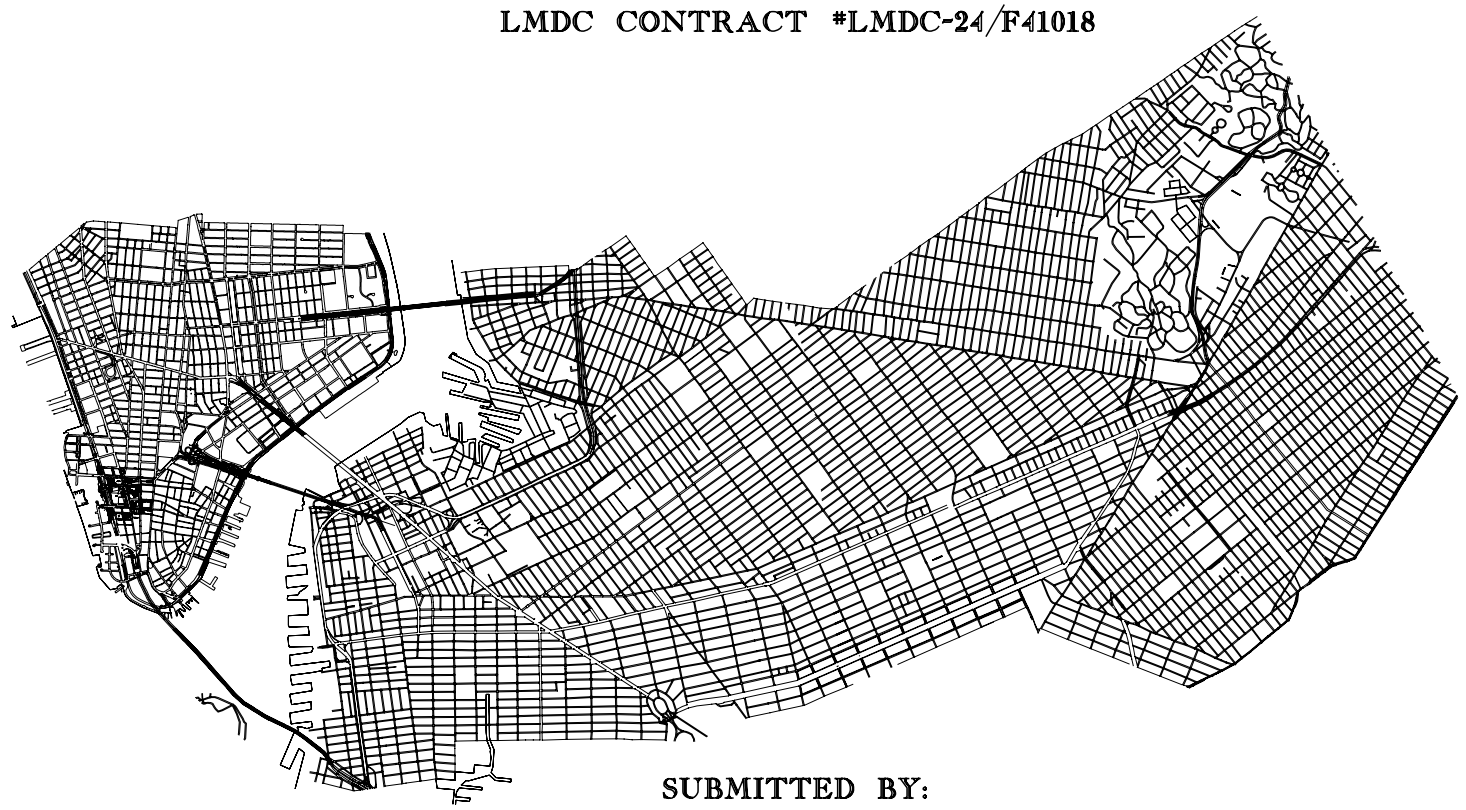
SUPPLEMENTAL REPORT
APPENDIX B: ENGINEERING DRAWINGS

DATE: MAY, 2004
LMDC CONTRACT #LMDC-24/F41018



SUBMITTED BY:

PARSONS/SYSTRA ENGINEERING, INC.-A JOINT VENTURE

IN ASSOCIATION WITH:

THE LOUIS BERGER GROUP
EL TALLER COLABORATIVO, P.C.
MATTHEW A. COOGAN
PROJECT PLANNING & ANALYSIS
MUESER RUTLEDGE CONSULTING ENGINEERS
LTK ENGINEERING SERVICES
MVA LTD.
MARKETSENSE
HAMILTON, RABINOVITZ & ALSCHULER, INC.

VERSION 2.0

LMDC Lower Manhattan Development Corporation

Lower Manhattan Airport and Commuter Access Alternatives Analysis

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DWG NO.	TITLE	SHEET NO.
GENERAL		
G-001	DRAWING LIST	1 OF 2
G-002	KEYPLAN	2 OF 2
EXHIBIT 1A (NEW NYCT TUNNEL ALTERNATIVE)		
GS-100A	NEW NYCT TUNNEL ALT. GENERAL INFORMATION	1 OF 12
TK-100A	NEW NYCT TUNNEL ALT. CURVE DATA	2 OF 12
TK-101A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	3 OF 12
TK-102A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	4 OF 12
TK-103A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	5 OF 12
TK-104A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	6 OF 12
TK-105A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	7 OF 12
TK-106A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	8 OF 12
TK-107A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	9 OF 12
TK-108A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	10 OF 12
TK-109A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	11 OF 12
TK-110A	NEW NYCT TUNNEL ALT. PLAN AND PROFILE	12 OF 12
EXHIBIT 1B (NEW LIRR TUNNEL ALTERNATIVE)		
GS-100B	NEW LIRR TUNNEL ALT. GENERAL INFORMATION	1 OF 11
TK-100B	NEW LIRR TUNNEL ALT. CURVE DATA	2 OF 11
TK-101B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	3 OF 11
TK-102B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	4 OF 11
TK-103B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	5 OF 11
TK-104B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	6 OF 11
TK-105B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	7 OF 11
TK-106B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	8 OF 11
TK-107B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	9 OF 11
TK-108B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	10 OF 11
TK-109B	NEW LIRR TUNNEL ALT. PLAN AND PROFILE	11 OF 11
EXHIBIT 2 (MONTAGUE TUNNEL ALTERNATIVE)		
GS-200	MONTAGUE TUNNEL ALTERNATIVE GENERAL INFORMATION	1 OF 10
TK-200	MONTAGUE TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FOURTH AVE. LINE CURVE DATA	2 OF 10
TK-201	MONTAGUE TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FOURTH AVE. LINE PLAN AND PROFILE	3 OF 10
TK-202	MONTAGUE TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FOURTH AVE. LINE PLAN AND PROFILE	4 OF 10
TK-203	MONTAGUE TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FOURTH AVE. LINE PLAN	5 OF 10
TK-204	MONTAGUE TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FOURTH AVE. LINE PROFILE	6 OF 10
TK-205	MONTAGUE TUNNEL ALTERNATIVE LOWER MANHATTAN AIRPORT PASSANGER TERMINAL CURVE DATA	7 OF 10
TK-206	MONTAGUE TUNNEL ALTERNATIVE LOWER MANHATTAN AIRPORT PASSANGER TERMINAL PLAN AND PROFILE	8 OF 10
TK-207	MONTAGUE TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE	9 OF 10
TK-208	MONTAGUE TUNNEL ALTERNATIVE PACIFIC STREET INTERLOCKING PLAN AND PROFILE	10 OF 10
EXHIBIT 3 (CRANBERRY TULLEN ALTERNATIVE)		
GS-300	CRANBERRY TUNNEL ALTERNATIVE GENERAL INFORMATION	1 OF 9
TK-300	CRANBERRY TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FULTON LINE CURVE DATA	2 OF 9
TK-301	CRANBERRY TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FULTON LINE PLAN AND PROFILE	3 OF 9
TK-302	CRANBERRY TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FULTON LINE PLAN AND PROFILE	4 OF 9
TK-303	CRANBERRY TUNNEL ALTERNATIVE ATLANTIC BRANCH TO FULTON LINE PLAN AND PROFILE	5 OF 9
TK-304	CRANBERRY TUNNEL ALTERNATIVE JAY STREET TO HOYT-SCHERMERHORN PLAN	6 OF 9
TK-305	CRANBERRY TUNNEL ALTERNATIVE JAY STREET TO HOYT-SCHERMERHORN PROFILES	7 OF 9
TK-306	CRANBERRY TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINALS CURVE DATA	8 OF 9
TK-307	CRANBERRY TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINALS PLAN AND PROFILES	1 OF 9
TK-308	CRANBERRY TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINALS PLAN	9 OF 9

DWG NO.	TITLE	SHEET NO.
EXHIBIT 4 (CRANBERRY/MONTAGUE TUNNELS ALTERNATIVE)		
GS-400	CRANBERRY/MONTAGUE GENERAL INFORMATION	1 OF 12
TK-400	CRANBERRY/MONTAGUE ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE CURVE DATA	2 OF 12
TK-401	CRANBERRY/MONTAGUE ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE PLAN AND PROFILE	3 OF 12
TK-402	CRANBERRY/MONTAGUE ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE PLAN AND PROFILE	4 OF 12
TK-403	CRANBERRY/MONTAGUE ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE PROFILE	5 OF 12
TK-404	CRANBERRY/MONTAGUE ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE PLAN AND PROFILE	6 OF 12
TK-405	CRANBERRY/MONTAGUE ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE PLAN	7 OF 12
TK-406	CRANBERRY/MONTAGUE ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE PROFILE	8 OF 12
TK-407	CRANBERRY/MONTAGUE LOWER MANHATTAN AIR TRAIN TERMINAL CURVE DATA	9 OF 12
TK-408	CRANBERRY/MONTAGUE LOWER MANHATTAN AIR TRAIN TERMINAL PLAN AND PROFILE	10 OF 12
TK-409	CRANBERRY/MONTAGUE CANAL STREET STATION MODIFICATIONS CURVE DATA	11 OF 12
TK-410	CRANBERRY/MONTAGUE CANAL STREET STATION MODIFICATIONS PLAN AND PROFILE	12 OF 12
EXHIBIT 5A (JAMAICA STATION-NYCT ALTERNATIVES)		
TK-500A	JAMAICA STATION NYCT ALTERNATIVE CURVE DATA	1 OF 6
TK-501A	JAMAICA STATION NYCT ALTERNATIVE	2 OF 6
TK-502A	JAMAICA STATION NYCT ALTERNATIVE	3 OF 6
TK-503A	JAMAICA STATION NYCT ALTERNATIVE	4 OF 6
TK-504A	JAMAICA STATION NYCT ALTERNATIVE	5 OF 6
TK-505A	JAMAICA STATION NYCT ALTERNATIVE	6 OF 6
EXHIBIT 5B (JAMAICA STATION-LIRR ALTERNATIVE)		
TK-500B	JAMAICA STATION LIRR ALTERNATIVE CURVE DATA	1 OF 5
TK-501B	JAMAICA STATION LIRR ALTERNATIVE	2 OF 5
TK-502B	JAMAICA STATION LIRR ALTERNATIVE	3 OF 5
TK-503B	JAMAICA STATION LIRR ALTERNATIVE	4 OF 5
TK-504B	JAMAICA STATION LIRR ALTERNATIVE	5 OF 5
EXHIBIT 6 (CROSS SECTIONS)		
CS-001	SECTION A-A ROCK TURNING BORING MACHINE & EARTH PRESSURE BALANCE MACHINE SECTIONS (SUBWAY ALTERNATIVE)	1 OF 15
CS-002	SECTION B-B ROCK TUNNEL BORING MACHINE & EARTH PRESSURE BALANCE MACHINE SECTIONS (COMMUTER ALTERNATIVE)	2 OF 15
CS-003	SECTION C-C MINED TUNNEL SECTION	3 OF 15
CS-004	SECTION D-D LIRR ATLANTIC AVENUE TUNEL SECTION	4 OF 15
CS-005	SECTION E-E LIRR ATLANTIC AVENUE TUNNEL SECTION	5 OF 15
CS-006	SECTION F-F ATLANTIC BRANCH TO FOURTH AVE. LINE SECTION	6 OF 15
CS-007	SECTION G-G ATLANTIC BRANCH TO FOURTH AVE. LINE SECTION	7 OF 15
CS-008	SECTION H-H ATLANTIC BRANCH TO FOURTH AVE. LINE SECTION	8 OF 15
CS-009	SECTION I-I ATLANTIC BRANCH TO FOURTH AVE. LINE SECTION	9 OF 15
CS-010	SECTION J-J LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE (MONTAGUE ALTERNATIVE)	10 OF 15
CS-011	SECTION K-K LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE (MONTAGUE ALTERNATIVE)	11 OF 15
CS-012	SECTION L-L LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE (MONTAGUE ALTERNATIVE)	12 OF 15
CS-013	SECTION M-M LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE (MONTAGUE ALTERNATIVE)	13 OF 15
CS-014	SECTION N-N LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE (MONTAGUE ALTERNATIVE)	14 OF 15
CS-015	SECTION O-O LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE (MONTAGUE ALTERNATIVE)	15 OF 15

DWG NO.	TITLE	SHEET NO.
EXHIBIT 7 (ANCILLARY FACILITIES)		
AF-001	ANCILLARY FACILITY EMERGENCY FAN PLANT LAYOUT	1 OF 8
AF-002	ANCILLARY FACILITY EMERGENCY FAN PLANT SECTION	2 OF 8
AF-003	ANCILLARY FACILITY DRAINAGE SECTION	3 OF 8
AF-004	ANCILLARY FACILITY UNDERPLATFORM EXHAUST SYSTEM	4 OF 8
AF-005	ANCILLARY FACILITY STATION VENTILATION	5 OF 8
AF-006	ANCILLARY FACILITY SUPPLY FAN ROOMS	6 OF 8
AF-007	ANCILLARY FACILITY SUBSTATION DESIGN-OPTION 1	7 OF 8
AF-008	ANCILLARY FACILITY SUBSTATION DESIGN-OPTION 2	8 OF 8
EXHIBIT 8 (STATIONS)		
ST-001	NEW NYCT TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION SITE PLAN	1 OF 23
ST-002	NEW NYCT TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION PLANS	2 OF 23
ST-003	NEW NYCT TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION CROSS SECTION	3 OF 23
ST-004	NEW NYCT TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL SITE PLAN	4 OF 23
ST-005	NEW NYCT TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL PLANS	5 OF 23
ST-006	NEW NYCT TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL SECTION	6 OF 23
ST-007	NEW NYCT TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL SECTIONS	7 OF 23
ST-008	NEW LIRR TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION SITE PLAN	8 OF 23
ST-009	NEW LIRR TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION PLANS	9 OF 23
ST-010	NEW LIRR TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION CROSS SECTION	10 OF 23
ST-011	NEW LIRR TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL SITE PLAN	11 OF 23
ST-012	NEW LIRR TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL PLANS	12 OF 23
ST-013	NEW LIRR TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL SECTIONS	13 OF 23
ST-014	MONTAGUE TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION SITE PLAN	14 OF 23
ST-015	MONTAGUE TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION PLANS	15 OF 23
ST-016	MONTAGUE TUNNEL ALTERNATIVE ATLANTIC AVENUE STATION CROSS SECTION	16 OF 23
ST-017	MONTAGUE TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL SITE PLAN	17 OF 23
ST-018	MONTAGUE TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL PLANS	18 OF 23
ST-019	MONTAGUE TUNNEL ALTERNATIVE LOWER MANHATTAN TERMINAL SECTIONS	19 OF 23
ST-020	CRANBERRY LOWER MANHATTAN TERMINAL SECTION	20 OF 23
ST-021	CRANBERRY LOWER MANHATTAN TERMINAL SECTIONS	21 OF 23
ST-022	CRANBERRY/MONTAGUE LOWER MANHATTAN TERMINAL SITE PLAN	22 OF 23
ST-023	CRANBERRY/MONTAGUE LOWER MANHATTAN TERMINAL PLANS AND SECTION	23 OF 23

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

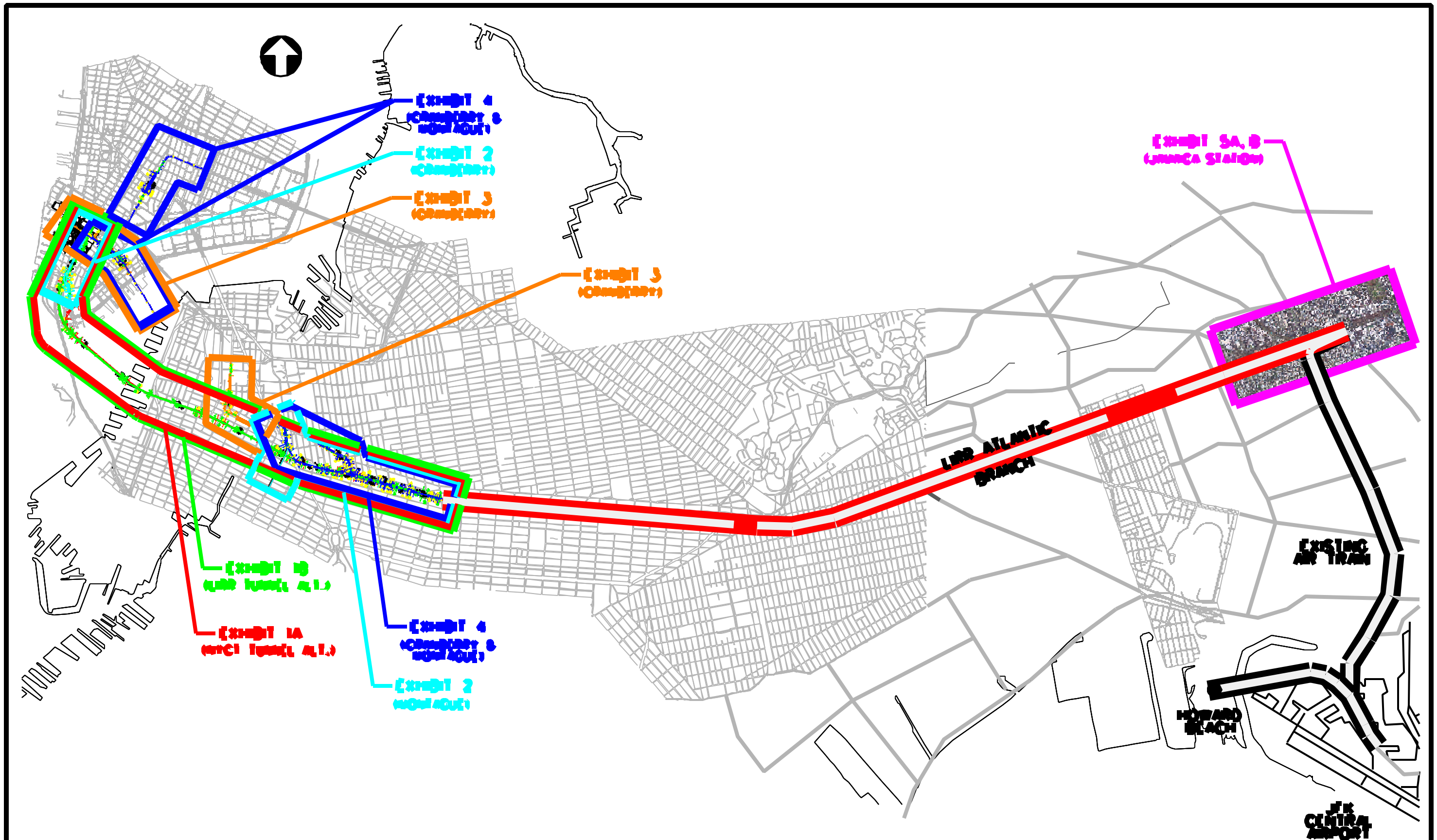
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVE ANALYSIS
APPENDIX B
DRAWING LIST

SCALE: NONE	CONTRACT No.
FILE NAME: DWG LIST	ISSUE FINAL
DRAWING No.: G-001	SHEET No. 1 OF 2
DATE: 26 MAY 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS BRINCKERHOFF

SYSTRA ENGINEERING

A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC

Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVE ANALYSIS
APPENDIX B
KEYPLAN

SCALE: NONE

FILE NAME: KEYPLAN

DRAWING No.: B-002

DATE: 28 MAY 04

CONTRACT No.

ISSUE FINAL

SHEET No. 2 OF 2

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

NEW NYCT TUNNEL ALTERNATIVE

DATE: APRIL 23, 2004

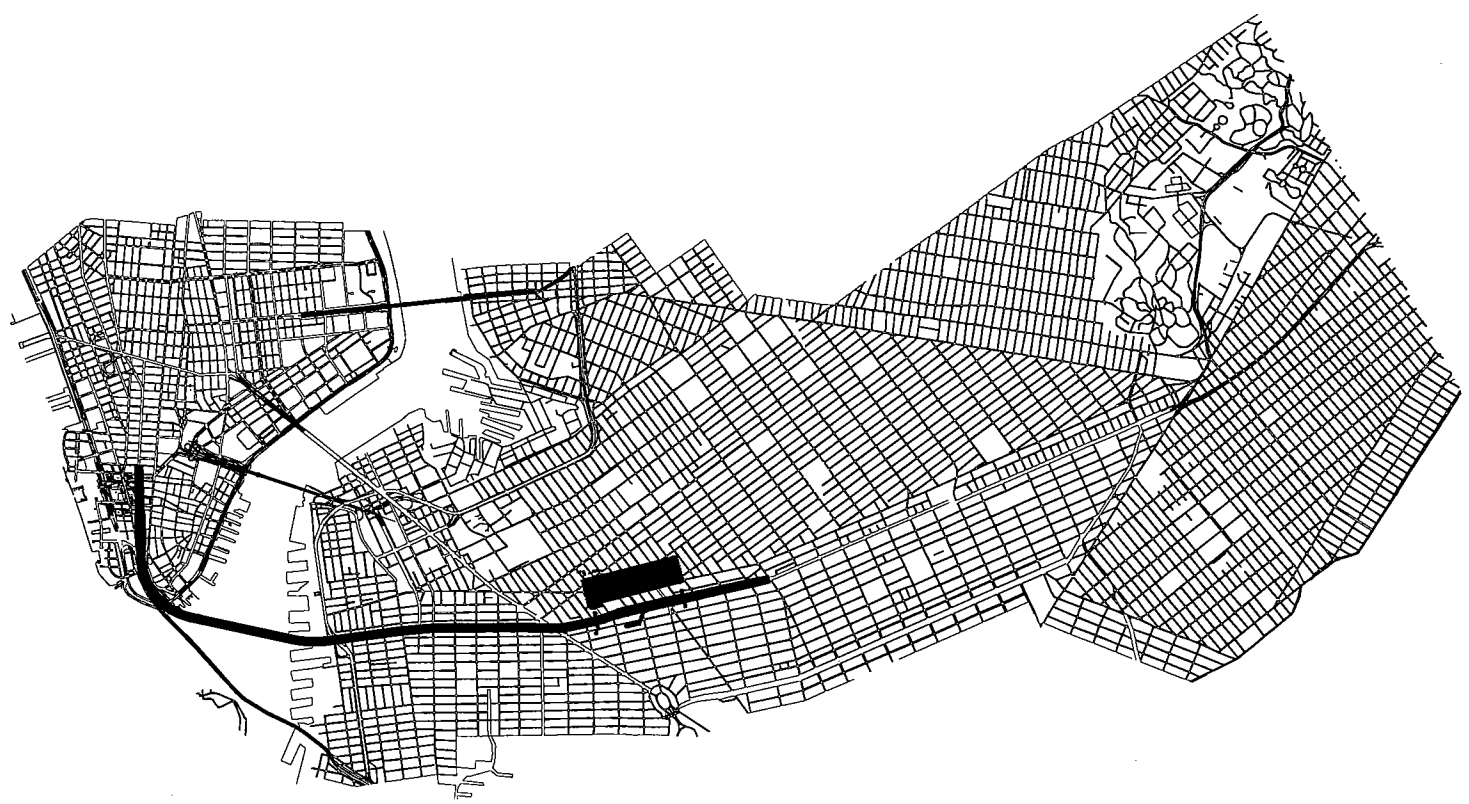


EXHIBIT 1A

LMDC Lower Manhattan Development Corporation

Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

GENERAL NOTES

1. ELEVATIONS INDICATED REFER TO NYCT DATUM. ELEVATION 100 IS 2.653 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, UNITED STATES COAST AND GEODETIC SURVEY DATUM.
2. EXISTING TUNNEL INFRASTRUCTURE OUTLINES AND TRACK ALIGNMENT LOCATED FROM NYCT CONSTRUCTION DRAWINGS. OVERLYING STREET GRID AND BUILDING OUTLINES DEVELOPED FROM MULTIPLE SOURCES. THESE DRAWINGS ARE NOT TO BE USED FOR NEW CONSTRUCTION.
3. STATIONING IS MEASURED ALONG PROPOSED BASELINE ALIGNMENT.
4. ALL TRACK POINTS EXCEPT P.I.'S ARE AT CENTERLINE OF PROPOSED TRACK, UNLESS NOTED OTHERWISE.
5. PROFILE GRID STATIONING BASED UPON BASELINE ALIGNMENT UNLESS NOTED OTHERWISE.
6. CUT AND COVER CONSTRUCTION EXPECTED AFTER RTBM AND/OR EPBM CONSTRUCTION OF RUNNING TUNNELS TO COMPLETE ALL OR PART OF THE STATION MEZZANINE, ANCILLARY FACILITIES, AND STATION ENTRANCES. WHERE POSSIBLE HARD ROCK MINING OR NATM METHODS WILL BE EMPLOYED TO CONSTRUCT CROSSOVERS TO LIMIT STREET SURFACE DISRUPTION, THROUGHOUT THE ALIGNMENT EXPECTED CONSTRUCTION METHODS ARE BASED UPON PRELIMINARY INFORMATION. ACTUAL CONSTRUCTION METHOD EMPLOYED WOULD BE SELECTED FOLLOWING DETAILED GEOLOGICAL INVESTIGATION, ENVIRONMENTAL AND PROPERTY IMPACT ANALYSES, AND COST ANALYSES FOR VARIOUS CONSTRUCTION MEANS AND METHODS.

GENERAL ABBREVIATIONS

APPROXIMATE	APPROX.
AVENUE	AVE
CENTER	CTR
CENTER TO CENTER	C/C
CLEARANCE	CLR
DEGREE	DEG, °
DIAMETER	DIA, Ø
DRAWING	DWG
EAST	E
EASTBOUND	E.B.
ELEVATION	ELEV., EL
EXISTING	EX, EXIST
FEET	FT, '
HORIZONTAL	HORIZ
INCH	IN., "
LINEAR FEET	LF
MILES PER HOUR	MPH
MINIMUM	MIN
NORTH	N
NORTHBOUND	N.B.
NOT TO SCALE	N.T.S.
NUMBER	NO., #
OUTSIDE DIAMETER	OD
REQUIRED	REQ'D
ROUTE	RTE
SOUTHBOUND	S.B.
STREET	ST
TYPICAL	TYP.
VERTICAL	VERT
WEST	W
WESTBOUND	W.B.

TRACK ABBREVIATIONS

ACTUAL SUPERELEVATION	Ea
BASE OF RAIL	BOR
CENTERLINE	℄
CROSSOVER	X-OVER, X/O
CURVE TO SPIRAL	CS
DEGREE OF CURVATURE (ARC DEFINITION)	Dc
LENGTH OF CURVE	Lc
LENGTH OF SPIRAL	Ls
PASSENGER COMFORT LIMITING SPEED	Vp
POINT OF VERTICAL CURVE	PVC
POINT OF INTERSECTION, TURNOUT	PITO
POINT OF VERTICAL CURVE	PVI
POINT OF SWITCH	PS
POINT OF INTERSECTION	PI
POINT OF CURVE	PC
POINT OF TANGENT	PT
POINT OF VERTICAL TANGENCY	PVT
POINT OF COMPOUND CURVE	PCC
RADIUS OF CURVE	Rc
SPIRAL TO CURVE	SC
SPIRAL TO TANGENT	ST
STATION, STATIONING	STA.
SWITCH	SW
TANGENT LENGTH	T
TANGENT TO SPIRAL	TS
TOTAL CENTRAL ANGLE	I
TRACK	TRK
TURNOUT	T/O
UNBALANCED SUPERELEVATION	Eu
VERTICAL CURVE	VC

HORIZONTAL ALIGNMENT LEGEND

- ℄ OF PROPOSED TRACK
- 75+00 — PROPOSED BASELINE & STATIONING
- ℄ OF EXISTING TRACK
- POINT OF SWITCH
- PITO
- NORTH ARROW
- C1-02 — CURVE NUMBER
- PROPOSED TURNOUT
- PROPOSED CROSSOVER
- PC — HORIZONTAL CURVE POINT
- HISTORIC DISTRICT (APPROXIMATE LIMITS)

VERTICAL ALIGNMENT LEGEND

- VERTICAL CURVE POINT
- PROPOSED TRACK, BASE OF RAIL
- EXISTING TRACK
- APPROXIMATION OF BEDROCK SURFACE
- EXISTING GRADE
- 92 / 90 — DEPTH AT PLATFORM LEVEL

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE
GENERAL INFORMATION

SCALE: NONE
FILE NAME: NYCTGS100A
DRAWING No.: GS-100A
DATE: 23 APR 04

CONTRACT No.
ISSUE: FINAL
SHEET No. 1 OF 12

TRACK 1

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	TK-101A	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C1-02	TK-101A	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C1-03	TK-101A	00-49-59	00-57-18	6000.00	43.62	87.24	0	0	4.00	77
C1-04	TK-101A	00-50-29	01-11-37	4800.00	35.24	70.48	0	0	4.00	69
C1-05	TK-102A	01-39-03	01-11-37	4800.00	69.15	138.30	0	0	4.00	69
C1-06	TK-102A	00-55-36	01-11-37	4800.00	38.82	77.64	0	0	4.00	69
C1-07	TK-102A	00-50-20	01-11-37	4800.00	35.14	70.29	0	0	4.00	69
C1-08	TK-102A	05-18-58	02-51-53	2000.00	52.80	105.57	80.00	2	4.00	54
C1-09	TK-102A	06-53-26	02-51-53	2000.00	80.30	160.52	80.00	2	4.00	54
C1-10	TK-103A	14-23-18	01-54-35	3000.00	378.68	753.37	0	0	4.00	54
C1-11	TK-103A	02-11-46	01-11-37	4800.00	92.00	183.98	0	0	4.00	69
C1-12	TK-104A	04-42-50	01-16-24	4500.00	185.21	370.22	0	0	4.00	67
C1-13	TK-105A	02-44-11	01-16-24	4500.00	107.48	214.92	0	0	4.00	67
C1-14	TK-106A	19-58-56	01-42-37	3350.00	590.16	1168.34	0	0	4.00	57
C1-15	TK-107A	76-29-41	02-51-53	2000.00	1544.35	2630.17	40.00	1	4.00	50

TRACK 2

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	TK-101A	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C2-02	TK-101A	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C2-03	TK-101A	00-49-59	00-57-18	6000.00	43.62	87.24	0	0	4.00	77
C2-04	TK-101A	03-01-05	01-11-37	4800.00	126.45	252.84	0	0	4.00	69
C2-05	TK-102A	02-12-31	01-11-37	4800.00	92.53	185.03	0	0	4.00	69
C2-06	TK-102A	00-55-36	01-11-37	4800.00	38.82	77.64	0	0	4.00	69
C2-07	TK-102A	07-22-53	02-51-53	2000.00	88.89	177.66	80.00	2	4.00	54
C2-08	TK-102A	08-07-01	02-51-53	2000.00	101.75	203.33	80.00	2	4.00	54
C2-09	TK-103A	14-23-18	01-54-35	3000.00	378.68	753.37	0	0	4.00	54
C2-10	TK-103A	02-11-46	01-11-37	4800.00	92.00	183.98	0	0	4.00	69
C2-11	TK-104A	04-42-50	01-16-24	4500.00	185.21	370.22	0	0	4.00	67
C2-12	TK-105A	02-44-11	01-16-24	4500.00	107.48	214.92	0	0	4.00	67
C2-13	TK-106A	19-58-56	01-42-37	3350.00	590.16	1168.34	0	0	4.00	57
C2-14	TK-107A	76-29-41	02-51-53	2000.00	1544.35	2630.17	40.00	1	4.00	50

TRACK 3

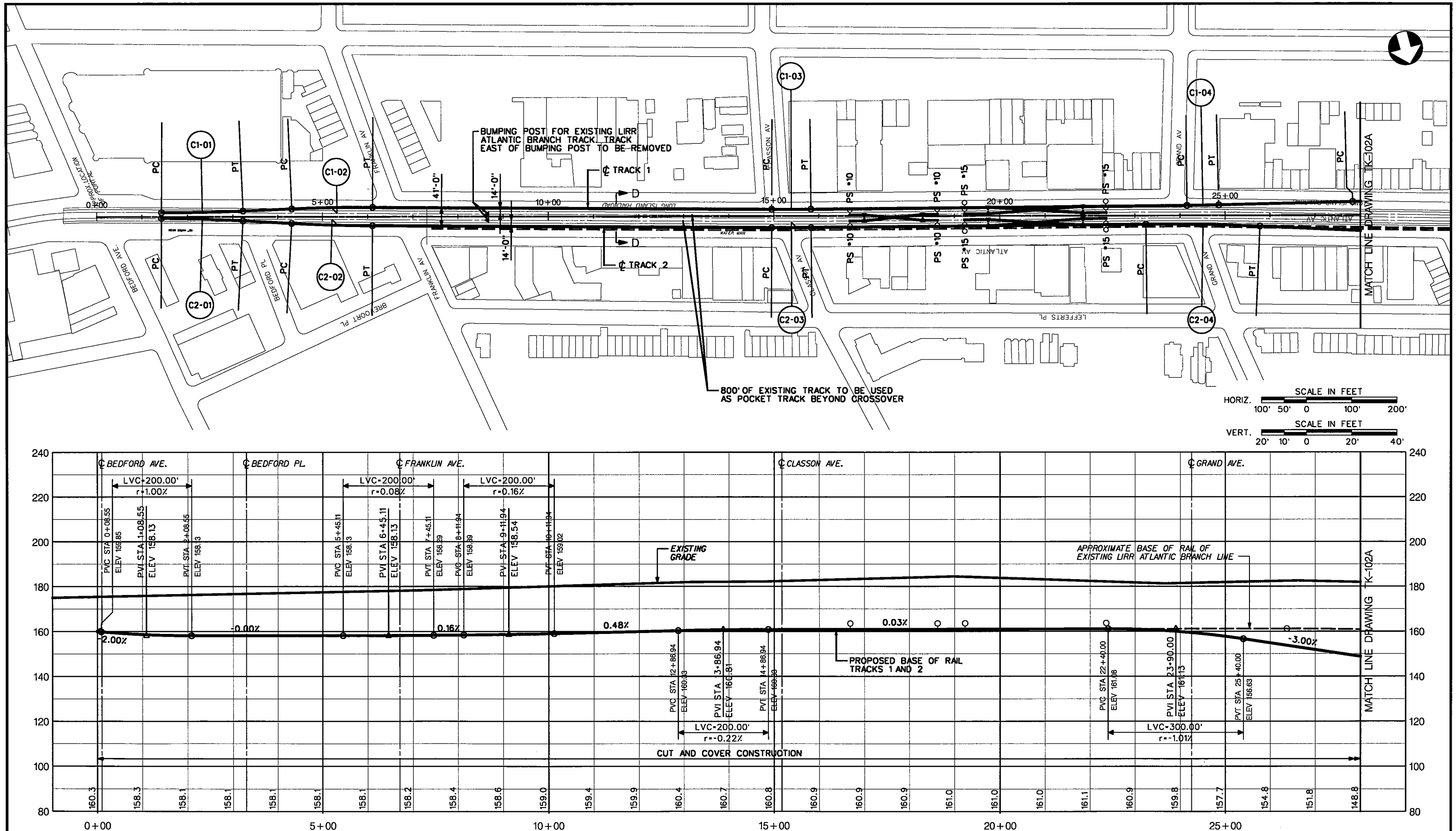
CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C3-01	TK-108A	05-43-29	06-21-58	900.00	45.00	89.92	0	0	4.00	30
C3-02	TK-110A	05-43-29	06-21-58	900.00	45.00	89.92	0	0	4.00	30

TRACK 4

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C4-01	TK-108A	05-43-29	06-21-58	900.00	45.00	89.92	0	0	4.00	30
C4-02	TK-110A	05-43-29	06-21-58	900.00	45.00	89.92	0	0	4.00	30

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE Eu = 4". PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 40 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

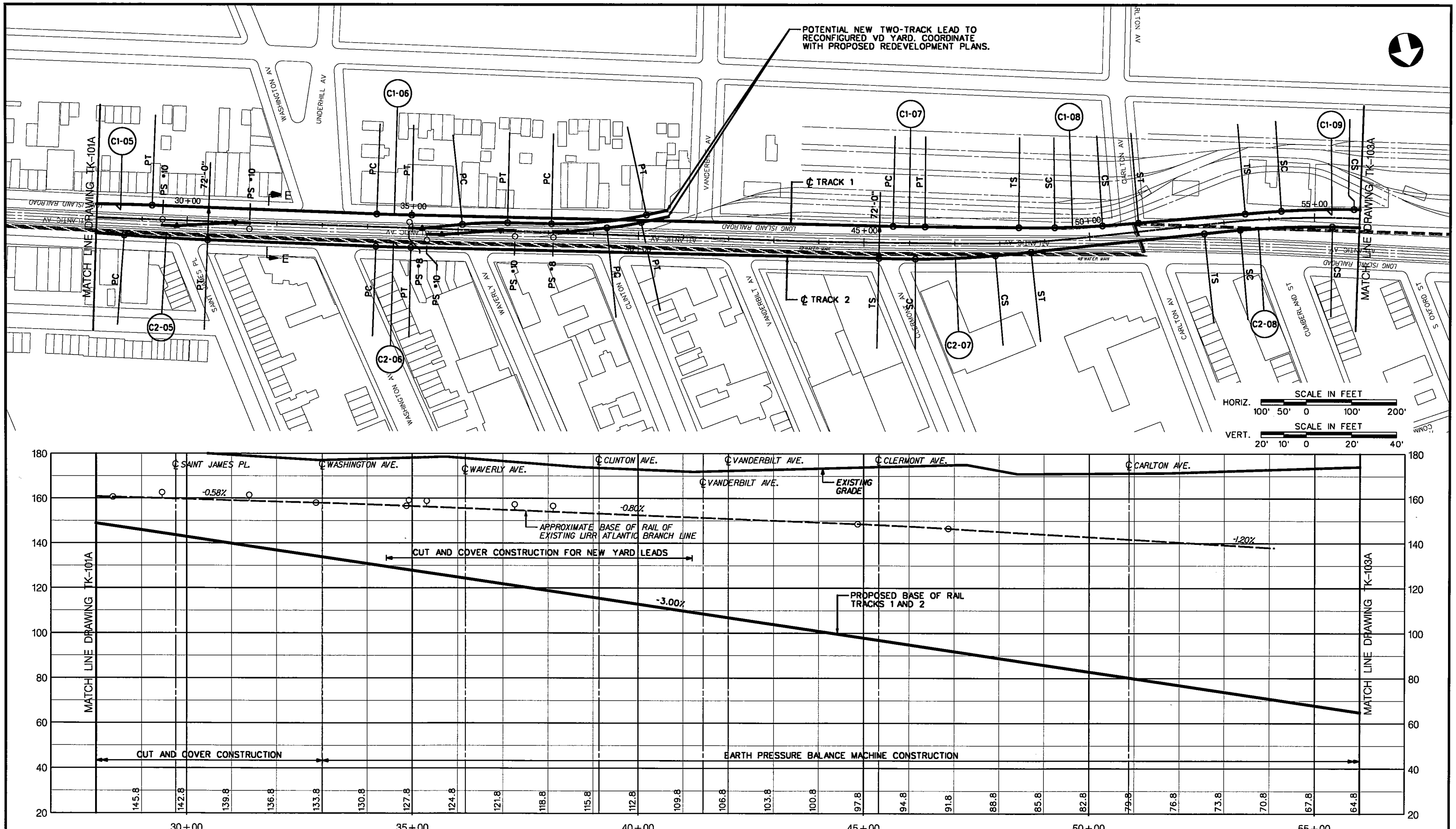
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: NYCTTK101A	ISSUE FINAL
DRAWING No.: TK-101A	SHEET No. 3 OF 12
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

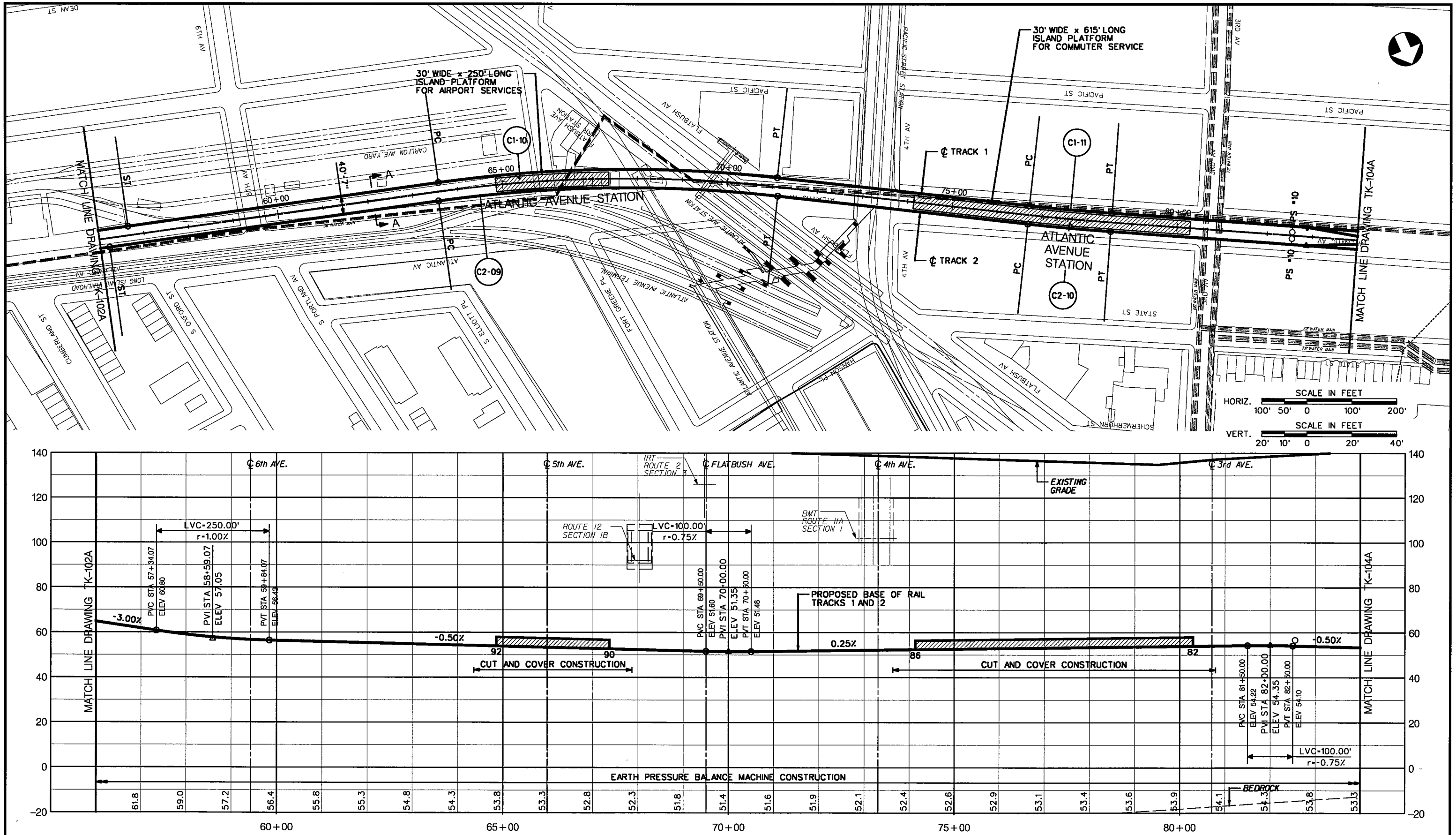
LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: NYCTTK102A
DRAWING No.: TK-102A
DATE: 23 APR 04

CONTRACT No.
ISSUE: FINAL
SHEET No. 4 OF 12



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

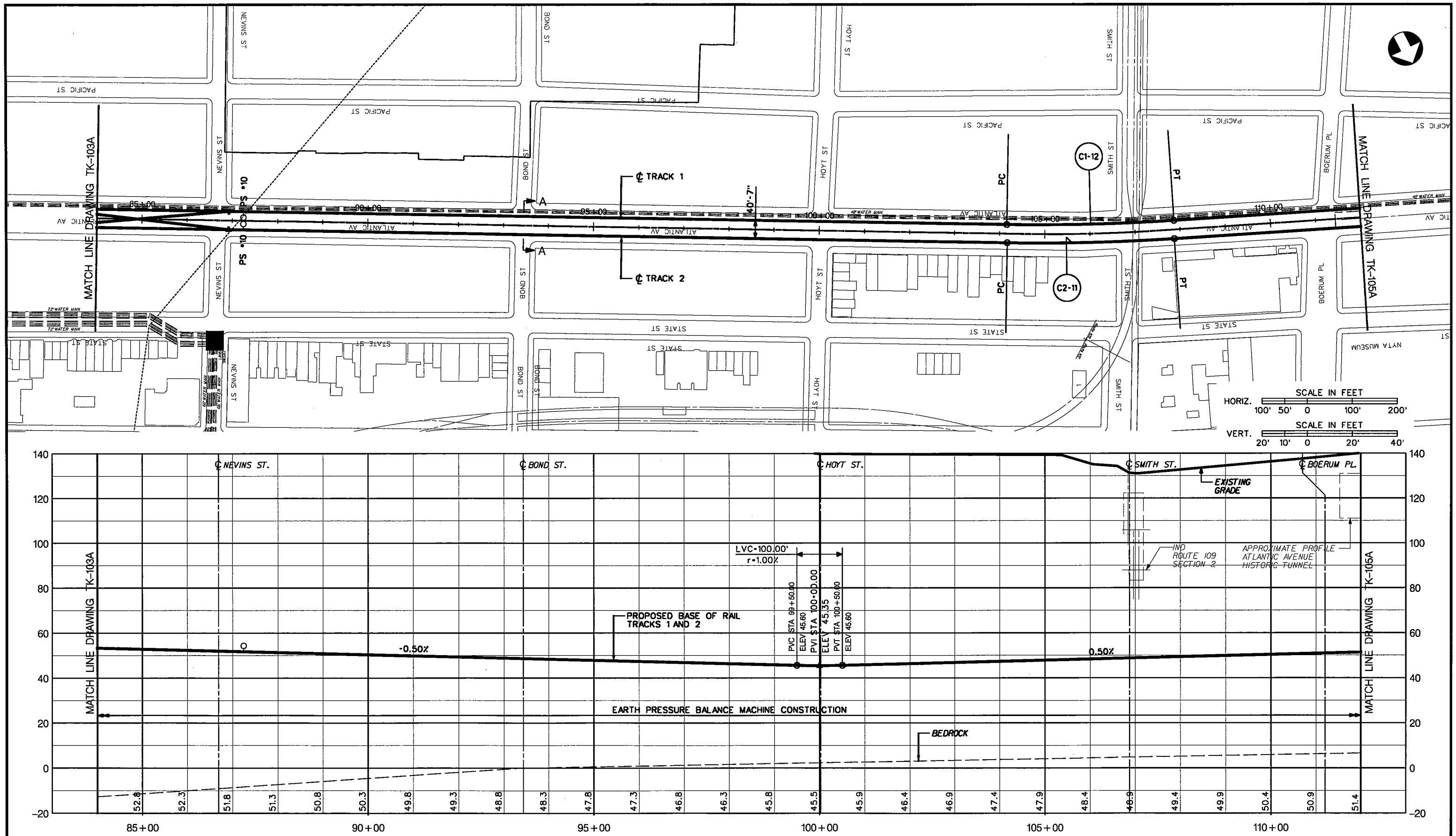
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: NYCTTK103A	ISSUE FINAL
DRAWING No.: TK-103A	SHEET No. 5 OF 12
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

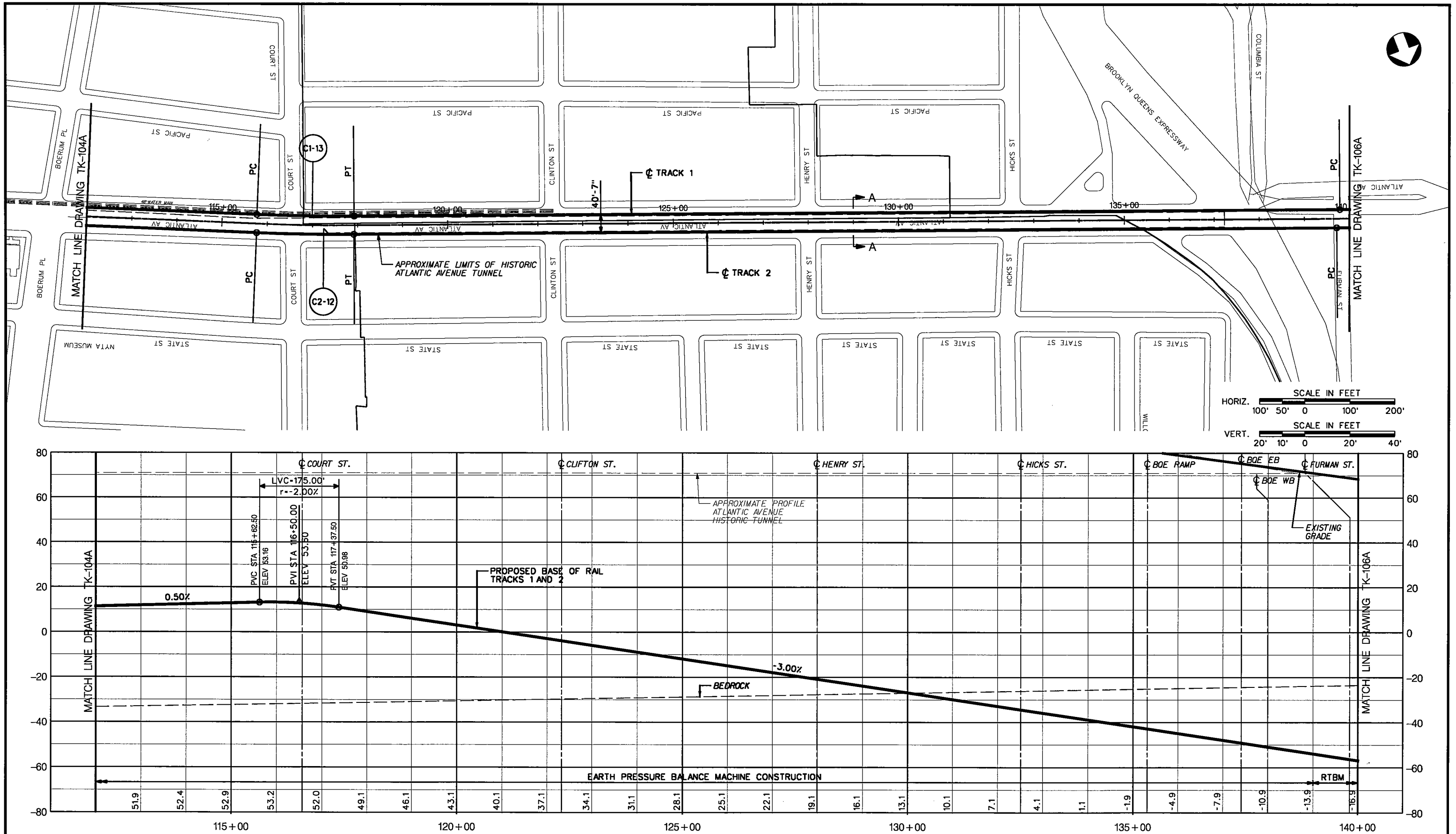
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	NYCTTK104A
DRAWING No.:	TK-104A
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	6 OF 12



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

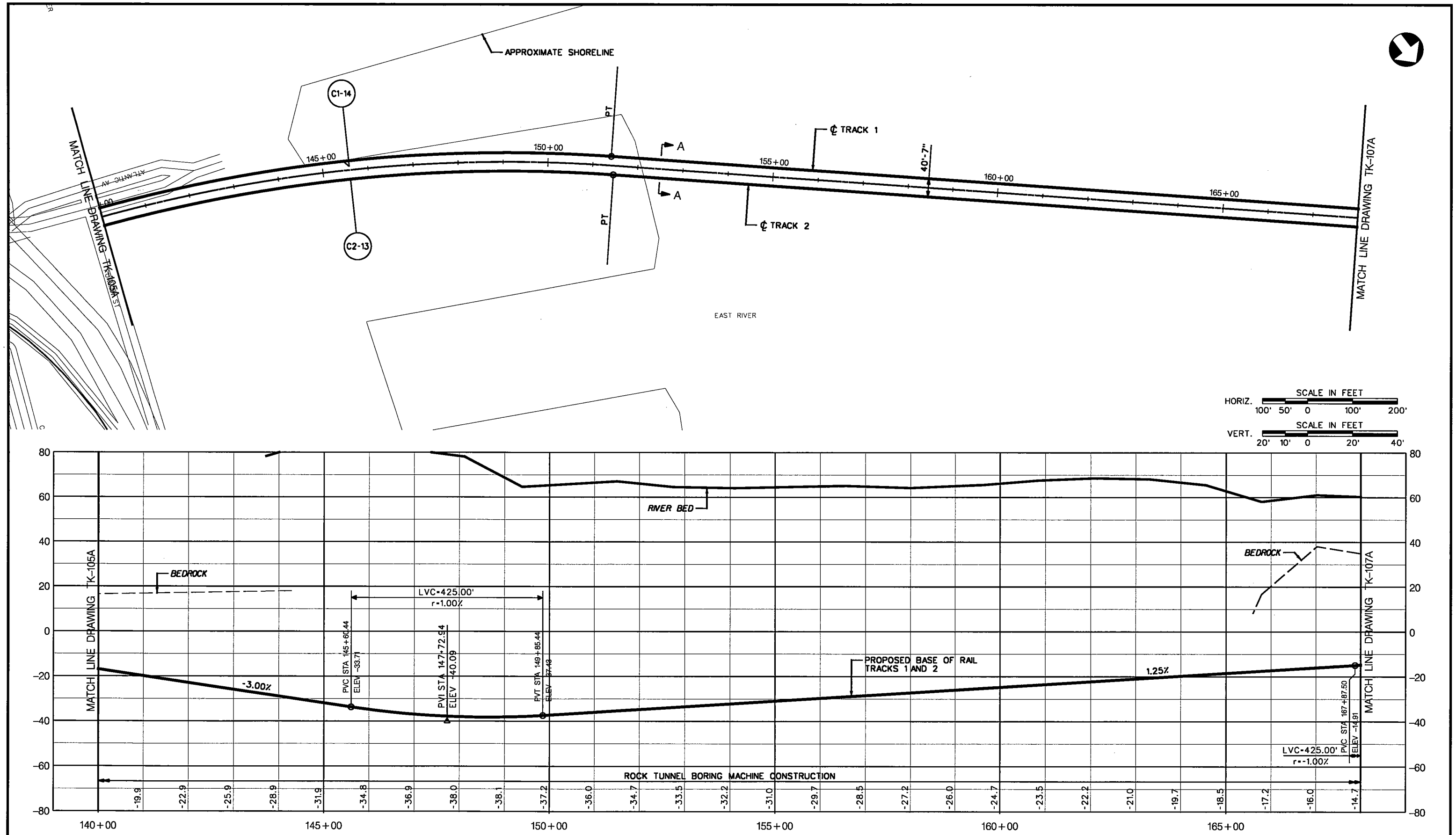
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	NYCTTK105A
DRAWING No.:	TK-105A
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	7 OF 12



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

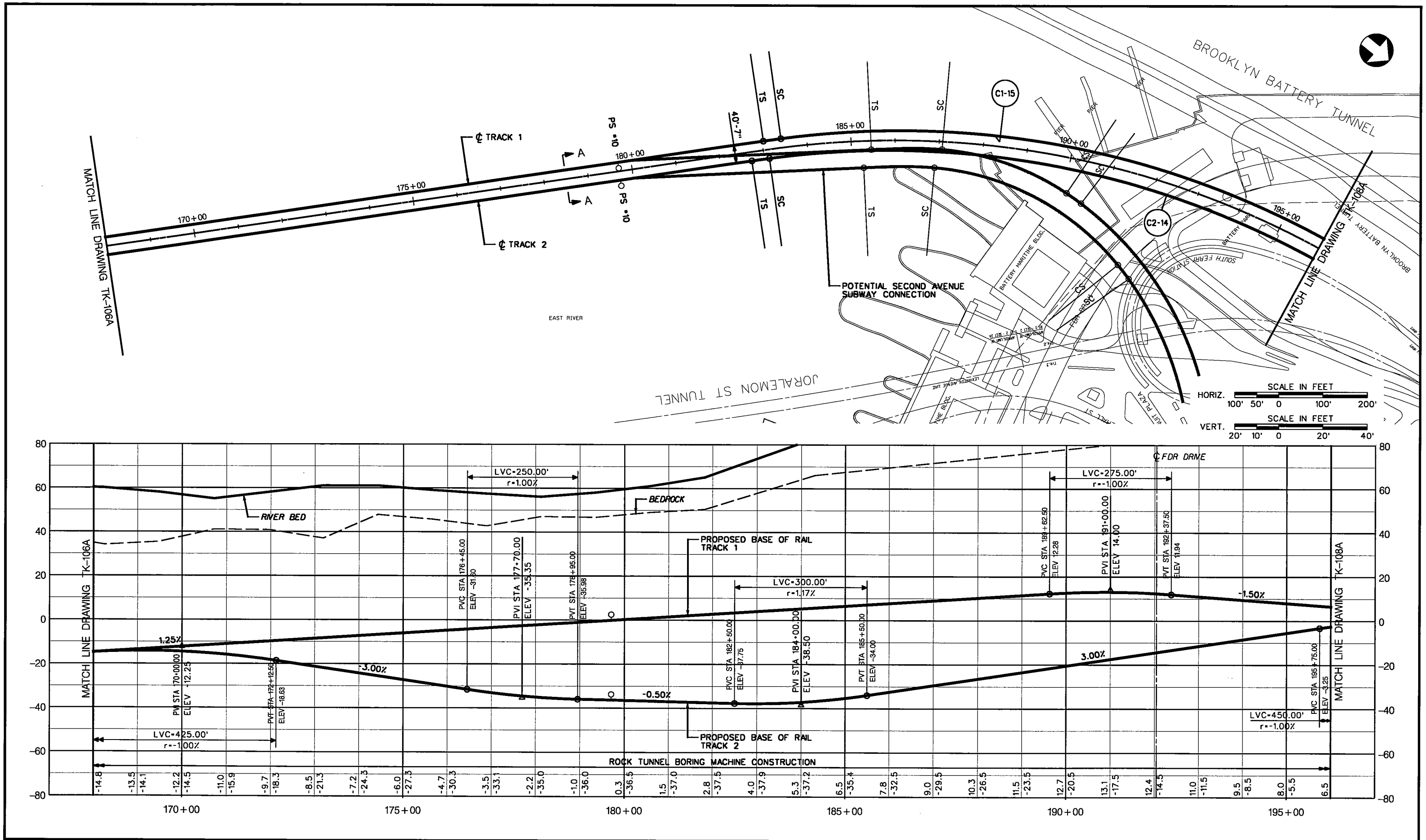
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	NYCTTK106A
DRAWING No.:	TK-106A
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	8 OF 12



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS — SYSTRA ENGINEERING — *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

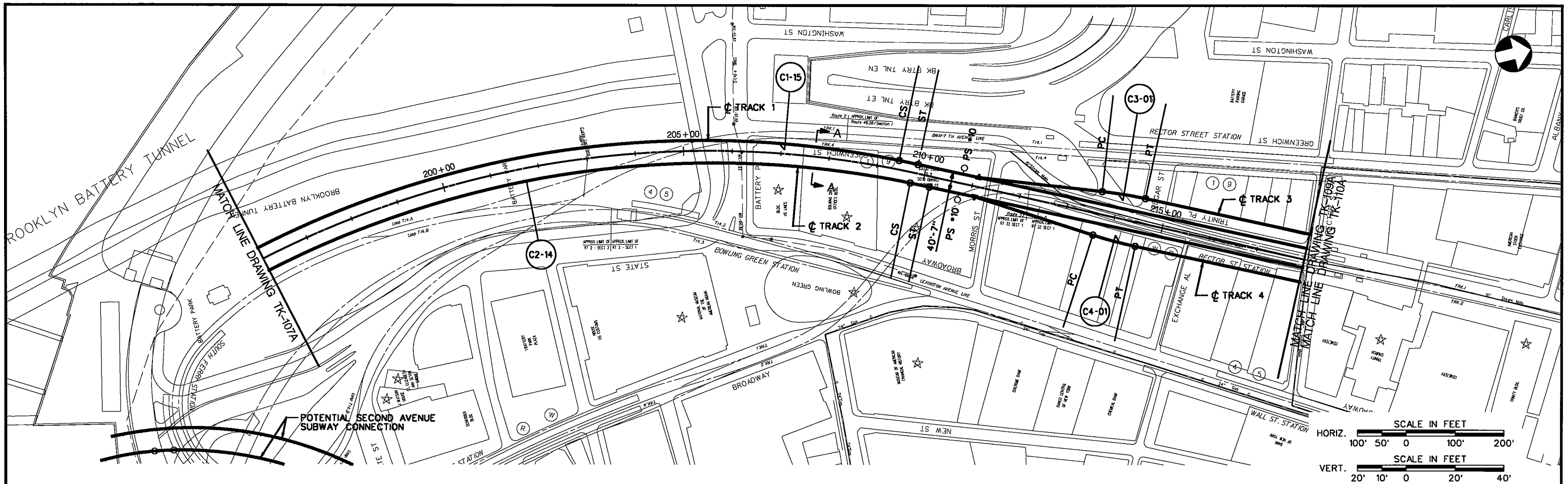
DATE:	REVISIONS	No.

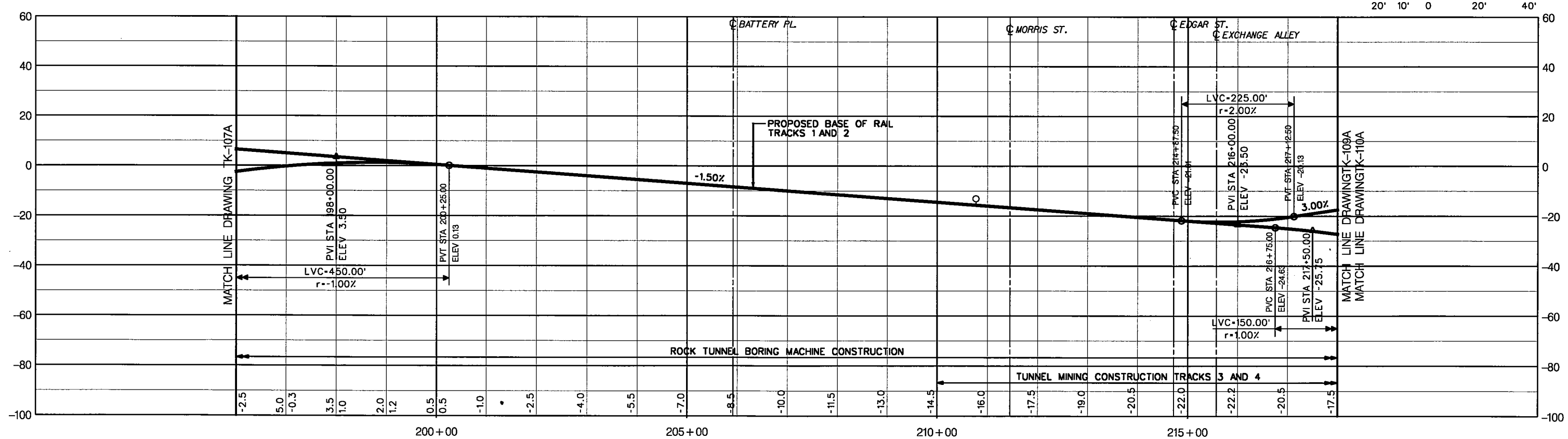
LMDC Lower Manhattan Development Corporation — Metropolitan Transportation Authority — New York City Economic Development Corporation — THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	NYCTTK107A
DRAWING No.:	TK-107A
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	9 OF 12





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS — SYSTRA ENGINEERING — *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

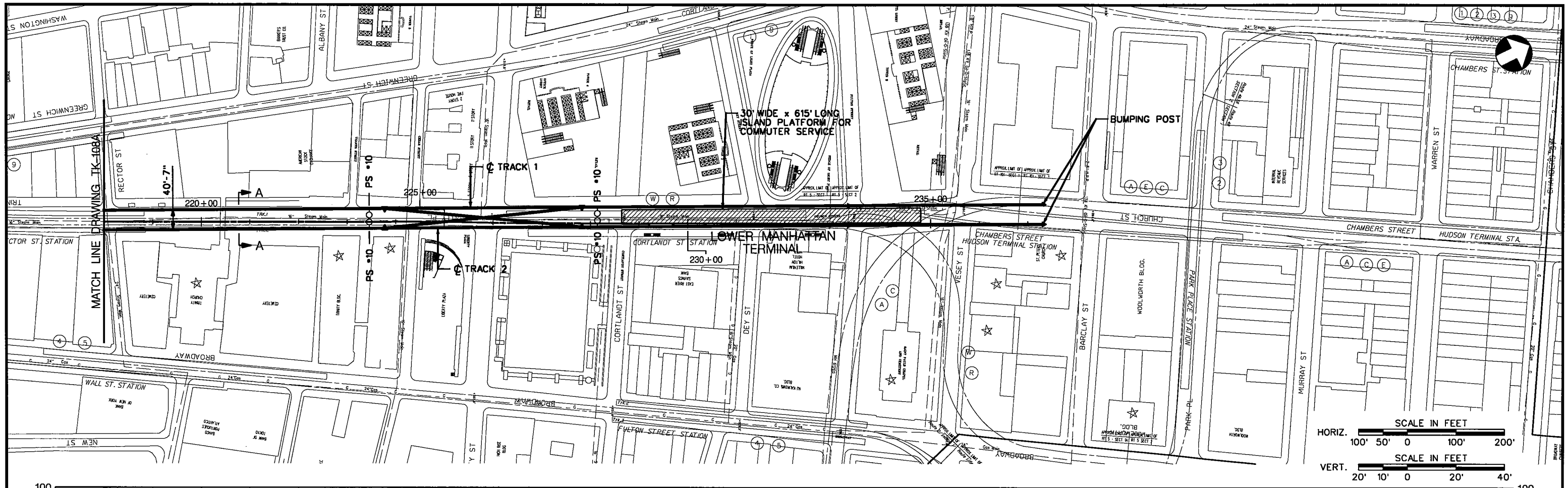
DATE:	REVISIONS	No.

