtles and sturgeon occur in the East River, and thus, within the vicinity of your proposed project, any proposed in-water work has the potential to affect these species. As project details become finalized, a consultation, pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, may be necessary as any discretionary federal action, such as the approval or funding of a project by a Federal agency, that may affect a listed species must undergo consultation pursuant to section 7 of the ESA of 1973, as amended. If the proposed project has the potential to affect listed species, and it is being approved, permitted or funded by a Federal agency, the lead Federal agency, or their designated non-Federal representative, is responsible for determining whether the proposed action is likely to affect the listed species. The Federal agency would submit their determination along with justification for their determination and a request for concurrence, to the attention of the ESA Section 7 Coordinator, NMFS Northeast Regional Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930. After reviewing this information, NMFS would then be able to conduct a consultation under section 7 of the ESA.

Should you have any questions regarding these comments, please contact Mark Murray-Brown at 978-281-9306 or by email at Mark.Murray-Brown@noaa.gov.

Sincerely,

Kimberly Damon-Randall
Acting Assistant Regional Administrator
for Protected Resources

EC: Sullivan, NER/PRD
File Code: Technical Assistance – AECOM East Midtown Waterfront Esplanade Project - East River
PCTS: T/NER/2012/03946

Appendix B

NMFS Meeting Minutes

Meeting Record

To		From	
Name	Cali Gorewitz	Name	John Seaboldt
Firm	NYC EDC	Firm	AECOM
E-mail:	cgorewitz@nycedc.com	Date Sent	11/26/12
Meeting Date:	11/20/12		
Project Name:	East Midtown Waterfront Esplanade		
Project Number:	EDC Contract No. 38430001 (AECOM 60221358)		
Subject:	Meeting Minutes: Project Briefing for NOAA National Marine Fisheries Service		

☒ In-Person ☐ Telephone ☐ Conference Call

Attendees: Diane Rusanowsky (NMFS), Cali Gorewitz (NYCEDC), Daniel Colangione (NYCEDC), John Seaboldt (AECOM), James Mansky (AECOM), and Aleksandr Modjeski (AECOM)

Attachments: Briefing for NOAA NMFS - November 20, 2012 presentation
Attendance Sheet

A. Presentation

1. Cali Gorewitz presented the background and overall concepts of the proposed East Midtown Waterfront Esplanade (EMWE) project that will create a new public waterfront esplanade along the East River in Manhattan from East 38th Street to East 60th Street and fill a critical gap in the Manhattan Greenway.
2. Aleksandr Modjeski (AM) presented the findings of the underwater dive survey conducted in October 2011 regarding the existing aquatic habitat quality and the species observed during the survey. The habitat quality is considered to be sub-optimal compared to other habitats in the Long Island Sound and the Hudson-Raritan estuary. The species observed are considered common for this habitat.
3. AM also presented the Essential Fish Habitat (EFH) findings, reviewed the Threatened/Endangered Species list (based on the September 18, 2012 NOAA consultation letter), and provided an overview of potential mitigation and habitat enhancement scenarios.
4. James Mansky presented the next steps for the EMWE project. The design of the preferred alternative would be determined in late 2012. The impacts of the esplanade will be determined in early 2013. The permit application including the EFH Assessment, Biological Assessment (BA) and identification of possible mitigation opportunities are scheduled to be completed in the spring of 2013.

B. Project Elements

1. Diane Rusanowsky (DR) asked about the demolition of the Waterside Pier. It was explained that the pier is a concrete deck supported by timber piles with cribbing and it would be replaced in-kind and in-place under the US Army Corps of Engineers Nationwide Permit and the New York State Department of Environmental Conservation General Permit. While very early in the design phase, it is anticipated that the new structure would be supported by steel piles and the deck would be built above the elevation of the 100-year flood. DR stated that the impacts of the new piles to the hydraulics of the river should be evaluated for the proposed Waterside Pier structure, as well as the new esplanade. DR also indicated that once the design has advanced for the esplanade, the pile installation methods will need to be described.
2. DR requested information about the proposed esplanade in relationship to the defined federal channel limits. EDC will follow up with a graphic that has been prepared for previous discussions with other agencies that shows the approximate distances of the proposed esplanade from the western limit of the channel at the narrowest point in the river (across from Roosevelt Island).
3. While not a common occurrence, DR noted that there should be no part of the proposed esplanade where a seal could haul out.
4. DR recommended reviewing the record of consultation between the New York State Department of Transportation and the National Marine Fisheries Services for the FDR Drive Outboard Detour Project. In addition, the studies conducted by Ken Able and for the Verdant Power Project (VPP) should be evaluated. The Federal Energy Regulatory Commission Docket number for the FPP is 12611.

C. Essential Fish Habitat and Biological Assessments

1. For the EFH, some species or life stages may be eliminated from consideration due to the water depth in the project area, but they should not be eliminated due to salinity since the river salinity varies considerably over time. The area of suitable habitat in the project area needs to be identified for each of the EFH species. The organization of the EFH Assessment document should be based upon fishery management principals and the discussion of the egg and larvae life stages can be combined. Forage species such as bay anchovy and silversides can be combined as well and identified as schooling species.
2. For the preparation of the BA, the NMFS staff in the Gloucester, MA office should be consulted. DR identified Julie Crocker as the person who was involved with protected species for the Tappan Zee Bridge replacement project.

D. Potential Mitigation Opportunities

1. In regard to mitigation opportunities, DR mentioned that there should be consideration of leaving some of the timber piles at the Waterside Pier if there would be an ecological benefit. The use of reef balls and eco-discs was discussed. These may be used at the reconstructed Waterside Pier. DR said that removing debris under the pier would likely have little ecological value.
2. DR suggested reviewing any studies on the reef balls of the West Harlem project, as well as any studies done as part of the Westway project.

END OF NOTES

Appendix C

Ecological Dive Survey

AECOM
30 Knightsbridge Road, Suite 520
Piscataway, New Jersey 08854

732-564-3600 tel
732-369-0122 fax

Memorandum

To	John Seaboldt	Page	1
CC	James Mansky, Karen Appell, and Indhira Figuereo		
Subject	East Midtown Waterfront Esplanade (EMWE) - Ecological Underwater Survey		
From	Capt. Aleksandr Modjeski		
Date	January 3, 2011		

SUMMARY

An Ecological Underwater Survey was performed as part of the preliminary baseline assessment necessary for identifying potential ecological impacts from the construction of the EMWE and on-site mitigation opportunities along the eastern shoreline of the East River between East 38th Street and East 61st Street in Manhattan from October 3rd through October 5th, 2011.

The survey consisted of the following:

- Visual dive survey performed parallel to shoreline to a distance of 50 feet riverward from the existing bulkhead or Waterside Pier (located between East 38th and East 41st Street) documenting: observed habitat types, size, and general locations; general health of habitat; species presence and visual density (biodiversity); substrate type; and any other anomalies that could assist in assessing impacts from construction and potential on-site mitigation design.

- Piling survey at two locations underneath the Waterside Pier to determine changes (if any) in spatial distribution, biodiversity, and abundance of species moving shoreward and away from direct sunlight.

- Submerged aquatic vegetation (SAV) presence/absence survey.

- Identification of types, size, and general location of micro-habitats/habitats present riverward to 50 feet (depth permitting) of existing infrastructure (documented with video).

- Identification of observed marine/estuarine species, and

- Video documentation of density, type, and spatial distribution of encrusting organisms underneath the Waterside Pier, bordering pilings along the steel bulkhead, two bedrock outcrops located along the northern portion of the survey area, and the existing caissons installed as part of the construction of the FDR Drive Outboard Detour Roadway.

Attached documents include: field logbook (#60221358.2.3), field notes, Figure 1 showing sample transect locations by date, and seven (7) DVDs of underwater observations taken along the various transects parallel to shore. Table 1 summarizes the period of the survey, type of equipment used, field team members, logbook ID, vessel/navigation equipment, and weather/conditions during sampling effort.

Table 1: Field Sampling Summary

Mobilization	3-Oct-11
Demobilization	5-Oct-11
Equipment Used	Commercial hard hat diving gear, umbilical, wetsuit, secchi disk, helmet mounted video camera and light, and communications box.
Field Team	Capt. Alek Modjeski (AECOM), Kevin Shepherd (Fathom Solutions LLC), Ted Barnes (Fathom Solutions LLC), Sam Townsen (Fathom Solutions LLC)
Logbook ID	60221358.2.3
Vessel and Navigation	1968 20' black and white Monarch I/O 100 Hp - Vessel # CT3977AA, On board GPS
Weather/Conditions	October 3, 2011 - Partly cloudy, light wind from SW, with temperatures in the 60's.
	October 4, 2011 - Partly cloudy, moderate NW winds, highs in the low 60's
	October 5, 2011 - Clear, light wind with highs in the 70's.

SURVEY METHODOLOGY

Safety inspection of gear and vessel; safety briefings, and USCG pre- and post dive notifications were performed daily. Prior to the daily underwater survey, a secchi disk was used to determine visibility depth. Visibility was further confirmed by the diver. Diver visibility ranged from approximately six (6) inches to three (3) feet and was dependent on tide. Visibility was better around the ebb tide but diminished as the tide flooded and current increased. It should be noted that the 1st Quarter Moon Phase occurred on October 3rd and 4th, 2011 and therefore, both days experienced neap tides[1]. A tide table for the survey dates is provided in Table 2. Tide data is given for East 41st Street, New York City and based on data from NOAA New York Battery Station 4911.

Table 2: Tides: East 41st Street, New York City

Date	High	Elevation (feet)	Low	Elevation (feet)
3-Oct-11	2:35:00 AM	4.3	8:24:00 AM	0.7
	3:01:00 PM	5.0	9:19:00 PM	0.6
4-Oct-11	3:38:00 AM	4.2	9:34:00 AM	0.9
	4:01:00 PM	4.8	10:25:00 PM	0.7
5-Oct-11	4:40:00 AM	4.1	10:41:00 AM	1.0
	17:03:00 PM	4.6	11:23:00 PM	0.6

Mean Range: 4.3 feet   Mean Tide: 2.4 feet

Light attenuation along the edge of the bulkhead or pier riverward differed from secchi readings and was estimated to a depth of approximately 11 feet for all three (3) days. Light attenuation depth was

---

[1] *Tides that occur at the first or last quarter of the moon when the tide-generating forces of the sun and moon oppose each other and produce the smallest rise and fall in tidal level.*

confirmed by the diver. Natural light was observed to be present underneath the pier to a distance of 40 to 50 feet shoreward but surficial distance was tide dependent and lessened as the tide flooded.

The Ecological Underwater Survey was a three (3) day event performed by a tethered, in-water commercial hard-hat diver equipped with 150 foot air hose umbilical, ship to diver communication, and video with real-time streaming to an onboard monitor; an onboard dive assistant; an onboard dive coordinator/health and safety officer; and a marine ecologist/field manager. The underwater survey was conducted along the eastern shoreline of the East River between East 38th Street and East 61st Street in Manhattan from October 3rd, 2011 through October 5th, 2011. A total of 17 transects were completed directly parallel and adjacent to the existing bulkhead/pier to a riverward distance of 50 feet (depth permitting for safe diving) within a swath spanning a distance of 1.3 miles and covering an area of 0.012 square miles. All transects were videoed and stored on DVDs.

Dependent on the start position, tide, and current, each transect spanned the length of the umbilical (approximately 100 to 150 feet) or 300 feet to include two umbilical lengths (one up current and one down current from the starting point). For each individual transect, the shore-side survey was performed first and involved descending down a piling or existing structure to bottom and then proceeding upcurrent to the length of the umbilical. Once the shore-side bulkhead or pier structure dive transect was complete, the diver was instructed to move riverward approximately 50 feet (depth permitting for diver safety) and use the current to survey the bottom in a zigzag pattern back and forth towards the bulkhead or pier in a downriver direction and then riverward again until area was completely surveyed. The vessel was moored to the existing structure. Once the diver passed the vessel, he continued in a like manner to the length of the umbilical. Upon completion of the river-side transect, the diver was retrieved and the vessel was repositioned for the next shore-side transect. In addition, two (2) additional transects were completed underneath and perpendicular to shore starting from the riverward edge of the existing Waterside Pier and continuing landward approximately 40 to 50 feet underneath the pier to record changes in biological diversity or abundance on the pilings as the diver moved underneath and away from direct sunlight. Transects by date are shown in Figure 1. Table 3 provides: the sampling transect locations between East 38th and East 61st streets; date sampled; and average water depth in feet to bottom.

RESULTS

A total of 17 underwater transects were completed parallel to shore out to a distance of 50 feet spanning a distance of 1.3 miles along the shore. An additional two (2) bisecting transects approximately 50 feet in length were completed underneath the Waterside Pier to determine changes (if any) in spatial distribution, species abundance, and species composition on individual pilings as the diver moved underneath the pier structure and away from direct sunlight. Real-time video streaming from the diver’s helmet to an onboard monitor, in conjunction with diver to ship communication, allowed the onboard marine biologist to assess habitat and species composition first-hand and direct the diver to areas in need of further observation. Recorded video was stored on DVDs by survey date and archived for later reference. A total of 19 species were identified onboard via real-time video and through collection of samples (e.g. macroalgae at bedrock) when identification could not be confirmed via video. Species were identified to lowest practicable taxonomic level and identification was further confirmed by reviewing the DVDs. Habitat assessment characteristics including slope, percent coverage, depth of surficial substrate, relief, and general habitat health were visually assessed and results based on the diver and the onboard marine biologist’s observations.

Table 3: Transect Identification, Date Surveyed, Coordinates, and Average Water Depth in Feet

Transect ID	Date Surveyed	Start Time	Approximate Coordinates (Start) Latitude/Longitude	Average Depth (ft)
1003-1	10/3/2011	9:00 AM	Southern edge of pier	25
Pile South Pier	10/3/2011	9:15 AM	Southern edge of pier	15-25
1003-2	10/3/2011	9:35 AM	14th pile to south edge of dock	25
1003-1A	10/3/2011	10:00 AM	40°44.753'/73°58.172'	25
1003-2A	10/3/2011	10:13 AM	40°44.753'/73°58.172'	30
Pile Mid Pier	10/3/2011	11:45 AM	40°44.774'/73°58.149'	ND
1003-1B	10/3/2011	12:10 PM	40°44.774'/73°58.149'	30
1003-1C	10/3/2011	12:50 PM	40°44.777'/73°58.150'	25
1003-1D	10/3/2011	2:25 PM	40°44.828'/73°58.111'	25
1004-1	10/4/2011	9:15 AM	40°44.860'/73°58.095'	15-17
1004-2	10/4/2011	11:00 AM	40°44.882'/73°58.069'	25-30
1004-3	10/4/2011	12:30 PM	40°44.986'/73°57.987'	21
1004-4	10/4/2011	1:20 PM	40°45.015'/73°57.961'	24
1005-A	10/5/2011	7:45 AM	40°45.527'/73°57.570'	6-43
1005-B	10/5/2011	8:54 AM	40°45.473'/73°57.552'	6-20
1005-C	10/5/2011	10:45 AM	40°45.354'/73°57.636'	2-UNK
1005-D	10/5/2011	11:30 AM	40°45.334'/73°57.669'	40
1005-E	10/5/2011	12:32 PM	40°45.204'/73°57.788'	35-UNK
1005-F	10/5/2011	1:10 PM	40°45.272/73°57.735'	43

Depth does not include tide difference

Range of depth indicates either shallow depth under pier to river's edge of pier or depth of bulkhead to a riverward distance of up to 50 feet

ND – Not determined as it was similar to Pile South Pier Transect

UNK – Outer depth unknown and not determined to promote safety of diver

Overall, four (4) different habitat types were identified based on differences in structure present, substrate type, species composition and distribution, and include:

- **Under-Pier Bottom Habitat** located underneath the Waterside Pier consisting of a low-relief rubble and anthropogenic debris and multiple wooden and concrete coated pilings;
- **Piling/Open Water Edge Habitat** that consisting of riprap/rubble substrate with less debris than that of the Under-Pier habitat and wooden pilings;
- **Natural Bedrock Outcrops and Caissons** located in the northern portion of the study area consisting of large rocks and bedrock substrate and the surface of the metal caissons; and
- **Offshore Habitat** to 50' from existing shoreline consisting mostly of sand/silt and some riprap. Offshore habitat will be include in each of the aforementioned habitat types and not discussed separately as substrate type was usually a function of corresponding shore-side habitat. For all habitat types, no submerged aquatic vegetation (SAV) was observed. A brief description of each is given below and further detailed in the attached logbook. Table 4 provides a list of species.

Under-Pier Bottom Habitat

The Under-Pier Bottom Habitat was located along the edge and underneath the Waterside Pier located between East 38th Street and East 41st Street and consisted of seven (7) parallel transect and two (2) perpendicular under-pier piling transects (Figure 1). Depth along the edge of the pier was relatively uniform and ranged from 25 to 30 feet. Bottom habitat consisted of a low relief (1 to 2 feet high) layer of concrete rubble, rebar, and other anthropogenic debris associated with the pier construction. The bottom was covered by a one (1) to two (2) inch silt veneer. Along transect 1A, between East 39th Street and East 40th Street; the substrate had small pockets of sand and a 10 to 20 foot wide area of a coal-like material. The slope to the back of pier was moderate for the majority of the pier at about 30 degrees but the slope at the mid-piling transect was steeper with an approximately 45 degree incline. In addition, cribbing and timber littered the bottom in areas where the pier was in disrepair. Except for the occasional blue crab (*Callinectes sapidus)* and sponge, no benthic organisms were observed attached or using the bottom substrate or timber. Total bottom coverage underneath the pier by benthic organisms is estimated to be less than 5%. An unknown juvenile flounder and two cunners (*Tautogolabrus adspersus*) were observed on the bottom. Overall condition of bottom habitat was poor. A complete species list is given in Table 4. The substrate was mostly silt and rubble and of poor quality.

Unlike the bottom habitat, outer and inner piles along the edge of and underneath the Waterside Pier did have encrusting organisms. Outer piles along the length of the pier were visually surveyed and were approximately 30 to 65% encrusted with sessile organisms. Inner piles were similar in species composition and diversity. On the average, the upper 12 feet of the pilings had the most diversity with sea grapes (*Molgula manhattensis*) being most dominant entire length of submerged piling.

Table 4 – Species List

Species	**Common Name**
Bryopsis plumosa	green sea fern
Rhodymenia palmata	dulse
Agardhiella tenera	Agardh's red weed
Haliclona loosanoffi	Loosanoff’s haliclona
Microciona prolifera	red beard sponge
Haliplanella luciae	striped anemone
Class Hydrozoa	hydroids
Molgula manhattensis	sea grape
Balanus spp.	barnacles
Littorina spp.	periwinkle spp.
Thais lapillus	dogwinkles
Mytilus edulis	blue mussel
Crassostrea virginica	oyster
unknown mud crab	unknown mud crab
Callinectes sapidus	blue crab
Anchoa mitchilli	bay anchovy
Myoxocephalus aenaeus	grubby sculpin
Tautogolabrus adspersus	cunner
unknown flounder	unknown flounder

Barnacles inhabited the intertidal strata but were not as common 5 to 8 feet below water's surface and comprised approximately 10-15% of piling community population. Blue mussel (*Mytilus edulis*) distribution was patchy from piling to piling and contributed approximately 20-30% of overall population. Sea grapes or squirts were approximately 50%-55% of the coverage. Other species observed on the pilings contributed roughly 5 to 10% of coverage included: green sea fern (*Bryopsis plumose*), Agardh's red weed (*Agardhiella tenera*), red beard sponge (*Microciona prolifera*), hydroids, striped anemone (*Haliplanella luciae*), Loosanoff's haliclona (*Haliclona loosanoffi*), dogwinkles (*Thais lapillus*), periwinkles (*Littorina spp*.), and grubby sculpin (*Myoxocephalus aenaeus*). Overall condition of piling habitat at Waterside Pier was marginal.

Piling/Open Water Edge Habitat

Piling/Open Water Edge Habitat was located along the edge of the existing bulkhead along the FDR Drive in the vicinity of the Queens Midtown Tunnel Entrance from East 43rd Street to East 53rd Street and consisted of six (6) transects surveyed on October 4th and 5th, 2011. Depth ranged from 15 to 25 feet at the time of survey. Substrate located nearest East 43rd Street consisted of low relief habitat (1-2-feet high) with riprap-sized rocks (approximately a foot in diameter), concrete rubble, and an occasional sandy pocket. Some anthropogenic debris (e.g. steel, rebar) was observed. The slope was relatively flat. On the northern side of the tunnel, substrate became more silty with some rock and concrete. Debris was less prevalent than observed at the under-pier habitat. Bottom habitat had very little benthic community coverage and was sparsely populated by sponge or dogwhelk (approximately 3-5% overall coverage). Occasional blue crab was observed. Overall condition of bottom habitat was poor.

Pilings were positioned approximately six (6) feet apart and were 10% covered from the bottom to a depth of 12 feet. At approximately 12 feet, where light was observed to attenuate, tubiculous polychaete castings were evident making up about 60% of total piling coverage to the surface. Blue mussels were observed within the upper 12 feet of the water column but they are not as prevalent as sea grapes and sponges. Other species observed were similar to those found at the edge habitat of the under-pier habitat. Overall, pile habitat was similar to that of the under-pier habitat and condition was poor to moderate. The substrate was mostly silt and rubble and of poor quality.

Natural Bedrock Outcrops and Caissons Habitat

Natural Bedrock Outcrop and Caissons Habitat was located north of East 53rd Street with terminus at East 61st Streets. A total of four (4) transects were completed to characterize the habitat. Habitat included two large natural rock outcrops with a tide pool located adjacent to the FDR Highway between East 57th Street and East 59th Street and encrusting habitat on the caissons slightly riverward (approximately 50 feet) of the shoreline. Depth varied between two feet in the tide pool to depths greater than 40 feet at the rock wall. Slope on bedrock was steep at about a 90 degree vertical drop. Substrate was either bedrock or small rock (approximately 12 inches in diameter) with little or no silt layer. Percent coverage varied by depth along the bedrock but overall coverage was approximately 40 to 50%. Species observed included: green sea fern, dulse, Agardh's red weed, Loosanoff's haliclona, red beard sponge, striped anemones, hydroids, sea grapes, barnacles, dogwinkles, blue mussel, oysters (*Crassostrea virginica*), blue crab, bay anchovy, and cunner. Caisson species composition was similar to that of the under-pier and piling open water habitats. Overall, habitat condition and biodiversity was best along natural outcrops with overall rating of moderate to fair. The substrate riverward was mostly silt and rubble and of poor quality.

SUMMARY

In general, habitat conditions for the Under-Pier Bottom Habitat, Piling/Open Water Edge Habitat, and Offshore Habitat were poor and could provide on-site mitigation opportunities. Species diversity was best at the natural outcrops and habitat condition appeared to be of higher quality than the other three habitat areas investigated. Bottom habitats had little to no visible macrobenthic or encrusting communities. Pilings did have moderate colonization but it appeared the majority of colonization started where light attenuated. The dominant species on the piles was sea grape, followed by blue mussels and sponges. No SAV was observed and it is most likely not present due to water depth, absence of preferred substrate, current, and depth of light attenuation. Oysters were present on natural bedrock but were not observed in other bottom substrates, under-pier, or on piling edge habitat.

Sincerely yours,

Capt. Aleksandr Modjeski
Aleksandr.modjeski@aecom.com

ATTACHMENTS

LOGBOOK

OTHER FIELD FORMS AND NOTES

FIGURE

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outcrop/oysters
55th ; 57th 250' - 300' long
30 x 40 wide
[illegible] 908-670-1036

CONTENTS

PAGE | REFERENCE | DATE

AECOM

AL MODJESKI - 732-589-5116
K. Appell - 646-708-3288
J. Mansky - 212-798-8599
B Demuth - 212-701-2827
I. Figuereo - 212-973-2942
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NYPD HARBOR DIVISION

718-765-4100 (F) - 4102

Bathy - EWELL W. FINLEY

Steve Holdaway - 646-279-7316

TIDES - H or L & elevation
CURRENT vel. -
weather -
START LOCATION -
STOP LOCATION -
TRASECT # -
Transect description -
photos - # & description
video taken - Y or N
substrate type / composition
structures present
type structures
microhabitat types & loc
water temp -
sketch
species encountered
- visibility depth
underpier structures
distance
composition
encrustment cover % -

Habitat types (CMECS)

1) ESTUARINE SHALLOW WATER (SW) TIDAL
~~RIVERINE~~ subtidal - below
MLLW to depth of 4M
2) ESTUARINE (SW) TIDAL ~~RIVERINE~~ INTERTIDAL
MLLW to MHHW
3) ESTUARINE DEEPWATER - >4M
Subtidal

NOAA Benthic Class

- unconsolidated - sand/mud/silt
- SAV
- MACROALGAE
- PATCH ROCK/RUBBLE
- PAVEMENT
- BEDROCK
- STRUCTURAL
- anthropogenic
- boulder
- oyster

INC - slope of bank when possible

10/3/11

ARRIVE ON-site. Gave safety briefing. weather - partly cloudy 60° WIND light SW Low tide 0824. 0.7' BIll DEMUTH & Andrew Dowling ON-site. Going to start survey once diver is checked and geared up. Going to work w/ tide but going to start in front of pier at 3EM and work upriver.

Notified USCG that we will start work momentarily. Prepping gear; monitoring VHF Channel 13. Light extends all the way to bulkhead under Cont'd Pier (0820) since tide is so low. Piles here encrustment to

0915 - complete edge of south pier now heading North along edge of pier to see habitat changes Filled out sheet 1 and 2 data <u>edge</u> habitat consisting of rock, wood, rebar, small diameter pipe, etc. Bottom relatively the same throughout. Sea squirts on bottom. Most diversity between 0-12'-14' below MLW. Bottom still w/ pipe and somewhat dimensionable. Blue crab Piping encrusted

Corner South piles - 2 or 3 w/ blue mussel @ 1-2". No more after. Coverage to bottom. Other piles - squirts dominate

Diversity decreases on edge
@ 1/2 way down piles
Heading shoreward piles
remained 50 - 80% encrusted
Not much different from
edge habitat. Going to
Go ahead and do next
segment.

Repositioning @ 16th pile
where concrete bulkhead
starts w/ pile row in front.
27.4' deep at Transect
1A moving downriver for edge
N - 40° 44'.753 (19' for
W 73° 58.172 diver)

00 START 1A - center pier
A4 last finish pt we
have more timber on bottom
NO fish seen. Bottom not

like 3 feet or more in pockets
between debris - some may
be larger. Appears to be
some coal as well.

1012 - Transect 1A 25' off SHORE
Fm 1st capstan to 4th
capstan roughly. Habitat
has a little more relief
but pockets of silt/sand
also encountered. Entire
pocket of clay balls @
75' from bow of boat
(see coordinates) at 25' off.
NO SAV. 1/2 way between
capstan 1 & 2 there is
concrete wall located behind
piles. Steel debris 25' off
close to capstan 4. sand/
silt/clam shell - NO SAV -

- Walking downriver from capstan 4 - rubble fields along vertical transect. Small pile field (4 piles) started near area. Vertical piles not as encrusted as those observed southern section Capstan - 2. mussels on pile @ 9 to 10' down at Capstan 4 molgula, sponge, hydroids sp. Wall concrete not all the way to bottom. Inside is metal/concrete encased piles (wait @ 2-3' under current depth. Edge habitat cement columns go all the way down. Concrete caissons sparsely encrusted at bottom w/ sponges. Located a few horizontal piles. Area with wall (capstan 2 w/) not [illegible] for

this edge habitat. Piles not as encrusted but still have same species squirts, barnacles, sponges.

1100 - Complete transect 1A. Average vertical height of debris field and rubble about 1-2'. Coal found as well. possibly from barge in the past. Diver said there was about a barge full near coordinates on page 6 near where fender damage is between capstan 2 and 3.

1105 - Repositioned to start next transect 1B - edge - 1B 25' Boat at 40°44.774 (N) W 73° 58.149 @ 30' upriver of 5th Capstan. Video working well. Visibility still

we will do another
transect under pier to
see coverage of piles
and spatial distribution.
from front towards Roadway
Will go down 1 then up next
and alternate direction w/
each pile. Concrete wall
stops at Capstone 4/5).. 1B
Diver Down for Transect 2A
starting approximately 40'
downriver of coordinates (s)
at concrete wall and then
working edge habitat upriver after
piling check and then will
zigzag between 25' & 50' off
for offshore transects to
accomodate current. 1B
Diver T. Barnes. Transect 2A
Pile has (at boat) mussels
which get somewhat thicker

DISC #2 Start w/ pile survey

consists of rock debris w/ 1-2'
high relief w/ some fill
debris. Moving to next piling
there is some silt & muck
depth to 2'+. Inner pile
has tunicates at bottom w/
a depth at bulkhead @ 14.5'
. 50% slope so almost 45° ∠
1135 Diver heading south to last
termination point along edge
of dock. Encountered some
horiz. piles w/ tunicates and
snails along w/ blue crabs
Timber on bottom. Some
small rubble piles @ 1'-2'
high w/ other debris
Most bottom is silt covered.
Habitat similar to habitat
encountered along edge south
of concrete bulkhead.

Current increasing. I have
encountered Habitat dent
for corner (Saw another one)
w/ my of small sheetpile
Now at termination point
at concrete caisson @
capstan 4. Concrete has
evidence of tube polychaetes.
Piles to check at Capstan
4 about 3 in from (upriver) of
Capstan 4. (26') depth
- Start piling check Bank
slope steep. Substrate
Rocky Rubble w/ silt veneer.
2nd pile in - @ bottom
10-20% coverage. Depth 8' away
@ bulkhead (@ ~~20 ft~~) 11' deep.
Barnacles on surface 10-15%
coverage to a depth to
2-3 feet. (1' out at mid
tide to 4-5' w/ 15-

Bulkhead also has @ 40% molgula

1st inner pile - shoreward
Barnacles 40% to 2' below surface
then tunicates @ 30% w/
evidence of tube worms.
2nd pile 9' to 4' @ 40%
coverage by tunicates some
anemones (sparse along w/
barnacles @ @ 4' below
surface. Barnacles above waterline
3rd pile 50% above to a 1 foot
below barnacles less coverage
to 3' then sporadic. To bottom
is molgula & sponge @ 30-
40% coverage.
4th pile - molgula/sponge bottom to
@ 4' under surface 30-40%
coverage Then barnacle again
80%. Another species of fish

No oyster spat on pilings
yet.
5th pile - scattered barnacles
to deeper depths w/ tunicates
30-40% biotic coverage
6th pile - snails on bottom
40-50% coverage up to
6' from bottom. Coverage
slightly increasing. Biodiversity
about the same. Barnacles
to 5' deep from MHW →
surface to MHW another
1 foot.
7th pile - Barnacles to @
8-10 feet down pile - sporadic
w/ 20% cover - 50% coverage
molgula to bottom for 8'
below. Sponge sporadic.
8th pile - mussels top 1/3
w/ barnacles. Patchy - 20%
w/ molgula dominating bottom

1210 - Starting 1-B @ station on
coordinates moving upriver w/
current. Current fast.
Habitat similar w/ woody debris,
rock and little to none
marine life observed. Much of
substrate silt covered, hard
bottom rock. Sporadic
sponges on rock. Vertical
relief 1-2 feet high. Tires,
bottles, and other debris evident.
No life in tire. Small patch
of mussels and some snails
observed. Habitat condition POOR
~~~35'~~ deep at location w/ 6-8'
25' | drop observed near pile
@ ~~30 upriver of~~ coordinates
Tough to get location due
to current.
1220 - Still debris, metal, rock
~~~

5- No change in habitat
type along edge of dock
@20' upriver coordinates, debris
lessening w/ more rock. Visibly
diminishing due to increase in
current velocity. More
homogenous riprap. Mussels
observed to bottom on pile
w/ patchy coverage. @ 6th
Capstan. More debris again.
Appears vertical habitat more
diverse than bottom habitat
for sessile organisms. There
though hard bottom, not
much of anything attaching except
to piles. Pile check - no
oyster spat. Only shellfish
is mussel. Finished transect
1B along edge habitat at
~~3rd~~ 4th lightpost heading south
from north pier end.

1236- Bringing diver in. Current strong
Almost complete w/ Pier.
Need to stand down on
open water until current slows.
1241 - Diver up, repositioning for
continuation of edge habitat
survey.
1250 - DIVER DOWN FOR TRANSECT
1C @ 50' from coordinates
downriver start 40° 44.777
73°58.150
Going down at stern and
going to endpt of 1B edge.
Boat at station 5+50.
OUTER Pile check - Barnacles
@ 20%, molgula below 4.5'
from MLW w/ sponge. Barnacles
mostly in tidal range.
Bottom: timber, rock,
debris, sheet metal/piles.

Observed a flounder but unable to see species. Otherwise K habitat similar to what we have been encountering - low relief habitat. Pilings South of 5+50 have mussels, barnacles, molgula, and sponge. Mussels nearly 20% coverage to bottom. Molgula dominant. Visibility poor (6"). Mussels to bottom of pilings. Not much on substrate. mostly silt covered hard bottom.

+ saw 2 mud crabs on 2 pilings + No SAV. @ 25' deep.

20

30 Based on habitat type encountered under and along dock, we will perform ~~remainder~~ of edge work along 100'

pretty much homogenous, we will not do a detailed inch by inch survey. Open water can still be performed in a zig/zag or live-boat drift along either 25' and 50' foot transect or zig zag between 25' and 50' to get better idea of habitat and presence/absence of structure.

1330 · Continuing on transect under boat. No change in habitat variability, biodiversity, or coverage of pilings. Seeing more patches of mussel periodically on piles ~~subs~~ Ar. Looks like

+ another goby or toadfish on pile. Will look at video.

Cable [illegible] observed near

7' from bottom are mussels and barnacles (sporadic) - pile coverage at bottom around 20%. Barnacles @ 15' from bottom Visibility @ 4". NO SPAT FOR oyster. We did see some line in the water but none had any encrusting organisms. NO SAV (too deep) Saw some bryozoans on a pile or two back at 1B.

40. Substrate still same w/ silt near 2ND TO LAST facing upriver light post.

2 Complete 1C.

Diver up.

3 Repositioned to START 1D. Current slowing. N - 40° 44.828'
W - 73° 58.111

OFFSET @ 50 upriver - survey downriver 50'.

TRANSECT	START	STOP	10/3/11
1	0900	0935	
1A	1004	1013	
1B	~~1122~~ 1210	1241	
1C	1250	1342	
2	0935	1000	
2A	1013	1100	
Pile transect -		1145	1210 (mid)
Pile transect -	0915 - 0935		(south)
1D	1425	1510	

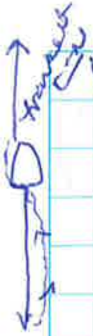
(cont) visibility poor. START DISK 3. No changes in coverage or biodiversity No spat or SAV. Depth @ 25'. Slope increases rapidly from pier.

Pilings covered w/ molgula on bottom that 50% and then @ 6' up start mussel and barnacles w/ @ 30%

more sponge and crab (blue) seen on pilings. Appears that mussels have a preference to which side of pile (southern side more mussels) (northern side more squirts). Evidence of tubiculous worms.

15- Rock/rubble bottom. No growth, covered w/ silt. Complete 1st phase at 1D terminus and coming back to walk from coordinates upriver.

51 Diver going back down to finish 1D transect. More blue mussels on pilings at coordinates (30% coverage). Rocky hardbottom again w/ some debris. Majority of Disk 3 not good due to poor visibility. Voice recording and though it makes a



low relief. May provide some habitat for demersal but not many species observed except for cunner and blue crab. No burrowing shellfish observed only shells (soft clam)

1510 Dive complete. Going to scout upriver to show where transects will be for tomorrow's survey.

1535 - Went over dive tomorrow and locations. Heading to shore. Called USCG.

5OCT 2010

AM ON-SITE. Reviewed days notes. Checked USCG to make sure we can still work due to helicopter accident. 30° slope w/ 12" rock rubble w/ veneer of silt w/ little dimension. GAVE H & S.

Arrive on station underneath bridge between 59th & 60th ST.

LAT: 40° 45.527
W: 73° 57.570'

Will do an edge transect

SAW 3 rock outcrops between 57th & 59th. Will investigate.

Weather: clear, light wind @ 56° w/ highs today in 70's

Low - 1014 1.0'
High - 1703 4.6'

Yesterday - majority of substrate

Diver did encounter some mussels attached to substrate but nothing of significance.

0745 Diver in at new transect 1-A-1005. Will work downriver w/ ebb to a distance to about where 1st bedrock outcrop is between 3 and 4th caisson (N to S). Secchi disk reading 36". Doing edge habitat. Depth 26.5 ft.

Diver down on bulkhead. Some encrustment (maybe 10%) w/ barnacles. Some relief where bulkhead is corroding w/ mud crab. Piles @ 70% encrusted w/ sponge, squirts, bryozoan (patchy)

Bottom low relief 12"
Rip.rap layer @ 1' deep.
Not much fish habitat for
adult species but
moderate for juveniles.
Cunner seen (juvenile)
using habitat. Some
encrustment on rock.
Not very silty at all.
Some concrete slabs
located that provide better
relief and habitat along
For where concrete is
missing or has fallen.
1/2 way through transect
it looks like coverage on
piles @ bottom to 7'
is decreasing @ 20%
coverage mostly tunicates
No coverage on rocks
@ 75 South of coordinate

Some encrustment by barnacles
(sporadic but large) underneath
wall along 12 x 12 timber and
concrete bottom edge of wall.
Seeing more sponge moving
through transects. Observed
3-4 gobies 22 (10 later)
on bottom. So habitat is
a little more diverse and
seems to be better utilized
than under pier.

0815 @ 15' N of caisson
transect 1A-1005 - 6' deep
of bulkhead. Transect complete
@ 150' in distance. Walking
out 25' to 50' to check
substrate and depth 14'.
Substrate unchanged (rubble)
current increasing. Habitat
being used by cunner

Found 1 oyster attached to bottom so potential exists for oyster reef colonization - located @ 25' offshore on rock bottom mid transect. (1st disc 10/5) Observed an eel (anguilla) in rubble. observed 2 blue crabs offshore more light availability due to shallower depth.

Complete offshore transect off 1A-1005. (25'-50'). 43' hole directly under bridge / boat coordinates. Next transect will start (1B-1005) at Northern most caisson from bulkhead riverward @ 10' past caisson. Tieing up to 2ND caisson as it appears to be safer

then south. Some large caissons laid on bottom (concrete) under bridge area near last coords.

Transect 1B-1005

OFFSET 50' N of
N 40°45.473'
W 73°57.552'

Depth 6' at 2ND caisson on coordinates. Some attachment by barnacles from MHW to a few feet below MLW on caissons, bulkhead, and bedrock area. @ 40% coverage.

0854 - Diver down. START 1B-1005. Walking upriver to 1st caisson Area somewhat sheltered. Mostly bedrock underneath oyster attached to bedrock bottom near caisson #2.

1st caisson - 10'-15' off
12" rocks @ 18' deep.
Some snails and occasional
barnacle & another caisson
on bottom. some gravelly
spots/pockets. Edg habitat
has slight veneer of
silt. 1 dead cunner. NO
SAV. 2 small 1m patches
of macroalgae (green) Again
blue crabs, snails, cunner
edge - 2',3' of H2O at
depth by 2nd caisson.
Majority of substrate rock
ontop of bedrock shallow
as it is 3-6' deep at
dead low. Light probably
attenuates to bottom majority
of time.

Habitat somewhat diverse near
near rock pile. Drill holes in
old rock so seems there is
more dimension to habitat.
Depth off rockpile @ 6' to
about 10-15' offshore caisson
line. Stopped transect at middle
of rockpile to reposition in
order to keep diver safe.
Per diver, habitat condition
along transect 1B-1005 same
as what he has been seeing
past 2 days. He feels that
visually, there was less
attached to wall and rocks
then at other downriver sites.

0930 Back in at 5th caisson.
Depth 14' at Caisson. Rocks
on bottom covered w/ silt
veneer 16' OFFSHORE CAISSON

Another oyster close (1') or so from other oyster. Near tie-up location

N 40° 45.443'
W 73° 57.574'

NO SAV yet, saw 1 blue crab doubler by 6th caisson. No change in habitat condition are change to sheet pile bulkhead from concrete at 6th caisson. Pretty low relief rock cover. Less attachment on bulkhead (steel) vs. concrete. NOT much debris – mostly rock bottom w/ silt veneer up to 12"x12" in area. Another oyster attached to bottom. At end of rig. Going offshore transect to @ 25-50' off bulkhead (10' off

in slope.

1000 - Arrive at Southern most outcrop near E. 56th St. Large outcrop that extends from 2nd piling set after sheetpile(s) to 4 ~~3~~ piles (caissons) S. Extends about to caisson line riverward

NO SAV observed from vessel.

There is H_2O behind outcrop near bulkhead (now concrete). Will investigate to see if tidal pool or not.

1045 - Transect IC-1005

START Rock outcrop ~~here~~ as well

Diver Down. Going to do possible tidalpool first then outside perimeter of outcrop

N 40° 45.354'
W 73° 57.636'

By diver off.

outcrop has red and green
seaweed. Back pool sandy
about 2' deep at current
tide level. Water in tidal
pool turbid w/ quite a bit
of debris. Green/red algae
in tide pool. NO SAV.
Rock wall at perimeter
30% sponge 5% barnacle,
relatively shallow ledge.
Video shows moving north
All transects downriver today
SCHOOL OF SILVERSIDES OR
ANCHOVIES (check video)
oyster attachment seen (1)
ON outcrop midway between
North caisson (at coord) and
next downriver caisson.
anemones and bryozoans also
on rock face. Few

This area along wall has
most biodiversity than any othe
section of mar investigated.
Also have mussels wedged between
grooves in rock. Also just found
some oyster spat, hydroid
☆ ANOTHER OYSTER w/in a few
feet of last one. It appears
this section of river w/ outcrop
has more opportunity for habitat
~~and~~ ATTACHMENT TO w/ folds in
rock. Similar to layer cake artificial
reef ball.

1125 - Complete transect 1C-1085
moving to southern side of
outcrop

1130 - Transect 1D-1085 at
5th caisson from south
Going to go north and

to @ 150-180' downriver. At coordinates, 5'x5' granite blocks w/ a drop To 40' off wall (@). Kept some specimens of seaweed for 10. I know what they are but want to confirm. Hydroids present in colonies Habitat same as last transect along rockface. Observing shallow habitat at first where light attenuates and then deeper. Larger barnacles located @ 12 below current surface: Mussel presents Some tunicates seen @ 10' down in patches Not dominant species. Sponge is. Mussels single not in clumps. Spaced anywhere from 6" to a

and going to continue transect to a distance of 150' to 180' feet down river. Sporadic clusters of small finger tip (fingertip) size anemones. Depth at wall @ 20' fm coordinates (downriver) is 5'. hardbottom granite

1150 Stop transect survey to fix comm.

1200 comm fixed. Diver start at last spot & continuing downriver. Outcrop ends @ 50'-60' fm caisson (downriver fm caisson) To 25' offshore substrate rock/riprap to depth of @ 15'. Wall here goes all the way to substrate. Similar to other habitats excluding rock outcrops.

Transect continuing fm 6th caisson or 4th set downriver. From 5th set to 4th set (looking upriver), habitat ~~availability~~ condition decreased quickly and substrate changed → Depth at 4th set of caisson 40'. Substrate silt covered construction debris concrete, etc. Slope rather gradual - 20° ∡ to 30 ∡.

OFFSHORE complete for 1D-1005 and diver coming up. Caught on rebar w/ rigging but done once free. Going to reposition to do end of caissons to concrete since habitat is similar and composition is const. debris, low relief majority of the way.

ARRIVE AT START FOR THAT SET 1E-1005.

North length of rigging. Visibility going as well so this may be last transect. Start video and dive.

Bulkhead concrete over 12"x12" wooden timber sponges and mussels on pile 50-60 mussel coverage w/ 10% barnacle some bryozoans and sponge. Down to 35' and not on bottom. Seeing some tunicates as well. Total coverage pile fm surface to bottom @ 60%. Bottom rocky granite @ 12" Area silt covered and barnacles occasionally on bottom some construction debris so very similar habitat/substrate type. Decent piling coverage here. Better then 1st da

Light to about 14-15'.
Anemones around 12' (patches)
barnacles dominant on cross
timber. No SAV or oyster spat
Piles more diverse here w/
blue mussel dominant - roughly
coverage between 60-70%
mussels to bottom, other species
squirts, anemones, bryozoan, sponge,
balanus some hydroids,
Deeper barnacles approx. 25¢
size. Depth at 35' @ 50-75'
upriver of coordinates. Rocks
here @ cm silt on top.
Mussels also attached in
between rock in small
1' diameter patches -
sporadic. Piles @ 5' apart.
@ 12 up from bottom more
mussels & barnacles evident
mussels in wide clusters

if and how far out substrate
changes. 45' deep at terminus
along bulkhead at end of
transect. Looks to be
mostly debris out to 25'
from bulkhead to deep to
go further out safely. No change.

1300 Complete 1E - 1005. Will
reposition upriver and do 1
more transect to base of
caissons. Substrate type
similar to what was encountered
yesterday from N pier to here.

1310 START 1F - 1005 FINAL TRANSECT
FOR DAY DUE TO DEPTHS
ENCOUNTERED.
40° 45.272' start
73° 57.735'
Going to drift upriver to
1st st of southernmost

Visibility back to @ 2' or so. Thought it was decreasing but it was not. Window most likely closing though. START LOCATION @ 75' from southernmost caisson. hydroids, ~~bryozoans~~, barnacles mussels (dominant) 65-75% pile coverage. to @ 25-30' deep. Depth at site from stern is 43'. On surface where cross timber is located directly under concrete some mussels wedged into gap split. Calling end of transect as this area is consistent w/ habitat we have seen already to south. Bottom most likely rip rap, silt covered debris. No oyster, no

①

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

South perimeter

Transect #/Direction 1/upriver **Streets** 38th → 1st vent

Transect GPS Start Lat/Long: /

Transect GPS End Lat/Long: /

Transect Length

Divers T. Barnes **Location** East River, Manhattan side

Co./State Kings/NY **Start Time** 0900

Other **Completion Time** 0935

High Tide 1510 **Low Tide** 0824

Tide [✓ ebb] or → flood **Low Tide Elevation MLW** 0.7'

Water depth 25' **Estimated Current Speed** slack

Video taken? [✓ Y] or N **Photos Taken** Y or N

WEATHER DATA

Temperature See

Wind Speed Car Book

Wind Direction

Overcast/Clear/Rain

WATER DATA

Temperature 65° +

Visibility @ 18"

Secchi Disk/Turbidity N/A

Estimated Water Depth

Other Comments

underpiles / outside piles. Outside piles - barnacles 90%. 5% redbeard sponge. 5% molgula from surface to MHW mark.

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
underpier	entire pier	rocky	N			X		
		50 to 100lb rocks						
		~~tires~~ piping						
		slabs						

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*

eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*

egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*

enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

Light to back wall @ 40-50 from bulkhead edge. Also existing bulkhead south of E 38th is scarred below H_2O line.

SPECIES ENCOUNTERED **(Benthic and Pelagic)**

baitfish either anchovy or silverside

mussels 4' underwater w/ sea grapes more abundant w/ depth from wake zone

60% pile.- NOT much diversity after @ 10-12'

On bottom - not encrusted - some small gastropods

metal I beams, anemones (1%)

②

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

3rd pile S →

Transect #/Direction 1

Streets 1st vent → 2nd pile

Transect GPS Start Lat/Long: /

Transect GPS End Lat/Long: /

Transect Length

Divers T Benes

Co./State Kings/NY

Other

High Tide

Tide ebb or [✓ flood]

Water depth 25'

Video taken? [✓ Y] or N

Location East River, Manhattan side

Start Time

Completion Time

Low Tide

Low Tide Elevation MLW

Estimated Current Speed

Photos Taken Y or [✓ N]

WEATHER DATA

Temperature

Wind Direction

Wind Speed

Overcast/Clear/Rain

WATER DATA

Temperature

Secchi Disk/Turbidity

Visibility

Estimated Water Depth

Other Comments

Concrete w/ rebar, 4x4' under deck @ 5' IN
tunicates/sponges to bottom of piles, lots of bottles
hard bottom - blue mussel - 10-20% blue mussel to bottom

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*
enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**

bottom substrate silty veneer w/ debris - NO cover.

15' deep at back wall - last pile so moderately sloped.

(3)

DATE 6/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transcect #/Direction ____________ **Streets** 38th North to —> 10th pile

Transect GPS Start Lat/Long: ____________ / ____________

Transect GPS End Lat/Long: ____________ / ____________

Transect Length ____________

Divers ____________

Co./State Kings/NY

Other ____________

High Tide ____________

Tide ebb or flood

Water depth ____________

Video taken? Y or N

Location East River, Manhattan side

Start Time ____________

Completion Time ____________

Low Tide ____________

Low Tide Elevation MLW ____________

Estimated Current Speed ____________

Photos Taken Y or N

WEATHER DATA

Temperature ____________

Wind Direction ____________

Wind Speed ____________

Overcast/Clear/Rain ____________

WATER DATA

Temperature ____________

Secchi Disk/Turbidity ____________

Visibility ____________

Estimated Water Depth ____________

Other Comments
Edge habitat - pipe, Rock, concrete, debris, buckets etc, tires, piping encrusted - More Rock w/ silt 2" silt covering rocks. cable & timbers

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
eneral Substrate Type *- Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
egetation Coverage *- A = Absent, L = Light, H = Heavy inc. %*
enthic Coverage *- A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
Blue crab, snails, sea squirts. blue mussel, some macroalgae.

④

DATE Oct 3 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction 1 **Streets** 10th pile →
Transect GPS Start Lat/Long: /
Transect GPS End Lat/Long: /
Transect Length 3rd → 14 pile
Divers T. Barnes **Location** East River, Manhattan side
Co./State Kings/NY **Start Time** 0900
Other **Completion Time** 0935
High Tide **Low Tide** 0824
Tide ebb or [✓ flood] **Low Tide Elevation MLW** 0.7'
Water depth 25' **Estimated Current Speed** slack
Video taken? [✓ Y] or N **Photos Taken** Y or N

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain

WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth

Other Comments
20' to 30' timber at 10th pile creating cribbing
cunner in piles - I beam 13th pile 6x12'
Blue crabs (3 or 4) at edge habitat on bottom

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
eneral Substrate Type - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling
egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc.%

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
12th pile - No rock crushed sand/very soft
to 6" deep plus - blue crab, squirts, barnacles,
sponge,

⑧

DATE 10/3 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction #2 25' off

Streets ~~34~~ 14th pile → E 38th

Transect GPS Start Lat/Long: /

Transect GPS End Lat/Long: /

Transect Length

Divers I. Bres

Location East River, Manhattan side

Co./State Kings/NY

Start Time 0935

Other

Completion Time

High Tide

Low Tide

Tide ebb or flood

Low Tide Elevation MLW

Water depth

Estimated Current Speed

Video taken? Y or N

Photos Taken Y or N

WEATHER DATA

Temperature

Wind Speed

Wind Direction

Overcast/Clear/Rain

WATER DATA

Temperature

Visibility

Secchi Disk/Turbidity

Estimated Water Depth

Other Comments

silty, soft bottom w/ patches of rock and pipe. at 9th pile some oyster shell on bottom shell looks to be relict. NO SPAT. Also some thin clam (~~soft~~) soft

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
silty	transect	silt to 6"+	NO	NO	NO	NO	NO	poor

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*

eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*

egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*

enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**

6

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction 1A **Streets** mid pier (39th to 40th)
Transect GPS Start Lat/Long: in logbook /
Transect GPS End Lat/Long: /
Transect Length
Divers T. Bruno **Location** East River, Manhattan side
Co./State Kings/NY **Start Time** 1000
Other **Completion Time**
High Tide **Low Tide**
Tide ebb or [✓ flood] **Low Tide Elevation MLW** 0.7'
Water depth **Estimated Current Speed** p/u since slack
Video taken? [✓ Y] or N **Photos Taken** Y or [✓ N]

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain

WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth

Other Comments
silt over rubble, rock, debris, bottom void of much life, chain link fence, pockets of sand.

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
rocky								
rubble								
sand patch		~6" soft	IN sand	(5	timber	in	from	last pile

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*
enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
snails, tunicates, barnacles, sponge

DATE 10/3 ⑦ 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction DA

Streets 25' off

Transect GPS Start Lat/Long: /

Transect GPS End Lat/Long: /

Transect Length see sheet ⑥

Divers

Location East River, Manhattan side

Co./State Kings/NY

Start Time 1013

Other

Completion Time

High Tide

Low Tide

Tide ebb or [✓ flood]

Low Tide Elevation MLW

Water depth 30'

Estimated Current Speed

Video taken? [✓ Y] or N

Photos Taken Y or [✓ N]

WEATHER DATA

Temperature

Wind Speed

Wind Direction

Overcast/Clear/Rain

WATER DATA

Temperature

Visibility

Secchi Disk/Turbidity

Estimated Water Depth

Other Comments

debris, relict (sparse) oyster. rock, pipe, debris covered in sponge, car springs

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
debris fields	to 25'	a,t, silt.	N	N	N	NA	N	poor

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*

eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*

egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*

enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED (Benthic and Pelagic)

RELICT CLAM shells

0

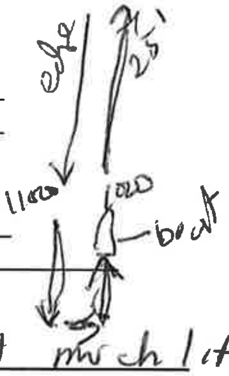
DATE 10/3/11 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction 2A upper off 25' **Streets** 1A - at Lat/Long (steel) 6
Transect GPS Start Lat/Long: (cont.) / to 4th capstan
Transect GPS End Lat/Long: /
Transect Length
Divers
Location East River, Manhattan side
Co./State Kings/NY
Start Time ~~1000~~ 1013
Other
Completion Time 1100
High Tide
Low Tide
Tide ebb or flood
Low Tide Elevation MLW
Water depth 30'
Estimated Current Speed
Video taken? Y or N
Photos Taken Y or N

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain



WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth

Other Comments

rock pile then some debris, steel, not much life encounteed. cement, etc. (between 3rd and 4th capstan

HABITAT DATA **underpier or open water and/or pile**

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*
enthic Coverage - *A = Absent, L = Light, H = Heavy inc. %*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**

Small pockets of dead clams - more abundant as they move riverward - 1 blue crab

Capstan 4 - steel debris (clean)

10-4-11

mid
4044.860
7358.095

Station ① Just North of Pier

100' in each direction

start 915.

① Starting in the corner Just north of con ED pier (15' water)
Sandy bottom large chunk of concrete Misc. Debris close to FDR aprox 2' High off Sandy bottom

at start of tunnel there was 17' of water

over the tunnel area we found Brick and ~~St~~ small Stone
on the piles in the center section of tunnel we found small musels squirts a atached But dead oyster Shell

24' of water in the center of the tunnel area steel debris rock bottom rope and cable soft coral growing on debris

on the north side cason we have musells snails sponges squirts and a small 2' fish

10' out off the wall going from the end of the tunnel Heading South to the con ED pier

found 2 oyster shells (Dead) a very lively Blue crab and a baby blue crab the bottom is made up of aprox 12" stone

2 small fish aprox 25' off the wall in the middle of tunnel area

past the tunnel area the rock tapers off to a bottom made of mud and debris very few sighns of life a few snails and sponges

4'-5' Deep Pile of debris including Rope 3" ruber hose ect in the corner by the con ED pier sponges seem to be doing well

end at 10:20

end 4044872
7358085

start 4044.846
7358.105

Station ② located between tunnel E and

UN Intake 4044 ~~9~~882

Start 11:00 7358 ~~60~~69

Heading north along the wall
Just North of the tunel Starting under the outflow ㉕'
we find musles and snails on the pilings a rocky Bottom
that looks like armor stone or rip rap
much less debris not much for life on the bottom other
than sponges bottom grade drops off quickly
pile bents are aprox 5-6' apart

light seams to penatrate aprox 12' and thats
where the muscles are most dense

this section was much more consistant

~~10-13~~
15-25' out Heading South ㉙
Same rocky bottom a few snails a dead blue crab
very light debris a few old pilings and one
pice of pipe one 5-6" blue crab and 2 small fish

4" blue crab
3-4' squar area of sand

aprox 50' out in 30' of water we found a blue crab
and a collony of musles

end 1206 4044 909

73 58 067

UN Intake
4044 940
7358 030

star
1230 Station ③ due to curent we decided to just do the north side of the boat instead of going Both ways

Start 4044986
7357987

21' deep very light marine growth rocky/Hard (concrete) Bottom

small patches of soft mud w/mussels on top most muddy patches are found just under the platform

most life, is on the piles ~~and~~ consisting of squirts mussels and snails

④ 1320 Ended @ 4045,015
7357.961 due to wave action

we then moved the Boat to this location and continued North

similer conditions found 24' of water

hard bottom of 12" dia stone (avg) | Broken off piling

light mud mixed in with the Rock
very consistant

on the incoming tide the daylight seams to penatrate aprox 11'

sea squirts and sponges seam to be the most prevelent

steap slope

15'-25' ~~[illegible]~~ out Rocky bottom w/crushed shells and silt

end @ 1400 4045043
7357953

Legend

▨ Survey Area (25-50 ft from shoreline)

├┤ Transects

— Shoreline

Survey Date

🟨 10/03/2011

🟩 10/04/2011

🟪 10/05/2011

0 225 450 Feet

N

Notes:
1. State Plane NAD83 Coordinates, U.S. Survey Feet;
2. Basemap data sourced from City of New York Department of City Planning

Transect Locations
Midtown Esplanade

East River
Ecological Dive Survey
New York, NY

FIGURE
1

AECOM

U.S. Department
of Transportation
**Federal Highway
Administration**

New York Division

Leo W. O'Brien Federal Building
11A Clinton Avenue, Suite 719
Albany, NY 12207
518-431-4127
518-431-4121
NewYork.FHWA@dot.gov

June 25, 2014

In Reply Refer To:
HED-NY

RECEIVED
AUG 26 2014
PLANNING & DEVELOPMENT

Mr. Mark Murray-Brown
ESA Section 7 Coordinator
NMFS Northeast Regional Office
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Subject: PIN X776.00 & PIN X770.14
East Midtown Waterfront Esplanade, New York. NY
Threatened and Endangered Species Determination

Dear Mr. Murray-Brown

In response to NYSDOT Region 11's June 16 request, FHWA concurs with the determination that the subject project "*May Affect,* but is *Not Likely to Adversely Affect*" the identified threatened and endangered Federal species. The Biological Assessment is enclosed.

The proposed project is located along the shoreline of the Manhattan side of the East River in New York County, New York. It will construct an approximately 0.96 mile long esplanade.

FHWA is requesting concurrence with this determination from NMFS. We would appreciate your response at your earliest convenience within 30 days. Meanwhile, if you have any questions or concerns, please contact me at 518-431-8874.

Sincerely,

/s/ RICHARD F. BEERS, JR.

Richard F. Beers, Jr.
Senior Area Engineer

Enclosure

cc:
J. Lau, NYSDOT Region 11 Design Supervisor
T. Sanyal, NYSDOT Region 11
R. Davies, FHWA

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

OCT 24 2014

Mr. Richard Beers, P.E.
Senior Area Engineer
Federal Highway Administration
Leo O'Brien Federal Building
Room 719
Clinton Ave and N. Pearl Street
Albany, NY 12207

Re: PIN X776.00 and PIN X770.14 East Midtown Waterfront Esplanade and Greenway

Dear Mr. Beers,

We have completed an Endangered Species Act (ESA) section 7 consultation in response to a letter received June 25, 2014 and further information received through October 1, 2014 regarding the above-referenced proposed project. We concur with your determination that the proposed project may affect, but is not likely to adversely affect, any species listed as threatened or endangered by us under the ESA of 1973, as amended. Our supporting analysis is provided below.

Proposed Project

The applicant, New York State Department of Transportation (NYSDOT), has requested Federal Highway Administration (FHWA) authorization to construct the East Midtown Waterfront Esplanade (EMWE) in the East River, a tidal strait connecting Long Island Sound to New York Harbor, in Williamsburg, Borough of Brooklyn, Kings County, New York. The proposed project will construct a 0.96-mile long esplanade and greenway along the Manhattan side of the East River. The entire EMWE structure will be offset by approximately 30 feet from the bulkhead bordering the Franklin D. Roosevelt (FDR) Drive from East 41st Street to East 60th Street. The proposed esplanade will be divided into two sections: the United Nations (UN) Esplanade and the Outboard Detour Roadway (ODR) Esplanade. Construction of the two esplanades will be separated by at least 4 years. It is anticipated that permits or authorizations will also be necessary from the U.S. Army Corps of Engineers, New York District. FHWA is the lead Federal agency for this section 7 consultation.

The UN Esplanade will encompass three acres of total area and will be supported by 92, 48-inch diameter hollow steel piles that are 64 feet long with a 5/8-inch thick wall. The ODR Esplanade will encompass two acres of total area and will be supported by 84 hollow steel piles (37 54-inch diameter piles and 47 24-inch diameter piles) that are 30 feet long with a 5/8-inch thick wall (See Table 1).

In total, the proposed EMWE structure will require 176 hollow steel piles that will be filled with approximately 160 cubic feet of grout/concrete each, once installed. The piles will be installed every 100 feet in rows of 2's and 3's to support the esplanade. According to NYSDOT's May 2014 Environmental Assessment (EA), all of the 24-inch and 54-inch diameter piles as well as 58 of the 92 48-inch diameter piles associated with the project will be drilled into the bedrock with rock sockets while the remaining 34 48-inch diameter piles will be installed by using a vibratory hammer for 15 minutes before seating the piles into the bedrock with an impact hammer (FHWA, 2014). The applicant estimates that approximately 200 impact hammer strikes (requiring up to 20 minutes to complete) will be needed to seat the piles. However, the applicant has stated that, depending on project site conditions, these pile installation plans are subject to change. Recent conservative projections given to us by the applicant estimate that, if project site conditions are determined to be suboptimal, up to 100 of the piles will need to be installed using the vibratory hammer/impact hammer procedure described above. Given this updated estimate of pile installation methods, we are analyzing the worst-case scenario in which a total of 100 piles are installed via vibratory hammer/impact hammer. For the purposes of this analysis, we will assume these 100 piles will include the largest piles associated with the project (i.e., all 37 54-inch diameter piles and 63 of the 92 48-inch diameter piles) because installation of larger piles is louder than smaller piles. Thus, in the scenario analyzed here, all 47 24-inch diameter piles and 29 of the 92 48-inch diameter piles will be installed via the drilling method (Table 1).

Table 1. Proposed EMWE pile characteristics

Structure	**Pile Type**	**Pile Diameter**	**Quantity***	**Installation Method***
UN Esplanade	Hollow steel	48-inch	29	Drilling
		48-inch	63	Vibratory Hammer/Impact Hammer
ODR Esplanade	Hollow steel	24-inch	47	Drilling
		54-inch	37	Vibratory Hammer/Impact Hammer

*As detailed above, our analysis of the effects of pile installation will assume a worst-case scenario with regards to the pile installation methods.

For each of the two sections of the EMWE structure (i.e., the UN Esplanade and the ODR Esplanade), pile installation is expected to take place over the course of a continuous three month period, using two crews working 8 hour work days. The applicant estimates that up to 3 piles will be installed per day and pile installation will occur up to 4 times per week. Vessel traffic associated with the EMWE project would be limited to up to 10 vessels. Vessels are expected to be moored during the majority of project construction, only moving short distances when a positional readjustment is needed.

The additional shading and coverage areas created by the proposed EMWE structure discussed above are considered project debits by the New York State Department of Environmental Conservation (DEC). In order to offset these project debits, the DEC requires the applicant to restore an approximately equal amount of littoral zone and benthic habitat near the project site (i.e., within 10 miles), as will be lost during the EMWE project (i.e., approximately 5 acres). These restoration efforts are known as "project-related improvements." Specifically, to offset the project debits incurred from the ODR Esplanade, the applicant has proposed the following pier, dock, and building removals listed below. The projects and/or mechanisms to offset the project debits associated with the UN Esplanade have not yet been determined.[1]

- Removal of the pier at East 74th Street in Manhattan. The pier is located 1 mile from the proposed EMWE construction site.
- Removal of a collapsed building that has collapsed over the water at the Cromwell Center on Staten Island. The site is located 9.3 miles from the EMWE construction site.
- Removal of the coal dock at North Brother Island in the East River within the Bronx Borough. The site is located 4.2 miles from the EMWE construction site.
- Partial removal of the Bush Terminal Pier 5 and Pier 7 in the Brooklyn Borough within New York Harbor's Upper Bay (henceforth referred to as the Upper Bay). The site is located 6.4 miles from the EMWE construction site.

Both the removal of the East 74th Street pier and the collapsed building at the Cromwell Center have already been completed and will not be considered further in this consultation. Therefore, this consultation will consider the effects of the removal of the coal dock at North Brother Island and the partial removal of the two Bush Terminal piers. If any additional project-related improvements associated with the EMWE project are proposed, further consultation may be necessary.

The construction equipment that will be used for the removal of the dock at North Brother Island and the Bush Terminal piers include: moored barges, a crane, and a backhoe. A backhoe is very similar to a mechanical dredge but is often used for excavation purposes. While the exact location and/or construction methodology for these projects have not been finalized, the applicant has stated that no pile driving with an impact hammer, release of hazardous materials, or production of large sediment plumes will result from structure removals associated with project-related improvements.

Description of the Action Area

The proposed EMWE project is located on the western edge of the East River. The East River is a 16-mile long tidal strait that separates Manhattan from the boroughs of Queens and Brooklyn and connects the Upper New York Harbor (i.e., the Upper Bay) and the western portion of the Long Island Sound. Roosevelt Island is a 3-mile long, 0.15-mile wide island that lies within the East River between Manhattan and Queens, running from East 46th Street to East 85th Street. Due to Roosevelt Island, the narrowest point of the project site within the East River is 900 feet wide. The East River at the EMWE project site is deep (i.e., between 15-40 feet at the site of construction, up to 70 feet within the action area) and subject to strong currents (i.e., greater than 2 knots). The habitat at the EMWE project site is characterized by rock and cobblestone substrate, the absence of submerged aquatic vegetation (SAV), and limited benthic invertebrates.

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[1] The DEC has stated that additional credits to offset the debits created by the UN Esplanade can be provided through three possible options: 1) additional off-site removals; 2) mitigation bank (when available); or 3) in-lieu fee arrangement (when available).

The sites of the proposed project-related improvements (i.e., dock and pier removals) include shoreline areas with depths of up to 72 feet on North Brother Island within the East River and in the Bush Terminals in Brooklyn bordering the Upper Bay. While forage material is expected to be extremely limited within the vicinity of the Bush Terminal piers, forage material such as benthic invertebrates could be found within the vicinity of North Brother Island. No SAV is present at either site.

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR § 402.02). For this action, the action area consists of the project footprint of the EMWE and the project-related improvements, the area used by the project's vessels, and the surrounding waters of the East River and Upper Bay where the effects of pile driving/drilling and structure removal (e.g. increases in suspended sediment, underwater noise levels) will be experienced. Analysis of pile driving/drilling activities (i.e., the type and size of the piles to be driven) indicates that effects of increased underwater noise from pile driving (the loudest activity considered here) will be experienced up to a maximum of a 328-foot radius from the pile being driven (Illingworth and Rodkin, Inc. and Jones and Stokes 2009). Based on the best available information, removing in-water structures with a backhoe will produce suspended sediment plumes similar to those produced by mechanical dredging operations (i.e., turbidity plumes with a 4,921-foot radius from the source (Burton 1993, ACOE 2007)). Thus, the action area is the project footprint, the area within a 328-foot radius of the piles being driven, the area within a 4,921-foot radius of the in-water structures being removed via backhoe, and all movements made by the project's vessels while construction is underway. This area is expected to encompass all of the direct and indirect effects of the proposed project.

NMFS Listed Species in the Action Area

Sea Turtles

Four species of federally threatened or endangered sea turtles under our jurisdiction are found seasonally in the coastal waters of New York: the federally threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead (*Caretta caretta*), and the federally endangered Kemp's ridley (*Lepidochelys kempi*), green (*Chelonian mydas*) and leatherback (*Dermochelys coriacea*) sea turtles. In general, listed sea turtles are seasonally distributed in coastal U.S. Atlantic waters, migrating to and from habitats extending from Florida to New England, with overwintering concentrations in southern waters. As water temperatures rise in the spring, these turtles begin to migrate northward. As temperatures decline rapidly in the fall, turtles in northern waters begin their southward migration. Sea turtles are expected to be in New York waters in warmer months, typically when water temperatures are at least 15°C. This typically coincides with the months of May through November, with the highest concentrations of sea turtles present from June-October (Morreale 2003; Morreale and Standora 2005; Shoop and Kenney 1992).

The action area (encompassing both the East River and the Upper Bay) has depths of approximately 15 to 72 feet, making it consistent with the depths likely to be used by sea turtles in New York waters (i.e., 16-49 feet). However, the majority of the action area contains only suboptimal foraging habitat for sea turtles. With the exception of a small area near North Brother Island, the bottom substrate of both the East River and the Upper Bay consists of cobblestones and bedrock with no sandy sediment, no SAV, and very limited benthic invertebrates. Additionally, studies in New York waters have indicated that sea turtles mainly occur in areas where waters are slow-moving or still (i.e., less than 2 knots) (Ruben and Morreale, 1999). In contrast, the average speed of flow in the East River has been found to be greater than 2 knots. Furthermore, Ruben and Morreale (1999) demonstrated that the habitats found in the New York Bight complex, including the East River and the Upper Bay, were considered only marginally suitable for listed sea turtles. These findings are supported by the lack of evidence of sea turtles in the East River. Based on these factors, we conclude that sea turtles will not occur in the East River or in the Upper Bay. Thus, ESA-listed sea turtles will not occur in the action area and will not be considered further in this consultation.

Shortnose Sturgeon

Shortnose sturgeon (*Acipenser brevirostrum*) occur in the Hudson River from upper Staten Island in the Upper Bay to the Troy Dam (approximately river kilometer [rkm] 245). Due to the distance from shortnose sturgeon spawning grounds in the Hudson River (i.e., greater than 200 km downstream of the action area) and the higher salinity of the action area, shortnose sturgeon eggs and larvae will not occur in any part of the action area. Only subadult or adult shortnose sturgeon may be present in the East River or the Upper Bay, as discussed below.

Presence in the East River

There have been no documented captures of shortnose sturgeon in the East River; however, shortnose sturgeon have been captured near the confluence of the East River and New York Harbor and at least two shortnose sturgeon that were tagged in the Hudson River have been recaptured in the Connecticut River (SSSRT, 2010). As there have been no documented captures of shortnose sturgeon in the area where the East River converges with Long Island Sound, it is unknown whether these fish traveled through the East River through Long Island Sound (the most direct route) or exited New York Harbor into the Atlantic Ocean and swam around southern Long Island and back into Long Island Sound. Thus, while the East River is not a high use area for shortnose sturgeon and there have been no documented captures of shortnose sturgeon in the East River, given the known distribution of shortnose sturgeon in nearby waters, occasional transient shortnose sturgeon may be present in the East River.

Any shortnose sturgeon present in the East River are likely to be migrating and possibly foraging opportunistically. While migrating, subadult and adult shortnose sturgeon are typically found in the deepest areas of a river or channel with suitable dissolved oxygen levels. Foraging shortnose sturgeon are often found in shallower waters if suitable forage is present. Foraging often occurs within mudflats at, or near, areas with SAV or shellfish resources. While no part of the action area has SAV, the shoreline surrounding North Brother Island in the East River (the site of a project-related improvement) may contain benthic invertebrate resources. Therefore, we expect occasional transient (and opportunistically foraging) shortnose sturgeon to be present within the East River.

Presence in the Upper Bay

One of the proposed project-related improvements associated with the EMWE project is the removal of two piers within the Upper Bay of New York Harbor near the Bush Terminals. While shortnose sturgeon are known to be present in the Upper Bay, habitat conditions make the use of the Bush Terminals area by shortnose sturgeon extremely unlikely.

Atlantic Sturgeon

There are five DPSs of Atlantic sturgeon listed as threatened or endangered. Atlantic sturgeon originating from the New York Bight, Chesapeake Bay, South Atlantic, and Carolina DPSs are listed as endangered, while the Gulf of Maine DPS is listed as threatened. The marine range of all five DPSs extends along the Atlantic coast from Canada to Cape Canaveral, Florida and includes the action area.

Atlantic sturgeon spawn in their natal river, with spawning migrations generally occurring during February-March in southern systems, April-May in Mid-Atlantic systems, and May-July in Canadian systems (Murawski and Pacheco 1977; Smith, 1985; Bain 1997; Smith and Clugston 1997; Caron *et al.* 2002). Young remain in the river/estuary until approximately age 2 and at lengths of 30-36 inches before emigrating to the open ocean as subadults (Holland and Yelverton 1973; Dovel and Berggren 1983; Dadswell 2006; ASSRT 2007). After emigration from their natal river/estuary, subadults and adult Atlantic sturgeon travel within the marine environment, typically in waters between 16 to 164 feet in depth, using coastal bays, sounds, and ocean waters (Vladykov and Greeley 1963; Murawski and Pacheco 1977; Dovel and Berggren 1983; Smith 1985; Collins and Smith 1997; Welsh et al. 2002; Savoy and Pacileo 2003; Stein et al. 2004; Laney et al. 2007; Dunton et al. 2010; Erickson et al. 2011). No eggs, larvae, or juvenile Atlantic sturgeon will occur anywhere within the action area because Atlantic sturgeon spawn in freshwater portions of large rivers and early life stages are not tolerant of salinity. Furthermore, Atlantic sturgeon do not overwinter in the East River or the Upper Bay. Therefore, adult and subadult Atlantic sturgeon from any of the five DPSs will only occur in the action area from April through November.

Presence in East River

No studies targeting Atlantic sturgeon have been carried out in the East River. Dunton et al. (2011) tagged 66 Atlantic sturgeon off the south coast of Long Island in May 2011. During the summer of 2011, two of these tagged individuals were detected on acoustic receivers deployed in the East River. While this information confirms that Atlantic sturgeon occur in the East River, we currently have no estimates of the number of Atlantic sturgeon that are likely to occur in the East River generally or during any particular time of the year. Regardless, the East River may be used as sturgeon migrate between spawning, overwintering, and/or foraging sites along the East Coast. Therefore, we expect transient (and opportunistically foraging) subadult and adult Atlantic sturgeon to occur throughout the East River, including areas near the EMWE and North Brother Island.

Presence in the Upper Bay

Subadult and adult Atlantic sturgeon will also occur within the Upper Bay as they migrate in and out of the Hudson River. However, since the Bush Terminals project site is highly industrialized and only supports a very limited amount of forage for Atlantic sturgeon (i.e., benthic invertebrates), Atlantic sturgeon in the Upper Bay are extremely unlikely to be present at the Bush Terminals site.

Effects of the Action

Pile Driving

Pile driving can cause effects to hearing and air containing organs of fish, such as the swim bladder and lungs. Effects to fish can range from temporary avoidance of an area to death due to injury of internal organs. The type and size of the pile, type of installation method (i.e., vibratory hammer, impact hammer, etc.), type and size of the animal (smaller animals are often more sensitive), and distance from the sound source all contribute to the likelihood of effects to an individual. Generally, the larger the pile and the closer an animal is to the pile, the greater the likelihood of effects. The proposed EMWE construction will involve the installation of 176 new hollow steel piles (37 54-inch piles, 92 48-inch piles, and 47 24-inch piles). We have assumed a worst-case scenario where a total of 100 piles (i.e., 37 54-inch piles and 63 48-inch piles) will be installed with a vibratory hammer and seated with an impact hammer while the remaining piles (i.e., 29 48-inch piles and 47 24-inch piles) will be drilled into the bedrock (See Table 1). Pile installation will involve two crews working 8-hour days for up to 3 months for each section of the EMWE. The applicant estimates that up to 3 piles will be installed per day and pile installation will occur up to 4 times per week. Piles installed with a vibratory hammer will require 15 minutes of vibratory hammer use to install the pile and 200 blows via impact hammer (i.e., requiring up to 20 minutes) to seat the pile.

Based on published measurements of underwater noise during pile installation (i.e., Table I.2-3 *in* Illingworth and Rodkin, Inc. and Jones and Stokes, 2009), Table 2 describes the most conservative analog to the project plans. Table 2 estimates the average underwater noise levels produced by the installation of 66-inch diameter CIDH (i.e., hollow) steel piles in approximately 13 feet of water using an impact hammer during the Richmond-San Rafael Bridge construction in San Rafael, California. Table 2 displays the noise levels for the impact hammer method as well as values that have been adjusted for the decibel levels produced by vibratory hammers, which are expected to be approximately 10 dB below the noise levels produced by impact hammers (Illingworth and Rodkin, Inc. and Jones and Stokes, 2009). The estimates in Table 2 likely overestimate the noise that will be produced from driving the smaller piles that will be used in the EMWE project (i.e., 24, 48, or 54-inches in diameter) in the deeper waters found in the action area (i.e., 15-40 feet) because noise will be lower for smaller diameter piles. This analysis represents the worst-case scenario that the effects from the EMWE pile driving operation pose. The estimated underwater noise levels (i.e., Peak, Root Mean Square (RMS), Sound Exposure Level (SEL), and Cumulative Sound Exposure Level (cSEL)) are taken from a distance of 33 feet, using data provided in Illingworth and Rodkin, Inc. and Jones and Stokes (2009).[2]

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[2] **Peak sound pressure level**: the largest absolute value of the instantaneous sound pressure and is expressed as dB re: 1 μPa_{Peak}.

Root Mean Square (RMS) pressure: the square root of the average squared pressures over the duration of a pulse; most pile-driving impulses occur over a 50 to 100 millisecond (msec) period, with most of the energy contained in the first 30 to 50 msec (Illingworth and Rodkin, Inc. and Jones and Stokes, 2009). Therefore, RMS pressure levels are generally "produced" within seconds of the pile driving operations and represent effective pressure and its resultant intensity (in dB re: 1 μPa_{RMS}) produced by a sound source.

Table 2: Estimated average underwater noise levels produced at 33 feet by the driving of hollow steel piles[3]

Pile Type	Hammer Type	Estimated Peak Noise Level (dB_{Peak})	Estimated RMS Pressure Level (dB_{RMS})	Estimated Sound Exposure Level (SEL)
66-inch hollow steel piles	Vibratory	200	185	175
66-inch hollow steel piles	Impact	210	195	185

Criteria for Assessing the Potential for Physiological Effects of Sound on Fish

The Fisheries Hydroacoustic Working Group (FHWG) was formed in 2004 and consists of biologists from NMFS, USFWS, FHWA, and the California, Washington and Oregon DOTs, supported by national experts on sound propagation activities that affect fish and wildlife species of concern. In June 2008, the agencies signed an MOA documenting criteria for assessing physiological effects of pile driving on fish. The criteria were developed for the acoustic levels at which physiological effects to fish could be expected. It should be noted that these levels represent the onset of physiological effects (Stadler and Woodbury, 2009), and not levels at which fish are necessarily mortally damaged. These criteria were developed to apply to all species, including listed green sturgeon, which are biologically similar to Atlantic and shortnose sturgeon and for these purposes can be considered a surrogate. The interim criteria are listed below and summarized in Table 3.

- Peak SPL: 206 decibels relative to 1 micro-Pascal (dB re 1 μPa).
- cSEL: 187 decibels relative to 1 micro-Pascal-squared second (dB re 1μPa^2-s) for fishes above 2 grams (0.07 ounces).
- cSEL: 183 dB re 1μPa^2-s for fishes below 2 grams (0.07 ounces).

Sound Exposure Level (SEL): the constant sound level over one second that has the same amount of acoustic energy, as indicated by the square of the sound pressure, as the original sound (expressed as dB re: 1 μPa^2•sec).

Cumulative SEL (cSEL): the energy accumulated over multiple strikes over a period of time; the cSEL value is not a measure of the instantaneous or maximum noise level, but it is a measure of the accumulated energy over a period of time to which an animal is exposed during any kind of signal. For operations with an impact hammer, the rapidity with which the cSEL accumulates depends on the level of the single strike SEL, the number of piles being installed, and the total number of pile strikes it takes to install the pile under consideration. The actual level of accumulated energy (cSEL) is the logarithmic sum of the total number of single strike SELS. Thus, cSEL (dB) = Single-strike SEL + 10 Log (N); where N is the number of pile strikes (Bastasch *et al.* 2008; Stadler and Woodbury 2009).\

[3] Values were calculated from measurements taken 10 meters away from the pile driving operation during the Richmond-San Rafael Bridge construction (Table I.2-3 *in* Illingworth and Rodkin, Inc. and Jones and Stokes 2009).

At this time, this criteria represents the best available information on the thresholds at which physiological effects to sturgeon from impulsive sounds are likely to occur. The swim bladder of sturgeon is relatively small compared to other species (Beregi et al. 2001). While there are no data that correlate effects of noise on fishes and swim bladder size, the physiological effects of impulsive noises on sturgeon may actually be less than on other species due to the small size of their swim bladder. It is important to note that physiological effects may range from minor injuries from which individuals are anticipated to completely recover with no impact to fitness to significant injuries that will lead to death. The severity of injury is related to the distance from the sound source and the duration of exposure; therefore, the closer to the source and the greater the duration of the exposure, the higher likelihood of significant injury.

Based on the available information, we consider the potential for physiological effects upon exposure to noise of 206dB re 1 μPa peak and 187 dB re 1 μPa^2-s cSEL (Table 3). Use of the 183 dB re 1 μPa^2-s cSEL threshold is not appropriate for this consultation because all sturgeon in the action area will be larger than 2 grams. As explained here, physiological effects could range from minor injuries that a fish is expected to completely recover from with no impairment to survival to major injuries that increase the potential for mortality, or result in death.

Available Information for Assessing Behavioral Effects
In order to be detected, a sound must be above the "background" level. Additionally, results from some studies suggest that sound may need to be biologically relevant to an individual to elicit a behavioral response. We are currently aware of only one study that has examined sturgeon behavior during pile driving. A monitoring plan is currently being implemented at the Tappan Zee Bridge replacement project (Hudson River, New York) using acoustic telemetry receivers to examine the behavior of acoustically tagged sturgeon. All available information to date indicates that sturgeon respond behaviorally as predicted (i.e., they demonstrate avoidance behavior during impact pile driving) (AKRF and Popper (2012a, 2012b)).

Given the available information from studies on other fish species (see Plachta and Popper 2003, Doksaeter *et al.* 2009, Mueller-Blenke *et al.* 2010, Feist 1991) we consider 150 dB_{RMS} to be a <u>conservative</u> indicator of the noise level at which there is the potential for behavioral effects, provided the operational frequency of the source falls within the hearing range of the fish species of concern (Table 3). That is not to say that exposure to noise levels of 150 dB re 1 μPa RMS will always result in behavioral modifications or that any behavioral modifications will rise to the level of "take" (i.e., harm or harassment) but that there is a potential, upon exposure to noise at this level, to experience some behavioral response. We expect that behavioral responses could range from a temporary startle to avoidance of an area with disturbing levels of sound. The effect of any anticipated response on individuals will be considered in the effects analysis below.

Table 3. Summary of estimated noise levels with potential to cause physiological or behavioral effects to shortnose sturgeon or Atlantic sturgeon.

Species Group	**Physiological Effects***	**Behavioral Effects**
Sturgeon	206 dB_{Peak} <u>and</u> 187 dB_{cSEL}	150 dB_{RMS}

**Dual Criteria.*

Underwater Impact Calculations
As the distance from the source increases, underwater noise levels produced by pile driving dissipate rapidly. Based on a conservative estimate derived from attenuation rate data published in Table I.2-3 in Illingworth and Rodkin Inc. and Jones and Stokes 2009, we expect underwater noise levels will attenuate approximately 5 dB every 33 feet for steel piles.

The Practical Spreading Loss Model is often used to calculate underwater noise impacts and the distance at which a specific cSEL value is attained. However, as this model is not appropriate for this action area, we have considered an alternative means to establish a distance from a pile where noise levels with the potential to cause physiological effects to fish could be experienced.[4] NMFS recognizes that a SEL below 150 dB will not contribute to the overall cSEL because it has virtually no effect on fish; that is, it will never accumulate to levels reaching 187 dB_{cSEL} and thus was deemed the level of "effective quiet" (Stadler and Woodbury 2009). Therefore, the distance from the pile to where the SEL level drops to 150 dB is the maximum distance from a pile that a fish may be physiologically impacted, regardless of how many times the pile is struck or how long the pile is vibrated (i.e., at X feet from a pile, SEL=150 dB; thus, further than X feet from a pile, there is no potential for physiological effects) (Stadler and Woodbury 2009). Calculating this distance, therefore, allows us to establish the size of the area near the pile where physiological effects could be experienced, with any fish outside of the 150 dB isopleth not expected to be exposed to noise levels with the potential to cause physiological effects to fish.

Table 4: Estimated Distances to Physiological and Behavioral Effects Thresholds for Shortnose Sturgeon and Atlantic Sturgeon

Pile Type	**Hammer Type**	**Distance (feet) to 206 dB_{peak}****	**Distance (feet) to SEL of 150 dB re: $1\mu Pa^2 \cdot sec$****	**Distance (feet) to 150 dB_{RMS}****
66-inch hollow steel piles*	Vibratory	Not reached	197 feet	262 feet
66-inch hollow steel piles*	Impact	60 feet	262 feet	328 feet

*Worst-case scenario for the 54-inch and 48-inch piles to be installed via vibratory hammer/impact hammer.
**Calculated by NMFS based on reported Peak, SEL, and RMS levels 10 meters from the pile driving operation conducted during the construction of the Richmond-San Rafael Bridge in San Rafael, California (Table I.2-3 *in* Illingworth and Rodkin Inc. and Jones and Stokes 2009).

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[4] The Practical Spreading Loss Model is based on geometric spreading and assumes that sound propagation is occurring within an open water ecosystem (e.g., middle of the ocean), unbound by geographic features, such as shorelines. This model does not consider important physical factors or features of the aquatic and surrounding environment, such as temperature, bottom topography, depth, or geography of the affected area (e.g., presence of landmasses or shorelines within the affected water body), that are known to greatly affect the propagation/attenuation of sound in water (Bastasch et al. 2008; e.g., 78 FR 29705, May 21, 2013). We find that the Practical Spreading Loss Model overestimates the distance at which underwater noise levels are reached in environments such as rivers or narrow bays that are not "open water" (Bastasch et al. 2008). Due to the nature of the model, any estimates obtained are unrealistically large and thus do not appropriately represent the acoustic footprint of an action in a confined, non-open ocean environment.

Physiological Effects to Shortnose Sturgeon and Atlantic Sturgeon

As described above, exposure to underwater noise levels greater than 206 dB_{Peak} and 187 dB_{cSEL} can result in physiological impacts to sturgeon. While the 206 dB_{Peak} level will not be reached while a pile is being installed via vibratory hammer, it may be reached while a pile is being seated via impact hammer (See Table 4). Therefore, if an Atlantic sturgeon was within 60 feet of a pile being seated, it could experience physiological effects from the noise produced during a single strike of the pile. However, it is extremely unlikely that any transient sturgeon in the area will be present within 60 feet of a pile at the start of the pile seating procedure because each 206 dB_{Peak} isopleth will be very small relative to the size of the East River (i.e., each isopleth will be 120 feet in diameter while the narrowest width of the East River is 900 feet) and short-lived (i.e., lasting up to 20 minutes). Therefore, it is extremely unlikely that any sturgeon will be exposed to peak noise levels exceeding 206 dB_{Peak}.

The 187 dB_{cSEL} criteria for injurious levels of cumulative noise would be met within the 197-foot 150 dB SEL isopleth produced while the vibratory hammer is used (and within the 262-foot 150 dB SEL isopleth produced while the impact hammer is used). In order to reach the 187 dB_{cSEL} threshold, a sturgeon would need to remain within 197/262 feet of the pile being driven/seated, respectively, for the entirety of each pile installation period (i.e., 15 to 20 minutes). The presence of sturgeon in the East River is expected to be limited to occasional transients. In the unlikely event that a sturgeon is near the pile when pile installation begins, we expect the noise generated at the start of pile driving will cause that sturgeon to leave the area (see assessment of behavioral impacts below). As such, it is extremely unlikely that a sturgeon would stay close enough to a pile during pile driving to be exposed to enough pile driving noise to cause physiological effects to the sturgeon. That is, it is extremely unlikely that a sturgeon would remain within 197/262 feet of any pile being installed/seated for the duration of the procedure. Thus, based on the best available information, it is extremely unlikely that any sturgeon will be exposed to underwater noise that could result in physiological effects. The potential for physiological effects to Atlantic sturgeon or shortnose sturgeon resulting from the noise effects of steel pile installation is discountable.

Behavioral Effects to Atlantic Sturgeon

Based on the information presented in Table 4, underwater noise levels are expected to be below 150 dB_{RMS} at distances beyond approximately 262 feet from the piles being installed via vibratory hammer and beyond approximately 328 feet from the piles being seated via impact hammer. Should a sturgeon move into the action area where the 150 dB_{RMS} isopleth extends, it is reasonable to assume that the sturgeon, upon detecting underwater noise levels of 150 dB_{RMS}, will modify its behavior and redirect its course of movement away from the ensonified area and, therefore, away from the project site. Similarly, any sturgeon that is near the piles at the start of pile driving is expected to swim away from the piles to avoid any area with potentially disturbing levels of noise. If any movements away from the ensonified area do occur, it is extremely unlikely that these movements will amount to measurable or detectable changes to essential sturgeon behaviors (e.g., migrating to and from spawning, overwintering and foraging grounds) because the change in behavior will be limited to the avoidance of a very small area. The width of the East River at the narrowest point of the project site is approximately 900 feet and the maximum extent of the 150 dB_{RMS} isopleth will be no greater than 328 feet from any pile installed. Thus, the extent of the ensonified area will not present a barrier to sturgeon movements during any period of pile installation. As such, pile driving noise effects on shortnose sturgeon and Atlantic sturgeon behavior are insignificant.

Noise Associated with Drilling Operations

Seventy six of the 176 new piles to be installed during the construction of the EMWE will be drilled into the bedrock of the East River. Based on the best available information on drilling operations, regardless of pile size, source/peak levels for underwater geotechnical drills have been estimated to range from 118 to 145 dB re $1\mu Pa_{Peak}$ (approximately 120 dB re $1\mu Pa_{SEL}$ and 130 dB re $1\mu Pa_{RMS}$)[5] three feet from the source, with underwater noise levels decreasing to 101.5 dB re 1μPa at 492 feet from the source (76 FR 80893; Fishermen's Energy of New Jersey, LLC 2009). Thus, underwater noise levels produced during drilling operations are below levels that could cause physiological or behavioral effects to sturgeon (see Table 3). Therefore, there will be no effect to sturgeon exposed to noise generated by the drilling of 76 hollow steel piles in the East River.

Water Quality Effects of Pile Installation

The installation of piles will disturb bottom sediments and may cause a temporary increase in suspended sediment in the action area around the EMWE structure. Available information indicates that pile driving activities will produce turbidity levels of less 50 mg/L, with concentrations of total suspended solids (TSS) reaching levels approximately 5 to 10 mg/L above background levels (i.e., 1.0 to 2.0 mg/L) within a few hundred feet of the pile being driven (FHWA 2012). The small resulting sediment plume is expected to settle out of the water column within a few hours, especially considering the strong currents found in the East River. Studies of the effects of turbid water on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). The TSS levels expected for pile driving (5.0 to 10.0 mg/L above background levels) are below those shown to have an adverse effect on fish (580 mg/L for the most sensitive species, with 1,000 mg/L more typical; see summary of scientific literature in Burton 1993) and their benthic communities (390 mg/L (EPA 1986)).

Because the resulting increase in suspended sediment concentrations from pile installation are not toxic to sturgeon, are extremely unlikely to result in reductions in the quality or quantity of sturgeon prey, will settle out of the water column within a few hours, and will be small relative to background levels of TSS in the East River, suspended sediment from the EMWE project is extremely unlikely to disrupt any essential sturgeon life functions conducted in the East River. Based on the best available information, we conclude that the effects on shortnose sturgeon and Atlantic sturgeon from suspended sediment resulting from pile driving activities are discountable.

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[5] Note, SEL and RMS values are estimates. The following equations were used to provide these estimates: SEL=peak pressure-25; RMS=peak pressure-15 (developed by J. Stadler and D. Woodbury for NMFS pile driving calculations; see http://www.dot.ca.gov/hq/env/bio/fisheries_bioacoustics.htm). Additionally, based on a NMFS equation to estimate cSEL levels for continuous noise sources: $cSEL=dB_{RMS} - 10\log$ (duration of the sound source) (pers. comm., Amy Scholik, NMFS Protected Resources Acoustic Coordinator, email dated 4/26/2013), estimated cSEL levels will be below 187 dBcSEL at any distance from the drill, regardless of the duration of the noise produced by drilling operations.

Habitat Modification

The proposed EMWE structure would add approximately 5 acres of shading to the area. As the project area is not a known foraging area and has no SAV or shellfish beds, sturgeon may use the area to forage opportunistically, but will not rely on it as a major source of prey. Therefore, the alteration of habitat (i.e., increased shading) due to this project is not expected to result in a reduction in the availability or accessibility of prey resources relied upon by sturgeon. Furthermore, the addition of the new EMWE structure is extremely unlikely to alter the habitat in any way that prevents sturgeon from using the action area as a migratory pathway to other areas that may be more suitable for foraging. Based on this information, the effects of habitat modification from this project on shortnose sturgeon and Atlantic sturgeon will be discountable.

Pier and Dock Removals

The DEC has required the applicant to offset the project "debits" (i.e., habitat modification effects such as increased shading and alteration of benthic habitat caused by the installation of the EMWE) with project "credits," referred to as project-related improvements. Project-related improvements include removing structures such as docks and piers near the EMWE project in order to decrease shading and increase available benthic habitat in the area. The proposed pier/dock removals in the Bush Terminal and on North Brother Island will involve using a backhoe attached to a moored barge and crane. A backhoe is a highly accurate and localized mode of mechanical dredging that is similar to an excavator used to remove in-water structures. Thus, backhoe operations associated with this project will produce suspended sediment plumes similar to those produced by mechanical dredging operations. Therefore, the turbidity plume associated with the backhoe operation will extend a maximum of a 4,921 foot radius from the site of construction (Burton 1993, ACOE 2007). Turbidity levels associated with these sediment plumes typically range from 26-350 mg/L (ACOE 2007, Anchor Environmental 2003), with the highest levels detected adjacent to the site of the backhoe operation and concentrations decreasing with greater distance from the site of impact (ACOE 2007).

As mentioned above, concentrations of TSS can reach thousands of milligrams per liter before an acute toxic reaction is expected in fish (580 mg/L for the most sensitive species, with 1,000 mg/L more typical; see summary of scientific literature in Burton 1993). Therefore, TSS levels will not reach levels that are toxic to sturgeon. Sturgeon may avoid areas with high TSS; however, any change in behavior is likely to be undetectable as it will only involve minor movements to alter course out of the sediment plume. Furthermore, any impacts to forage will be temporary, as recolonization is expected to begin in as little as a month, with the impacted area expected to be completely recolonized within approximately 12 months (Guerra-Garcia and Garcia-Gomez, 2006). Thus, based on the best available information, the effects of suspended sediment resulting from project-related improvements on Atlantic sturgeon and shortnose sturgeon will be insignificant and discountable. The effects of the vessel traffic associated with the project-related improvements are discussed below. No other effects to listed species are expected to occur as a result of the two proposed dock/pier removals.

Vessel Traffic

Shortnose sturgeon and Atlantic sturgeon can be injured or killed as a result of being struck by boat hulls or propellers. The factors relevant to determining the risk to these species from vessel strikes vary, but may be related to the size and speed of the vessels, navigational clearance (i.e., depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of individuals in the area (i.e., foraging, migrating, etc.).

