



Long Island Rail Road  
**East Side Access**



**CONTRACT DOCUMENT**

## **DRAWINGS**

**Contract CM009** (Re-Bid)  
Manhattan Tunnels Excavation

**BOOK 4 of 5**

Volume 1 of 2

*May 2006*

**CONFORMED, Addenda 1-10 Incorporated**




**Metropolitan Transportation Authority**  
Capital Construction  
State of New York




CONTRACT CM009											
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Long Island Rail Road  
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REVISIONS

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M. DELLA POSTA  
DRAWN BY:  
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MANHATTAN TUNNELS EXCAVATION

INDEX OF DRAWINGS  
SHEET 2

SCALE:  
NONE  
DRAWING NUMBER:  
CM009-IN-0002  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
2 OF 276

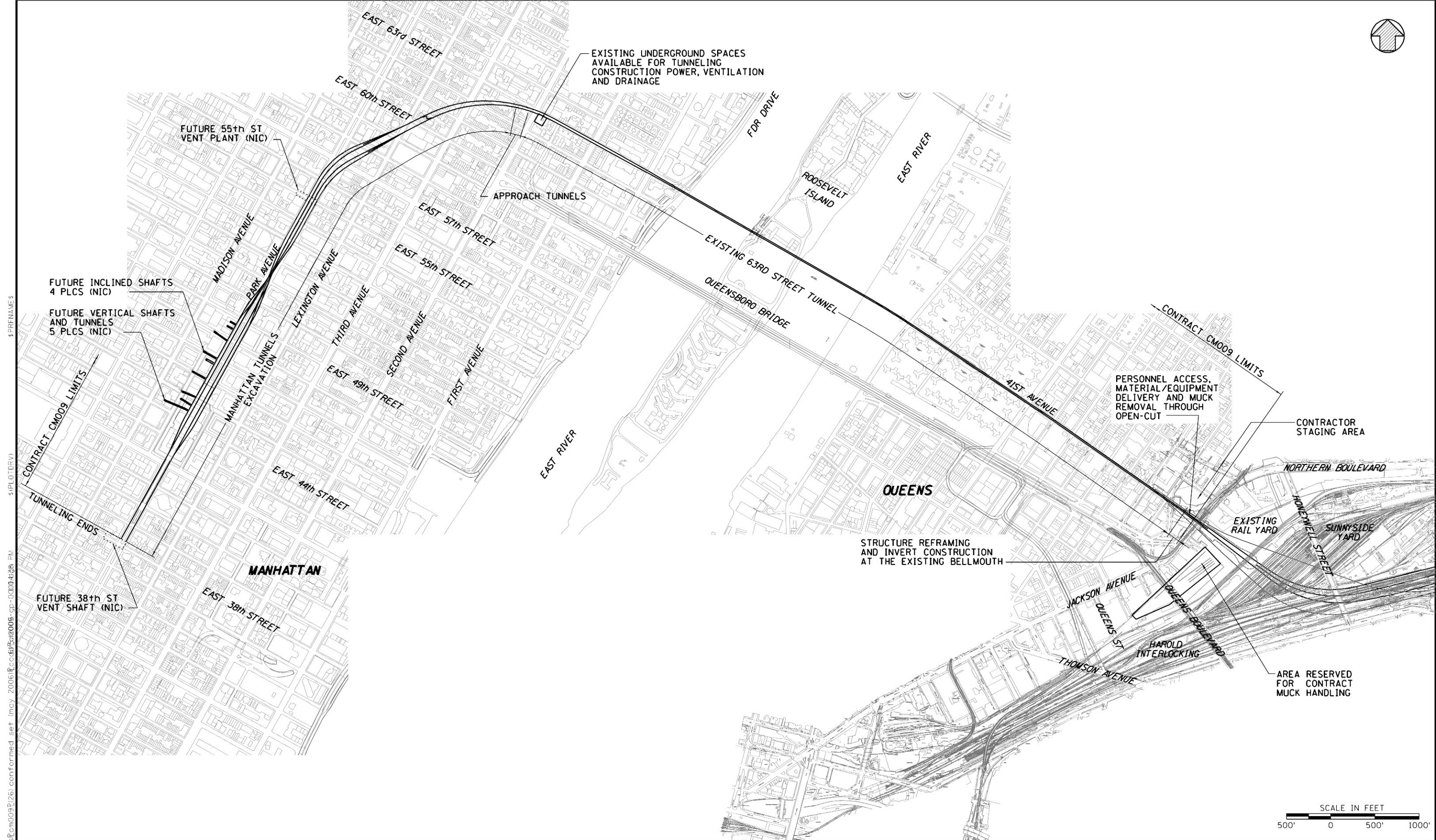


CONTRACT CM009													
SHEET No.	DWG No.	REVISION No.	DESCRIPTION	SHEET No.	DWG No.	REVISION No.	DESCRIPTION						
N/A	STD-TK-0126		STANDARD DRAWINGS (CONT'D)	N/A	STD-PR-0192		STANDARD DRAWINGS (CONT'D)						
N/A	STD-TK-0127		TRACK ALIGNMENT-UPPER LEVEL COMPOSITE ALIGNMENT PLAN-SHEET 7	N/A	STD-PR-0193		TRACK ALIGNMENT-TRACK T304 PROFILE-STA T304 20+97.38 TO STA T304 29+53.42						
			TRACK ALIGNMENT-UPPER LEVEL COMPOSITE ALIGNMENT PLAN-SHEET 8				TRACK ALIGNMENT-TRACK T304 PROFILE-STA T304 29+53.42 TO STA T304 32+97.10						
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N/A	STD-TK-0402		ALIGNMENT CURVE DATA-SHEET 2	N/A	STD-PR-0195		TRACK ALIGNMENT-TRACK BF2 PROFILE-STA BF2 1044+11.23 TO STA 1046+11.38						
N/A	STD-TK-0403		ALIGNMENT CURVE DATA-SHEET 3										
N/A	STD-TK-0404		ALIGNMENT CURVE DATA-SHEET 4	N/A	STD-PR-0250		TRACK ALIGNMENT-COMPOSITE PROFILE-STA 1+10 TO STA 1069+50						
N/A	STD-TK-0405		ALIGNMENT CURVE DATA-SHEET 5	N/A	STD-PR-0251		TRACK ALIGNMENT-COMPOSITE PROFILE-STA 1069+50 TO STA 1084+20						
N/A	STD-PR-0100		TRACK ALIGNMENT-TRACK L402 PROFILE-STA L402 1+10.00 TO STA L402 7+35	N/A	STD-CT-9001		SURVEY OF EXISTING 63RD STREET TUNNEL						
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N/A	STD-PR-0103		TRACK ALIGNMENT-TRACK T402 PROFILE-STA T402 20+97.38 TO STA T402 29+53.42	N/A	STD-CT-9004		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
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N/A	STD-PR-0105		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2 1048+30 TO STA EB2 1057+20	N/A	STD-CT-9006		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0106		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2 1057+20 TO STA EB2 1064+25	N/A	STD-CT-9007		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0107		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2 1064+25 TO STA EB2 1073+40	N/A	STD-CT-9008		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0108		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2 1073+40 TO STA EB2 1081+00	N/A	STD-CT-9009		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0109		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2 1081+00 TO STA EB2a 86+90	N/A	STD-CT-9010		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0110		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2a 86+90 TO STA EB2a 94+00	N/A	STD-CT-9011		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0111		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2a 94+00 TO STA EB2a 103+60	N/A	STD-CT-9012		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
				N/A	STD-CT-9013		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0112		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2a 103+60 TO STA EB2c 112+20	N/A	STD-CT-9014		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0113		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2c 112+20 TO STA EB2d 121+40	N/A	STD-CT-9015		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0114		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2d 121+40 TO STA EB2d 130+60	N/A	STD-CT-9016		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0115		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2d 130+60 TO STA EB2e 140+25	N/A	STD-CT-9017		63RD STREET TUNNEL - EXISTING CONDITIONS - PLAN AND PROFILE						
N/A	STD-PR-0116		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2e 140+25 TO STA EB2e 149+40	N/A	STD-CT-9018		63RD STREET TUNNEL - EXISTING CONDITIONS - AS-BUILT DETAILS						
N/A	STD-PR-0117		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2e 149+40 TO STA EB2f 158+50	N/A	STD-CT-9019		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0118		TRACK ALIGNMENT-TRACK EB2 PROFILE-STA EB2f 158+50 TO STA EB2f 167+70	N/A	STD-CT-9020		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0119		TRACK ALIGNMENT-TRACK EB2 & LL PROFILES-STA EB2f 167+70 TO STA LL 1172+21.71	N/A	STD-CT-9021		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
				N/A	STD-CT-9022		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0120		TRACK ALIGNMENT-TRACK L403 PROFILE-STA L403 1+10 TO STA L403 7+35	N/A	STD-CT-9023		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0121		TRACK ALIGNMENT-TRACK L403 PROFILE-STA L403 7+35 TO STA L403 16+70	N/A	STD-CT-9024		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0122		TRACK ALIGNMENT-TRACK L403 & T403 PROFILES-STA L403 16+70 TO STA T403 20+97.38	N/A	STD-CT-9025		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0123		TRACK ALIGNMENT-TRACK T403 PROFILE-STA T403 20+97.38 TO STA T403 29+53.42	N/A	STD-CT-9026		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0124		TRACK ALIGNMENT-TRACK T403 AND WB1 PROFILES-STA T403 29+53.42 TO STA WB1 1048+30	N/A	STD-CT-9027		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0125		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 1048+30 TO STA WB1 1057+20	N/A	STD-CT-9028		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0126		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 1057+20 TO STA WB1 1064+25	N/A	STD-CT-9029		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0127		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 1064+25 TO STA WB1 1073+40	N/A	STD-CT-9030		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0128		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 1073+40 TO STA WB1 1081+00	N/A	STD-CT-9031		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0129		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 1081+00 TO STA WB1 86+90	N/A	STD-CT-9032		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
				N/A	STD-CT-9033		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0130		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 86+90 TO STA WB1 94+00	N/A	STD-CT-9034		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0131		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 94+00 TO STA WB1 103+60	N/A	STD-CT-9035		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0132		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 103+60 TO STA WB1 112+20	N/A	STD-CT-9036		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0133		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 112+20 TO STA WB1 121+40	N/A	STD-CT-9037		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0134		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 121+40 TO STA WB1 130+60	N/A	STD-CT-9038		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0135		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 130+60 TO STA WB1 140+25	N/A	STD-CT-9039		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0136		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 140+25 TO STA WB1 149+40	N/A	STD-CT-9040		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0137		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 149+40 TO STA WB1 158+50	N/A	STD-CT-9041		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0138		TRACK ALIGNMENT-TRACK WB1 PROFILE-STA WB1 158+50 TO STA WB1 167+70	N/A	STD-CT-9042		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0139		TRACK ALIGNMENT-TRACK WB1 & A PROFILES-STA WB1 167+70 TO STA A 1172+21.71	N/A	STD-CT-9043		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
				N/A	STD-CT-9044		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0140		TRACK ALIGNMENT-TRACK L401 PROFILE-STA L401 12+00 TO STA L401 16+70	N/A	STD-CT-9045		63RD STREET TUNNEL - EXISTING CONDITIONS - CROSS SECTIONS						
N/A	STD-PR-0141		TRACK ALIGNMENT-TRACK L401 & T401 PROFILES-STA L401 16+70 TO STA T401 20+97.38										
N/A	STD-PR-0142		TRACK ALIGNMENT-TRACK T401 PROFILE-STA T401 20+97.38 TO STA T401 29+53.42	N/A	STD-GN-0005		ABBREVIATIONS FOR PUBLICATIONS, AGENCIES AND ASSOCIATIONS						
N/A	STD-PR-0143		TRACK ALIGNMENT-TRACK T401 PROFILE-STA T401 29+53.42 TO STA T401 34+80.65	N/A	STD-GN-2601		GENERAL SYMBOLS						
				N/A	STD-CD-1001		VEHICLE CLEARANCE DIAGRAM						
N/A	STD-PR-0150		TRACK ALIGNMENT-TRACK L404 PROFILE-STA L404 12+00 TO STA L404 16+70	N/A	STD-CT-0001		CIVIL AND UTILITY SYMBOLS						
N/A	STD-PR-0151		TRACK ALIGNMENT-TRACK L404 & T404 PROFILES-STA L404 16+70 TO STA T404 20+97.38	N/A	STD-CT-0003		CIVIL ABBREVIATIONS						
N/A	STD-PR-0152		TRACK ALIGNMENT-TRACK T404 PROFILE-STA T404 20+97.38 TO STA T404 29+53.42										
N/A	STD-PR-0153		TRACK ALIGNMENT-TRACK T404 PROFILE-STA T404 29+53.42 TO STA T404 34+80.97										
N/A	STD-PR-0154		TRACK ALIGNMENT-TRACK BF3 PROFILE-STA BF3 1045+97.06 TO STA BF3 1047+97.21	N/A	STD-GS-0010		TRACK GEOMETRY LAYOUT AND ABBREVIATIONS						
N/A	STD-PR-0155		TRACK ALIGNMENT-TRACK BF4 PROFILE-STA BF4 1045+97.22 TO STA BF4 1047+97.37	N/A	STD-GS-1007		QUEENS CONTROL - SURVEY DATA TIES - SHEET 1						
N/A	STD-PR-0156		TRACK ALIGNMENT-TRACK YK1 PROFILE-STA YK1 96+87.00 TO STA YK1 102+50.53	N/A	STD-GS-1008		QUEENS CONTROL - SURVEY DATA TIES - SHEET 2						
N/A	STD-PR-0157		TRACK ALIGNMENT-TRACK YK2 PROFILE-STA YK2 96+87.00 TO STA YK2 102+50.46	N/A	STD-GS-1020		QUEENS CONTROL - PROPOSED MONUMENT PLAN - SHEET 3						
				N/A	STD-GS-1021		QUEENS CONTROL - PROPOSED MONUMENT PLAN - SHEET 4						
N/A	STD-PR-0160		TRACK ALIGNMENT-TRACK L302 PROFILE-STA L302 1+10 TO STA L302 7+35	N/A	STD-GS-1003		MANHATTAN CONTROL MARKERS - SHEET 1 OF 4						
N/A	STD-PR-0161		TRACK ALIGNMENT-TRACK L302 PROFILE-STA L302 7+35 TO STA L302 16+70	N/A	STD-GS-1004		MANHATTAN CONTROL MARKERS - SHEET 2 OF 4						
N/A	STD-PR-0162		TRACK ALIGNMENT-TRACK L302 & T302 PROFILES-STA L302 16+70 TO STA T302 20+97.38	N/A	STD-GS-1005		MANHATTAN CONTROL MARKERS - SHEET 3 OF 4						
N/A	STD-PR-0163		TRACK ALIGNMENT-TRACK T302 PROFILE-STA T302 20+97.38 TO STA T302 29+53.42	N/A	STD-GS-1006		MANHATTAN CONTROL MARKERS - SHEET 4 OF 4						
N/A	STD-PR-0164		TRACK ALIGNMENT-TRACK T302 AND EB4 PROFILES-STA T302 29+53.42 TO STA EB4 1048+30	N/A	STD-GS-2001		CHAIN LINK FENCE DETAILS						
N/A	STD-PR-0165		TRACK ALIGNMENT-TRACK EB4 PROFILE-STA EB4 1048+30 TO STA EB4 1057+20	N/A	STD-GS-2005		CONSTRUCTION AND CONTRACTION JOINTS FOR CONCRETE BASE						
N/A	STD-PR-0166		TRACK ALIGNMENT-TRACK EB4 PROFILE-STA EB4 1057+20 TO STA EB4 1064+25	N/A	STD-GS-2010		PAVING AND RESTORATION MISCELLANEOUS DETAILS						
N/A	STD-PR-0167		TRACK ALIGNMENT-TRACK EB4 PROFILE-STA EB4 1064+25 TO STA EB4 1068+97.96	N/A	STD-GS-5003		TEMPORARY CONCRETE BARRIER - SHEET 1</						



CONTRACT CM009									
SHEET No.	DWG No.	REVISION No.	DESCRIPTION	SHEET No.	DWG No.	REVISION No.	DESCRIPTION		
N/A	CM009-AR-0004	1	REFERENCE DRAWINGS	N/A			SPECIFIC DETAIL DRAWINGS		
			CONSTRUCTION POWER SUBSTATION						
N/A	CM009-CP-0001	1	ARCHITECTURAL	N/A	SD-1		SHIPS LADDER IN LIRR TUNNEL		
			SITE PLAN - EXISTING CONDITIONS						
N/A	CM009-CP-0002	1	CONSTRUCTION POWER	N/A	SD-2		EB TUNNEL GRIT CHAMBER SLAB SUPPORT AT ROOSEVELT ISLAND		
N/A	CM009-CP-0004	1	SYMBOLS, ABBREVIATIONS & GENERAL NOTES - SHEET 1	N/A	SD-3		PERFORATED STEEL PLATE WITH FILTER FABRIC AT HAND HOLES IN 63RD STREET LIRR TUNNELS		
N/A	CM009-CP-0005	1	SYMBOLS, ABBREVIATIONS & GENERAL NOTES - SHEET 2	N/A	SD-4		INSTALLATION DETAILS 8" WATER SUPPLY LINE IN LIRR 63RD ST TUNNELS AT CROSS PASSAGE STA 1198+25 TO 1198+75		
N/A	CM009-CP-0010	1	PLAN - ELECTRIC SERVICE MANHOLES	N/A	SD-5		8" WATER SUPPLY LINE SUPPORT DETAILS 63RD STREET LIRR TUNNELS		
N/A	CM009-CP-0011	1	ELECTRIC SERVICE CONDUIT ROUTES - PARTIAL PLAN AND DETAILS	N/A	SD-6		TYPICAL INSTALLATION DETAILS - 2 1/2" FIRE HOSE VALVE FOR 8" WATER SUPPLY LINE IN 63RD STREET LIRR TUNNELS		
N/A	CM009-CP-0012	1	13.2 KV SERVICE - SINGLE LINE DIAGRAM	N/A	SD-7		DUPLEX PUMPS IN 2ND AVE GRIT CHAMBER - AT ELEVATION 196'		
N/A	CM009-CP-0013	1	RELAY SINGLE LINE DIAGRAM - SHEET 1 OF 3	N/A	SD-8		SECTION A-A AND D-D FOR THE UNDERGROUND UTILITIES AT QUEENS STAGING AREA PROJECT SITE		
N/A	CM009-CP-0031	1	RELAY SINGLE LINE DIAGRAM - SHEET 1 OF 4	N/A	SD-9		TYPICAL INSTALLATION OF 8" BUTTERFLY VALVES FOR THE 8" WATER SUPPLY LINE IN 63RD STREET LIRR TUNNELS		
N/A	CM009-CP-0070	1	RELAY SINGLE LINE DIAGRAM - SHEET 1 OF 5	N/A	M-1		MECHANICAL DRAWINGS		
N/A	CM009-CP-0131	1	MEDIUM VOLTAGE SUBSTATION PLAN - SUGGESTED EQUIPMENT LAYOUT						
N/A	CM009-CP-0131	1	PROPERTY LINE MANHOLE	N/A	M-2		8" WATER SUPPLY LINE AND 10" DISCHARGE SUMP LINES FROM GRADE LEVEL TO LIRR TUNNEL		
N/A	CM009-CP-0131	1	MAINTENANCE OF TRAFFIC - 63RD STREET	N/A	M-3		TRIPLEX BOOSTER PUMP SYSTEM FOR THE 8" WATER SUPPLY LINE IN A HEATED ENCLOSURE		
N/A	CM009-CP-0131	1		N/A	M-4		EQUIPMENT LAYOUT PLAN - GROUND WATER TREATMENT SYSTEM AT 2ND AVE VENT SHAFT (LIRR TRACK LEVEL)		
N/A	CM009-CP-0131	1		N/A	M-5		PH/OWS/SETTLEMENT TANK OUTLINE AND SECTIONS FOR GROUND WATER TREATMENT SYSTEM AT 2ND AVE SHAFT (LIRR TRACK LEVEL)		
N/A	CM009-CP-0131	1		N/A	M-5		BULK SETTLEMENT TANK OUTLINE AND SECTION FOR GROUND WATER TREATMENT SYSTEM AT 2ND AVE SHAFT (LIRR TRACK LEVEL)		
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
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N/A	CM009-CP-0131	1		N/A	M-5				
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N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
N/A	CM009-CP-0131	1		N/A	M-5				
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N/A	CM009-CP-0131	1		N/A	M-5				
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N/A	CM009-CP-0131	1		N/A	M-5				





**MTA** Metropolitan Transportation Authority  
Capital Construction

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PROFESSIONAL. THE LICENSED PROFESSIONAL  
SHALL AFFIX TO THIS DOCUMENT THE SEAL  
AND THE NOTATION "ALTERED BY",  
FOLLOWED BY THE AUTHORIZED SIGNATURE  
AND THE DATE OF THE ALTERATION."

5/26/06	CONFORMED DRAWING	
DATE:	REVISIONS	No.

DESIGNED BY: D. ROBERTS
DRAWN BY: M. CAPONE
CHECKED BY: G. AYVAS
COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

NY PROFESSIONAL License No.
ORIGINAL SIGNED & SEALED
DATE: _____

MANHATTAN TUNNELS EXCAVATION  
CONTRACT PLAN

SCALE AS NOTED
DRAWING NUMBER CM009-GP-0001
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 5 OF 276



GENERAL NOTES





1. SEE CIVIL STANDARD DRAWINGS STD-GS-1003 THROUGH STD-GS-1006 FOR PROJECT HORIZONTAL AND VERTICAL DATUMS.
2. ALL STATIONS ON THE DRAWINGS ARE IN FEET AND REFER TO THE PROJECT TRACK STATIONING SYSTEM AND ARE MEASURED ALONG THE TRACK CENTERLINES.
3. NOTE THAT THE PROJECT TRACK STATIONING AND THE FIELD SURVEY STATIONING ARE NOT THE SAME. THE PROJECT TRACK STATIONING BEGINS AT THE EXISTING TUNNEL EAST END IN QUEENS AND FOLLOWS THE PROPOSED TRACK ALIGNMENT BACKWARD THROUGH MANHATTAN. THE FIELD SURVEY BASELINE IS BASED ON A STRAIGHT LINE APPROXIMATION OF THE EXISTING TUNNEL CENTERLINE.
4. STATIONS ARE REFERENCED TO TRACKS L402-T402-EB2 AS THE BASELINE UNLESS NOTED OTHERWISE.
5. PLAN DIMENSIONS ARE MEASURED IN A TRUE HORIZONTAL PLANE, UNLESS NOTED OTHERWISE.
6. VERTICAL DIMENSIONS ARE MEASURED IN A TRUE VERTICAL PLANE, UNLESS NOTED OTHERWISE.
7. GRADIENTS ARE IN PERCENT, UNLESS NOTED OTHERWISE.
8. THE CONTRACTOR SHALL VERIFY IN THE FIELD ALL DIMENSIONS, LOCATIONS, AND ELEVATIONS OF EXISTING STRUCTURES SHOWN ON THE CONTRACT DRAWINGS BEFORE COMMENCEMENT OF ANY WORK. THE CONTRACTOR SHALL NOTIFY THE RESIDENT ENGINEER OF ANY DISCREPANCIES THAT MAY EXIST BEFORE PERFORMING RELATED WORK.
9. TAX BLOCK NUMBERS, LOT NUMBERS AND LOT DIMENSIONS OF PROPERTIES IN MANHATTAN ARE SHOWN AS PER THE REAL PROPERTY ASSESSMENT BUREAU, CITY OF NEW YORK, BOROUGH OF MANHATTAN.
10. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL BASELINE MARKERS IN ORDER TO BE ABLE TO PROTECT AND MAINTAIN PERMANENT SURVEY BASELINE MONUMENTS.
11. PROVIDE PROTECTIVE FENCING AS SHOWN ON THE DRAWINGS AND AS MAY BE REQUIRED BY THE OPERATING RAILROADS.
12. FOR INFORMATION ON PROPERTIES ABOVE AND ADJACENT TO THE TUNNEL ALIGNMENTS SEE DRAWINGS CM009-CT-7001 THROUGH CM009-CT-7008.
13. THE PLANS REFLECT INFORMATION FROM PREVIOUS AND CONCURRENT ESA CONTRACTS AT THE TIME OF PREPARATION OF THE CONTRACT DOCUMENTS. THERE IS NO GUARANTEE THAT PRESENTED INFORMATION IS COMPLETE, ACCURATE OR AS-BUILT.
14. WITHIN THESE CONTRACT DRAWINGS, SPECIFIC DOCUMENTS ARE REFERENCED TO ASSIST THE CONTRACTOR IN PERFORMING THE WORK. THESE DOCUMENTS ARE AVAILABLE FOR CONTRACTOR'S REVIEW AT THE ESA PROJECT CONTRACT REFERENCE DOCUMENT READING LOCATION AT THE ESA PROCUREMENT DEPARTMENT OFFICE. SEE SUPPLEMENTAL TERMS AND CONDITIONS FOR LISTING OF REFERENCE DOCUMENTS.

MANHATTAN TUNNELS

1. TUNNELING AND CAVERN EXCAVATIONS SHALL NOT BE ADVANCED WITHOUT INITIAL SUPPORT.
2. THE INITIAL SUPPORT SHOWN ON THE CONTRACT DRAWINGS IS THE MINIMUM REQUIRED. THE CONTRACTOR MAY PROPOSE ALTERNATE INITIAL SUPPORT SYSTEMS. IN SUCH A CASE, THE CONTRACTOR SHALL SUBMIT TO THE RESIDENT ENGINEER FOR REVIEW, CALCULATIONS DEMONSTRATING THAT THE PROPOSED ALTERNATE INITIAL SUPPORT SYSTEMS ARE EQUIVALENT TO THAT SHOWN ON THE CONTRACT DRAWINGS, PRIOR TO ACTUALLY EXCAVATING EACH OF THE DIFFERENT CAVERNS AND TUNNELS.
3. THE INITIAL SUPPORT SHALL BE SUPPLEMENTED WITH ADDITIONAL INITIAL SUPPORT ELEMENTS, AS SHOWN ON CONTRACT DRAWING CM009-GT-2000, IF ACTUAL GROUND CONDITIONS ENCOUNTERED SO DICTATE, OR IF DIRECTED BY THE RESIDENT ENGINEER.
4. A NEW ROUND OF EXCAVATION SHALL ONLY BE OPENED UP FOLLOWING THE INSTALLATION OF INITIAL SUPPORT AND ADDITIONAL INITIAL SUPPORT OF THE PREVIOUS ROUND AND FOR A LENGTH NOT EXCEEDING THE MAXIMUM LENGTH OF UNSUPPORTED EXCAVATION SHOWN ON THE CONTRACT DRAWINGS. ROUND LENGTH AND INITIAL SUPPORT SPACING MAY REQUIRE REDUCTION, IF ACTUAL GROUND CONDITIONS ENCOUNTERED SO DICTATE, OR IF DIRECTED BY THE RESIDENT ENGINEER.
5. THE CONSTRUCTION SEQUENCES SHOWN ON THE CONTRACT DRAWINGS ARE SUGGESTED MEANS AND METHODS FOR ACCOMPLISHING THE WORK. THE CONSTRUCTION SEQUENCES CAN BE ADJUSTED BY THE CONTRACTOR, DURING CONSTRUCTION, BASED UPON THE ROCK MASS CONDITIONS ENCOUNTERED, PROXIMITY TO ADJACENT AND OVERLYING STRUCTURES, AND THE ABILITY TO CONTROL VIBRATION AND DEFORMATION OF BOTH THE EXCAVATED TUNNELS AND ADJACENT OR OVERLYING STRUCTURES IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT SPECIFICATIONS. SUCH ADJUSTED CONSTRUCTION SEQUENCE PLANS MUST BE BASED UPON THE PREDICTED CONDITIONS PRESENTED IN THE GBR, AND WILL BE SUBJECT TO REVIEW BY THE RESIDENT ENGINEER PRIOR TO PERFORMING THE WORK.
6. THE DESIGN OF THE TBM ASSEMBLY CHAMBER AND ADJOINING STARTER TUNNELS IS A SUGGESTED DESIGN AND MAY BE ADJUSTED BY THE CONTRACTOR AS REQUIRED, TO SUIT THE CONTRACTOR'S MEANS-AND-METHODS FOR ASSEMBLY AND LAUNCHING OF THE TUNNEL BORING MACHINES.
7. THE CONTRACTOR SHALL FOLLOW THE REQUIREMENTS OF THE FIRE DEPARTMENT OF THE CITY OF NEW YORK (FDNY) ON EXPLOSIVES HANDLING AND STORAGE. THE CONTRACTOR MAY SEEK VARIANCES TO FDNY REQUIREMENTS THROUGH THE RESIDENT ENGINEER.
8. THE CONTRACTOR SHALL UTILIZE CONTROLLED BLASTING METHODS TO REDUCE OVERBREAK AND COMPLY WITH THE GROUND-BORNE NOISE AND VIBRATION LIMITATIONS ASSOCIATED WITH BLASTING, AS SPECIFIED.
9. PREVIOUSLY EXCAVATED TUNNELS AND CAVERNS UNDER THIS CONTRACT WITHIN 100 FT OF DRILL-AND-BLAST EXCAVATION SHALL BE VISUALLY INSPECTED FOR STRUCTURAL INTEGRITY FOLLOWING BLASTING OPERATIONS. SHOULD ANY CONDITIONS INDICATE INSTABILITIES OF SUCH TUNNELS OR CAVERNS AND THEIR INITIAL SUPPORT, THE DRILL-AND-BLAST EXCAVATION SHALL BE TEMPORARILY SUSPENDED AND THE CONTRACTOR SHALL SUBMIT REMEDIAL MEASURES FOR STABILIZING THE PREVIOUSLY EXCAVATED TUNNELS OR CAVERNS AND MODIFIED EXCAVATION METHODS TO THE RESIDENT ENGINEER FOR REVIEW PRIOR TO RESUMPTION OF DRILL-AND-BLAST OPERATIONS.
10. AT INTERSECTING STRUCTURES, PRE-SUPPORT SPILLING SHALL BE INSTALLED AS REQUIRED BY A ACTUAL GROUND CONDITIONS ENCOUNTERED OR AS DIRECTED BY THE RESIDENT ENGINEER AS A PART OF ADDITIONAL INITIAL SUPPORT.

QUEENS WORK SITE

1. ALL CONTRACTOR'S PERSONNEL, MATERIALS AND EQUIPMENT ACCESS, AND LOGISTICS SHALL BE THROUGH THE QUEENS OPEN-CUT AND THROUGH THE EXISTING LOWER LEVEL OF THE 63RD STREET TUNNEL. ALL MUCK SHALL BE REMOVED THROUGH THE EXISTING TUNNEL AND THE QUEENS OPEN-CUT.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE QUEENS OPEN-CUT AND EXISTING FACILITIES PROVIDED TO THE CONTRACTOR BY THE MTA.
3. THE CONTRACTOR IS PROVIDED WITH AN AREA WITHIN THE EXISTING RAIL YARD FOR MUCK HANDLING. THE CONTRACTOR SHALL COORDINATE ACCESS WITH THE ESA CONTRACT CQ028 CONTRACTOR AND ANY OTHER ESA CONTRACTORS THROUGH THE RESIDENT ENGINEER AND SHALL BE RESPONSIBLE FOR MAINTAINING STAGING AND ACCESS AREAS USED WITHIN THE EXISTING RAIL YARD.
4. THE CONTRACTOR SHALL ERECT AN ELEVATED CONVEYOR OVER NORTHERN BOULEVARD AND UNDER THE NEW YORK CITY TRANSIT (NYCT) ELEVATED LINE TO TRANSPORT TUNNEL MUCK TO A LOADING AREA IN THE EXISTING RAIL YARD.
5. DURING CONSTRUCTION, INCLUDING OVERHEAD WORK, ALL AFFECTED PEDESTRIAN AND VEHICULAR TRAFFIC CROSSINGS SHALL BE MAINTAINED AND PROTECTED.
6. THE CONTRACTOR SHALL COORDINATE ACCESS THROUGH THE AREA RESERVED FOR ESA CONTRACT CQ028 TO THE EXISTING RAIL YARD FOR THE CONVEYOR INSTALLATION AND MAINTENANCE THROUGH THE RESIDENT ENGINEER.
7. THE CONTRACTOR SHALL CONDUCT THE WORK SO THAT NO EQUIPMENT, MATERIAL OR DEBRIS WILL BE PLACED ON OR BE ALLOWED TO FALL UPON PRIVATE PROPERTY IN THE VICINITY OF THE WORK. THE CONTRACTOR SHALL FIRST OBTAIN WRITTEN PERMISSION TO PROCEED FROM THE RESIDENT ENGINEER AND THE OWNER OF THE ADJACENT PROPERTY. IF A PROPERTY IS DAMAGED OR IMPACTED BY THE WORK, SUCH PROPERTY SHALL BE RESTORED BY THE CONTRACTOR TO ORIGINAL CONDITION AS SOON AS POSSIBLE.
8. THE CONTRACTOR SHALL COORDINATE AND COOPERATE WITH RAILROAD FORCES AND ANY OTHER CONTRACTORS ON SITE DURING CONSTRUCTION.
9. ALL PERMANENT AND TEMPORARY CONNECTIONS TO EXISTING IN-SERVICE TRACK SHALL BE COORDINATED WITH MTA-LONG ISLAND RAIL ROAD (LIRR) AND NEW YORK & ATLANTIC RAILWAY (NYAR) THROUGH THE RESIDENT ENGINEER.
10. WHERE SOIL AT THE SUBGRADE HAS BEEN DISTURBED OR IS DEEMED TO BE UNSATISFACTORY, THE SOIL SHALL BE REMOVED TO A LEVEL DEEMED SATISFACTORY AND REPLACED WITH CRUSHED STONE OR SELECT FILL.
11. THE CONTRACTOR IS RESPONSIBLE FOR ALL WATER ACCUMULATIONS AS A RESULT OF CONSTRUCTION OPERATIONS AND SHALL PUMP WATER ACCUMULATIONS IN ACCORDANCE WITH THE SPECIFICATIONS AND AT THE REQUEST OF THE RESIDENT ENGINEER.
12. THE CONTRACTOR SHALL CLEAN AND SWEEP ALL PEDESTRIAN WALKWAYS AND VEHICULAR ROADWAYS ADJACENT TO THE CONSTRUCTION SITE AS REQUIRED OR DIRECTED BY THE RESIDENT ENGINEER.
13. FOR ADDITIONAL REQUIREMENTS WORKING ADJACENT TO THE EXISTING NYCT STRUCTURES, SEE DRAWING CM009-GP-0055.

 <b>Metropolitan Transportation Authority</b> Capital Construction		 <b>PB STV PARSONS</b> General Engineering Consultant 469 Seventh Avenue • New York, NY • 10018		PARSONS BRINCKERHOFF STV INCORPORATED PARSONS TRANSPORTATION GROUP OF NEW YORK, INC.		IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DOCUMENT IN ANY WAY UNLESS THAT PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL. THE LICENSED PROFESSIONAL SHALL AFFIX TO THIS DOCUMENT THE SEAL AND THE NOTATION "ALTERED BY", FOLLOWED BY THE AUTHORIZED SIGNATURE AND THE DATE OF THE ALTERATION."						DESIGNED BY: <b>M. DELLA POSTA</b> DRAWN BY: <b>C. PEARSON</b> CHECKED BY: <b>J. CULHANE</b> COORDINATED BY: <b>M. DELLA POSTA</b> APPROVED BY: <b>J. SCHABIB</b>		NY PROFESSIONAL License No.  <b>ORIGINAL SIGNED &amp; SEALED</b>  DATE: _____		<b>MANHATTAN TUNNELS EXCAVATION</b>   <b>GENERAL NOTES</b> SHEET 1		SCALE: NONE DRAWING NUMBER: CM009-GP-0051 DATE: 5-26-06 REVISION NUMBER: 0		CONTRACT No. <b>CM009</b> ISSUE  SHEET No. <u>6</u> OF <u>276</u>	
 <b>Long Island Rail Road</b> <b>East Side Access</b>								5/26/06		CONFORMED DRAWING											
								DATE:		REVISIONS		No.									

GENERAL NOTES – CONTINUED

CONSTRUCTION UTILITIES – GENERAL

1. THE CONTRACTOR SHALL INSTALL TEMPORARY UTILITIES AS REQUIRED FOR THE TUNNEL CONSTRUCTION. THE TEMPORARY UTILITIES SHALL BE OPERATED AND MAINTAINED FOR THE TERM OF THE CONTRACT. THE UTILITIES SHALL BE HANDED OVER TO THE MTA AT THE COMPLETION OF THE CONTRACT.
2. THE CONTRACTOR SHALL MAINTAIN EXISTING TEMPORARY UTILITIES, AND MODIFY THEM, AS REQUIRED, FOR CONSTRUCTION.
3. AS-BUILT CONDITIONS OF THE EXISTING CONSTRUCTION UTILITY SYSTEMS ARE INCLUDED IN VOLUME OF REFERENCE DOCUMENTS, ATTACHED TO THIS CONTRACT WHICH IS PROVIDED FOR BIDDER INFORMATION.

## CONSTRUCTION UTILITIES – DRAINAGE




1. THE EXISTING TUNNEL DRAINAGE SYSTEM SHALL BE UPGRADED, MAINTAINED AND EXTENDED THROUGHOUT WORK AREAS BY THE CONTRACTOR AS REQUIRED, TO SUPPORT CONSTRUCTION. CONTRACTOR SHALL DESIGN ANY UPGRADES OR MODIFICATIONS TO THE EXISTING SYSTEM AND SUBMIT TO THE RESIDENT ENGINEER FOR REVIEW.
2. THE CONTRACTOR SHALL OBTAIN ALL PERMITS FOR WASTEWATER AND TUNNEL SEEPAGE DISCHARGE, INCLUDING SEWER SITE CONNECTIONS. THE CONTRACTOR SHALL DESIGN AND INSTALL SITE CONNECTIONS ACCORDING TO NYCDEP STANDARDS. SIDEWALK AND STREET RESTORATION SHALL BE MADE ACCORDING TO NYC DOT STANDARDS.
3. THE CONTRACTOR SHALL INSPECT AND CLEAN THE DRAINAGE PIPING IN THE EXISTING TUNNEL INVERTS. THE CONTRACTOR SHALL PROTECT AND MAINTAIN THE TRACK DRAINAGE PIPING FOR THE DURATION OF THE CONTRACT.
4. THE PUMPING EQUIPMENT, EXISTING AND INSTALLED, SHALL BE HANDED OVER TO THE MTA AT THE COMPLETION OF THE CONTRACT.
5. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN THE TEMPORARY DRAINAGE AND GROUNDWATER TREATMENT SYSTEM PROVIDED BY THE MTA AT THE EXISTING QUEENS OPEN-CUT. THE RESIDENT ENGINEER WILL PROVIDE THE CONTRACTOR WITH THE AS-BUILT INFORMATION OF THE TEMPORARY DRAINAGE AND GROUNDWATER TREATMENT SYSTEMS. THE CONTRACTOR SHALL INSTALL ADDITIONAL DRAINAGE/TREATMENT SYSTEMS AS NECESSARY TO HANDLE THE WATER FLOW FROM THE EXISTING 63RD TUNNELS AND THE NEW MANHATTAN TUNNELS.
6. MODIFICATIONS TO TEMPORARY DRAINAGE SYSTEM SHALL BE IMPLEMENTED BY THE CONTRACTOR AS REQUIRED FOR ANY NEW CONDITIONS DETECTED DURING CONSTRUCTION.
7. WHERE SUMPS WILL BE REQUIRED WITHIN THE NEWLY EXCAVATED TUNNELS, THE CONTRACTOR SHALL PROVIDE SUMP LOCATION AND DIMENSIONS, EXCAVATION METHODS, SUPPORT OF EXCAVATION, DETAILS OF SUMP COVERS AND PROTECTIVE BARRIERS TO THE RESIDENT ENGINEER FOR REVIEW PRIOR TO SUMP CONSTRUCTION.
8. THE CONTRACTOR AND THE RESIDENT ENGINEER SHALL INSPECT THE ENTIRE TUNNEL DRAINAGE SYSTEM IN BOTH THE CONSTRUCTED TUNNELS AND WITHIN THE EXISTING 63RD STREET TUNNELS PRIOR TO HANDOVER AT THE COMPLETION OF THE CONTRACT. THE CONTRACTOR SHALL CLEAN THE ENTIRE TUNNEL DRAINAGE SYSTEM INCLUDING THE DISCHARGE LINES TO CITY SEWERS. THE CONTRACTOR SHALL REPAIR OR REPLACE ALL DRAINAGE EQUIPMENT, INCLUDING PIPING, AS REQUIRED, PRIOR TO HAND-OVER AT CONTRACT COMPLETION.