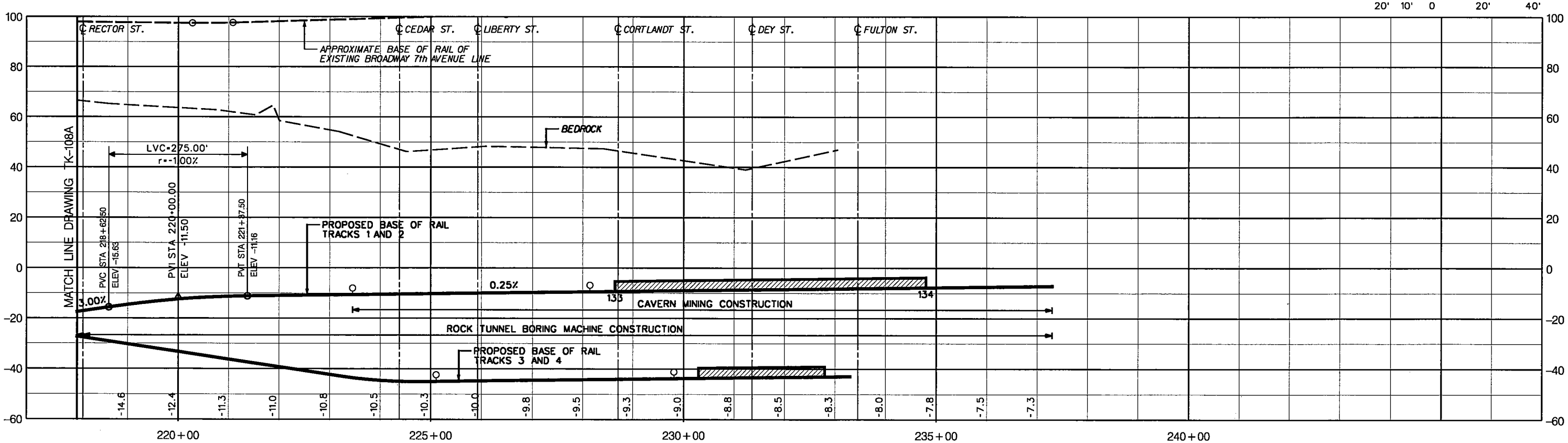
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	NYCTTK108A
DRAWING No.:	TK-108A
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	10 OF 12





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

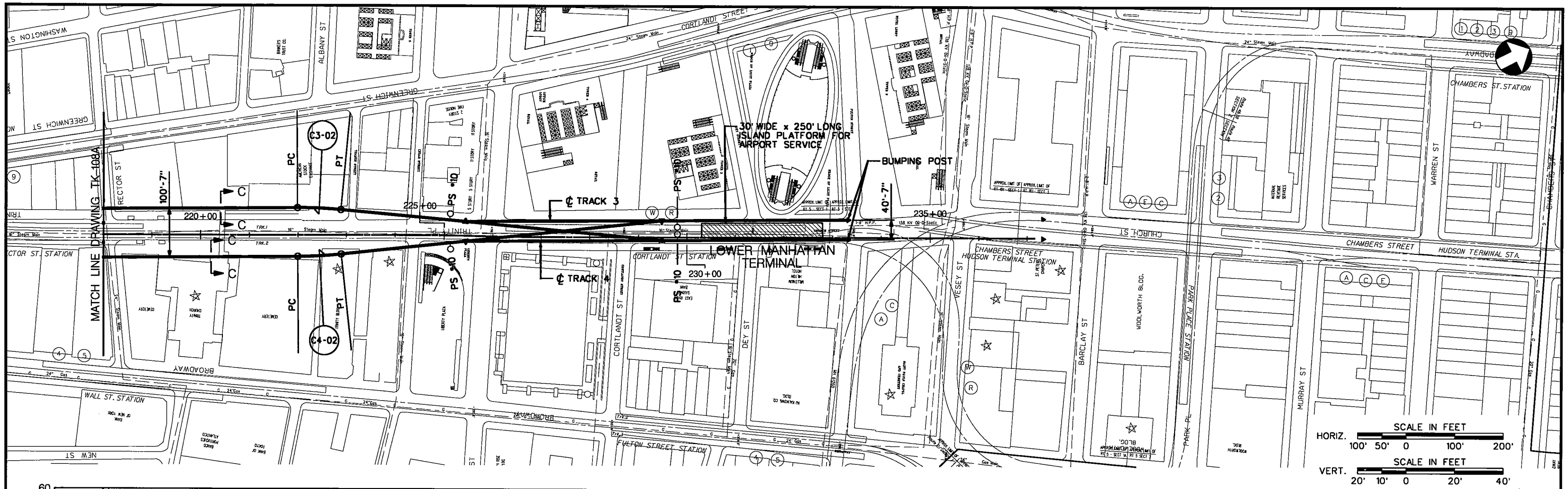
DATE:	REVISIONS	No.

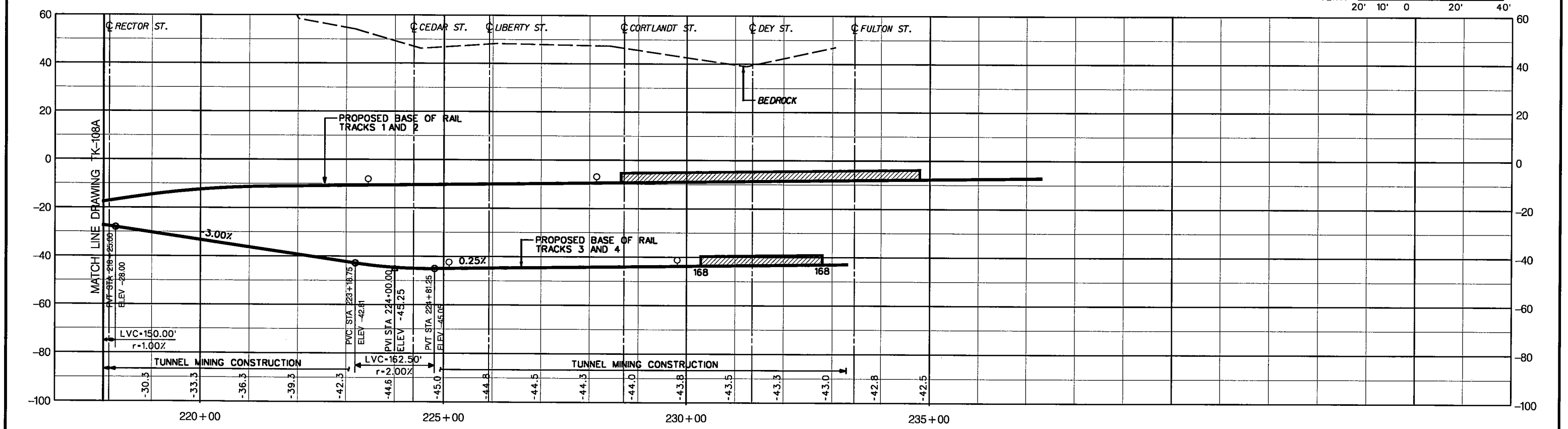
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: NYCTTK109A	ISSUE FINAL
DRAWING No.: TK-109A	SHEET No. 11 OF 12
DATE: 23 APR 04	





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS
SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: NYCTTK110A	ISSUE FINAL
DRAWING No.: TK-110A	SHEET No.
DATE: 23 APR 04	12 OF 12

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

NEW LIRR TUNNEL ALTERNATIVE

DATE: APRIL 23, 2004

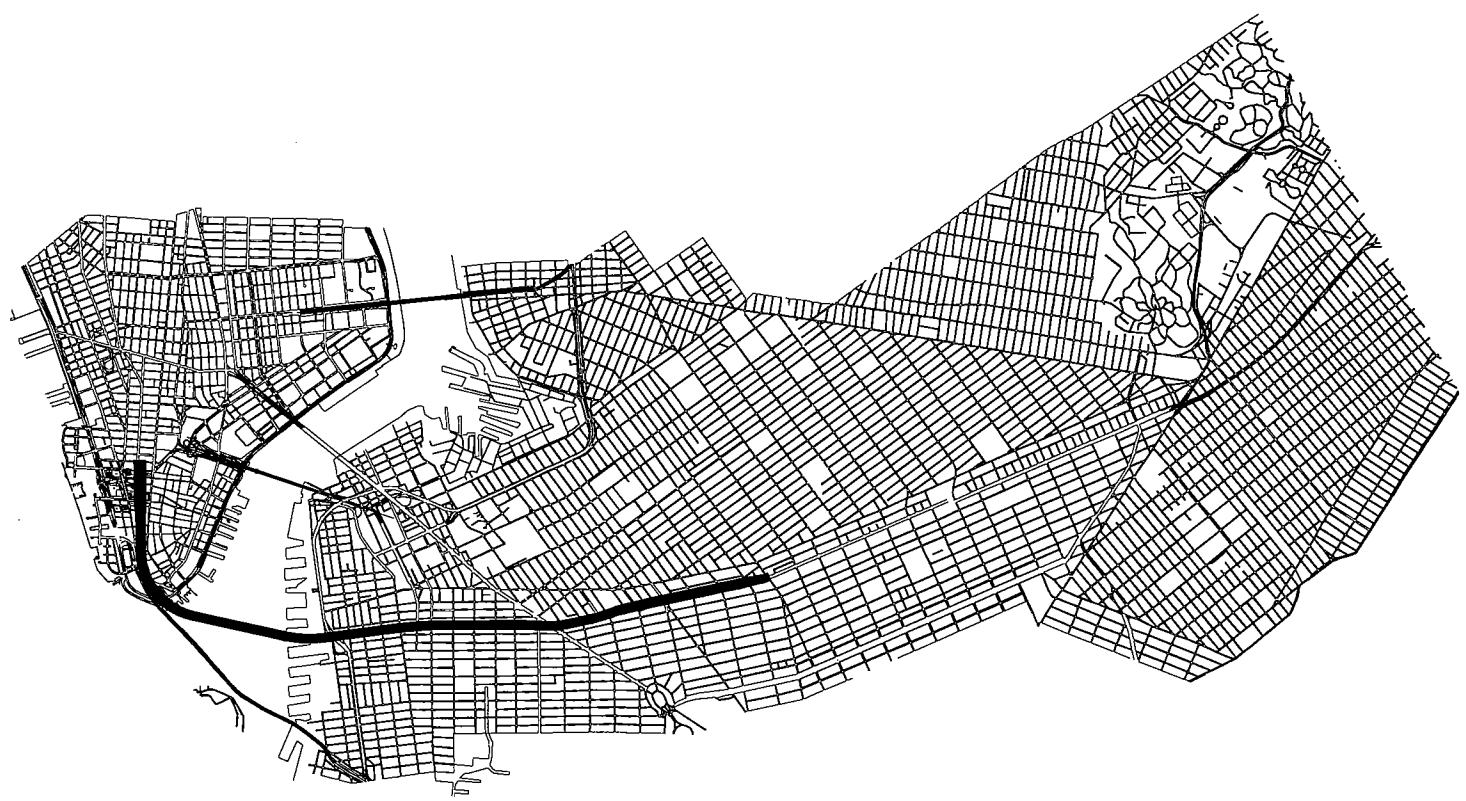


EXHIBIT 1B

LMDC Lower Manhattan Development Corporation

Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

PARSONS SYSTRA ENGINEERING *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

GENERAL NOTES

1. ELEVATIONS INDICATED REFER TO NYCT DATUM. ELEVATION 100 IS 2.653 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, UNITED STATES COAST AND GEODETIC SURVEY DATUM.
2. EXISTING TUNNEL INFRASTRUCTURE OUTLINES AND TRACK ALIGNMENT LOCATED FROM NYCT CONSTRUCTION DRAWINGS. OVERLYING STREET GRID AND BUILDING OUTLINES DEVELOPED FROM MULTIPLE SOURCES. THESE DRAWINGS ARE NOT TO BE USED FOR NEW CONSTRUCTION.
3. STATIONING IS MEASURED ALONG PROPOSED BASELINE ALIGNMENT.
4. ALL TRACK POINTS EXCEPT P.I.'S ARE AT CENTERLINE OF PROPOSED TRACK, UNLESS NOTED OTHERWISE.
5. PROFILE GRID STATIONING BASED UPON BASELINE ALIGNMENT UNLESS NOTED OTHERWISE.
6. CUT AND COVER CONSTRUCTION EXPECTED AFTER RTBM AND/OR EPBM CONSTRUCTION OF RUNNING TUNNELS TO COMPLETE ALL OR PART OF THE STATION MEZZANINE, ANCILLARY FACILITIES, AND STATION ENTRANCES. WHERE POSSIBLE HARD ROCK MINING OR NATM METHODS WILL BE EMPLOYED TO CONSTRUCT CROSSOVERS TO LIMIT STREET SURFACE DISRUPTION, THROUGHOUT THE ALIGNMENT EXPECTED CONSTRUCTION METHODS ARE BASED UPON PRELIMINARY INFORMATION. ACTUAL CONSTRUCTION METHOD EMPLOYED WOULD BE SELECTED FOLLOWING DETAILED GEOLOGICAL INVESTIGATION, ENVIRONMENTAL AND PROPERTY IMPACT ANALYSES, AND COST ANALYSES FOR VARIOUS CONSTRUCTION MEANS AND METHODS.

GENERAL ABBREVIATIONS

APPROXIMATE	APPROX.
AVENUE	AVE
CENTER	CTR
CENTER TO CENTER	C/C
CLEARANCE	CLR
DEGREE	DEG, °
DIAMETER	DIA, Ø
DRAWING	DWG
EAST	E
EASTBOUND	E.B.
ELEVATION	ELEV., EL
EXISTING	EX, EXIST
FEET	FT, '
HORIZONTAL	HORIZ
INCH	IN., "
LINEAR FEET	LF
MILES PER HOUR	MPH
MINIMUM	MIN
NORTH	N
NORTHBOUND	N.B.
NOT TO SCALE	N.T.S.
NUMBER	NO., #
OUTSIDE DIAMETER	OD
REQUIRED	REQ'D
ROUTE	RTE
SOUTHBOUND	S.B.
STREET	ST
TYPICAL	TYP.
VERTICAL	VERT
WEST	W
WESTBOUND	W.B.

TRACK ABBREVIATIONS

ACTUAL SUPERELEVATION	Ea
BASE OF RAIL	BOR
CENTERLINE	℄
CROSSOVER	X-OVER, X/O
CURVE TO SPIRAL	CS
DEGREE OF CURVATURE (ARC DEFINITION)	Dc
LENGTH OF CURVE	Lc
LENGTH OF SPIRAL	Ls
PASSENGER COMFORT LIMITING SPEED	Vp
POINT OF VERTICAL CURVE	PVC
POINT OF INTERSECTION, TURNOUT	PITO
POINT OF VERTICAL CURVE	PVI
POINT OF SWITCH	PS
POINT OF INTERSECTION	PI
POINT OF CURVE	PC
POINT OF TANGENT	PT
POINT OF VERTICAL TANGENCY	PVT
POINT OF COMPOUND CURVE	PCC
RADIUS OF CURVE	Rc
SPIRAL TO CURVE	SC
SPIRAL TO TANGENT	ST
STATION, STATIONING	STA.
SWITCH	SW
TANGENT LENGTH	T
TANGENT TO SPIRAL	TS
TOTAL CENTRAL ANGLE	I
TRACK	TRK
TURNOUT	T/O
UNBALANCED SUPERELEVATION	Eu
VERTICAL CURVE	VC

HORIZONTAL ALIGNMENT LEGEND

- ℄ OF PROPOSED TRACK
- 75+00 — PROPOSED BASELINE & STATIONING
- ℄ OF EXISTING TRACK
- POINT OF SWITCH
- PITO
- NORTH ARROW
- C1-02 — CURVE NUMBER
- PROPOSED TURNOUT
- PROPOSED CROSSOVER
- PC — HORIZONTAL CURVE POINT
- HISTORIC DISTRICT (APPROXIMATE LIMITS)

VERTICAL ALIGNMENT LEGEND

- VERTICAL CURVE POINT
- PROPOSED TRACK, BASE OF RAIL
- EXISTING TRACK
- APPROXIMATION OF BEDROCK SURFACE
- EXISTING GRADE
- 92 / 90 — DEPTH AT PLATFORM LEVEL

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS — SYSTRA ENGINEERING — *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation — Metropolitan Transportation Authority — New York City Economic Development Corporation — THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE
GENERAL INFORMATION

SCALE: NONE
FILE NAME: LIRRGS100B
DRAWING No.: GS-100B
DATE: 23 APR 04

CONTRACT No.
ISSUE: FINAL
SHEET No. 1 OF 11

TRACK 1

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	TK-101B	02-54-59	02-55-00	1964.64	50.01	100.00	0	0	3.00	51
C1-02	TK-101B	02-54-59	01-00-00	5729.65	145.85	291.64	0	0	2.51	60
C1-03	TK-101B	00-49-59	00-44-00	7813.11	56.80	113.60	0	0	1.85	60
C1-04	TK-101B	00-48-34	00-44-00	7813.11	55.19	110.38	0	0	1.85	60
C1-05	TK-102B	00-55-36	00-44-00	7813.11	63.19	126.38	0	0	1.85	60
C1-06	TK-102B	06-04-18	01-35-00	3618.80	150.50	300.82	82.67	1	3.00	60
C1-07	TK-102B	06-48-26	01-35-00	3618.80	173.77	347.27	82.67	1	3.00	60
C1-08	TK-103B	14-23-18	01-59-00	2889.01	280.96	560.16	165.33	2	3.00	60
C1-09	TK-103B	02-11-46	00-44-00	7813.11	149.76	299.48	0	0	1.85	60
C1-10	TK-104B	04-42-50	00-44-00	7813.11	321.58	642.79	0	0	1.85	60
C1-11	TK-105B	02-44-11	00-44-00	7813.11	186.61	373.15	0	0	1.85	60
C1-12	TK-106B	19-58-56	01-35-00	3618.80	594.98	1179.42	82.67	1	3.00	60
C1-13	TK-107B	76-51-32	02-47-00	2058.73	1379.67	2431.00	330.67	4	3.00	60

TRACK 2

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	TK-101B	02-54-59	02-55-00	1964.64	50.01	100.00	0	0	3.00	51
C2-02	TK-101B	02-54-59	01-00-00	5729.65	145.85	291.64	0	0	2.51	60
C2-03	TK-101B	00-49-59	00-44-00	7813.11	56.80	113.60	0	0	1.85	60
C2-04	TK-101B	00-48-34	00-44-00	7813.11	55.19	110.38	0	0	1.85	60
C2-05	TK-102B	00-55-36	00-44-00	7813.11	63.19	126.38	0	0	1.85	60
C2-06	TK-102B	06-04-18	01-35-00	3618.80	150.50	300.82	82.67	1	3.00	60
C2-07	TK-102B	06-48-26	01-35-00	3618.80	173.77	347.27	82.67	1	3.00	60
C2-08	TK-103B	14-23-18	01-59-00	2889.01	280.96	560.16	165.33	2	3.00	60
C2-09	TK-103B	02-11-46	00-44-00	7813.11	149.76	299.48	0	0	1.85	60
C2-10	TK-104B	04-42-50	00-44-00	7813.11	321.58	642.79	0	0	1.85	60
C2-11	TK-105B	02-44-11	00-44-00	7813.11	186.61	373.15	0	0	1.85	60
C2-12	TK-106B	19-58-56	01-35-00	3618.80	594.98	1179.42	82.67	1	3.00	60
C2-13	TK-107B	76-51-32	02-47-00	2058.73	1379.67	2431.00	330.67	4	3.00	60

TRACK 3

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C3-01	TK-109B	05-43-29	05-00-00	1146.28	57.31	114.53	0	0	3.00	29

TRACK 4

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C4-01	TK-109B	05-43-29	05-00-00	1146.28	57.31	114.53	0	0	3.00	29

TRACK AT-1

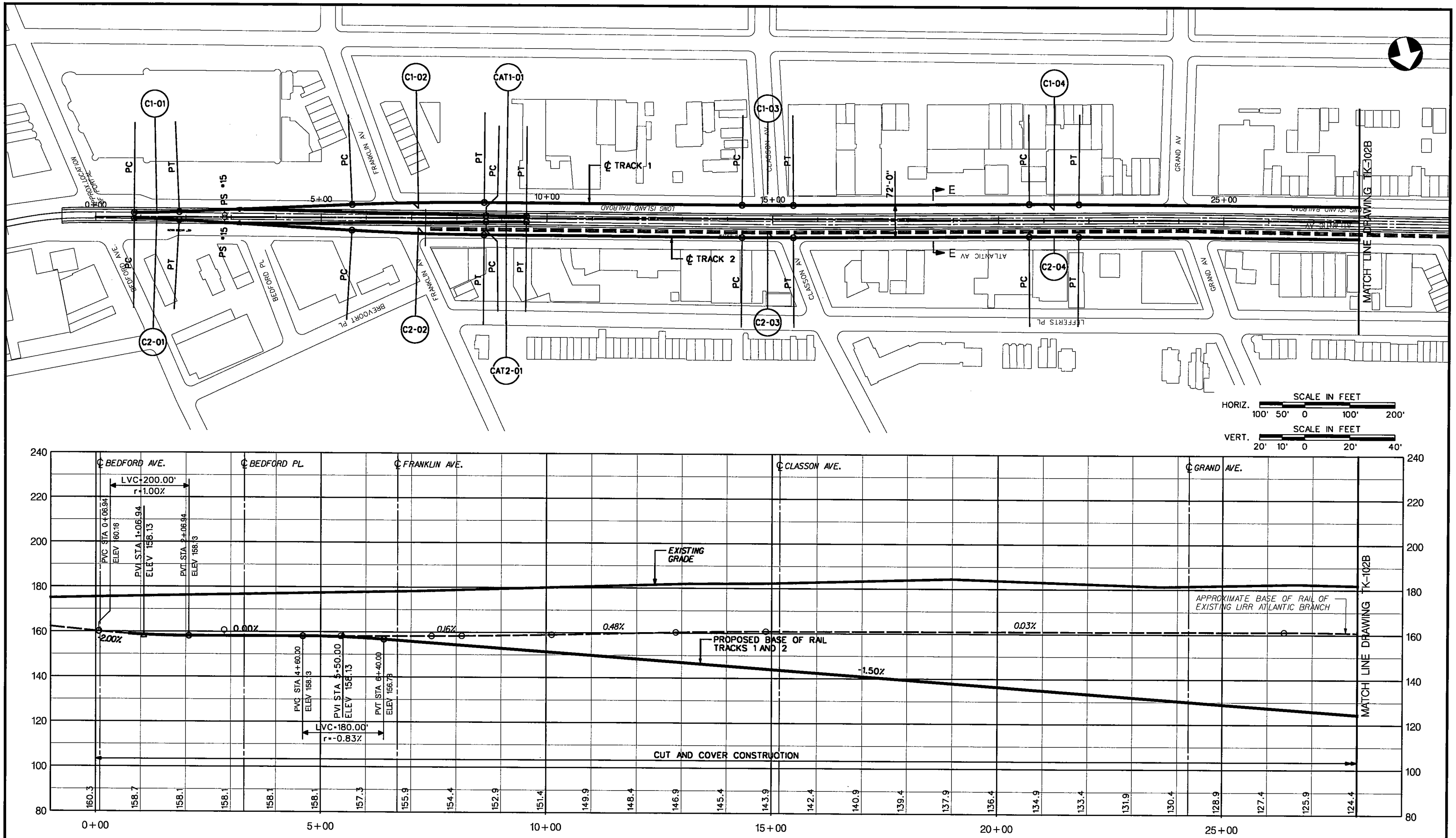
CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
CAT1-1	TK-101B	00-54-07	01-00-00	5729.65	45.09	90.19	0	0	0.63	30

TRACK AT-2

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
CAT2-1	TK-101B	00-54-07	01-00-00	5729.65	45.09	90.19	0	0	0.63	30

NOTES:

1. $V_p = \sqrt{\frac{E_a + E_u}{0.0007 D_c}}$ PASSENGER COMFORT LIMITING SPEEDS, V_p, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (E_a) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 82.67 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING CHORD DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS
SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

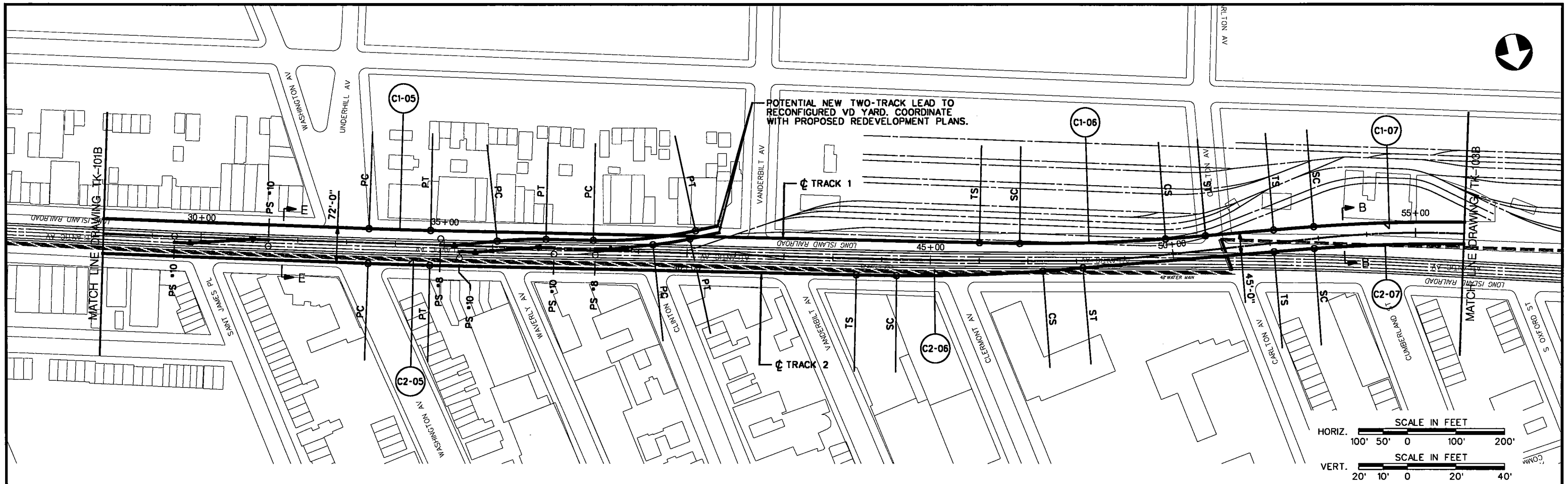
DATE:	REVISIONS	No.

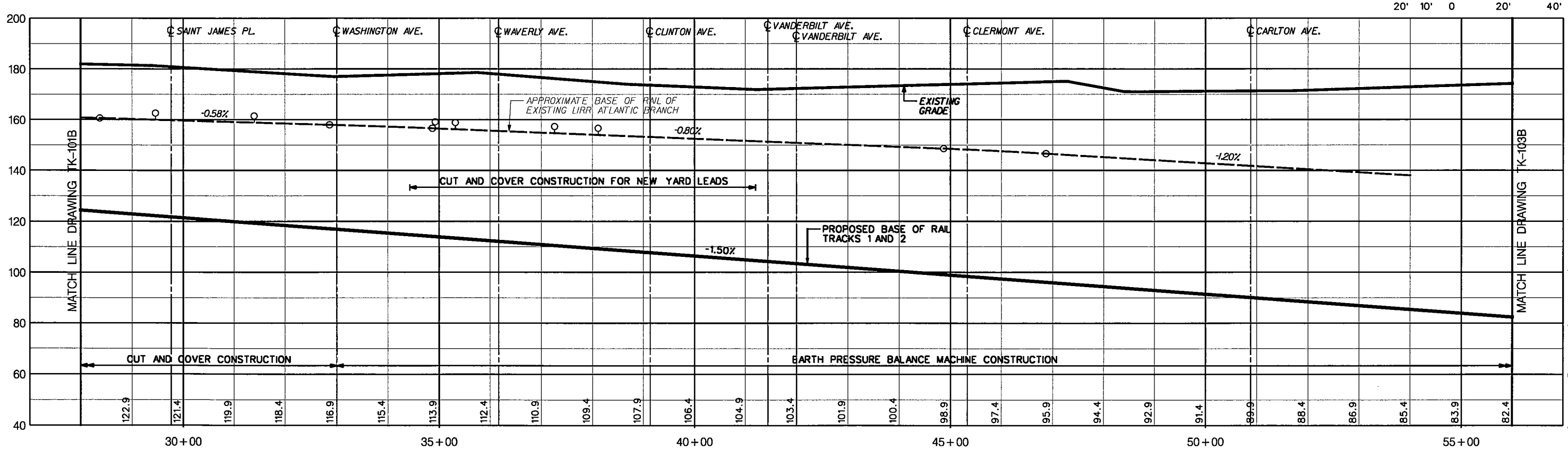
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	LIRRTK101B
DRAWING No.:	TK-101B
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	3 OF 11





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

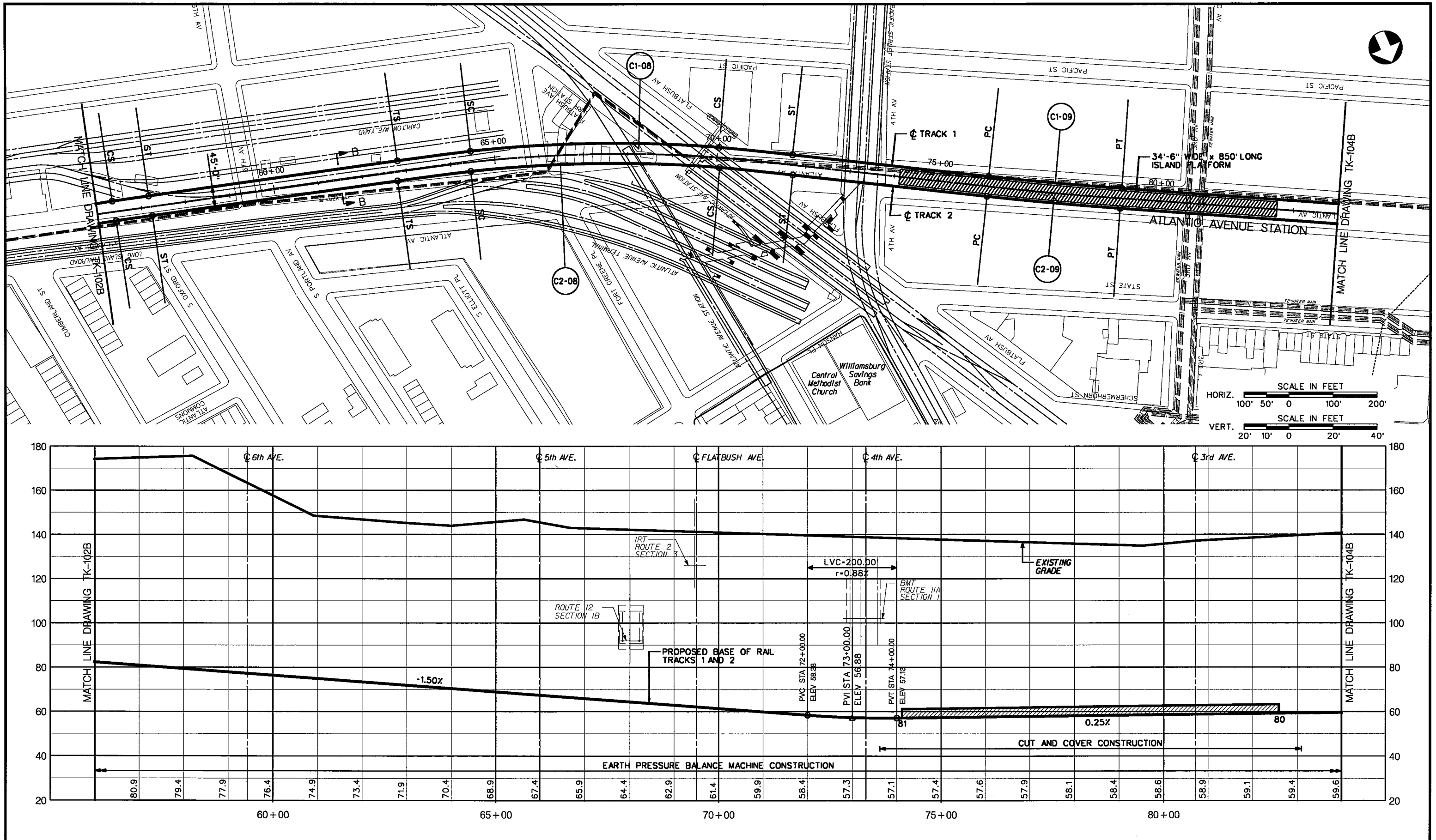
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: LIRRTK102B
DRAWING No.: TK-102B
DATE: 23 APRIL 04

CONTRACT No.
ISSUE FINAL
SHEET No. 4 OF 11



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

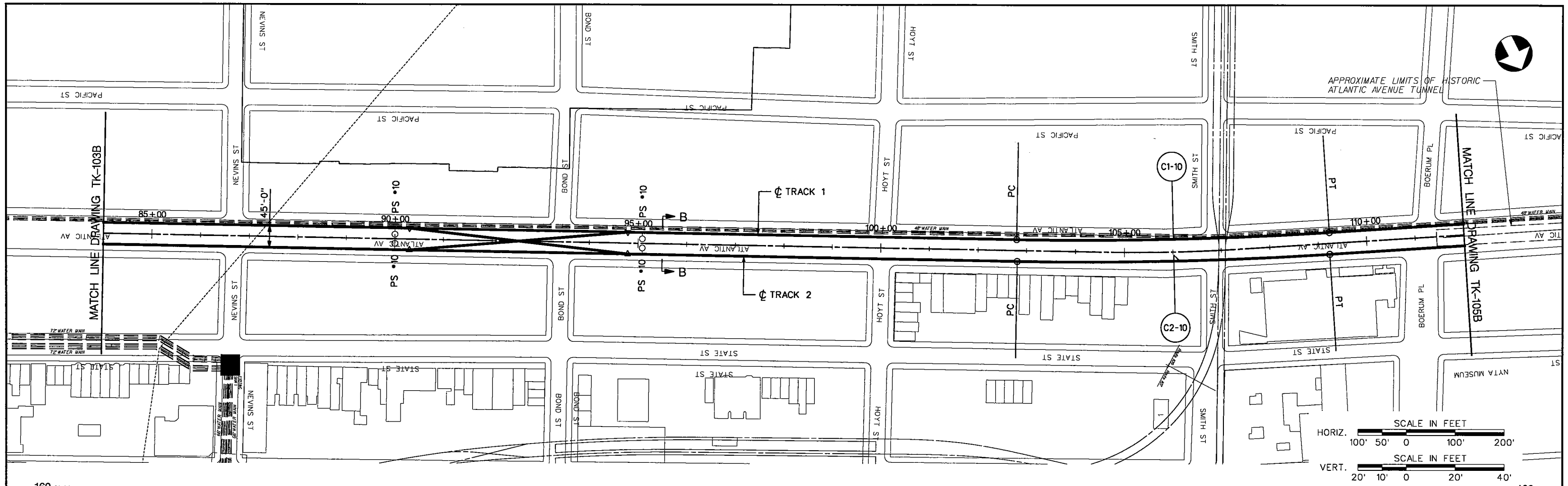
DATE:	REVISIONS	No.

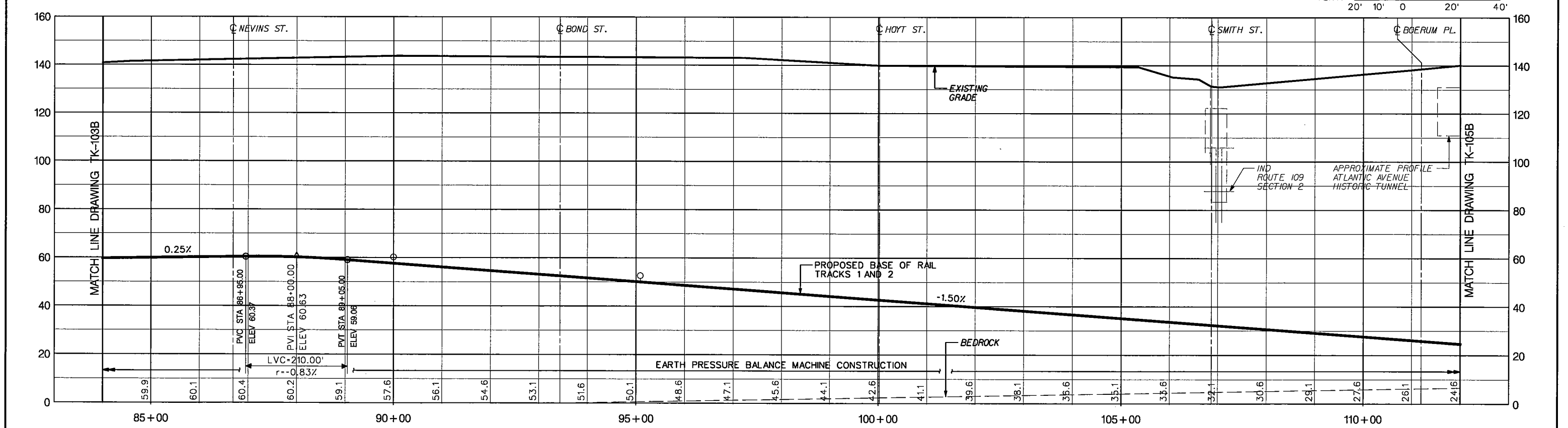
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	LIRRTK103B
DRAWING No.:	TK-103B
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	5 OF 11





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

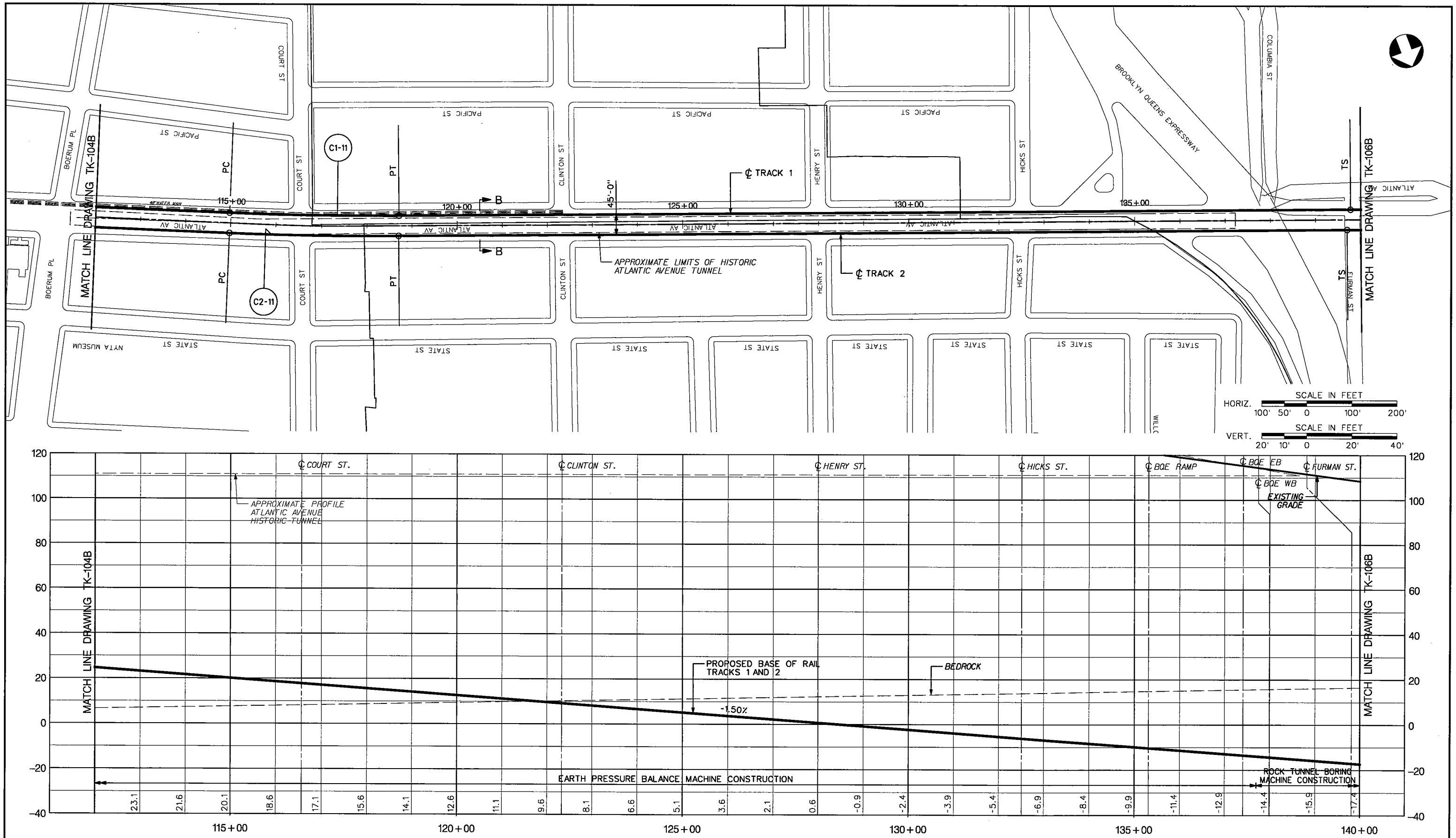
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: LIRRTK104B	ISSUE FINAL
DRAWING No.: TK-104B	SHEET No.
DATE: 23 APR 04	6 OF 11



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

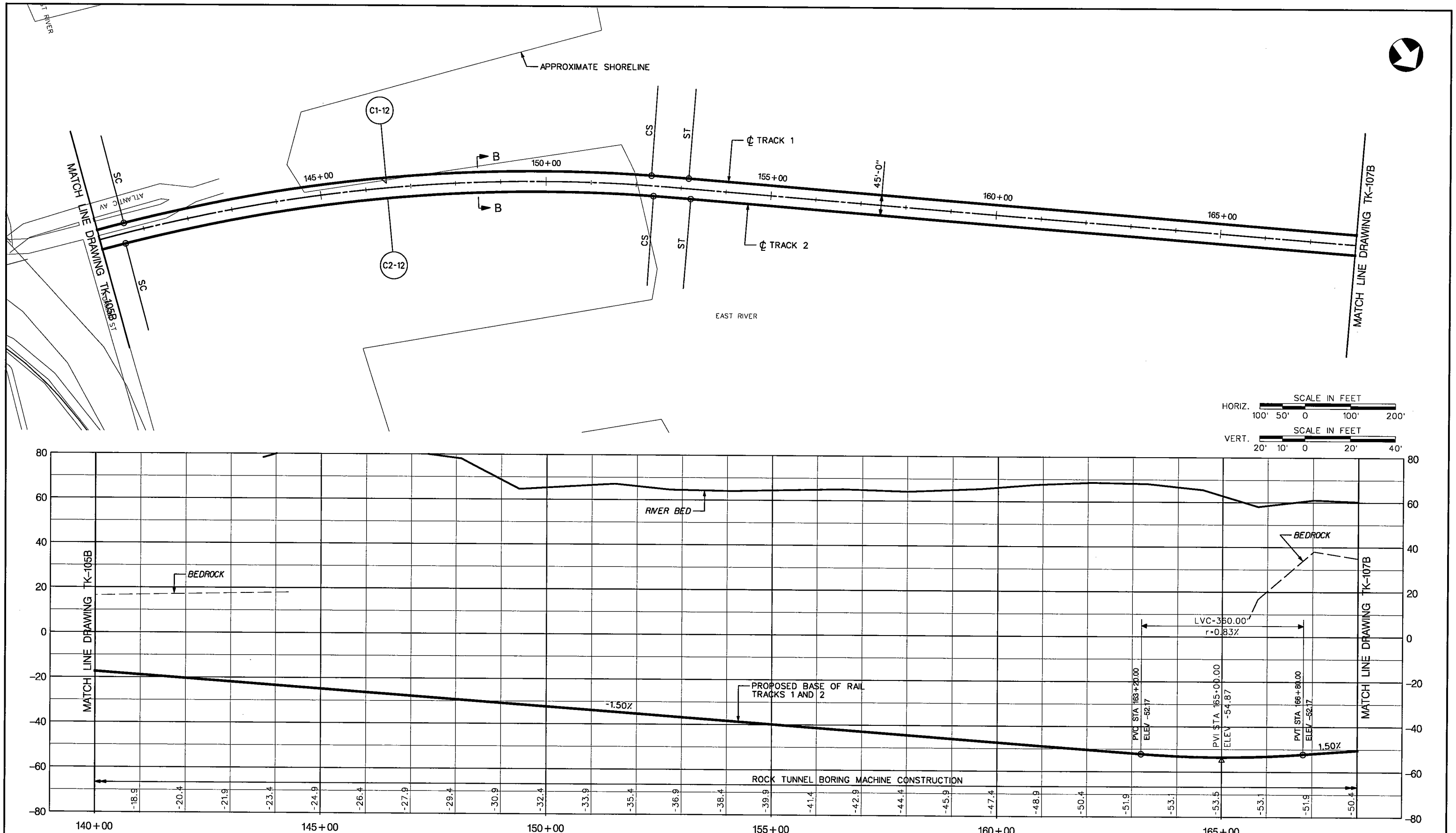
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	LIRRTK105B
DRAWING No.:	TK-105B
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	7 OF 11



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

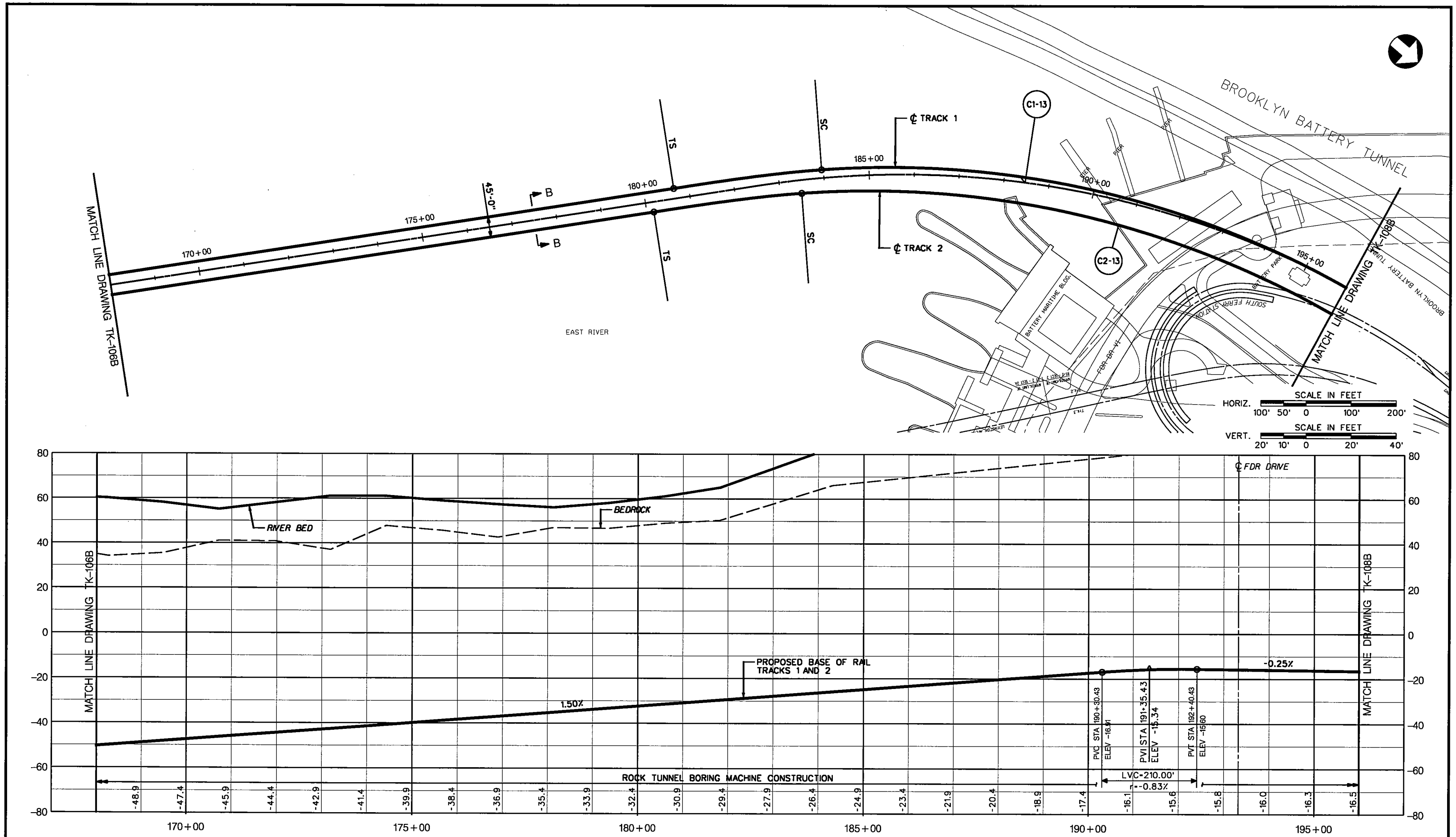
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
MTA Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: LIRRTK106B	ISSUE FINAL
DRAWING No.: TK-106B	SHEET No.
DATE: 23 APR 04	8 OF 11



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

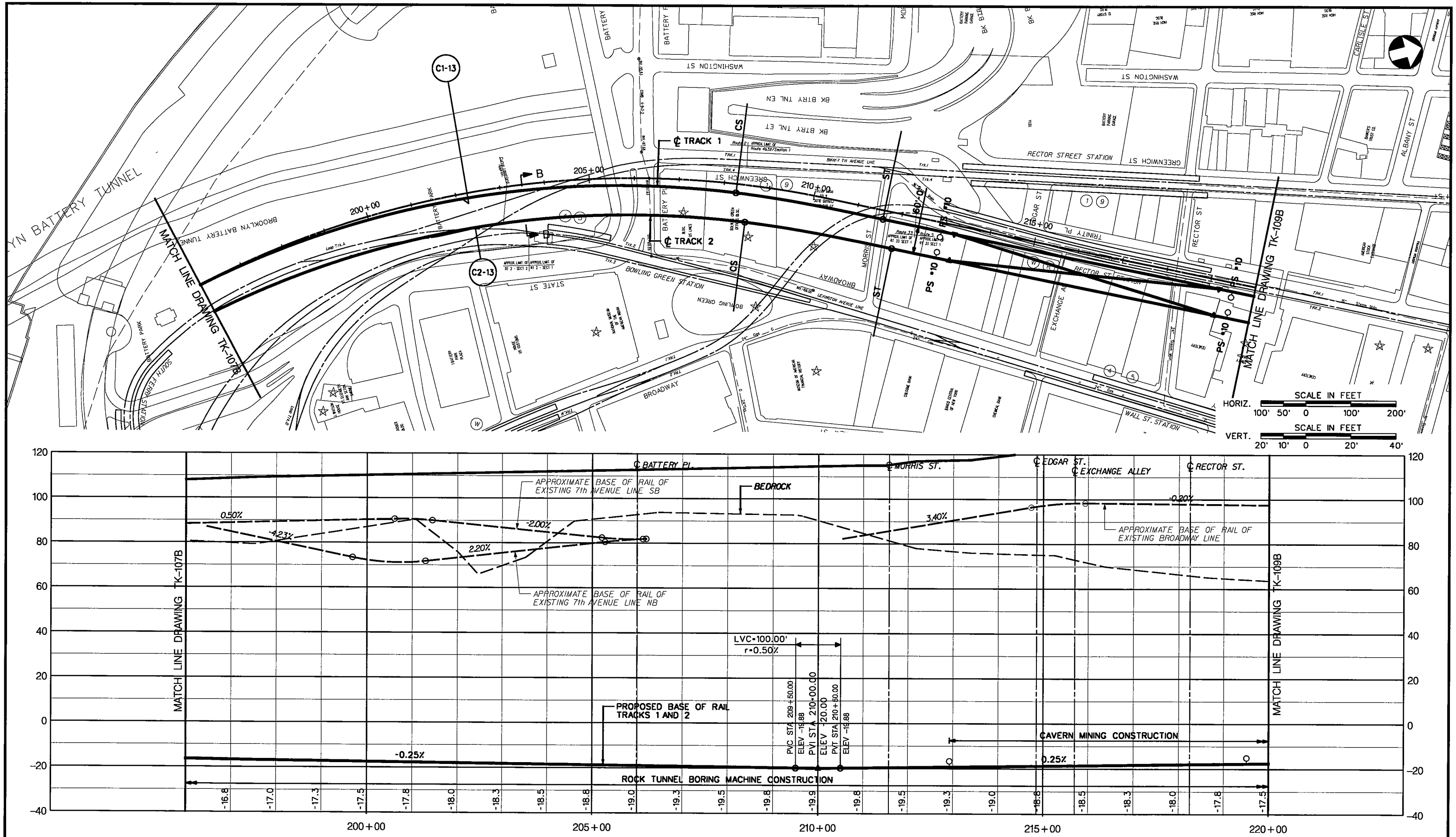
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE:	AS NOTED
FILE NAME:	LIRRTK107B
DRAWING No.:	TK-107B
DATE:	23 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	9 OF 11



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

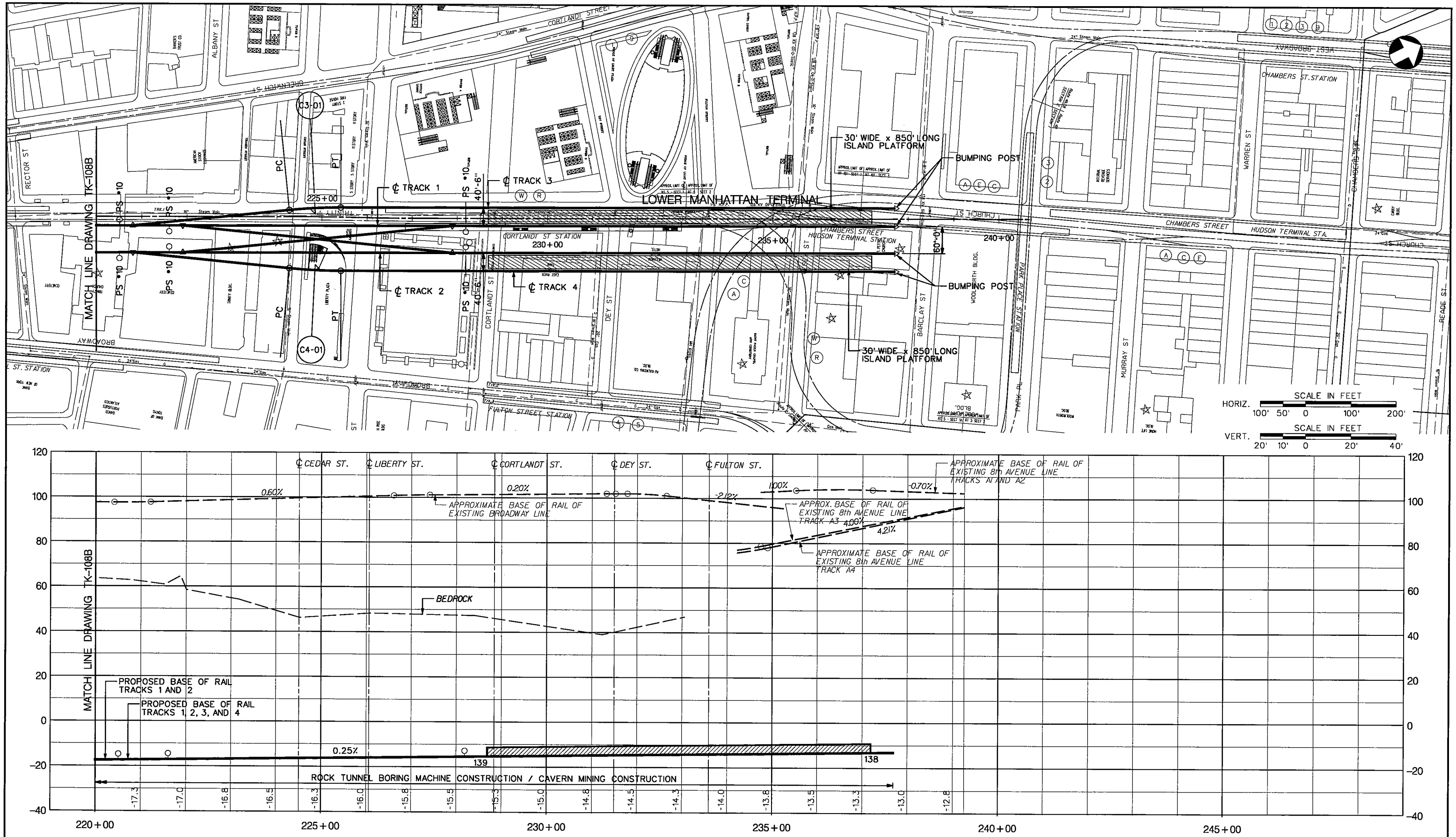
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: LIRRTK108B	ISSUE FINAL
DRAWING No.: TK-108B	SHEET No.
DATE: 23 APR 04	10 OF 11



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
MTA Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE

PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: LIRRTK109B	ISSUE FINAL
DRAWING No.: TK-109B	SHEET No. 11 OF 11
DATE: 23 APR 04	

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

MONTAGUE TUNNEL ALTERNATIVE

DATE: APRIL 23, 2004

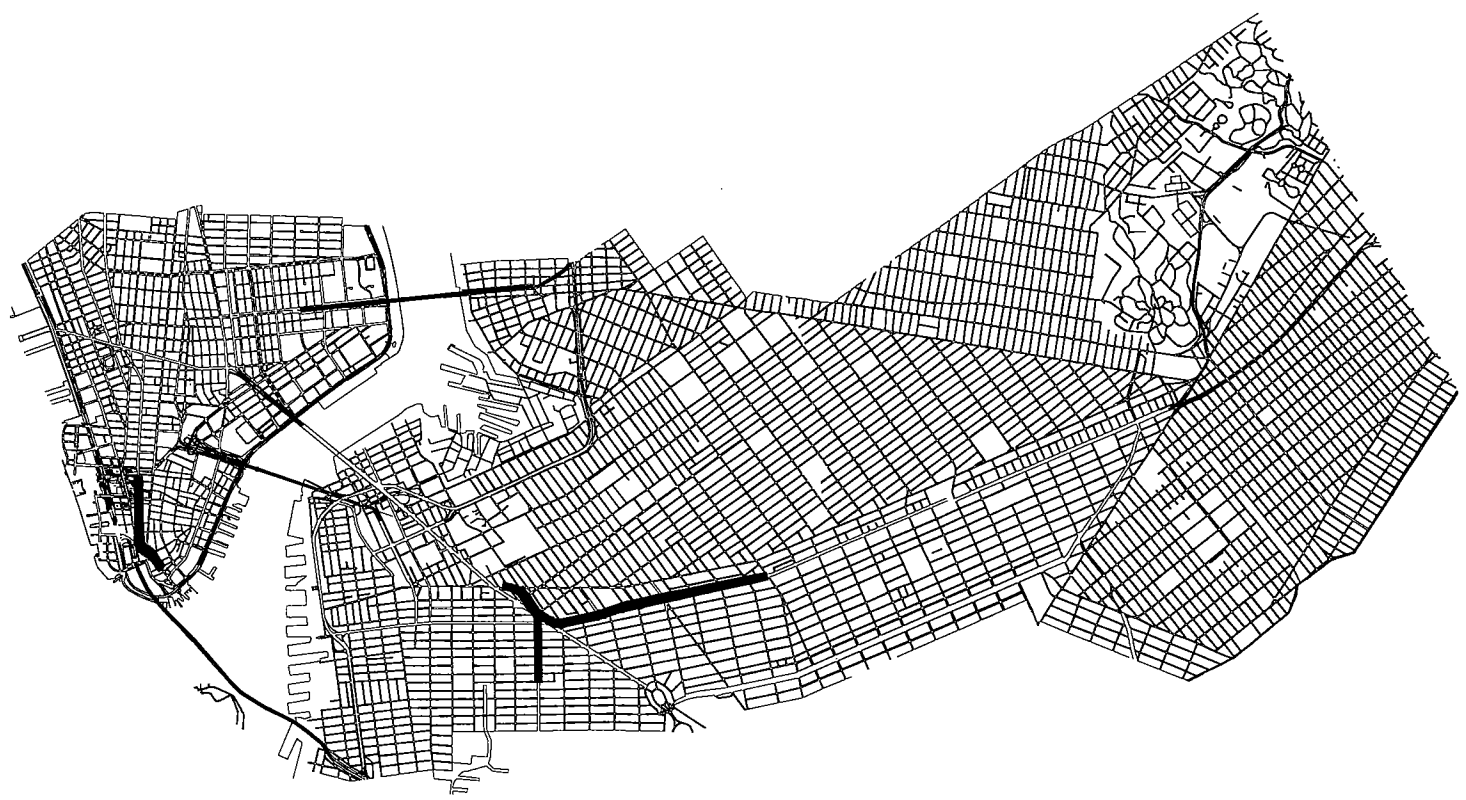


EXHIBIT 2

LMDC Lower Manhattan Development Corporation

Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

GENERAL NOTES

1. ELEVATIONS INDICATED REFER TO NYCT DATUM. ELEVATION 100 IS 2.653 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, UNITED STATES COAST AND GEODETIC SURVEY DATUM.
2. EXISTING TUNNEL INFRASTRUCTURE OUTLINES AND TRACK ALIGNMENT LOCATED FROM NYCT CONSTRUCTION DRAWINGS. OVERLYING STREET GRID AND BUILDING OUTLINES DEVELOPED FROM MULTIPLE SOURCES. THESE DRAWINGS ARE NOT TO BE USED FOR NEW CONSTRUCTION.
3. STATIONING IS MEASURED ALONG PROPOSED BASELINE ALIGNMENT.
4. ALL TRACK POINTS EXCEPT P.I.'S ARE AT CENTERLINE OF PROPOSED TRACK, UNLESS NOTED OTHERWISE.
5. PROFILE GRID STATIONING BASED UPON BASELINE ALIGNMENT UNLESS NOTED OTHERWISE.
6. CUT AND COVER CONSTRUCTION EXPECTED AFTER RTBM AND/OR EPBM CONSTRUCTION OF RUNNING TUNNELS TO COMPLETE ALL OR PART OF THE STATION MEZZANINE, ANCILLARY FACILITIES, AND STATION ENTRANCES. WHERE POSSIBLE HARD ROCK MINING OR NATM METHODS WILL BE EMPLOYED TO CONSTRUCT CROSSOVERS TO LIMIT STREET SURFACE DISRUPTION, THROUGHOUT THE ALIGNMENT EXPECTED CONSTRUCTION METHODS ARE BASED UPON PRELIMINARY INFORMATION. ACTUAL CONSTRUCTION METHOD EMPLOYED WOULD BE SELECTED FOLLOWING DETAILED GEOLOGICAL INVESTIGATION, ENVIRONMENTAL AND PROPERTY IMPACT ANALYSES, AND COST ANALYSES FOR VARIOUS CONSTRUCTION MEANS AND METHODS.

GENERAL ABBREVIATIONS

APPROXIMATE	APPROX.
AVENUE	AVE
CENTER	CTR
CENTER TO CENTER	C/C
CLEARANCE	CLR
DEGREE	DEG, °
DIAMETER	DIA, Ø
DRAWING	DWG
EAST	E
EASTBOUND	E.B.
ELEVATION	ELEV., EL
EXISTING	EX, EXIST
FEET	FT, '
HORIZONTAL	HORIZ
INCH	IN., "
LINEAR FEET	LF
MILES PER HOUR	MPH
MINIMUM	MIN
NORTH	N
NORTHBOUND	N.B.
NOT TO SCALE	N.T.S.
NUMBER	NO., #
OUTSIDE DIAMETER	OD
REQUIRED	REQ'D
ROUTE	RTE
SOUTHBOUND	S.B.
STREET	ST
TYPICAL	TYP.
VERTICAL	VERT
WEST	W
WESTBOUND	W.B.