While there will be up to 10 active vessels used during the EMWE construction and up to 3 vessels used during the pier/dock removals, most will be tugboats and barges. Tugboat movement will be contained within the EMWE work area (i.e., less than 100 acres). All the barges associated with the proposed projects will remain stationary unless they need to be repositioned. Thus, the vessels associated with the proposed actions will result in a small, temporary increase in vessel traffic within the East River and the Upper Bay. As mentioned above, shortnose and Atlantic sturgeon are more vulnerable to being struck in shallow water by faster moving vessels with deep drafts. In contrast, the project sites are deep (i.e., 15-72 feet deep), the barges and tugboats have shallow drafts, and they will travel at slow speeds (i.e., less than 2 knots). Thus, the project conditions give listed species ample space and time to avoid any interaction with project vessels and it is extremely unlikely that any shortnose sturgeon or Atlantic sturgeon will interact with the project's barges or tugboats during the proposed actions. Based the best available information, any effects to shortnose sturgeon or Atlantic sturgeon from the temporary increase in vessel traffic from these projects will be discountable.

Essential Fish Habitat Comments

Essential Fish Habitat (EFH) has been designated in the project area. The Magnuson Stevens Fishery Conservation and Management Act (MSA) requires federal agencies such as Federal Highway Administration, to consult us on any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect EFH identified under the MSA. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments, lists the required contents of EFH assessments, and generally outlines each agency's obligations in this consultation procedure. This process is also separate and distinct from any consultation or coordination under the ESA. Based upon the information provided, it appears the proposed project will affect EFH adversely and EFH consultation is required.

For a listing of EFH and further information on the EFH consultation process, please go to our website at: www.greateratlantic.fisheries.noaa.gov/habitat. If you wish to discuss this further, please call Melissa Alvarez of the Habitat Conservation Division at 732-872-3116 or e-mail melissa.alvarez@noaa.gov.

Conclusions

Based on the analysis that any effects to listed species will be insignificant or discountable, we concur with your determination that the proposed project is not likely to adversely affect any listed species under NMFS jurisdiction. Therefore, no further consultation pursuant to section 7 of the ESA is required.

Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, reinitiation would be required. Should you have any questions about this correspondence, please contact Daniel Marrone at 978-282-8465 or by email (daniel.marrone@noaa.gov).

Sincerely,

for John K. Bullard
Regional Administrator

Ec: Schnettler, NMFS/PRD
Alvarez, NMFS/HCD

File Code: Section7/Nonfisheries/FHWA/Informal/2014/EMWE
PCTS: NER-2014-11202

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November 4, 2014

In Reply Refer To:
HED-NY

Mr. Uchenna Madu
Director of Planning and Development
New York State Department of Transportation – Region 11
One Hunters Point Plaza
47 -20 21st Street
Long Island City, NY 11101

Subject: **PIN X776.00**
East Midtown Esplanade and Greenway
East 41st St. to East 60th St. on East River, New York City

Dear Mr. Madu:

We have attached the October 24 letter from the National Marine Fisheries Service. They have concurred with our determination that the proposed project may affect, but it is not likely to adversely affect, any species listed as threatened or endangered Federal species. The report shall be revised to document this determination for the Endangered Species Act. Additionally, note in this letter their concern that the proposed project will affect the Essential Fish Habitat (EFH) and that EFH consultation under the Magnuson Stevens Fishery Conservation and Management Act (MSA) is required. Therefore, please provide us a hard copy of the Essential Fish Habitat Assessment so that we can consult with them.

The Environment Assessment (EA) will need to be revised to reflect the above and additionally the following:

1. General- As we have previously stated to your Region, your official submission must be on NYSDOT letterhead. It must indicate that NYSDOT has reviewed the document and concurs with its findings. The request shall clearly specify what actions (Section 106 completed, wetland finding, ESA effect, 4(f) finding, etc.) NYSDOT wants from FHWA. Please refer to NYSDOT's Procedures for Locally Administered Federal Projects Manual and the Project Development Manual for complete requirements. The submission must include a hard copy of the document including all Appendices.
   All references in the EA to the Appendices must include the page number of the appropriate Appendix. Also, all appropriate dates in this report will need to be updated when the report is submitted for our approval. Examples are page 1-8 (Design Approval) and page 1-10 (TBD).
2. Page 4-26 &4-53- Historic and Cultural Resources, the Finding Documentation and SHPO's opinion should be submitted though NYSDOT to our office for our concurrence and determination that Section 106 is completed. This will need to be documented in the EA.

3. Page 4-35- Executive Order 11990, the Wetland Finding should be completed now and included in the EA.
4. Page 4-58- The *de minimis* impact Section 4(f) finding needs to include the December 16, 2013 letter from New York City Department of Parks & Recreation.

If you have any questions or concerns, please contact me at 518-431-8874.

Sincerely,

Richard F. Beers, Jr.
Senior Area Engineer

Attachment:

cc: T. Sanyal, Structures, NYSDOT Region 11
R. Davies, FHWA

For Internal Use Only: WRP no.

Date Received: DOS no.

NEW YORK CITY WATERFRONT REVITALIZATION PROGRAM

Consistency Assessment Form

Proposed actions that are subject to CEQR, ULURP or other local, state or federal discretionary review procedures, and that are within New York City's designated coastal zone, must be reviewed and assessed for their consistency with the *New York City Waterfront Revitalization Program (WRP)*. The WRP was adopted as a 197-a Plan by the Council of the City of New York on October 13, 1999, and subsequently approved by the New York State Department of State with the concurrence of the United States Department of Commerce pursuant to applicable state and federal law, including the Waterfront Revitalization of Coastal Areas and Inland Waterways Act. As a result of these approvals, state and federal discretionary actions within the city's coastal zone must be consistent to the maximum extent practicable with the WRP policies and the city must be given the opportunity to comment on all state and federal projects within its coastal zone.

This form is intended to assist an applicant in certifying that the proposed activity is consistent with the WRP. It should be completed when the local, state, or federal application is prepared. The completed form and accompanying information will be used by the New York State Department of State, other state agencies or the New York City Department of City Planning in their review of the applicant's certification of consistency.

A. APPLICANT

1. Name: NYC Department of Small Business Services (Attn: Dmitri Konon, NYCEDC)
2. Address: 110 William Street, 7th Floor, New York, NY 10038
3. Telephone: 212-513-6428 Fax: 212-618-8991 E-mail: DKonon@nycedc.com
4. Project site owner: City of New York

B. PROPOSED ACTIVITY

1. Brief description of activity:

The Proposed Action involves the construction of a new public esplanade for pedestrians and bicyclists along the Manhattan shoreline over the East River between East 41st and East 60th Streets. The esplanade would be linked to existing and separately proposed open spaces at East 41st, 51st and 60th Streets, along with new upland pedestrian bridge connections over the FDR Drive at East 48th and East 54th Streets.

2. Purpose of activity:

The construction of the East Midtown Waterfront Esplanade would accomplish several critical policy goals established by the City in Vision 2020: NYC Comprehensive Waterfront Plan (2011), the Manhattan Waterfront Greenway Master Plan (2004), and other planning documents, including creating connections to existing open space to the south and north, and provide increased public access to the waterfront. The esplanade would be completed and open to the public in the year 2025.

3. Location of activity: (street address/borough or site description):

The Proposed Action would be located along the eastern shoreline of Manhattan over the East River, located between East 41st and East 60th Streets, adjacent to the FDR Drive and the United Nations Headquarters, as well as residential development. Portions of the northern section of the esplanade would be placed over and adjacent to existing caissons in the river left over from the FDR Drive's Outbound Detour Roadway (ODR) project.

Proposed Activity Cont'd

4. If a federal or state permit or license was issued or is required for the proposed activity, identify the permit type(s), the authorizing agency and provide the application or permit number(s), if known:
   Authorization from the US Coast Guard pursuant to Section 9 of the Rivers and Harbors Act for construction of bridges over navigable waters and from USACE pursuant to Section 10 of the Rivers and Harbors Act for work in or over navigable waters; approval from NYS DEC per Article 15 Protection of Waters Program of the State ECL, and Section 401 Water Quality Certification that the project will comply with state water quality standards; review and approval from the NYS DOS for coastal zone consistency determination (via NYC DCP).
5. Is federal or state funding being used to finance the project? If so, please identify the funding source(s).
   Yes; Federal Highway Administration (FHWA)
6. Will the proposed project require the preparation of an environmental impact statement?
   Yes ______ No ✔ If yes, identify Lead Agency:
   A NEPA Environmental Assessment is being prepared with NYS DOT as the lead agency and CEQR Environmental Impact Statement is being prepared with the NYC DSBS as the lead agency.
7. Identify **city** discretionary actions, such as a zoning amendment or adoption of an urban renewal plan, required for the proposed project.
   None

C. COASTAL ASSESSMENT

Location Questions:	**Yes**	**No**
1. Is the project site on the waterfront or at the water's edge?	✔	
2. Does the proposed project require a waterfront site?	✔	
3. Would the action result in a physical alteration to a waterfront site, including land along the shoreline, land underwater, or coastal waters?	✔	

Policy Questions **Yes** **No**

The following questions represent, in a broad sense, the policies of the WRP. Numbers in parentheses after each question indicate the policy or policies addressed by the question. The new Waterfront Revitalization Program offers detailed explanations of the policies, including criteria for consistency determinations.

Check either "Yes" or "No" for each of the following questions. For all "yes" responses, provide an attachment assessing the effects of the proposed activity on the relevant policies or standards. Explain how the action would be consistent with the goals of those policies and standards.

4. Will the proposed project result in revitalization or redevelopment of a deteriorated or under-used waterfront site? (1)	✔	
5. Is the project site appropriate for residential or commercial redevelopment? (1.1)		✔
6. Will the action result in a change in scale or character of a neighborhood? (1.2)		✔

Policy Questions cont'd	Yes	No
7. Will the proposed activity require provision of new public services or infrastructure in undeveloped or sparsely populated sections of the coastal area? (1.3)		✓
8. Is the action located in one of the designated Significant Maritime and Industrial Areas (SMIA): South Bronx, Newtown Creek, Brooklyn Navy Yard, Red Hook, Sunset Park, or Staten Island? (2)		✓
9. Are there any waterfront structures, such as piers, docks, bulkheads or wharves, located on the project sites? (2)	✓	
10. Would the action involve the siting or construction of a facility essential to the generation or transmission of energy, or a natural gas facility, or would it develop new energy resources? (2.1)		✓
11. Does the action involve the siting of a working waterfront use outside of a SMIA? (2.2)		✓
12. Does the proposed project involve infrastructure improvement, such as construction or repair of piers, docks, or bulkheads? (2.3, 3.2)	✓	
13. Would the action involve mining, dredging, or dredge disposal, or placement of dredged or fill materials in coastal waters? (2.3, 3.1, 4, 5.3, 6.3)		✓
14. Would the action be located in a commercial or recreational boating center, such as City Island, Sheepshead Bay or Great Kills or an area devoted to water-dependent transportation? (3)		✓
15. Would the proposed project have an adverse effect upon the land or water uses within a commercial or recreation boating center or water-dependent transportation center? (3.1)		✓
16. Would the proposed project create any conflicts between commercial and recreational boating? (3.2)	✓	
17. Does the proposed project involve any boating activity that would have an impact on the aquatic environment or surrounding land and water uses? (3.3)		✓
18. Is the action located in one of the designated Special Natural Waterfront Areas (SNWA): Long Island Sound- East River, Jamaica Bay, or Northwest Staten Island? (4 and 9.2)		✓
19. Is the project site in or adjacent to a Significant Coastal Fish and Wildlife Habitat? (4.1)		✓
20. Is the site located within or adjacent to a Recognized Ecological Complex: South Shore of Staten Island or Riverdale Natural Area District? (4.1and 9.2)		✓
21. Would the action involve any activity in or near a tidal or freshwater wetland? (4.2)	✓	
22. Does the project site contain a rare ecological community or would the proposed project affect a vulnerable plant, fish, or wildlife species? (4.3)		✓
23. Would the action have any effects on commercial or recreational use of fish resources? (4.4)	✓	
24. Would the proposed project in any way affect the water quality classification of nearby waters or be unable to be consistent with that classification? (5)		✓
25. Would the action result in any direct or indirect discharges, including toxins, hazardous substances, or other pollutants, effluent, or waste, into any waterbody? (5.1)		✓
26. Would the action result in the draining of stormwater runoff or sewer overflows into coastal waters? (5.1)	✓	
27. Will any activity associated with the project generate nonpoint source pollution? (5.2)		✓
28. Would the action cause violations of the National or State air quality standards? (5.2)		✓

Policy Questions cont'd	Yes	No
29. Would the action result in significant amounts of acid rain precursors (nitrates and sulfates)? (5.2C)		✓
30. Will the project involve the excavation or placing of fill in or near navigable waters, marshes, estuaries, tidal marshes or other wetlands? (5.3)	✓	
31. Would the proposed action have any effects on surface or ground water supplies? (5.4)		✓
32. Would the action result in any activities within a federally designated flood hazard area or state-designated erosion hazards area? (6)	✓	
33. Would the action result in any construction activities that would lead to erosion? (6)		✓
34. Would the action involve construction or reconstruction of a flood or erosion control structure? (6.1)		✓
35. Would the action involve any new or increased activity on or near any beach, dune, barrier island, or bluff? (6.1)		✓
36. Does the proposed project involve use of public funds for flood prevention or erosion control? (6.2)		✓
37. Would the proposed project affect a non-renewable source of sand ? (6.3)		✓
38. Would the action result in shipping, handling, or storing of solid wastes, hazardous materials, or other pollutants? (7)		✓
39. Would the action affect any sites that have been used as landfills? (7.1)		✓
40. Would the action result in development of a site that may contain contamination or that has a history of underground fuel tanks, oil spills, or other form or petroleum product use or storage? (7.2)	✓	
41. Will the proposed activity result in any transport, storage, treatment, or disposal of solid wastes or hazardous materials, or the siting of a solid or hazardous waste facility? (7.3)		✓
42. Would the action result in a reduction of existing or required access to or along coastal waters, public access areas, or public parks or open spaces? (8)		✓
43. Will the proposed project affect or be located in, on, or adjacent to any federal, state, or city park or other land in public ownership protected for open space preservation? (8)	✓	
44. Would the action result in the provision of open space without provision for its maintenance? (8.1)		✓
45. Would the action result in any development along the shoreline but NOT include new water-enhanced or water-dependent recreational space? (8.2)		✓
46. Will the proposed project impede visual access to coastal lands, waters and open space? (8.3)		✓
47. Does the proposed project involve publicly owned or acquired land that could accommodate waterfront open space or recreation? (8.4)	✓	
48. Does the project site involve lands or waters held in public trust by the state or city? (8.5)	✓	
49. Would the action affect natural or built resources that contribute to the scenic quality of a coastal area? (9)		✓
50. Does the site currently include elements that degrade the area's scenic quality or block views to the water? (9.1)	✓	

Policy Questions cont'd	Yes	No
51. Would the proposed action have a significant adverse impact on historic, archeological, or cultural resources? (10)		✓
52. Will the proposed activity affect or be located in, on, or adjacent to an historic resource listed on the National or State Register of Historic Places, or designated as a landmark by the City of New York? (10)	✓	

D. CERTIFICATION

The applicant or agent must certify that the proposed activity is consistent with New York City's Waterfront Revitalization Program, pursuant to the New York State Coastal Management Program. If this certification cannot be made, the proposed activity shall not be undertaken. If the certification can be made, complete this section.

"The proposed activity complies with New York State's Coastal Management Program as expressed in New York City's approved Local Waterfront Revitalization Program, pursuant to New York State's Coastal Management Program, and will be conducted in a manner consistent with such program."

Applicant/Agent Name:____

Address:____

Attn: Dmitri Konon Telephone________________

Applicant/Agent Signature:________________________ Date:______________

NEW YORK CITY WATERFRONT REVITALIZATION PROGRAM (WRP) CONSISTENCY ASSESSMENT FORM

WRP POLICY QUESTIONS – RESPONSES

WRP Policy 1: *Support and facilitate commercial and residential redevelopment in areas well-suited to such development.*

The Proposed Project would result in construction of a new esplanade along an underutilized waterfront site. The construction of the East Midtown Waterfront Esplanade and Greenway for public open space would help foster economic growth in the mixed-use area, by attracting visitors to the area and providing a new recreation opportunity.

WRP Policy 2: *Support water-dependent and industrial uses in New York City coastal areas that are well-suited to their continued operation.*

The Proposed Project includes the construction of the East Midtown Waterfront Esplanade and Greenway on a waterfront structure for use as a public waterfront open space which will support water dependent uses. A bulkhead to the East River and the FDR Drive run the entire length of the proposed esplanade. The adjacent areas to the west of the FDR Drive include the United Nations Headquarters and residential buildings. Immediately to the south is vacant land formerly used for industrial purposes (Con Edison) and now proposed for a major mixed-use residential/commercial development, and immediately to the north is an industrial power station (north of East 59th Street at York Avenue). Changes to the area have occurred over the past decade and any other industrial uses have since ceased operations and the related upland structures have been removed.

WRP Policy 2.3: *Provide infrastructure improvements necessary to support working waterfront uses.*

The East Midtown Waterfront Esplanade would be constructed along a section of the Manhattan waterfront that does not support commercial uses. The surrounding adjacent areas are no longer used for industrial purposes. The construction of the esplanade would not impede marine vessels within the river, as the esplanade structure would only be approximately 40 feet wide (widening to 50 feet in two small sections) and offset approximately 30 feet from the existing shoreline.

WRP Policy 3: *Promote use of New York City's waterways for commercial and recreational boating and water-dependent transportation centers.*

The Proposed Project is still in the conceptual design phase and discussions of programming are ongoing. A full response to this policy, including a discussion of the programming of maritime use along the esplanade, will be submitted when the design is further advanced.

WRP Policy 3.2: *Minimize Conflicts between recreational, commercial and ocean-going freight vessels*

The Proposed Project would result in the construction of an esplanade with a new public waterfront open space along the East River. The construction of the esplanade would not impede marine vessels within the river, as the esplanade would only be at most 40 feet wide and offset approximately 30 feet from the shoreline. No interference with the federal navigational channel is expected during construction (see Section 2.13 of the EAS). The proposed esplanade is not designed for docking by any recreational, commercial or ocean-going vessels. A fender/sheet wall at the nodes would allow for tie-up by emergency vessels only. The Proposed Project would neither help nor hinder the achievement of the policy.

WRP Policy 4.2: *Protect and restore tidal and freshwater wetlands.*

The New York State Department of Environmental Conservation (NYSDEC) regulates tidal wetlands in areas that are less than 6 foot deep at mean low water. Along the slopes of the rock outcrops from mean high water to -6 foot at mean low water, there are tidal wetlands associated with sparsely vegetated rocks along the East River in the vicinity of the proposed esplanade. The vegetation is limited to marine algae. Care will be taken during design to avoid and minimize any impact to these wetlands. A shading study indicated the potential for these wetlands to be in partial shading during mid-morning hours. All required federal and state permits will be obtained from USACE and NYSDEC prior to commencement of construction, and all conditions and requirements adhered to.

Opportunities for on-site ecological enhancement of the marine environment (such as in-water restoration) will continue to be evaluated with participation from NYSDEC and will be submitted when the design is further advanced.

There are no freshwater wetlands within or adjacent to the project area.

WRP Policy 4.4: *Maintain and protect living aquatic resources.*

Construction of the Proposed Project may have the potential to adversely affect individual transient shortnose and Atlantic sturgeon and marine turtles in the immediate vicinity of pile placement; however, it is not likely to jeopardize the continued existence of their corresponding populations. Upon cessation of construction activities, changes within the esplanade area would not inhibit fish movement, increase or decrease water velocity, substantially reduce potential long-term food resources, or affect water quality. The habitat of the Proposed Project area does not represent an area solely used by essential fish habitat (EFH)-listed species for critical life cycle activities (e.g., spawning, migration route, etc.). The amount of habitat impacted and the duration of impacts is so minor that it is anticipated that the impacts to EFH-listed species would be negligible. There would be no commercial use of living aquatic resources as part of the Proposed Project.

WRP Policy 5.1: *Manage direct or indirect discharges to waterbodies.*

The Proposed Project is subject to the State Pollutant Discharge Elimination System (SPDES) requirements regulating stormwater discharges. Stormwater runoff from the Proposed Project's bicycle path would discharge to flow-through stormwater planters in the median. The planters would treat the runoff which would then flow into perforated underdrains to downspouts and the East River below. Drainage slots through the pedestrian path parapet would discharge the gutter flows directly to the river below. Screens would capture trash and debris from the stormwater discharge.

WRP Policy 5.3: *Protect water quality when excavating or placing fill in navigable waters and in or near marshes, estuaries, tidal marshes, and wetlands.*

The Proposed Project would require placement of fill in the East River through the installation of piles. Best management practices would be adhered to when working with fluids (e.g., grout, etc.) over open waters. Refueling of vessels is discussed under Policy 7.2.

The Proposed Project's esplanade would not adversely affect navigability of the waters (see Section 2.3 above). During construction, moored construction barges may occasionally encroach on the eastern edge of the navigation channel. A NYSDEC Protection of Waters Permit for Excavation or Placement of Fill in Navigable Waters will be required, pursuant to ECL Article 15, Title 5. Effects from re-suspended sediments are not expected to jeopardize aquatic species due to use of best management practices and the dispersion of any suspended sediment by the strong currents in the East River. Seasonal restrictions and special permit conditions associated with anadromous fish migration will be observed.

WRP Policy 6: *Minimize loss of life, structures and natural resources caused by flooding and erosion.*

The Proposed Project would be located over the East River and within a federally designated flood hazard area. The top of the esplanade structure would be above the 100-year flood elevation (2013 Preliminary FIRM), except at the connection to Andrew Haswell Green Park. The height of the esplanade was determined such that there would be a two-foot minimum clearance between the pile caps and the Mean Higher High Water (MHHW) elevation. The esplanade would comply with all applicable building codes, rules and regulations for construction in floodplains in order to minimize impacts from storm surge. The Proposed Project would create new park amenities with tree plantings and landscaping. This will help increase the resilience of the natural environment over the river, and mitigate the urban heat island effect. In addition, the proposed esplanade was designed to be at an elevation 2.20 feet above the predicted 2088 mean high water line of the East River and would be expected to withstand major storm events and sea level rise that may occur as a result of climate change. Specific climate change adaptation measures will be submitted when the design is further advanced.

WRP Policy 7.2: *Prevent and remediate discharge of petroleum products.*

A Phase I Environmental Site Assessment (ESA) did not identify any existing or historic recognized environmental concerns; however, based on historical on-site and surrounding area land uses, NYCDEP requested that protection of human health and the environment be ensured through implementation of a Construction Health and Safety Plan (CHASP) and elimination of post-construction exposure on the upland connection sites (i.e., no landscaped areas). It is anticipated that concrete supply would be via a barge-mounted concrete batch plant. Contractors would only refuel vehicles in designated areas that have appropriate containment systems to capture accidental spills. Implementation of a Remedial Action Plan (RAP) and CHASP would ensure no significant adverse impacts from hazardous materials as a result of the construction activities associated with the Proposed Project. After construction, the East Midtown Waterfront Esplanade and Greenway would not include any petroleum fueling facilities or require storage of petroleum products.

WRP Policy 8: *Provide public access to and along New York City's coastal waters.*

The Proposed Project complies with this policy by providing new waterfront access and a waterfront esplanade for use by the public. Public access to the esplanade would be provided through an Upland Bridge Connection at East 48th and East 54th Streets. The proposed Upland Bridge Connection at East 54th Street would also connect the proposed esplanade to an existing waterfront walkway and seating area which extends from approximately East 50th and East 54th Streets, as well to Sutton Park (along Sutton Place between East 53rd and East 54th Streets). In addition, the Proposed Project would connect to existing or proposed waterfront esplanades to the south (Waterside Pier) and north (Andrew Haswell Green Park and East River Esplanade). Additional access across the FDR Drive would be provided from Waterside Pier at Glick Park and Andrew Haswell Green Park at 60th Street. Although the Project Area is zoned C5-2, R8B, R10 and M3-2, the East Midtown Waterfront Esplanade and Greenway would not be subject to zoning. A complete response to this policy, including a site plan detailing the programming access and site design, will be submitted when the design of the Proposed Project is further advanced.

A Public Involvement Plan has been prepared and a Community Working Group focused on the East Midtown Waterfront Esplanade was formed. In addition, the Eastside Greenway and Park (EGAP) Board was formed. The Design Report/Environmental Assessment will be made available for public review as part of the NEPA process. Public Design Commission review will be completed once design development progresses (anticipated in 2016 or during final design).

WRP Policy 8.4: *Preserve and develop waterfront open space and recreation on publicly owned land at suitable locations.*

The Proposed Project complies with this policy to develop new waterfront open space and recreational amenities for the public. The Proposed Project would construct the East Midtown Waterfront Esplanade and Greenway, which would provide extensive waterfront open space and recreational amenities, as well as links with existing or planned public park and waterfront walkways to both the south and north.

WRP Policy 8.5: *Preserve the public interest in and use of lands and waters held in public trust by the state and city.*

The Proposed Project would allow for the construction of the East Midtown Waterfront Esplanade and Greenway with a new public waterfront open space along the East River. The waters are held in trust by the City of New York.

WRP Policy 9.1: *Protect and improve visual quality associated with New York City's urban context and the historic and working waterfront.*

The Proposed Project would help protect views along the East River, as well as provide new public access for views along the river, and enhance views from other areas toward the East Midtown Waterfront Esplanade and Greenway. Within the Project Area, view corridors are found along the East River, looking both northward and southward from the shoreline adjacent to the location of the proposed open space area. However, pedestrian access to the shoreline is limited and generally restricted, due to built structures at the United Nations Headquarters, and the location of the FDR Drive along the shoreline. Views are available from the existing Peter Detmold Park and Sutton Parks across from the FDR Drive, as well as from certain east-west side streets that are not blocked by buildings or the FDR Drive, such as East 54th, 56th and 57th Streets. The Proposed Project would enhance views for the public looking towards the esplanade from across the river along the shorelines of Roosevelt Island, Queens and Brooklyn. The Proposed Project would also be directly oriented with group existing and planned esplanade areas and with Sutton Park, helping to preserve open space and maximize views to and from the river, and incorporate the adjacent open space.

WRP Policy 10: *Protect, preserve and enhance resources significant to the historical, archaeological, and cultural legacy of the New York City coastal area.*

There are 11 historic architectural resources in the area of potential effect (APE) of the Proposed Project. These resources include one State/National Register of Historic Places (S/NRHP)-listed resource (Sutton Place Historic District), one S/NRHP-listed and New York City Landmarks Preservation Commission (LPC)-designated resource (Ed Koch Queensboro Bridge), one LPC-designated resource (Lamppost), and eight S/NRHP-eligible resources (FDR Drive, Queens Midtown Tunnel and Ventilation Building, United Nations [UN] Headquarters, 1 Beekman Place, River House, Cannon Point South, Cannon Point North, and 1 Sutton Place South).

Only one resource – the FDR Drive -- would be directly affected by the proposed esplanade. The highway would be impacted by the introduction of pedestrian overpasses that would provide access to the esplanade from the west side of the highway. However, because the FDR Drive is currently spanned by a number of overpasses, introduction of two additional overpasses would be in keeping with the character of the existing setting, and would therefore not alter the characteristics that contribute to its significance. As a result, the proposed esplanade would have no adverse effect on the cultural significance of the FDR Drive.

In terms of indirect effects, the significance of six resources (Sutton Place Historic District, 1 Beekman Place, River House, Cannon Point North, Cannon Point South, and 1 Sutton Place South) is tied, in part, to river views. The proposed esplanade would be constructed at a lower elevation than the resources, and would only be approximately 40-feet wide. While the proposed esplanade would be visible, it would not significantly obstruct views of the East River from the resources, or of the resources from the river. Therefore, the proposed esplanade would not diminish the integrity of the setting of these resources because the setting would generally remain the same. Similarly, the proposed esplanade would also be visible from five resources (Ed Koch Queensboro Bridge, Lamppost, FDR Drive, Queens-Midtown Tunnel and Ventilation Building, and UN Headquarters) whose significance is not specifically tied to river views, although the river is in their viewshed. Of these, one (Lamppost) is a historic replica, and as a result, the project would have no effect on it. The proposed esplanade would have no adverse effect because it would not diminish the integrity of their setting. Therefore, overall, the proposed esplanade would not adversely affect historic architectural resources in the APE.

From: JESSICA FAIN [mailto:JFAIN@planning.nyc.gov]
Sent: Wednesday, July 23, 2014 11:02 AM
To: Elijah Hutchinson; Marilyn Lee
Cc: MICHAEL MARRELLA; Zappieri, Jeffrey D (DOS); 'Sturn, Terra (DOS)'; LAUREN HAMID-SHAPIRO; 'john.rollino@aecom.com'
Subject: East Midtown Waterfront Esplanade and Greenway/ WRP #12-101/ F #13-0976

We have completed the review of the project as described below for consistency with the policies and intent of the New York City Waterfront Revitalization Program (WRP).

> **East Midtown Waterfront Esplanade and Greenway:** The East Midtown Waterfront Esplanade and Greenway is a proposed approximately 0.96 mile long esplanade, located along the Manhattan side of the East River in New York, New York. The Proposed Project is offset approximately 30 feet from the eastern side of the Franklin D. Roosevelt East River (FDR) Drive (Route 907L), from East 41st Street to East 60th Street, which together define the project limits. The Proposed Project includes: (1) The United Nations Esplanade ("UN Esplanade") located along the waterfront adjacent to the United Nations Headquarters and other high-rise developments from East 41st to 53rd Streets; (2) The Outboard Detour Roadway Esplanade ("ODR Esplanade") located along the waterfront from East 53rd to 60th Streets, where the portions of the proposed esplanade would be placed over existing ODR caissons; and (3) Two new upland pedestrian bridge connections to connect the landside west of the FDR Drive to the esplanades at East 48th Street and at East 54th Street.

Based on the information submitted, the Waterfront Open Space Division, on behalf of the New York City Coastal Commission, having reviewed the waterfront aspect of this action, finds that the actions will not substantially hinder the achievement of any Waterfront Revitalization Program (WRP) policy and hereby recommends that this action is found consistent with the WRP policies.

As a condition of this concurrence, the Department of City Planning recognizes and supports the conditions set forth by the New York State Department of State in their letter dated June 19, 2014 for project F-13-0976 that states that, as the phases of work are developed, the New York City Economic Development Corporation will submit full plan drawings and details for further review and will engage in ongoing coordination with both the Department of State and the Department of City Planning to ensure the long-term project goals as well as State coastal policy objectives and Local Waterfront Revitalization (WRP) policy objects are being concurrently met. Moreover, as indicated in the WRP responses provided to the Department of City Planning, more detailed information should be provided at that time about: maritime uses along the esplanade (Policy 3), opportunities for onsite ecological enhancement of the marine environment (Policy 4), design considerations for sea level rise and flooding based on the best available climate change projections (Policy 6), and more detailed programming and site design for public access (Policy 8).

This consistency determination is only applicable to the information received and the current proposal. Any additional information or project modifications would require an independent consistency review.

For your records, this project has been assigned WRP #12-101. If there are any questions regarding this review, please contact me.

Sincerely,

JESSICA FAIN
PLANNER, WATERFRONT AND OPEN SPACE DIVISION

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ANDREW M. CUOMO
GOVERNOR

CESAR A. PERALES
SECRETARY OF STATE

June 19, 2014

Mr. John Rollino
AECOM Technical Services, Inc.
125 Broad Street
New York, NY 10004

RE: **F-2013-0976**
U.S. Army Corps of Engineers/ New York District Permit
Application – NYS DEC #2-6204-01615/00004-00006
East Midtown Waterfront Esplanade & Greenway
Manhattan shoreline over the East River (between E. 41st and E. 60th Streets), New York City, NY; County of New York

General Concurrence

Dear Mr. Rollino:

The Department of State (Department) has completed its review of your Federal Consistency Assessment Form (FCAF), consistency certification, and all supporting information that has been submitted to date related to the above-referenced proposal. Pursuant to 15 CFR Part 930.62, and based upon the project information submitted, the Department of State concurs with your consistency certification for this activity as described and presented in conceptual and preliminary designs.

As a condition of concurrence, the Department anticipates that as the phases of work are developed, the applicant – New York City Economic Development Corporation (NYC EDC) - and its consultants will submit full plan drawings and details for further Department review and will engage in ongoing coordination with both the Department and the New York City Department of City Planning. Given the scope, complexity, and long time horizon of the proposed project, such coordination is necessary to ensure that the long-term project goals as well as State coastal policy objectives and Local Waterfront Revitalization Program (WRP) policy objectives are being concurrently met.

When specific project details develop or are changed, and as additional information becomes available, please submit your request(s) for modification along with full plan sets and any supporting documentation to the Department of State in order to commence consistency review. Be sure to include a new Federal Consistency Assessment Form, certifying statement, and reference to work at the various sites (or phases) and as such work may impact State coastal policies and WRP policies and please provide a narrative analysis of policies as applicable.

This concurrence is without prejudice to and does not obviate the need to obtain all other applicable licenses, permits, other forms of authorization or approval that may be required pursuant to existing State statutes. When communicating with us regarding this matter, please contact us at (518) 474-6000 and refer to our file #F-2013-0976.

Sincerely,

Jeffrey D. Zappieri
Manager of Consistency Review
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Draft Cultural Resources Survey

East Midtown Waterfront Esplanade Project

PIN X776.00 and PIN X770.14

Prepared for

New York State Department of Transportation-Region 11
Hunters Point Plaza
47-40 21st Street
Long Island City, New York

and

New York City Economic Development Corporation
110 William Street
New York, New York

Prepared by

AECOM
20 Exchange Place
New York, New York

March 2013

MANAGEMENT SUMMARY

A. DOT PIN

X776.00 and X770.14

B. DOT Project Type and Funding

Project:	East Midtown Waterfront Esplanade Project
Type of Funding:	US Department of Transportation, Federal Highway Administration; New York State Department of State, and the City of New York

C. Cultural Resources Survey Type

Phase IA Archaeological Survey; Historic Architectural Reconnaissance Survey

D. Location Information

East River between East 41st to East 60th Street adjacent to the FDR Drive; project also includes three proposed pedestrian bridges that would connect the landside (west of the FDR Drive) to the proposed esplanade (east of the FDR Drive) at East 42nd, 48th and 54th streets.

Borough:	Manhattan (Minor Civil Division No. 06101)
County:	New York

E. Survey Area

Length:	5,050 to 5,120 feet
Width:	395 to 684 feet
Acres:	63.974 Acres

F. USGS 7.5 Minute Quadrangle Maps

Brooklyn, N.Y.
Central Park, N.Y./N.J.

G. Results of Archaeological Survey

G.1 Sensitivity Assessment

Prehistoric (high, medium, low):	Tentatively assessed: low potential; additional information required
Historic (high, medium, low):	Tentatively assessed: low to no potential; additional information required

G.2 Archaeological Survey Methodology

Number of shovel test pits:	Not applicable (N/A)
Number of units:	N/A
Surface survey (yes/no):	Yes; reconnaissance walkover and visual survey

G.3 Results of Archaeological Survey

Number of prehistoric sites identified:	N/A
Number of historic sites identified:	N/A
Number of sites recommended for investigation:	N/A
Number of listed/eligible or potentially eligible S/NRHP sites identified:	0

H. Results of Architectural Survey

H.1 Number of Buildings/Structures in Project Area

Forty-eight buildings, structures, objects, and parks; see Figure 6-1

H.2 Number of Known S/NRHP-Listed/Eligible Resources

One S/NRHP-listed historic district; one S/NRHP-listed structure; see Table 6-1

H.3 Number of Recommended S/NRHP-Eligible Resources

Eight resources are recommended for further study to determine S/NRHP eligibility status; see Table 6-2

H.4 Number of S/NRHP-Listed/Eligible and Recommended Eligible Resources Identified

Two S/NRHP-listed resources, and eight resources recommended for further study to determine S/NRHP eligibility status; see Tables 6-1 and 6-2

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J. Date

March 2013

K. Sponsors

Project Sponsors:

New York City Economic Development Corporation
New York City Department of Transportation
New York City Department of Parks and Recreation
New York City Mayor’s Office

Project Approval Authority:

US Department of Transportation, Federal Highway Administration
New York State Department of Transportation
New York State Department of Environmental Conservation
New York State Department of State
New York State Department of General Services
US Army Corps of Engineers
US Coast Guard
National Marine Fisheries Service
New York City Department of Small Business Services

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1 INTRODUCTION

1.1 Project Description

The New York City Economic Development Corporation (NYCEDC), acting on behalf of New York City (the City) and in partnership with the New York City Department of Transportation (NYCDOT), the New York City Department of Parks and Recreation (NYCDPR), and the New York City Mayor's Office, has initiated a Capital Project for the development of the East Midtown Waterfront Esplanade (EMWE). Because development of the EMWE utilizes federal funds provided by the US Department of Transportation (USDOT), Federal Highway Administration (FHWA), the New York State Department of Transportation (NYSDOT) is acting as the lead federal agency for National Environmental Policy Act/New York State Environmental Quality Review Act (NEPA/SEQRA) on behalf of FHWA.

This Draft Cultural Resources Survey Report was prepared by AECOM on behalf of NYSDOT to identify potentially significant cultural resources, also known as archaeological and historic architectural resources, in the project area in accordance with the NEPA, Section 106 (16 USC 470f) of the National Historic Preservation Act (NHPA) of 1966, as amended, SEQRA, and the New York State Historic Preservation Act (SHPA).

The proposed EMWE is intended to close a critical gap in the Manhattan Waterfront Greenway along the East River from East 41st to East 60th Street and would provide waterfront access, open space and new recreation amenities to the East Midtown community. Public access would be provided to the waterfront, and new open space for the densely populated communities of East Midtown would be created where virtually no access currently exists. A safe recreation area for a wide range of users would be provided, including children, the disabled and elderly, along with opportunities for water-dependent and water-related uses, while promoting New Yorkers' understanding of, and relationship to, the East River/Hudson River Estuary as a natural feature and historical landscape.

The project consists of a new esplanade approximately 0.96 miles long, consisting of new platforms over new drilled shafts/piles, located along the Manhattan side over the East River, adjacent to the Franklin Delano Roosevelt (FDR) Drive (Figure 1-1). The EMWE is defined in two sections: the proposed United Nations (UN) Esplanade that extends from East 41st (at the northern terminus of the existing Waterside Pier) northward past the UN Headquarters to East 53rd Street; and a northern section that will extend from 53rd Street to East 60th Street along the drilled shafts/piles left in place within the river from Outbound Detour Roadway (ODR) project when the FDR Drive was reconstructed.

The southern boundary of the proposed UN Esplanade would start at East 41st Street, where the Waterside Pier is situated on pilings over the river from East 38th to 41st Streets. The proposed esplanade would be connected to the Waterside Pier, which is separately planned to be reconstructed as a publically-accessible open space, and provide continuous connections southward through the existing Glick Park. The proposed EMWE would be constructed northward from the Waterside Pier over the East River past the United Nations Headquarters. An approximately 30-foot off-set from the bulkhead of the FDR Drive and United Nations Headquarters would be provided (Figure 1-2).

The proposed ODR Esplanade is anticipated to utilize existing drilled shafts/piles that were used as temporary support structure for the ODR when the FDR Drive was reconstructed. The drilled shafts/piles from the ODR were left in place in anticipation that they would be re-used to support a part of the

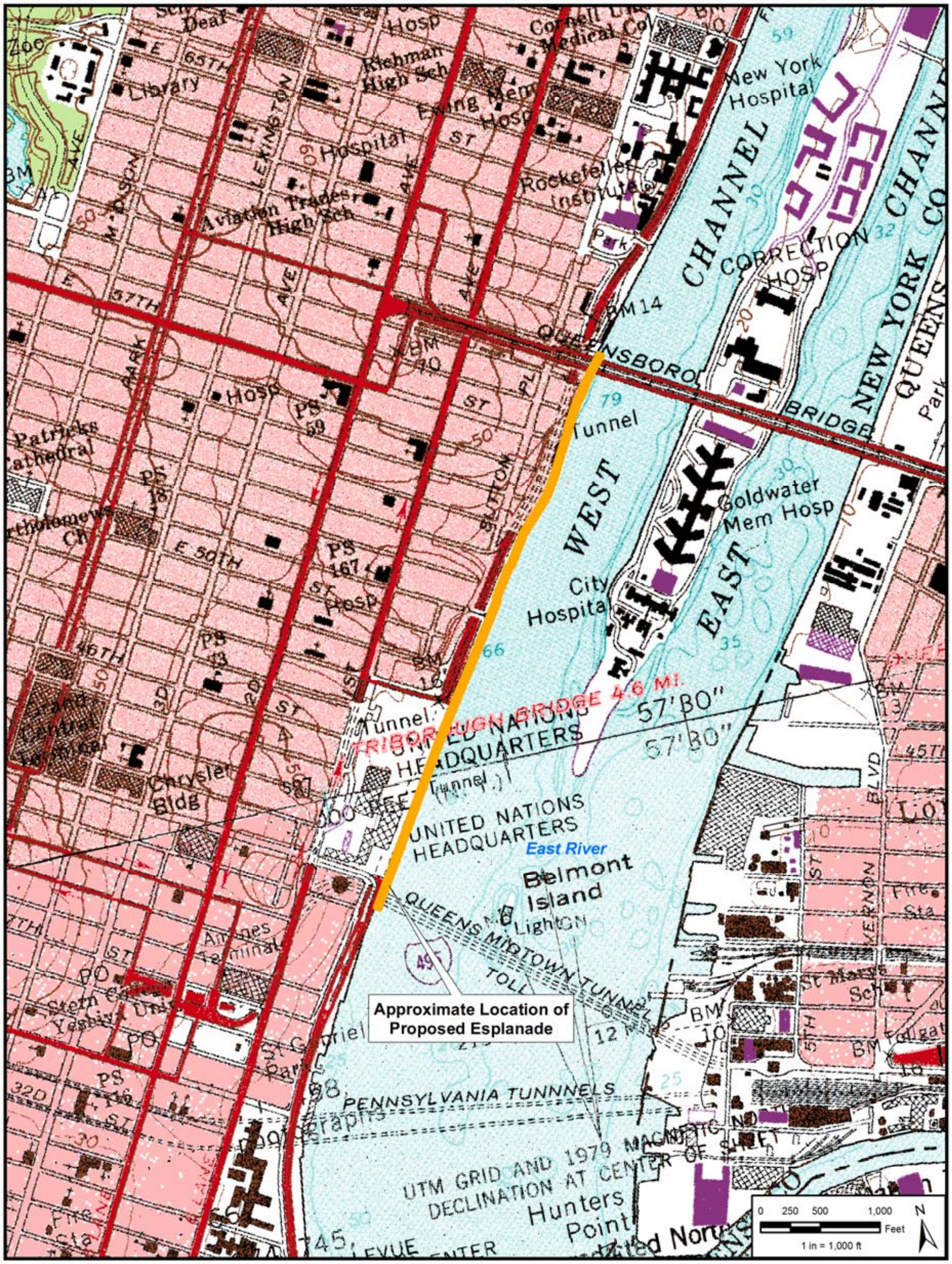


Figure 1-1 Project Site Location on Portions of USGS Central Park, N.Y./N.J. and Brooklyn, N.Y. 7.5. Minute Quadrangles (2000).

Source: Bing Aerial Map.

Figure 1-2 UN Esplanade

proposed esplanade. The drilled shafts/piles are off-set from the shoreline varying in distance from the bulkhead up to 35 feet (ft) away (Figure 1-3). New drilled shafts/piles are also anticipated to be placed near the existing drilled shafts/piles to be reused.

The latest plans depict the proposed esplanade platform with a typical width of 40 ft. The width changes near the three proposed pedestrian/cyclist bridge access points. The platform narrows to 32-ft-wide near East 41st Street where the UN Esplanade meets the Waterside Pier. The platform widens to 50 ft opposite East 49th Street, along the UN Esplanade, and again at East 53rd Street, along the ODR Esplanade.

The latest plans indicate that 184 steel sheet piles will be drilled into bedrock to support the new piers that will support the esplanade structure. According to the plans, 162 piles will be 54-inch-diameter; 22 piles located at the northern end of the esplanade will be 24-inch-diameter. The piers that will support the esplanade structure will typically be comprised of two pilings each, spaced 25-ft-apart. The piers supported by 54-in-diameter piles will be spaced at varying intervals along the esplanade, from 25-ft to 90-ft apart; the piers supported by 24-inch-diameter piles will be spaced at 30-ft intervals.

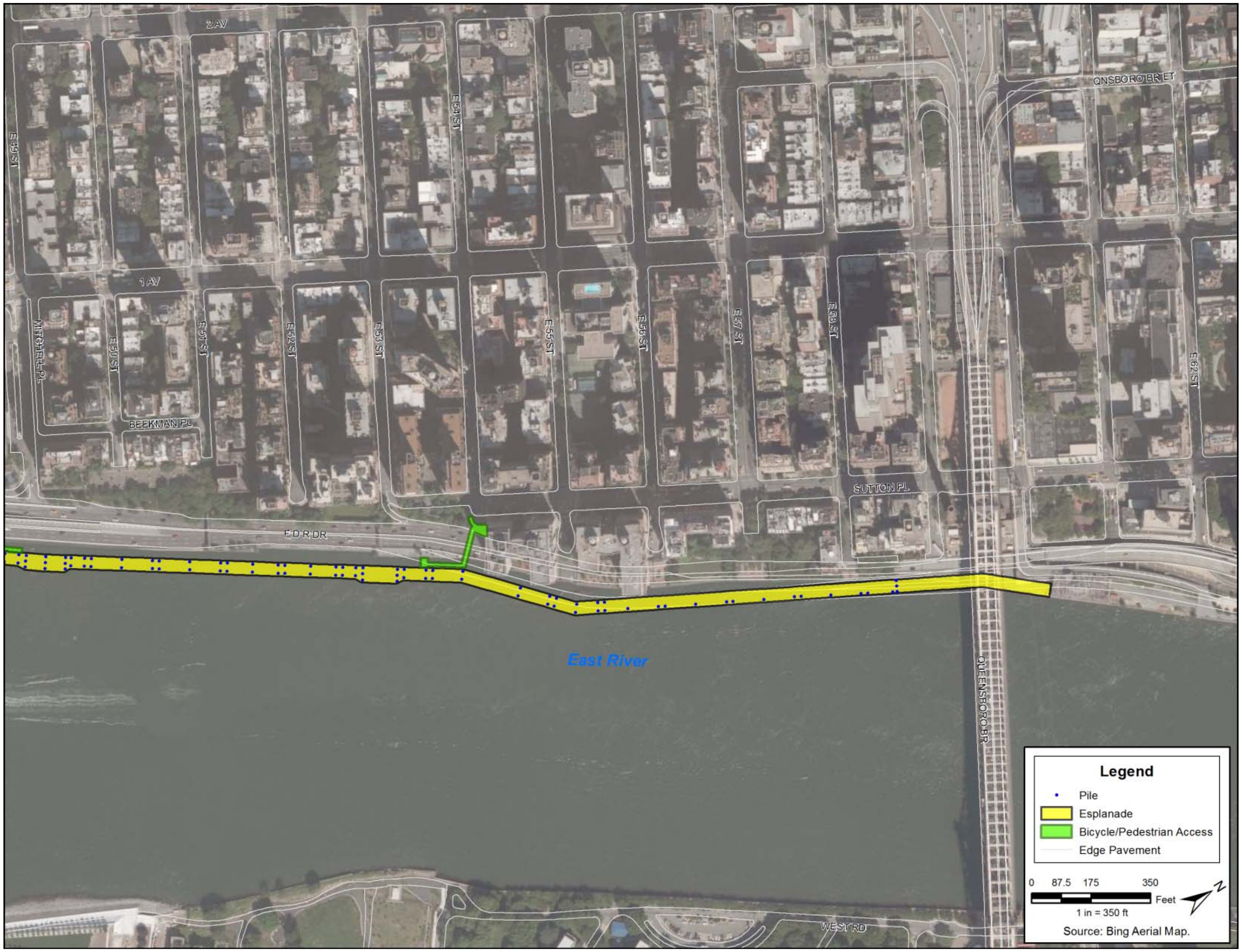
Approximately 59 existing 54-inch-diameter drilled shafts that were installed as part of the ODR project are located between East 53rd Street and East 60th Street. Just over half of these ODR drilled shafts were cut off at the mud line following abandonment of the ODR. Of the drilled shafts still visible above the water line between East 55th Street and East 59th Street, 13 will be reused for the proposed esplanade. Between East 55th Street and East 57th Street, seven “battered piles” will be installed at an angle to avoid the ODR drilled shafts that were cut off at the mud line.

Additionally, the project includes three proposed pedestrian bridges to connect the landside (west of the FDR Drive) to the esplanade (east of the FDR Drive). The proposed pedestrian bridges will cross the FDR Drive at East 42nd, East 48th and East 54th Street. At East 42nd Street, a pedestrian and cyclist lane will utilize the northernmost lane of the existing FDR Drive 3-lane exit ramp. The new bridge will be connected to the elevated portion of the ramp, and continue eastward to cross the FDR Drive, turning southward as it descends to the esplanade near East 41st Street (Figure 1-4). The proposed bridge will require additional support pilings to be placed within the river; no supports will be required on the landside.

At East 48th Street, a new pedestrian and cyclist bridge to the esplanade is anticipated to be provided between the existing East 48th Street elevated entrance ramp to the northbound FDR Drive and the north fence line of the UN Headquarters property by completing construction of an existing, elevated partial ramp (Figure 1-5). As part of the completed ramp, the proposed bridge would continue over the FDR Drive and is anticipated to then turn northwards as it descends to the proposed esplanade and connects to its western side near East 49th Street within the river. The completion of the existing ramp and bridge will require additional support pilings to be placed within the river, as well as landside, to the south of East 48th Street and at its terminus.

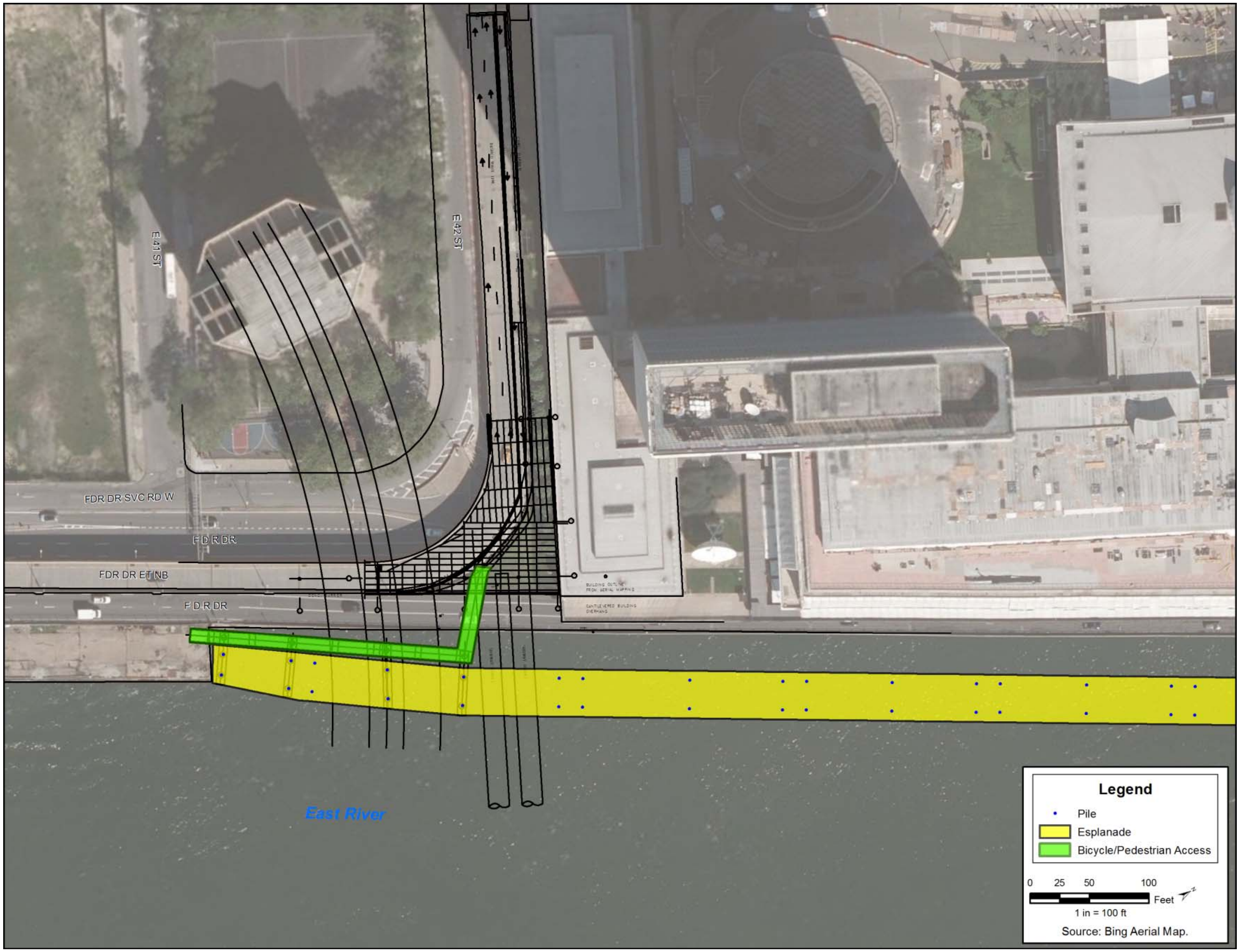
At East 54th Street, a new pedestrian and cyclist bridge to the esplanade is anticipated to be provided from Sutton Place Park, located on the east side of Sutton Place, at the terminus of East 54th Street (Figure 1-6). The bridge would continue over the FDR Drive and then is anticipated to turn southward as it descends to the proposed esplanade and connects to its western side between East 53rd and East 54th Streets within the river. The bridge will require additional support pilings to be placed within the river, as well as landside at Sutton Place Park.

Other access points include existing connections at East 37th Street (through Glick Park), at East 51st Street, and at East 60th Street. At East 51st Street, east of Sutton Place, there is a stairway and pedestrian



Source: Bing Aerial Map.

Figure 1-3 ODR Esplanade



Source: Bing Aerial Map.

Figure 1-4 Proposed Upland Connection at East 42nd Street

Source: Bing Aerial Map.

Figure 1-5 Proposed Upland Connection at East 48th Street

Source: Bing Aerial Map.

Figure 1-6 Proposed Upland Connection at East 54th Street bridge across Peter Detmold Park and the FDR Drive connecting the neighborhood to a small section of the park along the East River, which will be incorporated into the proposed esplanade. At York Avenue and East 60th Street, an existing roadway ramp over the FDR Drive provides shared access for bicycles and pedestrians to an existing waterside esplanade that extends north along the East River.

1.2 Regulatory Framework

NHPA of 1966 was enacted to integrate consideration of historic resources into the early stages of project planning by a federal agency. Under Section 106 of NHPA, prior to execution of a project, a federal agency or federally funded agency is required to consider the project's impact on any district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register of Historic Places. SHPA has similar requirements to consider the impacts of state-funded or licensed projects on districts, sites, buildings, structures and objects listed in or eligible for inclusion in the New York State Register of Historic Places.

Other regulations and legislation also direct federal agencies to preserve important historic, cultural, and natural aspects of the nation's heritage, and to consider these resources in project planning and execution. These directives include, but are not limited to:

- NEPA (42 USC 4321-4361).
- Executive Order (EO) 11593, Protection and Enhancement of the Cultural Environment.
- The Historic Sites, Buildings, and Antiquities Act (16 USC 461).
- The Public Buildings Cooperative Use Act (40 USC 601a).
- The Antiquities Act (16 USC 431-433).

These regulations have been taken into consideration in the preparation of this report.

1.3 Area of Potential Effect

In accordance with Section 106, archaeological and historic architectural Areas of Potential Effects (APEs) have been delineated to take into account potential direct effects of the proposed action on archaeological resources and potential direct and indirect effects of the proposed action on historic architectural resources. In accordance with Section 106 of NHPA, direct effects include, but are not limited to, physical damage or destruction of all or part of a property; physical alterations; moving or realigning a historic property; and/or isolating a property from its setting. Indirect effects may include visual, audible or atmospheric intrusions; shadow effects; vibrations; and changes in access or use. Indirect effects on archaeological resources are not considered, as they do not involve subsurface ground disturbance.

1.3.1 Archaeological APE

The archaeological APE has been delineated according to information presented on preliminary project plans. The archaeological study area has been determined through consultation with NYSDOT to be a one-quarter-mile radius around the proposed project area. Both the archaeological APE and the archaeological study area are depicted on Figure 1-7.

Figure 1-7 Archaeological APE and Study Area

The archaeological APE is concerned with direct effects of the proposed actions on previously identified and potential archaeological resources. The archaeological APE has been delineated as those areas in which ground disturbance will occur as a result of proposed project actions, both on land and in the bed of the East River. Ground disturbance areas can also include construction staging or work areas. The archaeological APE includes both horizontal and vertical components, which are determined through an examination of project design plans. When delineating an archaeological APE, the footprint of proposed construction defines the horizontal component; the vertical component is determined by the depth of proposed disturbance. The horizontal component of the EMWE archaeological APE is the footprint of proposed ground disturbance; the vertical component varies within the APE, depending upon the proposed action.

As described above in Subchapter 1.1, the project consists of a new East River esplanade in two sections; the UN Esplanade from the northern end of the extant Waterside Pier at East 41st Street to East 53rd Street, built on piles or drilled shafts/piles on a 30-ft offset from the FDR Drive bulkhead; and the ODR Esplanade that would extend from East 53rd Street to East 60th Street, built on existing and new drilled shafts/piles up to 35-ft outboard of the FDR Drive bulkhead. The archaeological assessment of these actions will consider that the construction-related disturbances to the bed of the East River are the same for both sections.

Other proposed actions, as described in detail above, include the construction of three pedestrian/cyclist bridges to connect the landside west of the FDR Drive to the proposed new esplanade in the East River. The proposed pedestrian/cyclist bridges will span the FDR Drive at East 42nd, East 48th and East 54th Streets. These proposed actions would create a combination of ground disturbance on the landside and in the East River.

The EMWE archaeological APE is therefore composed of five discrete areas within the overall EMWE project area; the new UN Esplanade from East 41st Street to East 53rd Street, the ODR Esplanade from East 53rd Street to East 60th Street, and the three new bridges, as depicted on Figure 1-7. The non-contiguous archaeological APE is described by location as per preliminary project mapping as follows:

- **UN Esplanade:** Will entail construction of 115 54-inch-diameter drilled piles in the East River to support an approximately 3,100-ft-long, 32 to 40-ft-wide new platform that is offset 30-ft from the FDR Drive bulkhead. The UN Esplanade proposes one platform section narrowed to 32-ft at East 41st Street and another platform section widened to 50 ft at East 49th Street. The average depth to bedrock is 92 ft, ranging from 56 to 123 ft. The average sediment thickness is 42.5 ft, ranging from 14 to 90 ft.

- **ODR Esplanade:** Will entail construction of 67 new drilled piles (47 54-inch-diameter drilled piles and 20 24-inch-diameter drilled piles) and reuse of 13 existing ODR drilled shafts/piles to support an approximately 1,800-ft-long, 32 to 40-ft-wide new platform that is offset up to 35-ft from the FDR Drive bulkhead. The ODR Esplanade proposes one platform section widened to 50 ft at East 53rd Street. The average depth to bedrock is 46.5 ft, ranging from 21 to 75.5 ft. The average sediment thickness is 16.8 ft, and ranges from 4 to 40 ft.

- **East 42nd Street Bridge:** Will not require construction of support pilings at the elevated deck section of the 3-lane East 42nd Street exit ramp adjacent to the southbound lanes of the FDR Drive; no ground disturbance will occur. However, four additional drilled piles will be required to support the pedestrian/cyclist ramp connection to the UN Esplanade within the river between East 41st and 42nd Streets.

- **East 48th Street Bridge:** Will entail the completion of an extant partial ramp located between the existing East 48th Street FDR Drive elevated entrance ramp and the north fence of the UN Headquarters property. The completion of the ramp is anticipated to require the installation of support piles at four locations. These ground disturbance locations, described from west to east, are as follows: proposed pier on spread footing on shallow rock, approximately 10-ft-below grade; proposed pier on spread footing on medium depth rock, approximately 15-ft-below grade; proposed pier on pile cap supported by short piles socketed into rock, approximately 40-ft-below grade; and proposed pier on pile cap supported on piles socketed into rock, approximately 85-ft-below grade. The completed ramp will bridge the FDR Drive, and then turn northward to descend to the new esplanade opposite East 49th Street. Completion of the bridge over the FDR Drive and the connection to the new esplanade will require the construction of four additional drilled piles outboard of the FDR Drive bulkhead in the river from East 48th Street to East 49th Street.

- **East 54th Street Bridge:** Will entail construction of a pedestrian and cyclist ramp and its abutment walls on fill within existing Sutton Place Park. It is anticipated that excavation to 4-ft-below grade will be required to construct the ramp. The bridge over the FDR Drive will begin in the park adjacent to the retaining wall on the west side of the FDR Drive East 53rd Street exit ramp, which will be supported by the construction of a bridge pier on pile cap supported on piles, approximately 85-ft-below grade. The bridge will span the FDR Drive, then turn southward, and descend to join the new esplanade on a deck/platform that will connect the existing waterfront park to the new esplanade. Completion of the bridge over the FDR Drive and the connection to the new esplanade will require the construction of three additional drilled piles outboard of the bulkhead in the river south of East 54th Street.

This study will assess the archaeological potential of the above described locations that together, comprise the archaeological APE. It should be noted that staging areas and work areas, which are also components of the archaeological APE, have not yet been determined.

1.3.2 Historic Architectural APE

The historic architectural APE is depicted on Figure 1-8, and has been delineated to take into account direct and indirect effects of development of the proposed esplanade and pedestrian bridges on historic architectural resources. The northern and southern boundaries of the APE correspond to the northern and southern limits of the project, at approximately 60th Street, and East 41st Street, respectively. The eastern boundary extends approximately 100 ft from the FDR Drive into the East River. The western boundary corresponds to the western lot lines of properties adjacent to the FDR Drive because properties in this area have the potential to be impacted by construction-related activities (i.e. vibration) and possess the greatest potential to have views of the proposed EMWE. Properties outside this area either would not likely have views of the proposed EMWE, or would be far-enough removed that views would be unlikely to result in impacts, and therefore, are not included in the historic architectural APE.

Figure 1-8 Historical Architectural APE

1.4 Objectives of Cultural Resource Survey

This cultural resources survey has multiple objectives for the archaeological assessment and the historic architectural assessment.

The main objectives of the archaeological assessment are twofold:

- To identify known prehistoric and historic archaeological sites and shipwrecks within archaeological APE and archaeological study area.

- To determine the potential for encountering intact, potentially significant archaeological resources within the archaeological APE that would be impacted by proposed project actions.

The objectives of the historic architectural assessment are:

- To identify known State/National Register of Historic Places (S/NRHP)-listed and eligible resources and designated New York City Landmarks Preservation Commission (NYCLPC) within and immediately adjacent to the APE.

- To identify historic architectural resources that may warrant further study to determine whether they qualify as S/NRHP-eligible resources.

The body of the report is organized as follows: Chapter 2 provides an overview of the environmental setting. Chapter 3 provides the prehistoric and historic overview. Chapter 4 provides the methodology employed for the archaeological and historic architectural assessment. Chapter 5 provides the results of the archaeological assessment and associated conclusions. Chapter 6 provides the results of the historic architectural assessment, and associated conclusions and recommendations. Chapter 7 includes references cited, and Chapter 8 includes a list of preparers.

Two appendices are bound in this report including Appendix A – Historic Maps, and Appendix B – National Register Nomination Forms.

2 ENVIRONMENTAL SETTING

The present topography of the project area and all of Manhattan has been shaped by both natural and man-made forces. Historic development has altered and often obliterated the natural topographic features that once characterized the original land surface.

Manhattan is located in the embayed section of the Atlantic Coastal Plain physiographic province of New York, which extends along the Atlantic Coast and ranges from 100- to 200-miles-wide (Thompson 1977). The surficial geology of Manhattan and surrounding islands is the result of glacial forces.

Several glaciations have worked to form the surficial geology of the New York City area. The most recent glaciation, the Wisconsin, extended as far south as Staten Island, where the terminal moraine, known as the Harbor Hill Moraine, was deposited. Following the glacier's retreat ca. 12,500 years Before Present (BP), marking the end of the Pleistocene, meltwaters trapped by ice and moraines formed lakes in low-lying areas. Glacial Lake Flushing filled in the valleys of the East, Hudson and Hackensack rivers, submerging most of Manhattan (USGS 2003 in HPI 2007). As the lake eventually drained, breaking through the moraine, the island and channel of the East River became dry land ca. 12,000 BP (Raber et al. 1984:10 in HPI 2007). As the Wisconsin glacier retreated, its meltwaters raised sea level, filling the East, Hudson, and Hackensack river valleys. The East River is essentially a drowned estuary; the river flows south along the study area and is also subject to tidal action.

The valley of the East River was formed by glacial activity over 50,000 thousand years ago. Today it is a 16-mile-long tidal strait connecting Long Island Sound with New York Harbor near the Battery. The average depth of the East River ranges between 40 to 70 ft; the deepest point is 116 ft, located between Long Island (in the vicinity of Queens) and Ward's Island. Between about East 48th and East 86th Streets, Roosevelt Island divides the river into two channels, the West Channel and the East Channel. The project area extends into the West Channel, a deep, rock-bottomed stretch of the river that is subject to strong currents with speeds of up to 5.2 knots (TAMS 1999).

Depth to bedrock within the project area was recorded from close to 30 borings collected for the proposed drilled pile locations. Bedrock was encountered at varying depths, from 21-ft- to 123-ft-below mean low water, with an average depth of 69.3 ft. The thickness of sediment overlying bedrock along the river bottom was also recorded as part of the boring survey. The average thickness of sediment was 29.7 ft (varying from 4-ft- to 90-ft-thick). Sediment accumulation was thinnest in the area adjacent to the mid-East 50s, where rock outcrops are visible above the water's surface. The age of these sediments is not known at this time. The accumulated sediments noted in the borings may well date to millennia prior to any human habitation of the area, as strong current and tidal action found within the river today combine to create a scouring effect, preventing extensive areas of sediment buildup (TAMS 1999).

The US Army Corp of Engineers maintains a wide navigation channel (or lane) through the East River, including lanes in both the West and East Channels. Within the West Channel, the 550-ft-wide navigation lane begins approximately 175 ft east of the bulkhead line on the Manhattan shoreline. The navigation lane is maintained to a depth of 35 ft below mean sea level.

The retreat of the Wisconsin glacier and the draining of glacial Lake Flushing left Manhattan with a terrain characterized by rough and irregular hills, ridges, and small valleys. Streams, ponds, and marshy lowlands were also created. The natural soils of Manhattan consist primarily of unconsolidated glacial till, clays, and sands overlying bedrock. The layer of unconsolidated material is less than 25-ft-thick in most places, discontinuous, and has low permeability (TAMS 1999). Groundwater levels fluctuate with the tide. As a result of land modifications associated with the island's development over the past three centuries, most of the soils have been repeatedly disturbed, stripped, or mixed with and/or overlain by fill deposits as hills were leveled, valleys were filled, and the shorelines were pushed out into the rivers.

The underlying bedrock of Manhattan consists of formations of schists, gneisses, dolomitic marble, and serpentine of Precambrian and early Paleozoic origin (HPI 2007). The most familiar of these formations is the Manhattan Schist, which can be seen today as outcrops in many city parks. Glacial striations are present in many of the outcrops in Central Park.

3 PREHISTORIC AND HISTORIC CONTEXTS

3.1 Prehistoric Context

The period of prehistory represented in the New York City area extends for over 12,000 years and is presented as a series of major cultural periods describing specific adaptations to a changing environment and other factors. The basic cultural sequence and chronology for New York State is based primarily on Ritchie (1994 [originally published 1965, revised 1969, 1980]) and other commonly used timetables for the region (Cantwell and Wall 2001). This cultural sequence, shown in Table 3-1 below, follows generally that of the northeastern United States.

Table 3-1

Cultural Sequence and Chronology

Cultural Period	Time Period	Geological Age
Paleo-Indian	Ca. 12,000 - 10,000 BP (Ca. 10,000 - 8,000 BC)	Late Pleistocene
Early Archaic	10,000 - 7,000 BP (8,000 - 5,000 BC)	Early Holocene
Middle Archaic	7,000 - 5,000 BP (5,000 - 3,000 BC)	
Late Archaic	5,000 - 3,000 BP (3,000 - 1,000 BC)	
Early Woodland	3,000 - 1,950 BP (1,000 BC – AD 1)	
Middle Woodland	1,950 - 950 BP (AD 1 - 1000)	
Late Woodland	950 - 450 BP (AD 1000 - 1525)	
Contact	450 - 300 BP (AD 1525-1650)	

The following subsections provide summary information on this chronology organized by the three major prehistoric adaptive trends (Paleo-Indian, Archaic, and Woodland) as they pertain to the project vicinity. The contact period, a period of increasing contact and conflict between the native populations and European settlers, is also briefly summarized below.

3.1.1 Paleo-Indian

While the exact timing and route in which humans first entered the northeastern United States remains uncertain, evidence suggests that the area was first populated as early as ca. 12,000 BP. This marks the earliest known phase of human occupation in the area, referred to as the Paleo-Indian period.

The terminal Pleistocene period in southern New York was characterized by a peri-glacial or boreal environment, dominated by open spruce woodlands and stands of birch, popular, and willow. This was succeeded in the Early Holocene by closed canopy pine-birch-oak forests. Open woodland provided optimal grazing for fauna such as caribou, musk-oxen, mammoth, and horse, while the advent of closed-canopy forest created habitat for deer and small game. Paleo-Indian peoples would also have been able to exploit food sources such as shellfish. Archaeological evidence suggests that Paleo-Indian peoples were highly mobile hunters and gatherers who lived in small groups and did not maintain permanent settlements.

Some early interpretations of the Paleo-Indian diet suggested that they were focused on hunting megafauna, however it is now generally believed that Paleo-Indian's hunted a variety of animals for subsistence. Available plant life was also likely harvested and utilized. The distinctive artifact of the Paleo-Indian period is the fluted Clovis point, a clearly recognizable spear or projectile point type that is usually identified as having a deep flake or scar chipped vertically along the center section from the base. The point style is named after a site in Clovis, New Mexico, where it was first identified, and is used to help date sites across the United States.

Paleo-Indians are thought to have lived in relatively small groups moving across the landscape seasonally in search of resources. Evidence of their encampments can therefore be difficult to define in the archaeological record. Sites dating to this period have been identified throughout the northeast, including southern New York, northern New Jersey, and Connecticut.

A Paleo-Indian site known as the Port Mobil site was identified on the western shore of Staten Island, New York, several miles to the southwest of the current project area. This site was identified along the banks of the Kill Van Kill, a saltwater estuary in New York Harbor. However, during the time of its occupation by Paleo-Indian peoples, the site setting was along high ground overlooking what was then a brackish stream, and situated west of the deeply incised path of the Hudson River (Cantwell and Wall 2001:42). Artifacts recovered from the site included Clovis points, scrapers, knives, drills and gravers. This variety of tools suggested that the site was utilized as more than just a hunting camp, and may have included activities such as tool processing and animal hide preparation (Cantwell and Wall 2001:44).

In general, the New York City area would have been situated several miles from the Atlantic Coast during this period, so what today appears as a coastal environment would have been an inland setting and perhaps less attractive to early inhabitants than it would become several thousand years later. The current project area would likely have been exposed land, as sea levels were several hundred feet lower.

3.1.2 Archaic

The Early and Middle Archaic periods had long been interpreted as representing a low point in human occupation in the northeast, but as with the Paleo-Indian period, surface collections have begun to fill the gap. Increasing density over the period may be related to environmental changes, as the New York City area transitioned from relatively resource poor coniferous to hardwood forests (Salwen 1975).

Archaic settlements consisted of small, multi-component sites located on tidal inlets, coves, bays, and freshwater inland ponds and streams. Archaic tool kits indicate that a wider variety of food resources were being systematically exploited than during the Paleo-Indian period. The Archaic period tool kits included plant processing implements and fishing-related artifacts.

The Archaic period was characterized by generalized hunter-gatherers exploiting large game and a wide variety of fauna including small mammals and birds and riverine resources. A great number of shell mounds on the Lower Hudson indicate systematic exploitation of oysters at least as far north as Croton. The popularity of oysters in the native diet from the Archaic period onward is indicated by the size of various New York shell mounds, which ranged from lenses of a few square meters up to immense mounds of many acres. Fishing equipment, such as netsinkers, are also common at Archaic sites, but the extensive presence of knives and other butchering tools at the sites point to the continued importance of hunting.

Extensive shell mounds were reported to have existed along the East River at Throggs Neck and Hellgate, and in the Inwood area of Washington Heights along the Harlem River (Schaper 1989). Late Archaic habitation sites are likely to be found nearby.

The complexity of Archaic settlement is matched by the increasing diversity in projectile point styles, suggesting that New York State was occupied by a variety of groups with different subsistence strategies and social identities (Salwen 1975). Archaic sites do not provide evidence of agricultural practice, but the artifact assemblages from many excavated sites suggest that occupation was either year-round or repeated.

3.1.3 Woodland

The Woodland period in New York State sees the establishment of horticulture, sedentary villages, and the development of larger social units, including the predecessors of historically recognized tribes. Pottery was gradually introduced, and a much wider variety of material culture came into use. In technological terms, the Early Woodland period is marked by the emergence of pottery, however, additional technological advancements that arose during the Woodland period include smoking pipes, the bow and arrow, and a wide variety of chipped and groundstone artifacts.

While minor climate fluctuations took place during this period, the overall climate was very similar to that of today.

Early Woodland sites are similar to those of the Late Archaic. They were typically small, and artifacts such as projectile points, scrapers, and bone tools provide evidence of hunting, fishing, and limited cultivation (Funk 1976). Pottery is found on an increasing number of sites, typically stamped and impressed cooking pots tempered with crushed shell.

During the Middle Woodland to Late Woodland period, the size and complexity of sites increased tremendously. The key to later developments was the introduction of horticulture, and the triad of cultigens: maize (*Zea mays)*; beans *(Phaseolus vulgaris)*; and squash *(Cucurbita pepo)*. Their processing was facilitated by the use of cooking pots and storage pits. Villages were occupied year round and smaller hunting, fishing, and farming settlements developed as offshoots.

Ceramics became more important for storage, and the project area falls within the area encompassed by the East River Aspect, as defined by Carlyle Smith. The Clason Point site in The Bronx was the type site for one of the foci, and important material was recovered from early excavations at the nearby Van Cortlandt and Pelham Knolls sites in The Bronx, as well as the Dyckman Street site in Upper Manhattan (Smith 1950).

3.1.4 Contact

The Late Woodland Period ended with the arrival of the first Europeans during the early-16th century. Giovanni de Verrazano, the Italian born explorer who was sailing under the French flag, reached New York Harbor in his ship the *Dauphin* on April 17, 1524. Eighty-five years later, in 1609, Henry Hudson's voyage in search of the Northeast Passage to the Orient took place, whereupon he re-entered New York

Harbor and the river that now bears his name. Almost immediately thereafter, Dutch traders in great numbers began flooding into the area in search of furs and other materials.

Hudson's exploration of the harbor also marked the beginning of violent encounters between Native American groups and the Europeans. Shortly after Hudson's crew members explored Staten Island, a skirmish broke out with the local Native Americans, and one of Hudson's men was killed.

At Contact, the New York City area was occupied by numerous Lenape groups speaking Munsee dialects of Algonquian. Upper Manhattan appears to have been inhabited by bands calling themselves *Rechgawawank* (Kraft 1991). At Contact, most Lenape groups lived in small, dispersed settlements made up of rectangular houses constructed of bark or saplings. The extent to which the Lenape groups practiced agriculture as opposed to simple gardening is unclear, but their overall subsistence was oriented toward exceedingly rich coastal resources, including shellfish and anadromous species such as sturgeon (Cantwell & Wall 2001).

Once contact had been established with the Europeans, the Native American way of life was forever changed. The Native Americans quickly began to suffer from the effects of European contact in that disease, alcoholism, and warfare began to decimate the populations of native groups. The Native Americans at first continued to occupy the village sites they had established near water sources. However, as the European settlements grew and subsequently required more land, the conflicts with Native Americans escalated. This was especially prevalent during the 1640s when Director-General Kieft ordered many unprovoked attacks on the native groups. A treaty was signed in 1645 ending these attacks (Grumet 1981).

Peter Stuyvesant replaced Kieft as Director-General in 1647, and the relations between the Native American groups and European colonists were somewhat improved. However, the "Peach War" of 1655 renewed the hostilities between the groups and led to increased violence. The war was precipitated when Attorney General Van Dyck shot and killed a Native American woman who was picking peaches in his orchard (Federal Writers' Project 1939).

3.2 Historic Context

3.2.1 Introduction

The settlement and development history of the City of New York, beginning with its origins as a Dutch trading port during the early 17th century has been well researched and documented by numerous researchers, cartographers, historians, and writers. It is not the objective of the current study to present an all-encompassing history of the City of New York; this study is focused on the settlement and development history of the current project area, with the major goal being an assessment of its archaeological potential. In addition, the historic context provides a framework to assist in understanding the significance of architectural resources within the historic architectural APE.

During the 17th and 18th centuries, most of Manhattan was a patchwork of farms and open meadows, ponds, streams, and marshes, crossed here and there by winding country roads. The heart of the city was concentrated at the southern tip of the island, along short, crooked streets that were shaped by local conditions and displayed no unifying order (Ballon 2012). Nearly two centuries of land filling activities along the lower East River shoreline had created Water Street, Front Street, and South Street, as well as the numerous slips and docks along the East River waterfront.

3.2.2 The Port of New York

Between 1626 and 1820, Manhattan changed from a colonial outpost producing raw materials for its mother country into the most important commercial and manufacturing district in the United States. During this period, New York became the country's most populous city, its leading seaport, and its most important manufacturing, wholesaling, and financial center (Bergman and Pohl 1975:2).

Ships provided the indispensible link between American producers and European consumers. During the 17th, 18th and 19th centuries, sailing ships were slow, inefficient, and expensive carriers. A trip from Manhattan to London took several weeks, often two to three months. The carrying capacity was relatively small, not much larger than a tractor trailer truck today. In the age of sail, it took a lot of manpower to hoist sails during the voyage, and to load and unload cargo at each destination. As a result, fleets of ships were plying the transatlantic trade, and thousands of seamen were employed (Bergman and Pohl 1975).

New York's trade had exploded after the British takeover in 1664. The hinterlands became the granary for the English West Indian colonies, and the Port of New York became the region's foremost milling and transshipment center. In 1687, 35 vessels cleared the port; in 1772, 700 vessels cleared the port. In 1760, ships sailing from New York employed 3,500 seamen (Bergman and Pohl 1975:3).

The so-named "triangular trade" during the colonial period greatly expanded the activities of the port. In the triangular trade, for example, ships from the West Indies brought sugar to New York. New York ships sent back flour and livestock to the West Indies. Both New York and the West Indies exported raw materials to England, and England in turn exported manufactured goods to New York and the West Indies (Bergman and Pohl 1975:3).

The Port of New York was also involved in the inter-coastal trade during the colonial period. By the 1750s, ships sailed regularly to ports on Long Island Sound, the Hudson River towns, Staten Island, and ports in northeastern New Jersey. The ships transported passengers and mail, as well as raw materials and finished goods. In 1765, a contemporary noted that New York controlled "…all the trade of the western part of Connecticut and that of New Jersey…" (Bergman and Pohl 1975:3).

Prior to 1820, nearly all of New York's wharves were located along the lower East River. The water was calmer than the Hudson River, and ice floes were less common. It is noted by Bergman and Pohl (1975) that "wharves" should be more correctly be referred to as "quays" since they did not jut out into the river, but rather paralleled the river. The quays were very active with bales of textiles, barrels of food stuffs, chests of tea, and casks of rum and wine (Bergman and Pohl 1975:3).

Despite the English ban on manufacturing in her colonies, New York emerged as a premier manufacturing center as a direct result of the port's importance as the collection and distribution center for raw materials. Processing or manufacturing reduced bulky raw materials such as grain and made them less expensive to ship. Clothing manufactories, distilleries, iron foundries, sugar refineries, and ship building establishments were all flourishing in New York prior to the American Revolution (Bergman and Pohl 1975).

The financial activities of the colonial era coffee houses were institutionalized in 1812 with the founding of the New York Stock and Exchange Board. This in turn led to the establishment of banking and insurance concerns. By 1820, New York had become the country's most active port, with 25 percent of the US foreign trade passing through the port. At the same time, New York became the finance and insurance capital of the country. New York institutions provided loans to manufacturers and investors, and insured cargoes against loss (Bergman and Pohl 1975).

Robert Fulton introduced steamboat transportation to the Hudson River in 1807 with the success of the *Clermont.* However, steamboats did not take over many of New York's transatlantic or inter-coastal routes until the 1840s. The greatest advantage of steam over sail power was speed. The cost of steam transport was high in the early decades after its introduction, and the steamers initially carried the highest return portion of the transatlantic trade, that of passengers and mail. In 1848, the Cunard Line began regular service between New York and Liverpool. However, as late as 1899, transatlantic steamers were equipped with sails for supplementary power (Bergman and Pohl 1975:17).

Sailing vessels dominated ocean shipping until the end of the 19th century. Lower operating costs (than steam powered vessels), design changes (to increase cargo capacity and speed), and regularly scheduled trips kept them competitive with steam ships, particularly in the hauling of cargo and in the transporting of immigrants. During the 1820-1850 period, carrying capacity of sailing ships increased three-fold, and the average transatlantic trip was reduced to 33 days, down from 39. More of the sailing ships operated on fixed schedules after 1818, when the Black Ball Line introduced its packet service. New York was the first port to offer packet service (Bergman and Pohl 1975:18).

In the packet service, one ship sailed each month from New York, and one ship sailed from Liverpool on a specified day and hour. In 1845, 52 transatlantic packets sailed out of New York, giving the port three regular sailings per week (Bergman and Pohl 1975:18). The packet lines also connected New York with Charleston and New Orleans and the Port of New York soon controlled the cotton shipments from the south that were arriving in port for export or manufacture. During the period 1820-1860, New York handled 60 percent of all US imports and 33 percent of all exports (Bergman and Pohl 1975:18).

In 1870, the Port of New York handled 57 percent of the US foreign trade. After this time, total tonnage continued to increase, but New York's share of foreign trade declined to 37 percent of US exports and 58 percent of its imports by 1913 (Bergman and Pohl 1975:20).

As trade grew in the period 1820-1920, piers and warehouses filled the Manhattan and Brooklyn East River shorelines (Figures A-4a through A-4d; A-5a through A-5d). In Brooklyn, the Gowanus Canal and Newtown Creek also developed in the same manner. Docking and storage facilities began to transform the west side of Manhattan along the Hudson River. Railroad yards occupied hundreds of acres in Manhattan during this period; railroad terminals were frequently located along major water transportation routes such as the East and Hudson rivers to facilitate the transfer of cargoes between rail and water carriers. The Lehigh Valley Railroad Freight Station was located within the study area on the East River at East 43rd Street in 1857 (Figure A-5a).

By the late-19th century, many rail yards were located in New Jersey along the Hudson River, where most of the rail lines from the west converged. The Hudson River prevented direct access to Manhattan until the tunnels under the river were constructed in the early-20th century (Bergman and Pohl 1975: 20). As more and more cargo was transported via railroads from the west, the Hudson River played a more important role in shipping, most likely at the expense of the facilities located along the East River.

3.2.3 Population Growth

As the Port of New York grew, so did the population. Between 1664and 1776, the village was transformed into a town, and the town into a city. By 1775, the population was about 25,000 inhabitants that were concentrated in the built up section at the lower tip of the island between the Hudson and East rivers from the Battery to about one mile north. The population density was high, as there was little available land north of the settled core (Bergman and Pohl 1975).

After the Revolutionary War, during which much of the city had been destroyed, the population grew even more rapidly. By 1820, the population reached 125,000, and the built up section of the city expanded northward an additional mile to about North Street (today's Houston Street). Most of the population was confined to the area east of Broadway where the island was wider. The population density per square mile approached 50,000, and only northward expansion could relieve the congestion (Bergman and Pohl 1975).

There has been much written about the unsanitary conditions that plagued the overcrowded slums of New York, the deadly epidemics that ravaged the city periodically, as well as the attempts to correct the deplorable conditions, such as the introduction of Croton water by 1842. Only an expansion of residential building northward could hope to alleviate the intolerable living conditions in New York's slums.

3.2.4 The Common Lands

New York City's deep port was the powerful economic engine driving the city's dramatic growth at the turn of the 19th century. The busy docks along the East and Hudson rivers were the points of contact with the growing global commercial economy. The streets of the city, however, were its lifeblood, to circulate merchandise, to shop and to live on (Ballon 2012:17).

Throughout the 18th century, a 1,200-acre parcel of Manhattan real estate was referred to as "Common Lands", a term dating back to the Dongan Charter of 1686. According to the charter, the "waste and vacant" common land from about today's 23rd Street to 90th Street between Second and Seventh Avenues was owned by the city and leased (Ballon 2012). Throughout the 18th century, large and small farms dotted the Manhattan landscape north of the crowded commercial and residential heart of the city. A number of private estates owned by prosperous, early New York families were located east of the Common Lands (east of today's Second Avenue), their holdings extending to the East River (Figure A-1). East River Estates in the vicinity of the current project area were owned by Winthrops, Beekmans, Seamans, Ardens, Buchanans, Pearsalls, Schermerhorns, Lenoxes, Rhinelanders, and Lawrences, to name a few (Sackersdorff 1815; Burroughs and Wallace 1999; Ballon 2012).

Toward the close of the 18th century following the American Revolution, ca. 1796, the Common Council decided that it would be to the city's advantage to subdivide and sell the Common Lands to reduce the city's debt. The topography of the Common Lands required that a detailed survey of the island be conducted as farm lines, the boundaries of the Common Lands, private property lines, existing thoroughfares, water courses, and topographic features needed to be accurately mapped.

It was necessary to devise a plan to subdivide the Common Lands in an orderly manner that would lay out north-south thoroughfares to facilitate northward expansion as well as east-west thoroughfares that would link the two transportation arteries of the Hudson and East rivers. In addition, some guidelines or parameters needed to be worked out for standardizing the distances between streets and avenues that would determine the resulting block sizes that were to be subdivided into residential lots, commercial lots, and public parks or open spaces. In other words, the need for a master plan was recognized.

The Common Council, recognizing the need for an accurate planning tool, commissioned a survey of the Common Lands and proposals for their distribution.

3.2.5 The Commissioners' Plan of 1811

In 1807, the Common Council appealed to the New York State Legislature regarding the necessity of a master plan for subdividing not only the Common Lands, but all of Manhattan real estate above the existing commercial center at its southern tip. The population explosion at the turn of the 19th century was creating slums in the city as more and more immigrant workers were being forced to live in overcrowded, unsanitary, and essentially substandard housing. The Common Council, being of the conviction that New York was destined for greatness, recognized the need for a master plan to structure its long term growth. As a result of the city's appeal, in 1807, the State legislature appointed three men to a commission whose directive was to develop the master plan for the layout and subdivision of Manhattan. The commissioners were Simeon De Witt, Gouverneur Morris, and John Rutherford (Ballon 2012). The Commissioners appointed John Randel, Jr. as Surveyor-General for the project.

At the turn of the 19th century, the Manhattan street pattern below North Street (Houston Street) did not lend itself to being incorporated into a planned grid, and this was particularly true for the streetscape below Wall Street. The early streets did not cross at right angles, and were of varying widths. Because of this situation, the Commissioners fixed the baselines of the plan at North Street (Houston Street), Art Street (Washington Square North), and Greenwich Lane (Greenwich Street), leaving Greenwich Village and the West Village untouched (Ballon 2012). Randel began the topographic survey in Spring 1808, and completed it in Fall 1810.

The Commissioners decided that the street pattern would be a gridiron of intersecting streets and avenues. The gridiron street pattern had already been used in Philadelphia, Savannah, Charleston and New Orleans. Randel's plan consisted of a gridiron of 12 north-south avenues, each 100-ft wide, and 155 east-west numbered streets at a 200-ft interval, each 60-ft wide (Cohen and Augustyn 1997). The natural topography of the island was apparently not taken into consideration. This fact would lead to extensive cutting, filling, and grading activity as the grid was implemented and expanded throughout the 19th century. Nevertheless, the result was the street grid we see today, which is one of the most defining elements of Manhattan, and represents a milestone in city planning.

3.2.6 Development of the East Side of Manhattan

New York first expanded northward along the East Side. The generally lower topography of the East Side facilitated construction unlike the terrain of the West Side's rugged hills and valleys. The development of the East Side illustrates the multiple stages of urban growth seen for all of Manhattan, as it transitioned from farmland to sparsely settled streets and blocks, and then developed into distinct and densely settled neighborhoods (Ballon 2012:127).

Today's East River shoreline of Manhattan Island bears little resemblance to what it was during the 17th, 18th, and 19th centuries. This is particularly true for the shore along and in the vicinity of the project area. For example, Turtle Bay once occupied the land east of First Avenue from north of East 45th to south of East 48th Street. For sailing ships from the early colonial era through the American Revolution, the bay was a safe haven from winter gales and the strong East River currents (Figures A-1, A-2, and A-3). Shipbuilders established themselves in the Turtle Bay area, and by 1808, when Robert Fulton was testing his steamboat on the East River, the wharf area was filling up with breweries, carpentry shops, mills, and other small industries (http://turtlebay-nyc.org/history). It is interesting to note that as late as 1857, a large shipyard is shown occupying the blocks between the projected lines of East 42nd and East 44th Streets, east of First Avenue, in spite of the fact that the northern half of Turtle Bay had been filled by this time, and East 47th Street had been opened and built to the new East River shoreline (Figure A-4a).

The decade of the 1830s brought about a residential housing boom in New York. This boom was a result of the nationwide economic expansion from railroads, a local population explosion, and available wealth generated by the opening of the Erie Canal in 1825. During this decade New York became the fastest growing city in the country (Ballon 2012: 127).

In order to accommodate the population growth and business expansion, the city embarked upon a large-scale street opening, widening, and building campaign that enabled a burst of uptown residential housing construction. By the time the Financial Panic of 1837 ended this period of speculation, the city had legally opened gridded roads to approximately East 52nd Street (Ballon 2012: 127). New housing replaced the old. At Dutch Hill, the shantytown on East 42nd Street at the East River, the city broke up hundreds of one-room shacks, cobbled together from old timbers and tin roofing that had housed over a thousand full-time residents (Burrows and Wallace 1999: 930).

As access to the middle and Upper East Side improved, increased levels of development were possible. Third Avenue was among the first thoroughfares opened and built; by 1814 it was passable to Harlem (Ballon 2012). During the early decades of the 19th century, horse-pulled omnibuses traveled Second Avenue and Third Avenue, and steamers sailed the East River from Peck Slip in Lower Manhattan to Harlem.

In 1831, banker John Mason and other Manhattan landholders won a charter to establish the New York and Harlem Railroad along Fourth Avenue as a means to improve the value of their uptown real estate holdings.

The next building boom in the city ran from the mid-1840s until the Financial Panic of 1857. This boom pushed development further uptown, but it wasn’t until the Civil War (1861-1865) ended that the city’s eastern limit moved north of East 59th Street (Ballon 2012:127).

As the city opened, built, and paved streets through the East Side during the 1840s and 1850s, according to the Commissioner’s Plan, it broke up many of the old country estates of early New York families. Many of these families tried to stop the implementation of the grid to maintain the integrity of their ancestral lands; others such as James W. Beekman, divided their property into lots and made a great deal of money in the real estate market (Moscow 1980; Ballon 2012).

Despite the building booms of earlier decades, by the mid-19th century, the unsanitary conditions and extreme overcrowding that plagued the Lower East Side began to creep uptown. Speculators had thrown up substandard housing on the damp and low-lying streets leading from First Avenue down to the waterfront. The east-midtown area’s many vacant lots were used as garbage dumps and stables piled their manure loads in colossal heaps (Burrows and Wallace 1999: 991) (Figures A-4a through A-4d).

Turtle Bay was filled in after the Civil War, and brownstones were built in increasing number to house an immigrant European work force for the breweries, slaughterhouses, and factories that lined the East River shore. A review of historic atlases from the last half of the 19th century indicates that many “offensive” industries were located along the East River. In the East Midtown area, it was not until the late-1940s to early-1950s that the slaughterhouses and meat packing businesses were removed from the East River shoreline, to accommodate the construction of the UN Headquarters complex.

Eventually, brick row houses were constructed for the middle class on the cross-town streets from Third Avenue to the East River. Four- and five-story tenements lined First, Second, and Third avenues and during the 1860s, also began to fill in empty lots on the side streets (Lockwood 1995:246).

3.2.7 East Midtown Waterfront, Early 1900s

In the early-20th century, construction of the Queensboro Bridge (present-day Ed Koch Queensboro Bridge) commenced, which would link the boroughs of Manhattan and Queens. The bridge was situated at East 59th Street in Manhattan, and crossed the East River and Blackwell’s Island (present-day

Roosevelt Island) before touching down in Long Island City in Queens. After numerous construction delays, including collapse of at least two sections, the bridge opened to the public in 1909 (Queensboro Bridge no date). Upon its opening, it was described by *The New York Times* as "…one of three great cantilever structures of the world…" (*The New York Times* March 31, 1909). The completion of the bridge sparked the transformation of Queens from a rural outpost to a modern borough.

By the late-19th century, the brownstones that had been erected throughout the city between 1850 and1880 had fallen out of fashion, and by the early-20th century, prominent architects began to redesign the brownstones, often in the Colonial Revival or Neo-Georgian styles. By this time, the midtown neighborhood along the East River, which included numerous such brownstones, caught the eye of developers. In 1920, brownstones at Sutton Place between East 57th and East 58th streets (present-day S/NRHP-listed Sutton Place Historic District) were acquired by a syndicate known as Sutton Square, headed by architect Eliot Cross, of architectural firm Cross & Cross. The syndicate planned to sell the buildings individually; however, established design restrictions geared towards removing the "blight" of the brownstones to ensure a cohesive design for the group of buildings. Prominent architects and architectural firms were responsible for the 1920s-era renovations, including Mott B. Schmidt, William Lescaze, Delano & Aldrich, Polhemus & Coffin, and Murphy & Dana. These buildings provided an alternative for wealthy New Yorkers who wished to maintain a single-family residence in the city (Hesch 1985).

A number of notable New Yorkers moved to the neighborhood in the 1920s, including literary agent and author Elizabeth Marbury, actress and interior designer Elsie de Wolfe, and Anne Morgan, J.P. Morgan's daughter. However, the neighborhoods status as wealthy enclave was cemented when Anne Vanderbilt, widow of William K. Vanderbilt, acquired 1 Sutton Place in 1921. *The New York Times* reported that "Mrs. William K. Vanderbilt plans to lead an exodus of society from Fifth Avenue and elsewhere to Avenue A [present-day Sutton Place]" (*The New York Times* January 9, 1921). The building was re-designed by noted architect Mott B. Schmidt according to design restrictions imposed by the Sutton Place syndicate, and Mrs. Vanderbilt lived there until her death in 1940.

In addition to renovation of existing mid-to-late-19th century single family residences, luxury apartments also began to be constructed along the East River. For example, in 1925, steel magnate Henry Phipps, who had acquired existing buildings in the area, also opted to construct a 13-story cooperative apartment house, at 1 Sutton Place South. The Neo-Georgian-style building with landscaped garden overlooking the East River was designed by renowned architect, Rosario Candela with Cross & Cross. Construction of luxury apartments along the East River continued throughout the 1920s, and marked the transformation of this area into an enclave for the wealthy. In 1928, *The New York Times* reported that "[I]n the space of about two years entire blocks of cold-water flats, breweries, coal pockets and sundry industrial structures that have outlined their usefulness have been razed and in their stead have risen loft apartments and puncture the skyline with an effect that is indeed startling to anybody familiar with conditions a few years ago…" (*The New York Times* June 24, 1928). Property costs skyrocketed accordingly, with prices that had ranged from $8 to $10 per square ft around 1920, rising to between $75 to $95 per square ft by 1929 (*The New York Times* January 6, 1929).