## CONSTRUCTION UTILITIES – WATER

1. THE EXISTING TUNNEL WATER DISTRIBUTION SYSTEM SHALL BE UPGRADED, MAINTAINED AND EXTENDED THROUGHOUT WORK AREAS BY THE CONTRACTOR AS REQUIRED, TO SUPPORT CONSTRUCTION. CONTRACTOR SHALL DESIGN ANY UPGRADES OR MODIFICATIONS TO THE EXISTING SYSTEM AND SUBMIT TO THE RESIDENT ENGINEER FOR REVIEW.
2. FIRE HOSE CONNECTION SHALL BE SPACED 300 FT ON CENTER PER NFPA 14 ART. 5-3 2F OR AS ACCEPTED BY FDNY.
3. THE CONTRACTOR SHALL INCORPORATE INTO HIS DESIGN THE EXISTING WATER DISTRIBUTION SYSTEM PROVIDED BY THE MTA.
4. THE CONTRACTOR SHALL MAKE PROVISIONS FOR POTABLE WATER.
5. WATER VALVE CONNECTIONS (NUMBER AND LOCATION) SHALL BE DETERMINED BY THE CONTRACTOR. SUBMIT TO THE RESIDENT ENGINEER FOR REVIEW PRIOR TO INSTALLATION.
6. WATER METER, PRESSURE REDUCING VALVE, BACKFLOW PREVENTOR AND BOOSTER PUMP LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR. FOR ABOVE GROUND WATER UTILITIES, COORDINATE WITH SURFACE EQUIPMENT. FOR BELOW GROUND, COORDINATE WITH TUNNEL CONSTRUCTION OPERATIONS.
7. PROTECT BOOSTER PUMP SYSTEM AND PRESSURE REDUCING VALVE STATION FROM WEATHER AND CONSTRUCTION OPERATIONS, PROVIDE ENCLOSURE IF NECESSARY.
8. THE WATER DISTRIBUTION SYSTEM SHALL BE HANDED OVER TO THE MTA AT THE COMPLETION OF THE CONTRACT.
9. THE CONTRACTOR AND THE RESIDENT ENGINEER SHALL INSPECT THE ENTIRE WATER DISTRIBUTION SYSTEM IN BOTH THE CONSTRUCTED TUNNELS AND WITHIN THE EXISTING 63RD STREET TUNNELS PRIOR TO HANDOVER AT THE COMPLETION OF THE CONTRACT. THE CONTRACTOR SHALL REPAIR OR REPLACE ALL WATER DISTRIBUTION EQUIPMENT, INCLUDING PIPING, AS REQUIRED PRIOR TO HAND-OVER AT CONTRACT COMPLETION.

## CONSTRUCTION UTILITIES – VENTILATION

1. THE CONTRACTOR SHALL DESIGN A TEMPORARY VENTILATION SYSTEM THAT MEETS THE NEEDS OF THE TUNNEL CONSTRUCTION CONTRACT AND IS IN COMPLIANCE WITH ALL APPLICABLE FEDERAL, STATE, LOCAL REGULATIONS AND INDUSTRY STANDARDS. SUBMIT TO THE RESIDENT ENGINEER FOR REVIEW PRIOR TO INSTALLATION.
2. THE TEMPORARY TUNNEL VENTILATION SYSTEM IS TO MEET ALL OF THE REQUIREMENTS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION THAT APPLY INCLUDING OUTSIDE AIR PROVISIONS FOR UNDERGROUND CONSTRUCTION, LINEAR AIR VELOCITIES FOR TEMPORARY TUNNEL VENTILATION, AND DIESEL ENGINE EXHAUST DILUTION.
3. THE EXISTING TUNNEL VENTILATION SYSTEM, VENTILATING THE EXISTING 63RD STREET TUNNEL LIRR LEVEL MAY BE UTILIZED BY THE CONTRACTOR FOR CONSTRUCTION VENTILATION AND SHALL BE UPGRADED, MAINTAINED AND EXTENDED THROUGHOUT WORK AREAS, AS REQUIRED, TO SUPPORT CONSTRUCTION. CONTRACTOR SHALL DESIGN ANY UPGRADES OR MODIFICATIONS TO THE EXISTING SYSTEM AND SUBMIT TO THE RESIDENT ENGINEER FOR REVIEW.
4. THE CONTRACTOR MAY INCORPORATE THE LIRR FACILITIES WITHIN THE MTA'S SECOND AVENUE VENTILATION FACILITY INCLUDING VERTICAL SHAFTS, HORIZONTAL PLENUMS, VACANT LIRR ASSIGNED SPACES, BUILDING PLENUMS, AND EXTERIOR LOUVERS FOR TUNNEL CONSTRUCTION VENTILATION.
5. THE EXISTING QUEENS OPEN-CUT WILL BE OPEN FOR THE DURATION OF THE CONTRACT. AIRFLOW THROUGH THE OPEN-CUT AREA SHALL BE CONSIDERED BY THE CONTRACTOR IN THE DEVELOPMENT OF THE TEMPORARY TUNNEL VENTILATION SYSTEM.
6. LEAKAGE POINTS WITHIN THE EXISTING 63RD STREET TUNNEL (I.E. EXISTING DOOR/WALL/SHAFT OPENINGS), AS WELL AS HVAC REQUIREMENTS IN ANCILLARY EQUIPMENT ROOMS SHALL BE CONSIDERED IN THE DESIGN AND DEVELOPMENT OF THE TEMPORARY TUNNEL VENTILATION SYSTEM.
7. CONTRACTOR SHALL OBTAIN ALL PERMITS ASSOCIATED WITH THE AMBIENT DISCHARGE OF THE TEMPORARY TUNNEL VENTILATION SYSTEM.
8. THE CONTRACTOR AND THE RESIDENT ENGINEER SHALL INSPECT THE ENTIRE VENTILATION SYSTEM IN BOTH THE CONSTRUCTED TUNNELS AND WITHIN THE EXISTING 63RD STREET TUNNELS AT THE COMPLETION OF THE CONTRACT, THE CONTRACTOR SHALL REPAIR OR REPLACE ALL EQUIPMENT TO THE SATISFACTION OF THE RESIDENT ENGINEER BEFORE THE SYSTEM IS HANDED OVER TO THE MTA.

 <b>Metropolitan Transportation Authority</b> Capital Construction	 <b>PARSONS</b> PB STV PARSONS General Engineering Consultant 489 Seventh Avenue • New York, NY • 10018	PARSONS BRINCKERHOFF STV INCORPORATED PARSONS TRANSPORTATION GROUP OF NEW YORK, INC.	IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DOCUMENT IN ANY WAY UNLESS THAT PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL. THE LICENSED PROFESSIONAL SHALL AFFIX TO THIS DOCUMENT THE SEAL AND THE NOTATION "ALTERED BY". FOLLOWED BY THE AUTHORIZED SIGNATURE AND THE DATE OF THE ALTERATION."	DESIGNED BY: M. DELLA POSTA	NY PROFESSIONAL License No. _____ <b>ORIGINAL          SIGNED          &amp;          SEALED</b>	<b>MANHATTAN TUNNELS EXCAVATION</b>  GENERAL NOTES SHEET 2	SCALE: NONE	CONTRACT No. CM009
				DRAWN BY: C. PEARSON			DRAWING NUMBER: CM009-GP-0052	DATE: 5-26-06
 <b>Long Island Rail Road</b> <b>East Side Access</b>				CHECKED BY: J. CULHANE			REVISION NUMBER: 0	
				COORDINATED BY: M. DELLA POSTA				
				APPROVED BY: J. SCHABIB				
				DATE: _____				
				REVISIONS: _____				



CONSTRUCTION UTILITIES – POWER


1. THE CONTRACTOR SHALL DESIGN THE TEMPORARY CONSTRUCTION POWER SYSTEM AND SUBMIT TO THE RESIDENT ENGINEER FOR REVIEW.
2. THE CONTRACTOR SHALL IDENTIFY THE RATINGS OF ALL CONSTRUCTION EQUIPMENT TO BE UTILIZED AND PROVIDE INTERIM ELECTRICAL SERVICE SUITABLE FOR THE EQUIPMENT. IN THE EVENT WHERE THE SERVICE VOLTAGE IS DIFFERENT THAN UTILIZATION VOLTAGE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE TRANSFORMERS AND DISTRIBUTION EQUIPMENT TO SUPPLY POWER AT THE REQUIRED RATING.
3. THE CONTRACTOR AND THE RESIDENT ENGINEER SHALL INSPECT THE ENTIRE TEMPORARY POWER SYSTEM, INCLUDING BUT NOT LIMITED TO FEEDERS, SUBSTATIONS, LIGHTING, VENTILATION AND DRAINAGE, AT THE COMPLETION OF THE CONTRACT. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY DEFICIENT EQUIPMENT, COMPONENTS OR SYSTEMS BEFORE THE SYSTEM IS HANDED OVER TO THE MTA.

INTERIM POWER (PRIOR TO TBM TUNNELING)


1. THE CONTRACTOR IS TO DESIGN, INSTALL, OPERATE AND MAINTAIN THE INTERIM POWER SYSTEM FOR THE PERIOD OF CONSTRUCTION OF THE MEDIUM VOLTAGE SUBSTATION. CONTRACTOR SHALL OBTAIN ALL REQUIRED APPROVALS FROM CON ED.
2. THE CAPACITY OF THE INTERIM SERVICE SHALL BE CALCULATED TO INCLUDE THE EXISTING 63RD STREET TUNNEL LIGHTING, TEMPORARY VENTILATION EQUIPMENT, TEMPORARY SUMP PUMPS AND CONSTRUCTION EQUIPMENT TO BE UTILIZED FOR THE INITIAL TUNNEL CONSTRUCTION (BY DRILL-AND-BLAST) AND CONSTRUCTION ACCESS AREA (BEFORE TBM OPERATION).
3. THE EXISTING ELECTRICAL SERVICES AT THE SECOND AVE AND THE 29TH STREET LIRR TEMPORARY VENTILATION FACILITIES ARE AVAILABLE TO THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR POWER CONSUMPTION COSTS.
4. THE CONTRACTOR SHALL PROVIDE POWER FROM THE NEW INTERIM ELECTRIC SYSTEM TO THE TWO SUMP PUMPS WITHIN THE EXISTING 63RD STREET TUNNEL WEST OF VERNON BOULEVARD.
5. THE CONTRACTOR SHALL INCORPORATE THE EXISTING ELECTRIC UTILITY SERVICE, LIGHTING AND POWER DISTRIBUTION PROVIDED BY THE MTA AT THE QUEENS ACCESS OPEN-CUT, AS PART OF INTERIM POWER SYSTEM TO SUPPORT THE INITIAL CONSTRUCTION ACTIVITIES UNDER THIS CONTRACT.

CONSTRUCTION POWER (DURING TBM TUNNELING)

1. THE CONTRACTOR MAY UTILIZE THE UNOCCUPIED SPACE WITHIN THE MTA'S SECOND AVENUE VENTILATION FACILITY RESERVED FOR THE FUTURE LIRR TRACTION POWER SUBSTATION TO HOUSE THE CONSTRUCTION POWER SUBSTATION. A REFERENCE DESIGN OF THE CONSTRUCTION POWER SUBSTATION IS AVAILABLE TO THE CONTRACTOR AS A SUGGESTED LAYOUT. FINAL DESIGN AND LAYOUT OF THE CONSTRUCTION POWER SUBSTATION IS THE RESPONSIBILITY OF THE CONTRACTOR.
2. THE CONTRACTOR MAY UTILIZE THE EXISTING LIRR AIR SHAFTS AND PLENUMS WITHIN THE MTA'S SECOND AVENUE VENTILATION FACILITY FOR ROUTING OF MEDIUM VOLTAGE FEEDERS FROM THE MEDIUM VOLTAGE SUBSTATION TO THE EXISTING TUNNELS. THE FEEDERS SHALL HAVE SUFFICIENT CAPACITY TO TRANSMIT THE REQUIRED POWER TO THE TBMS, AND TEMPORARY POWER CENTERS (TPC) SERVING OTHER CONSTRUCTION SERVICE EQUIPMENT, AND EXISTING AND NEW TUNNEL CONSTRUCTION UTILITIES.
3. TEMPORARY POWER CENTERS (TPC) AND LOW VOLTAGE LOAD CENTERS (LC) IN THE MANHATTAN SEGMENT SHALL BE FURNISHED AND INSTALLED IN NEW TUNNEL SECTIONS PROGRESSIVELY, FOLLOWING THE TBM EQUIPMENT. IF REMOVAL OF THE DISTRIBUTION EQUIPMENT IS REQUIRED FOR TBM REMOVAL, THE CONTRACTOR SHALL DISCONNECT AND TEMPORARILY REMOVE THE EQUIPMENT AND REINSTALL AND RECONNECT BACK INTO SERVICE AFTER THE TBM PASSES. THE POWER AND MISCELLANEOUS LOAD CENTERS SHALL BE HANDED OVER TO THE MTA BY SUBSTANTIAL COMPLETION.
4. THE LOAD CENTERS (LC) INSTALLED UNDER THE INTERIM POWER SHALL BE RECONNECTED TO THE NEW TPC(S) POWER CENTERS FOR THE REMAINING DURATION OF THIS CONTRACT.
5. THE CONTRACTOR SHALL COORDINATE TEMPORARY POWER DISTRIBUTION WITH SEQUENCE OF TUNNEL CONSTRUCTION AND DETERMINE QUANTITY AND RATING OF TPC'S AND LC'S AS REQUIRED.



Metropolitan Transportation Authority  
Capital Construction



Long Island Rail Road  
East Side Access

GEC

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THE DIRECTION OF A LICENSED  
PROFESSIONAL. THE LICENSED PROFESSIONAL  
SHALL AFFIX TO THIS DOCUMENT THE SEAL  
AND THE NOTATION "ALTERED BY".  
FOLLOWED BY THE AUTHORIZED SIGNATURE  
AND THE DATE OF THE ALTERATION."

5/26/06

CONFORMED DRAWING



DATE:REVISIONSNo.

DESIGNED BY:  
M. DELLA POSTA  
DRAWN BY:  
C. PEARSON  
CHECKED BY:  
J. CULHANE  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

NY PROFESSIONAL  
License No.  
  
ORIGINAL  
SIGNED  
&  
SEALED  
  
DATE: \_\_\_\_\_

MANHATTAN TUNNELS EXCAVATION  
  
  
GENERAL NOTES  
SHEET 3

SCALE:  
NONE

DRAWING NUMBER:  
CM009-GP-0053

DATE:  
5-26-06

REVISION NUMBER:  
0

CONTRACT No.  
CM009

ISSUE

SHEET No.  
8 OF 276

DESIGN CODES AND STANDARDS

DESIGN IS BASED ON THE CURRENT EDITION OF THE CODES LISTED BELOW. WHERE CODES CONFLICT, THE MORE STRINGENT REQUIREMENTS APPLY:

1. NEW YORK STATE BUILDING CODES
2. AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)  
MANUAL FOR RAILWAY ENGINEERING
3. STRUCTURAL ENGINEERING INSTITUTE (SEI)/AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)  
SEI/ASCE 7-02 - MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.
4. AMERICAN CONCRETE INSTITUTE (ACI)  
ACI 318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
5. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):  
SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS, ALLOWABLE STRESS DESIGN  
SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS
6. AMERICAN WELDING SOCIETY (AWS):  
AWS D1.1 STRUCTURAL WELDING CODE - STEEL  
AWS D1.4 STRUCTURAL WELDING CODE - REINFORCING STEEL  
AWS D1.5 BRIDGE WELDING CODE
7. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
8. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)  
STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES
9. NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT)  
STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES  
(AASHTO SPECIFICATIONS PLUS NYSDOT BLUE PAGES)
10. NEW YORK CITY DEPARTMENT OF TRANSPORTATION (NYCDOT)
11. NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NYCDEP)

MATERIALS FOR INITIAL SUPPORT

1. ROCK DOWELS:

ASTM A615 GRADE 75 EPOXY-COATED REINFORCING BARS  
ASTM A36 END PLATES  
RESIN OR CEMENT GROUT
2. ROCK BOLTS:

ASTM A615 GRADE 75 EPOXY-COATED REINFORCING BARS  
RESIN OR CEMENT GROUT  
TENSION TO 0.6FY  
ASTM A36 END PLATES
3. SHOTCRETE:

5,000 PSI AT 28 DAYS
4. WELDED WIRE FABRIC:

ASTM A185
5. LATTICE GIRDERS:

AS SHOWN AND SPECIFIED
6. STEEL RIBS & POSTS:

ASTM A572, GRADE 50
7. STEEL CHANNELS:

ASTM A36
8. STEEL FIBERS:

ASTM A820
9. MINE STRAPS:

ASTM A569
10. GLASS REINFORCED POLYMER (GRP) DOWELS:


AS SHOWN AND SPECIFIED
11. MAT LAGGING:


ASTM A185
12. PILE-SUPPORT SPILES:


ASTM A615 GRADE 60
13. SELF-DRILLING SPILES:

DYWIDAG "MAI" R32N OR EQUAL


SYMBOLS


- CENTERLINE, TOP OF RAIL
- 


THEORETICAL EXCAVATION LINE (MAY ALSO INDICATE EXCAVATED SURFACE IN A STAGE IN EXCAVATION SEQUENCE DRAWINGS)
- 


INTERIM EXCAVATION LINE FOR INITIAL TBM DRIVE OR FOR TRANSVERSE PHASED EXCAVATION
- 

EXISTING EXCAVATED SURFACE AND/OR COMPLETED WORK BY OTHERS PRIOR TO START OF THE WORK SHOWN HEREIN.
- EXCAVATION LINE (BELOW)
- EXTERIOR LOT LINE
- .....

NOT IN CONTRACT (NIC)
- CLEARANCE LINE (EXTRADOS OF FINAL LINER)
- OPTIONAL EXCAVATION LINE
- 

EXISTING STRUCTURE AND/OR COMPLETED WORK BY OTHERS PRIOR TO START OF THE WORK SHOWN HEREIN
- 

SPOT ELEVATION
- 

WP  
WORK POINT
- 

TOP OF RAIL



MATERIALS:

1. CAST-IN-PLACE CONCRETE:

f'c = 4,000 PSI
2. LEAN/FILL CONCRETE:

f'c = 2,000 PSI
3. STEEL BARS FOR CONCRETE REINFORCEMENT:  
ASTM A615, GRADE 60

fy = 60,000 PSI
4. STEEL WELDED WIRE FABRIC, PLAIN, FOR  
CONCRETE REINFORCEMENT:  
ASTM A185

fy = 70,000 PSI
5. STEEL WELDED WIRE FABRIC, DEFORMED,  
FOR CONCRETE REINFORCEMENT: ASTM A496.

fy = 60,000 PSI
6. STRUCTURAL STEEL FOR PERMANENT STRUCTURES  
(INCLUDING PLATES, ANGLES, AND MISCELLANEOUS SHAPES):  
ASTM A709, GRADE 50 OR 50W

Fy = 50,000 PSI
7. STRUCTURAL STEEL FOR TEMPORARY STRUCTURES  
(STRUCTURES TO BE REMOVED BEFORE  
THE COMPLETION OF THE CONTRACT):  
ASTM A709, GRADE 50  
ASTM A36 OR ASTM A709, GRADE 36

Fy = 50,000 PSI  
Fy = 36,000 PSI
8. STEEL PIPE AND STRUCTURAL TUBING FOR BRACING:  
ASTM A500, GRADE B

Fy = 46,000 PSI
9. STRUCTURAL WELDS:

Fu = 70,000 PSI
10. BOLTED CONNECTIONS: ASTM A325 OR ASTM A490 SLIP  
CRITICAL HIGH-STRENGTH BOLTS (7/8" DIAMETER A325 MINIMUM)
11. ANCHOR RODS: ASTM F1554, GRADE 105

STRUCTURAL STEEL:

1. THE ENDS OF FRAME ASSEMBLY BEAMS AND COLUMNS IN BEARING SHALL BE MILLED.
2. REFER TO THE CONTRACT DRAWINGS AND SPECIFICATIONS OF OTHER DISCIPLINES FOR INSERTS, HOLES, FERRULES, DUCTS, PIPES, AND RACEWAYS NOT SHOWN ON THE STRUCTURAL DRAWINGS. THE CONTRACTOR SHALL COORDINATE REQUIREMENTS OF ALL DISCIPLINES FOR STRUCTURAL PENETRATIONS.
3. CUTS, HOLES, COPEs, ETC. (INCLUDING THE ALL NECESSARY REINFORCEMENT) REQUIRED FOR THE WORK OF OTHER DISCIPLINES SHALL BE SHOWN ON THE SHOP DRAWINGS AND MADE IN THE SHOP. CUTS OR BURNING OF HOLES IN NEW STRUCTURAL STEEL MEMBERS IN THE FIELD WILL NOT BE PERMITTED.
4. ALTERNATE CONNECTION DETAILS MAY BE USED IF SUCH DETAILS ARE SUBMITTED TO THE RESIDENT ENGINEER FOR REVIEW; HOWEVER THE CONTRACTORS BID SHALL ANTICIPATE THE USE OF THE SPECIFIC DETAILS SHOWN ON THE CONTRACT DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ANY PROPOSED ALTERNATE DETAILS.
5. SPLICES IN STEEL FRAMING, IF REQUIRED, SHALL BE DESIGNED FOR 100% OF THE MOMENT AND SHEAR CAPACITIES OF THE SECTION. THE SPLICE MATERIAL SHALL INCLUDE PLATES ON BOTH FACES OF THE WEB AND FLANGES AND SHALL BE SIZED TO BE EQUAL TO OR GREATER THAN THE MEMBER SECTION MODULUS AND CROSS SECTIONAL AREA. SPLICE LOCATIONS SHALL BE PRESENTED ON THE SHOP DRAWINGS FOR REVIEW.
6. THE PORTIONS OF STEEL MEMBERS THAT WILL BE ENCASED IN CONCRETE WILL RECEIVE SPRAYED-ON FIRE PROOFING, OR ARE FAYING SURFACES, SHALL NOT BE PAINTED. STEEL MEMBERS, PLATES, AND CONNECTION SURFACES EXPOSED TO THE WEATHER SHALL BE PAINTED AS SPECIFIED BELOW:  
  
SURFACE PREPARATION:  
SSPC SP-6 COMMERCIAL BLASTING  
  
PRIME COAT:  
AMERON "DIMETCOTE 9SERIES", 2.5-MILS TO BE APPLIED WITHIN 4 HOURS AFTER BLASTING.  
  
SECOND COAT:  
AMERON "AMERLOCK 385 SERIES", 4 TO 6-MILS.  
  
THIRD COAT:  
AMERON "AMERSHIELD", AT 5-MILS.
7. THE CONTRACTOR MAY PROPOSE AN ALTERNATE PAINTING SYSTEM. ALL COMPONENTS OF THE SYSTEM SHALL BE FROM THE SAME MANUFACTURER.
8. WHERE THE INSTALLATION OF CONCRETE ENCASEMENT OF STEEL MEMBERS IS DELAYED TO SUIT CONTRACTOR'S NEEDS, THE STEEL MEMBERS SHALL RECEIVE SURFACE PREP AND PRIME COAT ONLY.


CONCRETE:

1. CONSTRUCTION JOINTS IN CONCRETE STRUCTURES OTHER THAN THOSE SHOWN ON THE PLANS WILL NOT BE PERMITTED UNLESS REVIEWED BY THE RESIDENT ENGINEER.
2. ALL EXPOSED CAST-IN-PLACE CONCRETE EDGES SHALL BE CHAMFERED 3/4" x 3/4", UNLESS NOTED OTHERWISE.
3. ALL CONCRETE EDGES AND CORNERS UNDER A WATERPROOFING MEMBRANE SHALL BE CHAMFERED 1" x 1", UNLESS NOTED OTHERWISE.
4. KEYS AND/OR DOWELS NOT SHOWN ON THE CONTRACT DRAWINGS SHALL BE LOCATED AND SUBMITTED TO THE RESIDENT ENGINEER FOR REVIEW.
5. UNLESS OTHERWISE SHOWN ON THE PLANS THE MINIMUM COVER FOR REINFORCEMENT SHALL BE AS INDICATED IN THE TABLE ON THIS DRAWING.
6. ALL METAL REINFORCING BAR CHAIRS AND SUPPORTS SHALL HAVE PLASTIC SHOES. ALL FORMING HARDWARE (E.G., TIES) SHALL BE ELECTROPLATED OR MADE OF A NON-FERROUS MATERIAL.
7. CONCRETE SHALL NOT BE PLACED UNTIL ALL REQUIRED DOWELS, ANCHOR BOLTS, PIPE SLEEVES, EMBEDDED PIPES, CONDUITS, GROUNDING EQUIPMENT, WATERSTOPS, AND MISCELLANEOUS STEEL WHICH ARE TO BE SET IN THE CONCRETE ARE IN PLACE. COORDINATE WORK WITH THE DRAWINGS AND SPECIFICATIONS OF OTHER DISCIPLINES FOR EMBEDMENTS AND PENETRATIONS.
8. ALL OPENINGS FOR DOORS, HATCHES, AND PIPE CHASES SHALL BE MADE TO TRUE SQUARE OR RECTANGULAR DIMENSIONS, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
9. ALL BEAMS AND SLABS SHALL BE CAST MONOLITHICALLY, UNLESS NOTED OTHERWISE.
10. FLOOR AND ROOF SLABS SHALL BE PLACED LEVEL, UNLESS NOTED OTHERWISE.


WORK NEAR NYCT STRUCTURES

1. IF ANY PORTION OF THE EXISTING SUBWAY STRUCTURE OR FINISH IS DAMAGED, IT SHALL BE REPAIRED OR REPLACED WITH INKIND NEW MATERIALS.
2. BLASTING WILL BE PERMITTED ONLY WITH LIGHT CHARGES SUBJECT TO THE REVIEW OF THE RESIDENT ENGINEER AND IN ACCORDANCE WITH THE REGULATIONS OF THE NEW YORK CITY FIRE DEPARTMENT.
3. VIBRATORY HAMMERS WILL NOT BE PERMITTED WITHIN 75 FEET OF SUBWAY STRUCTURES. HOE RAMS WILL NOT BE PERMITTED WITHIN 25 FEET OF SUBWAY STRUCTURES.
4. THERE SHALL BE NO MACHINE EXCAVATION WITHIN 3 FEET OF NYCT STRUCTURES, POWER DUCT LINES, OR ANY OTHER FACILITIES UNTIL THEY HAVE BEEN CAREFULLY EXPOSED BY HAND EXCAVATION.
5. TEMPORARY SHORING MAY BE PLACED IN DIRECT CONTACT WITH NYCT STRUCTURES ONLY IF THE NYCT STRUCTURE IS SHOWN TO BE ABLE TO SUPPORT ALL ANTICIPATED LOADS THAT CAN BE TRANSFERRED THROUGH THE TEMPORARY STRUCTURES WITHOUT DAMAGING THE EXISTING STRUCTURE. AT THE COMPLETION OF THE CONTRACT, THESE TEMPORARY SHORING AND BRACING SYSTEMS ARE TO BE REMOVED OR CUT-OFF.
6. IF SHIELDS ARE TO BE INSTALLED TO PROTECT NYCT FACILITIES, PLANS SHOWING THE LOCATION, TYPE, AND METHOD OF ATTACHMENT TO THE NYCT STRUCTURE SHALL BE SUBMITTED TO THE RESIDENT ENGINEER AND NYCT FOR REVIEW.
7. ALL LUMBER AND PLYWOOD USED FOR PROTECTION OF NYCT FACILITIES SHALL BE FIRE RETARDANT.
8. BURNING OF, WELDING TO, OR DRILLING THROUGH EXISTING STEEL STRUCTURES WILL NOT BE PERMITTED EXCEPT AS SHOWN ON THE CONTRACT DRAWINGS.
9. TRACTORS, CRANES, EXCAVATORS, ETC. USED IN THE VICINITY OF THE NYCT ELEVATED STRUCTURE SHALL BE ISOLATED FROM THE GROUND. SINCE THE ELEVATED STRUCTURE IS USED AS A NEGATIVE RETURN PATH, WITH A CONSEQUENT POTENTIAL BETWEEN IT AND THE GROUND, ANY CONTACT BETWEEN THE STRUCTURE AND GROUNDED EQUIPMENT CAN RESULT IN BURNING OF THE STEEL.

MINIMUM COVER FOR REINFORCEMENT	
STRUCTURAL ELEMENT	COVER
TOP AND BOTTOM OF ELEVATED SLABS; BOTTOM OF INVERT/TRACK SLABS WITH WATERPROOFING	1 1/2"
BEAMS AND COLUMNS	2"
WALLS AND PIERS ABOVE FOOTINGS	2"
FOOTINGS, SLABS AND MISCELLANEOUS ELEMENTS CAST DIRECTLY AGAINST SOIL	3"
CAVERN LINING, TUNNEL LINING, PRECAST LINING	1 1/2"
OTHER ELEMENTS, UON	2"



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5/26/06	CONFORMED DRAWING				
DATE:	REVISIONS	No.			

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DRAWN BY: J. L. RICE
CHECKED BY: C. J. CICILEO
COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

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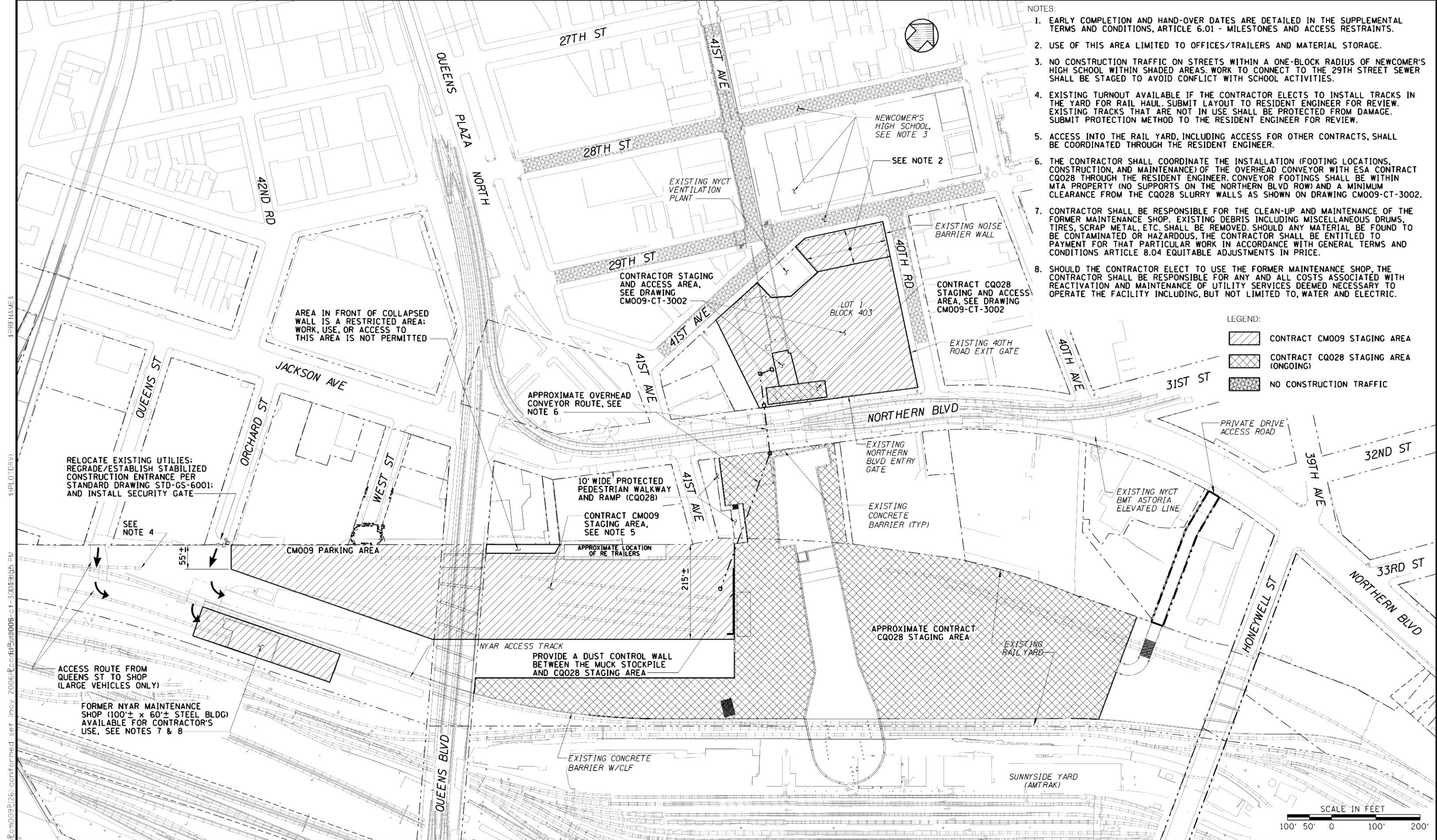
DATE: \_\_\_\_\_

MANHATTAN TUNNELS EXCAVATION

GENERAL NOTES  
SHEET 5

SCALE: NONE
DRAWING NUMBER: CM009-GP-0055
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 10 of 276



- NOTES:
1. EARLY COMPLETION AND HAND-OVER DATES ARE DETAILED IN THE SUPPLEMENTAL TERMS AND CONDITIONS, ARTICLE 6.01 - MILESTONES AND ACCESS RESTRAINTS.
  2. USE OF THIS AREA LIMITED TO OFFICES/TRAILERS AND MATERIAL STORAGE.
  3. NO CONSTRUCTION TRAFFIC ON STREETS WITHIN A ONE-BLOCK RADIUS OF NEWCOMER'S HIGH SCHOOL WITHIN SHADED AREAS. WORK TO CONNECT TO THE 29TH STREET SEWER SHALL BE STAGED TO AVOID CONFLICT WITH SCHOOL ACTIVITIES.
  4. EXISTING TURNOUT AVAILABLE IF THE CONTRACTOR ELECTS TO INSTALL TRACKS IN THE YARD FOR RAIL HAUL. SUBMIT LAYOUT TO RESIDENT ENGINEER FOR REVIEW. EXISTING TRACKS THAT ARE NOT IN USE SHALL BE PROTECTED FROM DAMAGE. SUBMIT PROTECTION METHOD TO THE RESIDENT ENGINEER FOR REVIEW.
  5. ACCESS INTO THE RAIL YARD, INCLUDING ACCESS FOR OTHER CONTRACTS, SHALL BE COORDINATED THROUGH THE RESIDENT ENGINEER.
  6. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION (FOOTING LOCATIONS, CONSTRUCTION, AND MAINTENANCE) OF THE OVERHEAD CONVEYOR WITH ESA CONTRACT CQ028 THROUGH THE RESIDENT ENGINEER. CONVEYOR FOOTINGS SHALL BE WITHIN MTA PROPERTY (NO SUPPORTS ON THE NORTHERN BLVD ROW) AND A MINIMUM CLEARANCE FROM THE CQ028 SLURRY WALLS AS SHOWN ON DRAWING CM009-CT-3002.
  7. CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEAN-UP AND MAINTENANCE OF THE FORMER MAINTENANCE SHOP. EXISTING DEBRIS INCLUDING MISCELLANEOUS DRUMS, TIRES, SCRAP METAL, ETC. SHALL BE REMOVED. SHOULD ANY MATERIAL BE FOUND TO BE CONTAMINATED OR HAZARDOUS, THE CONTRACTOR SHALL BE ENTITLED TO PAYMENT FOR THAT PARTICULAR WORK IN ACCORDANCE WITH GENERAL TERMS AND CONDITIONS ARTICLE 8.04 EQUITABLE ADJUSTMENTS IN PRICE.
  8. SHOULD THE CONTRACTOR ELECT TO USE THE FORMER MAINTENANCE SHOP, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL COSTS ASSOCIATED WITH REACTIVATION AND MAINTENANCE OF UTILITY SERVICES DEEMED NECESSARY TO OPERATE THE FACILITY INCLUDING, BUT NOT LIMITED TO, WATER AND ELECTRIC.

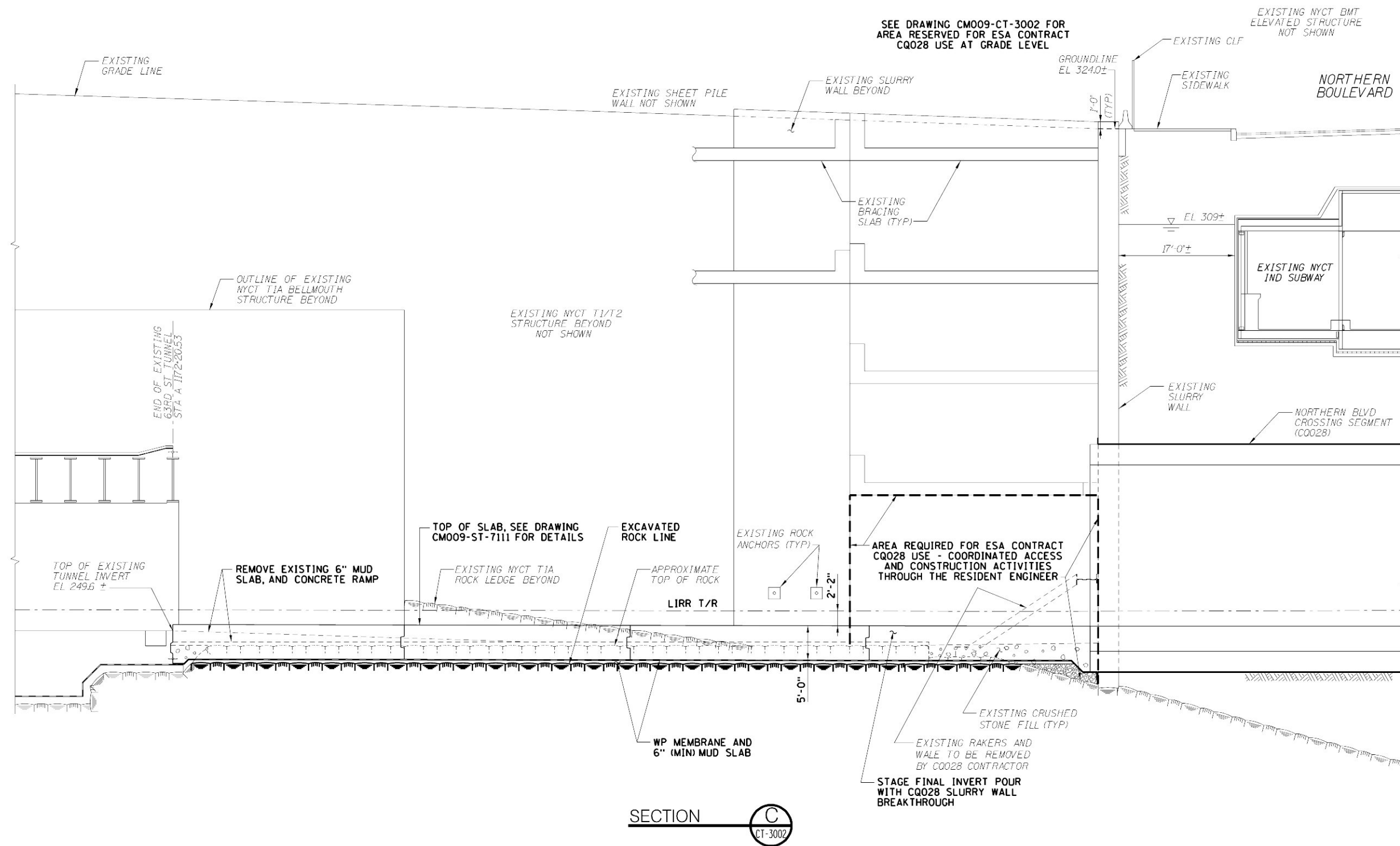
LEGEND:

	CONTRACT CM009 STAGING AREA
	CONTRACT CQ028 STAGING AREA (ONGOING)
	NO CONSTRUCTION TRAFFIC

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**Metropolitan Transportation Authority**  
 Capital Construction


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**Long Island Rail Road**  
**East Side Access**

<div style="display: flex; align-items: center;"> <div style="font-size: 48pt; font-weight: bold; margin-right: 10px;">GEC</div> <div> <div>PB STV PARSONS</div> <hr style="border: 0.5px solid black;"/> <div>General Engineering Consultant</div> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <div>PARSONS BRINCKERHOFF STV INCORPORATED PARSONS TRANSPORTATION GROUP OF NEW YORK, INC.</div> <hr style="border: 0.5px solid black;"/> <div>469 Seventh Avenue • New York, NY • 10018</div> </div> </div>
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	DRAWN BY:	C. J. CICILEO
	CHECKED BY:	J. L. RICE
	COORDINATED BY:	M. DELLA POSTA
	APPROVED BY:	

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MANHATTAN TUNNELS EXCAVATION  
QUEENS ACCESS  
OPEN-CUT EXCAVATION AT EXISTING BELLMOUTH  
LONGITUDINAL SECTION

SCALE: AS NOTED	CONTRACT No. CM009
DRAWING NUMBER: CM009-CT-3005	ISSUE
DATE: 5-26-06	SHEET No. 13 -- 276
REVISION NUMBER: 0	



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1.0 EXISTING 63RD STREET TUNNEL REHABILITATION GENERAL NOTES:

- 1.1 FOR GENERAL NOTES SEE DRAWINGS STARTING AT CM009-GP-0051.
- 1.2 FOR QUEENS ACCESS CONTRACTOR STAGING PLAN SEE DRAWING CM009-CT-3001.
- 1.3 NYCT OPERATES THE 63RD STREET LINE ABOVE THE LIRR TRACK LEVEL AND HAS OPERATING FACILITIES AT 2ND AVENUE, FDR DRIVE, ROOSEVELT ISLAND AND VERNON BLVD SHAFTS.
- 1.4 THE CONTRACTOR SHALL HAVE ACCESS TO EMERGENCY EXITS FOR EMERGENCY SITUATIONS ONLY. THE CONTRACTOR IS CAUTIONED THAT ALL EMERGENCY EXIT DOORS ARE ALARMED.
- 1.5 FOR ORIGINAL DESIGN LOADS, EXISTING STRUCTURE, EXISTING DRAINAGE SYSTEM, EMBEDDED CONDUITS, EXISTING UTILITIES AND PREVIOUS REHABILITATION WORK OF THE EXISTING 63RD STREET TUNNEL THE CONTRACTOR SHALL REFER TO THE FOLLOWING REFERENCE DOCUMENTS:
- A. NYCT ROUTE 131-A SECTIONS 1, 5B, 6 AND 7 (CONTRACT DRAWINGS).
  - B. NYCT CONTRACT C-20203 - 63RD STREET LINE TO QUEENS BLVD. LINE CONNECTION FROM 29TH STREET TO NORTHERN BOULEVARD (AS-BUILT DRAWINGS).
  - C. NYCT CONTRACT C-33207-2 - 63RD STREET LINE REHABILITATION TRACK, SIGNAL AND WATER REMEDY WORK (CONTRACT DRAWINGS).
  - D. LIRR ESA CONTRACT CM016 - MANHATTAN APPROACH TUNNELS EXCAVATION BY ROADHEADER (AS-BUILT DRAWINGS)

THE ABOVE REFERENCE DOCUMENTS ARE AVAILABLE FOR REVIEW IN THE  
ESA PROCUREMENT DEPARTMENT OFFICE.