TRACK ABBREVIATIONS

ACTUAL SUPERELEVATION	Ea
BASE OF RAIL	BOR
CENTERLINE	℄
CROSSOVER	X-OVER, X/O
CURVE TO SPIRAL	CS
DEGREE OF CURVATURE (ARC DEFINITION)	Dc
LENGTH OF CURVE	Lc
LENGTH OF SPIRAL	Ls
PASSENGER COMFORT LIMITING SPEED	Vp
POINT OF VERTICAL CURVE	PVC
POINT OF INTERSECTION, TURNOUT	PITO
POINT OF VERTICAL CURVE	PVI
POINT OF SWITCH	PS
POINT OF INTERSECTION	PI
POINT OF CURVE	PC
POINT OF TANGENT	PT
POINT OF VERTICAL TANGENCY	PVT
POINT OF COMPOUND CURVE	PCC
RADIUS OF CURVE	Rc
SPIRAL TO CURVE	SC
SPIRAL TO TANGENT	ST
STATION, STATIONING	STA.
SWITCH	SW
TANGENT LENGTH	T
TANGENT TO SPIRAL	TS
TOTAL CENTRAL ANGLE	I
TRACK	TRK
TURNOUT	T/O
UNBALANCED SUPERELEVATION	Eu
VERTICAL CURVE	VC

HORIZONTAL ALIGNMENT LEGEND

- ℄ OF PROPOSED TRACK
- 75+00 — PROPOSED BASELINE & STATIONING
- ℄ OF EXISTING TRACK
- POINT OF SWITCH
- PITO
- NORTH ARROW
- C1-02 — CURVE NUMBER
- PROPOSED TURNOUT
- PROPOSED CROSSOVER
- PC — HORIZONTAL CURVE POINT
- HISTORIC DISTRICT (APPROXIMATE LIMITS)

VERTICAL ALIGNMENT LEGEND

- VERTICAL CURVE POINT
- PROPOSED TRACK, BASE OF RAIL
- EXISTING TRACK
- APPROXIMATION OF BEDROCK SURFACE
- EXISTING GRADE
- 92 / 90 — DEPTH AT PLATFORM LEVEL

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
GENERAL INFORMATION

SCALE: NONE	CONTRACT No.
FILE NAME: MONTGS200	ISSUE FINAL
DRAWING No.: GS-200	SHEET No. 1 OF 10
DATE: 23 APR 04	

TRACK 1

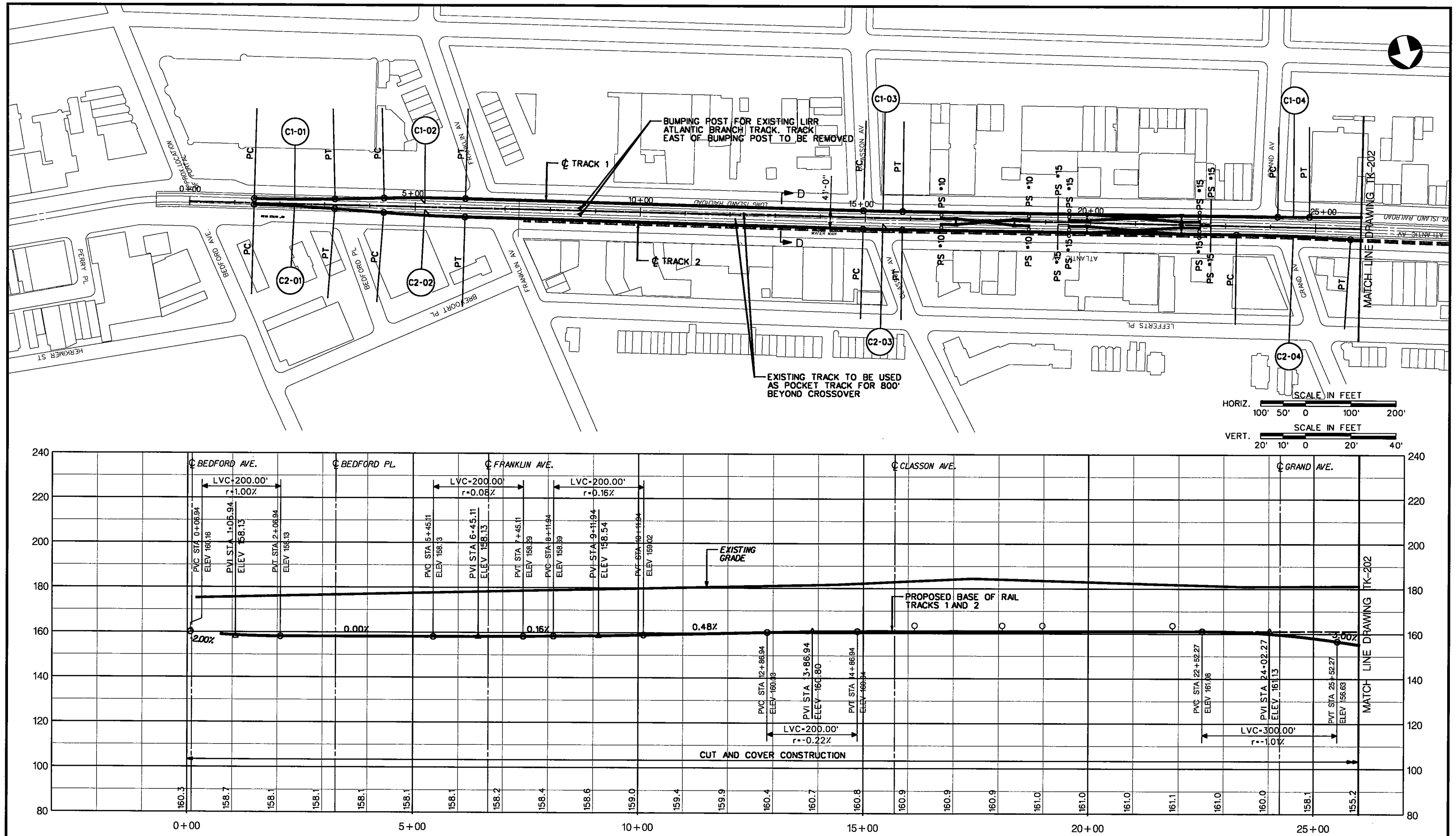
CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	TK-201	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C1-02	TK-201	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C1-03	TK-201	00-49-59	00-57-18	6000.00	43.62	87.24	0	0	4.00	77
C1-04	TK-201	00-50-29	01-11-37	4800.00	35.24	70.48	0	0	4.00	69
C1-05	TK-202	01-39-03	01-11-37	4800.00	69.15	138.30	0	0	4.00	69
C1-06	TK-202	00-55-36	01-11-37	4800.00	38.82	77.64	0	0	4.00	69
C1-07	TK-202	06-09-18	02-51-53	2000.00	87.48	174.85	40.00	1	4.00	50
C1-08	TK-202	06-53-26	02-48-28	2040.58	102.79	205.40	40.00	1	4.00	50
C1-09	TK-203	45-25-41	11-27-33	500.00	186.17	356.43	40.00	1	4.00	25
C1-10	TK-203	23-57-17	09-32-57	600.00	86.01	170.85	80.00	2	4.00	30
C1-11	TK-203	44-15-56	09-32-57	600.00	198.58	383.55	80.00	2	4.00	30

TRACK 2

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	TK-201	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C2-02	TK-201	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C2-03	TK-201	00-49-59	00-57-18	6000.00	43.62	87.24	0	0	4.00	77
C2-04	TK-201	03-01-05	01-11-37	4800.00	126.45	252.84	0	0	4.00	69
C2-05	TK-202	02-12-31	01-11-37	4800.00	92.53	185.03	0	0	4.00	69
C2-06	TK-202	00-55-36	01-11-37	4800.00	38.82	77.64	0	0	4.00	69
C2-07	TK-202	06-09-18	02-51-53	2000.00	87.48	174.85	40.00	1	4.00	50
C2-08	TK-202	06-53-26	02-51-53	2000.00	100.35	200.52	40.00	1	4.00	50
C2-09	TK-203	45-25-41	11-27-33	500.00	186.17	356.43	40.00	1	4.00	25
C2-10	TK-203	23-57-17	09-32-57	600.00	86.01	170.85	80.00	2	4.00	30
C2-11	TK-203	05-43-29	04-40-38	1225.00	61.25	122.40	0	0	4.00	30

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE Eu = 4". PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 40 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS — SYSTRA ENGINEERING — *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

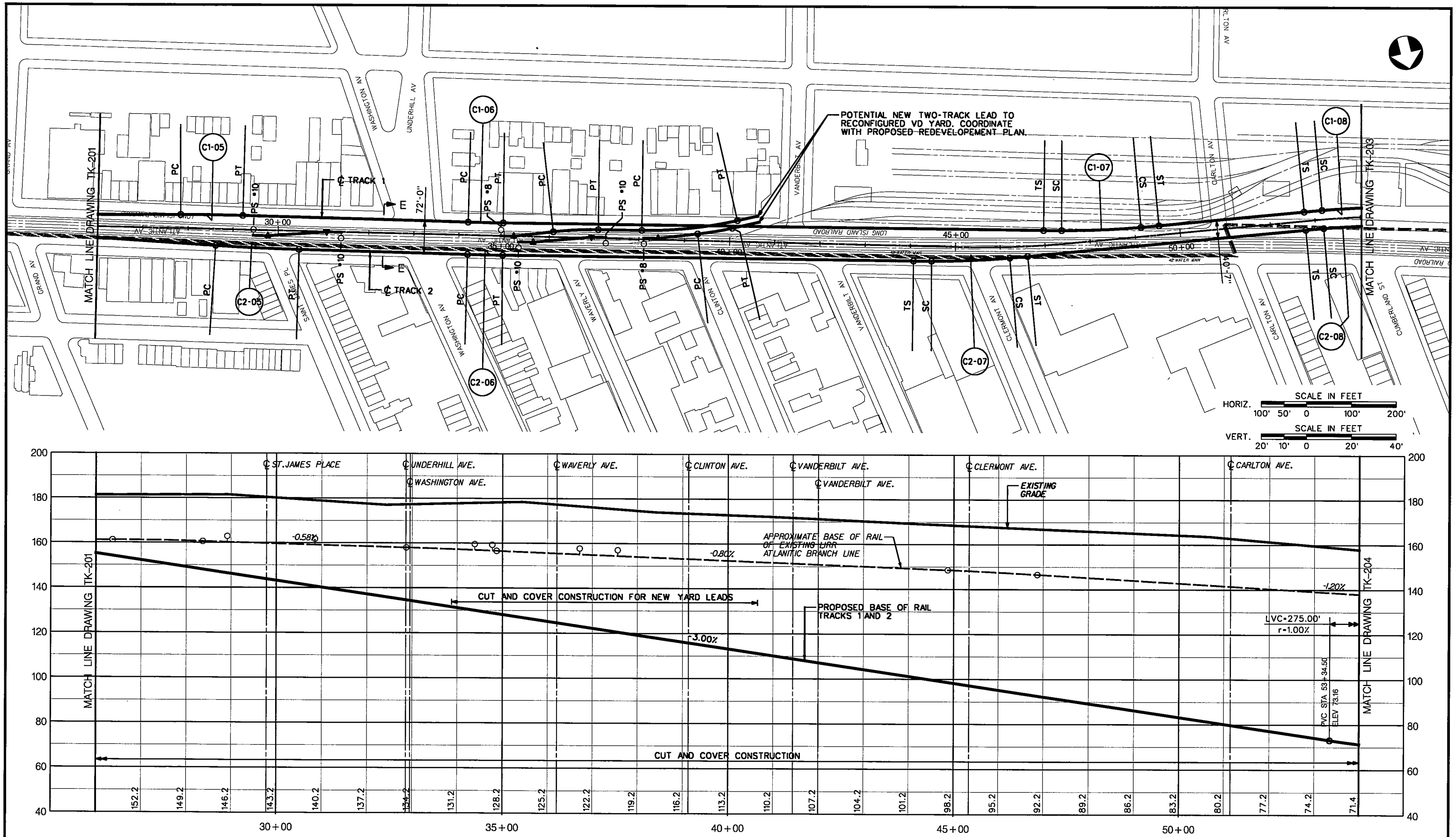
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
ATLANTIC BRANCH TO FOURTH AVE. LINE
PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: MONTTK201
DRAWING No.: TK-201
DATE: 23 APR 04

CONTRACT No.
ISSUE: FINAL
SHEET No. 3 OF 10



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

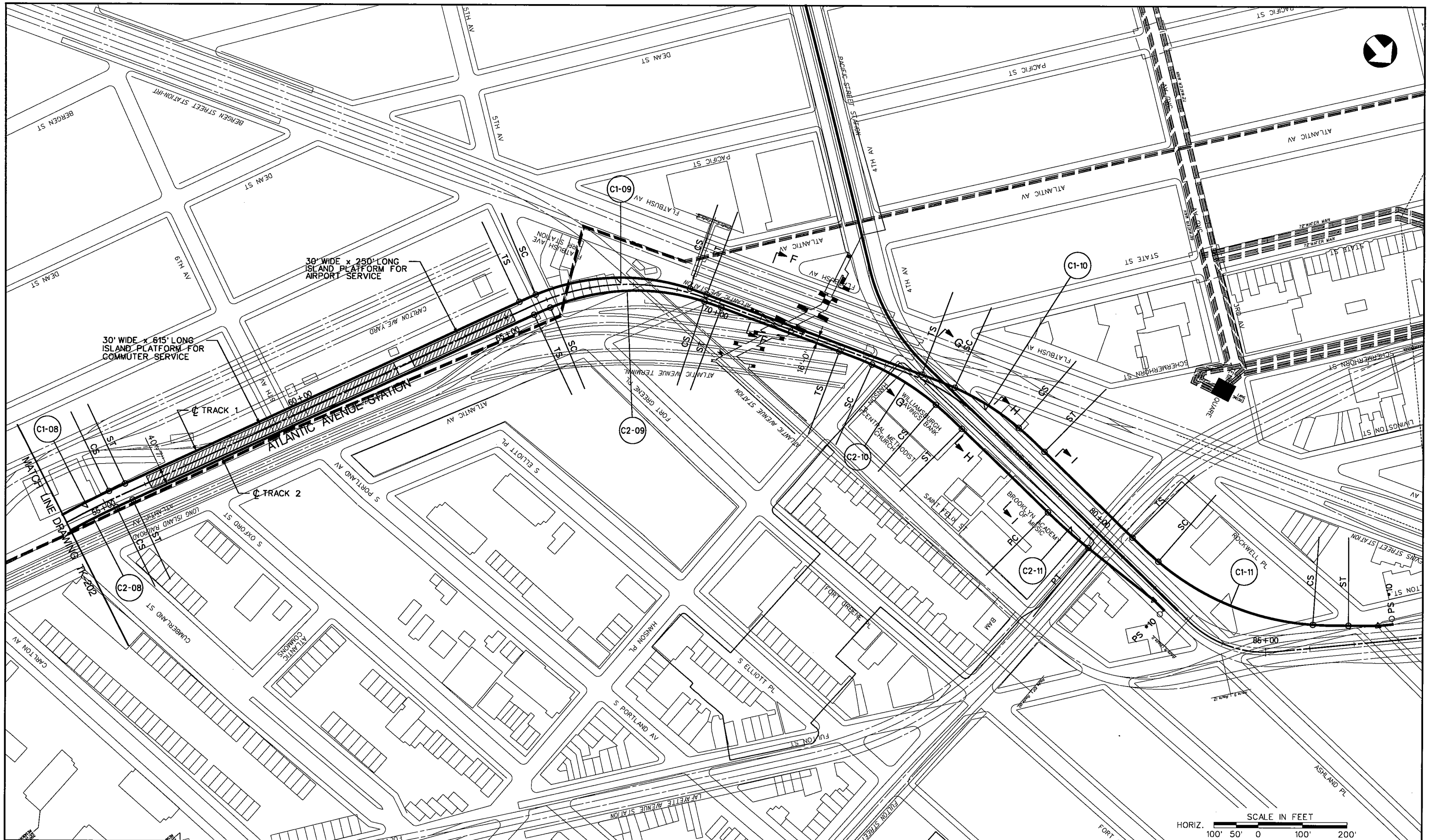
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
ATLANTIC BRANCH TO FOURTH AVE. LINE
PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: MONTTK202	ISSUE FINAL
DRAWING No.: TK-202	SHEET No. 4 OF 10
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS

SYSTRA ENGINEERING

A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation

New York City Economic Development Corporation

MTA Metropolitan Transportation Authority

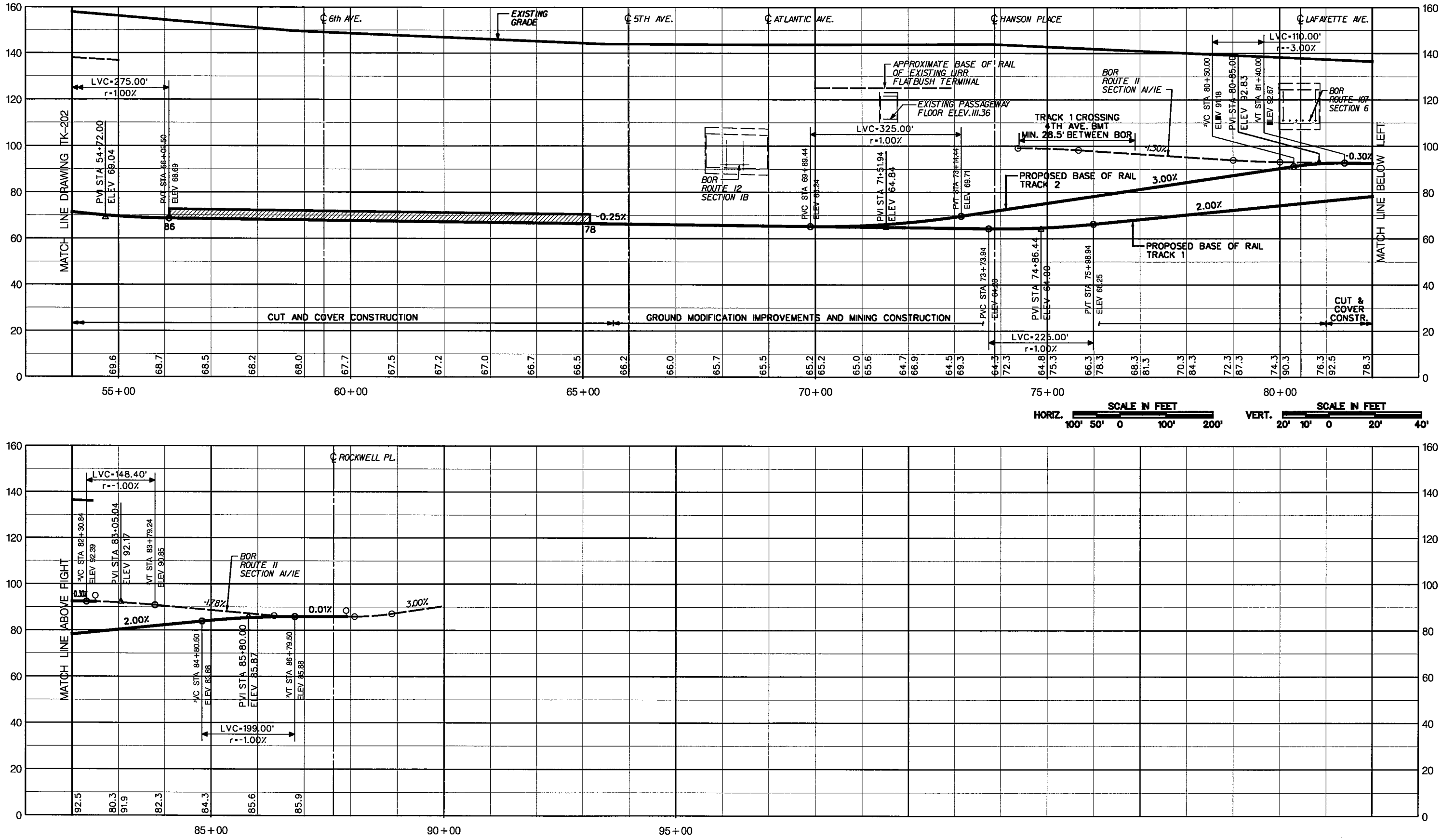
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE

ATLANTIC BRANCH TO FOURTH AVE. LINE

PLAN

SCALE: 1" = 100'	CONTRACT No.
FILE NAME: MONTTK203	ISSUE FINAL
DRAWING No.: TK-203	SHEET No. 5 OF 10
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
ATLANTIC BRANCH TO FOURTH AVE. LINE
PROFILE

SCALE: AS NOTED
FILE NAME: MONTTK204
DRAWING No.: TK-204
DATE: 23 APR 04

CONTRACT No.
ISSUE: FINAL
SHEET No. 6 OF 10

TRACK 1

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	TK-206	11-27-50	06-21-58	900.00	90.34	180.08	0	0	4.00	30
C1-02	TK-206	75-35-55	15-04-40	380.00	263.95	461.39	40.00	1	4.00	21
C1-03	TK-206	26-41-55	15-04-40	380.00	69.29	137.07	40.00	1	4.00	21

TRACK 2

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	TK-206	04-27-11	06-21-58	900.00	34.99	69.95	0	0	4.00	30
C2-02	TK-206	54-15-01	15-04-40	380.00	170.06	319.80	40.00	1	4.00	21
C2-03	TK-206	29-26-19	15-04-40	380.00	78.72	155.24	40.00	1	4.00	21

TRACK 3

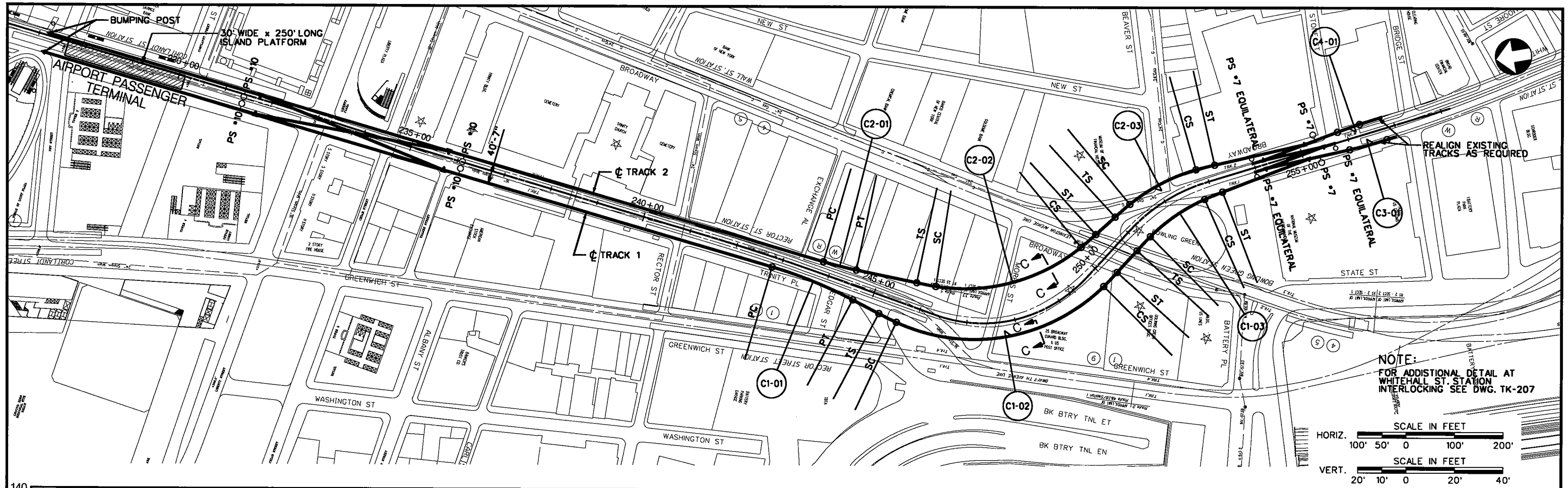
CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C3-01	TK-206	05-05-12	06-21-58	900.00	39.98	79.90	0	0	4.00	30

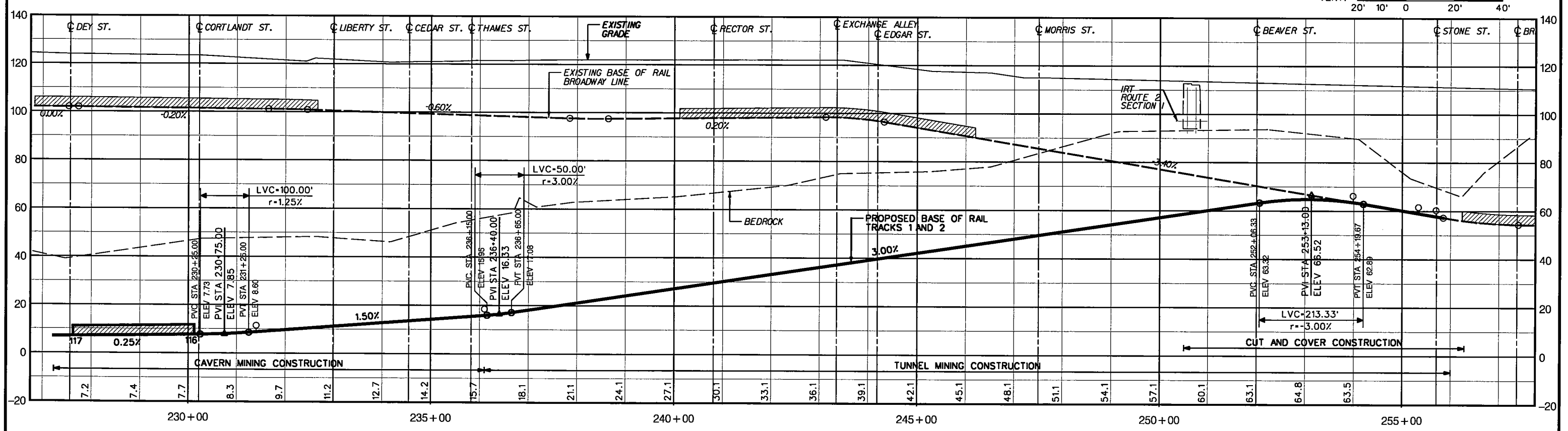
TRACK 4

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C4-01	TK-206	03-05-06	06-21-58	900.00	24.24	48.46	0	0	4.00	30

NOTES:

1. Vp = 0.5 $\sqrt{R(Ea+Eu)}$, WHERE Eu = 4". PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 40 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS
SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
LOWER MANHATTAN
AIRPORT PASSENGER TERMINAL
PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: MONTTK206	ISSUE FINAL
DRAWING No.: TK-206	SHEET No. 8 OF 10
DATE: 23 APRIL 04	

NEW ST

BEAVER ST

MUSEUM OF AMERICAN FINANCIAL HISTORY

LEXINGTON AVENUE IRT ABOVE BROADWAY LINE

PROPOSED STRUCTURE

BROADWAY

STONE ST

BRIDGE ST

WHITEHALL STREET STATION

TRK.M

TRK.2

TRK.1

J

K

L

M

N

O

255+00

250+00

PROPOSED ALIGNMENT WITHIN EXISTING STRUCTURE

RECONSTRUCT EXISTING STRUCTURE AS REQUIRED TO ACCOMMODATE PROPOSED INTERLOCKING RECONFIGURATION. DETAILED SURVEY REQUIRED TO CONFIRM EXTENT OF RECONSTRUCTION NECESSARY.

EXISTING STRUCTURE

BOWLING GREEN

BOWLING GREEN STATION

NATIONAL MUSEUM OF THE AMERICAN INDIAN

HOUSE US CUSTOMS

NOTE:

LOCATION OF EXISTING TRACK WITHIN STREET ROW ESTABLISHED FROM NYCT AS-BUILT DRAWINGS. LOCATION DIFFERS FROM BASEMAPPING SHOWN IN DWG. TK 206

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation

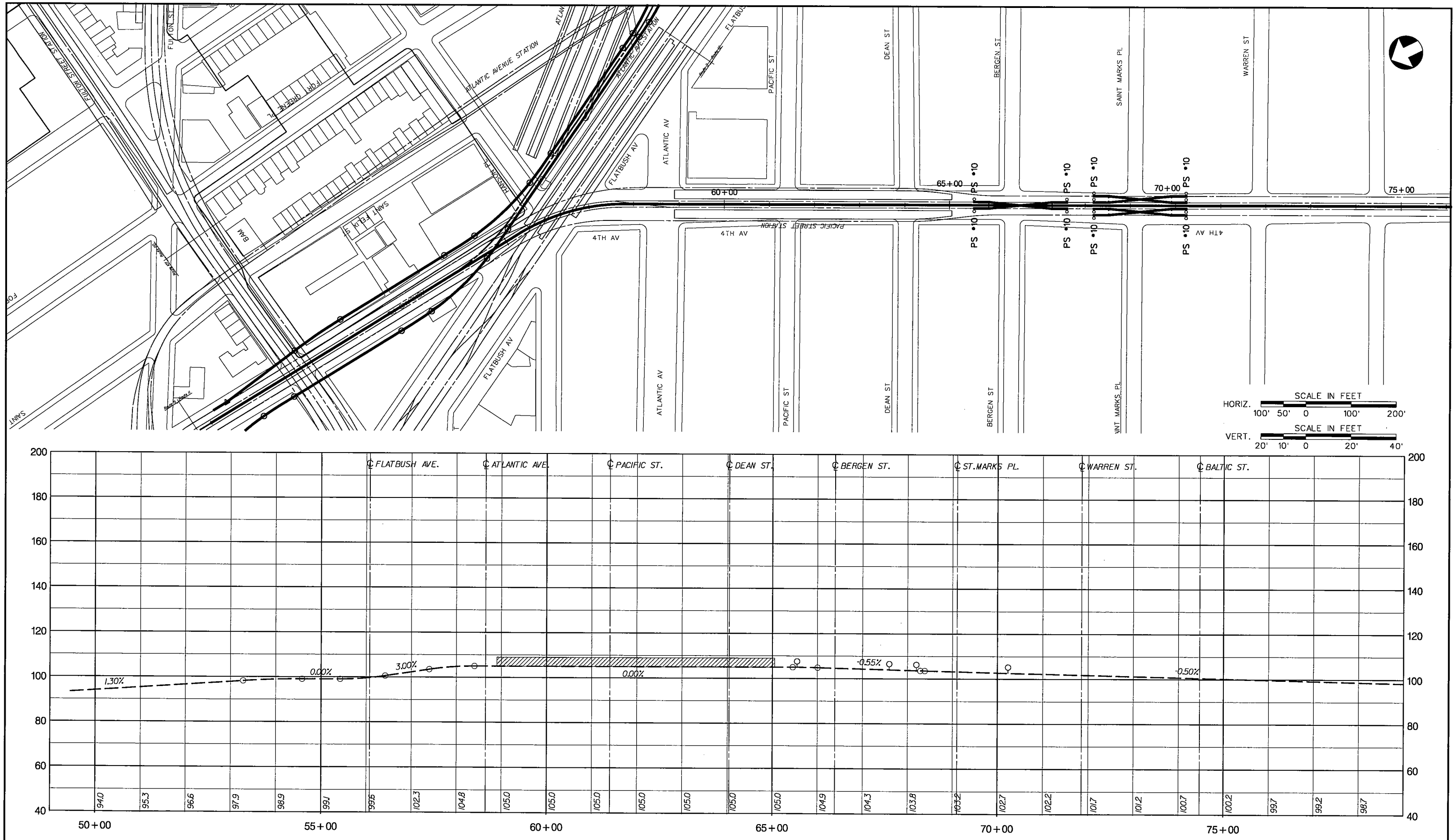
Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE

SCALE: 1"=50'	CONTRACT No.
FILE NAME: MONTTK207	ISSUE FINAL
DRAWING No.: TK-207	SHEET No. 9 OF 10
DATE: 23 APRIL 2004	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
PACIFIC STREET INTERLOCKING
PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: MONTTK208	ISSUE FINAL
DRAWING No.: TK-208	SHEET No. 10 OF 10
DATE: 23 APR 04	

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

CRANBERRY TUNNEL ALTERNATIVE

DATE: APRIL 23, 2004

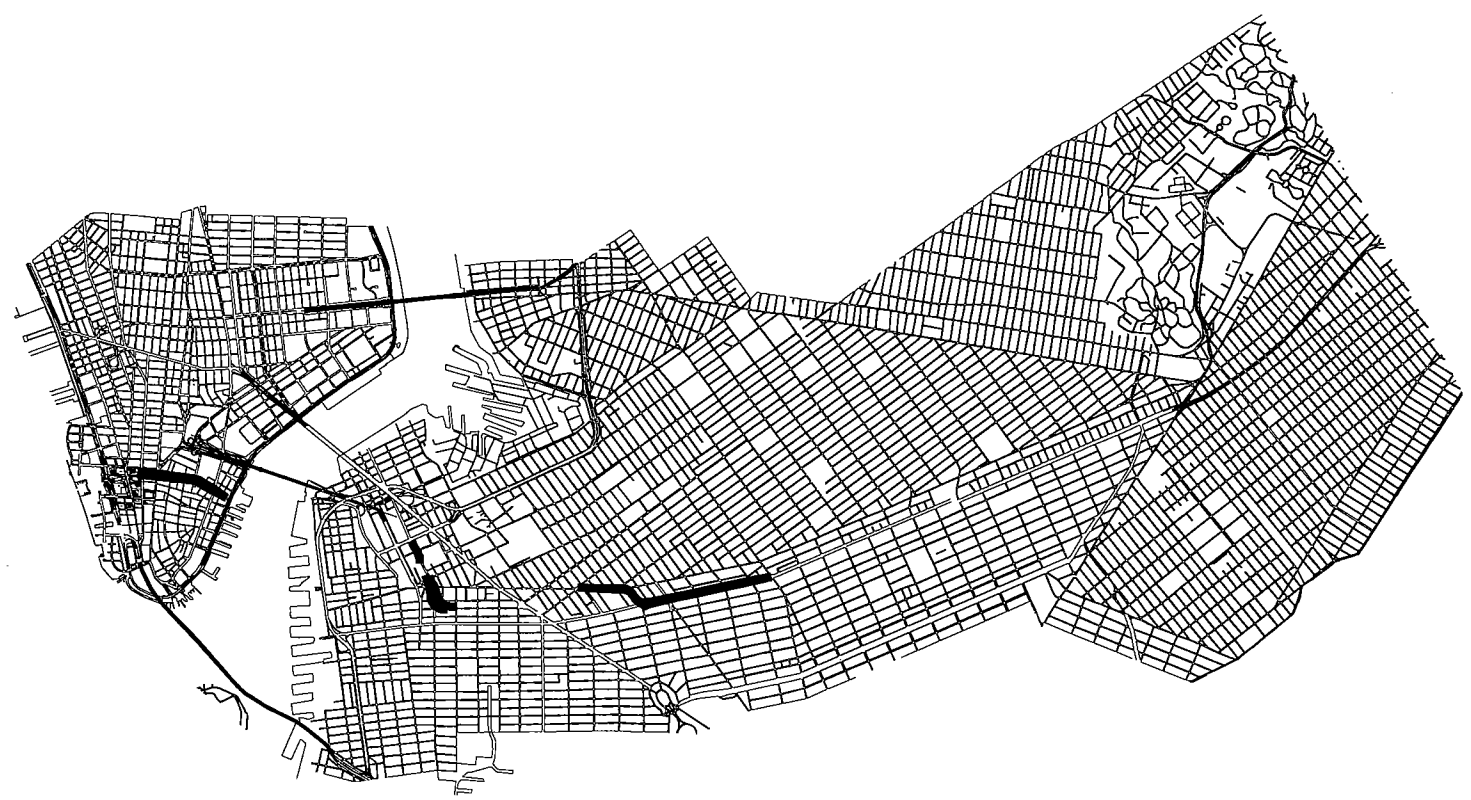


EXHIBIT 3

LMDC Lower Manhattan Development Corporation

Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

PARSONS SYSTRA ENGINEERING A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

GENERAL NOTES

1. ELEVATIONS INDICATED REFER TO NYCT DATUM. ELEVATION 100 IS 2.653 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, UNITED STATES COAST AND GEODETIC SURVEY DATUM.
2. EXISTING TUNNEL INFRASTRUCTURE OUTLINES AND TRACK ALIGNMENT LOCATED FROM NYCT CONSTRUCTION DRAWINGS. OVERLYING STREET GRID AND BUILDING OUTLINES DEVELOPED FROM MULTIPLE SOURCES. THESE DRAWINGS ARE NOT TO BE USED FOR NEW CONSTRUCTION.
3. STATIONING IS MEASURED ALONG PROPOSED BASELINE ALIGNMENT.
4. ALL TRACK POINTS EXCEPT P.I.'S ARE AT CENTERLINE OF PROPOSED TRACK, UNLESS NOTED OTHERWISE.
5. PROFILE GRID STATIONING BASED UPON BASELINE ALIGNMENT UNLESS NOTED OTHERWISE.
6. CUT AND COVER CONSTRUCTION EXPECTED AFTER RTBM AND/OR EPBM CONSTRUCTION OF RUNNING TUNNELS TO COMPLETE ALL OR PART OF THE STATION MEZZANINE, ANCILLARY FACILITIES, AND STATION ENTRANCES. WHERE POSSIBLE HARD ROCK MINING OR NATM METHODS WILL BE EMPLOYED TO CONSTRUCT CROSSOVERS TO LIMIT STREET SURFACE DISRUPTION, THROUGHOUT THE ALIGNMENT EXPECTED CONSTRUCTION METHODS ARE BASED UPON PRELIMINARY INFORMATION. ACTUAL CONSTRUCTION METHOD EMPLOYED WOULD BE SELECTED FOLLOWING DETAILED GEOLOGICAL INVESTIGATION, ENVIRONMENTAL AND PROPERTY IMPACT ANALYSES, AND COST ANALYSES FOR VARIOUS CONSTRUCTION MEANS AND METHODS.

GENERAL ABBREVIATIONS

APPROXIMATE	APPROX.
AVENUE	AVE
CENTER	CTR
CENTER TO CENTER	C/C
CLEARANCE	CLR
DEGREE	DEG, °
DIAMETER	DIA, Ø
DRAWING	DWG
EAST	E
EASTBOUND	E.B.
ELEVATION	ELEV., EL
EXISTING	EX, EXIST
FEET	FT, '
HORIZONTAL	HORIZ
INCH	IN., "
LINEAR FEET	LF
MILES PER HOUR	MPH
MINIMUM	MIN
NORTH	N
NORTHBOUND	N.B.
NOT TO SCALE	N.T.S.
NUMBER	NO., #
OUTSIDE DIAMETER	OD
REQUIRED	REQ'D
ROUTE	RTE
SOUTHBOUND	S.B.
STREET	ST
TYPICAL	TYP.
VERTICAL	VERT
WEST	W
WESTBOUND	W.B.

TRACK ABBREVIATIONS

ACTUAL SUPERELEVATION	Ea
BASE OF RAIL	BOR
CENTERLINE	℄
CROSSOVER	X-OVER, X/O
CURVE TO SPIRAL	CS
DEGREE OF CURVATURE (ARC DEFINITION)	Dc
LENGTH OF CURVE	Lc
LENGTH OF SPIRAL	Ls
PASSENGER COMFORT LIMITING SPEED	Vp
POINT OF VERTICAL CURVE	PVC
POINT OF INTERSECTION, TURNOUT	PITO
POINT OF VERTICAL CURVE	PVI
POINT OF SWITCH	PS
POINT OF INTERSECTION	PI
POINT OF CURVE	PC
POINT OF TANGENT	PT
POINT OF VERTICAL TANGENCY	PVT
POINT OF COMPOUND CURVE	PCC
RADIUS OF CURVE	Rc
SPIRAL TO CURVE	SC
SPIRAL TO TANGENT	ST
STATION, STATIONING	STA.
SWITCH	SW
TANGENT LENGTH	T
TANGENT TO SPIRAL	TS
TOTAL CENTRAL ANGLE	I
TRACK	TRK
TURNOUT	T/O
UNBALANCED SUPERELEVATION	Eu
VERTICAL CURVE	VC

HORIZONTAL ALIGNMENT LEGEND

- ℄ OF PROPOSED TRACK
- 75+00 — PROPOSED BASELINE & STATIONING
- ℄ OF EXISTING TRACK
- POINT OF SWITCH
- PITO
- NORTH ARROW
- C1-02 — CURVE NUMBER
- PROPOSED TURNOUT
- PROPOSED CROSSOVER
- PC — HORIZONTAL CURVE POINT
- HISTORIC DISTRICT (APPROXIMATE LIMITS)

VERTICAL ALIGNMENT LEGEND

- VERTICAL CURVE POINT
- PROPOSED TRACK, BASE OF RAIL
- EXISTING TRACK
- APPROXIMATION OF BEDROCK SURFACE
- EXISTING GRADE
- 92 / 90 — DEPTH AT PLATFORM LEVEL

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS — SYSTRA ENGINEERING — *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation — Metropolitan Transportation Authority — New York City Economic Development Corporation — THE PORT AUTHORITY OF NY & NJ

CRANBERRY TUNNEL ALTERNATIVE
GENERAL INFORMATION

SCALE: NONE	CONTRACT No.
FILE NAME: CRANGS300	ISSUE FINAL
DRAWING No.: GS-300	SHEET No. 1 OF 9
DATE: 23 APR 04	

TRACK 1

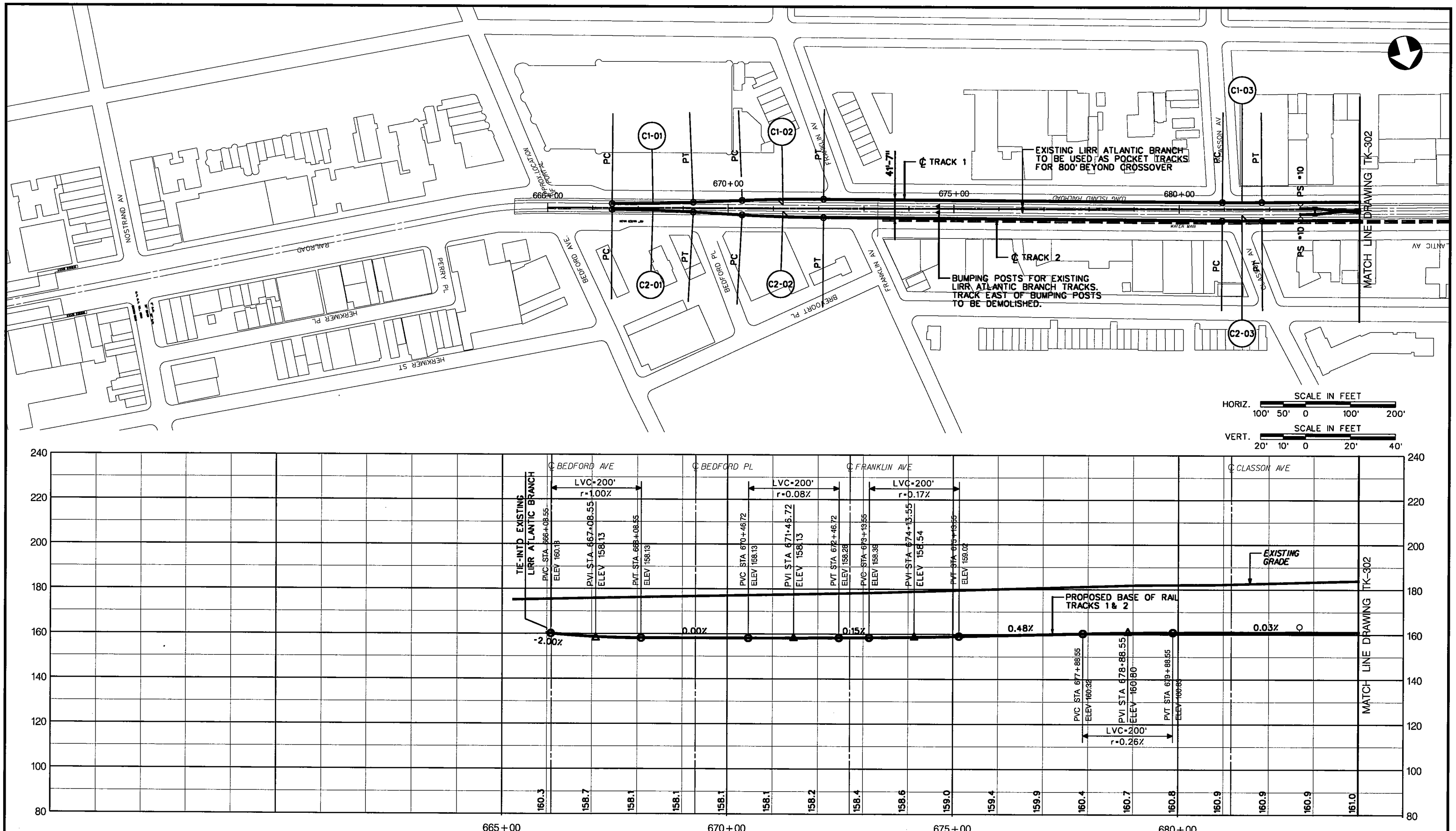
CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	TK-301	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C1-02	TK-301	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C1-03	TK-301	00-49-59	00-57-18	6000.00	43.62	87.24	0	0	4.00	77
C1-04	TK-302	01-16-56	01-11-37	4800.00	53.72	107.43	0	0	4.00	69
C1-05	TK-302	02-01-34	01-11-37	4800.00	84.88	169.74	0	0	4.00	69
C1-06	TK-302	00-13-43	00-17-11	20000.00	39.90	79.80	0	0	4.00	141
C1-07	TK-302	66-30-19	14-19-26	400.00	221.32	404.29	60.00	1 1/2	4.00	23
C1-08	TK-303	52-45-06	14-19-26	400.00	162.25	308.28	60.00	1 1/2	4.00	23
C1-09	TK-303	03-49-06	04-46-29	1200.00	40.00	79.97	0	0	4.00	34

TRACK 2

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	TK-301	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C2-02	TK-301	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C2-03	TK-301	00-49-59	00-57-18	6000.00	43.62	87.24	0	0	4.00	77
C2-04	TK-302	01-16-56	01-11-37	4800.00	53.72	107.43	0	0	4.00	69
C2-05	TK-302	01-47-51	01-11-37	4800.00	75.30	150.58	0	0	4.00	69
C2-06	TK-302	66-30-19	14-19-26	400.00	221.32	404.29	60.00	1 1/2	4.00	23
C2-07	TK-302	52-45-06	14-19-26	400.00	162.25	308.28	60.00	1 1/2	4.00	23
C2-08	TK-303	02-43-06	04-46-29	1200.00	28.47	56.93	0	0	4.00	34

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE Eu = 4". PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 40 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS
SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

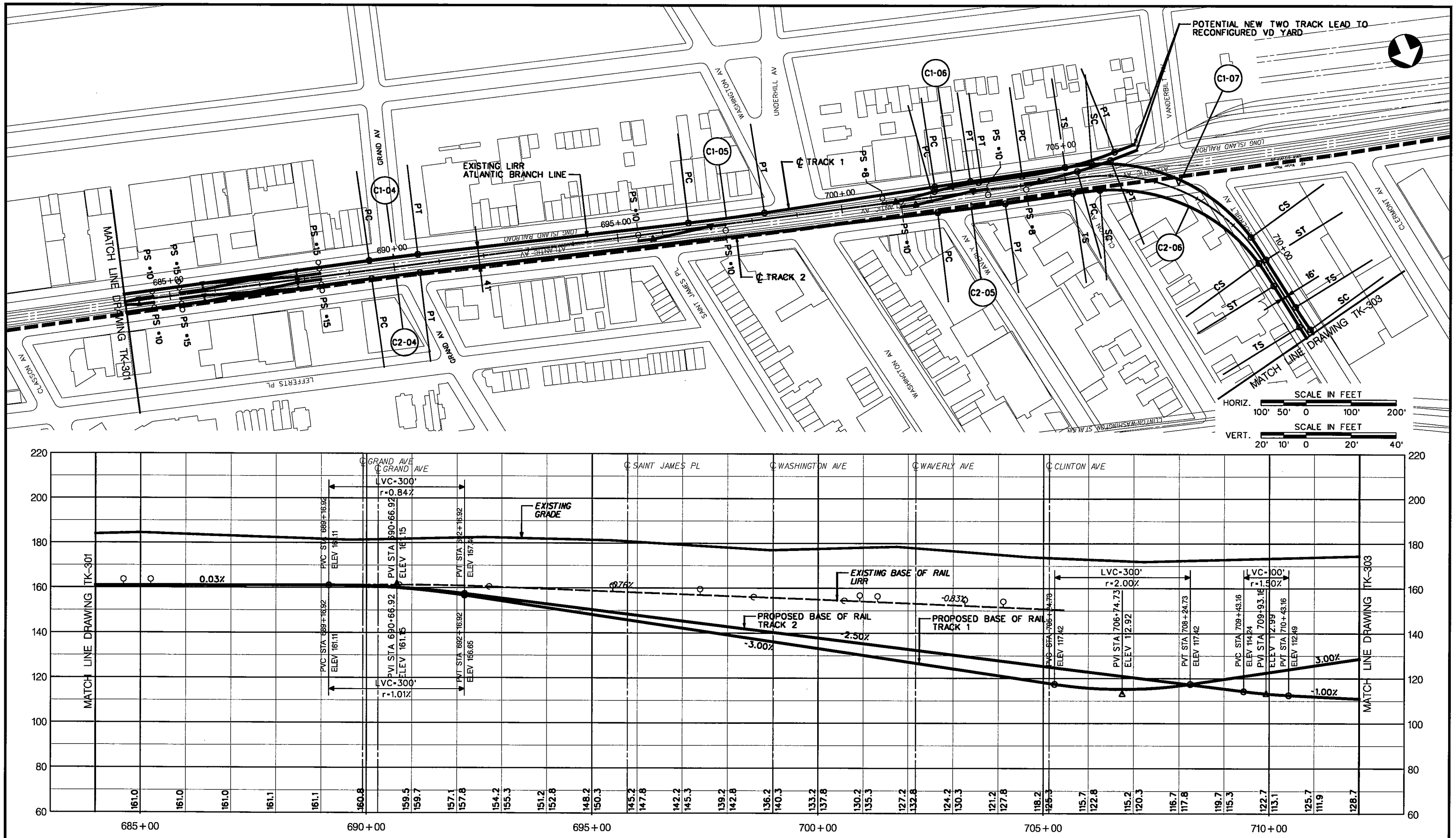
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY TUNNEL ALTERNATIVE
ATLANTIC BRANCH TO FULTON LINE
PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: CRANTK301
DRAWING No.: TK-301
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 3 OF 9



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

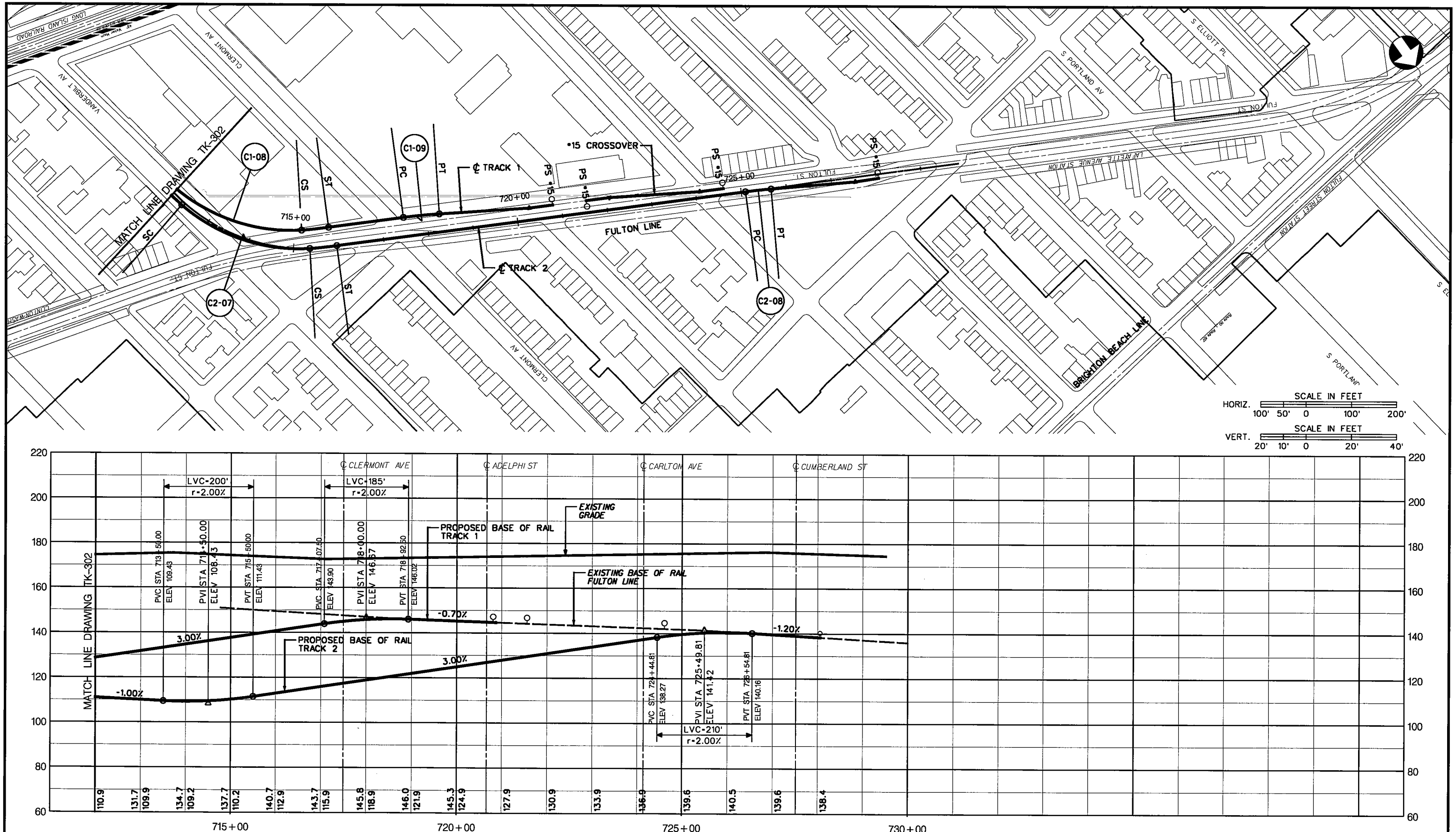
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

CRANBERRY TUNNEL ALTERNATIVE
ATLANTIC BRANCH TO FULTON LINE
PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: CRANTK302
DRAWING No.: TK-302
DATE: 23 APR 04

CONTRACT No.
ISSUE: FINAL
SHEET No. 4 OF 9



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

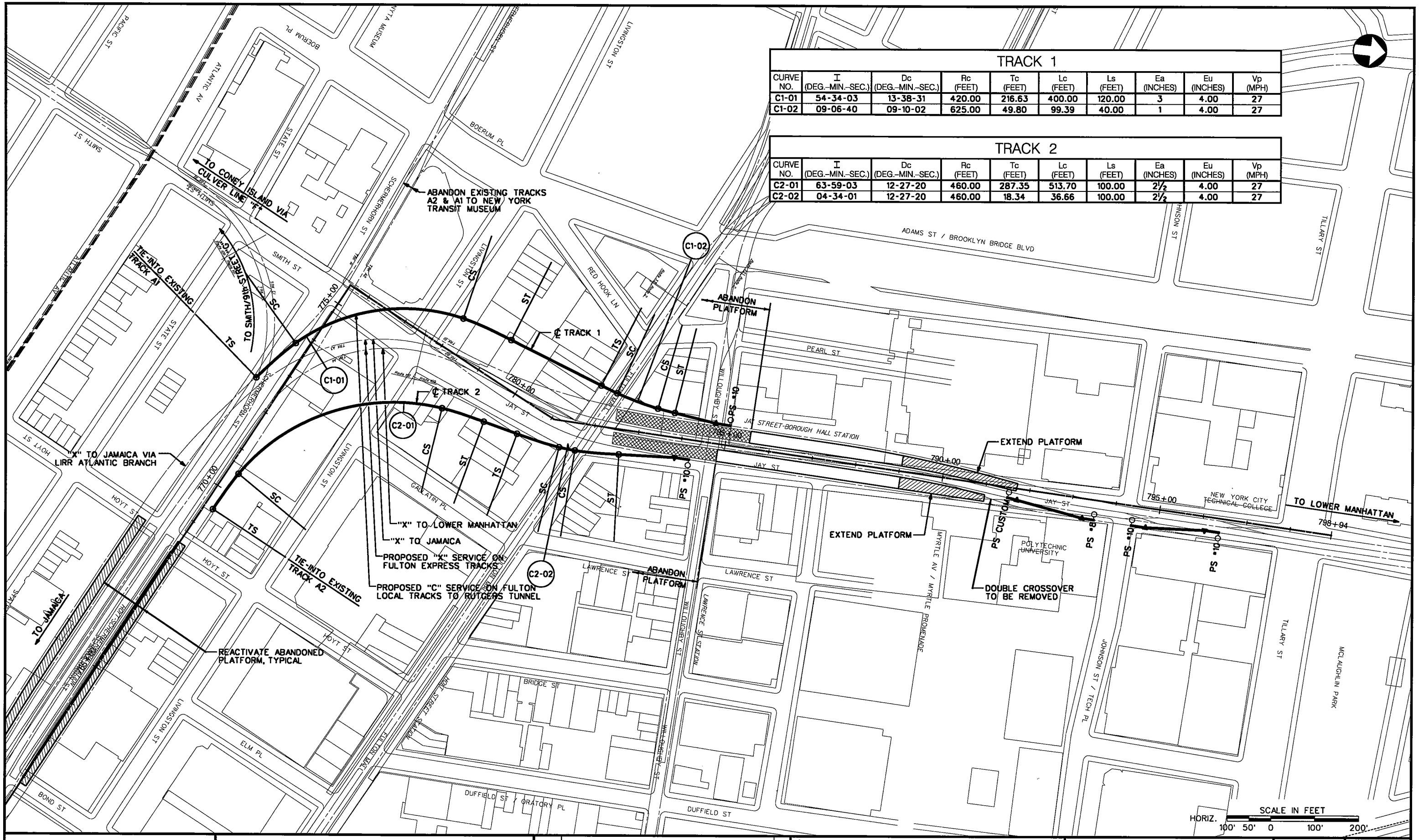
LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

CRANBERRY TUNNEL ALTERNATIVE
ATLANTIC BRANCH TO FULTON LINE
PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: CRANTK303	ISSUE FINAL
DRAWING No.: TK-303	SHEET No. 5 OF 9
DATE: 23 APR 04	

TRACK 1									
CURVE NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	54-34-03	13-38-31	420.00	216.63	400.00	120.00	3	4.00	27
C1-02	09-06-40	09-10-02	625.00	49.80	99.39	40.00	1	4.00	27

TRACK 2									
CURVE NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	63-59-03	12-27-20	460.00	287.35	513.70	100.00	2½	4.00	27
C2-02	04-34-01	12-27-20	460.00	18.34	36.66	100.00	2½	4.00	27



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS
SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

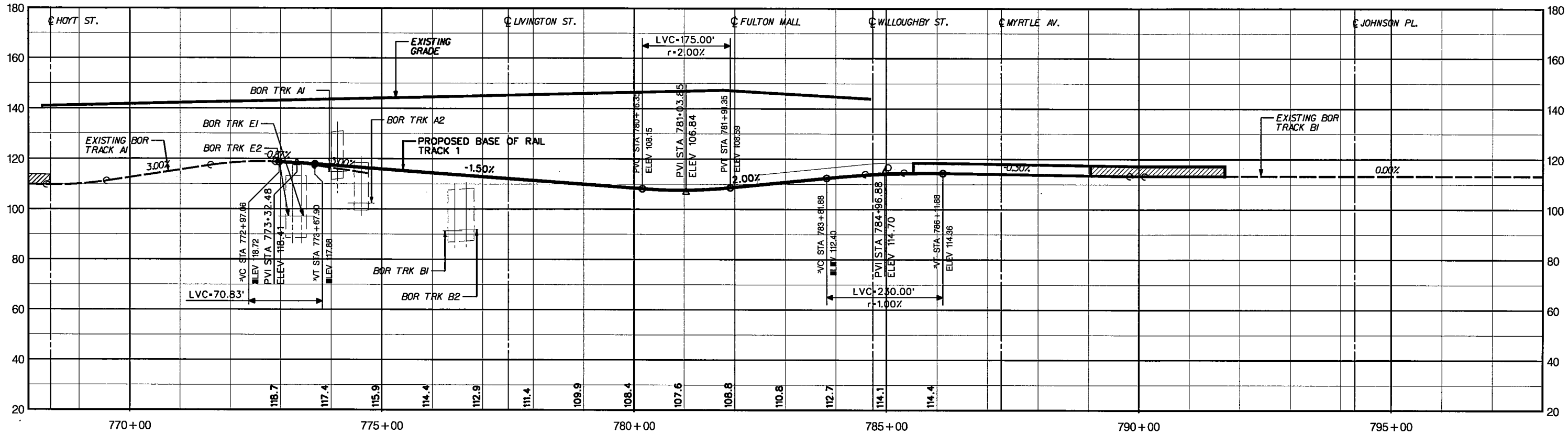
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY TUNNEL ALTERNATIVE

JAY STREET TO HOYT-SCHERMERHORN
PLAN

SCALE: 1"=100'
FILE NAME: CRANTK304
DRAWING No.: TK-304
DATE: 23 APR 04

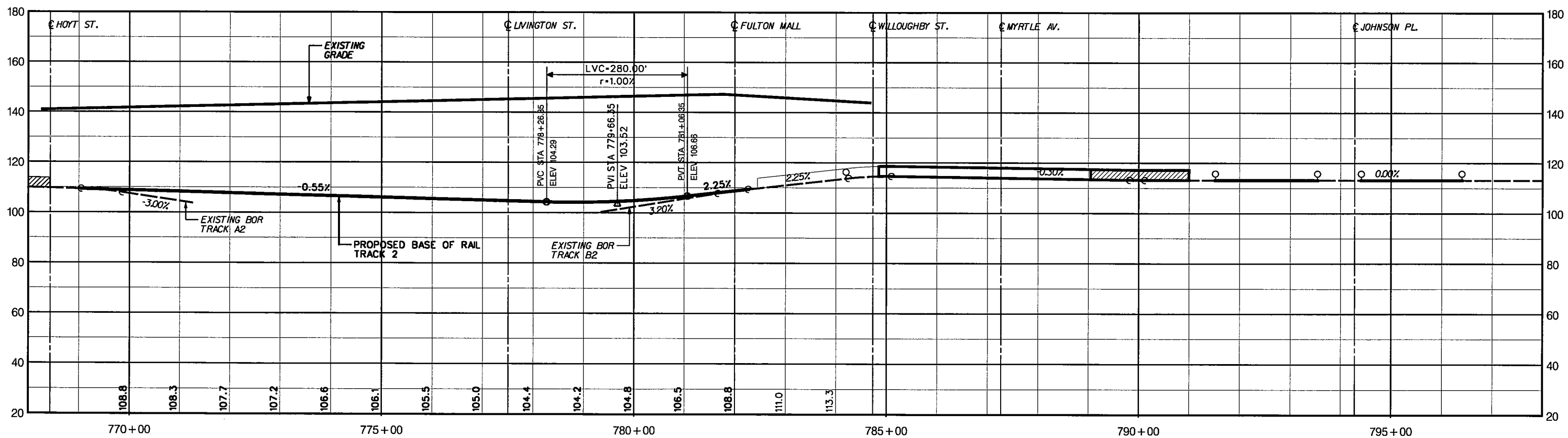
CONTRACT No.
ISSUE: FINAL
SHEET No. 6 OF 9



TRACK 2 NORTHBOUND FROM HOYT–SCHERMERHORN FOR C SERVICE

HORIZ. SCALE IN FEET 100' 50' 0 100' 200'

VERT. SCALE IN FEET 20' 10' 0 20' 40'



TRACK 1 SOUTHBOUND FROM JAY ST.–BOROUGH HALL FOR C SERVICE

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY TUNNEL ALTERNATIVE
JAY STREET TO HOYT-SCHERMERHORN
PROFILES

SCALE: AS NOTED	CONTRACT No.
FILE NAME: CRANTK305	ISSUE FINAL
DRAWING No.: TK-305	SHEET No. 7 OF 9
DATE: 23 APR 04	

TRACK 1

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	TK-307	3-49-06	4-46-29	1200.00	40.00	79.97	0	0	4.00	34
C1-02	TK-307	24-28-02	6-44-26	850.00	184.30	362.98	0	0	4.00	29

TRACK 2

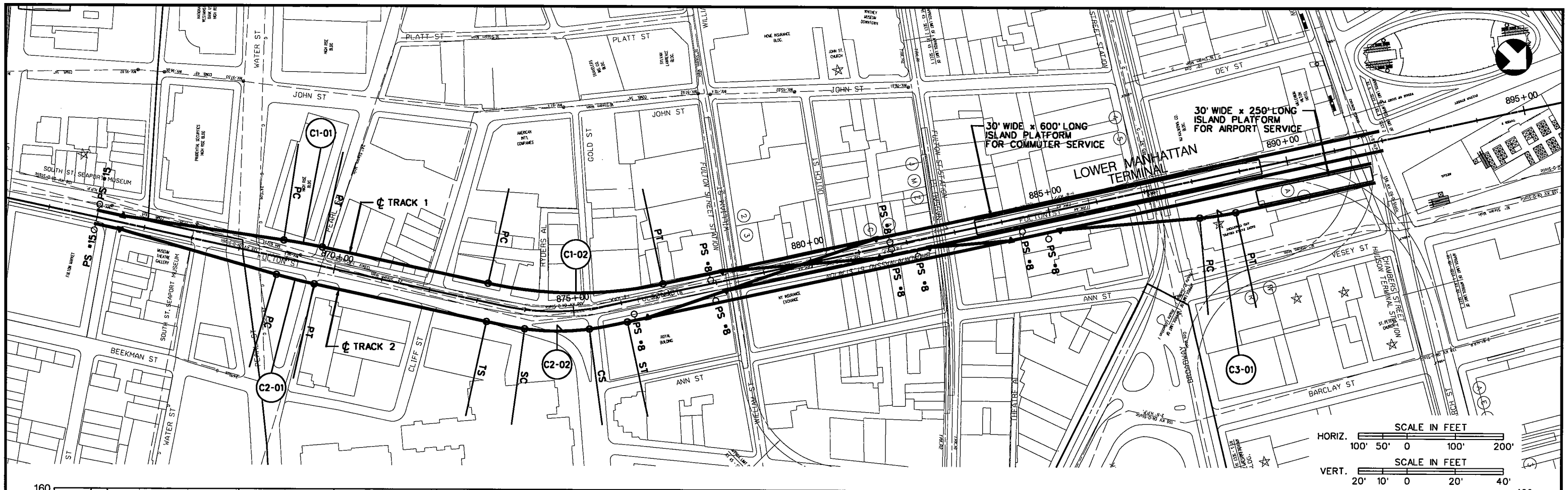
CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	TK-307	3-49-06	4-46-29	1200.00	40.00	79.97	0	0	4.00	34
C2-02	TK-307	18-44-33	11-27-33	500.00	67.16	133.52	80.00	2	4.00	27

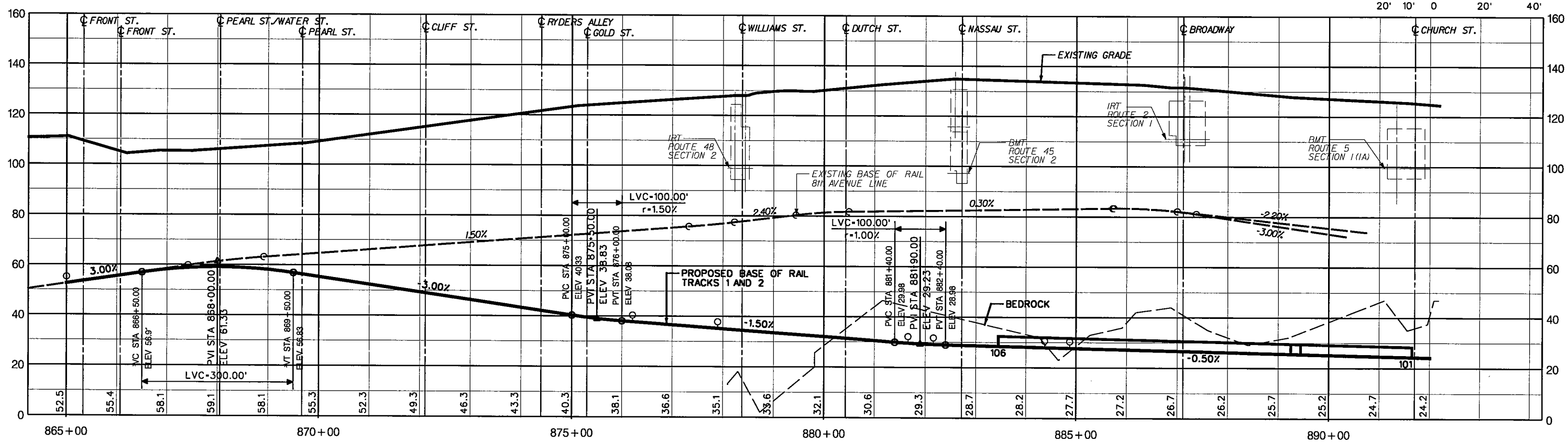
TRACK 3

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C3-01	TK-307	7-09-10	9-32-57	600	37.50	74.90	0	0.00	4.00	24

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE Eu = 4". PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 40 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

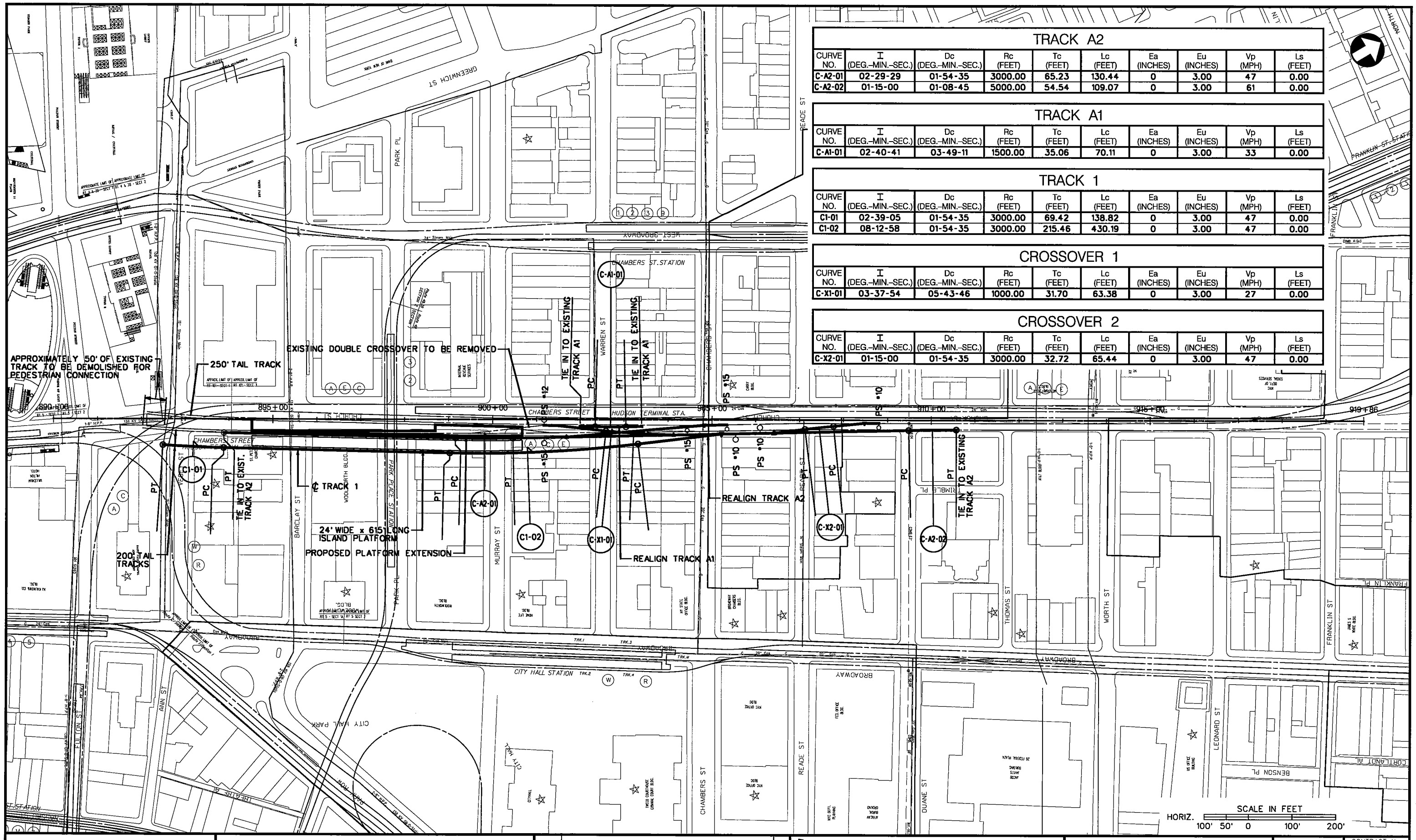
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINALS
PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: CRANTK307	ISSUE FINAL
DRAWING No.: TK-307	SHEET No.
DATE: 23 APR 04	1 OF 9



TRACK A2

CURVE NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)	Ls (FEET)
C-A2-01	02-29-29	01-54-35	3000.00	65.23	130.44	0	3.00	47	0.00
C-A2-02	01-15-00	01-08-45	5000.00	54.54	109.07	0	3.00	61	0.00

TRACK A1

CURVE NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)	Ls (FEET)
C-A1-01	02-40-41	03-49-11	1500.00	35.06	70.11	0	3.00	33	0.00

TRACK 1

CURVE NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)	Ls (FEET)
C1-01	02-39-05	01-54-35	3000.00	69.42	138.82	0	3.00	47	0.00
C1-02	08-12-58	01-54-35	3000.00	215.46	430.19	0	3.00	47	0.00

CROSSOVER 1

CURVE NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)	Ls (FEET)
C-X1-01	03-37-54	05-43-46	1000.00	31.70	63.38	0	3.00	27	0.00

CROSSOVER 2

CURVE NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)	Ls (FEET)
C-X2-01	01-15-00	01-54-35	3000.00	32.72	65.44	0	3.00	47	0.00

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS

SYSTRA ENGINEERING

A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation

New York City Economic Development Corporation

MTA Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

CRANBERRY TUNNEL ALTERNATIVE

CHAMBERS STREET HUDSON TERMINAL STATION OPERATIONAL IMPROVEMENTS PLAN

SCALE: 1" = 100'

FILE NAME: CRANTK308

DRAWING No.: TK-308

DATE: 23 APR 04

CONTRACT No.