3.2.8 East Midtown Waterfront, 1929-1940s

The advent of the Great Depression (1929-1941) in 1929 did not initially slow construction, as is evidenced by completion of multiple apartments in the area, and throughout the city during this time. For example, in 1930, construction commenced at 1 Beekman Place, designed by Sloan & Robertson and financed by John D. Rockefeller, Jr. (*The New York Times* January 7, 1930). Another building constructed during the early years of the Depression was River House, designed by Bottomley, Wagner & White at

435 East 52nd Street (1930). The building was situated between 52 and 53rd streets, and the juxtaposition between wealth and poverty at this location was pronounced. Although eventually eradicated, the end of East 53rd Street was one of the worst pockets of poverty in the city, and was depicted in "Dead End," a play, and later film about a gang of so-called "dead-end kids" that hung out at the waterfront. Although construction of River House was completed during the Great Depression, it faced financial difficulties as the price of luxury apartments drastically fell. For example, apartments that once sold for $50,000 pre-Depression were reduced to $500 in the midst of the Depression. The owners forfeited on the mortgage and it was sold at auction in 1941 (Gaines 2005).

In the 1930s, construction of the East River Drive (present-day FDR Drive) under the direction of Robert Moses, New York City arterial coordinator and parks commissioner, commenced. The roadway was proposed to extend 9 ½ miles along the eastern edge of Manhattan from the Battery to the Triborough Bridge, and required countless land acquisitions from property owners, many of whom were not pleased that a new roadway would be constructed in their backyards (FDR Drive no date). In 1936, *The New York Times* reported that property owners along the East River from 23rd to 61st streets opposed plans to construct the roadway, claiming that the "motor highway would have an adverse effect on the exclusive residential districts that have been built up on recent years." Alternatively, residents in the area proposed construction of a roof over the road or burying it in a tunnel to obscure it from their viewshed (*The New York Times* September 20, 1936).

Ultimately, the section of the FDR Drive between 41st and 59th streets was constructed using a variety of methods, including at-grade sections, viaducts, decked, and roofed sections. Construction was completed in stages, generally accompanied by a dedication ceremony to mark the formal opening of each section. In 1940, a 40-block section from 49th to 93rd streets was completed. Impacts on the newly-developed exclusive residential neighborhood varied. River House, as well as its neighbor on the south side of East 52nd Street, known as the Campanile, lost their riverside terraces. However, the city increased the property's square footage east of the building, replaced the yacht landing, and constructed a private walkway over the FDR Drive to access the landing (*The New York Times* June 23, 1940).

The FDR Drive was roofed from approximately East 56th through East 59th streets, which allowed for the enlargement of gardens and courtyards associated with properties at these locations. At 1 Sutton Place, the city tripled the small courtyard east of the building, and created a garden atop the roofed highway. Similarly, the block of houses at Sutton Place's garden and was also expanded atop the roofed highway (Gray November 13, 2005). In addition, the city also developed parks along the East River Drive, such as small parks at the east end of East 56th, 57th, and 58th streets (Markland October 26, 1941).

In 1942, the final section of the FDR Drive from 34th to 49th streets was completed (*The New York Times* May 26, 1942). An article in the *The New York Times,* written by then Manhattan borough president Stanley Isaacs recounted the many obstacles faced during construction, noting that it was a major engineering feat which required establishing over 70 acres of new land through fill, harsh conditions in the East River, and challenges of double, and triple-decking a highway system. In addition to engineering challenges, the city faced the legal logistics of land acquisition. The completed roadway, Isaacs noted, was "more than a highway – it is a broad civic concept" and "represents an effort to improve New York's traffic conditions, provide new municipal services and reclaim a historic waterfront with the soundest and most advanced ides of city planning" (Isaacs June 30, 1940).

While the FDR Drive was under construction, another major transportation improvement was undertaken, development of the Queens-Midtown Tunnel which linked east midtown Manhattan with Long Island City, Queens. In 1930, the US Army Corps of Engineers approved a plan to construct the tunnel at this location; however, due to a lack funding as a result of the Great Depression, construction didn't commence until 1936. Engineer Ole Singstad, responsible for the Holland Tunnel, designed and served as chief engineer of Queens-Midtown Tunnel. Singstad's concept featured two tubes which were wider than the Holland Tunnel to accommodate wider cars. Two ventilation buildings were constructed, one in Manhattan at First Avenue and 41st Street and one in Queens on Borden Avenue in Long Island City. Because of variations in the geology of the East River and its shorelines, a number of methods were required to construct the tunnel. These included blasting through bedrock and boring utilizing massive circular cutting shields. The tunnel was completed in November 1940 (Queens-Midtown Tunnel no date). Similar to construction of the Ed Koch Queensboro Bridge in the early-20th century, the opening of the Queens-Midtown Tunnel increased accessibility to and from Queens, thereby stimulating development in the borough as well as in neighboring Nassau County to the east.

In 1946, the UN, which had been established in 1945, opted to erect its headquarters in Manhattan on First Avenue, between 42nd and 48th streets. The purchase of the $8.5 million property was financed by John D. Rockefeller Jr., and the headquarters was designed by a consortium of architects led by Wallace K. Harrison of Harrison, Abramovitz & Harris. While construction was underway, the UN was temporarily housed in an ice skating rink at Flushing Meadows-Corona Park in Queens County, and an industrial facility on Long Island in Lake Success, Nassau County, among other locations. The headquarters complex was constructed between 1947-1953, and was dominated by the 544-ft high, narrow, Secretariat Building. Other buildings included the Library, General Assembly Building, and Conference Building extending over the FDR Drive. For security purposes, First Avenue was reconfigured, and traffic was diverted through a tunnel (White et. al 2010).

3.2.9 East Midtown Waterfront, 1950s-Present

In the 1950s, new luxury apartments were constructed overlooking the East River. Among these were 45 and 25 Sutton Place South, known as Cannon Point North and Cannon Point South, respectively. The apartments each encompassed one square block, and were erected over the newly-constructed East River Drive. The builders were able to erect the buildings over the highway because the city obtained an easement to construct the highway, while the property owner (at the time Henry Phipps Estate) retained air rights, thus allowing for future development (*The New York Times* February 1, 1958). Construction over the highway allowed both apartments to extend to the river's edge and provide uninterrupted waterfront views.

Cannon Point South and North were designed by noted architect Paul Resnick, with Harry Green as associate. Resnick died soon after construction of the apartments, in 1966. His obituary referenced the apartment buildings, indicating that they were one of his notable achievements, in part because of their location spanning the East River Drive, which necessitated numerous engineering studies and planning (*The New York Times* June 18, 1946). Cannon Point North at 45 Sutton Place South was constructed first, and consisted of a 19-story-and-penthouse cooperative apartment, with spacious three to eight room suites, the majority of which "enjoy breath taking views of the River and the Manhattan skyline" through broad picture windows. A real estate brochure promoting the apartment noted that it was "[d]esigned in keeping with its distinctive address" and offered "truly gracious living in New York's smartest river front entrance" (Cannon Point South no date). Cannon Point North was completed in 1959, and Cannon Point South was completed the following year in 1960. A similar real estate brochure was prepared to promote Cannon Point North, and noted that it served as a companion structure to 45 Sutton Place South, and "[l]ike its famous counterpart, this new 19 story and penthouse residence enjoys one of Manhattan's smartest locations, as well as other distinctive features which made Cannon Point South an instant success." In addition, Cannon Point North also featured a landscaped garden (Cannon Point North no date). The area remains an exclusive address today, with a high concentration of original pre-and post-war luxury apartments.

4 SURVEY METHODOLOGY

The methodologies employed in the various levels of work effort necessary to accomplish the survey objectives are described in this chapter.

4.1 Phase IA Archaeological Survey

Completion of this Phase IA survey involved a site reconnaissance walkover survey, archival documentary and cartographic research, and analysis of all collected information. The archaeological APE defined for this survey includes terrestrial and underwater components (Figure 1-7). The agreed upon archaeological study area for this survey is a one-quarter-mile radius of the project area (Figure 1-7).

4.1.1 Site Reconnaissance Walkover

A site reconnaissance walkover survey of the terrestrial archaeological APE was conducted; a visual survey of the East River shoreline underwater archaeological APE was conducted at the same time. The field view was concerned with documenting existing conditions in the APE and immediate vicinity through observation, field notes, photography, and project map notations. The documented conditions included the following:

- Location, condition, and extent of known resources, if any.
- Past and current land uses.
- Topography, vegetation, and hydrology.
- Nature and extent of historic and modern ground disturbance.
- Evidence of historic and/or prehistoric activity, if any.

4.1.2 Documentary and Cartographic Research Methods

In order to develop necessary background information pertaining to the environment, prehistory, history, and previously identified archaeological resources in the archaeological APE and study area, research was conducted at, or collected from the online files of the following repositories:

- New York State Office of Parks, Recreation and Historic Preservation (NYSHPO), Peebles Island, Waterford, New York.

- NYCLPC, One Centre Street, New York, New York.

- New York Public Library, Map Division, Fifth Avenue, New York, New York.

The archaeological site files of NYSHPO and the New York State Museum (NYSM) archived at NYSHPO were consulted to determine the presence of previously identified prehistoric and historic archaeological sites within the APE and within a one-quarter-mile radius of the APE. The NYSHPO Shipwrecks site file database for the East River was consulted to determine the presence of previously identified shipwrecks in the archaeological APE or immediate vicinity.

In addition, conversations were held with NYSHPO staff archaeologists regarding their knowledge of the archaeological history of the study area during the site file visit, particularly with reference to shipwrecks in the East River.

Previously conducted cultural resources studies, archaeological assessments and surveys relevant to the current study were reviewed at NYSHPO, and through the online website of the LPC. The data collected from these repositories helped establish an appropriate context against which to consider the significance of any potential resources that may be located in the archaeological APE.

Numerous online websites were consulted to research the environmental and geological history of the study area, strengthen the prehistoric and historic contexts, review local histories, conduct additional cartographic research, and review other primary and secondary resources. The online sites consulted are listed in Chapter 7, Bibliography.

4.2 Historic Architectural Survey Methodology

4.2.1 Background Research

For the Historic Architectural Resources Survey, background research was conducted at government agencies and public repositories. State and local government agencies were contacted to determine the extent of significant historic architectural resources in the historic architectural APE. Table 4-1 provides a list of the types of data gathered from these agencies.

Table 4-1

Historic Architectural Data on File at State and Local Agencies

Type of Resource	Description
S/NRHP-Listed Resources	Buildings, structures, sites, objects, or districts that possess national, state, or local significance and are listed in the S/NRHP, maintained by NYSHPO and NPS; some S/NRHP-listed resources are also LPC-designated resources.
S/NRHP-Eligible Resources	Same as above, with the exception that NYSHPO has determined resources to be eligible for S/NRHP listing but the resource has not yet been listed; some S/NRHP-eligible resources are also LPC-eligible resources.
NYCLPC-Designated Resources	Buildings, structures, sites, objects, or districts protected by NYCLPC; some NYCLPC-designated resources have also been listed or determined eligible for listing in the S/NRHP.

4.2.1.1 New York State Historic Preservation Office

NYSHPO maintains a repository of historic architectural resources, information, and documentation. Data gathering was conducted at NYSHPO for the following categories of resources:

- S/NRHP-listed resources
- S/NRHP-eligible resources

S/NRHP nomination forms were obtained for such resources in the historic architectural APE. In addition, the online NYSHPO State Historic Preservation Information Network (SPHINX) database, which is organized by minor civil division (MCD), was consulted for this project within the historic architectural APE. S/NRHP-listed and eligible resources in the APE are included in Chapter 6.

4.2.1.2 New York City Landmarks Preservation Commission

NYCLPC maintains an online repository of designation reports for resources in New York City that are protected under the Landmarks Law. The online repository was consulted for this project within the historic architectural APE. NYCLPC-designated resources in the APE are included in Chapter 6

4.2.1.3 Local Sources

Sources used in preparation of the Draft Cultural Resources Survey Report included local and regional histories, site reports, contemporary periodicals and newspapers, books and reports, maps, plans and photographs. Information was gathered online and at the New York Public Library.

4.2.2 National Register of Historic Places Guidelines

According to National Park Service (NPS) guidelines, historic buildings, structures, sites, objects, and districts that are over 50 years old are eligible for listing in the NRHP if they possess historic significance as defined by NRHP criteria, and possess architectural integrity. NRHP has defined seven aspects of architectural integrity:

- Location
- Design
- Setting
- Materials
- Workmanship
- Feeling
- Association

Table 4-2, Criteria for Historic Significance, defines NRHP criteria and Table 4-3, Integrity Aspects Defined, presents guidelines for architectural integrity.

In New York, NYSHPO cooperates with NPS to list historic architectural resources in the S/NRHP, and under Section 106, decides whether historic architectural resources identified within an APE, and recommended eligible by lead federal agencies, possess adequate significance and integrity to be determined eligible for listing in the S/NRHP.

Table 4-2

Criteria for Historic Significance

36 CFR 60.4, Part I

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
B. That are associated with the lives of persons significant in our past; or
C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. That have yielded, or may be likely to yield, information important in prehistory or history.

36 CFR 60.4, Part II

Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

A. A religious property deriving primary significance from architectural or artistic distinction or historical importance; or
B. A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or
C. A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his productive life; or
D. A cemetery which derives its primary significance from graves or persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or
E. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or
F. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or
G. A property achieving significance within the past 50 years if it is of exceptional importance.

Source: US Department of the Interior (US DOI) 1991.

Table 4-3

Integrity Aspects Defined

Aspect of Integrity	Property Attributes
Location	Must not have been moved.
Design	Must retain historic elements that create the form, plan, space, structure, and style of the property.
Setting	Setting must retain its historic character.
Materials	Must retain the key exterior materials dating from the period of its historic significance.
Workmanship	Methods of construction from its time of significance must be evident.
Feeling	Physical features must convey its historic character.
Association	Must be the actual place where a historic event or activity occurred and must be sufficiently intact to convey that relationship to an observer.
Source: US DOI 1991.	

4.2.3 Historic Architectural Assessment

A historic architectural resources survey was conducted within the historic architectural APE in accordance with relevant guidelines described above. It was undertaken by architectural historians who meet NPS Professional Qualification Standards for Architectural History, codified under 36 CFR Part 61. The survey process consisted of both research and field work.

As described in Sections 4.2.2 through 4.2.4, files of the NYSHPO and NYCLPC were reviewed at the commencement of the survey to determine the number and nature of known historic architectural resources located within or adjacent to the study area. Archival research was conducted, and upon completion of research, a field view occurred to identify both known resources and previously unidentified resources that appear to possess significance, and may warrant further study.

Field work required site visits to historic architectural resources within the APE, including buildings, structures, sites, objects, and districts. Resources were photographed and field notes were prepared about historic architectural resources within the APE.

Each building, structure and site within the study area was analyzed according to the themes or patterns of development identified during the background research. If a building, structure or site, such as a park, possessed physical or associative characteristics that significantly related it to the historic context and also possessed sufficient historic integrity to be a good representative of its property type, it may be considered architecturally significant according to NRHP criteria. Recommendations for resources that may warrant further study are based on the NRHP criteria for evaluation in Table 4-1, and NPS guidelines defining architectural integrity in Table 4-2 (US DOI 1991). Chapter 6 provides the results of the historic architectural assessment.

In addition, historic architectural resources in the APE that do not appear to qualify for listing in the S/NRHP were also documented during the survey. These included resources over 50 years old that have been altered and generally lack integrity, or are common examples of their type, and better examples exist in New York City. Chapter 6 provides information on these resources.

5 ARCHAEOLOGICAL SURVEY

This chapter presents the results and conclusions of the Phase IA archaeological assessment survey. The chapter presents results by each completed survey task and ends with the archaeological assessment presented in the conclusions section.

5.1 Results of Survey

The Phase IA archaeological assessment survey tasks included a site reconnaissance walkover and visual survey, archival documentary research, cartographic research, and analysis of all collected information.

5.1.1 Reconnaissance Walkover and Visual Surveys

A field visit was conducted on March 5, 2013. The area from East 36th Street to East 60th Street was walked over, and the East River portions of the archaeology APE were viewed where accessible from landside overlooks and from existing piers.

The southern end of the study area was accessed through the 37th Street underpass into existing Glick Park. East River ferries to Queens and Brooklyn embark from a pier located between East 35th Street and East 36th Street, directly south of the study area (Photo 1). Glick Park extends northward to approximately East 38th Street at which point it is separated from Waterside Pier by a fence. A gate through the fence is kept locked, with no public access to the pier. North of the fence, the pier extends to approximately East 41st Street (Photo 2). Scattered construction-related and other debris was noted on this section of pier through the fence (Photo 3).

The East River shore was not visible north of East 41st from Glick Park and the Waterside Pier. The walkover proceeded westward across East 40th Street to Second Avenue, then northward up Second Avenue to East 42nd Street in Tudor City. The East 42nd Street portion of the archaeology APE, the location of the southernmost new pedestrian/cyclist bridge, was first viewed from Tudor City Place at East 42nd Street, an overpass affording views of the East 42nd Street FDR Drive ramp at First Avenue and the south side of the UN Headquarters property (Photo 4).

The East 42nd Street FDR Drive exit ramp consists of three traffic lanes that are elevated adjacent to the FDR Drive, and descend to the grade of First Avenue at East 42nd Street (Photo 5). The proposed bridge would utilize the northernmost traffic lane, and require connection to the existing elevated portion of the ramp structure. From the elevated ramp structure, the bridge would span the FDR Drive and descend to connect with the UN Esplanade.

The walkover returned to First Avenue and East 42nd Street, and proceeded north on the east side of First Avenue along the western side of the UN Headquarters property to East 48th Street, the second archaeology APE location. The second proposed pedestrian/cyclist bridge from the landside to the new UN Esplanade would be placed adjacent to the FDR Drive East 48th Street northbound entrance ramp, between the south side of the ramp (Photo 6) and the north fence of the UN Headquarters property (Photo 7). Trucks and other construction-related equipment were noted along the north fence within the UN Headquarters property (Photo 8). Project plans indicate that the ramp will be completed and will bridge the FDR Drive to join the UN Esplanade.

Photo 1 In Glick Park looking southeast at ferry landing between East 35th and East 36th Streets; southern portion of the archaeological study area.

Photo 2 In Glick Park looking north at fenced-off, Waterside Pier that runs between East 38th and East 41st Streets.

Photo 3 Looking north at Waterside Pier from Glick Park. Note scattered construction-related equipment beyond fence; note UN Secretariat Building at left.

Photo 4 On Tudor City Place looking east at East 42nd Street elevated ramp portion of archaeological APE. Note UN Headquarters on left and First Avenue tunnel under East 42nd Street.

Photo 5 On Tudor Place looking at East 42nd Street Ramp. Note elevated curve section of ramp.

Photo 6 On first Avenue at northwest corner of UN Headquarters property looking east up East 48th Street FDR Drive northbound entrance ramp.

Photo 7 At northwest corner of UN Headquarters property looking southeast at unused section of East 48th Street ramp between north fence of UN property and extant East 48th Street ramp.

Photo 8 At northwest corner of UN property looking east at unused section of ramp adjacent to north fence of UN property being used as construction equipment parking/staging area.

At the terminus of East 48th Street at the FDR Drive, the elevated portion of the entrance ramp to the northbound FDR Drive turns northward away from the northeast corner of the UN Headquarters property (Photo 9) to descend to grade of the FDR Drive. The location of the proposed bridge connection to the proposed UN Esplanade in the East River was not visible from this location.

The walkover continued back along East 48th Street to First Avenue, and continued north to Mitchell Place, which runs along the south side of the Beekman Place neighborhood, and rises in elevation from First Avenue to its highest point at the corner of Beekman Place. From this vantage point, the retaining wall of the East 48th Street entrance ramp to the northbound FDR Drive was blocking the view of the East River shoreline and the proposed location of the second pedestrian/cyclist bridge connection to the proposed new UN Esplanade (Photo 10).

The walkover continued north along Beekman Place, then east along East 51st Street to its dead end at a set of stone staircases that provide access to Peter Detmold Park, and a pedestrian bridge over the FDR Drive and the park. The pedestrian bridge staircase descends to a small waterfront park on the East River (Photo 11). The park runs north along the river to East 54th Street, where it ends at a fence located at the southern end of a large, brick residential building that spans the FDR Drive (Photo 12). The building fronts Sutton Place on the landside. Beyond the fence to the north a construction access walkway continues adjacent to the East River bulkhead (Photo 13). The park does not continue to the south of the pedestrian bridge over Peter Detmold Park (Photo 14).

Large drilled shafts/piles, estimated at 4- to 5-ft in diameter, were noted in the river from approximately East 53rd Street northward, continuing past the end of the waterside park (Photo 15). These drilled shafts/piles were part of the support structure for the ODR, and left in place in anticipation of the proposed esplanade project. According to the project description, both the waterside park in this area and the drilled shafts/piles will be incorporated into the proposed ODR North.

Another section of the archaeological APE is located near the end of the waterside park opposite East 54th Street., The third pedestrian/cyclist bridge would connect to the proposed esplanade from an elevated deck to be constructed in existing Sutton Place Park, landside, at East 54th Street and Sutton Place (Photos 16 and 17). The park is a small, triangle-shaped vest-pocket park that abuts Sutton Place, the residential building that spans the FDR Drive, and the FDR Drive East 53rd Street exit ramp (Photos 18 and 19). The bridge would leave Sutton Place Park (Photo 20), span the FDR Drive, and descend to connect to the ODR North (Photo 21). As mentioned above, the ODR North would incorporate the existing drilled shafts/piles, and require additional drilled shafts/piles through this section of the East River.

The walkover continued northward through the Sutton Place neighborhood along Sutton Place to access views of the archaeology APE within the East River where the ODR North would be constructed. Most of the east-west streets off Sutton Place from East 54th Street to East 58th Street dead-end onto small neighborhood parks. Each was investigated during the walkover. The existing line of drilled shafts/piles and north-south running outcrops in the river were noted landside of the drilled shafts/piles from East 55th and East 56th Streets (Photos 22 and 23).

The Ed Koch Queensboro Bridge crosses the project area between East 59th and East 60th Streets. At East 60th Street off York Avenue, an existing ramp over the FDR Drive provides shared access for cyclists and pedestrians to an existing waterside esplanade that extends northward along the East River. The existing waterfront pier area to the south of the Ed Koch Queensboro Bridge is currently being utilized as a construction staging area. The line of existing drilled shafts/piles ends at 58th Street.

Photo 9 At the foot of East 48th Street at southbound FDR Drive exit ramp looking south at the elevated ramp structure. Note FDR underpass below UN Headquarters property in background.

Photo 10 On Mitchell Place at Beekman Place looking east at East 48th Street northbound entrance ramp blocking view of East River shoreline and location of proposed UN Esplanade.

Photo 11 On East 51st Street pedestrian bridge over Peter Detmold Park and the FDR Drive looking north at existing Peter Detmold Park and the FDR Drive.

Photo 12 In waterside park looking north at fenced-off end of the existing esplanade opposite East 54th Street portion of archaeological APE at Sutton Place Park.

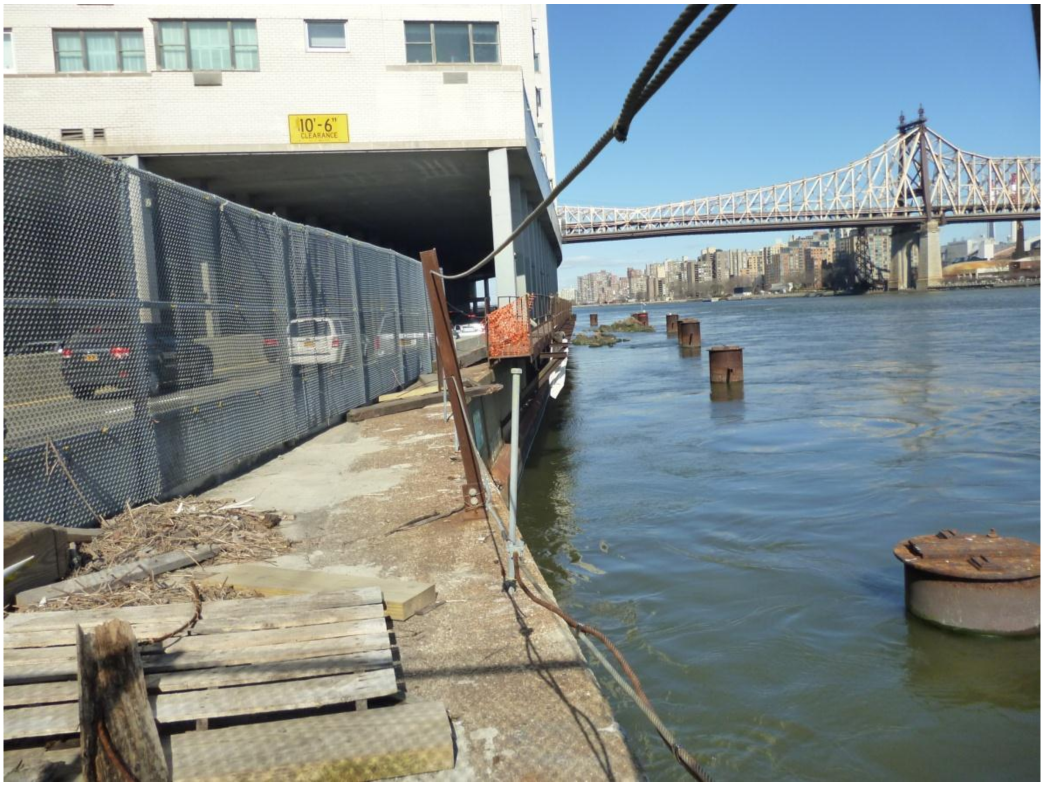


Photo 13 At end of existing esplanade looking north at fenced-off construction walkway along bulkhead adjacent to FDR Drive. Note building underpass and ODR drilled shafts/piles in river.

Photo 14 On East 51st Street pedestrian bridge over Peter Detmold Park and FDR Drive looking south at inaccessible concrete walkway along bulkhead and pier foundation in river.

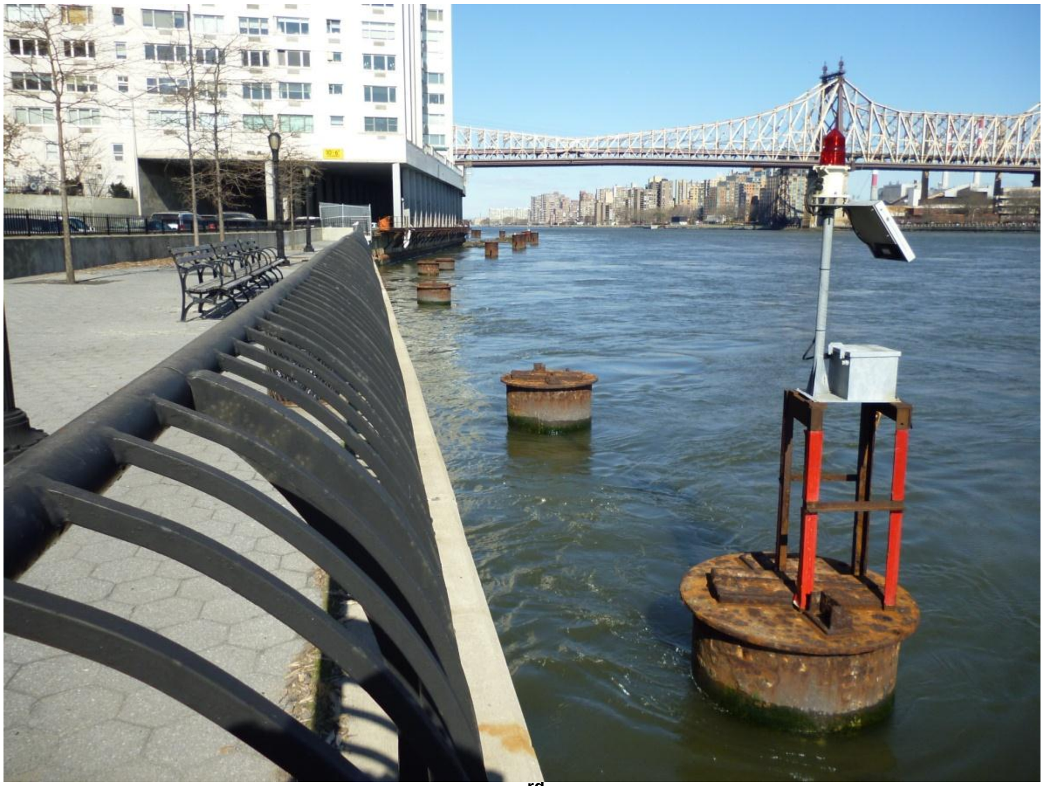


Photo 15 In waterside esplanade opposite East 53rd Street looking north at ODR drilled shafts/piles left in river that may be reused for EMWE Project.

Photo 16 In existing esplanade looking northwest at terminus of East 54th Street and Sutton Place Park portion of archaeological APE adjacent to FDR Drive.

Photo 17 Southwest corner of East 54th Street and Sutton Place looking east at park abutting south end of building that spans FDR Drive. Note subsurface utility presence in street.

Photo 18 At north end of Sutton Place Park looking south at proposed pedestrian/cyclist bridge deck connection location. Note higher elevation of the northern end of the park.

Photo 19 At terminus of East 54th Street at Sutton Place looking south-southeast at end of park at East 53rd Street. Note multiple utility mark-outs on pavement, manholes, and storm drain grate.

Photo 20 In Sutton Place Park looking southeast along angle of proposed bridge to esplanade connection to the left of the light pole in center of photo.

Photo 21 In Sutton Place Park looking east-southeast at location where the ODR Esplanade /extant waterside esplanade meets the extant construction walkway along the bulkhead.

Photo 22 In public park at the terminus of East 55th Street east of Sutton Place looking north-northeast at ODR drilled shafts/piles and rock outcrops in river.

Photo 23 In public park at the terminus of East 56th Street east of Sutton Place looking north at line of ODR drilled shafts/piles in river to East 58th Street. Note existing pier beyond line of drilled shafts/piles extending to and under Ed Koch Queensboro Bridge in background.

5.1.2 Previously Identified Sites

A review of the files of the NYSHPO and LPC found that no archaeological sites have been previously identified within the APE. A review of the wider one-quarter-mile study area did reveal a small number of recorded sites. The majority of these sites represent evidence of historic activity in the vicinity of the project area, including terrestrial sites and shipwrecks (Figure 5-1). Table 5-1 highlights the nine archaeological sites identified within the study area.

One prehistoric site was identified within the one-quarter-mile study area (NYSM Site No. 4061). This site was recorded in the early-20th century by archaeologist Arthur C. Parker and was noted to contain traces of prehistoric occupation in the general vicinity of East 59th Street and First Avenue. Early historic mapping of this area depicts the general vicinity of the site location on high ground overlooking streams to the north, and the East River to the east, the shore of which was marked by expanses of rock outcrop (Viele 1865; Figure A-2). No additional information regarding the site is noted in the site files, such as site type, artifacts or features encountered, or cultural and temporal affiliation.

Eight historic sites were identified within the study area, including four terrestrial sites (NYSHPO Site No. A06101-0495 through -0498, and A06101-017150 through -017151), and two shipwreck sites (UN Wreck A and UN Shipwreck B).

The historic terrestrial sites were identified on Roosevelt Island. Four of these, recorded in the mid-1970s by archaeologists Susan Kardas and Edward Larrabee, are associated with historic structures on and connecting to the island, including the late-18th to early-19th century Blackwell House, mid-19th century Smallpox Hospital (ruins), late-19th century Strecker Memorial Laboratory, and early-20th century Ed Koch Queensboro Bridge. These four sites do not appear to document archaeological resources identified in the field, but rather suggest the potential for associated sites to be present.

The remaining two terrestrial sites were identified through Phase IB survey conducted in the 2000s, including monitoring, shovel testing, and ground penetrating radar (GPR) surveys (Baldwin, et al. 2007). Two buried land surfaces were encountered in the vicinity of the now-demolished mid-19th century City Hospital (NYSHPO Site No. A06101.017151). The first (or upper) buried land surface was dated to the late-18th or 19th century, possibly predating association with the hospital. An undated, but underlying land surface was also encountered; this stratum contained shell but no temporally diagnostic material within the limits of testing. The second site identified through testing recorded the potential stone wall remains of a ca. mid-20th century, map-documented addition to the Smallpox Hospital (NYSHPO Site No. A06101-017150).

In addition to the terrestrial sites noted above, an underwater sonar survey conducted in the 2000s identified the remains of two ships several hundred ft to the east of the current Manhattan coastline, in the southeastern portion of the current one-quarter-mile study area (NYSHPO 2013). One of the wrecks was identified as a rectangular-shaped scow, but no additional data regarding its usage (and subsequent loss) were reported (UN Wreck B). Scows are flat-bottomed boats designed to easily navigate shallow waterways, including areas where shoals might obstruct navigation of vessels with deeper draughts. These boats were commonly used for coastal as well as inland waterway transportation for the second half of the 19th century to the 20th century (Chapelle 1951). No information was provided for the second wreck (UN Wreck A).

Figure 5-1 Previously Identified Archaeological Sites

Table 5-1

Previously Identified Archaeological Sites within a One Quarter Mile Radius of the Project Area

Site Name	Site No.	Time Period	Temporal/ Cultural Affiliation	Site Type	Comments	Reference
NYSHPO Site Number (Prefix A06101.)						
Ed Koch Queensboro Bridge	0495	Historic	Early 20th C	Engineering	Location of existing bridge, built 1909	Kardas and Larrabee 1977
Smallpox Hospital	0496	Historic	Mid-19th – 20th C	Institutional	Ruins of hospital, built 1854-1856, and associated remains	Kardas and Larrabee 1977
Strecker Memorial Laboratory	0497	Historic	Late 19th – 20th C	Institutional	Location of extant former pathology laboratory, built 1892, and associated remains	Kardas and Larrabee 1977
Blackwell House	0498	Historic	Late 18th - 19th C	Domestic	Location of extant farmhouse, built 1796-1804, and associated remains	Kardas and Larrabee 1977
City Hospital Intact Land Surface	017150	Historic	Late 18th – 19th C	Domestic	Buried ground surface, artifacts recovered included food remains, ceramic, glass, and pipe fragments and architectural debris	Baldwin and Cox (JMA) 2009
Smallpox Hospital Kitchen Addition (Drennen Hall)	017151	Historic	Ca. Mid-20th C	Institutional	Rock rubble identified through testing and GPR survey may be remains of addition documented on mid-20th C mapping	Baldwin and Cox (JMA) 2009
NYSM Sites						
ACP NYRK (No #)	4061	Prehistoric	Unknown	Traces of Occupation	No information	Parker
NYSHPO Shipwrecks						
UN Wreck A	N/A	Historic	Unknown	Shipwreck	No information	Parsons Brinckerhoff 2004 in NYSHPO 2013
UN Wreck B	N/A	Historic	Unknown	Shipwreck	Inverted, rectangular scow	Parsons Brinckerhoff 2004 in NYSHPO 2013

5.1.3 Previously Conducted Surveys

A review of the files of the NYSHPO and LPC identified one archaeological survey within the archaeological APE (Kardas and Larrabee 1977). A review of the wider one-quarter-mile study area did reveal several nearby archaeological surveys conducted in association with various development projects, including expansion of the UN Headquarters (Geismar 2003), construction of a new subway tunnel (Kearns, *et al.* 2003), creation of parkland on Roosevelt Island (Heaton 2007 and Baldwin, et al. 2009), and general maintenance activities along the East River waterfront (Kardas and Larrabee 1977).

Table 5-2 below highlights the previous archaeological surveys that have been conducted within the one-quarter-mile study area. Figure 5-2 depicts the location of these project areas, which are keyed to the Map Number column in Table 5-2.

5.1.3.1 Archaeological Surveys

East River Reach Drift Removal

This cultural resource survey was conducted in response to proposed removal and disposal of derelict hulks and structures along a 7.5 mile-long stretch of Manhattan's East River waterfront, extending from the Battery to East 90th Street (Kardas and Larrabee 1977). The survey largely focused on the southern end of its project area (between the Battery and the Brooklyn Bridge), where the majority of the affected piers were located. The limited amount of subsurface survey conducted was similarly within this southern portion of the project area.

The survey noted that the East River likely did not exist prior to 8,000 years ago. On-going sea level rise submerged the valley floor, slowly creating the tidal water body that exists today. Extensive rock outcroppings still visible in the vicinity of the East 50s, across from Roosevelt Island, may have been separated from the island of Manhattan by tidal flats, as the shoreline would have been located further east than its current alignment.

Regular dredging activity along the busy East River waterfront was noted to have occurred through the early-20th century. An eventual slowdown in shipping activity along the waterfront appears to be reflected in the shrinking number of piers, as documented on coastal survey maps (Figures A-7 through A-12).

Proposed actions within the current project area included removal of a derelict 20th century structure located in the East River along the general alignment of East 49th Street. The method of proposed removal was not clearly indicated, but current views of this area verify that the structure depicted in the report has been removed.

UN Expansion

Proposed development of a 35-story office tower to be utilized by the UN, known as the United Nations Consolidation Project, resulted in a Phase IA survey of a parcel between East 41st Street and East 42st Street, fronting First Avenue (Geismar 2003). This project originally included the construction of an esplanade in the East River, which resulted in a side-scan sonar survey of the UN Headquarters waterfront, and is discussed below. The proposed office tower property is situated on paved parkland located to the south of the East 42nd Street Ramp portion of the archaeological APE. The property had been developed with four-story buildings in the mid-1870s. Later development on the block included construction of power company facility, the widening of First Avenue to the east by approximately 28 ft,

Figure 5-2 Previously Conducted Surveys

Table 5-2

Previously Conducted Archaeological Surveys
Within a One Quarter Mile Radius of the Project Area

Survey Title	Author / Year	Map Number
United Nations Consolidation Project (Block 1353, Lot 1) Borough of Manhattan 1A Archaeological Assessment	Geismar 2003	1
Second Avenue Subway Phase 1A Archaeological Assessment	Kearns, et al. 2003	2
Phase IA Archaeological Sensitivity Assessment For Southpoint Park, Roosevelt Island, New York, New York	Heaton 2007	3
Phase IB Archeological Survey And Ground Penetrating Radar (GPR) Survey Of Southpoint Park, Roosevelt Island	Baldwin, et al. 2009	4
Phase IA Archaeological Study Installation Of Duct Banks South End Of Roosevelt Island	Louis Berger & Associates, Inc. 1998	5
Stage IA Archaeological Assessment MTA/Long Island Railroad East Side Access Project	Kearns, et al. 1999	6
Cultural Resource Reconnaissance East River Reach New York Harbor Collection & Removal of Drift Project	Kardas and Larrabee 1977	7

and construction of the Queens Midtown Tunnel, including the two tunnel tubes and associated vent shaft (Figure 1- 4).

While extensive disturbance was noted on portions of the block, the use of the project area portion of the block as parkland may have preserved potential archaeological deposits. The survey concluded that there was potential for domestic features associated with the late-19th century buildings to be present, such as privies located in the rear yards.

Second Avenue Subway

A Phase IA survey was prepared for the Metropolitan Transportation Authority (MTA) NYC Transit as part of a Supplemental Draft Environmental Impact Statement (SDEIS) for the Federal Transit Administration (FTA) in preparation for a new subway tunnel to be constructed below Second Avenue from 125th Street to Lower Manhattan (Kearns, et al. 2003). Due to the extensive length of the project corridor, the study area was tightly reined in around the APE.

This archaeological assessment identified areas of prehistoric and historic archaeological potential along its corridor, including five areas between East 60th and East 42nd Streets in the vicinity of Second Avenue. Depths at which potential prehistoric archaeological resources might be present in the vicinity of East 60th, East 59th and East 42nd Streets were estimated based on research suggesting that fill may have preserved earlier land surfaces and/or disturbance/removal of former land surfaces could not be clearly defined. Historic potential associated with early-19th century residential farmsteads were also similarly noted in this vicinity of East 60th and East 45th Streets. However, these estimates for possible depths of archaeologically sensitive surfaces are not clearly translatable to the current project corridor, given the extent of cut and fill activity required to implement the street grid in the area east of First Avenue during the 19th and 20th centuries. Therefore, this assessment is most useful in suggesting the general archaeological sensitivity of the area.

Southpoint Park

A 12-acre parcel at the southern end of Roosevelt Island was proposed for development as a park, known as Southpoint Park. This area included portions of the grounds and ruins of the mid-19th century Smallpox Hospital, and the mid-19th century City Hospital (demolished 1989), as well as an expanse of filled land extending from the original southern end of the island. A Phase IA survey was conducted by John Milner Associates (JMA) to assess the potential for encountering intact remains associated with or predating the hospitals (Heaton 2007). While prehistoric sites had not been previously identified on the island, the survey noted that the setting may have been favorable for prehistoric activities such as fishing, and that sites may be present.

The survey concluded that while extensive disturbance had been documented in association with past construction and demolition activities, there was limited potential for intact buried surfaces to be present. A Phase IB survey, including subsurface testing and GPR survey was recommended.

The Phase IB survey identified three areas of sensitivity, including buried land surfaces and a possible structural element of the Smallpox Hospital (Baldwin et al. 2009). The buried land surfaces were in the vicinity of the City Hospital, though they may predate association with it. Artifact recovery suggested one buried surface dated to the late-18th or 19th century; an underlying buried surface was also encountered, but diagnostic material was not recovered (OPRHP Site A06101.017150, noted above). A stone wall addition to the Smallpox Hospital was also likely encountered during the survey (OPRHP Site A06101.017151, noted above). No evidence of prehistoric activity was noted during the survey.

Repair of Duct Banks, Roosevelt Island

The NYC Transit Authority proposed to replace high voltage feeder cable duct banks and associated manhole covers in the southern portion of Roosevelt Island. Upon review of the design plans, NYCLPC noted the potential for prehistoric and historic (specifically 19th century) resources to be present within the project area, and requested a Phase IA survey.

A Phase IA documentary survey of the project area was conducted, which included the review of documentary and cartographic data, previous boring logs, and a walkover (Louis Berger & Associates, Inc. 1998). The survey concluded that the project area had low sensitivity for both prehistoric and historic resources. No previous prehistoric sites were identified on the island, and evidence of possible occupation was assumed to be ephemeral. Sensitivity associated with the mid-19th century development of the southern end of the island was determined to be low due to extensive disturbance from building demolition and construction and maintenance of roads and utilities; extensive fill was also documented through nearby soil borings. No additional archaeological work was recommended.

East Side Access Project, Roosevelt Island

A Phase IA survey was conducted for the MTA/Long Island Railroad in preparation for the proposed East Side Access Project. Proposed areas of impact within the project area were located in several New York

City boroughs; a small portion of the project area situated on the western bank of Roosevelt Island is within the current study area.

Proposed actions on Roosevelt Island included construction of a substation to extend approximately 20 ft below grade in the vicinity of an existing ventilation shaft. Prehistoric sensitivity was determined to be low to moderate; while clear evidence that buried resources is not present, if these resources were to exist, they would likely have been disturbed by subsequent inundation by the East River during more recent activities associated with a construction of a subway tunnel in the 1970s. The project area was similarly concluded to have no sensitivity for buried historic period archaeological resources.

5.1.3.2 Other Surveys

Side-Scan Sonar Survey of East River for UN Esplanade

A side-scan sonar survey was conducted by Parsons Brinckerhoff in 2004 as part of the proposed United Nations Consolidation Project on behalf of the UN Development Corporation. The proposed project included a 35-story office tower located between 41st Street and 42nd Street on First Avenue (the Phase IA survey is discussed above), and an esplanade in the East River along the UN Headquarters waterfront.

According to former Parsons Brinckerhoff personnel who were involved with the original project, the building and the esplanade were being evaluated together, and a model was being developed to integrate the landside and in-river components (Samuel Less personal communication 2013). According to Mr. Less, the building and esplanade were ultimately disengaged, and the model was never fully developed.

The data files provided to AECOM indicated that the areal coverage of the survey extended as far south as East 39th Street and nearly as far north as East 53rd Street. According to Mr. Less, not all of the raw sonar information was processed because the project was interrupted and ultimately not completed as proposed.

However, the sonar data was processed and analyzed for the area adjacent to the UN Headquarters. Two shipwrecks were detected through the survey and thought to be a coal scow (UN Shipwreck B) and a schooner (UN Shipwreck A) (Figure 5-1). The schooner was thought to be potentially historic, and the information was discussed with and forwarded to NYSHPO in 2004 (Samuel Less personal communication 2013). The two shipwrecks are listed in the New York State Shipwrecks Site Files. No report was completed for the side-scan sonar survey because the project was changed.

The two shipwrecks are not located within the archaeological APE; they are located within the one-quarter-mile archaeological study area. The two shipwrecks will not be impacted by the actions associated with the current project.

Reconstruction of FDR and Harlem River Drives (Technical Memorandums for Other Supporting Structures and Marine Sampling)

As part of the proposed reconstruction of the FDR and Harlem River Drives, TAMS Consultants, Inc., on behalf of NYSDOT prepared several technical documents to better understand the engineering and environmental aspects of the project.

The Marine Sampling survey collected data for the western and eastern channels of the East River, which flank both sides of Roosevelt Island (TAMS Consultants Inc. and E.W. Finley, P.C. 1989a). A significantly lower number of vertebrate marine species were identified in the western channel. The survey suggested that two factors likely contributed to making the western channel a less hospitable environment than the eastern: the swifter current in the western channel, which continually scoured the river bottom; and the higher volume of boat traffic.

One of the engineering-based technical memorandums focused on the conditions of the existing riverfront fill retaining walls along the roadways (TAMS Consultants, Inc. 1989). The purpose of this report was to identify necessary improvements to maintain the structural integrity of the overlying roadways. The report noted that retaining walls within the project area dated to approximately 1939–1940, when the FDR Drive was first constructed. Sheet piling faces the western end of the various retaining walls constructed within the current APE. The most typical retaining wall structure type along this section of roadway is a Relieving Platform, supported in part by piles. The retaining wall type varied: above the Queens Midtown Tunnel, where a High Level Deck was constructed; approximately between East 54th and East 58th Streets where a Gravity Retaining Wall was constructed; and between East 58th and East 59th Streets where a Rip Rap Embankment was placed.

Cross-sections of the FDR Drive depict the highway's driving surface overlying approximately 10 ft of fill, then a concrete deck, sheet piling and timber piles, then rip rap and/or fill. The cross-sections extend approximately 20 ft to the east of the roadway, and depict the sloping river bottom, and in some areas the underlying bedrock. In the portion of the river adjacent to the East 50s, the bedrock is particularly shallow and outcrops in multiple locations.

Road improvements were eventually conducted along the FDR Drive in the archaeological study area (between East 55th and East 63rd Streets); these are discussed in the following section.

FDR Drive Southbound Rehabilitation

An Environmental Report was prepared by TAMS Consultants, Inc., on behalf of the NYSDOT as part of the FDR Drive Southbound Project, which extended between East 55th and East 63rd Streets (TAMS Consultants, Inc. 1999). The rehabilitation project required the construction of a temporary, fixed ODR, which would carry traffic displaced by repair work along the existing southbound FDR Drive. This ODR would be constructed within the East River.

The proposed actions involved construction of numerous drilled shafts/piles, approximately four-ft in diameter each, between East 53rd and East 59th Streets within 131 ft of the bulkhead line. Construction of the drilled shafts/piles involved boring and removal of rock. A floating fendering system was also to be utilized during construction to protect the ODR from boat traffic along the river. The fendering system was to be placed 30 ft east of the ODR and anchored to the river bottom (TAMS Consultants, Inc. 1999: Appendix B).

Benthic mapping conducted in preparation for the project identified a benthic substrate of rock within and adjacent to the project area (TAMS Consultants, Inc. 1999: Appendix B). The strong current in the area was mentioned, as it creates a continual scouring action that prevents much sediment accumulation along the river bottom.

A view of the project area today shows that while the ODR has since been constructed and removed, the drilled shafts/piles remain in place. Some of these drilled shafts/piles may be reused to help support the proposed ODR North.

5.1.4 Cartographic Review

The review included the examination of 18th, 19th, 20th, and 21st century cartographic documents. These documents provided evidence of past land use, landform modifications, and shoreline alterations within and in the vicinity of the archaeological APE and study area. The documents reviewed included 18th and 19th century maps, 19th century insurance atlases, and 19th through 21st century coastal surveys. These cartographic documents are discussed below, and appear in Appendix A.

5.1.4.1 18th and 19th Century Maps

The British Headquarters Map ca. 1782

The British mapping of New York City during the American Revolution culminated in the drafting of this extremely large-scale map of the entire island, which likely hung in the British forces command room, and used to plan the defense of the city. The map is untitled but has become known as the *British Headquarters Map*, believed to have been drafted in 1782, by an unknown cartographer (Figure A-1). This map is the only surviving 18th century, virtually complete record of the topography of Manhattan Island and delineates every stream, pond, swamp, marsh, elevation, and contour of the shoreline. In addition to providing extremely accurate topographic details for use by the military, the map is the only surviving document to fully display the roads, lanes, structures, estates, and villages that once existed on the island, north of the core at the southern tip (Cohen and Augustyn 1997).

This map depicts structures in red; and fields, gardens, piers, barns and other structures in black. The map shows Kipps Bay, Turtle Bay, and numerous other small embayments within the archaeological study area. The rocky shore and bluffs of today’s Beekman Place and Sutton Place neighborhoods are clearly seen.

The 1815 Map of Farms

The 1815 *Maps of Farms*, commonly called *The Blue Book*, was compiled and drawn by City Surveyor Otto Sackersdorff in 1815. This set of maps was drawn from the original farm maps on file in the Street Commissioner’s Office and includes the lines of the streets and avenues laid out by John Randal, Jr. Randal’s original survey was conducted from 1807-1811 and provided the base map for the Commissioner’s Plan published by William Bridges in 1811. These maps depict the original farm lines, property owners and acreage, existing structures, watercourses, and shoreline, superimposed on the base map of streets and avenues surveyed by Randal. Docks and wharves are not shown in the study area.

The shoreline of the East River is depicted as irregular with bays and points of land from East 36th Street to East 60th Street. Kip’s Bay is depicted in the area now covered by East 36th Street and First Avenue; Turtle Bay is shown extending nearly to First Avenue north of East 45th Street to south of East 48th Street, and smaller bays are indicated at East 53rd Street and Avenue A (today’s Sutton Place), and from East 60th to East 62nd Streets and Avenue A (today’s York Avenue). There is a stream emptying into Turtle Bay from the northwest; this was known as De Voor’s Mill Stream during the 18th century.

First Avenue is the only through north-south thoroughfare depicted in the study area north of Kips Bay; to the east, Avenue A begins in the vicinity of today’s East 54th Street, on high ground or a promontory in the East River. The east-west cross streets appear as part of the grid, but they have not yet been opened and paved. Scattered farm dwellings are depicted, many of which lie within the gridded streets and avenues. No structures are shown within the three proposed bridge areas of the archaeological APE; all three areas appear vacant.

The East 42nd Street portion of the APE was owned by Francis B. Winthrop as part of an 82.84-acre farm. The Winthrop dwelling is depicted as lying just south of the intersection of today's East 43rd Street and First Avenue. No structures are depicted for the East 42nd Street portion of the APE; no structures are shown for the East River shoreline.

The East 48th Street portion of the APE was also part of the 82.84-acre Winthrop tract. This portion of the APE was formerly high ground to the north of Turtle Bay. No structures are depicted along East 48th Street, or along the East River shoreline.

The East 54th Street portion of the APE was part of a 13.62-acre farm belonging to Arden. The Arden dwelling is depicted as lying on the south side of today's East 54th Street, between Avenue A (today's Sutton Place) and First Avenue. Avenue A begins running northward from the intersection of East 54th Street, made possible by the high ground that juts into the East River from today's East 54th Street to East 57th Street. No structures are depicted along East 54th Street, or along the East River shoreline.

1865 Viele Sanitary Map

The 1865 Egbert Viele *Sanitary and Topographical Map of the City and Island of New York Showing Original Water Courses and Made Land* map depicts the original topography of Manhattan atop the street grid of the Commissioner's Plan of 1811. This map was first published in 1859 and is still in use today. Viele issued this map to expose the problems that were being created as waterways were buried under newly constructed streets and buildings, destroying Manhattan's natural drainage system. The map notes the original watercourses, underground and surface streams, bluffs, outcrops, hills, meadows, marsh lands, ditches, canals, bays, the original shoreline, and areas of landfill (Augustyn and Cohen 1997). The East River shoreline is shown in detail; there are numerous bluffs, hills and outcrops depicted from East 36th Street to East 60th Street (Figure A-2).

Within the archaeological study area, the most conspicuous features are: Turtle Bay and the stream emptying into it from the northwest at East 45th to East 47th Streets; a rocky bluff extending from East 51st to East 53rd Streets (today's Beekman Place); a promontory formed from rocky bluffs from East 54th to East 57th Streets with a hilltop at East 56th Street (the start of Avenue A or Sutton Place); and a bluff from East 57th to East 60th Streets with a hilltop on Avenue A (today's Sutton Place) between East 58th and East 59th Streets. There are no docks depicted in the APE or the archaeological study area from East 36th to East 60th Streets.

The Viele map notes some land filling has occurred within the study area along the East River shoreline in the area of East 37th to East 42nd Streets at the foot of the rocky bluff. The East 42nd Street portion of the APE is depicted as a rocky bluff at the shoreline. The East 48th Street portion of the APE is shown as a rocky bluff at the shoreline on the north side of Turtle Bay and, moving west, descends into marshy land and then rises up onto higher ground before it crosses First Avenue and the stream that empties into Turtle Bay. The East 54th Street portion of the APE is depicted on a bluff just inland from the shoreline, where it intersects with Avenue A. Marshy land at the foot of a large bluff to the northwest is depicted between Avenue A and First Avenue.

It should be noted that this map became a valuable guide for prospective property purchasers and developers, as well as for architects, engineers, and builders who needed to determine the subsurface water and silt conditions on a parcel before they could accurately assess the feasibility of a development project, or develop costs for a project. For example, it is said that Paul Starrett, the builder of the Empire State Building and Stuyvesant Town, never prepared an estimate before consulting the Viele map (Augustyn and Cohen 1997).

Another example with particular relevance to the current project relates to the site of the UN Headquarters. When the site was first proposed in the 1940s, the engineers faced the problem of dealing with extensive amounts of landfill of unpredictable composition. In discussing the problem, one of the engineers wrote: "Even before we can make the borings, we dig up all the old maps and surveys we can find. Our bible in this case is the Viele map of 1865, which shows the city as it then was, with its still largely natural shoreline. The Viele map indicates, for instance, that Turtle Bay was to take up a large part of the present UN site, and in that section we can count on our borings to show filled-in land to a depth of thirty or forty feet. Along First Avenue we expect to find, and are finding, that bedrock is only a few feet down, but along the river we'll have to push down through a good deal of gravel and mud." (Augustyn and Cohen 1997: 139).

1874 Viele Topographic Map

The 1874 Egbert Viele *Topographic Atlas of the City of New York, including the Annexed Territory, Showing the Original Water Courses and Made Land* map was also consulted. This map indicates that since the 1865 Viele map was issued, extensive land filling has occurred along the East River shoreline (Figure A-3). Kips Bay and Turtle Bay are completely filled; and, also within the study area, East 36th through East 50th Streets have been extended eastward as a result of land filling activities. Piers or docks have been constructed into the East River at East 37th, East 38th, East 45th, and East 46th Streets. A dock or wharf has been constructed parallel to the shore at East 41st Street. The stream emptying into Turtle Bay has not yet been filled, and is depicted crossing First Avenue at East 54th Street.

The East 42nd Street portion of the APE is depicted as having been substantially filled eastward of the rocky bluff of the former shoreline. It also appears that fill has been placed westward of the rocks to First Avenue, probably in an attempt to bring the grade up to the level of an inland knoll west of First Avenue. The inland East 48th Street portion of the APE is depicted much the same as on the 1865 map. However, substantial fill has been placed at the former terminus of East 48th Street, covering the rocks that once formed the shoreline north of Turtle Bay. The East 54th Street portion of the APE appears unchanged; it appears that land filling activities had not progressed as far north by 1874.

5.1.4.2 Insurance Atlases

1857 Perris & Browne Atlas

The 1857 Perris and Browne *Insurance Atlas of the City of New York, Borough of Manhattan* was reviewed as part of the current study. The atlas depicts blocks and lots, streets and avenues, sizes and types of structures, and names of commercial establishments. The original East River shoreline is also depicted, as are the differences between opened and planned streets (Figures A-4a through A-4d).

The East 42nd Street portion of the APE does not depict any structures at the shoreline. East 42nd Street, east of First Avenue is planned but not yet opened and paved. The block is not yet lotted and there are no structures fronting First Avenue. There are structures depicted north of the proposed street on a large parcel that extends to the shoreline including a blacksmith's shop and a "Pen-Holder Factory". A "Ship Yard" is shown from the north line of East 42nd Street to the south line of East 44th Street. These structures are not in the APE (Figure A-4a).

The East 48th Street portion of the APE does not depict any structures at the shoreline. One frame structure is shown on the north side of East 48th Street halfway to First Avenue, but is not labeled. The street appears to be opened and paved east of First Avenue, but the block is not yet lotted and there are no structures fronting First Avenue. A small north-south lane containing frame and brick structures is depicted between East 47th and East 48th Streets. The lane ends at the north bank of partially filled Turtle Bay at 47th Street. None of these structures are located within the APE (Figure A-4b).

The East 54th Street portion of the APE does not depict any structures at the shoreline, which is not far from the east line of Avenue A. The street appears to be paved and opened between First Avenue and Avenue A; there is little land between Avenue A and the river. The shoreline is very irregular and depicts a small bay south of East 54th Street. Fronting the river below East 54th Street is a brick "Shot Factory" and "Shot Tower" complex. The owner is not given. This factory likely dates after 1815, as it is not depicted on the Sackersdorff *Maps of Farms*. These structures are not in the archaeological APE, as they are located west of Avenue A and south of East 54th Street (Figure A-4c).

The 1857 atlas shows that relatively little development has occurred at the East River shoreline in the study area, but the industries that had been established foreshadowed the area's manufacturing future. These riverfront establishments include: the "Butcher's Hide & Melting Association" between East 44th and East 45th Streets; a "Manure Warehouse" and "Offal Contractor's Yard" between East 45th and East 46th Streets; a "Coal Yard" built on partially filled Turtle Bay between East 46th and East 47th Streets; a "Lumber Yard" on the south side of East 49th Street; a "Brick Yard" on the south side of East 53rd Street; and the "Shot Factory" and "Shot Tower" on the south side of East 54th Street (Figures A-4a through A-4d).

1899 Bromley Atlas

The 1899 Bromley *Atlas of New York City, Borough of Manhattan* was reviewed as part of the current study. The atlas depicts blocks and lots and their dimensions, streets and avenues and their widths, sizes and types of structures, names of commercial establishments, water and sewer lines, and not-yet-filled water lots in the East River. The former shoreline of the river and former watercourses are also depicted (Figures A-5a through A-5d).

The East 42nd Street portion of the APE is shown as 100-ft-wide, paved and open, with water (6-inch) and sewer lines, and fire hydrants in the sidewalk. A 97-ft deep water lot is shown at the shoreline. No structures are depicted near the shoreline, but the "Equitable Gas Light Co." is shown occupying most of the block between East 42nd and East 43rd Streets. The remainder of the block has been lotted and several lots contain structures, including two-story and five-story tenements and the two-story "N. Y. Veal & Mutton Co." building fronting First Avenue (Figure A-5a). None of these structures are within the APE.

The East 48th Street portion of the APE is shown as 60-ft-wide, paved and open, with water (12-inch) and sewer lines, and fire hydrants in the sidewalk. A Malt House occupies a riverfront lot on the north side of East 48th Street; most of the waterfront lots to the north and south of East 48th Street are vacant. It appears that East 48th Street has been extended as a result of landfill approximately 25 ft into the East River. No structures are located within the APE (Figure A-5b).

The East 54th Street portion of the APE is shown as 60-ft-wide, paved, and open for approximately 130 ft east of Avenue A. East 54th Street has apparently been extended by landfill for approximately 80 ft during the last half of the 19th century. A sewer line is depicted; water lines are not. Five-story tenements are depicted fronting Avenue A (today's Sutton Place) north of East 54th Street; no structures are shown at the waterfront. The partial block located south of East 54th Street and east of Avenue A, the future site of Sutton Place Park, is vacant (Figure A-5c). No structures are located within the APE.

The 1899 atlas shows that much development had occurred on the blocks adjacent to the East River shoreline within the archaeological study area. While no structures are shown within the three discrete portions of the APE at East 42nd, East 48th, or East 54th Streets, the streets have been paved and opened, public services have been installed within the streets, the blocks have been lotted and many contain structures.

A variety of businesses are located on the blocks east of First Avenue, although many are not located on the waterfront. Businesses that are located along the East River include: the "Equitable Gas Light Co." between 42nd and 43rd Streets; the "Lehigh Valley Railroad Freight Station" between East 43rd and East 44th Streets, which has been built mostly on landfill; the "Schwarzschild & Sulzberger Slaughter Houses" between East 44th and East 45th Streets and East 45th and East 46th Streets; a "Malt House" between East 48th and East 49th Streets; the "New York Hygeia Ice Co." between East 51st and East 52nd Streets; a "Coal Yard" and the "Central Park Brewery" between East 56th and East 57th Streets east of Avenue A; and the "New York Steam Co." between East 59th and East 60th Streets east of Avenue A (Figures A-5a through A-5d).

1928 Sanborn Pier Map

The 1928 Sanborn Map Company *Pier Map of New York Harbor* was reviewed as part of the current study. The map depicts block outlines, streets and avenues, public and commercial structures east of First Avenue, names of commercial establishments east of First Avenue, water lines, fire hydrants, and piers into the river. Also depicted on this map are: the 1917 Bulkhead Line; the Pierhead Line, modified and approved by the Secretary of War in 1917; and the Exterior Line of Lands under Water Granted to the City in 1871 (Figures A-6a through A-6c).

The East 42nd Street portion of the archaeological APE is shown with a 6-inch water line, fire hydrants in the sidewalk, and the Interboro Rapid Transit (IRT) subway tunnel running below, crossing under the East River to Queens. A pier at the terminus of East 42nd Street is depicted extending from the bulkhead line to the pierhead line. No structures are depicted near the shoreline, but the "N. Y. Edison Co." is shown occupying most of the block between East 41st and East 42nd Streets. The block between East 42nd and East 43rd Streets, depicted as the "Equitable Gas Light Co." on the 1899 Bromley map is vacant in 1929 (or possibly residential and therefore not depicted) (Figure A-6a).

The East 48th Street portion of the APE is shown with a 6-inch water line, possibly mislabeled, as a 12-inch line was depicted on the 1899 Bromley map, and fire hydrants in the sidewalk. A "Lehigh Valley RR Freight Pier" is located inland of the bulkhead and parallel to the river from East 47th to East 48th Streets. On the north side of East 48th Street, a "NY Times Paper Warehouse" is located on the shoreline (Figure A-6b). No structures are located within this portion of the APE.

The East 54th Street portion of the archaeological APE is shown with a 6-inch water line extending east of Sutton Place. The future Sutton Place Park to the south of East 54th Street and Sutton Place is shown as a small, vacant, triangle-shaped parcel. Sutton Place has not yet been extended to the south. An IRT subway tunnel is shown running under East 53rd, crossing under the East River to Queens (Figure A-6c). There are no structures located within this portion of the APE.

A variety of businesses are located on the blocks east of First Avenue and Sutton Place north of East 54th Street, although many are not located on the waterfront. Businesses that are located along the East River include: "The NY Edison Co." between 41st and 42nd Streets; the "United Dressed Beef Company of NY" between East 43rd and East 44th Streets; the "Wilson & Co. Abattoirs" (slaughter houses) between East 44th and East 45th Streets and East 45th and East 46th Streets; the "Lehigh Valley RR Freight Pier" between East 47th and East 48th Streets; the "NY Times Paper Warehouse" between East 48th and East 49th Streets; a pier labeled "dump" at the foot of East 49th Street; and the "NY Steam Co." building on the south side of East 59th Street, between Sutton Place and Riverview Terrace. The Queensborough (sic)

Bridge is depicted crossing the northern portion of the study area between East 59th and East 60th Streets (Figures A-6a through A-6c).

5.1.4.3 Coastal Surveys

USCS maps of the East River from the mid-19th century forward depict minimal change in river depths within the APE and archaeological study area (1855, 1857, and 1877). The coastline also appears relatively static during this period until implementation of the Commissioners Plan street grid (Figure A-7).

19th Century Coastal Surveys

The grid superimposed on an 1877 map highlights the location of certain geographical features and suggests some level of land-altering activity to create a more uniform coastline. On this 1877 map, Turtle Bay is shown east of First Ave between East 45th and East 48th streets; it should be noted that Turtle Bay was reportedly filled in by 1868. A point of land extending between approximately East 54 and East 56 streets has been altered to accommodate the new street grid, notably the intersection of East 54th Street and the start of Avenue A (later Sutton Place). A small embayment between East 59th and East 63rd streets remains relatively unchanged with the exception of docks/landings extending from the foot of East 61th and East 62nd streets.

The 1887 USCS shows that by this time, the bulkhead line between East 39th and East 44th Streets had been pushed further out into the river (Figure A-8). No structures are present at the terminus of East 42nd Street. It appears that former docks along this stretch of river have been incorporated as fill behind the bulkhead. Existing docks are depicted at East 38th, East 39th, East 46th (formerly within Turtle Bay), East 49th, and East 50th Streets. Beekman Place is shown east of First Avenue running north-south between East 49th and East 51st Streets; there also appears to be some shoreline modification in progress. No development is shown at the planned intersection of East 54th Street and Avenue A (Sutton Place). The bluff between East 55th and East 60th Streets is clearly shown, and structures have been built on the east side of Avenue A, marking the beginnings of the Sutton Place neighborhood.

20th and 21st Century Coastal Surveys

The 1906 USCS map shows that the bulkhead at the lower end of the study area had been pushed further out into the river. The former docks at East 38th and East 39th Streets have been incorporated into the new bulkhead line. No changes are depicted for the terminus of East 42nd Street. There are structures set back from the shoreline at East 48th Street. There appears to be a series of docks, and a structure/dock along the shoreline below Beekman Place. A structure is noted fronting Avenue A north of the terminus of East 54th Street; there is vacant land to the south. The Sutton Place bluff is evident, and a dock complex is depicted at the shoreline below.

The 1929 USCS map depicts new docks at the foot of East 38th, East 39th, East 42nd, East 45th, and East 46th Streets (Figure A-9). An L-shaped dock structure/waterfront structure is depicted between East 47th and East 48th Streets. New docks are shown at the foot of East 49th and East 53rd Streets. Avenue A has been built and opened south to East 53rd Street, and a clock tower has been erected on the northwest corner of Avenue A and East 54th Street; there is no land at the southeast corner. Both the Beekman and Sutton Place neighborhoods show signs of additional development. The shorefront complex of docks and structures from East 55th Street to East 60th Street has been altered and pushed further out into the river. The Queensboro Bridge (Ed Koch Queensboro Bridge), completed in 1909, is depicted at the north end of the study area (Figure A-9).

The 1933 map indicates some new development within the street grid, as well as a few changes along the waterfront. Changes between East 49th and East 52nd Streets include a new structure erected along the bluff east of Beekman Place (between East 49th and East 51st Streets), and expansion of a structure and associated alteration to the waterfront between East 51st and East 52nd Streets. Other alterations to the shoreline are visible between East 58th and East 60th Streets (just north of the bridge), where docks/landings in the East River were either modified or newly constructed.

The 1941 map shows that the shoreline has undergone major alterations that have all but erased the natural shoreline. This map also indicates that the extant docks have been numbered (Figure A-10). The bulkhead line in the southern portion of the study area appears to have been pushed out further into the river, partially incorporating docks, and the map indicates that bulkheads are under construction in the river from East 49th to East 54th Streets, and from East 59th Street northward.

The 1966 coast survey shows extensive changes to the East River shoreline, largely due to the construction of the FDR Drive and the UN Headquarters (Figure A-11). A walkway over the FDR Drive to a dock in the river is shown at East 39th Street. East 42nd Street ends at First Avenue, at the southwest corner of the UN Headquarters property. A narrower street, offset from East 42nd Street to the south continues east of First Avenue and terminates at the FDR Drive. This is the location of the East 42nd Street portion of the APE. East 48th Street is depicted as running east of First Avenue along the northern boundary of the UN property, and also serves as the East 48th Street exit for the southbound FDR Drive. East 54th Street is depicted as running between First Avenue and Avenue A. Sutton Place Park, on the east side of Avenue A is not shown; the FDR Drive occupies most of the land on the east side of Avenue A, and the south side of East 54th Street.

The 1974, 2001, and 2012 coast surveys were also reviewed. The most notable changes have occurred along the bulkhead line south of East 40th Street, where the bulkhead has again been pushed out into the river. No changes to the East 42nd, East 48th, or East 54th Streets portions of the APE were depicted. The 2012 map shows the existing drilled shafts/piles in the river from East 53rd to East 58th Streets (Figure A-12).

5.2 Conclusions

The following section assesses the historic and prehistoric archaeological sensitivity for each of the five portions of the archaeological APE. It should be noted that additional information regarding the locations of staging areas and work areas will be required to finalize the archaeological assessment. It is also not known whether or not dredging will be a component of the proposed esplanade construction.

5.2.1 UN Esplanade

This portion of the archaeological APE is in the East River from East 41st to East 53rd Streets. The search of the NYSHPO Shipwreck Database revealed that no previously documented shipwrecks are located within the APE. However, two shipwrecks that are listed in the NYSHPO database were located within the archaeological study area through a side-scan sonar survey conducted by Parsons Brinckerhoff in 2004. There is very limited information given in the NYSHPO database concerning these two resources. A search of the site reports at NYSHPO failed to locate the 2004 report, despite its being listed as submitted on November 10, 2004 (03PR00489). However, AECOM was able to contact former Parsons Brinckerhoff personnel who had been involved in the side-scan sonar survey and were gracious enough to provide information concerning the areal extent of the 2004 survey coverage. The information regarding the two shipwrecks had been sent to NYSHPO by Parsons Brinckerhoff in 2004; no report was completed because the proposed project was interrupted and changed.

The construction of the FDR Drive and the installation of its bulkhead have in all likelihood caused extensive subsurface disturbance along its length. Additional disturbance may have been caused by dredging actions prior to the FDR Drive construction, and in the 60-plus years since its completion.

Research has indicated that the western channel of the East River exhibits the greatest current and tidal action, resulting in relatively little sediment accumulation (TAMS 1999). Sediment depths were obtained through the boring survey for the current project's proposed drilled pile locations. The age of these sediments, however, is not known at this time. The accumulated sediments noted in the borings may well date to millennia prior to any human habitation of the area.

Data received concerning the 2004 side-scan sonar survey confirms that there are no shipwrecks in the APE in the East River from East 41st Street to the northern boundary of the UN Headquarters property, just south of East 48th Street. While it cannot be stated with absolute certainty, it is unlikely that undocumented archaeological resources such as historic shipwrecks are located in the East 48th Street to East 53rd Street portion of the APE in the East River.

5.2.2 ODR Esplanade

This portion of the archaeological APE is in the East River from East 53rd to East 60th Streets. The search of the NYSHPO Shipwreck Database revealed that no previously documented shipwrecks are located within the APE or within the archaeological study area.

The construction of the FDR Drive and the installation of its bulkhead have in all likelihood caused extensive subsurface disturbance along their length. The construction of the Ed Koch Queensboro Bridge in 1909 has also impacted the riverbed near the northern end of the study area. Benthic mapping conducted for the FDR Drive Rehabilitation Project, between East 53rd Street and East 64th Street, described the benthic substrate, or river bottom, as "rocky, containing pieces of rip-rap and construction debris resulting from the extensive building activities that have taken place in this area" (TAMS 1999: S-13). It was further noted that strong currents and tidal action prevent the deposition of large amounts of sediment along this section of the East River.

The installations of the 59 54-inch-diameter ODR drilled shafts/piles have impacted the riverbed from East 53rd Street to East 60th Street, which is the length of the entire proposed ODR Esplanade. It was also noted above that 33 of these ODR drilled shafts/piles were cut off at the mud line following the project's completion. The method by which these drilled shafts/piles were cut is not known, but it is quite likely that additional subsurface disturbance was created at that time.

While it cannot be stated with absolute certainty, it is highly unlikely that undocumented archaeological resources are located in this portion of the APE in the East River.

5.2.3 42nd Street Ramp

This proposed pedestrian/cyclist bridge portion of the archaeological APE runs up the FDR Drive East 42nd Street exit ramp on the south side of the UN Headquarters property from the grade at First Avenue, eastward to the elevated ramp section, eastward over the FDR Drive, then descends to connect with the proposed UN Esplanade.

The connection of the proposed pedestrian/cyclist bridge to the existing elevated FDR Drive ramp will not require the construction of support pilings landside of the FDR Drive. According to the latest design plans, there is no anticipated ground disturbance in this portion of the APE.

It may or may not become necessary to include new piling supports landside of the FDR Drive. In either event, this portion of the APE possesses little to no historic archaeological sensitivity. No map documented structures have been identified for this portion of the APE. The review of numerous cartographic resources consulted shows that East 42nd Street, east of First Avenue, contains substantial fill deposits that have created most of the land on which the East 42nd Street ramp was built.

In terms of prehistoric sensitivity of the landside portion of the APE, it is possible that buried living surfaces containing intact, potentially significant prehistoric resources have survived beneath extensive fill deposits. This location, however, does not lend itself to that scenario, as the ground within the APE was considerably lower in elevation at the shoreline than that of an easy walk inland to the west or to the north. Native American occupation would likely have been on higher ground.

The connection of the pedestrian/cyclist bridge to the UN Esplanade will require the installation of four additional drilled piles in the East River between East 41st Street and East 42nd Street. It is highly unlikely that undocumented archaeological resources are located in this portion of the APE in the East River. This portion of the APE was included in the 2004 side-scan sonar survey; no archaeological resources were identified.

5.2.4 48th Street Ramp

This proposed pedestrian/cyclist bridge portion of the archaeological APE is located between the FDR Drive East 48th Street northbound entrance ramp, and the north side of the UN Headquarters property, east of First Avenue, and will entail the completion of an extant partial ramp. The completion of the ramp will require substantial ground disturbance at four locations landside of the FDR Drive. The areas of ground disturbance will be created by the installation of support pilings at depths of 10-ft-, 15-ft- , 40-ft-, and 85-ft-below grade (from west to east). The completed ramp will bridge the FDR Drive and then turn northward to connect with the proposed UN Esplanade in the river.

This portion of the APE possesses little to no historic archaeological sensitivity. No map documented structures have been identified for this portion of the APE. The review of numerous cartographic resources consulted shows that East 48th Street, east of First Avenue contains substantial fill deposits that have created much of the land on which the East 48th Street ramp was built. Historically, the East River shoreline at today's East 48th Street consisted of a rocky bluff on the north side of Turtle Bay that dropped in elevation inland to the west and north. Vast amounts of fill would have been needed to bring the area to a more or less level grade with the rocky bluff that forms today's Beekman Place neighborhood between East 48th and East 51st Streets. The area to the south, between East 48th and East 42nd Streets is now the UN Headquarters, whose construction required vast amounts of fill, and caused extensive disturbance to the area and the street grid.

This portion of the APE possesses little to no prehistoric sensitivity, as most of the area was within Turtle Bay until it was filled during the 1860s. In addition, the entire area was extensively disturbed during the construction of the UN Headquarters from 1947 to 1953.

The connection of the pedestrian/cyclist bridge to the UN Esplanade will require the installation of four additional drilled piles in the East River between East 48th Street and East 49th Street. While it cannot be stated with absolute certainty, it is unlikely that undocumented archaeological resources are located in this portion of the APE in the East River.

5.2.5 54th Street Ramp

This proposed pedestrian/cyclist bridge portion of the archaeological APE begins in Sutton Place Park, east of Sutton Place, and south of East 54th Street, adjacent to the FDR Drive. The latest project plans call for a pedestrian/cyclist ramp and its abutment walls to be constructed on fill, but will also require excavation to 4-ft- below grade. The proposed bridge leaves the park from a bridge pier support structure that will be supported on piles, 85-ft-below grade. The bridge will span the FDR Drive and then turn southward to connect with the ODR Esplanade.

This portion of the APE possesses little to no historic archaeological sensitivity. No map documented structures have been identified for this portion of the APE. The review of numerous cartographic resources consulted shows that most of the land east of Sutton Place and south of East 54th Street is filled land. Historically, the East River shoreline on the north side of today's East 54th Street consisted of a rocky bluff trending north around an inland hill located at today's East 55th Street and Sutton Place; the south side of East 54th Street would have been in the river. The Sutton Place neighborhood is located on the high ground to the north.

This portion of the APE possesses little to no prehistoric sensitivity, as most of the area was within the East River or the face of a rocky bluff until the 20th century. In addition, the entire area was extensively disturbed during the construction of the FDR Drive and the residential building spanning the roadway.

The connection of the pedestrian/cyclist bridge to the existing waterfront park and proposed ODR Esplanade will require the installation of three additional drilled piles in the East River south of East 54th Street. It is possible that existing ODR drilled shafts/piles in this area will also be reused to connect the bridge to the existing park and new esplanade. While it cannot be stated with absolute certainty, it is unlikely that undocumented archaeological resources are located in this portion of the APE in the East River. It is likely that extensive prior subsurface disturbance resulted from the installation of the ODR drilled shafts/piles.

5.3 Recommendations

It has been determined through the research conducted for the present study that the landside portions of the archaeological APE possess little to no prehistoric or historic archaeological sensitivity. The archaeological sensitivity of the bed of the East River within the archaeological APE is somewhat more difficult to evaluate.

Research has indicated that the bed of the river has been previously disturbed in isolated locations along the proposed route of the ODR Esplanade, from East 53rd Street to East 60th Street. The prior disturbance was caused by the installation of 59 54-inch-diameter drilled shafts/piles associated with the ODR project. In addition, the cutting off of half of these drilled shafts/piles at the mud line likely created additional disturbance to the river bed. A cultural resources survey for the ODR project was apparently not conducted; no report could be found in the NYSHPO or LPC files.

The riverbed along the proposed route of the UN Esplanade, from East 41st Street to East 53rd Street, was not affected by the ODR project. However, the West Channel of the East River and the adjacent shoreline were probably subject to dredging activities during the late-19th century through the 20th century. Research conducted by Kardas and Larrabee (1977) concluded that between 1929 and 1976, the USACE conducted at least 80 dredging and obstruction removal projects along the Manhattan waterfront. Dredging activity would have impacted archaeological resources on the riverbed, but the depths to which the dredging would have occurred are not often known, as they were not always recorded, particularly prior to the 20th century (HPI 2007).

As stated above in the Conclusions, the side-scan sonar survey covering the area from East 41st Street to just south of East 48th Street was analyzed, and no archaeological resources were documented within the APE. It is unlikely that undocumented archaeological resources are located in the UN Esplanade from East 48th Street to East 53rd Street, or in the ODR Esplanade portions of the APE in the East River. However, it cannot be stated with absolute certainty that none exist. The side-scan sonar survey conducted in 2004 did reveal the presence of two shipwrecks in the archaeological study area.

It should be noted that the side-scan sonar data is now over nine years old, and several intense storms have affected the East River in the interim. For example, the intense wind and wave action generated by Superstorm Sandy in October 2012 had the potential to extensively disturb the bed of the East River. Previously documented resources may have been disturbed or washed away and new resources may have been deposited.

A Phase IB side-scan sonar survey of the proposed esplanade footprint from East 48th Street to East 60th Street, from the bulkhead along the FDR Drive outboard 200 ft into the river is recommended.

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6 RESULTS OF ARCHITECTURAL SURVEY

6.1 Historic Architectural Assessment

The historic architectural APE is characterized by a dense concentration of high-end, pre-and-post-World War II-era residences and apartment buildings, interspersed with few more recently constructed buildings. A number of small-scale parks, major transportation infrastructure, and an international territory occupied by the UN Headquarters are also situated within the APE.

Three resources within the historic architectural APE have been previously evaluated, as indicated in Table 6-1. Photos 1-4 depict these resources, which are also mapped in Figure 6-1. Copies of the NRHP nomination forms are included in Appendix B.

In addition to the three previously evaluated resources, 27 resources over 50 years old have been identified in the historic architectural APE. Of these, eight resources appear to be historically and/or architecturally significant, and retain integrity. These resources are described in Table 6-2, depicted on Figure 6-1, and illustrated in Photos 5 -22.

The remaining 19 of the 27 resources do not appear to be historically and or architecturally significant, and lack integrity. These resources include converted brownstones dating to the mid-19th century, pre-and post-World War II-era luxury apartments, and a number of small parks and playgrounds which generally date to construction of the FDR Drive. In general, these resources either represent common-place features, or lack integrity as a result of alterations over time. These resources are depicted on Figure 6-1, and illustrated in Photos 23-32.

Table 6-1

Previously Evaluated Resources in the Historic Architectural APE

Address/Name	Year Built	Status	Description/Significance
Sutton Place Historic District	1920s	S/NRHP-listed	Historic District includes 12 contributing buildings, one contributing garden, and four non-contributing buildings; district is historically and architecturally significant as a cohesive residential development initially constructed in the mid-19th century, and re-designed as high-end residences for the affluent in the 1920s according to design guidelines.
Ed Koch Queensboro Bridge	1909	S/NRHP-Listed and NYCLPC-designated landmark	Two-span, thru-cantilever truss bridge over the East River, the first to connect Manhattan to Queens; designed by noted engineer Gustav Lindenthal and architect Henry Hornbostel; significant for the aesthetics of its design and its engineering merit, and for its role in the development of Queens.
Lamppost; East 58th Street south of Sutton Place	Ca. 2000	NYCLPC-designated landmark	According to the NYCLPC-designation report for Historic Street Lampposts prepared in 1997, a Type-F Twin Lamppost, the last of its type, was at this location; in the early 2000s, the lamppost was replaced with a replica Bishop's Crook Lamppost (http://forgotten-ny.com/2009/04/lampposts-by-the-letter-r-henry-bacons-types-a-through-g/); although a replica, lamppost is still listed as a NYCLPC-designated landmark on NYCityMap, available at: http://gis.nyc.gov/doitt/nycitymap/

Table 6-2

Potentially Significant Resources in Historic Architectural APE

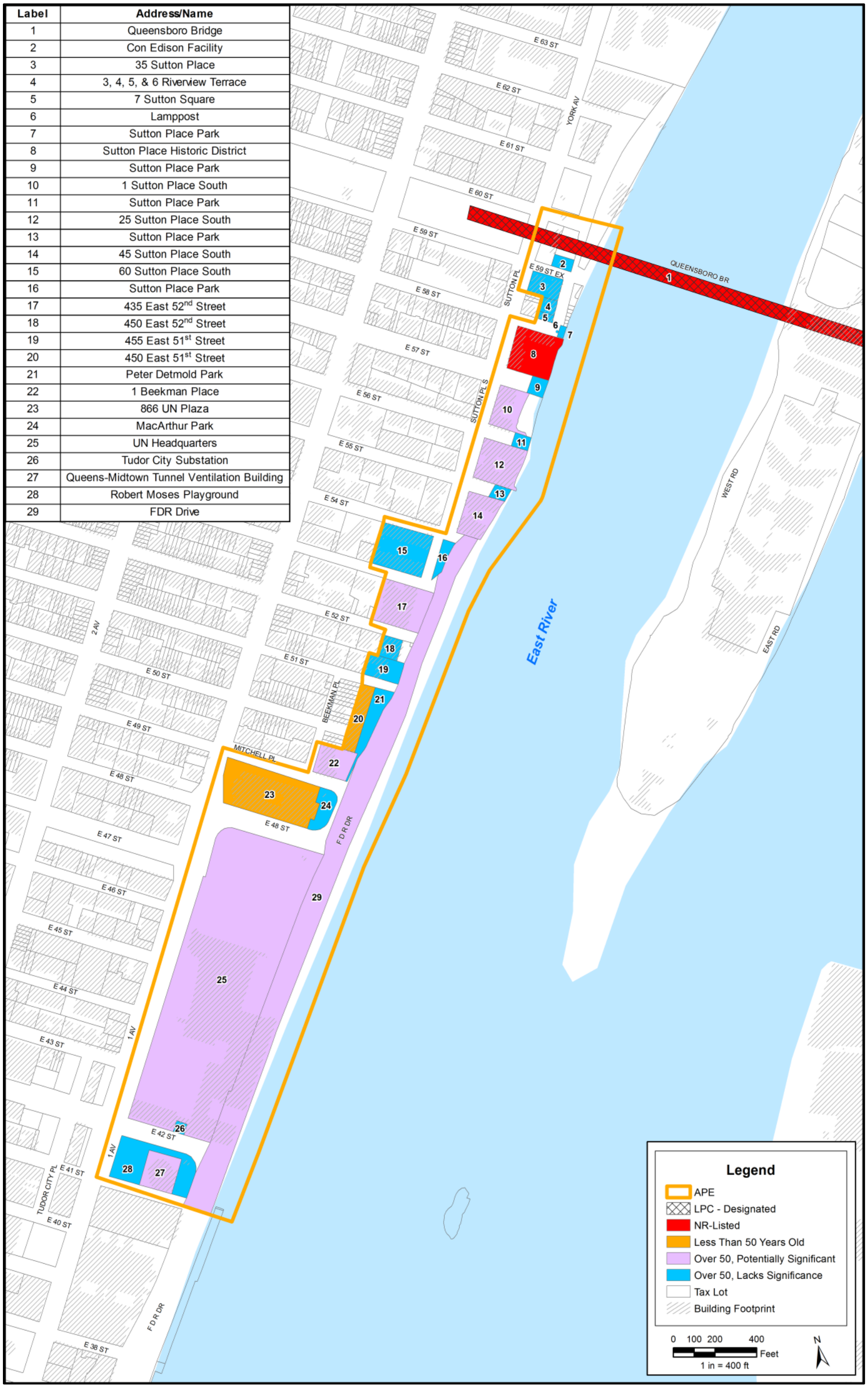
Address/Name	Year Built	Description/Significance
FDR Drive	1934-1966	Originally known as the East River Drive; constructed under Robert Moses, New York City arterial coordinator and parks commissioner, using Public Works Administration (PWA) funds; highway constructed on fill and piles with decked and roofed segments; appears to be historically significant as a large-scale federally funded highway initiated during the Great Depression and completed following World War II; significant for its engineering and design; although the highway has been altered, it generally retains integrity of location, design, setting, materials, workmanship, feeling, and association.
Queens-Midtown Tunnel and Ventilation Building	1936-1940	Tunnel consists of two tubes that connect midtown Manhattan to Long Island City, and also features two ventilation buildings located at 1st Avenue and 41st Street in Manhattan, and Borden Avenue in Long island City; designed by Ole Singstad, who also designed the Holland Tunnel; partially funded by PWA; appears to be historically significant as a mid-20th-century tunnel that provided connection to Queens and Long Island, and led to increased suburban development in these areas; and significant for its engineering and design, constructed through multiple geological conditions, utilizing multiple methods, including blasting and boring, and its association with noted tunnel engineer Ole Singstad; although somewhat altered over time, it retains integrity of location, design, setting, materials, workmanship, feeling, and association.
United Nations Headquarters	1947-1953	United Nations Headquarters, designed by consortium of architects led by Wallace K. Harrison, complex features the 544-foot high, narrow, Secretariat Building. Other buildings included the Library, General Assembly Building, and Conference Building that extends over the FDR Drive; appears to be historically and architecturally significant; retains integrity of location, design, setting, materials, workmanship, feeling, and association.
1 Beekman Place	1931	Classical-style, red brick, 17-story luxury apartment building overlooking the East River, designed by Sloan & Robertson, appears to be historically significant for its association with the 1920-30s-era re-development of this East River waterfront neighborhood which was transformed from a neighborhood with industrial properties and tenements to a wealthy neighborhood; and architecturally significant as a good example of a Classical-style luxury apartment building designed by prominent architects; although it has been somewhat altered, it retains integrity of location, design, setting, materials, workmanship, feeling, and association.

1

Table 6-2 (cont'd)

Potentially Significant Resources in Historic Architectural APE

Address/Name	Year Built	Description/Significance
435 E 52nd Street/River House	1931	Art Deco-style, gray brick and limestone luxury apartment building with classical details overlooking the East River; features a U-shaped 14-story base with a central 26-story tower designed by Bottomley, Wagner & White, and constructed by builders James Stewart & Company; appears to be historically significant for its association with the 1920-30s-era re-development of this East River waterfront neighborhood which was transformed from a neighborhood with industrial properties and tenements to a wealthy neighborhood; and architecturally significant as a good example of a skyscraper luxury apartment building with Art Deco and Classical-style elements; although it has been somewhat altered, it retains integrity of location, design, setting, materials, workmanship, feeling, and association.
45 Sutton Place South/Cannon Point South	1959	One of two post-World War II-era Modern luxury apartment buildings designed by noted architects Paul Resnick and Harry Green, that were constructed over the FDR Drive; appear to be historically significant for its association with post-World War II-era development in this area, architecturally significant as a mid-century Modern apartment building, and significant for its design and innovative engineering required to construct over the highway; although it has been somewhat altered over time, such as introduction of new windows, it retains integrity of location, design, setting, materials, workmanship, feeling, and association.
25 Sutton Place South/Cannon Point North	1960	One of two post-World War II-era Modern luxury apartment buildings designed by noted architects Paul Resnick and Harry Green, that were constructed over the FDR Drive; appear to be historically significant for its association with post-World War II-era development in this area, architecturally significant as a mid-century Modern apartment building, and significant for its design and innovative engineering required to construct over the highway; although it has been somewhat altered over time, such as introduction of new windows, it retains integrity of location, design, setting, materials, workmanship, feeling, and association.
1 Sutton Place South	1925	Neo-Georgian-style, brick, 13-story luxury apartment building overlooking the East River designed by architect Rosario Candela with Cross & Cross, well-known for his designs of numerous New York City luxury apartment buildings in the 1920s and 1930s; appears to be historically significant for its association with the 1920-30s-era re-development of this East River waterfront neighborhood which was transformed from a neighborhood with industrial properties and tenements to a wealthy neighborhood; architecturally significant as a good example of a Neo-Georgian-style luxury apartment building designed by a noted architect; retains integrity of location, design, setting, materials, workmanship, feeling, and association.



Label	Address/Name
1	Queensboro Bridge
2	Con Edison Facility
3	35 Sutton Place
4	3, 4, 5, & 6 Riverview Terrace
5	7 Sutton Square
6	Lamppost
7	Sutton Place Park
8	Sutton Place Historic District
9	Sutton Place Park
10	1 Sutton Place South
11	Sutton Place Park
12	25 Sutton Place South
13	Sutton Place Park
14	45 Sutton Place South
15	60 Sutton Place South
16	Sutton Place Park
17	435 East 52nd Street
18	450 East 52nd Street
19	455 East 51st Street
20	450 East 51st Street
21	Peter Detmold Park
22	1 Beekman Place
23	866 UN Plaza
24	MacArthur Park
25	UN Headquarters
26	Tudor City Substation
27	Queens-Midtown Tunnel Ventilation Building
28	Robert Moses Playground
29	FDR Drive

Figure 6-1 Architectural Resources in APE

Photo 1 View looking northeast toward S/NRHP-listed Sutton Place Historic District, on Sutton Place between East 57th and East 58th Streets (Number 8 on Figure 6-1).

Photo 2 View looking north toward 1 Sutton Place and rear garden in S/NRHP-listed Sutton Place Historic District (Number 8 on Figure 6-1).

Photo 3 View looking northeast toward S/NRHP-listed/NYCLPC-designated Ed Koch Queensboro Bridge (Number 1 on Figure 6-1).

Photo 4 View looking south toward NYCLPC-designated Lamppost at the east end of East 58th Street. Note that original Twin F-type Lamppost was replaced in early 2000s with a replica Bishop's Crook Lamppost (Number 6 on Figure 6-1).

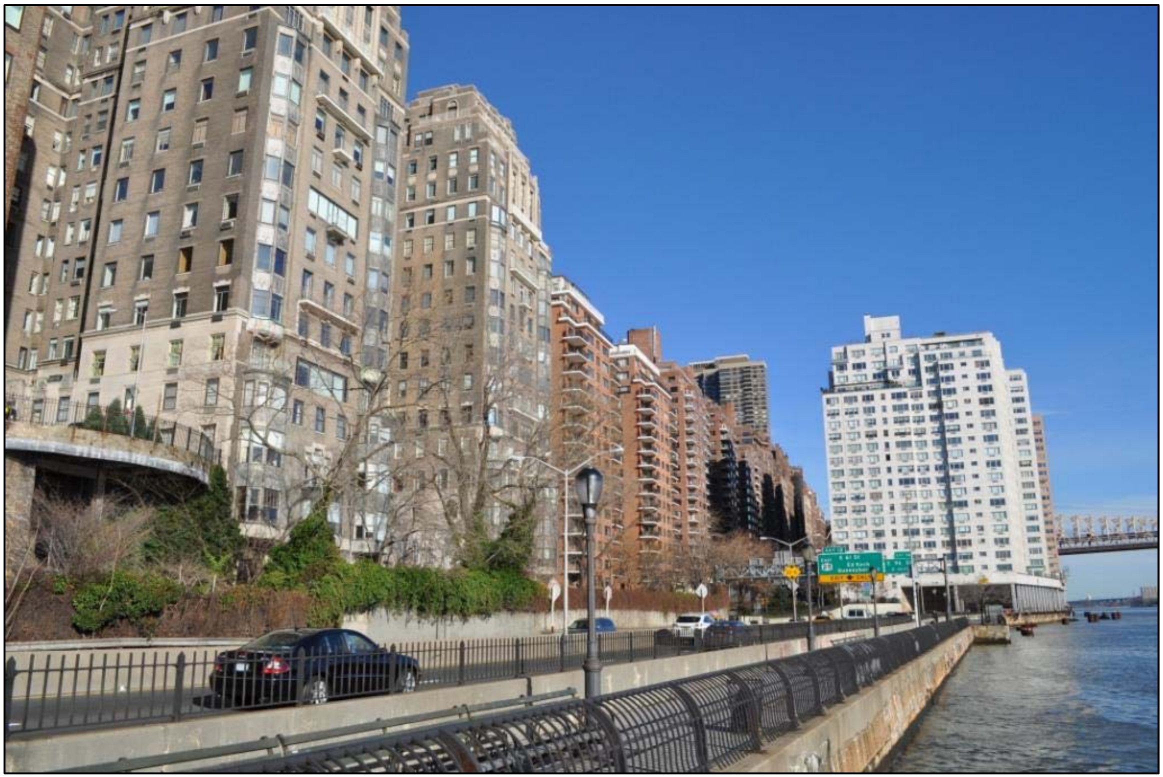


Photo 5 View looking north of FDR Drive from esplanade at approximately East 52^{nd} Street. FDR Drive appears to be potentially historically significant, and significant from an engineering standpoint (Number 29 on Figure 6-1).

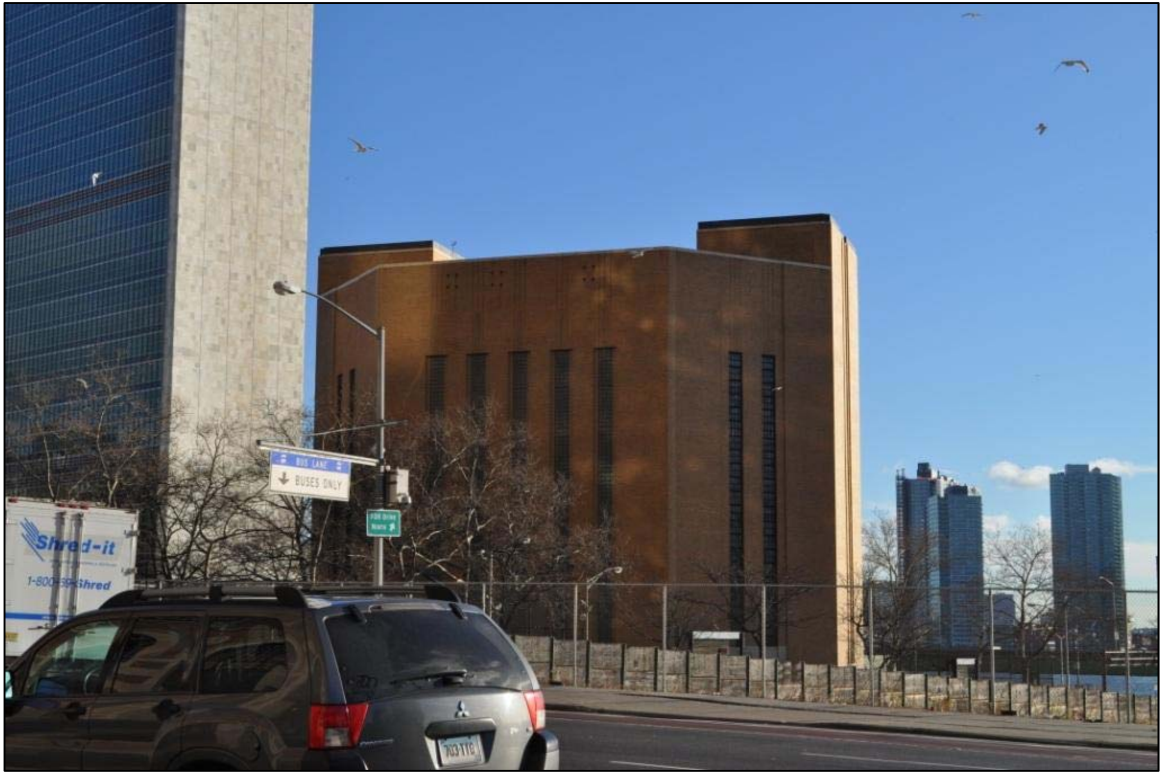


Photo 6 View looking southeast toward Queens-Midtown Tunnel Ventilation Building, which appears to be historically and architecturally significant (Number 27 on Figure 6-1).