- 1.6 REMOVE EXISTING OVERLAY SHOWN ON DWGS CM009-CT-3104 THROUGH CM009-CT-3110.
- 1.7 PER NYCT CONTRACT C-33207-2, THE CONCRETE OVERLAY IS INDICATED AS A MINIMUM 3 INCHES THICK; SLOPED 1/4 INCH PER FOOT (MINIMUM); REINFORCED WITH EPOXY COATED WWF 4 x 4 W2.9 x W2.9. 2 LAYERS OF BUILDING PAPER ARE INDICATED BETWEEN OVERLAY AND TRACK INVERT SLAB.

2.0 MAINTENANCE, PROTECTION AND SUPPORT OF EXISTING STRUCTURES AND UTILITIES:

- 2.1 THE CONTRACTOR SHALL MAINTAIN AND PROTECT THE EXISTING 63RD STREET TUNNEL STRUCTURE INCLUDING BUT NOT LIMITED TO THE EXISTING TUNNELS, CROSS PASSAGEWAYS, SHAFTS, EMERGENCY EXITS, VENTILATION FACILITIES, GRIT CHAMBERS, PUMPING STATIONS, SUMPS, SIGNAL ROOMS AND NICHES.
- 2.2 THE CONTRACTOR SHALL PROVIDE TEMPORARY SUPPORT FOR CONSTRUCTION LOADS TO PREVENT ANY DAMAGE TO THE EXISTING LIRR GRIT CHAMBER SLABS LOCATED AT 2ND AVE, ROOSEVELT ISLAND, VERNON BOULEVARD AND 12TH STREET PUMPING FACILITIES.
- 2.3 THE EXISTING LIRR PUMP ROOMS AT ROOSEVELT ISLAND, VERNON BOULEVARD, AND 12TH STREET ARE NOT ASSIGNED TO THE CONTRACTOR AND WILL REMAIN UNDER THE JURISDICTION OF NYCT. THE EXISTING 2ND AVENUE LIRR PUMP ROOM AND THE TWO SUMPS WEST OF VERNON BOULEVARD ARE ASSIGNED TO THE CONTRACTOR WHO SHALL BE RESPONSIBLE FOR MAINTENANCE AND OPERATION OF THE EXISTING PUMPS. ELECTRICAL POWER FOR THE EXISTING 2ND AVENUE PUMPS WILL BE PROVIDED FROM NYCT ELECTRICAL ROOM. THE ELECTRICAL POWER FOR THE TWO SUMP PUMPS (OR AS MODIFIED BY THE CONTRACTOR) WEST OF VERNON BOULEVARD ARE THE RESPONSIBILITY OF THE CONTRACTOR. FOR ADDITIONAL NOTES ON DRAINAGE SEE DWG CM009-CT-0052.
- 2.4 THE CONTRACTOR SHALL NOT OBSTRUCT MTA ACCESS TO THE CATHODIC PROTECTION TEST STATIONS LOCATED WITHIN THE IMMERSED TUBE PORTIONS OF THE EXISTING 63RD STREET TUNNEL STRUCTURE.
- 2.5 THE CONTRACTOR SHALL MAINTAIN AND PROTECT THE EXISTING UTILITY LINES IN THE EXISTING 63RD STREET TUNNEL INCLUDING BUT NOT LIMITED TO:
- A. 4" DIAMETER CABLEVISION FIBER OPTIC COMMUNICATION CONDUITS AND PULL BOXES
  - B. MTA'S EMERGENCY TELEPHONE BOXES, CONDUITS AND LIGHTS
  - C. THE PROJECT SECURITY EQUIPMENT - SIGNAGE, ALARMS, ASSOCIATED CABLES/CONDUITS, ETC.
- INFORMATION ON EXISTING UTILITIES IS AVAILABLE ON ESA CONTRACT CM016 AS-BUILT DRAWINGS, PROVIDED AS A REFERENCE DOCUMENT ATTACHED TO THIS CONTRACT.
- 2.6 THE CONTRACTOR SHALL REPAIR ANY DAMAGE TO THE EXISTING STRUCTURE OR UTILITIES CAUSED BY THE CONTRACTOR'S CONSTRUCTION ACTIVITIES TO THE SATISFACTION OF THE RESIDENT ENGINEER.

3.0 REMOVAL OF EXISTING STRUCTURES AND UTILITIES





- 3.1 THE CONTRACTOR SHALL REMOVE THE EXISTING FIRE LINE IN THE EXISTING 63RD STREET TUNNEL STRUCTURE. CONTRACTOR SHALL COORDINATE FIRE LINE REMOVAL WITH NYCT THROUGH THE RESIDENT ENGINEER FOR CUTTING OF EXISTING WATER SUPPLY AND DEACTIVATION OF ELECTRICAL SERVICE TO PIPE HEAT TRACING.

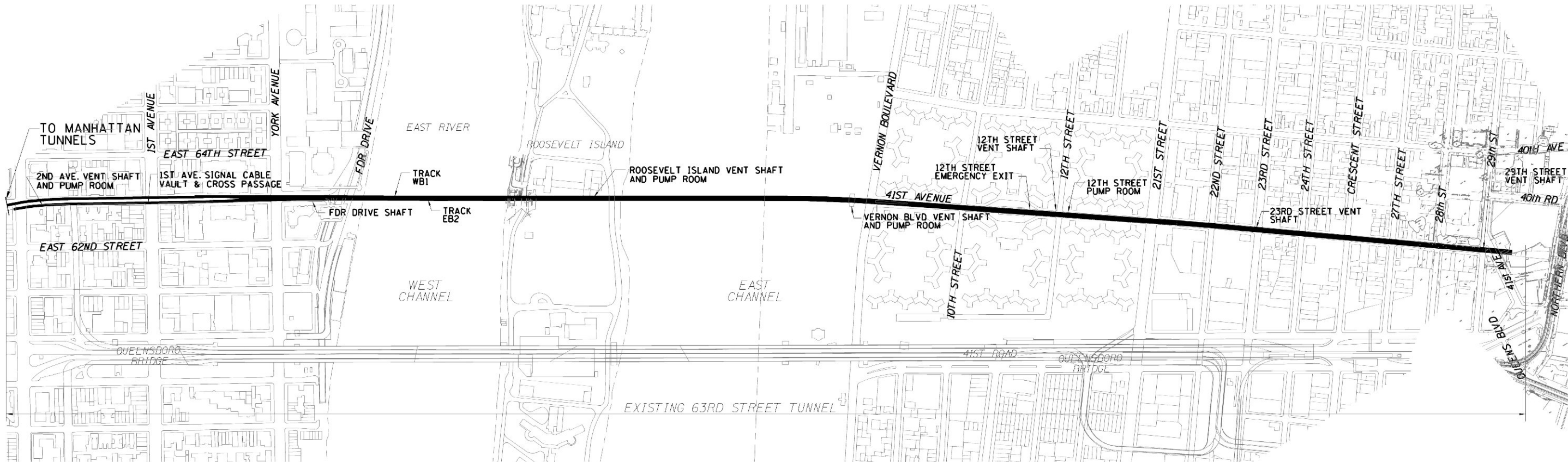
5.0 ENVIRONMENTAL:

- 5.1 WHERE BROWN METAL I-BEAMS OR METAL SLIDING DOORS ON CABLE NICHES ARE TO BE REMOVED UNDER THE CONTRACT, THEY SHALL BE MANAGED AS LEAD-BASED PAINT IN ACCORDANCE WITH SPECIFICATION SECTION 13281.

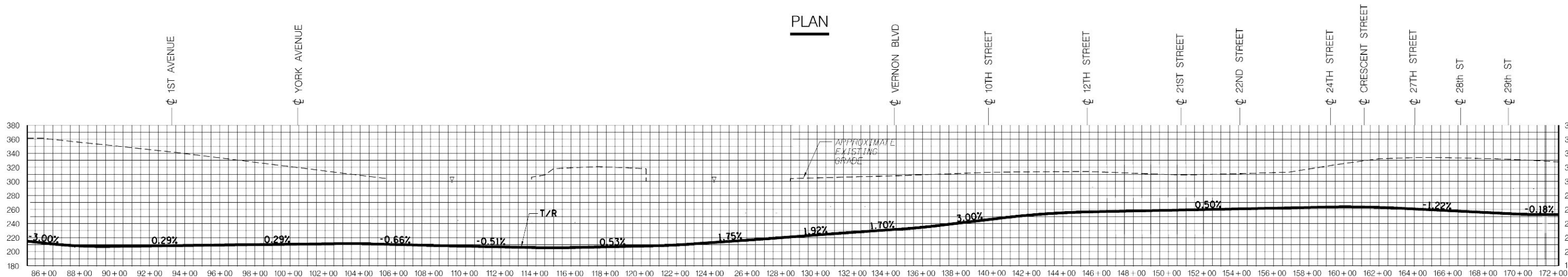
EMERGENCY EXITS:

LOCATION	EXIT POINT AT STREET SURFACE
2ND AVE	— EAST SIDE OF NYCT VENTILATION BUILDING, SE CORNER EAST 63RD STREET AND SECOND AVENUE
FDR DRIVE	— SIDEWALK HATCH ON NORTH AND SOUTH SIDES OF EAST 63RD STREET, WEST OF SOUTHBOUND FDR DRIVE
ROOSEVELT ISLAND	— NORTH AND SOUTH SIDES OF NYCT VENTILATION BUILDING
VERNON BOULEVARD	— EAST SIDE OF NYCT VENTILATION BUILDING IN QUEENSBRIDGE PARK
12TH STREET	— NORTH AND SOUTH SIDES OF 41ST AVENUE, 160 FT WEST OF 12TH STREET
23RD STREET	— WEST SIDE OF 23RD STREET, NORTH AND SOUTH OF 41ST AVENUE
29TH STREET	— NORTHWEST AND SOUTHEAST CORNERS OF 41ST AVENUE AND 29TH STREET

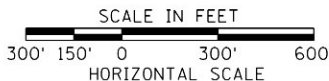
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				5/26/06	CONFORMED DRAWING					CHECKED BY: <b>C. PEARSON</b>	DRAWING NUMBER: CM009-CT-3091
 <b>Long Island Rail Road</b> <b>East Side Access</b>						CHECKED BY: <b>C. BARRATT</b>			EXISTING 63RD STREET TUNNEL REHABILITATION GENERAL NOTES	DATE: 5-26-06	SHEET No. <b>14</b> OF <b>276</b>
						COORDINATED BY: <b>M. DELLA POSTA</b>				REVISION NUMBER: 0	
				DATE:	REVISIONS	No.	APPROVED BY: <b>J. SCHABIB</b>	DATE: _____			



PLAN



PROFILE



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**Long Island Rail Road**  
East Side Access

**GEC** PB  
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DATE:	REVISIONS	No.

DESIGNED BY:  
A. VALDIVIA  
DRAWN BY:  
C. PEARSON  
CHECKED BY:  
C. BARRATT  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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**MANHATTAN TUNNELS EXCAVATION**  
  
EXISTING 63RD STREET TUNNEL REHABILITATION  
GENERAL PLAN AND PROFILE

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-CT-3080  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
**CM009**  
ISSUE  
  
SHEET No.  
**15** OF 276



EXISTING STRUCTURES

VENTILATION FACILITIES:

SECOND AVENUE  
ROOSEVELT ISLAND  
VERNON BOULEVARD  
12TH STREET  
23RD STREET  
29TH STREET

TRACTION POWER SUBSTATION:

SECOND AVENUE  
VERNON BOULEVARD

EMERGENCY EXITS:

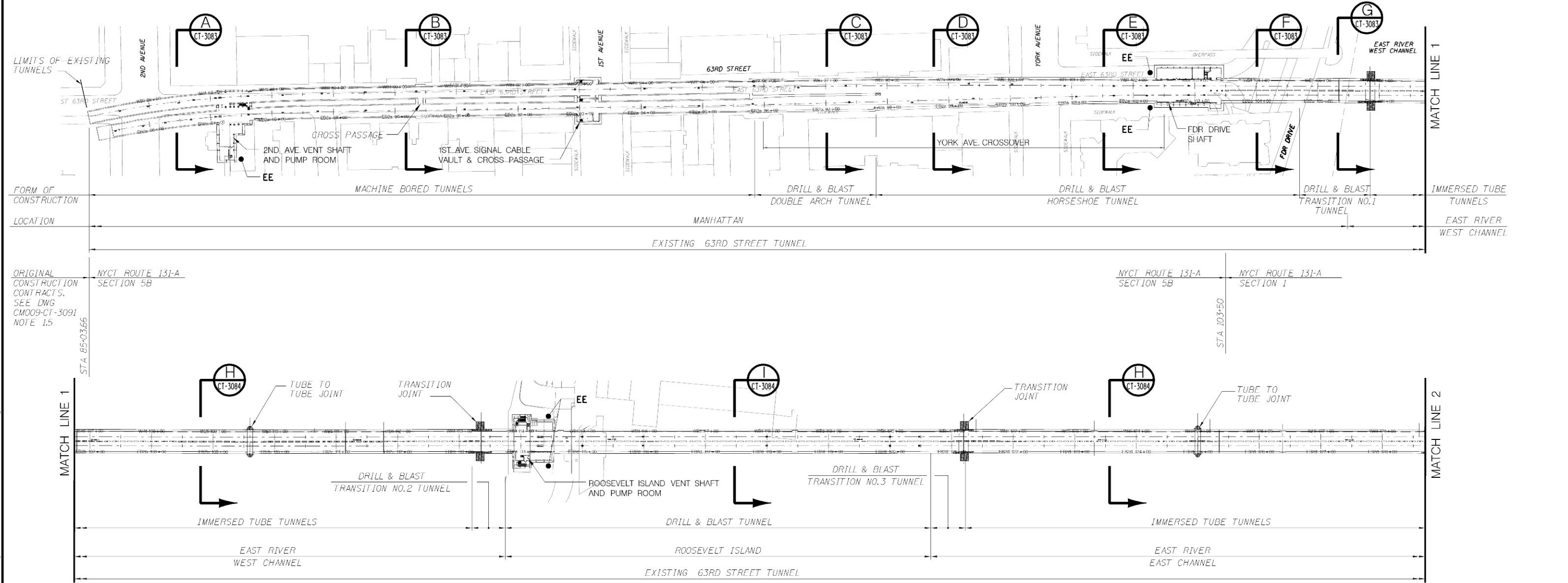
SECOND AVENUE  
FDR DRIVE  
ROOSEVELT ISLAND  
VERNON BOULEVARD  
12TH STREET  
23RD STREET  
29TH STREET

PUMP ROOMS:

SECOND AVENUE  
ROOSEVELT ISLAND  
VERNON BOULEVARD  
12TH STREET



WATER METER ROOMS:

SECOND AVENUE  
FDR DRIVE  
ROOSEVELT ISLAND  
VERNON BOULEVARD  
12TH STREET  
23RD STREET  
29TH STREET



NOTE:  
EE - EMERGENCY EXIT LOCATION AT SURFACE.  
SEE DWG CM009-CT-3091.



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EXISTING STRUCTURES

VENTILATION FACILITIES:

SECOND AVENUE  
ROOSEVELT ISLAND  
VERNON BOULEVARD  
12TH STREET  
23RD STREET  
29TH STREET

TRACTION POWER SUBSTATION:

SECOND AVENUE  
VERNON BOULEVARD

EMERGENCY EXITS:

SECOND AVENUE  
FDR DRIVE  
ROOSEVELT ISLAND  
VERNON BOULEVARD  
12TH STREET  
23RD STREET  
29TH STREET

PUMP ROOMS:

SECOND AVENUE  
ROOSEVELT ISLAND  
VERNON BOULEVARD  
12TH STREET

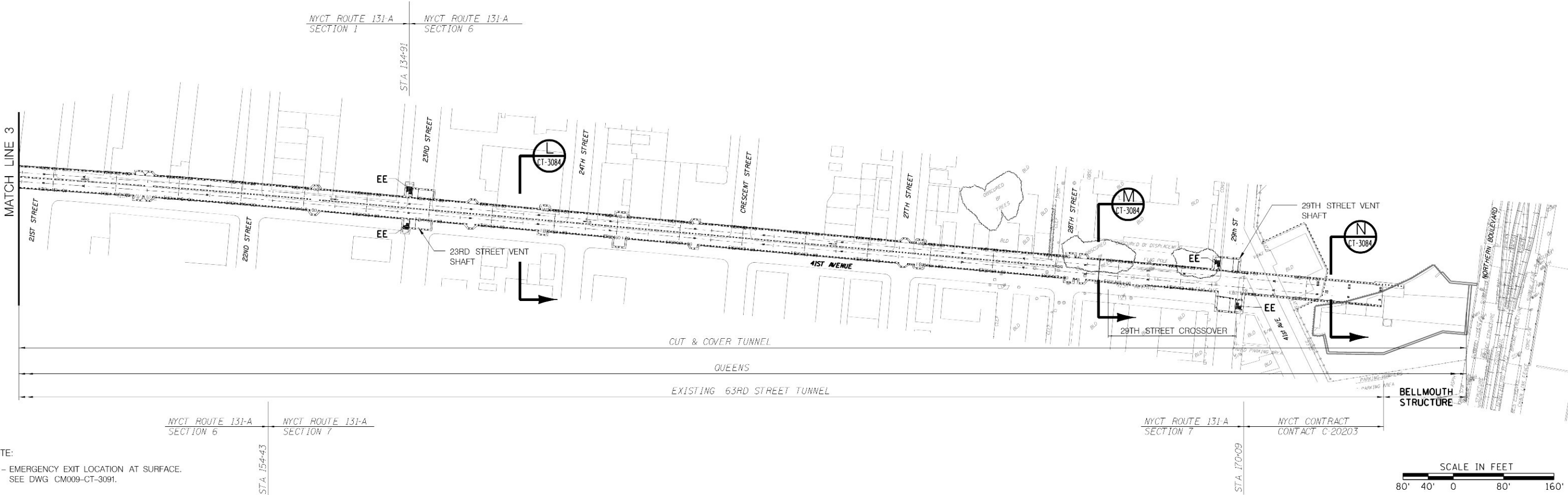
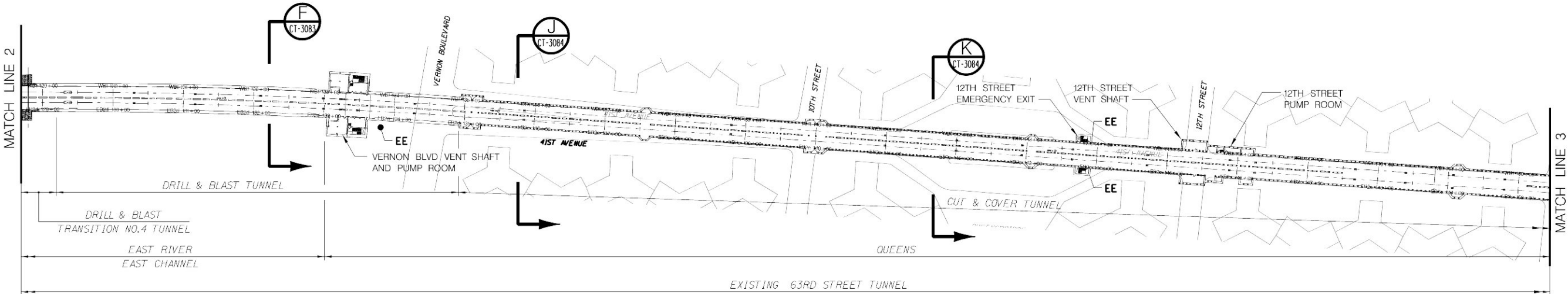
WATER METER ROOMS:

SECOND AVENUE  
FDR DRIVE  
ROOSEVELT ISLAND  
VERNON BOULEVARD  
12TH STREET  
23RD STREET  
29TH STREET


\$PRNAME\$

\$PLOTIDREV\$

\$REF6\$  
y:\p00cd submissions\p00009\126: conformed set (may 2006)\p00cd\p00008-ct-3082\222qm PM



NOTE:  
EE - EMERGENCY EXIT LOCATION AT SURFACE.  
SEE DWG CM009-CT-3091.

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DESIGNED BY: A. VALDIVIA	NY PROFESSIONAL License No.
DRAWN BY: C. PEARSON	
CHECKED BY: C. BARRATT	
COORDINATED BY: M. DELLA POSTA	
APPROVED BY: J. SCHABIB	

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&  
SEALED**

**MANHATTAN TUNNELS EXCAVATION**  
  
EXISTING 63RD STREET TUNNEL REHABILITATION  
EXISTING CONDITIONS - PLANS  
SHEET 2

SCALE AS NOTED
DRAWING NUMBER CM009-CT-3082
DATE: 5-26-06
REVISION NUMBER: 0

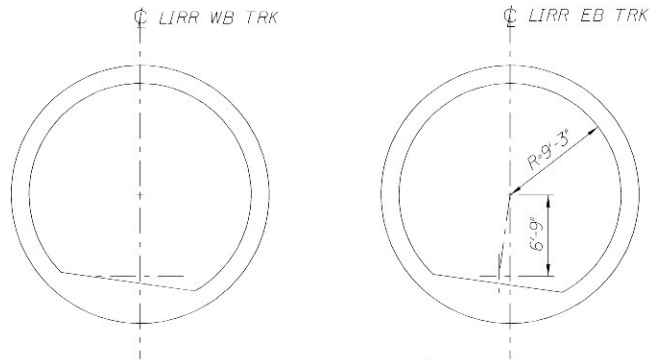
CONTRACT No. CM009
ISSUE
SHEET No. 17 OF 276



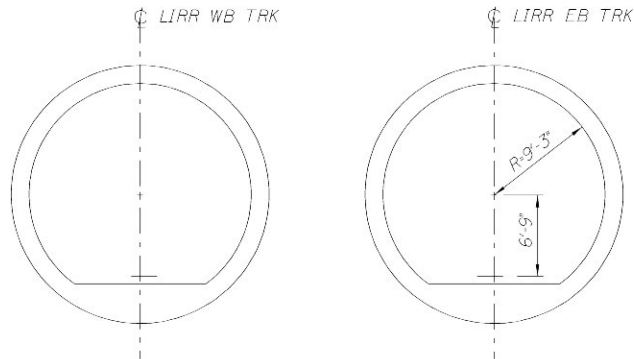
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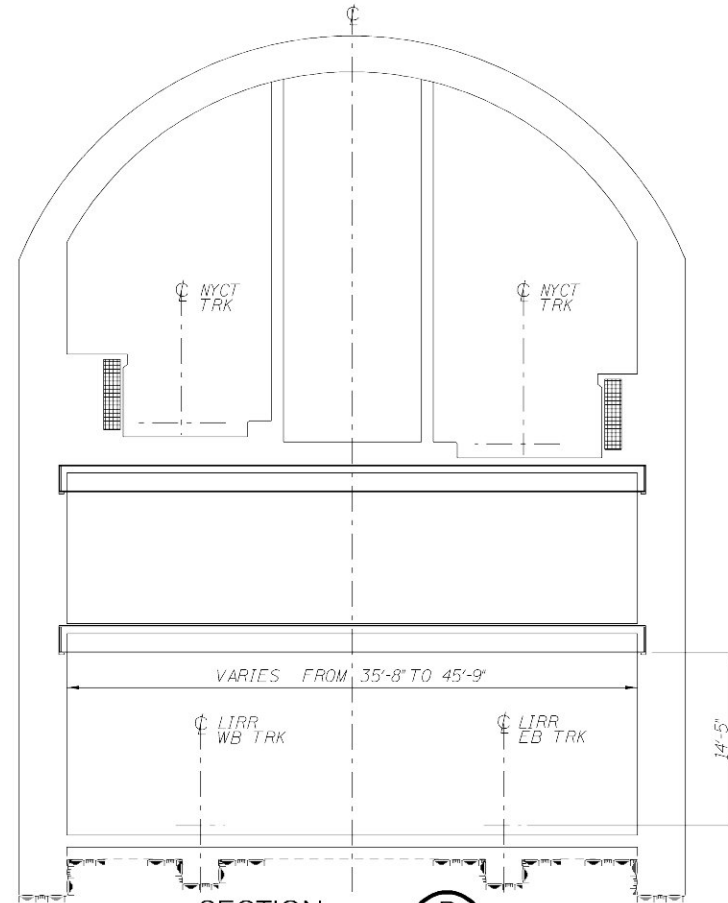
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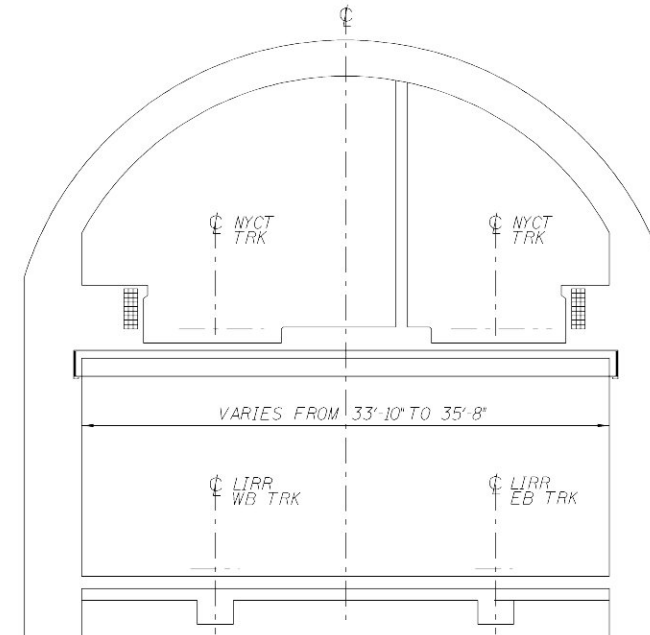
SECTION **A**  
CT-3081  
(MACHINE BORED TUNNEL)



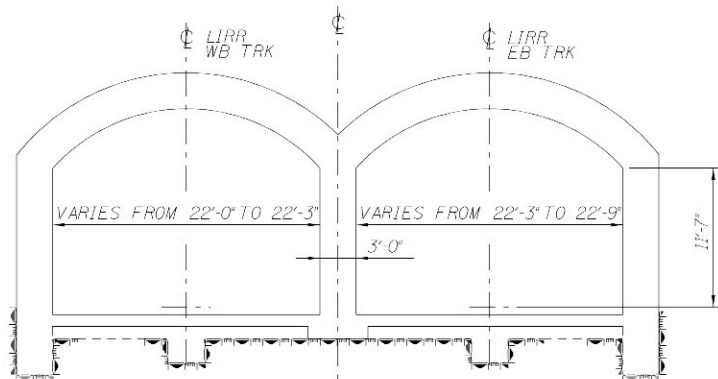
SECTION **B**  
CT-3081  
(MACHINE BORED TUNNEL)



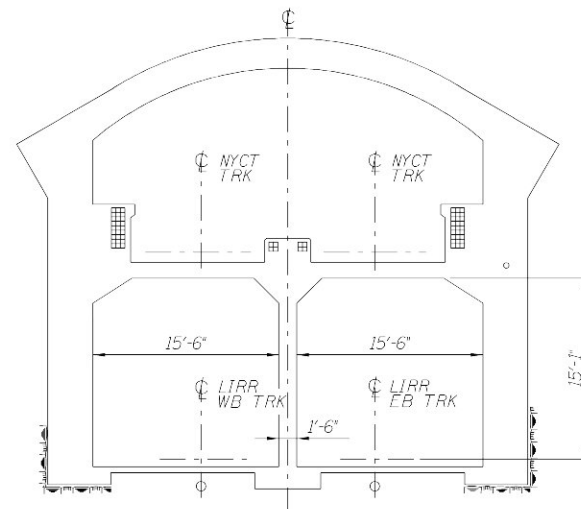
SECTION **D**  
CT-3081  
(HORSESHOE TUNNEL)



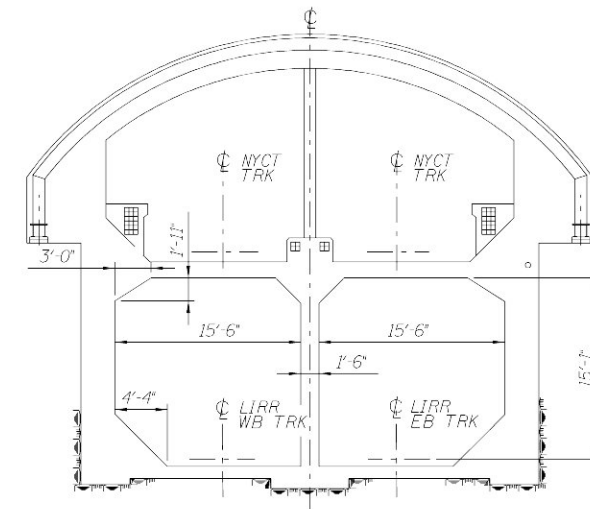
SECTION **E**  
CT-3081  
(HORSESHOE TUNNEL)



SECTION **C**  
CT-3081  
(DOUBLE ARCH CONSTRUCTION)



SECTION **F**  
CT-3081 CT-3082  
(HORSESHOE TUNNEL)



SECTION **G**  
CT-3081  
(TRANSITION TUNNEL)  
TRANSITION NO. 1 ONLY

NOTE:  
1. TYPICAL SECTIONS AND DIMENSIONS OF EXISTING TUNNEL STRUCTURES ARE AS SHOWN ON ORIGINAL CONTRACT DRAWINGS. DIMENSIONS ARE TO BE VERIFIED ON SITE.

SCALE IN FEET  
8' 4' 0' 8' 16'

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Capital Construction

**Long Island Rail Road**  
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DESIGNED BY:  
**A. VALDIVIA**  
DRAWN BY:  
**C. PEARSON**  
CHECKED BY:  
**C. BARRATT**  
COORDINATED BY:  
**M. DELLA POSTA**  
APPROVED BY:  
**J. SCHABIB**

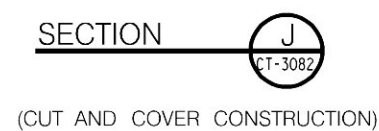
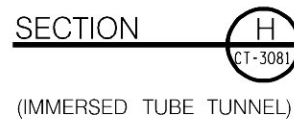
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**MANHATTAN TUNNELS EXCAVATION**

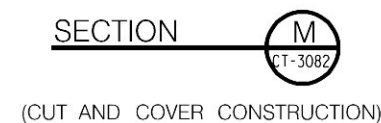
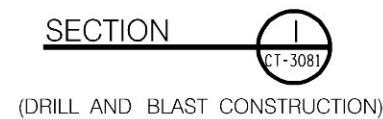
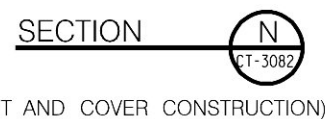
EXISTING 63RD STREET TUNNEL  
EXISTING CONDITIONS – SECTIONS  
SHEET 1

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-CT-3083  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
**CM009**  
ISSUE  
SHEET No.  
**18** OF **276**



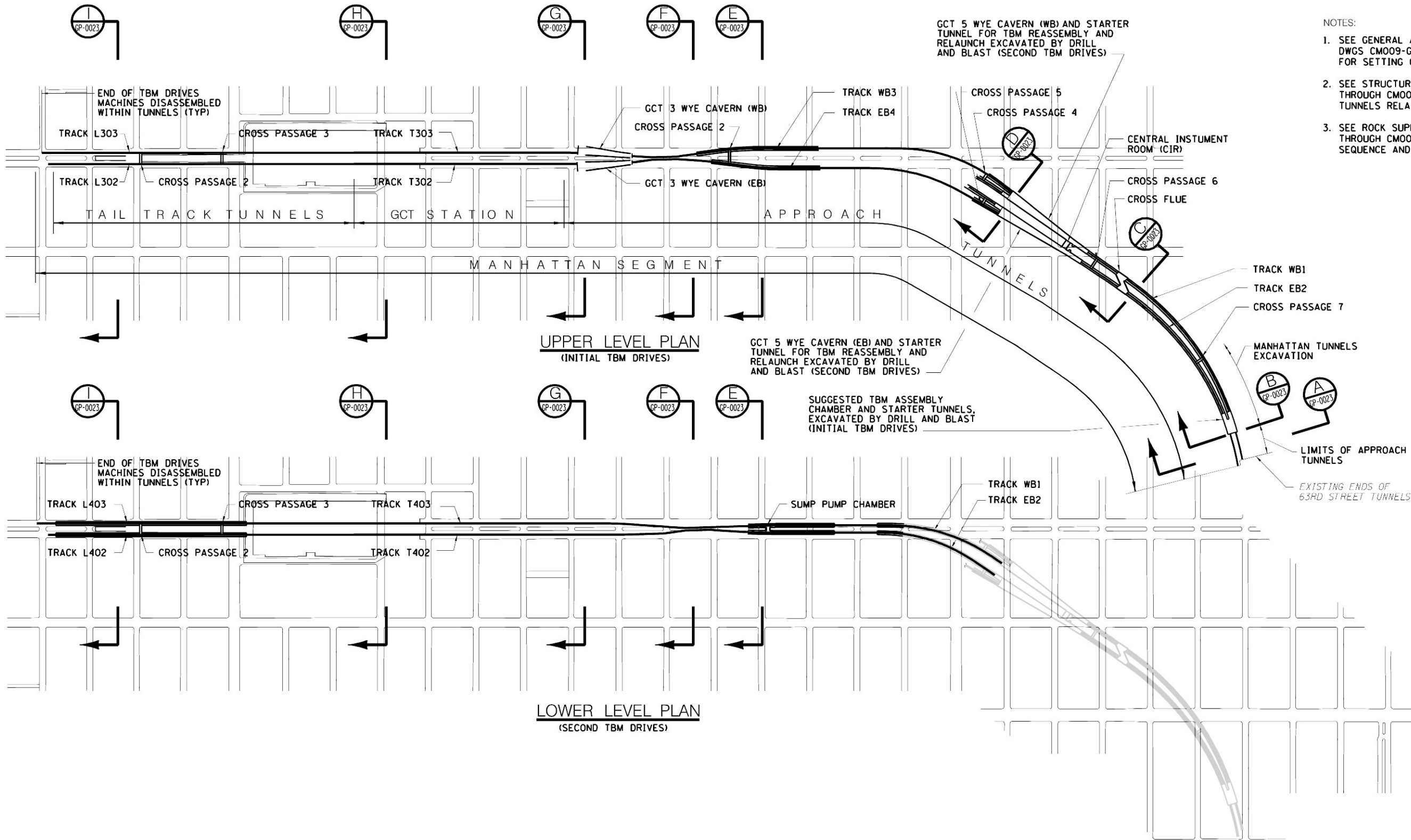
Architectural floor plan of the 14th Street Station platform area. The plan shows a large rectangular platform area with a width of 32'-10" and a depth of 14'-5" (MIN). The platform is divided into two main sections: the upper section for NYCT (New York City Transit) and the lower section for LIRR (Long Island Rail Road). The NYCT section includes tracks T1 and T2, with a central island platform. The LIRR section includes tracks WB (Westbound) and EB (Eastbound), with a central island platform. The plan also shows various structural elements, including walls, columns, and stairs. Dimensions are provided for the platform area and the overall station footprint.







- NOTES:
1. SEE GENERAL ARRANGEMENT SECTIONS, DWGS CM009-GP-0101 THROUGH CM009-GP-0121 FOR SETTING OUT OF TUNNEL SECTIONS.
  2. SEE STRUCTURAL PLANS, DWGS CM009-ST-1001 THROUGH CM009-ST-1110 FOR SETTING OUT OF TUNNELS RELATIVE TO TRACK ALIGNMENTS.
  3. SEE ROCK SUPPORT DWGS CM009-RS-1001 THROUGH CM009-RS-2091 FOR EXCAVATION SEQUENCE AND INITIAL SUPPORT.



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		DRAWN BY: J. RICCARDI
		CHECKED BY: G. AYVAS
		COORDINATED BY: M. DELLA POSTA
		APPROVED BY: J. SCHABIB
DATE:	REVISIONS	No.

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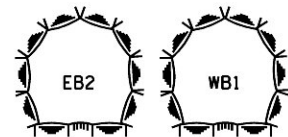
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DATE:

**MANHATTAN TUNNELS EXCAVATION**

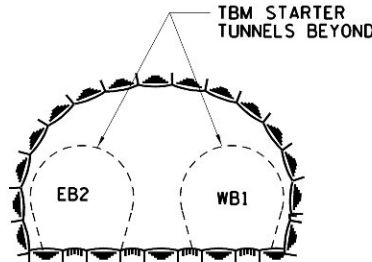
TUNNELING EXCAVATION  
PLANS

SCALE AS NOTED	CONTRACT No. CM009
DRAWING NUMBER CM009-GP-0022	ISSUE
DATE 5-26-06	SHEET No. 20 OF 276
REVISION NUMBER 0	



APPROACH TUNNELS

SECTION A  
GP-0022



SUGGESTED TBM ASSEMBLY CHAMBER

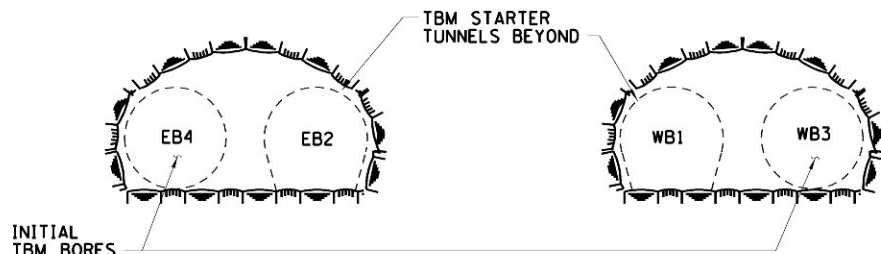
SECTION B  
GP-0022



TBM BORED TUNNELS

SECTION C  
GP-0022

NOTE:  
1. FOR INTERFACING BETWEEN CONTRACT CM009 AND ADJACENT ESA CONTRACT, REFER TO CONTRACT CM009 SUPPLEMENTAL TERMS AND CONDITIONS.