ISSUE: FINAL

SHEET No. 9 OF 9

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

CRANBERRY & MONTAGUE COMBINED ALTERNATIVE

DATE: APRIL 23, 2004

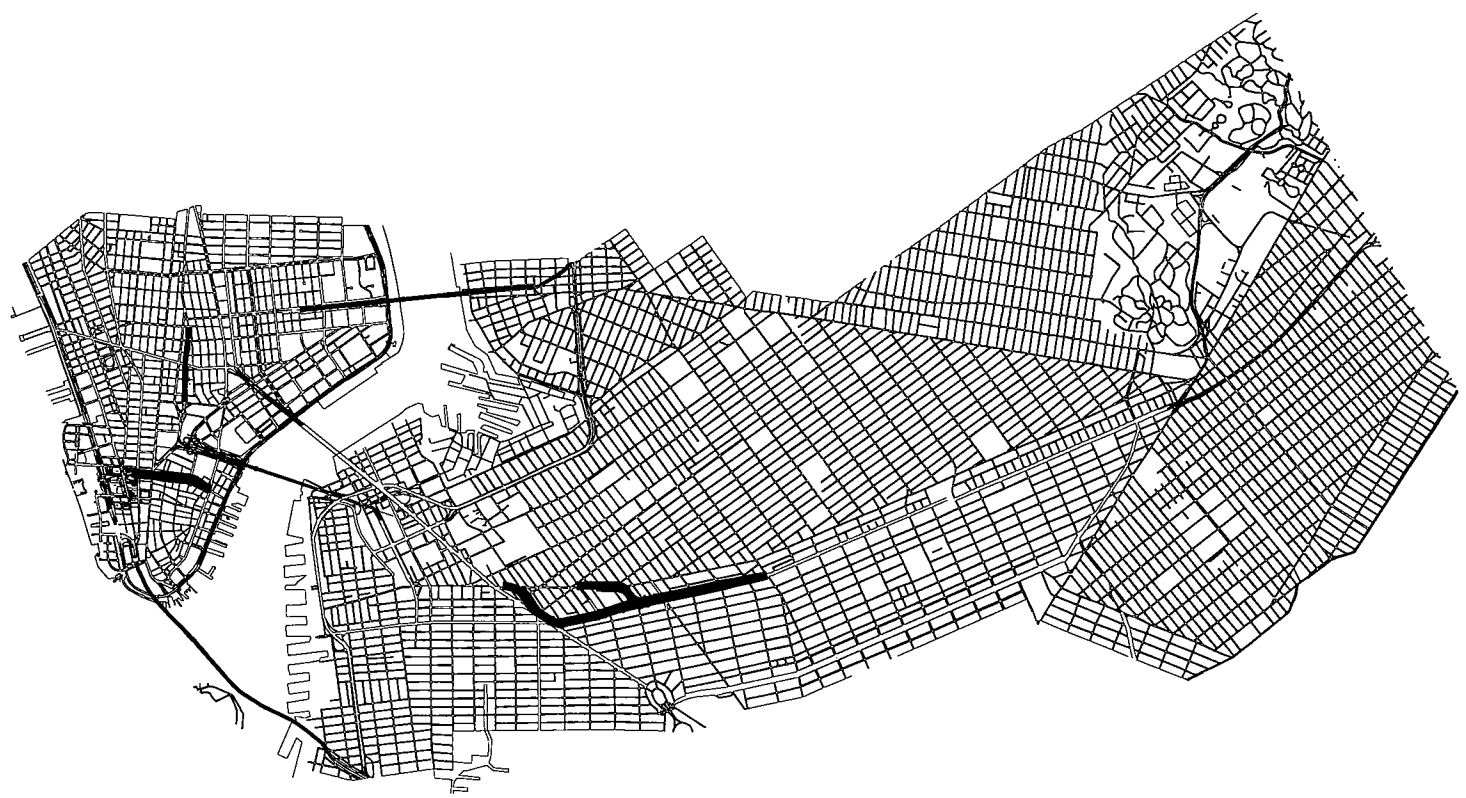


EXHIBIT 4

LMDC Lower Manhattan Development Corporation

Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

GENERAL NOTES

1. ELEVATIONS INDICATED REFER TO NYCT DATUM. ELEVATION 100 IS 2.653 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, UNITED STATES COAST AND GEODETIC SURVEY DATUM.
2. EXISTING TUNNEL INFRASTRUCTURE OUTLINES AND TRACK ALIGNMENT LOCATED FROM NYCT CONSTRUCTION DRAWINGS. OVERLYING STREET GRID AND BUILDING OUTLINES DEVELOPED FROM MULTIPLE SOURCES. THESE DRAWINGS ARE NOT TO BE USED FOR NEW CONSTRUCTION.
3. STATIONING IS MEASURED ALONG PROPOSED BASELINE ALIGNMENT.
4. ALL TRACK POINTS EXCEPT P.I.'S ARE AT CENTERLINE OF PROPOSED TRACK, UNLESS NOTED OTHERWISE.
5. PROFILE GRID STATIONING BASED UPON BASELINE ALIGNMENT UNLESS NOTED OTHERWISE.
6. CUT AND COVER CONSTRUCTION EXPECTED AFTER RTBM AND/OR EPBM CONSTRUCTION OF RUNNING TUNNELS TO COMPLETE ALL OR PART OF THE STATION MEZZANINE, ANCILLARY FACILITIES, AND STATION ENTRANCES. WHERE POSSIBLE HARD ROCK MINING OR NATM METHODS WILL BE EMPLOYED TO CONSTRUCT CROSSOVERS TO LIMIT STREET SURFACE DISRUPTION, THROUGHOUT THE ALIGNMENT EXPECTED CONSTRUCTION METHODS ARE BASED UPON PRELIMINARY INFORMATION. ACTUAL CONSTRUCTION METHOD EMPLOYED WOULD BE SELECTED FOLLOWING DETAILED GEOLOGICAL INVESTIGATION, ENVIRONMENTAL AND PROPERTY IMPACT ANALYSES, AND COST ANALYSES FOR VARIOUS CONSTRUCTION MEANS AND METHODS.

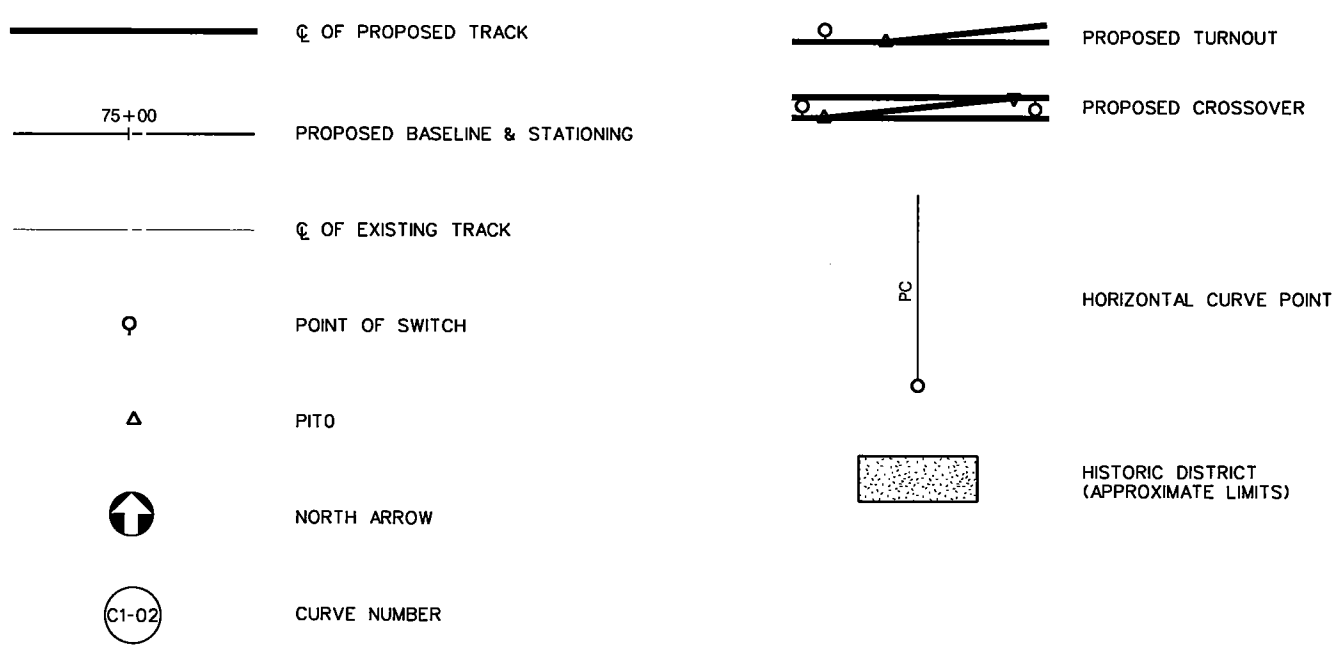
GENERAL ABBREVIATIONS

APPROXIMATE	APPROX.
AVENUE	AVE
CENTER	CTR
CENTER TO CENTER	C/C
CLEARANCE	CLR
DEGREE	DEG, °
DIAMETER	DIA, Ø
DRAWING	DWG
EAST	E
EASTBOUND	E.B.
ELEVATION	ELEV., EL
EXISTING	EX, EXIST
FEET	FT, '
HORIZONTAL	HORIZ
INCH	IN., "
LINEAR FEET	LF
MILES PER HOUR	MPH
MINIMUM	MIN
NORTH	N
NORTHBOUND	N.B.
NOT TO SCALE	N.T.S.
NUMBER	NO., #
OUTSIDE DIAMETER	OD
REQUIRED	REQ'D
ROUTE	RTE
SOUTHBOUND	S.B.
STREET	ST
TYPICAL	TYP.
VERTICAL	VERT
WEST	W
WESTBOUND	W.B.

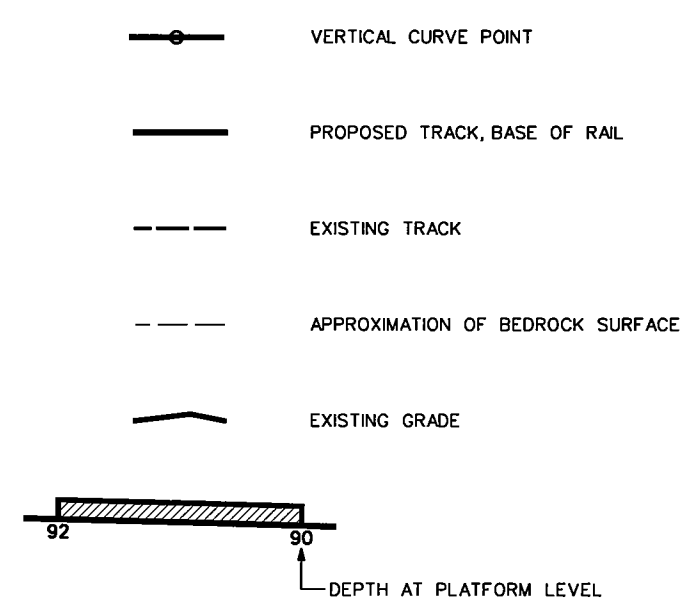
TRACK ABBREVIATIONS

ACTUAL SUPERELEVATION	Ea
BASE OF RAIL	BOR
CENTERLINE	℄
CROSSOVER	X-OVER, X/O
CURVE TO SPIRAL	CS
DEGREE OF CURVATURE (ARC DEFINITION)	Dc
LENGTH OF CURVE	Lc
LENGTH OF SPIRAL	Ls
PASSENGER COMFORT LIMITING SPEED	Vp
POINT OF VERTICAL CURVE	PVC
POINT OF INTERSECTION, TURNOUT	PITO
POINT OF VERTICAL CURVE	PVI
POINT OF SWITCH	PS
POINT OF INTERSECTION	PI
POINT OF CURVE	PC
POINT OF TANGENT	PT
POINT OF VERTICAL TANGENCY	PVT
POINT OF COMPOUND CURVE	PCC
RADIUS OF CURVE	Rc
SPIRAL TO CURVE	SC
SPIRAL TO TANGENT	ST
STATION, STATIONING	STA.
SWITCH	SW
TANGENT LENGTH	T
TANGENT TO SPIRAL	TS
TOTAL CENTRAL ANGLE	I
TRACK	TRK
TURNOUT	T/O
UNBALANCED SUPERELEVATION	Eu
VERTICAL CURVE	VC

HORIZONTAL ALIGNMENT LEGEND



VERTICAL ALIGNMENT LEGEND



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

CRANBERRY /MONTAGUE
GENERAL INFORMATION

SCALE: NONE	CONTRACT No.
FILE NAME: CMCGS400	ISSUE FINAL
DRAWING No.: GS-400	SHEET No. 1 OF 12
DATE: 23 APR 04	

TRACK 1

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	TK-401	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C1-02	TK-401	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C1-03	TK-401	00-49-59	00-57-18	6000.00	43.62	87.24	0	0	4.00	77
C1-04	TK-401	01-33-09	01-11-37	4800.00	65.04	130.07	0	0	4.00	69
C1-05	TK-402	02-21-43	01-11-37	4800.00	98.95	197.88	0	0	4.00	69
C1-06	TK-402	00-55-36	01-11-37	4800.00	38.82	77.64	0	0	4.00	69
C1-07	TK-402	66-06-26	14-19-26	400.00	219.51	401.52	60.00	1 1/2	4.00	23
C1-08	TK-404	52-45-06	14-19-26	400.00	162.25	308.28	60.00	1 1/2	4.00	23
C1-09	TK-404	05-43-29	06-21-58	900.00	45.00	89.92	0	0	4.00	30

TRACK 2

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	TK-401	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C2-02	TK-401	02-46-54	01-32-55	3700.00	89.84	179.64	0	0	4.00	60
C2-03	TK-401	00-49-59	00-57-18	6000.00	43.62	87.24	0	0	4.00	77
C2-04	TK-401	03-40-14	01-11-37	4800.00	153.80	307.49	0	0	4.00	69
C2-05	TK-402	02-51-39	01-11-37	4800.00	119.86	239.68	0	0	4.00	69
C2-06	TK-402	00-55-36	01-11-37	4800.00	38.82	77.64	0	0	4.00	69
C2-07	TK-402	66-06-26	14-19-26	400.00	219.51	401.52	60.00	1 1/2	4.00	23
C2-08	TK-404	52-45-06	14-19-26	400.00	162.25	308.28	60.00	1 1/2	4.00	23
C2-09	TK-404	05-43-29	06-21-58	900.00	53.66	107.20	0	0	4.00	30

TRACK 3

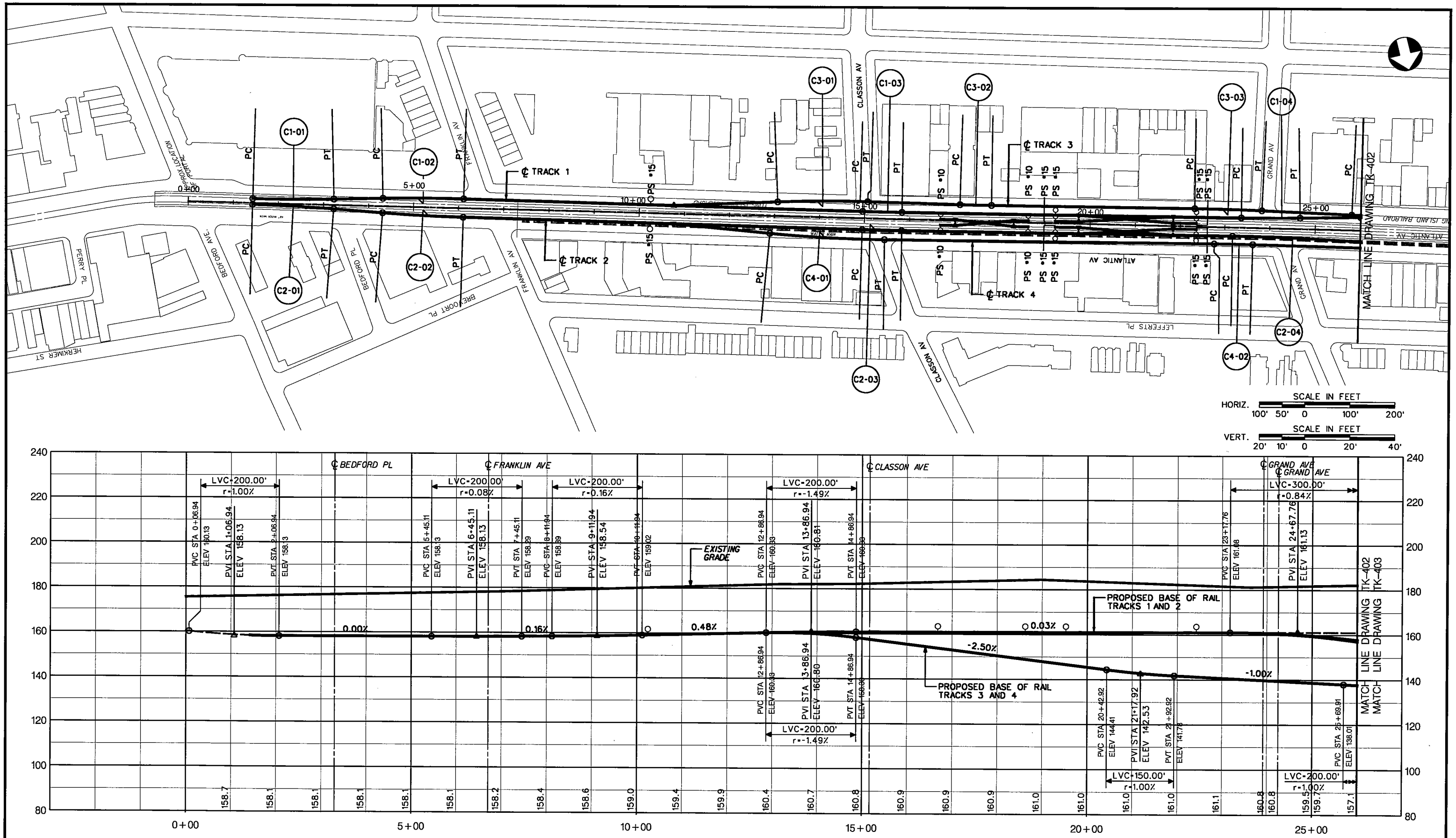
CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C3-01	TK-401	03-49-06	01-54-35	3000.00	100.00	199.92	0	0	4.00	54
C3-02	TK-401	00-49-59	01-11-37	4800.00	34.90	69.79	0	0	4.00	69
C3-03	TK-401	01-47-26	01-11-37	4800.00	75.01	150.00	0	0	4.00	69
C3-04	TK-402	00-58-52	01-11-37	4800.00	41.09	82.19	0	0	4.00	69
C3-05	TK-402	00-55-36	01-11-37	4800.00	38.82	77.64	0	0	4.00	69
C3-06	TK-402	06-09-18	02-51-53	2000.00	87.48	174.85	40.00	1	4.00	50
C3-07	TK-402	06-53-26	02-48-28	2040.58	102.79	205.40	40.00	1	4.00	50
C3-08	TK-405	45-25-41	11-27-33	500.00	186.17	356.43	40.00	1	4.00	25
C3-09	TK-405	23-57-17	09-32-57	600.00	86.01	170.85	80.00	2	4.00	30
C3-10	TK-405	44-15-56	09-32-57	600.00	198.58	383.55	80.00	2	4.00	30

TRACK 4

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C4-01	TK-401	04-52-16	01-54-35	3000.00	127.60	255.06	0	0	4.00	54
C4-02	TK-401	01-01-45	01-11-37	4800.00	43.11	86.22	0	0	4.00	69
C4-03	TK-402	00-55-36	01-11-37	4800.00	38.82	77.64	0	0	4.00	69
C4-04	TK-402	06-09-18	02-51-53	2000.00	87.48	174.85	40.00	1	4.00	50
C4-05	TK-402	06-53-26	02-51-53	2000.00	100.35	200.52	40.00	1	4.00	50
C4-06	TK-405	45-25-41	11-27-33	500.00	186.17	356.43	40.00	1	4.00	25
C4-07	TK-405	23-57-17	09-32-57	600.00	86.01	170.85	80.00	2	4.00	30
C4-08	TK-405	05-43-29	04-40-38	600.00	61.25	122.40	80.00	2	4.00	30

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE Eu = 4". PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 40 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS
SYSTRA ENGINEERING
A Joint Venture

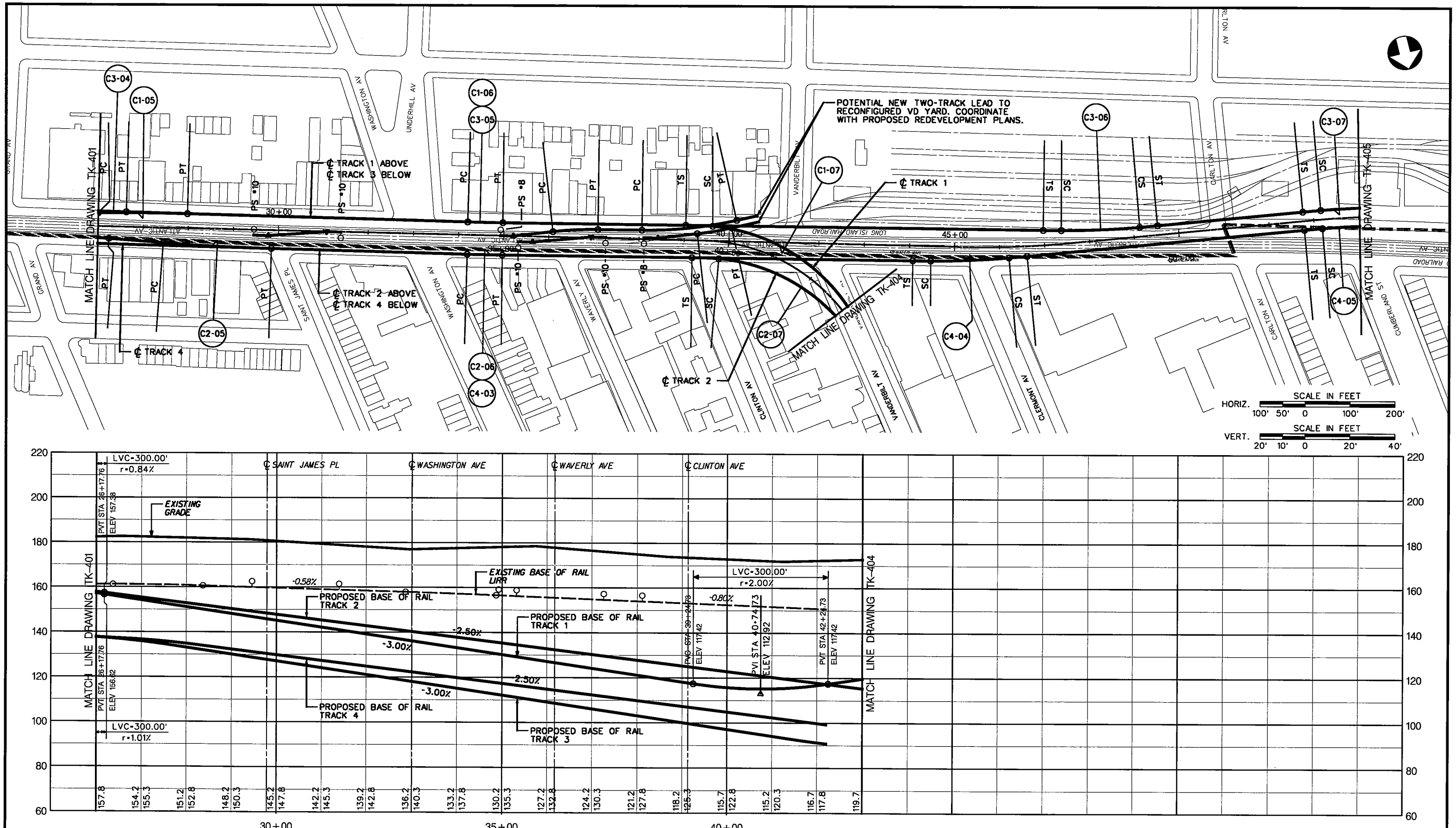
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE
PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: CMCTK401
DRAWING No.: TK-401
DATE: 23 APR 04
CONTRACT No.
ISSUE: FINAL
SHEET No. 3 OF 12



PROFILE FOR TRACKS 1 AND 2

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING *A Joint Venture*

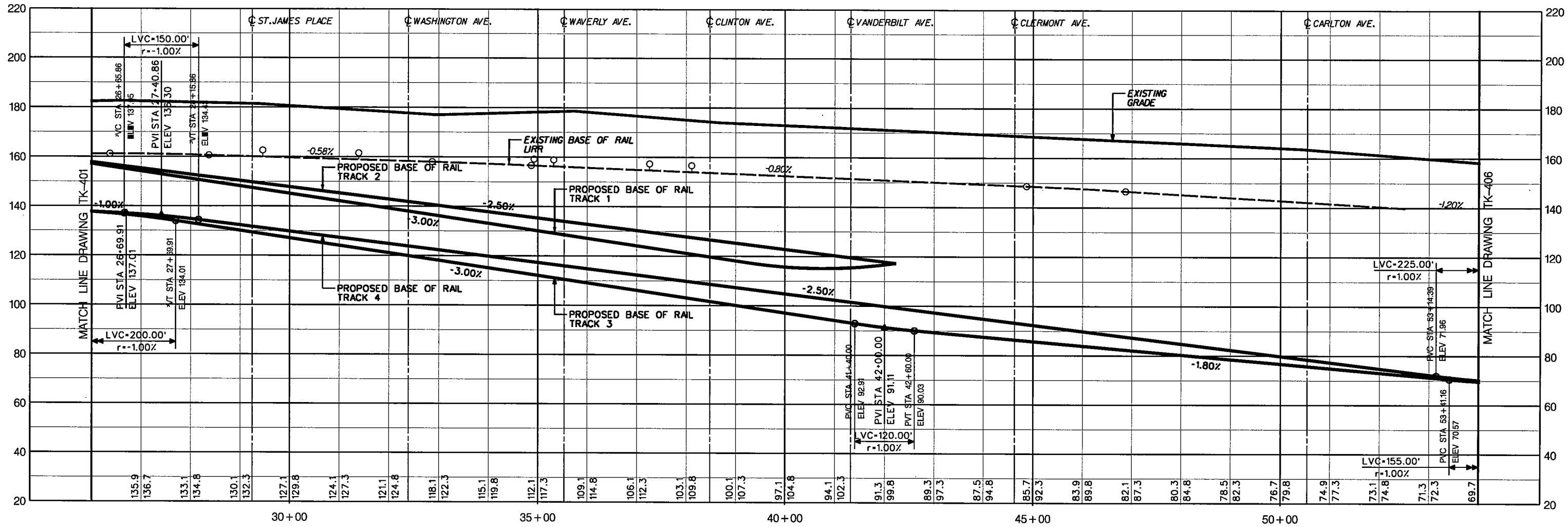
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE
PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: CMCTK402
DRAWING No.: TK-402
DATE: 23 APR 04
CONTRACT No.
ISSUE: FINAL
SHEET No. 4 OF 12



PROFILE FOR TRACKS 3 AND 4

HORIZ. SCALE IN FEET 100' 50' 0 100' 200'

VERT. SCALE IN FEET 20' 10' 0 20' 40'

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation

New York City Economic Development Corporation

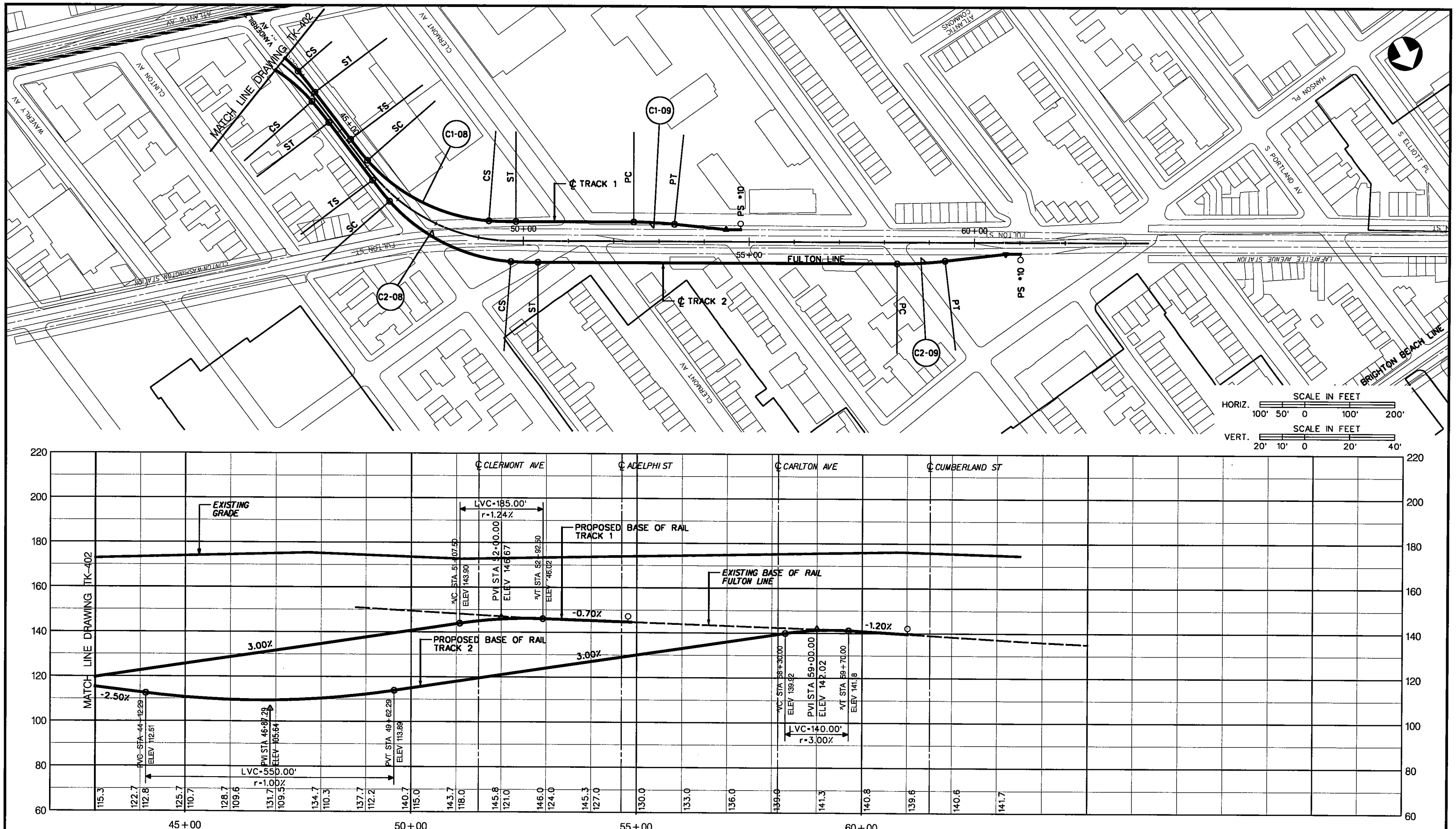
MTA Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
ATLANTIC BRANCH TO
FOURTH AVENUE LINE AND FULTON LINE
PROFILE

SCALE: AS NOTED
FILE NAME: CMCTK403
DRAWING No.: TK-403
DATE: 23 APR 04

CONTRACT No.
ISSUE: FINAL
SHEET No. 5 OF 12



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

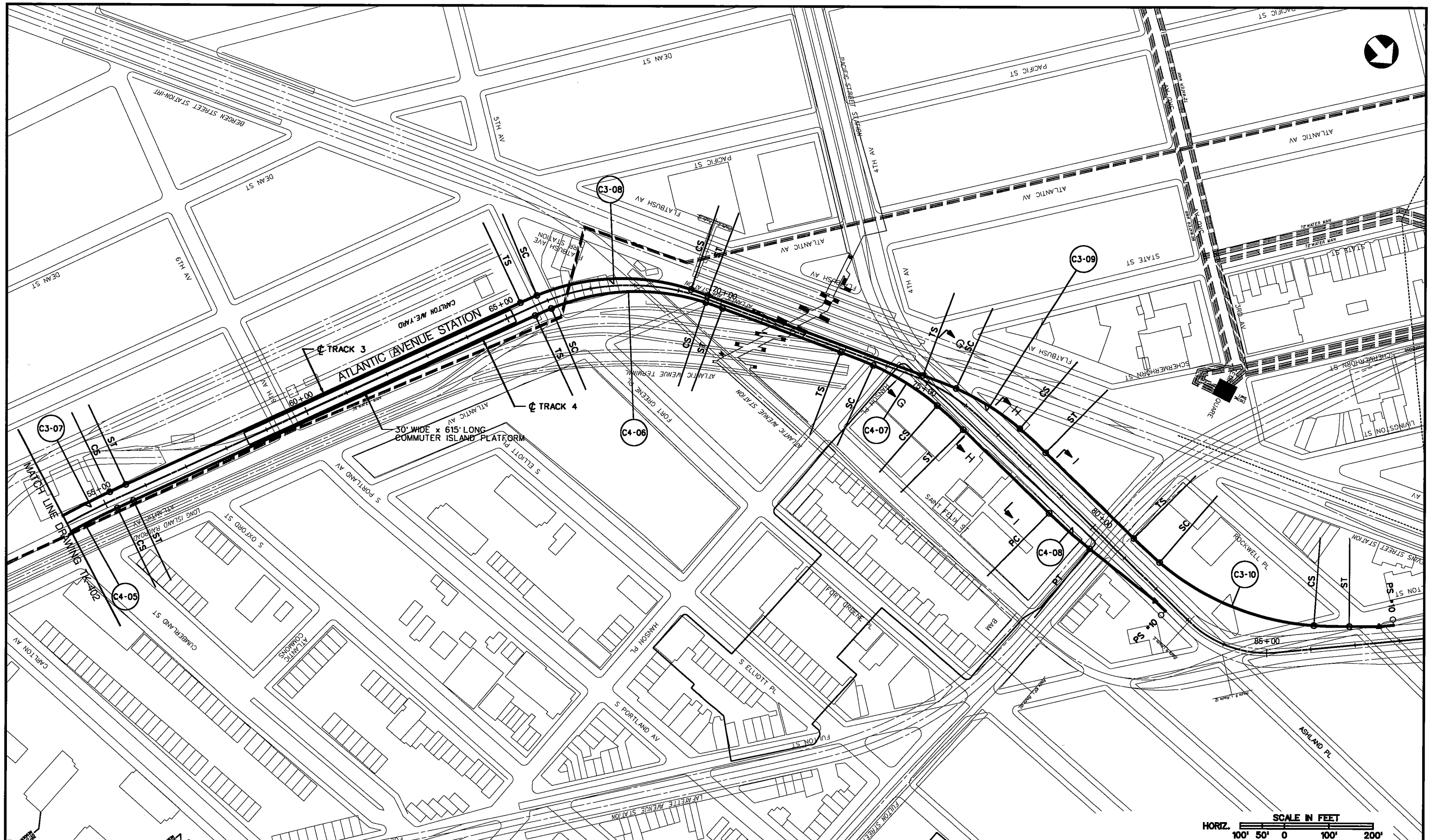
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE
PLAN AND PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: CMCTK404	ISSUE FINAL
DRAWING No.: TK-404	SHEET No. 6 OF 12
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS

SYSTRA ENGINEERING

A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation

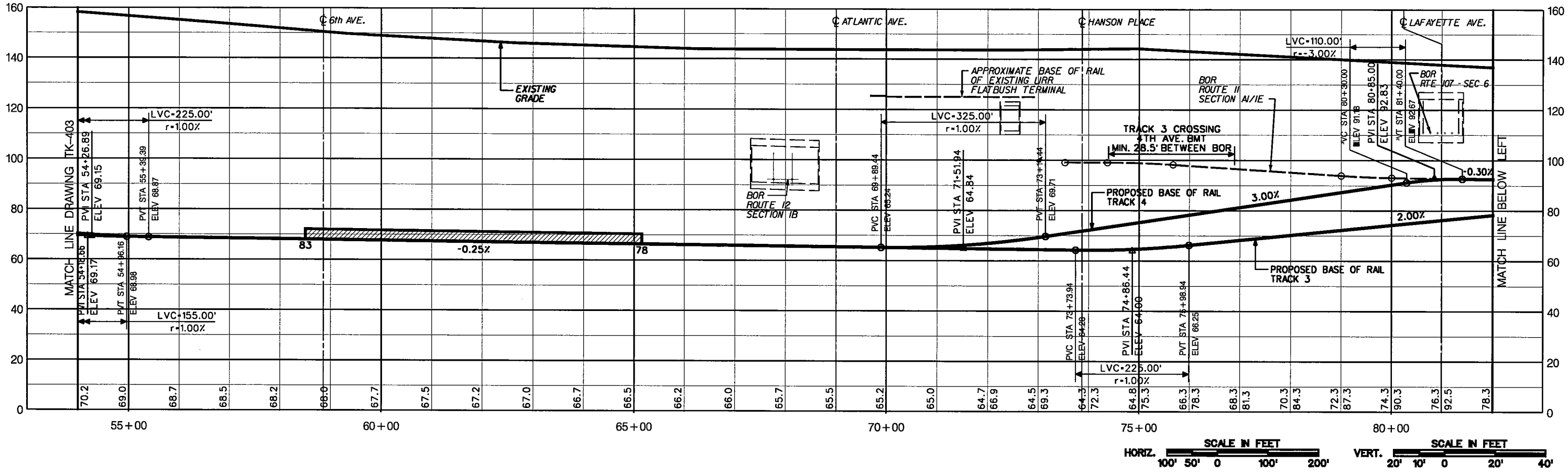
New York City Economic Development Corporation

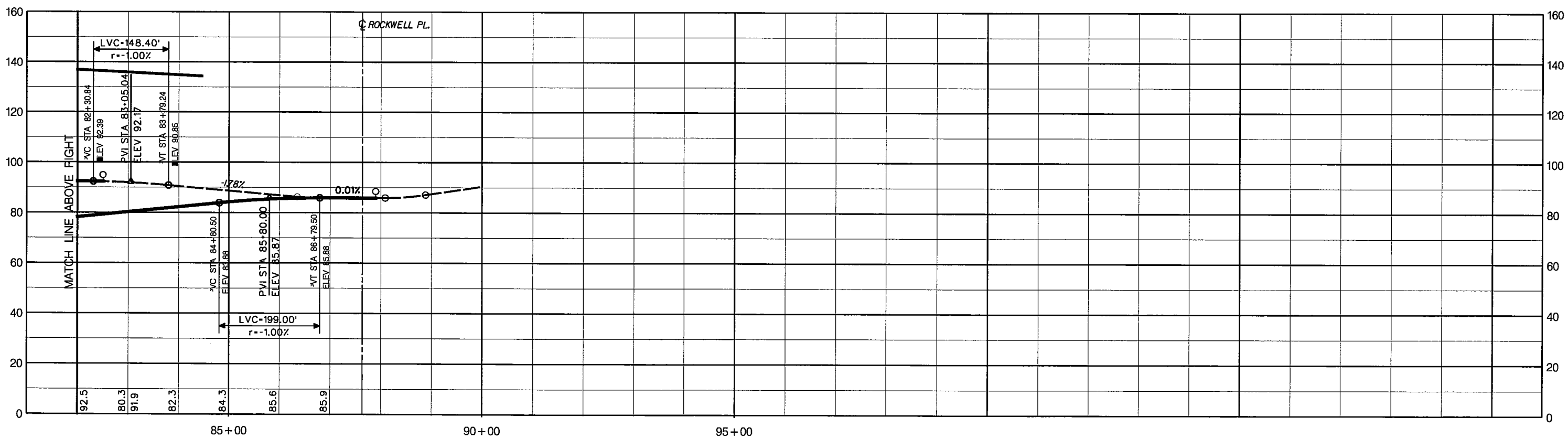
Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE
PLAN

SCALE: 1" = 100'	CONTRACT No.
FILE NAME: CMCTK405	ISSUE FINAL
DRAWING No.: TK-405	SHEET No. 7 OF 12
DATE: 23 APR 04	





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
ATLANTIC BRANCH TO FOURTH AVENUE LINE AND FULTON LINE
PROFILE

SCALE: AS NOTED	CONTRACT No.
FILE NAME: CMCTK406	ISSUE FINAL
DRAWING No.: TK-406	SHEET No. 8 OF 12
DATE: 23 APR 04	

TRACK 1

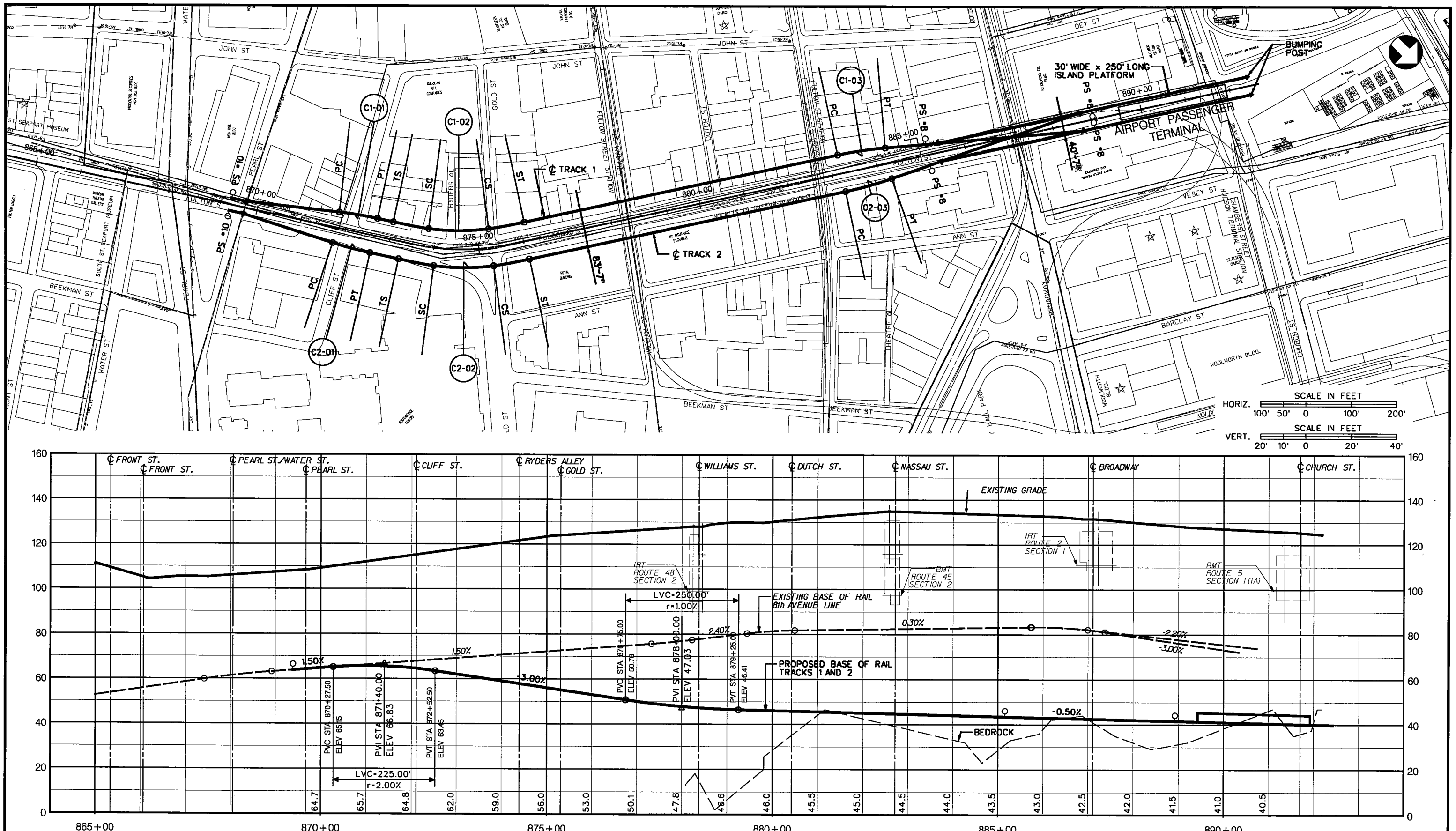
CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C1-01	TK-408	05-43-29	06-44-26	850.00	42.50	84.93	0	0	4.00	29
C1-02	TK-408	24-28-02	11-27-33	500.00	67.16	133.52	80.00	2	4.00	27
C1-02	TK-408	07-09-10	06-44-26	850.00	53.13	106.11	0	0	4.00	29

TRACK 2

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
C2-01	TK-408	05-43-29	06-44-26	850.00	42.50	84.93	0	0	4.00	29
C2-02	TK-408	24-28-02	11-27-33	500.00	67.16	133.52	80.00	2	4.00	27
C2-03	TK-408	07-09-10	06-44-26	850.00	53.13	106.11	0	0	4.00	29

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE Eu = 4". PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 40 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
LOWER MANHATTAN AIR TRAIN TERMINAL
PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: CMCTK408
DRAWING No.: TK-408
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 10 OF 12

TRACK J1

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)	Ls (FEET)
J1-01	TK-301	03-37-58	04-46-29	1200.00	38.06	76.09	0	3.00	30	0.00
J1-02	TK-301	00-58-56	01-38-13	3500.00	30.00	60.00	0	3.00	51	0.00

TRACK J3

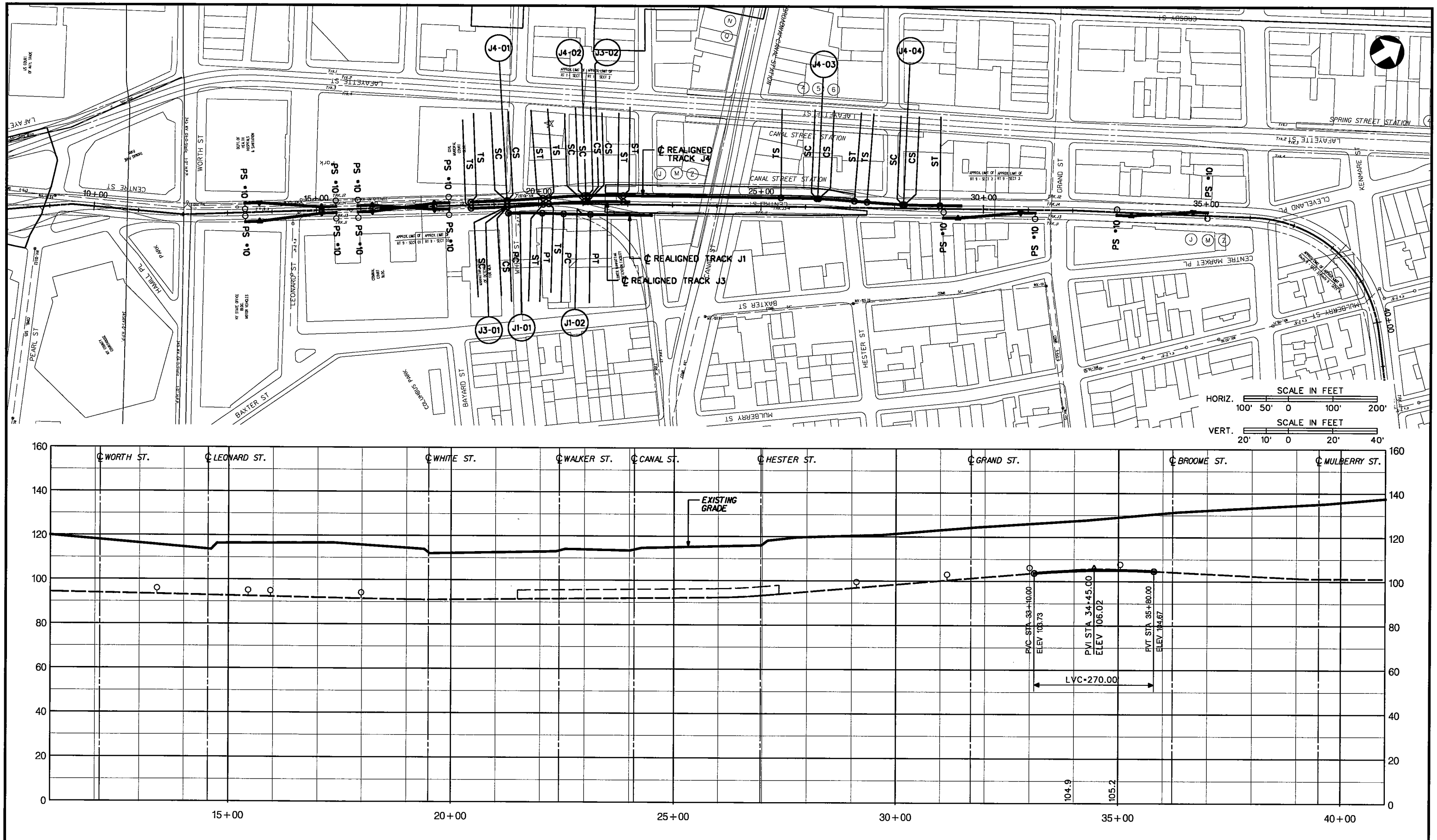
CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)	Ls (FEET)
J3-01	TK-301	00-03-22	02-51-53	2000.00	0.98	1.96	2	3.00	50	80.00
J3-02	TK-301	00-24-54	05-43-46	1000.00	3.62	7.24	2	3.00	35	80.00

TRACK J4

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)	Ls (FEET)
J4-01	TK-301	00-03-31	02-51-53	2000.00	1.02	2.04	2	3.00	50	80.00
J4-02	TK-301	00-25-02	05-43-46	1000.00	3.64	7.28	2	3.00	35	80.00
J4-03	TK-301	00-12-36	04-32-50	1260.00	2.31	4.62	2	3.00	40	80.00
J4-04	TK-301	00-12-36	04-32-50	1260.00	2.31	4.62	2	3.00	40	80.00

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE Eu = 3". PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE FULL LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE OF 1 INCH IN 40 FEET.
3. ACTUAL SUPERELEVATION HAS BEEN DEVELOPED BASED UPON A CONSIDERATION OF EXPECTED SPEEDS AS INFLUENCED BY SPECIAL TRACKWORK, STATION LOCATIONS AND GRADES.
4. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
5. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
CANAL STREET STATION MODIFICATIONS
PLAN AND PROFILE

SCALE: AS NOTED
FILE NAME: CMCTK410
DRAWING No.: TK-410
DATE: 23 APR 04

CONTRACT No.
ISSUE: FINAL
SHEET No. 12 OF 12

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

JAMAICA STATION - NYCT ALTERNATIVES

DATE: APRIL 23, 2004

EXHIBIT 5A

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ
PARSONS SYSTRA ENGINEERING
A Joint Venture
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

TRACK 1

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
T1-1	TK-502A	01-14-23	0-34-23	10000.00	83.68	218.58	0	0	2.00	68
T1-2	TK-502A	14-35-04	04-46-29	1200.00	201.11	210.49	95	2.00	4.00	42
T1-3	TK-502A	09-36-23	04-46-29	1200.00	130.85	141.20	60	1.50	4.00	41
T1-4	TK-503A	03-34-47	04-46-29	1200.00	37.50	74.98	0	0	2.00	23
T1-5	TK-504A	04-48-52	03-49-11	1500.00	63.06	126.04	0	0	2.00	26

TRACK 2

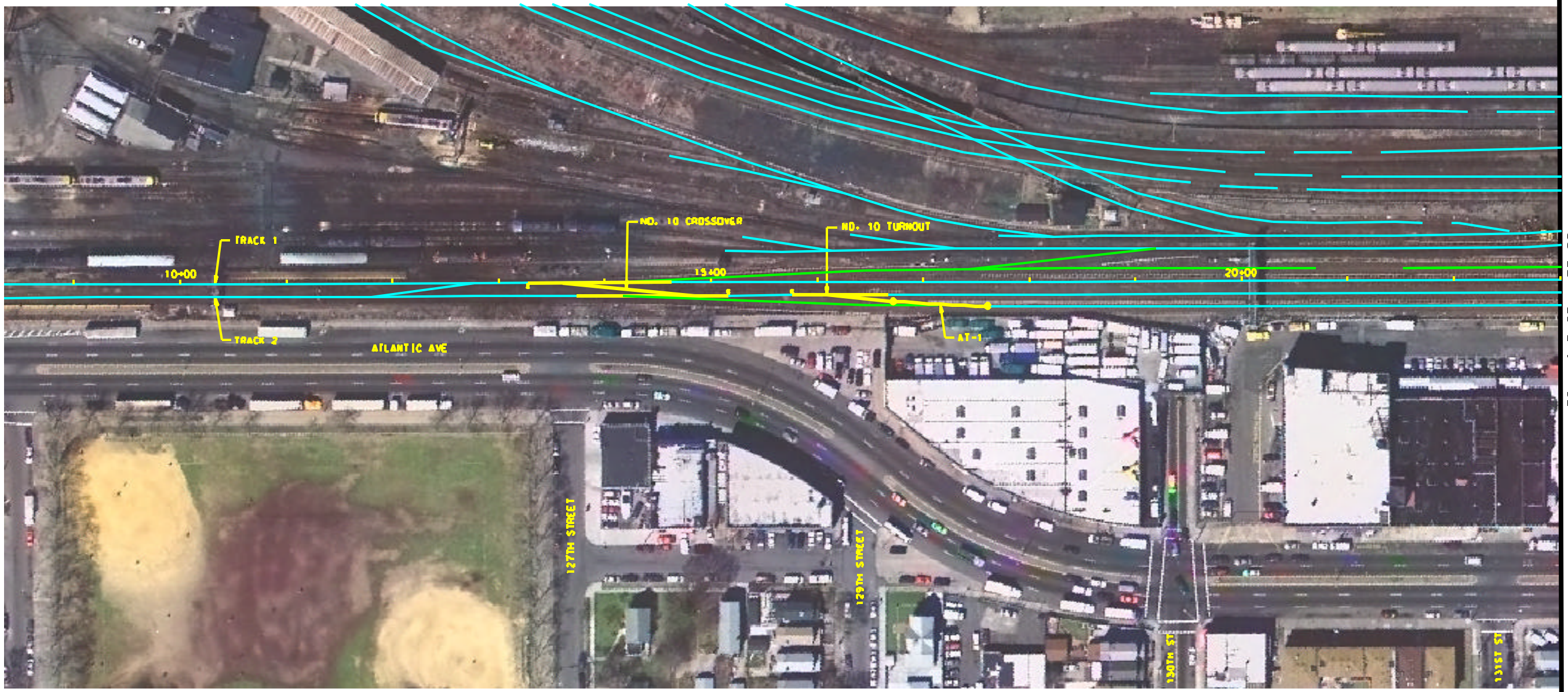
CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
T2-1	TK-502A	13-07-24	02-43-42	2100.00	271.56	421.00	60	1.50	4.00	54
T2-2	TK-503A	12-58-39	04-46-29	1200.00	165.85	141.20	60	1.50	4.00	41
T2-3	TK-503A	03-34-47	04-46-29	1200.00	37.50	74.98	0	0	2.00	23
T2-4	TK-503A	03-14-13	01-54-35	3000.00	84.77	169.49	0	0	2.00	37
T2-5	TK-504A	02-19-36	01-54-35	3000.00	60.92	121.82	0	0	2.00	37

AIR TRAIN CONNECTION

CURVE NO.	DWG. NO.	I (DEG.–MIN.–SEC.)	Dc (DEG.–MIN.–SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
AT-1	TK-501A	04-51-15	05-27-24	1050.00	44.51	88.96	0	0	1.50	20
AT-2	TK-502A	05-46-19	05-27-24	1050.00	52.93	105.78	0	0	2.00	22
AT-3	TK-502A	08-51-53	04-14-39	1350.00	104.64	208.87	0	0	2.00	25
AT-4	TK-502A	20-47-28	04-14-39	1350.00	247.66	489.88	0	0	2.00	25
AT-5	TK-503A	18-23-08	04-14-39	1350.00	218.48	433.20	0	0	2.00	25

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE R, Ea, AND Eu, ARE AS INDICATED. PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE THAT DOES NOT EXCEED 1 INCH IN 40 FEET.
3. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
4. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
Ellotter Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC

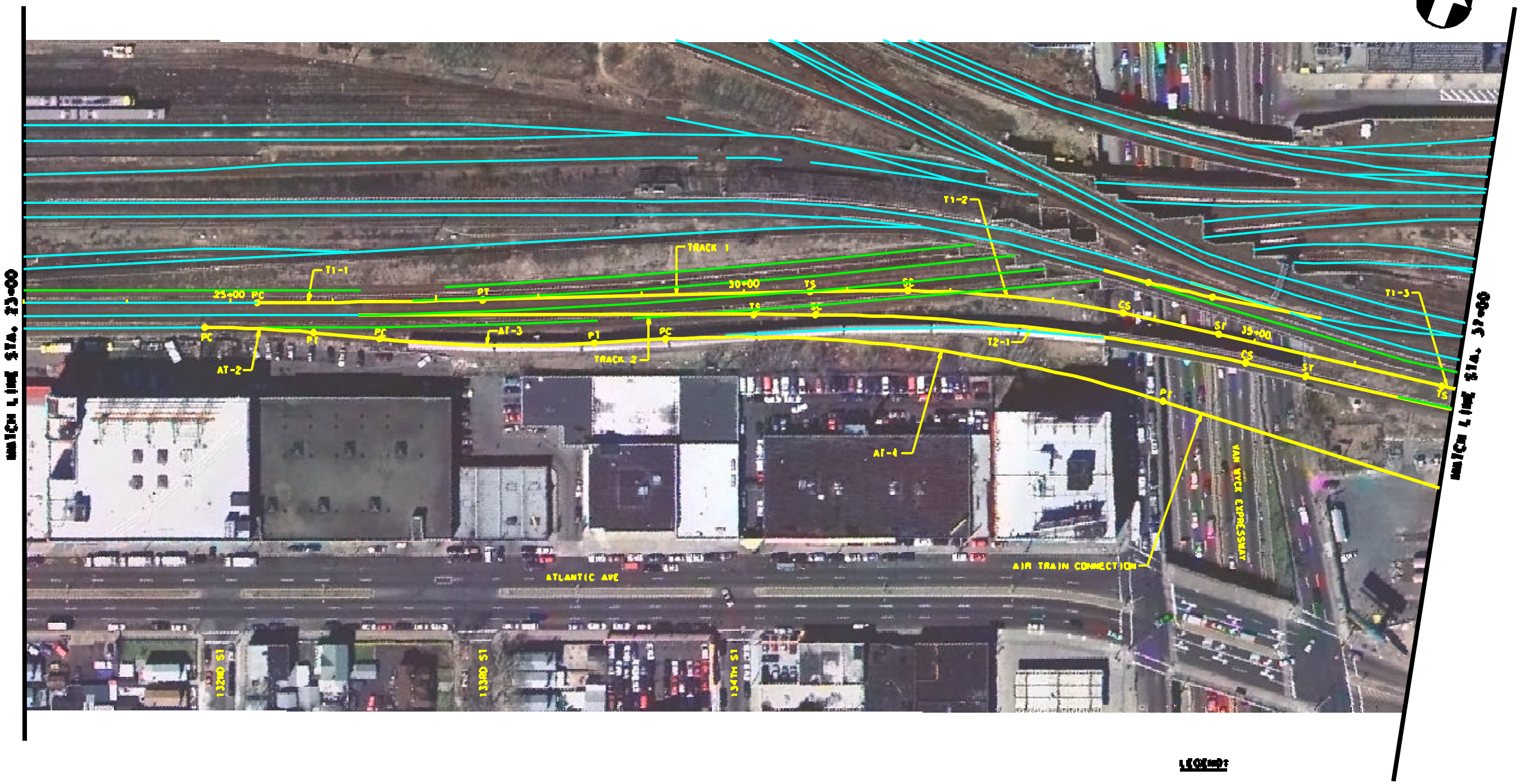
New York City Economic Development Corporation

Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
NYCT ALTERNATIVE

SCALE: 1"=100'	CONTRACT No.
FILE NAME: JAMTKS01A	ISSUE FINAL
DRAWING No.: TK-501A	SHEET No. 2 OF 5
DATE: 28 APR 04	



LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
Ellotter Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC

New York City Economic Development Corporation

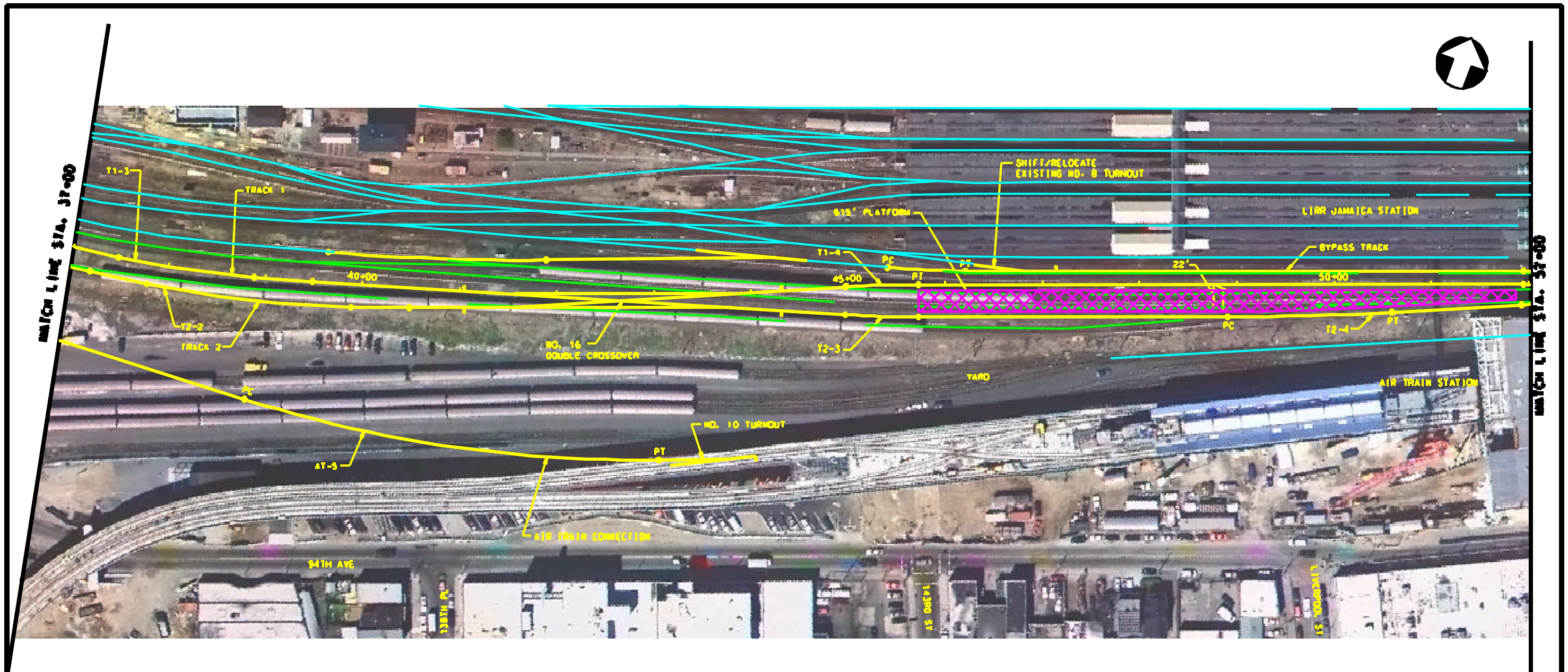
Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
NYCT ALTERNATIVE

SCALE: 1"=100'
FILE NAME: JAMTK502A
DRAWING No.: TK-502A
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 3 OF 5



LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS BRINCKERHOFF SYSTRA
A Joint Venture

The Louis Berger Group
Ellotser Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

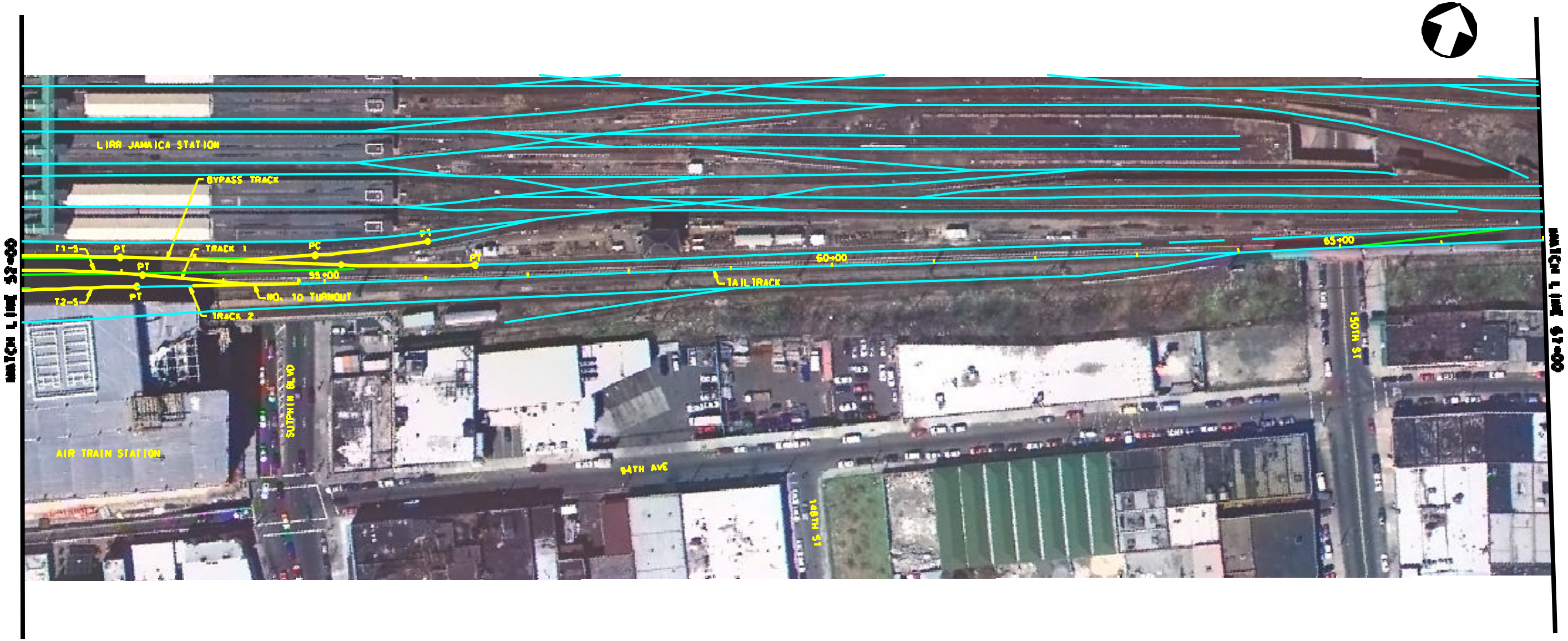
DATE:	REVISIONS	No.