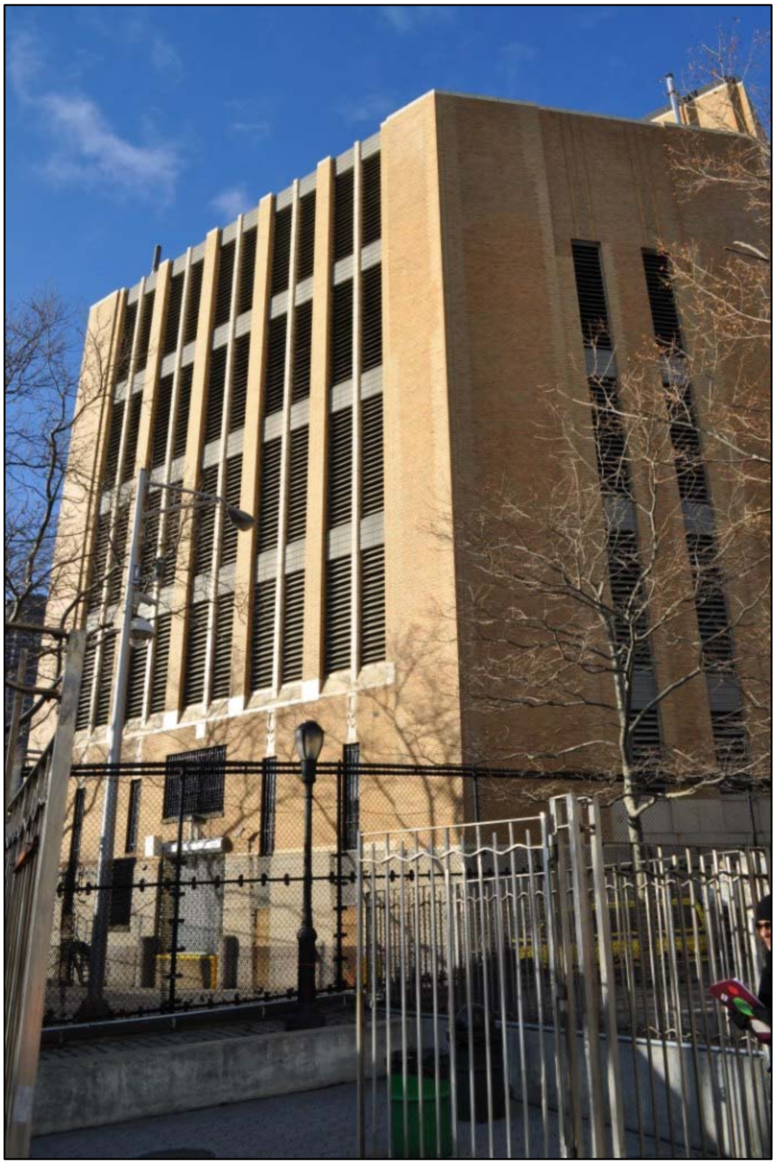


Photo 7 View looking southwest of close-up of Queens-Midtown Tunnel Ventilation Building (Number 27 on Figure 6-1).

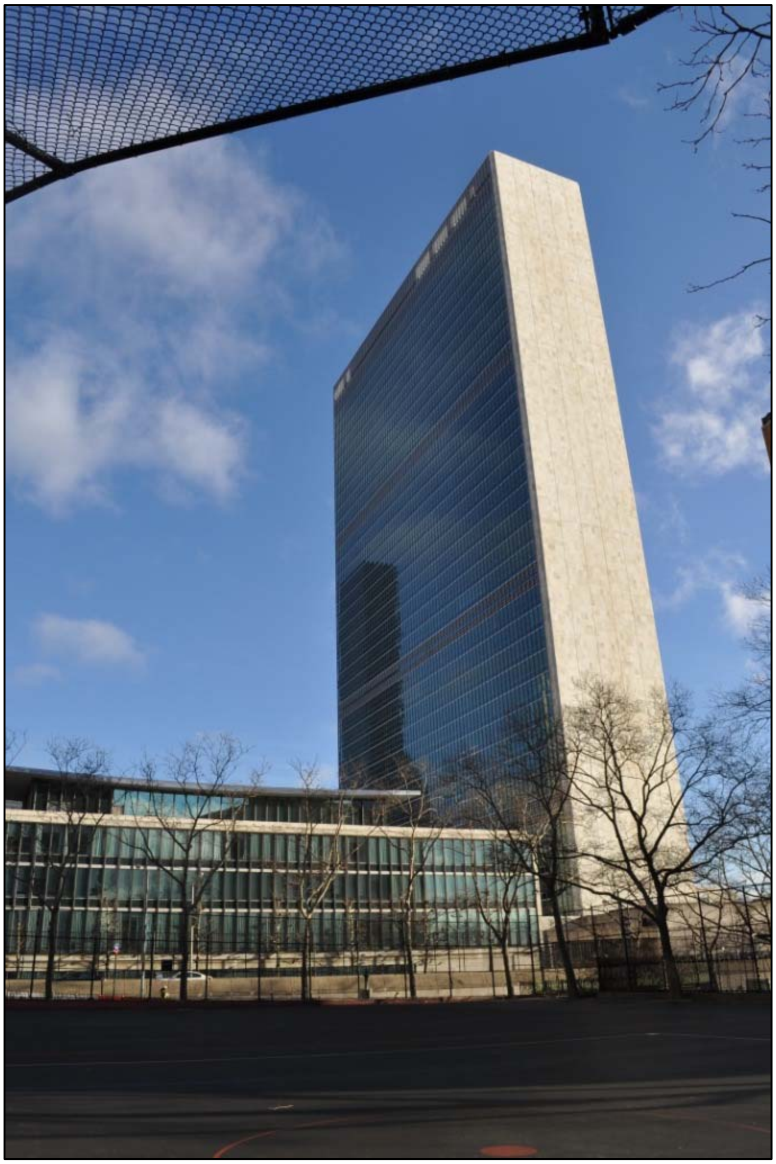


Photo 8 View looking north towards Secretariat Building (right) and Library (left) at United Nations. United Nations Complex appears to be appears to be historically and architecturally significant (Number 25 on Figure 6-1).

Photo 9 View looking east toward General Assembly Building at United Nations (Number 25 on Figure 6-1).

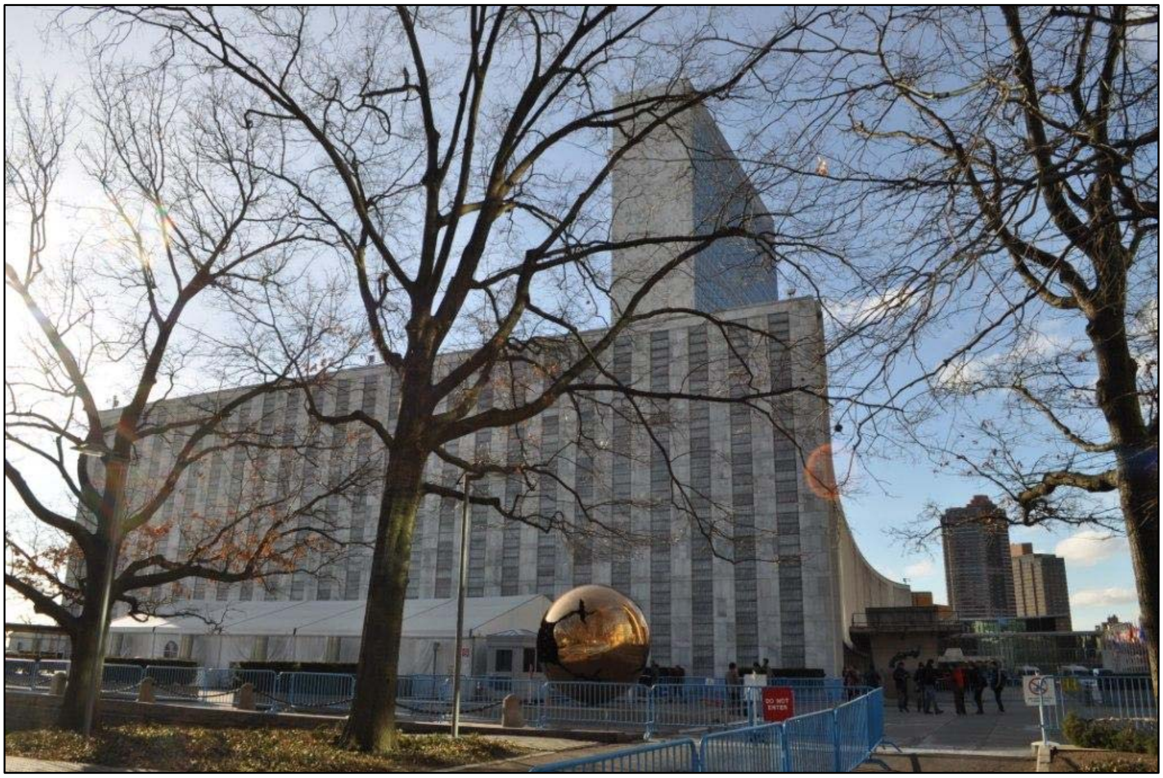


Photo 10 View looking south toward General Assembly Building (foreground) and Secretariat Building (background) at United Nations (Number 25 on Figure 6-1).

Photo 11 View looking east toward west, or primary façade of 1 Beekman Place, which appears to be historically and architecturally significant (Number 22 on Figure 6-1).

Photo 12 Close-up of main entrance to 1 Beekman Place (Number 22 on Figure 6-1).

Photo 13 View looking north toward south façade of 1 Beekman Place (Number 22 on Figure 6-1).

Photo 14 View looking northeast towards south façade of 435 East 52nd Street, River House, which appears to be historically and architecturally significant (Number 17 on Figure 6-1).

Photo 15 View looking west towards rear, or east façade, of 435 East 52nd Street, River House (Number 17 on Figure 6-1).

Photo 16 View looking northeast toward west, or primary façade of 45 Sutton Place South, Cannon Point South. Building appears to be historically and architecturally significant (Number 14 on Figure 6-1).

Photo 17 View looking north toward south façade of 45 Sutton Place South, Cannon Point South. Note eastern portion of building was constructed over FDR Drive (Number 14 on Figure 6-1).

Photo 18 View looking southeast toward west, or primary façade of 25 Sutton Place South, Cannon Point North. Note 45 Sutton Place South situated to south, appears to be historically and architecturally significant (Number 12 on Figure 6-1).

Photo 19 View looking south toward main entrance to 25 Sutton Place South, Cannon Point North (Number 12 on Figure 6-1).

Photo 20 View looking northeast toward west, or primary façade of 1 Sutton Place South. Building appears to be historically and architecturally significant (Number 10 on Figure 6-1).

Photo 21 Close-up of entrance on west façade of 1 Sutton Place South (Number 10 on Figure 6-1).

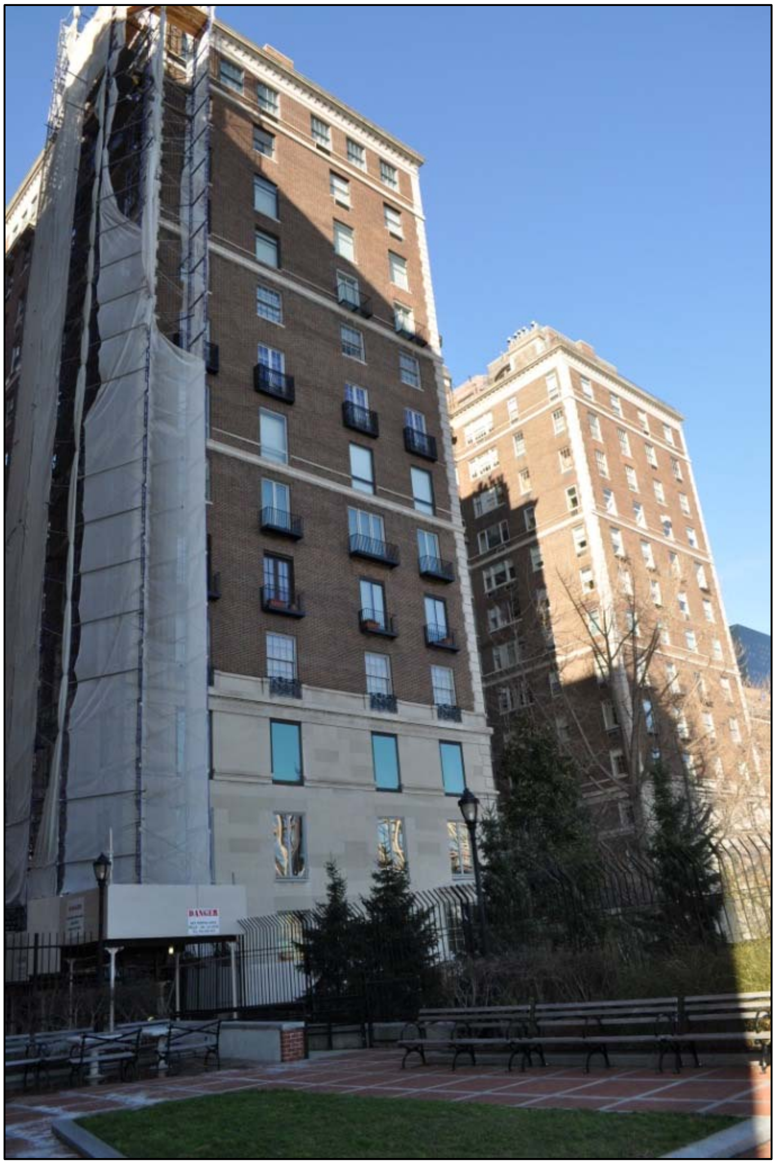


Photo 22 View looking northwest of east, or rear façade of 1 Sutton Place South (Number 10 on Figure 6-1).

Photo 23 View looking west in Robert Moses Playground between East 41st and East 42nd streets. This small New York City playground has been renovated over time, and lacks historical and architectural significance (Number 28 on Figure 6-1).

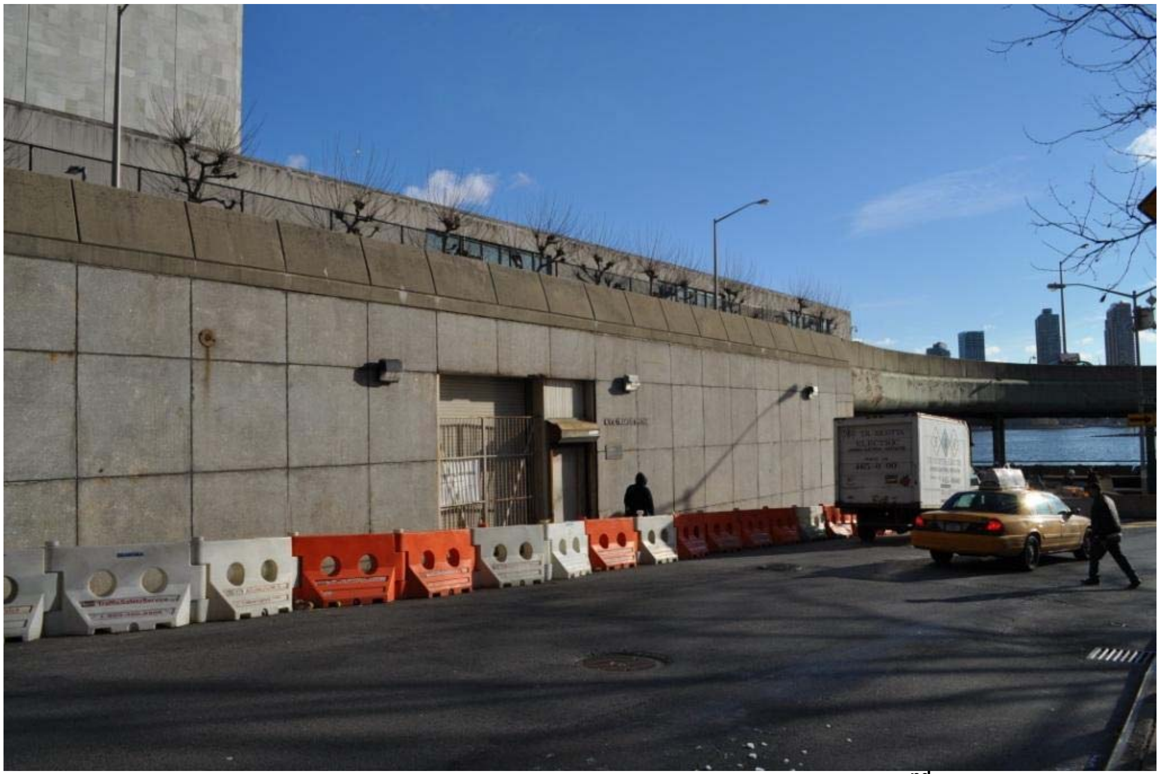


Photo 24 View looking northeast toward Tudor City Substation on East 42nd Street, which lacks historical and architectural significance (Number 26 on Figure 6-1).

Photo 25 View looking south toward Peter Detmold Park, which has been altered over time, and lacks historical and architectural significance (Number 21 on Figure 6-1).

Photo 26 View looking northeast toward south, or primary façade of 455 East 51st Street, which has been considerably altered over time, and lacks integrity (Number 19 on Figure 6-1).

Photo 27 View looking southeast toward north, or primary façade of 450 East 52nd Street, the Campanile (building on left). Building has been considerably altered over time, and lacks integrity (Number 18 on Figure 6-1).

Photo 28 View looking west toward 60 Sutton Place South, a commonplace mid-century apartment building that lacks historical and architectural significance (Number 15 on Figure 6-1).

Photo 29 View looking northeast toward Sutton Place Park at end of East 57th Street, a representative example of one of five Sutton Place Parks, which are commonplace small-scale New York City Parks that lack historical and architectural distinction (Number 9 on Figure 6-1).

Photo 30 View looking northwest toward residences along Riverview Terrace at Sutton Square. Residences have been considerably altered over time, and lack integrity (Number 4 on Figure 6-1).

Photo 31 View looking southeast toward west, or primary façade of 35 Sutton Place South, a commonplace mid-century apartment building that has been altered over time, and lacks integrity (Number 3 on Figure 6-1).

Photo 32 View looking northwest toward Con Edison Facility on East 59th Street, under Ed Koch Queensboro Bridge; facility lacks historical and architectural significance (Number 2 on Figure 6-1).

6.2 Conclusions and Recommendations

Eleven historically significant resources are located in the historic architectural APE. They include three previously evaluated resources, and eight potentially significant resources listed in Tables 6-1 and 6-2.

Next steps include review of this report by NYSDOT, NYSHPO, NYCEDC, and NYCLPC. NYSDOT and NYSHPO may require completion of NYSDOT Historic Resource Inventory Forms to provide more information on the one NYCLPC-designated resource (Lamppost), and eight potentially significant resources in order to facilitate a determination of S/NRHP eligibility.

In addition, NYSDOT and NYSHPO may request preparation of the Finding Documentation package to formally assess impacts of the EMWE Project in accordance with Section 106 of NHPA, and more specifically, 36 Code of Federal Regulations (CFR) Part 800, Criteria of Adverse Effect. The Finding Documentation would be prepared in accordance with Section 106 Procedures for NYSDOT memorandum dated July 2, 2001 (Clark July 2, 2001).

The Finding Documentation would provide an analysis of the effects of the EMWE project on the one S/NRHP-listed resource (Sutton Place Historic District), one S/NRHP-listed and NYCLPC-designated resource (Ed Koch Queensboro Bridge), one NYCLPC-designated resource (Lamppost), and up to eight potentially significant resources that may be determined S/NRHP eligible. If the Finding Documentation concludes that the EMWE Project would result in an adverse effect on resources, Memorandum of Agreement (MOA) would be developed between NYSDOT, NYSHPO, NYCEDC, NYCLPC, and the Advisory Council on Historic Preservation (ACHP) if they choose to participate. The MOA would provide stipulations to mitigate adverse effects, conclude the Section 106 process, and enable the project to proceed.

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Appendix A

Historic Maps

Figure A-1 Portion of 1782 British Headquarters Map

Figure A-2 Portion of 1865 Viele Map of Sanitary Conditions

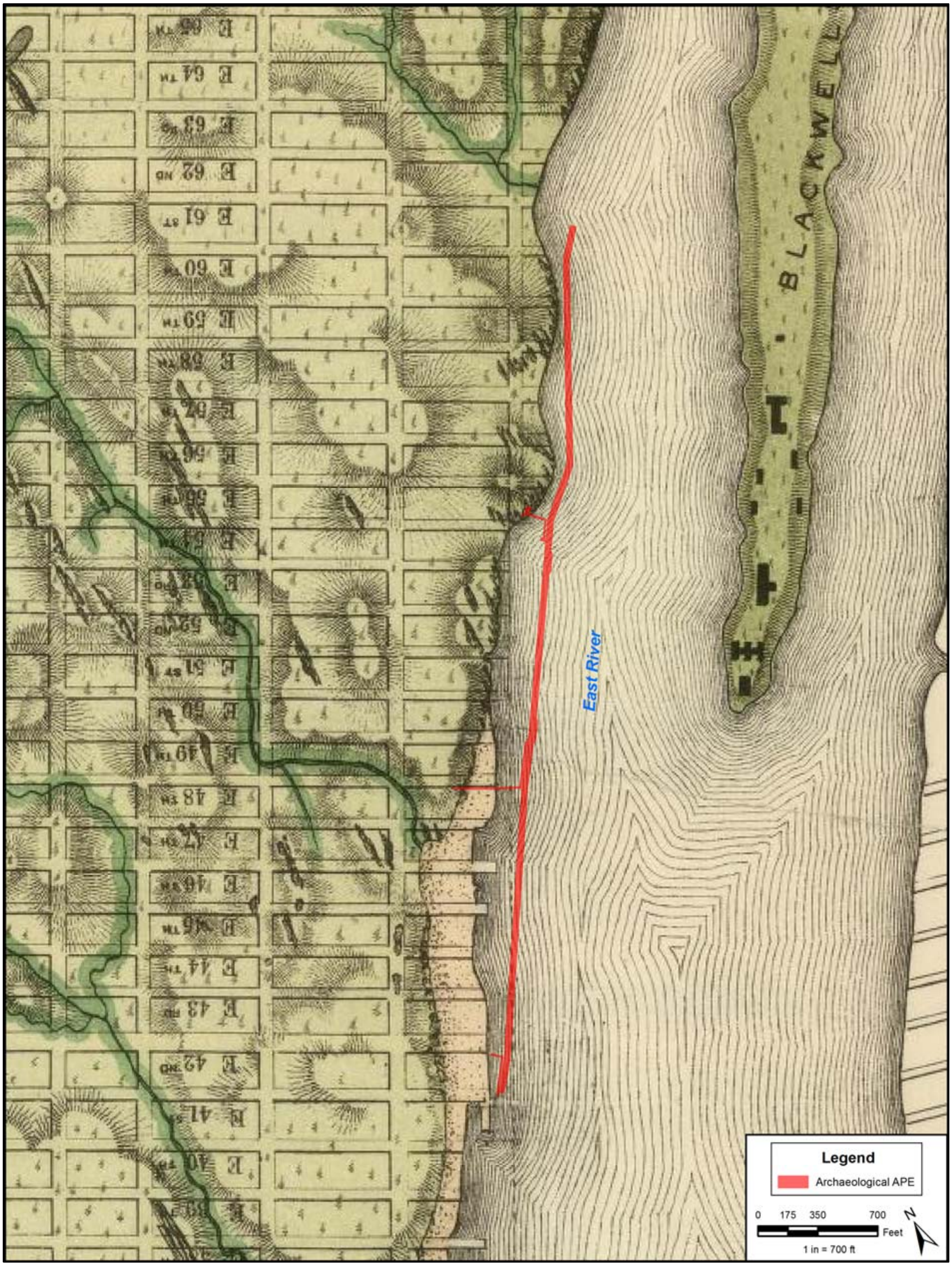


Figure A-3 Portion of 1874 Viele Topographic Atlas of New York

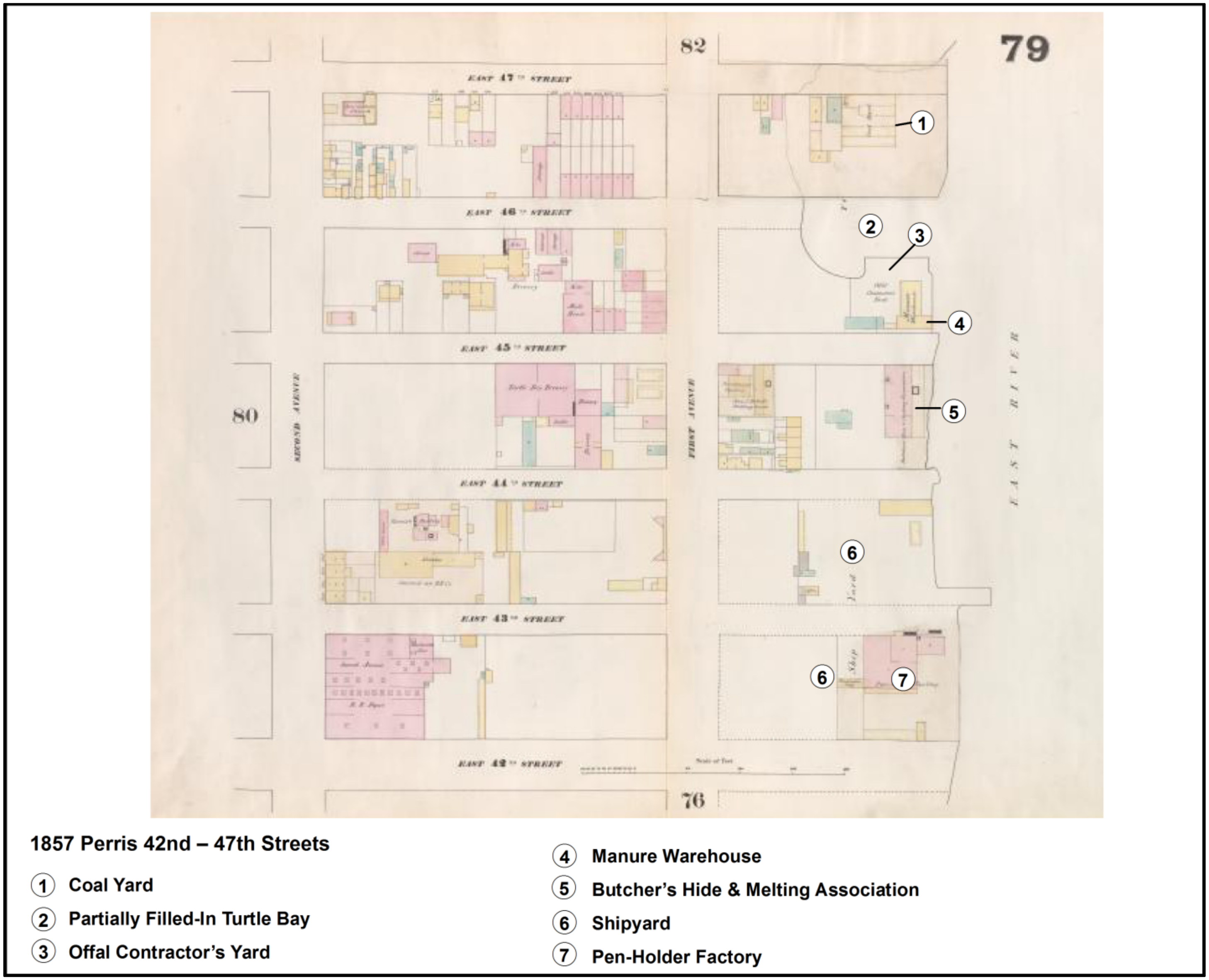


Figure A-4a Portion of 1857 Perris – Browne Atlas

1857 Perris 47th – 52nd Streets

- ① Terrace Wall
- ② Lumber Yard
- ③ Turtle Bay

Figure A-4b Portion of 1857 Perris – Browne Atlas

1857 Perris 52nd – 57th Streets

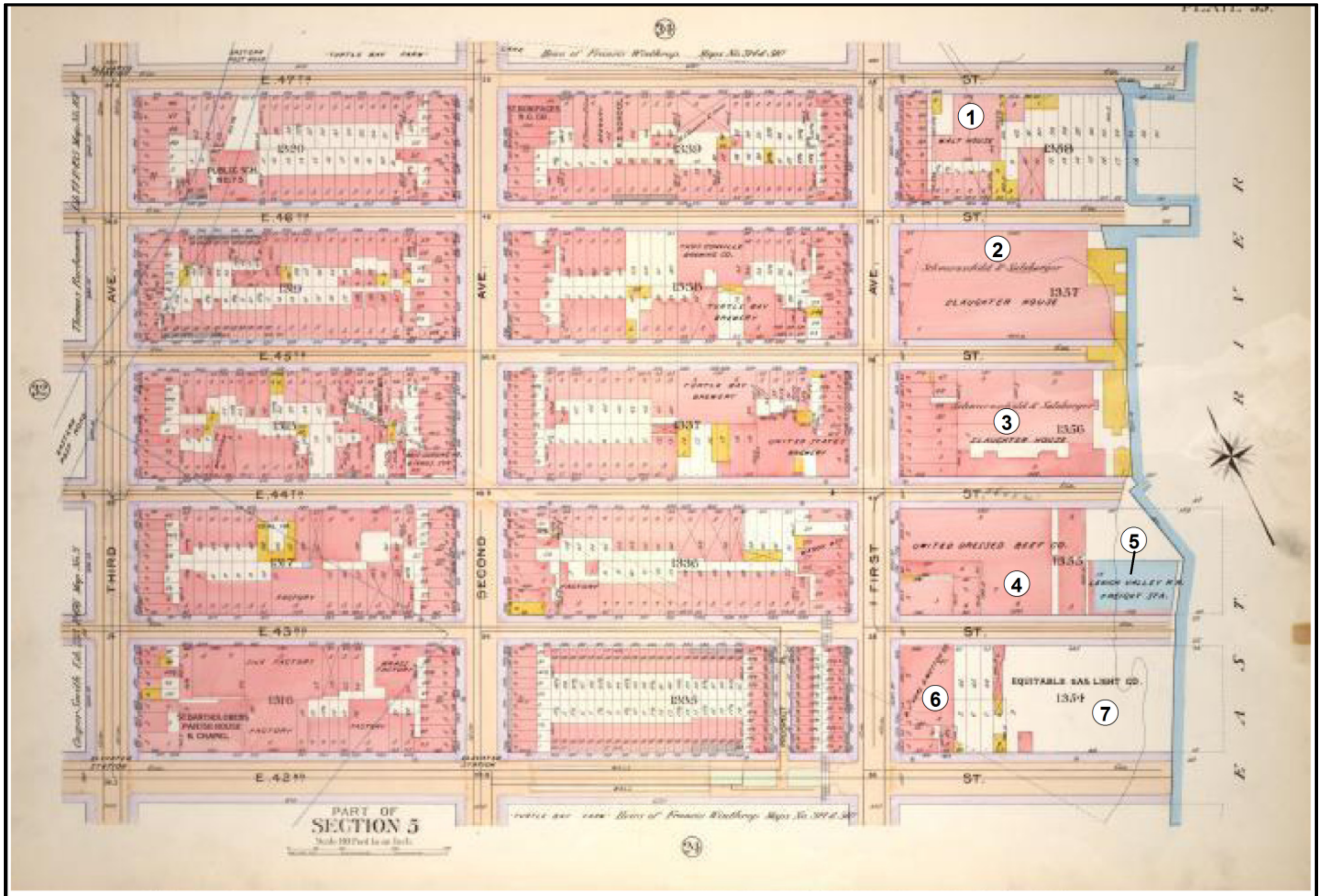
① **Shot Factory & Shot Tower**

② **Brick Yard**

Figure A-4c Portion of 1857 Perris – Browne Atlas

1857 Perris 57th – 63rd Streets

Figure A-4d Portion of 1857 Perris – Browne Atlas



1899 Bromley 42-47th Streets

① Malt House

② Schwarzschild & Sultzberger "Slaughter House"

③ Schwarzschild & Sultzberger "Slaughter House"

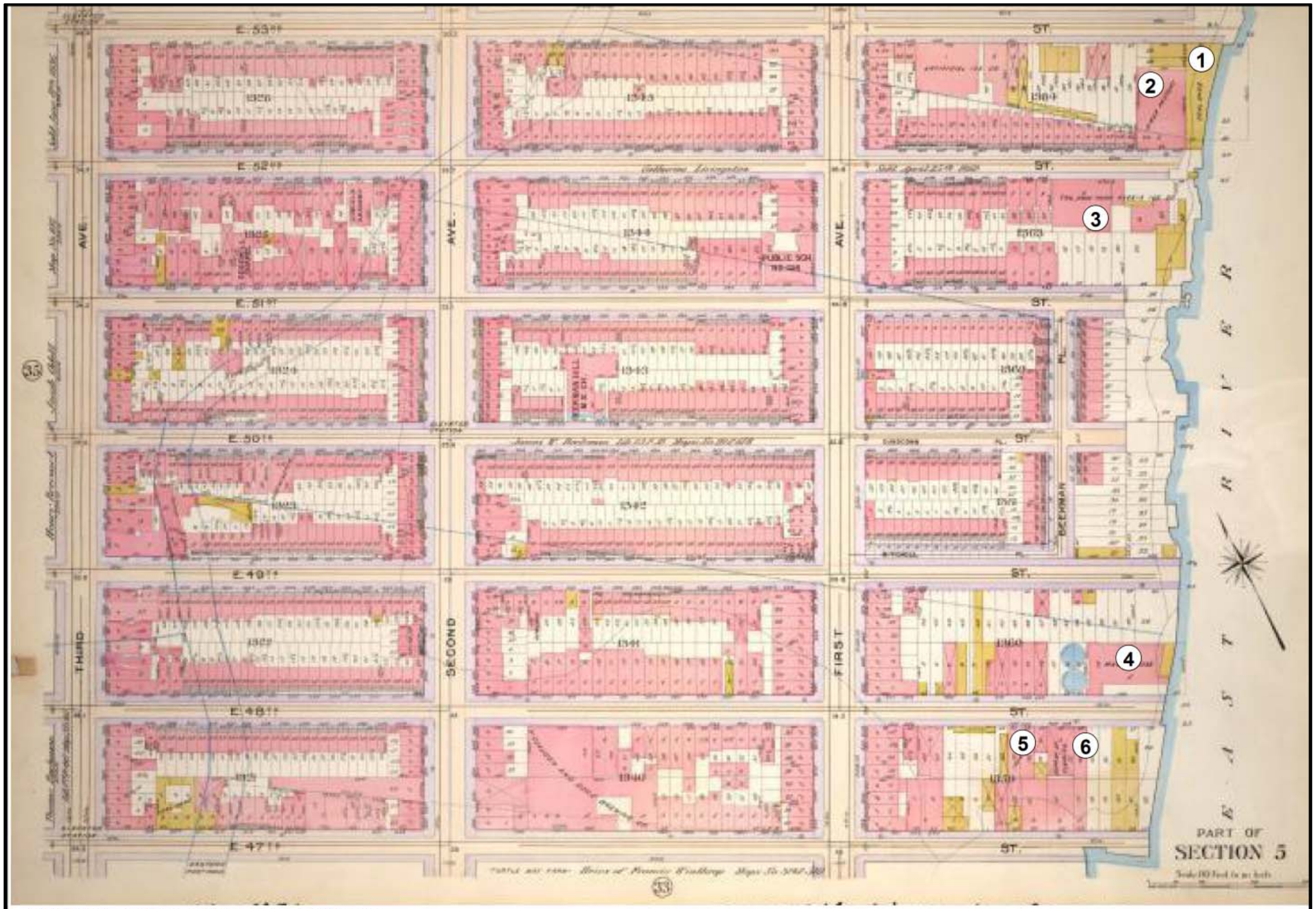
④ United Dressed Beef Co.

⑤ Lehigh Valley RR Freight Station

⑥ N.Y. Veal & Mutton Co.

⑦ Equitable Gas Light Co.

Figure A-5a Portion of 1899 Bromley Atlas



1899 Bromley 47th – 53rd Streets

① **Coal Shed**

② **Cigar Factory**

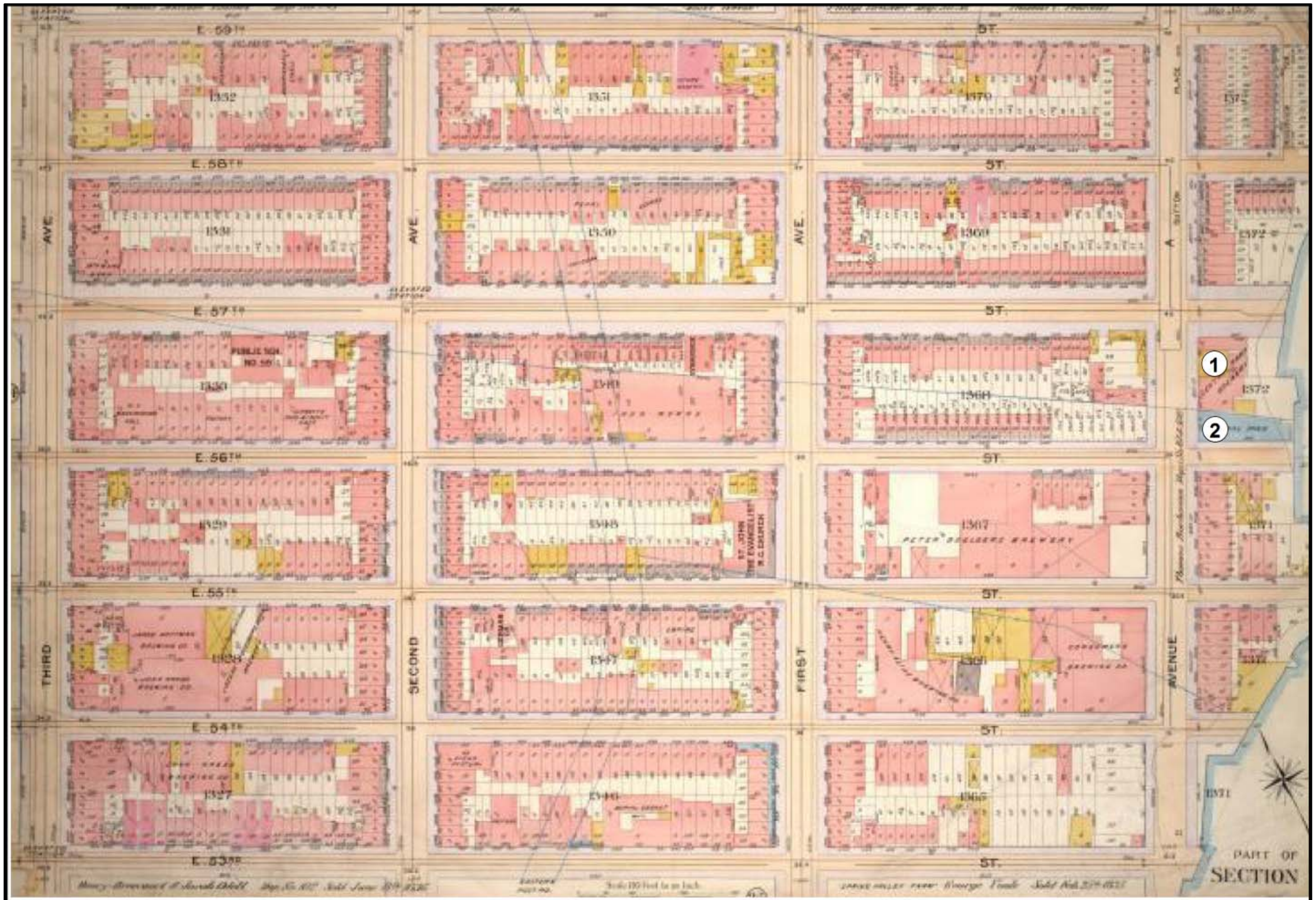
③ **The NY Hygeia Ice Co.**

④ **Malt House**

⑤ **Iron Works**

⑥ **Dept. of Street Cleaning**

Figure A-5b Portion of 1899 Bromley Atlas

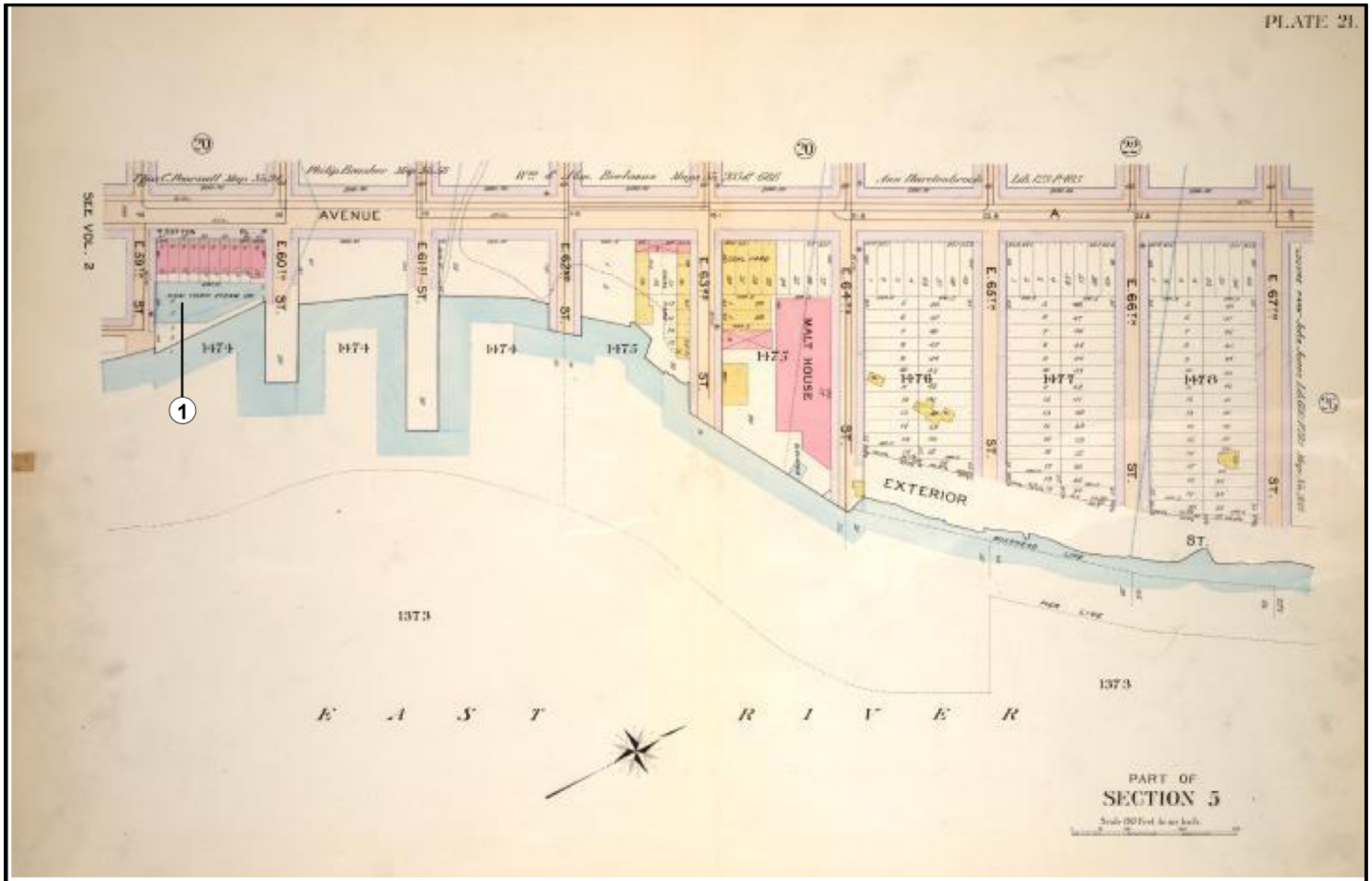


1899 Bromley 53rd – 59th Streets

① **Central Park Brewery**

② **Coal Shed**

Figure A-5c Portion of 1899 Bromley Atlas



1899 Bromley 59th – 67th Streets

① **New York Steam Co.**

Figure A-5d Portion of 1899 Bromley Atlas

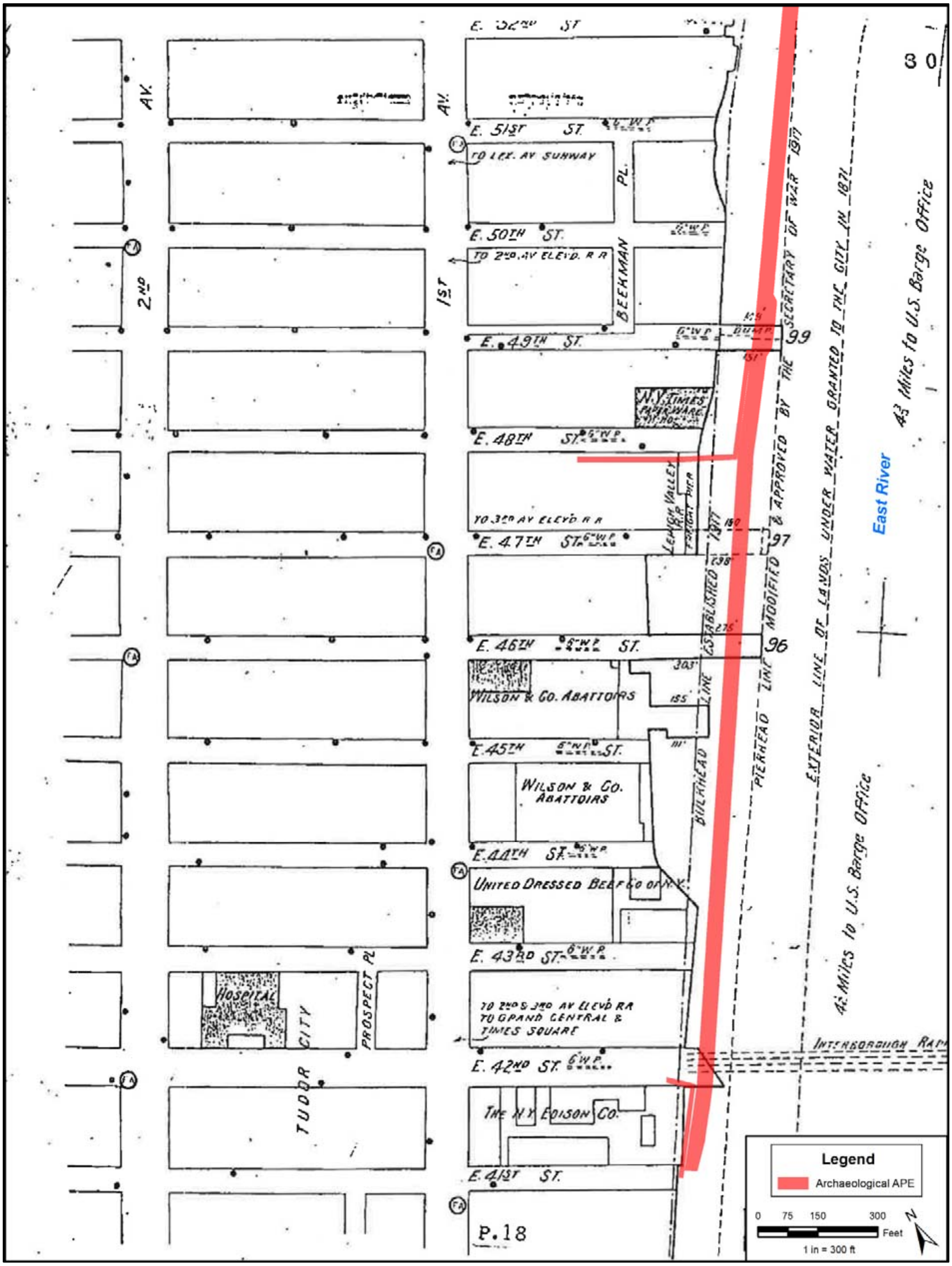


Figure A-6a Portion of 1928 Sanborn Pier Map of New York Harbor

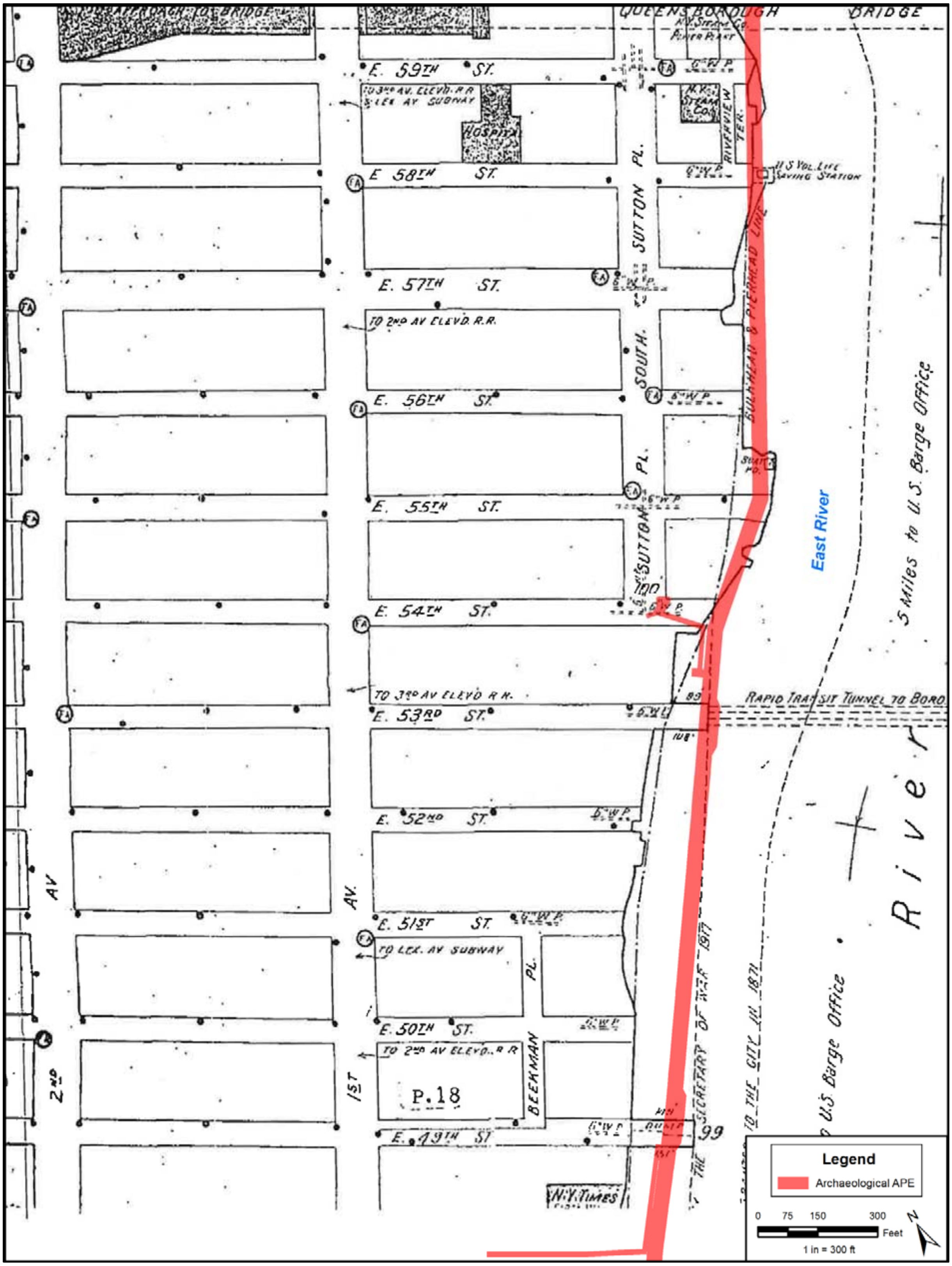


Figure A-6b Portion of 1928 Sanborn Pier Map of New York Harbor

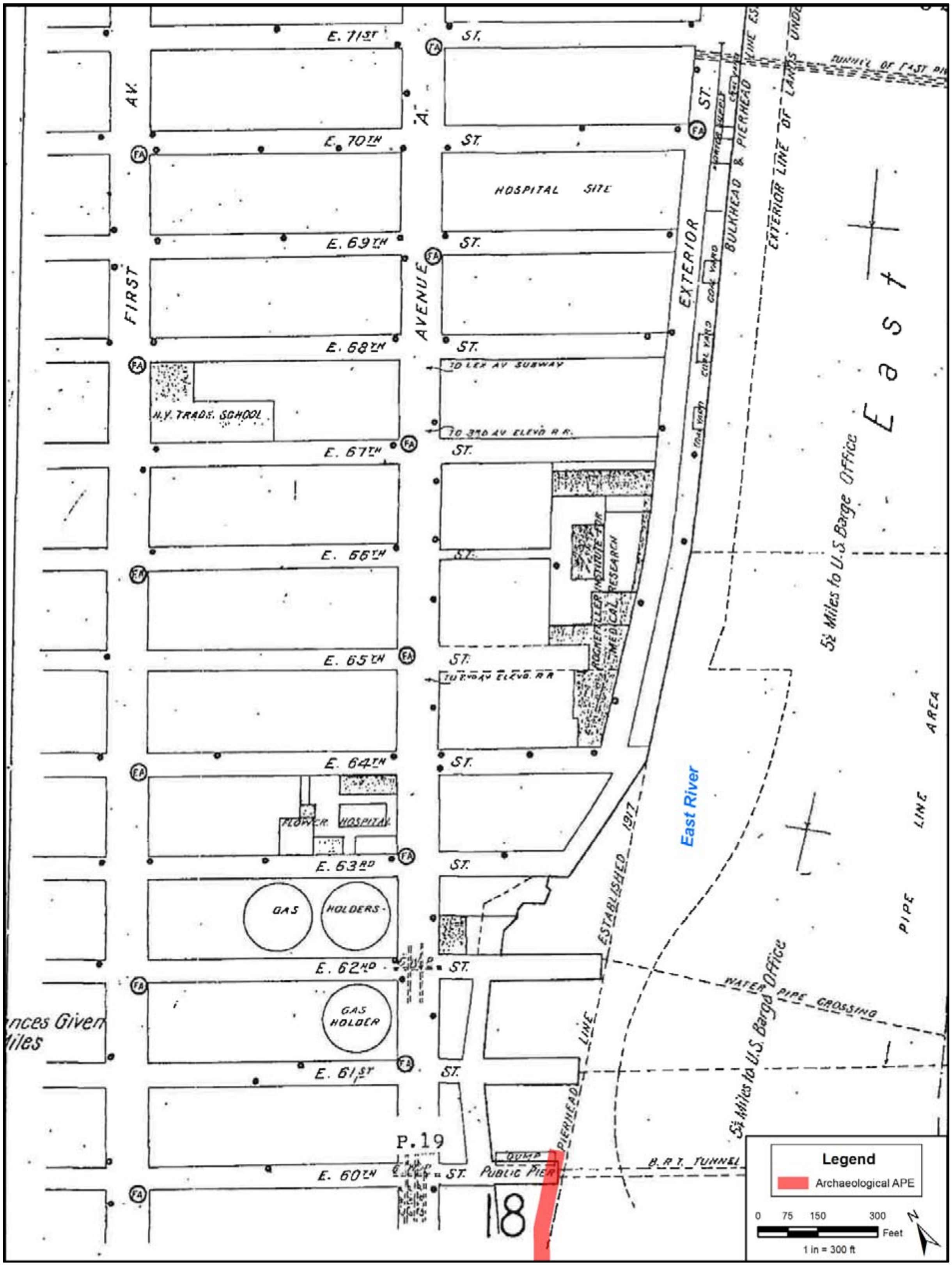


Figure A-6c Portion of 1928 Sanborn Pier Map of New York Harbor

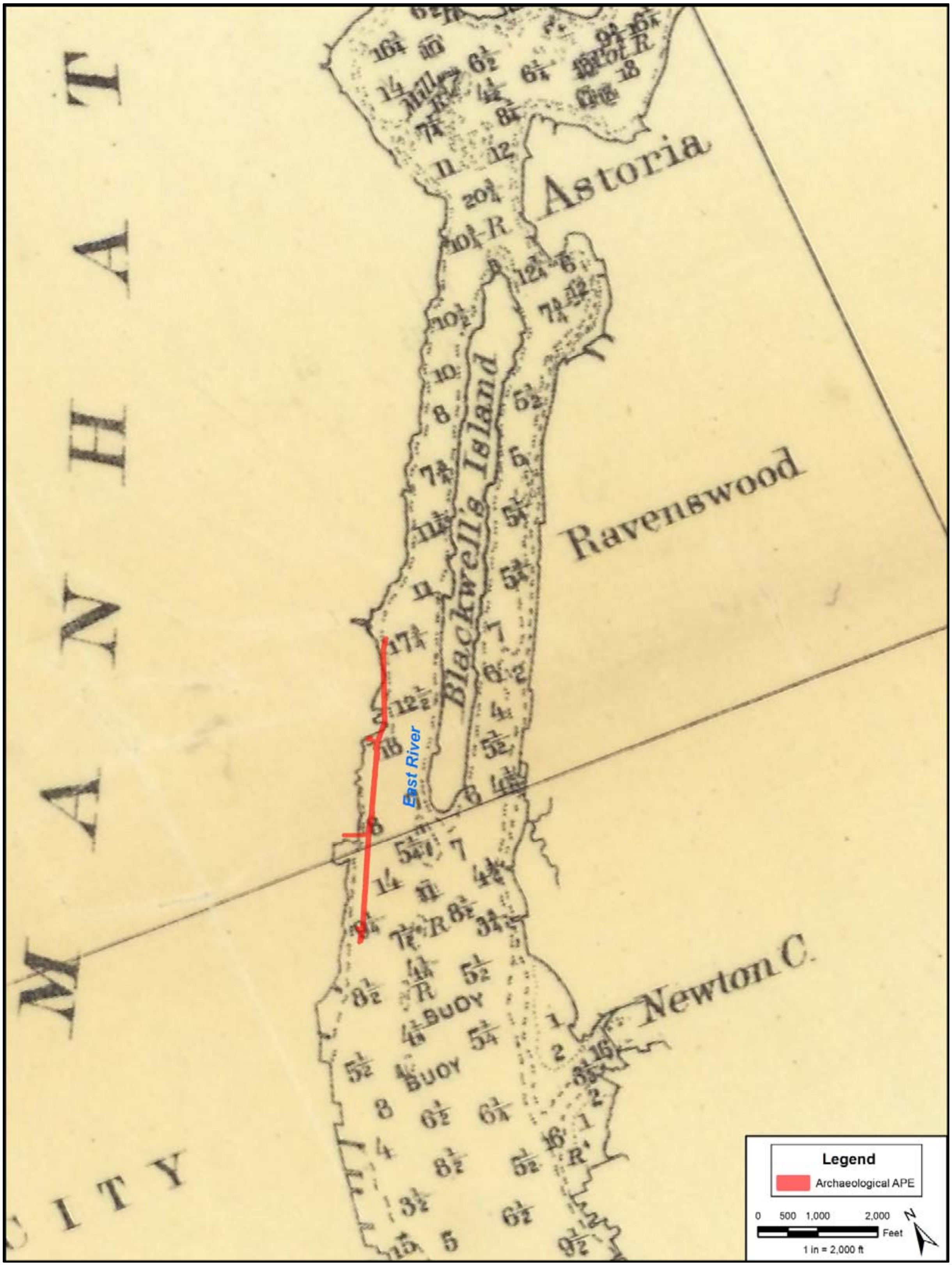


Figure A-7 Portion of 1857 USCS Preliminary Chart of New York Bay and Harbor

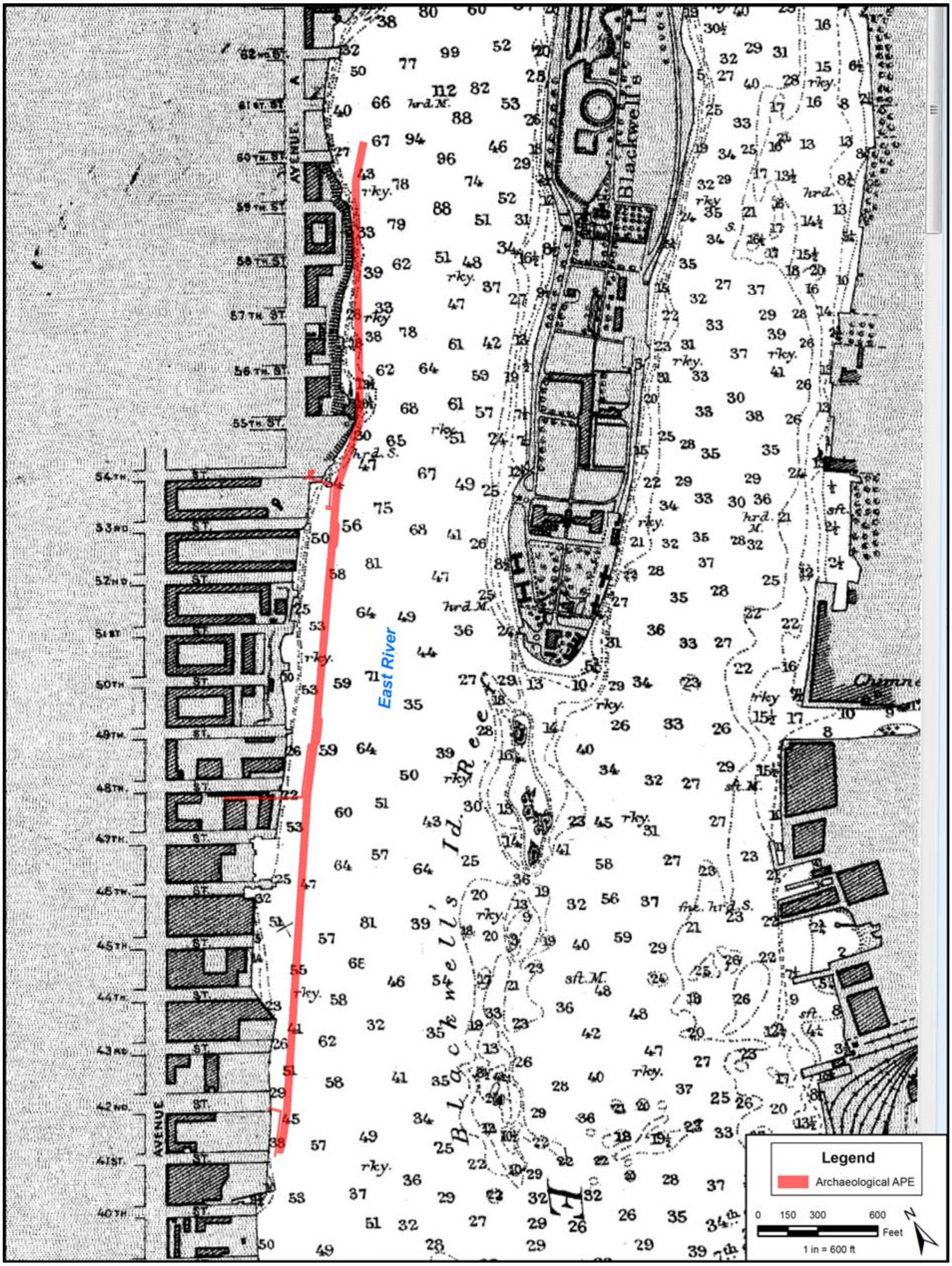


Figure A-8 Portion of 1887 USC&GS Hudson and East Rivers from Governors Island to 67th Street

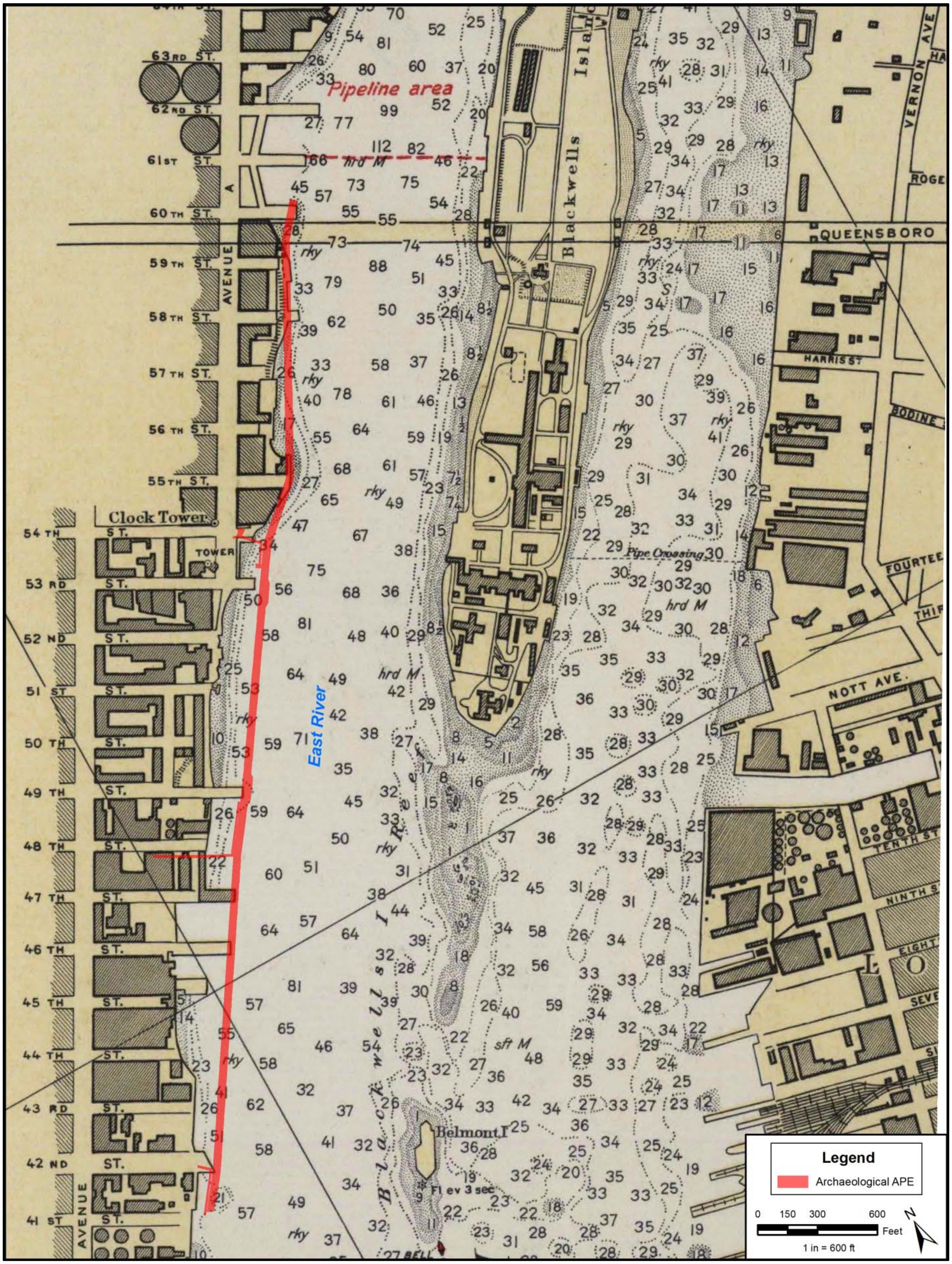


Figure A-9 Portion of 1929 USC&GS Hudson and East Rivers from Governors Island to 67th Street

Figure A-10 Portion of 1941 USC&GS United States – East Coast New York and New Jersey Hudson and East Rivers, Governors Island to 67th Street

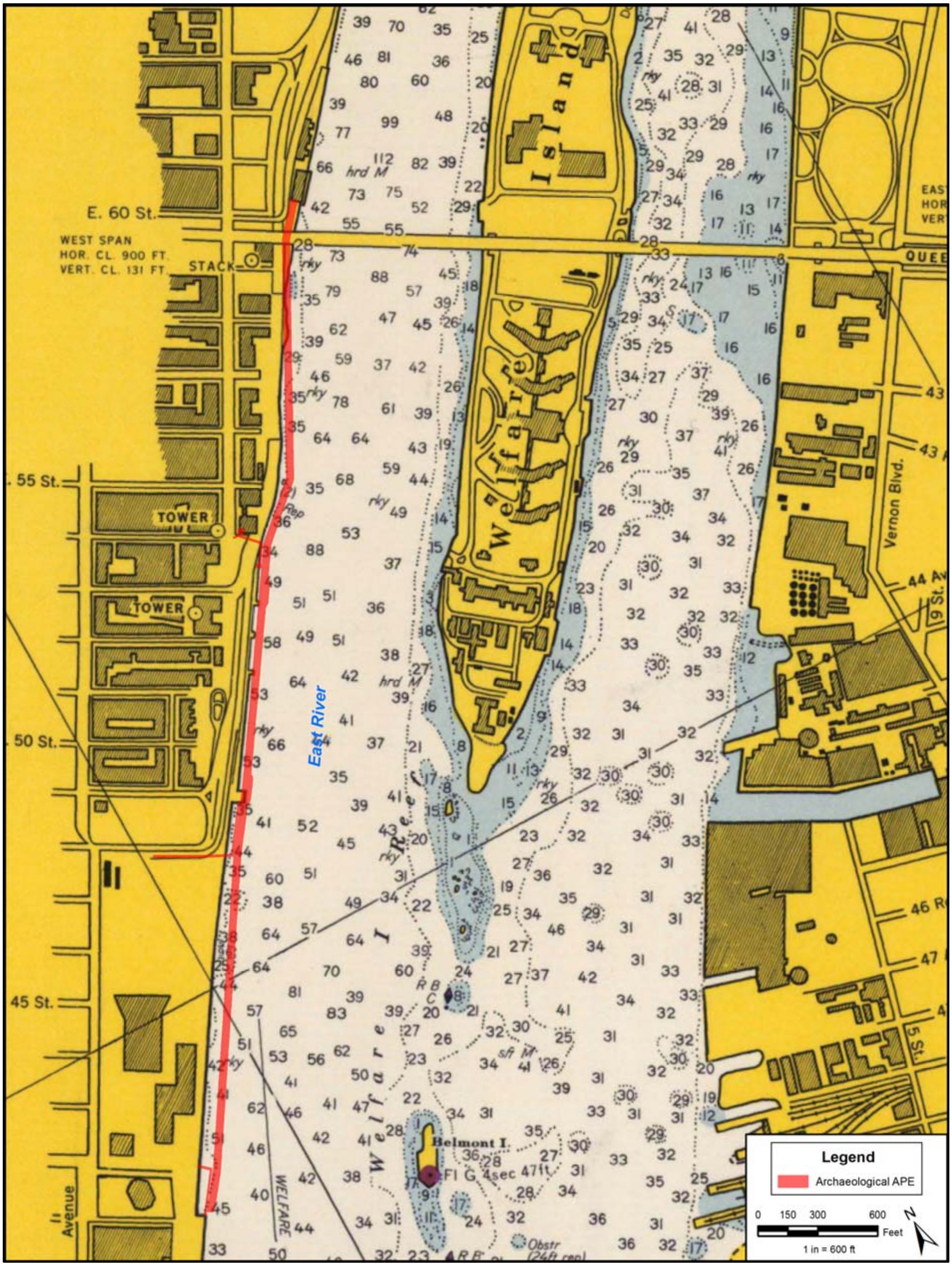


Figure A-11 Portion of 1966 USC&GS United States – East Coast New York and New Jersey Hudson and East Rivers, Governors Island to 67th Street

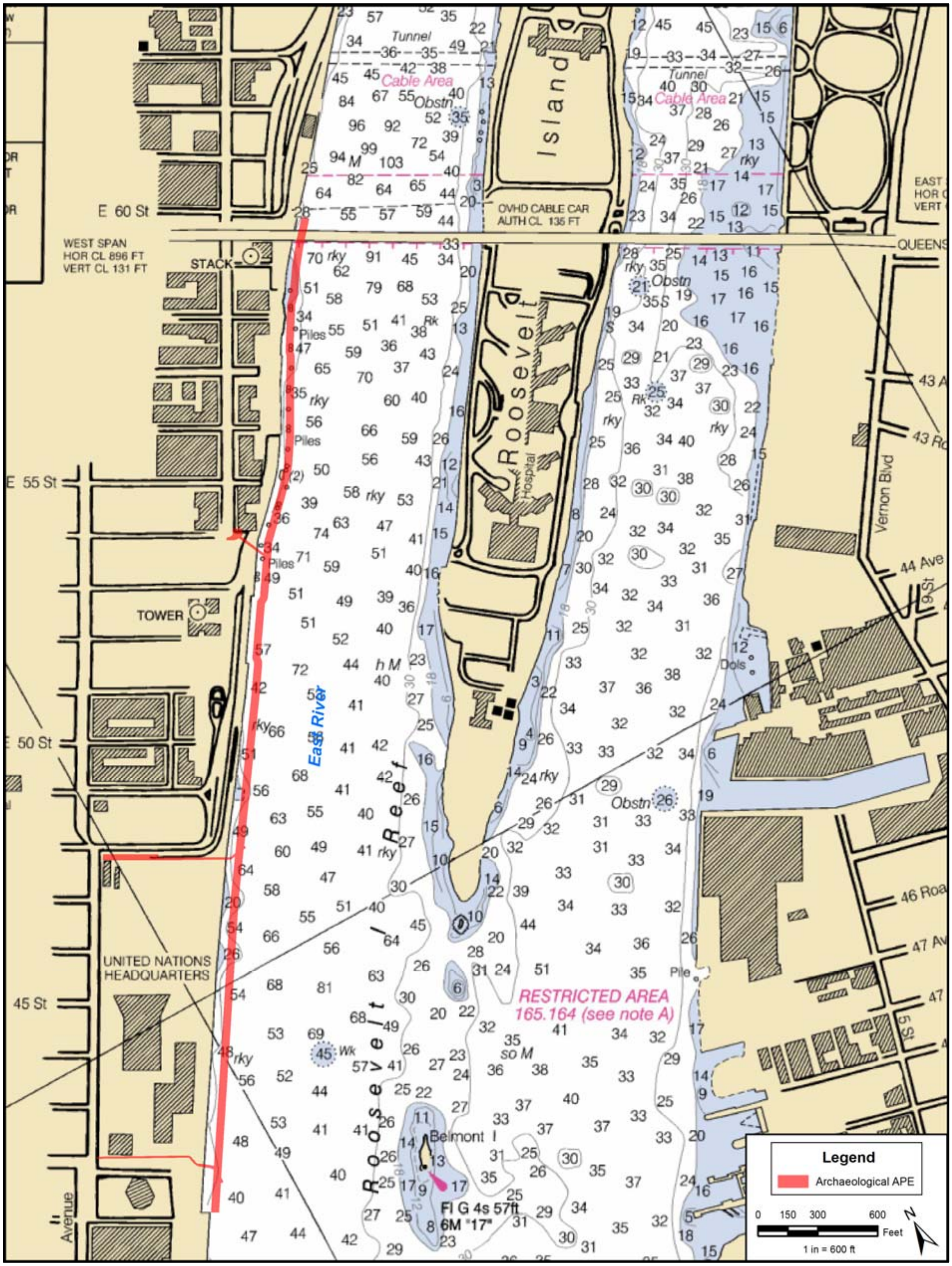


Figure A-12 Portion of 2012 USC&GS United States – East Coast New York and New Jersey Hudson and East Rivers, Governors Island to 67th Street

Appendix B

National Register Nomination Forms

NPS Form 10-900

OMB No. 1024-0018

NPS Form 10-900
(3-82)

OMB No. 1024-0018
Expires 10-31-87

United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

For NPS use only

received

date entered

See instructions in *How to Complete National Register Forms*
Type all entries—complete applicable sections

1. Name

historic Sutton Place Historic District

and or common

2. Location

street & number 1-21 Sutton Place; 4-16 Sutton Square ___ not for publication

city, town New York ___ vicinity of

state New York code 036 county New York code 061

3. Classification

Category
_X_ district
___ building(s)
___ structure
___ site
___ object

Ownership
___ public
_x_ private
___ both

Public Acquisition
___ in process
___ being considered

Status
_X_ occupied
___ unoccupied
___ work in progress

Accessible
_X_ yes: restricted
_X_ yes: unrestricted
___ no

Present Use
___ agriculture
___ commercial
___ educational
___ entertainment
___ government
___ industrial
___ military
___ museum
___ park
_x_ private residence
___ religious
___ scientific
___ transportation
___ other:

4. Owner of Property

name see attached

street & number

city, town ___ vicinity of state

5. Location of Legal Description

courthouse, registry of deeds, etc. Surrogate's Court/Hall of Records

street & number 31 Chambers Street

city, town New York state New York 10007

6. Representation in Existing Surveys

title None has this property been determined eligible? ___ yes _X_ no

date ___ federal ___ state ___ county ___ local

depository for survey records

city, town state

NPS Form 10-900-a

NPS Form 10-900-a
(3-82)

OMB No. 1024-0018
Expires 10-31-87
OMB No. 1024-0018
Expires 10-31-87

United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

For NPS use only
received
date entered

Continuation sheet Sutton Place Historic District New York County, NY Item number 4 Page 2

Owners

1 Sutton Place	Henry J. Heinz II Goodwood State Road Swickley, Pa.
3 Sutton Place	United Nations 833 UN Plaza New York, NY 10017
7 Sutton Place	Robert G. Goelet 425 Park Avenue New York, NY 10022
9 Sutton Place	Robert G. Goelet 425 Park Avenue New York, NY 10022
11 Sutton Place	Ieoh Ming Pei 660 Madison Avenue New York, NY 10022
13 Sutton Place	Edith R.D. Soeiro 2829 Pacific Avenue San Francisco, California
15 Sutton Place	Carl Taylor 15 Sutton Place New York, NY 10022
17 Sutton Place	Giorgia Laurenti et al OTIC Corp. 425 East 61st Street New York, NY 10021
19 Sutton Place	Norman J. Alexander 19 Sutton Place New York, NY 10022
21 Sutton Place	Courgette S A Barry H. Singer c/o Lowenthal Landau Fish 250 Park Avenue New York, NY 10017
4 Sutton Square	Phyllis I. Kerdasha 4 Sutton Square New York, NY 10022

6 Sutton Square	Peter J. Sprague 6 Sutton Square New York, NY 10022
8-10 Sutton Square	Neil A. McConnell 12 Sutton Square New York, NY 10022
12 Sutton Square	Neil A. McConnell 12 Sutton Square New York, NY 10022
14 Sutton Square	John Goelet 14 Sutton Square New York, NY 10022
16 Sutton Square	George Lindemann 1067 Fifth Avenue New York, NY 10028
Garden	Sutton Square Inc. 4 Sutton Square New York, NY 10022

7. Description

7. Description

Condition
X excellent
___ good
___ fair
___ deteriorated
___ ruins
___ unexposed

Check one
X unaltered
X altered

Check one
X original site
___ moved date N.A

Describe the present and original (if known) physical appearance

The Sutton Place Historic District is a cohesive residential development consisting of*twelve contributing houses, four houses which are non-contributing due to their age, and the common garden to the rear of all of the homes. The district consists of the entire block bounded by Sutton Place on the west, Sutton Square on the north, East 57th Street on the south, and the East River on the east. The district is made up exclusively of four- and five-story single-family residences with brick or stucco front and rear facades. The earliest designs in the district date from 1920 when the Sutton Place development began. The primary building type in the surrounding area is the apartment building, most of which are thirteen to twenty stories tall and were built in the 1920s and 1930s. Directly to the north of the historic district, across Sutton Square, is a small group of row houses that face onto Riverview Terrace, a private street. This group consists of two houses from the 1940s and three houses with facades that display original detail from the 1880s.

The buildings within the historic district can be divided into two stylistic categories. Approximately half of the houses adapt eighteenth-century American Georgian Colonial or seventeenth- and eighteenth-century English Georgian motifs (photos 1,3). These houses are constructed of brick laid in Flemish bond and they are examples of the twentieth-century American Colonial Revival style. The design of these houses tends to be quite refined with a limited amount of beautifully carved stone detail such as the entrance enframement of Nos. 1(photo 4) and 3 (photo 1) Sutton Place. The remainder of the buildings in the historic district are extremely refined stucco structures which take their basic form from Italian Renaissance villas, but which exhibit Renaissance, Gothic, and Georgian detail (photos 1,2). This detail is generally simple and restrained and is often limited to the entrance enframement (photo 5). Almost all of the houses in the historic district have fine iron railings (photos 3-5) that enliven the streetscape. There are four buildings is the district that are less than fifty years old. These buildings were designed in a manner compatible with the older structures and they do not detract from the character of the area (photos 6-9).

*(12 contributing building, 1 contributing structure)

<u>Buildings in the Sutton Place Historic District</u>

1 Sutton Place. Anne Vanderbilt Residence. Mott B. Schmidt, 1921.(photos 1,4). Four-story Neo-Georgian style brick building; round-arched entrance set within brick enframement with brick pediment; projecting cornice; brick parapet; paneled door; three-story rear extension; garden entrance with arched hood.

3 Sutton Place. Anne Morgan Residence. Mott B. Schmidt, 1921-22 (photo 1). Large Neo-Georgian style four-story brick house; arched entrance set within Ionic-columned stone enframement; modillioned cornice; splayed stone lintels; service entrance with transom and splayed stone lintel; mansard on garden facade.

7 Sutton Place. Marshall Kernochan Residence. Polhemus & Coffin, 1934. Neo-Italian Renaissance style four-story stucco building; street level entrance with Doric pilasters supporting a broken pediment with central urn; large ground-floor window and service door grouping set within rusticated enframement; broken pediments at third floor windows echoing that of entrance; balcony on garden facade.

9 Sutton Place. Robert W. Goelet Residence. H. Page Cross, 1969-71 (photo 6). Simple, refined Colonial Revival style four-story residence designed by the son of Sutton Place developer Eliot Cross; round-arched entrance with raised brick surround; splayed brick lintels; stone sills; cornice. Non-contributing due to age.

11 Sutton Place. Read & Everett, 1921-22 (photo 2). Stuccoed, four-story residence with subtle detail; rusticated base; iron fence and balconies; stucco cornice.

13 Sutton Place. Elisabeth Marbury/Elsie de Wolfe Residence. Mott B. Schmidt, 1921-22 (photo 2). Four-story stuccoed building with subtle Georgian detail; rusticated base; splayed lintels; shoulder-arched entrance; paneled door; ironwork. Alteration: bowed windows replace original sash on second floor.

15 Sutton Place. Isabelle Cammann Residence. James Casale, 1921-22 (photo 2). Five-story stucco building with subtle Gothic detail; sunken entrance topped by ogee arch; small-paned windows; iron balconies and railing; crisply cut windows with projecting sills; mansard roof with two dormers.

17 Sutton Place. Chauncey Olcott Residence. Mott B. Schmidt, 1921-23 (photo 2). Five-story stucco residence with Neo-Georgian detail; sunken entrance; rusticated base; paneled door; splayed lintels with projecting keystones; projecting cornice and belt course; mansard roof with two dormers; ironwork. Alteration: original sash replaced by plate glass.

19 Sutton Place. Norman Alexander Residence. John D. Latimer Associates, c.1980 (photo 2,7). Five-story brick building with French Renaissance detail executed in Paris; segmental-arched window and door openings with stone enframements; mansard roof with two dormers; iron balconies. Non-contributing due to age.

21 Sutton Place. Simeon Ford Residence. William Lescaze, 1923-24 (photo 2). English Palladian style four-story stucco house; rusticated base; quoins; niche on Sutton Place elevation occupied by statue of saint; monumental Ionic pilasters on Sutton Square elevation support broken pediment; ornate entrance on Sutton Square; oriel in east facade of four-story rear elevation. Alterations: sash of dormer window on Sutton Place replaced by plate glass; parapet added to top of mansard roof.

4 Sutton Square. Henry H. Sprague Residence. Carl Volmer, 1921-22. Four-story brick Neo-Georgian house; sunken entrance; paneled door; iron fence and brick wall; second-floor window grouping topped by fan; stepped side parapet.

6 Sutton Square. Edgar Stillman Residence. Murphy & Dana, 1921-22 (photo 3). Wide four-story brick Neo-Federal style house; ground floor with three shallow recessed arches; entrance with leaded fanlight and paneled door; central oriel; simple stone cornice; stone rosette.

10 Sutton Square. H. Page Cross, 1973 (photo 3,8). Neo-Georgian style four-story brick residence; originally identical to No. 6, but altered to resemble No. 12; stone window and door enframements; paneled door; iron railing. Non-contributing due to age.

12 Sutton Square. Dr. Kenneth Taylor Residence. Delano & Aldrich, 1920-21 (photo 3). Five-story brick residence with heavy English Georgian detail; entrance with segmental-arched stone enframement; windows with stone segmental pediments, stone lintels, and stone quoins; stone panels between third and fourth floors; iron railings; mansard roof with two dormers. Alteration: garage placed in ground floor.

14 Sutton Square. Dr. Foster Kennedy Residnece. Henry O, Milliken, 1920-21. Five-story stuccoed house with subtle Georgian detail; round-arched entrance with recessed door and fanlight; rusticated base; French windows; second floor windows with blind arches; mansard roof with two dormers.

16 Sutton Square. 1984 (photo 9). Five-story brick residence with Colonial detail; columnar entrance portico; stone quoins, lintels, sills, and belt courses; iron railings. Non-contributing due to age.

The garden of Sutton Place is set behind a wall which runs along East 57th Street. The garden consists of a grassy lawn bordered by flower beds, bushes, and trees. Approximately one-third of the garden (the easternmost section nearest to the East River; generally that section extending south from the party wall separating 14 and 16 Sutton Square) was removed in 1939 for the construction of the East River Drive. The drive was constructed beneath the site of the garden. This section of the garden was replaced in 1945 when construction was completed and the garden retains much of its original appearance.

8. Significance

Period
___ prehistoric
___ 1400–1499
___ 1500–1599
___ 1600–1699
___ 1700–1799
___ 1800–1899
_X_ 1900–

Areas of Significance—Check and justify below
___ archeology-prehistoric
___ archeology-historic
___ agriculture
_X_ architecture
___ art
___ commerce
___ communications
___ community planning
___ conservation
___ economics
___ education
___ engineering
___ exploration/settlement
___ industry
___ invention
___ landscape architecture
___ law
___ literature
___ military
___ music
___ philosophy
___ politics/government
___ religion
___ science
___ sculpture
___ social/humanitarian
___ theater
___ transportation
___ other (specify)

Specific dates 1920-1935

Builder/Architect various

Statement of Significance (in one paragraph)

The Sutton Place Historic District is architecturally significant as a cohesive intact residential enclave that exemplifies a distinctive early twentieth century architectural movement in New York City. Exponents of this movement sought to "beautify" the nineteenth-century brownstone neighborhoods of New York by altering or rebuilding the old houses using restrained Colonial, English Renaissance, and southern European motifs. In the 1920s several planned real estate developments were begun that transformed entire groups of rundown brownstones, regarded then as a blight on the city, into stylish new enclaves complete with shared landscaped gardens. The buildings in the Sutton Place Historic District, originally constructed in the 1880s, were acquired in the early 1920s by a syndicate headed by architect Eliot Cross. All sixteen buildings were individually sold and developed, but their designs were subject to the regulations of restrictive covenants and to review by the syndicate's architects. This resulted in a unified composition. In addition, a common rear garden was protected by the covenant. Many of the facades of the Sutton Place development were designed by prominent architects, including early works by Mott B. Schmidt and William Lescaze, as well as fine representative examples of the work of such firms as Delano & Aldrich, Polhemus & Coffin, and Murphy & Dana. Popular mainly among the city's most affluent residents, the movement to redesign the city's typical nineteenth-century residences was seen as a way of keeping the wealthy from abandoning the city for the suburbs and as an alternative to apartment house living. Prominent individuals who were among the original residents of the historic district include Anne Vanderbilt, Anne Morgan, and Elsie de Wolfe. Although scattered individual residences exist throughout New York City that were altered using restrained decoration during this period, Sutton Place is one of only two neighborhoods to survive as distinct enclaves that retain a communal landscaped garden, thus conveying the feelings and associations that characterize this design and development type.

The present development of the Sutton Place Historic District began in 1920, but the developmental history of the district extends back to the late 1870s. Sutton Place, actually a part of Avenue A (now York Avenue), was named for Effingham B. Sutton, a dry goods merchant and real estate developer. Sutton made his fortune as a trader and was the first to send ships to California after the discovery of gold. Along with other investors, Sutton is believed to have bought up land on the far east side of Manhattan adjacent to the East River, on the assumption that this would become an affluent locale. This did not occur; the initial architectural development of these riverside blocks in the late 1870s and early 1880s consisted of Neo-Grec style brownstone-fronted flats and row houses. These buildings were typical of the structures erected throughout the city, particularly along the east side of Manhattan, to house middle-class families. By the early 1890s these buildings were not only stylistically out of date, but most had become inexpensive rooming houses.

At the turn of the century New York's most affluent citizens were building houses on and just off of Fifth Avenue north of 59th Street. With incomes unrestrained by taxes, the city's financial and social elite were building large and showy mansions which were sumptuously decorated. World War I put a stop to this building. The advent of the income tax, decline in the number of people willing to work as servants, and advances in automotive technology dramatically altered the life-style of wealthy New Yorkers in the post World War I era. The period of grand, often ostentatious private buildings came to an end. As the New York Times reported, "the rich, these days, are not as rich as they used to be--that the bigger their incomes are the more of those incomes goes for taxes....Economy has become the general fashion in all social strata, and there now is little or no humiliation attendant upon the pulling in of horns, the diminution of luxury, a revision to ideas as to what is essential to comfort and happiness."[1] As the large mansions became too expensive to maintain, many were replaced by apartment houses or converted into multiple dwellings.[2] Rather than live in an apartment building, large numbers of the city's affluent upper middle class and upper class chose to move out of New York entirely, settling in the surrounding suburban areas. This change in living habits is reflected in the professional and popular architectural magazines which, during the 1910s and 1920s illustrated suburban residences almost exclusively. As the Architectural Forum noted in 1924:

> Many are leaving [New York] to make their permanent homes in the country, where estates are constantly increasing in size and number, as country life occupies more and more the time and interest of city people.[3]

The affluent urbanite who did not wish to live in a multiple dwelling or move to the suburbs was faced with a dilemna during this period. The large mansions were too expensive to maintain, but apartment living entailed the abridgement of a certain amount of privacy; the smaller houses on the side streets of the East Side were the brownstone-fronted row houses that symbolized all that was ugly about New York. Brownstone had been the facing material for most New York residences erected between about 1850 and the early 1880s and brownstone houses lined the blocks from Greenwich Village north into Harlem. By the 1880s, when stones of varying hues had gained popularity, brownstone was condemned as the scourge of New York. Edith Wharton described the New York of her childhood as "this little low-studded rectangular New York cursed with its universal chocolate-coloured coating of the most hideous stone ever quarried."[4] By the 1920s the press was filled with comments such as that written by Wesley Sherwood Bessell in Architecture:

> Years back New York was infested with a blight, now known as the "brownstone era." This blight has been handed down to the present generation of architects as an heirloom. It has existed as a nightmare to the profession who have had to face these monstrous rows of brownstone buildings.[5]

In the second decade of the twentieth century a movement was initiated to redesign the old brownstones, thus making the houses more livable and making New York's streets more "picturesque." There were two major design trends evident during this period--a restrained version of the Colonial Revival or Neo-Georgian style and a streamlined stucco mode. The Colonial Revival style first gained popularity for urban dwellings in the last years of the nineteenth century, primarily through the work of McKim, Mead & White. The earliest of these Colonial Revival houses were red brick structures with stone bases and trim and they were often ornamented with bold three-dimensional detail. Major examples of these buildings in New York City are the James J. Goodwin Houses at 9-11 West 54th Street (1896-98) and the Henry B. Hollins House (1899-1901) at 12-14 West 56th Street. In the second and third decades of the twentieth century, Colonial Revival designs became more refined. The stone trim on these brick houses became more planar and the success of the facade designs often depended on the proportions of the openings and wall surfaces and on the placement of simple, often flat decorative details. Generally, only the main entrance was framed by ornate carved forms. Buildings designed in this "Colonial Revival"style often combined motifs derived from late seventeenth and eighteenth century English architecture, as well as from eighteenth and early nineteenth century American models. The leading New York practitioners of this distilled Colonial Revival style were Mott B. Schmidt and the firm of Delano & Aldrich. These architects and others designed entire new residences in the style as well as new facades for older homes.

A more unusual development of the early decades of the twentieth century was the movement to redesign the facades of the old row houses by stripping off the stoops and all projecting ornament (lintels, window and door enframements, old bracketed cornices, etc.). The facades were then covered with stucco tinted colors such as beige and yellow that were redolent of the Mediterranean villas of Italy and Spain. Like their Colonial Revival style neighbors, these buildings are extremely refined, with large planar areas and modest ornamental touches. These simple, but sophisticated houses have ornament that is generally limited to small flourishes around the entrance and to the addition of iron railings, tile panels, sculpture and similar features. The cultivated design of these buildings is particularly striking when compared to the far more ornate and frequently ostentatious Beaux-Arts style private homes built a generation earlier. They reflect a new elegant and restrained life-style favored by a certain portion of New York's wealthiest citizens. As with the mansions built at the turn of the century, these stucco structures are based on European design precedents; they are closely related to the very restrained and planar Italian villas illustrated in contemporary magazines.[6]

It was not only the exteriors of old houses that were altered. The interiors were redone as well; their decoration echoed the new restraint evident outside. Behind this work was the belief that by "remodeling with individual taste the old high-stoop houses,thus happily and rapidly replacing the monotonous mediocrity of unbroken brownstone fronts,"[7] New York's streets would be beautified and made suitable for wealthy people who wished to remain in New York, but still live in a private home. Termed "miracles of plastic surgery"[8] and likened to "the ugly duckling...growing into a swan,"[9] the movement to redesign old houses swept across the eastern edge of Manhattan, particularly in the area east of Third Avenue from about 48th Street to 65th Street, within walking distance of the offices and shops of Midtown.

This architectural development had its genesis on East 19th Street between Irving Place and Second Avenue in the Gramercy Park Historic District. Known as the "block beautiful," this street of Greek Revival style brick houses and Italianate style brownstone residences erected as middle-class housing in the mid-nineteenth century began to be modernized in the 1910s. Most of the design work on this street was undertaken by architect Frederick Sterner whose stucco facades ornamented with tile, ceramic, and iron detail are still visible. These buildings were primarily altered into multiple dwellings that attracted moderately successful artists, actors, and other cultured people. This new design idea caught on and soon the city's wealthiest citizens began altering old brownstone houses into new single-family residences. In 1921 the New York Times Magazine noted the revolutionary quality of this movement:

> For the first time in the history of respectable cities... the millionaires are moving into the cheap old dwelling houses that were foreordained at their beginnings to harbor, in the relaxation of their evening suspenders, middle-class filing clerks and floor-walkers with tired feet.[10]

The article goes on to report that "a whole new school of architecture [has] been developed as a result of this exodus"; the author labels this style "New Yorkized Venetian."[11]

Most of the facade alterations were undertaken individually by owners who purchased single properties. There were, however, a few large-scale projects. The two most influential of these are the Turtle Bay Gardens Historic District (NR listed 1983) and the Sutton Place Historic District. Turtle Bay was begun in 1919 by a single individual who had twenty mid-nineteenth century houses on East 48th Street and East 49th Street altered into a unified composition with their rear gardens combined and landscaped. The houses were then sold off with protective covenants.[12]

Sutton Place differed from Turtle Bay in that its design was not the work of a single architect. The old houses on Sutton Place and Sutton Square were owned by two parties--Sutton Square, Inc. and George Osborn. The development had a combined landscaped garden and was protected by a single covenant, but each site was sold and developed individually by its purchaser within restrictive guidelines established in 1920. Because of its spectacular riverside setting and the ability of owners to design their own homes, Sutton Place attracted people of the highest social caliber. Sutton Place became the center for the new architectural design and new social lifestyle and it has remained one of the most prominent residential enclaves in New York.