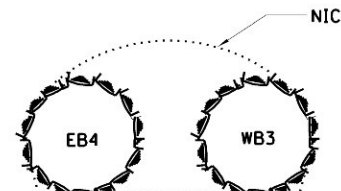
GCT 5 - WYE CAVERN

SECTION D  
GP-0022

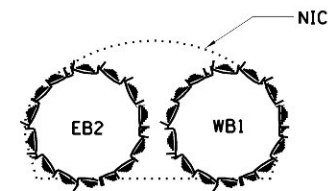


TBM BORED TUNNELS

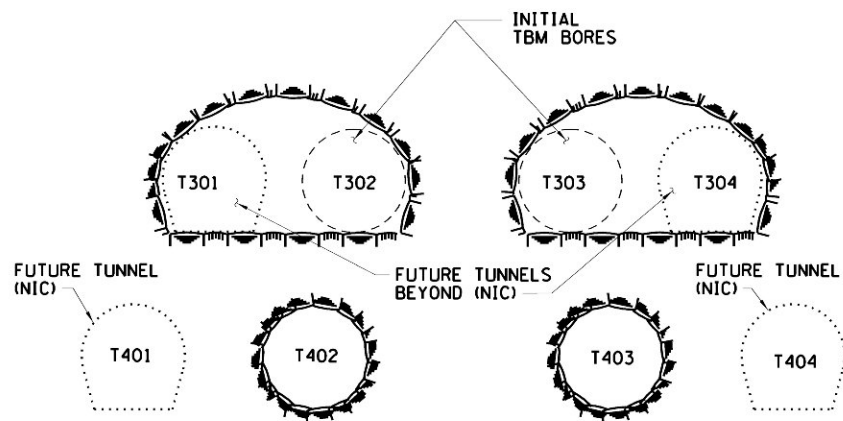
SECTION E  
GP-0022



TBM BORED TUNNELS  
(FUTURE GCT 3 & 4 - CROSSOVERS)

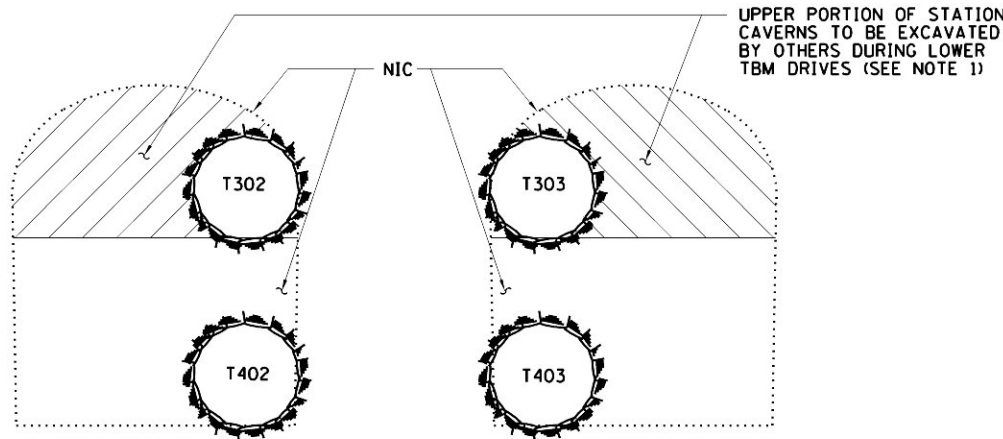


SECTION F  
GP-0022



GCT 3 - WYE CAVERN

SECTION G  
GP-0022



TBM BORED TUNNELS  
(FUTURE GCT STATION)

SECTION H  
GP-0022



TBM BORED TUNNELS  
(TAIL TRACKS)

SECTION I  
GP-0022



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

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DRAWN BY:  
L. LUBIN  
CHECKED BY:  
M. DELLA POSTA  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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**MANHATTAN TUNNELS EXCAVATION**  
  
TUNNELING EXCAVATION  
SECTIONS

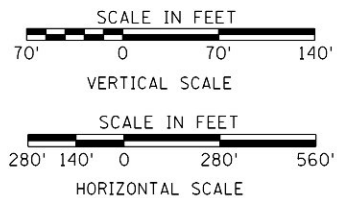
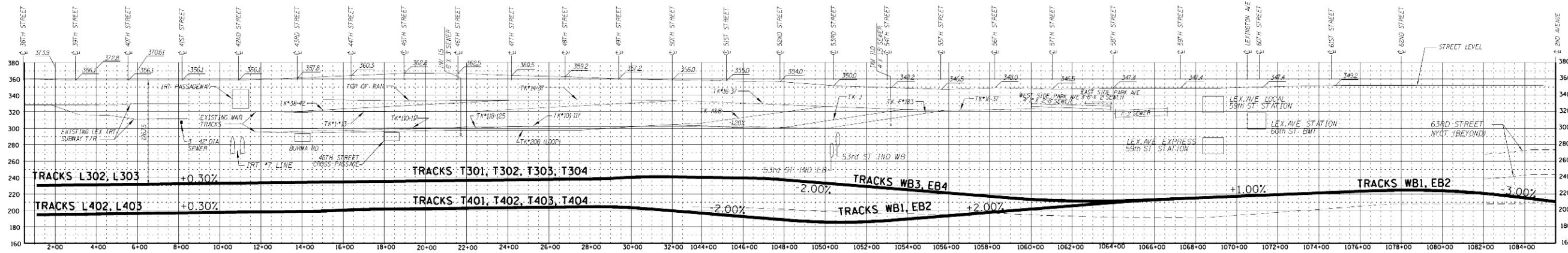
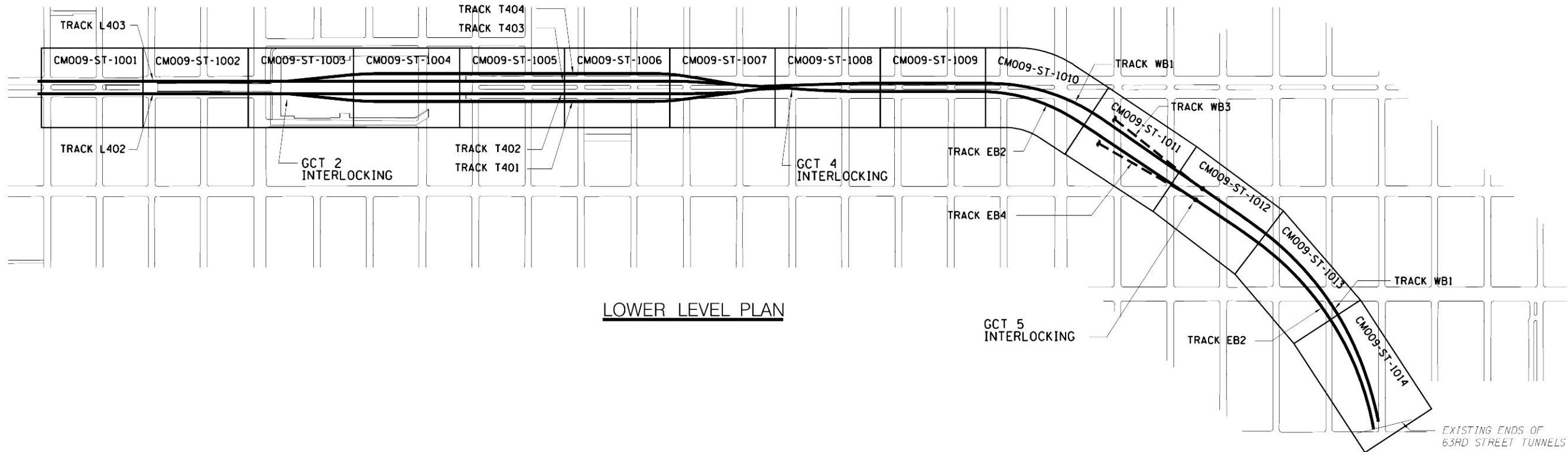
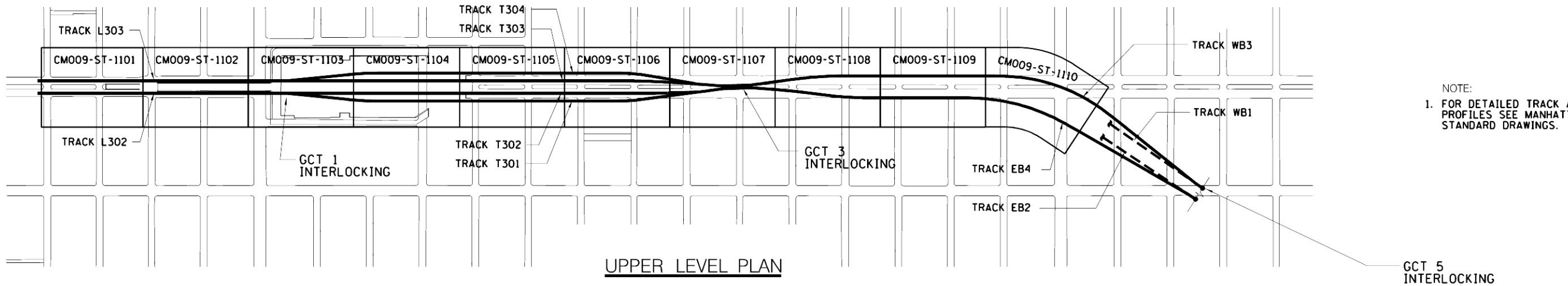
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AS NOTED  
DRAWING NUMBER:  
CM009-GP-0023  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
**CM009**  
ISSUE:  
  
SHEET No.  
**21** OF **276**



\$PRNAME\$  
\$PLOTDRW\$

\$REF 63\$  
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Long Island Rail Road  
East Side Access

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DRAWN BY: J. RICCARDI
CHECKED BY: G. AYVAS
COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

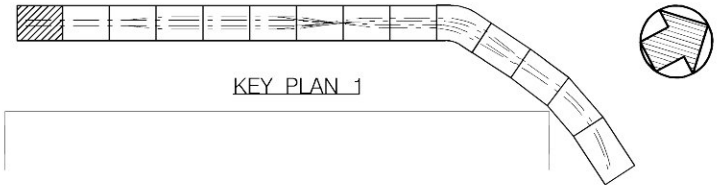
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DATE: \_\_\_\_\_

MANHATTAN TUNNELS EXCAVATION  
GENERAL ALIGNMENT PLAN AND PROFILE

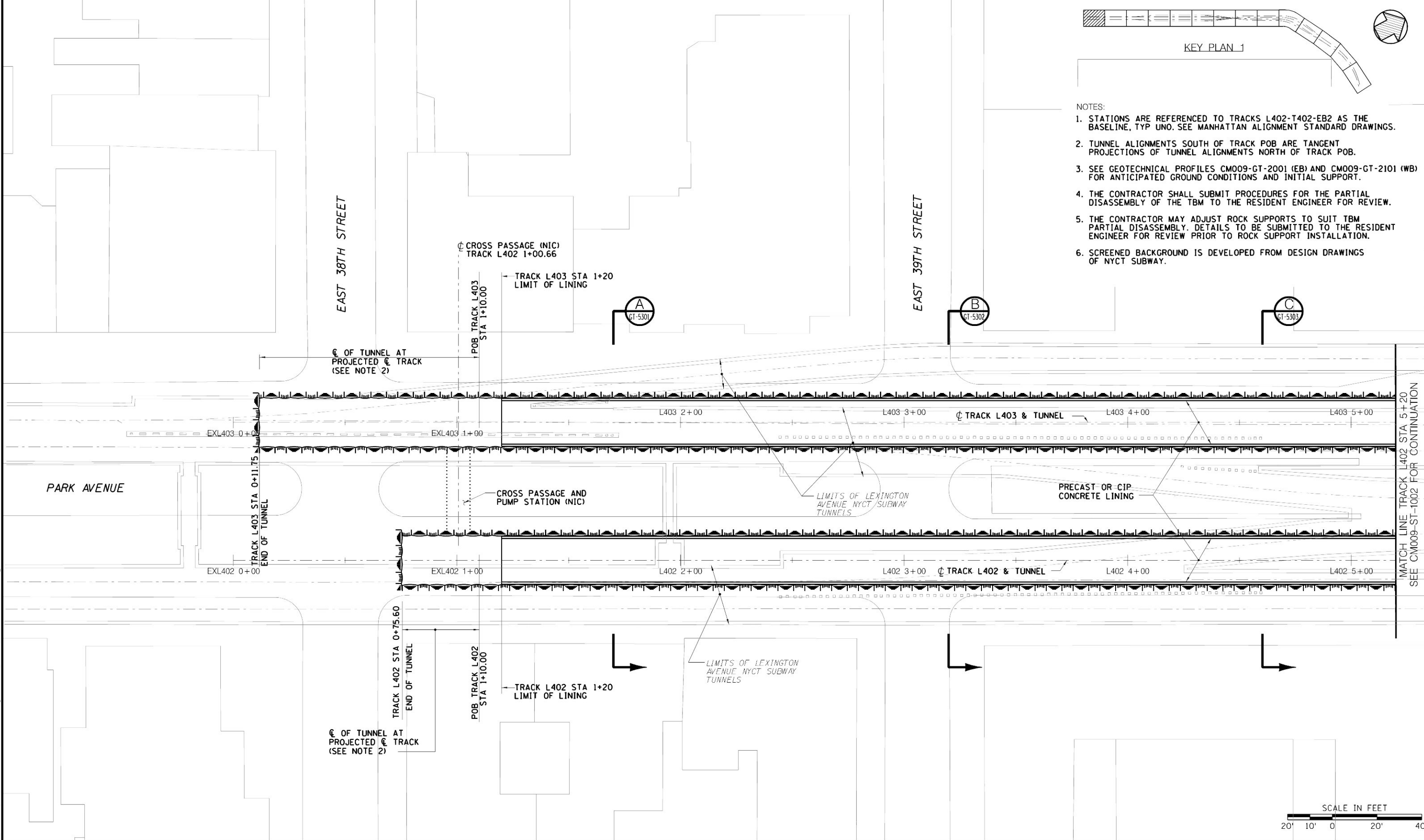
SCALE AS NOTED
DRAWING NUMBER CM009-GP-0021
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 22 OF 276

\$PRFNAME\$  
\$PLT01\$  
\$REF\$  
\$FILE\$  
submissions\000009\126: conformed set (may 2006)\00000008-st-1001.dwg PM



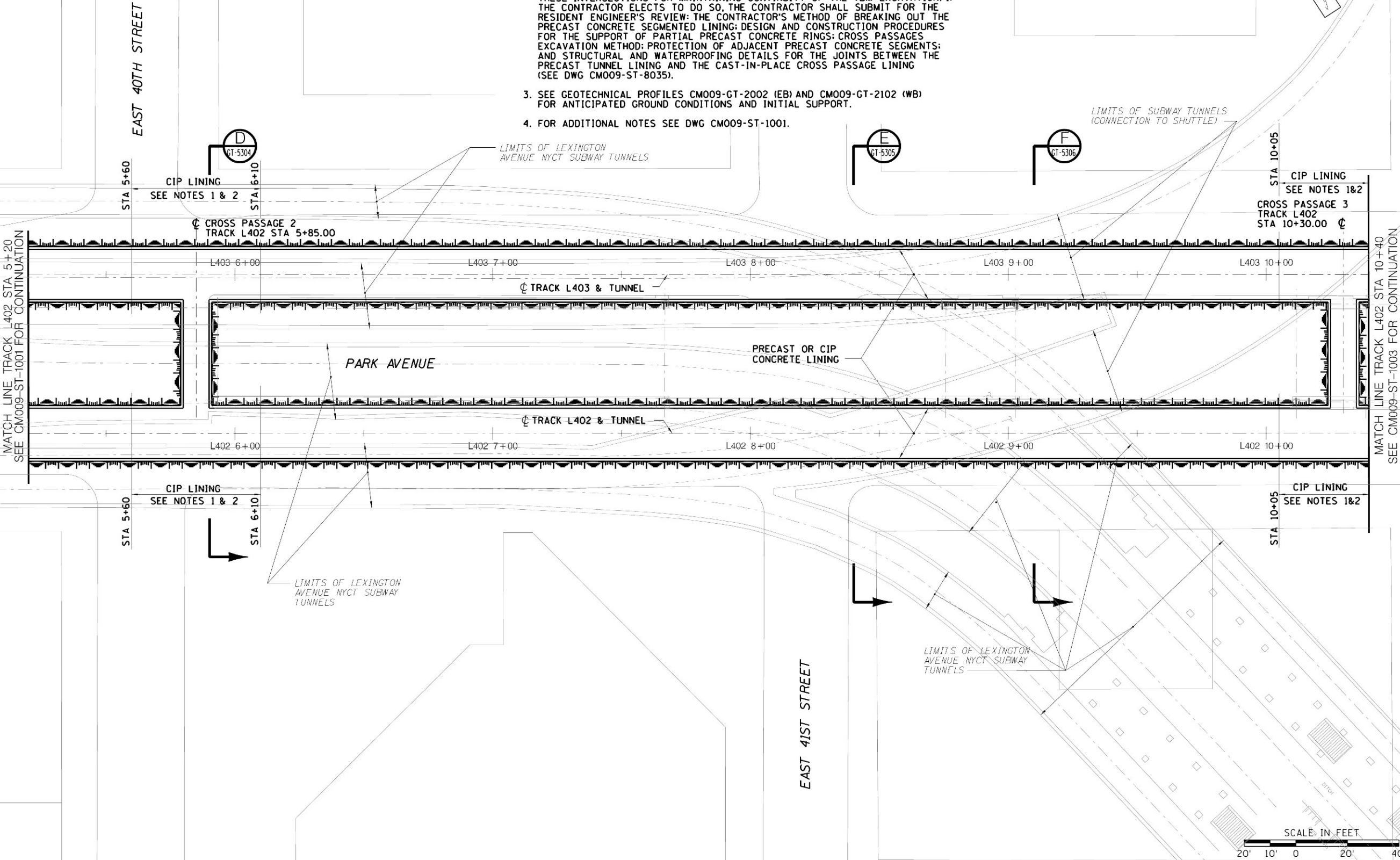
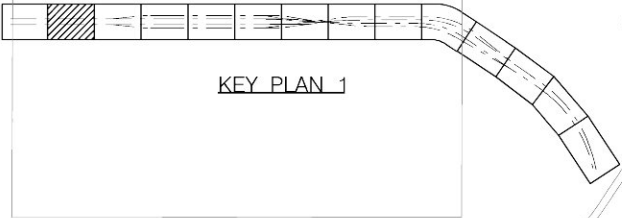
- NOTES:
1. STATIONS ARE REFERENCED TO TRACKS L402-T402-EB2 AS THE BASELINE, TYP UNO. SEE MANHATTAN ALIGNMENT STANDARD DRAWINGS.
  2. TUNNEL ALIGNMENTS SOUTH OF TRACK POB ARE TANGENT PROJECTIONS OF TUNNEL ALIGNMENTS NORTH OF TRACK POB.
  3. SEE GEOTECHNICAL PROFILES CM009-GT-2001 (EB) AND CM009-GT-2101 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  4. THE CONTRACTOR SHALL SUBMIT PROCEDURES FOR THE PARTIAL DISASSEMBLY OF THE TBM TO THE RESIDENT ENGINEER FOR REVIEW.
  5. THE CONTRACTOR MAY ADJUST ROCK SUPPORTS TO SUIT TBM PARTIAL DISASSEMBLY. DETAILS TO BE SUBMITTED TO THE RESIDENT ENGINEER FOR REVIEW PRIOR TO ROCK SUPPORT INSTALLATION.
  6. SCREENED BACKGROUND IS DEVELOPED FROM DESIGN DRAWINGS OF NYCT SUBWAY.

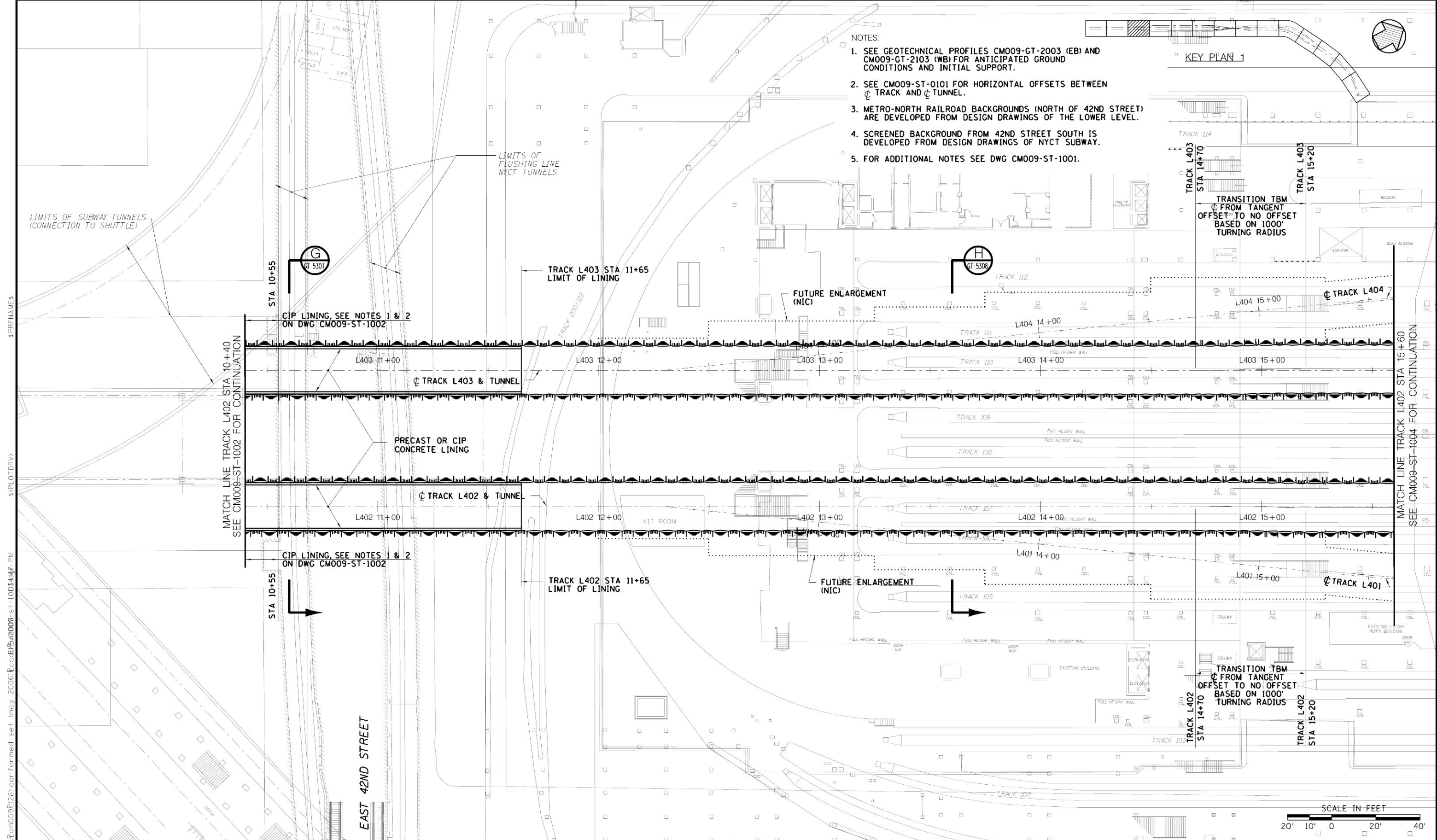


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Long Island Rail Road East Side Access			5/26/06 CONFORMED DRAWING	DATE: _____			




- NOTES:
1. THE TUNNEL LINING AT THE INTERSECTIONS WITH THE CROSS PASSAGES ARE SHOWN AS CAST-IN-PLACE CONCRETE. IF CONTRACTOR SELECTS TO INSTALL PRECAST CONCRETE LINING, THE LIMITS BETWEEN PRECAST TUNNEL LINING AND THE CAST-IN-PLACE TUNNEL SEGMENTS ARE APPROXIMATE AND CAN BE ADJUSTED, PLUS/MINUS 3 FEET, BY THE CONTRACTOR.
  2. THE CONTRACTOR MAY INSTALL PRECAST CONCRETE LINING IN THE TUNNELS AT THESE INTERSECTIONS FOR MAINTAINING CONTINUITY OF THE TBM EXCAVATION. IF THE CONTRACTOR ELECTS TO DO SO, THE CONTRACTOR SHALL SUBMIT FOR THE RESIDENT ENGINEER'S REVIEW: THE CONTRACTOR'S METHOD OF BREAKING OUT THE PRECAST CONCRETE SEGMENTED LINING; DESIGN AND CONSTRUCTION PROCEDURES FOR THE SUPPORT OF PARTIAL PRECAST CONCRETE RINGS; CROSS PASSAGES EXCAVATION METHOD; PROTECTION OF ADJACENT PRECAST CONCRETE SEGMENTS; AND STRUCTURAL AND WATERPROOFING DETAILS FOR THE JOINTS BETWEEN THE PRECAST TUNNEL LINING AND THE CAST-IN-PLACE CROSS PASSAGE LINING (SEE DWG CM009-ST-8035).
  3. SEE GEOTECHNICAL PROFILES CM009-GT-2002 (EB) AND CM009-GT-2102 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  4. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1001.






- NOTES:
1. SEE GEOTECHNICAL PROFILES CM009-GT-2003 (EB) AND CM009-GT-2103 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  2. SEE CM009-ST-0101 FOR HORIZONTAL OFFSETS BETWEEN  $\phi$  TRACK AND  $\phi$  TUNNEL.
  3. METRO-NORTH RAILROAD BACKGROUNDS (NORTH OF 42ND STREET) ARE DEVELOPED FROM DESIGN DRAWINGS OF THE LOWER LEVEL.
  4. SCREENED BACKGROUND FROM 42ND STREET SOUTH IS DEVELOPED FROM DESIGN DRAWINGS OF NYCT SUBWAY.
  5. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1001.

\$PRNAME\$  
\$SLOTIDREV\$  
\$REF 63\$  
\$FILED\$  
submissions\cm009st1004\cm009st1004.dgn  
set (may 2006) [cc66] [cm009st1004.dgn] PM

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**Long Island Rail Road**  
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DATE:	REVISIONS

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DRAWN BY: D. VASQUEZ
CHECKED BY: A. GONZALEZ
COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

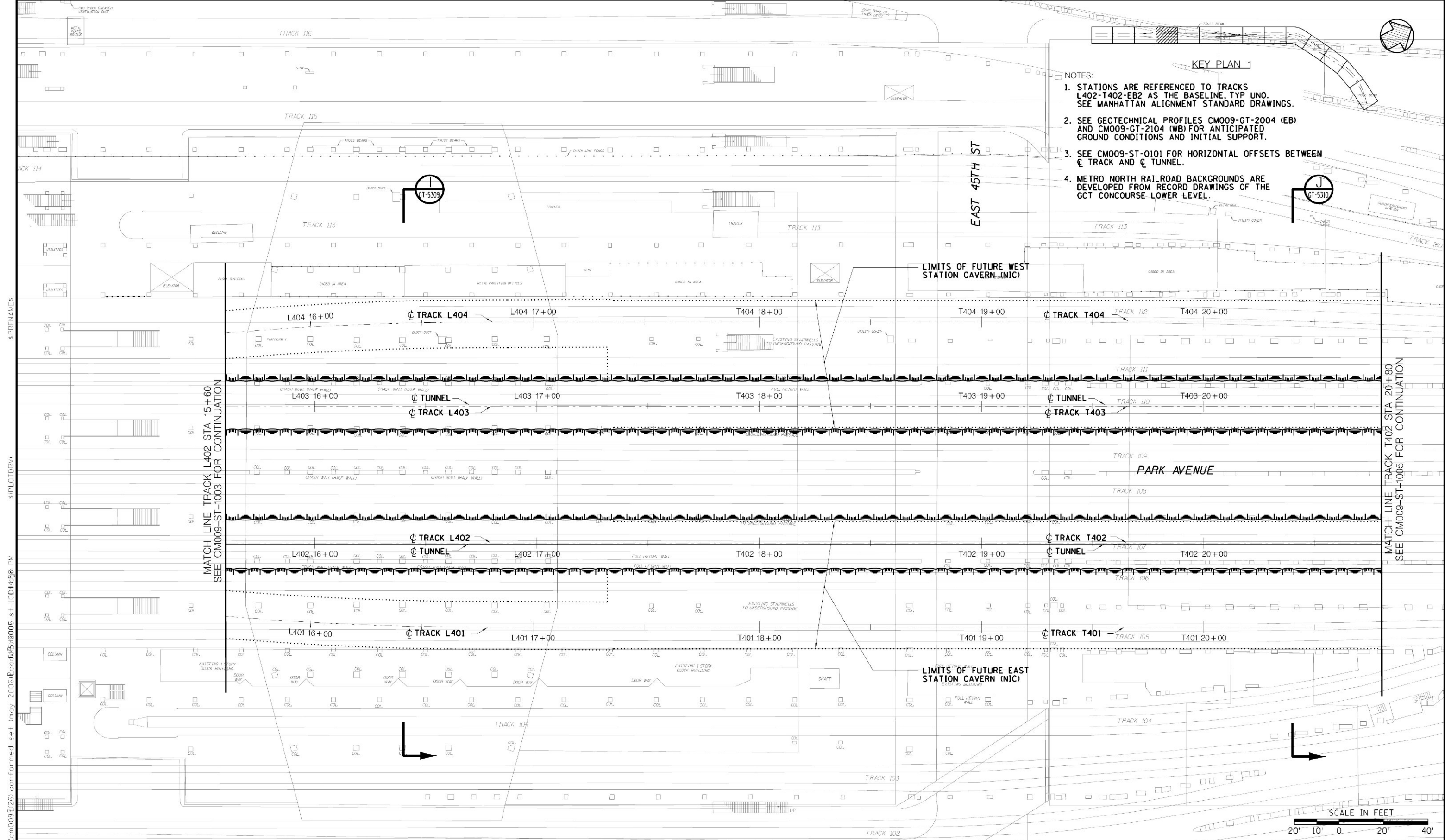
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MANHATTAN TUNNELS EXCAVATION

STRUCTURAL GENERAL PLAN  
LOWER LEVEL  
SHEET 3

SCALE AS NOTED
DRAWING NUMBER CM009-ST-1003
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 25 OF 276

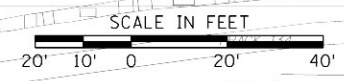


- NOTES:
1. STATIONS ARE REFERENCED TO TRACKS L402-T402-EB2 AS THE BASELINE, TYP UNO. SEE MANHATTAN ALIGNMENT STANDARD DRAWINGS.
  2. SEE GEOTECHNICAL PROFILES CM009-GT-2004 (EB) AND CM009-GT-2104 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  3. SEE CM009-ST-0101 FOR HORIZONTAL OFFSETS BETWEEN  $\phi$  TRACK AND  $\phi$  TUNNEL.
  4. METRO NORTH RAILROAD BACKGROUNDS ARE DEVELOPED FROM RECORD DRAWINGS OF THE GCT CONCOURSE LOWER LEVEL.

KEY PLAN 1

MATCH LINE TRACK L402 STA 15+60  
SEE CM009-ST-1003 FOR CONTINUATION

MATCH LINE TRACK T402 STA 20+80  
SEE CM009-ST-1005 FOR CONTINUATION



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CHECKED BY: A. GONZALEZ
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APPROVED BY: J. SCHABIB

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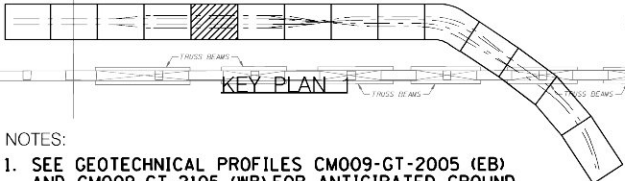
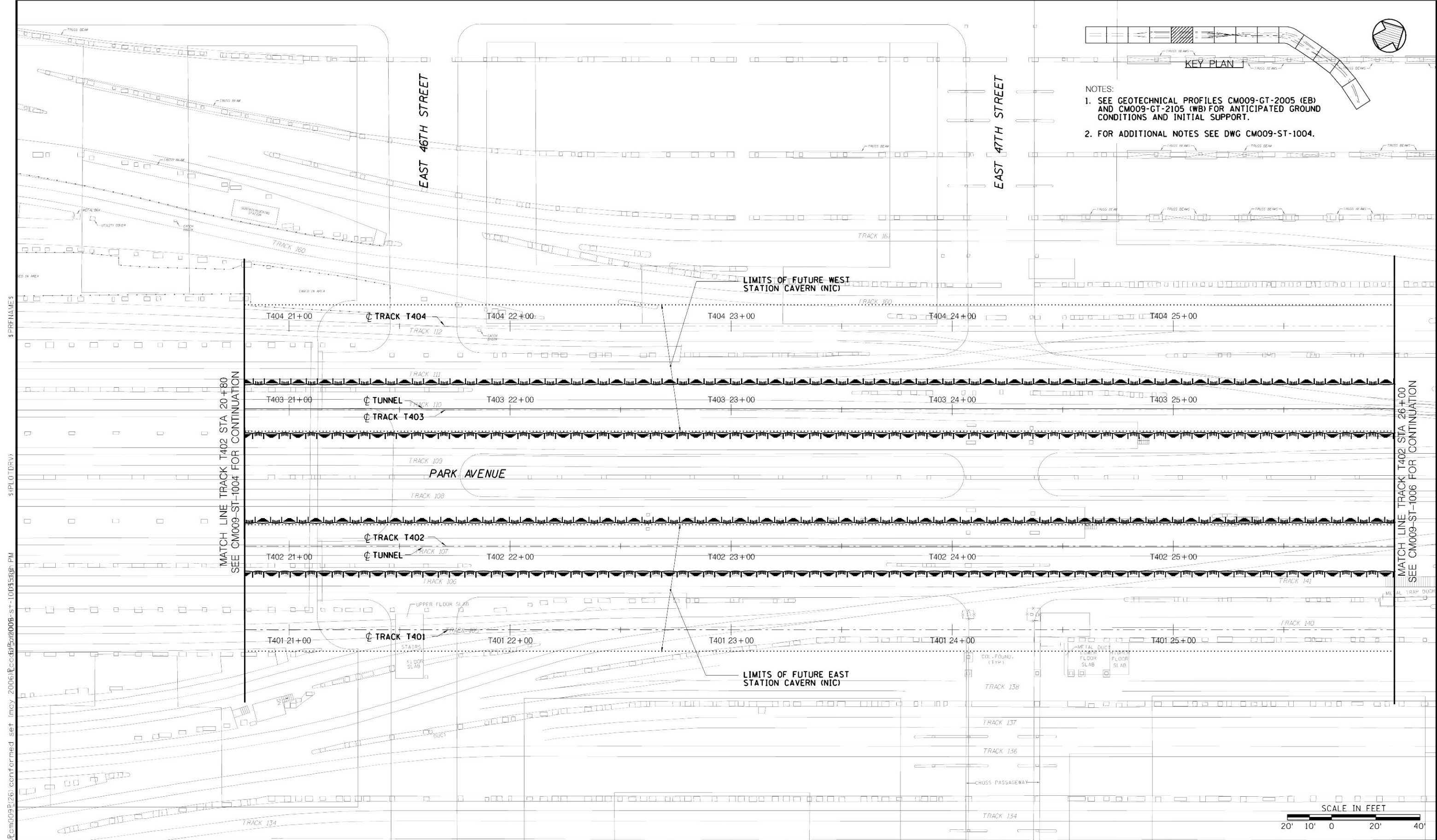
**MANHATTAN TUNNELS EXCAVATION**

STRUCTURAL GENERAL PLAN  
LOWER LEVEL  
SHEET 4

SCALE AS NOTED
DRAWING NUMBER CM009-ST-1004
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 26 OF 276





- NOTES:
1. SEE GEOTECHNICAL PROFILES CM009-GT-2005 (EB) AND CM009-GT-2105 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  2. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1004.

MATCH LINE TRACK T402 STA 20+80  
SEE CM009-ST-1004 FOR CONTINUATION

MATCH LINE TRACK T402 STA 26+00  
SEE CM009-ST-1006 FOR CONTINUATION

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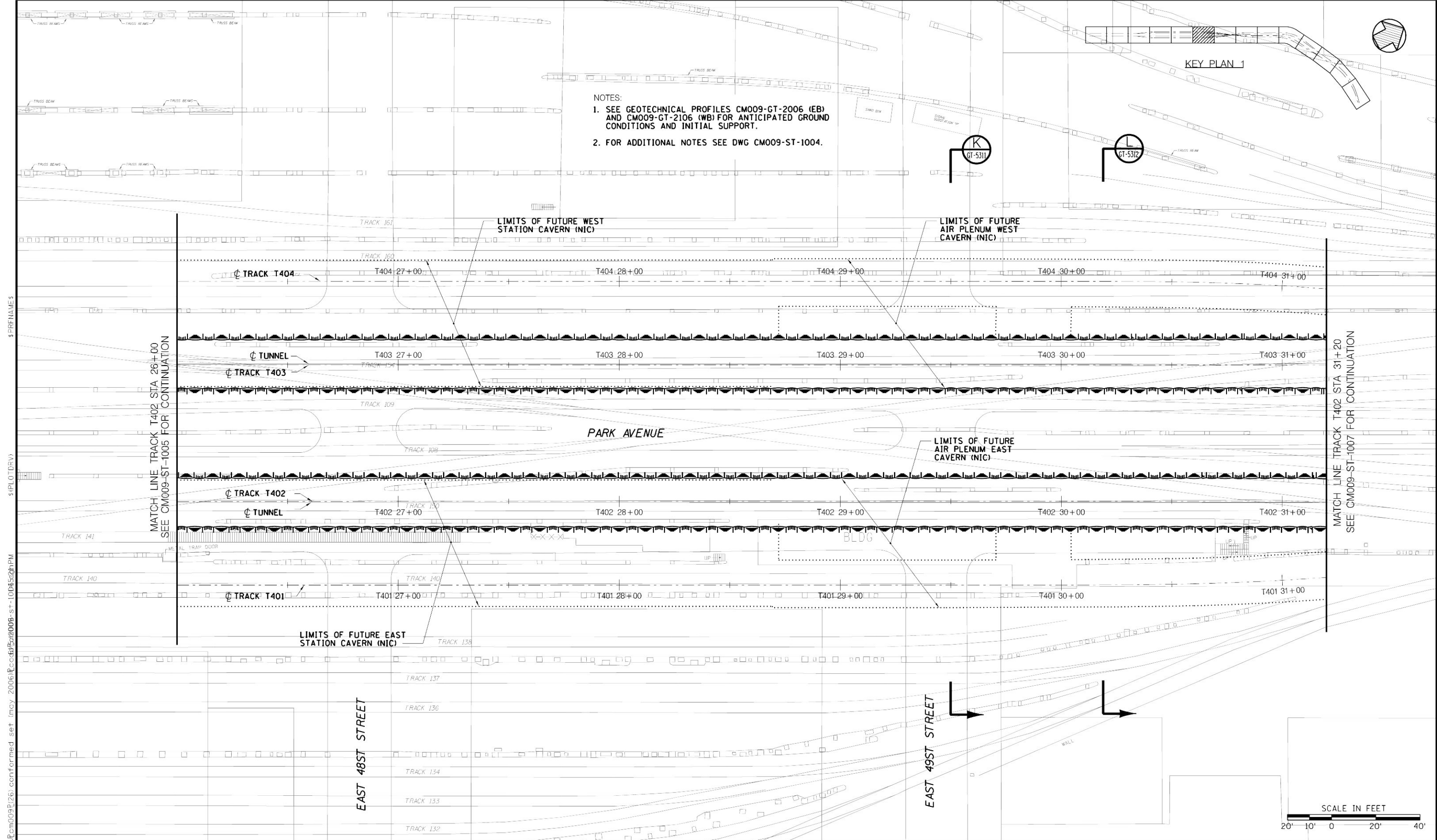
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**MANHATTAN TUNNELS EXCAVATION**


STRUCTURAL GENERAL PLAN  
LOWER LEVEL  
SHEET 5

SCALE AS NOTED
DRAWING NUMBER CM009-ST-1005
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 27 OF 276



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DRAWN BY:  
D. VASQUEZ  
CHECKED BY:  
A. GONZALEZ  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB





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**MANHATTAN TUNNELS EXCAVATION**  
**STRUCTURAL GENERAL PLAN  
LOWER LEVEL**  
SHEET 6

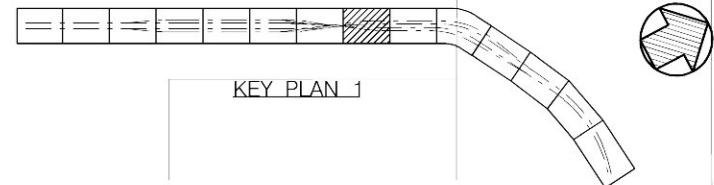
SCALE AS NOTED DRAWING NUMBER CM009-ST-1006 DATE: 5-26-06 REVISION NUMBER: 0	CONTRACT No. <b>CM009</b> ISSUE  SHEET No. <b>28</b> OF 276
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1. SEE GEOTECHNICAL PROFILES CM009-GT-2007 (EB) AND CM009-GT-2107 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
2. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1004.