LMDC
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
NYCT ALTERNATIVE

SCALE: 1"=100'
FILE NAME: JAMTKS03A
DRAWING No.: TK-S03A
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 4 OF 5



LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
Ci Tower Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC

New York City Economic Development Corporation

Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
NYCT ALTERNATIVE

SCALE:	1"=100'
FILE NAME:	JAMITKS04A
DRAWING No.:	TK-S04A
DATE:	28 APR 04
CONTRACT No.	
ISSUE	FINAL
SHEET No.	5 OF 5

LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS BRINCKERHOFF SYSTRA
A Joint Venture

The Louis Berger Group
Ellotser Collaborative, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
NYCT ALTERNATIVE

SCALE: 1"=100'	CONTRACT No.
FILE NAME: JAMTKS05A	ISSUE FINAL
DRAWING No.: TK-S05A	SHEET No. 6 OF 6
DATE: 23 APR 04	

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

JAMAICA STATION - LIRR ALTERNATIVE

DATE: APRIL 23, 2004

EXHIBIT 5B

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ
PARSONS SYSTRA ENGINEERING A Joint Venture
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

TRACK 1

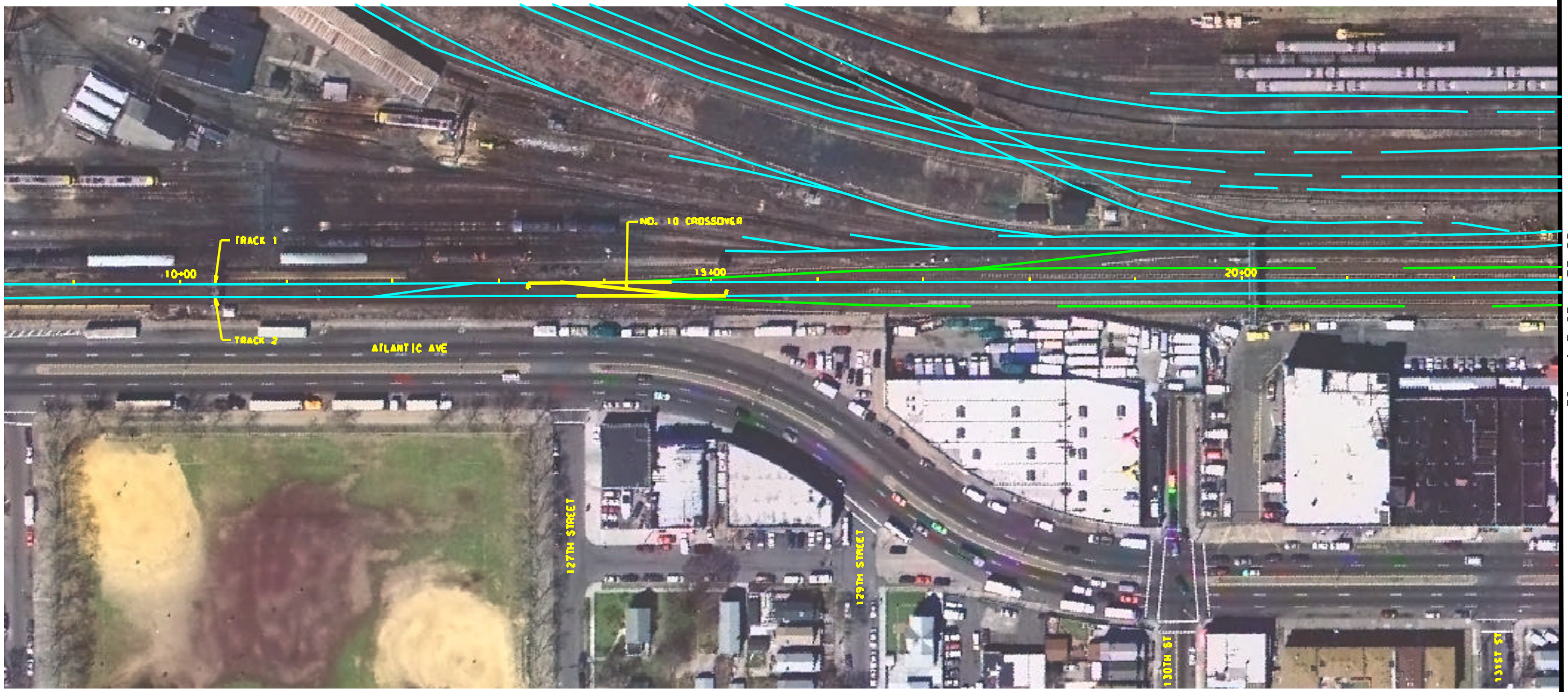
CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
T1-1	TK-502B	01-14-23	0-34-23	10000.00	83.68	218.58	0	0	1.50	61
T1-2	TK-502B	14-35-04	04-46-29	1200.00	201.11	210.49	95	1.50	1.50	30
T1-3	TK-502B	08-01-28	04-46-29	1200.00	131.70	73.09	95	1.50	1.50	30
T1-4	TK-503B	03-49-06	05-27-24	1050.00	35.00	69.97	0	0	1.50	20
T1-5	TK-503B	01-20-37	01-25-57	4000.00	46.90	93.79	0	0	1.50	39
T1-6	TK-504B	01-47-17	00-49-07	7000.00	109.23	250.98	0	0	1.50	51

TRACK 2

CURVE NO.	DWG. NO.	I (DEG.-MIN.-SEC.)	Dc (DEG.-MIN.-SEC.)	Rc (FEET)	Tc (FEET)	Lc (FEET)	Ls (FEET)	Ea (INCHES)	Eu (INCHES)	Vp (MPH)
T2-1	TK-502B	13-07-24	02-43-42	2100.00	271.56	421.00	60	0.50	1.50	32
T2-2	TK-502B	11-38-02	05-27-24	1050.00	106.97	213.20	0	0	1.50	20
T2-3	TK-503B	03-49-06	05-27-24	1050.00	35.00	69.97	0	0	1.50	20
T2-4	TK-503B	01-20-37	01-25-14	4033.33	47.29	94.57	0	0	1.50	39
T2-5	TK-503B	02-51-05	01-25-57	4000.00	99.56	199.07	0	0	1.50	39
T2-6	TK-504B	01-56-28	02-26-17	2350.00	39.81	79.61	0	0	1.50	30

NOTES:

1. $Vp = 0.5\sqrt{R(Ea+Eu)}$, WHERE R, Ea, AND Eu, ARE AS INDICATED. PASSENGER COMFORT LIMITING SPEEDS, Vp, AS SHOWN IN CURVE TABLE REPRESENT THEORETICAL MAXIMUMS.
2. ACTUAL SUPERELEVATION (Ea) WILL BE ATTAINED AND REMOVED LINEARLY THROUGH THE LENGTH OF THE SPIRAL TRANSITION CURVE AT A RATE THAT DOES NOT EXCEED ½INCH IN 31 FEET FOR SPEEDS UP TO AND INCLUDING 50 MPH. FOR SPEEDS 51 TO 70 MPH (INCLUSIVE), THE RATE OF CHANGE DOES NOT EXCEED ⅜INCH IN 31 FEET.
3. DEGREE OF CURVATURE ON THIS SHEET, CALCULATED USING ARC DEFINITION.
4. THESE DRAWINGS DEVELOPED FROM EXISTING MAPPING. NOT TO BE USED FOR CONSTRUCTION.



LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
Ellotter Collaborative, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC

Metropolitan Transportation Authority

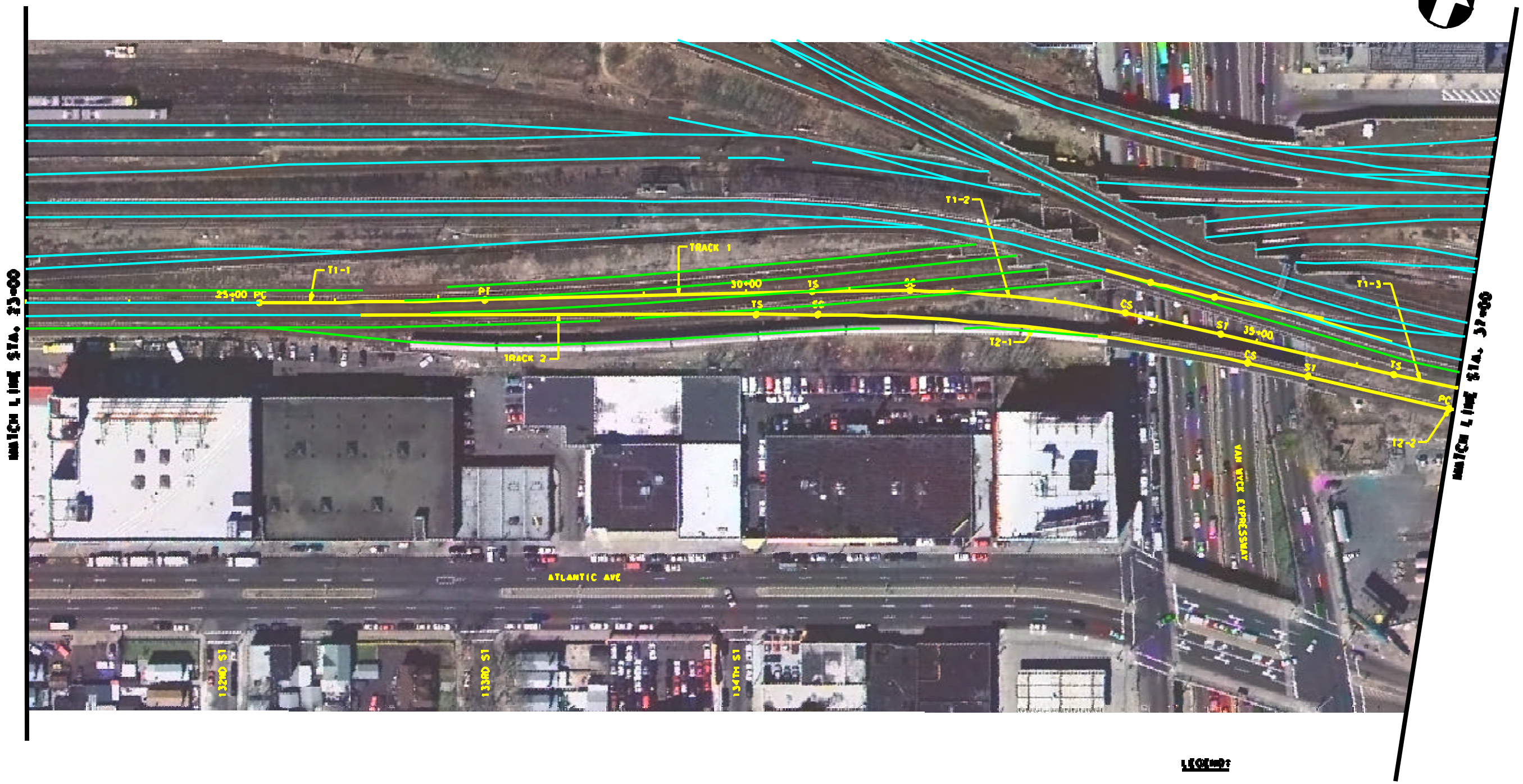
New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
LIRR ALTERNATIVE

SCALE: 1"=100'
FILE NAME: JAMTIK501B
DRAWING No.: TK-501B
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 2 OF 5



LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
Ellotter Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC

New York City Economic Development Corporation

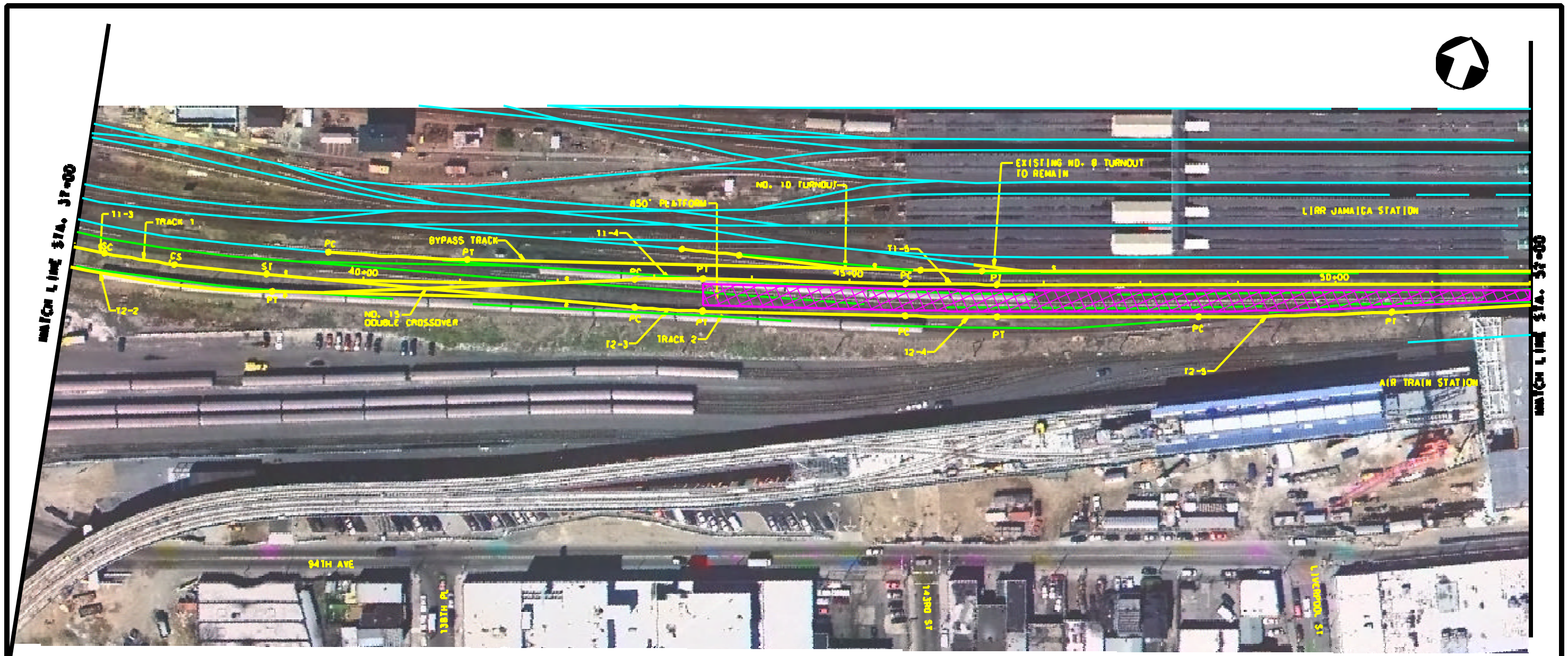
Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
LIRR ALTERNATIVE

SCALE: 1"=100'
FILE NAME: JAMTK502B
DRAWING No.: TK-502B
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 3 OF 5



LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
Ellotter Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC

New York City Economic Development Corporation

Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
LIRR ALTERNATIVE

SCALE: 1"=100'
FILE NAME: JAMTK5C03B
DRAWING No.: TK-503B
DATE: 23 APR 04

CONTRACT No.

ISSUE FINAL

SHEET No. 4 OF 5

LEGEND:

- PROPOSED
- EXISTING
- EXISTING TO BE REMOVED

SCALE : 1" = 100' 100 50 0 100

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
Ellotter Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC

New York City Economic Development Corporation

Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

JAMAICA STATION
LIRR ALTERNATIVE

SCALE: 1"=100'	CONTRACT No.
FILE NAME: JAMTK504B	ISSUE FINAL
DRAWING No.: TK-504B	SHEET No. 5 OF 5
DATE: 23 APR 04	

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

CROSS SECTIONS

DATE: APRIL 23, 2004

EXHIBIT 6

LMDC Lower Manhattan Development Corporation

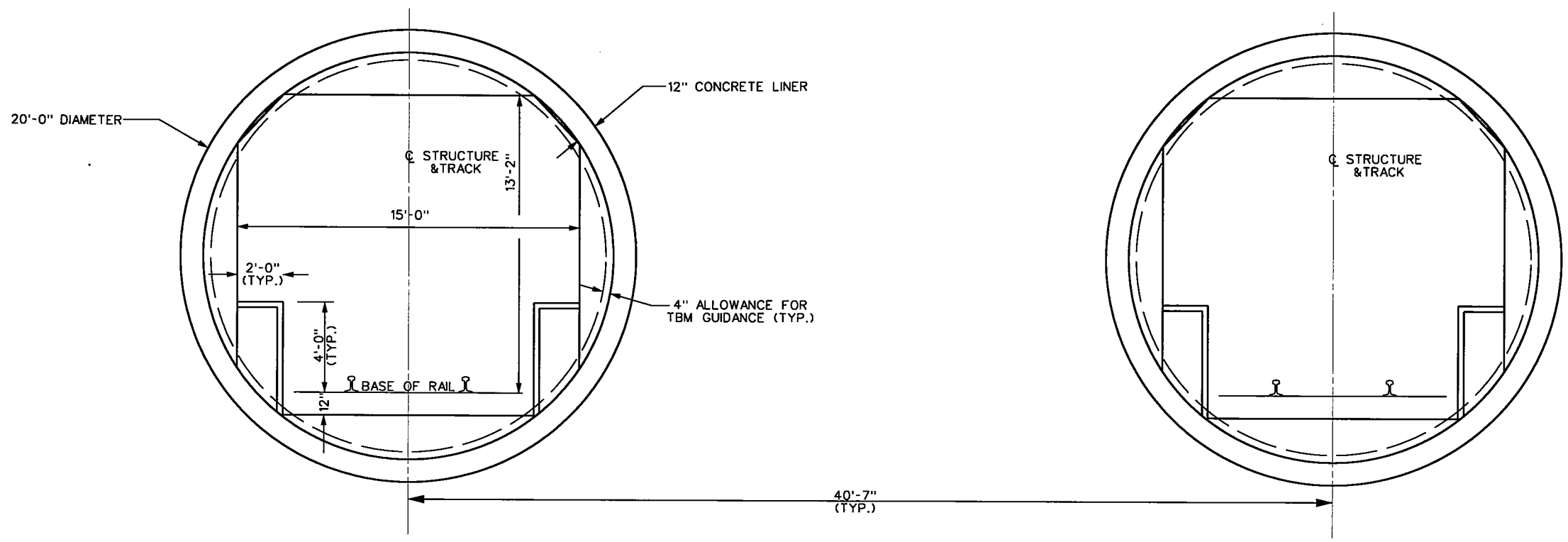
Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense



SECTION A–A

(ROCK TUNNEL BORING MACHINE & EARTH PRESSURE BALANCE MACHINE SECTION)

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

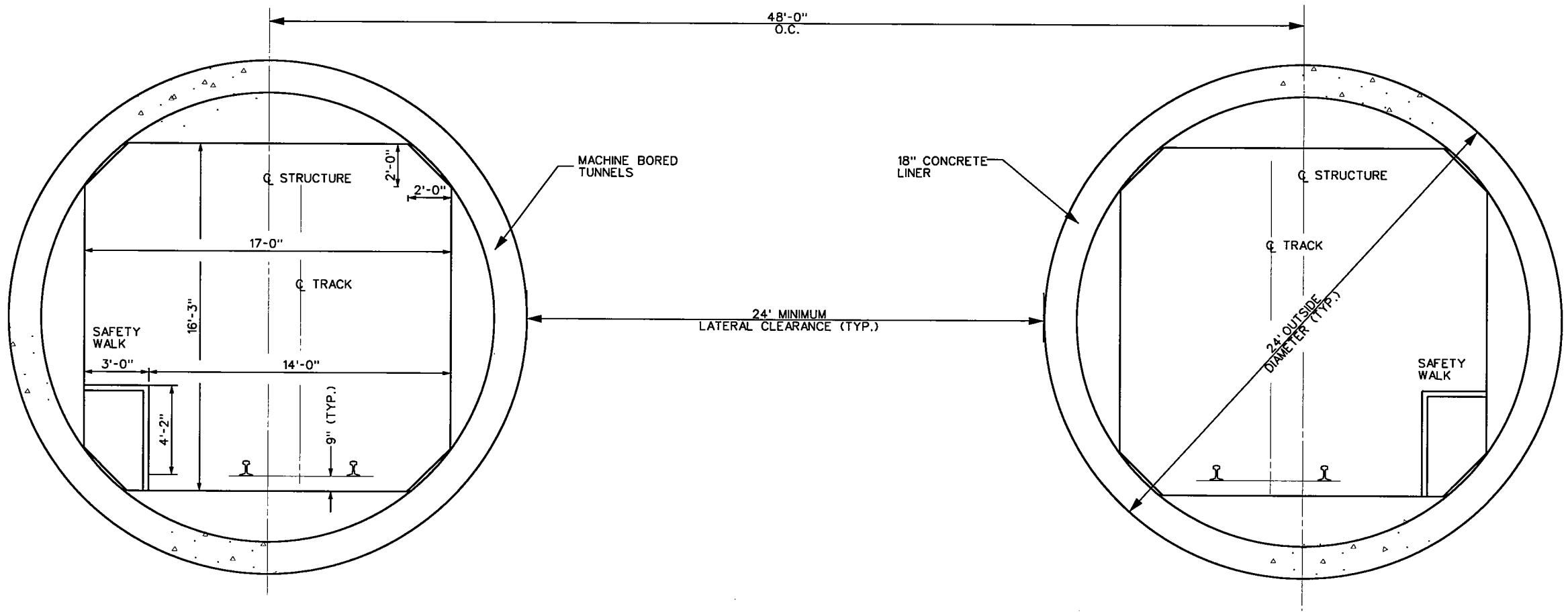
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

SECTION A–A
ROCK TUNNEL BORING MACHINE & EARTH PRESSURE BALANCE MACHINE SECTIONS
(SUBWAY ALTERNATIVE)

SCALE: 1"=6'
FILE NAME: SECTCS001
DRAWING No.: CS-001
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 1 OF 15



SECTION B–B

(ROCK TUNNEL BORING MACHINE & EARTH PRESSURE BALANCE MACHINE SECTION)

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

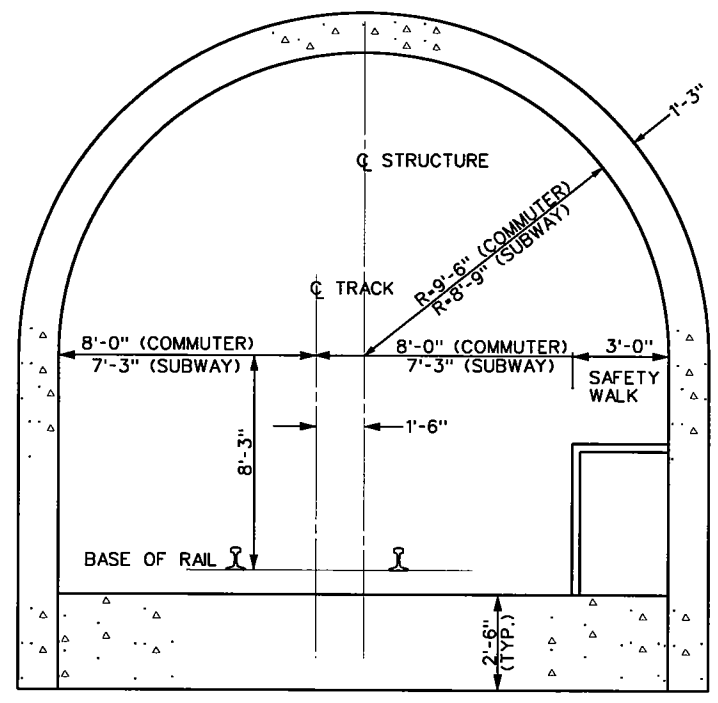
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

SECTION B–B
ROCK TUNNEL BORING MACHINE & EARTH PRESSURE BALANCE MACHINE SECTIONS
(COMMUTER ALTERNATIVE)

SCALE: 1"=6'	CONTRACT No.
FILE NAME: SECTCS002	ISSUE FINAL
DRAWING No.: CS–002	SHEET No. 2 OF 15
DATE: 23 APR 04	



SECTION C–C

ROCK MINED TUNNEL

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation

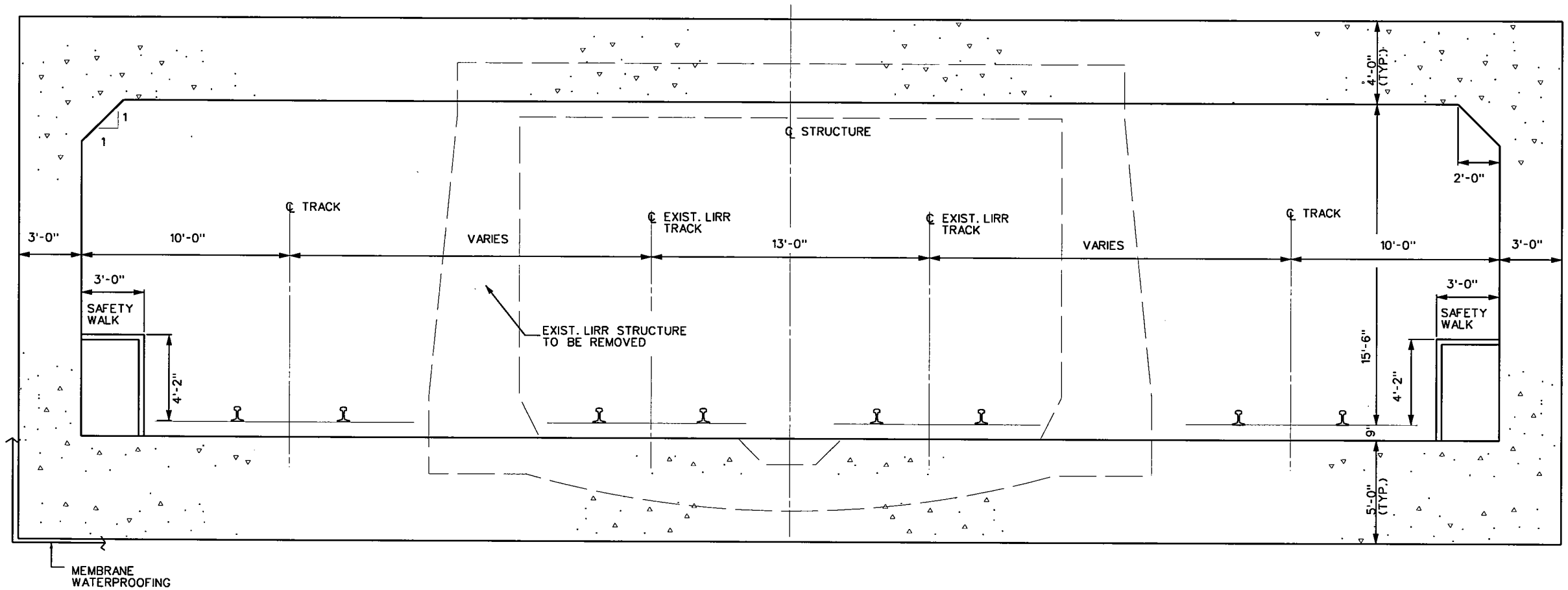
New York City Economic Development Corporation

Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

SECTION C–C
MINED TUNNEL SECTION

SCALE: 1"=6'	CONTRACT No.
FILE NAME: SECTCS003	ISSUE FINAL
DRAWING No.: CS-003	SHEET No. 3 OF 15
DATE: 23 APR 04	



SECTION D–D

(LIRR ATLANTIC AVE. FOUR TRACK TUNNEL)

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation

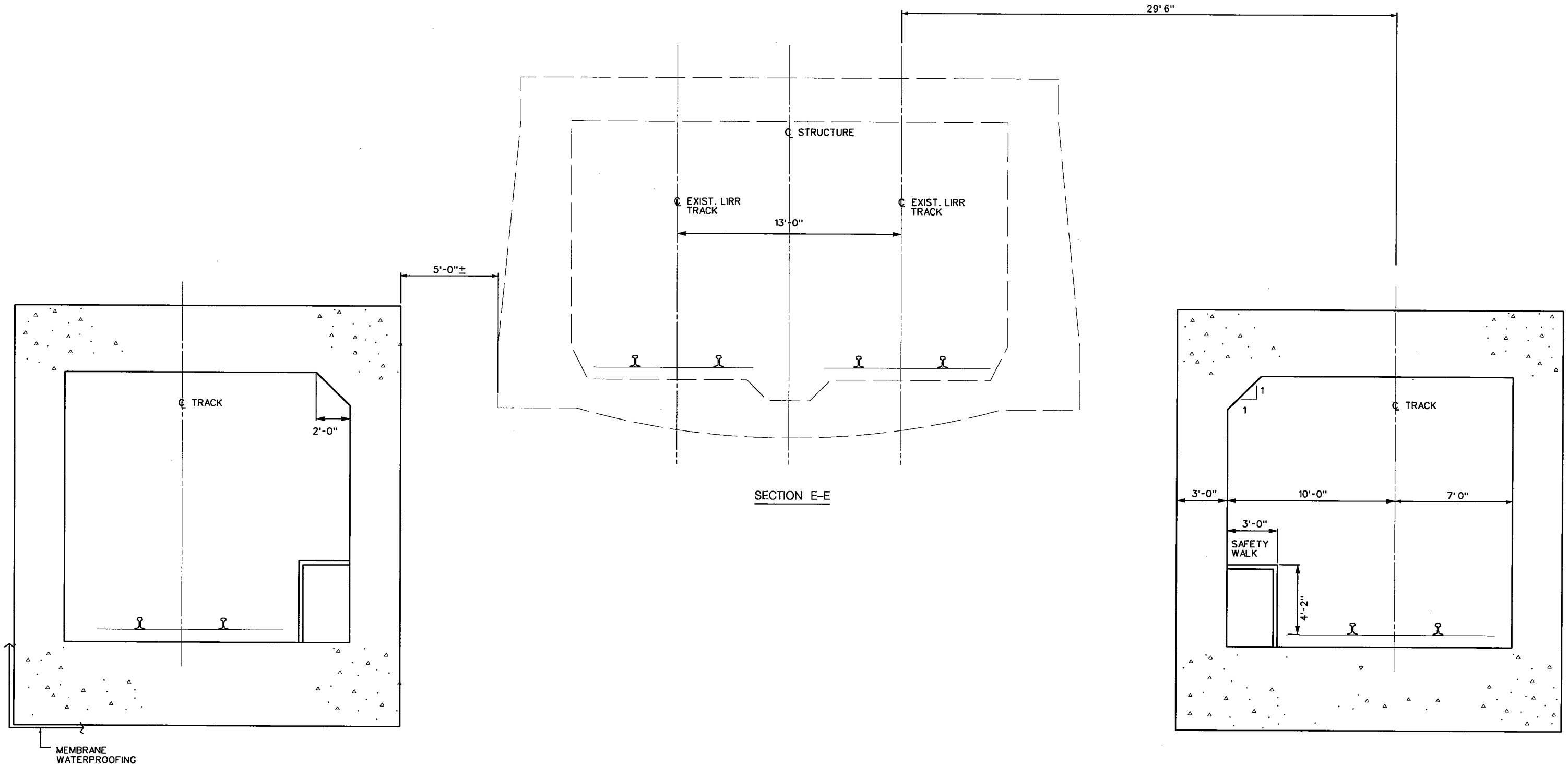
New York City Economic Development Corporation

Metropolitan Transportation Authority

THE PORT AUTHORITY OF NY & NJ

SECTION D–D
LIRR ATLANTIC AVENUE TUNNEL SECTION

SCALE: 1" = 6'	CONTRACT No.
FILE NAME: SECTCS004	ISSUE FINAL
DRAWING No.: CS–004	SHEET No. 4 OF 15
DATE: 23 APR 04	



SECTION E–E

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

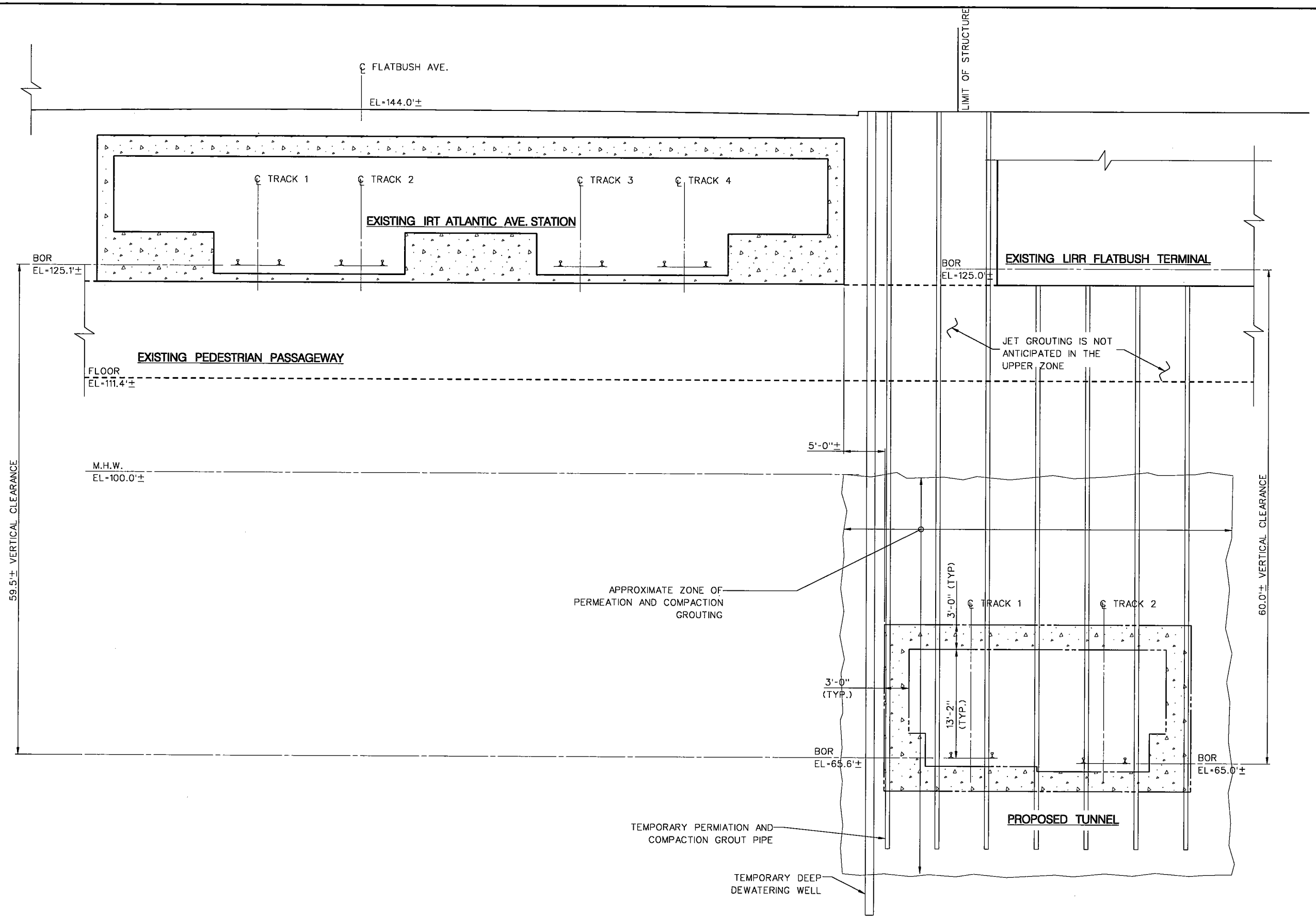
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

SECTION E–E
LIRR ATLANTIC AVENUE TUNNEL SECTION

SCALE: 1"=6'
FILE NAME: SECTCS005
DRAWING No.: CS-005
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 5 OF 15



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

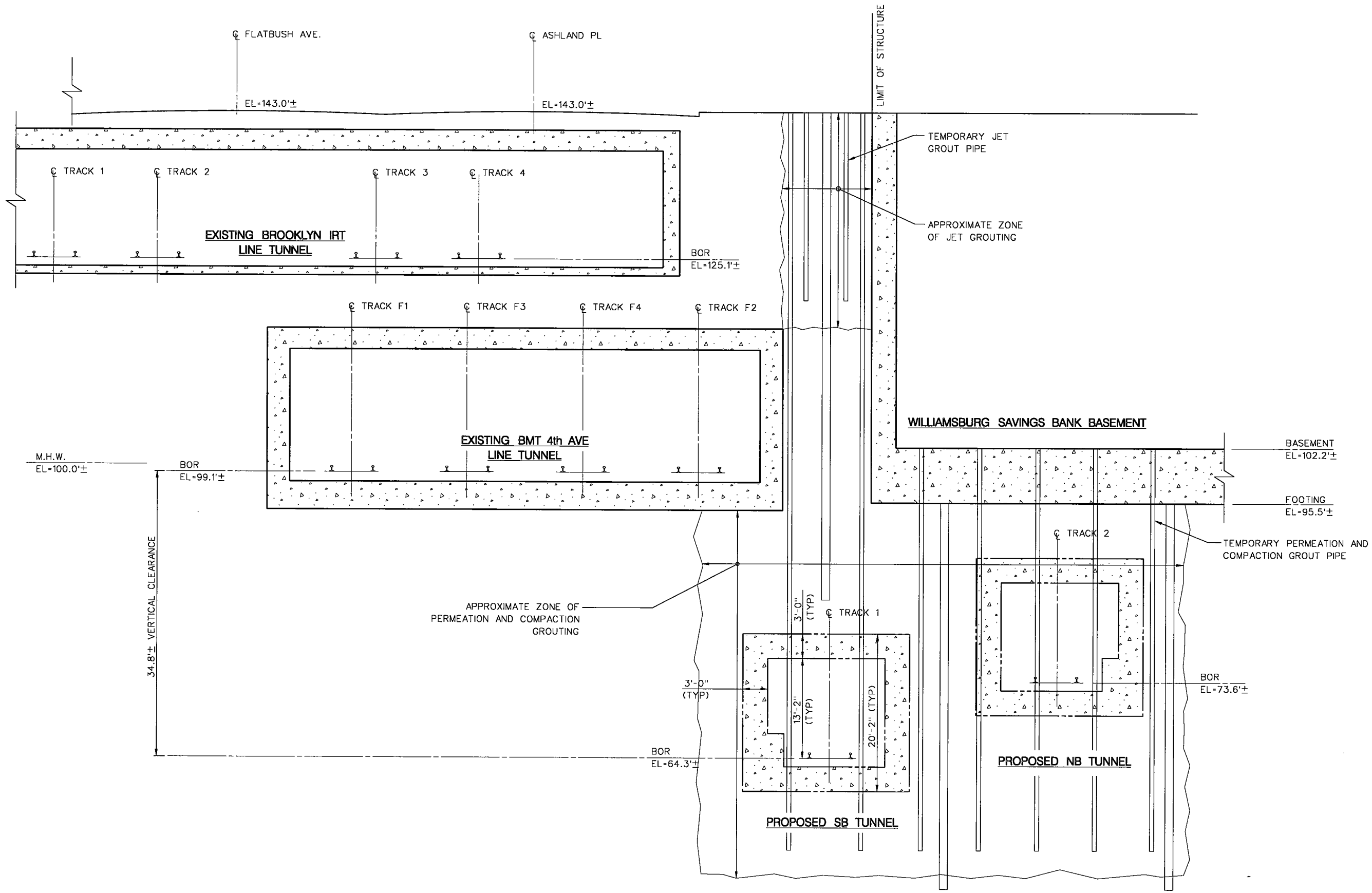
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

SECTION F–F
ATLANTIC BRANCH TO FOURTH AVE. LINE SECTION

SCALE: 1"=12"	CONTRACT No.
FILE NAME: SECTCS006	ISSUE FINAL
DRAWING No.: CS-006	SHEET No.
DATE: 23 APR 04	6 OF 15



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

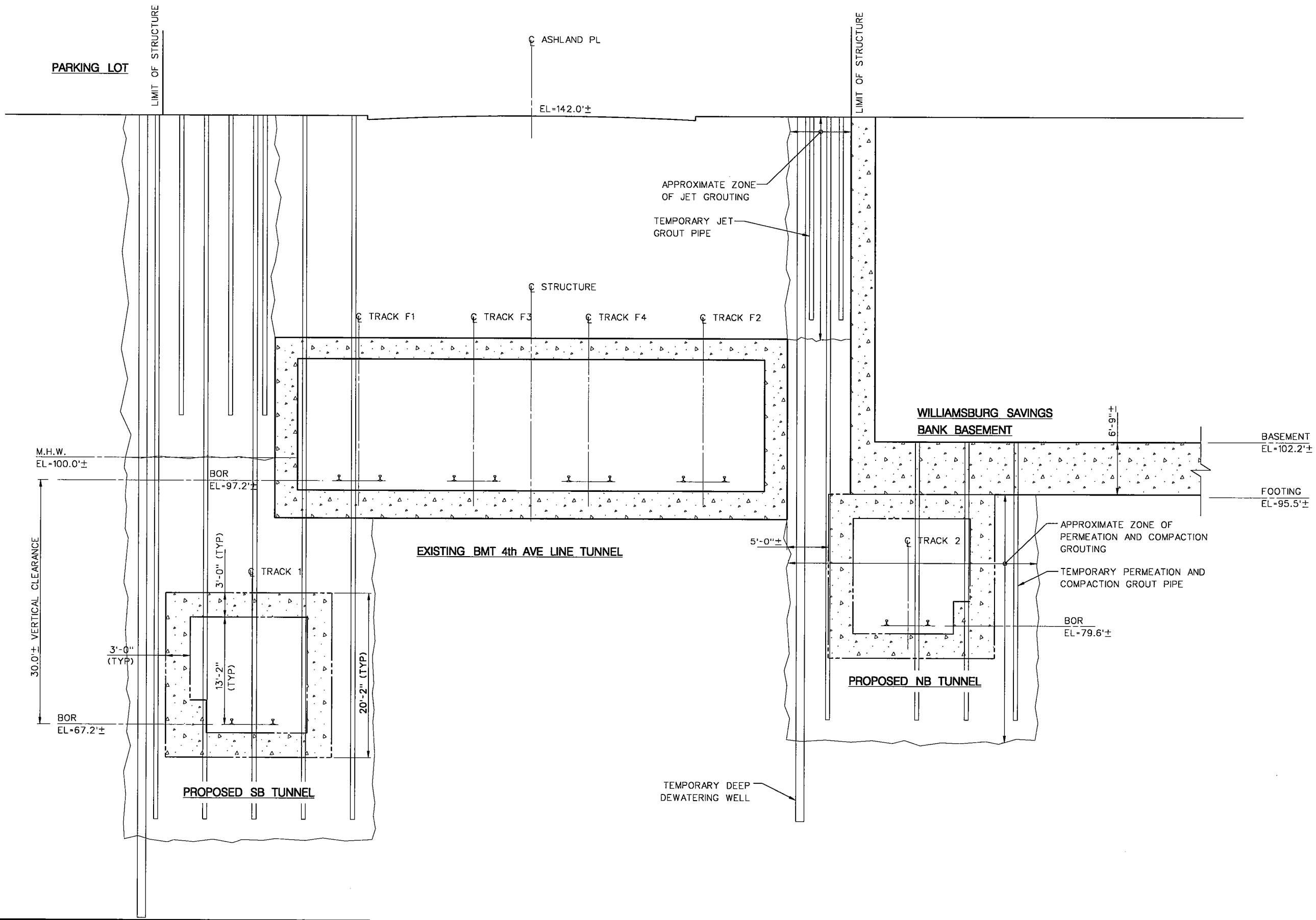
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

SECTION G–G
ATLANTIC BRANCH TO FOURTH AVE. LINE SECTION

SCALE: 1"=12"	CONTRACT No.
FILE NAME: SECTCS007	ISSUE FINAL
DRAWING No.: CS-007	SHEET No. 7 OF 15
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

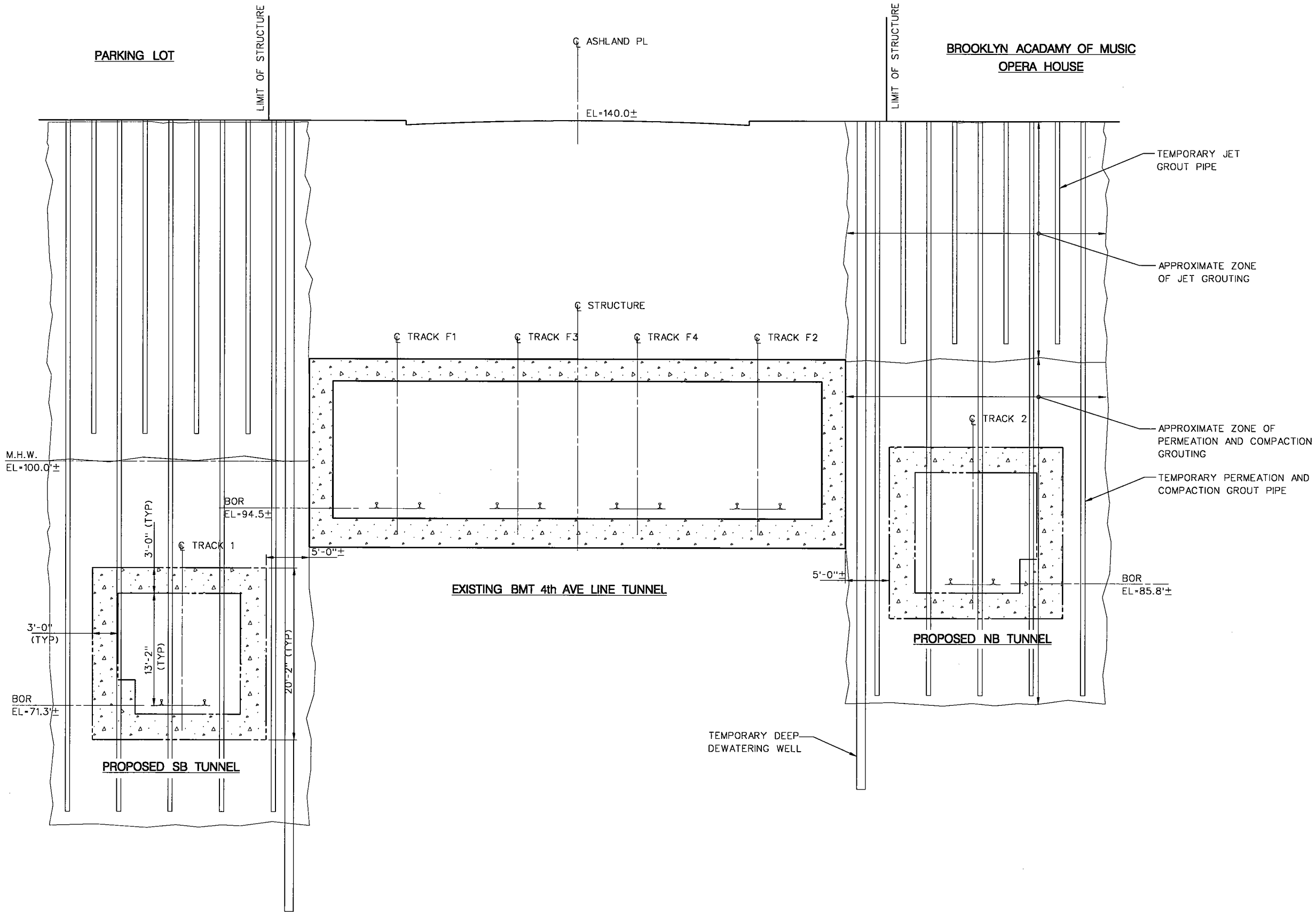
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

SECTION H–H
ATLANTIC BRANCH TO FOURTH AVE. LINE SECTION

SCALE: 1"=12"	CONTRACT No.
FILE NAME: SECTCS008	ISSUE FINAL
DRAWING No.: CS–008	SHEET No.
DATE: 23 APR 04	8 OF 15



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS
SYSTRA ENGINEERING
A Joint Venture

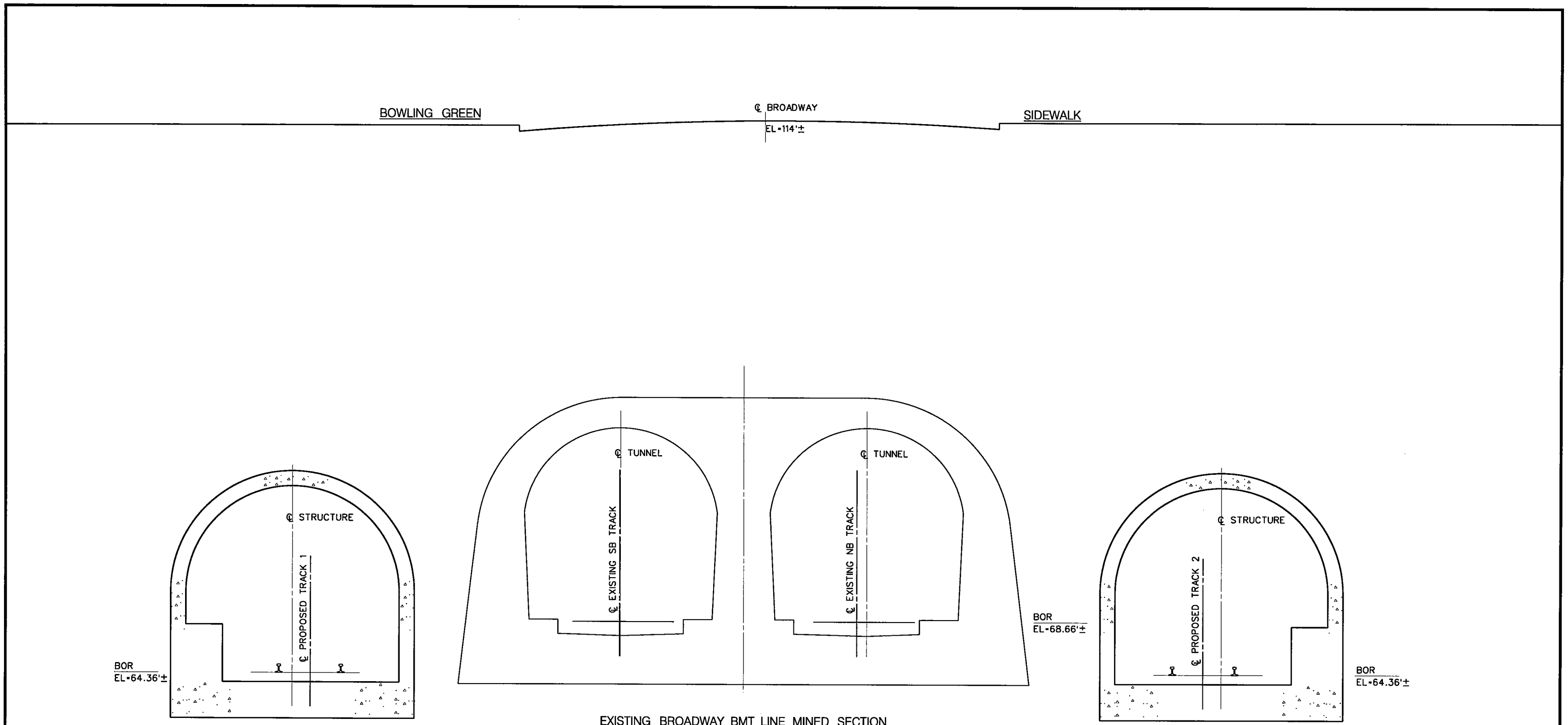
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

SECTION I-I
ATLANTIC BRANCH TO FOURTH AVE. LINE SECTION

SCALE: 1"=12"	CONTRACT No.
FILE NAME: SECTCS009	ISSUE FINAL
DRAWING No.: CS-009	SHEET No. 9 OF 15
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

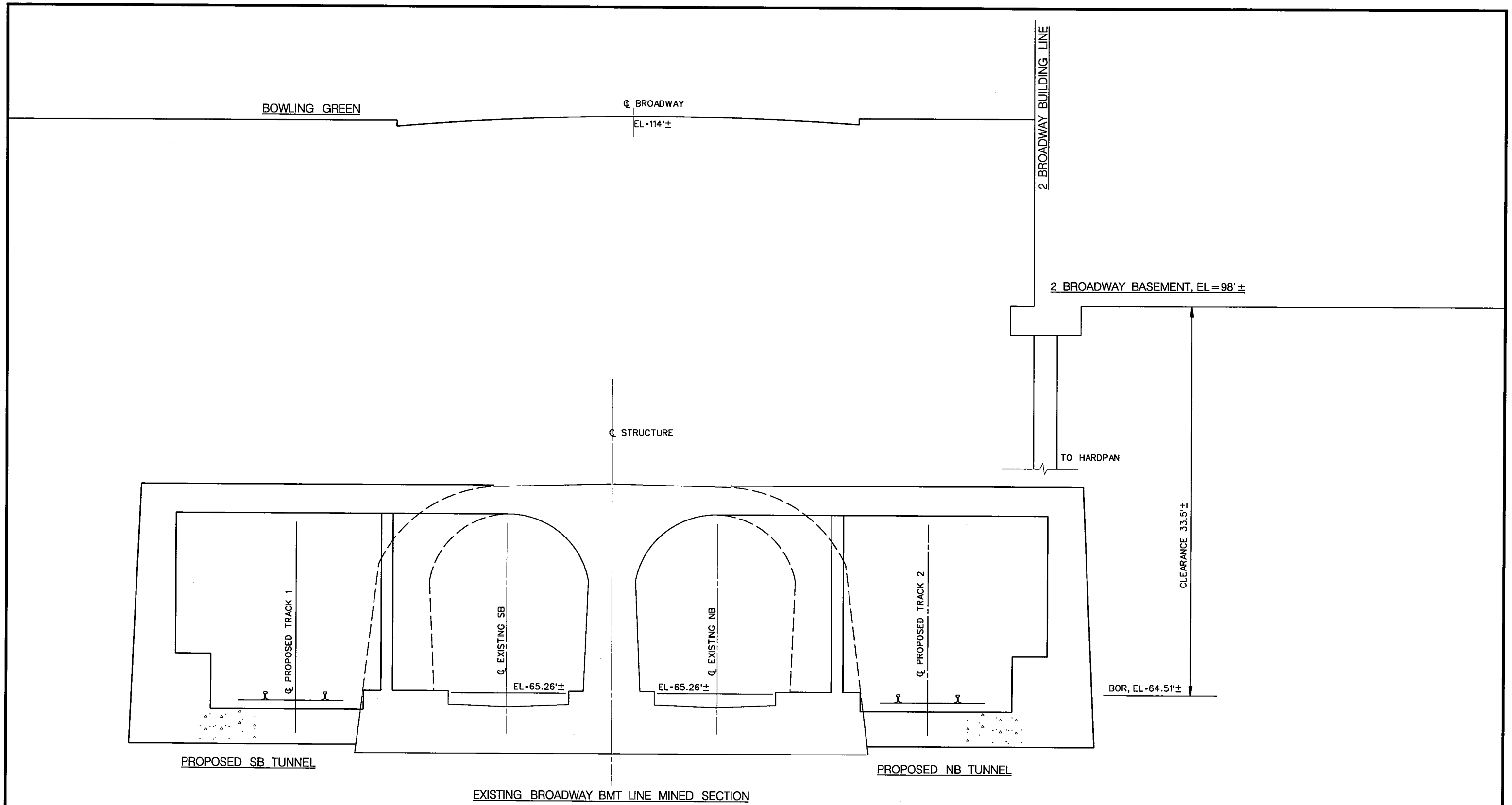
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

SECTION J–J
LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE
(MONTAGUE ALTERNATIVE)

SCALE: N.T.S.	CONTRACT No.
FILE NAME: SECTCS010	ISSUE FINAL
DRAWING No.: CS–010	SHEET No. 10 OF 15
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

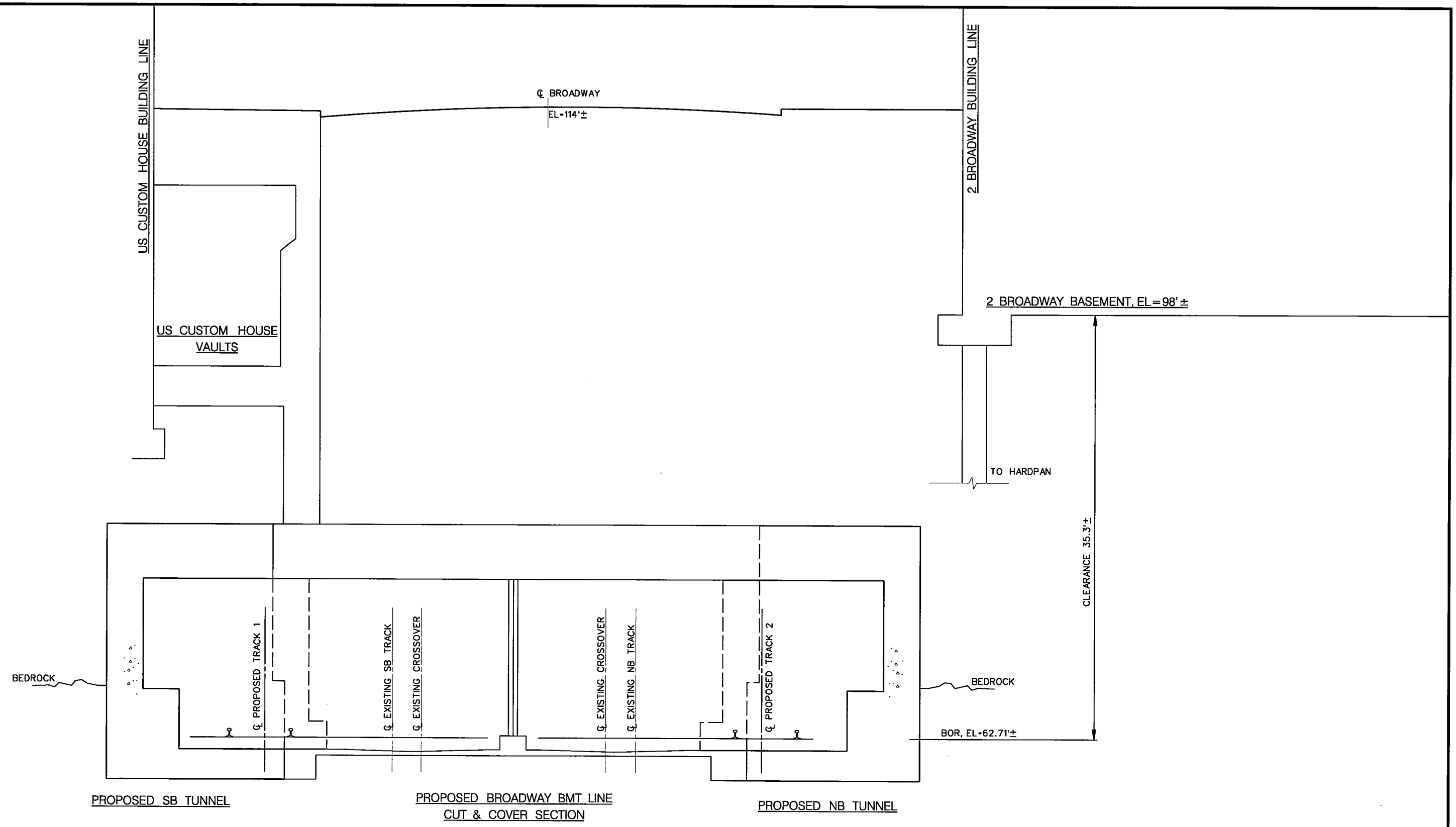
DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

SECTION K–K
LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE
(MONTAGUE ALTERNATIVE)

SCALE: N.T.S.
FILE NAME: SECTCS011
DRAWING No.: CS–011
DATE: 23 APR 04

CONTRACT No.
ISSUE FINAL
SHEET No. 11 OF 15



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

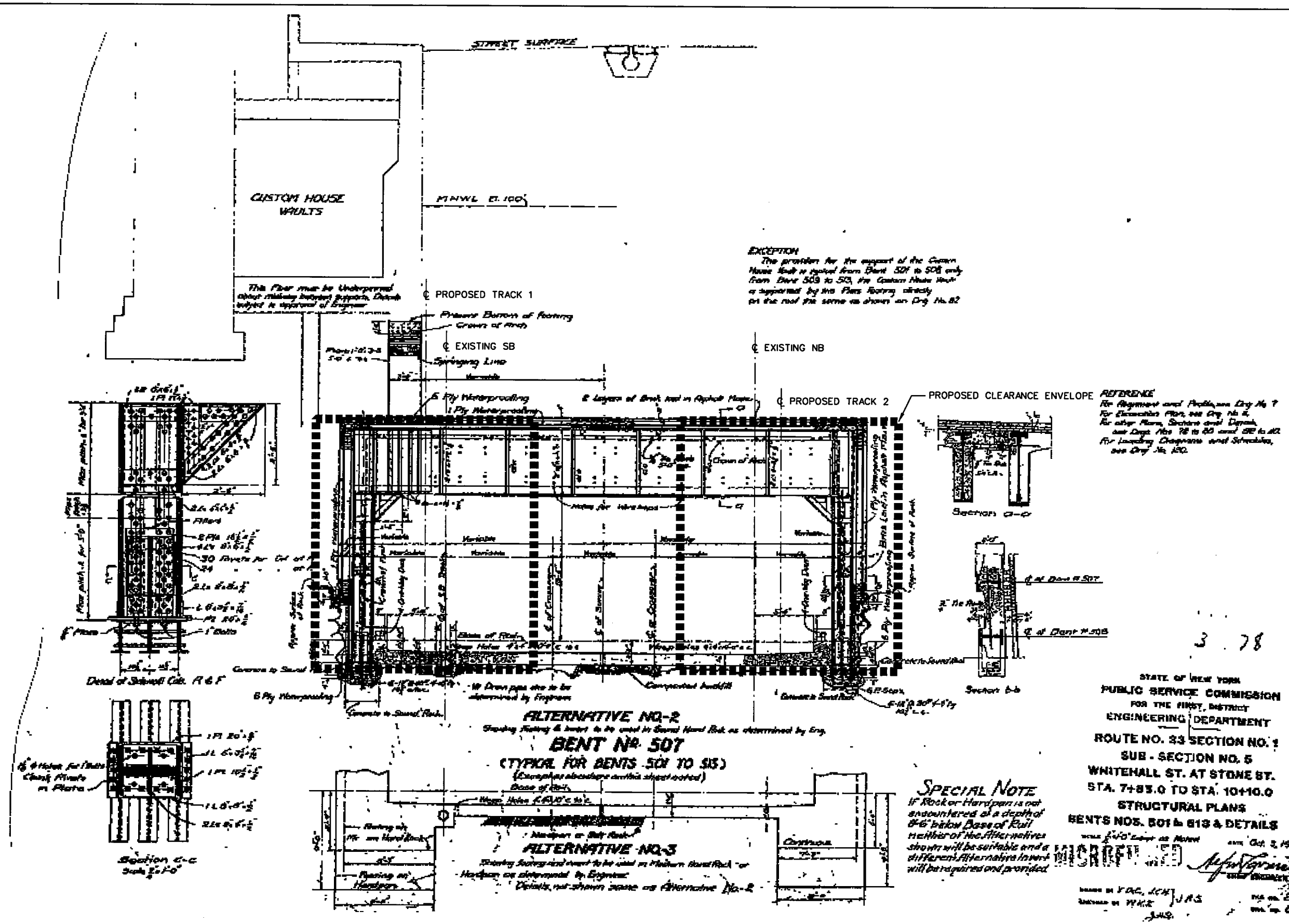
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

SECTION L–L
LOWER MANHATTAN TERMINAL BREAKOUT FROM BROADWAY LINE
(MONTAGUE ALTERNATIVE)

SCALE: N.T.S.	CONTRACT No.
FILE NAME: SECTCS012	ISSUE FINAL
DRAWING No.: CS–012	SHEET No. 12 OF 15
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

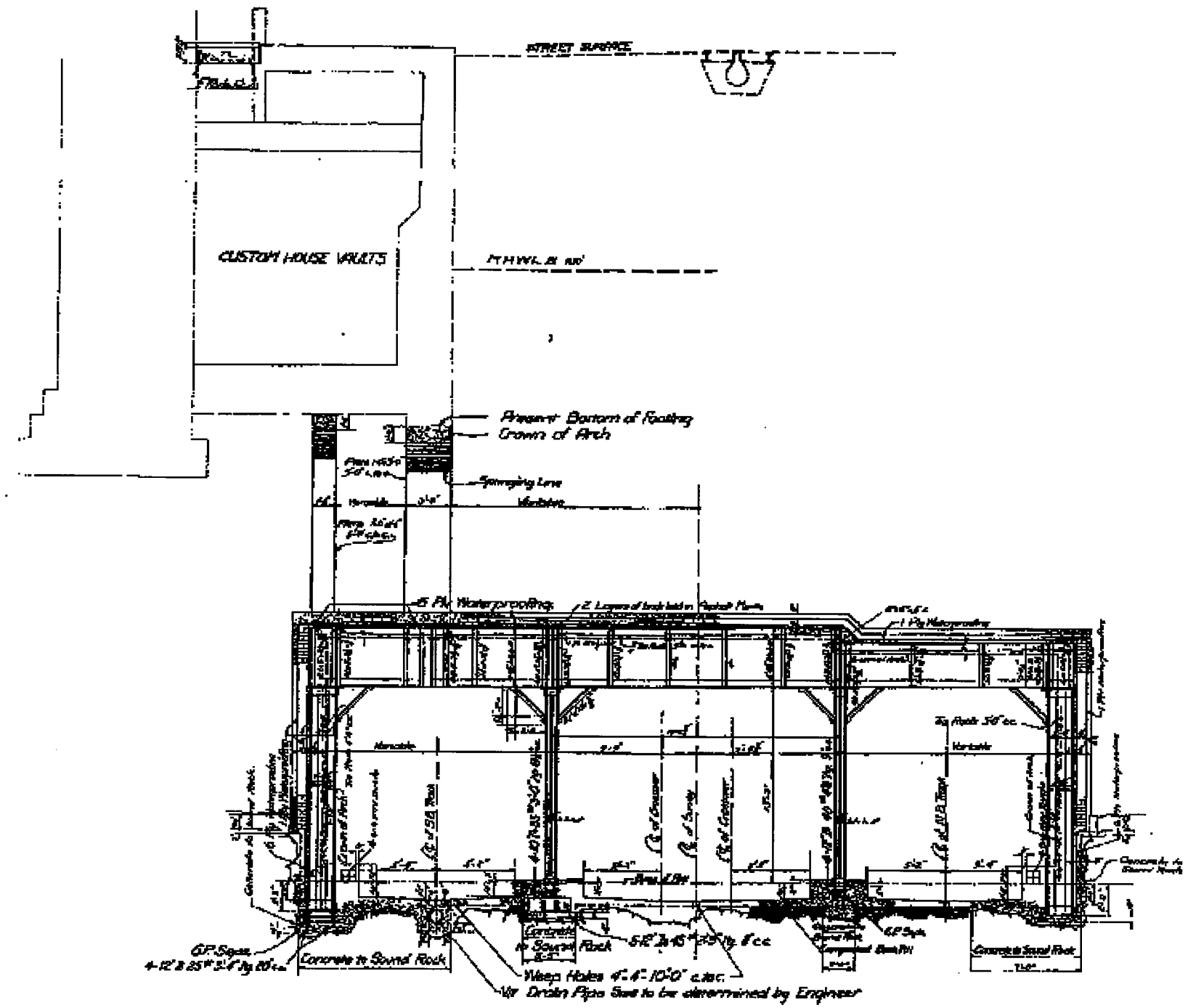
The Louis Berger Group
El Taller Colaborativa, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

SECTION M–M
LOWER MANHATTAN TERMINAL
BREAKOUT FROM BROADWAY LINE
(MONTAGUE ALTERNATIVE)

SCALE: N.T.S.	CONTRACT No.
FILE NAME: SECTCS013	ISSUE FINAL
DRAWING No.: CS–013	SHEET No.
DATE: 23 APR 2004	13 OF 15



BENT № 514

(TYPICAL FOR BENTS 514 & 515)

REVISED. MAY 1, 1916
Section of landing at sidewalk level added
Dwg 121 added to reference notes

REFERENCE
For Alignment and Profile, see Dwg No. 7.
For Excavation Plan, see Dwg. No. 8.
For other Plans, Sections and Details
see Dwgs. Nos. 72 to 81 and 83 to 110 & 121
For Loading Diagrams and Schedules,
see Dwg. No. 120.