The acceptance of this new way of living by prominent members of such leading

New York families as the Vanderbilt's, Morgan's, and Roosevelt's had a tremendous impact on the redesign of old houses all over the newly fashionable far East Side. It should be noted, however, that while this area attracted people from the leading families of the city, these were people who consciously sought to remove themselves from the traditional social life which centered on Fifth Avenue and Park Avenue. Many of those who moved to Sutton Place were heavily involved in the arts and philanthropy and they were seeking a somewhat artistic, but still distinguished place in which to live. As one New York Times Magazine article commented, the keynotes of Sutton Place and similar areas were "quaintness and artistry...just as correctness is that of Park Avenue."[13]

The block now bounded by 57th Street, Sutton Place, and Sutton Square was ripe for redevelopment in 1920. Not only was the block beautifully sited on the East River, but all but two of the lots were in the same ownership. In February 1920 the executors and trustees of Theodore Schumacher sold their holdings to George Osborn. Soon after, Osborn acquired the remainder of the block. Osborn was involved with real estate as the manager of the Phipps estate and it seems likely that he purchased the block as a financial venture. Several months after the purchase Osborn sold all but three lots to a syndicate known as Sutton Square which was headed by architect Eliot Cross. Osborn retained 1-5 Sutton Place, which he sold individually in 1921.

The Sutton Square syndicate arranged an elaborate plan for the redevelopment of the entire block including the properties retained by Osborn. This plan envisioned the sale of each lot and required the redesign of all of the buildings by their new owners. The entire development was to focus on a rear garden (overlooking the river) which would be in common ownership. All buyers of property had to sign a restrictive covenant. According to the covenent agreement recorded on July 2, 1920, its purpose was "to establish a uniform plan, scheme or restriction respecting the use of the dwelling houses and also respecting the use, embellishment and maintenance of that portion of said block not now in the actual occupation of buildings as a garden or place in common...for the use and benefit of each and every purchaser of any of said dwelling houses."[14] The covenant required that each building be a first class private dwelling that was not more than four stories and basement tall; that each house be occupied by one family (1-5 Sutton Place could be combined into a single four-family residence; however, this did not occur); that each owner pay an annual maintenance for the upkeep of the garden; and that kitchens and laundries be removed from the garden fronts. The most interesting feature of the covenant was the clause that required owners to refinish the front and rear elevations of the old houses by on or about July 1, 1922. The covenant noted that owners had to repaint or refinish the walls, repaint the window sash and frames, and construct ornamental cornices. In addition, all exterior decoration and refinishing was to be approved by the architectural firm of Cross & Cross. It is clear that one of the objectives of the development was to rid the block of the brownstone fronts which were regarded as a blight on the neighborhood.

The architectural firm of Cross & Cross consisted of Eliot Cross (1884-1949), who headed the Sutton Square syndicate, and his older brother John Walter Cross (1878-1951). Soon after establishing their office in 1907 Cross & Cross began to be patronized by socially prominent clients. The firm favored a restrained Colonial Revival idiom in their own designs such as the Links Club (1916, 36-38 East 62nd Street) and several houses within the Upper East Side Historic District. In later years they designed several notable Art Deco style structures including the General Electric Building (1931) at Lexington Avenue and East 51st Street and Tiffany & Co. (1939) at Fifth Avenue and East 57th Street. Eliot Cross had a financial interest in the success of the Sutton Place project as an investor in the syndicate and as the initial mortgagee for most of the early sales (these were later assigned to the New York Trust Company). The design review was undoubtedly established to ensure that no single house was too outlandish or would cheapen the ambiance and quality of the development. Almost immediately, the Sutton Place plan was a success. The development established the area as a prestigious residential section and land values and speculation increased. Soon, investment in the neighborhood rose dramatically and large apartment houses, several designed by Cross & Cross, were built on the surrounding blocks.

The first property sale in the Sutton Place development came on July 2, 1920 when Margaret W. Cammann, wife of importer Henry Lorillard Cammann, purchased 7 Sutton Place. She was followed on July 31, 1920 by Dr. Kenneth Taylor and Dr. Foster Kennedy who purchased 12 and 14 Sutton Square. Three other purchases followed in 1920, but it was not until January 1921 that the social standing of the area was established with the purchase of 1 Sutton Place by Anne H. Vanderbilt, the widow of William K. Vanderbilt, and No. 13 by playwright Elisabeth Marbury, companion to interior designer Elsie de Wolfe, who was also to reside at the house. Other original owners included Anne Morgan, daughter of J. Pierpont Morgan at No. 3; former ambassador to Spain Joseph Willard at No. 9; Laura F. Delano, cousin of Franklin D. Roosevelt, at No. 11; American actor and famous Irish balladeer Chauncey Olcott at No. 17; banker Jabish Holmes, Jr. at No. 19; Simeon Ford, owner of New York's prominent Grand Union Hotel, at No. 21; Dr. Edgar Stillman, a diabetes specialist, at 6 Sutton Square; law professor Joseph Chamberlain at 8 Sutton Square; and Mr. and Mrs. Reredon Havemeyer at 16 Sutton Square. Later residents have included Caroline M. Slade, a leader in the women's suffrage movement, and Marshall Kernochan, composer and head of the Galaxy Music Corporation, both at 7 Sutton Place; Kermit Roosevelt, son of Theodore Roosevelt, a 9 Sutton Place; film star Miriam Hopkins at 13 Sutton Place; Robert Goelet, director of both the American Museum of Natural History and the New-York Historical Society, at 7 Sutton Place; architect I.M. Pei at 11 Sutton Place; and various Secretary Generals of the United Nations at 3 Sutton Place.

The redesign of the Sutton Place row houses began in 1920 with the alterations to the facades of 12 and 14 Sutton Square. These two buildings, one designed in a Neo-Georgian mode and the other in a streamlined Renaissance mode, were the harbingers of the two styles that were to predominate in the historic district. No. 12 was designed by the prestigious firm of Delano & Aldrich and it has a somewhat English flavor. The building is a bit more ornate than most of Delano & Aldrich's oeuvre, but it is an urbane structure, indicative of what was to follow in the area(photo 3). No. 14 was designed by Henry O. Milliken. It is a planar stuccoed building with subtle architectural detailing which includes a rusticated base, a round-arched entrance, French windows, and blind fanlights on the second floor.

The redesign of many of the Sutton Place buildings occurred in 1921. Four of the major redesign projects of 1921 were the work of architect Mott B. Schmidt. Schmidt (1889-1977) was born in Middletown, New York and educated at Pratt Institute in Brooklyn. He established his architectural office in 1912 and by 1917 he had attracted clients of social prominence. Schmidt was introduced to Sutton Place by his friend Elsie de Wolfe. Elsie de Wolfe, one of the most important and influential interior decorators of the early twentieth century, commissioned Schmidt to redesign the house at 13 Sutton Place. For this fashion leader Schmidt designed an extremely restrained stucco house with simple splayed lintels, a shoulder-arched entrance, and a subtle iron areaway railing (photo 2). The de Wolfe connection accounts for Schmidt's commissions to design the houses of Anne Vanderbilt (1 Sutton Place), Anne Morgan (3 Sutton Place), and Chauncey Olcott (17 Sutton Place). The stuccoed Olcott house (photo 2), which displays splayed lintels with console keystones, a mansard roof, a rusticated base, and a simple iron railing, resembles the Marbury/de Wolfe house in its restrained elegance. The Vanderbilt and Morgan houses reflect Schmidt's interest in Georgian architecture. Both of these houses are new structures that totally replaced the earlier dwellings on their sites. The Vanderbilt house (photo 1,4) replaced a single row house, while the larger Morgan house (photo 1) replaced two older buildings. Anne Vanderbilt's residence has its entrance facing onto 57th Street. The brick door enframement is reputed to have been inspired by one by Sir Christopher Wren in King's Bend Walk, London.[15] The house was consciously given an "antique" look--the brick was salvaged from the building which previously occupied the site and it was stained in order to tone down its coloration. The Morgan house is of red Harvard brick with white marble trim. The house was built to "recall the old houses of Philadelphia, Salem and New York."[16]

Most of the other houses in the historic district were designed in either the streamlined stucco or Colonial Revival modes used by Schmidt. Nos. 11 and 15 Sutton Place (photo 2) are stucco buildings with subtle detail, while most of the houses on Sutton Square are Colonial Revival in style (photo 3). Of particular note is 6 Sutton Square (photo 3), designed by Murphy & Dana in 1921, with its elegant fanlit entrance. No. 21 Sutton Place (photo 2) is one of the most interesting and important houses in the historic district. It was the first building independently designed by William Lescaze, who became a pioneering American modernist. Designed in 1923, this refined Renaissance-inspired stucco building features monumental Ionic pilasters, broken pediment, volutes, rusticated base, and sculpture niche. This commission made it possible for Lescaze to leave his job in Cleveland and open an architectural office in New York. The streamlined quality of the "distilled modernized classicism"[17] of this design can be seen as a precursor of Lescaze's later moderne buildings.

Several buildings in the historic district have had their facades redesigned more than once. No. 7 Sutton Place, published in 1922, had a somewhat dull Italian Renaissance style stone front designed by William F. Dominick, which was replaced by a more interesting Italian front, designed by Polhemus & Coffin, in 1933-34.

Four buildings have facades that are less than fifty years old. These buildings were designed with the same sensibility and use the same materials as the earlier houses. They are non-contributing structures due to age alone.

Each building has a rear elevation that matches the style of the front facade. The upper stories of these garden fronts are visible from 57th Street. The garden itself was layed out in 1920 by Sutton Square, Inc. and has been beautifully maintained ever since. In 1939-45, when the East River Drive was constructed from 49th Street to 92nd Street, the eastern section of the garden (generally the area east of a line extending south from the party wall separating 14 and 16 Sutton Square) was removed, as was the house at 16 Sutton Square. The eastern section of the garden and the house were rebuilt by the city on a platform over the highway.

The Sutton Square district is as successful a residential enclave today as it was in the early 1920s when it was established. The houses continue to attract socially prominent individuals and the houses and communal garden continue to retain a high level of integrity as examples of an early twentieth century urban architectural ideal.

Footnotes

[1] New York Times, January 11, 1921, p. 10.

[2] The earliest apartment building on Fifth Avenue north of 59th Street is 998 Fifth Avenue built in 1910-12. Other apartment buildings followed, particularly in the 1920s.

[3] Architectural Forum 41(August 1924) 49.

[4] Quoted in Susan Edmiston and Linda D. Cirino, Literary New York: A History and Guide (Boston: Houghton Mifflin Co., 1976), pp. 165-66.

[5] Architecture 43(June 1921) 190.

[6] Examples include the Villa Galileo (Il Giojello)at Pian De'Giullari near Florence, in Architectural Record 48(July 1920) 2; Villa Pazzi (La Vacchia) at Pian De'Giullari, in Architectural Record 48(December 1920) 498; Villa Capponi at Arcetri near Florence, in Architectural Record 49(February 1921) 116.

[7] Architectural Forum 41(August 1924) 49.

[8] Mildred Adams, "The East River Becomes the Fashion," New York Times Magazine, October 16, 1927, p. 4.

[9] Architectural Record 52(November 1922)403.

[10] Helen Bullitt Lowry, "Better Than New," New York Times Magazine, December 11, 1921, p. 4.

[11] Ibid.

[12] Turtle Bay was designed before the Sutton Place houses, but the covenant was not issued until after the Sutton Place covenant.

[13] Adams, p. 4.

[14] "Agreement and Supplemental Agreement re Garden Assessment, Real Estate Taxes, Alterations, etc. Sutton Square, Inc. with Property Owners. July 1, 1920 (recorded July 2, 1920, liber 3167, p. 432), p.1.

[15] "Two Notable Houses on Sutton Place, New York: The Homes of Mrs. W.K. Vanderbilt and Miss Anne Morgan," 41(August 1924) 50.

[16] Ibid., 51.

[17] Lindsay Stamm Shapiro, "The Early Work 1923-1928," in <u>William Lescaze</u>, Institute for Architecture and Urban Studies, Catalogue 16 (NY: Rizzoli, 1982), p. 8.

9. Major Bibliographical References

9. Major Bibliographical References

See attached

10. Geographical Data

Acreage of nominated property slightly less than one acre

Quadrangle name Central Park , N.Y.-N.J. **Quadrangle scale** 1:24,000

UTM References

	Zone	Easting	Northing		Zone	Easting	Northing
A	18	587300	4512160	B			
C				D			
E				F			
G				H			

Verbal boundary description and justification

See map

List all states and counties for properties overlapping state or county boundaries

state code county code

state code county code

11. Form Prepared By

See continuation sheet

name/title Merrill Hesch

organization NYS Department of Parks, Recreation and Historic Preservation date July 1985

street & number Agency Building 1 telephone 518-474-0479

city or town Albany state New York 12238

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

___ national ___ state X local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

State Historic Preservation Officer signature Julia S. Stokes

title Deputy Commissioner for Historic Preservation date Aug 8, 1985

For NPS use only

I hereby certify that this property is included in the National Register

date

Keeper of the National Register

Attest: date

Chief of Registration

United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

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Continuation sheet Sutton Place Historic District New York County, NY Item number 9 Page 2

Major Bibliographical References

Adams, Mildred, "The East River Becomes the Fashion," New York Times Magazine. October 16, 1927, Section IV, pp. 4-5.

Eberlein, Harold Donaldson, "The Town House of a New Regime--Numbers 6 & 8 Sutton Sq., New York City," Architectural Record 52(November 1922) 402-14.

"House of Miss Anne Morgan, Sutton Place, New York," American Architect 125 (February 13, 1924) No. 2439.

Lowry, Helen Bullitt, "Better Than New," New York Times Magazine. December 11, 1921, Section III, part 2, pp. 4-5.

New York Times, July 25, 1920, VIII, p.1; January 9, 1921, p.1; January 11, 1921, p.10; January 23, 1921, VIII, p.1; March 10, 1921, p.3; October 15, 1921, p.13; October 23, 1921, IX, p.1; November 27, 1921, p.5.

"Two Notable Houses on Sutton Place, New York: The Homes of Mrs. W.K. Vanderbilt and Miss Anne Morgan," Architectural Forum 41(August 1924) 49, plates 17-24.

NPS Form 10-900-a
(3-82)

OMB No. 1024-0018
Expires 10-31-87
OMB No. 1024-0018
Expires 10-31-87

United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

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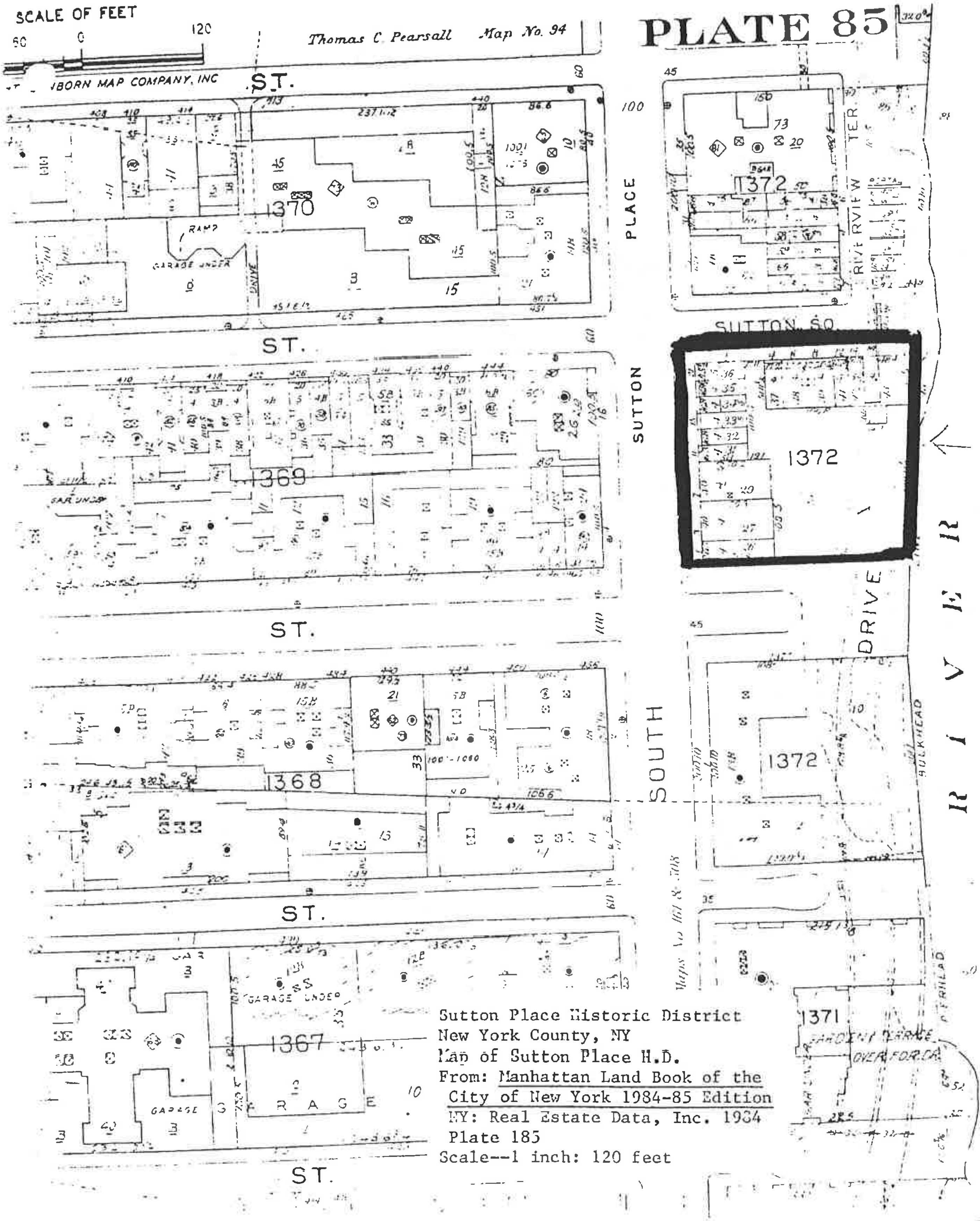
Continuation sheet Sutton Place Historic District New York County, NY Item number 11 Page 2

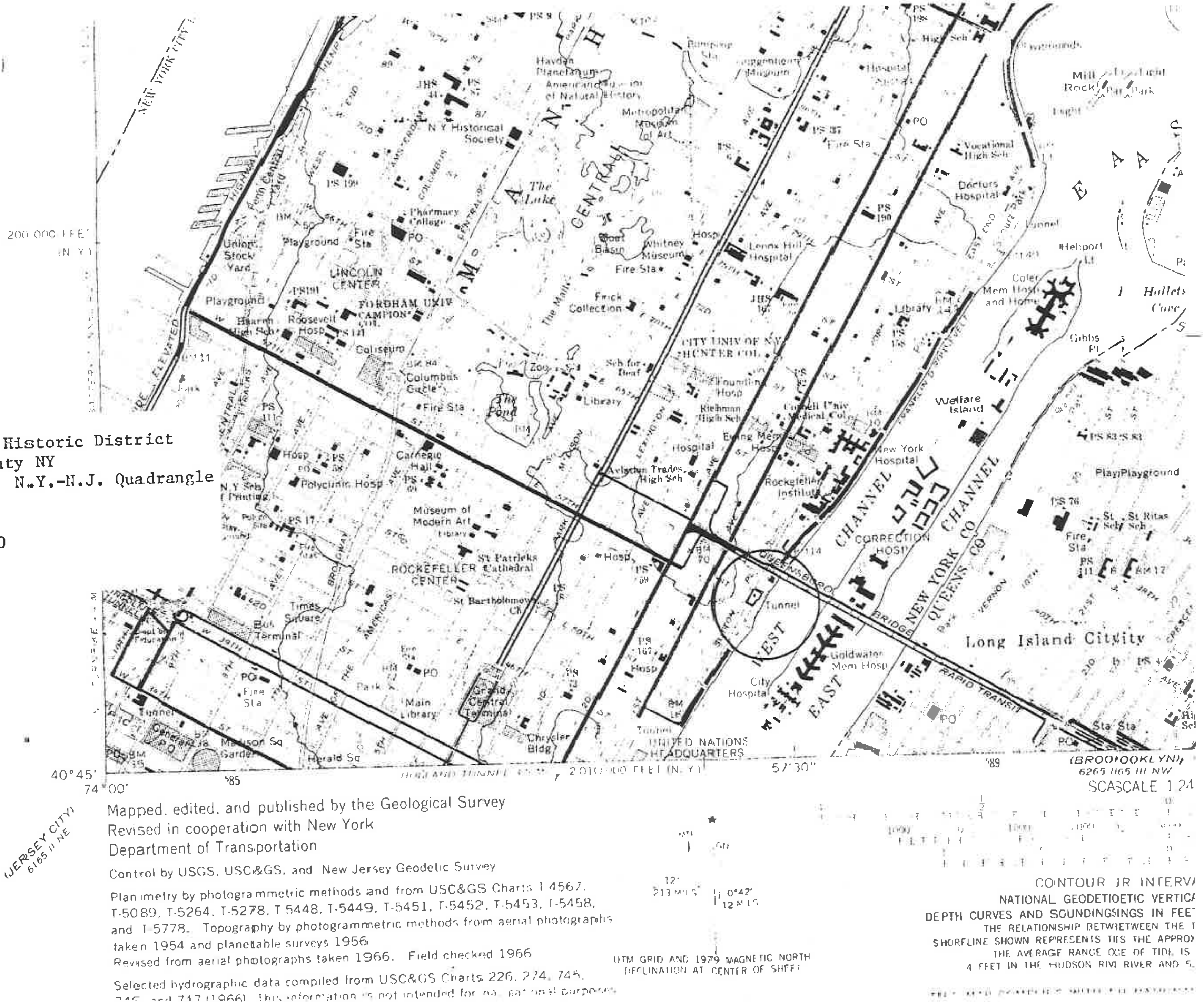
Report prepared by:

Andrew Scott Dolkart
201 West 92nd Street--Apt. 3F
New York, NY 10025



Sutton Place Historic District
New York County, NY
Map of Sutton Place H.D.
From: Manhattan Land Book of the City of New York 1984-85 Edition
NY: Real Estate Data, Inc. 1984
Plate 185
Scale--1 inch: 120 feet

Sutton Place Historic District
New York County NY
Central Park N.Y.-N.J. Quadrangle
Zone 18
East 587300
North 4512160



Form No. 10-300 REV. (9/77)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

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RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

OFFICE COPY

1 NAME

HISTORIC

AND/OR COMMON Queensboro (59th Street) Bridge

2 LOCATION

STREET & NUMBER 11th Street and Bridge Plaza North and Bridge Plaza South, Borough of Queens to 2nd Avenue and 59th and 60th Streets, Manhattan

__NOT FOR PUBLICATION

CITY, TOWN New York

__ VICINITY OF

CONGRESSIONAL DISTRICT 9th and 18th

STATE New York

CODE 036

COUNTY New York and Queens

CODE 061/081

3 CLASSIFICATION

CATEGORY
- __DISTRICT
- __BUILDING(S)
- X_STRUCTURE
- __SITE
- __OBJECT

OWNERSHIP
- XPUBLIC
- __PRIVATE
- __BOTH

PUBLIC ACQUISITION
- __IN PROCESS
- __BEING CONSIDERED

STATUS
- X_OCCUPIED
- __UNOCCUPIED
- __WORK IN PROGRESS

ACCESSIBLE
- __YES: RESTRICTED
- X_YES: UNRESTRICTED
- __NO

PRESENT USE
- __AGRICULTURE
- __COMMERCIAL
- __EDUCATIONAL
- __ENTERTAINMENT
- __GOVERNMENT
- __INDUSTRIAL
- __MILITARY
- __MUSEUM
- __PARK
- __PRIVATE RESIDENCE
- __RELIGIOUS
- __SCIENTIFIC
- X_TRANSPORTATION
- __OTHER:

4 OWNER OF PROPERTY

NAME Dept. of Transportation, City of New York

STREET & NUMBER 40 Worth Street

CITY, TOWN New York

__ VICINITY OF

STATE New York

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC. New York County Hall of Records

STREET & NUMBER 31 Chambers Streets

CITY, TOWN New York

STATE New York

6 REPRESENTATION IN EXISTING SURVEYS

TITLE

DATE

__FEDERAL __STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS

CITY, TOWN

STATE

7 DESCRIPTION

CONDITION

__EXCELLENT
X GOOD
__FAIR
__DETERIORATED
__RUINS
__UNEXPOSED

CHECK ONE

__UNALTERED
X ALTERED

CHECK ONE

X ORIGINAL SITE
__MOVED DATE________

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Queensboro Bridge is a two-span, through cantilever truss bridge. In a manner that is unusual for a bridge of this size, neither span has a suspended truss, and each is hinged directly to its counterpart. The overall length of the bridge is 4168 feet from Second Avenue in Manhattan to Eleventh Street in Queens. The main span, bridging the East River from Manhattan to Roosevelt (Blackwell's) Island, is 1182 feet in length. The lesser span, bridging the river from Queens to Roosevelt Island, is 988 feet in length. The bridge is 86 feet wide, and its height above high water is 135 feet. Built between 1901 and 1909, the Queensboro Bridge was the longest, largest and heaviest cantilever bridge ever built at the time of its completion.

The steel superstructure of the bridge stands on four piers of rusticated granite, one each in Manhattan and Queens, and two on Roosevelt Island. The bridge has two roadways, an upper and a lower deck. All roadways are of reinforced concrete, but originally consisted of steel floor beams and stringers carrying a wood deck. The bridge was designed to carry pedestrians, the Second Avenue Elevated, and trolleys. It now is limited to vehicular traffic only.

Both the Manhattan and Queens approaches consist of simple steel frame structures stiffened below the lower roadway. Only the Manhattan approaches exhibit extensive architectural treatment. The anchorages are of rusticated mansonry surmounted by segmentally-arched pediments and shallow domes as they rise above the roadways. They are treated as monumental elements, and contained elevators and stairways to the trolley lines on the bridge. On the Manhattan side, the treatment of the approach continues this nonstructural stone treatment to the west of the anchorage. There is an arcade of nine segmental arches running to First Avenue, a broad segmental arch over the avenue, and three arches just to the west of the avenue. The spandrels above the arches were originally filled with an incrustation of multicolored tiles, which have since been removed leaving grey brick exposed.

Behind the arcades is a space that was designed and used as a public market. It is arranged in a uniform pattern of four bays on a thirty foot grid and is surmounted by shallow timbrel vaults. The arcade is glazed in small lights with steel mullions and muntins. The glazing was added in 1918 to allow the market to operate year round. The arcade west of First Avenue is covered by the same shallow vaulting as is the market space. The vaults, known as "Guastavino Tiles" (after their builder), or Catalan Vaulting, consist of three layers of ceramic tiles cemented together,, with a combined thickness of about four inches. These vaults are totally self-supporting, and remain intact with only minor signs of efflorescence resulting from poor drainage of the roadways above.

The upper level roadway is supported by an exposed steel substructure, and access is via a pair of ramps running north and south at midblock. Approach ramps were added between First and Second Avenues during a bridge renovation in 1955, and were executed in a style and in materials consistent with the original approaches. The lower level is reached by two ramps off of Fifty-ninth and Sixtieth Streets and directly from street level at Second Avenue.

On the Queens side, the approaches lead from a complex of elevated highways, all rebuilt in 1955. The Queens approaches never had the embellishment of the Manhattan approaches; they are all built of exposed steel and concrete.

The steel superstructure shows considerable aesthetic treatment. It is entered from either end through a monumental arch which has a massive bronze plaque in the place of the keystone. The original engineer's conception was considerably altered by the architect and supervising engineer to give it a more graceful and monolithic profile. The steel towers are surmounted by ornate steel finials.

At the bridge plaza on Second Avenue, there are two kiosks of the original five (one has been restored and moved to the Brooklyn Children's Museum) that led into the trolley station below grade. These kiosks are built of cast iron and terra cotta tile, with Catalan Vaulting for the soffits. The iron is especially well detailed with complex Beaux Arts ornament. Near the corner of Fifty-ninth Street and Second Avenue stands one of the original two electroliers, built of heavy bronze in a distinctly Beaux Arts style. The other half of the pair is in storage in the trolley barn below awaiting restoration. These elements were designed by the architect as fitting compliments to the design of the approaches and the bridge itself. Another particularly interesting decorative element occupies the east wall of the market space, and is a fountain given to the market in 1919 by the Municipal Arts Society. It is of carved stone, and includes a mosaic by Edwin Blashfield.

structor must be associated with the scientific constructor at every step."[3] Lindenthal commissioned Henry Hornbostel, president of the Beaux Arts Society of America, an "architect of considerable originality"[4] in spite of his rigid adherence to the principles of the Beaux Arts style. He made many additions and basic changes to the preliminary work of the engineers, making the steelwork of the cantilevers more appealing and creating a unique series of approaches in Manhattan. His work was well received, and Montgomery Schuyler found that "the (Queensboro Bridge) shows as distinct an advantage upon the Brooklyn Bridge as the Williamsburg (a particularly unpopular East River bridge completed in 1903) shows a retrogression."[5] Lindenthal's practice of involving an architect from conception through completion proved so successful that it became almost universal practice thereafter.

The Queensboro Bridge was also built as symbol of the unification of the City of New York. The boroughs of Brooklyn, Queens, Manhattan and Staten Island became part of New York in 1903. Until then, only Roebling's Brooklyn Bridge joined any two boroughs. The Queensboro, along with the Manhattan and Williamsburg Bridges, were quickly built soon after unification, all being completed by 1909, as a physical affirmation of the consolidation.

The bridge was built with special features. Beneath the Manhattan approaches, Raphael Guastavino, the famed engineer/contractor, built a 47,000 square-foot public market surmounted by his unique Catalan Vaults. The market space, the bulk of which lies in the western portion of the block between First and York Avenues, was used until 1936 as one of the grandest of the city's public markets. It remains in use as a storage space for city trucks. The space has been called one of New York's great architectural secrets,[6] and is surely a testimony both to the civic spirit that built a major municipal gathering place as part of a utilitarian structure, and the skill of Guastavino, Hornbostel, and Lindenthal.

---

[3] Montgomery Schuyler, "Our Four Big Bridges," Architectural Record, Vol. XXV, p. 155.

[4] James Van Trump, "Henry Hornbostel: The New Brutalism," Charette, Vol. XLVI, No. 5, pp. 9,19.

[5] Montgomery Schuyler, op. cit., p. 154.

[6] Paul Goldberger, Interview, January 25, 1977.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

See Continuation Sheet

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY 26

QUADRANGLE NAME Central Park

QUADRANGLE SCALE 1:24,000

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	1 8	5 87 4 00	4 5 1 2 5 5 0
B	1 8	5 88 9 10	4 5 1 1 7 2 0
C	1 8	5 88 8 80	4 5 1 1 6 6 0
D	1 8	5 87 3 80	4 5 1 2 4 8 0
E			
F			
G			
H			

VERBAL BOUNDARY DESCRIPTION

Bounded on west by Second Avenue in New York County; on east by Eleventh Avenue. The bridge is eighty-six feet wide.

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
New York	036	New York	061
New York	036	Queens	081

11 FORM PREPARED BY

NAME / TITLE
Huntley Gill, edited by Elizabeth Spencer-Ralph

ORGANIZATION
NYS Parks and Rec., Div. for Historic Preservation

DATE
10/11/78

STREET & NUMBER
Agency Bldg. #1, Empire State Plaza

TELEPHONE
(518)474-0479

CITY OR TOWN
Albany

STATE
New York

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL XXX

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE Deputy Commissioner for Historic Preservation

DATE 10/20/78

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

KEEPER OF THE NATIONAL REGISTER

ATTEST:

DATE

CHIEF OF REGISTRATION

8 SIGNIFICANCE

PERIOD

_PREHISTORIC
_1400-1499
_1500-1599
_1600-1699
_1700-1799
_1800-1899
X 1900-

AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW

_ARCHEOLOGY-PREHISTORIC
_ARCHEOLOGY-HISTORIC
_AGRICULTURE
X ARCHITECTURE
_ART
_COMMERCE
_COMMUNICATIONS

_COMMUNITY PLANNING
_CONSERVATION
_ECONOMICS
_EDUCATION
X ENGINEERING
_EXPLORATION/SETTLEMENT
_INDUSTRY
_INVENTION

_LANDSCAPE ARCHITECTURE
_LAW
_LITERATURE
_MILITARY
_MUSIC
_PHILOSOPHY
_POLITICS/GOVERNMENT

_RELIGION
_SCIENCE
_SCULPTURE
_SOCIAL/HUMANITARIAN
_THEATER
_TRANSPORTATION
_OTHER (SPECIFY)

SPECIFIC DATES 1909 BUILDER/ARCHITECT Gustav Lindenthal/Henry Hornbostel

STATEMENT OF SIGNIFICANCE

The Queensboro Bridge is significant as an urban artifact, as an important engineering achievement and as a civic symbol.

The bridge was designed by Gustav Lindenthal, "one of the great men of American bridge engineering,"[1] and his bridge was the largest and heaviest cantilever bridge ever constructed to the time of its completion in 1909. The successful completion of the bridge was noted throughout the world, since cantilever bridges had fallen into disrepute with the collapse of the Quebec bridge in 1907, two years before the completion of the Queensboro. Also unusual was the fact that the bridge was built as a "through cantilever," in which the bridge's roadways pass through its supporting trusses rather than sitting above them, as was more common. In addition, the Queensboro is unusual in that is has no suspended spans -- that is, hinged spans supported by cantilevered trusses -- it is hinged only in the center of each river crossing. The Queensboro "epitomizes the exuberant vitality of American structural art perhaps better than any other large bridge.... (It) may, from the point of view of style and engineering, be said to represent the culmination of nineteenth-century American bridge design."[2]

Another unique aspect of the bridge is that it was the first to involve an architect from its conception onwards. "Mr. Lindenthal had the conviction that the common method of bridgebuilding, whereby the structure is designed by an engineer, and afterward, if at all, an architect invoked to give it such form and comeliness as may still be practicable, was a radically wrong method..... the artistic con-

---

[1] David Plowden, Bridges: The Spans of North America. The Viking Press, New York; 1974. p. 180.

[2] Ibid., p. 179.

Form No 10-300a
(Hev 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
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Queensboro Bridge
New York/Queens County

CONTINUATION SHEET ITEM NUMBER 9 PAGE 1

Barman, Christian. The Bridge. New York, 1926.

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Hornbostel, Henry. "The New East River Bridges." Architecture. Vol. VIII, 1903, pp. 103-105.

New York City Department of Bridges. Blackwell's Island Bridge. New York, 1903.

Plowden, David. Bridges: The Spans of North America. New York, 1974.

Schuyler, Montgomery. "Bridges and the Art Commission." Architectural Record. December, 1907. Vol. XXII, pp. 469-475.

-------------------. "Our Four Big Bridges." Architectural Record. March, 1909. Vol. XXV, pp. 147-160.

central park QUAD

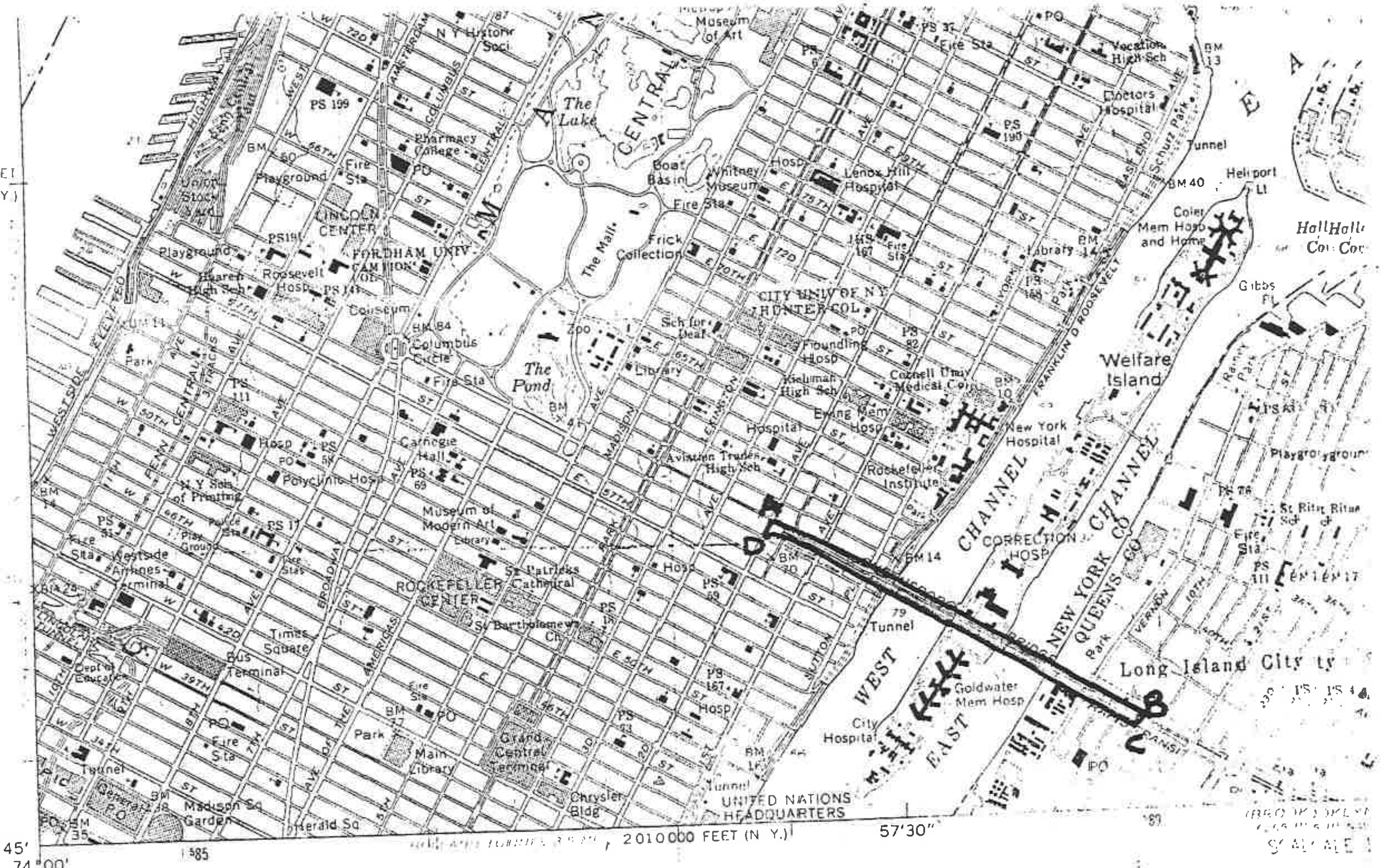
QUEENSBORO BRIDGE, NEW YORK COUNTY AND QUEENS COUNTY

A EASTING
5/87/400
NORTHING
45/12/550

B EASTING
5/88/910
NORTHING
45/11/720

C EASTING
5/88/880
NORTHING
45/11/660

D EASTING
5/87/380
NORTHING
45/12/480



(JERSEY CITY)
6165 II NE

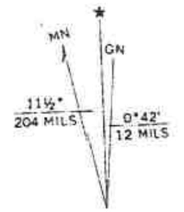
Mapped, edited, and published by the Geological Survey
Revised in cooperation with New York
Department of Transportation

Control by USGS, USC&GS, and New Jersey Geodetic Survey

Planimetry by photogrammetric methods and from USC&GS Charts T-4567, T-5089, T-5264, T-5278, T-5448, T-5449, T-5451, T-5452, T-5453, T-5458, and T-5778. Topography by photogrammetric methods from aerial photographs taken 1954 and planetable surveys 1956
Revised from aerial photographs taken 1966. Field checked 1966

Selected hydrographic data compiled from USC&GS Charts 226, 274, 745, 746, and 747 (1966). This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum
10,000-foot grids based on New York coordinate system, Long Island zone, and New Jersey coordinate system
1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue
landmark buildings are shown



UTM GRID AND 1966 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

CONTOUR INTE
DATUM IS MEA

DEPTH CURVES AND SOUNDINGS IN F
SHORELINE SHOWN REPRESENTS THE AP
THE MEAN RANGE OF TI
4 FEET IN THE HUDSON RIVER AT

THIS MAP COMPLIES WITH NATI
FOR SALE BY U.S. GEOLOGICAL S
A FOLDER DESCRIBING TOPOGRAPHIC MAPS

Technical Memorandum

Date: August 19, 2013

To: New York State Department of Environmental Conservation

From: New York City Economic Development Corporation
AECOM

Subject: **East Midtown Waterfront Esplanade**
Site Ecology and Shading of the East River

The New York City Economic Development Corporation (NYCEDC) is preparing environmental documentation in support of the proposed East Midtown Waterfront Esplanade (EMWE) in the East River along the shoreline of Manhattan from East 41th Street to East 60th Street (see **Figure 1**). The EMWE is a proposed 40-foot (13.1-meter) wide esplanade that would be offset from the shoreline by a distance of up to 30 feet (9.3 meters).

This technical memorandum provides an assessment of the habitat conditions in the East River and the project area (East 41th Street to East 60th Street) and analyses of previous studies that evaluated shading impacts from overwater structures in urban harbors. As shown in the following technical memorandum, once constructed, the EMWE would shade a portion of the East River that is currently sunlit. Some impacts to the marine environment would occur; however, it is projected that, based on the quality of the habitat and the dimensions of the EMWE, the EMWE would not cause unmitigable environmental impacts to the marine environment. Significant impacts are considered if the EMWE would create conditions in the river that would serve as a permanent barrier for fish swimming to Manhattan's shoreline; provide a barrier or significantly impair the ability of fish to swim north and south in the East River; and/or provide a situation that significantly reduces the population of an endangered species or another species of fish within the Hudson Raritan Estuary (HRE).

1. East River – Physical Environment

The East River is part of the HRE Complex which comprises the estuaries of the Hudson and Raritan Rivers. Formed during the last ice age, the East River is a tidal strait that provides a hydrologic connection between Upper New York Harbor, the Harlem River and western Long Island Sound. Several tidal inlets (e.g., Newtown Creek, Gowanus Canal, Flushing Creek) flow into the East River. These waterbodies and the East River have been subject to substantial anthropogenic development and pollution.

1.1. Depths and Currents

In the EMWE project area, the river is generally 0.5 miles (0.8 kilometers) wide. From East 47th Street to East 86th Street, the presence of Roosevelt Island causes the river to flow into two separate channels - the East Channel, and West Channel. In the vicinity of project area, the West Channel and East Channel are each approximately 900 to 1,000 feet (278.5 to 310 meters) in width.

Although Roosevelt Island divides the river almost equally, the channels have considerably different physical conditions and habitats. The Manhattan shoreline of the West Channel is generally bulkheaded with adjacent water depths over 30 feet (9.3 meters). The center of the West Channel has depths over

100 feet (31 meters) and the bottom is largely comprised of rocky material. The East Channel is much shallower, with maximum depths of only 40 feet (12.4 meters) (see **Figure 2**). Strong currents occur throughout the East River. In the vicinity of the Queensborough Bridge, the current in the West Channel can reach approximately 5.2 knots. Currents in the East Channel are less, up to 4.1 knots (NOAA, 2013).

1.2. Shoreline Habitats

When first explored and settled by European settlers, mudflats, tidal marshes, and several small streams were located along much of Manhattan's eastern shoreline. In fact, Turtle Bay on Manhattan's east side (approximately East 45th to East 48th Streets) was so named because of the sea turtle population residing in its eel grass meadows (Fordham, 2013). Mudflats, tidal marshes, stream mouths, and eel grass beds are all very valuable habitats that are utilized by estuarine fish species for a variety of activities (e.g., foraging, spawning, nursery areas, etc.). Also, massive oyster reefs were found throughout the river. Oyster reefs are an important benthic habitat type that provides both three dimensional habitat and food resources for fish.

The Manhattan shoreline of the West Channel has undergone significant development over the last few centuries (see **Figure 3**). The development has expanded the shoreline waterward; the shallow bays and creeks that were once present in the project area have been filled. Today, the shoreline is largely comprised of concrete facades and sheetpile bulkheads. Many storm sewer and road drainage pipes empty into the project area (**Photos 1** and **2**). Within the project area, there are two rock out-crops, which are remnants of a small bluffs, located near East 55th and East 58th Streets. Depths adjacent to the rock outcrop are 30 feet (9.2 meters) in many locations and almost 60 feet north of East 58th Street.

In the project area, the shorelines of the East Channel along eastern Roosevelt Island and western Queens are less developed. In the East Channel, shallow shoals are present along the both shorelines. Several of these shoals are extensive and occupy almost half of the width of the channel. The Queens shoreline is comprised of pile supported piers, rip rap and bulkheads and formerly developed areas that have become dilapidated and now consist of sediments, rocks, and debris. In fact, some waterfront structures located along portions of the shoreline of the East River have deteriorated and created shallow water habitat with sloping shorelines that provide additional limited nursery habitat for certain species of fish (USFWS 1997, USACE, 2004).

1.3. Water Quality

Visibility

For over 100 years, the New York City Department of Environmental Protection (NYCDEP) has conducted a water quality monitoring program throughout New York Harbor. The closest monitoring station to the project area is Station E2, located near East 23rd Street in the East River.

A Secchi disk is used to estimate the clarity of surface waters. High Secchi readings (greater than 5.0 feet [1.5 meters]) are indicative of clear water. Low Secchi readings, about 0.3 feet (1 meter), are typically associated with typically due to high concentration of suspended solids or plankton blooms in degraded waters. These degraded waters have light-limiting conditions, which in turn affect primary productivity and nutrient cycling.

Visibility for location E2 is provided in **Table 1** which presents the results in meters. During 2012, the visibility at location E2 varied from 1.9 to 4.8 feet (0.6 to 1.5 meters).

Figure 1 Project Area Location Map

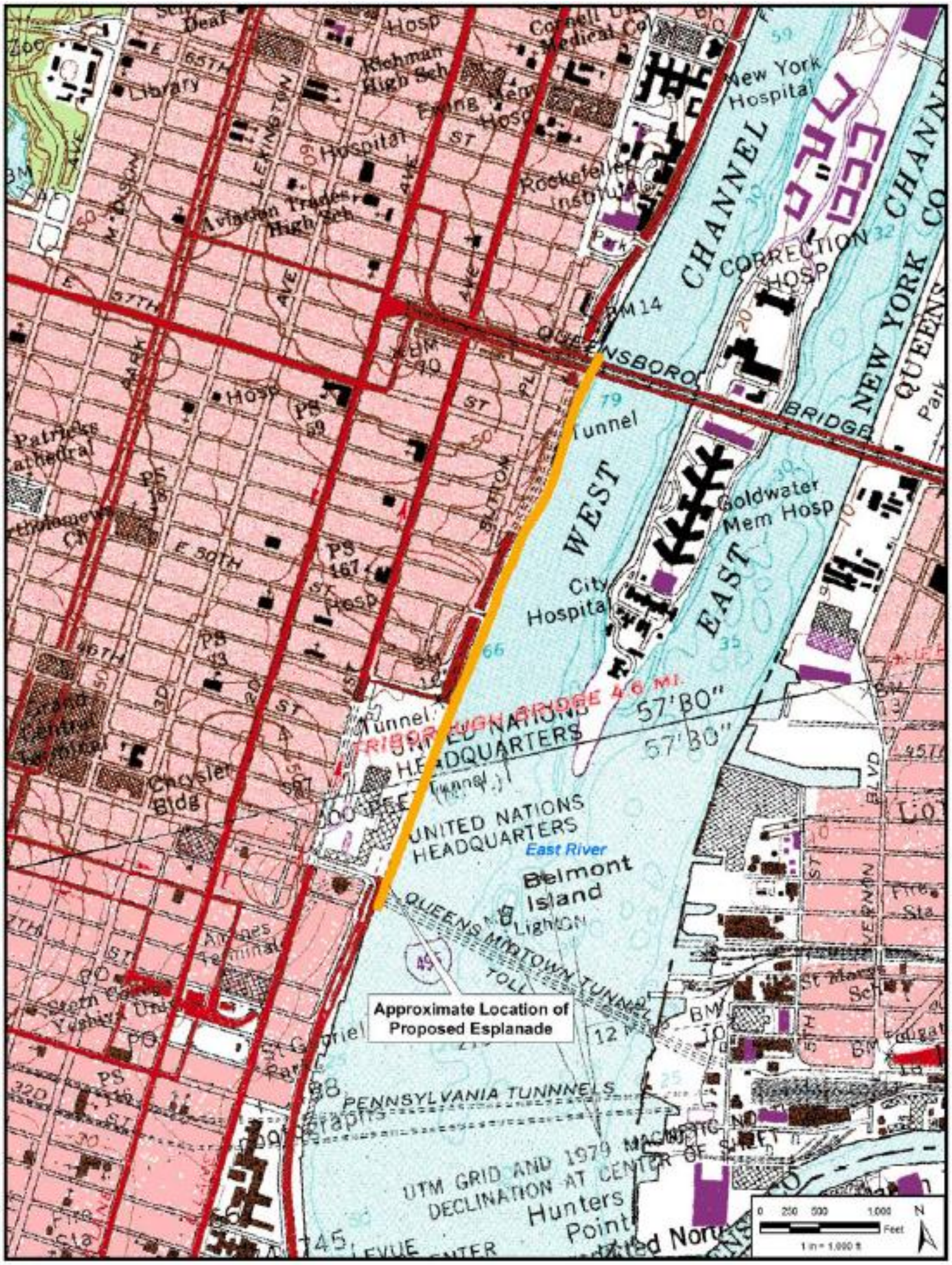


Figure 2 Water Depths in the West and East Channels

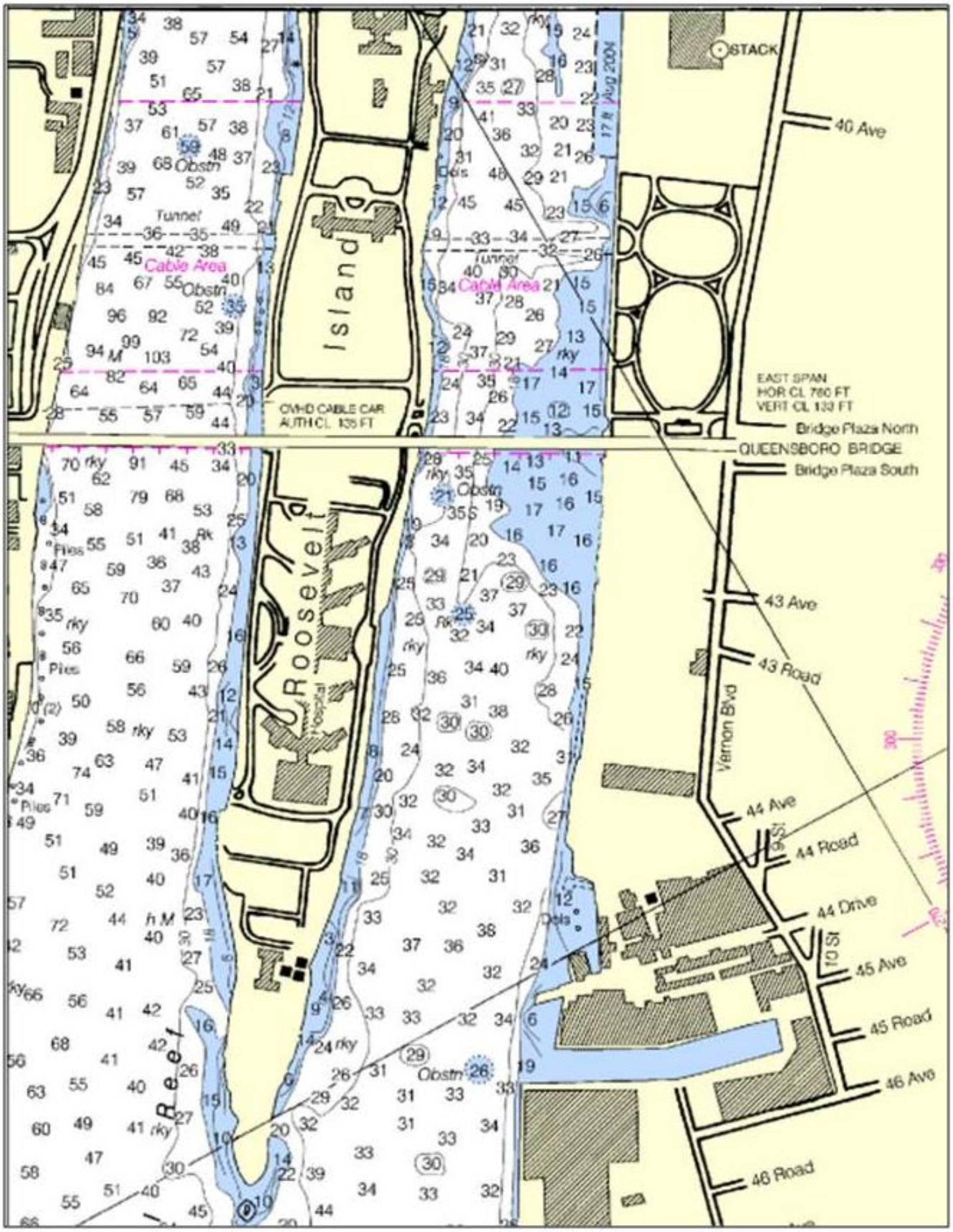
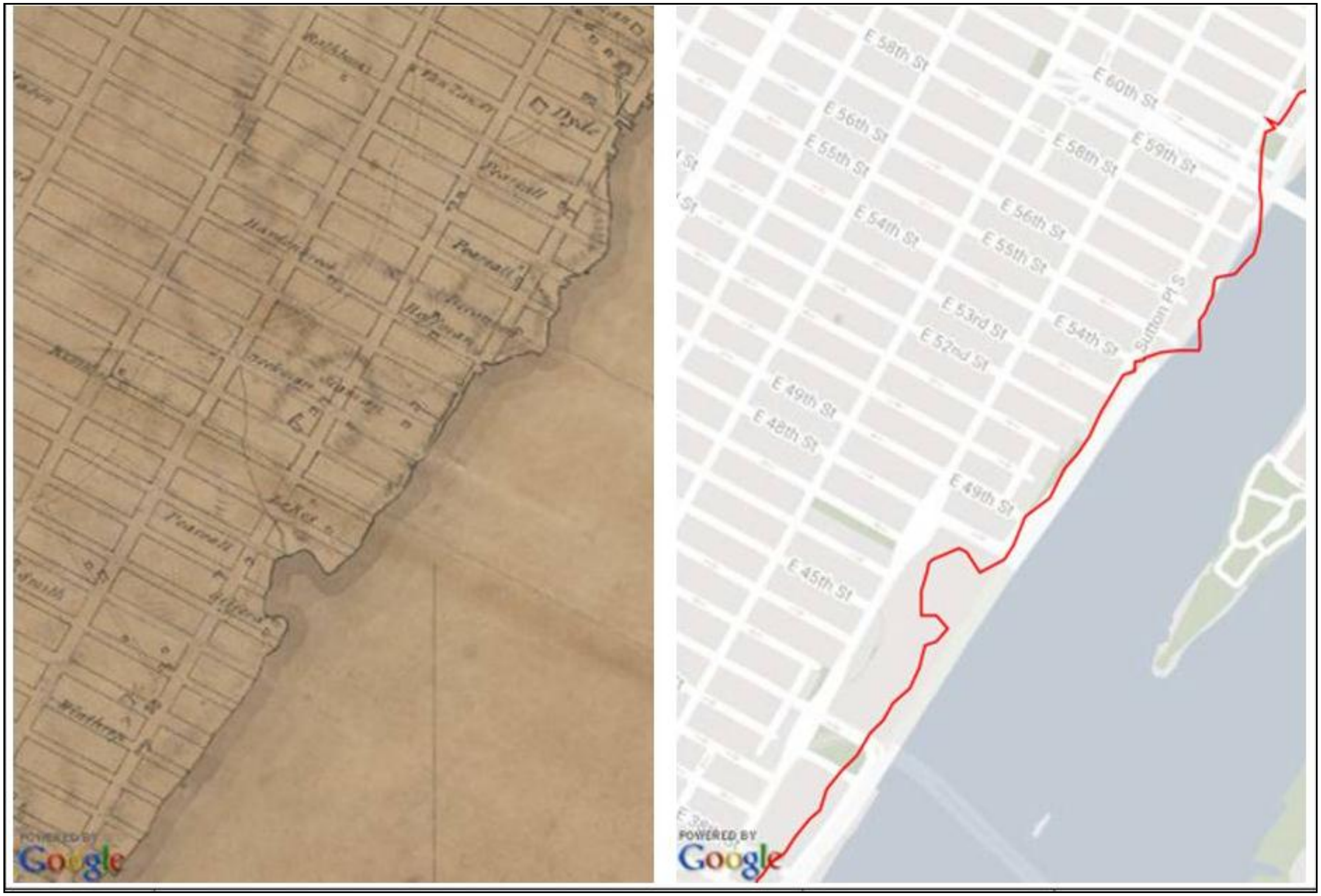


Figure 3 Project Area Shoreline: 1811 and Today



Note - The redline is the 1811 shoreline superimposed on today's shoreline.

Photo 1: View of Concrete Facades and a Caisson from the Former Outboard Detour Roadway

Photo 2: View of the Sheet Pile Bulkhead. Note outfall between the two caissons.

Table 1 Visibility Measurements at Sample Location E2 in 2012

Sample Date	Transparency (m)*	Sample Date	Transparency (m)*	Sample Date	Transparency (m)*
01/09/2012	1.1	07/09/2012	0.9	09/17/2012	1.2
02/13/2012	0.9	07/16/2012	0.9	09/24/2012	0.9
03/05/2012	0.9	07/23/2012	0.8	10/01/2012	1.2
04/03/2012	1.1	07/30/2012	1.1	11/10/2012	1.2
05/29/2012	0.6	08/06/2012	1.1	11/13/2012	1.2
06/04/2012	0.8	08/13/2012	0.9	11/19/2012	0.8
06/11/2012	0.8	08/20/2012	1.2	12/10/2012	1.5
06/18/2012	0.9	08/27/2012	0.8	12/17/2012	1.2
06/25/2012	1.1	09/04/2012	0.9		
07/02/2012	0.8	09/10/2012	1.4		
Note: 1 meter = 3.094 ft.					

Past studies conducted in the EMWE project area identified visibility readings, using a Secchi Disk, ranging from 4.8 to 6.5 feet (1.5 to 2 meters) meters in the summer and fall seasons (NYSDOT, 1999). A dive survey conducted in 2011, identified natural light was observed underwater to a maximum of 12.6 feet (3.9 meters), with variation due to stage of the tide. Note, the diver observations were underwater and not conducted with a Secchi disk.

Best Usage Classification

The best water usage classification for the East River is Class I (fishing or boating and secondary recreation contact). Under Class I designation, shell fishing is not considered an appropriate use (NYSDEC, 2011).

The East River is listed on New York State’s List of Section 303(d) Priority Waters. Waters on this list are designated as ‘impaired waters’ where designated uses are not fully supported. The water quality of the East River is stressed largely due to combined sewer overflow, municipal discharges (e.g., Newtown Creek Waste Water Treatment Plant), and other sanitary system discharges. Also, impacting the water are toxins and other contaminates from current and former industrial activities as well as urban storm runoff which contributes to low dissolved oxygen (NYSDEC, 2011).

The New York State Department of Health (NYSDOH) has issued health advisories recommending limiting consumption of North American eel, gizzard shad or crab hepatopancreas and no more than one meal per month of Atlantic needlefish, bluefish, rainbow smelt, striped bass or white perch from these waters due to possible elevated levels of PCBs. In **Appendix A**, a comparison of NYCDEP monitoring stations near the project area and select stations in New York Harbor are provided to illustrate the stressed conditions of the river.

2. Faunal Usage of the East River in the Project Area

2.1. East River

Several surveys over the past decades have been conducted to assess the fish community of the East River and associated bays and inlets of Eastern Long Island Sound. These data indicate that over 80 finfish species on average inhabit the Lower Hudson area (Woodhead, 1994 and ConEdison, 1992 in USFWS, 1997). In addition, a year-long impingement and entrainment survey conducted between 2006 and 2007 in the East River at Astoria, Queens (ENSR, 2007) identified 71 species of finfish. The populations of fish change seasonally with varying salinity levels as they move between the Long Island Sound, the East River and the Hudson River. Only a few species are residents of the East River. Dominant species found during the surveys were scup (*Stenotomus chrysops)*, tautog (*Tautoga onitis)*, cunner (*Tautogolabrus adspersus)*, bay anchovy (*Anchoa mitchilli)*, Atlantic menhaden (*Brevoortia tyrannus)*, northern pipefish (*Syngnathus fuscus)*, naked goby (*Gobiosoma bosci)*, Atlantic butterfish (*Peprilus triacanthus)*, conger eel (*Conger oceanicus)*, oyster toadfish (*Opsanus tau)*, and Atlantic silverside (*Menidia menidia)*.

Table 2 Seasonal Distribution of Fish Species in the East River

January - March	April - June	July - September	October- December
Alewife	**Alewife**	Alewife	Alewife
3-Spined Stickleback	3-Spined Stickleback	Atlantic Herring	Atlantic Silverside
Atlantic Herring	**Atlantic Herring**	Atlantic Menhaden	Bay Anchovy
Atlantic Menhaden	Atlantic Silverside	**Atlantic Silverside**	Blueback Herring
Atlantic Silverside	**Atlantic Tomcod**	Atlantic Tomcod	Conger Eel
Atlantic Tomcod	Bay Anchovy*	Bay Anchovy	Cunner
Bay Anchovy*	**Blueback Herring**	Blueback Herring	Grubby
Blueback Herring	Butterfish	Bluefish	Naked Goby
Conger Eel	**Conger Eel**	**Butterfish**	Northern Pipefish
Cunner	Cunner	Conger Eel	Rainbow Smelt
Fourbeard Rockling	**Fourbeard Rockling**	Cunner	Red Hake
Grubby	**Grubby**	Fourbeard Rockling	Rock Gunnel
Northern Pipefish	Naked Goby	Grubby	Seabord Goby
Rainbow Smelt**	**Northern Pipefish**	Northern Pipefish	Spotted Hake
Red Hake	Northern Puffer	Northern Puffer	Striped Bass
Rock Gunnel	Rainbow Smelt	Rainbow Smelt	**Striped Searobin**
Seabord Goby	Red Hake	Rock Gunnel	Weakfish
Silver Hake	**Rock Gunnel**	Silver Hake	Windowpane
Spotted Hake	Seabord Goby	**Striped Bass**	Winter Flounder
Striped Bass	Silver Hake	Striped Searobin	
Weakfish	Spotted Hake	Weakfish	
Windowpane	Striped Bass	Windowpane	
Winter Flounder	Windowpane	Winter Flounder	
	Winter Flounder		
Bold text represents peak presence			

The Hudson/Raritan Rivers and Long Island Sound typically have the greatest fish biomass and production during the warmer months of the year (LMS, 2000). Anadromous species, such as

American shad (*Alosa sapidissima*), striped bass, and blueback herring, utilize the East River as a migratory corridor during the spring and fall. Fish that spawn in marine-brackish water such as weakfish, winter flounder, bay anchovy, bluefish, and Atlantic menhaden, also commonly utilize coastal bays, straits such as the East River, and estuaries as juvenile nursery areas (LMS, 2000). Surveys conducted by LMS (1983, 1986, and 1989), Malcolm Pirnie Inc. (1984), and Woodward-Clyde (1986) have documented seasonal abundances and migratory patterns. The most abundant species for these surveys were: winter flounder, striped bass, Atlantic tomcod, and grubby with several other species varying among the different surveys that comprised the remaining species. In addition, the 316(b) Impingement and Entrainment Study performed at the Astoria Generating Station, Queens (ENSR, 2007) also documented fish use by life stage. **Table 2** shows seasonality of species collected during the ENSR 2007 Study.

2.2. Species Usage of the Project Area

Although the portion of the East River that separates Queens from Manhattan is located in the one of the most densely populated areas in the world, there are only two known ecological surveys that have occurred in the immediate vicinity of the project area: A seasonal fish and benthic invertebrate survey was conducted in 1999 for the New York State Department of Transportation (NYSDOT) as part of the Outboard Detour Roadway project; and, a 2011 Dive survey within the EMWE project area.

In 1999, fish surveys were conducted using otter trawls in both the East and West Channels between East 52nd and East 57th Streets. An otter trawl is a large net that is dragged along the bottom behind a towing vessel. During the trawling events that occurred over a two-day event in the summer and fall of 1998, no fish were recovered in the West Channel. This would suggest that the West Channel near the project area does not serve as attractive habitat for large numbers of demersal fish. In the East Channel, several species common to the HRE were recovered (e.g., tautog, flounder, etc.), but generally in very low numbers. Scrapings of the bulkhead along the Manhattan shoreline found organisms common to the New York Estuary. Species observed included; green algae (*Ulva lattuca* and *Codium* sp.), brown algae (*Fucus*, sp.) as well as hydroids, sponges, barnacles, etc. A component of the 1999 survey used artificial substrate samplers along the bulkhead. Species observed included; decapods, isopods and other motile organisms.

In October of 2011, a dive survey was performed in the project area. The dive survey was conducted over a three-day period by a tethered, in-water hard-hat diver equipped with 150 foot air hose umbilical, ship to diver communication, and video with real-time streaming to a support boat with an onboard monitor. The underwater survey was conducted along the eastern shoreline of the East River between East 38th Street and East 61st Street from October 3 through 5, 2011. A total of 17 transects were completed directly parallel and adjacent to the existing bulkhead/pier to a riverward distance of 50 feet within an area spanning a distance of 1.3 miles and covering 0.012 square miles.

The dive survey identified the physical habitats and fauna observed. Within the footprint of the EMWE and along Manhattan's shoreline, the following habitats were identified:

Piling/Open Water Edge Habitat

Piling/Open Water Edge Habitat was located at the edge of the existing bulkhead along the FDR Drive in the vicinity of the Queens Midtown Tunnel Entrance from East 43rd Street to East 53rd Street. Water depth ranged from 15 to 25 feet at the time of survey. Substrate consisted of low relief habitat (0.3 to 0.6 meters) high with riprap-sized rocks (approximately a 1 foot [0.3 meters] in diameter), concrete rubble, and an occasional sandy pocket. Some anthropogenic debris (e.g. steel, rebar) was observed. The slope was relatively flat. On the northern side of the tunnel, substrate became more silty with some rock and concrete. Debris was less prevalent. The bottom habitat had very little benthic community coverage and was sparsely populated by sponges and gastropods (approximately 3-5 percent overall coverage). The overall condition of bottom habitat was identified as poor.

At approximately 12 feet (3.7 meters), where light was observed to attenuate, tubiculous polychaete castings were evident making up about 60 percentage of total piling coverage to the surface. Blue mussels were observed within the upper 12 feet (3.7 meters) of the water column but they were not as prevalent as sea grapes and sponges. The substrate was mostly silt and rubble of poor habitat quality.

Natural Bedrock Outcrop and Caissons Habitat

Natural Bedrock Outcrop and Caissons Habitat were located north of East 53rd Street to East 61st Street. Habitat included two large natural rock outcrops with a tide pool located adjacent to the FDR Drive between East 57th Street and East 59th Street and encrusting habitat on the caissons slightly riverward (approximately 50 feet [12.4 meters]) of the shoreline. Depth varied between 2 feet (0.6 meters) in the tide pool to greater than 40 feet (12.4 meters) at the rock wall. Slope of the bedrock was steep at about a 90 degree vertical drop. Substrate was either bedrock or small rock (approximately one foot in diameter) with little or no silt layer. Percent coverage of benthic organisms varied by depth along the bedrock but overall coverage was approximately 40 to 50 percent. Species observed included are common to the harbor including; green sea fern (*Bryopsis plumose*), Agardh's red weed (*Agardhiella tenera*), red beard sponge (*Microciona prolifera*), hydroids, striped anemone (*Haliplanella luciae*), Loosanoff's haliclona (*Haliclona loosanoffi*), dogwinkles (*Thais lapillus*), periwinkles (*Littorina* spp.), oysters, and blue mussel (*Mytilus edulis*). Overall, habitat condition and biodiversity was highest along natural outcrops with overall rating of moderate to fair. The substrate riverward was mostly silt and rubble and of poor quality. Species composition found on the caissons was similar although mussels were observed but no oysters.

No submerged aquatic vegetation (SAV) beds were observed in the project area. The lack of SAV is most likely due to water depth, absence of preferred substrate, currents, and depth of light attenuation.

There were few observations of fish in the project area during the survey in 2011. This is likely due to the currents and limited habitat for fish. Observations of the bulkheads and rock outcrops identified some foraging opportunities for fish; however, the near vertical bulkheads provide limited cover for fish. Similar bulkheads have been found to provide limited habitat due to the lack of cover (Gothues and Able, 2010; Ianuzzi and Ludwig 2004). In the project area, fish likely use the area as a transit corridor. The East Channel may be favored as a transit corridor over the West Channel due to its habitat diversity (shallow waters, limited sheet pile bulkheads, shoreline structures, and large shoals).

2.3. Existing Conditions Summary

Overall the habitat conditions in the EMWE project area are poor. The waters are deep and subject to strong currents (greater than 4 knots). The shoreline is largely bulkheaded with outfalls. Higher value shallow water habitats (mudflats, SAV beds, etc.) are not present in the project area. Species diversity in the project area was highest at the natural rock outcrops and habitat condition appeared to be of high quality. Sheetpile bulkheads provide little, if any, habitat value. The bottom habitats had little to no visible encrusting biological communities.

Fish in the project area vary seasonally and consist of species that occupy various depths in the water column. The species vary from schooling baitfish that occur in the upper portions of the water column to demersal fish that occur on benthic habitats as well as predatory species (e.g., blue fish, striped bass, etc.) that may be found at all depths. Many fish species utilize the project area to transit between lower New York Harbor, Long Island Sound and the Harlem River to the Hudson River. Moreover, the lack of shallow shoals makes the area unattractive habitat for species that spawn in this habitat (e.g., winter flounder).

Some fish are likely to utilize the floral and faunal organisms on the bulkheads and rock outcrops as prey species; however, the vertical structures provide limited resources along the shoreline in the project area to attract fish. By comparison, the shorelines of Roosevelt Island and the East Channel are shallower with various structures that provide more attractive habitat resources for fish than the EMWE project area.

3. Shading of the East River

Impacts to fish from shading by piers and other anthropogenic structures is an important topic of concern for marine related projects and subject of academic study (i.e., Able and Grothues, 2011, Grothues and Able 2010; Able and Duffy-Anderson. 2006; Nightingale and Simenstad, 2001). These studies have identified that shading can alter fish behavior, reduce fish populations, and/or potentially pose a barrier to migration.

Pier 40 Study

A recent study by Able and Grothues (2011) identified an abundance of fish around Pier 40 on Manhattan's western shoreline. Pier 40 was selected because it is a large pier (i.e., approximately 830 feet [294 m] x 735 feet [290 m] wide) and the effect of shading would be most easily observed and quantified in such an extreme case; although, the authors did caution that the shading effect may not have a linear relationship with scale (size of the structure). In that study, a marked reduction in fish populations, especially small planktivorous baitfish (e,g., bay anchovies, etc.), was identified at approximately 16.1 feet (5 meters) from the edge of the pier line – the distance that light was below useful levels for fish vision (light was measured at 0 μE m^{-2} s^{-1}) (Able and Grothues, 2011). The study also determined a reduction in predatory fish species as well; although, the correlation was not as strong as that of the baitfish.

It should be noted that Pier 40 sits low to the water. The distance between mean low water and the top of the pier deck is only 11 feet (3.4 meters), while the distance between mean low water and the top of the proposed EMWE deck is approximately 19.5 feet (5.9 meters). The deck thickness of the Pier 40 deck is approximately 1 foot (0.3 meters) and large pile caps extend down another 2 – 3 feet (0.6 - 1 meters). Moreover, the deck is supported by numerous piles. Many of the pile bents are spaced 10 to 25 feet (3.1 to 7.7 meters) apart. Large lateral support structures (**Photos 3** and **4**) are located on the outside of the pier structure. The amount of sunlight that penetrates under the pier is reduced by the presence of these structures. The distance between the bottom of the pile bents to the water surface at high and low tide are 2.5 feet (0.8 m) and 7 feet (2.3 m), respectively. Finally, the pier is west facing and the amount of direct morning sunlight penetrating under the pier's southern perimeter is somewhat reduced due to confining geometries of the New York City skyline and vessels moored along the north and south sides of the pier. It is estimated that water depths under Pier 40 are 12-15 feet (3.7 to 4.6 meters) deep (HPA Engineers P.C. 2009).

Able and Grothues (2011) also caution that although the decline in fish population tightly correlates to the reduction of light levels; other factors may have contributed to the reduction of fish. The dense pile field under Pier 40 may create turbid conditions that fish sense and combined with ever increasing darkness caused the fish to seek more open water conditions. Under pier fish observations were often performed by a Didson camera towed behind a kayak. A question arises if the presence and movement of the kayak influenced fish behavior, too.

During the study, light levels at night were recorded at approximately 0 $\mu E\ m^{-2}\ s^{-1}$ both under and away from the piers. Fish abundance was significantly higher in open water at distances over 7.5 meters away from the pier edge. This is attributed to the attracting effect of lights of the New York City skyline. Although, review of the graphs presented in Able and Grothues (2011) indicate fish were recorded at night over 100 feet (30 meters) under the pier too, albeit in very low numbers.

A study by Grothues and Able (2010) examined eight piers on Manhattan's west shoreline that varied in width from 51.7 to 775.7 feet (16 to 240 meters). The studied piers and their respective dimensions are presented in **Table 3**.

Table 3
Pier Length and Widths Presented in Grothues and Able 2010

Pier	Length (m)*	Width (m)*	Pier	Length (m)*	Width (m)*
Pier 40	294	240	59	254	44
Pier 45	260	30	61	263	41
Pier 54	233	26	76	221	85
Pier 57	262	41	100	217	16
Notes: 1 meter = 3.094 feet.					

Grothues and Able (2010) identified that for pelagic fish, both large predators and their small prey are not abundant under large piers with intense shading, but can be abundant at pier edges and in open water, perhaps in response to light availability. They also found that striped bass were not typically found far under Pier 40, but occasionally were found at distances of about 25.8 to 32.3 feet (8 to 10 meters) under the pier. They concluded that this distance is approximately half to a quarter of the total width of other sampled piers (e.g. Pier 54, Pier 57, and Pier 100) from which they suggest that at narrower piers, there may be an enhancement rather than a restriction in habitat usage by some larger predatory fish species. For example, narrower piers produce less shading, large predatory fish may use the shaded areas as cover and strike at baitfish that swim along the edge of the piers. Thus, the long narrow piers have an increased edge to covered surface ratio that would allow this behavior. In addition, Grothues and Able reported that they observed a large school of bait fish passed completely under Pier 57, which is a pier that is smaller than Pier 40.

Photo 3: Pier 40. Note the numerous pilings and horizontal support members. Source: HPA Engineers P.C. 2009

Photo 4: View of the dense pile field under Pier 40. HPA Engineers P.C. 2009

Review of the data in Grothues and Able, identified that for both large and small fish, the catch per unit effort (CPUE) was higher for underpier areas as compared to derelict pier piles and bulkheads. Along the Manhattan waterfront, large fish were most often encountered near Pier 57 (Photo 5). Grothues and Able note that Pier 57 is unique among the sampled piers in that its support structure consists of wide, long concrete supports instead of individual pilings (The bents appear to be approximately 15 feet (4.6 meters) apart in **Photo 5**).This would further suggest that narrow piers without intense shading, especially those without dense pile fields, have a far less impact on fish movement than large piers with intense shading and dense pile clusters. Grothues and Able also documented one large school of small fish that stretched through Pier 57 from open water on the north side unbroken through to open water on the south side - a distance of more than 136 feet (42 meters).

Thus, the presence of fish under piers is variable due to myriad of factors. For narrowly shaded areas, it appears that smaller fish can travel through the shaded areas. The increased edge to covered ratio may enhance habitat characteristics for predatory fish. The authors did not quantify intense shading or large piers; however, it stands to reason that from their findings that a large structure such as Pier 40 would produce light levels so low that the lack of fish can be regularly observed. However a structure such as pier 57 (133 feet- [41 meters-] wide) does not produce the “intense shading” which would serve as a barrier to fish travel.

Other studies (Able and Duffy-Anderson 2006; Metzger et al 2001; and Duffy-Anderson and Able 1999) found reduced fish populations of many species in under pier areas. However, the sample location for these studies occurred in open water and along the piers edge, but the sample locations occurred at 64.6 feet and 129.3 feet (20 meters and 40 meters) under the pier deck. Duffy-Anderson and Able (1999) identified light intensities at 64.6 feet (20 meters) at 0.01 to 0.02 $\mu E\ m^{-2}\ s^{-1}$ and at 0 $\mu E\ m^{-2}\ s^{-1}$ at 129.3 feet (40 meters). Thus, these under pier sample locations are areas of intense shading and likely do not represent underpier areas of narrower piers.

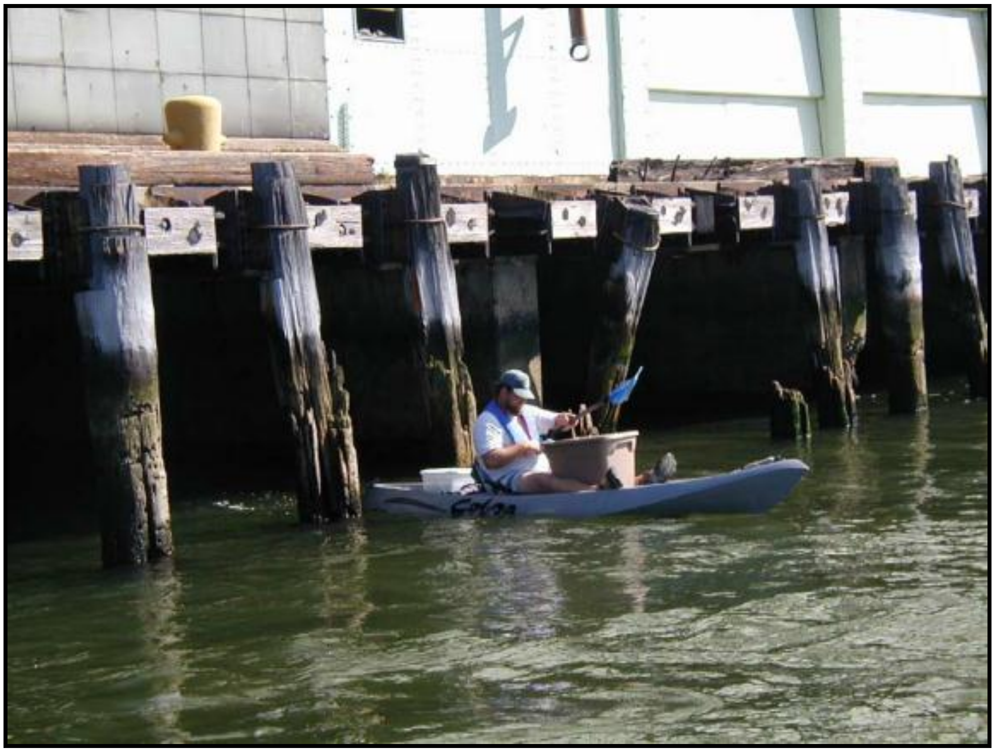


Photo 5: Photo of Pier 57 (from Grothues and Able, 2010).

Shading of the EMWE

Although some impacts to the marine environment may occur from the EMWE; it is projected that, based on the quality of the habitat and the dimensions of the EMWE, the EMWE would not cause unmitigable environmental impacts to the marine environment. Significant impacts are considered if the EMWE would create shading conditions in the river that would serve as a permanent barrier for fish swimming to Manhattan's shoreline; provide a barrier or significantly impair the ability of fish to swim north and south in the East River; and/or provide a situation that significantly reduces the population of an endangered species or another species of fish within the Hudson Raritan Estuary (HRE).

The waters of the EMWE project area are deep (often in excess of 30 feet [9.3 meters]). In 2011, the NYCDEP conducted sampling in the open waters at the Harbor Monitoring Station E2, located in the East River roughly parallel to East 23rd Street. Light measurements of 0 μE m^{-2} $s^{-}1$ were recorded at depth as shallow as 28 feet (8.7 meters). Many demersal species in the East River (e.g., flounders, eels, etc.) occupy the bottom habitats, which is well below the sunlit portion of the upper water column. Thus, it could be assumed that the presence of the EMWE would not preclude demersal fish or many other species from swimming under the EMWE at such depths as there would be minimal, if any, change to lighting. Also, given the strong currents in the area, the pilings may serve at an attractive refuge for fish.

The design of the EMWE is considerably different than Pier 40 or other large piers with intense shading. The EMWE would largely stand on a north-south alignment with greater spacing between pier bents; generally spaced at 90 feet (27.9 meters). At mean high and low tides, the difference between the surface of the water and the bottom of the deck and the water surface would be approximately 7.5 feet (2.5 meters) and 11 feet (3.6 meters), respectively. With a width of only 40 feet and open to sunlight on both sides, the intense shading under Pier 40 would not occur under the EMWE. As reported above, Grothues and Able (2010) reported that a large school of bait fish passed completely under Pier 57 - a pier smaller than Pier 40 without dense pile fields.

The east-west connections of the EMWE would be of similar construction to the north-south portion of the EMWE, which would allow light to pass underneath the structure. Thus, it therefore stands to reason that the anticipated amount of underpier shading would not serve as an impenetrable barrier to fish that occupy the upper portions of the water column.

With respect to fish travel at night, previous studies have shown fish are often abundant away from the pier edges. It is possible that the EMWE may actually attract fish. The combination of the refuge provided by the EMWE's piles, the pedestrian and deck lighting of the EMWE, and the residual lighting of the Manhattan skyline could result in an increase number of fish around the EMWE than what currently exists in the project area.

Anthropogenic development within and adjacent to the marine environment may result in negative, and in some instances, positive impacts. In order to identify the potential for adverse impacts, AECOM is completing studies of the extent of shading projected to result from the EMWE. Using a computer model, the shaded areas under and/or adjacent to the proposed EMWE are being calculated. The calculations determine shading for the summer and winter solstices and the vernal and autumnal equinoxes, representing the dates of December 21st, March 20th, and June 21st. For each of these days, the amount of shading is calculated for 9:00 a.m., 12:00 p.m. (noon), 3:00 p.m. and 6:00 p.m.[1] and at low and high tide.

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[1] For December 21st (winter solstice), no calculations were performed for the 6:00 p.m. time period. For March 20th, the evening time period of 6:00 p.m. was adjusted to 5:00 p.m.

As shown in the attached figures in **Appendix B**, shading from the proposed esplanade would be cast to the west during the morning and noon time periods on the analyses dates, while shading over the water would be cast eastward during the afternoon and evening time periods. The surface water would experience more shading during mean low tide than at mean high tide, as shown below in **Table 4**.

Table 4
Surrounding Surface Water Shaded by Proposed EMWE

Analysis Date	Time	Sq. Ft. in Shade at High Tide	Sq. Ft. in Shade at Low Tide
December 21			
	9:00 a.m.	153,085	142,539
	12:00 p.m.	71,858	108,325
	3:00 p.m.	55,543	79,014
June 21			
	9:00 a.m.	76,389	92,763
	12:00 p.m.	35,052	40,776
	3:00 p.m.	65,126	78,210
	6:00 p.m.	314,614	383,792
March 20			
	9:00 a.m.	97,649	141,504
	12:00 p.m.	33,439	54,817
	3:00 p.m.	38,663	57,351
	5:00 p.m.	237,559	359,858

Notes: Areas above do not include any shading over land.
Areas above do not include surface waters directly underneath the esplanade footprint (approximately 206,962 square feet).

The area underneath the esplanade deck would be partially shaded, with areas above the water surface, towards the center, always in shade, as shown in the cross section figures provided in **Appendix B**. The analyses show that all portions of the water underneath the EMWE would receive direct sunlight at some point in the daily tide cycle. Under the EMWE, the width of the area always in shade narrows as one approaches the water surface to the degree that only a small, area at MHW would always be in shade. Due to the narrow width of the EMWE and its separation from the Manhattan shoreline, direct and indirect sunlight would penetrate under portions of both sides of the structure during the course of the day. Thus, shading conditions under the EMWE would not be comparable to the permanent intense shading conditions under Pier 40. Overall, the analysis shows that all portions of the water underneath the esplanade would receive direct sunlight at some point in the daily tide cycle. Furthermore, indirect, diffused light should penetrate into those areas that are in temporary shading. Therefore, The predicted shaded conditions would not serve as a permanent barrier for fish to swim under the EMWE; thus, shading from the EMWE is not expected to have significant adverse effects on fish species or habitats present in the study area.

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APPENDIX A

WATER QUALITY

The NYCDEP conducts water quality evaluations as part of their City-Wide Long-Term CSO Control Planning Project, including the East River. The results of this sampling indicate that the impact of CSOs, wastewater discharges, urban stormwater runoff and dry weather sanitary flows cause periodic low dissolved oxygen (DO) levels that do not meet water quality standards. Pathogen levels in East River typically meet applicable criteria (NYCDEP, City-Wide Long-Term CSO Control Planning Program, June 2011)

As previously noted, the East River is impaired due to urban runoff and wastewater which contributes to low DO. **Table A-1** below identifies the NYCDEP's Water Quality Monitoring data for surface water DO at location E2 (NYCDEP, 2013). Also for comparison, the following other locations are shown:

- E4, located approximately two miles north of the project area, east of Wards Island near Hell Gate.
- E10, located in Long Island Sound, approximately one mile east of the East River's confluence with Long Island Sound.
- N6, located south of the battery in New York Harbor.
- N16, located in the Atlantic Ocean approximately one mile south of Rockaway Point.

Table A-1

Dissolved Oxygen Readings - Surface Water

Date	E2 (mg/L)	E4 (mg/L)	E10 (mg/L)	N6 (mg/L)	N16 (mg/L)
Jan Wk 2	7.59	7.59	9.90	9.03	7.86
Feb Wk 2	10.68	10.69	11.47		10.56
Mar Wk 1	10.55	12.06	12.94	10.83	10.64
Apr Wk 1	8.94	-	10.84	-	9.67
May Wk 4	6.15	6.08	7.72	7.50	8.04
Jun Wk 1	6.92	6.46	7.48	7.09	7.82
Jun Wk 2	5.77	5.39		7.23	-
Jun Wk 3	6.82	5.62	9.40	7.50	7.64
Jun Wk 4	4.57	5.27	6.02	6.16	6.90
Jul Wk 1	5.02	-	-	-	6.47
Jul Wk 2	5.73	5.38	6.50	6.98	8.10
JulyWk 3	-	3.86	6.12	5.37	5.25
July Wk 4	4.47	4.05	6.47		7.00
Aug Wk 1	4.03	4.30	5.33	4.80	8.29
Aug Wk 2	3.94	3.40	5.81	5.81	3.82
Aug Wk 3	3.72	2.93	3.49	3.83	7.12

Date	E2 (mg/L)	E4 (mg/L)	E10 (mg/L)	N6 (mg/L)	N16 (mg/L)
Aug Wk 4	4.48	4.60	6.19	4.93	5.69
Sept Wk 1	4.08	3.63	4.04	5.66	5.90
Sept Wk 2	3.62	2.37	4.92	4.97	5.20
Sept Wk 3	4.94	5.10	5.20		4.74
Sept Wk 4	5.55	5.69	6.88	5.51	6.81
Oct Wk 1	5.60	5.30	6.26	6.06	6.76
Nov Wk 2	8.46	8.46	-	8.71	-
Nov Wk 2	8.18	8.67	9.11	8.12	-
Nov Wk 3	8.24	8.13	-	8.87	-
Dec Wk 1	9.10	8.92	-	10.06	9.26
Dec Wk 2	8.99	NS	9.63	8.88	9.37
Dec Wk 3	10.54	8.79	9.39	9.17	-

Table A-2 identifies the DO reading for waters near the bottom at locations E2, E4, N6, E10, and N16. The data presented in **Tables A-1** and **4-2** show that the DO in the two East River locations (E2, E4) is typically lower than the other presented locations.

Table A-2

Dissolved Oxygen Readings - Bottom

Date	E2 (mg/L)	E4 (mg/L)	E10 (mg/L)	N6 (mg/L)	N16 (mg/L)
Jan Wk 2	8.61	8.61	10.32	9.12	7.18
Feb Wk 2	10.80	11.38	11.94	-	10.19
Mar Wk 1	10.89	12.03	12.07	10.03	10.92
Apr Wk 1	8.95		9.60	-	-
May Wk 4	6.07		7.08	6.52	-
Jun Wk 1	6.22	6.39	7.25	7.51	7.34
Jun Wk 2	5.30	5.09	-	5.95	-
Jun Wk 3	6.55	5.35	4.93	5.60	6.93
Jun Wk 4	4.65	5.23	4.04	6.10	5.91
Jul Wk 1	4.86	-	5.12	-	6.23
Jul Wk 2	5.25	5.37	2.17	5.20	6.34
Jul Wk 3	-	3.74	-	4.90	5.75
Jul Wk 4	4.24	4.05	3.38	-	6.34
Aug Wk 1	4.02	4.32	2.39	4.79	5.32
Aug Wk 2	4.03	3.77	1.65	4.46	3.76
Aug Wk 3	3.70	2.63	2.52	4.05	6.62
Aug Wk 4	3.99	4.11	3.93	5.34	5.00
Sept Wk 1	4.21	4.41	4.03	5.05	5.57
Sept Wk2	3.80	2.80	2.22	3.60	5.06

Date	E2 (mg/L)	E4 (mg/L)	E10 (mg/L)	N6 (mg/L)	N16 (mg/L)
Sept Wk3	4.95	4.92	4.87	-	5.69
Sept Wk 4	5.54	5.94	6.24	5.53	6.81
Oct Wk 1	5.55	5.40	6.12	5.99	6.87
Nov Wk 2	8.12	9.41	-	-	-
Nov Wk 2	8.20	8.49	9.05	8.21	-
Nov Wk 3	8.20	8.39	-	8.50	-
Dec Wk 1	-	-	-	9.22	10.14
Dec Wk 2	8.74	9.00	9.24	8.64	9.50
Dec Wk 3	9.25	8.79	9.41	8.92	-

The NYCDEP monitors select water quality parameters within the East River at several stations. The NYCDEP monitors the levels of Fecal Coliform and *Enterococcus* bacteria within the East River, south of the project area, near the Waterside Pier.

Table A-3 identifies the Fecal Coliform and *Enteroccuss* bacteria at Station E2. For comparative purposes location N16 is included in the table. Review of the data clearly shows the impact of urbanization on the water of the East River as fecal coliform was measured dramatically higher rates than N16, when compared to water of the open ocean. Maximum levels of *Enterococcus* in 2012 were reported as exceeding 800/100ml, though numbers under 100/100ml were more common.

Table A-3

Fecal Coliform and Enterococcus – Results of NYCDEP Water Monitoring

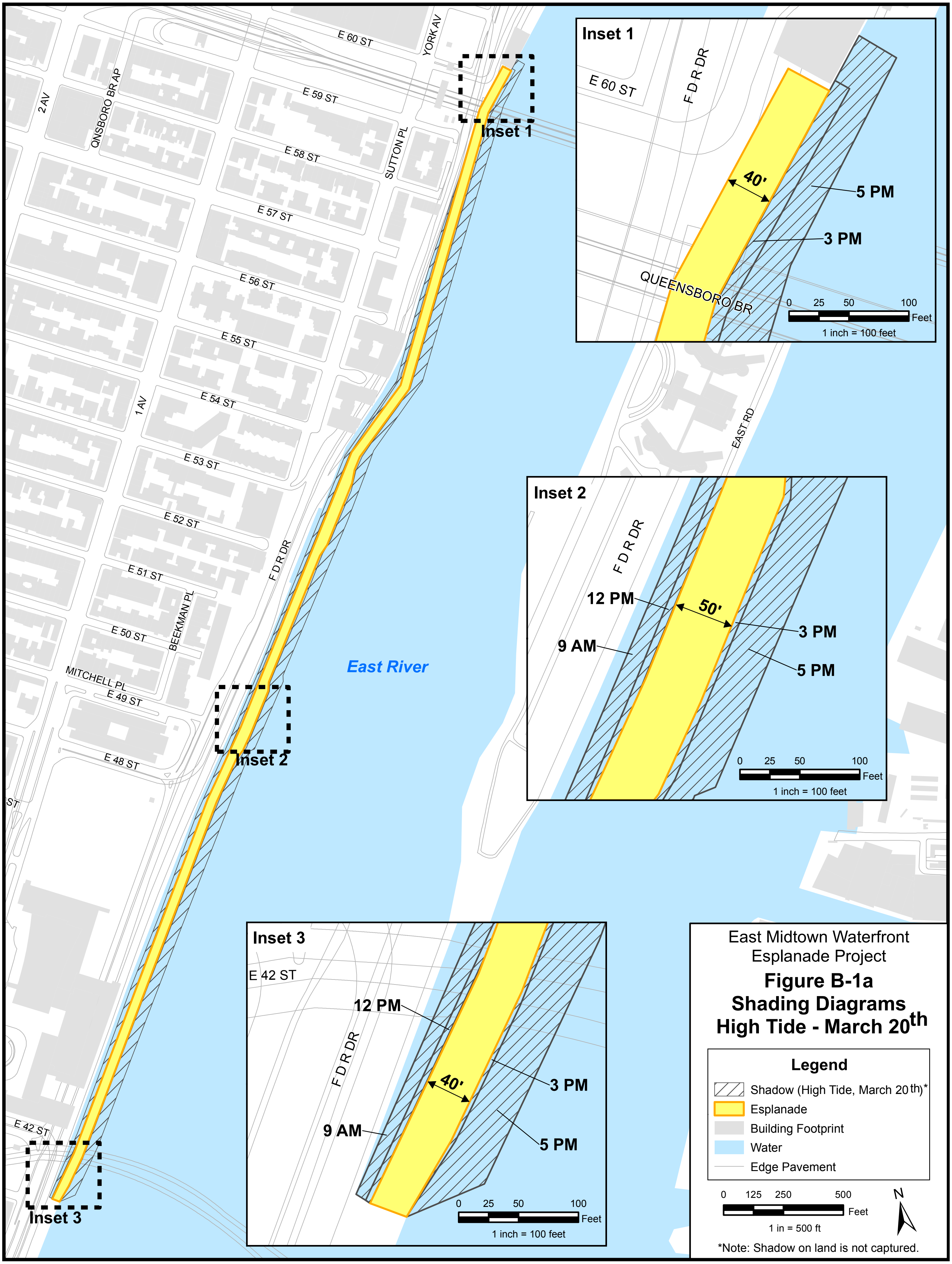
Location E2			Location N16		
Sample Date	Fecal Coliform (#100 mg/L)	Enterococcus (#100 mg/L)	Sample Date	Fecal Coliform (#100 mg/L)	Enterococcus (#100 mg/L)
01/09/2012	32	1	01/11/2012	1.00	2.00
02/13/2012	3	2	02/14/2012	1	1
03/05/2012	14	4	03/7/2012	4	1
04/02/2012	NS	NS	04/4/2012	1	1
04/03/2012	29	2	-	-	-
05/29/2012	11	1	05/31/2012	40	1
06/04/2012	100	46	06/06/2012	1	1
06/11/2012	22	1	06/13/2012		
06/18/2012	47	10	06/20/2012	1	8
06/25/2012	122	4	06/27/2012	9	2
07/02/2012	NS	2	07/05/2012	11	1
07/09/2012	254	2	07/11/2012	1	1
07/16/2012	800	20	07/18/2012	1	1
07/23/2012	128	1	07/24/2012	2	2
07/30/2012	176	6	-	-	-

Location E2			**Location N16**		
Sample Date	Fecal Coliform (#100 mg/L)	Enterococcus (#100 mg/L)	Sample Date	Fecal Coliform (#100 mg/L)	Enterococcus (#100 mg/L)
08/06/2012	790	60	08/08/2012	1	1
08/13/2012	48	1	08/15/2012	3	1
08/20/2012	42	2	08/22/2012	9	1
08/27/2012	156	47	08/29/2012	484	2
09/04/2012	25	2	09/06/2012	5	2
09/10/2012	300	3	09/12/2012	2	1
09/17/2012	6	2	09/19/2012	1	2
09/24/2012	45	4	09/26/2012	1	1
10/01/2012	50	5	10/03/2012	1	2
11/10/2012	233	32	-	-	-
11/13/2012	3	4	11/15/2012		
11/19/2012	5	1	-	-	-
12/03/2012	2	1	12/05/2012	1	1
12/10/2012	2000	800	12/12/2012	11	2
12/17/2012	22	16	12/19/2012	-	-

In addition to industrial discharges and combined sewer overflow, the East River and Western Long Island Sound region receive treated sewage from 18 wastewater treatment plants located in New York and the southern Connecticut area. About 83 percent of this effluent is discharged into the East River (Sweeney, 2004). A study conducted by Sweeney et al. showed that the East River had elevated levels of lead, phosphates, silver, copper, cadmium, and nitrates. There were also a number of inorganic pollutants in the waterway (Sweeney, 2004).