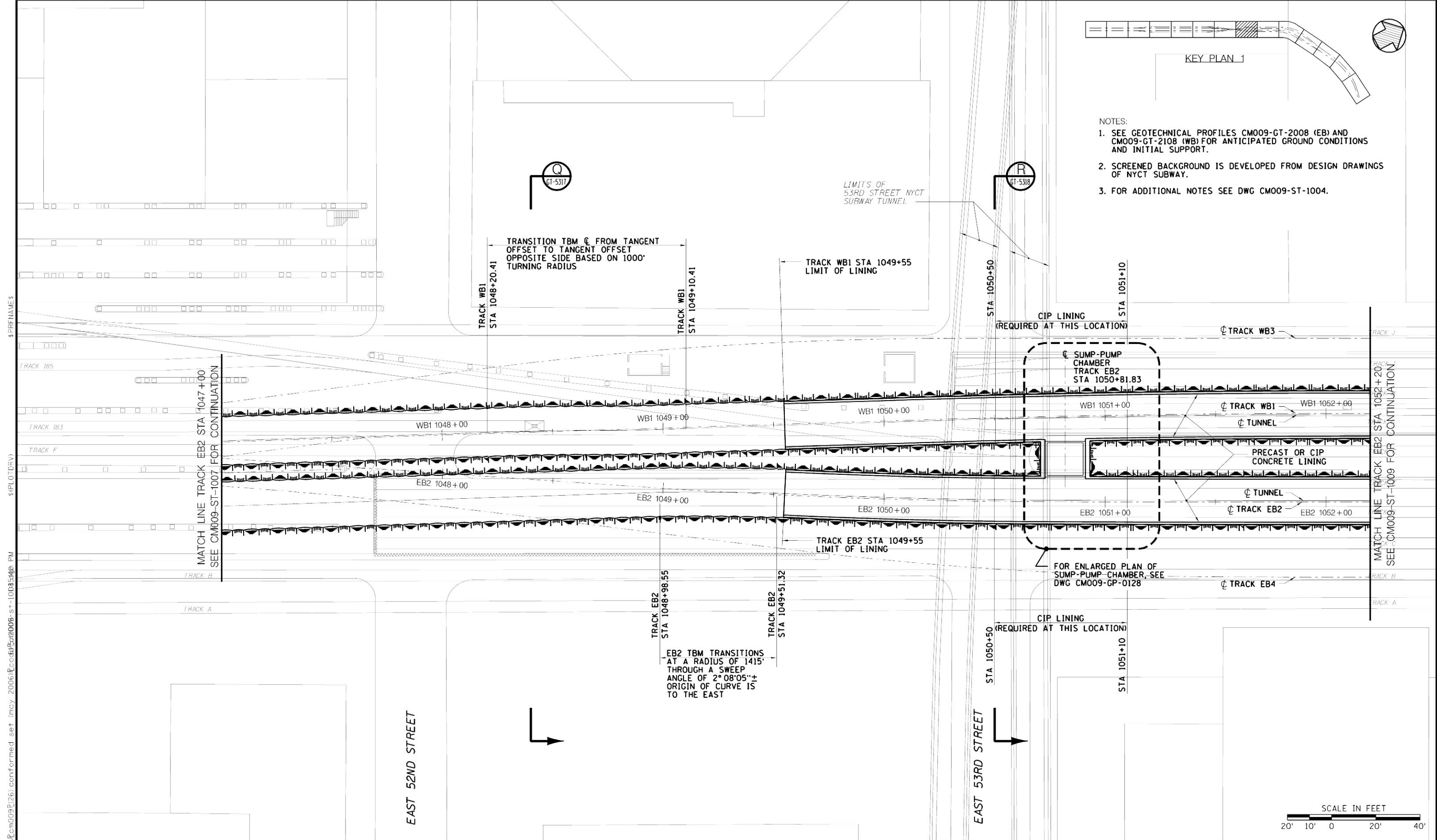
 <b>Metropolitan Transportation Authority</b> Capital Construction	 <b>Long Island Rail Road</b> <b>East Side Access</b>	 <b>PB STV PARSONS</b> General Engineering Consultant 469 Seventh Avenue • New York, NY • 10018	PARSONS BRINCKERHOFF STV INCORPORATED PARSONS TRANSPORTATION GROUP OF NEW YORK, INC.	IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DOCUMENT IN ANY WAY UNLESS THAT PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL. THE LICENSED PROFESSIONAL SHALL AFFIX TO THIS DOCUMENT THE SEAL AND THE NOTATION "ALTERED BY". FOLLOWED BY THE AUTHORIZED SIGNATURE AND THE DATE OF THE ALTERATION."	DESIGNED BY: V. SHEY	NY PROFESSIONAL License No. _____ <b>ORIGINAL SIGNED &amp; SEALED</b> DATE: _____	<b>MANHATTAN TUNNELS EXCAVATION</b>  STRUCTURAL GENERAL PLAN LOWER LEVEL SHEET 7	SCALE: AS NOTED	CONTRACT No. <b>CM009</b>
					DRAWN BY: J. RICCARDI			CHECKED BY: C. BARRATT	COORDINATED BY: M. DELLA POSTA
		DATE: 5/26/06	CONFORMED DRAWING		REVISIONS			DATE: 5-26-06	SHEET No. <b>29</b> OF <b>27</b>
								REVISION NUMBER: 0	



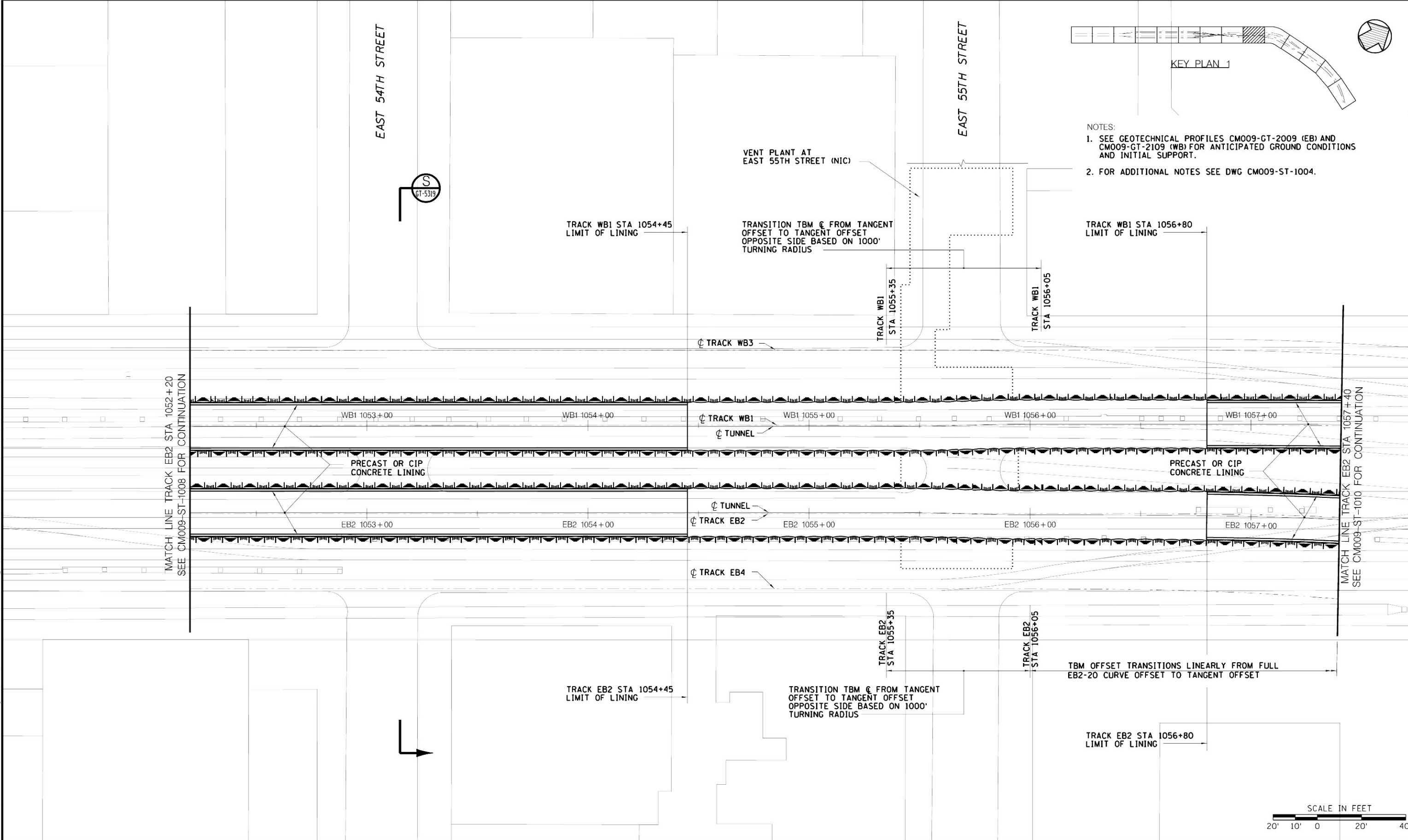



- NOTES:


1. SEE GEOTECHNICAL PROFILES CMO09-GT-2008 (EB) AND CMO09-GT-2108 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
2. SCREENED BACKGROUND IS DEVELOPED FROM DESIGN DRAWINGS OF NYCT SUBWAY.
3. FOR ADDITIONAL NOTES SEE DWG CMO09-ST-1004.



\$PRJNAME\$  
\$PLOTIDREV\$  
\$REF\$  
\$FILE\$  
submissions\cm009\p126\conformed set (may 2006)\cc46\cm009-st-1009.dgn PM



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Capital Construction

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DRAWN BY:  
D. VASQUEZ  
CHECKED BY:  
A. GONZALEZ  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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SIGNED  
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**MANHATTAN TUNNELS EXCAVATION**  
  
STRUCTURAL GENERAL PLAN  
LOWER LEVEL  
SHEET 9

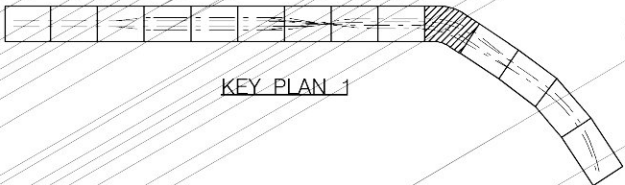
SCALE AS NOTED
DRAWING NUMBER CM009-ST-1009
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. <b>CM009</b> ISSUE
SHEET No. <b>31</b> OF <b>276</b>

\$REF63  
y:\p000d submittals\cm009\26: conformed set (may 2006)\c006\26:cm009-ST-1010.dwg PM  
\$PRNAME\$  
\$PLOTDRW\$

NOTES:

1. SEE GEOTECHNICAL PROFILES CM009-GT-2010 (EB) AND CM009-GT-2110 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
2. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1004.



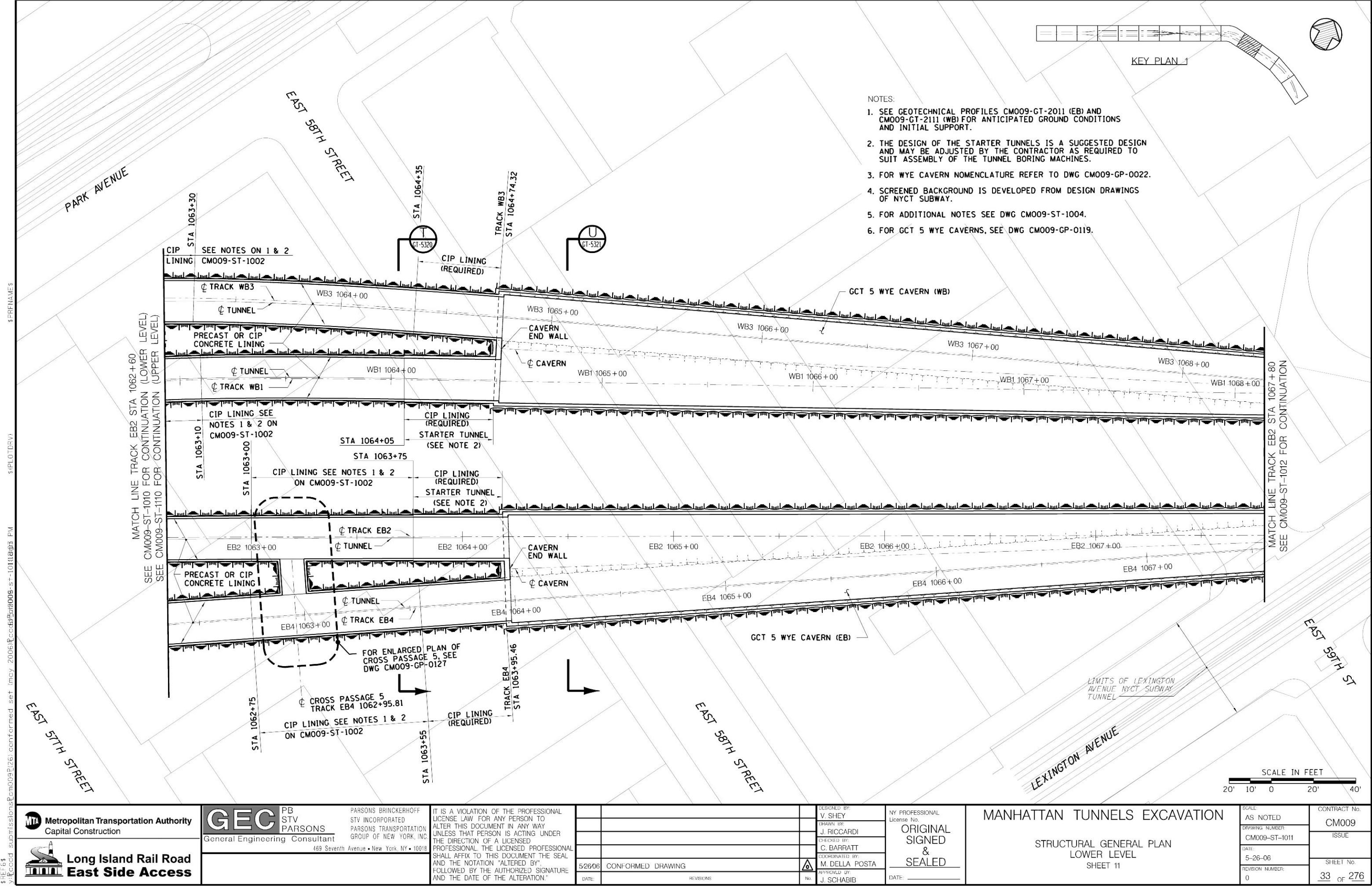
TBM OFFSET TRANSITIONS  
LINEARLY FROM FULL EB2-20  
CURVE OFFSET TO TANGENT OFFSET

MATCH LINE TRACK EB2 STA 1062+60  
SEE CM009-ST-1011 FOR CONTINUATION



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				DRAWN BY: D. VASQUEZ				DRAWING NUMBER CM009-ST-1010	ISSUE
Long Island Rail Road East Side Access				CHECKED BY: A. GONZALEZ			STRUCTURAL GENERAL PLAN LOWER LEVEL SHEET 10	DATE: 5-26-06	SHEET No. 32 OF 276
				COORDINATED BY: M. DELLA POSTA				REVISION NUMBER: 0	
				APPROVED BY: J. SCHABIB					
				DATE: 5/26/06					
				REVISIONS					





- NOTES:
1. SEE GEOTECHNICAL PROFILES CM009-GT-2011 (EB) AND CM009-GT-2111 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  2. THE DESIGN OF THE STARTER TUNNELS IS A SUGGESTED DESIGN AND MAY BE ADJUSTED BY THE CONTRACTOR AS REQUIRED TO SUIT ASSEMBLY OF THE TUNNEL BORING MACHINES.
  3. FOR WYE CAVERN NOMENCLATURE REFER TO DWG CM009-GP-0022.
  4. SCREENED BACKGROUND IS DEVELOPED FROM DESIGN DRAWINGS OF NYCT SUBWAY.
  5. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1004.
  6. FOR GCT 5 WYE CAVERNS, SEE DWG CM009-GP-0119.





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			5/26/06	CONFORMED DRAWING	DRAWN BY: J. RICCARDI CHECKED BY: C. BARRATT COORDINATED BY: M. DELLA POSTA APPROVED BY: J. SCHABIB					
Long Island Rail Road East Side Access								STRUCTURAL GENERAL PLAN LOWER LEVEL SHEET 11	REVISION NUMBER: 0	SHEET No. 33 OF 276



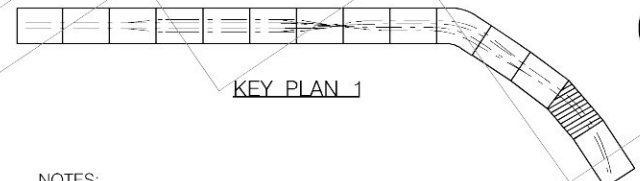
NOTES:

1. SEE GEOTECHNICAL PROFILES CM009-GT-2012 (EB) AND CM009-GT-2112 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
2. FOR WYE CAVERN NOMENCLATURE REFER TO DWG CM009-GP-0022.
3. SCREENED BACKGROUND IS DEVELOPED FROM DESIGN DRAWINGS OF NYCT SUBWAY.
4. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1004.
5. FOR CROSS FLUE GEOMETRY SEE DWG CM009-GP-0124.
6. FOR INITIAL SUPPORT OF CROSS FLUE SEE DWG CM009-RS-1127.

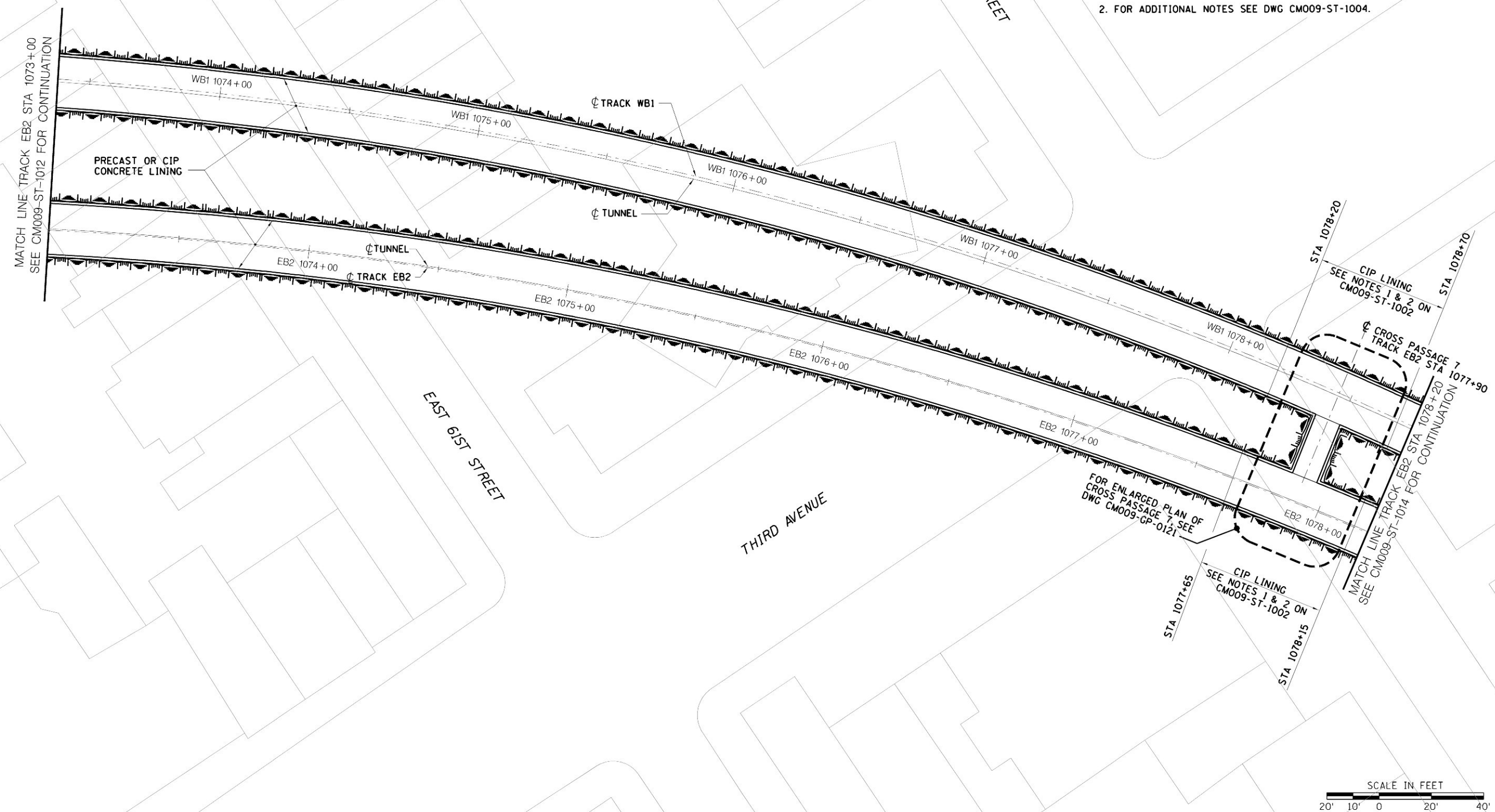


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									DRAWN BY: J. RICCARDI			DRAWING NUMBER: CM009-ST-1012	ISSUE
										CHECKED BY: C. BARRATT		DATE: 5-26-06	SHEET No. 34 OF 276
										COORDINATED BY: M. DELLA POSTA		REVISION NUMBER: 0	
										APPROVED BY: J. SCHABIE			

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\$REF\$  
\$FILE\$  
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- NOTES:
1. SEE GEOTECHNICAL PROFILES CM009-GT-2013 (EB) AND CM009-GT-2113 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  2. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1004.



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DRAWN BY:  
D. VASQUEZ  
CHECKED BY:  
A. GONZALEZ  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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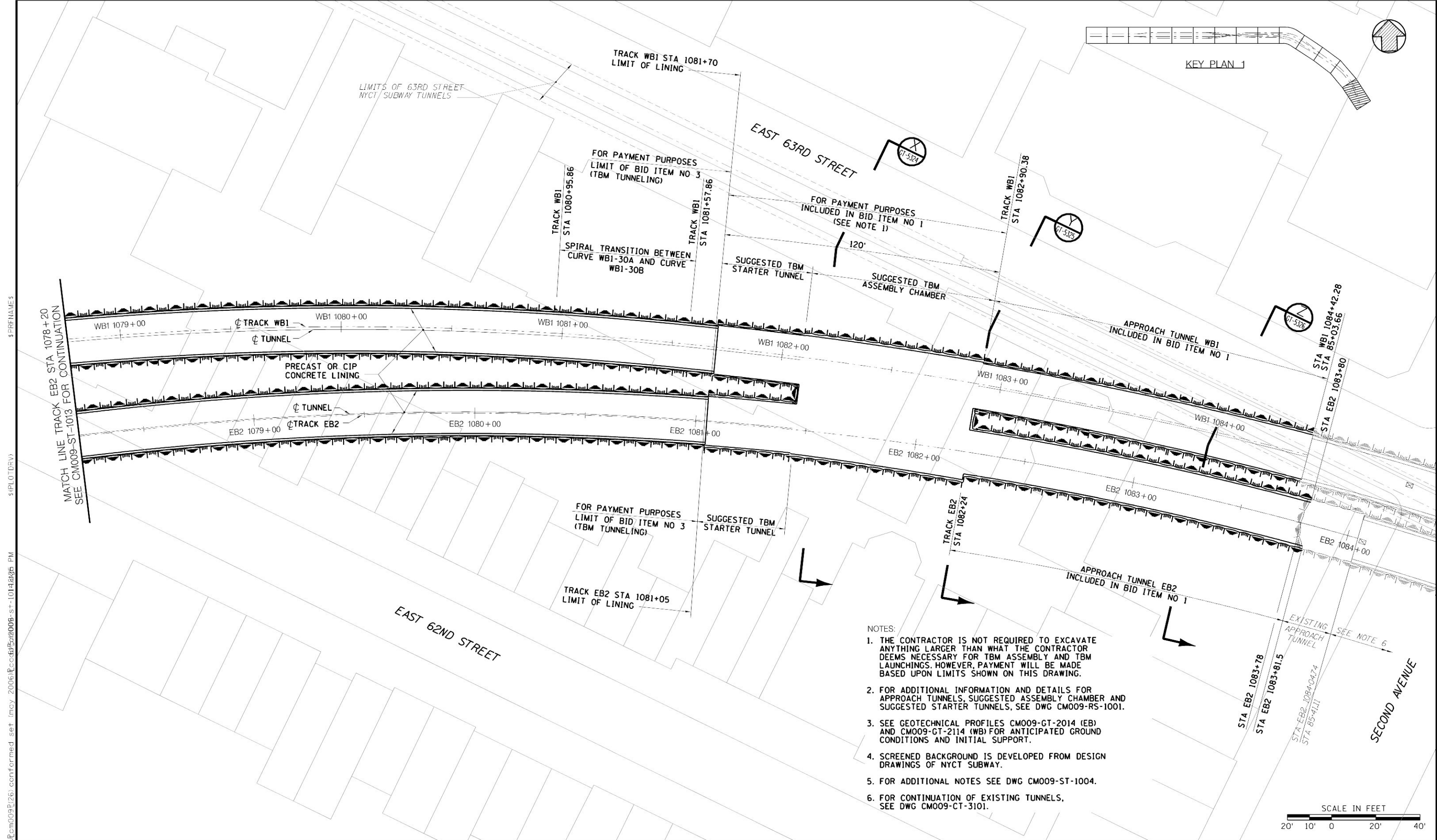
**MANHATTAN TUNNELS EXCAVATION**

STRUCTURAL GENERAL PLAN  
LOWER LEVEL  
SHEET 13


SCALE AS NOTED
DRAWING NUMBER CM009-ST-1013
DATE: 5-26-06
REVISION NUMBER: 0


CONTRACT No. CM009
ISSUE
SHEET No. 35 OF 276





- NOTES:
1. THE CONTRACTOR IS NOT REQUIRED TO EXCAVATE ANYTHING LARGER THAN WHAT THE CONTRACTOR DEEMS NECESSARY FOR TBM ASSEMBLY AND TBM LAUNCHINGS. HOWEVER, PAYMENT WILL BE MADE BASED UPON LIMITS SHOWN ON THIS DRAWING.
  2. FOR ADDITIONAL INFORMATION AND DETAILS FOR APPROACH TUNNELS, SUGGESTED ASSEMBLY CHAMBER AND SUGGESTED STARTER TUNNELS, SEE DWG CM009-RS-1001.
  3. SEE GEOTECHNICAL PROFILES CM009-GT-2014 (EB) AND CM009-GT-2114 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  4. SCREENED BACKGROUND IS DEVELOPED FROM DESIGN DRAWINGS OF NYCT SUBWAY.
  5. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1004.
  6. FOR CONTINUATION OF EXISTING TUNNELS, SEE DWG CM009-CT-3101.

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D. VASQUEZ  
CHECKED BY:  
A. GONZALEZ  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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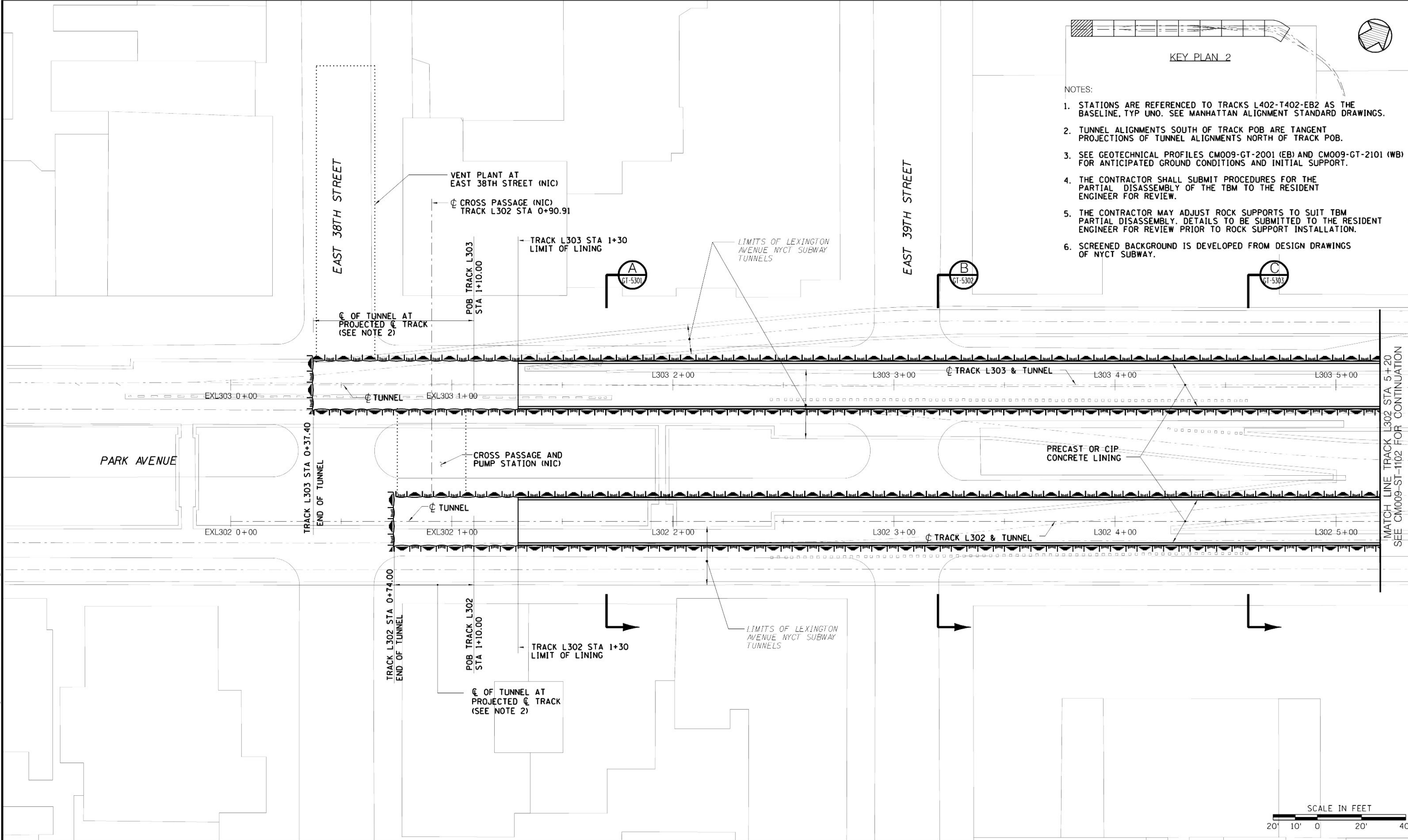
MANHATTAN TUNNELS EXCAVATION

STRUCTURAL GENERAL PLAN  
LOWER LEVEL  
SHEET 14

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-ST-1014  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
36 OF 276

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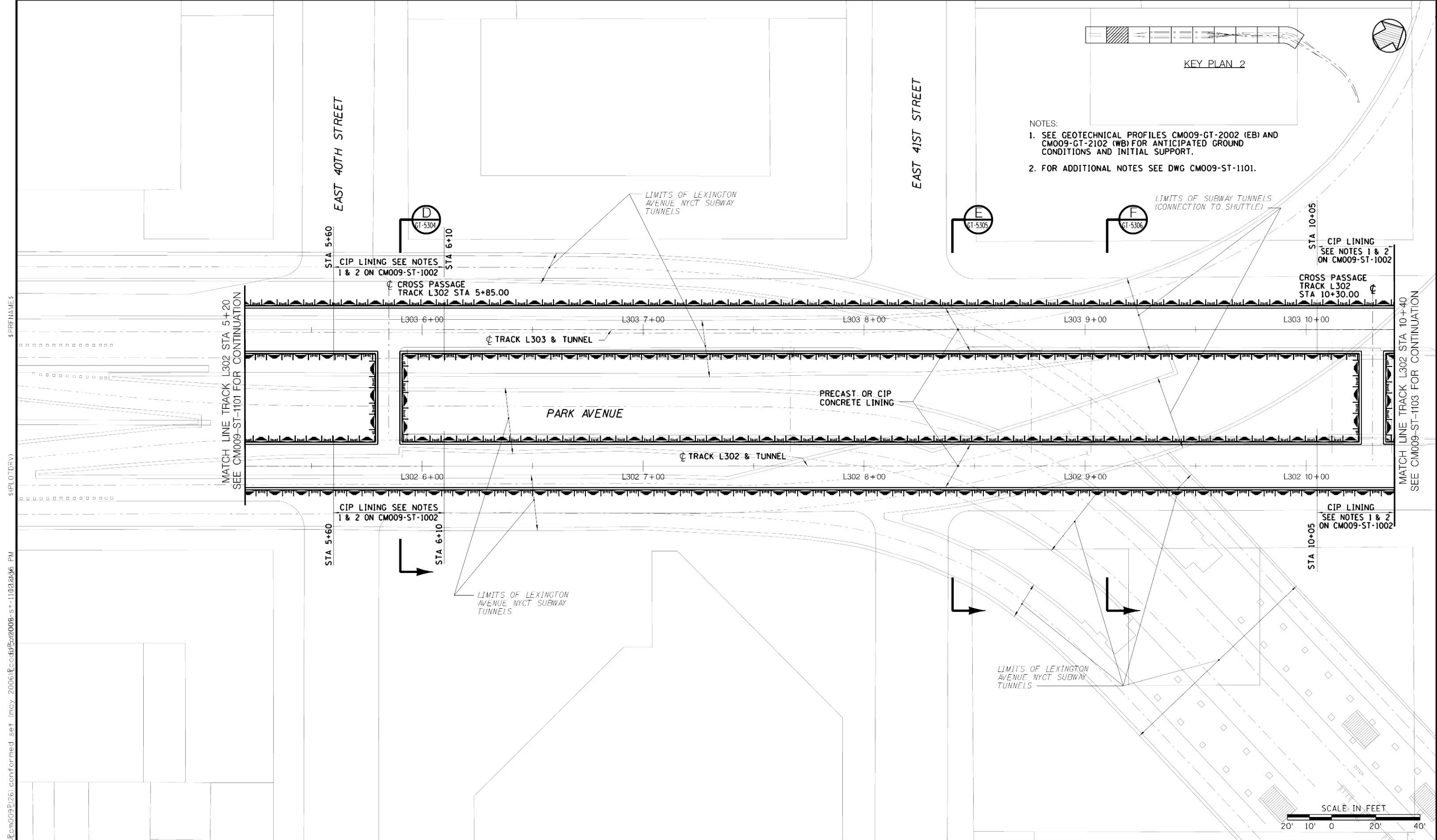


KEY PLAN 2


NOTES:


1. STATIONS ARE REFERENCED TO TRACKS L402-T402-EB2 AS THE BASELINE, TYP UNO. SEE MANHATTAN ALIGNMENT STANDARD DRAWINGS.
2. TUNNEL ALIGNMENTS SOUTH OF TRACK POB ARE TANGENT PROJECTIONS OF TUNNEL ALIGNMENTS NORTH OF TRACK POB.
3. SEE GEOTECHNICAL PROFILES CM009-GT-2001 (EB) AND CM009-GT-2101 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
4. THE CONTRACTOR SHALL SUBMIT PROCEDURES FOR THE PARTIAL DISASSEMBLY OF THE TBM TO THE RESIDENT ENGINEER FOR REVIEW.
5. THE CONTRACTOR MAY ADJUST ROCK SUPPORTS TO SUIT TBM PARTIAL DISASSEMBLY. DETAILS TO BE SUBMITTED TO THE RESIDENT ENGINEER FOR REVIEW PRIOR TO ROCK SUPPORT INSTALLATION.
6. SCREENED BACKGROUND IS DEVELOPED FROM DESIGN DRAWINGS OF NYCT SUBWAY.

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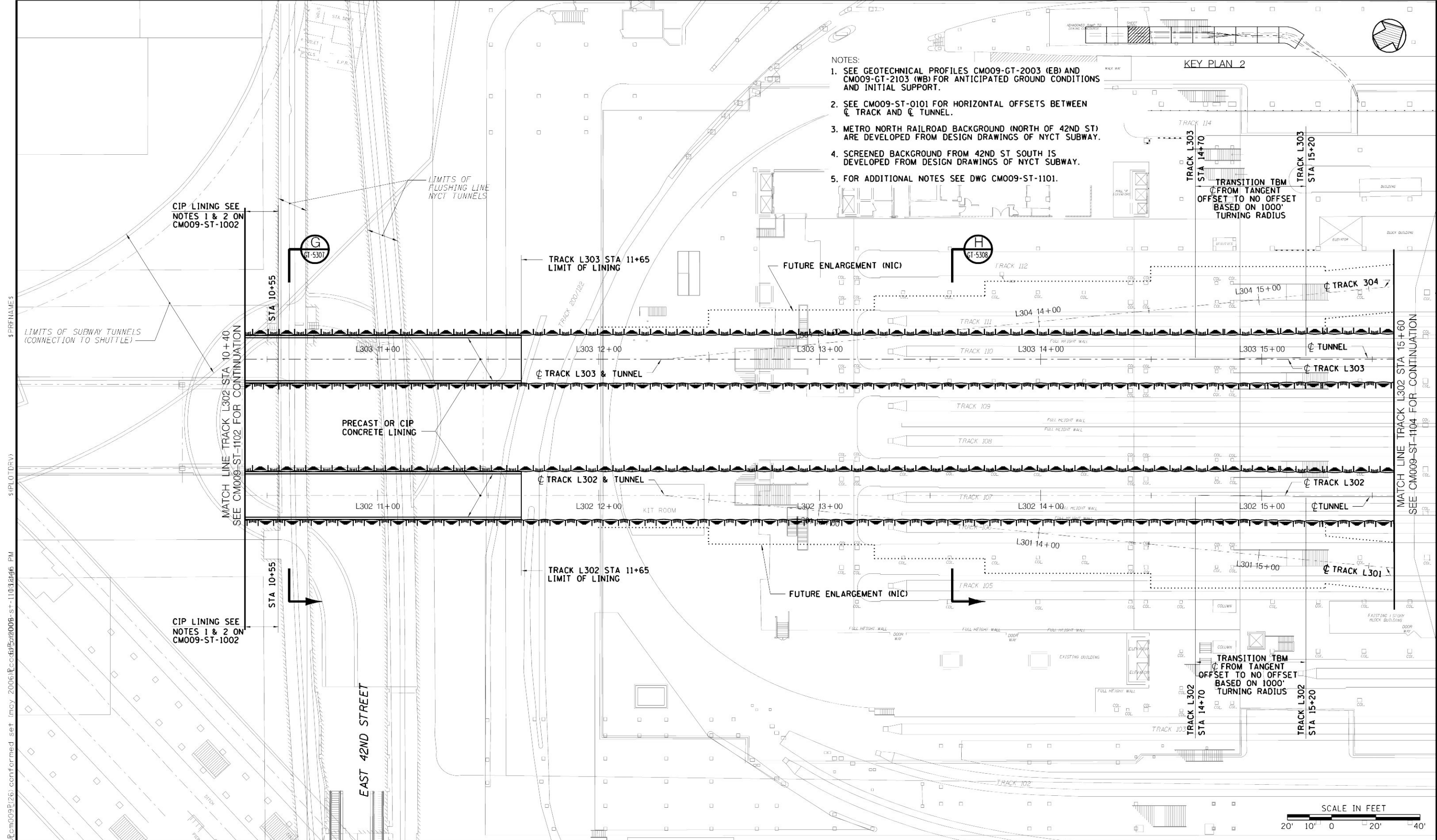
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STRUCTURAL GENERAL PLAN  
UPPER LEVEL  
SHEET 2


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CONTRACT No. <b>CM009</b> ISSUE
SHEET No. <b>38</b> OF <b>276</b>





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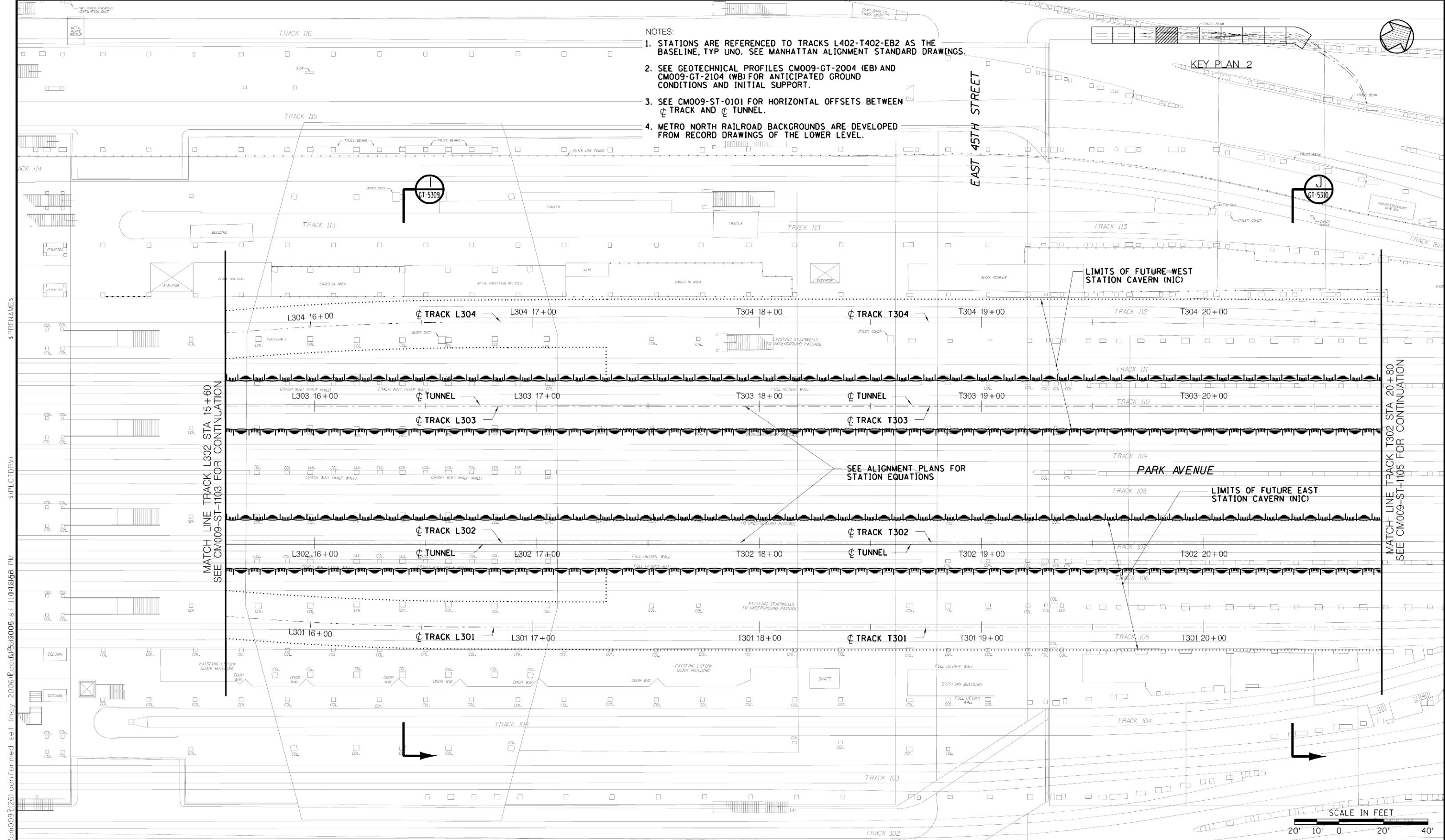
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**MANHATTAN TUNNELS EXCAVATION**

STRUCTURAL GENERAL PLAN  
UPPER LEVEL  
SHEET 3

SCALE AS NOTED DRAWING NUMBER CM009-ST-1103 DATE: 5-26-06 REVISION NUMBER: 0	CONTRACT No. <b>CM009</b> ISSUE  SHEET No. <b>39</b> OF 276
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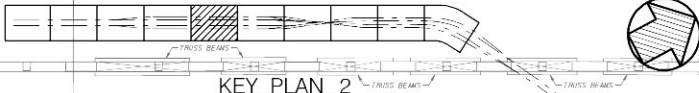
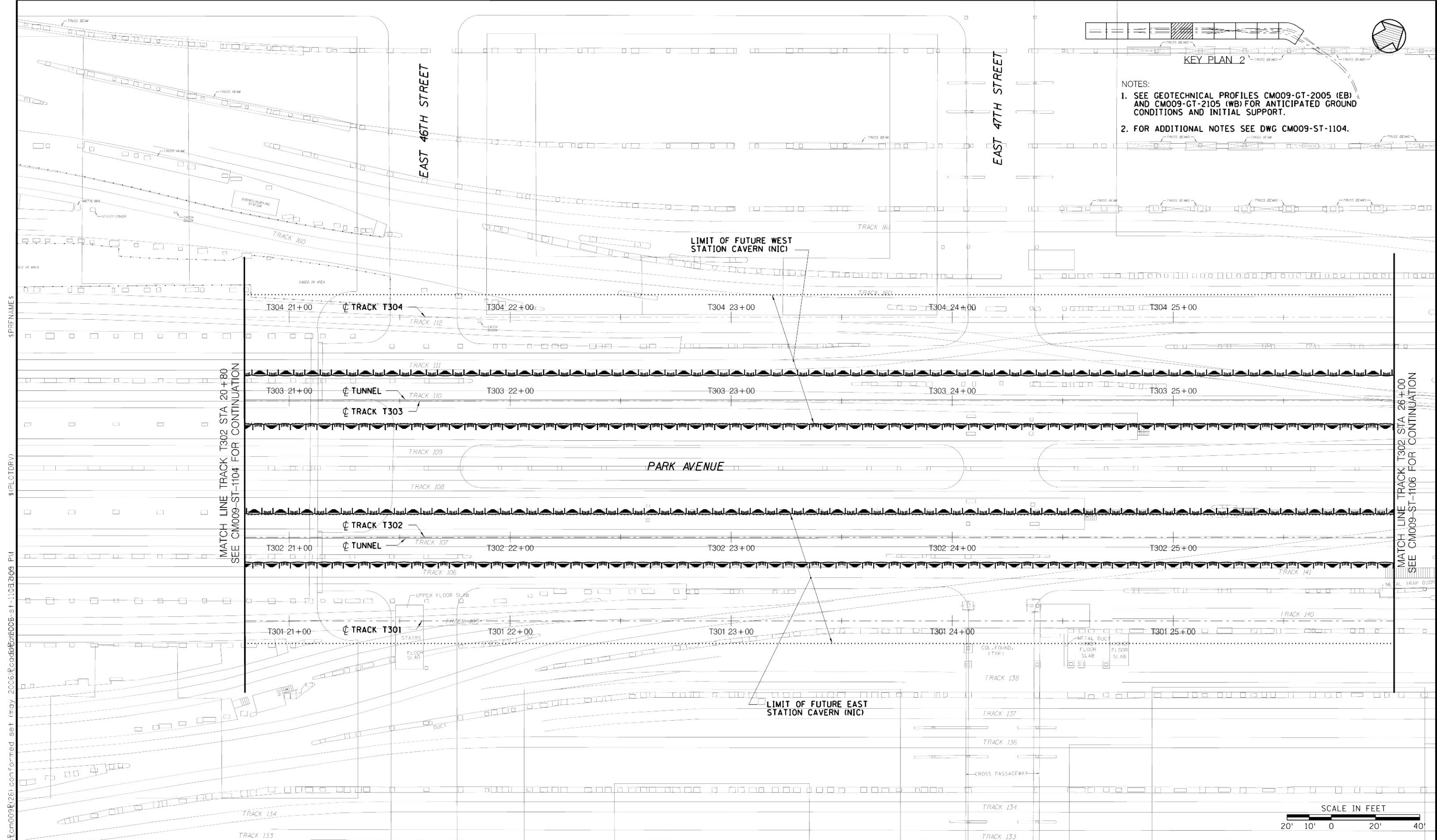
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**MANHATTAN TUNNELS EXCAVATION**

**STRUCTURAL GENERAL PLAN  
UPPER LEVEL**  
SHEET 4

SCALE AS NOTED	CONTRACT No. <b>CM009</b>
DRAWING NUMBER <b>CM009-ST-1104</b>	ISSUE
DATE: <b>5-26-06</b>	SHEET No.
REVISION NUMBER: <b>0</b>	<b>40</b> OF <b>276</b>



- NOTES:
1. SEE GEOTECHNICAL PROFILES CM009-GT-2005 (EB) AND CM009-GT-2105 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  2. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1104.