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION
FOR THE FIRST DISTRICT
ENGINEERING DEPARTMENT

ROUTE NO. 33 SECTION NO. 1
SUB - SECTION NO. 6
WHITEHALL ST. AT STONE ST.
STA. 7+85.0 TO STA. 10+10.0
STRUCTURAL PLANS
BENTS NOS. 514 & 516 & DETAILS

MICROFILMED

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

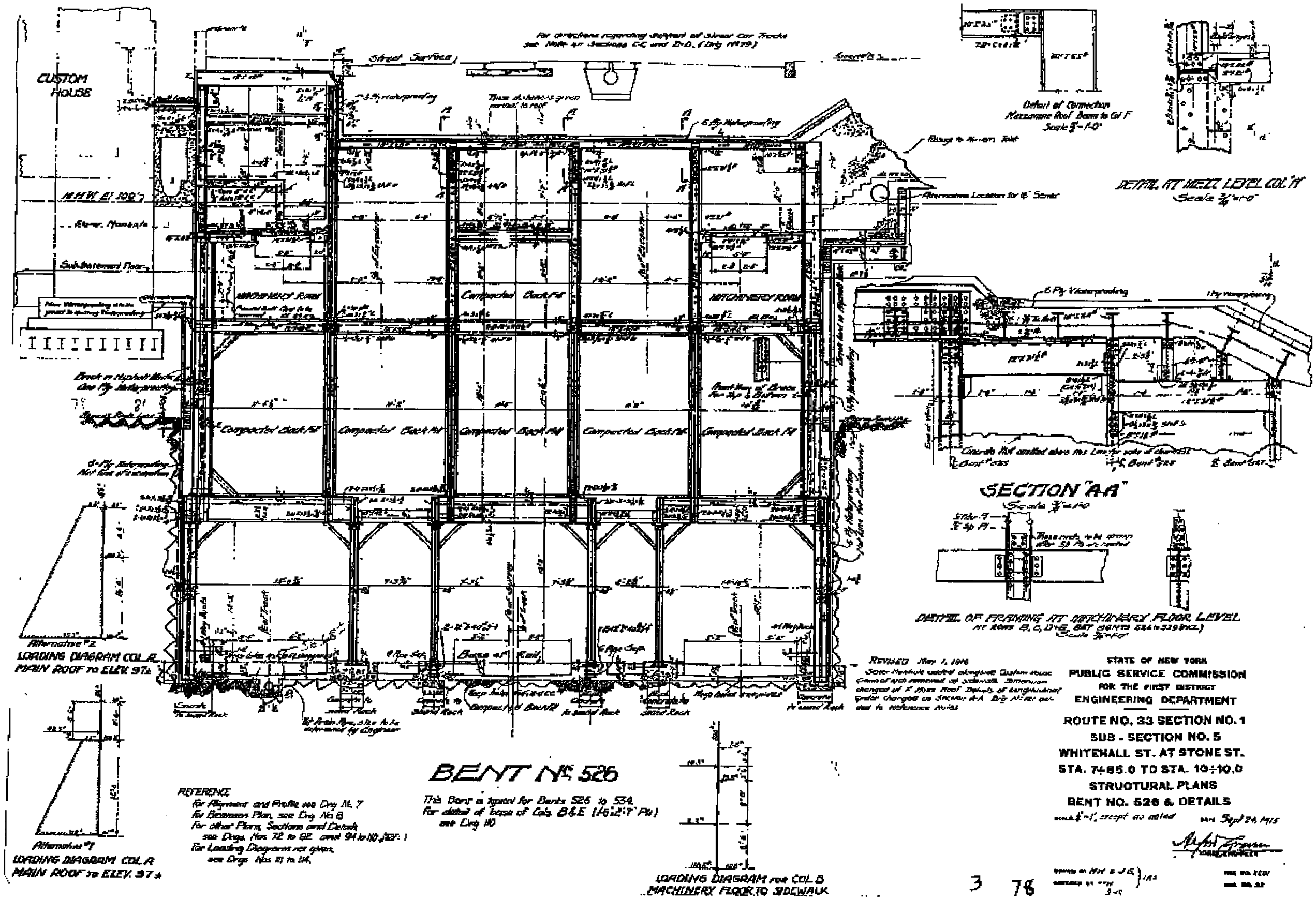
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

SECTION N–N
LOWER MANHATTAN TERMINAL
BREAKOUT FROM BROADWAY LINE
(MONTAGUE ALTERNATIVE)

SCALE: N.T.S.	CONTRACT No.
FILE NAME: SECTCS014	ISSUE FINAL
DRAWING No.: CS–014	SHEET No. 14 OF 15
DATE: 23 APR 2004	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

SECTION O–O
LOWER MANHATTAN TERMINAL
BREAKOUT FROM BROADWAY LINE
(MONTAGUE ALTERNATIVE)

SCALE: N.T.S.	CONTRACT No.
FILE NAME: SECTCS015	ISSUE FINAL
DRAWING No.: CS–015	SHEET No. 15 OF 15
DATE: 23 APR 2004	

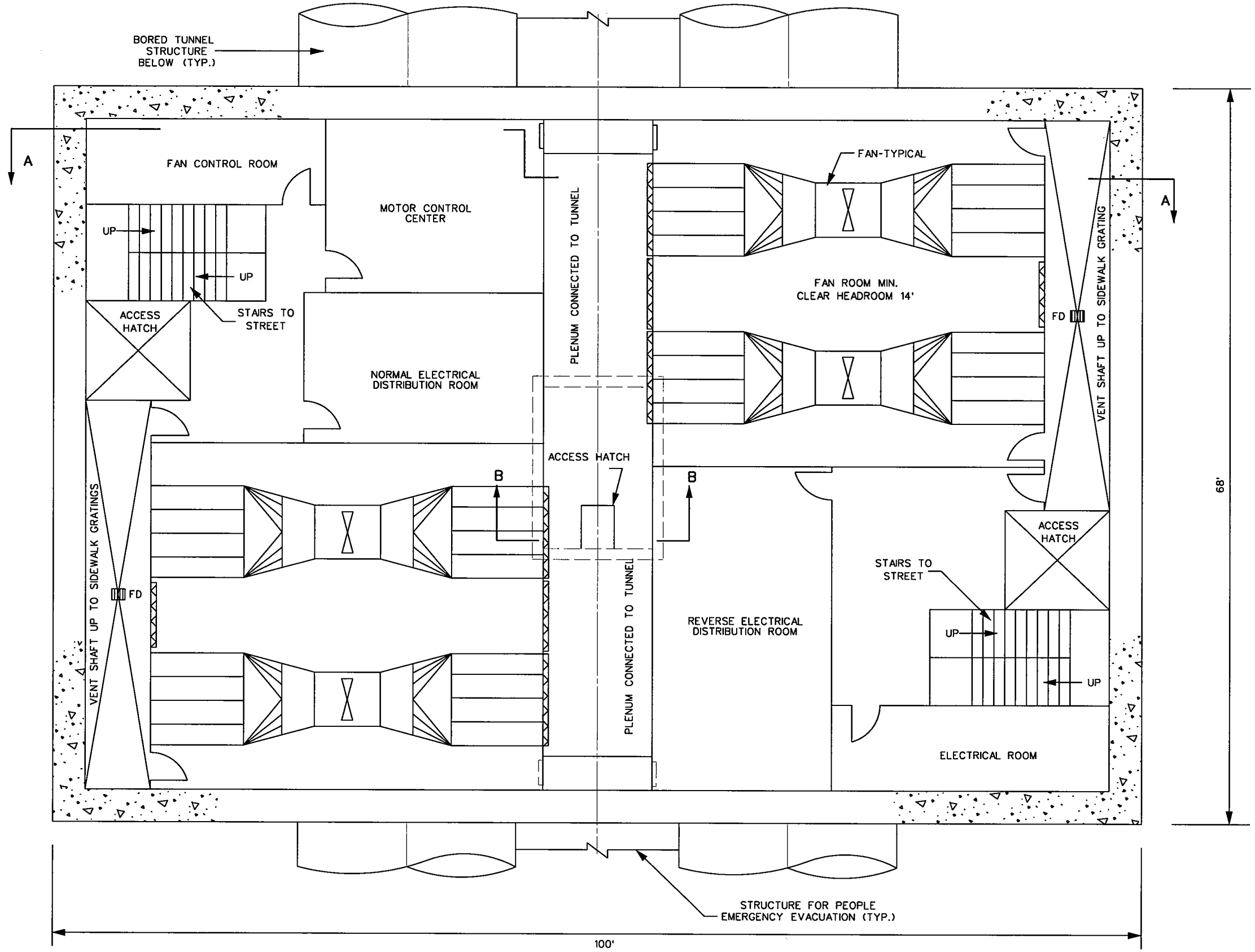
LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

ANCILLARY FACILITIES

DATE: APRIL 23, 2004

EXHIBIT 7

LMDC Lower Manhattan Development Corporation
MTA Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ
PARSONS SYSTRA ENGINEERING A Joint Venture
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense



PLAN
VENTILATION STRUCTURE
(BORED TUNNELS)

TUNNEL VENTILATION AXIAL FAN SCHEDULE					
LOCATION	NO. OF FANS REQ'D	CAPACITY	MOTOR		REMARKS
		CFM	HP	VOLTS/ PHASE	
FAN CHAMABER	4	100,000	125	200/3	SEE NOTES BELOW

NOTES:

1. ALL TABULATED DATA APPLIES TO FORWARD FLOW (AIR EXHAUSTED FROM THE TRACKS) AT STANDARD AIR DESITY OF 0.0749 LB/CUBIC FT FORWARD FLOW SHALL MEAN THAT AIR FLOWS OVER THE BLADES AND THEN OVER THE MOTOR. REVERSE FLOW DIRECTION SHALL BE OPPOSITE THE FORWARD FLOW DIRECTION.

2. REVERSE FLOW CFM (AIR EXHAUSTED FROM TRACKS) SHALL BE A MINIMUM OF 90% FORWARD FLOW AFM ASSUMING THAT THE SYSTEM RESISTANCE CURVE FOR REVERSE FLOW IS SAME AS FORWARD FLOW. BHP FOR REVERSE FLOW SHALL NOT EXCEED BHP FOR FORWARD FLOW.

3. ALL FANS, TEIR MOTORS AND ALL RELATED COMPONENTS EXPOSED TO THE EXHAUST AIRFLOW SHALL BE DESIGNED TO OPERATE IN AN AMBIENT ATMOSPHERE AT APPROXIMATELY 480 DEGREES FAHRENHEIT FOR A MINIMUM OF ONE HOUR.

ABBREVIATIONS:

ATS	AUTOMATIC TRANSFER SWITCH
C/B	CIRCUIT BREAKERS
CFM	CUBIC FEET PER MINUTE
FD	FLOOR DRAIN
MCC	MOTOR CONTROL CENTER

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

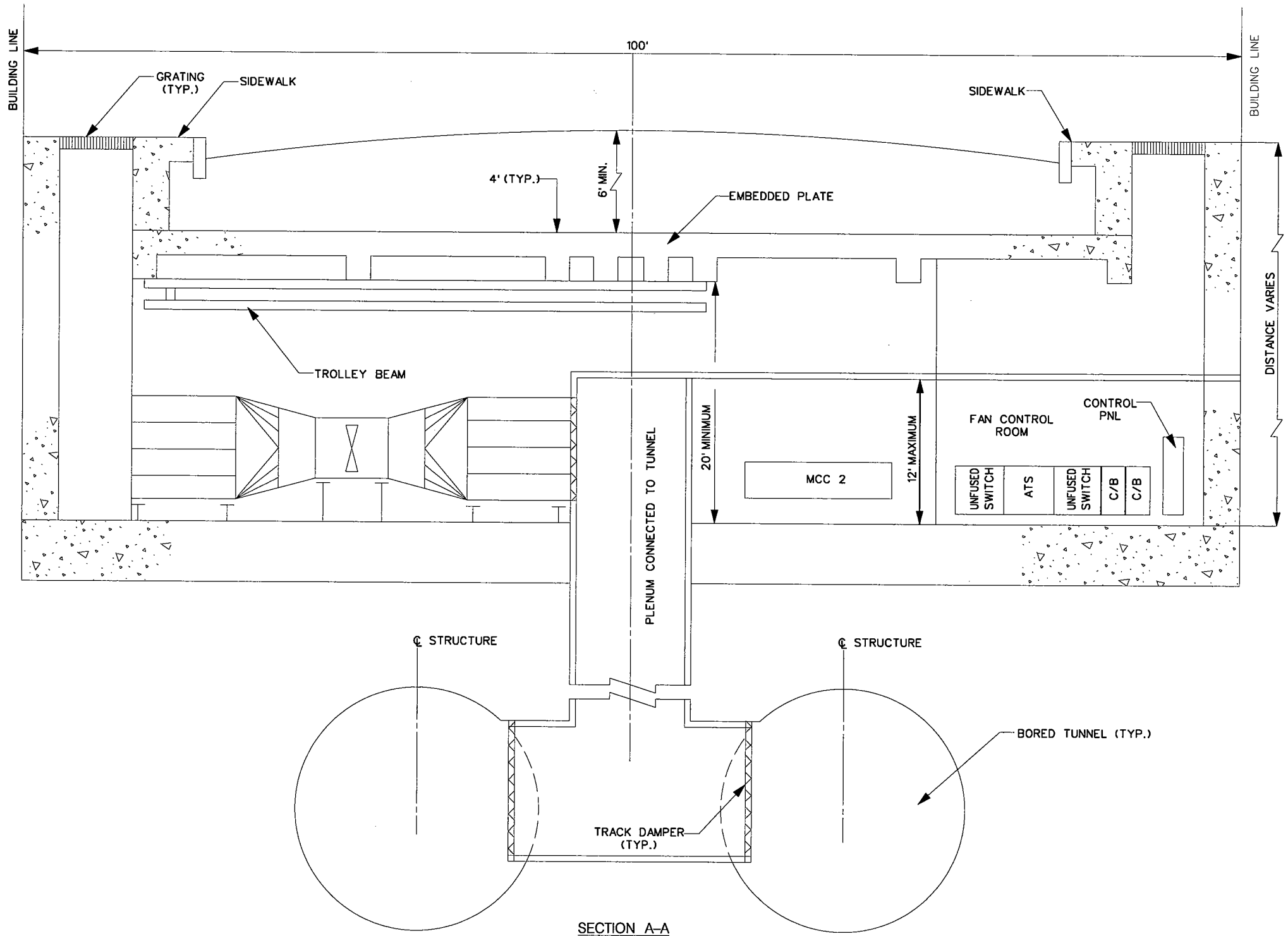
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

ANCILLARY FACILITY
EMERGENCY FAN PLANT
LAYOUT

SCALE: 1"=10'	CONTRACT No.
FILE NAME: ANCAF001	ISSUE FINAL
DRAWING No.: AF-001	SHEET No.
DATE: 23 APR 04	1 OF 8



SECTION A–A
(VENTILATION)

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

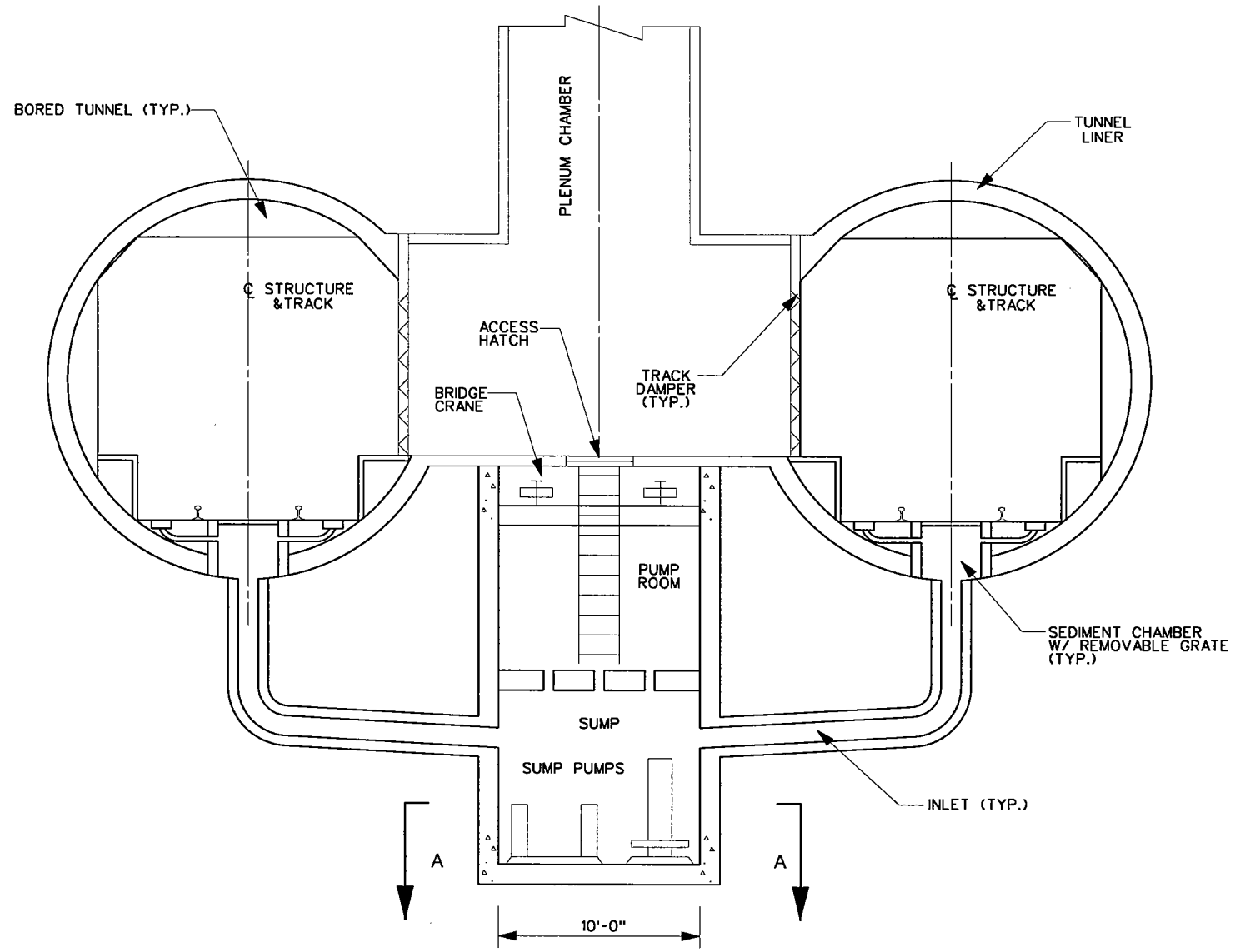
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

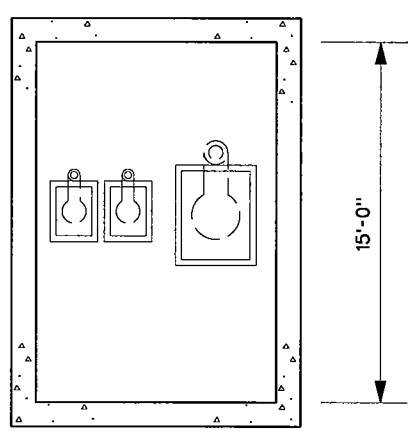
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

ANCILLARY FACILITY
EMERGENCY FAN PLANT
SECTION

SCALE: 1"=10'	CONTRACT No.
FILE NAME: ANCAF002	ISSUE FINAL
DRAWING No.: AF-002	SHEET No. 2 OF 8
DATE: 23 APR 04	



PUMP ROOM & SUMP



SECTION A–A
SUMP & PUMPS

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

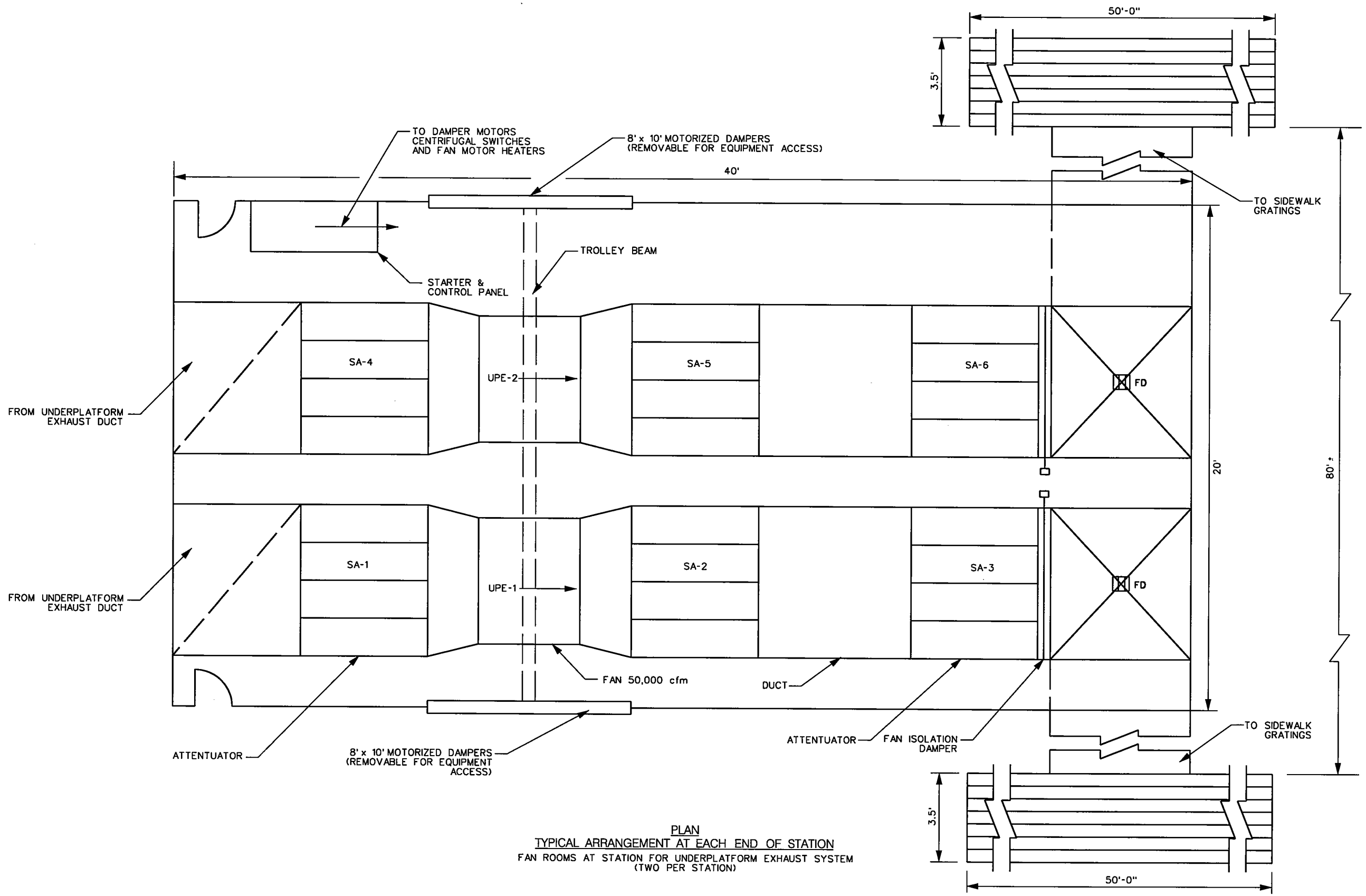
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

ANCILLARY FACILITY
DRAINAGE SECTION

SCALE: 1"=8'	CONTRACT No.
FILE NAME: ANCAF003	ISSUE FINAL
DRAWING No.: AF-003	SHEET No. 3 OF 8
DATE: 23 APR 04	



PLAN
TYPICAL ARRANGEMENT AT EACH END OF STATION
FAN ROOMS AT STATION FOR UNDERPLATFORM EXHAUST SYSTEM
(TWO PER STATION)

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

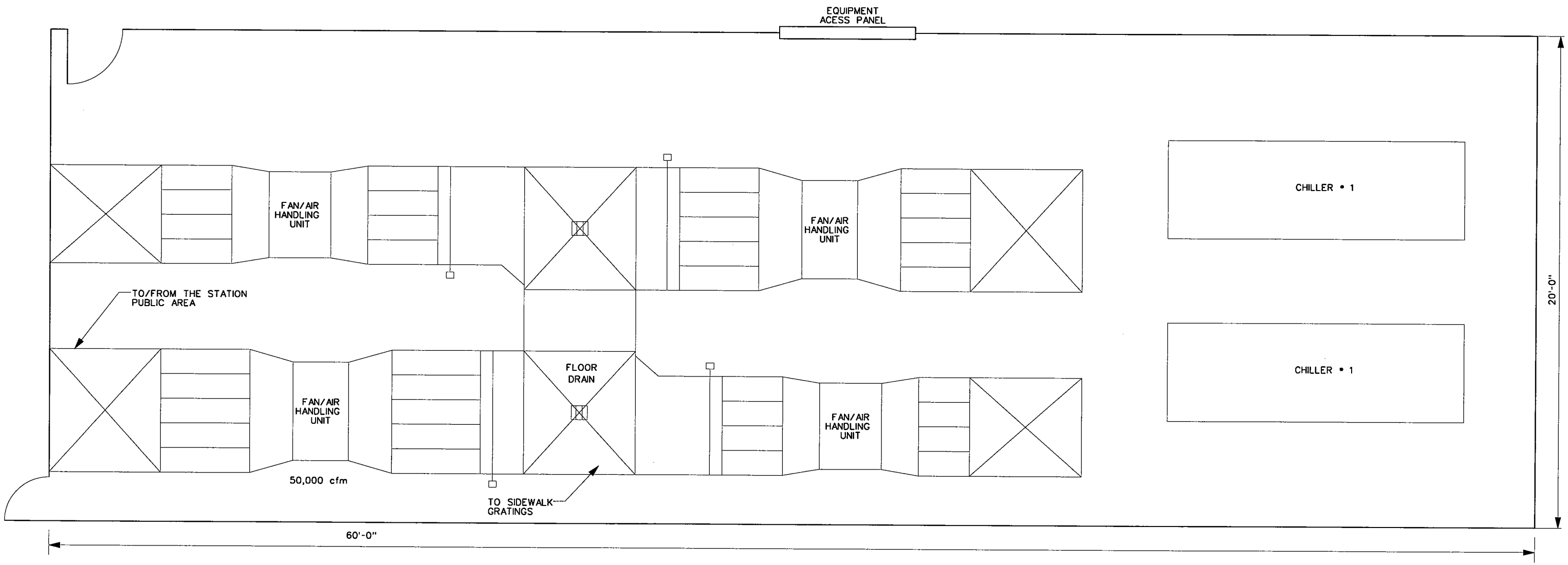
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

ANCILLARY FACILITY
UNDERPLATFORM EXHAUST SYSTEM

SCALE: 1"=4'	CONTRACT No.
FILE NAME: ANCAF004	ISSUE FINAL
DRAWING No.: AF-004	SHEET No. 4 OF 8
DATE: 23 APR 04	



PLAN

FAN ROOM FOR THE STATION VENTILATION/AIR CONDITIONING

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING *A Joint Venture*

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation

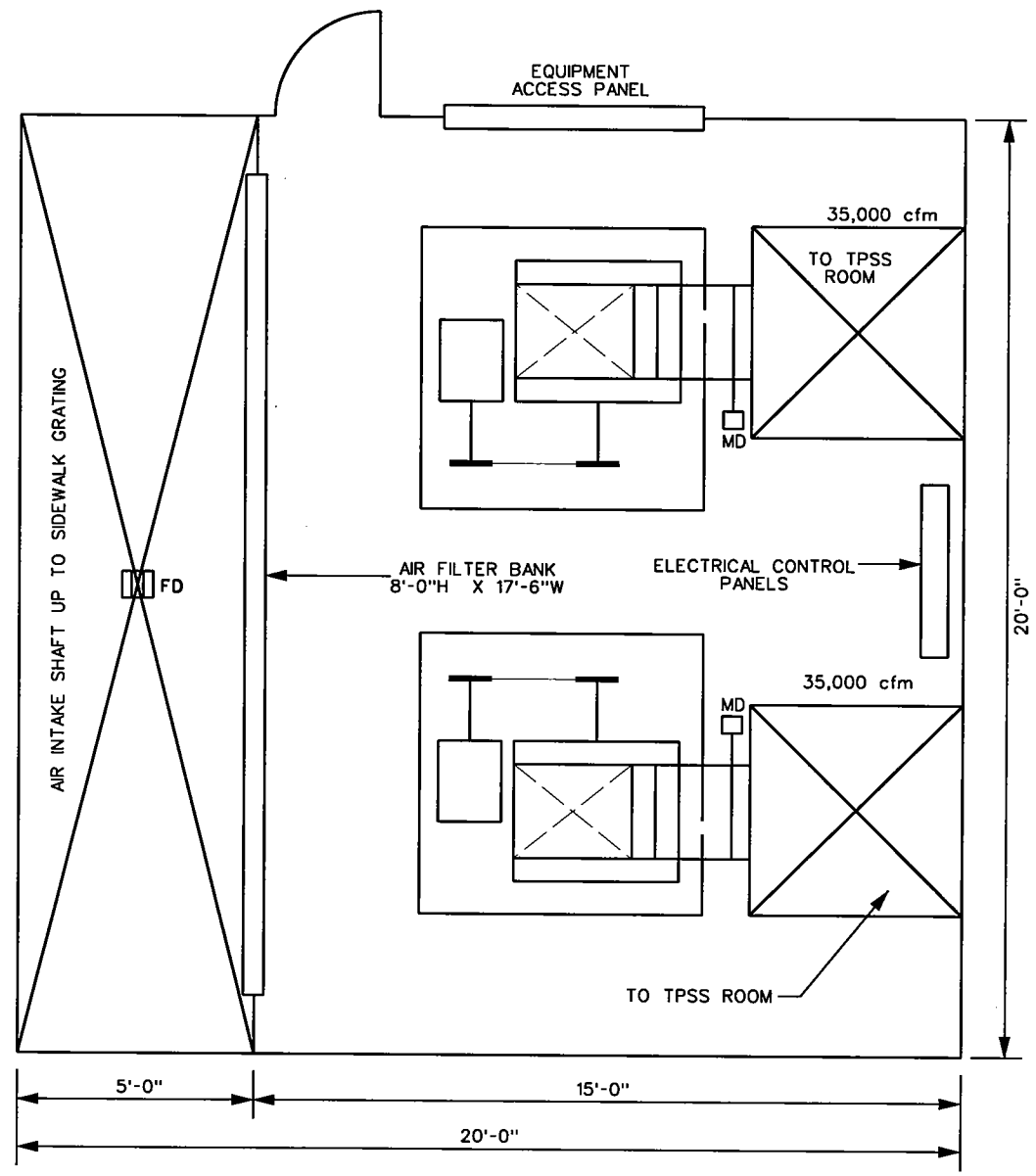
Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

ANCILLARY FACILITY
STATION VENTILATION

SCALE: 1" = 4'	CONTRACT No.
FILE NAME: ANCAF005	ISSUE FINAL
DRAWING No.: AF-005	SHEET No. 5 OF 8
DATE: 23 APR 04	



PLAN
SUPPLY FAN ROOM FOR TPSS

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

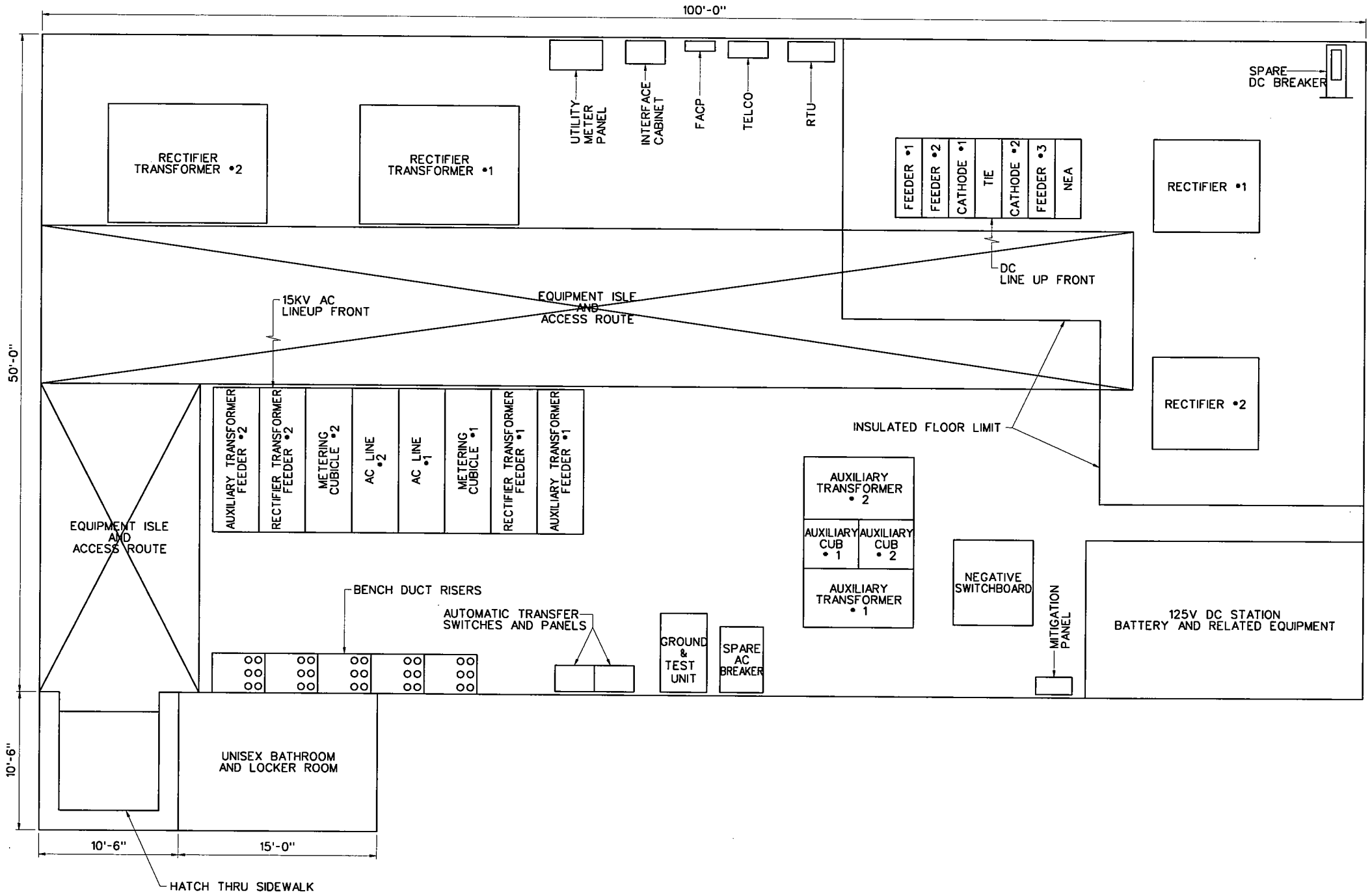
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

ANCILLARY FACILITY
SUPPLY FAN ROOMS

SCALE: 1" = 4'	CONTRACT No.
FILE NAME: ANCAF006	ISSUE FINAL
DRAWING No.: AF-006	SHEET No.
DATE: 23 APR 04	6 OF 8



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

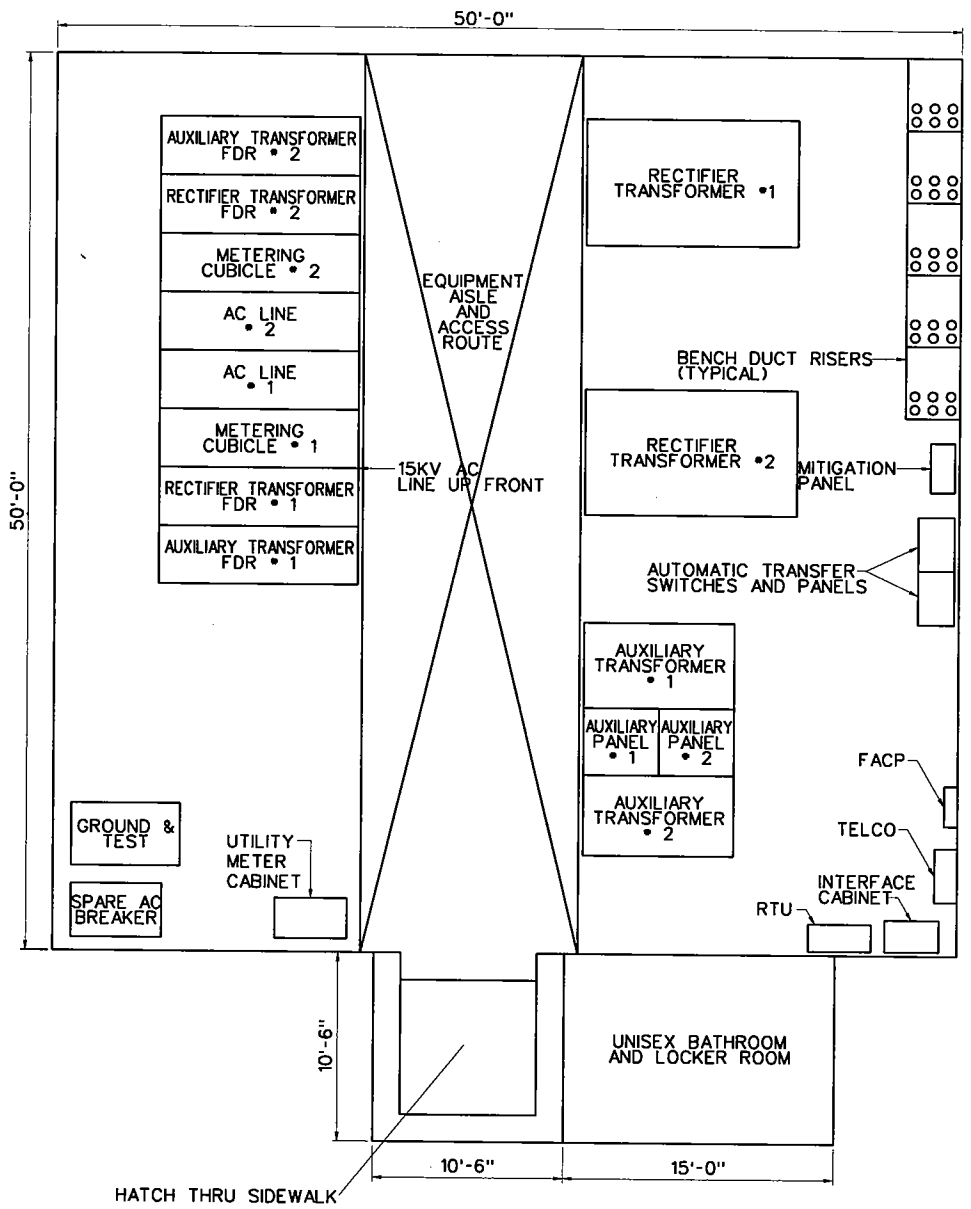
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

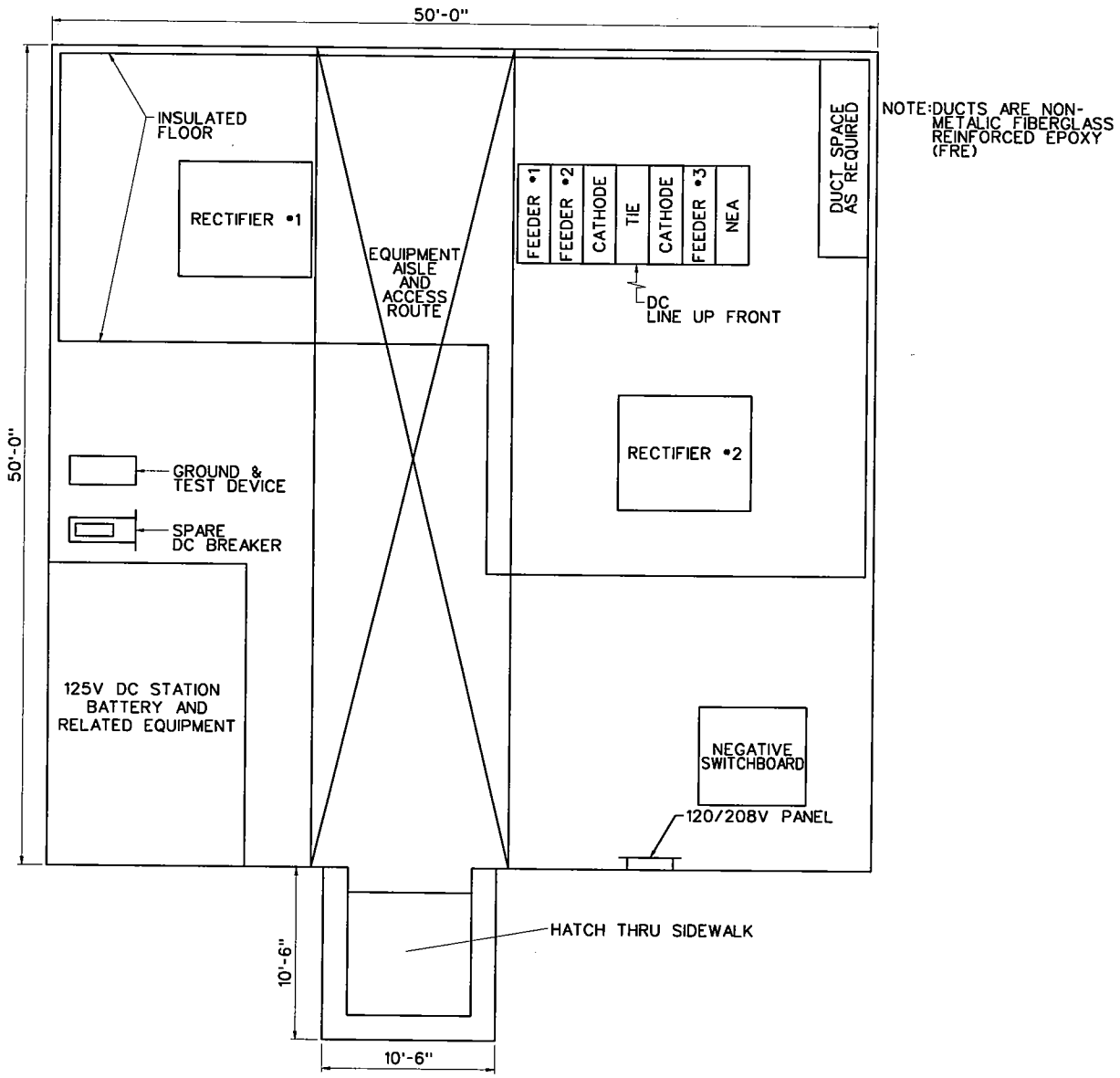
LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

ANCILLARY FACILITY
SUBSTATION DESIGN – OPTION 1

SCALE: N.T.S.	CONTRACT No.
FILE NAME: ANCAF007	ISSUE FINAL
DRAWING No.: AF-007	SHEET No. 7 OF 8
DATE: 23 APR 04	



TYPICAL AC EQUIPMENT ARRANGEMENT PLAN



TYPICAL DC EQUIPMENT ARRANGEMENT PLAN

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

ANCILLARY FACILITY
SUBSTATION DESIGN – OPTION 2

SCALE: N.T.S.	CONTRACT No.
FILE NAME: ANCAF008	ISSUE FINAL
DRAWING No.: AF-008	SHEET No. 8 OF 8
DATE: 23 APR 04	

LOWER MANHATTAN AIRPORT AND COMMUTER ACCESS ALTERNATIVES ANALYSIS

STATIONS

DATE: APRIL 23, 2004

EXHIBIT 8

LMDC Lower Manhattan Development Corporation

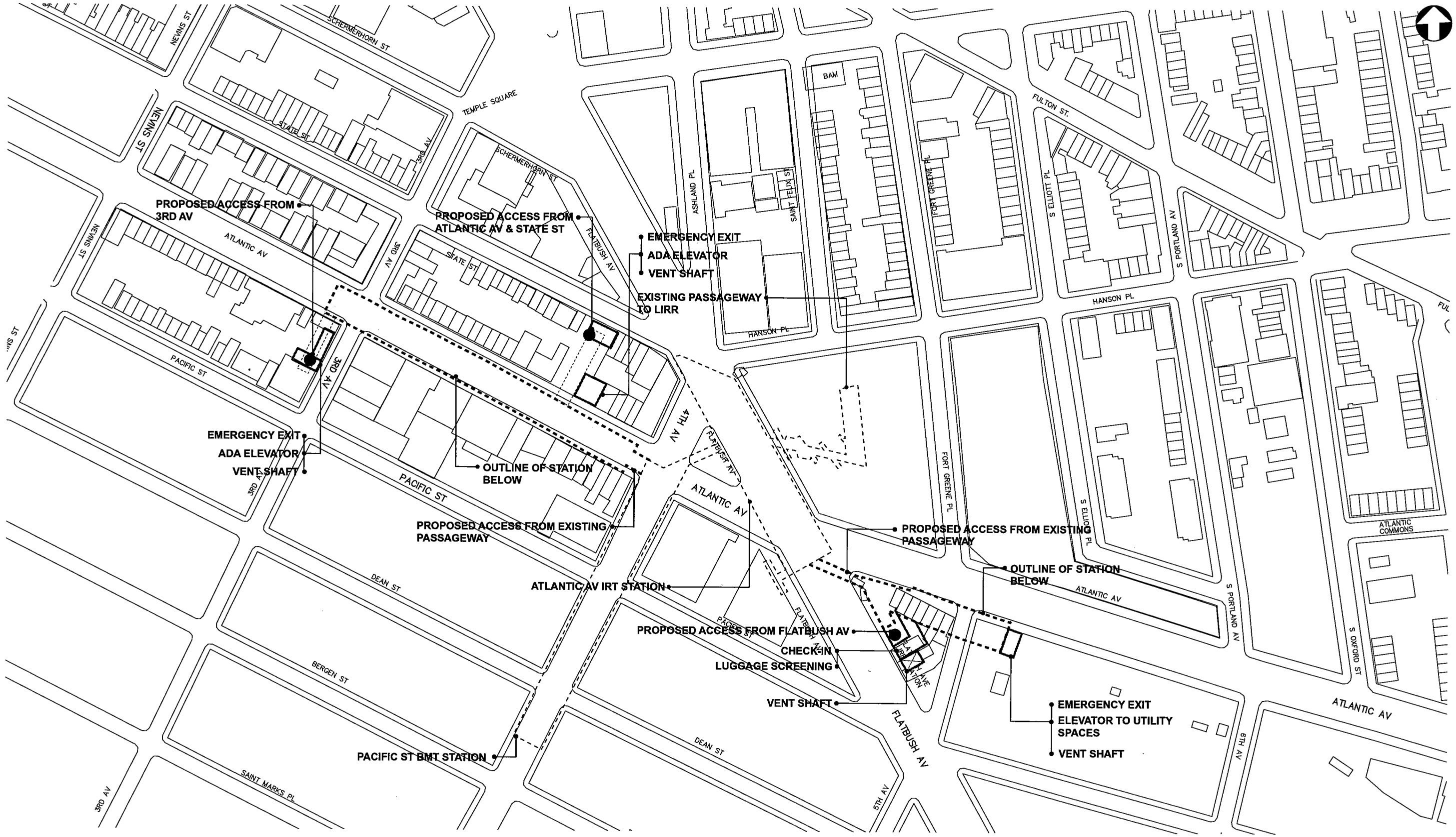
Metropolitan Transportation Authority

New York City Economic Development Corporation

THE PORT AUTHORITY OF NY & NJ

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS | SYSTRA ENGINEERING — *A Joint Venture*

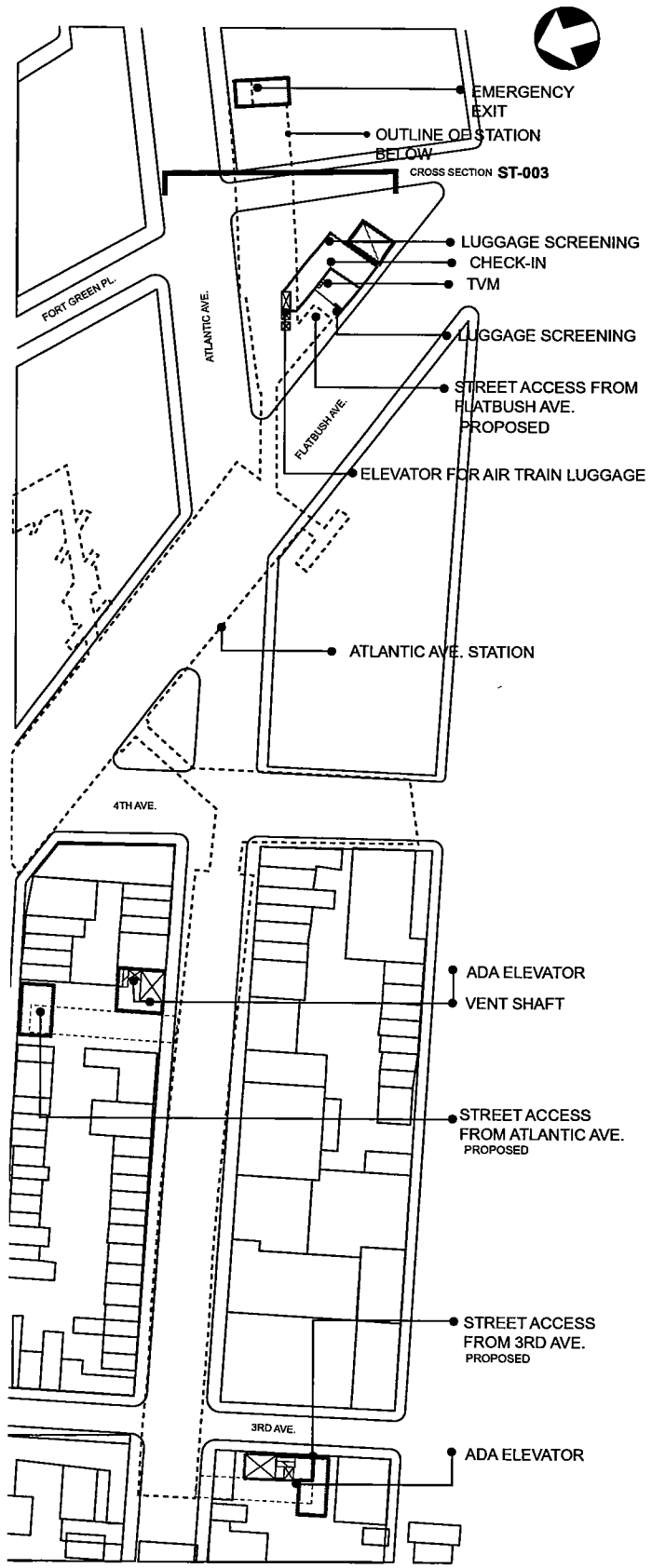
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE	REVISIONS	No.

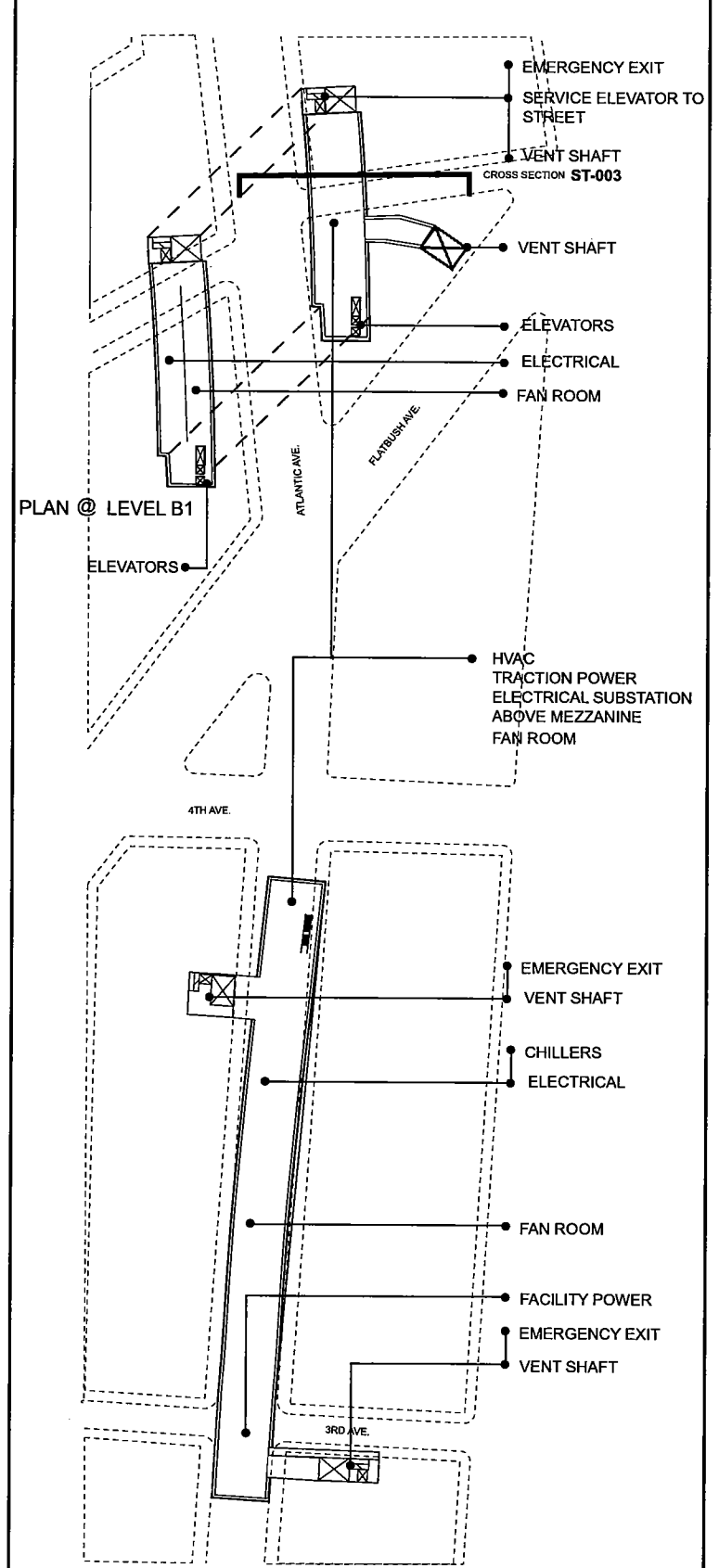
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
SITE PLAN

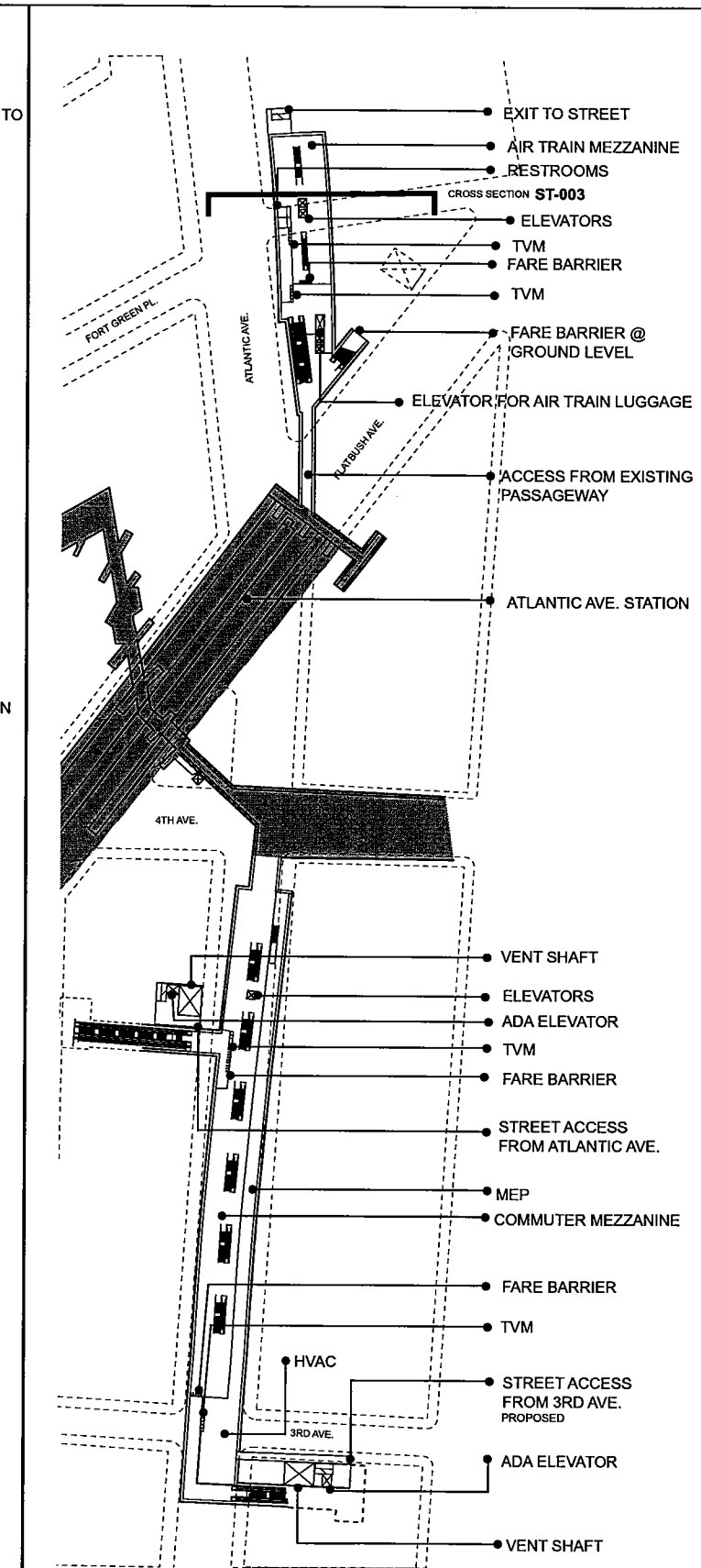
SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST001	ISSUE FINAL
DRAWING No.: ST-001	SHEET No. 1 OF 23
DATE: 23 APR 04	



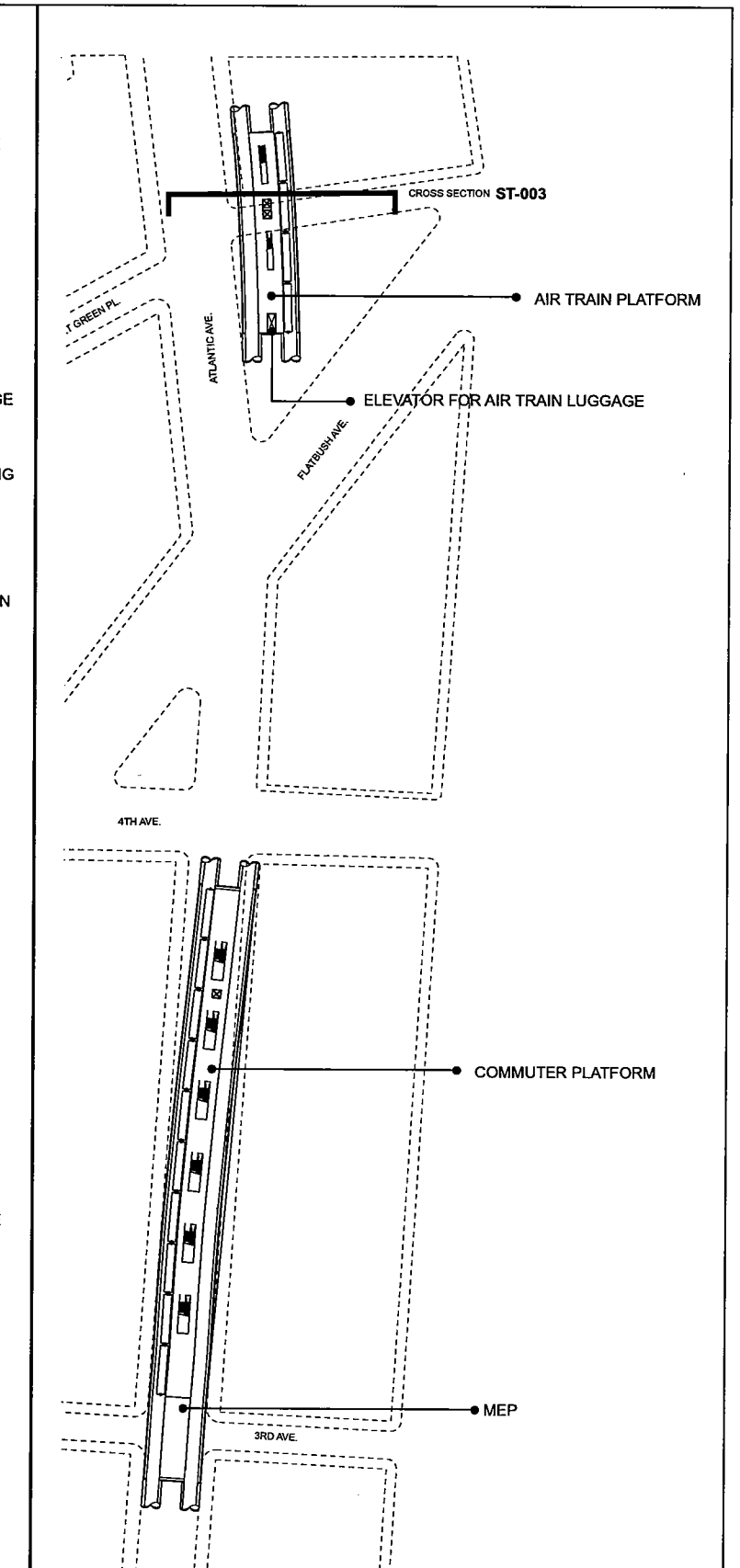
PLAN@ STREET LEVEL



PLAN @ LEVEL B2



PLAN@ MEZZANINE B3



PLAN@ PLATFORM B4

FEET 50 100 200

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

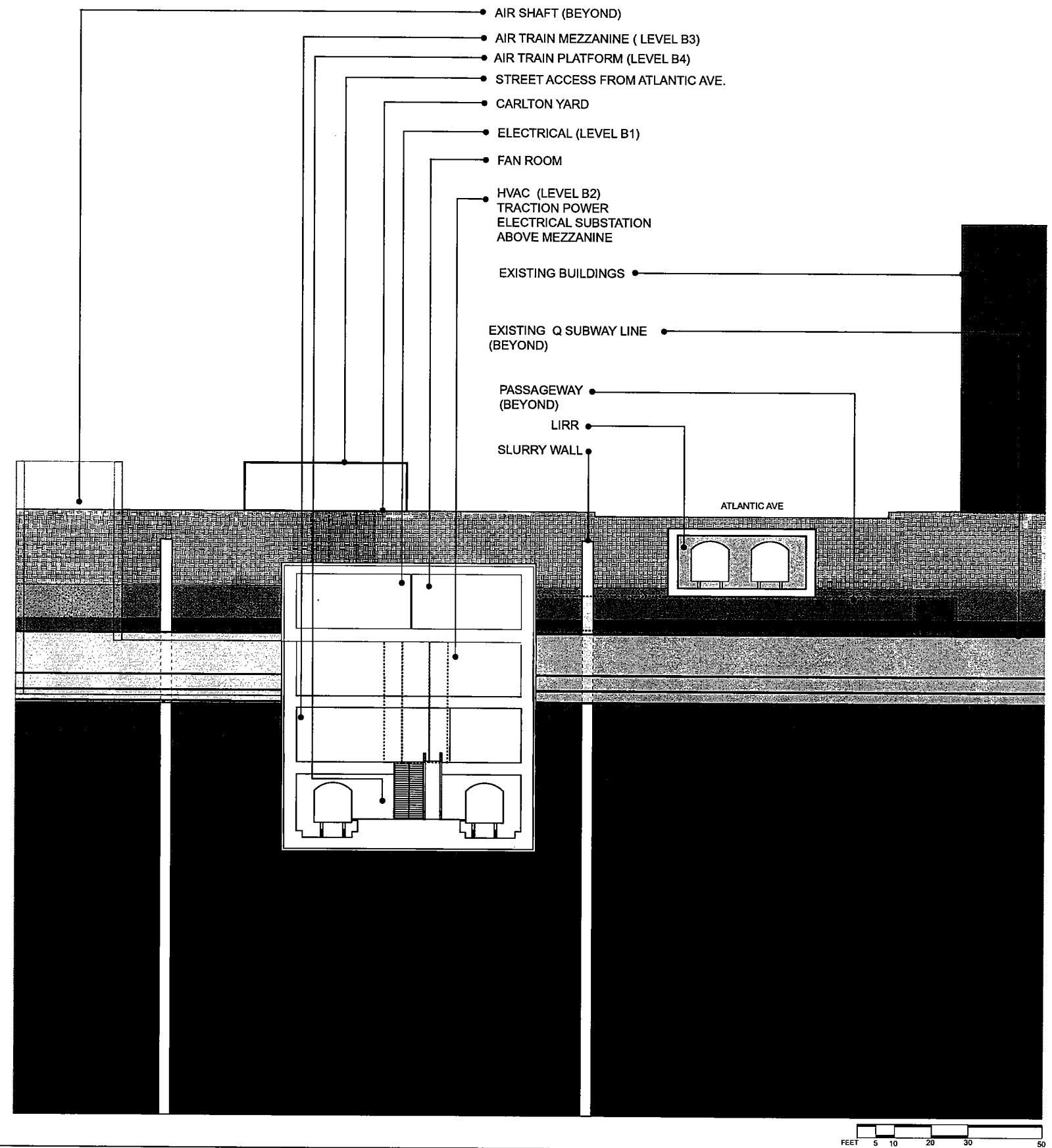
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
PLANS

SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST002	ISSUE FINAL
DRAWING No.: ST-002	SHEET No.
DATE: 23 APR 04	2 OF 23



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

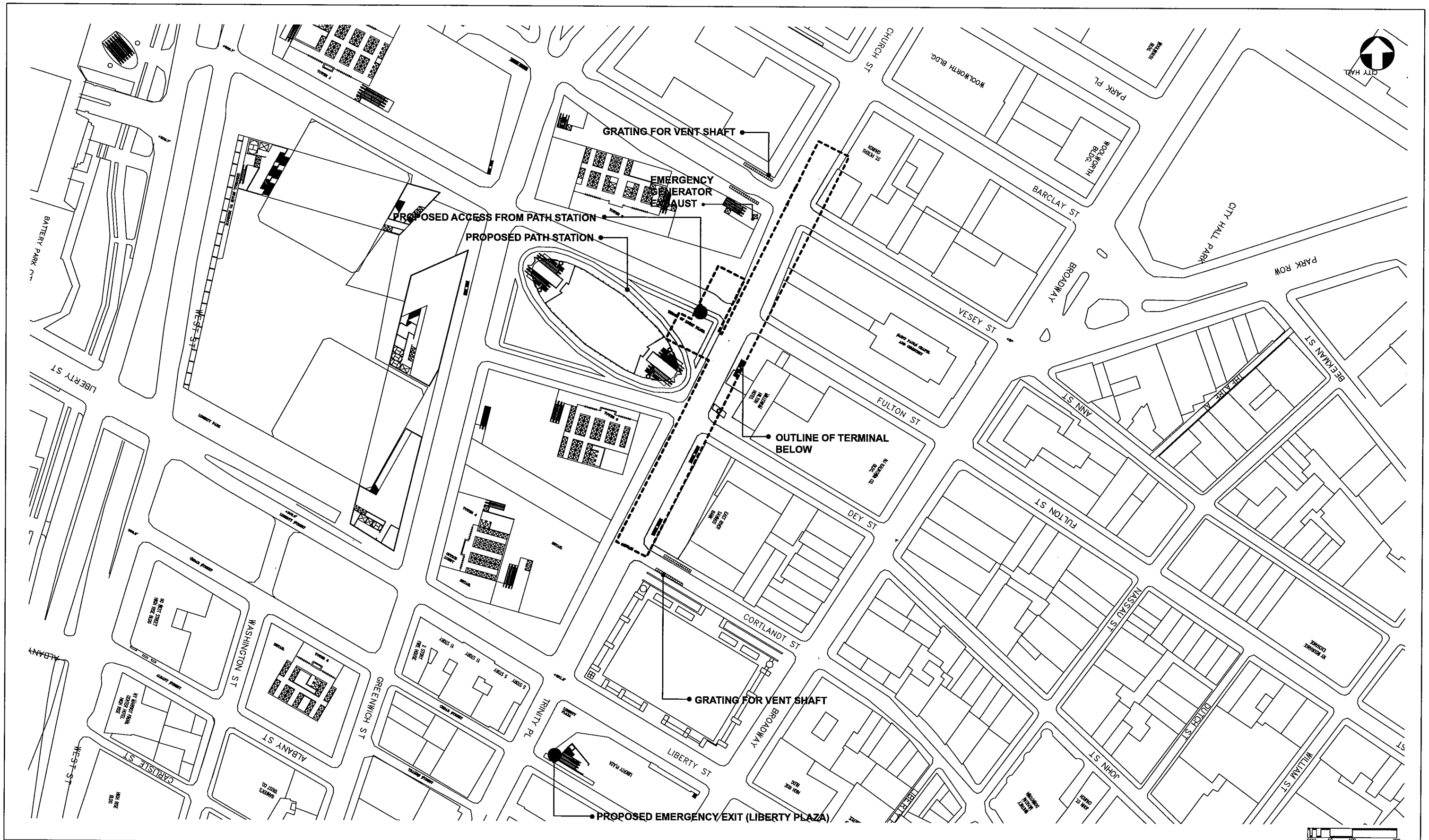
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
CROSS SECTION

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST003	ISSUE FINAL
DRAWING No.: ST-003	SHEET No.
DATE: 23 APR 04	3 OF 23



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

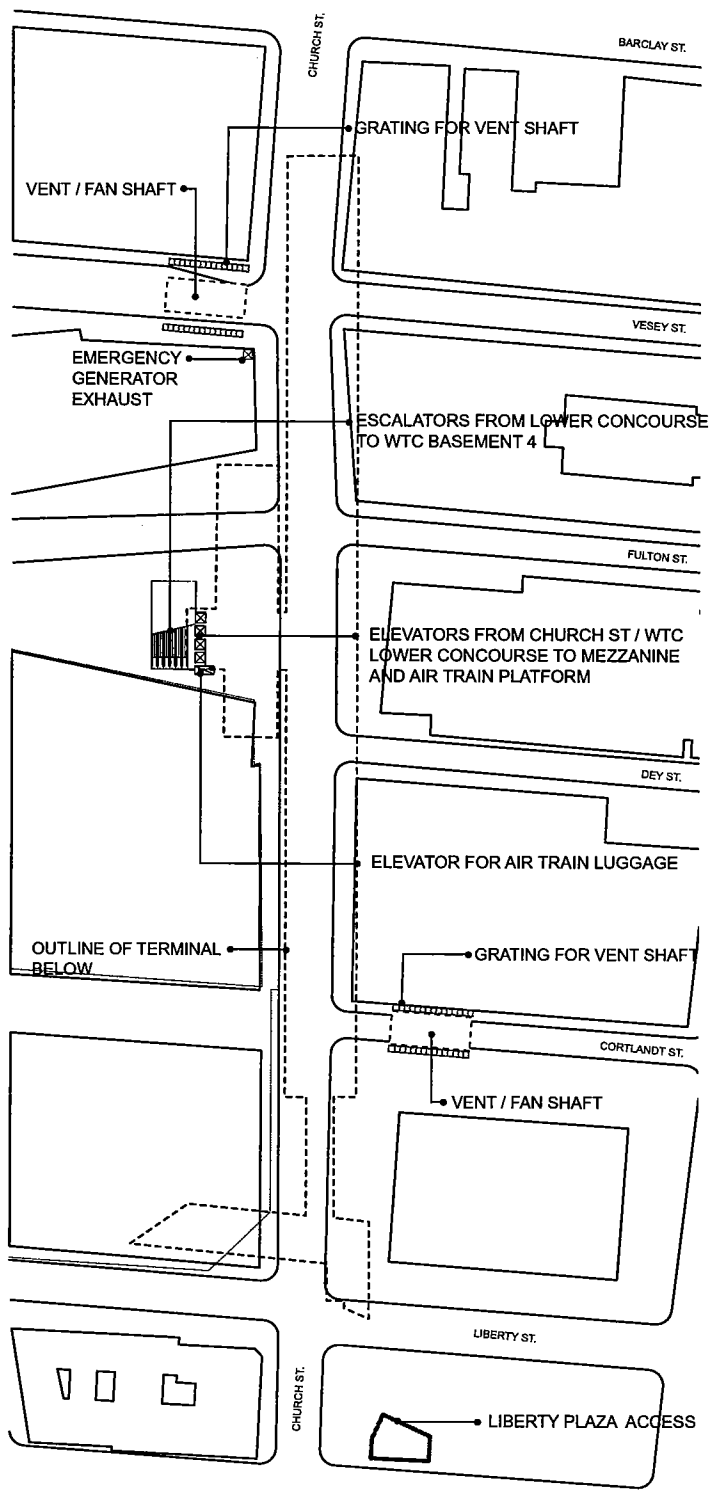
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