APPENDIX B

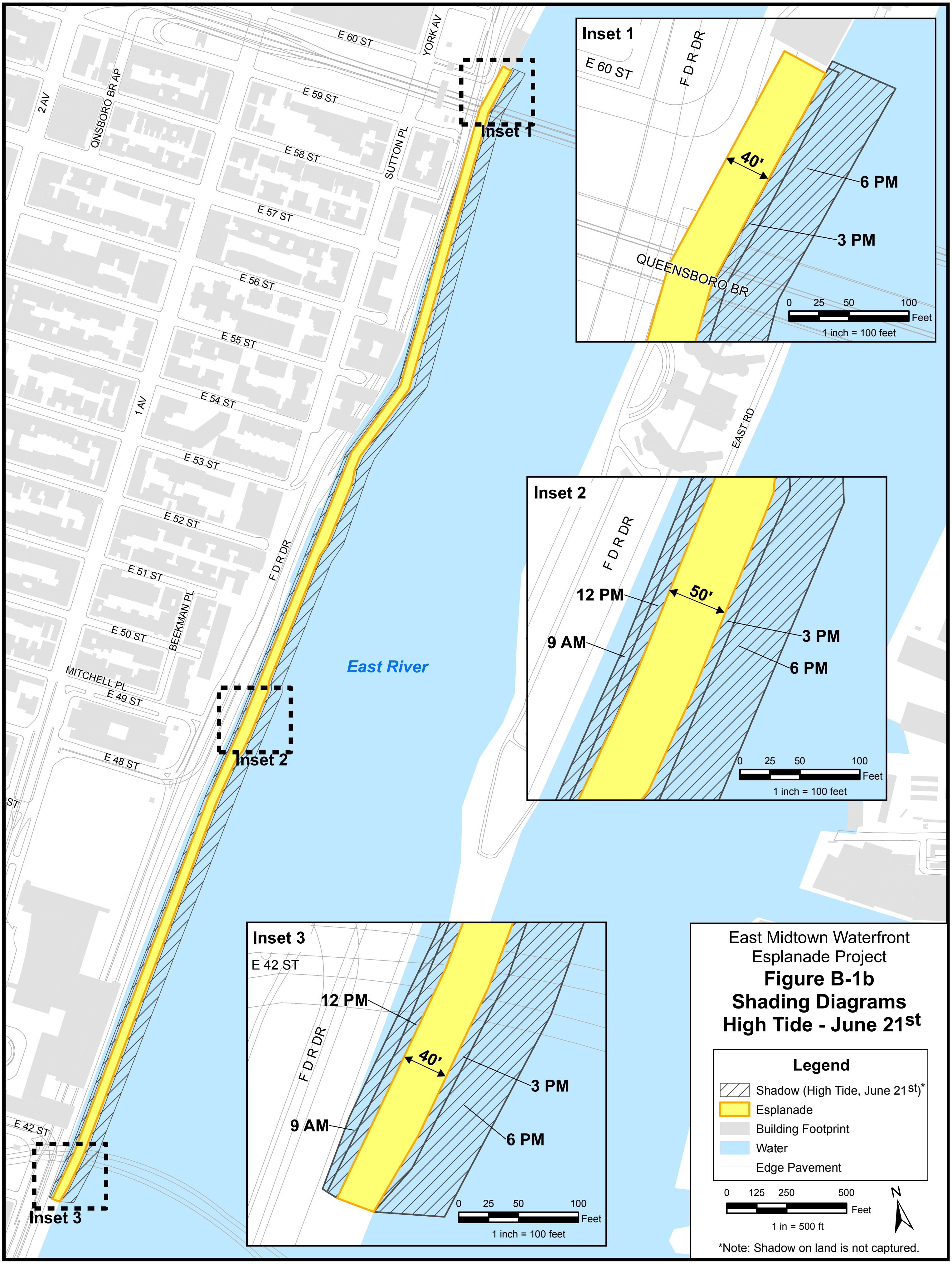
SHADING FIGURES



East Midtown Waterfront
Esplanade Project

Figure B-1a
Shading Diagrams
High Tide - March 20th

*Note: Shadow on land is not captured.

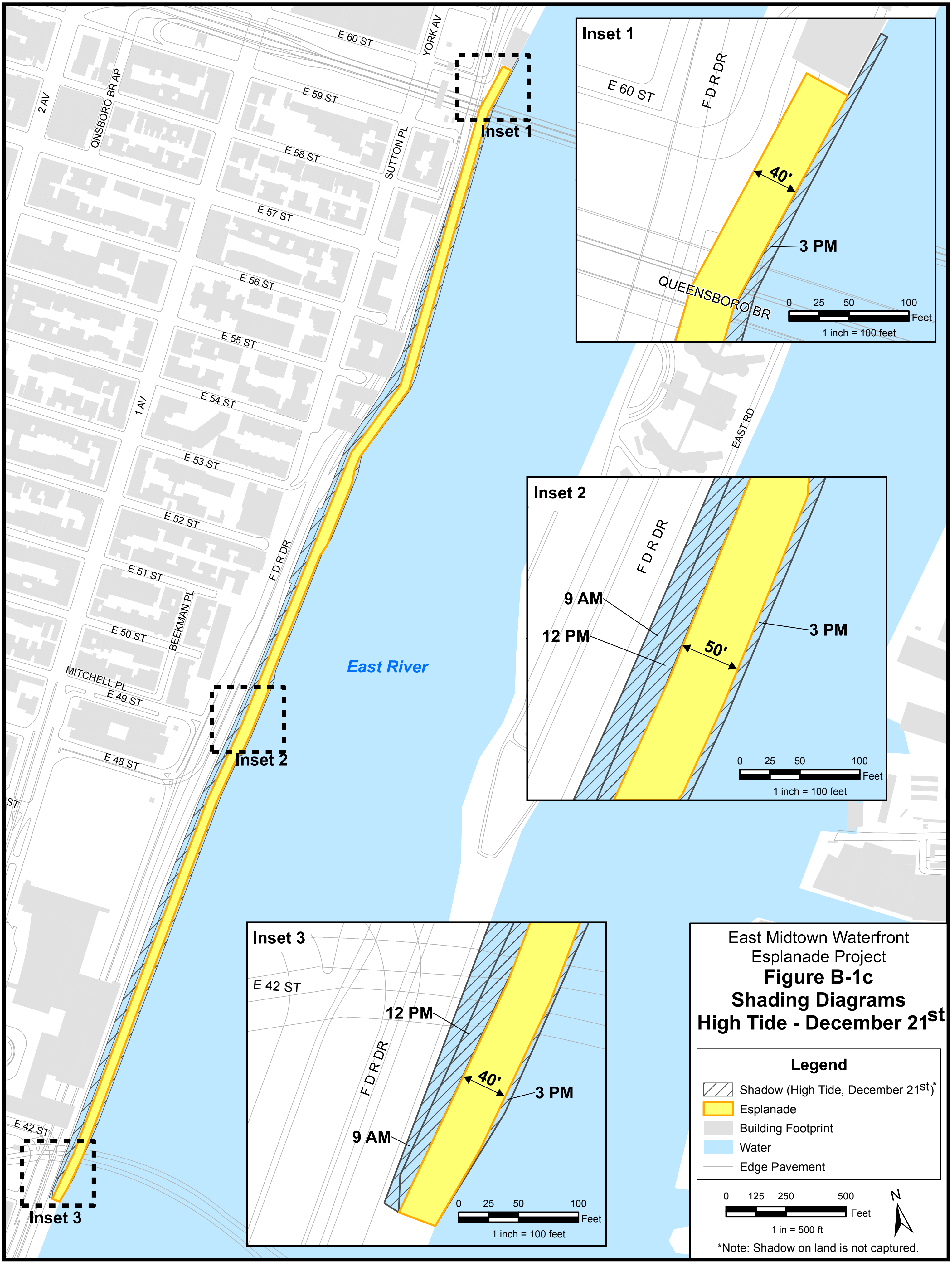


East Midtown Waterfront Esplanade Project

Figure B-1b

Shading Diagrams High Tide - June 21st

*Note: Shadow on land is not captured.



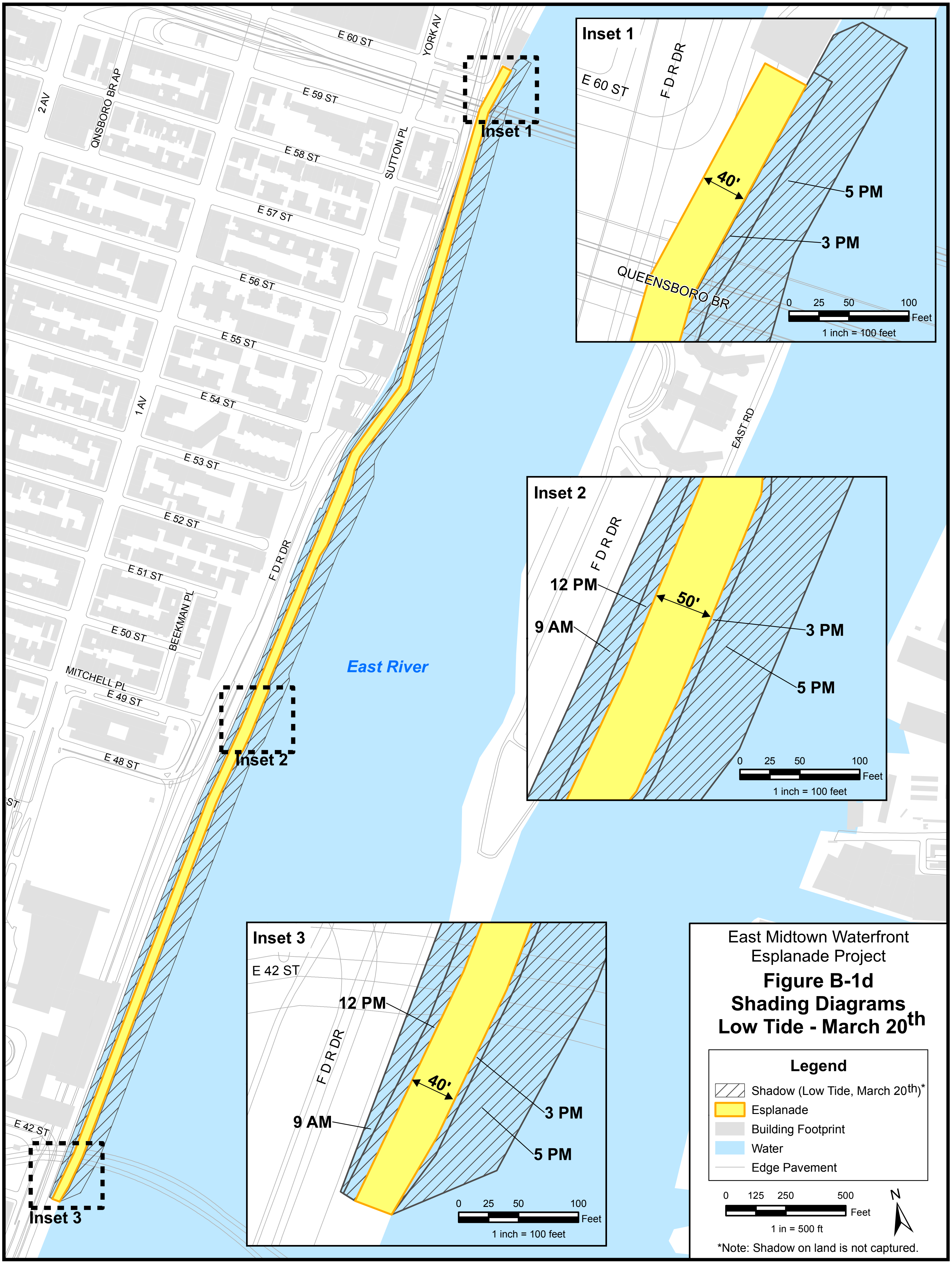
East Midtown Waterfront Esplanade Project

Figure B-1c

Shading Diagrams

High Tide - December 21st

*Note: Shadow on land is not captured.



East Midtown Waterfront
Esplanade Project

Figure B-1d
Shading Diagrams
Low Tide - March 20th

*Note: Shadow on land is not captured.

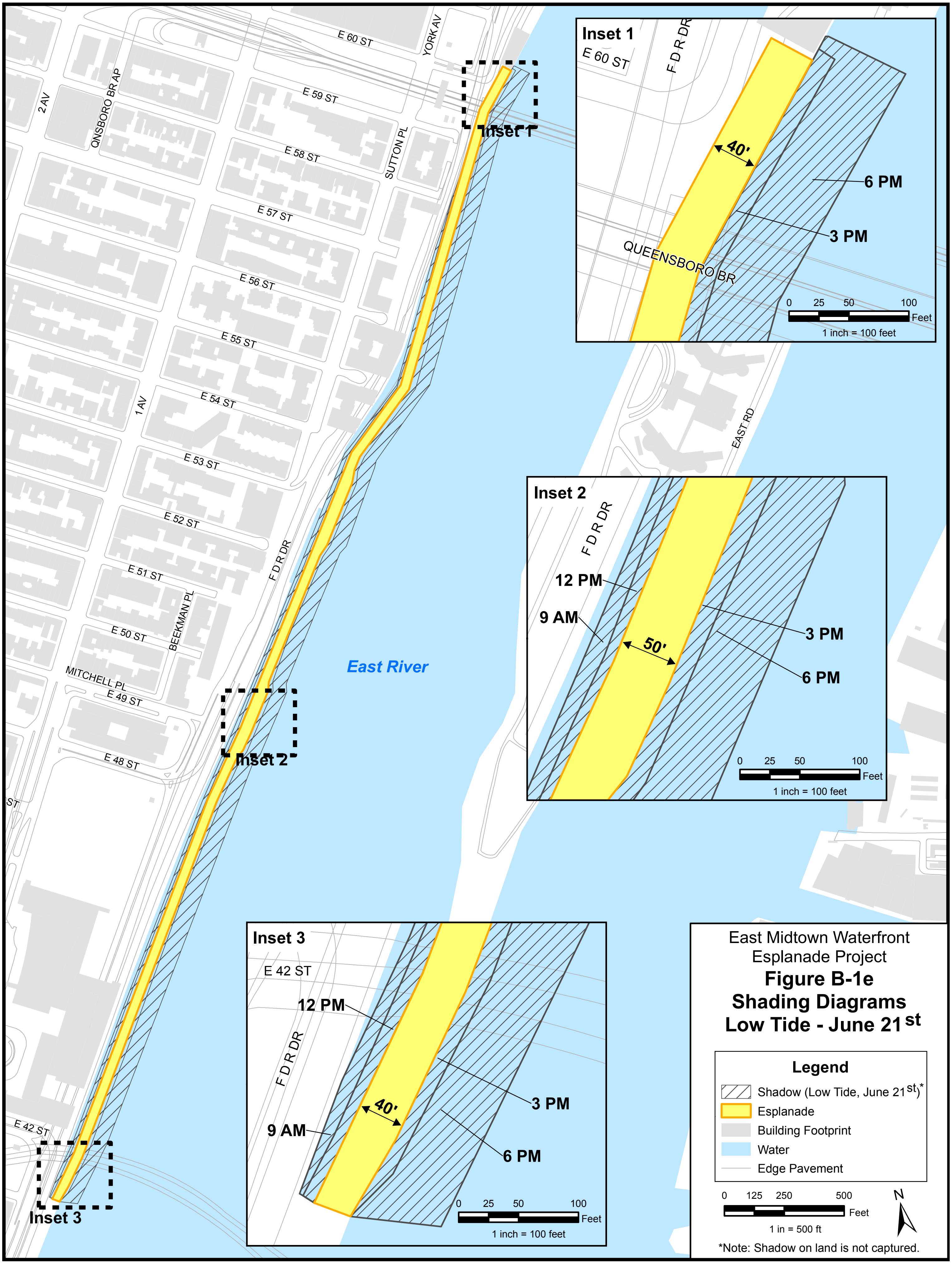
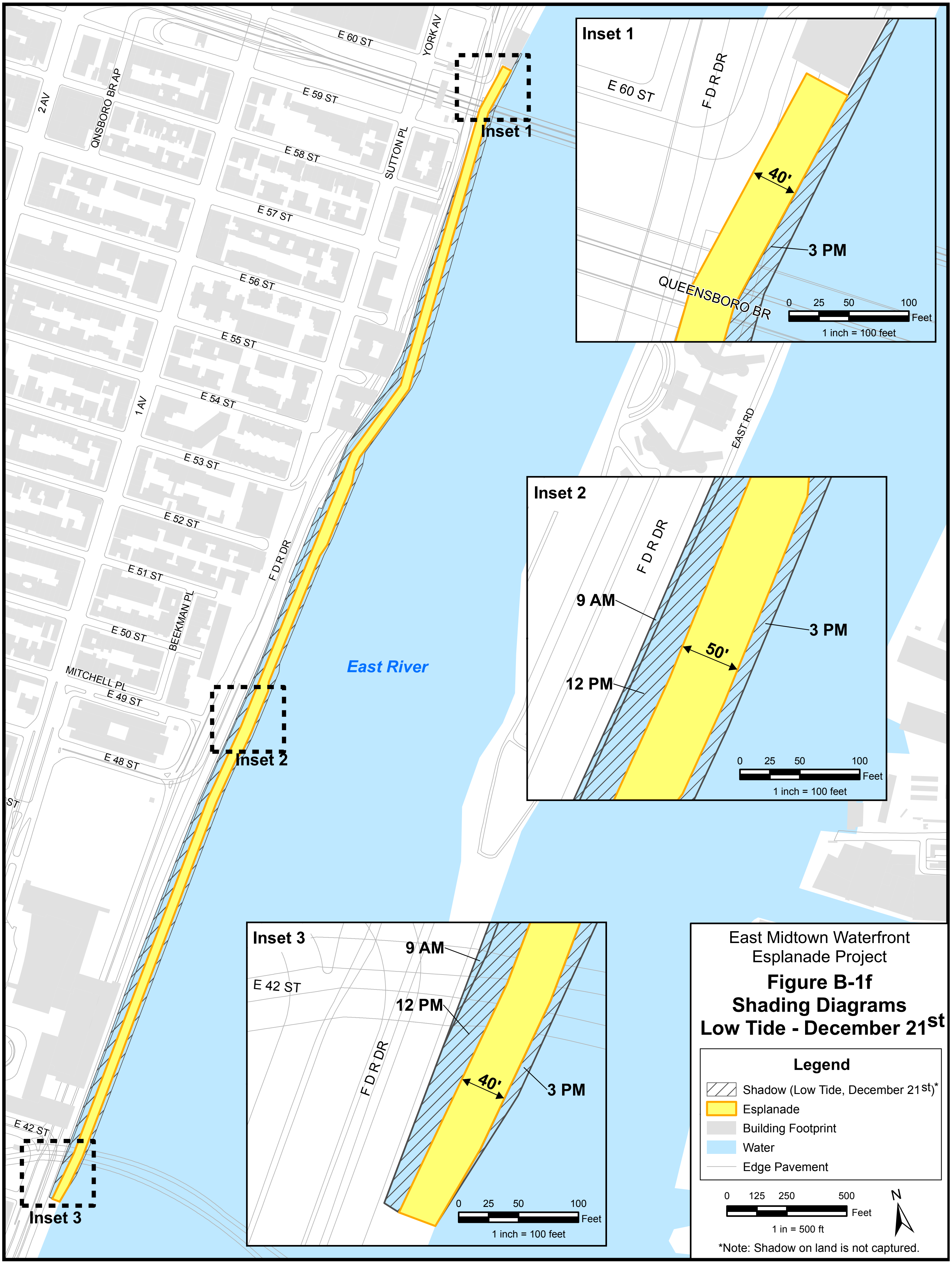

East Midtown Waterfront Esplanade Project

Figure B-1e
Shading Diagrams
Low Tide - June 21st



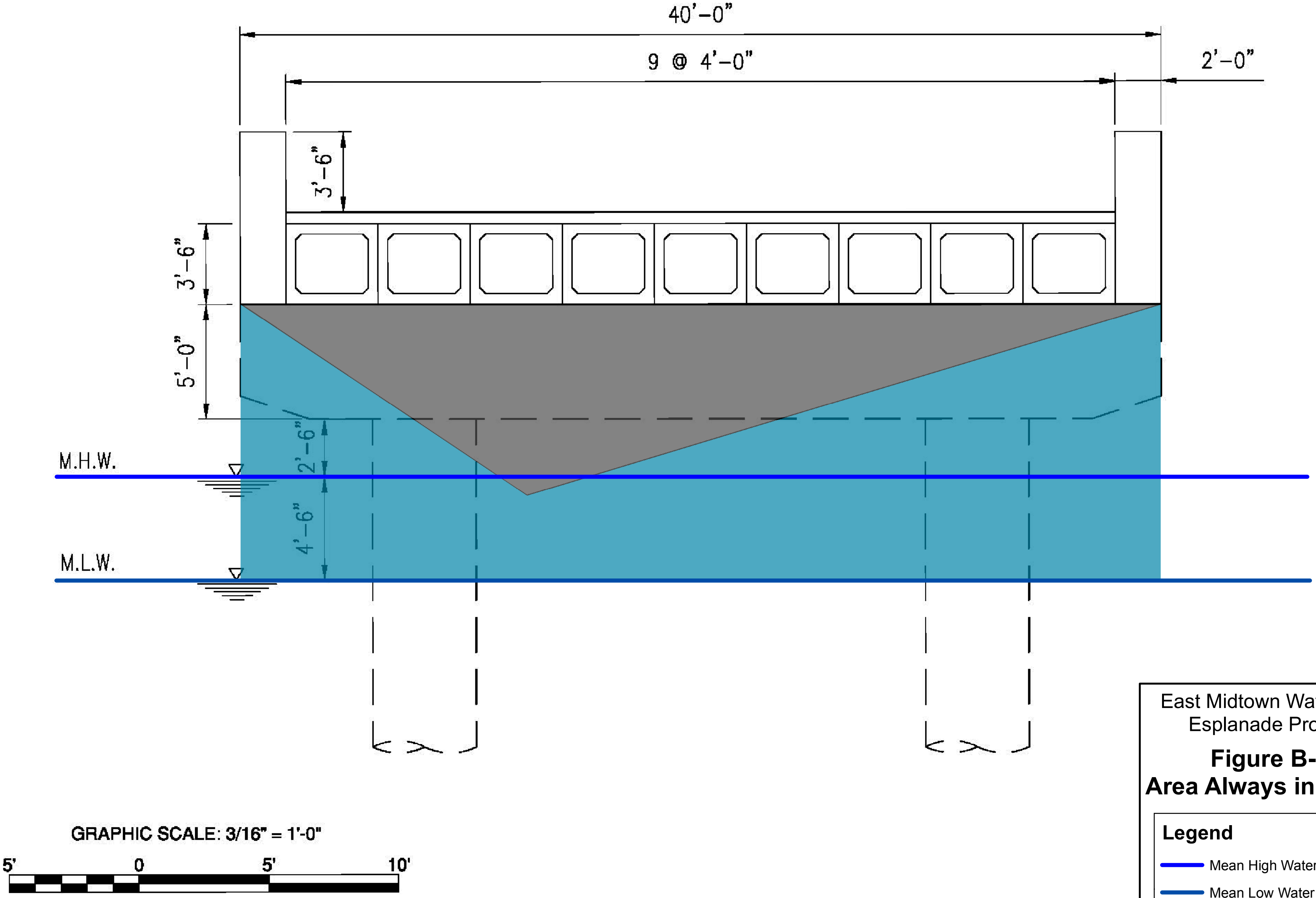
East Midtown Waterfront
Esplanade Project

Figure B-1f
Shading Diagrams
Low Tide - December 21st

Legend

- ▨ Shadow (Low Tide, December 21st)*
- 🟨 Esplanade
- ■ Building Footprint
- 🟦 Water
- — Edge Pavement

*Note: Shadow on land is not captured.



East Midtown Waterfront
Esplanade Project

Figure B-2
Area Always in Shade

Legend

— Mean High Water (M.H.W.)

— Mean Low Water (M.L.W.)

▨ Area Always in Shade

🟦 Partially Shaded Area

Draft

Essential Fish Habitat Assessment

East Midtown Waterfront Esplanade Project

PIN X776.00 and PIN X770.14

Prepared for

New York State Department of Transportation-Region 11
Hunters Point Plaza
47-40 21st Street
Long Island City, New York

and

New York City Economic Development Corporation
110 William Street
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20 Exchange Place
New York, New York

September 2013

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Acronyms and Abbreviations

ADCP	Acoustic Doppler Current Profiler
CFR	Code of Federal Regulations
EDC	New York City Economic Development Corporation
EFH	essential fish habitat
EMWE	East Midtown Waterfront Esplanade
ft	foot
HAPC	habitat area of particular concern
HRE	Hudson Raritan Estuary
L	liter
lb	pound
m	meter(s)
MAFMC	Mid-Atlantic Fishery Management Council
mg/L	Milligrams per liter
MHW	Mean High Water
MLW	Mean Low Water
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NEFMC	New England Fisheries Management Council
NERO	Northeast Regional Office
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NYCDEP	New York City Department of Environmental Protection
NYCDCP	New York City Department of Planning
NYCDOT	New York City Department of Transportation
NYSDEC	New York State Department of Environmental Conservation
NYS DOH	New York State Department of Health
ODR	Outboard Detour Roadway
ppt	part(s) per thousand
RITE	Roosevelt Island Tidal Energy
rms	Root Mean Squared
SEL	Sound Exposure Level
SHTL	Spring High Tide Line
SPL_{Peak}	Peak Sound Pressure Level
sq ft	Square Feet
UN	United Nations
USACE	United States Army Corps of Engineers
°C	degree(s) Celsius
°F	degree(s) Fahrenheit
<	less than
=	equal to
>	greater than
%	percent

Executive Summary

The New York City Economic Development Corporation (NYCEDC), working with the New York State Department of Transportation (NYSDOT) is proposing the construction of a new approximately 0.96 mile long waterfront esplanade over the East River, between East 41st and East 60th streets in the Borough of Manhattan, New York City (**Figure ES-1**). The construction of the East Midtown Waterfront Esplanade (EMWE), or the Proposed Action, would accomplish several critical policy goals established by the City in Vision 2020: NYC Comprehensive Waterfront Plan (2011), the Manhattan Waterfront Greenway Master Plan (2004), and other planning documents.

The EMWE is defined in two sections: the proposed United Nations (UN) Esplanade beginning at East 41st Street and extending northward past the UN Headquarters to approximately East 53rd Street; and the Outboard Detour Roadway (ODR) Esplanade, which will extend from approximately East 53rd Street to East 60th Street. These sections will be served by several upland connections. To the south of the proposed EMWE, the existing Waterside Pier is separately planned to be reconstructed, and will provide continuous connections southward through the existing Glick Park. See **Figures ES-2** through **ES-3** for project component overview.

The Proposed Action is currently anticipated to be built in the following phases:

- Phase 1: The ODR Esplanade is estimated to be completed by 2018; and
- Phase 2: The UN Esplanade is estimated to be completed by 2024, including potential upland connections as funding becomes available.

Additionally, the Proposed Action includes three proposed pedestrian bridges to connect the landside (west of the FDR Drive) to the esplanade (east of the FDR Drive). The proposed pedestrian bridges will cross the FDR Drive at East 48th and East 54th Streets. Other access points include existing connections at East 37th Street (through Glick Park and the reconstructed Waterside Pier), at East 51st Street, and at East 60th Street. Another connection, at East 42nd Street is currently under evaluation as a potential component of this project.

The UN Esplanade will encompass approximately three acres of total area. The scope of work involves the installation of approximately 99 48-inch diameter and three 54-inch diameter piles whose length on average will be approximately 64 feet with a 5/8-inch thick wall. The EMWE would be off-set approximately 30 feet from the bulkhead of the FDR Drive to improve light distribution for marine flora and fauna, the potential for enhanced United Nations security, reuse of the caissons from the former Outboard Detour Roadway, as well as enhanced user experience away from the FDR Drive. Approximately 85 of the piles will require rock sockets and which will be drilled into the bedrock.

Construction of the UN esplanade will occur over a 60-month time period. The pile driving portion of this work is anticipated to take approximately three months to complete if performed continuously. Permanent benthic disturbance from pile installation is calculated at 1,293 square feet or 0.03 acres.

The ODR Esplanade will encompass a total area of approximately two acres. The deck will be offset where applicable and design would incorporate two existing bedrock outcrops along the existing bulkhead. The ODR portion of the esplanade will be supported by approximately 71 new piles. The ODR Esplanade will reuse 16 existing caissons and four piles.

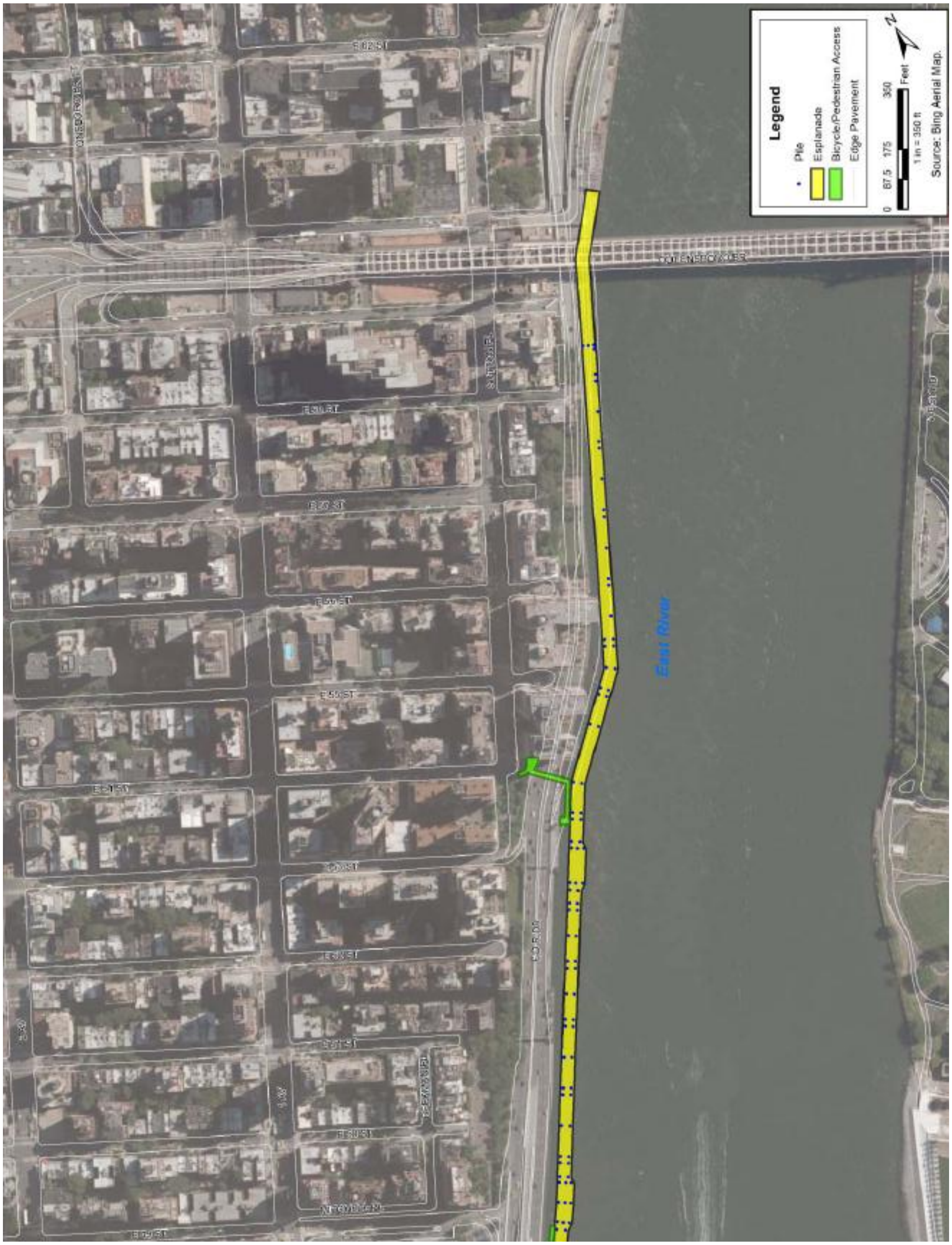
Figure ES-1 Project Area Location Map

Note: Project Area Location on Portions of USGS Central Park, N.Y./N.J. and Brooklyn, N.Y. 7.5. Minute Quadrangles (2000).

Figure ES-2 UN Esplanade

Source: Bing Aerial Map.

Figure ES-3 ODR Esplanade



New piles needed include:

- 24 54-inch diameter steel piles with a 5/8-inch thick wall approximately 60 feet in length;
- 47 24-inch diameter steel piles with a 5/8-inch thick wall approximately 60 feet in length; and

Construction of the ODR esplanade will occur over a 30-month time period. The pile driving portion of this work is anticipated to take approximately three months to complete if performed continuously. All of the piles will require rock sockets and will be drilled into the bedrock. Permanent benthic impact is estimated to be approximately 529 square feet or 0.01 acres**.** Total benthic impact from each esplanade collectively is 1,820 square feet or 0.04 acres.

It was observed during a dive survey performed in October 2012 that light within the proposed esplanade area attenuates between 10 and 12 feet below the river's surface. This portion of the water column where light penetrated had the more dense populations of marine algae and sessile fauna. It is estimated that installation of new piles on the ODR structure will provide an additional 18,102 square feet (sq ft) (0.4 acres)[1] surface for attachment of encrusting organisms. The UN will provide and an additional 61,905 sq ft (1.45 acres) of hard surfaces for attachment of organisms. Collectively, the EMWE would provide an estimated 80,000 (1.8 acres) of hard substrate for encrusting organisms.

This Essential Fish Habitat assessment (EFH) has been prepared pursuant to the Magnuson Fishery Conservation and Management Act (MSFCMA) to analyze potential impacts to federally-managed fishes and invertebrates from the proposed undertaking of constructing the EMWE in the East River between East 41st and East 60th Streets in Manhattan (the "Proposed Action").

The EFH assessment focuses on potential direct and indirect effects on the protected aquatic species and habitats in the Project Area. The effects evaluated in this EFH include those associated with expected pile driving and drilling, the re-suspension of sediment, increased vessel traffic associated with construction, and effects associated with the addition of permanent structure within the East River (e.g. shading).

In order to limit the amount of potential impacts during construction, it is expected that the following reasonable and prudent measures would be implemented:

- Use of silt management techniques and soil erosion practices to limit the transport of re-suspended sediment;
- Observance of seasonal restriction and special permit conditions associated with anadromous fish migration;
- No over-loading of barges relative to water depth;
- Use of high propeller support vessels;
- Limited movement of barges once at a particular location;
- Stockpiled materials would have appropriate containment measures;
- When possible, the contractor would work with pre-cast materials over the water;
- Any landside work would be performed in accordance with a sediment and erosion control plan; and
- Contractors would only refuel vehicles in designated areas that have appropriate containment systems to capture accidental spills.

The results of this EFH assessment are:

---

[1] Encrusting area calculated from the mudline to the high tide line.

- Minor increases in turbidity and sedimentation may be generated by the proposed construction activities; however, these increases would be exceedingly small and localized;
- If eggs and larvae are present during construction, they could be affected by any increases in turbidity. Although these increase would be insignificant;
- During the construction activities, adult and juvenile fish may leave the area of construction and move to nearby suitable locations outside the area of disturbance;
- After construction, there would may be a reduction in benthic organisms in and adjacent to areas that were affected by construction activities (spud pile footprints, anchor drag, etc.) but they would recover quickly;
- Underwater acoustic energy (at the levels that may injure fish) would likely not occur. Steel piles would be installed with drilled shafts and driven with a vibratory hammer. An impact hammer may be necessary to seat piles; however, it is anticipated the seating of a pile could be accomplished at low energy with only a few hammer blows;
- The removal of water column and benthic EFH would have exceedingly small and insignificant, long-term impacts; and
- The EMWE would not impact the water flow and circulation of the East River's West Channel,

Overall Project Effects

Based on the analysis provided in this EFH assessment, it is concluded that, while the EMWE may affect individual fish in the immediate vicinity of the Proposed Action, it would not adversely affect populations of EFH fish species or their habitats, as summarized in **Table ES-1**. Any impacts would be exceedingly small and insignificant. The impacts would not threaten the long-term survivability of EFH managed species or their potential prey species. Upon cessation of construction activities, changes within the project area would not inhibit fish movement, increase or decrease water velocity, substantially reduce potential long-term food resources, or affect water quality.

Table ES-1
Summary of Impacts to EFH Species and Essential Fish Habitats

Resource	Effect Determination for Pile Driving	Effect Determination for Vessel Traffic	Effect Determination from Suspended Sediment	Effect Determination for Spawning or Migration	Effect Determination for Shading	Overall Effect Determination for Project
EFH species	*No adverse effect*	*No adverse effect*	*No adverse effect*	*No adverse effect*	*No adverse effect*	*No adverse effect*
Essential fish habitats	*No adverse effect*	*No adverse effect*	*No adverse effect*	*No adverse effect*	*No adverse effect*	*No adverse effect*

The habitat of the project area is of low to moderate value and is similar to habitat throughout West Channel of the East River. The habitat of the project area does not represent an area solely used by EFH-listed species for critical life cycle activities (e.g., spawning, migration route, etc.). The amount of habitat impacted and the duration of impacts is so minor that it is anticipated that the impacts to EFH-listed species would be negligible.

1 INTRODUCTION

1.1 Background

The Fishery Conservation and Management Act of 1976, later changed to the Magnuson Fishery Conservation and Management Act in 1980, established a 200-nautical mile fishery conservation zone in United States waters and a regional network of Fishery Management Councils. The Fishery Management Councils are composed of federal and state officials, including the United States Fish and Wildlife Service, which oversee fishing activities within the fishery management zone. In 1996, the Magnuson Fishery Conservation and Management Act was reauthorized and amended as the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), also known as the Sustainable Fisheries Act. The MSFCMA mandated numerous changes to the existing legislation designed to prevent overfishing, rebuild depleted fish stocks, minimize by-catch, enhance research, improve monitoring, and protect fish habitat.

One of the most significant mandates in the MSFCMA is the essential fish habitat (EFH) provision, which provides the means to conserve fish habitat. The EFH mandate requires that the regional Fishery Management Councils, through federal Fishery Management Plans, describe and identify EFH for each federally-managed species, minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitats.

Congress defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 United States Code 1802[10]). The term “fish” is defined in the MSFCMA as “finfish, mollusks, crustaceans, and all other forms of marine animals and plant life other than marine mammals and birds.” The regulations for implementing EFH clarify that “waters” include all aquatic areas and their biological, chemical, and physical properties, while “substrate” includes the associated biological communities that make these areas suitable fish habitats (Department of Commerce, 1997a).

Habitats used at any time during a species’ life cycle (i.e., during at least one of its life stages) must be accounted for when describing and identifying EFH. In addition to EFH designations, areas called habitat areas of particular concern (HAPCs), which are a subset of designated EFH that is especially important ecologically to a species/life stage and/or is vulnerable to degradation, are also to be designated to provide additional focus for conservation efforts (Department of Commerce, 1997b). Categorization as HAPC does not confer additional protection or restriction to designated areas.

Authority to implement the MSFCMA is given to the Secretary of Commerce and delegated to the National Marine Fisheries Service (NMFS). The MSFCMA requires that EFH be identified and described for each federally-managed species. NMFS and regional Fishery Management Councils determine the species distributions by life stage and characterize associated habitats, including HAPC. The MSFCMA requires federal agencies to consult with NMFS on activities that may adversely affect EFH, or when NMFS independently learns of a federal activity that may adversely affect EFH. The MSFCMA defines an adverse effect as “any impact which reduces quality and/or quantity of EFH [and] may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species’ fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions” (50 CFR 600.810).

AECOM, on behalf of the NYSDOT and the NYCEDC, has prepared this EFH assessment pursuant to the MSFCMA to analyze potential impacts to federally-managed fishes and invertebrates from the proposed undertaking of constructing the EMWE in the East River between East 41st and East 60th Streets in Manhattan (the "Proposed Action"). The EMWE will be approximately one-mile in length and will parallel the Manhattan shoreline. The EMWE is expected to be positioned at varying distances approximately 30 feet away from shoreline.

For the purpose of this assessment, the Project Area is an open water area extending approximately 80 feet off of the bulkhead along Manhattan's eastern shoreline between East 41st and East 60th Streets.

1.2 Purpose and Need

The proposed EMWE is intended to close a critical gap in the Manhattan Waterfront Greenway along the East River from East 41st to East 60th Street and would provide waterfront access, open space and new recreation amenities to the East Midtown community. Public access would be provided to the waterfront, and new open space for the densely populated communities of East Midtown would be created where virtually no access currently exists. A safe recreation area for a wide range of users would be provided, including children, the disabled and elderly. Opportunities would be provided for water-related uses, and to promote esplanade users' understanding of and relationship to the East River/Hudson River Estuary as a natural feature and historical landscape.

2 DESCRIPTION OF THE PROPOSED ACTION

2.1 Description of Proposed Action

The NYCEDC, working with the NYSDOT is proposing the construction of a new approximately 0.96 mile long waterfront esplanade over the East River, between East 41st and East 60th streets in the Borough of Manhattan, New York City (**Figure ES-1**). The construction of the EMWE, or the Proposed Action, would accomplish several critical policy goals established by the City in Vision 2020: NYC Comprehensive Waterfront Plan (2011), the Manhattan Waterfront Greenway Master Plan (2004), and other planning documents.

The EMWE is defined in two sections: the proposed UN Esplanade beginning at East 41st Street and extending northward past the UN Headquarters to approximately East 53rd Street; and the ODR Esplanade, which will extend from approximately East 53rd Street to East 60th Street. These sections will be served by several upland connections. To the south of the proposed EMWE, the existing Waterside Pier is separately planned to be reconstructed, and will provide continuous connections southward through the existing Glick Park.

The proposed EMWE will close the gap in the Manhattan Waterfront Greenway along the East River from East 41st to East 60th Street and would provide waterfront access, open space and new recreation amenities to the East Midtown community. Public access would be provided to the waterfront, and new open space for the densely populated communities of East Midtown would be created. Additionally, recreational space for a wide range of users, including children, the disabled and elderly would be provided, along with opportunities for water-dependent and water-related uses. The EMWE will also increase esplanade users' understanding of and relationship to the East River/Hudson River Estuary as a natural feature and historical landscape.

The EMWE is proposed in two phases, which will be served by existing and potential upland connections (**Figure ES-1**):

- **United Nations Esplanade:** from East 41st to East 53rd Streets – This southern section of the Proposed Action would pass by the UN campus (**Figure ES-2**). The southern boundary of the proposed UN Esplanade would start at East 41st Street, where the existing Waterside Pier ends. The proposed esplanade would be connected to the Waterside Pier, which is separately planned to be rehabilitated as an open space, and provide continuous connections to the Manhattan Waterfront Greenway southward through the existing Glick Park. The proposed EMWE would be constructed northward from the Waterside Pier over the East River past the United Nations Headquarters. The EMWE would be off-set approximately 30 feet from the bulkhead of the FDR Drive and United Nations Headquarters to improve light distribution for marine flora and fauna, the potential for enhanced United Nations security, as well as enhanced user experience away from the FDR Drive. The esplanade deck is estimated to be 40 feet in width supported by approximately 99 48-inch diameter piles and three 54-inch diameter piles.

- **ODR Esplanade**: from East 53rd to East 60th Streets – This northern section of the Proposed Action will make use of existing in-water caisson structures that supported the temporary Outboard Detour Roadway during the reconstruction of the FDR Drive **(Figure ES-3**). The western row of caissons from the ODR was left in place in anticipation that they would be re-used to support a part of the proposed esplanade. The caissons are off-set from the bulkhead at varying distances up to 35 feet away. The caissons are constructed of ¾-inch thick steel and have an outer diameter of 54 inches. These caissons are proposed to be reused to support the new esplanade between East 52nd and East 58th Street and will be retrofitted with new tie-backs to the existing bulkhead and the FDR Drive. Supplemental piling to assist in supporting the new esplanade will also be installed as necessary.

The ODR esplanade will be offset approximately 30 feet from the existing bulkhead, and will include an approximately 40-foot wide deck. In addition to the reused caissons, approximately 24 54-inch diameter and 47 24-inch diameter steel piles will be installed.

- **Upland connections**: The EMWE would be approximately one mile in length with as many as five connection points from the shore. Potential connections include the existing esplanade access points at East 37th, East 51st, and East 60th Streets, as well as the potential connection at East 42nd Street and the proposed connections at East 48th and East 54th Streets.

    - *East 37th Street* – The southern boundary of the proposed esplanade would start where the existing Waterside Pier ends at 41st Street. The proposed esplanade would be connected to the Waterside Pier, which is separately planned to be reconstructed as an open space, and provide continuous connections southward through the existing Glick Park, which provides user access underneath the FDR Drive at the terminus of East 37th Street.

    - *East 42nd Street* – At East 42nd Street, a new ramp for pedestrians and cyclists will be explored for potential connection to the existing elevated roadway ramp. The new ramp will extend from the northernmost vehicle travel lane of three existing lanes that currently provide egress for vehicles exiting the FDR Drive. The new ramp would be placed at the terminus of the existing elevated roadway and extend over the FDR Drive and then turn southward as it descends to the esplanade near East 41st Street. The ramp will require additional support pilings to be placed within the river and on the western side of the FDR Drive, as well as some ground disturbance at the terminus of East 42nd Street. The connection at East 42nd Street may be removed as a component of the EMWE if not feasible but is being evaluated as a potential component of this project.

    - *East 48th Street* - At East 48th Street, a new pedestrian and cyclist bridge to the esplanade is proposed between the existing East 48th Street elevated entrance ramp to the northbound FDR Drive and the north fence line of the UN Headquarters property. This connection will be accomplished by completing the construction of an existing elevated ramp. Once completed, the proposed structure would continue over the FDR Drive and then turn northward as it descends to the proposed esplanade and connects to its western side near East 49th Street. The completion of the existing ramp and bridge will require additional support pilings in the river, as well as landside, to the south of East 48th Street and at its terminus.

    - *East 51st Street* – At East 51st Street, east of Sutton Place, there is a stairway and pedestrian bridge across the FDR Drive connecting the neighborhood to a small park along the East River. The proposed esplanade will explore connecting to this existing esplanade on the eastern edge of the FDR Drive.

    - *East 54th Street* - At East 54th Street, a new pedestrian and cyclist bridge to the esplanade is anticipated to be provided from Sutton Place Park, located on the east side of Sutton Place, at the terminus of East 54th Street. The bridge would continue over the FDR Drive and descend to the proposed esplanade connecting with the river to its western side between East 53rd and East 54th Streets.

- *East 60th Street* – At York Avenue and East 60th Street, an existing roadway ramp over the FDR Drive provides shared access for bicycles and pedestrians to an existing waterside esplanade that extends north along the East River. This ramp is expected to be separately redeveloped in the future.

2.2 Proposed Construction and Schedule

The Proposed Action is currently anticipated to be built in the following phases:

- Phase 1: The ODR Esplanade is estimated to be completed by 2018; and
- Phase 2: The UN Esplanade is estimated to be completed by 2024, including potential upland connections as funding becomes available.

2.2.1 Construction of the ODR Esplanade

Construction of the ODR esplanade will occur over a 30-month time period. The pile driving portion of this work is anticipated to take approximately three months to complete if performed continuously. For the ODR esplanade, approximately 71 new piles will be necessary as follows:

- 24 piles will be 54-inch diameter steel piles with a 5/8-inch thick wall approximately 60 feet in length; and

- 47 piles will be 24-inch diameter steel piles with a 5/8-inch thick wall approximately 60 feet in length.

Individual pile lengths will vary depending on rock elevations. All of the piles will require rock sockets which will be drilled into the bedrock. Once seated on rock, the piles will be fitted with a drilling rig that is capable of drilling within the pile to the required rock socket depth. After the sockets are drilled, reinforcing cages will be lowered into the socket and approximately 160 cubic feet of grout/concrete will be poured into each pile.

In addition to the new piles, the ODR and associated landside connections will make use of approximately 16 existing caissons and 4 existing piles that were part of the support structure of a former temporary roadway. The caissons have been in place for over 10 years.

2.2.2 Construction of the UN Esplanade

Construction of the UN esplanade will occur over a 60-month time period. The pile driving portion of this work is anticipated to take approximately three months to complete if performed continuously. For the UN esplanade (including the East 48th Street connection), approximately 99 48-inch diameter steel piles and three 54-inch diameter steel piles will be necessary (**Table 2-1**). The piles will be approximately 64 feet with a 5/8-inch thick wall. Individual pile lengths will vary depending on rock elevations. Approximately 85 of the piles will require rock sockets which will be drilled into the bedrock. Once seated on rock, the piles will be fitted with a drilling rig capable of drilling within the pile to the required rock socket depth. After the required sockets are drilled, reinforcing cages will be lowered into the socket and approximately 160 cubic feet of grout/concrete will be poured into each pile. The remaining 17 piles will not require rock sockets and will be vibrated into the sediment to the top of rock.

Table 2-1

New Piles to be Installed for the UN Esplanade

Structure	New Piles	
	Number	Size (ft)
UN	95	4
	3	4.5
48 St*	4	4

Note: *Connection subject to funding availability

2.2.3 Equipment

The equipment that will be used for the pile installation is projected to include the following:

- Pile installation will be accomplished by as many as two crews operating at a time, working an eight hour workday. During pile installation, it is anticipated that up to four barges may be utilized. Two of the barges will hold 250 ton cranes and at least one barge will be used for materials. The crane barges will be jack-up barges with four spud piles driven into the riverbed. The barges would generally be placed within and/or adjacent to the proposed construction footprint. Two of the barges may be placed next to each other, extending up to 135 feet (15-foot buffer, plus 60-feet long and 60-feet wide) into to the East River beyond the edge of the esplanade under construction.

- The materials barges will tie up to the crane barge, or will set anchors to maintain position during construction.

- The other equipment required is expected to be as follows:

    - Two Barges Mounted 250 Ton Cranes.
    - One Sheet-pile Vibratory Hammer.
    - One Pile Vibratory Hammer.
    - Two Compressors.
    - Two Generators.
    - One Rock Socket Drilling Rig.
    - Two Tugboats.
    - One Flat Deck Barge.
    - One Concrete Delivery Barge.
    - One Concrete Pumping Barge.
    - One Pile Delivery Barge.
    - One Hopper Scow.
    - One Dump Scow.

It is anticipated that concrete will be produced offsite and delivered to the work place by barge and pumped into the caissons. It is also anticipated that after the piles are filled, the pile caps and all other structural members that occur above the SHTL would be constructed offsite and put in place on site with the crane. Subsequent phases of esplanade construction which will include concrete and asphalt placement, furniture placement and landscaping could be supplied by trucks.

3 EFH DESIGNATION

To delineate EFH coastal littoral and continental shelf waters were first mapped by the regional Fisheries Management Councils and then superimposed with 10-minute square grids. Then survey data, gray literature, peer-reviewed literature, and reviews by academic and government fisheries experts were all used by the management councils to determine if these 10-minute square grids support EFH for federally managed species. As a result, both the New England Fisheries Management Council (NEFMC) and the Mid-Atlantic Fisheries Management Council (MAFMC) have designated EFH within the East River. The assessment within the following chapters of this report contains information on the life history of EFH species, potential impacts, and potential mitigation.

Review of the National Oceanic and Atmospheric Administration's (NOAA's) Northeast Regional Office's (NERO's) Guide to Essential Fish Habitat Designations in the Northeastern United States website (NOAA NERO, 2013a) determined that the project is located within 10-minute square grid 40407350 (designated by the latitude and longitude of the grid's southeast corner boundaries). The geographic boundaries of the grid are the following: latitude 40º50.0 North; longitude 73º 50.0 West; latitude 42º 40.0 North; and longitude 74º 00.0 West. The grid is described as waters within the Atlantic Ocean within the square within Atlantic Ocean waters within the square within the Hudson River estuary affecting the following: Manhattan Island, New York City, College Pt., NY., Long Island City, NY., Brooklyn, NY., Port Morris, NY., Unionport, NY., Flushing Bay, Astoria, NY., LaGuardia Airport, Badland I., Rikers I., Roosevelt I., Wards I., and Hells Gate, along with the East River, the Harlem River, and the Bronx River. **Table 3-1** identifies EFH designations within grid 40407350.

Based on review of EFH designations for the New England Skate Complex (NOAA NERO, 2013a), EFH has been designated for three skate species. The species and their life stages for which EFH has been designated are the following:

- Little skate, *Raja erinacea*; EFH designated for juvenile and adult life stages.
- Clearnose skate, *Raja erinacea*; EFH designated for the juvenile life stage.
- Winter skate, *Raja ocellata*; EFH designated for the juvenile life stage.

The life stages for which EFH has been designated for the three skate species may be present in waters in the vicinity of the Project Area, as their preferred habitats consist of sandy, gravelly, or mud substrates. Bottom habitat in the Project Area mostly consists of anthropogenic debris and some muddy areas. The presence of skates would be seasonal (species dependent) and most likely temporary. EFH designations for skates within grid 40407350 are shown on **Table 3-1**.

In addition, based on review of EFH designations for highly migratory species (NOAA NERO, 2013a), three of these species may utilize the waters of the project area.

- Sand tiger shark *Carcharias taurus'* neonates/early juveniles adult life stage.
- Dusky shark, C*archarhinus obscurus*; neonates/early juveniles adult life stage.
- Sandbar shark, *Carcharhinus plumbeus*; neonates/early juveniles, late juveniles / subadults and adult life stages.

Table 3-1

EFH Designated Species by Life Stage for East River 10-Minute Square Grids

Species	Eggs	Larvae	Juveniles	Adults
Atlantic butterfish *(Peprilus triacanthus)*		X	X	X
Atlantic mackerel *(Scomber scombrus)*			X	X
Atlantic sea herring *(Clupea harengus)*		X	X	X
black sea bass *(Centropristis striata)*	n/a		X	X
bluefish *(Pomatomus saltatrix)*			X	X
cobia *(Rachycentron canadum)*	X	X	X	X
dusky shark *(Carcharhinus obscurus)**		X		
king mackerel *(Scomberomorus cavalla)*	X	X	X	X
long finned squid *(Loligo pealeii)*	n/a	n/a		
ocean quahog *(Artica islandica)*	n/a	n/a		
pollock *(Pollachius virens)*			X	X
red hake *(Urophycis chuss)*		X	X	X
redfish *(Sebastes fasciatus)*	n/a			
sand tiger shark *(Carcharias taurus)**		X		
sandbar shark *(Carcharhinus plumbeus)**		X		X
scup *(Stenotomus chrysops)*	X	X	X	X
short finned squid *(Illex illecebrosus)*	n/a	n/a		
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
spiny dogfish *(Squalus acanthias)*	n/a	n/a		
summer flounder *(Paralichthys dentatus)*		X	X	X
surf clam *(Spisula solidissima)*	n/a	n/a		
windowpane flounder *(Scophthalmus aquosus)*	X	X	X	X
winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X
Skates				
clearnose skate (*Raja eglanteria*)			X	X
little skate (*Raja erinacea*)			X	X
winter skate (*Raja ocellata*)			X	X

Notes:

X indicates that EFH has been designated within the grid for the species and life stage.

N/A indicates the species either has no data available on the designated life stages or those life stages are not present in the species' reproductive cycle. These species are:

- long finned squid, short finned squid, and surf clam, which are referred to as pre-recruits and recruits (this corresponds with juveniles and adults in the tables); and
- scup and black sea bass, for which there is insufficient data for the life stages and no EFH designation has been made as of yet (some data is available for other life stages of these species).

* The highly migratory species' life stages that are summarized are broken down into neonates, juveniles, and adults. For these species there are no 'egg' designations and neonates correspond to the larvae heading.

Source: NOAA NERO, 2013

Since the East River is considered part of the Hudson/Raritan Estuary (HRE), species by life stage were also identified by preferred salinity zones (seawater or mixing/brackish) for the HRE as given in **Table 3-2**. The portion of the East River where the proposed project site is located has been identified by the

National Estuarine Inventory Data Atlas (NOAA, 1985) as a mixing zone with salinities between 0.5 to 25.0 parts per thousand (ppt). Data collected in the vicinity of the project area (Section 4.3) showed that there is potential for salinities to reach greater than 25 ppt dependent on tide, current, weather, and wind (Riverkeeper, 2012).

Pollock, sand tiger shark, sandbar shark, and dusky shark were not included as having preferred salinity zones in the summary of EFH Designations for the HRE and have therefore been omitted from Table 3-2. Although skates were not listed in the table; it is possible that certain life stages of the aforementioned may periodically transit the area. It will be given that juvenile and adult clearnose, little, and winter skates have the potential to transit the project area. Additionally, it is understood that each EFH estuarine designation by life stage has been identified as "common" or "abundant" from the Estuarine Living Marine Resources (ELMR) database (NCCOS, 2012).

Table 3-2 EFH

Designations for Rivers and Estuaries

Species	Eggs	Larvae	Juveniles	Adults
Atlantic butterfish *(Peprilus triacanthus)*	*Absent*	M	M,S	M,S
Atlantic mackerel *(Scomber scombrus)*	*Absent*	*Absent*	S	S
Atlantic sea herring *(Clupea harengus)*	*Absent*	M,S	M,S	M,S
Black sea bass (*Centropristis striata*)			M,S	M,S
Bluefish *(Pomatomus saltatrix)*	*Absent*	*Absent*	M,S	M,S
Cobia *(Rachycentron canadum)*	X	X	X	X
King mackerel *(Scomberomorus cavalla)*	X	X	X	X
Red hake *(Urophycis chuss)*	X	M,S	M,S	M,S
Scup *(Stenotomus chrysops)*	S	S	S	S
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
Summer flounder *(Paralicthys dentatus)*	*Absent*	F,M,S	M,S	M,S
Windowpane flounder *(Scopthalmus aquosus)**	M,S	M,S	M,S	M,S
Winter flounder *(Pleuronectes americanus)**	M,S	M,S	M,S	M,S

Notes:

***** *Adult species known to spawn in either Mixing Water/Brackish or Seawater Salinity Zones.*

Absent = Life stages were not listed within this 10' square.

S = seawater salinity zone of this bay or estuary (salinity greater than or equal to 25 ppt).

M = mixing water/ brackish salinity zone of this bay or estuary (salinities from 0.5 ppt -25 ppt).

F = tidal freshwater salinity zone of this bay or estuary (salinities from 0.0 ppt-0.5 ppt).

X = EFH has been designated within the square for a given species and life stage (not based on estuarine salinity zone).

Sources: *Guide to EFH Designations in the Northeastern United States* http://www.nero.nmfs.gov/ro/doc/ny3.html and *Estuarine Living Marine Resources Database* http://www8.nos.noaa.gov/biogeo_public/elmr.aspx

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4 HABITAT QUALITY OF THE PROJECT AREA AND THE EAST RIVER

This chapter provides a general description of the physical characteristics, water quality, and benthic and adjacent terrestrial habitats of the East River and the project area.

4.1 Physical Characteristics of the East River

4.1.1 Geography

The East River is a 16 mile-long tidal trait that connects the Long Island Sound with Upper New York Harbor. The river is comprised of two distinct segments.

- The Upper Segment – an approximately 8 miles long and is positioned on a roughly east-west axis between Hells Gate and the Whitestone Bridge; and

- The Lower Segment – approximately 8 miles long and lies on a north to south axis. The segment is bounded by Hells Gate and the Battery. The Lower Segment separates Manhattan from the boroughs of Queens and Brooklyn. At the southern tip of Manhattan, the East River meets Upper New York Harbor.

The project area is located in the lower segment, where the river is generally 0.5 miles wide. From East 47th Street to East 86th Street, the presence of Roosevelt Island causes the river to flow into two separate channels - the East Channel, and West Channel. In the vicinity of project area, the West Channel and East Channel are each approximately 900 to 1,000 ft in width.

4.1.2 Current Speed, Tidal Variation, and Depths

The East River is tidally influenced along its entire length from the Battery of Manhattan to Long Island Sound. The mean tide level is variable over the course of the river and is greatest at the northern portion of the river above Hell Gate. Mean tide at East 41st Street is 2.4 feet with a mean range of 4.31 feet. (NOAA, 2013).. Strong currents occur throughout the East River. Maximum predicted tidal current velocity obtained from a stationary recording Acoustic Doppler Current Profiler (ADCP) during 2008 for the Roosevelt Island Tidal Energy (RITE) Project located slightly north of Waterside Pier measured approximately 5.2 knots (Verdant, 2010). In the vicinity of the Queensborough Bridge, the current in the West Channel can reach approximately 4 knots (NOAA, 2013a). Direction and flow is dependent on tide which can also cause periods of little to no flow for short times.

Within the West Channel, depths along the Manhattan shoreline are variable but often in excess of 30 feet in depth, Depths in the center of the West Channel vary between 50 and 70 feet in depth. Within the Project Area, the average depth is approximately 30 feet.

4.1.3 Visibility

For over 100 years the NYCDEP has conducted a water quality monitoring program throughout New York Harbor. Results of the water quality program have shown over the last three decades, the water quality of New York Harbor is improving; although, many of the harbor's water bodies are impaired. As part of the monitoring program, the NYCDEP collects seawater samples for analysis at 62 locations throughout the harbor. The closest monitoring station (NYCDEP station) to the project area is Station E2, located near East 23rd Street in the East River.

A Secchi disk is used to estimate the clarity of surface waters. High Secchi transparency (greater than 5.0 feet, or 1.5 meters) is indicative of clear water, with declines in transparency typically due to high suspended solids concentrations or plankton blooms. Low Secchi readings (less than 3.0 feet or about 1 meter) are typically associated with degraded waters. These conditions are indicative of light-limiting conditions, which in turn affect primary productivity and nutrient cycling.

Visibility for location E2 (located near East 23rd Street) is provided in **Table 4-1** which presents the results in metric measurements. Also, for comparative purposes, location N16 is presented. Location N16 is located approximately one mile south of Rockaway Point and represents a less-impacted environment. During 2012, the visibility at location E2 varied from 0.6 to 1.5 meters. At location N16, visibility ranged from 0.9 to 6.1 meters. The average seasonal visibility at location E2 was 0.8 meters in the spring, 0.9 meters in the summer and fall, and 1.2 meters in the winter.

4.2 Water Quality

Water quality parameters are influential in determining the spatial and temporal distribution of marine populations when identifying preferred habitat. East River water quality is affected by temperature, rainfall, stormwater runoff, and waste influx.

The East River is listed on New York State's List of Section 303(d) Priority Waters. The water quality is stressed largely due to combined sewer overflow, municipal discharges (e.g., Newtown Creek Waste Water Treatment Plant), and other sanitary discharges. Also impacting the water are toxins and other contaminates from current and former industrial activities as well as urban storm runoff (NYSDEC, 2011).

4.2.1 Temperature and pH and Salinity

In order to obtain site specific date on temperature, pH, and salinity, data from two past studies conducted in the vicinity of the project area were used. In 1998, as part of the ODR project, the NYSDOT collected data between August and December (NYSDOT, 1998). Also, as part of scientific studies, water quality data were collected at the Astoria Generating Station throughout 2006. The Astoria Generating Station is located slightly upriver of Hells Gate on the East River

Table 4-1

Visibility Readings at Sample Stations E2 and N16 during 2012

Location E2		Location N16	
Sample Date	Transparency (m)	Sample Date	Transparency (m)
01/09/2012	1.1	01/11/2012	3.4
02/13/2012	0.9	02/14/2012	3.8
03/05/2012	0.9	03/07/2012	2.4
-	-	04/04/2012	4.1
04/03/2012	1.1	-	-
05/29/2012	0.6	05/31/2012	3.4
06/04/2012	0.8	06/06/2012	2.1
06/11/2012	0.8	06/13/2012	--
06/18/2012	0.9	06/20/2012	2.4
06/25/2012	1.1	06/27/2012	3.4
07/02/2012	0.8	07/05/2012	3.7
07/09/2012	0.9	07/11/2012	1.8
07/16/2012	0.9	07/18/2012	6.1
07/23/2012	0.8	07/24/2012	4.1
07/30/2012	1.1	-	-
08/06/2012	1.1	08/08/2012	1.8
08/13/2012	0.9	08/15/2012	2.1
08/20/2012	1.2	08/22/2012	4.0
08/27/2012	0.8	08/29/2012	2.0
09/04/2012	0.9	09/06/2012	2.9
09/10/2012	1.4	09/12/2012	2.1
09/17/2012	1.2	09/19/2012	1.2
09/24/2012	0.9	09/26/2012	1.8
10/01/2012	1.2	10/03/2012	2.7
11/10/2012	1.2	-	-
11/13/2012	1.2	11/15/2012	-
11/19/2012	0.8	-	-
-	-	12/05/2012	1.2
12/10/2012	1.5	12/12/2012	0.9
12/17/2012	1.2	12/19/2012	-
Seasonal Average	E2 (visibility in meters)	N16 (visibility in meters)	
Winter	0.9	3.2	
Spring	0.8	3.0	
Summer	0.9	2.9	
Fall	1.2	1.7	

4.2.1.1 Temperature and pH

Data collected throughout 2006 at showed average daily water temperature ranging from 34.5 to 76.5°F with highest values observed during the summer season, peaking in August, and lowest temperatures occurring during the winter months (ENSR, 2007). Average daily pH ranged from 7.23 to 9.25 with highest values occurring during the months of January through March.

In 1998 (NYSDOT, 1999), data collected within close proximity to the United Nations, showed a relatively constant temperature between samples collected at a depth of approximately 3 feet and 50 feet indicating the absence of a thermocline during those months and a well-mixed water body. Also, the pH of the sample areas averaged 7.4 in the warmer months, and higher in the colder months at 8.45 in December.

4.2.1.2 Salinity

Salinity measurements presented in the 1998 study (NYSDOT, 1998) ranged between 20.7 ‰ (parts per thousand) in August to 25.0 ‰ in December when temperatures were lowest. Data indicated that there was very little variability in salinity, pH, and dissolved oxygen values regardless of depth.

4.2.2 Best Usage Classification and Harbor Water Quality Monitoring

4.2.2.1 Best Usage Classification

The best water usage classification for the East River is Class I (fishing or boating and secondary recreation contact). The New York State Department of Health (NYSDOH) has issued health advisories recommending limiting consumption of north American eel, gizzard shad or crab hepatopancreas and no more than one meal per month of Atlantic needlefish, bluefish or rainbow smelt, striped bass or white perch from these waters due to possible elevated levels of PCBs. The source of this contamination is considered to be contaminated sediment, the result of past industrial discharges. Under Class I designation, shell fishing is not considered an appropriate use. Therefore, the waters of the East River are assessed for shell fishing use (NYSDEC, 2011).

4.2.2.2 Harbor Water Quality Monitoring Program

The NYCDEP conducts water quality evaluations as part of their City-Wide Long-Term CSO Control Planning Project, including the East River. The results of this sampling indicate that the impact of CSOs, wastewater discharges, urban stormwater runoff and dry weather sanitary flows cause periodic low dissolved oxygen (DO) levels that do not meet water quality standards. Pathogen levels in East River typically meet applicable criteria (NYCDEP, City-Wide Long-Term CSO Control Planning Program, June 2011)

As previously noted, the East River is impaired due to urban runoff and wastewater which contributes to low DO. **Table 4-2** below identifies the NYCDEP's Water Quality Monitoring data for surface water DO at location E2 (NYCDEP, 2013). Also for comparison, the following other locations are shown:

- E4, located approximately two miles north of the project area, east of Wards Island near Hell Gate.
- E10, located in Long Island Sound, approximately one mile east of the East River's confluence with Long Island Sound.
- N6, located south of the battery in New York Harbor.

- N16, located in the Atlantic Ocean approximately one mile south of Rockaway Point.

Table 4-2

Dissolved Oxygen Readings - Surface Water

Date	E2 (mg/L)	E4 (mg/L)	E10 (mg/L)	N6 (mg/L)	N16 (mg/L)
Jan Wk 2	7.59	7.59	9.90	9.03	7.86
Feb Wk 2	10.68	10.69	11.47		10.56
Mar Wk 1	10.55	12.06	12.94	10.83	10.64
Apr Wk 1	8.94	-	10.84	-	9.67
May Wk 4	6.15	6.08	7.72	7.50	8.04
June Wk 1	6.92	6.46	7.48	7.09	7.82
June Wk 2	5.77	5.39		7.23	-
June Wk 3	6.82	5.62	9.40	7.50	7.64
June Wk 4	4.57	5.27	6.02	6.16	6.90
July Wk 1	5.02	-	-	-	6.47
July Wk 2	5.73	5.38	6.50	6.98	8.10
July Wk 3	-	3.86	6.12	5.37	5.25
July Wk 4	4.47	4.05	6.47		7.00
Aug Wk 1	4.03	4.30	5.33	4.80	8.29
Aug Wk 2	3.94	3.40	5.81	5.81	3.82
Aug wk 3	3.72	2.93	3.49	3.83	7.12
Aug Wk 4	4.48	4.60	6.19	4.93	5.69
Sept Wk 1	4.08	3.63	4.04	5.66	5.90
Sept Wk2	3.62	2.37	4.92	4.97	5.20
Sept Wk3	4.94	5.10	5.20		4.74
Sept Wk 4	5.55	5.69	6.88	5.51	6.81
Oct Wk 1	5.60	5.30	6.26	6.06	6.76
Nov Wk 2	8.46	8.46	-	8.71	-
Nov Wk 2	8.18	8.67	9.11	8.12	-
Nov Wk 3	8.24	8.13	-	8.87	-
Dec Wk 1	9.10	8.92	-	10.06	9.26
Dec Wk 2	8.99	NS	9.63	8.88	9.37
Dec Wk 3	10.54	8.79	9.39	9.17	-

Table 4-3 identifies the DO reading for waters near the bottom at locations E2, E4, N6, E10, and N16. The data presented in **Tables 4-2** and **4-3** show that the DO in the two East River locations (E2, E4) is typically lower than the other presented locations.

Table 4-3

Dissolved Oxygen Readings - Bottom

Date	E2 (mg/L)	E4 (mg/L)	E10 (mg/L)	N6 (mg/L)	N16 (mg/L)
Jan Wk 2	8.61	8.61	10.32	9.12	7.18
Feb Wk 2	10.80	11.38	11.94	-	10.19
Mar Wk 1	10.89	12.03	12.07	10.03	10.92
Apr Wk 1	8.95		9.60	-	-
May Wk 4	6.07		7.08	6.52	-
June Wk 1	6.22	6.39	7.25	7.51	7.34
June Wk 2	5.30	5.09	-	5.95	-
June Wk 3	6.55	5.35	4.93	5.60	6.93
June Wk 4	4.65	5.23	4.04	6.10	5.91
July Wk 1	4.86	-	5.12	-	6.23
July Wk 2	5.25	5.37	2.17	5.20	6.34
July Wk 3	-	3.74	-	4.90	5.75
July Wk 4	4.24	4.05	3.38	-	6.34
Aug Wk 1	4.02	4.32	2.39	4.79	5.32
Aug Wk 2	4.03	3.77	1.65	4.46	3.76
Aug Wk 3	3.70	2.63	2.52	4.05	6.62
Aug Wk 4	3.99	4.11	3.93	5.34	5.00
Sept Wk 1	4.21	4.41	4.03	5.05	5.57
Sept Wk2	3.80	2.80	2.22	3.60	5.06
Sept Wk3	4.95	4.92	4.87	-	5.69
Sept Wk 4	5.54	5.94	6.24	5.53	6.81
Oct Wk 1	5.55	5.40	6.12	5.99	6.87
Nov Wk2	8.12	9.41	-	-	-
Nov Wk 2	8.20	8.49	9.05	8.21	-
Nov Wk 3	8.20	8.39	-	8.50	-
Dec Wk 1	-	-	-	9.22	10.14
Dec Wk 2	8.74	9.00	9.24	8.64	9.50
Dec Wk 3	9.25	8.79	9.41	8.92	-

The NYCDEP monitors select water quality parameters within the East River at several stations. The NYCDEP monitors the levels of Fecal Coliform and *Enterococcus* bacteria within the East River, south of the project area, near the Waterside Pier.

Table 4-4 identifies the Fecal Coliform and *Enteroccuss* bacteria at Station E2. For comparative purposes location N16 is included in the table. Review of the data clearly shows the impact of urbanization on the water of the East River as fecal coliform was measured dramatically higher rates than N16, when compared to water of the open ocean. Maximum levels of *Enterococcus* in 2012 were reported as exceeding 800/100ml, though numbers under 100/100ml were more common.

Table 4-4

Fecal Coliform and Enterococcus – Results of NYCDEP Water Monitoring

Location E2			Location N16		
Sample Date	Fecal Coliform (#100 mg/L)	Enterococcus (#100 mg/L)	Sample Date	Fecal Coliform (#100 mg/L)	Enterococcus (#100 mg/L)
01/09/2012	32	1	01/11/2012	1.00	2.00
02/13/2012	3	2	02/14/2012	1	1
03/05/2012	14	4	03/7/2012	4	1
04/02/2012	NS	NS	04/4/2012	1	1
04/03/2012	29	2	-	-	-
05/29/2012	11	1	05/31/2012	40	1
06/04/2012	100	46	06/06/2012	1	1
06/11/2012	22	1	06/13/2012		
06/18/2012	47	10	06/20/2012	1	8
06/25/2012	122	4	06/27/2012	9	2
07/02/2012	NS	2	07/05/2012	11	1
07/09/2012	254	2	07/11/2012	1	1
07/16/2012	800	20	07/18/2012	1	1
07/23/2012	128	1	07/24/2012	2	2
07/30/2012	176	6	-	-	-
08/06/2012	790	60	08/08/2012	1	1
08/13/2012	48	1	08/15/2012	3	1
08/20/2012	42	2	08/22/2012	9	1
08/27/2012	156	47	08/29/2012	484	2
09/04/2012	25	2	09/06/2012	5	2
09/10/2012	300	3	09/12/2012	2	1
09/17/2012	6	2	09/19/2012	1	2
09/24/2012	45	4	09/26/2012	1	1
10/01/2012	50	5	10/03/2012	1	2
11/10/2012	233	32	-	-	-
11/13/2012	3	4	11/15/2012		
11/19/2012	5	1	-	-	-
12/03/2012	2	1	12/05/2012	1	1
12/10/2012	2000	800	12/12/2012	11	2
12/17/2012	22	16	12/19/2012		

In addition to industrial discharges and combined sewer overflow, the East River and Western Long Island Sound region receive treated sewage from 18 wastewater treatment plants located in New York and the southern Connecticut area. About 83 percent of this effluent is discharged into the East River (Sweeney, 2004). A study conducted by Sweeney et al. showed that the East River had elevated levels of lead, phosphates, silver, copper, cadmium, and nitrates. There were also a number of inorganic pollutants in the waterway (Sweeney, 2004).

4.3 Habitats

4.3.1 Terrestrial Habitat

Historically, much of the land area adjacent to the East River has been subjected to filling activities due to land reclamation and/or stabilization efforts. Except for a few isolated roof-top gardens and very small urban parks, the terrestrial environment along the FDR Drive adjacent to the project area is paved and/or developed.

4.3.2 Aquatic Habitat

In order to identify the existing benthic habitat of the project area, an Ecological Underwater Survey (dive survey) was conducted within the project area. The dive survey was performed as part of the preliminary baseline assessment necessary for identifying potential ecological impacts from the construction of the EMWE and on-site habitat enhancement opportunities along the eastern shoreline of the East River between East 38th Street and East 61st Street (encompassing adjacent habitat areas to the north and south of the proposed esplanade) in Manhattan from October 3rd through October 5th, 2011. The survey consisted of the following:

- Visual dive survey performed parallel to shoreline to a distance of 50 feet riverward from the existing bulkhead. During the dive survey, the diver documented habitat types, size, and general locations; general health of habitat; species presence and visual density (biodiversity); substrate type; and any other anomalies that could assist in assessing impacts from construction and potential on-site mitigation design.

- Piling survey at two locations underneath the Waterside Pier (located just south of the UN Esplanade) to determine changes (if any) in spatial distribution, biodiversity, and abundance of species moving shoreward and away from direct sunlight.

- Submerged aquatic vegetation (SAV) presence/absence survey.

- Identification of types, size, and general location of micro-habitats/habitats present riverward to 50 feet (depth permitting) of existing infrastructure (documented with video).

- Identification of observed marine/estuarine species, and

- Video documentation of density, type, and spatial distribution of encrusting organisms underneath the Waterside Pier, bordering pilings along the steel bulkhead, two bedrock outcrops located along the northern portion of the survey area, and the existing caissons installed as part of the construction of the temporary FDR Drive ODR. For all habitat types, no submerged aquatic vegetation (SAV) was observed.

A total of 17 underwater transects (**Figure 4-1**) were completed parallel to the Manhattan shoreline out to a distance of approximately 50 feet and spanning a distance of 1.3 miles along the shore from East 38th Street to East 61st Street. Overall, three different habitat types were identified based on differences in structure present, substrate type, species composition and distribution, and included:

- **Piling/Open Water Edge Habitat** depth ranged from 15 to 25 feet at the time of survey. Substrate located nearest East 43rd Street consisted of low relief habitat (one- to two-feet high) with riprap-sized rocks (approximately a foot in diameter), concrete rubble, and an occasional sandy pocket. Some anthropogenic debris (e.g. steel, rebar) was observed. The slope was relatively flat. Debris was less prevalent than observed at the under-pier habitat. Bottom habitat had very little benthic community coverage and was sparsely populated by sponge or dogwhelk (approximately 3-5 percent overall coverage).

  Outer piles along this length of the bulkhead around East 43rd Street were visually surveyed and were approximately 30 to 65 percent encrusted with sessile organisms. Sea grapes (*Molgula manhattensis*) were most dominant entire length of submerged piling. Blue mussel (*Mytilus edulis)* distribution was patchy from piling to piling and contributed approximately 20 to 30 percent of overall population. Sea grapes or squirts were approximately 50 to 55 percent of the coverage. Other species observed on the pilings contributed roughly 5 to 10 percent of coverage included: green sea fern (*Bryopsis plumose*), Agardh's red weed (*Agardhiella tenera*), red beard sponge (*Microciona prolifera*), hydroids, striped anemone (*Haliplanella luciae*), Loosanoff's haliclona (*Haliclona loosanoffi*), dogwinkles (*Thais lapillus*), periwinkles (*Littorina spp*.), and grubby sculpin (*Myoxocephalus aenaeus*). Inner piles were observed to have similar species composition and diversity; though with reducing amounts of biomass proceeding further under the pier structure.

- **Natural Bedrock Outcrop and Caissons Habitat** were located north of East 53rd Street with terminus at East 61st Street. A total of four transects were completed to characterize the habitat. The habitat included two large natural rock outcrops with a tide pool located adjacent to the FDR Highway between East 57th Street and East 59th Street and encrusting habitat on the caissons slightly riverward (approximately 50 feet) of the shoreline. Depth varied between two feet in the tide pool to depths greater than 40 feet at the rock wall. Slope on bedrock was steep at about a 90 degree vertical drop. Substrate was either bedrock or small rock (approximately 12 inches in diameter) with little or no silt layer. Percent coverage varied by depth along the bedrock but overall coverage was approximately 40 to 50 percent. Species observed included: green sea fern, dulse (*Rhodymenia palmate)*, Agardh's red weed, Loosanoff's haliclona, red beard sponge, striped anemones, hydroids, sea grapes, barnacles, dogwinkles, blue mussel, oysters (*Crassostrea virginica*), blue crab, bay anchovy (*Anchoa mitchilli*), and cunner (*Tautogolabrus adspersus*). On the ODR caissons, species composition was similar to that of the under-pier and piling open water habitats. Overall, habitat condition and biodiversity was better along natural outcrops with overall rating of moderate to fair. The substrate riverward was mostly silt and rubble and of poor quality.

- **Offshore Habitat** to 50 feet from existing shoreline consisted mostly of sand/silt and some riprap. Substrate type was usually a function of corresponding shore-side habitat.

In 1998 (NYSDOT, 1999), trawls were conducted in the mid channel of the West and East Channels between East 45th and East 53rd Streets. Also, benthic populations were characterized through the use of artificial substrate samplers (e.g., rock baskets). Within the west channel of the East River the trawls identified low fish populations. The artificial substrate samples were colonized only be benthic species that are very common to urban waters (e.g., black-fingered mud crabs, isopods, mussels, etc.).

Figure 4-1 Dive Survey Study Area

AECOM

NYSDEC
East Midtown Waterfront
Esplanade Manhattan, NY

Dive Survey
Study Area

4.3.3 Flora

Within and immediately adjacent to the project area, there are no vegetated wetlands and/or submerged aquatic vegetation (SAV) beds. Plant life is limited to algae growing on hard substrates.

4.3.4 Fauna

4.3.4.1 General Fish Populations

New York Harbor is located within the Hudson River Estuary (HRE). Numerous estuarine and marine species occur regularly in the harbor, along with various anadromous and catadromous species. Marine and estuarine species are common to the New York Harbor and regularly occur in the East River. However, due to the swift current and limited rugosity (the measure of small-scale variations or amplitude in the height of a surface), the Project Area is likely provides low to moderate habitat value to estuarine and marine species.

The HRE is important to anadromous species as many species enter the harbor in the spring time to travel up the Hudson River and other small fresh water rivers to spawn. During migration, anadromous species may be present in the East River; however, it is not anticipated that the West Channel or the project area serve an attractive habitat for anadromous species due to the water quality characteristics. Most anadromous species would utilize the Hudson River for transit to freshwater spawning areas.

The potential presence of transient anadromous species along the edge habitat or near the project area does exist. These species include alewife *(Alosa pseudoharengus)*, blueback herring *(Alosa aestivalis)*, and American shad *(Alosa sapidissima)*. These species would be present in the East River as they swim upstream to spawning area (freshwater streams) in the HRE.

Two threatened and endangered anadromous fish species (i.e.. Atlantic sturgeon, *Acipenser oxyrinchus*, and shortnose sturgeon, *Acipenser brevirostrum*) may be present in New York Harbor. A biological assessment is currently being prepared for these species in relation to the construction and operation of the EMWE. It is anticipated that migratory pathways will not be impacted or impeded within the East River since design will minimize impacts to fish migration and allow for a minimal amount of shading.

4.3.5 Habitat Quality Assessment of the Project Area

In general, habitat conditions were poor. Species diversity was best at the natural outcrops and habitat condition appeared to be of better quality at the bedrock outcrops than the other habitat areas investigated. Bottom habitats had little to no visible macrobenthic or encrusting communities. Pilings did have moderate colonization but it appeared the majority of colonization ended where light attenuated. The dominant species on the piles was sea grape, followed by blue mussels and sponges. A small number of individual distributed oysters were present on natural bedrock but were not observed in other bottom substrates or habitats. Combined with the water quality conditions of the East River, the strong currents present in the West Channel, the Project Area as a whole has low habitat value for marine flora and fauna.

5 EVALUATION OF IMPACTS ON EFH MANAGED FISH SPECIES

This section provides descriptions of the EFH species that were identified for the waters of project area, the designated EFH for each species, and potential impacts. **Appendix A** provides detailed life stage information for species that are likely to occur in the project area.

The following EFH life history descriptions were provided in NOAA's Guide to Essential Fish Habitat Designations in the Northeastern United States accessed from textual and tabular data from http://www.nero.noaa.gov/hcd/list.htm. Additional citations are provided where applicable. Species have been assessed based on known potentially adverse impacts associated with the aforementioned proposed work to include noise, loss of habitat, increased sedimentation and turbidity, and shading. Further rationale is given in Section 7.

5.1 Atlantic Butterfish

5.1.1 Species Description

The Atlantic butterfish ranges from Newfoundland to Florida, but is primarily found from the Gulf of Maine to Cape Hatteras, North Carolina. Butterfish migrate in response to seasonal changes in water temperature. During the summer, butterfish move northward and inshore to feed and spawn. Spawning occurs during June to August and peaks progressively later at higher latitudes (Cross et al., 1999). Juvenile butterfish grow quickly and migrate offshore to deeper waters in late fall, returning again in April. During the winter, butterfish move southward and offshore to avoid cool waters (Howes and Goehringer, 1996). Butterfish are primarily pelagic and form loose schools that feed upon small fish, squid, and crustaceans. Butterfish have a high natural mortality rate and are preyed upon by many species including silver hake, bluefish, swordfish, and longfin squid.

Atlantic butterfish utilize New York Harbor from April to the late fall and as a nursery area in the summer. Eggs and larvae are present from June to August and juveniles are present in the fall.

5.1.2 EFH

NMFS has designated EFH for the larvae, juvenile and adult stages of this species in marine waters within the East River and for larvae, juveniles and adults in the mixing zone and juvenile and adult stages in the seawater salinity zone of the harbor.

5.1.3 Project Potential Impacts

Adult and juvenile butterfish are highly motile and, if present in the project area during construction, would relocate to nearby suitable habitats. It is likely that some amount of American butterfish eggs and larvae would be present in the work locations during construction; however, limited impacts are anticipated. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would not result in a significant loss of potential prey species for Atlantic butterfish.

5.2 Atlantic Sea Herring

5.2.1 Species Description

The Atlantic sea herring is widely distributed in continental shelf waters from Labrador to Cape Hatteras. It is a migratory, schooling species that consumes plankton. Atlantic herring are usually seen swimming in vast schools offshore (Geiser, 1984). Primary spawning locations off the northeastern United States are located on the Maine coast, Jeffreys Ledge, Nantucket Shoals, and Georges Bank. Spawning occurs during late August to October. Eggs are demersal and are typically deposited on gravelly substrates (NOAA NERO, 2013d).

5.2.2 EFH

NMFS has designated EFH for larvae, juveniles, and adults of this species in marine waters within the East River. NMFS also has designated EFH for larvae, juveniles, and adults in both the mixing and seawater salinity zones of the river.

5.2.3 Project Potential Impacts

Based on data reviewed on NOAA's Estuarine Living Marine Resources Database (ELMR) (NCCOS, 2012), larval, juvenile, and adult life stages of Atlantic herring have the potential to transit the proposed project site. ELMR lists juvenile and adult life stage as common in the Hudson River/Raritan Bay Estuary in salinities between 5 and 25 ppt and greater than 25 ppt during the months of January through May and rare the remainder of the year. Larvae are listed as common in April and May, rare in June, and absent the remainder of the year.

Adrift larval herring is known to seasonally be present in the East River (LMS, 1993; ENSR, 2007) and Atlantic herring was one of the most abundant species entrained (LMS, 1993). Herring travel in schools. Small schooling fish (much like juvenile herring) are known to avoid under-pier habitat areas but will use edge habitat (Able and Grothue, 2011). Juveniles may transit the project area though habitat is not preferred and preferred depths are much shallower than given in the above description. Adults may transit the location though habitat is not preferred and depth is shallower than preferred. Both life stages are pelagic and can potentially avoid the Project Area. It is expected that adults would tend to prefer more channelized areas and would likely avoid project site during construction. Impacts are anticipated to be minimal, if any.

5.3 Atlantic Mackerel

5.3.1 Species Description

The Atlantic mackerel is a fast-swimming, pelagic, schooling species distributed in the northwest Atlantic between Labrador and North Carolina. There are two major spawning components of this population: a southern group that spawns primarily in the Mid-Atlantic Bight (which extend from Montauk, New York to the Virginia-North Carolina border) during April and May, and a northern group that spawns in the Gulf of St. Lawrence in June and July. Both groups winter between Sable Island (off Nova Scotia) and Cape Hatteras in waters generally warmer than 45°F, with extensive northerly (spring) and southerly (autumn) migrations to and from spawning and summering grounds. Mackerel feed upon small fish Atlantic mackerel eggs are collected from shore to depths of 50 feet and temperatures between 41 and

73°F, and larvae are collected at depths between 33 and 425 feet and temperatures between 43 and 72°F. Juveniles and adults can occur from the shore to depths over 1,000 feet (NOAA NERO, 2013c).

5.3.2 EFH

NMFS has designated EFH for the juveniles and adults in marine waters within the East River, and for juveniles and adults in the seawater salinity zone of the river.

5.3.3 Project Potential Impacts

Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where adult Atlantic mackerel are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, adult Atlantic mackerel are collected from shore to 1,250 feet and temperatures between 39°F and 61°F. Adults are listed as not present in the Hudson River/Raritan Bay Estuary (NCCOS, 2012).

Juveniles are listed as “common” within the Hudson River/Raritan Bay Estuary in salinities greater than 25 ppt April through June and in October and November (NCCOS, 2012). Juvenile species have been collected in June within the East River (ENSR, 2007) though numbers were low and represented a small percentage of catch. Preferred EFH is not present at the proposed Project Area but life stage may be present. Adults are listed as “common” by ELMR (NCCOS, 2012) in April/May and October/November in salinities greater than 25 ppt and not listed in salinities lower. In the reports reviewed (Verdant, 2013; ENSR, 2007; TRC, 2002; LMS, 1993), no records of adult Atlantic mackerel collected or observed within the East River were given. It would appear that if this life stage may be uncommon and that if species is present, it would most likely use the more open waters associated with the channel. Impacts will be avoided or minimized through the use of best management practices (“BMPs”) and seasonality of construction schedule. Species’ life stages are pelagic and avoidance of the proposed Project Area during construction is anticipated, therefore no adverse impact is expected. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would not result in a significant loss of potential prey species for this Atlantic mackerel.

5.4 Black Sea Bass

5.4.1 Species Description

Black sea bass (*Centropristus striata*) are strictly confined to salt water, appearing inshore during the first or second week in May, and then withdrawing again late in October or early in November. The substrate preferred by the black sea bass generally consists of shellfish and eelgrass beds, man-made structures in sandy-shelly areas, and offshore clam beds (Bigelow and Schroeder, 1953). However, young of the year fish also occur in large numbers in structurally complex estuarine habitats (NOAA, 2007). During the part of the year when the black sea bass are inshore they are most plentiful on hard bottom, in water depths of less than 115 feet or so, often around submerged wrecks. They are bottom feeders, subsisting chiefly on crabs, lobsters, shrimp, and various mollusks (Bigelow and Schroeder, 1953).

Juvenile and adult black sea bass occur in the demersal waters over the Continental Shelf from the Gulf of Maine to Cape Hatteras, North Carolina. Juvenile and adult black seas bass are found in the estuaries in the summer and spring in water warmer than 43°F with salinities greater than 18 ppt, but winter offshore from south of New York to North Carolina. Black sea bass eggs are pelagic but also occur infrequently in large bays. This fish is present in New York Harbor, migrating inshore in spring and offshore to deeper waters in late fall. The diet of adults consists of crustaceans, fish, and mollusks.

5.4.2 EFH

NMFS has designated EFH for juveniles and adults of this species in marine waters within the East River and the mixing and seawater salinity zones of the river.

5.4.3 Project Potential Impacts

Juvenile and adult black sea bass have been identified as rare for the “mixing” and “seawater” salinity zones for the HRE between April and May and are absent the remaining months. Yet, habitat and a forage base does exist for theses life stages at the proposed location. Surveys conducted at Astoria Generating Station (ENSR, 2007) and Ravenswood (TRC, 2000) collected larval, juvenile, and adult life stages though percent composition of the catch was small compared to other species collected. Regardless, the potential for this species to seasonally be present during the summer months does exist though it is considered rare. Although juvenile and adult black sea bass are more structured-oriented, they are mobile and not expected to be impacted by the Proposed Action. The removal of the benthic habitat and water column through the implementation of the Proposed Action would not result in a significant loss of potential prey species for black sea bass.

5.5 Bluefish

5.5.1 Species Description

The bluefish is a migratory, pelagic species found throughout the world. Along the US Atlantic coast, bluefish are found from Maine to Florida, migrating northward in the spring and southward in the fall. Seasonal migrations of bluefish represent an important recreational and commercial fishery during the summer months along the northeastern shores of the US. Although spawning offshore during summer juveniles move in large numbers into the warmer inshore waters of the bay. These fish are voracious feeders, consuming a wide variety of fish and invertebrates in the water column. Mackerels, menhadens, alewives, herrings, and weakfish, as well as shrimp, lobsters, squid (*Loligo opalescens*), crabs, mysids, and annelid worms, are all part of the bluefish’s diet. The abundance of juveniles in shallow nearshore waters also provides an important source of prey for other predatory species.

Bluefish eggs are buoyant and pelagic and hatch in about two days. The newly-hatched larvae are also pelagic and remain in offshore waters for one to two months before migrating shoreward toward shallow-water nursery areas; for this reason, bluefish eggs and larvae are not anticipated to occur in the project area.

5.5.2 EFH

NMFS has designated EFH for juveniles and adults in the marine waters and the seawater and mixing water/brackish salinity zones of the East River.

5.5.3 Project Potential Impacts

Bluefish juveniles and adults may be present in the proposed project area in the warmer months of the year. During construction, the highly-motile fish would relocate to nearby suitable locations. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would not result in a significant loss potential of prey species for bluefish.

Juvenile and adult bluefish and corresponding EFH is seasonally present within the proposed project area, though under-pier habitats would be less preferred to that of open water and piling/edge habitats for juveniles. Based on Able and Grothues (2011) under-pier study along the Hudson River, it was observed that small schooling pelagic fishes avoided using under-pier habitat; whereas large pelagic fish species (e.g. adult striped bass and bluefish) were basically as common in open water as under-pier just inside of the edge. As stated previously, no SAV was observed on-site and the majority of the under-pier habitat consisted of concrete rubble. Juveniles and adults could likely use this habitat to forage concentrating on the smaller schooling fishes that are known to inhabit the piling edge habitat. Though presence is common, these species are pelagic and could avoid the Project Area during construction. Impact is not anticipated.

5.6 Clearnose Skate

5.6.1 Species Description

This species prefers inshore areas of 10–21°C and feeds mainly on decapod crustaceans, bivalves, polychaetes, squids and fishes. It breeds inshore, and reproduction is oviparous, like other skates, with oblong egg capsules deposited in sandy or muddy flats (Ha, 2009).

5.6.2 EFH

NMFS has designated the East River as EFH for clearnose skate, juveniles, and adults.

5.6.3 Project Potential Impacts

Clearnose skate juveniles may occur in the Project Area in the cooler months of the year. Clearnose skates would transit through the project area and use the benthic habitat for foraging opportunities. However, as clearnose skates are motile, they would relocate to nearby suitable habitats during construction. The removal of benthic habit would be a minor perturbance for clearnose skates that forage in the area of the project area, but would not affect the long-term survival of the species.

5.7 Cobia

5.7.1 Species Description

The cobia (Rachycentron canadum) is a fast-swimming fish that can be found near shore or inshore inhabiting inlets, bays, and mangrove swamps and is often seen around buoys, pilings, and wrecks. Cobia are distributed from Massachusetts to Argentina. Cobia primarily feed on crabs, squid, and small fish and can reach a size of up to 6 feet and 331 pounds (lbs), although they more commonly reach a size of between 22 and 110 lbs (Robins et al., 1986).

5.7.2 EFH

NMFS has designated the East River as EFH for cobia eggs, larvae, juveniles, and adults.