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**MANHATTAN TUNNELS EXCAVATION**

STRUCTURAL GENERAL PLAN  
UPPER LEVEL  
SHEET 5

SCALE AS NOTED
DRAWING NUMBER: CM009-ST-1105
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. <b>CM009</b>
ISSUE
SHEET No. <b>41</b> OF 276



NOTES:

1. SEE GEOTECHNICAL PROFILES CM009-GT-2006 (EB) AND CM009-GT-2106 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
2. FOR WYE CAVERN NOMENCLATURE REFER TO DWG CM009-GP-0022.
3. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1104.
4. FOR GCT 3 WYE CAVERNS, SEE DWG CM009-GP-0117.

KEY PLAN 2

LIMITS OF FUTURE VENTILATION TUNNEL (NIC)

K  
GT-5311

L  
GT-5312

LIMITS OF FUTURE WEST STATION CAVERN (NIC)

GCT 3 WYE CAVERN

CAVERN

LIMITS OF GCT 3 ENLARGED CAVERNS

PARK AVENUE

GCT 3 WYE CAVERN

LIMITS OF FUTURE EAST STATION CAVERN (NIC)

EAST 48TH STREET

EAST 49TH STREET

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

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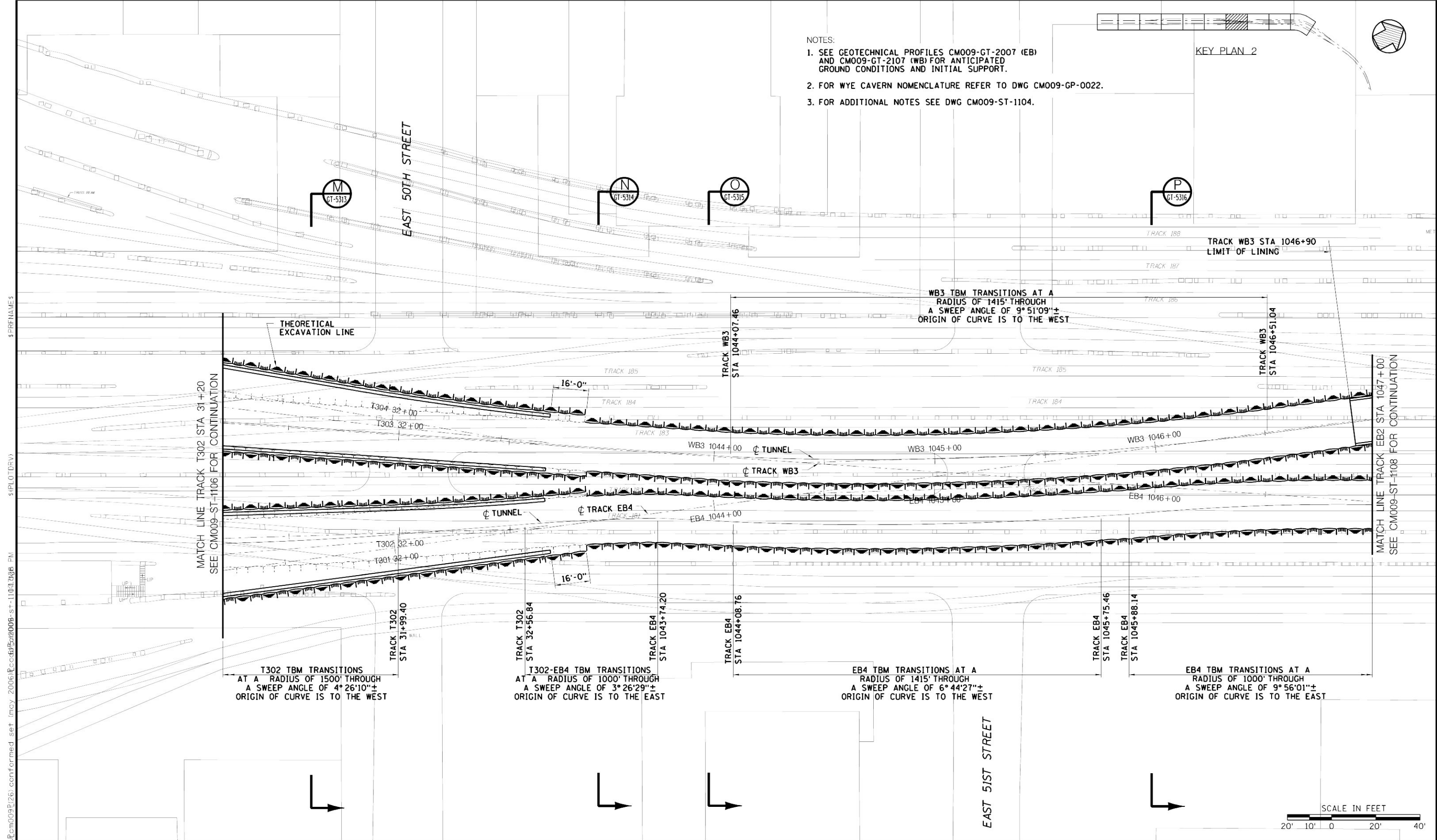
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MANHATTAN TUNNELS EXCAVATION

STRUCTURAL GENERAL PLAN  
UPPER LEVEL  
SHEET 6

SCALE AS NOTED
DRAWING NUMBER CM009-ST-1106
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 42 OF 276



- NOTES:
1. SEE GEOTECHNICAL PROFILES CM009-GT-2007 (EB) AND CM009-GT-2107 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  2. FOR WYE CAVERN NOMENCLATURE REFER TO DWG CM009-GP-0022.
  3. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1104.

KEY PLAN 2

MATCH LINE TRACK T302 STA 31+20  
SEE CM009-ST-1106 FOR CONTINUATION

MATCH LINE TRACK EB2 STA 1047+00  
SEE CM009-ST-1108 FOR CONTINUATION

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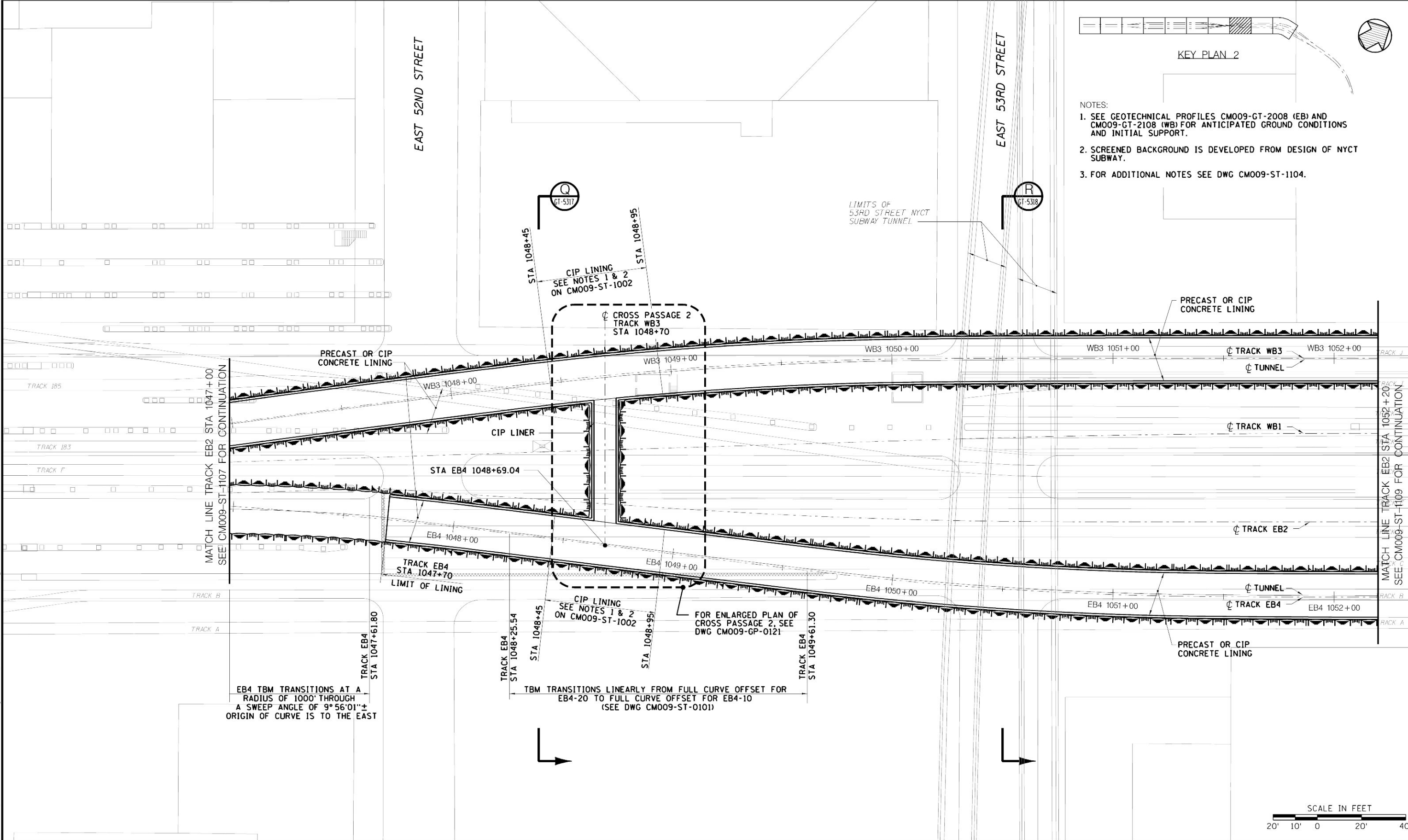
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STRUCTURAL GENERAL PLAN  
UPPER LEVEL  
SHEET 7

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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
43 OF 276

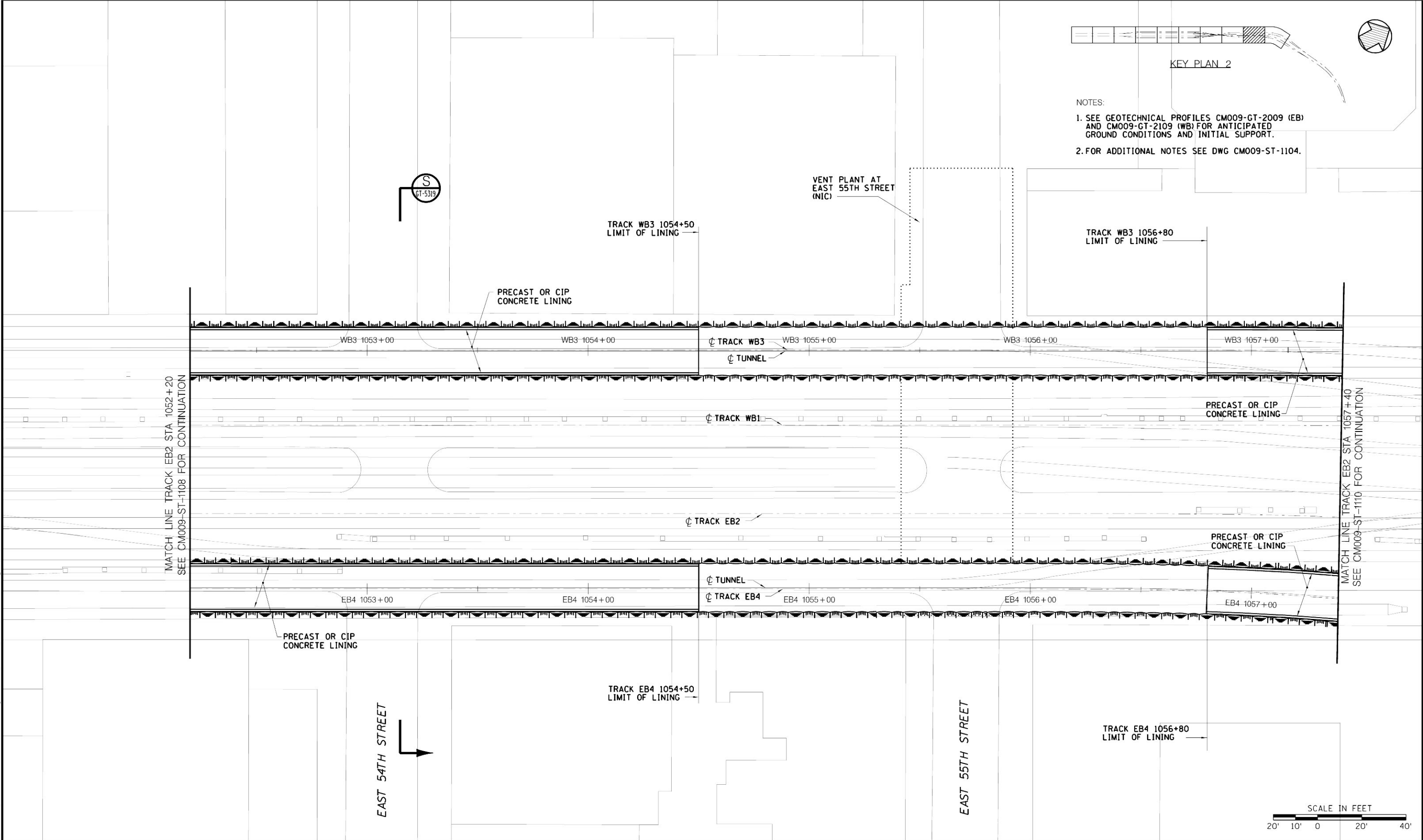
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				DATE:	REVISIONS	No.	DATE:		REVISIONS	DATE:



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MANHATTAN TUNNELS EXCAVATION

STRUCTURAL GENERAL PLAN  
UPPER LEVEL  
SHEET 9

SCALE AS NOTED
DRAWING NUMBER CM009-ST-1109
DATE: 5-26-06
REVISION NUMBER: 0

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ISSUE
SHEET No. 45 OF 276

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- NOTES:
1. SEE GEOTECHNICAL PROFILES CM009-GT-2010 (EB) AND CM009-GT-2110 (WB) FOR ANTICIPATED GROUND CONDITIONS AND INITIAL SUPPORT.
  2. FOR ADDITIONAL NOTES SEE DWG CM009-ST-1104.



KEY PLAN 2

STA 1062+80  
CIP LINING SEE NOTES 1 & 2 ON CM009-ST-1002

FOR ENLARGED PLAN OF CROSS PASSAGE 4, SEE DWG CM009-GP-0126

Ø CROSS PASSAGE 4 TRACK WB3 1063+07.26'

MATCH LINE TRACK EB2 STA 1062+60  
SEE CM009-ST-1011 FOR CONTINUATION

PRECAST OR CIP CONCRETE LINING

PRECAST OR CIP CONCRETE LINING


PARK AVENUE  
WB1 1060+00

EAST 57TH STREET

EAST 56TH STREET



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MANHATTAN TUNNELS EXCAVATION

STRUCTURAL GENERAL PLAN  
UPPER LEVEL  
SHEET 10

SCALE AS NOTED
DRAWING NUMBER CM009-ST-1110
DATE: 5-26-06
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CONTRACT No. CM009
ISSUE
SHEET No. 46 OF 276


ROCK WEATHERING CONDITION					
GRADE	CONDITION	TERM	TYPICAL GEOTECHNICAL SITE INVESTIGATION METHODS		DESCRIPTION
			DRILLING	SAMPLING	
1    2    3    4	ROCK-LIKE	FRESH	CORE	CORE	NO VISIBLE SIGN OF WEATHERING. NO DISCOLORATION OF THE ROCK MATERIAL VISIBLE ON MAJOR DISCONTINUITY SURFACES.
		UNWEATHERED	CORE	CORE	NO VISIBLE SIGN OF ROCK MATERIAL WEATHERING. PERHAPS SLIGHT DISCOLORATION ON MAJOR DISCONTINUITY SURFACES.
		SLIGHTLY WEATHERED	CORE	CORE	DISCOLORATION INDICATES WEATHERING OF ROCK MATERIAL AND DISCONTINUITY SURFACES. ALL THE ROCK MATERIAL MAY BE DISCOLORED BY WEATHERING AND MAY BE SOMEWHAT WEAKER EXTERNALLY THAN ITS FRESH CONDITION
		MODERATELY WEATHERED	CORE	CORE	MATRIX OF ROCK-LIKE AND SOIL-LIKE MATERIAL. LESS THAN HALF OF THE ROCK MATERIAL MATRIX IS WEATHERED TO A SOIL. FRESH OR DISCOLORED ROCK IS PRESENT EITHER AS A CONTINUOUS FRAMEWORK OR AS CORESTONES IN THE ROCK MATERIAL MATRIX.
		HIGHLY WEATHERED	CORE (ROLLER BIT INEFFECTIVE)	CORE	MORE THAN HALF OF THE ROCK MATERIAL MATRIX IS WEATHERED TO A SOIL. FRESH OR DISCOLORED ROCK IS PRESENT EITHER AS A DISCONTINUOUS FRAMEWORK OR AS CORESTONES.
5	SOIL-LIKE	COMPLETELY WEATHERED	CORE OR ROLLER BIT	CORE (DRIVE SAMPLE INEFFECTIVE)	ALL ROCK MATERIAL IS WEATHERED TO SOIL. THE ORIGINAL ROCK MASS STRUCTURE AND MATERIAL FABRIC IS STILL LARGELY INTACT, HOWEVER.
		DISINTEGRATED	CORE OR ROLLER BIT	DRIVE SAMPLE OR CORE	THE ROCK IS WEATHERED TO THE CONDITION OF A SOIL IN WHICH THE ORIGINAL ROCK MASS STRUCTURE IS LOST, BUT THE MATERIAL FABRIC IS STILL INTACT. THE MATERIAL IS FRIABLE, BUT THE MINERAL GRAINS ARE NOT DECOMPOSED.
		DECOMPOSED	ROLLER BIT	DRIVE SAMPLE (CORING INEFFECTIVE)	THE ROCK IS WEATHERED TO THE CONDITION OF A SOIL IN WHICH THE ORIGINAL MATERIAL FABRIC IS STILL INTACT. THE MATERIAL IS HIGHLY FRIABLE, WITH SOME OR ALL OF THE MINERAL GRAINS DECOMPOSED.
		RESIDUAL	ROLLER BIT	DRIVE SAMPLE	ALL ROCK MATERIAL IS CONVERTED TO SOIL. THE ORIGINAL ROCK MASS STRUCTURE AND MATERIAL FABRIC ARE LOST. DEPOSITS HAVE TYPICALLY EXPANDED CONSIDERABLY FROM THE ORIGINAL ROCK VOLUME, BUT HAVE NOT BEEN TRANSPORTED FAR FROM ORIGINAL ROCK LOCATION.
6					

ROCK JOINT FILLING STRENGTH CLASSIFICATION			
THE STRENGTH OF ANY FILLING MATERIALS ALONG DISCONTINUITY SURFACES IS ASSESSED IN ACCORDANCE WITH THE FOLLOWING DESCRIPTIONS AND GRADES			
GRADE	STRENGTH DESIGNATION	FIELD IDENTIFICATION	APPROXIMATE UNCONFINED COMPRESSION STRENGTH (KIP/SQ.FT)
S1	VERY SOFT CLAY	EXTRUDED BETWEEN FINGERS WHEN SQUEEZED.	0.5
S2	SOFT CLAY	MOLDED BY LIGHT FINGER PRESSURE.	0.5 TO 1.0
S3	FIRM CLAY	MOLDED BY STRONG FINGER PRESSURE.	1.0 TO 2.0
S4	STIFF CLAY	READILY INDENTED BY THUMB, BUT PENETRATED BY THUMB ONLY WITH GREAT EFFORT.	2.0 TO 5.0
S5	VERY STIFF CLAY	READILY INDENTED BY THUMBNAIL.	5.0 TO 10.0
S6	HARD CLAY	INDENTED WITH DIFFICULTY BY THUMBNAIL.	>10.0
GRADES S1 TO S6 APPLY TO COHESIVE, GENERALLY SLOW DRAINING SOILS (E.G. CLAYS, SILTY CLAYS, AND COMBINATIONS OF SILTS WITH SAND). IF NON-COHESIVE FILLINGS ARE IDENTIFIED, QUALITATIVE DESCRIPTION IS GENERALLY PROVIDED FOR EACH (E.G. FINE SAND). STRENGTH OF DISCONTINUITIES WITHOUT FILLING MATERIALS WILL GENERALLY BE CHARACTERIZED BY GRADES RO-R6 (ROCK) WHILE S1-S6 (CLAY) WILL GENERALLY APPLY TO FILLED DISCONTINUITIES.			


ROCK STRENGTH CLASSIFICATION			
GRADE	STRENGTH	FIELD IDENTIFICATION	APPROXIMATE UNCONFINED COMPRESSION STRENGTH (LBS/SQ.IN)
R0	EXTREMELY WEAK ROCK	READILY BREAKABLE BY HAND PRESSURE. CRUMBLES UNDER LIGHT BLOW OF GEOLOGICAL HAMMER. EASILY RAKED BY GEOLOGICAL HAMMER PICK.	40 TO 150
R1	VERY WEAK ROCK	CRUMBLES UNDER FIRM BLOW OF GEOLOGICAL HAMMER OR MODERATE HAND PRESSURE. CAN BE RAKED WITH GEOLOGICAL HAMMER PICK.	150 TO 700
R2	WEAK ROCK	BREAKS WITH LIGHT BLOW OF GEOLOGICAL HAMMER OR STRONG HAND PRESSURE.	700 TO 4,000
R3	MEDIUM STRONG ROCK	BREAKS WITH FIRM BLOW OF GEOLOGICAL HAMMER.	4,000 TO 7,000
R4	STRONG ROCK	SPECIMEN REQUIRES MORE THAN ONE FIRM BLOW OF GEOLOGICAL HAMMER TO BREAK IT.	7,000 TO 15,000
R5	VERY STRONG ROCK	SPECIMEN REQUIRES MANY FIRM BLOWS OF GEOLOGICAL HAMMER TO BREAK.	15,000 TO 36,000
R6	EXTREMELY STRONG ROCK	SPECIMEN CAN ONLY BE CHIPPED WITH GEOLOGICAL HAMMER.	>36,000

ROCK HARDNESS	
ROCK HARDNESS DESIGNATION	FIELD IDENTIFICATION
VERY SOFT	INDENTED BY THUMBNAIL
SOFT	CAN BE SCRATCHED WITH THUMBNAIL OR READILY PEELED WITH A POCKET KNIFE. READILY INDENTED BY FIRM BLOWS GEOLOGICAL HAMMER'S BLUNT END.
MODERATELY HARD	CAN BE PEELED BY A POCKET KNIFE WITH DIFFICULTY. SHALLOW INDENTATIONS MADE BY FIRM BLOW WITH POINT OF GEOLOGICAL HAMMER.
MEDIUM HARD	CANNOT BE SCRAPED OR PEELED WITH A POCKET KNIFE. BREAKS WHEN STRUCK WITH FIRM BLOWS BY BLUNT END OF GEOLOGICAL HAMMER.
HARD	DIFFICULT TO SCRATCH WITH EDGE OF A POCKET KNIFE. CHIPS WHEN STRUCK WITH FIRM BLOWS BY BLUNT END OF GEOLOGICAL HAMMER.
VERY HARD	DIFFICULT TO SCRATCH WITH POINT OF A POCKET KNIFE. MAY SPARK WHEN STRUCK WITH GEOLOGICAL HAMMER.
EXTREMELY HARD	PRODUCES ONLY SMALL CHIPS AND FREQUENTLY SPARKS WHEN STRUCK BY FIRM BLOWS WITH PICK OF GEOLOGICAL HAMMER. CANNOT BE SCRATCHED WITH POCKET KNIFE.


ROCK GRAIN TEXTURE	
GRAIN DESIGNATION	CONDITION
FINE	GRAIN PARTICLES NOT VISIBLE TO JUST BARELY VISIBLE WITH NAKED EYE.
MEDIUM	GRAIN SIZE BARELY TO EASILY VISIBLE WITH THE NAKED EYE; UP TO 1/8 INCH.
COARSE	GRAIN SIZE 1/8 INCH OR GREATER



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ROCK DISCONTINUITY CLASSIFICATIONS				
ROCK FRACTURE SPACING			ROCK LAYERING	
DESCRIPTION	SPACING		DESCRIPTION	SPACING
EXTREMELY CLOSE OR CRUSHED	<3/4 INCHES		LAMINATED	<1/2 INCHES
VERY CLOSE	3/4 TO 2-1/2 INCHES		VERY THIN	1/2 TO 2 INCHES
CLOSE	2-1/2 TO 8 INCHES		THIN	2 INCHES TO 1 FEET
MODERATE	8 INCHES TO 2 FEET		MEDIUM	1 TO 3 FEET
WIDE	2 TO 6 FEET		THICK	3 TO 10 FEET
VERY WIDE	6 TO 20 FEET		MASSIVE	> 10 FEET
NOTE: FRACTURES REFER TO NATURAL BREAKAGES INCLUDING JOINTS, SHEAR ZONES, AND FAULT LINES. FRACTURE SPACING RANGE DESIGNATIONS BASED ON ISRM GUIDELINES.		NOTE: LAYERING REFERS TO NATURAL ROCK FORMATION FEATURES SUCH AS FOLIATION, SEAMS, BANDING, OR BEDDING.		

JOINT ROUGHNESS, Jr		
DISCONTINUITY CATEGORY	DISCONTINUITY CONDITION (CONTACT SURFACE ROUGHNESS)	JOINT ROUGHNESS FACTOR Jr
DIRECT CONTACT BETWEEN SURFACES	DISCONTINUOUS JOINTS	4
	ROUGH OR IRREGULAR, UNDULATING	3
	SMOOTH, UNDULATING	2
	SLICKENSIDED, UNDULATING	1.5
	ROUGH OR IRREGULAR, PLANAR	1.5
	SMOOTH, PLANAR	1.0
NO DIRECT CONTACT BETWEEN SURFACES	SLICKENSIDED, PLANAR	0.5
	CLAY MINERAL ZONE PREVENTING ROCK WALL CONTACT	1.0(NOMINAL)
	SANDY, GRAVELLY, OR CRUSHED ZONE PREVENTING WALL CONTACT	1.0(NOMINAL)

JOINT ALTERATION, Ja			
JOINT CATEGORY	JOINT CONDITION (CONTACT SURFACE ALTERATION)		JOINT ALTERATION FACTOR Ja
	DESCRIPTION	CONDITION	
DIRECT CONTACT BETWEEN SURFACES (JOINT COATING LESS THAN 1/8" THICK)	A. TIGHTLY HEALED	TIGHTLY HEALED, HARD, NON-SOFTENING, IMPERMEABLE FILLING	0.75
	B. UNALTERED	UNALTERED JOINT SURFACES, SURFACES STAINING ONLY	1.0
	C. SLIGHTLY ALTERED	SLIGHTLY ALTERED JOINT WALLS. NON-SOFTENING MINERAL COATINGS, SANDY PARTICLES, CLAY FREE DISINTEGRATED ROCK ETC.	2.0
	D. COATED	SILTY OR SANDY CLAY COATINGS, SMALL CLAY FRACTION (NON-SOFTENING)	3.0
	E. CLAY COATED	SOFTENING OR LOW FRICTION CLAY MINERAL COATINGS, IE. KAOLINITE, MICA, CHLORITE, ETC.	4.0
NO DIRECT CONTACT BETWEEN SURFACES (JOINT COATING LESS THAN 1/4" THICK)	F. INFILLED	SANDY PARTICLES, CLAY-FREE DISINTEGRATED ROCK ETC.	4.0
	G. CLAY FILLED	STRONGLY OVERCONSOLIDATED, SOFTENING, CLAY MINERAL FILLINGS	6.0
	H. SOFT CLAY FILLED	MEDIUM OR LOW OVERCONSOLIDATION, SOFTENING, CLAY MINERAL FILLINGS	8.0
	J. SWELLING CLAY FILLED	SWELLING CLAY FILLINGS, IE. MONTMORILLONITE. (Ja VALUE FOR ITEM J DEPENDS ON PERCENT OF SWELLING CLAY-SIZE PARTICLES AND ACCESS TO WATER, ETC.)	8.0-12.0
NO DIRECT CONTACT BETWEEN SURFACES (JOINT COATING GREATER THAN 1/4" THICK)	L. CRUSHED ZONE	CRUSHED ROCK AND CLAY (SEE ITEMS G, H, AND J FOR DESCRIPTION OF CLAY CONDITION)	6.0, 8.0 OR 8.0-12.0
	N. DECOMPOSED ZONE	ZONES OR BANDS OF SILTY-OR SANDY CLAY, SMALL CLAY FRACTION (NON-SOFTENING)	5.0
	O. CLAY ZONE	THICK CONTINUOUS ZONES OR BANDS OF CLAY (SEE ITEMS G, H, AND J FOR DESCRIPTION OF CLAY CONDITION)	10.0, 13.0 OR 13.0-20.0

ROCK CLASSIFICATION NOTES:

- 1.CORE RECOVERY:

CORE RECOVERY IS EXPRESSED IN TWO WAYS. FIRST, AS THE SIMPLE NET LENGTH OF CORE RECOVERED IN INCHES. SECONDLY, AS THE RATIO OF THE LENGTH OF NET CORE RECOVERED TO THE OVERALL LENGTH OF THE CORE RUN, EXPRESSED AS A PERCENTAGE. CORE RECOVERY IS GENERALLY DETERMINED SEPARATELY FOR EACH SEPARATE CORING RUN.
- 2.RQD

RQD (ROCK QUALITY DESIGNATION) IS A GENERAL INDEX OF ROCK CORE CONDITION FOR ENGINEERING PURPOSES. RQD IS EXPRESSED AS A MODIFIED CORE RECOVERY PERCENTAGE IN WHICH ONLY THE SUM OF THE LENGTHS OF PIECES OF UNWEATHERED OR SLIGHTLY WEATHERED CORE OVER 4 INCHES LONG IS DIVIDED BY THE OVERALL LENGTH OF THE CORE RUN. THE AVERAGE LENGTH OF CORE PIECES IS USED WHERE END FRACTURES ARE NOT PERPENDICULAR TO THE CORE AXIS (I.E. WHERE ENDS OF CORE PIECES ARE SLANTED, BY MEASURING TO THE MIDDLE OF THE BREAK). FRESH CORE FRACTURES CREATED BY MECHANICAL BREAKAGE DURING DRILLING AND/OR HANDLING OF THE CORE ARE IGNORED IN COMPUTING RQD. RQD IS GENERALLY DETERMINED SEPARATELY FOR EACH SEPARATE CORE RUN.
- 3.DISCONTINUITY ORIENTATION ANGLE


ORIENTATION OF DISCONTINUITIES IS GENERALLY EXPRESSED AS AN ANGLE (IN DEGREES). THIS ORIENTATION REFERS TO THE ANGLE BETWEEN THE AVERAGE DIRECTION OF A DISCONTINUITY AND A PLANE PERPENDICULAR TO THE CORE AXIS. (E.G. FOR A VERTICAL BORING DISCONTINUITY ANGLE OF 0 DEGREES REFERS TO A HORIZONTAL DISCONTINUITY). THE COMPASS DIRECTION OF ROCK CORE DISCONTINUITES IS GENERALLY NOT DIRECTLY DETERMINABLE FROM CORE INSPECTION ALONE WITH THE CORING METHODS USED FOR THIS PROJECT.
3. REFERENCES:

FOR REFERENCES ON ROCK CLASSIFICATIONS SYSTEMS SEE THE GBR.


SURFACE PLANARITY	
DESIGNATION	CONDITION
PLANAR	A FLAT SURFACE
STEPPED	A SURFACE WITH ASPERITIES OR STEPS.
WAVY	A MODERATE UNDULATING SURFACE: CURVED, SMOOTHLY UNEVEN.

ROCK QUALITY DESIGNATION, RQD	
RQD PERCENT	ROCK QUALITY
< 25	VERY POOR
25-50	POOR
50-75	FAIR
75-90	GOOD
90-100	EXCELLENT


ROCK CORE CONTINUITY	
DESCRIPTION	AVERAGE LENGTH OF PIECES
SOUND	> 8 INCHES
SLIGHTLY FRACTURED	4 TO 8 INCHES
MODERATELY FRACTURED	1 TO 4 INCHES
EXTREMELY FRACTURED	< 1 INCH
NOTES: ROCK CORE CONTINUITY REFERS TO A GENERAL DESCRIPTIVE TERM DESCRIBING THE OVERALL DEGREE OF FRACTURING CONDITION OF EACH ROCK CORE RUN.	