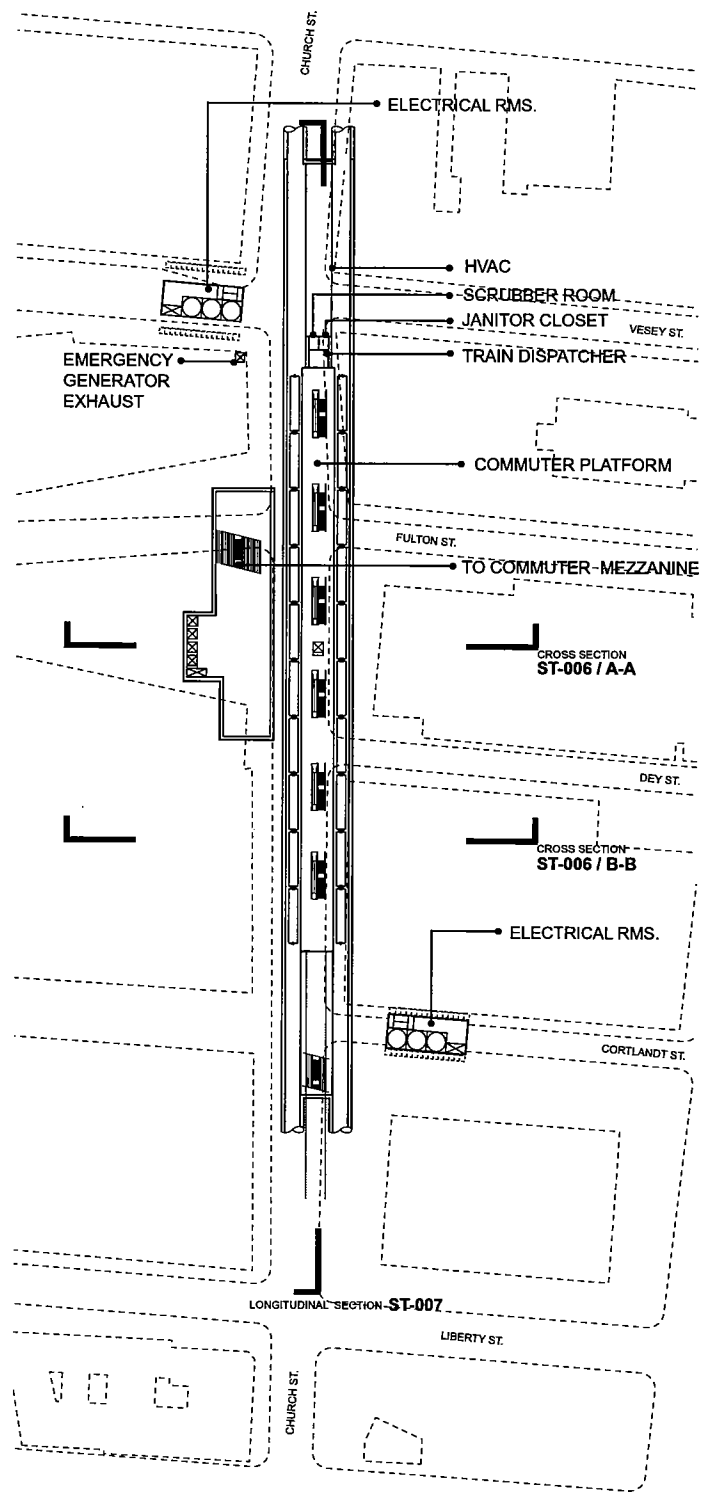
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
SITE PLAN

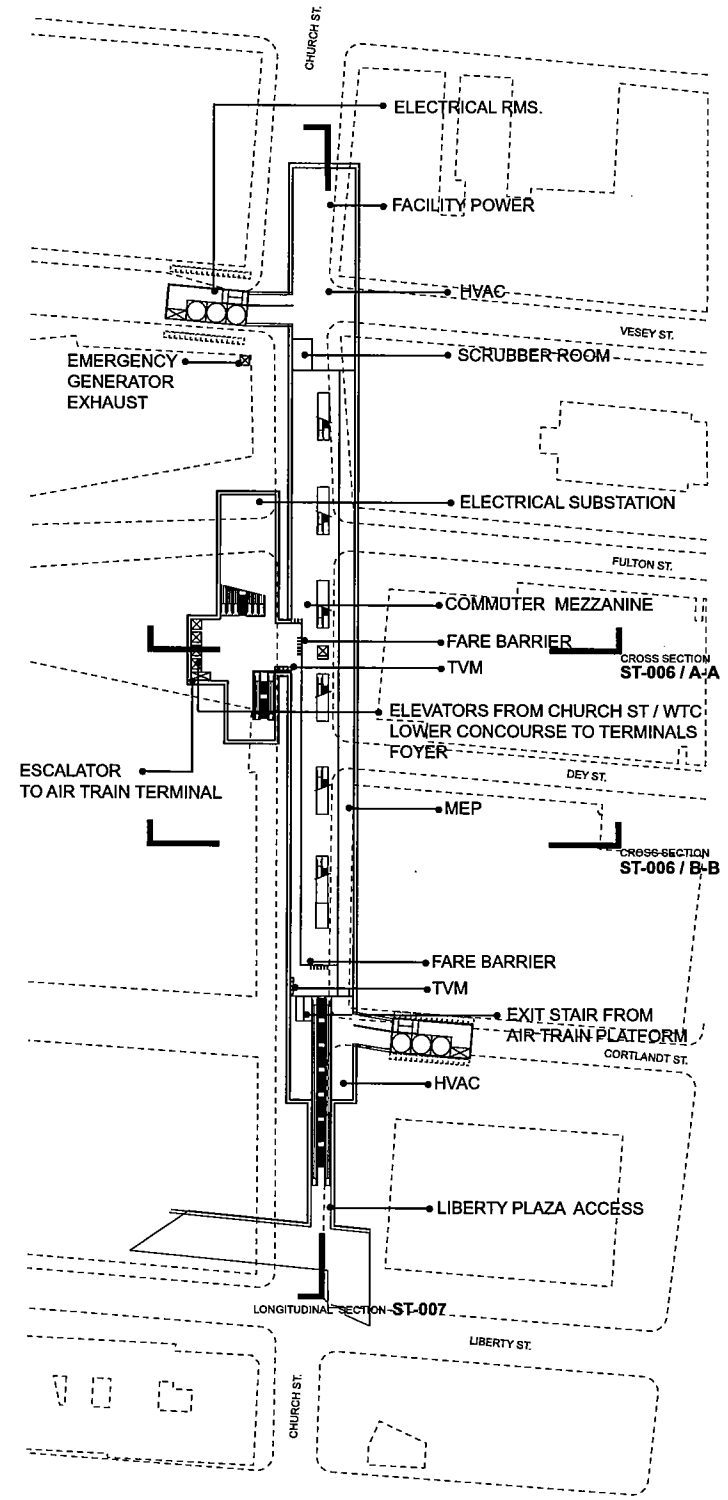
SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST004	ISSUE FINAL
DRAWING No.: ST-004	SHEET No. 4 OF 23
DATE: 23 APR 04	



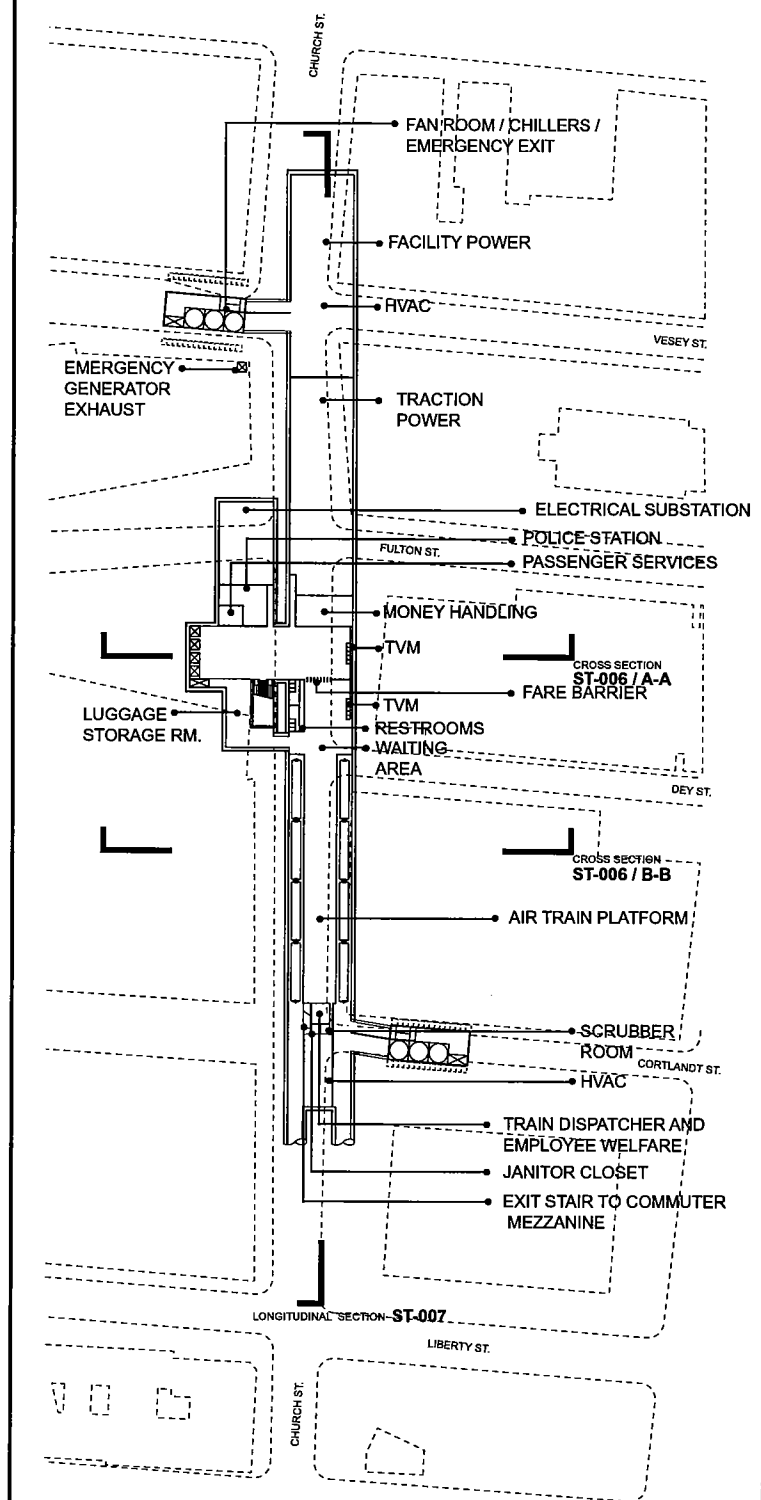
PLAN@ STREET LEVEL



PLAN@ LEVEL B1



PLAN@ MEZZANINE B2



PLAN@ PLATFORM B3

FEET 50 100 200

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

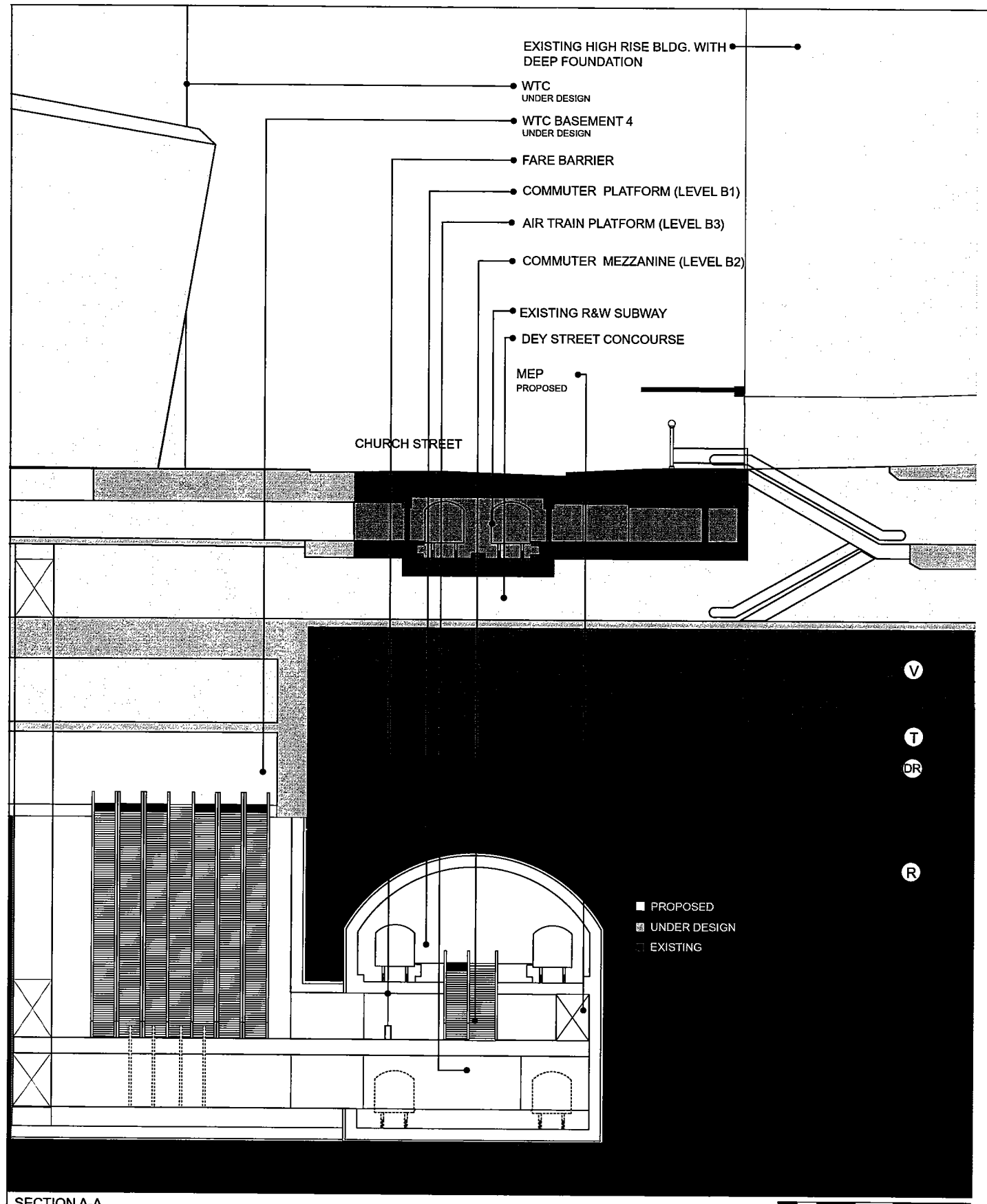
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

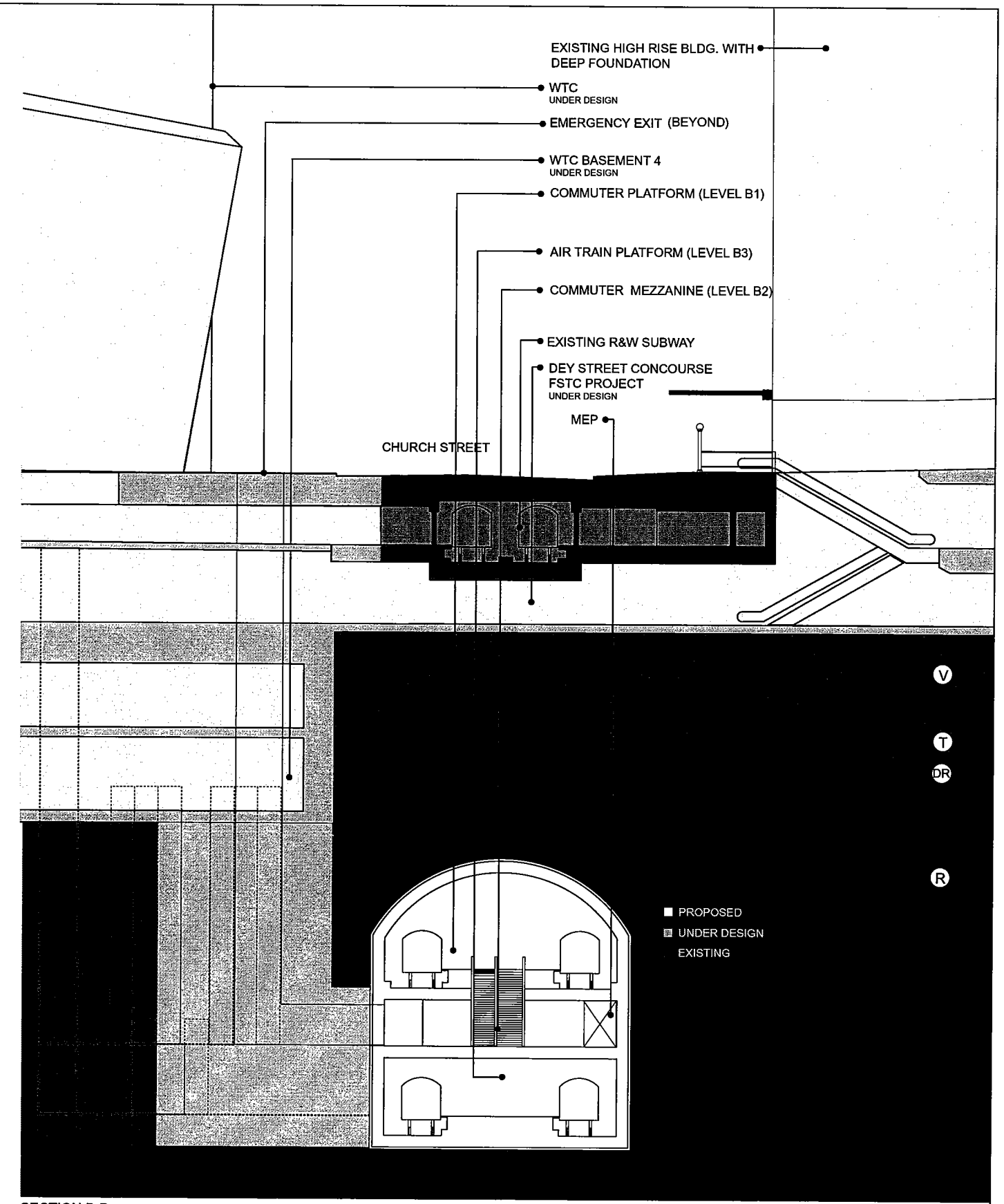
NEW NYCT TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
PLANS

SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST005	ISSUE FINAL
DRAWING No.: ST-005	SHEET No.
DATE: 23 APR 04	5 OF 23



SECTION A-A

FEET 5 10 20 30 50



SECTION B-B

FEET 5 10 20 30 50

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

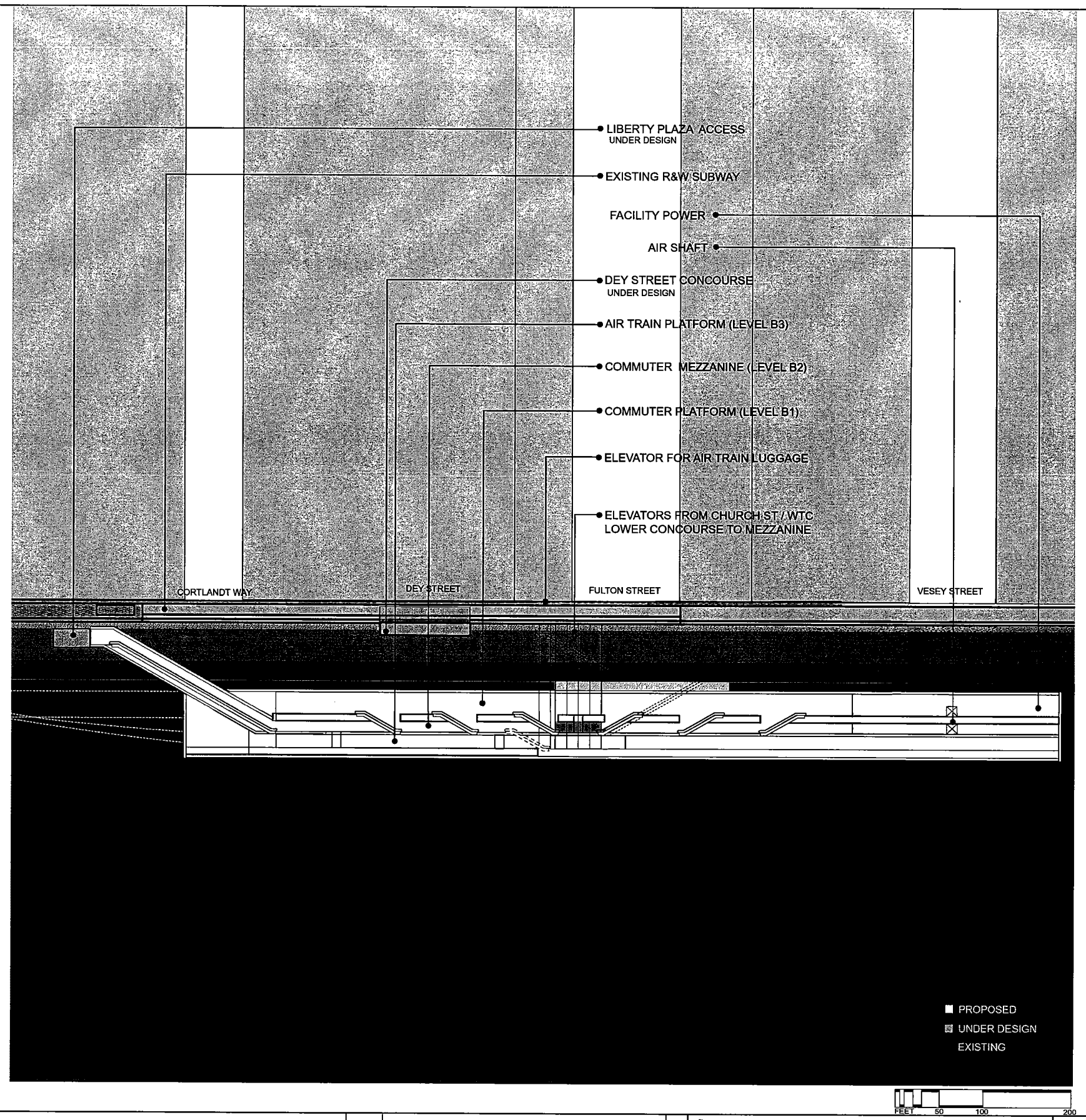
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
SECTIONS

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST006	ISSUE FINAL
DRAWING No.: ST-006	SHEET No.
DATE: 23 APR 04	6 OF 23



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

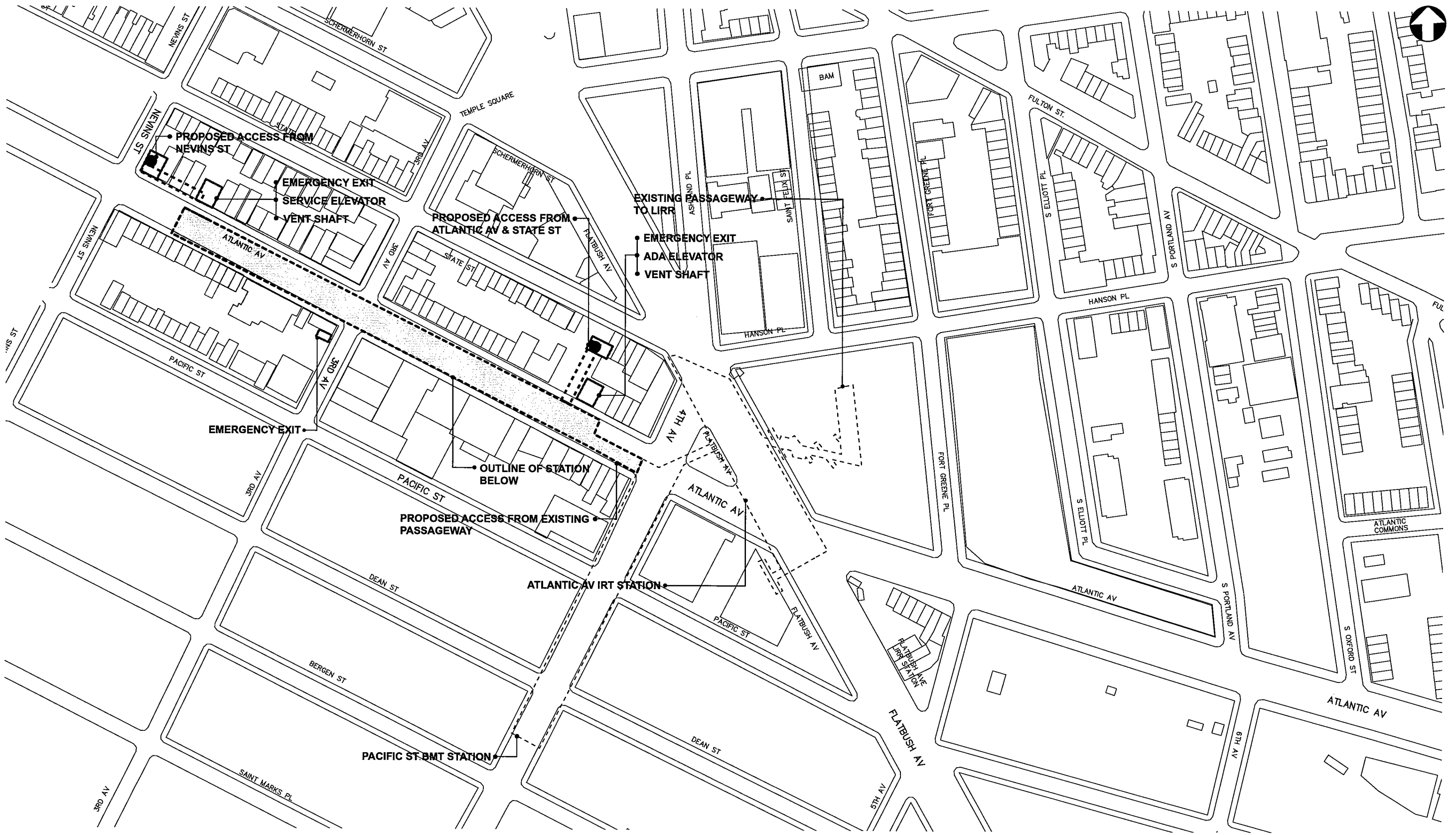
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW NYCT TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
SECTION

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST007	ISSUE FINAL
DRAWING No.: ST-007	SHEET No.
DATE: 23 APR 04	7 OF 23



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

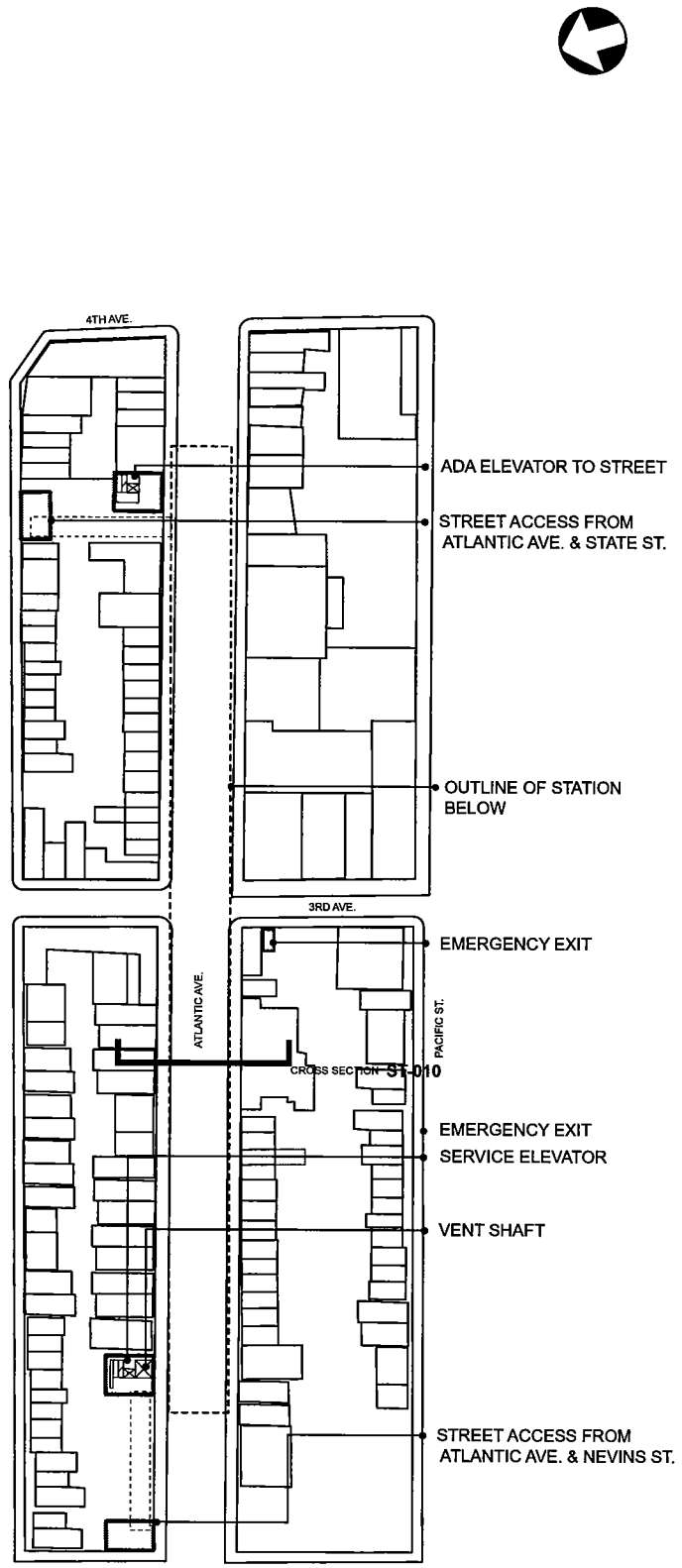
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

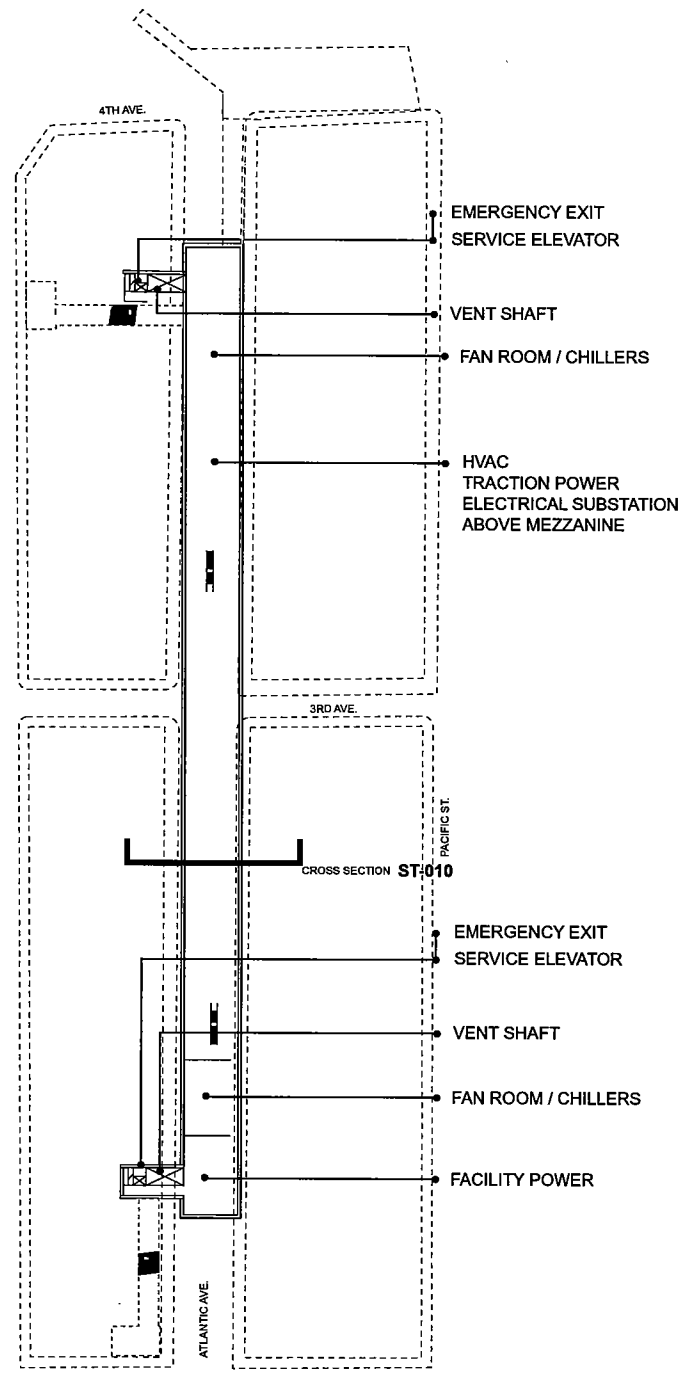
LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
SITE PLAN

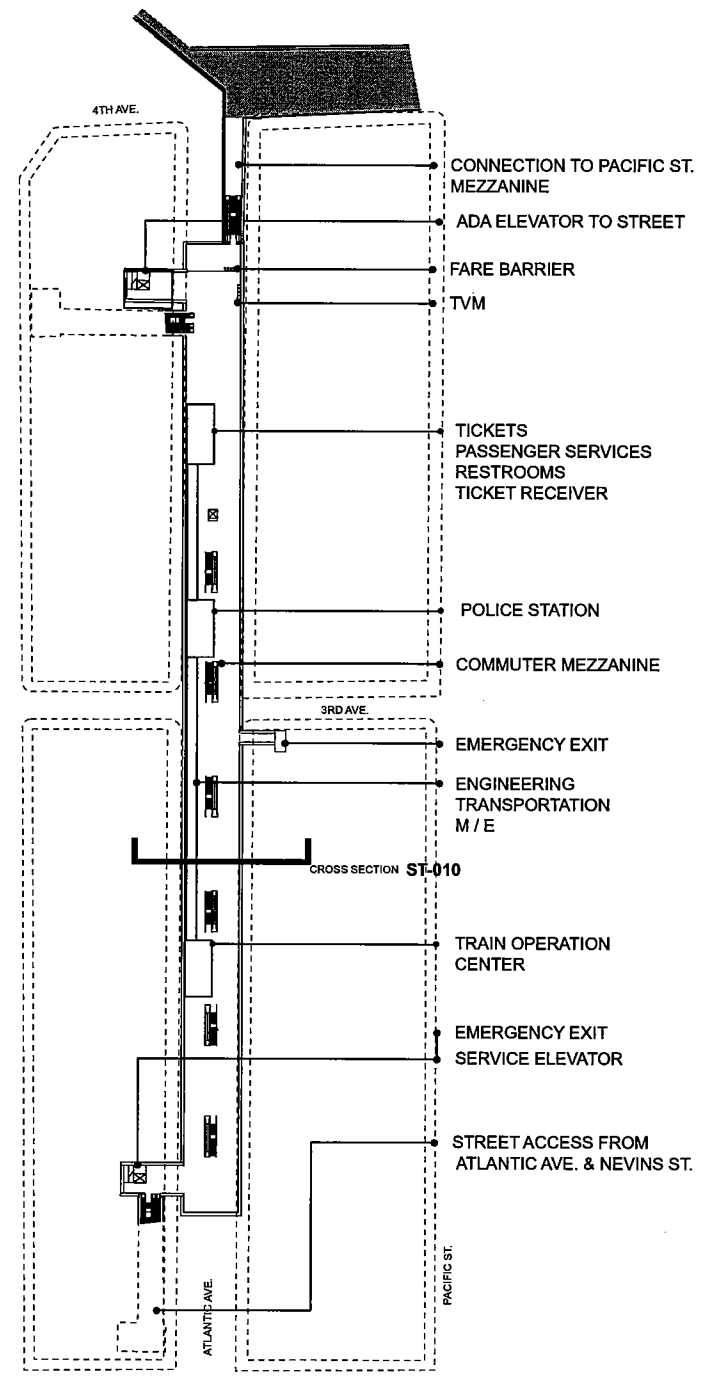
SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST008	ISSUE FINAL
DRAWING No.: ST-008	SHEET No. 8 OF 23
DATE: 23 APR 04	



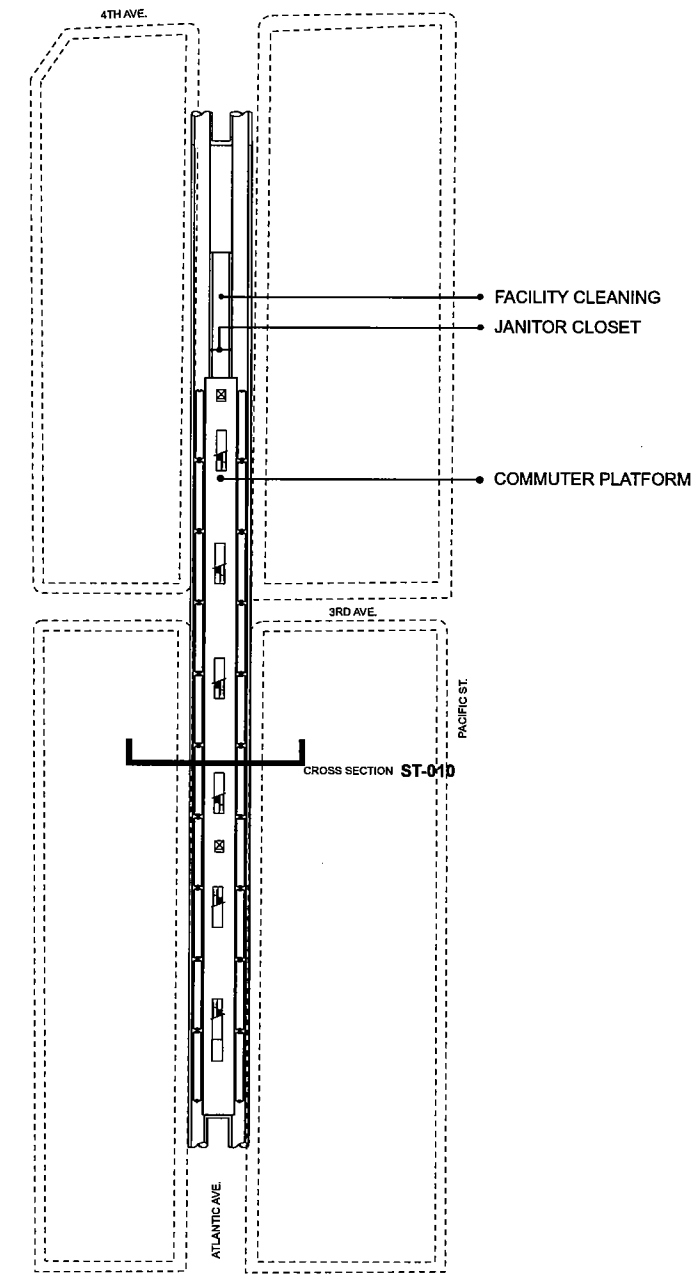
PLAN@ STREET LEVEL



PLAN@ LEVEL B1



PLAN@ MEZZANINE B2



PLAN@ PLATFORM B3

FEET 50 100 200

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

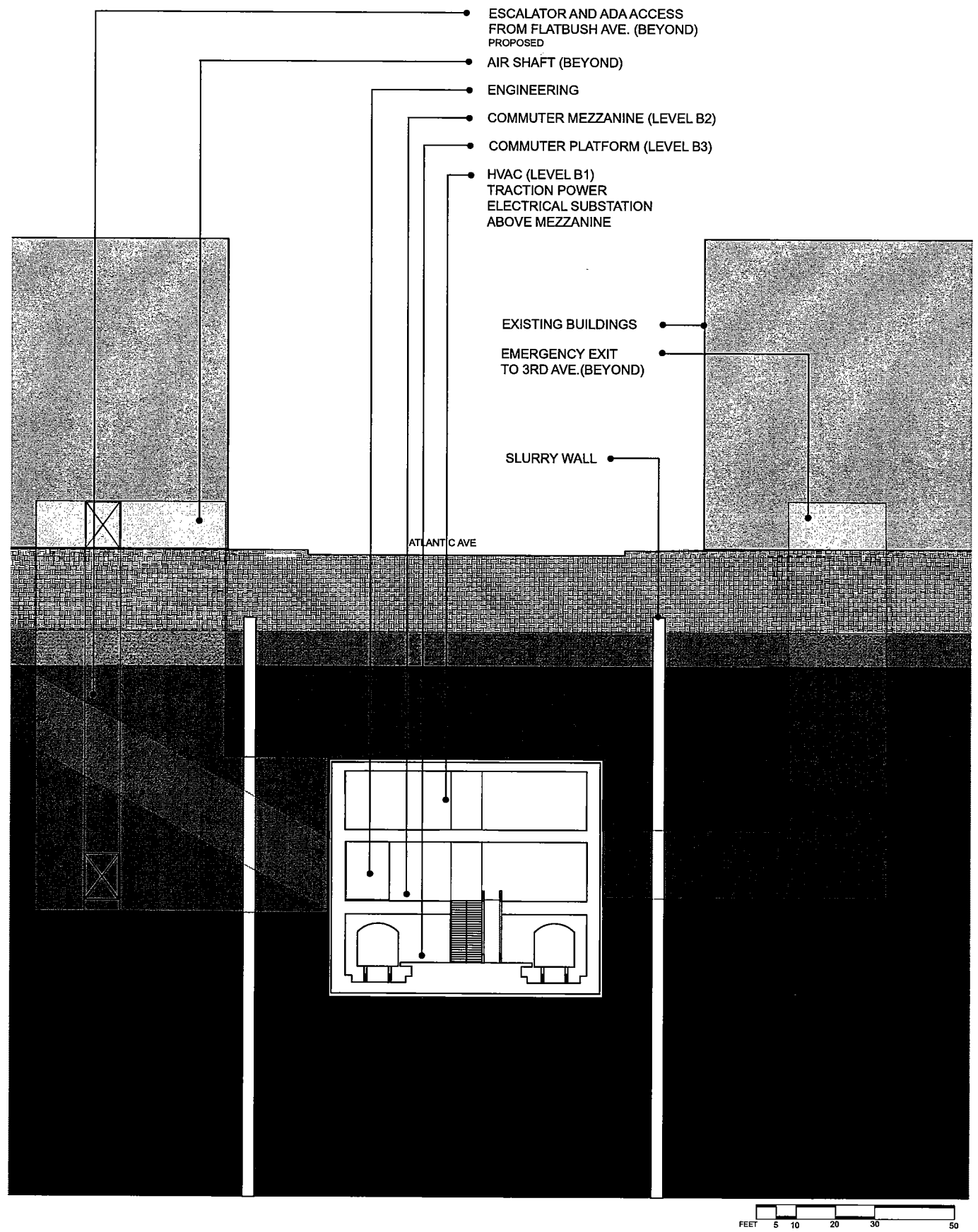
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
PLANS

SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST009	ISSUE FINAL
DRAWING No.: ST-009	SHEET No. 9 OF 23
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

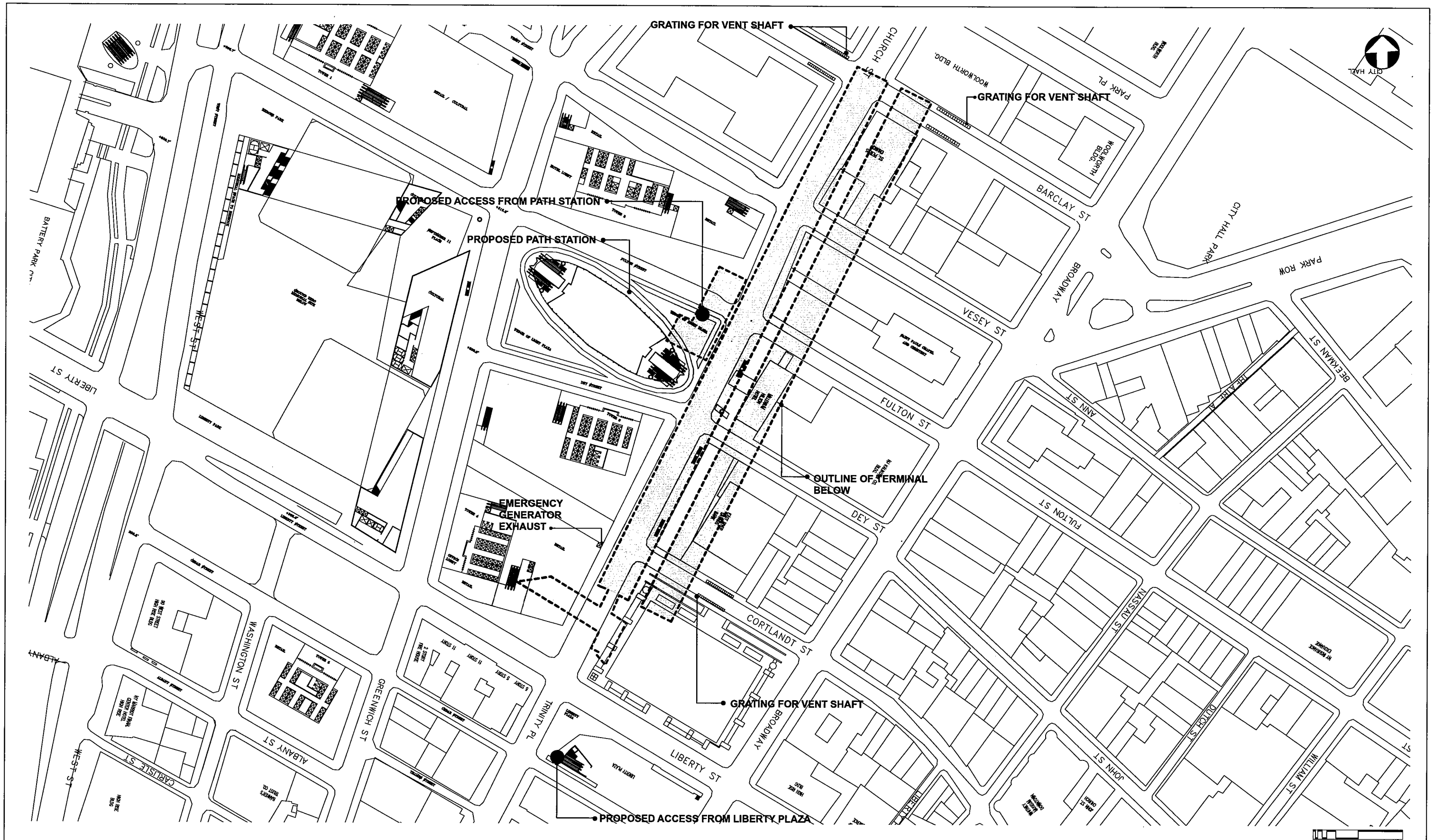
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
CROSS SECTION

SCALE: AS NOTED
FILE NAME: ST010
DRAWING No.: ST-010
DATE: 23 APR 04
CONTRACT No.
SSUE FINAL
SHEET No. 10 OF 23



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

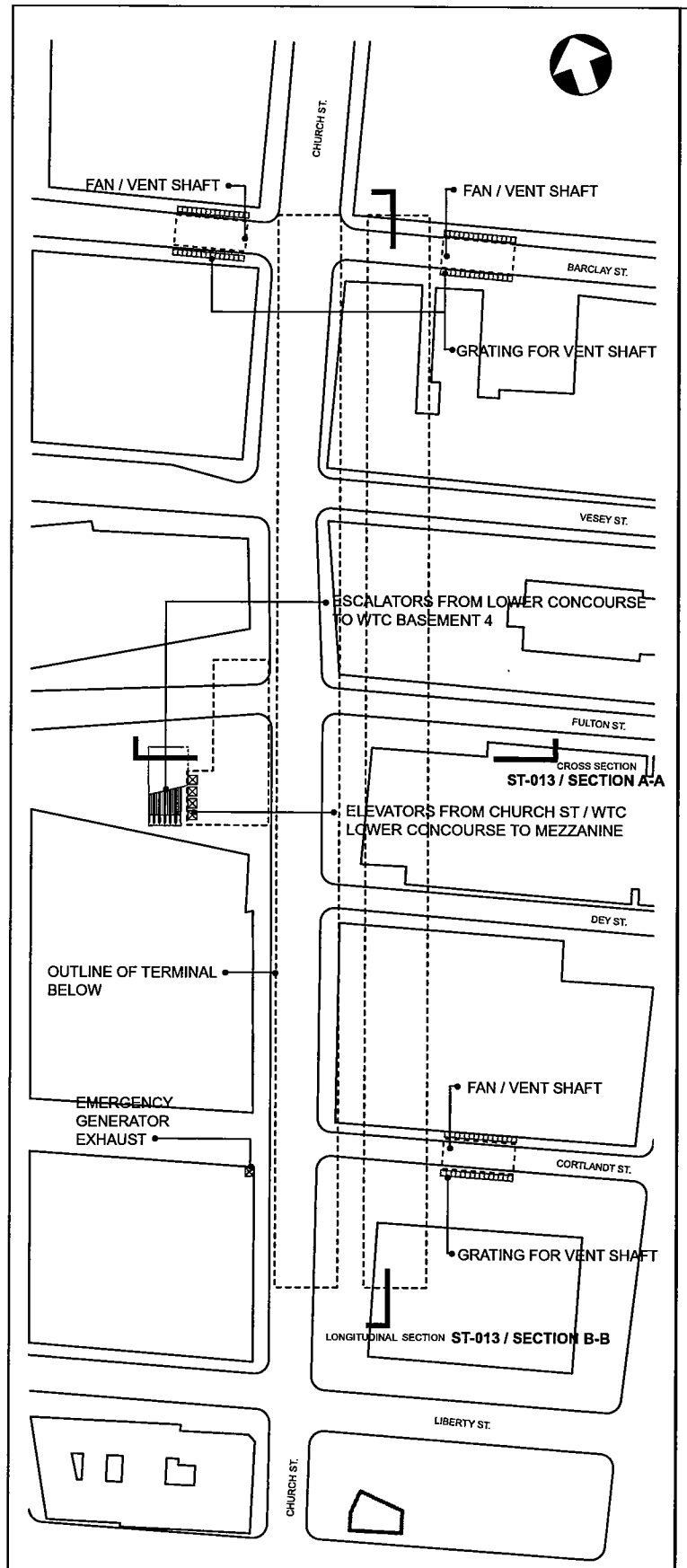
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

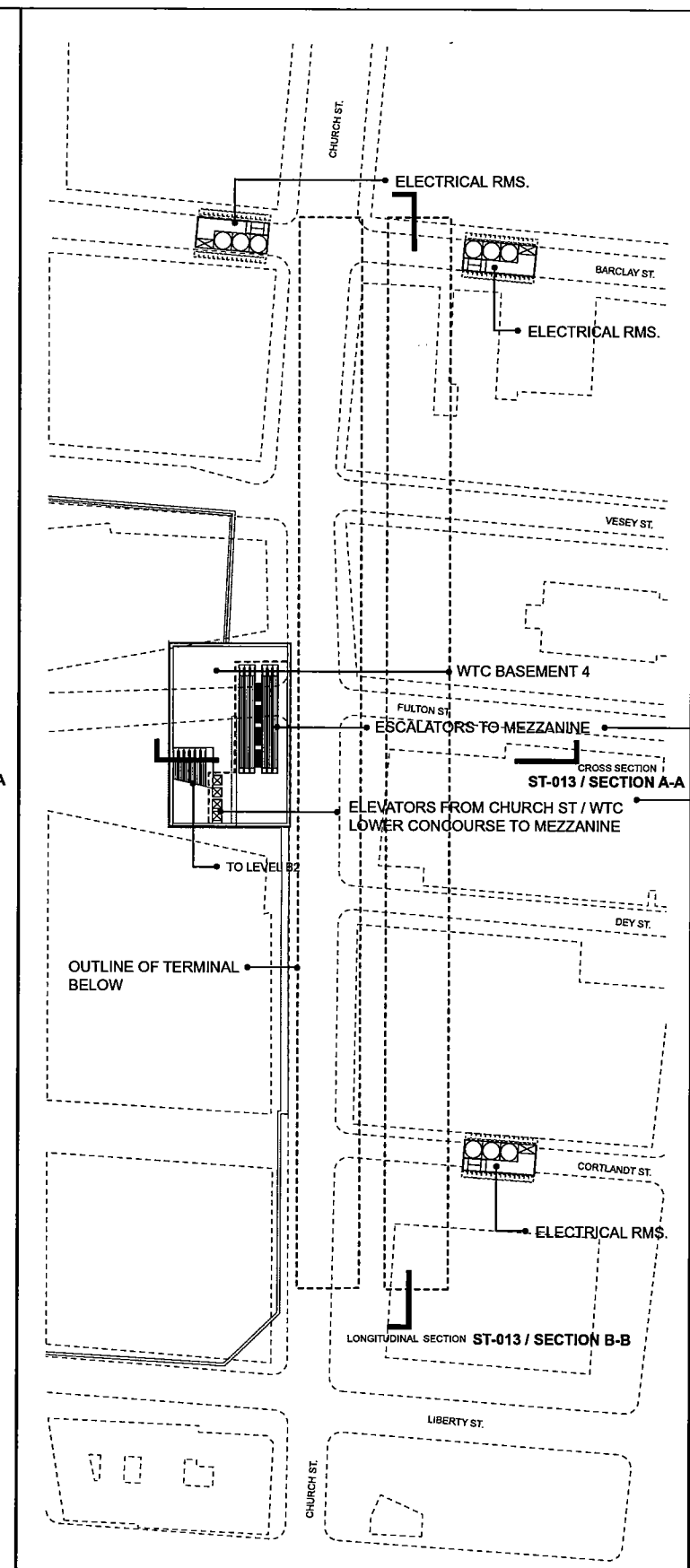
LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
SITE PLAN

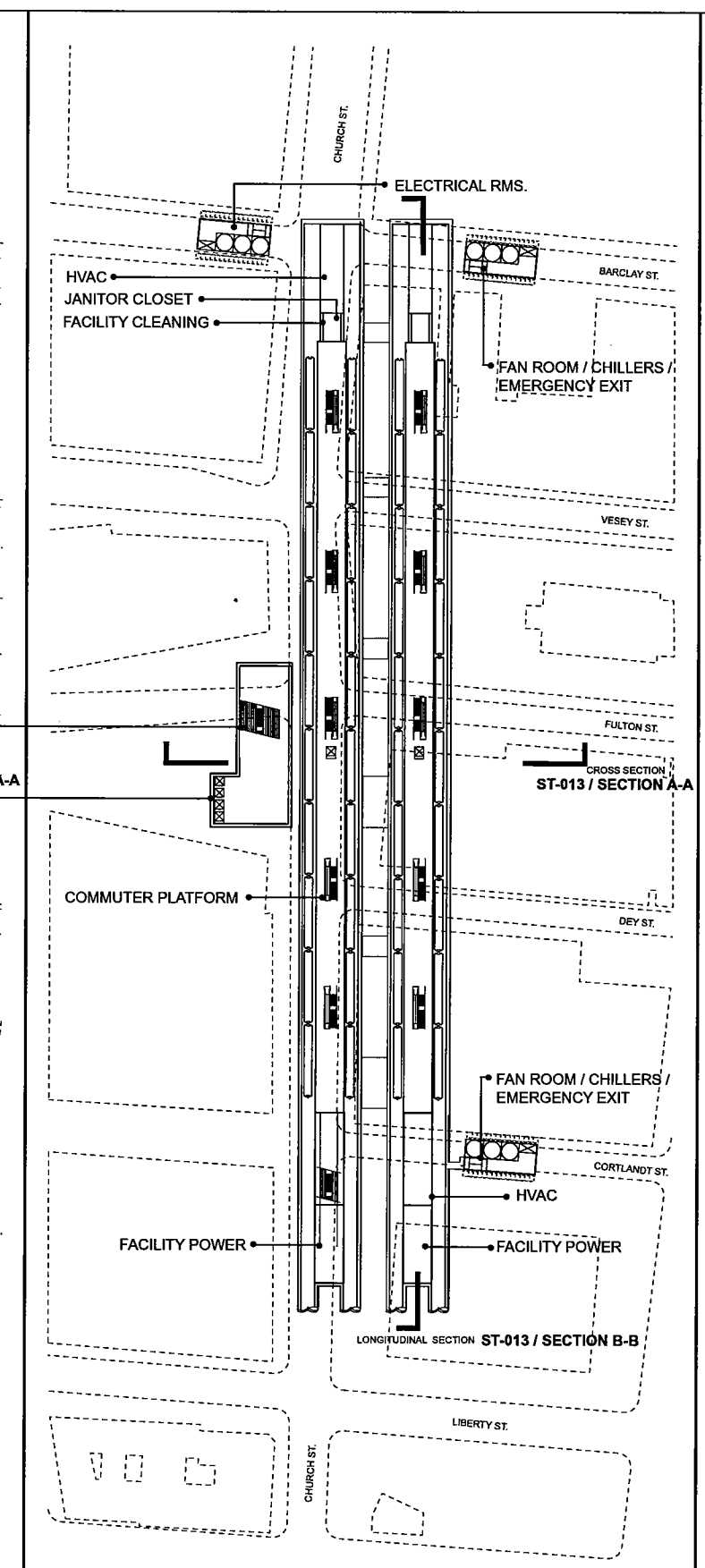
SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST011	ISSUE FINAL
DRAWING No.: ST-011	SHEET No. 11 OF 23
DATE: 23 APR 04	



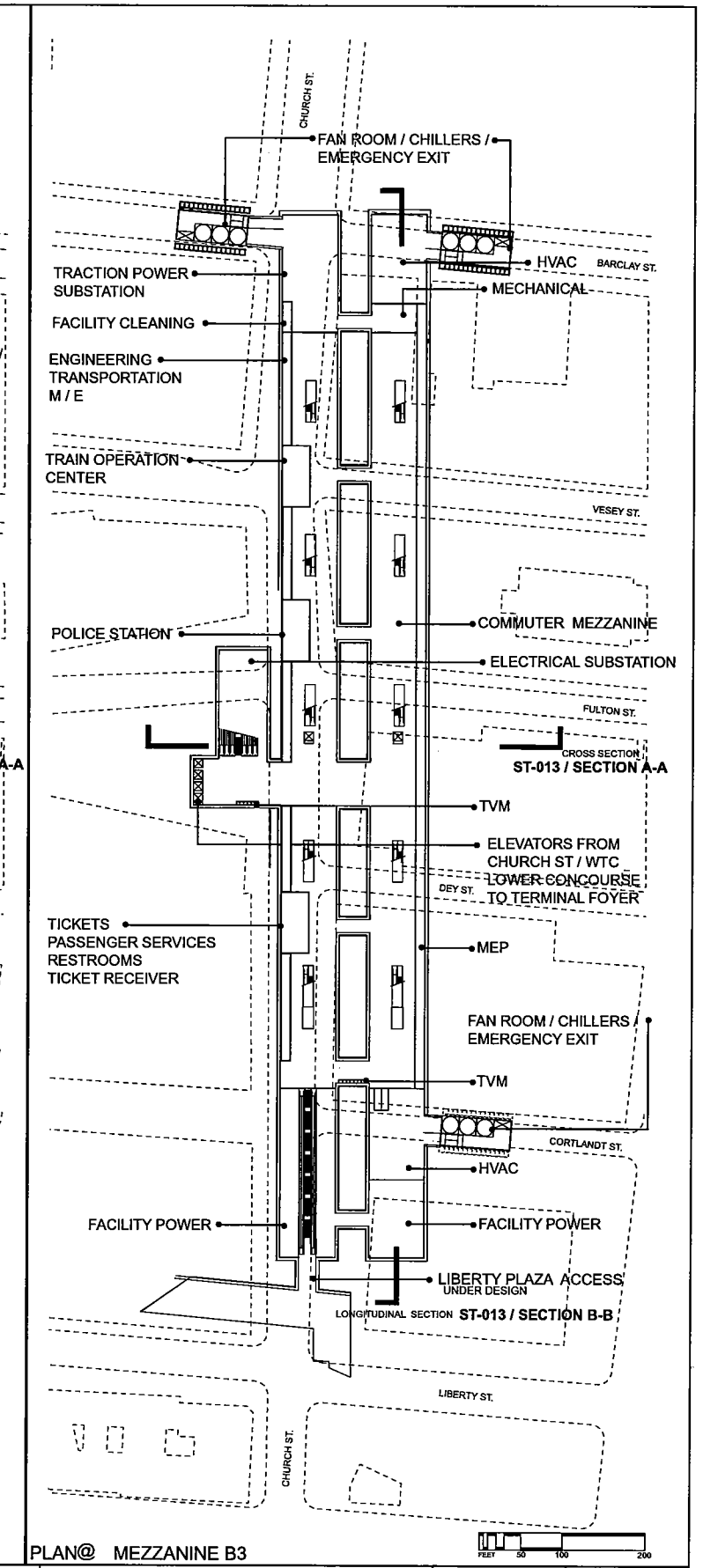
PLAN@ STREET LEVEL



PLAN@ LEVEL B1



PLAN@ PLATFORM B2



PLAN@ MEZZANINE B3

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

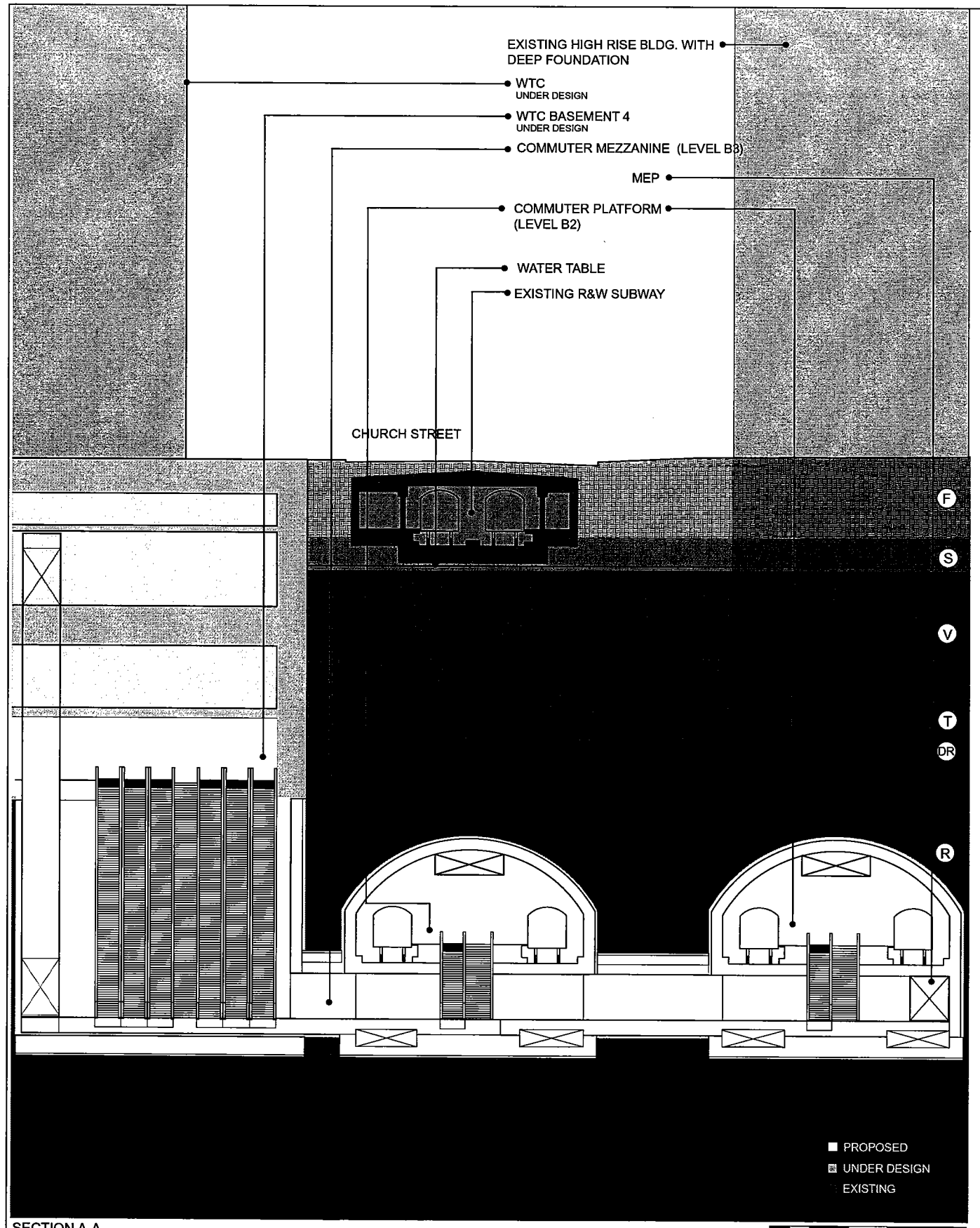
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

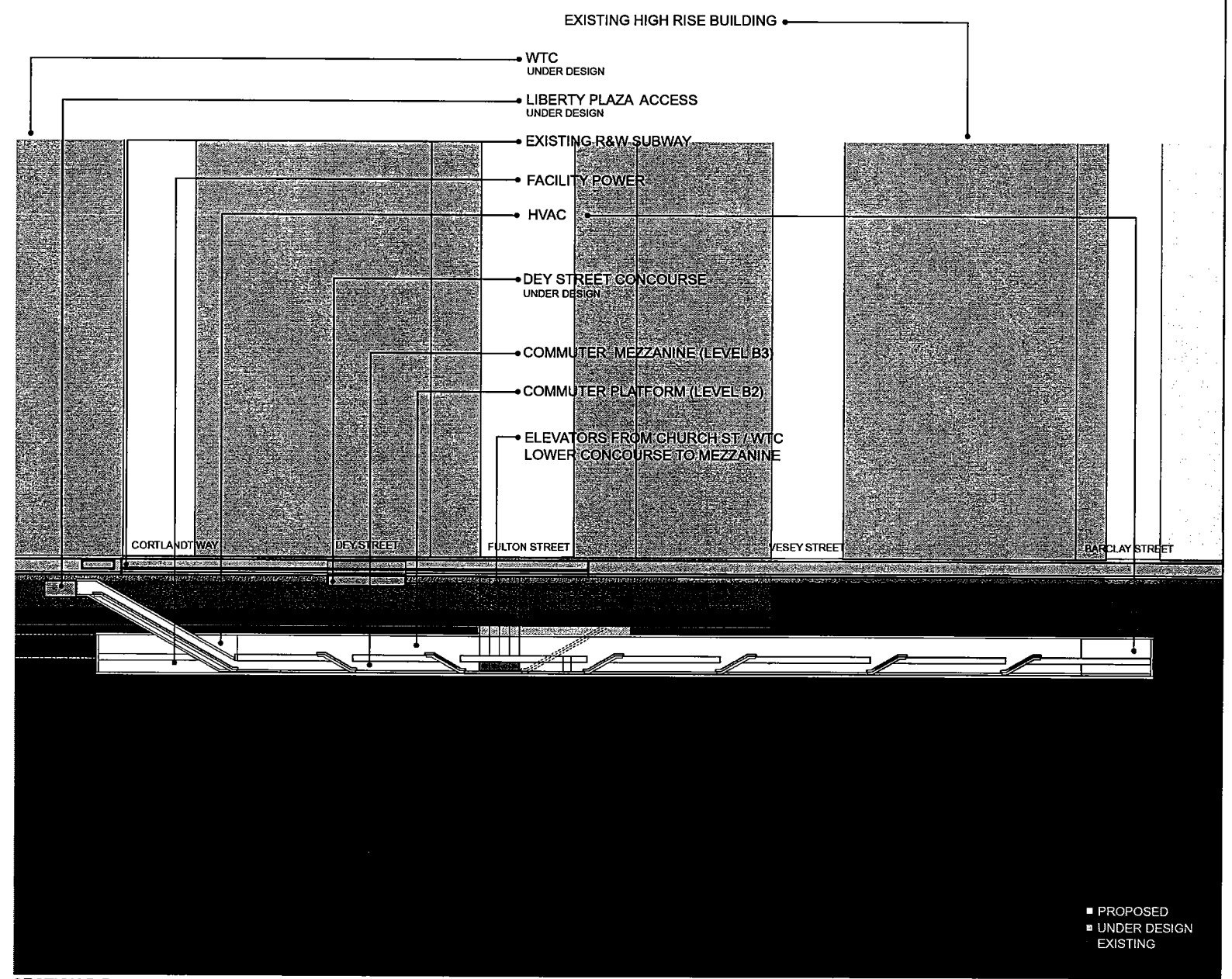
NEW LIRR TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
PLANS

SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST012	ISSUE FINAL
DRAWING No.: ST-012	SHEET No. 12 OF 23
DATE: 23 APR 04	