5.7.3 Project Potential Impacts

Cobia adults are highly motile species. Due to their preference for warm waters, cobia would only be present in the area of New York Harbor in the warmer months of the year. As an oceanic species, it is unlikely that cobia would be present in the project area. However, if cobia does occur in the East River, the project may disturb some of its habitat. However, given the small amount of disturbance associated with the project and the large amount of available habitat in the lower Hudson River Estuary and New York Harbor, any cobia using the project area could quickly relocate to nearby suitable habitat.

5.8 Dusky Shark

5.8.1 Species Description

The dusky shark occurs in both inshore (surf zone) and offshore waters from the surface to depths as deep as 1,300 feet (NMFS, 2013). The shark prefers waters with higher salinities (<20ppt). Their diet includes bony fishes, cartilaginous fishes, and squid (NMFS, 2013). During the course of the year, the shark takes long migrations, traveling to coastal US waters in the summer and tropical eaters in the colder portions of the year. Catch and landing data for the large coastal shark assemblage in the western Atlantic (which includes dusky sharks) indicates that since the 1970s, large coastal species declined by 50 to 75 percent (NMFS, 2013).

5.8.2 EFH

NMFS has designated the East River as EFH for dusky shark larvae.

5.8.3 Project Potential Impacts

Dusky shark larvae may be present in the East River Due to their preference for warm waters, the species would only be present in the area of New York Harbor in the warmer months of the year. The proposed project would occur in the East River and may disturb some of its habitat. However, given the small amount of disturbance associated with the project and the large amount of available habitat in the lower Hudson River Estuary and New York Harbor, any dusky shark using the project area could quickly relocate to nearby suitable habitat.

5.9 King Mackerel

5.9.1 Species Description

The king mackerel (Scomberomorus cavalla) is a fast-swimming fish that roams in schools. King mackerel are a "coastal pelagic" species, meaning they live in the open waters near the coast. They are typically found at depths of 115 to 591 feet (NMFS, 2011); although, they are sometimes found close to shore. King mackerel are voracious feeders that may be seen leaping out of water in pursuit of prey. Juvenile king mackerel prey on larval fish; adults prey on fish, squid, and shrimp and reach a size of up to 66 inches and 220 lbs (NMFS, 2011). King mackerel migrate to the northern part of their range in the summer and to the southern part in the winter. Migrations are based on water temperature and availability of food. King mackerel also form large schools. King mackerel span from May through October on the Outer Continental Shelf (NMFS, 2011)

5.9.2 EFH

NMFS has designated the East River as EFH for king mackerel eggs, larvae, juveniles, and adults.

5.9.3 Project Potential Impacts

King Mackerel adults are highly motile species. As an oceanic species, it is unlikely that king mackerel would often be present in the project area. However, given the small amount of disturbance associated with the Proposed Action and the large amount of available habitat in the lower Hudson River Estuary and New York Harbor, any mackerel using the project area could quickly relocate to nearby suitable habitat.

5.10 Little Skate

5.10.1 Species Description

The little skate occurs from Nova Scotia to Cape Hatteras and is one of the dominant members of the demersal fish community of the northwest Atlantic (Bigelow and Schroeder, 1953, as cited in NOAA, 2003). Little skate are generally found on sandy or gravelly bottoms, but also occur on mud (Bigelow and Schroeder, 1953; McEachran and Musick, 1975; Langton et al., 1995; Packer and Langton, unpublished manuscript). Bigelow and Schroeder (1953) found most little skate at depths less than 240 to 300 feet, with an overall depth range of 0 to 480 feet off southern New England.

5.10.2 EFH

NMFS has designated EFH for juveniles and adults of this species in marine waters within the East River.

5.10.3 Project Potential Impacts

Little skate juveniles and adults may occur in the project area as they sometimes prefer mud bottoms. The species may transit through the project area and use the habitat for foraging. During construction, the motile juvenile and adult fish would relocate to nearby suitable locations. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would also not result in any notable loss of potential prey species for skate.

5.11 Longfin Squid

5.11.1 Species Description

Longfin inshore squid occur from Newfoundland to the Gulf of Venezuela; however, the principal concentrations exploited in the United States occur from Georges Bank to Cape Hatteras (Brodziak, 1995). Longfin inshore squid are generally found at water temperatures of at least 48°F (Lange and Sissenwine, 1980, as cited in NOAA, 2005).

Most eggs are spawned in May and hatching occurs in July. Eggs generally occur in shallow waters, less than 165 feet and near shore. Juveniles inhabit upper 3 feet of the water column in waters with depths of approximately 165 to 325 feet on the continental shelf. Seasonally, the species is found in coastal inshore waters in spring to fall (shallow waters up to 590 feet) and offshore in winter in deeper waters, up to 1,300 feet on the shelf edge. The species is most abundant at the bottom during the day and moves upwards at night. Squid tend to prefer mud or sand bottoms, but the importance of bottom habitat is poorly understood (NOAA, 2005).

5.11.2 EFH

NMFS has indicted that there is not enough data to designate EFH for eggs and larvae of this species.

5.11.3 Project Potential Impacts

Longfin squid generally would not inhabit the Project Area in the winter, although squid may occur in inshore waters in the spring to fall. Longfin Squid are highly motile and, if squid were present during construction, they would relocate to other suitable locations. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would also not result in any notable loss of potential prey species for longfin squid.

5.12 Ocean Quahog

5.12.1 Species Description

The ocean quahog is distributed on the continental shelf from Newfoundland to Cape Hatteras (Weinberg1995). Greatest concentrations are in offshore waters south of Nantucket to the Delmarva Peninsula (Serchuk etal. 1982).

5.12.2 EFH

NMFS has indicted that there is not enough data to designate EFH for eggs and larvae of this species.

5.12.3 Project Potential Impacts

Ocean quahog may occur in the project area; although their preferred habitat would be in offshore waters. The limited benthic disturbance and sedimentation associated with the project would have minimal impacts, if any, on ocean quahog.

5.13 Pollock

5.13.1 Species Description

Pollock occur in the Northwest and Northeast Atlantic. In the Northwest Atlantic, it is most abundant on the western Scotian Shelf and in the Gulf of Maine. Adult pollock are generally found in water temperatures below 57°F, depths from 50 to 866 feet, and salinities between 31 and 34 ppt.

Spawning habitat consists of benthic substrate of hard, stony or rocky bottom (including artificial reefs). Pollock are most often observed spawning during the months September to April with peaks from December to February. The majority reaches sexual maturity by the age of three (O’Brien et al., 1993, as cited in NOAA NEFSC, 2013b). Juvenile pollock generally occupy inshore areas, but move offshore as they mature (NOAA NEFSC, 2013b).

5.13.2 EFH

NMFS has designated EFH for juvenile and adult life stages of this species in marine waters within the East River.

5.13.3 Project Potential Impacts

Though the on-site habitat at the proposed Project Area contains pockets of sand and concrete rubble that could be a substitute for EFH, habitat is of poor quality. Pollock was not listed as having designated EFH in the Hudson/Raritan Estuary in NOAA’s *Summary of Essential Fish Habitat (EFH) Designation: Major Estuaries, Bays, and Rivers along the Northeast United States Coast* (NMFS, 2000a). Based on data reviewed on the National Ocean Service’s (NOS) Estuarine Living Marine Resources Database (ELMR) (NCCOS, 2012); juvenile life stages for pollock are identified as not present in the HRE and adults are listed as rare in the Hudson River/Raritan Bay Estuary in salinities over 25 ppt. Surveys conducted near the Project Area (LMS, 1993; NYPA, 2001, and ENSR, 2007) indicated that juvenile pollock made up less than 0.1 percent of all fish collected annually in 1993, 2000, and 2006. No adult species were collected during these surveys. This species is most likely not present in the proposed Project Area and impact is not anticipated. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would not result in any notable loss of potential prey species for pollock.

5.14 Red Hake

5.14.1 Species Description

The red hake is distributed from the Gulf of St. Lawrence to North Carolina, but is most abundant between Georges Bank and New Jersey. Red hake undergo extensive seasonal migrations, moving into shallow waters to spawn in spring and summer and offshore to deep waters in the winter. Spawning occurs from May through November. The eggs are buoyant (Geiser, 1984) and are generally found in water temperatures below 50°F.

Spawning occurs from May through November, with primary spawning grounds on the southwest part of Georges Bank and in the Southern New England area off Montauk Point, Long Island (Colton and Temple, 1961, as cited NOAA NEFSC, 2013c). The first months of a red hake’s life are spent drifting at or near the surface and fry of 0.5 to 4 inches have been observed in summer under floating eelgrass or rockweed. As juveniles, red hake seek shelter from predators in scallop beds, and are commonly found in the mantle cavities of (or underneath) sea scallops. In the fall, due to their increasing size, red hake are likely to leave the safety of the scallop beds and seek warmer temperatures in offshore waters (Steiner et al., 1982, as cited in NOAA NEFSC, 2013c). The red hake's diet consists primarily of shrimp, squid, bergalls, small eels, spearing, sand eels, and the young of other species (Geiser, 1984).

5.14.2 EFH

NMFS has designated EFH for larvae, juveniles, and adult life stages of this species in marine waters within the East River and for larvae, juveniles, and adults in both the mixing and seawater salinity zone of the harbor.

5.14.3 Project Potential Impacts

Larval, juvenile, and adult red hake are listed as common in the mixing zone of the Hudson River/Raritan Bay Estuary (NCCOS, 2012). No larval red hake were collected during entrainments studies conducted at Astoria Generating Station (ENSR, 2007) but presence is still possible seasonally. Juvenile red hake substitute anthropogenic debris for shell fragments. The under-pier and piling/open water habitat does not accommodate live scallops though anthropogenic debris could be substituted for shell fragments. Though the preferred habitat is absent, a forage base of invertebrates is present and the potential for transient life stages within the proposed Project Area does exist. Because red hake are sensitive to DO levels (Steimle *et al.*, 1999), it is unlikely that the species will be present in warmer months when DO levels are lowest, but its presence could increase during colder months. Though larval movement is a function of the physical characteristics of the waterbody and surrounding area (e.g. tide, current, wind, weather, and runoff volumes), direct impact will be avoided through the use of BMPs and proposed seasonality of construction. Juvenile and adult red hake may be present in the project area but possess the mobility to avoid impacts. Red hake eggs are buoyant and could be transported to the project area, although due to dispersion from their spawning grounds there would be low numbers of eggs, if any, present in the project area. The removal of the minor amounts of benthic habitat and water column through the implementation of this project would not result in a significant loss of potential prey species for red hake.

5.15 Redfish

5.15.1 Species Description

Redfish growing up to 18 to 20 inches. The species is considered a deep water fish that prefers rocky bottoms. Redfish can be found in shallower waters during the colder winter months and their diet includes a variety of crustaceans, mollusks and small fish (Maine, 2013.)

http://www.maine.gov/dmr/recreational/anglerguide/doyouknowyourcatch/documents/acadianredfish.pdf

5.15.2 EFH

NMFS has indicted that there is not enough data to designate EFH for eggs of this species.

5.15.3 Project Potential Impacts

As a deep water fish, it is unlikely the species spawns in the waters of the project area and redfish eggs are not anticipated to be present in great numbers (if at all) in the project area. Impacts to redfish are considered negligible.

5.16 Sand Tiger Shark

5.16.1 Species Description

The sand tiger shark has a stout body with two large dorsal fins that are almost equal in size and the first dorsal fin placed far back on the trunk of the body. The sand tiger shark is often found in sandy coastal waters, shallow bays, estuaries and rocky or tropical reefs. Although most often found in shallow waters they also swim down to depths of 650 feet. Diet consists mainly of large and small bony fish, small sharks, rays, squid and crustaceans. The sand tiger shark also occurs in the eastern and western Atlantic, the Pacific and Indian Oceans and in the Mediterranean and Adriatic Seas.[2]

5.16.2 EFH

NMFS has designated the project area as EFH for shark larvae.

5.16.3 Potential Project Impacts

Sand tiger shark larvae may be present in the East River; although it is anticipated that if larvae are present, they occur in very low numbers. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would not result in any notable loss of potential prey species for sand tiger shark.

5.17 Sandbar Shark

5.17.1 Species Description

This species is found throughout the world. is a coastal shark, often in shallow waters associated with sandy or muddy flats, bays, estuaries and harbors commonly down to salinities of 20 ppt in some populations (Grubbs *et al*. 2007a) and also further offshore, particularly on banks, near islands, flat reefs and other topographic features in open waters (Compagno in prep.). This species occurs from the surfline down to 280 m, but typically in waters less than 100 m where it frequently forages near the seabed. This shark mainly feeds on small bottom fishes, as well as molluscs and crustaceans.[3]

5.17.2 EFH

NMFS has designated the project area as EFH for sandbar shark larvae and adults

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[2] http://new-brunswick.net/new-brunswick/sharks/species/sandtiger.html

[3] http://www.iucnredlist.org/details/3853/0

5.17.3 Potential Project Impacts

Sandbar shark larvae and adults are rarely present in the East River. The project area does not provide any unique habitat for the species; thus, the removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would not result in any notable loss of potential prey species for sand tiger shark.

5.18 Scup

5.18.1 Species Description

Scup occur primarily in the Mid-Atlantic Bight from Cape Cod to Cape Hatteras. Seasonal migrations occur during spring and autumn. In summer, scup are common in inshore waters from Massachusetts to Virginia, while in winter scup are found in offshore waters between Hudson Canyon and Cape Hatteras. Spawning occurs during summer months. In general, scup eggs are found from May through August in southern New England to coastal Virginia, in waters between 55 and 73°F and in salinities greater than 15 ppt (NOAA NERO, 2013g). Generally, scup larvae are most abundant nearshore from May through September, in waters between 55 and 73°F and in salinities greater than 15 ppt. Juvenile scup often are found in the summer and spring in estuaries and bays between Virginia and Massachusetts, in association with various sands, mud, mussel, and eelgrass bed substrates, and in water temperatures greater than 45°F and salinities greater than 15 ppt.

5.18.2 EFH

NMFS has designated EFH all life stages of this species in the marine waters and salinity zones of the East River.

5.18.3 Project Potential Impacts

Per the ELMR database, the aforementioned life stages of scup are considered rare in salinities between 5 and 25 ppt in the Hudson River/Raritan Bay Estuary. However, in salinities greater than 25 ppt, larvae are identified as common in July; juveniles are listed as abundant from June through September; and adults are common From June through August (NCCOS, 2012). In entrainment studies performed at Astoria Generating Station upriver (ENSR, 2007), larval scup were collected in June, and juveniles peaked in August. Impingement data for juveniles and adults from the same survey showed peak abundance in November and February. Regardless of seasonality shifts between defined EFH and actual collection; larval, juvenile, and adult scup have the potential to be within or adjacent to the project area. Direct impact will be avoided through the use of BMPs. This species' juvenile and adult life stages are most likely seasonally transient at the project area and have the ability to move during construction. Impact is not anticipated. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would not result in any notable loss of potential prey species for scup.

5.19 Shortfin Squid

5.19.1 Species Description

The shortfin squid is a short-lived, highly-migratory species that is distributed in the Northwest Atlantic Ocean from the Florida Straits to Newfoundland (Dawe and Hendrickson, 1998, as cited in NOAA NEFSC, 2013d). The species is semelparous (reproducing once before death). The lifespan ranges from 115 to 215 days and spawning occurs throughout most of the year as overlapping “microcohorts” enter the population throughout the year (Dawe and Beck, 1997, Hendrickson, 2004, as cited in NOAA NEFSC, 2013d). The species inhabits offshore shelf and slope waters primarily during spring through autumn (Hendrickson and Holmes, 2004, as cited in NOAA NEFSC, 2013d).

Productivity varies throughout the year and distribution and abundance change based on oceanographic factors (NOAA, 2013). Shortfin squid are generally found from shore to 600 feet (NOAA NEFSC, 2013d). Juvenile shortfin squid (less than or equal to 3.9 inches are referred to as pre-recruits while adults (greater than 3.9 inches) are referred to as recruits (NOAA NEFSC, 2013d). Pre-recruit short fin squid are generally found between 36 and 73^{o}F, while recruited squids are found between 39 and 66^{o}F (NOAA NEFSC, 2013d).

5.19.2 EFH

NMFS has indicted that there is not enough data to designate EFH for eggs and larvae of this species.

5.19.3 Project Potential Impacts

Short-finned squid may inhabit inshore waters from autumn until spring. Some life stage of the species may occur within the East River; although it is unlikely squid occur regularly in the project area. Short-finned Squid are highly motile and if squid were present during construction activities, they would relocate to nearby suitable locations. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would also not result in a significant loss of potential prey species for squid.

5.20 Spanish Mackerel

5.20.1 Species Description

The Spanish mackerel is a fast-swimming fish that roams in large schools. Spanish mackerel can be found near shore congregating around channels and bays, and are distributed from Cape Cod to South Florida, although they are rarely found north of the Chesapeake Bay (Robbins, 1986). Spanish mackerel primarily feed on shrimp, squid, and small fish and reach a size of up to 37 inches and 24 lbs.

5.20.2 EFH

NMFS has designated EFH for all life stages of this species.

5.20.3 Project Potential Impacts

Spanish mackerel are an open ocean species that would only be present in New York coastal waters in the warmer months of the year. The mackerel may swim into the Project Area in search of prey; although, their preferred habitat is in deeper more saline waters. The Proposed Action may disturb some potential habitat for Spanish mackerel prey species (small fish and crustaceans); however, given the limited amount of disturbance associated with the Proposed Action and the large amount of available habitat in the lower Hudson River Estuary, and New York Harbor, no notable loss of mackerel prey species are anticipated.

5.21 Spiny Dogfish

5.21.1 Species Description

Spiny dogfish are distributed worldwide on the continental shelves of boreal and temperate zones. The fish feed on a variety of marine organisms (e.g., fish, squid, etc.). Reproduction (birth) of spint dog fish occurs in the fall and winter.

5.21.2 EFH

NMFS has indicted that there is not enough data to designate EFH for eggs and larvae of this species

5.21.3 Project Potential Impacts

Impacts to spiny dogfish young would be minimal as birthing occurs offshore and the number of juveniles near the project is anticipated to be minimal. Spiny dogfish may swim into the Project Area; however, given the limited amount of disturbance associated with the Proposed Action and the large amount of available habitat in the lower Hudson River Estuary, and New York Harbor, no notable loss of mackerel prey species are anticipated.

5.22 Summer Flounder

5.22.1 Species Description

Summer flounder (or fluke) occur from the southern Gulf of Maine to South Carolina. Summer flounder are concentrated in bays and estuaries from late spring through early autumn, when an offshore migration to the outer continental shelf is undertaken. On the outer shelf they are found at depths up to 148 feet. Many summer flounder come close inshore when the waters are warm, but the great majority of the population, especially larger fish, lies farther offshore at that time of year (Bigelow and Schroeder, 1953, as cited in Dery, 1997). Spawning occurs offshore during autumn and early winter and the larvae are transported toward coastal areas by prevailing water currents.

Development of post-larvae and juveniles occurs primarily within bays and estuarine areas. Summer flounder often bury themselves in the soft bottom of the ocean or river. They consume small fish, most notably small mossbunker, squid, mackerel, sea robins, sand eels, killifish, and spearing.

5.22.2 EFH

NMFS has designated EFH for larvae, juvenile and adults life stages of this species in the marine waters of the project area and EFH for the larvae, juvenile and adults life stages of the mixing and salinity zones of the East River.

5.22.3 Project Potential Impacts

Although spawning takes place offshore, larvae can drift inshore, typically between October and May. Summer flounder larvae are listed as “rare” within the Hudson River/Raritan Bay Estuary in salinities between 5 and 25ppt and greater than 25 ppt during April through May and further identified as rare between September and December in salinities greater than 25 ppt (NCCOS, 2012). Larval stages have been documented in previous impingement and entrainment studies at Ravenswood (TRC, 2000) and Astoria (LMS, 1993 and ENSR, 2007). Best management practices will be employed to avoid impact to the larval life stage.

Juveniles and adults are listed as “rare” or “common” in salinities between 5 and 25ppt and greater than 25 ppt March through December. Juvenile and adult summer flounder have the potential to occur within project area. Though numbers are low in comparison to other species, summer flounder juveniles have been collected during impingement and entrainment studies at Astoria Generating Station (ENSR, 2007) and adults have been collected during impingement studies conducted at the Ravenswood (TRC, 2000). Though these species are demersal, both life stages are mobile. The Proposed Action is not expected to have a negative impact on any life stage of this species.

However, given the small amount of disturbance associated with the Proposed Action and the large amount of available habitat within the East River, it is anticipated that impacts to summer flounder eggs and larvae, if any, would be exceedingly small and insignificant. The removal of the minor amounts of benthic habitat and water column through the implementation of the Proposed Action would also not result in a significant loss of potential prey species for summer flounder within the East River. For flounder that forage in the project area, there would be a minimal loss of available foraging habitat.

5.23 Surf Clam

5.23.1 Species Description

The Atlantic surf clam, which is one of the largest bivalve mollusks in the western North Atlantic, inhabits sandy continental shelf habitats in both state waters and the federal waters of the United States Exclusive Economic Zone, along the Atlantic seaboard from the southern Gulf of Maine south to Cape Hatteras (Bigelow and Schroeder, 1953). In U.S. waters major concentrations of surf clams are found primarily on Georges Bank, in southern New England waters (south of Cape Cod and off Long Island), southern New Jersey, and the Delmarva Peninsula (Merrill and Ropes, 1969; Ropes, 1978). Atlantic surf clams inhabit waters from the surf zone seaward to depths of 400 feet; however, they are most abundant in water depths less than 240 feet (Ropes, 1978; NOAA, 1999).

5.23.2 EFH

NMFS has indicted that there is not enough data to designate EFH for eggs and larvae of this species.

5.23.3 Project Potential Impacts

Surf clam juveniles and adults do not occur in the Project Area as they prefer sandy habitats associated with open waters. It is anticipated the Proposed Action would not impact surf clams.

5.24 Windowpane Flounder

5.24.1 Species Description

Windowpane flounder, also known as sand flounder, are distributed on the northwest Atlantic continental shelf from the Gulf of St. Lawrence to Florida. This species inhabits large estuaries and is shoal water, benthic species that prefers sandy bottoms, as its name implies. However, it also frequents softer and muddier grounds (Bigelow and Schroeder, 1953, as cited in Dery, 1997). Peak spawning activity occurs in Mid-Atlantic Bight waters in May and October.

5.24.2 EFH

NMFS has designated EFH for all life stages of this species in marine waters within the East River, and in the seawater and mixing water/brackish salinity zones of the harbor.

5.24.3 Project Potential Impacts

Based on data reviewed on NOAA’s ELMR (NCCOS, 2012); adult, spawning, juvenile, and egg life stages of windowpane are identified as common in salinities greater than 25 ppt in the Hudson River/Raritan Bay Estuary. Egg and spawning life stages were identified as rare in salinities between 5 and 25 ppt; whereas the remaining life stages were considered common. Egg, larval, juvenile, and adult windowpane have been collected throughout the river and comprised up to 0.3 percent of total catch at Astoria Generating Station (LMS, 1993), 0.2 percent total catch at Ravenswood (TRC, 2000), and 0.5 percent of total catch at Astoria Generating Station in 2006 (ENSR, 2007). No adults were collected in 2006 study.

Windowpane flounder are sensitive to hypoxic conditions; and tend to avoid DO concentrations less than 3 mg/l (Howell and Simpson 1994). In summer months, the juvenile and adult species would tend to gravitate to deeper waters within the channel where water quality conditions would be more constant and avoid the shallow areas. Under-pier habitat is not representative of EFH habit, but EFH may exist alongside the outer edge of piling habitat where a more silt substrate was observed. Though habitat is not present, it is possible that eggs and larvae may enter underneath bulkhead pier structures while adrift. Egg distribution and larval movement is a function of the physical characteristics of the waterbody and surrounding area (e.g. tide, current, wind, weather, and runoff volumes). Eggs and larvae were identified as most dominant during May and June in the upper reaches of New York Harbor (USACE, 2002). Direct impact will be avoided through the use of BMPs and proposed seasonality of construction. Adult and juvenile species are expected to be farther offshore where habitat is more suitable, but potential presence seasonally does exist. This species’ life stages are most likely transient in the Proposed Area, and they have the ability to move during construction. As such, impacts are not anticipated.

Windowpane flounder habitat potentially would be disturbed during construction. However, given the small amount of disturbance under the Proposed Action and the large amount of available habitat within the East River, during construction, windowpane flounders using the project area would relocate to nearby suitable locations. The removal of benthic habitat under the Proposed Action would be a minor perturbance for windowpane flounder that forage in the area of the project area, but would not affect the long-term survival of the species.

5.25 Winter Flounder

5.25.1 Species Description

Winter flounder are distributed in the northwest Atlantic from Labrador to Georgia. The species is found in brackish and saltwater habitats. Abundance is highest from the Gulf of St. Lawrence to Chesapeake Bay. Optimum substrate for adults and juveniles is silty-sand. The diet consists primarily of benthic invertebrates. Movement patterns are generally localized. Winter flounder undertake small-scale migrations into estuaries, embayments, and saltwater ponds in winter to spawn, subsequently moving to deeper water during summer. Winter flounder tend to return to the same spawning locations in consecutive years. Optimum water temperature for spawning is 34 to 41^{o}F Females usually produce between 0.5 to 1.5 million eggs. Eggs are adhesive and settle to the bottom.

Generally, winter flounder release their eggs within areas that are less than 50°F, with salinities from 10 to 30 ppt, and in depths of less than 15 feet. Larval winter flounder are often found in shallow water between depths less than 18 feet (NEMFC NERO, 2013h). Juvenile and adult flounder can be found in waters up to approximately 160 and 325 feet in depth, respectively.

5.25.2 EFH

NMFS has designated EFH for winter flounder eggs, larvae, juveniles, and adults in the marine waters within the East River. NMFS has also designated EFH for all life stages of this species in the seawater and mixing water/brackish salinity zones of the harbor.

5.25.3 Project Potential Impacts

Winter flounder are a bottom dwelling species that spawns in the winter months in shallow waters less than 20 feet deep. When spawning, winter flounder are particularly susceptible to bottom disturbances as their eggs adhere to bottom sediments and are easily buried by increases in sedimentation.

Based on data reviewed on NOAA’s ELMR (NCCOS, 2012), all life stages of winter flounder have the potential to transit the proposed project site. ELMR lists each life stage as abundant in the Hudson River/Raritan Bay Estuary. In studies performed in the East River (TRC, 2000; TGE, 2002; ENSR, 2007), winter flounder was most abundant December through May and larval and juvenile life stages were one of the top four species collected.

Since winter flounder are demersal and have a direct connection to the substrate they are susceptible to pollution (Grosslein and Azarovitz,1982).The East River receives 83 percent of the effluent from 18 wastewater treatment plants located in New York and the southern Connecticut area (Sweeney, 2004). Maximum levels of *Enterococcus* in 2012 were reported as exceeding 4000/100ml, though numbers under 100/100ml were more common (NYCDEP, 2012). This is indicative to poor water quality. Due to the known current; lack of mud, gravel, or sand; tidal fluctuation; and the close proximity of a number of combined sewer overflows along the proposed Project Area, it is unlikely that under-pier or pier edge habitat is suitable for demersal egg masses or larvae. But, the potential exists for dislodged or adrift egg masses and larvae to transit the site. At similar stressed habitat in Ravenswood (TRC, 2000) post yolk-sac species were dominated by winter flounder, (36.4 percent). Fish sampling by LMS in 1983 at Westway indicated winter flounder as one of the top four dominant species collected. Therefore, the presence of juvenile and adult life stages is possible along pier edge and offshore habitat due to the presence of small pockets of sand or mud (ENSR, 2007; NYPA, 2001; and LMS, 1993). Under-pier habitat consisted of anthropogenic debris and rubble and preferred EFH for all life stages is questionable, but transit of species by life stage is possible.

Peak winter flounder egg and larval densities are from March to May in the New York and New Jersey Harbor Complex (USACE, 2002). Egg distribution and larval movement is a function of the physical characteristics of the waterbody and surrounding area (e.g. tide, current, wind, weather, and runoff volumes) and direct impact will be avoided through the use of BMPs and proposed seasonality of construction. Although juveniles and adults of this species are demersal, both life stages are mobile and can potentially avoid the project area. The Proposed Action is not expected to adversely impact any life stage of this species.

It is unlikely that the winter flounder use the project area for laying eggs as the waters are generally greater than 20 feet in depth. If winter flounder eggs were present within or adjacent to the work locations during construction, construction potentially would disturb eggs, which adhere to the bottom sediments. However, given the small amount of disturbance associated with the Proposed Action and the large amount of available habitat within the East River, the impacts to winter flounder would be exceedingly small and insignificant. During construction, juvenile and adult winter flounder, if present, would relocate to nearby suitable locations. The removal of benthic habit under any of the Proposed Action would be a minor perturbence for winter flounder that forage in the area of the project area, but would not affect the long-term survival of the species.

5.26 Winter Skate

5.26.1 Species Description

The winter skate is a common shelf-water species, found in the northwest Atlantic from Labrador to the Carolinas. This species prefers sandy and gravel substrate (Bigelow and Schroeder, 1953, Scott, 1982, as cited in Kukla et al., 2009b). Substrate type rather than depth appears more important in determining distribution (Scott, 1982, as cited in Kukla et al., 2009b). Winter skates can be found in depths from 0 to almost 1,000 feet.

Winter skates are slow-growing and produce few eggs each year. Eggs of winter skate are deposited throughout the year off southern New England and from summer to autumn off Nova Scotia (Vladykov, 1936, Collette and Klein-MacPhee, 2002, as cited in Kukla et al., 2009b). However, a peak in the reproductive season was observed during the summer months in the Gulf of Maine (Sulikowski et al., 2003, as cited in Kukla et al., 2009b). Females extruding complete egg purses have been noted only in the late summer/early autumn west of Sable Island, which may be a spawning area (Simon and Frank, 2000, as cited in Kukla et al., 2009b). Winter Skate migrate to deeper, colder waters during summer months in some areas and the species is sometimes termed a winter periodic (Scott and Scott, 1988, as cited in Kukla et al., 2009b).

5.26.2 EFH

NMFS has designated EFH for juveniles and adult life stages of this species in marine waters within the East River.

5.26.3 Project Potential Impacts

Winter skate juveniles may occur in the Project Area in the cooler months of the year. Winter skates would transit through the project area and use the benthic habitat for foraging opportunities. However, as winter skates are motile, they would relocate to nearby suitable habitats during construction. The removal of benthic habit would be a minor perturbance for winter skates that forage in the area of the project area, but would not affect the long-term survival of the species.

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6 SUMMARY OF IMPACTS

6.1 Impacts to EFH

The proposed EMWE will involve the construction of a new esplanade approximately one-mile in length located along Manhattan's east side adjacent to the FDR Drive and over the East River. The proposed esplanade will consist of new platforms over new pilings and the reuse of existing caissons.

Construction of structures in the water has the potential to directly and indirectly remove or alter habitat as well as potentially create new habitat. This chapter identifies the temporary or construction-related impacts of the EMWE and the anticipated permanent impacts of the operation of the EMWE.

6.1.1 Temporary Construction Impacts

6.1.1.1 Sedimentation and Turbidity Impacts

Anticipated disturbances below the SHTL, include pile installation, barge stabilization (e.g., placement of anchors, spud piles, etc.), vessel traffic, etc. All these activities have potential to re-suspend sediments. Increased turbidity and sedimentation can result in direct and indirect temporary impacts on the habitat of adult and juvenile demersal and pelagic fish, benthic invertebrates, and sessile organisms.

Sedimentation

Within the work locations, disturbed sediments would be temporarily re-suspended in the water column and re-deposited on the bottom. It is anticipated that due to the strong currents in the area, that if measureable amounts of re-deposition occur, it would occur in very small discreet areas. In areas of sedimentation, motile invertebrates (e.g., worms) likely would travel vertically upward in the sediment profile and thereby avoid mortality through burial. Sediment re-deposition could adversely affect less-motile and sessile benthic invertebrates. For instance, clam larvae are not likely to be affected by deposited sediment (except for potential effects on 'selection' of settlement sites by larvae), but at the earliest life stages the newly-settled clam larvae may not tolerate rapid deposition of fine sediments (Germano and Cary, 2005). Upon cessation of construction activities, the sedimentation would cease and no further impacts to benthic invertebrates would occur.

Turbidity

Turbidity (re-suspended sediments in the water column) can decrease water clarity, which could affect foraging behavior of visual predators and filter feeders. Other impacts associated with sedimentation include gill clogging and burial. It is anticipated that the proposed construction will not result in significant impacts to EFH or EFH-designated species. It is expected that fish will be temporarily displaced but will return to the area almost immediately following construction. Construction impacts are expected to be short term with negligible changes in bathymetry. Impacts to the marine water column will therefore be minor and temporary.

6.1.1.2 Acoustic Impacts

Hydroaccoustics and Marine Life

Sound is a critical source of environmental information for most vertebrates (e.g., Fay and Popper, 2000). Fish use sound to learn about their general environment, the presence of predators and prey, and, in many species, for acoustic communication. As a consequence, sound is important for fish survival, and anything that significantly impedes the ability of fish to detect a biologically relevant sound could decrease survival.

An increase in underwater noise can have both lethal and/or injurious effects on marine life. Effects on body tissues may result from barotrauma or result from rapid oscillations of air bubbles. Barotrauma occurs when there is a rapid change in pressure that directly affects the body gasses. Gas in the swim bladder, blood, and tissue of fish can experience a change in state, expand and contract during rapid pressure changes, which can lead to tissue damage and organ failure (Stephenson et al., 2010).

The damaging of fish tissue may lead to instant or rapid mortality, or render a fish with diminished auditory capacity, thus lessening a fish's ability to sense the acoustic scene. Finally, the increase in localized noise may alter a fishes behavior resulting in further perturbations.

Recent studies of the effects of pile driving sounds on fish showed that there is a clear relationship between onset of physiological effects and single strike and cumulative sound exposure level, and that the initial effects are very small and would not harm an animal (and from which there is rapid and complete recovery), whereas the most intense signals (e.g., >210 dB SEL_{cum}) may result in tissue damage that could have long-term mortal effects (Halvorsen *et al*. 2011.)

NMFS Criteria for Impact

As a result of an MOA a set of interim criteria were established for the acoustic levels at which there could be a potential onset of physiological effects to fish. The criteria were established in June 12, 2008 and are referred to as the interim West Coast criteria (reviewed in Woodbury and Stadler, 2008; Stadler and Woodbury, 2009). It should be noted, that these are onset of physiological effects (Stadler and Woodbury 2009), and not levels at which fish are mortally damaged. It is possible that the onset of physiological effects may be minimal changes in fish tissues that have no biological consequence (Halvorsen *et al*., 2011). The interim criteria are:

- Peak SPL: 206 dB re 1 μPa_{Peak};
- SELcum: 187 dB_{cSEL} for fishes above 2 grams (0.07 ounces); and
- SELcum: 187 dB_{cSEL} for fishes below 2 grams (0.07 ounces).

As a conservative measure, NOAA Fisheries and USFWS generally have used a 150 dB re 1 µPa rrms SPL criterion for the purposes of assessing behavioral effects of pile driving on fishes. Levels in excess of re 1 µPa rms can cause temporary behavioral changes (startle and stress) that could decrease a fish's ability to avoid predators.

Ambient Noise of the East River

It should also be noted that ambient sound levels in the marine environment are quite variable. Sound in the open ocean have been measured at 74 – 100 dB (CALTRANS, 2009; Kim, et al. 2009) while sounds within an urban estuary may be much higher. A recent study conducted by Reine et al., 2012, measured ambient noise in the mouth of the East River, near the southern tip of Manhattan, approximately 2 miles south of the project area. The ambient underwater noise averaged 125 dB re 1 µPa, which was recorded 27.8 ft below the surface.

There is a considerable amount of noise in New York Harbor due to tidal action, vessel traffic, subway tunnels, local geomorphology, and vibrations from bridges and roadways. Although no sound measurements were conducted at the project site, it is anticipated that the ambient average noise would be similar to the measurements that occurred at the southern tip of Manhattan (125 dB). This is attributed to the confining geometry of the west channel, the FDR Drive (a heavily used six-lane highway structure that is built into the water), the numerous and large vessels that transit through the west channel, and sound radiating from subway tunnels.

Project Generated Underwater Noise and Potential Effects

Construction of the EMWE

Piles will be installed with drilled shafts and vibratory hammers. Impact piling would only occur to seat the pile (if necessary). It is anticipated that only 2-3 piles would be erected each day in 3-month period for both the UN and ODR esplanades. The build years for the UN and ODR esplanades would be separated by at least four years.

Drilling of Shafts

The impacts of drilling shafts into the bottom of the East River is anticipated to have insignificant effects on EFH species. As per the Biological Assessment produced for the Tappan Zee Bridge Project NMFS indicated "*noise generated during drilling will be well below the noise levels likely to result in physiological or behavioral effects (i.e., 206 dB re 1 µPa peak and 187 dB re 1 µPa2 -s cSEL for physiological effects and 150 dB re 1 µPa RMS for behavioral effects). This conclusion is supported by analysis completed by NMFS Northwest Region on bridge projects carried out in Washington State where NMFS concluded that oscillating and rotating steel casements for drilled shafts are not likely to elevate underwater sound to a level that is likely to cause injury or noise that would cause adverse changes to fish behavior*." The bedrock geology of the Tappan Zee bridge area and eastern Manhattan is similar as both areas are dominated by metamorphic rock. Also, the depth and size of piles required for the EMWE is much less than Tappan Zee Bridge, as such, impacts from drilling of shafts is considered to be insignificant.

Vibratory Hammers

In May of 2012, a Pile Installation Demonstration Project (PIDP) was conducted for the Tappan Zee Bridge Project in the Hudson River. For the PIDP, the installation of 4-, 8-, and 10- foot piles by both vibratory and impact hammers were monitored. As part of the monitoring, short and long range acoustic monitors were placed approximately 35 and 1,000 feet from the demonstration piles. Monitoring during the vibratory hammering indicated that at the short range piles, the SPL varied between 169.6 and 185.2 (dB re 1 µPa) and the SPLs and the long range monitors 106.3 and 129.8 (dB re 1 µPa). Monitoring of the SEL (dB re 1 µPa^2·s) recorded values of 177.1 to 197.4 dB at the short range monitors and 128 to 154 dB at the long range monitors.

In a study conducted as part of the Richmond Inner Harbor in California (CalDOT, 2012) , the vibratory driving of a 72-inch pile (1.5 to 2 ft greater in diameter than piles to be driven for the EMWE), the dB re 1 µPa^2·s of SPL, SEL and RMS at 10 m was recorded as 183 dB, 170 dB, and 170 dB, respectively. Other projects to (Columbia River Crossing Project, Explosive Handling Wharf-2 (EHW-2) project located at

Naval Base Kitsap at Bangor, Washington) have to monitored vibratory piles and determined that the SPL is below the interim West Coast criteria and the SEL is rarely exceeded at a few meters from the pile.

In the Biological Opinion for the Tappan Zee Bridge project, NMFS states the following: *Installation of piles with a vibratory hammer will not result in peak noise levels greater than 206 dB re* 1 μPa^2·s *or cSEL greater than 187 dB re* 1 μPa^2·s *-so Thus, there is no potential for physiological effects due to exposure to this noise.*

Impact Hammer

The required energy to drive 48- and 54-inch piles, without noise attenuating systems, has been determined to exceed the interim criteria. However, the criteria are exceeded as piles are driven with an impact hammer through the undisturbed substrate, for the EMWE, impact hammering, if necessary, would only be used to finally seat the pile. It is anticipated that if impact hammering is utilized it would only require a few "taps" of the pile at a lower pressure. Thus, the potential to exceed the criteria greatly reduced.

Vessel Traffic

Boat engines, barge mounted machinery, vibrations from nearby structures (e.g., train tunnels, etc.) have the potential to impact fish and other marine fauna. The noise levels generated by these entities are not great enough to result in the death or mortality of organisms, but may affect behavior. For instance, the noise vibrations may mask other aquatic sounds or alter the fishes' behavior in another way.

New York Harbor is one of the busiest harbors in the world. Large ocean-going freighters and other vessels routinely sail within in several hundred feet of the project area. During construction, vessel traffic will be limited to several jack-up barges, a push or tug boat and a crew boat. With water depths average approximately 30 ft in the project area, However, given the size of the West Channel, and the depth of the water, and the high volume of marine traffic that occurs daily in the East River, it is anticipated that acoustic noise generated from these vessels will have limited, if any, impacts to EFH or EFH designated species.

Acoustic Impacts Summary

Large fish populations and/or fish aggregating structures are not present in the project area. Moreover, the project area and New York Harbor have ambient noise levels much higher than the ambient ocean. The placement of piles for the EMWE would not have significant impacts to EFH species or other marine fauna in the project area. Pile driving would only occur few a few minutes each day, approximately 3-4 days a week during a 90 day period. Pile driving will largely be accomplished with drilled shafts. Of the 173 piles that would comprise the EMWE, , approximately 153 piles would be drilled into place and only 20 piles would be put installed with and vibratory hammers. Impact hammers would only be used to seat the pile (if necessary). The seating of the pile would be accomplished with low blow counts and low energies.

If an unexpected field condition requires an impact hammering at levels that would exceed the SPL or SEL impact criteria, the contractor could employ a noise attenuating device (e.g., isolation casing) to attenuate the level of sound propagation below the impact criteria levels. Thus, the potential to exceed the criteria is greatly reduced and would likely not occur.

Thus, any exceedence of the SPL and SEL criteria would be extremely unlikely. Noise levels above 150 dB would be localized too It should be mentioned again, that presence of Roosevelt Island in the center of the East River would create a barrier to sound propagation. No elevated noise levels above any of the criteria would be anticipated in the East Channel, which provides more attractive fish habitat than the West Channel.

Once construction is completed, the EMWE would be used as a recreational esplanade. There would be no sound producing objects on the esplanade that would transmit sound into the water at or above the interim West Coast criteria. Thus, impacts to EFH species and EFH resulting from hydroaccoustics construction and/or operation of the EMWE would be minimal.

6.1.2 Permanent Impacts

6.1.2.1 Water Column EFH

Water Column Removal

The construction of the EMWE would require the occupation of water column habitat through the installation of new piles. The new piles would occupy approximately 56,300 cubic feet of water column (**Table 6-1**). The piles would be generally placed every 100 feet in a row of two to three over the course of approximately one mile. It is not anticipated that the placement of these piles would alter the flow of the river and/or affect the local currents as the piles would occupy an imperceptible quantity of water column.

Within the West Channel the river is subject to strong flows. In order to determine the percent of water volume the project would occupy within the one-mile length of the West Channel, the following was calculated: The approximate length of the EMWE (parallel to the shoreline), of approximately 5,000 feet, multiplied by the average width of the West Channel in the Project Area (approximately 950 feet), multiplied by the average depth across the West Channel near the Project Area (approximately 40 feet). This volume of water measures approximately 190,000,000 cubic feet of water. Divided by the amount of water column to be removed (approximately 79,000 cubic feet), the piles of the proposed EMWE would occupy only 0.040 percent of the one mile length of the West Channel.

Table 6-1

Cubic Feet of Water Volume Removed per Component

Component	Required Piles			Total Water Volume Removed per Pile Size (cubic ft)	Water Volume Removed per Component (cubic ft)
	Number	Diameter (in feet)	Pile Length (ft)		
ODR	24	4.5	37.8	14,421.08	16,776.08
	47	2	17.9	2,641.68	
UN	95	4	48.7	58,108.84	60,684
	3	4.5	54.0	2,575.19	
48 St	4	4	30	1,507.20	1,507
				Total	78,967

Fish Movement

It is not anticipated that the new structure would pose a barrier to fish movement in the East River. As stated earlier, the West Channel is approximately 950 feet wide. The EMWE would extend a maximum of approximately 80 feet from the shoreline; thus, leaving over 870 feet (perpendicular to the river's flow) for fish to swim. In fact, the placement of the piles for the EMWE may have positive benefits. Due to the very strong currents in the West Channel, the piles may serve as a refuge for fish to rest and stay out of the current.

6.1.2.2 Shading Impacts

The elevation of deck is being designed for future predicted tide elevations. The proposed EMWE design allows for 7.5 feet of clearance below the esplanade at Mean High Water (MHW), and 11 feet at Mean Low Water (MLW). Based on latest tidal epoch, MHW was determined to be El.+0.24 feet and MLW at El.-4.06 feet. Design also takes into account that the predicted MHW in Year 2088 (end of Design Life) is El.+2.16 feet and MLW El.-2.14 feet accounting for mean sea level rise and global warming effect. The datum presented for all elevations reported above is MBD, which is 2.75 feet above NGVD-29. The ODR esplanade would shade approximately 1.6 acres of open water habitat. The UN Esplanade would shade approximately 3.1 acres of open water habitat. As part of the Environmental Assessment, a shading study is being prepared and the results will quantify the potential shading impacts.

Impacts to Existing Shoreline/Bulkheads

Along the shoreline, the bulkheads are already colonized with a variety of marine fauna and flora common to New York harbor. The EMWE would largely be offset from the bulkheads by a distance of approximately 30 feet. It is anticipated that this distance would allow sunlight to still illuminate the area of the bulkhead that are currently sunlit. At the East 48th and East 52nd Streets ramp areas, etc., the construction of EMWE components would permanently shade areas of the bulkhead that are currently sunlit. However, the loss of sunlit areas would be offset by the installation of piles. It is anticipated that these piles would be colonized by similar organisms that are currently on the bulkheads.

Impacts to Fish and Open Water

Impacts to fish from shading by piers and other anthropogenic structures is an important topic of concern for marine related projects and subject of academic study (i.e., Able and Grothues, 2011, Grothues and Able 2010; Able and Duffy-Anderson. 2006; Nightingale and Simenstad, 2001). These studies have identified that shading can alter fish behavior, reduce fish populations, and/or potentially pose a barrier to migration.

A recent study by Able and Grothues (2011) identified an abundance of fish around Pier 40 on Manhattan's western shoreline. Pier 40 was selected because it is a large pier (i.e., approximately 830 feet x 735 feet wide) and the effect of shading would be most easily observed and quantified in such an extreme case; although, the authors did caution that the shading effect may not have a linear relationship with scale (size of the structure). In that study, a marked reduction in fish populations, especially small planktivorous baitfish (e,g., bay anchovies, etc.), was identified at approximately 16.1 feet from the edge of the pier line – the distance that light was below useful levels for fish vision (light was measured at 0 µE m^{-2} s^{-1}) (Able and Grothues, 2011). The study also determined a reduction in predatory fish species as well; although, the correlation was not as strong as that of the baitfish.

It should be noted that Pier 40 sits low to the water. The distance between mean low water and the top of the pier deck is only 11 feet, while the distance between mean low water and the top of the proposed

EMWE deck is approximately 19.5 feet. The deck thickness of the Pier 40 deck is approximately 1 foot and large pile caps extend down another 2 to 3 feet. Moreover, the deck is supported by numerous piles. Many of the pile bents are spaced 10 to 25 feet apart. Large lateral support structures (Photos 1 and 2) are located on the outside of the pier structure. The amount of sunlight that penetrates under the pier is reduced by the presence of these structures. The distance between the bottom of the pile bents to the water surface at high and low tide are 2.5 feet and 7 feet, respectively. Finally, the pier is west facing and amount of direct morning sunlight penetrating under the pier's southern perimeter is somewhat reduced due to confining geometries of the New York City skyline and vessels moored along the north and south sides of the pier. It is estimated that water depths under Pier 40 are 12-15 feet deep (HPA Engineers P.C. 2009).

Able and Grothues (2011) also caution that although the decline in fish population tightly correlates to the reduction of light levels; other factors may have contributed to the reduction of fish. The dense pile field under Pier 40 may create turbid conditions that fish sense and combined with ever increasing darkness caused the fish to seek more open water conditions. Under pier fish observations were often performed by a Didson camera towed behind a kayak. A question arises if the presence and movement of the kayak influenced fish behavior, too.

During the study, light levels at night were recorded at approximately 0 µE m^{-2} s^{-1} both under and away from the piers. Fish abundance was significantly higher in open water at distances over 7.5 meters away from the pier edge. This is attributed to the attracting effect of lights of the New York City skyline. Although, review of the graphs presented in Able and Grothues (2011) indicate fish were recorded at night over 100 feet (30 meters) under the pier too, albeit in very low numbers.

A study by Grothues and Able (2010) examined eight piers on Manhattan's west shoreline that varied in width from 51.7 to 775.7 feet. The studied piers and their respective dimensions are presented in Table 3.

Photo 1. Pier 40. Note the numerous pilings and horizontal support members. Source: HPA Engineers P.C. 2009

Photo 2. View of the dense pile field under Pier 40. HPA Engineers P.C. 2009

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Table 3
Pier Length and Widths Presented in Grothues and Able 2010

Pier	Length (m)*	Width (m)*	Pier	Length (m)*	Width (m)*
Pier 40	294	240	59	254	44
Pier 45	260	30	61	263	41
Pier 54	233	26	76	221	85
Pier 57	262	41	100	217	16
Notes: 1 meter = 3.094 feet.					

Grothues and Able (2010) identified that for pelagic fish, both large predators and their small prey are not abundant under large piers with intense shading, but can be abundant at pier edges and in open water, perhaps in response to light availability. They also found that striped bass were not typically found far under Pier 40, but occasionally were found at distances of about 25.8 to 32.3 feet under the pier. They concluded that this distance is approximately half to a quarter of the total width of other sampled piers (e.g. Pier 54, Pier 57, and Pier 100) from which they suggest that at narrower piers, there may be an enhancement rather than a restriction in habitat usage by some larger predatory fish species. For example, narrower piers produce less shading, large predatory fish may use the shaded areas as cover and strike at baitfish that swim along the edge of the piers. Thus, the long narrow piers have an increased edge to covered surface ratio that would allow this behavior. In addition, Grothues and Able reported that they observed a large school of bait fish passed completely under Pier 57, which is a pier that is smaller than Pier 40.

Review of the data in Grothues and Able, identified that for both large and small fish, the catch per unit effort (CPUE) was higher for underpier areas as compared to derelict pier piles and bulkheads. Along the Manhattan waterfront, large fish were most often encountered near Pier 57. Grothues and Able note that Pier 57 is unique among the sampled piers in that its support structure consists of wide, long concrete supports instead of individual pilings (The bents are approximately 20 feet apart).This would further suggest that narrow piers without intense shading, especially those without dense pile fields, have a far less impact on fish movement than large piers with intense shading and dense pile clusters. Grothues and Able also documented one large school of small fish that stretched through Pier 57 from open water on the north side unbroken through to open water of the south side - a distance of more than 136 feet.

Thus, the presence of fish under piers is variable due to myriad of factors. For narrowly shaded areas, it appears that smaller fish can travel through the shaded areas. The increased edge to covered ratio may enhance habitat characteristics for predatory fish. The authors did not quantify intense shading or large piers; however, it stands to reason that from their findings that a large structure such as Pier 40 would produce light levels so low that the lack of fish can be regularly observed. However a structure such as Pier 57 (133 feet- wide) does not produce the “intense shading” which would serve as a barrier to fish travel.

Other studies (Able and Duffy-Anderson 2006; Metzger et al 2001; and Duffy-Anderson and Able 1999) found reduced fish populations of many species in under pier areas. However, the sample location for these studies occurred in open water and along the piers edge, but the sample locations occurred at 64.6 feet and 129.3 feet under the pier deck. Duffy-Anderson and Able (1999) identified light intensities at 64.6 feet at 0.01 to 0.02 µE m-^{2} s^{-1} and at 0 µE m^{-2} s^{-1} at 129.3 feet (40 meters). Thus, these under pier sample locations are areas of intense shading and likely do not represent underpier areas of narrower piers.

Shading of the EMWE

Although some impacts to the marine environment may occur from the EMWE; it is projected that, based on the quality of the habitat and the dimensions of the EMWE, the EMWE would not cause unmitigable environmental impacts to the marine environment. Significant impacts are considered if the EMWE would create shading conditions in the river that would serve as a permanent barrier for fish swimming to Manhattan’s shoreline; provide a barrier or significantly impair the ability of fish to swim north and south in the East River; and/or provide a situation that significantly reduces the population of an endangered species or another species of fish within the Hudson Raritan Estuary (HRE).

The waters of the EMWE project area are deep (often in excess of 30 feet). In 2011, the NYCDEP conducted sampling in the open waters at the Harbor Monitoring Station E2, located in the East River roughly parallel to East 23rd Street. Light measurements of 0 µE m^{-2} s^{-1} were recorded at depth as shallow as 28 feet. Many demersal species in the East River (e.g., flounders, eels, etc.) occupy the bottom habitats, which is well below the sunlit portion of the upper water column. Thus, it could be assumed that the presence of the EMWE would not preclude demersal fish or many other species from swimming under the EMWE at such depths as there would be minimal, if any, change to lighting. Also, given the strong currents in the area, the pilings may serve at an attractive refuge for fish.

The design of the EMWE is considerably different than Pier 40 or other large piers with intense shading. The EMWE would largely stand on a north-south alignment with greater spacing between pier bents; generally spaced at 90 feet. At mean high and low tides, the difference between the surface of the water and the bottom of the deck and the water surface would be approximately 7.5 feet and 11 feet, respectively. With a width of only 40 feet and open to sunlight on both sides, the intense shading under Pier 40 would not occur under the EMWE. As reported above, Grothues and Able (2010) reported that a large school of bait fish passed completely under Pier 57 - a pier smaller than Pier 40 without dense pile fields.

The east-west connections of the EMWE would be of similar construction to the north-south portion of the EMWE, which would allow light to pass underneath the structure. Thus, it therefore stands to reason that the anticipated amount of underpier shading would not serve as an impenetrable barrier to fish that occupy the upper portions of the water column.

With respect to fish travel at night, previous studies have shown fish are often abundant away from the pier edges. It is possible that the EMWE may actually attract fish. The combination of the refuge provided by the EMWE's piles, the pedestrian and deck lighting of the EMWE, and the residual lighting of the Manhattan skyline could result in an increase number of fish around the EMWE than what currently exists in the project area.

Anthropogenic development within and adjacent to the marine environment may result in negative, and in some instances, positive impacts. In order to identify the potential for adverse impacts, AECOM is completing studies of the extent of shading projected to result from the EMWE. Using a computer model, the shaded areas under and/or adjacent to the proposed EMWE are being calculated. The calculations determine shading for the summer and winter solstices and the vernal and autumnal equinoxes, representing the dates of December 21st , March 20th , and June 21st. For each of these days, the amount of shading is calculated for 9:00 a.m., 12:00 p.m. (noon), 3:00 p.m. and 6:00 p.m. and at low and high tide.

The analyses show that all portions of the water underneath the EMWE would receive direct sunlight at some point in the daily tide cycle. Under the EMWE, the width of the area always in shade narrows as one approaches the water surface to the degree that only a small, area at MHW would always be in shade. Due to the narrow width of the EMWE and its separation from the Manhattan shoreline, direct and indirect sunlight would penetrate under portions of both sides of the structure during the course of the day. Thus, shading conditions under the EMWE would not be comparable to the permanent intense shading conditions under Pier 40. Overall, the analysis shows that all portions of the water underneath the esplanade would receive direct sunlight at some point in the daily tide cycle. Furthermore, indirect, diffused light should penetrate into those areas that are in temporary shading. Therefore, The predicted shaded conditions would not serve as a permanent barrier for fish to swim under the EMWE; thus, shading from the EMWE is not expected to have significant adverse effects on fish species or habitats present in the study area.

6.1.2.3 Benthic Habitat Removal

Installation of piles will result in some unavoidable impacts to marine fauna in the project area. Permanent benthic removal from pile installation is calculated at 0.04 acres (**Table 6-2**).

The benthic community, as observed during the on-site dive survey conducted by AECOM in 2011, indicated sparse coverage of the substrate. At a minimum, the benthos is expected to rapidly recover to its previous level following construction (Brooks *et al.*, 2006). Mobile organisms that are displaced during construction are expected to quickly return following construction. Previous studies (Iocco, 2000 and SAIC, 2006) have determined that benthic invertebrate populations inhabiting benthic sediments often quickly to recover after a disturbance.

Impacts beyond the permanent footprint of existing bulkhead structures (if any) are anticipated to be temporary and short-term due to the physical dynamics of the East River and the incorporation of BMPs during construction.

Table 6-2

Benthic Area Removed Due to Pile Installation

Component	Piles		Benthic Area Removed Per Pile Size (square ft)	Total Benthic Area Removed (sq ft)	Total Benthic Area Removed (Acres)
	Number	Diameter (in feet)			
ODR	24	4.5	381.51	530	0.01
	47	2	147.58		
UN	95	4	1,193.20	1,241	0.03
	3	4.5	79.48		
48 St Connection	4	4	50.24	50	<0.01
			Total	1,821	0.04

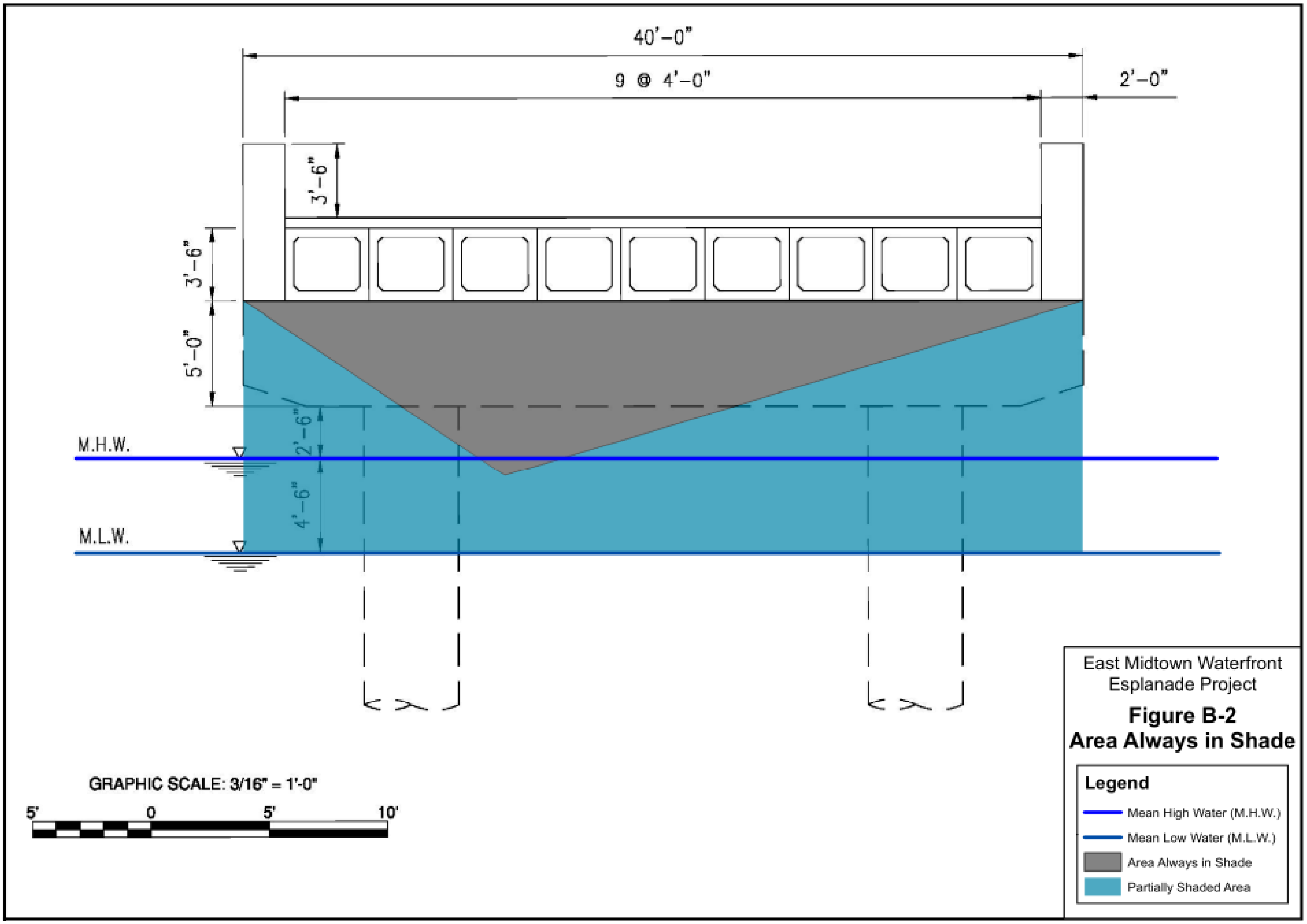
Conversely, the placement of the new piles would provide additional hard substrate for marine fauna and flora to colonize. As per the calculations identified in **Table 6-3**, the EMWE would create approximately 80,000 square feet for marine fauna to colonize. It is anticipated that marine flora would utilize the upper 10 foot of portions of the column with sufficient light exposure to support their physiological requirements.

Table 6-3

Total Encrusting Habitat Created by Construction of EMWE

Component	Piles			Total New Surface Area Per Pile Size (sq ft)	Total New Surface Area per Component (sq ft)
	Number	Diameter (in feet)	Pile Length (ft)		
ODR	24	4.5	37.8	12,818.7	18,102.10
	47	2	17.9	5,283.4	
UN	95	4	48.7	58,108.8	60,397.9
	3	4.5	54.0	2,575.1	
48 St Connection	4	4	30.00	1,507.2	1,507.20
			Total	80,007.2	80,007.2

Figure 6-1 Areas Always in Shade



6.1.2.4 Commercial And Recreational Fishing Activities

Commercial fishing activities occur within New York's coastal and oceanic waters. It is anticipated that the level of fishing activities, and resulting impacts to EFH and EFH-designated species, during the construction of the Proposed Action would be similar to recent years. Little, if any, commercial fishing occurs in New York Harbor. Recreational fishing near the project area occurs immediately south and north of the project area. The proposed EMWE will provide additional fishing stations for recreation fishers along the length of the esplanade. Although, this may increase the fishing pressure in the West Channel, it is not anticipated that the increase in fishing activities would result in adverse impacts to EFH or EFH-designated species.

6.2 Summary of Anticipated Temporal Impacts

This subchapter summarizes the short term and long-term impacts to EFH and designated EFH species and life stages. Impacts of the Proposed Action on EFH could range from none to negligible for some life stages of species with designated EFH within the East River. Any impacts would be localized.

6.2.1 Short Term Impacts

Construction activities will employ BMPs to reduce construction impacts. Minor increases in turbidity and sedimentation may be generated by the proposed construction activities; however, these increases would be exceedingly small and localized. If eggs and larvae are present during construction, they could be affected. During the construction period, adult and juvenile fish would leave the area of construction and move to nearby suitable locations outside the area of disturbance. Also, for a short period of time after construction, there would may be a marked reduction in benthic organisms in and adjacent to benthic areas that were affected by construction activities (spud pile footprints, anchor drag, etc.). However, as discussed previously, these areas would be quickly recolonized.

With respect to in-water construction projects, underwater acoustic energy (at the levels that may injure fish) would not occur. Steel piles would be driven with a vibratory hammer. Impact hammering using low blow counts and low energies would only be required to set the piles. If higher blow counts and energies are required, noise attenuating devices (i.e., isolation casings) could be employed.

Therefore, it can be anticipated that only very minor, short-term impacts on biological resources (e.g., benthic invertebrates, etc.) would occur in the project area; however, these impacts would not adversely affect any EFH species.

6.2.2 Long-Term Impacts

The removal of water column and benthic EFH would have exceedingly small and insignificant, long-term impacts. Given that these impacts would occur over small, discrete areas, and would not impact the water flow and circulation of West Channel, the EMWE would have no adverse effect on fish populations, including species with designated EFH in the East River.

6.3 Conclusions

The Proposed Action will affect EFH, but the impacts would be exceedingly small and insignificant. The impacts would not threaten the long-term survivability of EFH managed species or their potential prey species. Upon cessation of construction activities, changes within the project area would not inhibit fish movement, increase or decrease water velocity, substantially reduce potential long-term food resources, or affect water quality.

The habitat of the project area is of low to moderate value and is similar to habitat throughout West Channel of the East River. The habitat of the project area does not represent an area solely used by EFH-listed species for critical life cycle activities (e.g., spawning, migration route, etc.). The amount of habitat impacted and the duration of impacts is so minor that it is anticipated that the impacts to EFH-listed species would be negligible.

7 MITIGATION AND CONSERVATION MEASURES

7.1 Conservation Measures

Measures are expected to be implemented to minimize or avoid effects on EFH and managed species based on consultation with federal agencies and state. It is anticipated that the resource agencies may prohibit construction activities to occur during certain periods of the year to reduce potential impacts. It is expected that all permit conditions would be adhered to.

During construction, the contractor, if possible, would utilize turbidity curtains to reduce the potential for transport of suspended sediments. It is expected that regulatory agencies would be consulted to obtain their guidance on the use and deployment of turbidity curtains.

It is also anticipated that the selected contractor(s) would employ appropriate marine construction BMPs. The BMPs include but are not limited to:

- Use of silt management techniques and soil erosion practices to limit the downriver transport of re-suspended sediment;
- Observance of seasonal restriction and special permit conditions associated with anadromous fish migration;
- No over-loading of barges relative to water depth;
- Use of high propeller support vessels;
- Limited movement of barges once at a particular location;
- Stockpiled materials would have appropriate containment measures;
- When possible, the contractor would work with pre-cast materials over the water;
- Any landside work would be performed in accordance with a sediment and erosion control plan; and
- Contractors would only refuel vehicles in designated areas that have appropriate containment systems to capture accidental spills.

7.2 Mitigation

It is anticipated that shading and fill removal measures would be a condition of the environmental permits issued by the regulatory agencies. To this end, the NYCEDC is consulting with the NYSDEC and USACE regarding requirements for this project. To date, several potential sites have been identified in the East River and greater New York Harbor area to serve as project related improvements for the EMWE. It is anticipated that NYCEDC will have received guidance from NYSDEC regarding required activities by the time permit applications are submitted in the Fall of 2013. Work on the EMWE would not begin until permit conditions have been satisfied.

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Appendices

Appendix A

Detailed Species Description of Species to be Found in the Project Area

A.1 Atlantic Sea Herring

Larvae: Pelagic waters in the Gulf of Maine, Georges Bank, and southern New England that comprise 90 percent of the observed range of Atlantic herring larvae. Generally, the following conditions exist where Atlantic herring larvae are found: sea surface temperatures below 61° F, water depths from 165 to 300 feet, and salinities around 32 ppt. Atlantic herring larvae are observed between August and April, with peaks from September through November. Depth of water at the proposed project site is not preferred though it is possible for eggs to transit the project area depending on physical conditions.

Juveniles: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where Atlantic herring juveniles are found: water temperatures below 50°F, water depths from 50 to 450 feet, and a salinity range from 26 to 32 ppt.

Adults: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where Atlantic herring adults are found: water temperatures below 50°F, water depths from 65 to 450 feet, and salinities above 28 ppt.

Based on data reviewed on NOAA's Estuarine Living Marine Resources Database (ELMR) (NCCOS, 2012), larval, juvenile, and adult life stages of Atlantic herring have the potential to transit the proposed project site. ELMR lists juvenile and adult life stage as common in the Hudson River/Raritan Bay Estuary in salinities between 5 and 25 ppt and greater than 25 ppt during the months of January through May and rare the remainder of the year. Larvae are listed as common in April and May, rare in June, and absent the remainder of the year.

Adrift larval herring is known to seasonally be present in the East River (LMS, 1993; ENSR, 2007) and Atlantic herring was one of the most abundant species entrained (LMS, 1993). Herring travel in schools. Small schooling fish (much like juvenile herring) are known to avoid under-pier habitat areas but will use edge habitat (Able and Grothue, 2011). Juveniles may transit the Project Area though habitat is not preferred and preferred depths are much shallower than given in the above description. Adults may transit the location though habitat is not preferred and depth is shallower than preferred. Both life stages are pelagic and can potentially avoid the Project Area. It is expected that adults would tend to prefer more channelized areas and would likely avoid the area during construction. Impact is not anticipated.

A.2 Atlantic Butterfish

Larval: Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where butterfish larvae are "common," "abundant," or "highly abundant" on the Atlantic coast as given in the ELMR database (NCCOS, 2012), from Passamaquoddy Bay, Maine to James River, Virginia. Generally, butterfish larvae are collected in depths between 33 feet and 6,000 feet and temperatures between 48^{o}F and 66^{o}F.
Juveniles: Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where juvenile butterfish are "common," "abundant," or "highly abundant" on the Atlantic coast in the ELMR database (NCCOS, 2012), from Passamaquoddy Bay, Maine to James River, Virginia. Juvenile butterfish have been collected in depths between 33 feet and 1,200 feet and temperatures between 37^{o}F and 82^{o}F. This life stage prefers sandy and muddy substrates.

Adults: Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where adult butterfish are "common," "abundant," or "highly abundant" on the Atlantic coast per the ELMR database (NCCOS, 2012), from Passamaquoddy Bay, Maine to James River, Virginia. Adult butterfish have been collected in depths between 33 feet and 1,200 feet and temperatures between 37^{o}F and 82^{o}F. This life stage prefers sandy and muddy substrates.

According to ELMR data, larval butterfish are “common” in the HRE in salinities between 0.5 and 25 ppt in August, whereas juveniles and adults are common in salinities between 0.5 and 25 ppt and greater than 25 ppt between April and December. Habitat type at Astoria Generating Station upriver is similar to that of Waterside Pier. Impingement and entrainment studies at Astoria (ENSR, 2007) showed the majority of adult and juvenile species impinged was from end of May to end of September (with more juveniles than adult species impinged). Larvae were most prevalent in August entrainment samples.

Overall, EFH does appear to exist seasonally in patches within and adjacent to the proposed project site for the aforementioned three life stages. Small schooling fish are known to avoid under-pier habitat areas and habitat has been documented as suboptimal for many of the abundant pelagic fishes and benthic fishes in the Lower Hudson River estuary (Able and Grothue, 2011). Impacts to larvae will be avoided through the use of BMPs. Juvenile and adult species are pelagic and have the ability to avoid the project area during construction. The Proposed Action is not expected to have a negative impact on any life stage of this species.

A.3 Atlantic Mackerel

Juveniles: Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where juvenile Atlantic mackerel are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Juvenile Atlantic mackerel have been collected from shore to 1,050 feet and temperatures between 39^{o}F and 72^{o}F.

Adults: Inshore, EFH is the "mixing" and/or "seawater" portions of all the estuaries where adult Atlantic mackerel are "common," "abundant," or "highly abundant" on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia. Generally, adult Atlantic mackerel are collected from shore to 1,250 feet and temperatures between 39^{o}F and 61^{o}F. Adults are listed as not present in the Hudson River/Raritan Bay Estuary (NCCOS, 2012). EFH does not exist within the project area.

Juveniles are listed as “common” within the Hudson River/Raritan Bay Estuary in salinities greater than 25 ppt April through June and in October and November (NCCOS, 2012). Juvenile species have been collected in June within the East River (ENSR, 2007) though numbers were low and represented a small percentage of catch. Preferred EFH is not present within the project area but life stage may be present. Adults are listed as “common” by ELMR (NCCOS, 2012) in April/May and October/November in salinities greater than 25 ppt and not listed in salinities lower. In the reports reviewed (Verdant, 2013; ENSR, 2007; TRC, 2002; LMS, 1993), no records of adult Atlantic mackerel collected or observed within the East River were given. It would appear that if this life stage may be uncommon and that if species is present, it would most likely use the more open waters associated with the channel. Impacts will be avoided or minimized through the use of BMPs and seasonality of construction schedule. Species’ life stages are pelagic and avoidance of the proposed Project Area during construction is anticipated, therefore no adverse impact is expected.

A.4 Black Sea Bass

Juveniles: EFH inshore is the estuaries where black sea bass are identified as being common, abundant, or highly abundant in the ELMR database for the "mixing" and "seawater" salinity zones (NCCOS, 2012). Juveniles are found in the estuaries in the summer and spring in waters warmer than 43°F with salinities greater than 18 ppt. Juvenile black sea bass are usually found in with rough bottom, shellfish and eelgrass beds, man-made structures in sandy-shelly areas; and offshore clam beds and shell patches during the wintering. Juveniles winter offshore New Jersey. Juveniles are known to find shelter around piers (Steimle et.al, 1999a).

Adults: EFH inshore is the estuaries where adult black sea bass were identified as being common, abundant, or highly abundant in the ELMR database (NCCOS, 2012) for the "mixing" and "seawater" salinity zones. Black sea bass are generally found in estuaries from May through October with offshore wintering adults prevalent November through April. Structured habitats (natural and man-made), sand and shell are usually the preferred substrate. Adults are known to find shelter around piers (Steimle et.al, 1999a).

Juvenile and adult black sea bass have been identified as rare for the “mixing” and “seawater” salinity zones for the HRE between April and May and are absent the remaining months. Yet, habitat and a forage base does exist for theses life stages at the proposed location. Surveys conducted at Astoria Generating Station (ENSR, 2007) and Ravenswood (TRC, 2000) collected larval, juvenile, and adult life stages though percent composition of the catch was small compared to other species collected. Regardless, the potential for this species to seasonally be present during the summer months does exist though it is considered rare. Although juvenile and adult black sea bass are more structured-oriented, they are mobile and not expected to be impacted by the Proposed Action.

A.5 Bluefish

Juveniles: Inshore, EFH is all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Generally juvenile bluefish occur in Mid-Atlantic estuaries from May through October, within the "mixing" and "seawater" zones (Stone *et al.*, 1994) and can be found in areas having sand, mud, silt, clay, or *Spartina* and *Fucus* beds (Fahay *et al.*, 1999).

Adults: Inshore, EFH is all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Adult bluefish are found in Mid-Atlantic estuaries from April through October in the "mixing" and "seawater" zones (Stone *et al*., 1994). Bluefish adults are highly migratory and distribution varies seasonally and according to the size of the individuals comprising the schools. Bluefish are generally found in normal salinities (>25 ppt). Large predatory fish have been documented as being more abundant near the edge of piers and waterside structures to a distance underneath of up to 16 feet or where light still penetrates. Beyond that area of light penetration, studies have shown that abundance and occurrence declined sharply (Able and Grothue, 2011). There is potential for bluefish to forage or transit the proposed Project Area along the existing bulkhead and piling/edge habitat.

Juvenile and adult bluefish and corresponding EFH is seasonally present within the proposed Project Area though under-pier habitat would be less preferred to that of open water and piling/edge habitat for juveniles. Based on Able and Grothues (2011) under-pier study along the Hudson River, it was observed that small schooling pelagic fishes avoided using under-pier habitat; whereas large pelagic fish species (e.g. adult striped bass and bluefish) were basically as common in open water as under-pier just inside of the edge. As stated previously, no SAV was observed on-site and the majority of the under-pier habitat consisted of concrete rubble. Juveniles and adults could likely use this habitat to forage concentrating on the smaller schooling fishes that are known to inhabit the piling edge habitat. Though presence is common, these species are pelagic and could avoid the project area during construction. Impacts are not anticipated.

A.6 Pollock

Juveniles: Bottom habitats with aquatic vegetation or a substrate of sand, mud, or rocks in the Gulf of Maine and Georges Bank. Generally, the following conditions exist where pollock juveniles are found: water temperatures below 65°F, depths from 0 to 820 feet, and salinities between 29 and 32 ppt.

Adults: Bottom habitats in the Gulf of Maine and Georges Bank and hard bottom habitats (including artificial reefs) off southern New England and the middle Atlantic south to New Jersey. Generally, the following conditions exist where pollock adults are found: water temperatures below 57°F, depths from 50 to 1,200 feet, and salinities between 31 and 34ppt.

Though the on-site habitat at the proposed Project Area contains pockets of sand and concrete rubble that could be a substitute for EFH, habitat is of poor quality. Pollock was not listed as having designated EFH in the Hudson/Raritan Estuary in NOAA's *Summary of Essential Fish Habitat (EFH) Designation: Major Estuaries, Bays, and Rivers along the Northeast United States Coast* (NMFS, 2000a). Based on data reviewed on the NOS ELMR (NCCOS, 2012); juvenile life stages for pollock are identified as not present in the HRE and adults are listed as rare in the Hudson River/Raritan Bay Estuary in salinities over 25ppt. Surveys conducted near the project area (LMS, 1993; NYPA, 2001, and ENSR, 2007) indicated that juvenile pollock made up less than 0.1 percent of all fish collected annually in 1993, 2000, and 2006. No adult species were collected during these surveys. This species is most likely not present at the proposed Project Area and impact is not anticipated.

A.7 Red Hake

Larvae: Surface waters of the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where red hake larvae are found: sea surface temperatures below 65°F, water depths less than 650 feet, and salinity greater than 0.5 ppt. Red hake larvae are most often observed from May through December with abundances peaking between September and October.

Juveniles: Bottom habitats with a substrate of shell fragments, including areas with an abundance of live scallops, in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras. The following conditions exist where red hake juveniles are found: water temperatures below 61° F, depths less than 330 feet and a salinity range from 31 – 33 ppt.

Adults: Bottom habitats in depressions with a substrate of sand and mud in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where red hake adults are found: water temperatures below 54°F, depths from 33 to 425 feet, and a salinity range from 33 to 34 ppt.

Larval, juvenile, and adult red hake are listed as common in the mixing zone of the Hudson River/Raritan Bay Estuary (NCCOS, 2012). No larval red hake were collected during entrainments studies conducted at Astoria Generating Station (ENSR, 2007) but presence is still possible seasonally. Juvenile red hake substitute anthropogenic debris for shell fragments. The under-pier and piling/open water habitat does not accommodate live scallops though anthropogenic debris could be substituted for shell fragments. Though preferred habitat is absent, a forage base of invertebrates is present and the potential for transient life stages within the Proposed project Area does exist. Because red hake are sensitive to dissolved oxygen levels (Steimle *et al.*, 1999), it is unlikely species will be present in warmer months when dissolved oxygen levels are lowest, but presence could revolve around the colder months. Though larval movement is a function of the physical characteristics of the waterbody and surrounding area (e.g. tide, current, wind, weather, and runoff volumes), direct impact will be avoided through the use of BMPs and proposed seasonality of construction. Juvenile and adult red hake may be present in the project area but possess the mobility to avoid impacts.

A.8 Summer Flounder

Larvae: Inshore, EFH is identified as the estuaries where summer flounder presence in the "mixing" and "seawater" salinity zones is rare, common, abundant, or highly abundant (NCCOS, 2012). Summer flounder larvae are most abundant nearshore (12-50 miles from shore) at depths between 30 and 230 feet and frequently found in the northern part of the Mid-Atlantic Bight from September to February, and in the southern part from November to May.

Juveniles: EFH inshore is all of the estuaries where summer flounder were identified as being present (rare, common, abundant, or highly abundant) in the ELMR database (NCCOS, 2012) for the "mixing" and "seawater" salinity zones. Juveniles use several estuarine habitats as nursery areas, including salt marsh creeks, seagrass beds, mudflats, and open bay areas in water temperatures greater than 37^{o}F and salinities from 10 to 30 ppt. They are distributed throughout the New York-New Jersey Harbor Estuary prior to late summer and are more concentrated in sea grass beds as opposed to tidal marshes in the late summer and early autumn (Verdant, 2012).

Adults: Inshore, EFH is the estuaries where summer flounder were identified as being common, abundant, or highly abundant in the ELMR database (NCCOS, 2012) for the "mixing" and "seawater" salinity zones. Summer flounder adults inhabit shallow coastal and estuarine waters during warmer months and move offshore to depths of 500 feet in colder months.

Although spawning takes place offshore, larvae can drift inshore, typically between October and May. Summer flounder larvae are listed as "rare" within the Hudson River/Raritan Bay Estuary in salinities between 5 and 25 ppt and greater than 25 ppt during April through May and further identified as rare between September and December in salinities greater than 25 ppt (NCCOS, 2012). Larval stages have been documented in previous impingement and entrainment studies at Ravenswood (TRC, 2000) and Astoria (LMS, 1993 and ENSR, 2007). Best management practices will be employed to avoid impact to the larval life stage.

Juveniles and adults are listed as "rare" or "common" in salinities between 5 and 25 ppt and greater than 25 ppt March through December. Juvenile and adult summer flounder have the potential to occur within project area. Though numbers are low in comparison to other species, summer flounder juveniles have been collected during impingement and entrainment studies at Astoria Generating Station (ENSR, 2007) and adults have been collected during impingement studies conducted at the Ravenswood (TRC, 2000). Though these species are demersal, both life stages are mobile. The Proposed Action is not expected to have a negative impact on any life stage of this species.

A.9 Scup

Larvae: EFH is estuaries where scup were identified as common, abundant, or highly abundant in the ELMR database (NCCOS, 2012) for the "mixing" and "seawater" salinity zones. Scup larvae are most abundant nearshore from May through September in water temperature between 55 and 73^{o}F and in salinities greater than 15 ppt.

Juveniles: Inshore, EFH is the estuaries where scup are identified as being common, abundant, or highly abundant in the ELMR database (NCCOS, 2012) for the "mixing" and "seawater" salinity zones. Juvenile scup are found in estuaries and bays between Virginia and Massachusetts during the summer and spring and prefer sand, mud, mussel, and eelgrass bed type substrates. Preferred water temperatures are greater than 45^{o}F and salinities greater than 15 ppt.

Adults: EFH is the estuaries where scup were identified as being common, abundant, or highly abundant in the ELMR database (NCCOS, 2012) for the "mixing" and "seawater" salinity zones. Generally, wintering adults (November through April) are usually offshore, south of New York to North Carolina, in waters above 45^{o}F.

Per the ELMR database, the aforementioned life stages of scup are considered rare in salinities between 5 and 25 ppt in the Hudson River/Raritan Bay Estuary. However, in salinities greater than 25 ppt, larvae are identified as common in July; juveniles are listed as abundant from June through September; and adults are common From June through August (NCCOS, 2012). In entrainment studies performed at Astoria Generating Station upriver (ENSR, 2007), larval scup were collected in June, and juveniles peaked in August. Impingement data for juveniles and adults from the same survey showed peak abundance in November and February. Regardless of seasonality shifts between defined EFH and actual collection; larval, juvenile, and adult scup have the potential to be within or adjacent to the proposed Project Area. Direct impact will be avoided through the use of BMPs. This species' juvenile and adult life stages are most likely seasonally transient at the proposed Project Area and have the ability to move during construction. Impact is not anticipated.

A.10 Winter Flounder

Eggs: Bottom habitats with a substrate of sand, muddy sand, mud, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay. Generally, winter flounder eggs are found in the following conditions: water temperatures less than 41°F, salinities between 10 and 30 ppt, and water depths less than 15 feet.

Larvae: Pelagic and bottom waters of Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay. Generally, the following conditions exist where winter flounder larvae are found: sea surface temperatures less than 60°F, salinities between 10 and 30 ppt, and water depths less than 15 feet.

Juveniles: Bottom habitats with a substrate of mud or fine grained sand on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay. Generally, the following conditions exist where winter flounder young-of-the-year are found: water temperatures below 80° F, depths from 3 to 30 feet, and salinities between 5 and 33 ppt. Generally, the following conditions exist where juvenile winter flounder are found: water temperatures below 25° C, depths from 3 to 165 feet, and salinities between 10 and 30 ppt.

Adults: The essential fish habitat for adults is bottom habitats including estuaries to a depth of 330 feet. They prefer mud, sand, and gravel substrates.

Based on data reviewed on NOAA's ELMR (NCCOS, 2012), all life stages of winter flounder have the potential to transit the proposed project site. ELMR lists each life stage as abundant in the Hudson River/Raritan Bay Estuary. In studies performed in the East River (TRC, 2000; TGE, 2002; ENSR, 2007), winter flounder was most abundant December through May and larval and juvenile life stages were one of the top four species collected.

Yet, since winter flounder are demersal and have a direct connection to the substrate they are susceptible to pollution (Grosslein and Azarovitz,1982).The East River receives 83 percent of the effluent from 18 wastewater treatment plants located in New York and the southern Connecticut area (Sweeney, 2004). Maximum levels of *Enterococcus* in 2012 were reported as exceeding 4000/100ml, though numbers under 100/100ml were more common (NYCDEP, 2012). This is indicative to poor water quality. Due to the known current; lack of mud, gravel, or sand; tidal fluctuation; and the close proximity of a number of combined sewer overflows along the proposed project site, it is unlikely that under-pier or pier edge habitat is suitable for demersal egg masses or larvae. But, the potential exists for dislodged or adrift egg masses and larvae to transit the site. At similar stressed habitat in Ravenswood (TRC, 2000) post yolk-sac species were dominated by winter flounder, (36.4%). Fish sampling by LMS in 1983 at Westway indicated winter flounder as one of the top four dominant species collected. Therefore, the presence of juvenile and adult life stages is possible along pier edge and offshore habitat due to the presence of small pockets of sand or mud (ENSR, 2007; NYPA, 2001; and LMS, 1993). Under-pier habitat consisted of anthropogenic debris and rubble and preferred EFH for all life stages is questionable, but transit of species by life stage is possible.

Peak winter flounder egg and larval densities are from March to May in the New York and New Jersey Harbor Complex (USACE, 2002). Egg distribution and larval movement is a function of the physical characteristics of the waterbody and surrounding area (e.g. tide, current, wind, weather, and runoff volumes) and direct impact will be avoided through the use of BMPs and proposed seasonality of construction. Although juveniles and adults of this species are demersal, both life stages are mobile and can potentially avoid the Project Area. The Proposed Action is not expected to adversely impact any life stage of this species.

A.11 Windowpane Flounder

Eggs: Surface waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where windowpane flounder eggs are found: sea surface temperatures less than 68°F and water depths less than 230 feet. Windowpane flounder eggs are often observed from February to November with peaks in May and October in the middle Atlantic and July - August on Georges Bank.

Larvae: Pelagic waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where windowpane flounder larvae are found: sea surface temperatures less than 68° F and water depths less than 230 feet. Windowpane flounder larvae are often observed from February to November with peaks in May and October in the middle Atlantic and July through August on Georges Bank.

Juveniles: Bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras. Generally, the following conditions exist where windowpane flounder juveniles are found: water temperatures below 78°F, depths from 3 to 330 feet, and salinities between 5.5 and 36 ppt. Salinities and depth are within the preferred parameters.

Adults: Bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border. Generally, the following conditions exist where windowpane flounder adults are found: water temperatures below 78°F, depths from 3 to 250 feet, and salinities between 5.5 and 36 ppt.

Based on data reviewed on NOAA’s ELMR (NCCOS, 2012); adult, spawning, juvenile, and egg life stages of windowpane are identified as common in salinities greater than 25 ppt in the Hudson River/Raritan Bay Estuary. Egg and spawning life stages were identified as rare in salinities between 5 and 25 ppt; whereas the remaining life stages were considered common. Egg, larval, juvenile, and adult windowpane have been collected throughout the river and comprised up to 0.3 percent of total catch at Astoria Generating Station (LMS, 1993), 0.2 percent total catch at Ravenswood (TRC, 2000), and 0.5 percent of total catch at Astoria Generating Station in 2006 (ENSR, 2007). No adults were collected in 2006 study.

Windowpane flounder are sensitive to hypoxic conditions; and tend to avoid DO concentrations less than 3 mg/l (Howell and Simpson 1994). In summer months, the juvenile and adult species would tend to gravitate to deeper waters within the channel where water quality conditions would be more constant and avoid the shallow areas. Under-pier habitat is not representative of EFH habit, but EFH may exist alongside the outer edge of piling habitat where a more silt substrate was observed. Though habitat is not present, it is possible that eggs and larvae may enter underneath bulkhead pier structures while adrift. Egg distribution and larval movement is a function of the physical characteristics of the waterbody and surrounding area (e.g. tide, current, wind, weather, and runoff volumes). Eggs and larvae were identified as most dominant during May and June in the upper reaches of New York Harbor (USACE, 2002). Direct impact will be avoided through the use of BMPs and proposed seasonality of construction. Adult and juvenile species are expected to be farther offshore where habitat is more suitable, but potential presence seasonally does exist. This species' life stages are most likely transient at the proposed project area, and they have the ability to move during construction. Impact is not anticipated.

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Appendix B

October 2011 Dive Survey

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Memorandum

To	John Seaboldt	Page	1
CC	James Mansky, Karen Appell, and Indhira Figuereo		
Subject	East Midtown Waterfront Esplanade (EMWE) - Ecological Underwater Survey		
From	Capt. Aleksandr Modjeski		
Date	January 3, 2011		

SUMMARY

An Ecological Underwater Survey was performed as part of the preliminary baseline assessment necessary for identifying potential ecological impacts from the construction of the EMWE and on-site mitigation opportunities along the eastern shoreline of the East River between East 38th Street and East 61st Street in Manhattan from October 3rd through October 5th, 2011.

The survey consisted of the following:

- Visual dive survey performed parallel to shoreline to a distance of 50 feet riverward from the existing bulkhead or Waterside Pier (located between East 38th and East 41st Street) documenting: observed habitat types, size, and general locations; general health of habitat; species presence and visual density (biodiversity); substrate type; and any other anomalies that could assist in assessing impacts from construction and potential on-site mitigation design.
- Piling survey at two locations underneath the Waterside Pier to determine changes (if any) in spatial distribution, biodiversity, and abundance of species moving shoreward and away from direct sunlight.
- Submerged aquatic vegetation (SAV) presence/absence survey.
- Identification of types, size, and general location of micro-habitats/habitats present riverward to 50 feet (depth permitting) of existing infrastructure (documented with video).
- Identification of observed marine/estuarine species, and
- Video documentation of density, type, and spatial distribution of encrusting organisms underneath the Waterside Pier, bordering pilings along the steel bulkhead, two bedrock outcrops located along the northern portion of the survey area, and the existing caissons installed as part of the construction of the FDR Drive Outboard Detour Roadway.

Attached documents include: field logbook (#60221358.2.3), field notes, Figure 1 showing sample transect locations by date, and seven (7) DVDs of underwater observations taken along the various transects parallel to shore. Table 1 summarizes the period of the survey, type of equipment used, field team members, logbook ID, vessel/navigation equipment, and weather/conditions during sampling effort.

Table 1: Field Sampling Summary

Mobilization	3-Oct-11
Demobilization	5-Oct-11
Equipment Used	Commercial hard hat diving gear, umbilical, wetsuit, secchi disk, helmet mounted video camera and light, and communications box.
Field Team	Capt. Alek Modjeski (AECOM), Kevin Shepherd (Fathom Solutions LLC), Ted Barnes (Fathom Solutions LLC), Sam Townsen (Fathom Solutions LLC)
Logbook ID	60221358.2.3
Vessel and Navigation	1968 20' black and white Monarch I/O 100 Hp - Vessel # CT3977AA, On board GPS
Weather/Conditions	October 3, 2011 - Partly cloudy, light wind from SW, with temperatures in the 60's.
	October 4, 2011 - Partly cloudy, moderate NW winds, highs in the low 60's
	October 5, 2011 - Clear, light wind with highs in the 70's.

SURVEY METHODOLOGY

Safety inspection of gear and vessel; safety briefings, and USCG pre- and post dive notifications were performed daily. Prior to the daily underwater survey, a secchi disk was used to determine visibility depth. Visibility was further confirmed by the diver. Diver visibility ranged from approximately six (6) inches to three (3) feet and was dependent on tide. Visibility was better around the ebb tide but diminished as the tide flooded and current increased. It should be noted that the 1st Quarter Moon Phase occurred on October 3rd and 4th, 2011 and therefore, both days experienced neap tides[1]. A tide table for the survey dates is provided in Table 2. Tide data is given for East 41st Street, New York City and based on data from NOAA New York Battery Station 4911.

Table 2: Tides: East 41st Street, New York City

Date	High	Elevation (feet)	Low	Elevation (feet)
3-Oct-11	2:35:00 AM	4.3	8:24:00 AM	0.7
	3:01:00 PM	5.0	9:19:00 PM	0.6
4-Oct-11	3:38:00 AM	4.2	9:34:00 AM	0.9
	4:01:00 PM	4.8	10:25:00 PM	0.7
5-Oct-11	4:40:00 AM	4.1	10:41:00 AM	1.0
	17:03:00 PM	4.6	11:23:00 PM	0.6

Mean Range: 4.3 feet   Mean Tide: 2.4 feet

Light attenuation along the edge of the bulkhead or pier riverward differed from secchi readings and was estimated to a depth of approximately 11 feet for all three (3) days. Light attenuation depth was

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[1] *Tides that occur at the first or last quarter of the moon when the tide-generating forces of the sun and moon oppose each other and produce the smallest rise and fall in tidal level.*

confirmed by the diver. Natural light was observed to be present underneath the pier to a distance of 40 to 50 feet shoreward but surficial distance was tide dependent and lessened as the tide flooded.

The Ecological Underwater Survey was a three (3) day event performed by a tethered, in-water commercial hard-hat diver equipped with 150 foot air hose umbilical, ship to diver communication, and video with real-time streaming to an onboard monitor; an onboard dive assistant; an onboard dive coordinator/health and safety officer; and a marine ecologist/field manager. The underwater survey was conducted along the eastern shoreline of the East River between East 38th Street and East 61st Street in Manhattan from October 3rd, 2011 through October 5th, 2011. A total of 17 transects were completed directly parallel and adjacent to the existing bulkhead/pier to a riverward distance of 50 feet (depth permitting for safe diving) within a swath spanning a distance of 1.3 miles and covering an area of 0.012 square miles. All transects were videoed and stored on DVDs.

Dependent on the start position, tide, and current, each transect spanned the length of the umbilical (approximately 100 to 150 feet) or 300 feet to include two umbilical lengths (one up current and one down current from the starting point). For each individual transect, the shore-side survey was performed first and involved descending down a piling or existing structure to bottom and then proceeding upcurrent to the length of the umbilical. Once the shore-side bulkhead or pier structure dive transect was complete, the diver was instructed to move riverward approximately 50 feet (depth permitting for diver safety) and use the current to survey the bottom in a zigzag pattern back and forth towards the bulkhead or pier in a downriver direction and then riverward again until area was completely surveyed. The vessel was moored to the existing structure. Once the diver passed the vessel, he continued in a like manner to the length of the umbilical. Upon completion of the river-side transect, the diver was retrieved and the vessel was repositioned for the next shore-side transect. In addition, two (2) additional transects were completed underneath and perpendicular to shore starting from the riverward edge of the existing Waterside Pier and continuing landward approximately 40 to 50 feet underneath the pier to record changes in biological diversity or abundance on the pilings as the diver moved underneath and away from direct sunlight. Transects by date are shown in Figure 1. Table 3 provides: the sampling transect locations between East 38th and East 61st streets; date sampled; and average water depth in feet to bottom.

RESULTS

A total of 17 underwater transects were completed parallel to shore out to a distance of 50 feet spanning a distance of 1.3 miles along the shore. An additional two (2) bisecting transects approximately 50 feet in length were completed underneath the Waterside Pier to determine changes (if any) in spatial distribution, species abundance, and species composition on individual pilings as the diver moved underneath the pier structure and away from direct sunlight. Real-time video streaming from the diver’s helmet to an onboard monitor, in conjunction with diver to ship communication, allowed the onboard marine biologist to assess habitat and species composition first-hand and direct the diver to areas in need of further observation. Recorded video was stored on DVDs by survey date and archived for later reference. A total of 19 species were identified onboard via real-time video and through collection of samples (e.g. macroalgae at bedrock) when identification could not be confirmed via video. Species were identified to lowest practicable taxonomic level and identification was further confirmed by reviewing the DVDs. Habitat assessment characteristics including slope, percent coverage, depth of surficial substrate, relief, and general habitat health were visually assessed and results based on the diver and the onboard marine biologist’s observations.