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LEGEND

- BORINGS IN GCT AND METRO NORTH TUNNELS
- BORINGS ON STREETS
- BORINGS IN NYCT SUBWAY TUNNELS
- EXISTING BORINGS FROM PREVIOUS STUDIES BY OTHERS



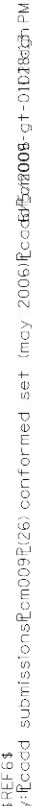
<b>Metropolitan Transportation Authority</b> Capital Construction		<b>PB STV PARSONS</b> General Engineering Consultant 489 Seventh Avenue • New York, NY • 10018		PARSONS BRINCKERHOFF STV INCORPORATED PARSONS TRANSPORTATION GROUP OF NEW YORK, INC. 10018		IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DOCUMENT IN ANY WAY UNLESS THAT PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL. THE LICENSED PROFESSIONAL SHALL AFFIX TO THIS DOCUMENT THE SEAL AND THE NOTATION "ALTERED BY". FOLLOWED BY THE AUTHORIZED SIGNATURE AND THE DATE OF THE ALTERATION."		<table><tr><td>DESIGNED BY: C. STEWART</td><td rowspan="5"></td></tr><tr><td>DRAWN BY: J. RICCARDI</td></tr><tr><td>CHECKED BY: A. MUKHERJEE</td></tr><tr><td>COORDINATED BY: M. DELLA POSTA</td></tr><tr><td>APPROVED BY: J. SCHABIB</td></tr></table>		DESIGNED BY: C. STEWART		DRAWN BY: J. RICCARDI	CHECKED BY: A. MUKHERJEE	COORDINATED BY: M. DELLA POSTA	APPROVED BY: J. SCHABIB	NY PROFESSIONAL License No. _____ <b>ORIGINAL SIGNED &amp; SEALED</b> DATE: _____		<b>MANHATTAN TUNNELS EXCAVATION</b>  MANHATTAN BORING LOCATION PLAN SHEET 1		<table><tr><td>SCALE AS NOTED</td><td>CONTRACT No. <b>CM009</b></td></tr><tr><td>DRAWING NUMBER CM009-GT-0101</td><td>ISSUE</td></tr><tr><td>DATE 5-26-06</td><td>SHEET No. <b>49</b> OF <b>276</b></td></tr><tr><td>REVISION NUMBER 0</td><td></td></tr></table>		SCALE AS NOTED	CONTRACT No. <b>CM009</b>	DRAWING NUMBER CM009-GT-0101	ISSUE	DATE 5-26-06	SHEET No. <b>49</b> OF <b>276</b>	REVISION NUMBER 0	
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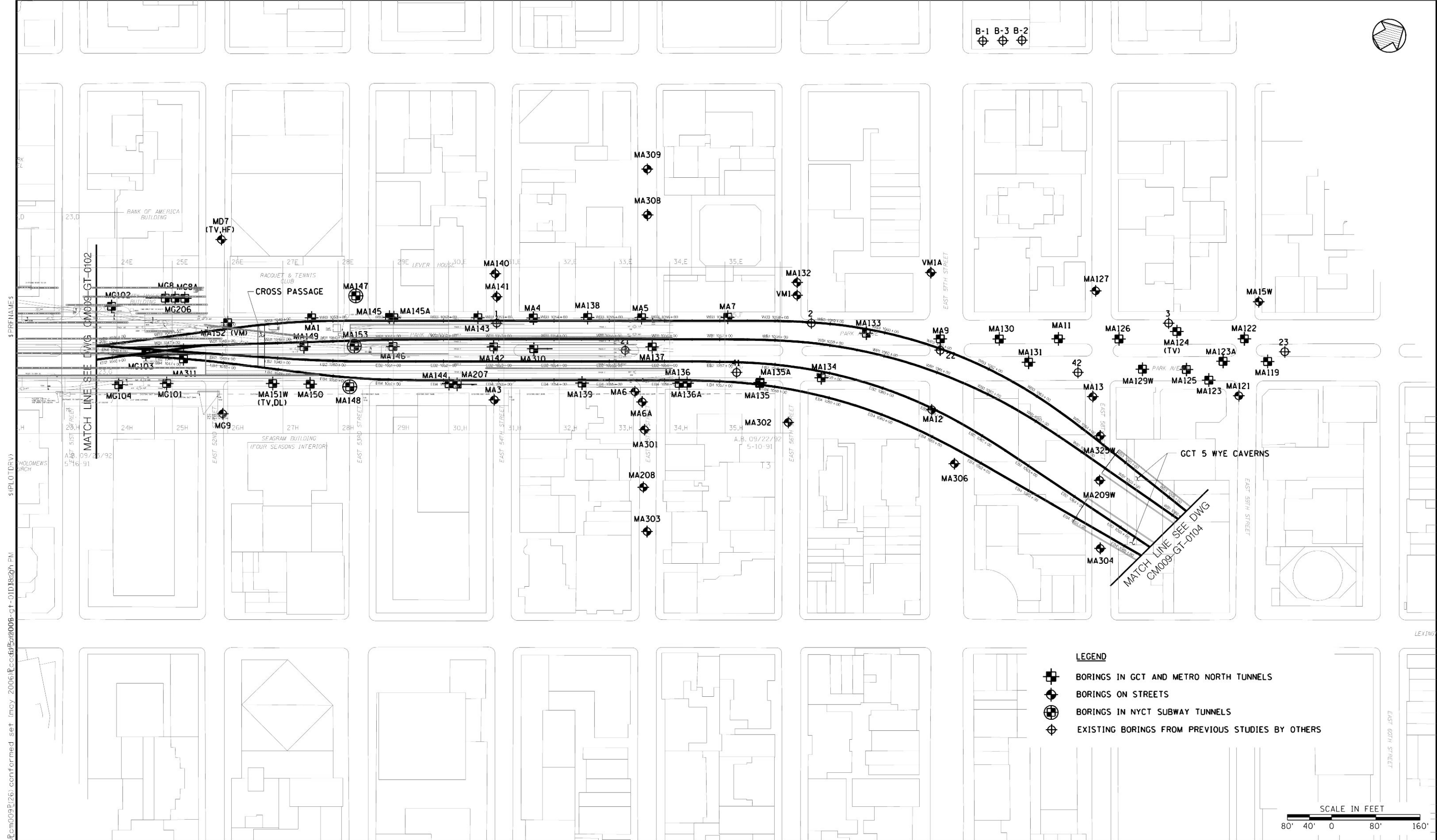
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B-1 B-3 B-2




LEGEND

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- BORINGS ON STREETS
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SCALE IN FEET  
80' 40' 0 80' 160'

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**MANHATTAN TUNNELS EXCAVATION**  
  
MANHATTAN BORING LOCATION PLAN  
SHEET 3

SCALE  
AS NOTED  
DRAWING NUMBER:  
CM009-GT-0103  
DATE:  
5-26-06  
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CONTRACT No.  
**CM009**  
ISSUE  
  
SHEET No.  
**51** OF 276



GENERAL NOTES:








1. THE LONGITUDINAL SECTION OF THE EAST TUNNELS (EB) SHOWN ON GEOTECHNICAL PROFILES IS TAKEN ALONG THE LOWER LEVEL EASTBOUND TRACKS L402, T402 AND EB2. THE LONGITUDINAL SECTION OF THE WEST TUNNELS (WB) SHOWN ON GEOTECHNICAL PROFILES IS TAKEN ALONG THE LOWER LEVEL WESTBOUND TRACKS L403, T403 AND WB1.
2. FRACTURE LOG, WHERE PROVIDED, SHOWS TRUE DIP ANGLE OF FRACTURE, INTERCEPTING CENTER OF LOG. THE DIP DIRECTION, WHERE MEASURED, CAN BE FOUND IN FIGURES AND TABLES WITHIN THE GEOTECHNICAL DATA REPORT (GDR).
3. SEE GEOTECHNICAL BASELINE REPORT FOR DETAILED DESCRIPTION OF ANTICIPATED GROUND CONDITIONS AND DEFINITION OF DESCRIPTIVE TERMS.
4. FOR TBM TUNNELS SUPPORT CLASS (SC) DEFINITIONS SEE DWG CM009RS-1051 THRU CM009RS-1055. SC I-E, II-E TBM WITH GLASS REINFORCED POLYMER (GRP) DOWELS ARE USED ON ANTICIPATION OF FUTURE DRILL & BLAST ENLARGEMENTS OF TBM TUNNELS.
5. SUPPORT CLASS RANGES WITHIN THEIR RESPECTIVE STATIONS INDICATED ON THE DRAWINGS ARE APPROXIMATE. TBM TUNNEL SUPPORT CLASSES SHALL BE ADJUSTED BASED ON ACTUAL GROUND CONDITIONS AND IN CONSULTATION BETWEEN THE CONTRACTOR AND THE RESIDENT ENGINEER.
6. ANGLE BORING DIRECTION IN AZIMUTH.
7. ADDITIONAL INITIAL SUPPORT SHOWN ON TABLE 1 SHALL BE INSTALLED AS REQUIRED BY ACTUAL GROUND CONDITIONS ENCOUNTERED OR AS DIRECTED BY THE RESIDENT ENGINEER IN ADDITION TO THE INITIAL SUPPORT SHOWN ON THE DRAWINGS.
8. TUNNEL GROUTING INCLUDES THOSE MEASURES AS INDICATED IN TABLE 2. THE RESPECTIVE RANGES WHERE THESE MEASURES MAY BE REQUIRED ARE INDICATED ON THE GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES DRAWINGS. GROUTING ZONES SHOWN ON GEOTECHNICAL PROFILE DRAWINGS INDICATE SECTIONS OF THE TUNNELS THAT MAY REQUIRE GROUTING BASED ON EVALUATION OF THE GEOTECHNICAL INFORMATION AVAILABLE. GROUTING IN OTHER AREAS NOT SPECIFICALLY SHOWN ON THE DRAWINGS MAY BE REQUIRED BY THE ACTUAL GROUND CONDITIONS.
9. PILLAR REINFORCEMENT IN TBM TUNNELS SHALL BE INSTALLED WHEN PILLAR THICKNESS IS LESS THAN 12' (MEASURED AT SPRING LINE) BETWEEN TUNNELS. THE RESPECTIVE SUPPORT CLASS RANGES ARE SHOWN ON THE GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES DRAWINGS.
10. LINE DRILLING AND/OR OTHER MEANS TO MITIGATE VIBRATION IMPACTS SHALL BE UTILIZED AS REQUIRED.
11. TUNNEL CONFIGURATIONS (RELATIVE TO EACH OTHER) ARE SHOWN ONLY TO FACILITATE INTERPRETATION OF GEOTECHNICAL INFORMATION AND INITIAL SUPPORT REQUIREMENTS SHOWN ON THESE DRAWINGS. SEE STRUCTURAL DRAWINGS CM009-ST-1001 THROUGH CM009-ST-1110 FOR TUNNEL CONFIGURATION IN PLAN.

TABLE 1 – ADDITIONAL INITIAL SUPPORT (SEE NOTE 7)		
MEASURE	MEANS	PURPOSE
ROCK DOWELS	•8 STEEL ROCK DOWELS, 6 FT AND 10 FT LONG OR 1" DIA 10' LONG GRP DOWELS, AS INDICATED	SPOT OR PATTERN DOWELLING TO STABILIZE THE EXCAVATION, POTENTIAL ROCK SLABS/WEDGES/BLOCKS
ROCK BOLTS	•9 ROCK BOLTS, 12 FT AND 16 FT LONG	SPOT OR PATTERN BOLTING TO STABILIZE THE EXCAVATION, POTENTIAL ROCK SLABS/WEDGES/BLOCKS
MINE STRAPS	14 GA STEEL PLATE, SECURED BY ROCK DOWELS	STABILIZE POTENTIAL ROCK SLABS/WEDGES/BLOCKS
PRE-SUPPORT SPILING	•11 REBARS OR SELF DRILLING GROUTED BARS, LENGTH 12 FT	LOCAL PRE-SUPPORT IN CONNECTION WITH DRILL AND BLAST EXCAVATION AT CAVERNS
PRE-SUPPORT SPILING	•8 REBARS, LENGTH 10 FT	LOCAL PRE-SUPPORT IN CONNECTION WITH DRILL AND BLAST EXCAVATION AT INTERSECTING STRUCTURES
SHOTCRETE	REINFORCED SHOTCRETE (BY STEEL FIBERS)	LOCALLY STABILIZE THE EXCAVATION.
STEEL SETS	W6x25 EXPANDED STEEL SETS (AS SC III TBM)	LOCALLY STABILIZE THE EXCAVATION IN TBM TUNNELS

TABLE 2 – TUNNEL GROUTING MEASURES (SEE NOTE 8)		
MEASURE	MEANS	PURPOSE
PRE-EXCAVATION GROUTING (AHEAD OF TUNNEL FACE)	INJECTION OF CEMENT BASED GROUT THROUGH HOLES DRILLED FROM TBM FACE	STABILIZATION OF ROCK MASS PRIOR TO TBM TUNNELING AND/OR REDUCTION OF WATER INFLOW
PRE-EXCAVATION GROUTING FROM THE COMPLETED SECTION OF ONE TUNNEL TO THE AREA IN ADVANCE OF THE TUNNEL FACE OF AN ADJACENT TUNNEL BEING MINED	INJECTION OF CEMENT BASED GROUT THROUGH HOLES DRILLED FROM A COMPLETED TUNNEL TOWARD AN ADJACENT TUNNEL	
POST-EXCAVATION GROUTING (FROM WITHIN THE EXCAVATED TUNNEL OR CAVERN)	INJECTION OF CEMENT BASED GROUT THROUGH HOLES DRILLED FROM WITHIN EXCAVATED TUNNEL OR CAVERN	

TABLE 3 – QUANTITIES FOR ITEMS AS LISTED IN TABLE 1 AND 2		
MEASURE	UNIT	QUANTITY
ROCK DOWELS	LF	5200
ROCK BOLTS	LF	1500
GRP DOWELS	LF	3600
MINE STRAPS	EA	INCIDENTAL
PRE-SUPPORT SPILING - CAVERNS	EA	1000
PRE-SUPPORT SPILING - INTERSECTING STRUCTURES	EA	200
SHOTCRETE (IN PLACE)	CY	250
STEEL SETS	EA	40
DRILLING AND PRE-GROUTING AHEAD OF TUNNEL FACE	CREW - HOURS	280
DRILLING AND PRE-GROUTING OF ADJACENT TUNNEL	CREW - HOURS	150
DRILLING AND POST-GROUTING	SACK (94 lbs)	3400

LEGEND:

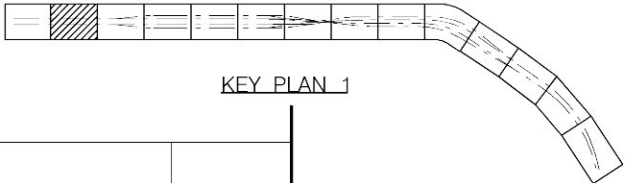
MG-202 (44' W)	DIMENSION IN PARENTHESIS DENOTES OFFSET DISTANCE FROM TRACK ALIGNMENT.
C-1	CORE RUN NUMBER
S-1	SPLIT SPOON SAMPLE NUMBER
G-1	GRAB SAMPLE NUMBER
▽	GROUND WATER LEVEL
EF	EXTREMELY FRACTURED CORE
CSM 33' TO 35'	ROCK CORE SAMPLE TESTED BY COLORADO SCHOOL OF MINES
SINTEF 120' TO 123'	ROCK CORE SAMPLE TESTED BY NORWEGIAN INSTITUTE OF TECHNOLOGY, TRONDHEIM, NORWAY
(NIC)	NOT IN CONTRACT
	THEORETICAL EXCAVATION LINE
	DEPTH OF BORING
	ROCK CORE RECOVERY (%)
	ROCK QUALITY DESIGNATION (%)
	CORE FRACTURE LOG
	COEFFICIENT OF PERMEABILITY CALCULATED FROM PACKER TEST (CM/S)
	PACKER TEST SCALE
---	TOP OF RAIL
-----	EXCAVATION LINE BEYOND OR BEHIND



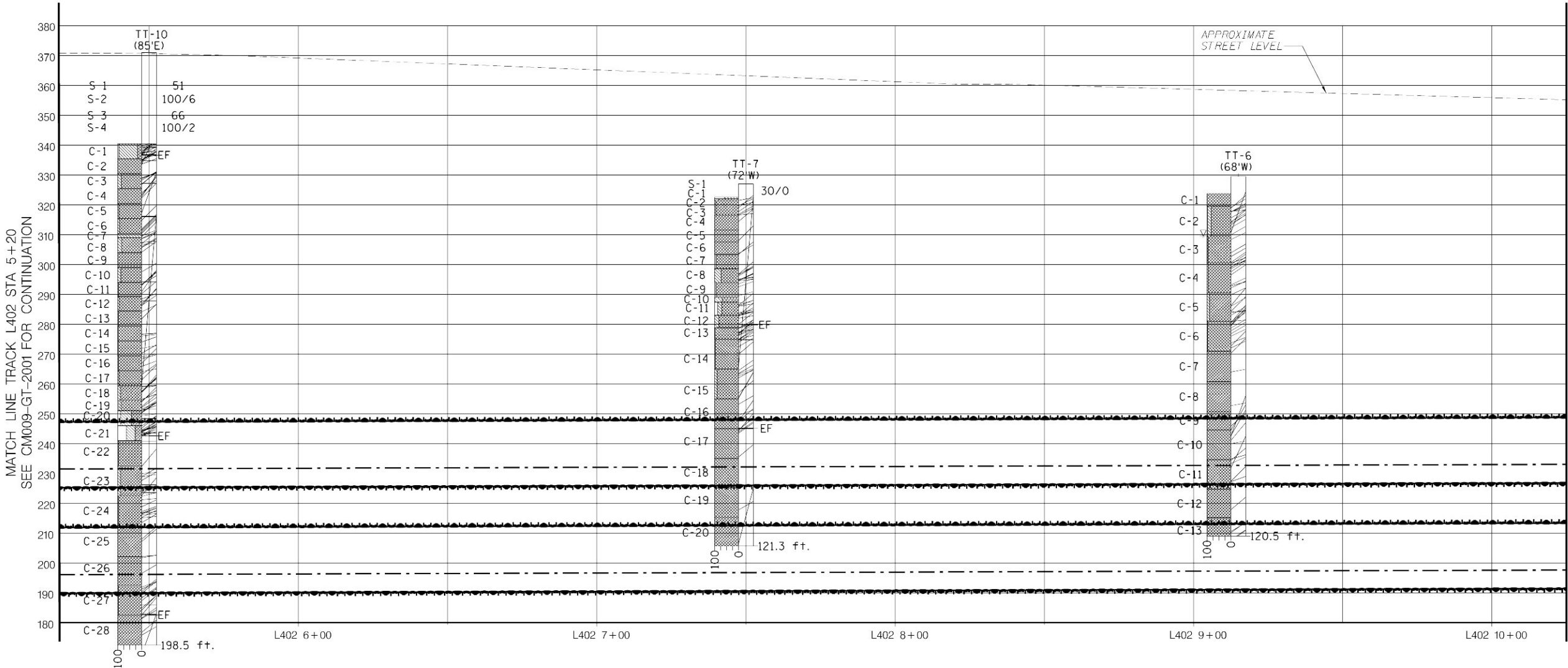


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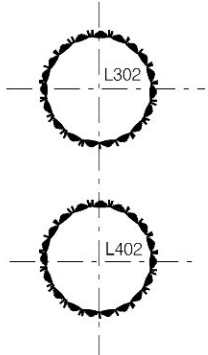
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KEY PLAN 1



- NOTES:
- FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  - SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1002 (LOWER LEVEL) AND CM009-ST-1102 (UPPER LEVEL).



TYPICAL TUNNEL CONFIGURATION

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST AND GNEISS WITH MINOR PEGMATITE, MODERATELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS AND RARE SHEARS LESS THAN 1" THICK. SOME LOCALLY DECOMPOSED ROCK.
-----------------------	---

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I TBM
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I TBM
OTHER MEASURES	



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CHECKED BY: V. GALL	
COORDINATED BY: M. DELLA POSTA	
APPROVED BY: J. SCHABIB	

ORIGINAL SIGNED & SEALED	DATE: _____
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MANHATTAN TUNNELS EXCAVATION

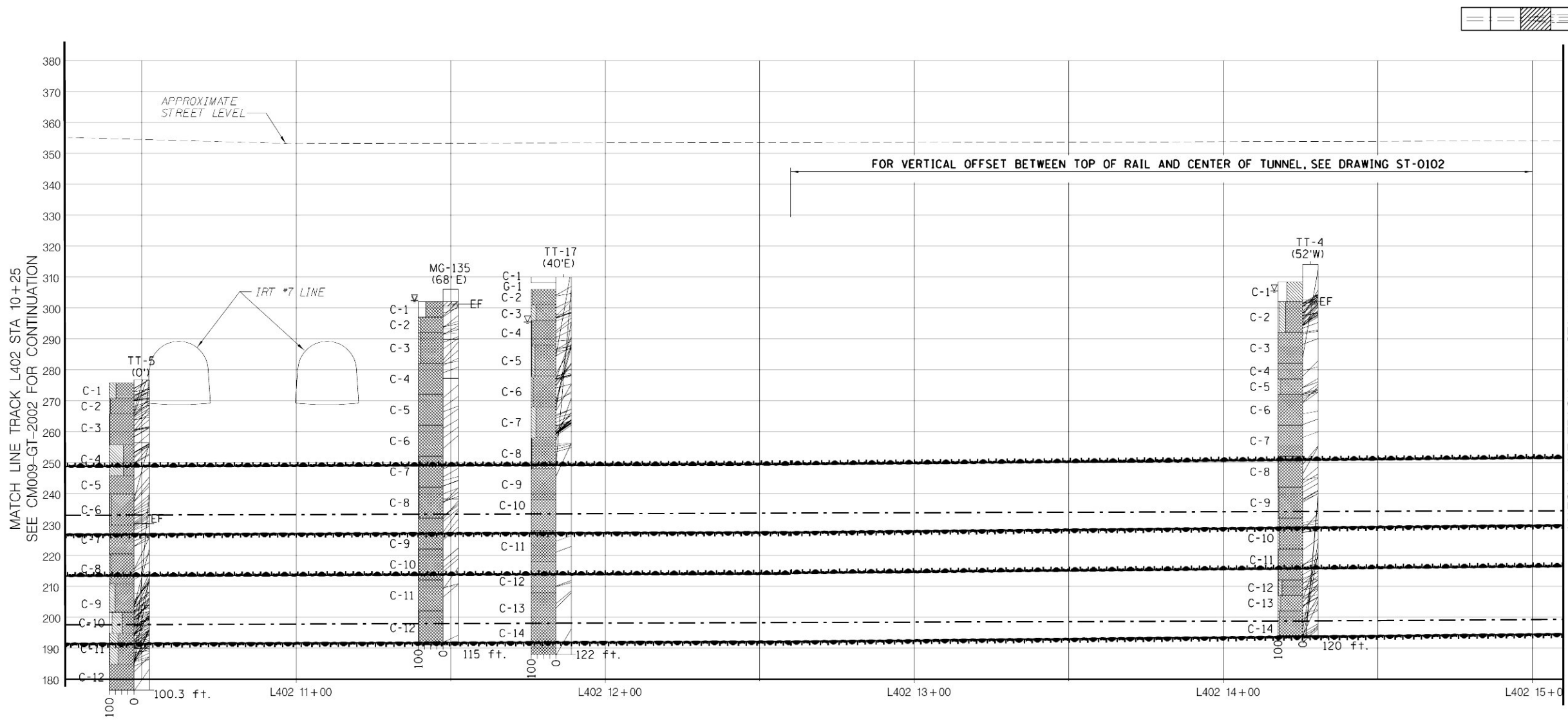
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK L302/L402 (EB)  
SHEET 2

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2002  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
55 OF 276

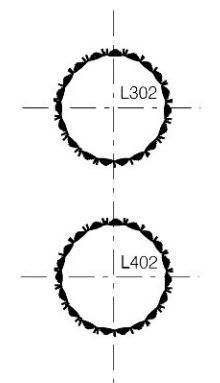
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KEY PLAN 1

- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1003 (LOWER LEVEL) AND CM009-ST-1103 (UPPER LEVEL).
  3. SUPPORT CLASS III WITHOUT STEEL MAT LAGGING INSTALLED DUE TO PROXIMITY OF IRT NO 7 LINE.



TYPICAL TUNNEL CONFIGURATION

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST AND GNEISS WITH MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS AND RARE SHEARS LESS THAN 1" THICK. SOME LOCALLY DECOMPOSED ROCK.
-----------------------	---

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	L302 10+50 SC I TBM	SC III TBM (SEE NOTE 3)	L302 11+25 SC I TBM	L302 11+92 SC I E TBM
OTHER MEASURES				

SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	L402 11+92 SC I TBM	SC I E TBM
OTHER MEASURES		



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DRAWN BY:  
M. SPYTEK  
CHECKED BY:  
V. GALL  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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DATE: 5/26/06  
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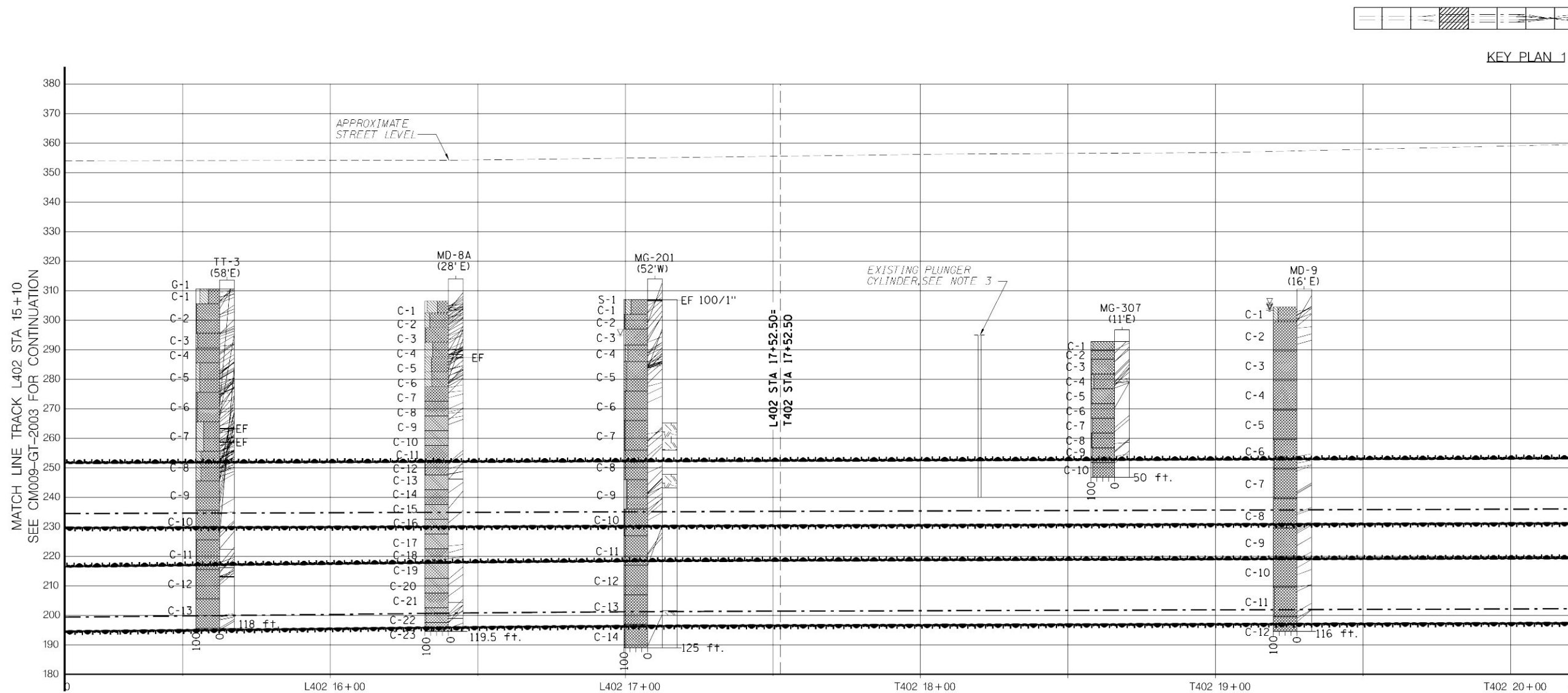
MANHATTAN TUNNELS EXCAVATION

GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK L302/L402 (EB)  
SHEET 3

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2003  
DATE:  
5-26-06  
REVISION NUMBER:  
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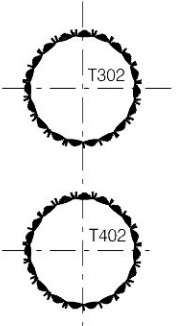
CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
56 OF 276





NOTES:

1. FOR NOTES AND LEGEND, SEE DWG CMO09-GT-2000.
2. SEE ALSO STRUCTURAL GENERAL PLANS CMO09-ST-1004 (LOWER LEVEL) AND CMO09-ST-1104 (UPPER LEVEL).
3. FOR PLUNGER CYLINDER LOCATION SEE ALSO SECTION ON DWG CMO09-CT-2020.



### TYPICAL TUNNEL CONFIGURATION

## ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST AND GNEISS WITH MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS AND RARE SHEARS LESS THAN 1" THICK. SOME LOCALLY DECOMPOSED ROCK.	T302 18+50 UNWEATHERED SCHIST GNEISS AND MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH OCCASIONAL CLUSTERS OF VERY CLOSELY TO CLOSELY SPACED JOINTS
-----------------------	---	---




SUPPORT CLASS RANGES UPPER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

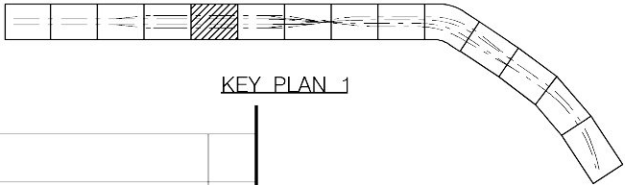
SUPPORT CLASS	<div> <div>L402 15 + 29</div> <div>SC I E TBM</div> </div> <div> <div>L402 17 + 26</div> <div>SC I E TBM</div> </div>	
OTHER MEASURES		



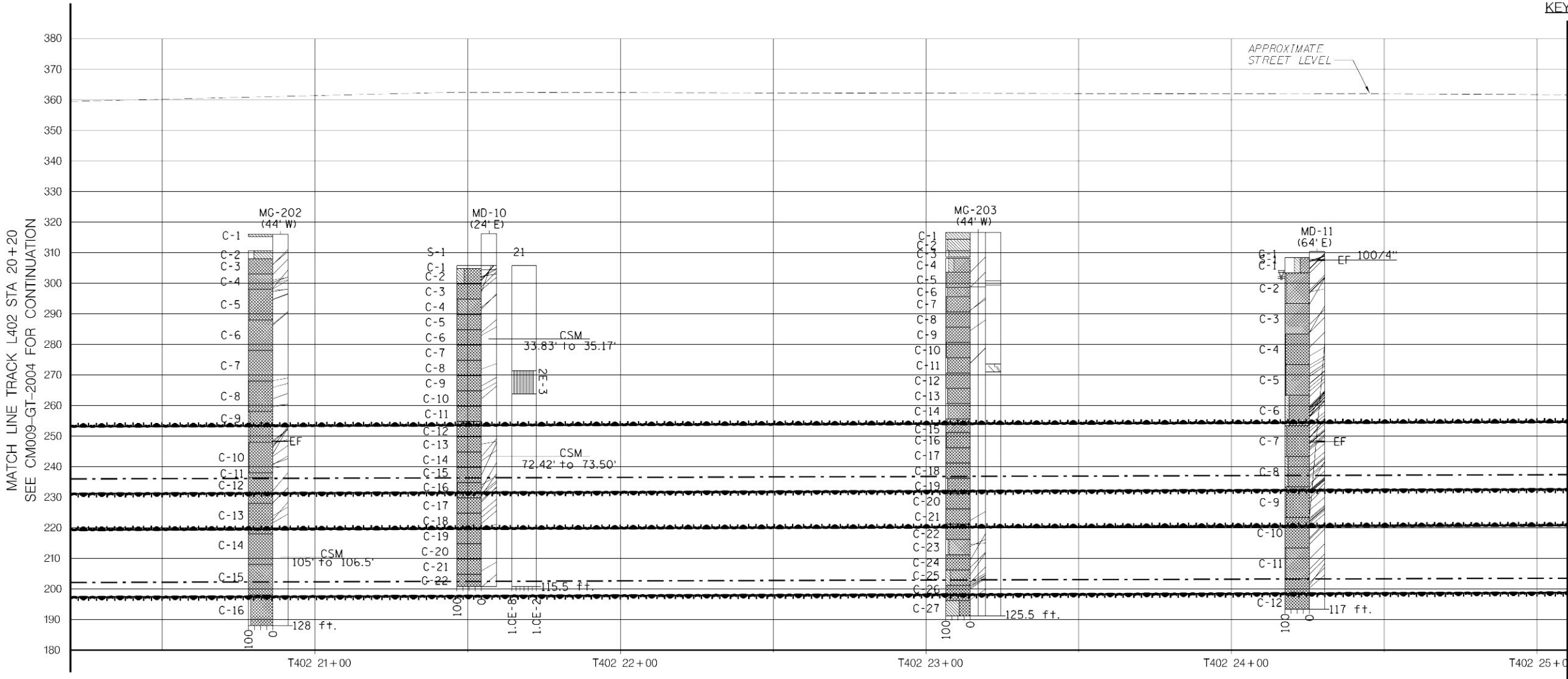
 <b>Metropolitan Transportation Authority</b> Capital Construction	 <b>Long Island Rail Road</b> <b>East Side Access</b>	 <b>PB STV PARSONS</b> General Engineering Consultant 469 Seventh Avenue • New York, NY • 10018	PARSONS BRINCKERHOFF STV INCORPORATED PARSONS TRANSPORTATION GROUP OF NEW YORK, INC.	IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DOCUMENT IN ANY WAY UNLESS THAT PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL. THE LICENSED PROFESSIONAL SHALL AFFIX TO THIS DOCUMENT THE SEAL AND THE NOTATION "ALTERED BY". FOLLOWED BY THE AUTHORIZED SIGNATURE AND THE DATE OF THE ALTERATION."	DESIGNED BY: C. STEWART	NY PROFESSIONAL License No.	<b>ORIGINAL SIGNED &amp; SEALED</b>	<b>MANHATTAN TUNNELS EXCAVATION</b>  GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES TRACK L302/L402, T302/T402, L301 & T301 (EB)  SHEET 4	SCALE: AS NOTED	CONTRACT No. CM009
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					CHECKED BY: V. GALL				DATE: 5-26-06	SHEET No. 57 OF 27
					COORDINATED BY: M. DELLA POSTA				REVISION NUMBER: 0	
					APPROVED BY: J. SCHABIB					
					DATE: 5/26/06					
					REVISIONS					

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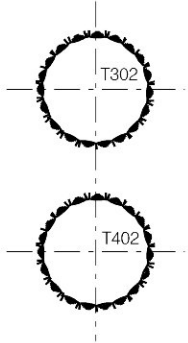
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set (may 2006)\cm009-gt-2006\cm009-gt-2006.dgn PM



KEY PLAN 1



- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1005 (LOWER LEVEL) AND CM009-ST-1105 (UPPER LEVEL).



TYPICAL TUNNEL CONFIGURATION



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M. SPYTEK

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V. GALL

COORDINATED BY:  
M. DELLA POSTA

APPROVED BY:  
J. SCHABIB

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MANHATTAN TUNNELS EXCAVATION

GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK T302/T402 AND T301 (EB)

SHEET 5

SCALE  
AS NOTED

DRAWING NUMBER  
CM009-GT-2005

DATE:  
5-26-06

REVISION NUMBER:  
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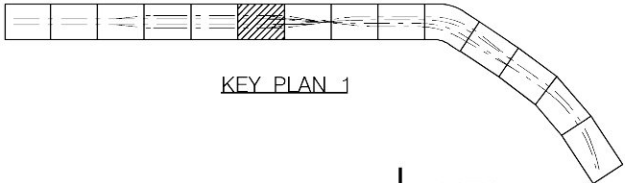
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CM009

ISSUE

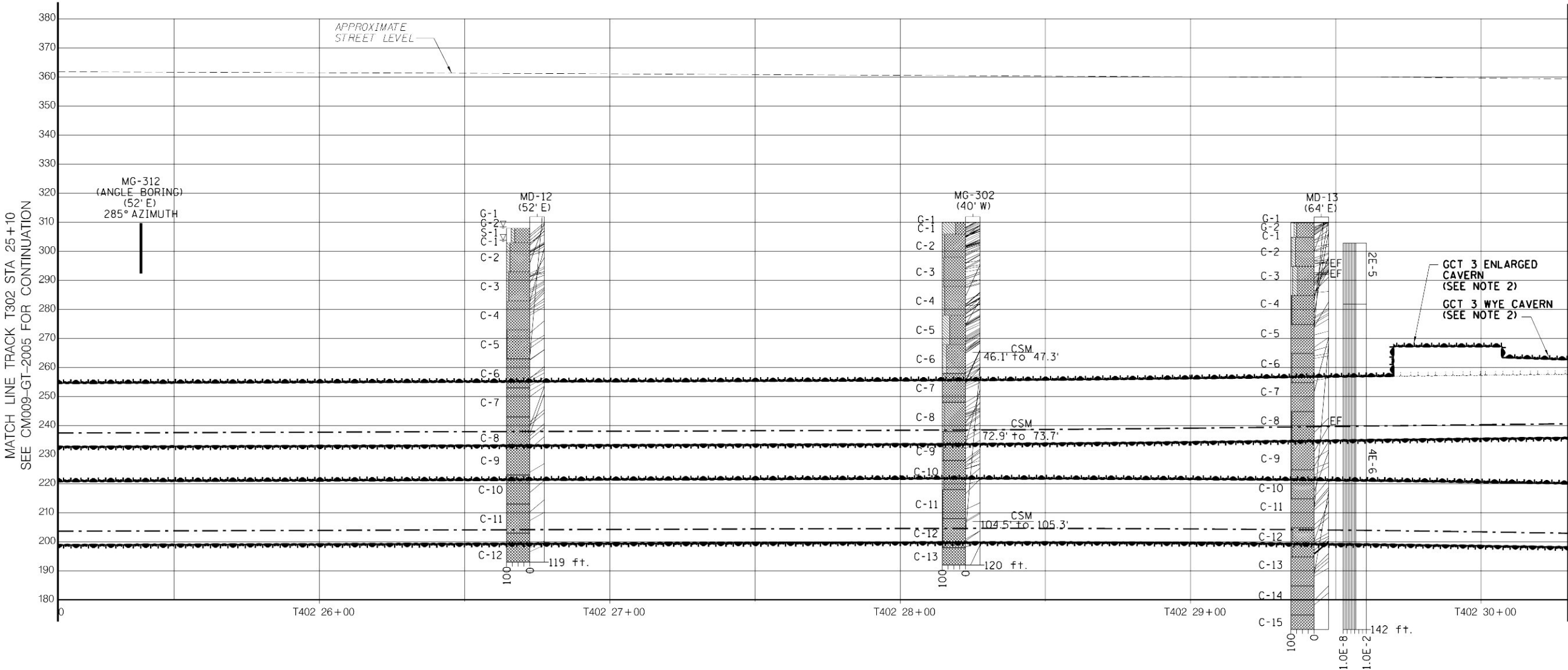
SHEET No.  
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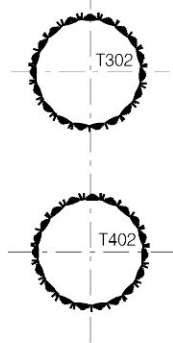
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KEY PLAN 1



- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. FOR EXACT LOCATION OF CAVERN STRUCTURES SEE CM009-GP-0117. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1006 (LOWER LEVEL) AND CM009-ST-1106 (UPPER LEVEL).



TYPICAL TUNNEL CONFIGURATION

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	UNWEATHERED SCHIST GNEISS AND MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH OCCASIONAL CLUSTERS OF VERY CLOSELY TO CLOSELY SPACED JOINTS
SUPPORT CLASS	SC I E TBM
OTHER MEASURES	
SUPPORT CLASS	SC I E TBM
OTHER MEASURES	



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CHECKED BY:  
V. GALL  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
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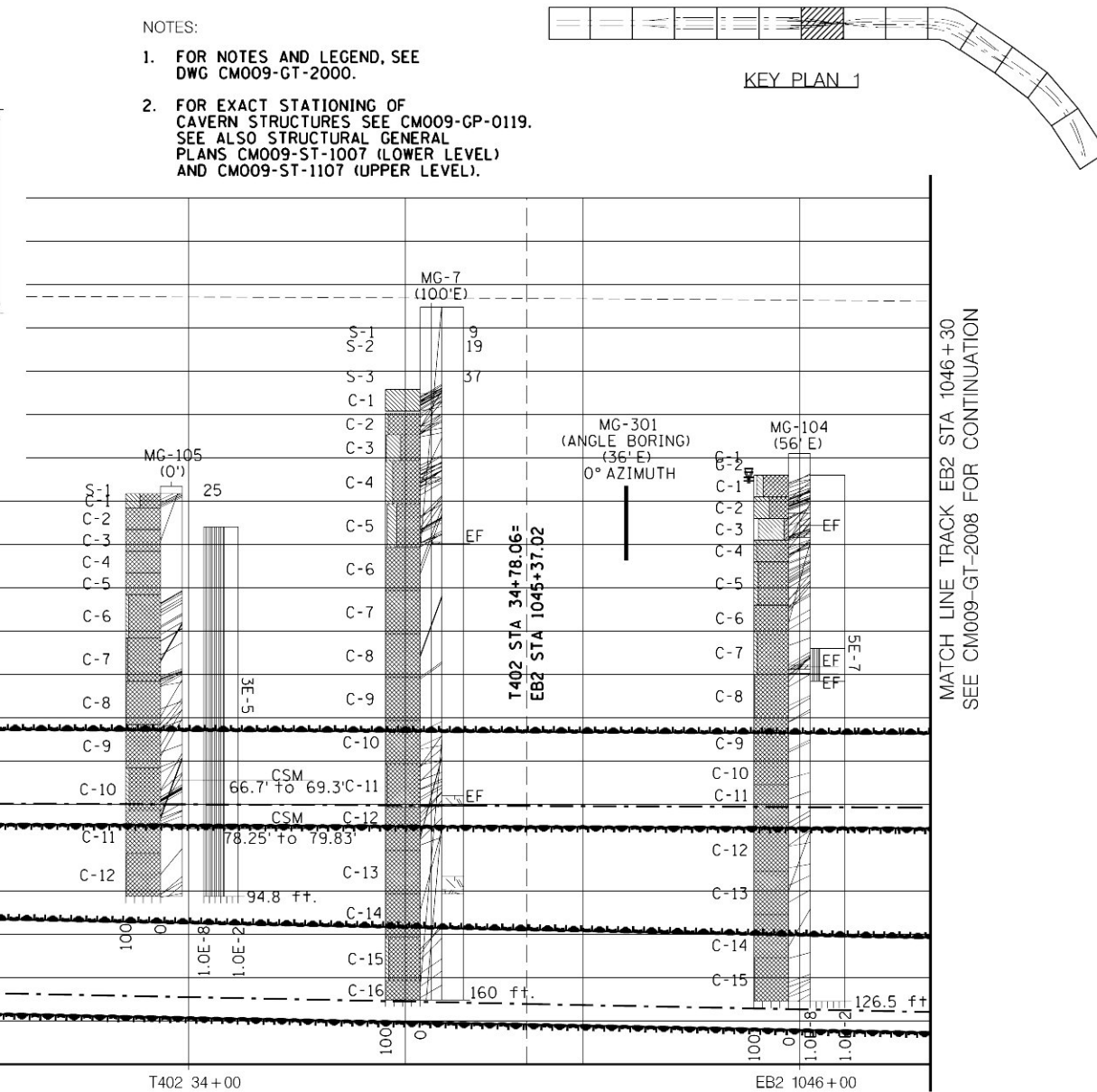
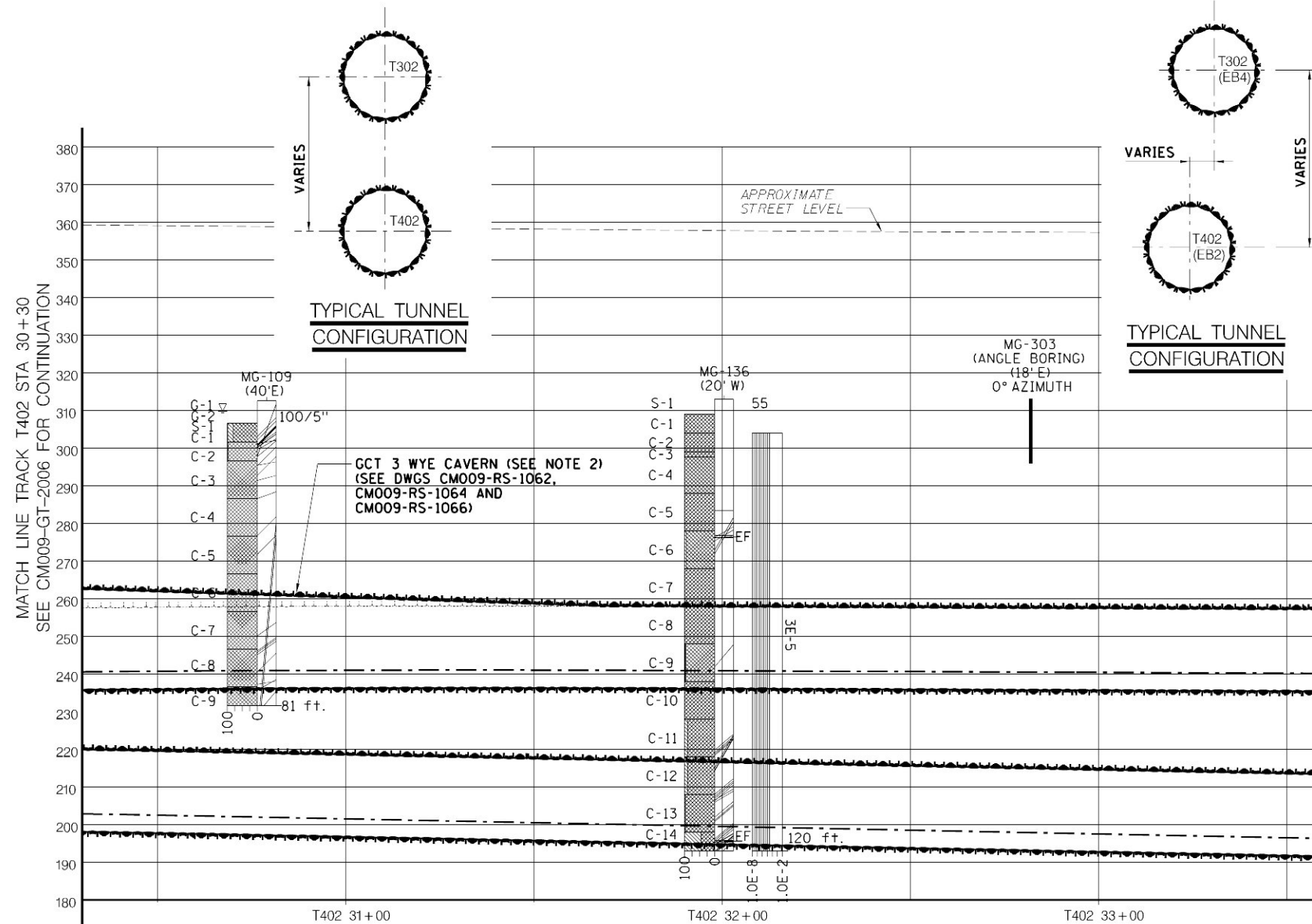
MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK T302/T402 AND T301 (EB)  
SHEET 6

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2006  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
59 OF 276



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NOTES:

1. FOR NOTES AND LEGEND, SEE  
DWG CM009-GT-2000.
2. FOR EXACT STATIONING OF  
CAVERN STRUCTURES SEE CM009-GP-0119.  
SEE ALSO STRUCTURAL GENERAL  
PLANS CM009-ST-1007 (LOWER LEVEL)  
AND CM009-ST-1107 (UPPER LEVEL).