SECTION A-A

FEET 5 10 20 30 50



SECTION B-B

FEET 50 100 200

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

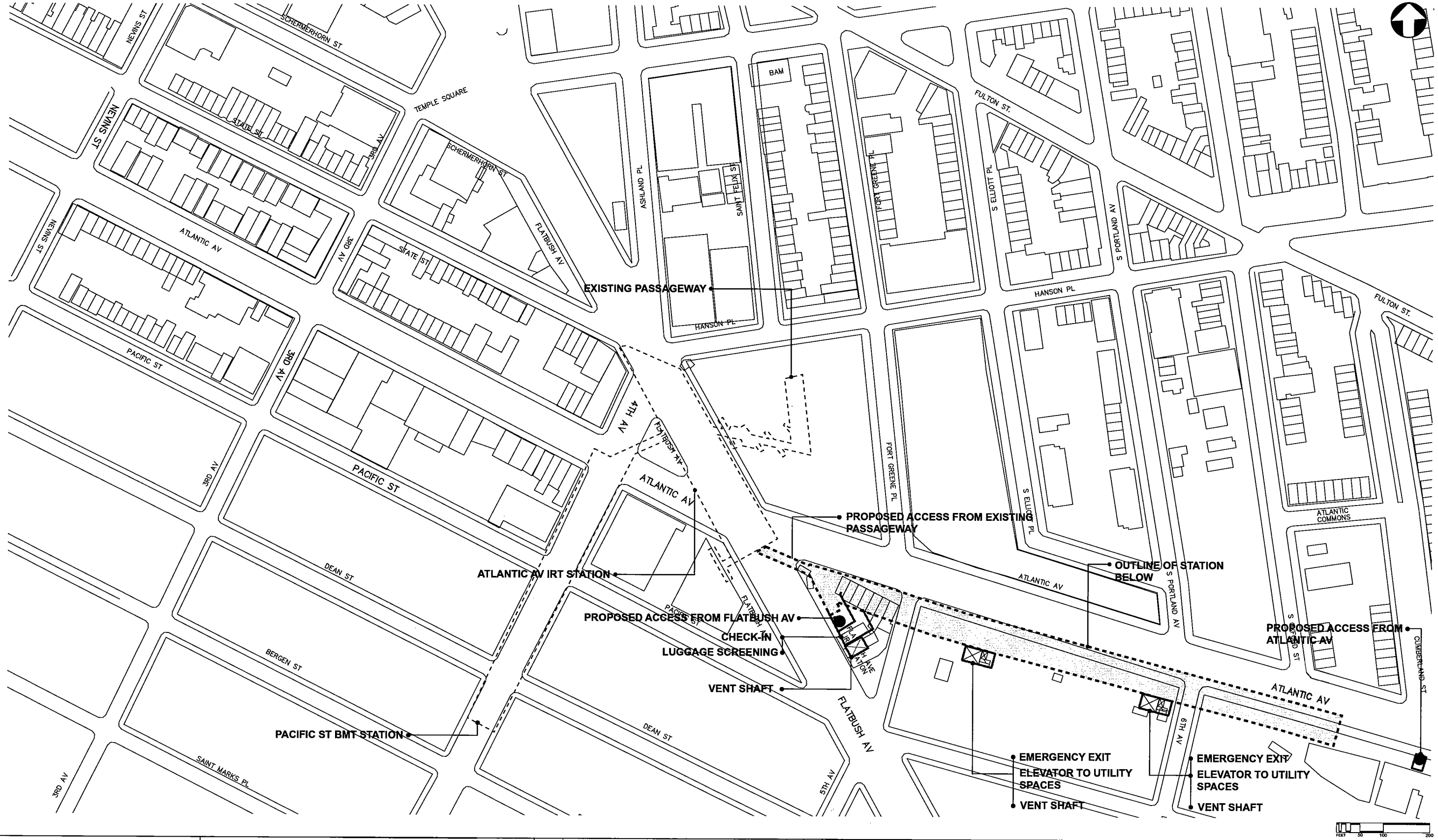
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

NEW LIRR TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
SECTIONS

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST013	ISSUE FINAL
DRAWING No.: ST-013	SHEET No. 13 OF 23
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

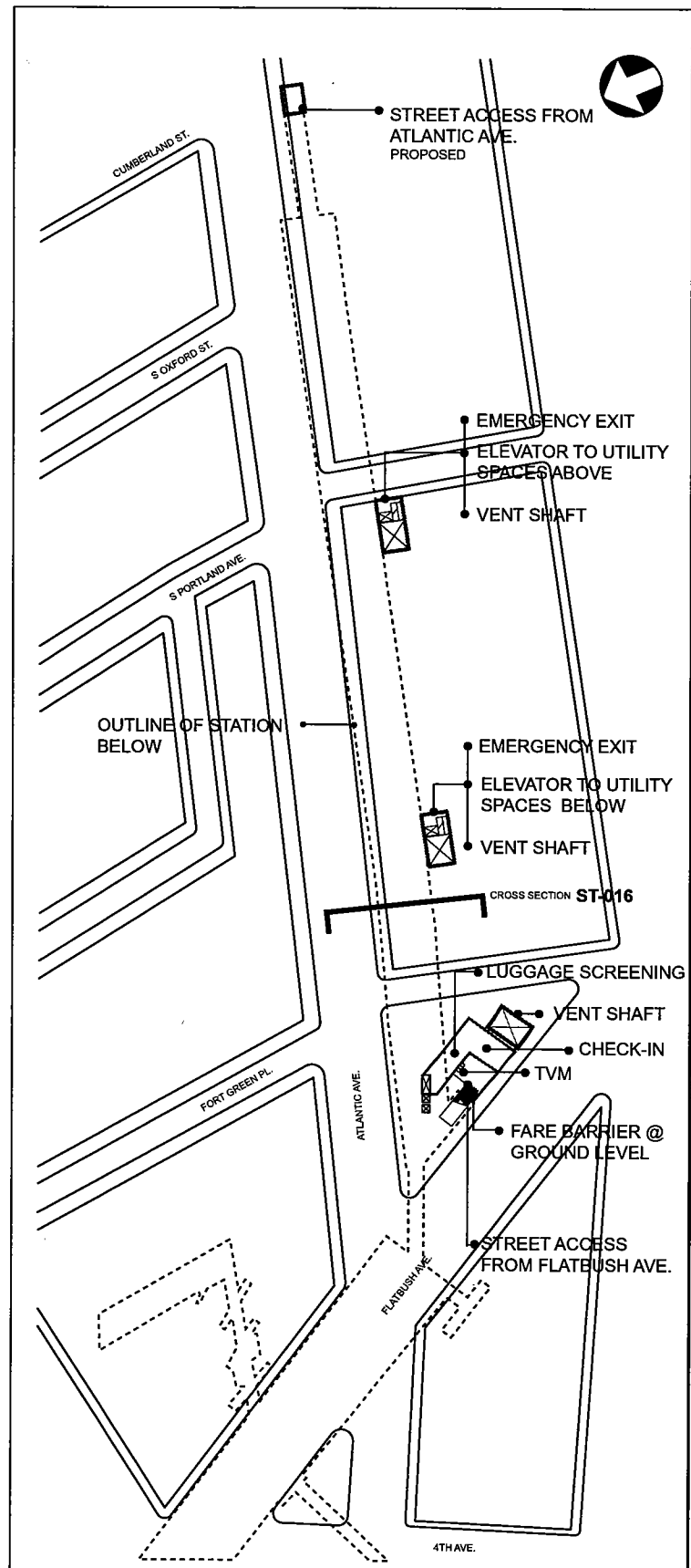
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

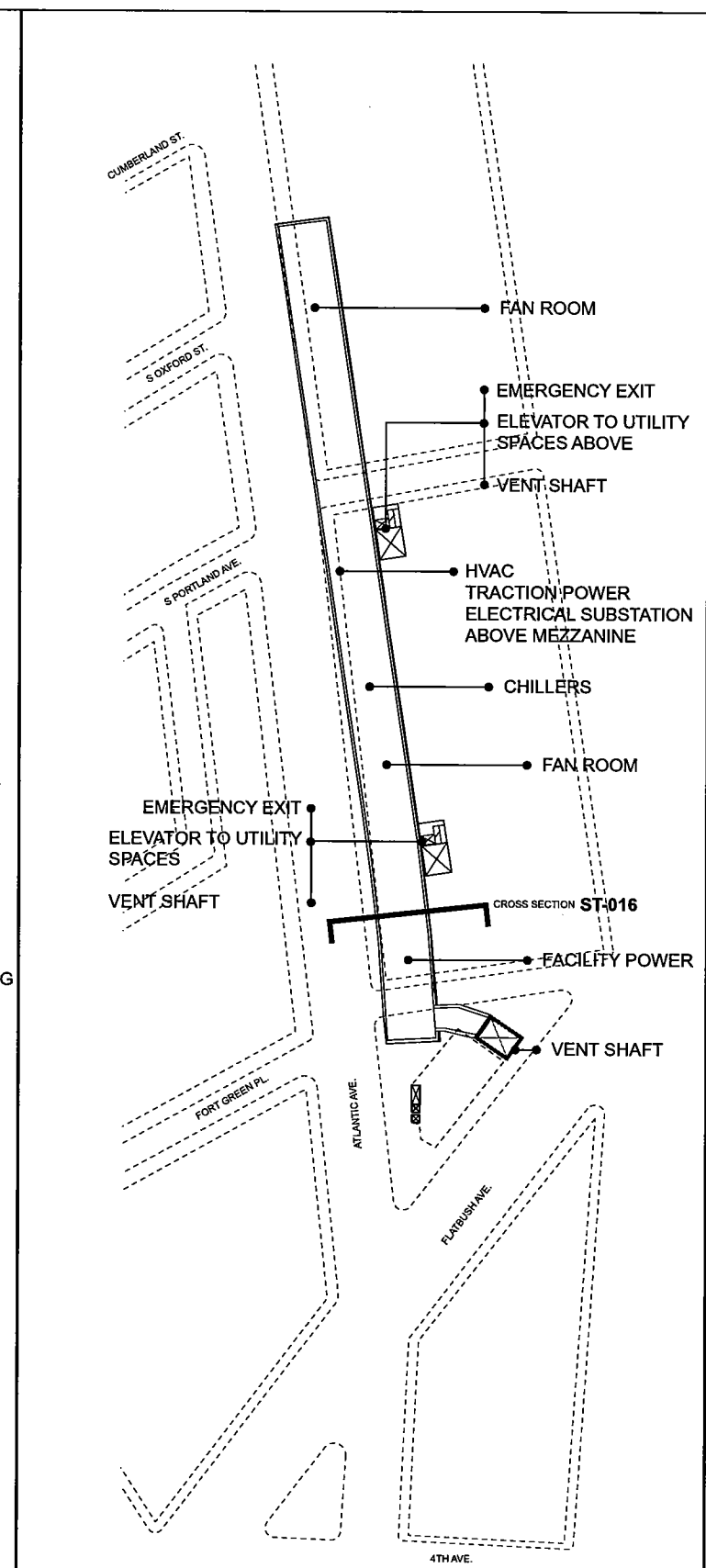
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
SITE PLAN

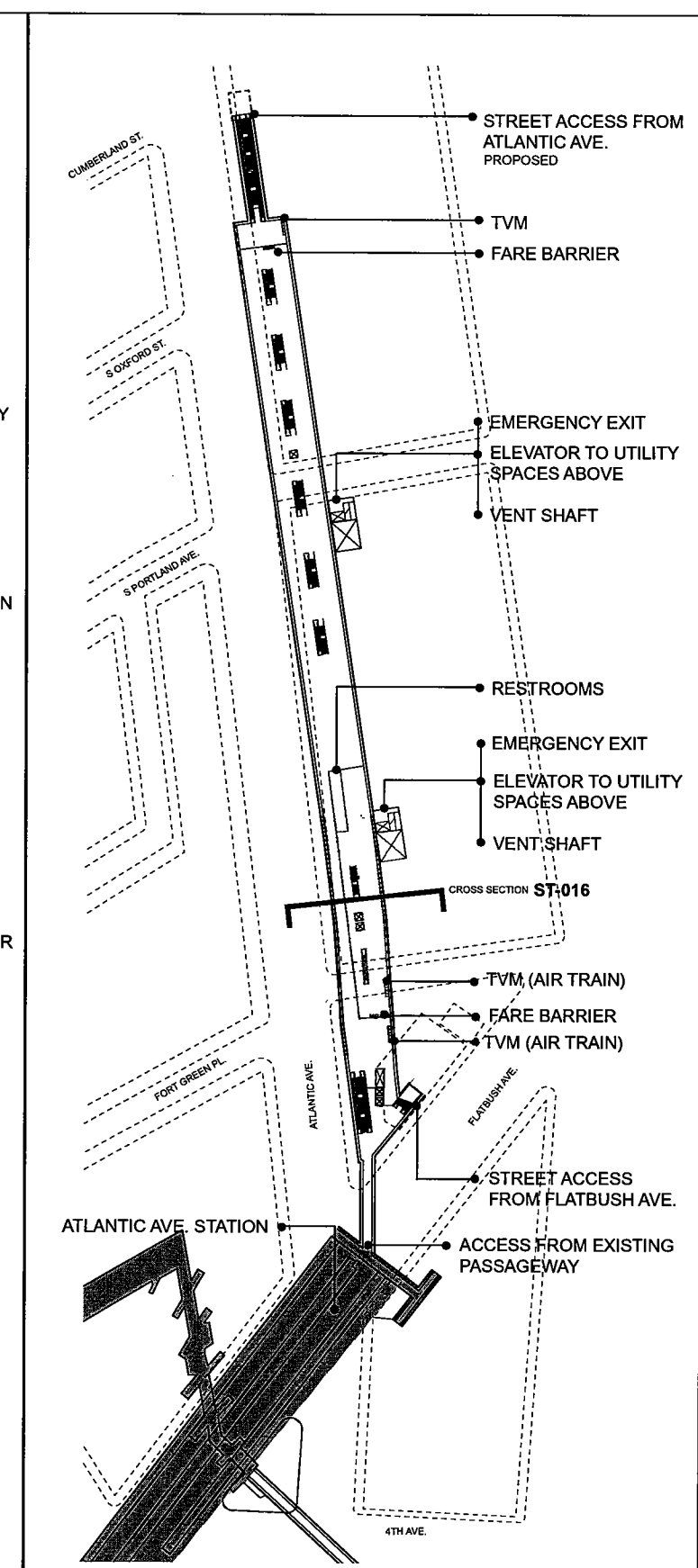
SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST014	ISSUE FINAL
DRAWING No.: ST-014	SHEET No. 14 OF 23
DATE: 23 APR 04	



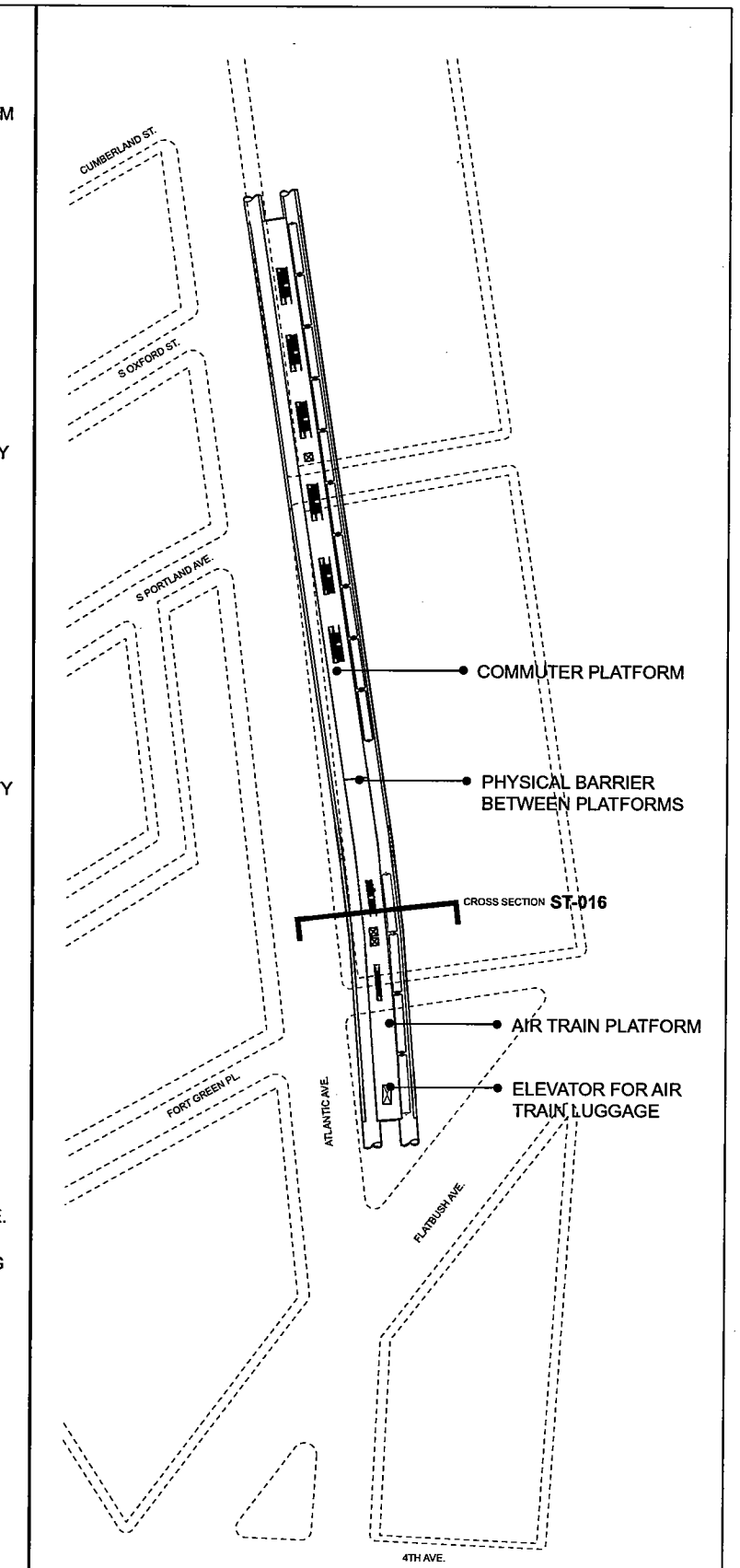
PLAN@ STREET LEVEL



PLAN@ LEVEL B1



PLAN@ MEZZANINE B2



PLAN@ PLATFORM B3

FEET 50 100 200

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

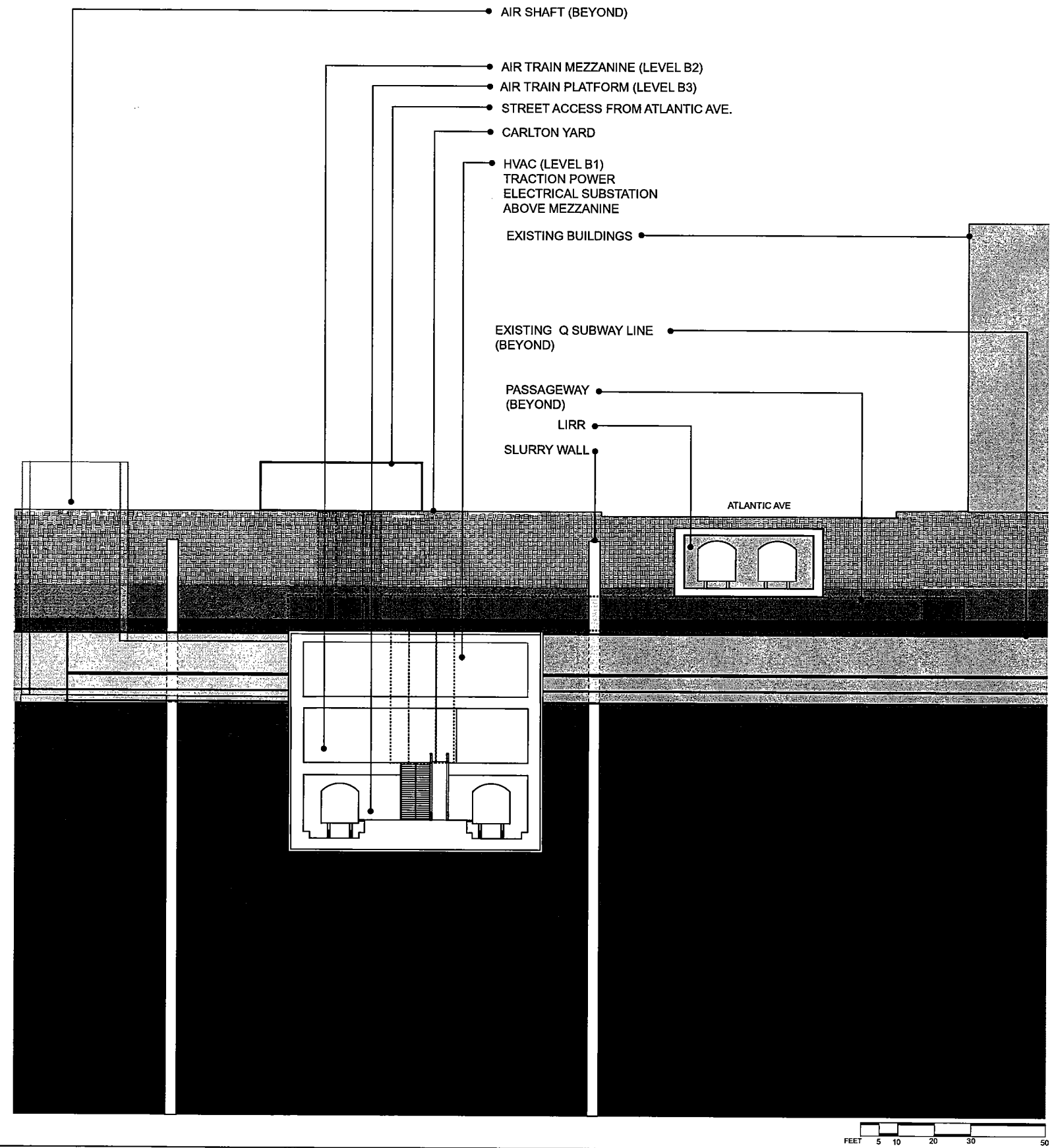
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
PLANS

SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST015	SSUE FINAL
DRAWING No.: ST-015	SHEET No. 15 OF 23
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

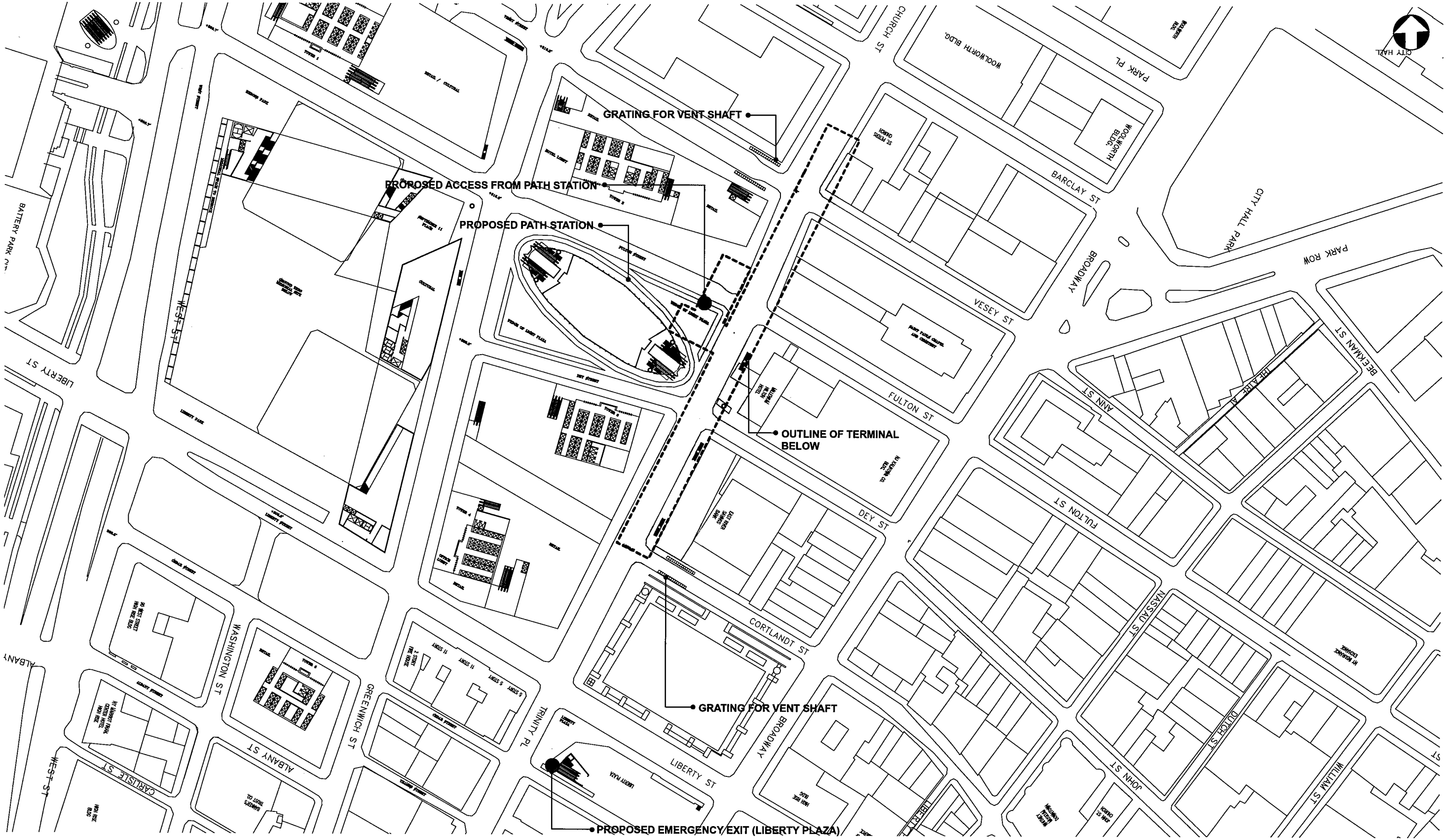
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
ATLANTIC AVENUE STATION
CROSS SECTION

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST016	SSUE FINAL
DRAWING No.: ST-016	SHEET No. 16 OF 23
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

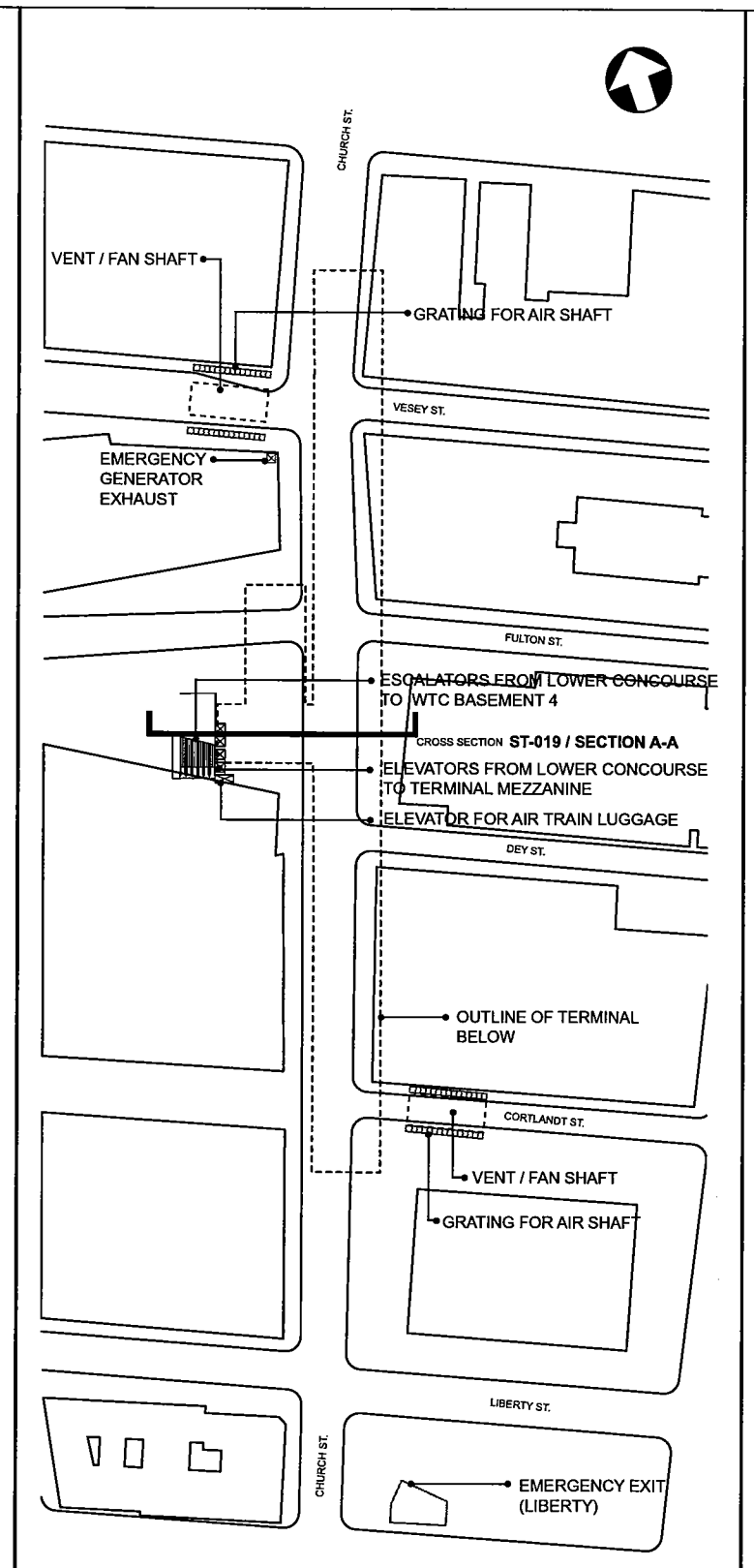
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

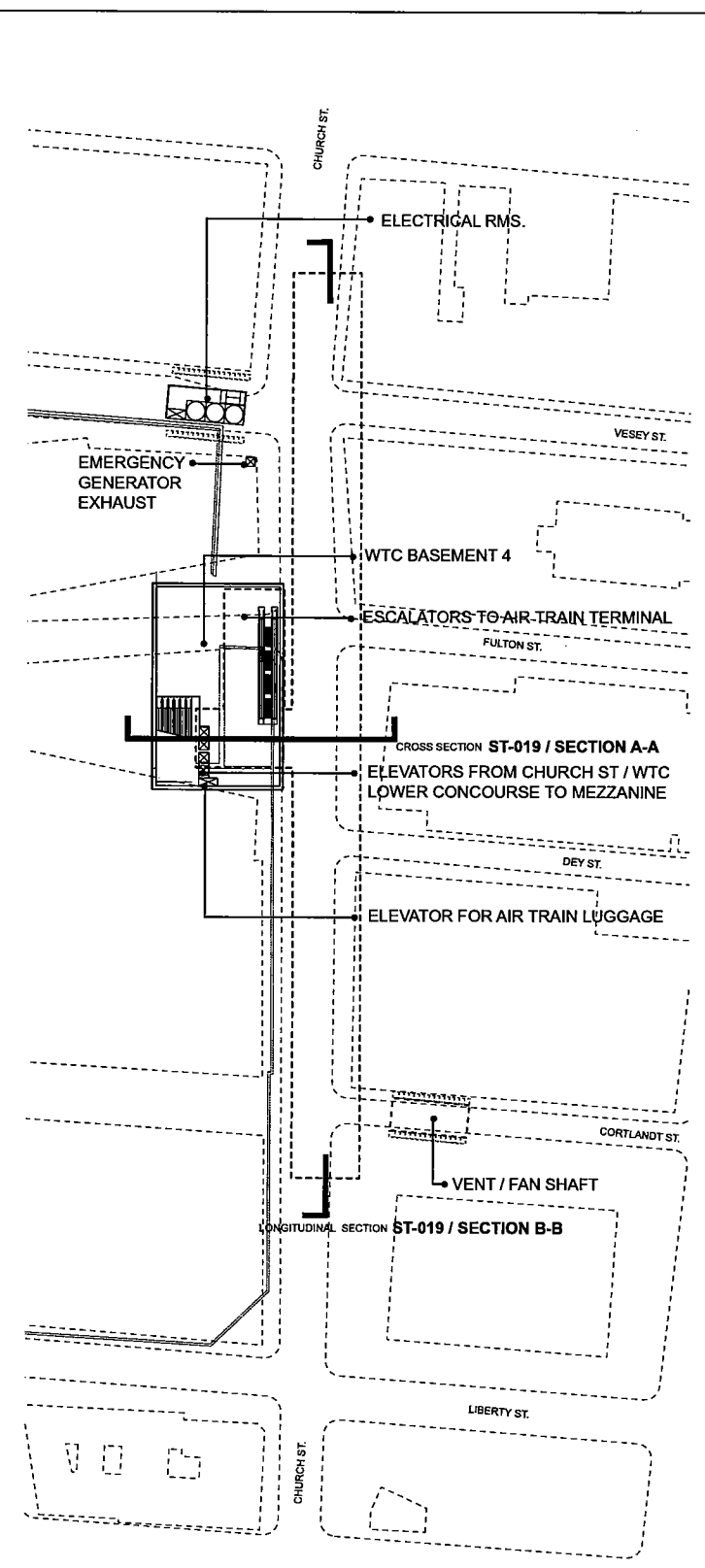
LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
MTA Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
SITE PLAN

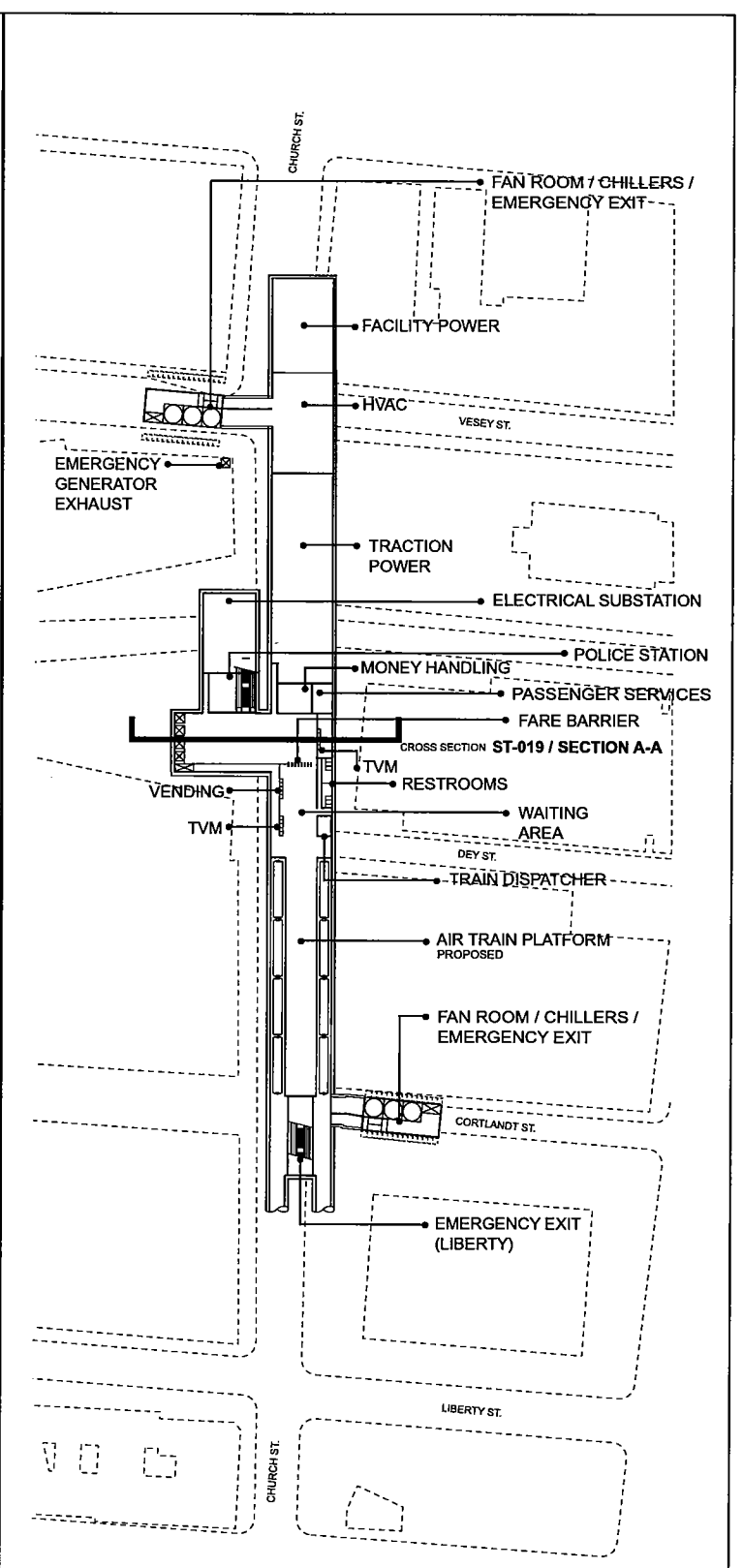
SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST017	ISSUE FINAL
DRAWING No.: ST-017	SHEET No.
DATE: 23 APR 04	17 OF 23



PLAN@ STREET LEVEL



PLAN@ LEVEL B1 (WTC LEVEL B4)



PLAN@ PLATFORM B2

FEET 50 100 200

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

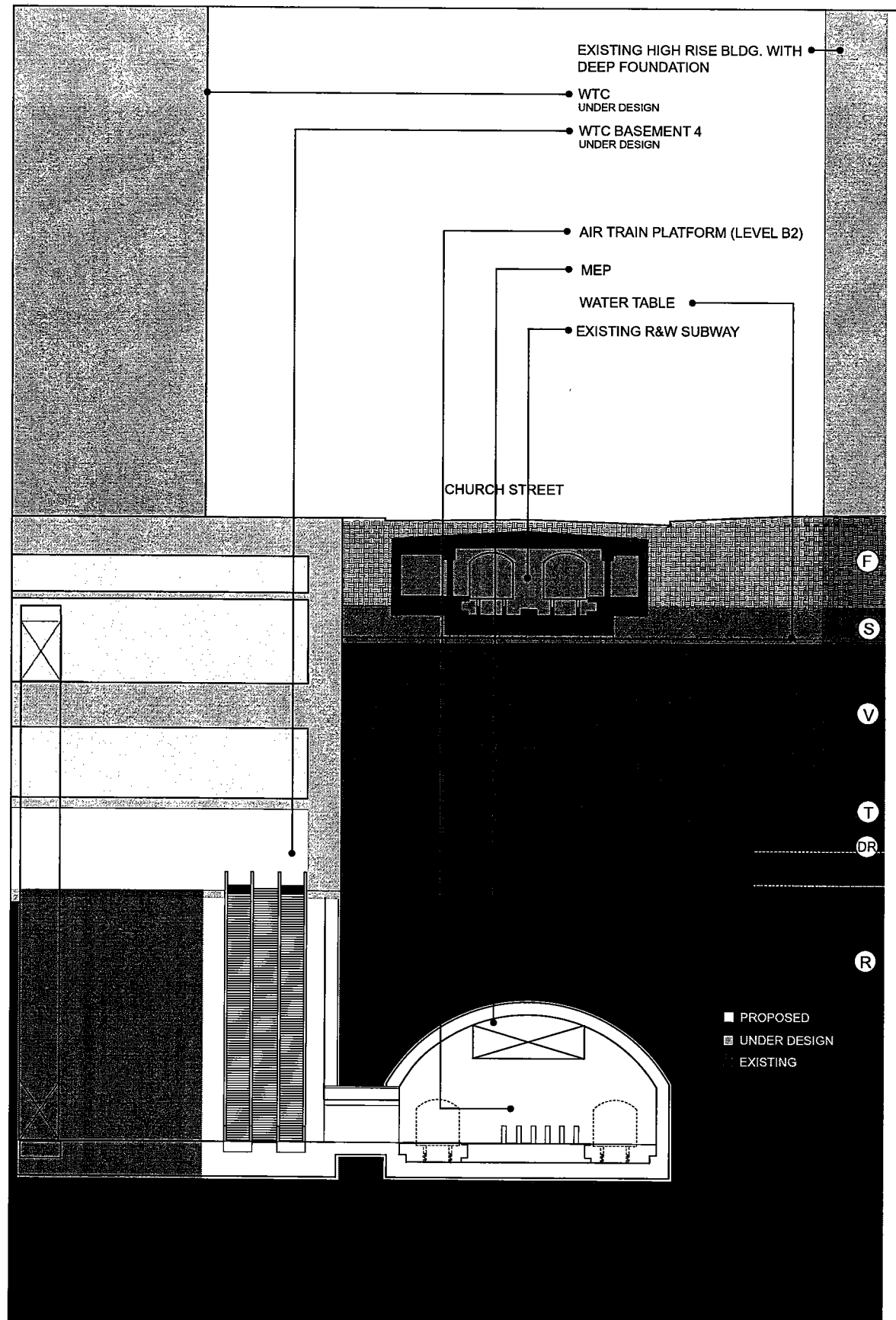
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

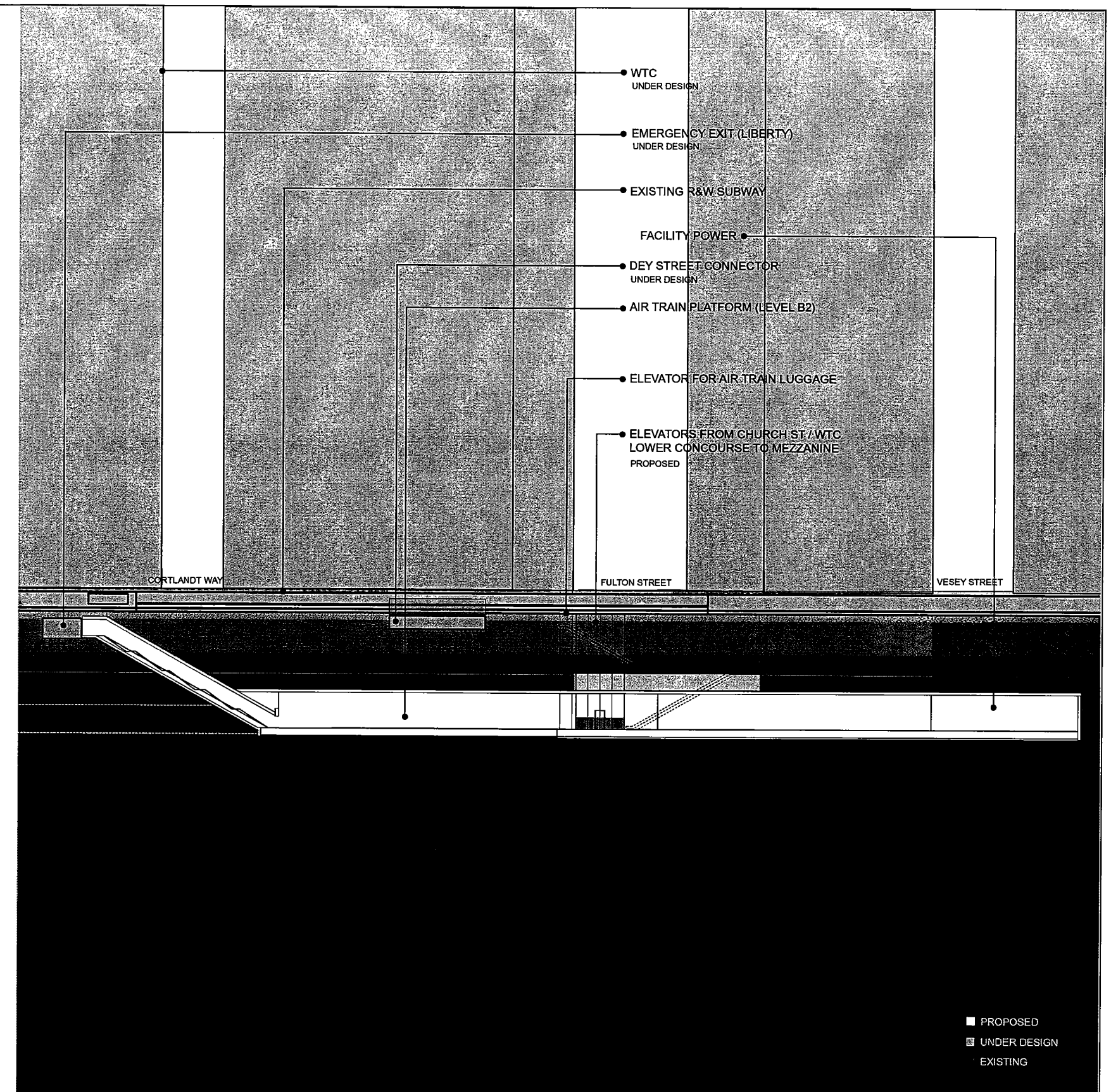
MONTAGUE TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
PLANS

SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST018	ISSUE FINAL
DRAWING No.: ST-018	SHEET No.
DATE: 23 APR 04	18 OF 23



SECTION A-A

FEET 5 10 20 30 50



SECTION B-B

FEET 50 100 200

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

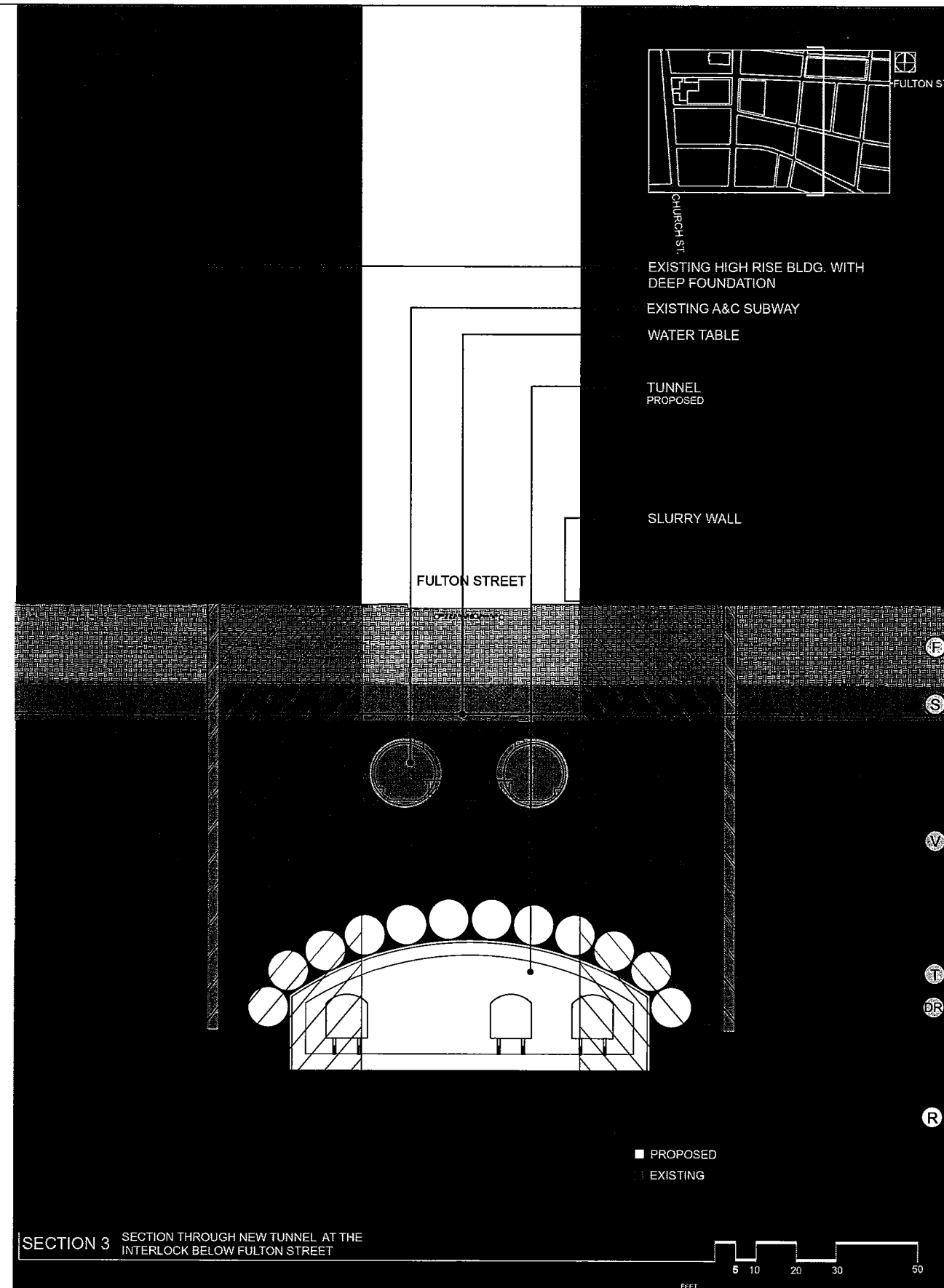
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

MONTAGUE TUNNEL ALTERNATIVE
LOWER MANHATTAN TERMINAL
SECTIONS

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST019	ISSUE FINAL
DRAWING No.: ST-019	SHEET No. 19 OF 23
DATE: 23 APR 04	



SECTION 3 SECTION THROUGH NEW TUNNEL AT THE INTERLOCK BELOW FULTON STREET

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

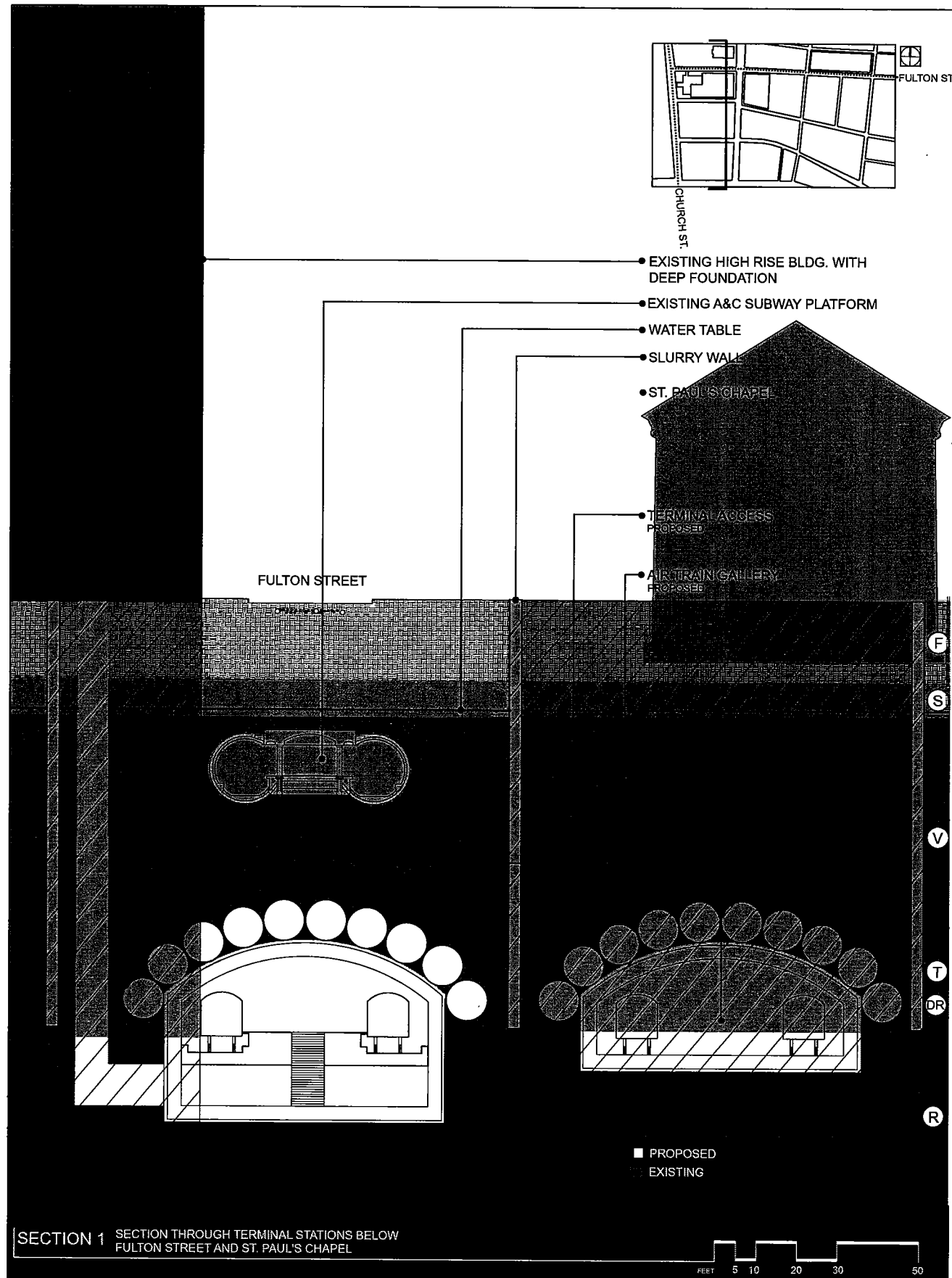
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

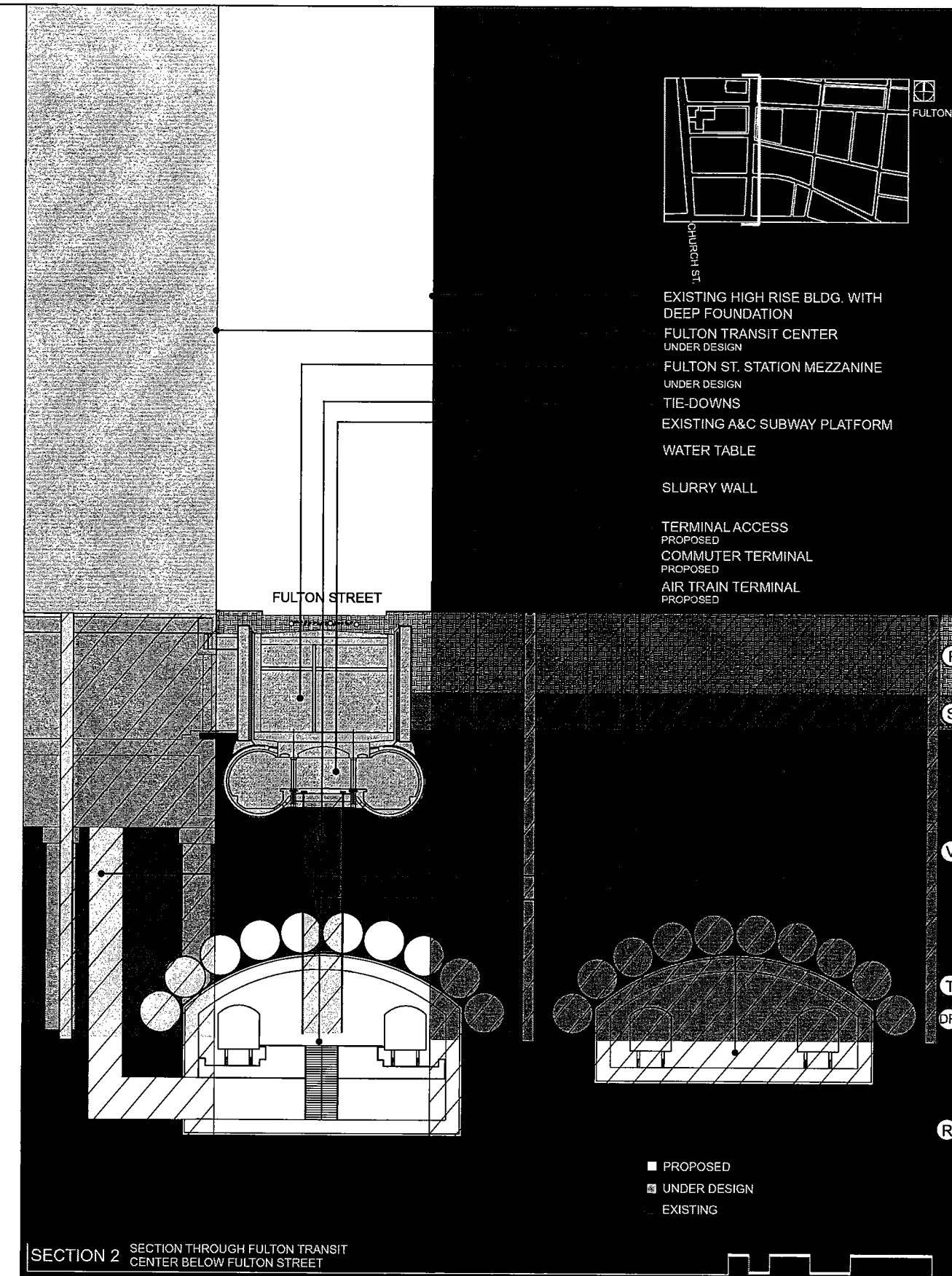
LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY
LOWER MANHATTAN TERMINAL
SECTION

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST020	ISSUE FINAL
DRAWING No.: ST-020	SHEET No. 20 OF 23
DATE: 23 APR 04	



SECTION 1 SECTION THROUGH TERMINAL STATIONS BELOW FULTON STREET AND ST. PAUL'S CHAPEL



SECTION 2 SECTION THROUGH FULTON TRANSIT CENTER BELOW FULTON STREET

Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

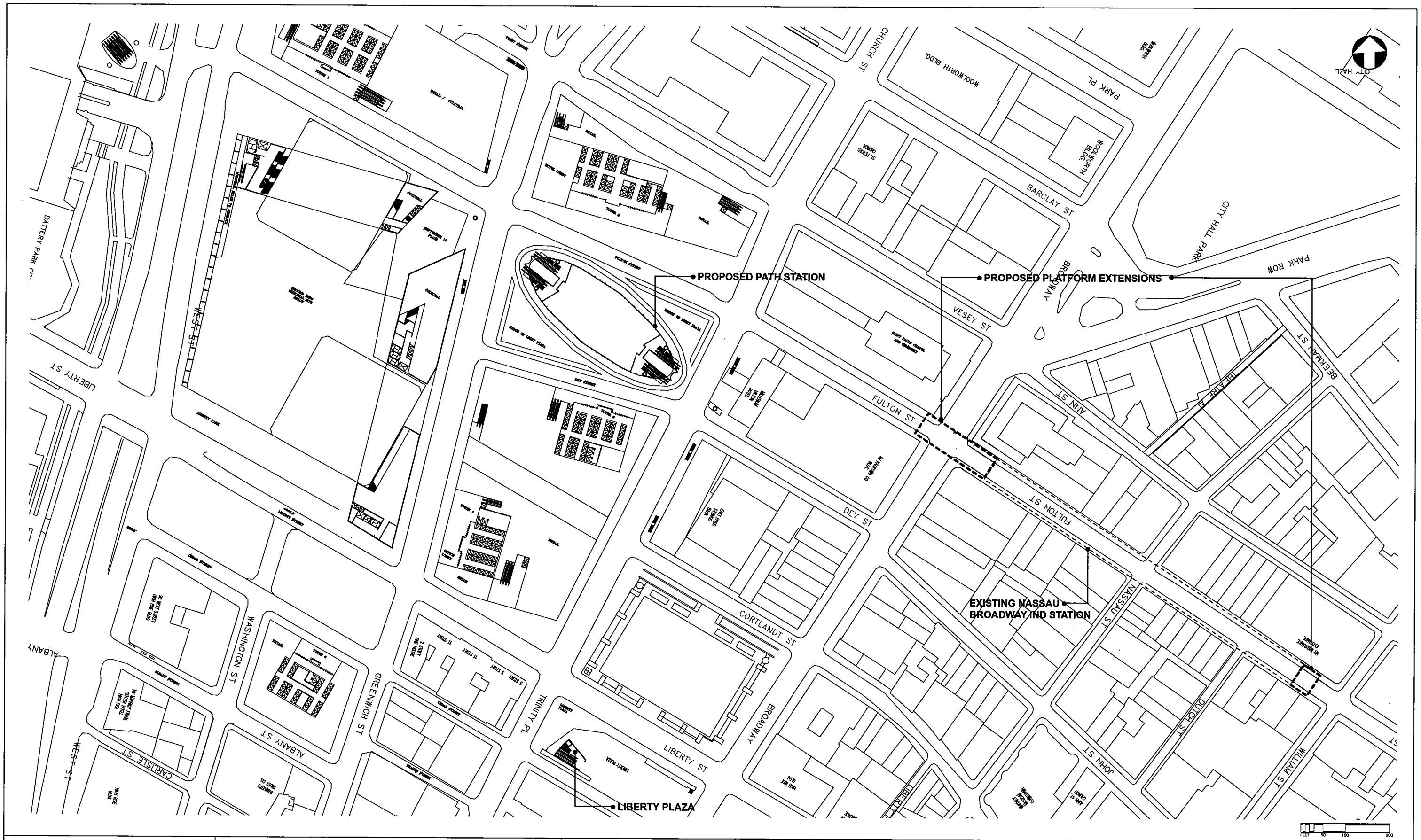
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE:	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY
LOWER MANHATTAN TERMINAL
SECTIONS

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST021	ISSUE FINAL
DRAWING No.: ST-021	SHEET No. 21 OF 23
DATE: 23 APR 04	



Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

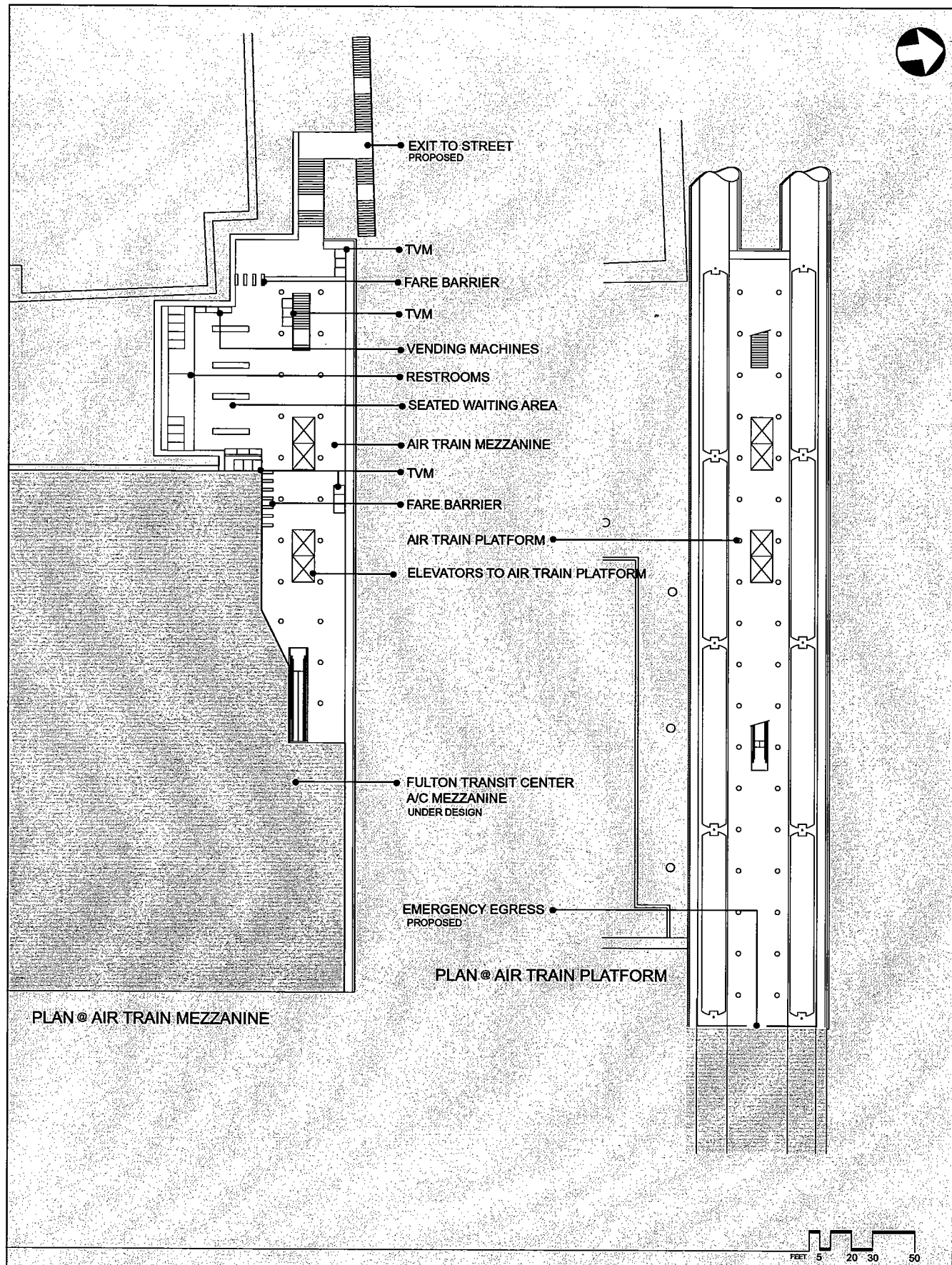
The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

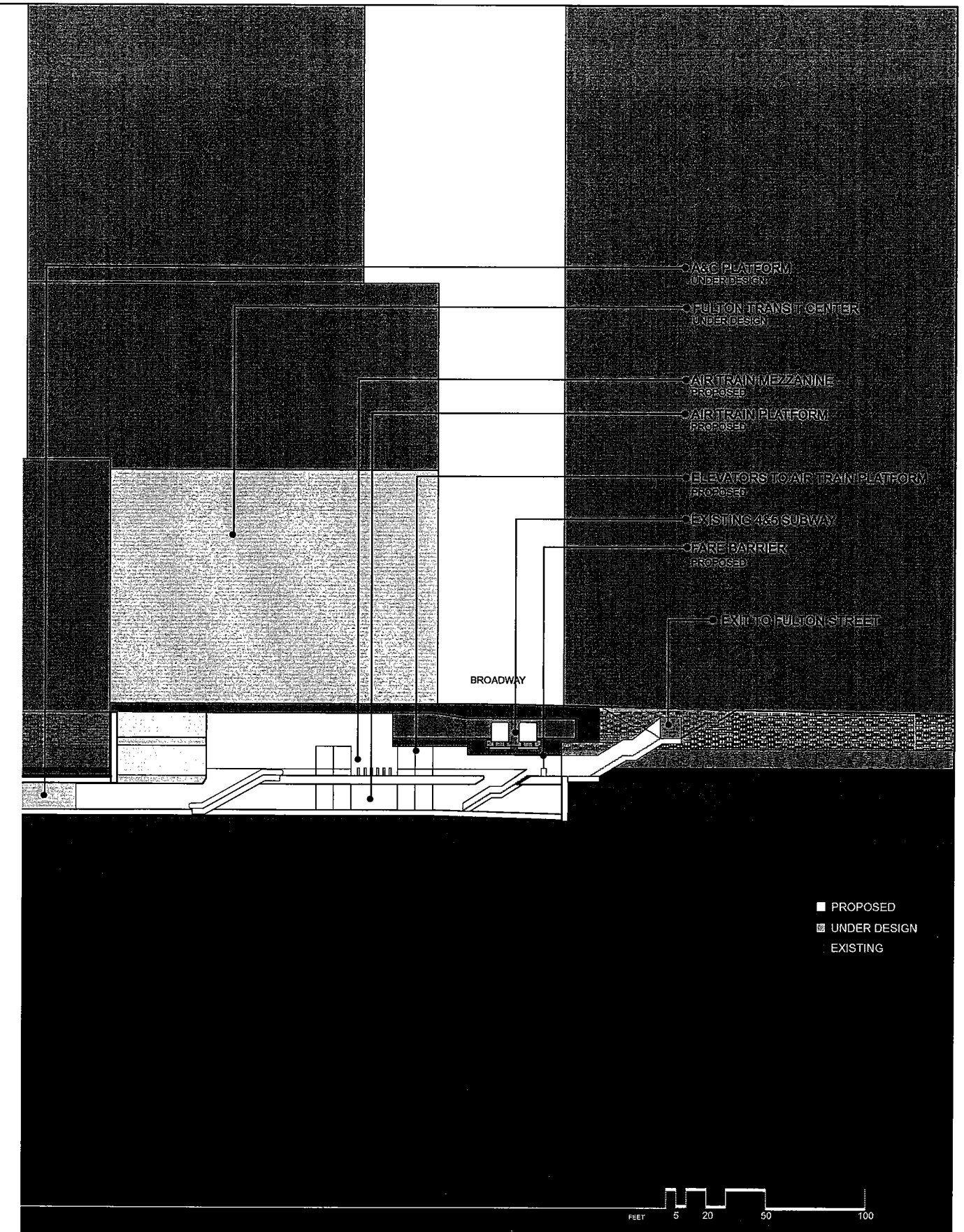
DATE	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
New York City Economic Development Corporation
Metropolitan Transportation Authority
THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
LOWER MANHATTAN TERMINAL
SITE PLAN

SCALE: 1"=200'	CONTRACT No.
FILE NAME: ST022	ISSUE FINAL
DRAWING No.: ST-022	SHEET No. 22 OF 23
DATE: 23 APR 04	





Lower Manhattan Airport and Commuter Access Alternatives Analysis

PARSONS SYSTRA ENGINEERING
A Joint Venture

The Louis Berger Group
El Taller Colaborativo, P.C.
Matthew A. Coogan
Project Planning & Analysis
Mueser Rutledge Consulting Engineers
LTK Engineering Services
MVA Ltd.
MarketSense

DATE	REVISIONS	No.

LMDC Lower Manhattan Development Corporation
Metropolitan Transportation Authority
New York City Economic Development Corporation
THE PORT AUTHORITY OF NY & NJ

CRANBERRY / MONTAGUE
LOWER MANHATTAN TERMINAL
PLANS AND SECTION

SCALE: AS NOTED	CONTRACT No.
FILE NAME: ST023	ISSUE FINAL
DRAWING No.: ST-023	SHEET No. 23 OF 23
DATE: 23 APR 04	