Table 3: Transect Identification, Date Surveyed, Coordinates, and Average Water Depth in Feet

Transect ID	Date Surveyed	Start Time	Approximate Coordinates (Start) Latitude/Longitude	Average Depth (ft)
1003-1	10/3/2011	9:00 AM	Southern edge of pier	25
Pile South Pier	10/3/2011	9:15 AM	Southern edge of pier	15-25
1003-2	10/3/2011	9:35 AM	14th pile to south edge of dock	25
1003-1A	10/3/2011	10:00 AM	40°44.753'/73°58.172'	25
1003-2A	10/3/2011	10:13 AM	40°44.753'/73°58.172'	30
Pile Mid Pier	10/3/2011	11:45 AM	40°44.774'/73°58.149'	ND
1003-1B	10/3/2011	12:10 PM	40°44.774'/73°58.149'	30
1003-1C	10/3/2011	12:50 PM	40°44.777'/73°58.150'	25
1003-1D	10/3/2011	2:25 PM	40°44.828'/73°58.111'	25
1004-1	10/4/2011	9:15 AM	40°44.860'/73°58.095'	15-17
1004-2	10/4/2011	11:00 AM	40°44.882'/73°58.069'	25-30
1004-3	10/4/2011	12:30 PM	40°44.986'/73°57.987'	21
1004-4	10/4/2011	1:20 PM	40°45.015'/73°57.961'	24
1005-A	10/5/2011	7:45 AM	40°45.527'/73°57.570'	6-43
1005-B	10/5/2011	8:54 AM	40°45.473'/73°57.552'	6-20
1005-C	10/5/2011	10:45 AM	40°45.354'/73°57.636'	2-UNK
1005-D	10/5/2011	11:30 AM	40°45.334'/73°57.669'	40
1005-E	10/5/2011	12:32 PM	40°45.204'/73°57.788'	35-UNK
1005-F	10/5/2011	1:10 PM	40°45.272/73°57.735'	43

Depth does not include tide difference

Range of depth indicates either shallow depth under pier to river's edge of pier or depth of bulkhead to a riverward distance of up to 50 feet

ND – Not determined as it was similar to Pile South Pier Transect

UNK – Outer depth unknown and not determined to promote safety of diver

Overall, four (4) different habitat types were identified based on differences in structure present, substrate type, species composition and distribution, and include:

- **Under-Pier Bottom Habitat** located underneath the Waterside Pier consisting of a low-relief rubble and anthropogenic debris and multiple wooden and concrete coated pilings;
- **Piling/Open Water Edge Habitat** that consisting of riprap/rubble substrate with less debris than that of the Under-Pier habitat and wooden pilings;
- **Natural Bedrock Outcrops and Caissons** located in the northern portion of the study area consisting of large rocks and bedrock substrate and the surface of the metal caissons; and
- **Offshore Habitat** to 50' from existing shoreline consisting mostly of sand/silt and some riprap. Offshore habitat will be include in each of the aforementioned habitat types and not discussed separately as substrate type was usually a function of corresponding shore-side habitat. For all habitat types, no submerged aquatic vegetation (SAV) was observed. A brief description of each is given below and further detailed in the attached logbook. Table 4 provides a list of species.

Under-Pier Bottom Habitat

The Under-Pier Bottom Habitat was located along the edge and underneath the Waterside Pier located between East 38th Street and East 41st Street and consisted of seven (7) parallel transect and two (2) perpendicular under-pier piling transects (Figure 1). Depth along the edge of the pier was relatively uniform and ranged from 25 to 30 feet. Bottom habitat consisted of a low relief (1 to 2 feet high) layer of concrete rubble, rebar, and other anthropogenic debris associated with the pier construction. The bottom was covered by a one (1) to two (2) inch silt veneer. Along transect 1A, between East 39th Street and East 40th Street; the substrate had small pockets of sand and a 10 to 20 foot wide area of a coal-like material. The slope to the back of pier was moderate for the majority of the pier at about 30 degrees but the slope at the mid-piling transect was steeper with an approximately 45 degree incline. In addition, cribbing and timber littered the bottom in areas where the pier was in disrepair. Except for the occasional blue crab (*Callinectes sapidus)* and sponge, no benthic organisms were observed attached or using the bottom substrate or timber. Total bottom coverage underneath the pier by benthic organisms is estimated to be less than 5%. An unknown juvenile flounder and two cunners (*Tautogolabrus adspersus*) were observed on the bottom. Overall condition of bottom habitat was poor. A complete species list is given in Table 4. The substrate was mostly silt and rubble and of poor quality.

Unlike the bottom habitat, outer and inner piles along the edge of and underneath the Waterside Pier did have encrusting organisms. Outer piles along the length of the pier were visually surveyed and were approximately 30 to 65% encrusted with sessile organisms. Inner piles were similar in species composition and diversity. On the average, the upper 12 feet of the pilings had the most diversity with sea grapes (*Molgula manhattensis*) being most dominant entire length of submerged piling.

Table 4 – Species List

Species	**Common Name**
Bryopsis plumosa	green sea fern
Rhodymenia palmata	dulse
Agardhiella tenera	Agardh's red weed
Haliclona loosanoffi	Loosanoff's haliclona
Microciona prolifera	red beard sponge
Haliplanella luciae	striped anemone
Class Hydrozoa	hydroids
Molgula manhattensis	sea grape
Balanus spp.	barnacles
Littorina spp.	periwinkle spp.
Thais lapillus	dogwinkles
Mytilus edulis	blue mussel
Crassostrea virginica	oyster
unknown mud crab	unknown mud crab
Callinectes sapidus	blue crab
Anchoa mitchilli	bay anchovy
Myoxocephalus aenaeus	grubby sculpin
Tautogolabrus adspersus	cunner
unknown flounder	unknown flounder

Barnacles inhabited the intertidal strata but were not as common 5 to 8 feet below water's surface and comprised approximately 10-15% of piling community population. Blue mussel (*Mytilus edulis*) distribution was patchy from piling to piling and contributed approximately 20-30% of overall population. Sea grapes or squirts were approximately 50%-55% of the coverage. Other species observed on the pilings contributed roughly 5 to 10% of coverage included: green sea fern (*Bryopsis plumose*), Agardh's red weed (*Agardhiella tenera*), red beard sponge (*Microciona prolifera*), hydroids, striped anemone (*Haliplanella luciae*), Loosanoff's haliclona (*Haliclona loosanoffi*), dogwinkles (*Thais lapillus*), periwinkles (*Littorina spp*.), and grubby sculpin (*Myoxocephalus aenaeus*). Overall condition of piling habitat at Waterside Pier was marginal.

Piling/Open Water Edge Habitat

Piling/Open Water Edge Habitat was located along the edge of the existing bulkhead along the FDR Drive in the vicinity of the Queens Midtown Tunnel Entrance from East 43rd Street to East 53rd Street and consisted of six (6) transects surveyed on October 4th and 5th, 2011. Depth ranged from 15 to 25 feet at the time of survey. Substrate located nearest East 43rd Street consisted of low relief habitat (1-2-feet high) with riprap-sized rocks (approximately a foot in diameter), concrete rubble, and an occasional sandy pocket. Some anthropogenic debris (e.g. steel, rebar) was observed. The slope was relatively flat. On the northern side of the tunnel, substrate became more silty with some rock and concrete. Debris was less prevalent than observed at the under-pier habitat. Bottom habitat had very little benthic community coverage and was sparsely populated by sponge or dogwhelk (approximately 3-5% overall coverage). Occasional blue crab was observed. Overall condition of bottom habitat was poor.

Pilings were positioned approximately six (6) feet apart and were 10% covered from the bottom to a depth of 12 feet. At approximately 12 feet, where light was observed to attenuate, tubiculous polychaete castings were evident making up about 60% of total piling coverage to the surface. Blue mussels were observed within the upper 12 feet of the water column but they are not as prevalent as sea grapes and sponges. Other species observed were similar to those found at the edge habitat of the under-pier habitat. Overall, pile habitat was similar to that of the under-pier habitat and condition was poor to moderate. The substrate was mostly silt and rubble and of poor quality.

Natural Bedrock Outcrops and Caissons Habitat

Natural Bedrock Outcrop and Caissons Habitat was located north of East 53rd Street with terminus at East 61st Streets. A total of four (4) transects were completed to characterize the habitat. Habitat included two large natural rock outcrops with a tide pool located adjacent to the FDR Highway between East 57th Street and East 59th Street and encrusting habitat on the caissons slightly riverward (approximately 50 feet) of the shoreline. Depth varied between two feet in the tide pool to depths greater than 40 feet at the rock wall. Slope on bedrock was steep at about a 90 degree vertical drop. Substrate was either bedrock or small rock (approximately 12 inches in diameter) with little or no silt layer. Percent coverage varied by depth along the bedrock but overall coverage was approximately 40 to 50%. Species observed included: green sea fern, dulse, Agardh's red weed, Loosanoff's haliclona, red beard sponge, striped anemones, hydroids, sea grapes, barnacles, dogwinkles, blue mussel, oysters (*Crassostrea virginica*), blue crab, bay anchovy, and cunner. Caisson species composition was similar to that of the under-pier and piling open water habitats. Overall, habitat condition and biodiversity was best along natural outcrops with overall rating of moderate to fair. The substrate riverward was mostly silt and rubble and of poor quality.

SUMMARY

In general, habitat conditions for the Under-Pier Bottom Habitat, Piling/Open Water Edge Habitat, and Offshore Habitat were poor and could provide on-site mitigation opportunities. Species diversity was best at the natural outcrops and habitat condition appeared to be of higher quality than the other three habitat areas investigated. Bottom habitats had little to no visible macrobenthic or encrusting communities. Pilings did have moderate colonization but it appeared the majority of colonization started where light attenuated. The dominant species on the piles was sea grape, followed by blue mussels and sponges. No SAV was observed and it is most likely not present due to water depth, absence of preferred substrate, current, and depth of light attenuation. Oysters were present on natural bedrock but were not observed in other bottom substrates, under-pier, or on piling edge habitat.

Sincerely yours,

Capt. Aleksandr Modjeski
Aleksandr.modjeski@aecom.com

ATTACHMENTS

LOGBOOK

OTHER FIELD FORMS AND NOTES

FIGURE

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outcrop/oysters
55th ; 57th 250' - 300' long
30 x 40 wide

CONTENTS

Pernosky 908-670-1036-

PAGE	REFERENCE	DATE

AECOM
AL MODJESKI - 732-589-5116
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Bathy - EWELL W. FINLEY
Steve Holdaway - 646-279-7316

USCG

TIDES - H or L & elevation
CURRENT vel. -
weather -
START LOCATION -
STOP LOCATION -
TRASECT # -
Transect description -
photos - # & description
video taken - Y or N
substrate type / composition
structures present
type structures
microhabitat types & loc
water temp -
sketch
species encountered
- visibility depth
underpier structures
distance
composition
encrustment cover % -

Habitat types (CMECS)

1) ESTUARINE SHALLOW WATER TIDAL (SW)
~~RIVERINE~~ Subtidal - below
MLLW to depth of 4M
2) ESTUARINE (SW) TIDAL ~~RIVERINE~~ INTERTIDAL
MLLW to MHHW
3) ESTUARINE DEEPWATER - >4M
Subtidal

NOAA Benthic Class

- UNCONSOLIDATED - sand/mud/silt
- SAV
- MACROALGAE
- PATCH ROCK / RUBBLE
- PAVEMENT
- BEDROCK
- STRUCTURAL
- anthropogenic
- boulder
- oyster

INC - slope of bank when possible

10/3/11

ARRIVE ON-site. Gave safety briefing. weather - partly cloudy 60° wind light SW Low tide 0824. 0.7' Bill DEMUTH & Andrew Dunclig ON-site. Going to start survey once diver is checked and geared up. Going to work w/ tide but going to start in front of pier at 38 M and work upriver.

Notified USCG that we will start work momentarily. Poppy gear: monitoring VHF Channel 13. Light extends all the way to bulkhead under Cont'd Pier (0820) since tide is so low. Piles here encrustment to

0915 - complete edge of south pier now heading North along edge of pier to see habitat changes. Filled out sheet 1 and 2 data edge habitat consisting of rock, wood, rebar, small diameter pipe, etc. Bottom relatively the same throughout. Sea squirts on bottom. Most diversity between 0 - 12' · 14' below MLW. Bottom still w/ pipe and somewhat dimensionable. Blue crab Piping encrusted

Corner South piles - 2 or 3 w/ blue mussel @ 1-2". No more after. Coverage to bottom. Other piles - squirts dominate

Diversity decreases on edge
@ 1/2 way down piles
Heading shoreward piles
remained 50 - 80% encrusted
Not much different from
edge habitat. Going to
go ahead and do next
segment.

5 Repositioning @ 16th pile
where concrete bulkhead
starts w/ pile row in front.
27.4' deep at Transect
1A moving downriver for edge
N - 40° 44'.753 (19' for
W 73° 58.172 diver)

00 START 1A - center pier
A4 last finish pt we
have more timber on bottom
NO fish seen. Bottom not

like 3 feet or more in pockets
between debris - some may
be large. Appears to be
some coal as well.

1012 - Transect 1A 25' off SHORE
From 1st capstan to 4th
capstan roughly. Habitat
has a little more relief
but pockets of silt/sand
also encountered. ENTIRE
pocket of clay balls @
75' from bow of boat
(see coordinates) at 25' off.
NO SAV. 1/2 way between
capstan 1 & 2 there is
concrete wall located behind
piles. STEEL DEBRIS 25' off
close to capstan 4. sand/
silt/clam shell - NO SPAT -

- Walking downriver from capstan 4 - rubble fields along vertical transect. Small pile field (4 piles) started near area. Vertical piles not as encrusted as those observed southern section Capstan 1 - 2. mussels on pile @ 9 to 10' down at Capstan 4 molgula, sponge, hydroids sp. Wall concrete not all the way to bottom. Inside is metal/concrete encased piles (wall @ 2-3' under current depth. Edge habitat cement columns go all the way down. Concrete caissons sparsely encrusted at bottom w/ sponges. Located a few horizontal piles. Area with wall (capstan 2 [illegible]

this edge habitat. Piles not as encrusted but still have same species squirts, barnacles sponges.

11~~04~~- Complete transect 1A. Average vertical height of debris field and rubble about 1-2'. Coal found as well, possibly from barge in the past. Diver said there was about a barge full near coordinates on page 6 near where fender damage is between capstan 2 and 3.

1105 - Repositioned to start next transect 1B - edge - 1B 25' Boat at 40°44.774 (N) W 73° 58.149 @ 30' upriver of 5th Capstan. Video working well. Visibility still

we will do another
transect under pier to
see coverage of piles
and spatial distribution.
from front towards Roadway
Will go down 1 then up next
and alternate direction w/
each pile. Concrete wall
stops at Capstone 4/5). 1B
Diver Down for Transect 2A
starting approximately 40'
downriver of coordinates (s)
at concrete wall and then
working edge habitat upriver after
piling check and then will
zigzag between 25' & 50' off
for offshore transects to
accomodate current. 1B
Diver T. Barnes. Transect 2A
Pile has (at boat) mussels
which get somewhat thicker

DISC #2 Start w/ pile survey

consists of rock debris w/ 1-2'
high relief w/ some fill
debris. Moving to outer piling
there is some silt & muck
depth to 2'+. Inner pile
has tunicates at bottom w/
a depth at bulkhead @ 14.5'
.50% slope so almost 45° ∡
1135 Diver heading south to last
termination point along edge
of dock. Encountered some
horiz. piles w/ tunicates and
snails along w/ blue crabs
Timber on bottom. Some
small rubble piles @ 1'-2'
high w/ other debris
Most bottom is silt covered.
Habitat similar to habitat
encountered along edge south
of concrete bulkhead.

Current increasing. I have
encountered Habitat dent
for corner (Saw another one)
w/ mix of small sheetpile
Now at termination point
at concrete caisson @
capstan 4. Concrete has
evidence of tube polychaetes.
Piles to check at Capstan
4 about 3 in from (upriver) of
Capstan 4. (26') depth
- Start piling check Bank
slope steep. Substrate
Rocky Rubble w/ silt veneer.
2nd pile in - @ bottom
10-20% coverage. Depth, 8' away
@ bulkhead ((~~@ 20 ft~~) 11' deep.
Barnacles on surface 10-15%
coverage to a depth to
2-3 feet. (1' out at mid
tide to 4-5' w/ 15-

Bulkhead also has @ 40% molgula

1st inner pile - shoreward
Barnacles 40% to 2' below surface
then tunicates @ 30% w/
evidence of tube worms.
2nd pile 9' to ~~6~~ 4' @ 40%
coverage by tunicates some
anemones (sparse along w/
barnacles @ @ 4' below
surface. Barnacles above waterline
3rd pile 50% above to a 1 foot
below barnacles less coverage
to 3' then sporadic. To bottom
is molgula & sponge @ 30-
40% coverage.
4th pile - molgula/sponge bottom to
@ 4' under surface 30-40%
coverage Then barnacle again
80%. Another species of fish

No oyster spat on pilings
yet.
5th pile - scattered barnacles
to deeper depths w/ tunicates
30-40% biotic coverage
6th pile - snails on bottom
40-30% coverage up to
6' from bottom. Coverage
slightly increasing. Biodiversity
about the same. Barnacles
to 5' deep from MHW →
surface to MHW another
1 foot.
7th pile - Barnacles to @
810 feet down pile - sporadic
w/ 20% cover - 50% coverage
molgula to bottom for 8'
below. Sponge sporadic.
8th pile - mussels top 1/3
w/ barnacles. Patchy - 20%
w/ molgula dominating bottom

1210 - Starting 1-B @ station on
coordinates moving upriver w/
current. Current fast.
Habitat similar w/ woody debris,
rock and little to none
marine life observed. Much of
substrate silt covered, hard
bottom rock. Sporadic
sponges on rock. Vertical
relief 1-2 feet high. Tires,
bottles, and other debris evident.
No life in tire. Small patch
of mussels and some snails
observed. Habitat condition POOR.
~ ~~35'~~ deep at location w/ 6-8'
25' drop observed near pile
~~@ 30 upriver of~~ coordinates
Tough to get location due
to current.
1220 - Still debris, metal, rock

5- No change in habitat
type along edge of dock
@20' upriver coordinates, debris
lessening w/ more rock. Visibly
diminishing due to increase in
current velocity. More
homogenous riprap. Mussels
observed to bottom on pile
w/ patchy coverage. @ 6th
Capstan. More debris again
Appears vertical habitat more
diverse than bottom habitat
for sessile organisms. Even
though hard bottom, not
much of anything attaching except
to piles. Pile check — no
oyster spat. Only shellfish
is mussel. Finished transect
1B along edge habitat at
~~3rd~~ 4th lightpost heading south
from north pier end.

1236- Brings diver in. Current strong
Almost complete w/ Pier.
Need to stand down on
open water until current slows.
1241 - Diver up, repositioning for
continuation of edge habitat
survey.
1250 - DIVER DOWN FOR TRANSECT
1C @ 50' from coordinates
downriver start 40° 44.777
73° 58.150
Going down at stern and
going to endpt of 1B edge.
Boat at station 5+50.
OUTER Pile check - Barnacles
@ 20%, mostly below 4.5'
from MLW w/ sponge. Barnacles
mostly in tidal range.
Bottom: timber, rock,
debris, sheet metal/piles.

Observed a flounder but unable to see species. Otherwise K habitat similar to what we have been encountering - low relief habitat. Pilings South of 5+50 have mussels, barnacles, molgula, and sponge. Mussels nearly 20% coverage to bottom. Molgula dominant. Visibility poor (6"). Mussels to bottom of pilings. Not much on substrate. mostly silt covered hard bottom.

+ saw 2 mud crabs on 2 pilings +

No SAV. @ 25' deep.

20

30 Based on habitat type encountered under and along dock, we will perform ~~remainder~~ of edge work along 100'

pretty much homogenous, we will not do a detailed inch by inch survey. Open water can still be performed in a zig/zag or live-boat drift along either 25' and 50' foot transect or zig zag between 25' and 50' to get better idea of habitat and presence/absence of structure.

1330. Continuing on transect under boat. No change in habitat variability, biodiversity, or coverage of pilings. Seeing more patches of mussel periodically on piles ~~subs~~ AL. Looks like

+ another sculpin or toadfish on pile. Will look at video

[illegible] observed [illegible]

7' from bottom are mussels and barnacles (sporadic) - pile coverage at bottom around 20%. Barnacles @ 15' from bottom. Visibility @ 4". NO SPAT FOR oyster. We did see some line in the water but none had any encrusting organisms. NO SAV (too deep). Saw some bryozoans on a pile or two back at 1B.

40. Substrate still same w/ silt near 2ND TO LAST facing upriver light post.

2 Complete 1C.

Diver up.

3 Repositioned to START 1D. Current slowing. N - 40° 44.828'
W - 73° 58.111
OFFSET @ 50 upriver - survey downriver 50'.

TRANSECT	START	STOP	10/3/11
1	0900	0935	
1A	1004	1013	
1B	~~1222~~ 1210	1241	
1C	1250	1342	
2	0935	1000	
2A	1013	1100	
Pile transect -		1145	1210 (mid)
Pile transect -	0915 - 0935		(south)
1D	1425	1510	

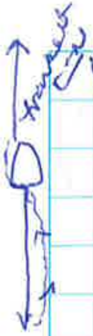
(cont) visibility poor. START DISK 3. No changes in coverage or biodiversity. No spat or SAV. Depth @ 25'. Slope increases rapidly from pier.

Pilings covered w/ molgula on bottom that 50% and then @ 6' up start mussel and barnacle w/ @ 30%

more sponge and crab (blue) seen on pilings. Appears that mussels have a preference to which side of pile (southern side more mussels) (northern side more SQUIRTS). EVIDENCE OF TUBICULOUS WORMS.

15- Rock/rubble bottom. No growth, covered w/ silt. Complete 1st phase at 1D terminus and coming back to work from coordinates upriver.

51 Diver going back down to finish 1D transect. More blue mussels on pilings at coordinates (30% coverage). Rocky hardbottom again w/ some debris. Majority of Disk 3 not good due to poor visibility. Voice recording and thrush makes a



low relief. May provide some habitat for demersal but not many species observed except for cunner and blue crab. NO burrowing shellfish observed only shells (soft clam)

1510 Dive complete. Going to scout upriver to show where transects will be for tomorrow's survey.

1535 - Went over dive tomorrow and locations. Heading to shore. Called USCG.

5 OCT 2011

AM ON-SITE. Reviewed days notes. Checked USCG to make sure we can still work due to helicopter accident.

30° slope w/ 12" rock rubble w/ veneer of silt w/ little dimension. Gave H+S.

Arrive on station underneath bridge between 59th & 60th ST.

LAT: 40° 45.527
W: 73° 57.570'

Will do on edge transect
Saw 3 rock outcrops between 57th & 59th. Will investigate.

Weather - clear, light wind @ 56° w/ highs today in 70's
Low - 1014 1.0'
High - 1703 4.6'

Yesterday - majority of substrate

Diver did encounter some mussels attached to substrate but nothing of significance.

0745 Diver in at new transect 1-A-1005. Will work downriver w/ ebb to a distance to about where 1st bedrock outcrop is between 3 and 4th caisson (N to S). Secchi disk reading 36". Doing edge habitat. Depth 26.5 ft.

Diver down on bulkhead some encrustment (maybe 10%) w/ barnacles. Some relief where bulkhead is corroding w/ mud crab. Piles @ 70% encrusted w/ sponge, squirts, bryozoan/patchy)

Bottom low relief 12" Rip.rap layer @ 1' deep. Not much fish habitat for adult species but moderate for juveniles. Cunner seen (juvenile) using habitat. Some encrustment on rock, Not very silty at all. Some concrete slabs located that provide better relief and habitat along For where concrete is missing or has fallen. ½ way through transect it looks like coverage on piles @ bottom to 7' is decreasing @ 20% coverage mostly tunicates No coverage on rocks @ 75 South of coordinate

Some encrustment by barnacles (sporadic but large) underneath wall along 12 x 12 timber and concrete bottom edge of wall Seeing more sponge moving through transects Observed 3-4 gobies 22 (10 later) on bottom. So habitat is a little more diverse and seems to be better utilized Than under pier.

0815 @ 15' N of caisson transect 1A-1005 - 6' deep of bulkhead. Transect complete @ 150' in distance. Working out 25' to 50' to check substrate and depth 14'. Substrate unchanged (rubble) current increasing. Habitat being used by cunner

Found 1 oyster attached to bottom so potential exploits for oyster reef colonization - located @ 25' offshore on rock bottom mid transect. (1st disc 10/5) Observed an eel (anguilla) in rubble observed 2 blue crabs offshore More light availability due to shallower depths. Complete offshore transect off 1A-1005. (25'-50'). 43' hole directly under bridge / boat coordinates. Next transect will start (1B-1005) at Northern most caisson from bulkhead riverward @ 10' past caisson. Tieing up to 2nd caisson as it appears to be safer

then south. Some large caissons laid on bottom (concrete) under bridge area near last coords.

Transect 1B-1005

OFFSET 50' N of
N 40°45.473'
W 73°57.552'

Depth 6' at 2nd caisson on coordinates. Some attachment by barnacles from MHW to a few feet below MLW on caissons, bulkhead, and bedrock area. C. 40 % coverage.

0854 - Diver down. START 1B-1005. Walking upriver to 1st caisson Area somewhat sheltered. Mostly bedrock underneath oyster attached to bedrock bottom near caisson #2.

1st caisson - 10'-15' off 12" rocks @ 18' deep. Some snails and occasional barnacle & another caisson on bottom. some gravelly spots/pockets. Edg habitat has slight veneer of silt. 1 dead cunner. NO SAV. 2 small IN patches of macroalgae. (green) Again blue crabs, snails, cunner edge - 2'-3' of H_2O at depth by 2nd caisson. Majority of substrate rock ontop of bedrock shallow as it is 3-6' deep at dead low. Light probably attenuates to bottom majority of time.

Habitat somewhat diverse near near rock pile. Drill holes in old rock so seems there is more dimension to habitat. Depth off rockpile @ 6' to about 10-15' offshore caisson line. Stopped transect at middle of rockpile to reposition in order to keep diver safe. Per diver, habitat condition along transect 1B-1005 same as what he has been seeing past 2 days. He feels that visually, there was less attached to wall and rocks then at other downriver sites.

0930 Back in at 5th caisson. Depth 14' at Caisson Rocks on bottom covered w/ silt veneer 16' OFFSHORE CAISSON

Another oyster close (1') or so from other oyster.
Near tie-up location
N 40° 45.443',
W 73° 57.574'
NO SAV yet, SAW 1 blue crab doubler by 6th caisson. No change in habitat condition are change to sheet pile bulkhead from concrete at 6th caissons. Pretty low relief rock cover. Less attachment on bulkhead (steel) vs. concrete. NOT much debris - mostly rock bottom w/ silt veneer up to 12"x12" IN AREA. Another oyster attached to bottom. At end of rig. Going offshore transect to @ 25 - 50' off bulkhead / 10' off

in slope.
1000 - ARRIVE AT Southern most outcrop near E. 56th ST. Large outcrop that extends from 2nd piling set after sheetpile (s) to 4 ~~3~~ piles (caissons) S. Extends out to caisson line riverward
NO SAV observed from vessel.
There is H_2O behind outcrop near bulkhead (now concrete). Will investigate to see if tidal pool or not.
1045 - Transect IC-1005
START ROCK OUTCROP ~~here~~ as well
Diver Down. Going to do possible tidalpool first then outside perimeter of outcrop
N 40° 45.354'
W 73° 57.636'
Bu diver off

outcrop has red and green seaweed. Back pool sandy about 2' deep at current tide level. Water in tidal pool turbid w/ quite a bit of debris. Green/red algae in tide pool. NO SAV.
Rock wall outer perimeter 30% sponge 5% barnacle, relatively shallow ledge.
Video shows moving north
All transects downriver today
SCHOOL OF SILVERSIDES OR ANCHOVIES (check video)
oyster attachment seen (1) ON outcrop midway between North caisson (at coord) and next downriver caissons.
anemones and bryozoans also on rock face. Few

This area along wall has most biodiversity than any other section of river investigated. Also have mussels wedged between grooves in rock. Also just found some oyster spat, hydroid
→ ANOTHER OYSTER w/ in a few feet of last one. It appears this section of river w/ outcrop has more opportunity for habitat ~~and~~ ATTACHMENT TO w/ folds in rock. Similar to layer cake artificial reef ball.

1125- Complete transect 1C-1005 moving to southern side of outcrop

1130 - Transect 1D-1005 at 5th caisson from south
Going to go north and

to @ 150-180' downriver. At coordinates, 5'x5' granite blocks w/ a drop to 40' off wall (@). Kept some specimens of seaweed for ID. I know what they are but want to confirm. Hydroids present in colonies. Habitat same as last transect along rockface. Observing shallow habitat at first where light attenuates and then deeper. Larger barnacles located @ 12 below current surface. Mussels present. Some tunicates seen @ 10' down in patches. Not dominant species. Sponge is. Mussels single not in clumps. Spaced anywhere from 6" to a

and going to continue transect to a distance of 150' to 180' feet down river. Sporadic clusters of small finger tip (fingertip) size anemones. Depth at wall @ 20' fm coordinates (downriver) is 5'. hardbottom granite.

1150 Stop transect survey to fix comm.

1200 comm fixed. Diver start at last spot & continuing downriver. Outcrop ends @ 50'-60' fm caisson (downriver fm caisson) To 25' offshore substrate rock/riprap to depth of @ 15'. wall here goes all the way to substrate. Similar to other habitats excluding rock outcrops.

Transect continuing fm 6th caisson or 4th set downriver. From 5th set to 4th set (looking upriver), habitat ~~availability~~ condition decreased quickly and substrate

* changed → Depth at 4th set of caisson 40'. Substrate rous silt covered construction debris concrete, etc. Slope rather gradual - 20° ∡ to 30 ∡.

OFFSHORE complete for 1D-1005 and diver coming up. Caught on rebar w/ rigging but done once free. Going to reposition to do end of caissons to concrete since habitat is similar and composition is const. debris, low relief majority of the way.

ARRIVE AT START FOR THAT SET 1E-1005.

North length of rigging. Visibility going as well so this may be last transect. Start video and dive.

Bulkhead concrete over 12"x12" wooden timber sponges and mussels on pile 50-60 mussel coverage w/ 10% barnacle some bryozoans and sponge. Down to 35' and not on bottom. Seeing some tunicates as well. Total coverage pile fm surface to bottom @ 60%. Bottom rocky granite @ 12" AREA silt covered and barnacles occasionally on bottom some construction debris so very similar habitat/substrate type. Decent piling coverage here. Better then 1st da

Light to about 14-15'.
Anemones around 12' (patches)
barnacles dominant on cross
timber. No SAV or oyster spat
Piles more diverse here w/
blue mussel dominant - roughly
coverage between 60-70%
mussels to bottom, other species
squirts, Anemones, bryozoan, sponge,
balanus some hydroids,
Deeper barnacles approx. 25¢
size. Depth at 35' @ 50-75'
upriver of coordinates. Rocks
here @ cm silt on top.
Mussels also attached in
between rock in small
1' diameter patches -
sporadic. Piles @ 5' apart.
@ 12 up from bottom mod
mussels & barnacles evident
mussels in nice clusters

If and how far out substrate
changes. 45' deep at terminus
along bulkhead at end of
transect. Looks to be
mostly debris out to 25'
from bulkhead to deep to
go further out safely. No change.
1300 Complete IE-1005. Will
reposition upriver and do 1
more transect to base of
caissons. Substrate type
similar to what was encountered
yesterday from N pier to here.
1310 START IF-1005 FINAL TRANSECT
FOR DAY DUE TO DEPTHS
ENCOUNTERED.
40° 45.272' start
73° 57.735'
Going to drift upriver to
1st st of southernmost

Visibility back to @ 2' or so. Thought it was decreasing but it was not. Window most likely closing though. START LOCATION @ 75' from southernmost caisson. hydroids, ~~bryozoans~~, barnacles mussels (dominant) 65-75% pile coverage. to @ 25-30' deep. Depth at site from stern is 43'. Our surface where cross timbers is located directly under concrete some mussels wedged into gap split. Culling end of transect as the area is consistent w/ habitat we had seen already to south - Bottom most likely rip rap, silt covered debris. No oyster, no

①

DATE 10/3 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

South perimeter

Transect #/Direction 1/upriver **Streets** 38th → 1st vent
Transect GPS Start Lat/Long: /
Transect GPS End Lat/Long: /
Transect Length
Divers T. Barnes
Location East River, Manhattan side
Co./State Kings/NY
Start Time 0900
Other
Completion Time 0935
High Tide 1510
Low Tide 0824
Tide [✓ ebb] or → flood
Low Tide Elevation MLW 0.7'
Water depth 25'
Estimated Current Speed slack
Video taken? [✓ Y] or N
Photos Taken Y or N

WEATHER DATA
Temperature See
Wind Speed Log Book
Wind Direction
Overcast/Clear/Rain

WATER DATA
Temperature 65° +
Visibility @ 18"
Secchi Disk/Turbidity N/A
Estimated Water Depth

Other Comments
underpiles / outside piles. Outside piles - barnacles 90%. 5% redbeard sponge. 5% molgula from surface to MHW mark.

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
underpier	entire pier	rocky	N			X		
		50 to 100lb rocks						
		piping						
		~~tires~~ o						
		slabs						

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
eneral Substrate Type - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling
egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc %

Light to back wall @ 40-50 from bulkhead edge. Also existing bulkhead south of E 38th is scarred below H2O line.

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
baitfish either anchovy or silverside
mussels 4' underwater w/ sea grapes more abundant w/ depth from wake zone

60% pile. - NOT much diversity after @ 10-12'

On bottom - not encrusted - some small gastropods
metal I beams, anemones (1%)

②

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

3rd pile S →

Transect #/Direction 1 **Streets** 1st vent → 2nd pile
Transect GPS Start Lat/Long: /
Transect GPS End Lat/Long: /
Transect Length
Divers T Beres
Co./State Kings/NY
Other
High Tide
Tide ebb or [✓ flood]
Water depth 25'
Video taken? [✓ Y] or N
Location East River, Manhattan side
Start Time
Completion Time
Low Tide
Low Tide Elevation MLW
Estimated Current Speed
Photos Taken Y or [✓ N]

WEATHER DATA

Temperature
Wind Direction
Wind Speed
Overcast/Clear/Rain

WATER DATA

Temperature
Secchi Disk/Turbidity
Visibility
Estimated Water Depth

Other Comments
Concrete w/ rebar, 4x4' under deck @ 5' IN
tunicates/sponges to bottom of piles, lots of bottles
hard bottom - blue mussel - 10-20% blue mussel to bottom

HABITAT DATA **underpier or open water and/or pile**

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
eneral Substrate Type *- Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
egetation Coverage *- A = Absent, L = Light, H = Heavy inc. %*
enthic Coverage *- A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
bottom substrate silty veneer w/ debris - NO cover.

15' deep at back wall - last pile so moderately sloped.

3

DATE 6/3 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction ____________ **Streets** 39th north to → 10th pile
Transect GPS Start Lat/Long: ____________ / ____________
Transect GPS End Lat/Long: ____________ / ____________
Transect Length ____________
Divers ____________
Location East River, Manhattan side
Co./State Kings/NY
Start Time ____________
Other ____________
Completion Time ____________
High Tide ____________
Low Tide ____________
Tide ebb or flood
Low Tide Elevation MLW ____________
Water depth ____________
Estimated Current Speed ____________
Video taken? Y or N
Photos Taken Y or N

WEATHER DATA

Temperature ____________
Wind Speed ____________
Wind Direction ____________
Overcast/Clear/Rain ____________

WATER DATA

Temperature ____________
Visibility ____________
Secchi Disk/Turbidity ____________
Estimated Water Depth ____________

Other Comments Edge habitat - pipe, Rock, concrete, debris, buckets etc, tires, piping encrusted - More Rock w/ silt 2" silt covering rocks. cable & timbers

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
eneral Substrate Type - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling
egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc.%

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
Blue crab, snails, sea squirts. blue mussel, some macroalgae.

④

DATE Oct 3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction 1

Streets 10th pile →

Transect GPS Start Lat/Long: /

Transect GPS End Lat/Long: /

Transect Length 3rd → 14 pile

Divers T. Burns

Location East River, Manhattan side

Co./State Kings/NY

Start Time 0900

Other

Completion Time 0935

High Tide

Low Tide 0824

Tide ebb or [✓ flood]

Low Tide Elevation MLW 0.7'

Water depth 25'

Estimated Current Speed slack

Video taken? [✓ Y] or N

Photos Taken Y or N

WEATHER DATA

Temperature

Wind Speed

Wind Direction

Overcast/Clear/Rain

WATER DATA

Temperature

Visibility

Secchi Disk/Turbidity

Estimated Water Depth

Other Comments

20' to 30' timber at 10th pile creating cribbing corner in piles - I beam 13th pile 6x12' Blue crabs (3 or 4) at edge habitat on bottom

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*

eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*

egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*

enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED **(Benthic and Pelagic)**

12th pile - No rock crushed sand/very soft to 6ft deep plus - blue crab, squirts, barnacles, sponge,

⑧

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction #2
Streets ~~84~~ 14th pile → E 38th
Transect GPS Start Lat/Long: 25' off /
Transect GPS End Lat/Long: /
Transect Length
Divers I. Bres
Location East River, Manhattan side
Co./State Kings/NY
Start Time 0935
Other
Completion Time
High Tide
Low Tide
Tide ebb or flood
Low Tide Elevation MLW
Water depth
Estimated Current Speed
Video taken? Y or N
Photos Taken Y or N

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain

WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth

Other Comments
silty, soft bottom w/ patches of rock and pipe. at 9th pile some oyster shell on bottom shell looks to be relict. NO SPAT. Also some thin clam ~~(soft)~~ soft

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
silty	transect	silt to 6"+	NO	NO	NO	NO	NO	POOR

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
eneral Substrate Type - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling
egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc.%

SPECIES ENCOUNTERED **(Benthic and Pelagic)**

⑥

DATE 10/3 **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction 1A **Streets** mid pier (39th to 40th)
Transect GPS Start Lat/Long: in logbook /
Transect GPS End Lat/Long: /
Transect Length
Divers T. Bures **Location** East River, Manhattan side
Co./State Kings/NY **Start Time** 1000
Other **Completion Time**
High Tide **Low Tide**
Tide ebb or [✓ flood] **Low Tide Elevation MLW** 0.7'
Water depth **Estimated Current Speed** p/u since slack
Video taken? [✓ Y] or N **Photos Taken** Y or [✓ N]

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain

WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth

Other Comments
silt over rubble, rock, debris, bottom void of much life, chain link fence, pockets of sand.

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
rocky								
rubble								
sand	patch	~6" soft	in sand	(5	timber	in	from	lost pile

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
eneral Substrate Type - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling
egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc.%

SPECIES ENCOUNTERED (Benthic and Pelagic)
snails, tunicates, barnacles, sponge

DATE 10/3 ⑦ **2011**

Ecological Dive Survey Data Sheet
East River Esplanade NYC

Transect #/Direction DA

Streets 25' off

Transect GPS Start Lat/Long: /

Transect GPS End Lat/Long: /

Transect Length see sheet ⑥

Divers

Location East River, Manhattan side

Co./State Kings/NY

Start Time 1013

Other

Completion Time

High Tide

Low Tide

Tide ebb or [✓ flood]

Low Tide Elevation MLW

Water depth 30'

Estimated Current Speed

Video taken? [✓ Y] or N

Photos Taken Y or [✓ N]

WEATHER DATA

Temperature

Wind Speed

Wind Direction

Overcast/Clear/Rain

WATER DATA

Temperature

Visibility

Secchi Disk/Turbidity

Estimated Water Depth

Other Comments

debris, relict (sparse) oyster. rock, pipe, debris covered in sponge, car springs

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health
debris, trees	to 25'	a,t, silt	N	N	N	NA	N	poor

abitat Type - *Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement*
eneral Substrate Type - *Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling*
egetation Coverage - *A = Absent, L = Light, H = Heavy inc. %*
enthic Coverage - *A = Absent, L = Light, H = Heavy inc.%*

SPECIES ENCOUNTERED (Benthic and Pelagic)

RELICT CLAM shells

0

DATE 10/3/11 2011

Ecological Dive Survey Data Sheet
East River Esplanade NYC

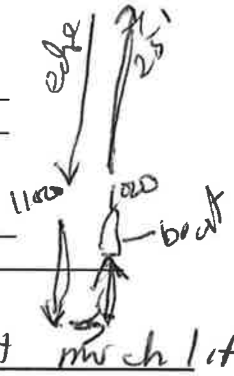
Transect #/Direction 2A upper off 25' **Streets** 1A - at Lat/Long (steel) 6
Transect GPS Start Lat/Long: (cont.) / to 4th capstan
Transect GPS End Lat/Long: /
Transect Length
Divers
Location East River, Manhattan side
Co./State Kings/NY
Start Time ~~1000~~ 1013
Other
Completion Time 1100
High Tide
Low Tide
Tide ebb or flood
Low Tide Elevation MLW
Water depth 30'
Estimated Current Speed
Video taken? Y or N
Photos Taken Y or N

WEATHER DATA

Temperature
Wind Speed
Wind Direction
Overcast/Clear/Rain

WATER DATA

Temperature
Visibility
Secchi Disk/Turbidity
Estimated Water Depth



Other Comments
rock pile then some debris, steel, not much life encountered. cement, etc. (between 3rd and 4th capstan

HABITAT DATA underpier or open water and/or pile

Habitat Type	Habitat Size/Area and Height	General Substrate Type/Depth	Vegetation Coverage	Epiphytic Coverage	Benthic Coverage	Vertical coverage (Piles only)	Light present	Habitat Health

abitat Type - Unc = Unconsolidated, SAV = Submerged Aquatic Vegetation, MA = Macroalgae, PR = Patch Rock, RP = Rubble Pile, Bo = Boulder, OR = Oyster Reef, Pvmt = Pavement
eneral Substrate Type - Si = Silt, M = Mud, SD = Sand, Sh = Shell, Co = Cobble, Pb = Pebble, Mu = Muck, RR = RipRap, Pile = Piling
egetation Coverage - A = Absent, L = Light, H = Heavy inc. %
enthic Coverage - A = Absent, L = Light, H = Heavy inc. %

SPECIES ENCOUNTERED **(Benthic and Pelagic)**
Small pockets of dead clams - more abundant as they move riverward - 1 blue crab
Capstan 4 - steel debris (clean)

10-4-11

mid
4044,860
7358,095

Station ① Just North of Pier

100′ in each direction

start 915.

① Starting in the corner Just north of con ED pier (15′ water) Sandy bottom large chunk of concrete Misc. Debris close to FDR aprox 2′ High off Sandy bottom

at start of tunnel there was 17′ of water

over the tunnel area we found Brick and ~~St~~ small Stone

on the piles in the center section of tunnel we found small musels squirts a atached But dead oyster shell

24′ of water in the center of the tunnel area steel debris rock bottom rope and cable soft coral growing on debris

on the north side cason we have musells snails sponges squirts and a small 2′ fish

10′ out off the wall going from the end of the tunnel Heading South to the con ED pier

found 2 oyster shells (Dead) a very lively Blue crab and a baby blue crab the bottom is made up of aprox 12″ stone

2 small fish aprox 25′ off the wall in the middle of tunnel area

past the tunnel area the rock tapers off to a bottom made of mud and debris very few sighns of life a few snails and sponges

4′-5′ Deep Pile of debris including Rope 3″ ruber hose ect in the corner by the con ED pier sponges seem to be doing well

end at 10:20

start 4044,846
7358,105

end 4044872
7358085

Station ② located between tunnel# and

UN Intake 4044 ~~9~~882

Start 11:00 7358 ~~60~~69

Heading north along the wall
Just North of the tunel Starting under the outflow ㉕'
we find musles and snails on the pilings a rocky Bottom
that looks like armor stone or rip rap
much less debris not much for life on the bottom other
than sponges bottom grade drops off quickly
pile bents are aprox 5-6' apart

light seams to penatrate aprox 12' and thats
where the muscles are most dense

this section was much more consistant

~~10-15~~
15-25' out Heading South ㉙'
Same rocky bottom a few snails a dead blue crab
very light debris a few old pilings and one
pice of pipe one 5-6" blue crab and ~~4~~ 2 small fish

4" blue crab
3-4' squar area of sand

aprox 50' out in 30' of water we found a blue crab
and a collony of musles

end 1206 4044 909

7358 067

UN Intake
4044 940
7358 030

star
1230 Station ③ due to curent we decided to just do the north side of the boat instead of going Both ways

Start 4044986
7357987

21' deep very light marine growth rocky/Hard (concrete) × Bottom

small patches of soft mud w/mussels on top most muddy patches are found just under the platform

most life is on the piles ~~and~~ consisting of squirts mussels and snails

④ 1320 Ended @ 4045,015
7357.961 due to wave action

we then moved the Boat to this location and continued North

similer conditions found 24' of water

hard bottom of 12" dia stone (avg) | Broken off piling

light mud mixed in with the Rock
very consistant

on the incoming tide the daylight seams to penatrate aprox 11'

sea squirts and sponges seam to be the most prevelent

steap slope

15-25' ~~[illegible]~~ out Rocky bottom w/crushed shells and silt

end @ 1400 4045043
7357953

Legend

▨	Survey Area (25-50 ft from shoreline)	**Survey Date**	
├┤	Transects	🟨	10/03/2011
━	Shoreline	🟩	10/04/2011
		🟪	10/05/2011

0 225 450 Feet

N

Notes:
1. State Plane NAD83 Coordinates, U.S. Survey Feet;
2. Basemap data sourced from City of New York Department of City Planning

Transect Locations
Midtown Esplanade

East River
Ecological Dive Survey
New York, NY

FIGURE
1

AECOM

U.S. Department
of Transportation
**Federal Highway
Administration**

New York Division

Leo W. O'Brien Federal Building
11A Clinton Avenue, Suite 719
Albany, NY 12207
518-431-4127
518-431-4121
NewYork.FHWA@dot.gov

December 8, 2014

In Reply Refer To:
HED-NY

RECEIVED
DEC 10 2014
PLANNING & DEVELOPMENT

Mr. John K. Bullard, Regional Administrator
NMFS Northeast Regional Office
55 Great Republic Drive
Gloucester, MA 01930

Subject: PIN X776.00 & PIN X770.14
East Midtown Waterfront Esplanade, New York. NY

Dear Mr. Bullard:

In response to NYSDOT Region 11's November 25 request, FHWA concurs with the determination that for subject project "The amount of habitat impacted and the duration of impacts is so minor that it is anticipated that the impacts to EFH-listed species would be negligible". The Essential Fish Habitat (EFH) Assessment is enclosed.

The proposed project is located along the shoreline of the Manhattan side of the East River in New York County, New York. It will construct an approximately 0.96 mile long esplanade.

FHWA is requesting concurrence with this determination from NMFS. We would appreciate your response at your earliest convenience within 30 days. Meanwhile, if you have any questions or concerns, please contact me at 518-431-8874.

Sincerely,

/s/ RICHARD F. BEERS, JR.

Richard F. Beers, Jr.
Senior Area Engineer

Enclosure

cc:
J. Lau, Design Supervisor, NYSDOT Reg. 11
T. Sanyal, NYSDOT Reg. 11
R. Davies, FHWA

From: Melissa Alvarez - NOAA Federal [mailto:melissa.alvarez@noaa.gov]
Sent: Thursday, March 12, 2015 10:08 AM
To: Sanyal, Tapas (DOT)
Subject: Re: FW: East Midtown Waterfront Esplanade

Tapas,

Please see the attached comment form. Thank you.

Melissa D. Alvarez, PWS

Marine Habitat Resource Specialist

Habitat Conservation Division

National Marine Fisheries Service

James J. Howard Marine Sciences Laboratory

74 Magruder Rd.

Highlands, NJ 07732

(732) 872-3116 phone

(732) 872-3077 fax

melissa.alvarez@noaa.gov

http://www.greateratlantic.fisheries.noaa.gov/

Federal Interagency Comment Form

PERMIT TYPE:	Federal Highway Administration
Project:	New York City Economic Development Corp East Midtown Waterfront Esplanade Project
Commenting Agency:	NOAA Fisheries
Project Manager:	Tapas Sanyal
Waterway	East River
Activity	New construction of 0.96 mile long waterfront esplanade

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS (Note: EFH CRs require a response from the federal action agency within 30 days of receipt or 10 days before a permit is issued if CRs are not included as a special condition of the permit)

1. A timing restriction for in water work for winter flounder and anadromous fish overwintering and spawning from January 15 to June 30 should be applied.

2. Once final mitigation plans are agreed upon, NMFS requests submittal of all plans for review and comment prior to the commencement of any work. Consultation is not considered complete until this is received.

FISH AND WILDLIFE COORDINATION ACT COMMENTS

1. Up to five acres of shading will occur from this work impacting both winter flounder and anadromous fish habitat. We recommend that the impact be further minimized and mitigated.

ENDANGERED SPECIES

Threatened or endangered species under the jurisdiction of the NMFS including sea turtles and Atlantic sturgeon may be present in the project area. The Corps should initiate coordination with NMFS' Protected Resources Division if they have not already done so.

SIGNATURE: Melissa Alvarez, PWS DATE: 03/12/2015

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

SEP 18 2012

Capt. Aleksandr Modjeski
Senior Marine Ecologist
AECOM
30 Knightsbridge Road, Suite 520
Piscataway, New Jersey 08854

Re: New York City Economic Corporation
East Midtown Waterfront Esplanade Project
Borough of Manhattan, New York County, New York
Essential Fish Habitat (EFH) and Threatened or Endangered Species Consultation
Request for Pre-application Meeting

Dear Capt. Modjeski,

In your letter dated August 21, 2012, you requested information about the presence of federally listed species in the vicinity of NYCEDC's proposed East Midtown Waterfront Esplanade Project, in the East River, Borough of Manhattan, New York, under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS).

The following listed species may occur in the East River:

Species	**Status**
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Gulf of Maine Distinct Population Segment (DPS) of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)	Threatened
New York Bight DPS of Atlantic sturgeon	Endangered
Chesapeake Bay DPS of Atlantic sturgeon	Endangered
Carolina DPS of Atlantic sturgeon	Endangered
South Atlantic DPS of Atlantic sturgeon	Endangered
Northwest Atlantic Ocean DPS of loggerhead sea turtle (*Caretta caretta*)	Threatened
Kemp's ridley sea turtle (*Lepidochelys kempi*)	Endangered

Green sea turtle (*Chelonia mydas*)	Endangered
Leatherback turtle (*Dermochelys coriacea*)	Endangered

Conclusions

As listed species of sea turtles and sturgeon occur in the East River, and thus, within the vicinity of your proposed project, any proposed in-water work has the potential to affect these species. As project details become finalized, a consultation, pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, may be necessary as any discretionary federal action, such as the approval or funding of a project by a Federal agency, that may affect a listed species must undergo consultation pursuant to section 7 of the ESA of 1973, as amended. If the proposed project has the potential to affect listed species, and it is being approved, permitted or funded by a Federal agency, the lead Federal agency, or their designated non-Federal representative, is responsible for determining whether the proposed action is likely to affect the listed species. The Federal agency would submit their determination along with justification for their determination and a request for concurrence, to the attention of the ESA Section 7 Coordinator, NMFS Northeast Regional Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930. After reviewing this information, NMFS would then be able to conduct a consultation under section 7 of the ESA.

Should you have any questions regarding these comments, please contact Mark Murray-Brown at 978-281-9306 or by email at Mark.Murray-Brown@noaa.gov.

Sincerely,

Kimberly Damon-Randall
Acting Assistant Regional Administrator
for Protected Resources

EC: Sullivan, NER/PRD
File Code: Technical Assistance – AECOM East Midtown Waterfront Esplanade Project - East River
PCTS: T/NER/2012/03946

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

AUG 29 2013

AECOM
c/o John Rollino
20 Exchange Place, 13th Floor
New York, NY 10005

Dear Mr. Rollino,

On August 14, 2013, you contacted us regarding an upcoming project, the East Midtown Waterfront Esplanade (EMWE), in order to ascertain whether NMFS may have concerns regarding marine mammals and the construction of the EMWE in conjunction with the Marine Mammal Protection Act (MMPA). You stated that the EMWE would involve construction of a bike path and pedestrian walkway from 40th Street to 60th Street along Manhattan's east shoreline, and that the EMWE would be separated from the shoreline by a distance of up to 30 ft. The MMPA prohibits the taking of marine mammals (by behavioral or injurious harassment, serious injury, or death) incidental to a specified activity, unless such taking is appropriately authorized.

We believe that there is little chance for construction of the EMWE to result in interaction with marine mammals due to rarity of occurrence at your project location. There are recorded occurrences of seals and very rarely cetaceans that far up the East River but we would consider the likelihood so low as to make the possibility of interaction with your project discountable. Further, we believe that the presence of harbor seals (or other marine mammals) in the East River, should it occur, would likely be a publicized occurrence, allowing project proponents to be aware of such presence and avoid interaction accordingly. Therefore, we believe there is no need for you to take any action pursuant to the MMPA.

If you have any further questions or concerns, please contact Ben Laws, Office of Protected Resources, at 301-427-8425.

Sincerely,

Jolie Harrison,
Incidental Take Program Supervisor,
Permits and Conservation Division,
Office of Protected Resources,
National Marine Fisheries Service.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th Floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **Fax:** (518) 402-8925
Website: www.dec.ny.gov

Joe Martens
Commissioner

September 25, 2013

Indhira Figuereo
AECOM
605 Third Avenue
New York, NY 10158

Re: Proposed Construction of the East Midtown Waterfront Esplanade (East 41st-East 60th Streets along Manhattan's Shoreline of the East River)
Town/City: New York. County: New York.

Dear Indhira Figuereo :

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to the above project

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities, which our databases indicate occur, or may occur, on your site or in the immediate vicinity of your site.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our databases. We cannot provide a definitive statement as to the presence or absence of all rare or state-listed species or significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental impact assessment.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, as listed at www.dec.ny.gov/about/39381.html.

Sincerely,

Andrea Chaloux

Andrea Chaloux
Environmental Review Specialist
New York Natural Heritage Program

865

The following state-listed animals have been documented at your project site, or in its vicinity.

The following list includes animals that are listed by NYS as Endangered, Threatened, or Special Concern; and/or that are federally listed or are candidates for federal listing. The list may also include significant natural communities that can serve as habitat for Endangered or Threatened animals, and/or other rare animals and rare plants found at these habitats.

For information about potential impacts of your project on these populations, how to avoid, minimize, or mitigate any impacts, and any permit considerations, contact the Wildlife Manager or the Fisheries Manager at the NYSDEC Regional Office for the region where the project is located. A listing of Regional Offices is at http://www.dec.ny.gov/about/558.html.

The following species and habitats have been documented at or near the project site, generally within 0.5 mile. Potential onsite and offsite impacts from the project may need to be addressed.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*FEDERAL LISTING*	
Birds				
Peregrine Falcon *Breeding*	*Falco peregrinus*	Endangered		1800

This report only includes records from the NY Natural Heritage databases. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. This information should not be substituted for on-site surveys that may be required for environmental impact assessment.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the listed animals in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, and from NYSDEC at http://www.dec.ny.gov/animals/7494.html.

Information about many of the rare plants and animals, and natural community types, in New York are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, and from NatureServe Explorer at http://www.natureserve.org/explorer.

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES

from

CONSTRUCTION ACTIVITY

Permit No. GP-0-10-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70
of the Environmental Conservation Law

Effective Date: January 29, 2010

Expiration Date: January 28, 2015

William R. Adriance
Chief Permit Administrator

William R. Adriance
Authorized Signature

January 28, 2010
Date

Address:
NYS DEC
Div. Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

Pursuant to Section 402 of the Clean Water Act (“CWA”), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System (“NPDES”)* permit or by a state permit program. New York’s *State Pollutant Discharge Elimination System (“SPDES”)* is a NPDES-approved program with permits issued in accordance with the *Environmental Conservation Law (“ECL”).*

This general permit (“permit”) is issued pursuant to Article 17, Titles 7, 8 and Article 70 of the ECL. An *owner or operator* may obtain coverage under this permit by submitting a Notice of Intent ("NOI") to the Department. Copies of this permit and the NOI for New York are available by calling (518) 402-8109 or at any New York State Department of Environmental Conservation (“the Department”) regional office (see Appendix G).They are also available on the Department’s website at:

http://www.dec.ny.gov/

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of “*construction activity*”, as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a point source and therefore, pursuant to Article 17-0505 of the ECL, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. They cannot wait until there is an actual *discharge* from the construction site to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES

FROM CONSTRUCTION ACTIVITIES

TABLE OF CONTENTS

Part I. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application - This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

B. Maintaining Water Quality - It shall be a violation of this permit and the *ECL* for any *discharge* to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

C. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph D. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater discharges from *construction activities*.

3. Notwithstanding paragraphs C.1 and C.2 above, the following non-stormwater *discharges* may be authorized by this permit: discharges from fire fighting activities; fire hydrant flushings; waters to which cleansers or other components have not been added that are used to wash vehicles or control dust in accordance with the SWPPP, routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; uncontaminated groundwater or spring water; uncontaminated discharges from construction site de-watering operations; and foundation or footing drains where flows are not contaminated with process materials such as solvents. For those entities required to obtain coverage under this permit, and who discharge as noted in this paragraph, and with the exception of flows from fire fighting activities, these discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with water quality standards in Part I.B.

D. <u>Activities Which Are Ineligible for Coverage Under This General Permit</u> - All of the following are **<u>not</u>** authorized by this permit:

1. *Discharges* after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharges* that are mixed with sources of non-stormwater other than those expressly authorized under subsection C.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII, subparagraph K of this permit;

4. *Discharges* from *construction activities* that adversely affect a listed, or proposed to be listed, endangered or threatened species, or its critical habitat;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects that:

    a. are tributary to waters of the state classified as AA or AA-s; and

   b. disturb one or more acres of land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey for the County in which the disturbance will occur.

7. *Construction activities* for linear transportation projects and linear utility projects that:
   a. are tributary to waters of the state classified as AA or AA-s; and

   b. disturb two or more acres of land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey for the County in which the disturbance will occur.

8. *Construction activities* that adversely affect a property that is listed or is eligible for listing on the State or National Register of Historic Places (Note: includes Archeological sites), unless there are written agreements in place with the NYS Office of Parks, Recreation and Historic Preservation (OPRHP) or other governmental agencies to mitigate the effects, or there are local land use approvals evidencing the same.

Part II. OBTAINING PERMIT COVERAGE

A. Notice of Intent (NOI) Submittal

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a *regulated, traditional land use control MS4* must first develop a SWPPP in accordance with all applicable requirements of this permit and then submit a completed NOI form to the address below in order to be authorized to *discharge* under this permit. The NOI form shall be one which is associated with this permit, signed in accordance with Part VII.H. of this permit.

   NOTICE OF INTENT
   NYS DEC, Bureau of Water Permits
   625 Broadway, 4th Floor
   Albany, New York 12233-3505

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first develop a SWPPP in accordance with all applicable requirements of this permit and then have its SWPPP reviewed and accepted by the *MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the “MS4 SWPPP Acceptance” form signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4*, or by a duly authorized representative of that person, and then submit that form along with the NOI to the address referenced under “Notice of Intent (NOI) Submittal”.

This requirement does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.E. (Change of Owner or Operator).

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

B. Permit Authorization

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied all of the following criteria:

    a. project review pursuant to the State Environmental Quality Review Act (SEQRA) have been satisfied, when SEQRA is applicable,

    b. where required, all necessary Department permits subject to the *Uniform Procedures Act (UPA)* (see 6 NYCRR Part 621) have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Regional Office in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

    c. the final SWPPP has been prepared, and

    d. an NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.B.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

a. For *construction activities* that are not subject to the requirements of a *regulated, traditional land use control MS4*:

   i. Five (5) business days from the date the Department receives a complete NOI for *construction activities* with a SWPPP that has been prepared in conformance with the technical standards referenced in Parts III.B.1, 2 and/or 3, or

   ii. Sixty (60) business days from the date the Department receives a complete NOI for *construction activities* with a SWPPP that has not been prepared in conformance with the technical standards referenced in Parts III.B.1, 2 or 3.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

   i. Five (5) business days from the date the Department receives a complete NOI and signed "MS4 SWPPP Acceptance" form,

4. The Department may suspend or deny an *owner's or operator's* coverage under this permit if the Department determines that the SWPPP does not meet the permit requirements.

5. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department.

C. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination (NOT) has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-10-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form and inspection reports at the construction site until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department.

The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land use control MS4*, the MS4 (provided the MS4 is not the *owner or operator* of the construction activity). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

    a. The *owner or operator* shall have a *qualified inspector* conduct **at least** two (2) site inspections in accordance with Part IV.C. every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

    b. In areas where soil disturbance activity has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control.

    c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

    d. The *owner or operator* shall install any additional site specific practices needed to protect water quality.

    e. The *owner or operator* shall include the requirements above in their SWPPP.

4. The Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements.

5. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*, the *owner or operator* shall notify the *MS4* in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *MS4,* the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *MS4* prior to commencing construction of the post-construction stormwater management practice.

D. Permit Coverage for Discharges Authorized Under GP-0-08-001

1. Upon renewal of SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-08-001), a*n owner or operator* of *construction activity* with coverage under GP-0-08-001, as of the effective date of GP-0-10-001, shall be authorized to *discharge* in accordance with GP-0-10-001 unless otherwise notified by the Department.

E. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.A.1.. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

   Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or operator* was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*.

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the pollutants in stormwater discharges and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the *owner or operator* shall amend the SWPPP:

    a. whenever the current provisions prove to be ineffective in minimizing pollutants in stormwater *discharges* from the site;

    b. whenever there is a change in design, construction, or operation at the construction site that has or could have an effect on the discharge of pollutants; and

    c. to address issues or deficiencies identified during an inspection by the *qualified inspector*, the Department or other regulatory authority.

5. The Department may notify the *owner or operator* at any time that the SWPPP does not meet one or more of the minimum requirements of this permit. The notification shall be in writing and identify the provisions of the SWPPP that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department may suspend the *owner's or operator's* coverage under this permit.

6. Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP.

The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor*. The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

> "I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings. "

In addition to providing the certification statement above, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the *trained contractor* responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the construction site. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

8. The SWPPP must include documentation supporting the determination of permit eligibility with regard to Part I.D.8. (Historic Places or Archeological Resource). At a minimum, the supporting documentation shall include the following:

a. Information on whether the stormwater discharge or *construction activities* would have an effect on a property (historic or archeological resource) that is listed or eligible for listing on the State or National Register of Historic Places;

b. Results of historic resources screening determinations conducted. Information regarding the location of historic places listed, or eligible for listing, on the State or National Registers of Historic Places <u>and</u> areas of archeological sensitivity that may indicate the need for a survey can be obtained online by viewing the New York State Office of Parks, Recreation and Historic Places (OPRHP) online resources located on their web site at: http://nysparks.state.ny.us/shpo/online-tools/ (using The Geographic Information System for Archeology and National Register). OPRHP can also be contacted at: NYS OPRHP, State Historic Preservation Office, Peebles Island Resources Center, P.O. Box 189, Waterford, NY 12188-0189, phone: 518-237-8643;

c. A description of measures necessary to avoid or minimize adverse impacts on places listed, or eligible for listing, on the State or National Register of Historic Places. If the *owner or operator* fails to describe and implement such measures, the stormwater *discharge* is ineligible for coverage under this permit; and

d. Where adverse effects may occur, any written agreements in place with OPRHP or other governmental agency to mitigate those effects, or local land use approvals evidencing the same.

B. <u>Required SWPPP Contents</u>

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control. Where erosion and sediment control practices are not designed in conformance with this technical standard, the *owner or operator* must demonstrate equivalence to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

    a. Background information about the scope of the project, including the location, type and size of project;

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s), wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater discharge(s);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. A description of the minimum erosion and sediment control practices to be installed or implemented for each construction activity that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

f. A temporary and permanent soil stabilization plan that meets the requirements of the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of final stabilization;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6., to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control;

j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in the stormwater *discharges*;

k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the construction site; and

l. Identification of any elements of the design that are not in conformance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standards.

2. Post-construction stormwater management practice component - All construction projects identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the most current version of the technical standard, New York State Stormwater Management Design Manual (“Design Manual”). If the Design Manual is revised during the term of this permit, an *owner or operator* must begin using the revised version of the Design Manual to prepare their SWPPP six (6) months from the final revision date of the Design Manual.

   Where post-construction stormwater management practices are not designed in conformance with this technical standard, the *owner or operator* must demonstrate equivalence to the technical standard.

   At a minimum, the post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project;

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. The dimensions, material specifications and installation details for each post-construction stormwater management practice;

d. Identification of any elements of the design that are not in conformance with the Design Manual. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standards;

e. A hydrologic and hydraulic analysis for all structural components of the stormwater management control system;

f. A detailed summary (including calculations) of the sizing criteria that was used to design all post-construction stormwater management practices. At a minimum, the summary shall address the required design criteria from the applicable chapter of the Design Manual; including the identification of and justification for any deviations from the Design Manual, and identification of any design criteria that are not required based on the design criteria or waiver criteria included in the Design Manual; and

g. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.g. above.

C. Required SWPPP Components by Project Type - Unless otherwise notified by the Department, *owners or operators* of *construction activities* identified in Table 1 of Appendix B are required to prepare a SWPPP that only includes erosion and sediment control practices designed in conformance with Part III.B.1. *Owners or operators* of the *construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3.

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices and all post-construction stormwater management practices identified in the SWPPP are maintained in effective operating condition at all times.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York, or protect the public health and safety and/or the environment.

B. Owner or Operator Maintenance Inspection Requirements

1. The *owner or operator* shall inspect, in accordance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, the erosion and sediment controls identified in the SWPPP to ensure that they are being maintained in effective operating condition at all times.

2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the *owner or operator* can stop conducting the maintenance inspections. The *owner or operator* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. as soon as soil disturbance activities resume.

3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *owner or operator* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

C. Qualified Inspector Inspection Requirements - The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- Licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- Registered Landscape Architect, or
- Someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, with the exception of:

    a. the construction of a single family residential subdivision with 25% or less impervious cover at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E;

    b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E;

    c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

    d. construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

    a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

(Part IV. C. 2)

b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.C.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the Regional Office stormwater contact person (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the Regional Office stormwater contact person (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity). in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization,* and all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the “Final Stabilization” and “Post-Construction Stormwater Management Practice” certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.A.1..

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization,* all points of discharge to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site, and all points of discharge from the construction site.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

   a. Date and time of inspection;

   b. Name and title of person(s) performing inspection;

   c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

   d. A description of the condition of the runoff at all points of discharge from the construction site. This shall include identification of any *discharges* of sediment from the construction site. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

   e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

   f. Identification of all erosion and sediment control practices that need repair or maintenance;

   g. Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

   h. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection;

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s); and

k. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector*. Pursuant to Part II.C.2., the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.A.1. The NOT form shall be one which is associated with this general permit, signed in accordance with Part VII.H.

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

   a. Total project completion - All construction activity identified in the SWPPP has been completed; <u>and</u> all areas of disturbance have achieved *final stabilization*; <u>and</u> all temporary, structural erosion and sediment control measures have been removed; <u>and</u> all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

   b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; <u>and</u> all areas disturbed as of the project shutdown date have achieved *final stabilization*; <u>and</u> all temporary, structural erosion and sediment control measures have been removed; <u>and</u> all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

   c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.E.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the “Final Stabilization” and “Post-Construction Stormwater Management Practice” certification statements on the NOT, certify that all disturbed areas have achieved *final stabilization;* and all temporary, structural erosion and sediment control measures have been removed; and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall also have the MS4 sign the “MS4 Acceptance” statement on the NOT. The *owner or operator* shall have the principal executive officer, ranking elected official, or duly authorized representative from the *regulated, traditional land use control MS4,* sign the “MS4 Acceptance” statement. The MS4 official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The MS4 can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector’s* final site inspection certification(s) required in Part V.3.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has modified their deed of record to include a deed covenant that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan,

d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, college, university), or government agency or authority, the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION OF RECORDS

A. Record Retention - The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the site achieves *final stabilization*. This period may be extended by the Department, in its sole discretion, at any time upon written notification.

B. Addresses - With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.A.1), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate Department Regional Office listed in Appendix F.

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply - The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied.

The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

B. **Continuation of the Expired General Permit** - This permit expires five (5) years from the effective date. However, coverage may be obtained under the expired general permit, which will continue in force and effect, until a new general permit is issued. Unless otherwise notified by the Department in writing, an *owner or operator* seeking authorization under the new general permit must submit a new NOI in accordance with the terms of such new general permit.

C. **Enforcement** - Failure of the *owner or operator*, its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. **Need to Halt or Reduce Activity Not a Defense** - It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. **Duty to Mitigate** - The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to minimize or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. **Duty to Provide Information** - The *owner or operator* shall make available to the Department for review and copying or furnish to the Department within five (5) business days of receipt of a Department request for such information, any information requested for the purpose of determining compliance with this permit. This can include, but is not limited to, the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form, executed maintenance agreement, and inspection reports. Failure to provide information requested by the Department within the request timeframe shall be a violation of this permit.

The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review the NOI, SWPPP or inspection reports. Copying of documents will be done at the requester’s expense.

G. **Other Information** - When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any other report, or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or impervious area), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. Signatory Requirements

1. All NOIs and NOTs shall be signed as follows:

    a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

        i. a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

        ii. the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

    b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

    c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

        i. the chief executive officer of the agency, or

ii. a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Part VII.H.1.;

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position) and,

   c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

   It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. Property Rights - The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity*.

J. Severability - The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

K. Denial of Coverage Under This Permit

1. At its sole discretion, the Department may require any *owner or operator* authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the *owner or operator* to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from *owner or operator* receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Regional Water Engineer, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. Any *owner or operator* authorized by this permit may request to be excluded from the coverage under this permit by applying for an individual permit or another general permit. In such cases, the *owner or operator* shall submit an individual application or an alternative general permit application in accordance with the requirements of this general permit, 40 CFR 122.26(c)(1)(ii) and 6 NYCRR Part 621, with reasons supporting the request, to the Department at the address for the appropriate Department Office (see addresses in Appendix F).The request may be granted by issuance of an individual permit or another general permit at the discretion of the Department.

3. When an individual SPDES permit is issued to a discharger authorized to discharge under a general SPDES permit for the same discharge(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. Proper Operation and Maintenance - The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. Inspection and Entry - The *owner or operator* shall allow the Department or an authorized representative of EPA, the State, or, in the case of a construction site which discharges through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the *owner's or operator's* premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

N. Permit Actions - At the Department's sole discretion, this permit may, at any time, be modified, suspended, revoked, or renewed. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions - Definitions of key terms are included in Appendix A of this permit.

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with *construction activity* covered by this permit, the *owner or operator* of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports – Article 17 of the ECL provides for a civil penalty of $37,500 per day per violation of this permit. Articles 175 and 210 of the New York State Penal Law provide for a criminal penalty of a fine and/or imprisonment for falsifying forms and reports required by this permit.

R. Other Permits – Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A

Definitions

Alter Hydrology from Pre to Post-Development Conditions - means the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

Combined Sewer - means a sewer that is designed to collect and convey both “sewage” and “stormwater”.

Commence (Commencement of) Construction Activities - means the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the SWPPP. See definition for “Construction Activity(ies)” also.

Construction Activity(ies) - means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Direct Discharge (to a specific surface waterbody) - means that runoff flows from a construction site by overland flow and the first point of discharge is the specific surface waterbody, or runoff flows from a construction site to a separate storm sewer system and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

Discharge(s) - means any addition of any pollutant to waters of the State through an outlet or point source.

Environmental Conservation Law (ECL) - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

Final Stabilization - means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 authorizing a category of discharges.

Groundwater - means waters in the saturated zone. The saturated zone is a subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Impervious Area (Cover) - means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Larger Common Plan of Development or Sale - means a contiguous area where multiple separate and distinct construction activities are occurring, or will occur, under one plan. The term “plan” in “larger common plan of development or sale” is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQRA) application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that construction activities may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same “common plan” is not concurrently being disturbed.

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

i. Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State*;*

ii. Designed or used for collecting or conveying stormwater;

iii. Which is not a *combined sewer*; and

iv. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

NOI Acknowledgment Letter - means the letter that the Department sends to an owner or operator to acknowledge the Department’s receipt and acceptance of a complete Notice of Intent. This letter documents the owner’s or operator’s authorization to discharge in accordance with the general permit for stormwater discharges from construction activity.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the construction activity is occurring; and/or an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications.

Pollutant - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in Parts 700 et seq of this Title.

Qualified Inspector - means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or other Department endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional - means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics in order to prepare a SWPPP that conforms to the Department’s technical standard. All components of the SWPPP that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is required to gain coverage under New York State DEC's SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s).

Routine Maintenance Activity - means construction activity that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Stream bank restoration projects (does not include the placement of spoil material),
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch),
- Placement of aggregate shoulder backing that makes the transition between the road shoulder and the ditch or embankment,
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or embankment,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

State Pollutant Discharge Elimination System (SPDES) - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

Surface Waters of the State - shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

Temporary Stabilization - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

Total Maximum Daily Loads (TMDLs) - A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. It is a calculation of the maximum amount of a pollutant that a waterbody can receive on a daily basis and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for point source discharges, load allocations (LAs) for nonpoint sources, and a margin of safety (MOS).

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.6., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* will be responsible for the day to day implementation of the SWPPP.

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

Water Quality Standard - means such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

APPENDIX B

Required SWPPP Components by Project Type

Table 1

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres:

- Single family home not located in one of the watersheds listed in Appendix C and not *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E
- Construction of a barn or other agricultural building, silo, stock yard or pen.

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
- Bike paths and trails
- Sidewalk construction projects that are not part of a road/ highway construction or reconstruction project
- Slope stabilization projects
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics
- Spoil areas that will be covered with vegetation
- Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields), excluding projects that *alter hydrology from pre to post development* conditions
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the “Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State”, excluding projects that involve soil disturbances of less than five acres and construction activities that include the construction or reconstruction of impervious area

The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land:

- All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

Table 2

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other agricultural building(e.g. silo) and structural practices as identified in Table II in the “Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State” that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional, includes hospitals, prisons, schools and colleges
- Industrial facilities, includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW’s and water treatment plants
- Office complexes
- Sports complexes
- Racetracks, includes racetracks with earthen (dirt) surface
- Road construction or reconstruction
- Parking lot construction or reconstruction
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover*, and constructed as part of an over-head electric transmission line project , wind-power project, cell tower project, oil or gas well drilling project or other linear utility project
- All other construction activities that include the construction or reconstruction of *impervious area* and *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

APPENDIX C

Watersheds Where Enhanced Phosphorus Removal Standards Are Required

Watersheds where *owners or operators* of construction activities identified in Table 2 of Appendix B must prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

- Entire New York City Watershed located east of the Hudson River - Figure 1
- Onondaga Lake Watershed - Figure 2
- Greenwood Lake Watershed -Figure 3
- Oscawana Lake Watershed – Figure 4

Figure 1 - New York City Watershed East of the Hudson

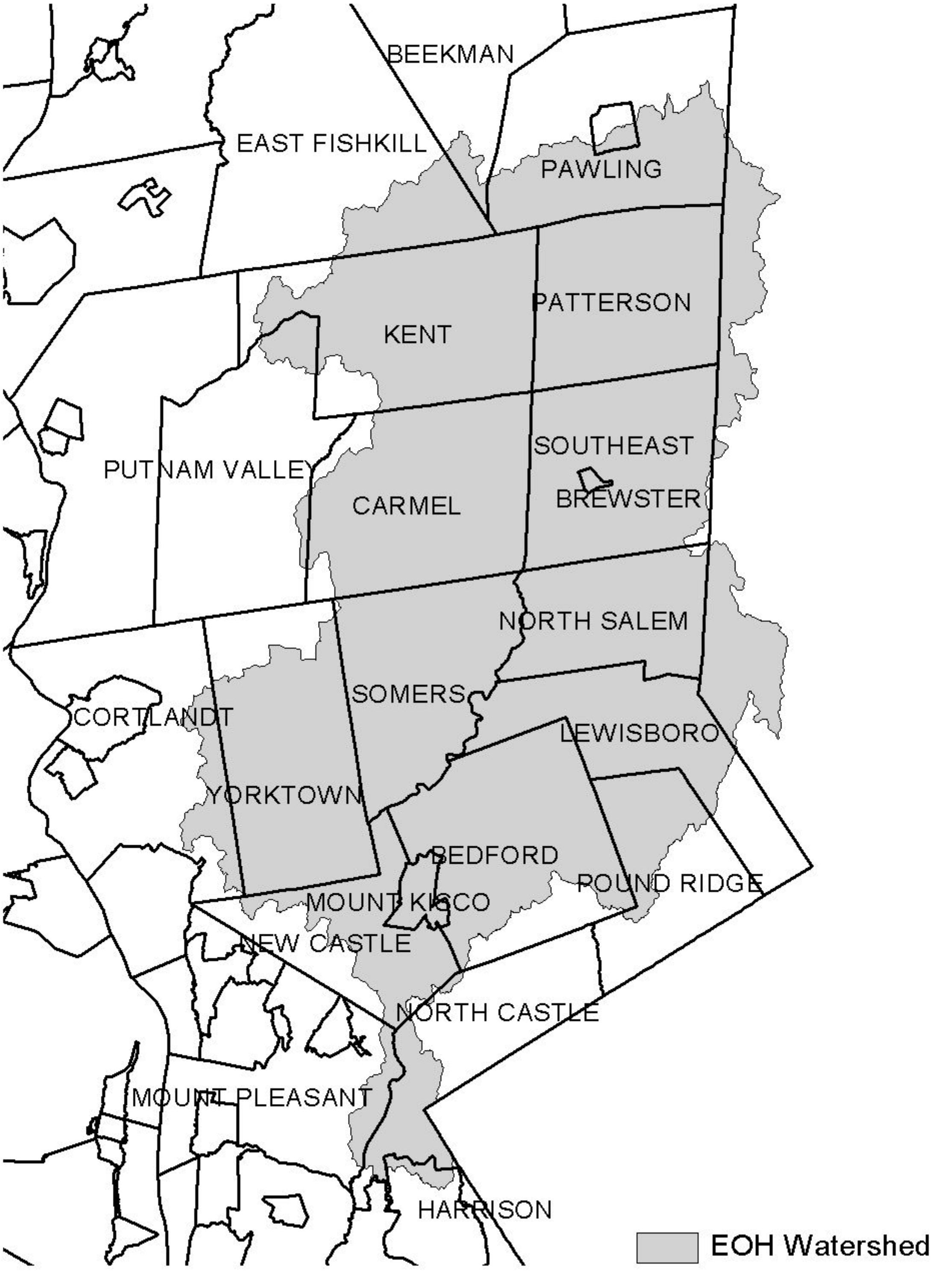


Figure 2 - Onondaga Lake Watershed

<u>Figure 3 - Greenwood Lake Watershed</u>

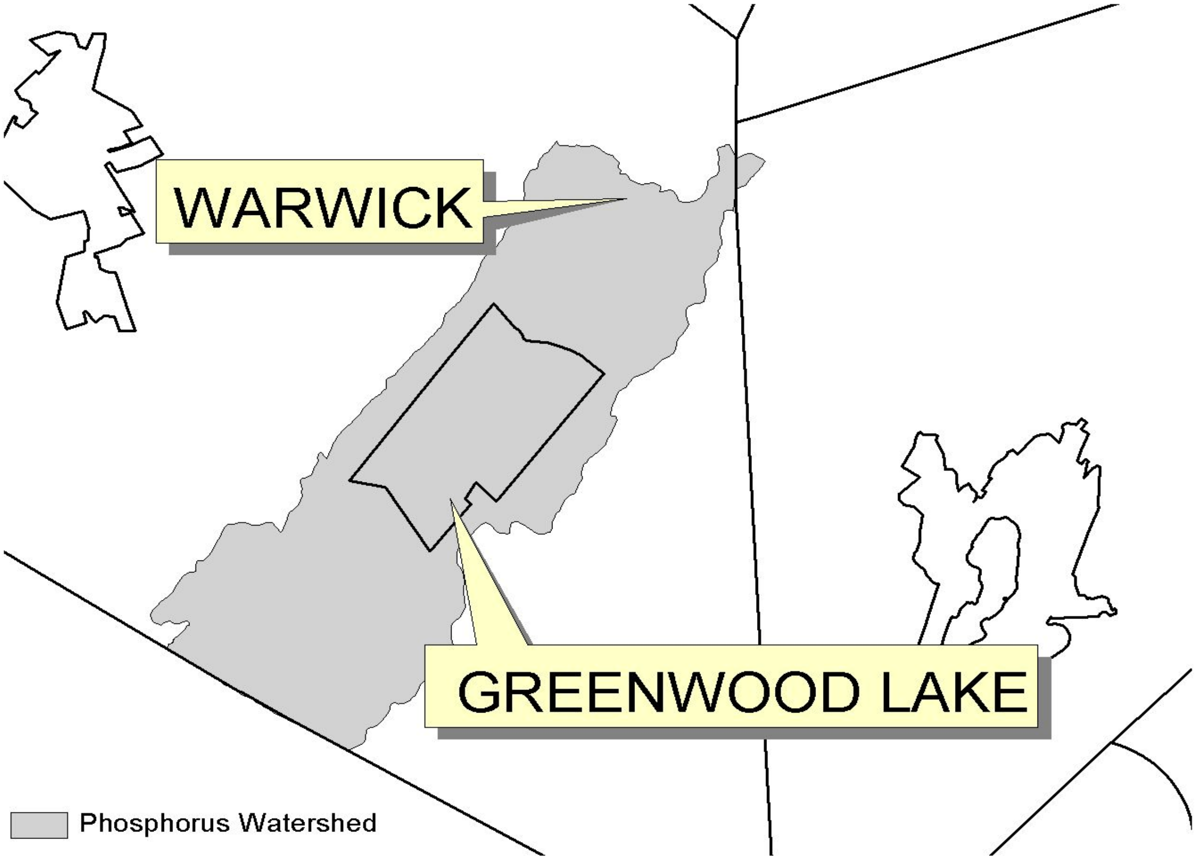
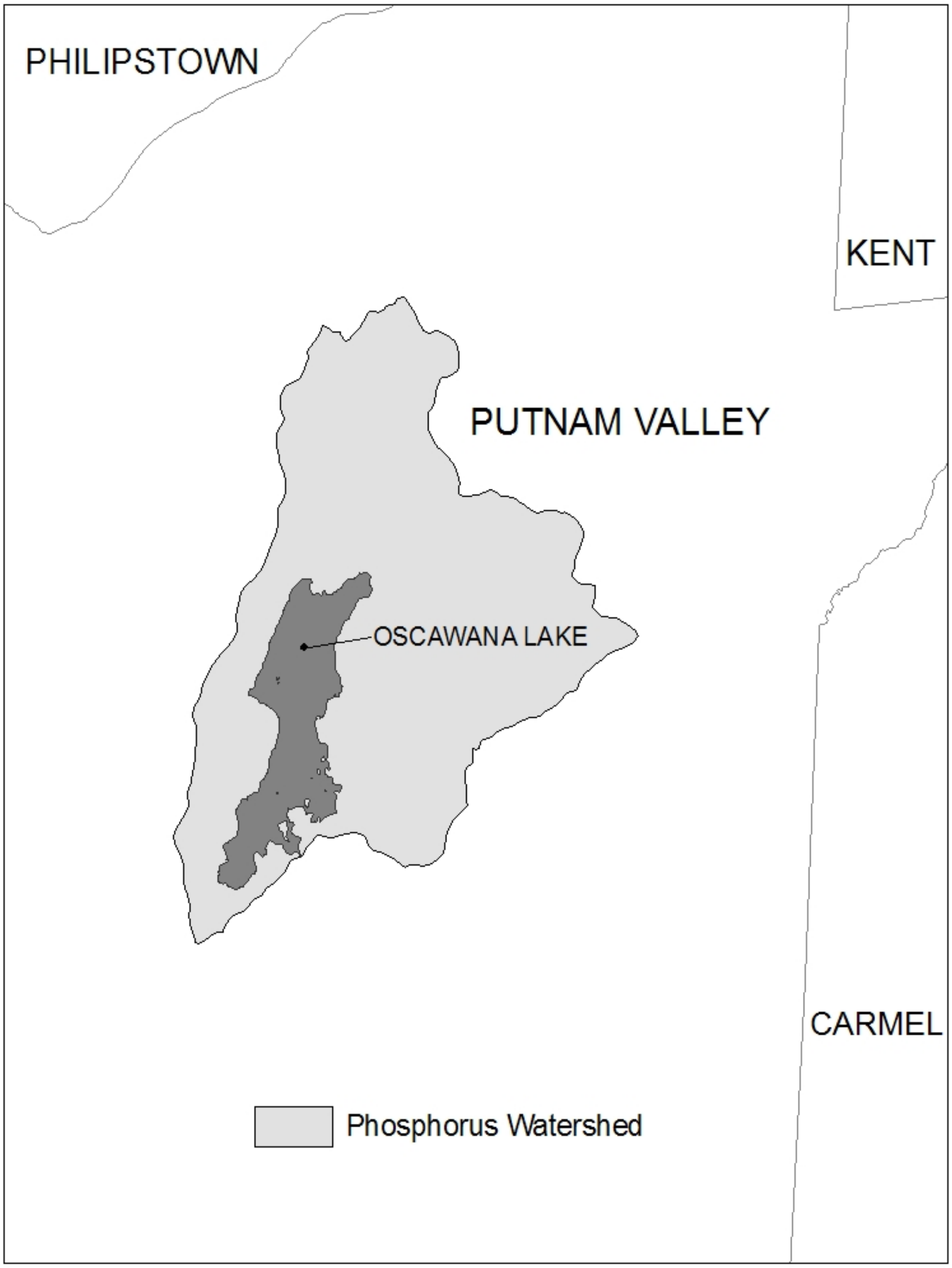


Figure 4 - Oscawana Lake Watershed



APPENDIX D

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River **-** See Figure 1 in Appendix C

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity (e.g. silt, sediment or nutrients). *Owners or operators* of single family home and single family residential subdivision construction activities that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the most current version of the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

COUNTY	WATERBODY
Albany	Ann Lee (Shakers) Pond, Stump Pond
Albany	Basic Creek Reservoir
Bronx	Van Cortlandt Lake
Broome	Whitney Point Lake/Reservoir
Broome	Beaver Lake
Broome	White Birch Lake
Chautauqua	Chautauqua Lake, North
Chautauqua	Chautauqua Lake, South
Chautauqua	Bear Lake
Chautauqua	Chadakoin River and tribs
Chautauqua	Lower Cassadaga Lake
Chautauqua	Middle Cassadaga Lake
Chautauqua	Findley Lake
Clinton	Great Chazy River, Lower, Main Stem
Columbia	Kinderhook Lake
Columbia	Robinson Pond
Dutchess	Hillside Lake
Dutchess	Wappinger Lakes
Dutchess	Fall Kill and tribs
Dutchess	Rudd Pond
Erie	Rush Creek and tribs
Erie	Ellicott Creek, Lower, and tribs
Erie	Beeman Creek and tribs
Erie	Murder Creek, Lower, and tribs
Erie	South Branch Smoke Cr, Lower, and tribs
Erie	Little Sister Creek, Lower, and tribs
Essex	Lake George (primary county listed as Warren)
Genesee	Black Creek, Upper, and minor tribs
Genesee	Tonawanda Creek, Middle, Main Stem
Genesee	Tonawanda Creek, Upper, and minor tribs
Genesee	Little Tonawanda Creek, Lower, and tribs
Genesee	Oak Orchard Creek, Upper, and tribs
Genesee	Bowen Brook and tribs
Genesee	Bigelow Creek and tribs
Greene	Schoharie Reservoir
Greene	Sleepy Hollow Lake
Herkimer	Steele Creek tribs
Kings	Hendrix Creek
Lewis	Mill Creek/South Branch and tribs
Livingston	Conesus Lake
Livingston	Jaycox Creek and tribs
Livingston	Mill Creek and minor tribs
Monroe	Genesee River, Lower, Main Stem
Monroe	Genesee River, Middle, Main Stem
Monroe	Black Creek, Lower, and minor tribs
Monroe	Buck Pond
Monroe	Long Pond
Monroe	Cranberry Pond
Monroe	Mill Creek and tribs
Monroe	Shipbuilders Creek and tribs
Monroe	Minor tribs to Irondequoit Bay
Monroe	Thomas Creek/White Brook and tribs
Nassau	Glen Cove Creek, Lower, and tribs
Nassau	LI Tribs (fresh) to East Bay
Nassau	East Meadow Brook, Upper, and tribs
Nassau	Hempstead Bay
Nassau	Hempstead Lake
Nassau	Grant Park Pond
Niagara	Bergholtz Creek and tribs
Oneida	Ballou, Nail Creeks
Onondaga	Ley Creek and tribs
Onondaga	Onondaga Creek, Lower and tribs
Onondaga	Onondaga creek, Middle and tribs
Onondaga	Onondaga Creek, Upper, and minor tribs
Onondaga	Harbor Brook, Lower, and tribs
Onondaga	Ninemile Creek, Lower, and tribs
Onondaga	Minor tribs to Onondaga Lake
Ontario	Honeoye Lake
Ontario	Hemlock Lake Outlet and minor tribs
Ontario	Great Brook and minor tribs
Oswego	Lake Neatahwanta
Putnam	Oscawana Lake
Putnam	Lake Carmel
Queens	Jamaica Bay, Eastern, and tribs (Queens)
Queens	Bergen Basin
Queens	Shellbank Basin
Rensselaer	Snyders Lake
Richmond	Grasmere, Arbutus and Wolfes Lakes
Saratoga	Dwaas Kill and tribs
Saratoga	Tribs to Lake Lonely
Saratoga	Lake Lonely
Saratoga	Schuyler Creek and tribs
Schenectady	Collins Lake

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity, cont'd.

COUNTY	WATERBODY	COUNTY	WATERBODY
Schoharie	Engleville Pond		
Schoharie	Summit Lake		
St. Lawrence	Black Lake Outlet/Black Lake		
Steuben	Lake Salubria		
Steuben	Smith Pond		
Suffolk	Millers Pond		
Suffolk	Mattituck (Marratooka) Pond		
Suffolk	Tidal tribs to West Moriches Bay		
Suffolk	Canaan Lake		
Suffolk	Lake Ronkonkoma		
Tompkins	Cayuga Lake, Southern End		
Tompkins	Owasco Inlet, Upper, and tribs		
Ulster	Ashokan Reservoir		
Ulster	Esopus Creek, Upper, and minor tribs		
Warren	Lake George		
Warren	Tribs to L.George, Village of L George		
Warren	Huddle/Finkle Brooks and tribs		
Warren	Indian Brook and tribs		
Warren	Hague Brook and tribs		
Washington	Tribs to L.George, East Shore of Lake George		
Washington	Cossayuna Lake		
Wayne	Port Bay		
Wayne	Marbletown Creek and tribs		
Westchester	Peach Lake		
Westchester	Mamaroneck River, Lower		
Westchester	Mamaroneck River, Upper, and minor tribs		
Westchester	Sheldrake River and tribs		
Westchester	Blind Brook, Lower		
Westchester	Blind Brook, Upper, and tribs		
Westchester	Lake Lincolndale		
Westchester	Lake Meahaugh		
Wyoming	Java Lake		
Wyoming	Silver Lake		

Note: The list above identifies those waters from the final New York State "2008 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy", dated May 26, 2008, that are impaired by silt, sediment or nutrients.

APPENDIX F

List of NYS DEC Regional Offices

Region	Covering the following counties:	DIVISION OF ENVIRONMENTAL PERMITS (DEP) Permit Administrators	DIVISION OF WATER (DOW) Water (SPDES) Program
1	Nassau and Suffolk	50 Circle Road Stony Brook, Ny 11790 Tel. (631) 444-0365	50 Circle Road Stony Brook, Ny 11790-3409 Tel. (631) 444-0405
2	Bronx, Kings, New York, Queens and Richmond	1 Hunters Point Plaza, 47-40 21st St. Long Island City, Ny 11101-5407 Tel. (718) 482-4997	1 Hunters Point Plaza, 47-40 21st St. Long Island City, Ny 11101-5407 Tel. (718) 482-4933
3	Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester	21 South Putt Corners Road New Paltz, Ny 12561-1696 Tel. (845) 256-3059	100 Hillside Avenue, Suite 1w White Plains, Ny 10603 Tel. (914) 428 - 2505
4	Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady and Schoharie	1150 North Westcott Road Schenectady, Ny 12306-2014 Tel. (518) 357-2069	1130 North Westcott Road Schenectady, Ny 12306-2014 Tel. (518) 357-2045
5	Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren and Washington	1115 State Route 86, Po Box 296 Ray Brook, Ny 12977-0296 Tel. (518) 897-1234	232 Golf Course Road, Po Box 220 Warrensburg, Ny 12885-0220 Tel. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROAD AVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVE. BUFFALO, NY 14203-2999 TEL. (716) 851-7070

Environmental Protection

Carter H. Strickland, Jr.
Commissioner

Angela Licata
Deputy Commissioner
of Sustainability
alicata@dep.nyc.gov

59-17 Junction Boulevard
Flushing, NY 11373
T: (718) 595-4398
F: (718) 595-4479

August 29th, 2013

Mr. Leon Fonfa
New York City Department of Small Business Services
110 William Street
New York, New York 10038

Re: East Midtown Waterfront Greenway and Esplanade
Pedestrian Bridges at E. 42nd, E. 48th and E. 54th Streets
DEP #14DEPTECH013M / CEQR # 13SBS004M
New York, New York.

Dear Mr. Fonfa:

The New York City Department of Environmental Protection, Bureau of Environmental Planning and Analysis (DEP) has reviewed the February 2013 Phase I Environmental Site Assessment Report (Phase 1), prepared by AECOM Environment on behalf of New York City Department of Small Business Services (SBS), New York City Department of Economic Development Corporation (EDC), in partnership with the New York City Department of Transportation (DOT) and the New York City Department of Parks and Recreation (DPR) (applicants) for the above referenced project. It is our understanding that the applicants proposes to construct the East Midtown waterfront Esplanade and Greenway Project between East 41st and East 60th Streets in Manhattan Community District 6. As currently proposed, the project will consist of the Outboard Detour Road Esplanade, United Nations Esplanade and various connections to the waterfront. The proposed connections (pedestrian bridges) will be located at East 42nd Street (Property 1), East 48th Street (Property 2) and East 54th Street (Property 3). These pedestrian bridges will connect the landside west of the Franklin D Roosevelt (FDR) Drive to the proposed East Midtown Waterfront Esplanade located east of the FDR Drive. It should be noted that Property 1 currently consists of the north lane of a three lane exit ramp from the northbound side of the FDR Drive. Property 2 is a concrete paved area with chain link fence and gate that is currently used to store construction equipment and materials and Property 3 is located within the north east corner of the Sutton Place Park and contains of a vegetated island and benches.

The February 2013 Phase I report revealed historical on-site and surrounding area land uses consisted of residential, manufacturing and commercial buildings, including a gas company with a coal house, gas holder, retort house, condenser house and tar house. Other uses also included a smelter house, a ferry station, a hotel, a wood factory, a lumber yard, parking garages, auto repair shops and multiple high-rise apartments. Regulatory databases such as the New York State Department of Environmental Conservation (NYSDEC)

SPILLS, Leaking Underground Storage Tank (LUST), Resource Conservation and Recovery Act, and Generator and Petroleum Bulk Storage identified several sites in close proximity to the property. The NYSDEC database reported 161 spills and 123 historical spills within their respective search distances from the project sites.

Based upon our review of the submitted documentation, we have the following comments and recommendations to SBS:

- SBS should inform the applicant that based on the historical on-site and surrounding area land uses, a Phase II Environmental Site Assessment (Phase II) is necessary to adequately identify/characterize the surface and subsurface soils of the subject parcel prior to soil disturbance for the proposed project. A Phase II Investigative Protocol/Work Plan summarizing the proposed drilling, soil sampling activities should be submitted to DEP for review and approval. The Work Plan should include blueprints and/or site plans displaying the current surface grade and sub-grade elevations and a site map depicting the proposed soil boring locations. Soil samples should be collected and analyzed by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory for the presence of volatile organic compounds (VOCs) by United States Environmental Protection Agency (EPA) Method 8260, semi-volatile organic compounds by EPA Method 8270, pesticides by EPA Method 8081, PCBs by EPA Method 8082, Target Analyte List metals. An Investigative Health and Safety Plan (HASP) should also be submitted to DEP for review and approval.

SBS should also instruct the applicant that the Phase II Work Plan and HASP should be submitted to DEP for review and approval prior to the start of any fieldwork. Future correspondence and submittals related to this project should include the following tracking number **14DEPTECH013M.** If you have any questions, you may contact Ms. Cassandra Scantlebury at (718) 595-6756.

Sincerely,

Maurice S. Winter
Deputy Director, Site Assessment

cc: E. Mahoney
M. Winter
W. Yu
T. Estesen
M. Wimbish
File