KEY PLAN 1

MATCH LINE TRACK EB2 STA 1046+30  
SEE CM009-GT-2008 FOR CONTINUATION

## ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	
-----------------------	--

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I TBM	SC II E TBM
OTHER MEASURES		

SCALE IN FEET



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	CHECKED BY:	V. GALL
	COORDINATED BY:	M. DELLA POSTA
	APPROVED BY:	J. SCHARIB
No.		

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MANHATTAN TUNNELS EXCAVATION

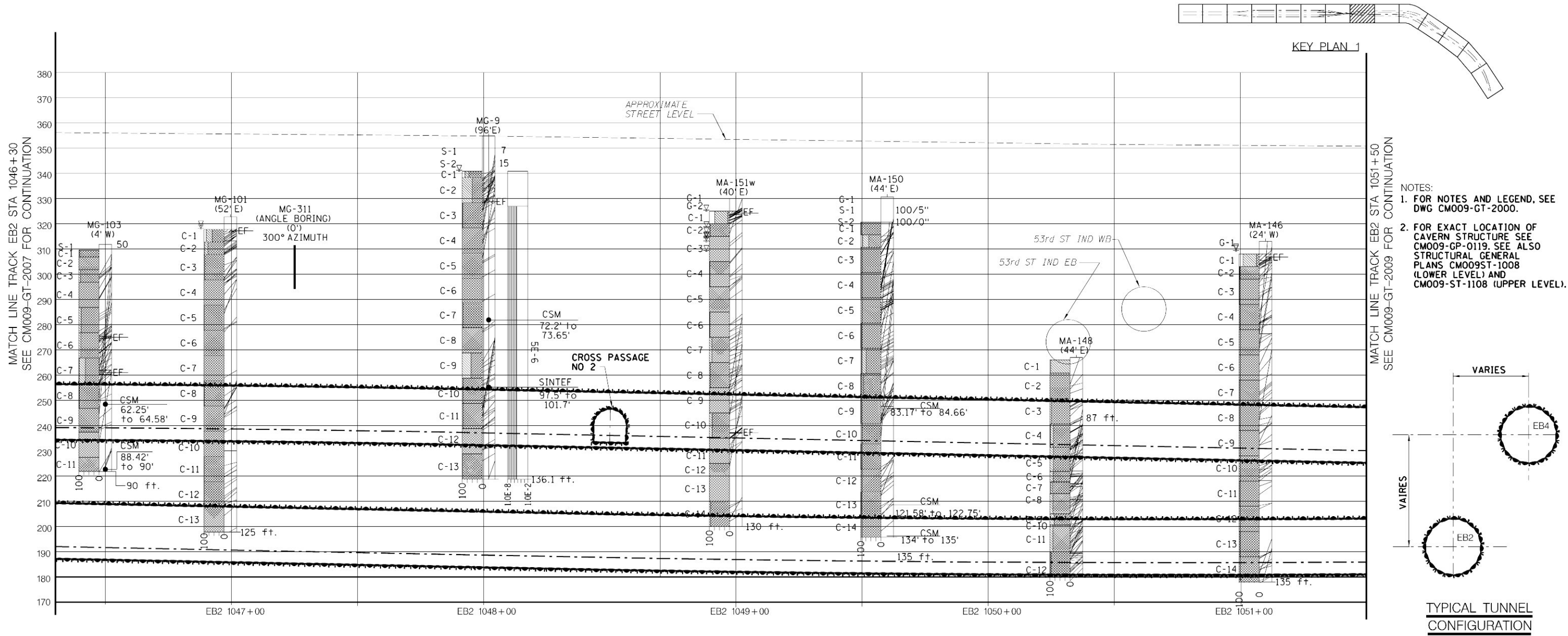
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK T302/T402, EB4/EB2 & T301 (EB)

SHEET 7

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DATE:	5-26-06	ISSUE	
REVISION NUMBER:	0	SHEET No.	60 OF 276

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- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. FOR EXACT LOCATION OF CAVERN STRUCTURE SEE CM009-GP-0119. SEE ALSO STRUCTURAL GENERAL PLANS CM009ST-1008 (LOWER LEVEL) AND CM009-ST-1108 (UPPER LEVEL).

### ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST GNEISS WITH MINOR PEGMATITE. CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS.
-----------------------	---

### SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC II E TBM	EB4 1047+48	SC II TBM	EB4 1050+00	SC III TBM	EB4 1051+00	SC II TBM
OTHER MEASURES	PRE-EXCAVATION GROUTING AS REQUIRED POSSIBLE FAULT WITH OPEN JOINTS AND SLICKENSIDES						

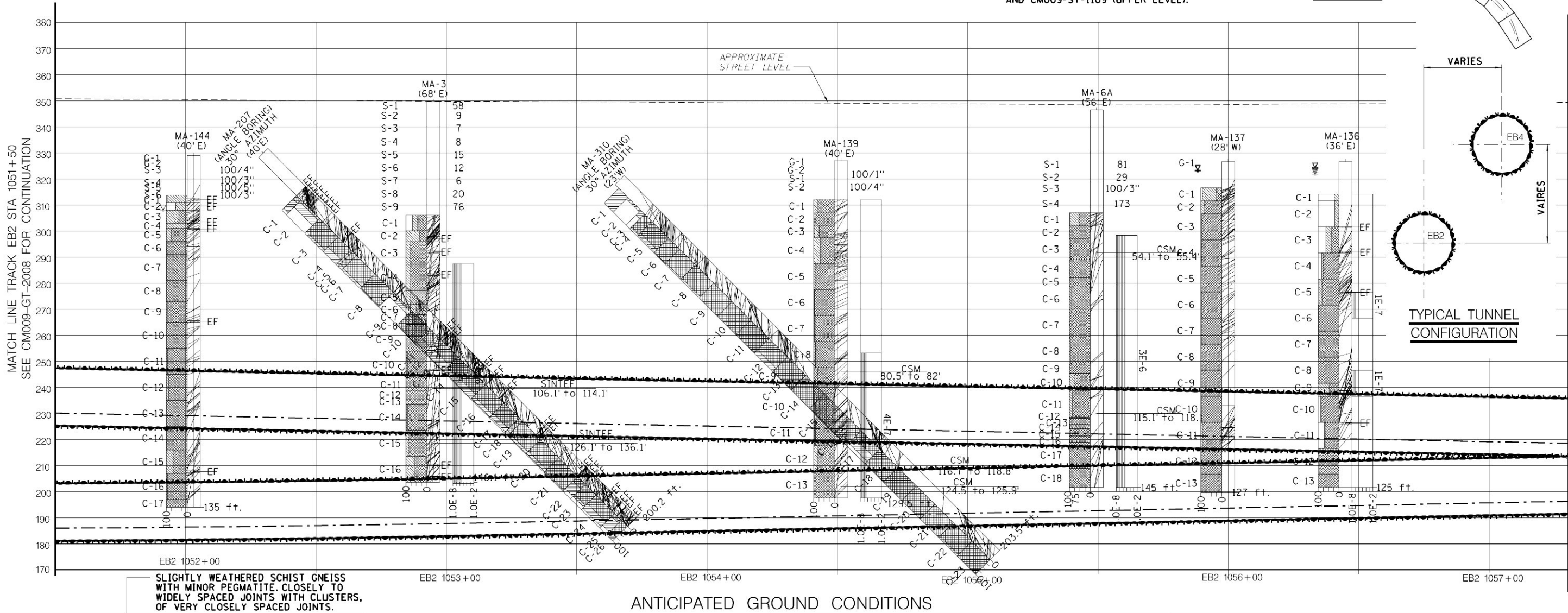
### SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC II E TBM	EB2 1049+36	SC II TBM	EB2 1050+00	EB2 1051+00
OTHER MEASURES	PRE-EXCAVATION GROUTING AS REQUIRED POSSIBLE FAULT WITH OPEN JOINTS AND SLICKENSIDES				

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

- NOTES:
- FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  - SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1009 (LOWER LEVEL) AND CM009-ST-1109 (UPPER LEVEL).

KEY PLAN 1

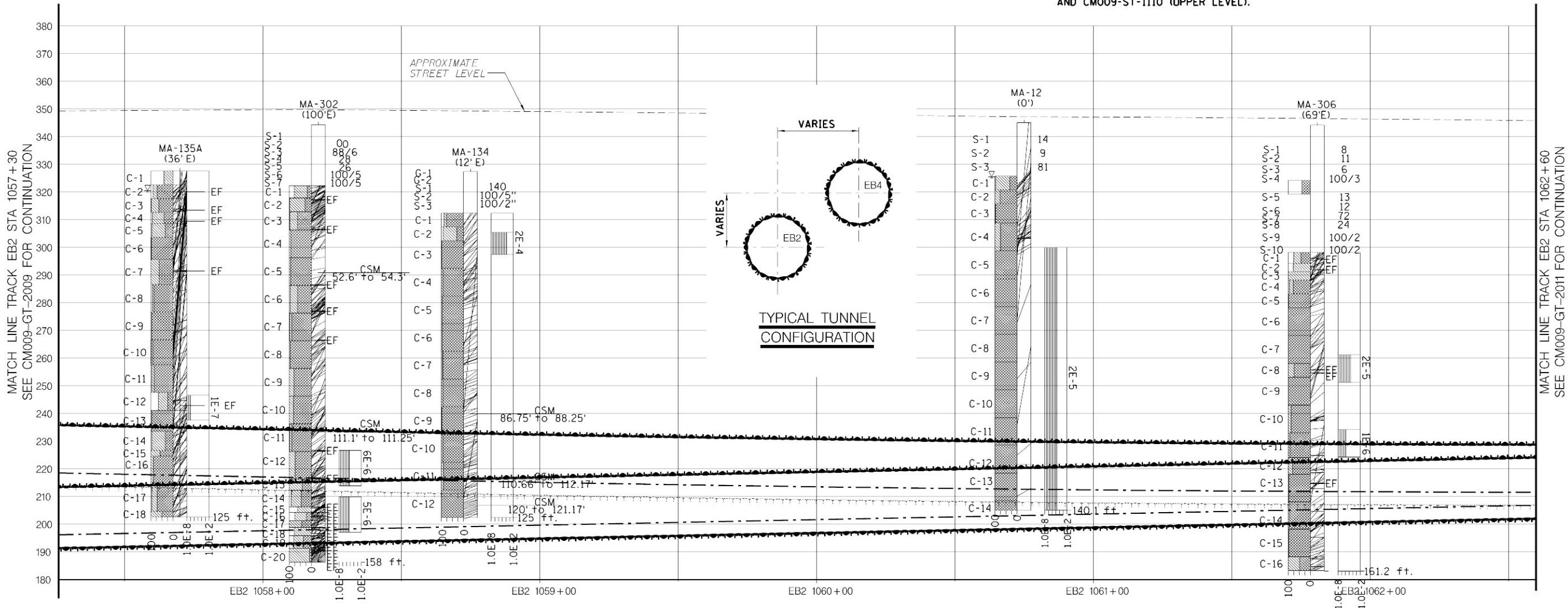




NOTES:

1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1010 (LOWER LEVEL) AND CM009-ST-1110 (UPPER LEVEL).

KEY PLAN 1



ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	UNWEATHERED SCHIST GNEISS AND MAJOR PEGMATITE, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS.
-----------------------	---

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I TBM
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I TBM
OTHER MEASURES	

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

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Capital Construction

Long Island Rail Road  
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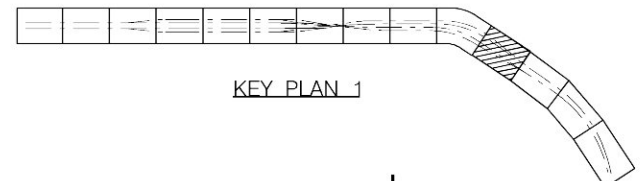
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C. STEWART  
DRAWN BY:  
D. ENGLISH  
CHECKED BY:  
V. GALL  
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M. DELLA POSTA  
APPROVED BY:  
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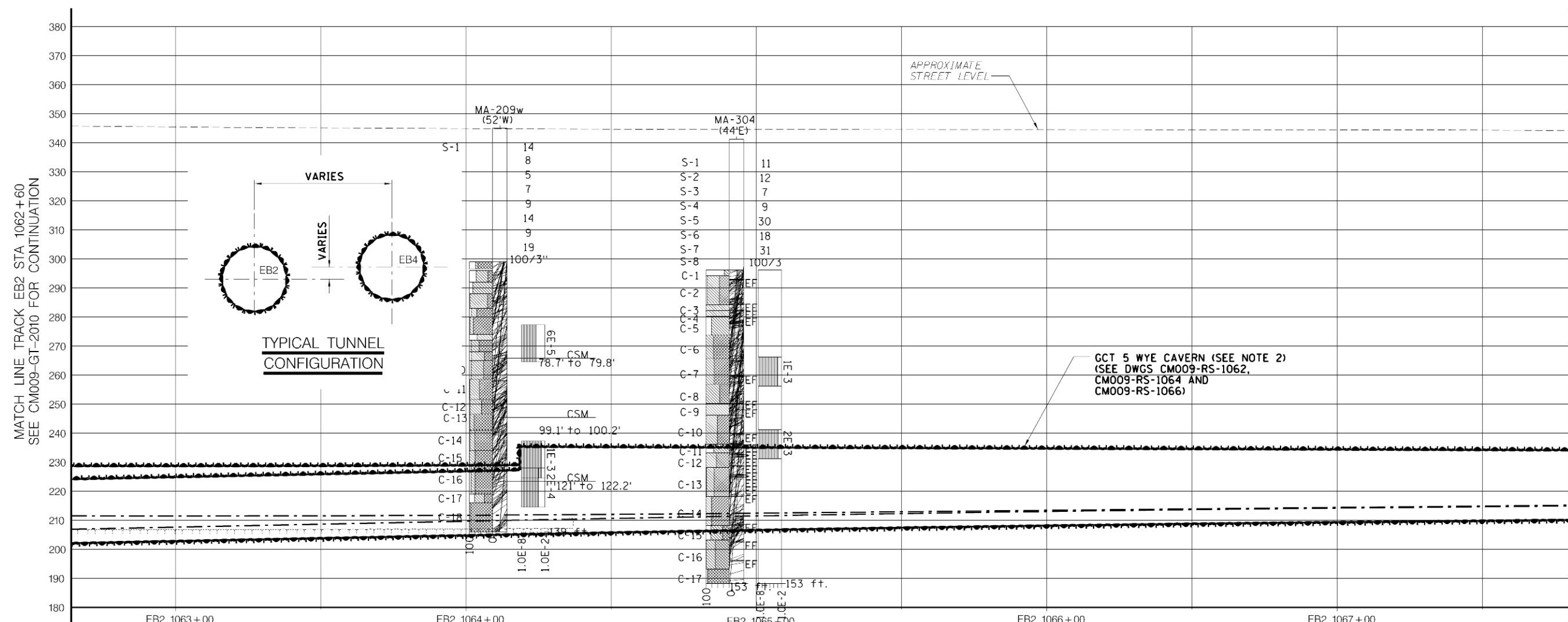
MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK EB4EB2  
SHEET 10

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2010  
DATE:  
5-26-06  
REVISION NUMBER:  
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CM009  
ISSUE  
SHEET No.  
63 OF 276



KEY PLAN 1



- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. FOR EXACT STATIONING OF CAVERN STRUCTURES SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1011 (LOWER LEVEL) AND CM009-ST-1111 (UPPER LEVEL).

MATCH LINE TRACK EB2 STA 1067+80  
SEE CM009-GT-2012 FOR CONTINUATION

UNWEATHERED SCHIST GNEISS AND MAJOR PEGMATITE, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS.

ANTICIPATED GROUND CONDITIONS

SLIGHTLY WEATHERED, ALTERED SCHIST, GNEISS, GRANOFELS AND PEGMATITE, THIN TO THICK DECOMPOSED AMPHIBOLITE WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED AND STEEPLY DIPPING OPEN JOINTS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED HEALED BRECCIATED SCHIST AND PEGMATITE, VERY CLOSELY SPACED JOINTS, WITH STEEPLY DIPPING OPEN JOINTS (DEFINED AS SHEAR ZONE IN GBR)
-----------------------	--

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	EB4 1062+75 SC I TBM	EB4 1063+55.04 SC III TBM	PILLAR REINF SEE CM009-RS-1104
OTHER MEASURES	PRE-EXCAVATION GROUTING AS REQUIRED		

SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	EB2 1063+00 SC I TBM	EB2 1063+78.98 SC III TBM	EB2 1064+18.98 STARTER TUNNEL TYPE II	EB2 1066+00 SC III TBM	SC II E TBM
OTHER MEASURES	PRE-EXCAVATION GROUTING AS REQUIRED		PRE-EXCAVATION GROUTING AS REQUIRED		



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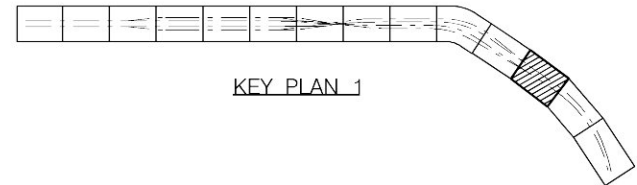
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CHECKED BY: V. GALL	
COORDINATED BY: M. DELLA POSTA	
APPROVED BY: J. SCHABIB	
DATE: 5/26/06	CONFORMED DRAWING
DATE:	REVISIONS

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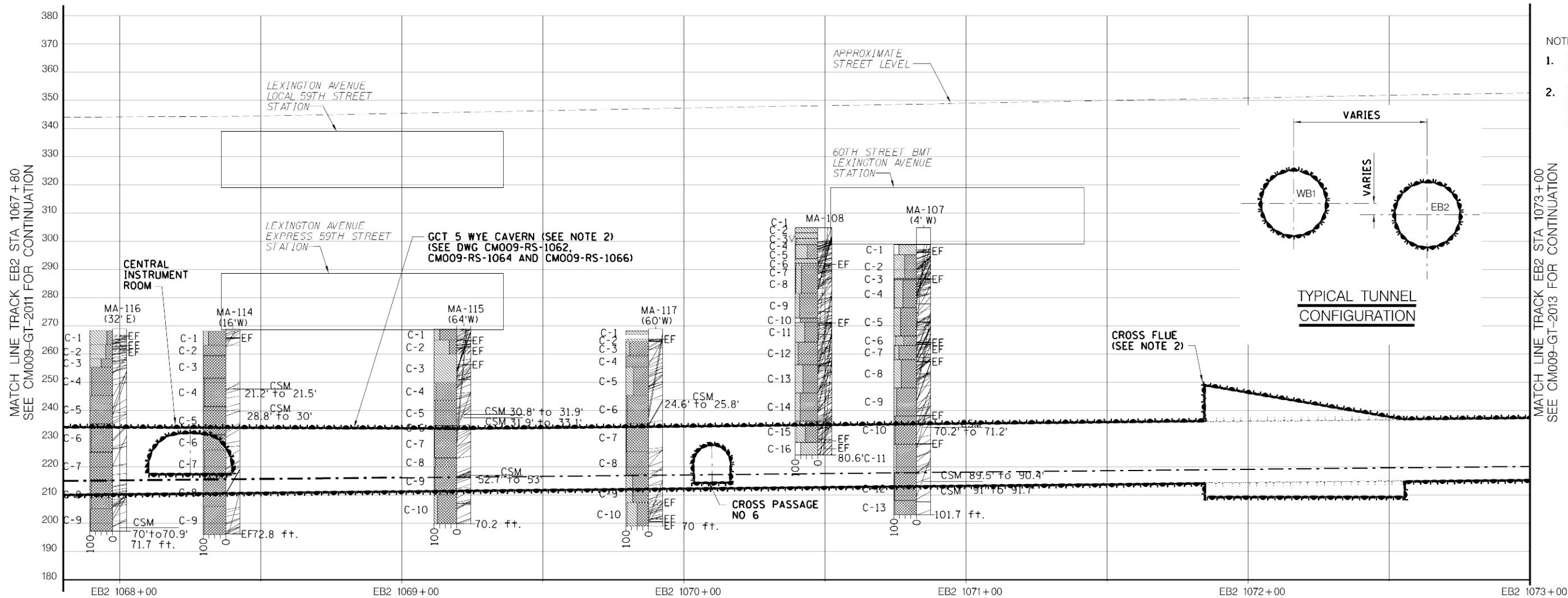
MANHATTAN TUNNELS EXCAVATION

GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES TRACK EB4/EB2 SHEET 11

SCALE: AS NOTED	CONTRACT No. CM009
DRAWING NUMBER: CM009-GT-2011	ISSUE
DATE: 5-26-06	SHEET No.
REVISION NUMBER: 0	64 OF 276



KEY PLAN 1



- NOTES:
- FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  - FOR EXACT STATIONING OF CAVERN STRUCTURES SEE ALSO STRUCTURAL GENERAL PLAN CM009-ST-1012.

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED, ALTERED SCHIST, GNEISS, GRANOFELS AND PEGMATITE. THIN TO THICK DECOMPOSED AMPHIBOLITE WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED AND STEEPLY DIPPING OPEN JOINTS
-----------------------	---

SUPPORT CLASS RANGES TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC II E TBM	EB2 1069+31.52	SC II TBM	EB2 1071+85	SC II E TBM	EB2 1072+55	SC II TBM
OTHER MEASURES							



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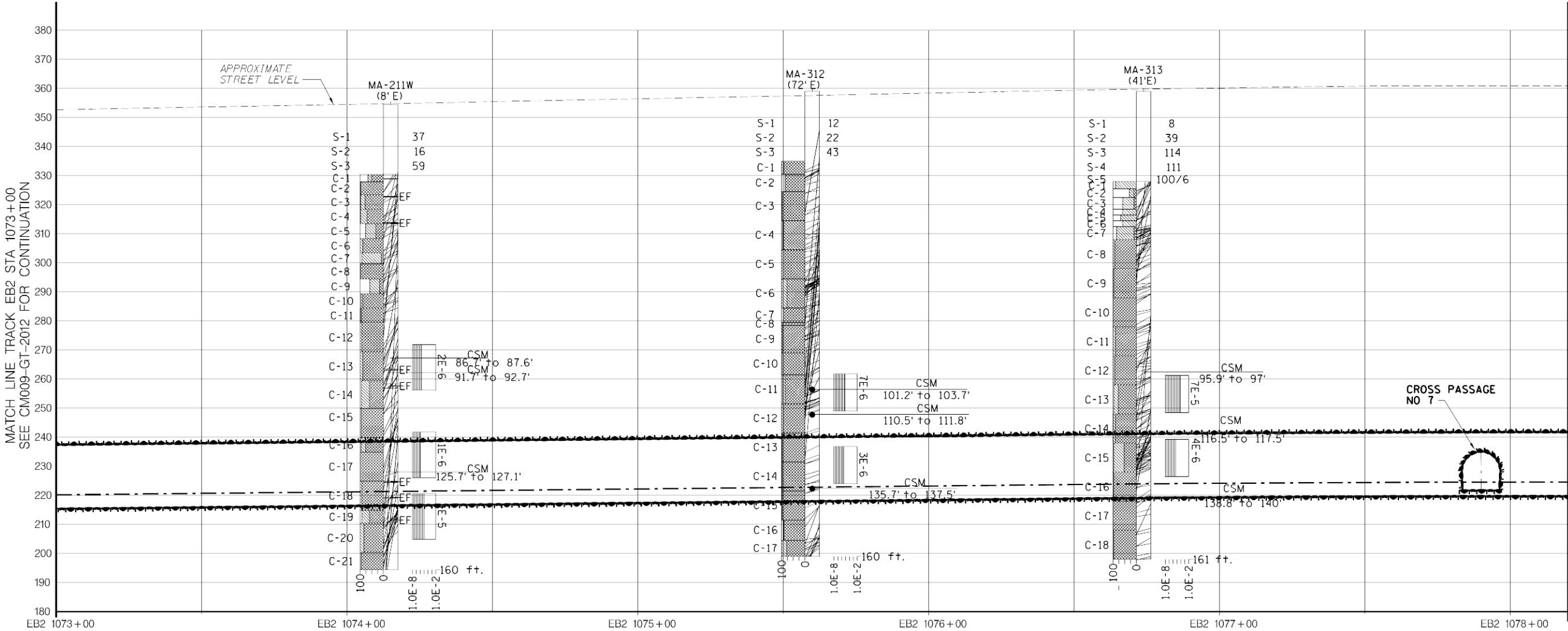
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK EB2  
SHEET 12

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2012  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
65 OF 276



- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. SEE ALSO STRUCTURAL GENERAL PLAN CM009-ST-1013.



SLIGHTLY WEATHERED, ALTERED SCHIST, GNEISS, GRANOFELS AND PEGMATITE, THIN TO THICK DECOMPOSED AMPHIBOLITE WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED AND STEEPLY DIPPING OPEN JOINTS

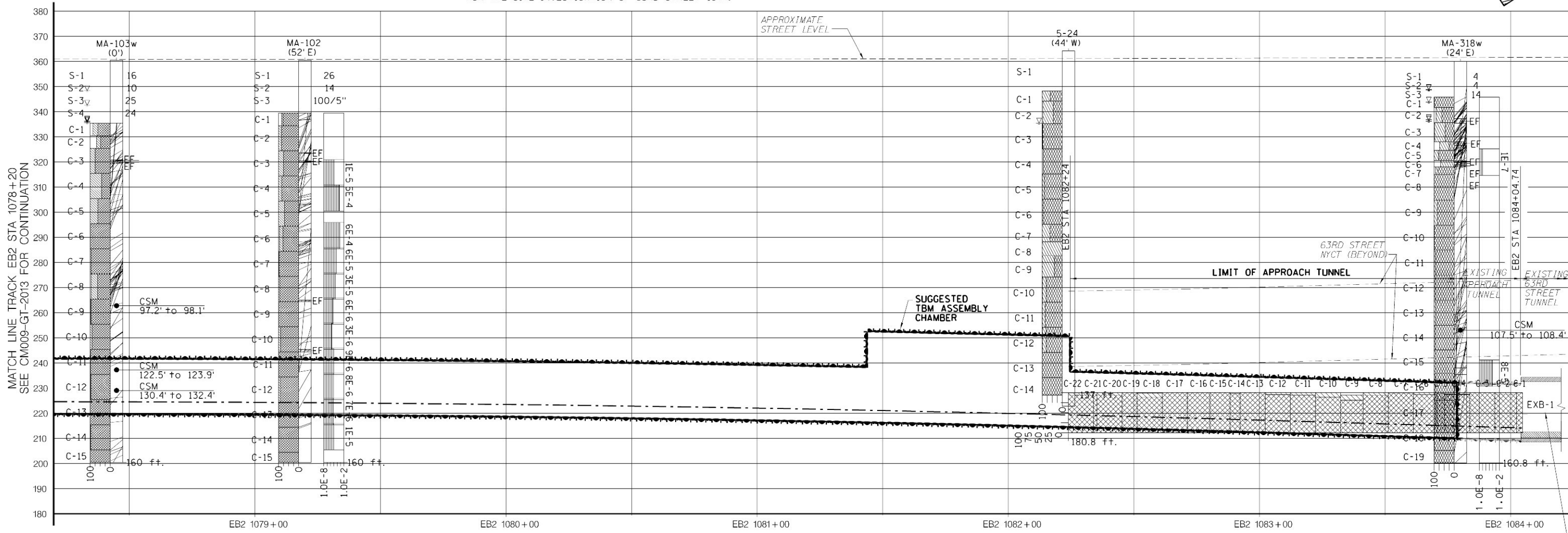
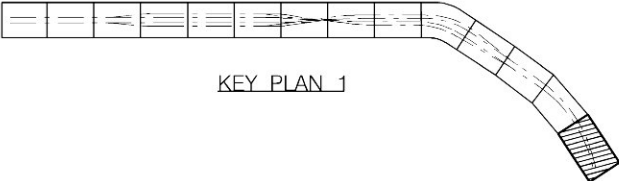
ANTICIPATED GROUND CONDITIONS

SLIGHTLY WEATHERED, ALTERED SCHIST, GNEISS AND GRANOFELS WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS

ROCK MASS DESCRIPTION	EB2 1073+50	EB2 1077+00
SUPPORT CLASS RANGES TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)		
SUPPORT CLASS	SC II TBM	SC I TBM
OTHER MEASURES		



- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. FOR EXACT LOCATION OF SUGGESTED TBM ASSEMBLY CHAMBER STRUCTURE SEE STRUCTURAL GENERAL PLAN CM009-ST-1014.
  3. FOR SUPPORT AND EXCAVATION SEQUENCE SEE DWG CM009-RS-1032.
  4. BORE HOLE NUMBER 5-23 AND 5-24 WAS TAKEN FROM THE SOURCE FOR THE SITE INVESTIGATION OF 63RD STREET 1974.
  5. THE RESIDENT ENGINEER SHALL PROVIDE AS-BUILT INFORMATION OF THE INITIAL SUPPORT OF THE EXISTING APPROACH TUNNEL.
  6. FOR INFORMATION ON BOREHOLE NO EXB-1 SEE REFERENCE DOCUMENT OF ESA CONTRACT CM016, "GEO TECHNICAL INFORMATION FOR RECORD."



ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED, ALTERED SCHIST, GNEISS AND GRANOFELS WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS	UNWEATHERED SCHIST AND GNEISS, MINOR GRANOFELS AND PEGMATITE, WITH GARNET CLOSELY TO WIDELY SPACED JOINTS, WITH RARE CLUSTERS OF VERY CLOSELY SPACED JOINTS
-----------------------	---	---

SUPPORT CLASS RANGES TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I TBM	SUGGESTED STARTER TUNNEL TYPE 1	SUGGESTED TBM ASSEMBLY CHAMBER SEE NOTE 2 & 3
OTHER MEASURES			

SUPPORT CLASS RANGES EXISTING APPROACH TUNNEL

SUPPORT CLASS IN APPROACH TUNNEL	SC I-B	(SEE NOTE 5)
OTHER MEASURES	LINE DRILLING AS REQUIRED	EXTENT OF LINE DRILLING



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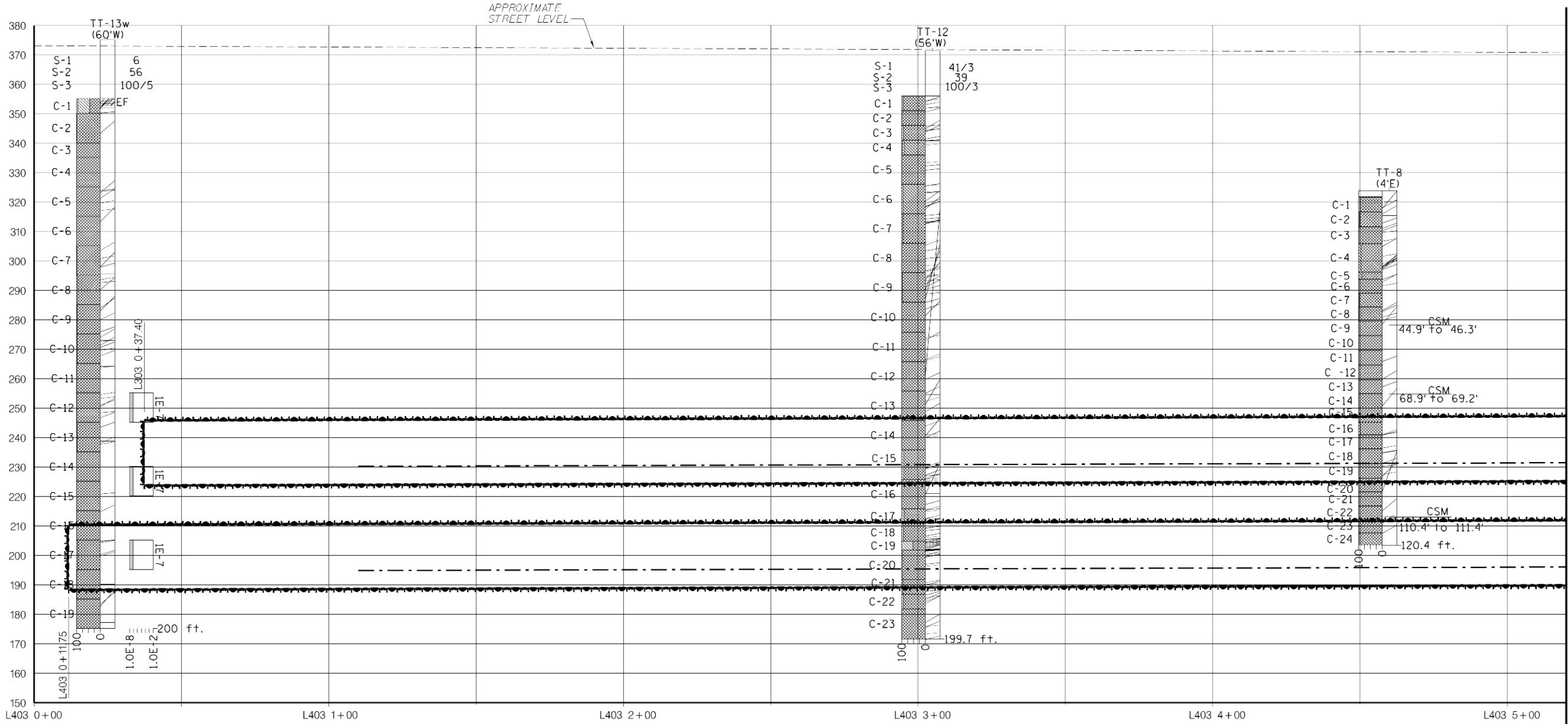
MANHATTAN TUNNELS EXCAVATION

GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK EB2  
SHEET 14

SCALE AS NOTED DRAWING NUMBER CM009-GT-2014 DATE: 5-26-06 REVISION NUMBER: 0	CONTRACT No. CM009 ISSUE SHEET No. 67 OF 276
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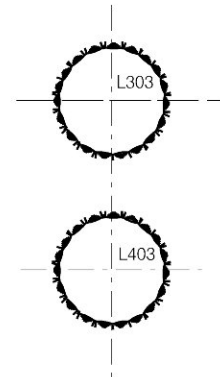
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KEY PLAN 1

- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1001 (LOWER LEVEL) AND CM009-ST-1101 (UPPER LEVEL).

MATCH LINE TRACK L403 STA 5+20  
SEE CM009-GT-2102 FOR CONTINUATION



TYPICAL TUNNEL  
CONFIGURATION

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST AND GNEISS WITH MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS AND RARE SHEARS LESS THAN 1" THICK. SOME LOCALLY DECOMPOSED ROCK
-----------------------	--

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	L303 0+37.40 SC I E TBM L303 1+07 SC I TBM
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	L403 0+11.75 SC I TBM L403 0+75 SC I E TBM L403 0+95 SC I TBM
OTHER MEASURES	

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

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GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK L303/L403 (WB)  
SHEET 1

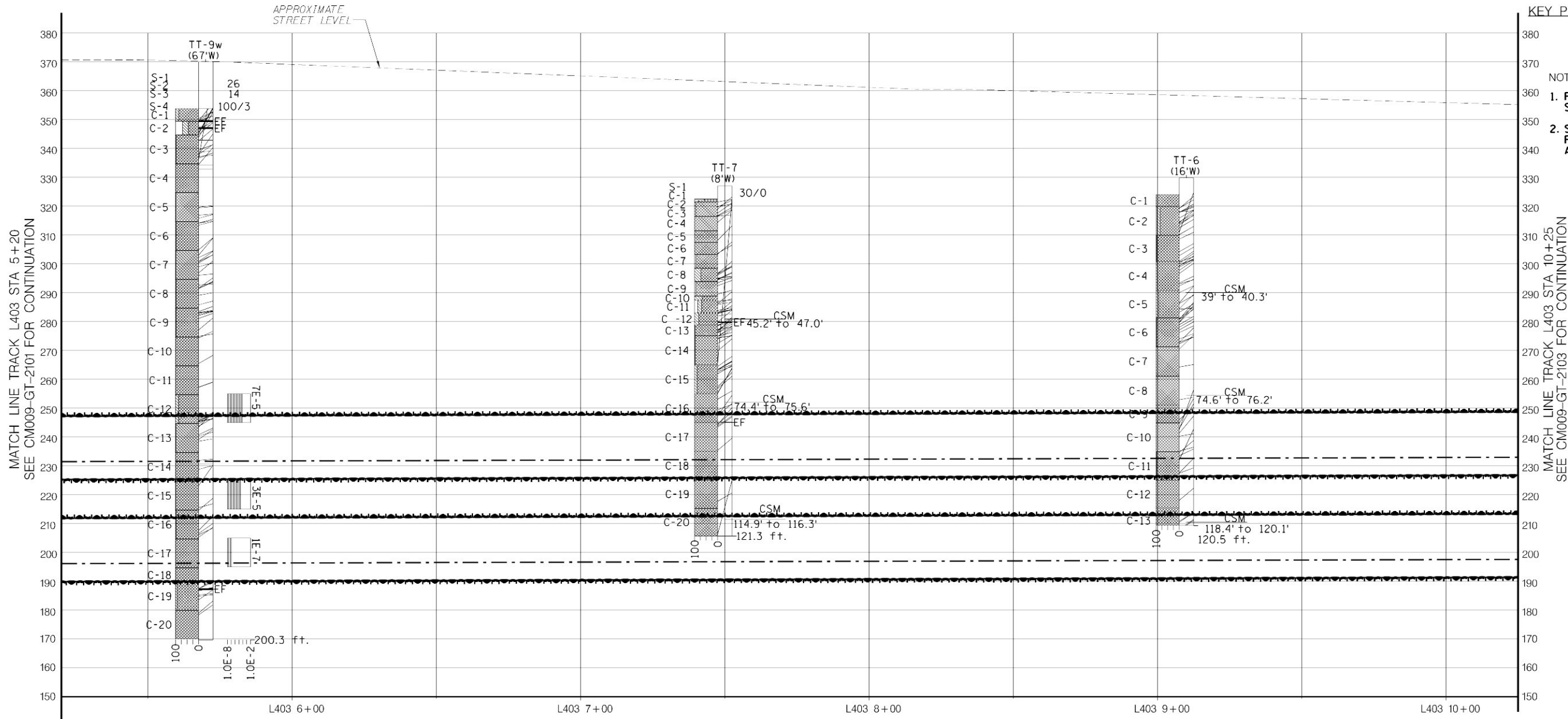
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DATE: 5-26-06	
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ISSUE	
SHEET No. 68 OF 276	



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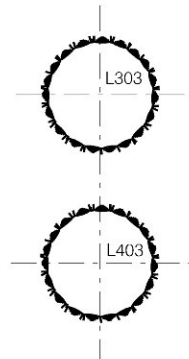
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KEY PLAN 1

NOTES:

1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1002 (LOWER LEVEL) AND CM009-ST-1102 (UPPER LEVEL)



TYPICAL TUNNEL CONFIGURATION

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST AND GNEISS WITH MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS AND RARE SHEARS LESS THAN 1" THICK. SOME LOCALLY DECOMPOSED ROCK
-----------------------	--

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I TBM
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I TBM
OTHER MEASURES	



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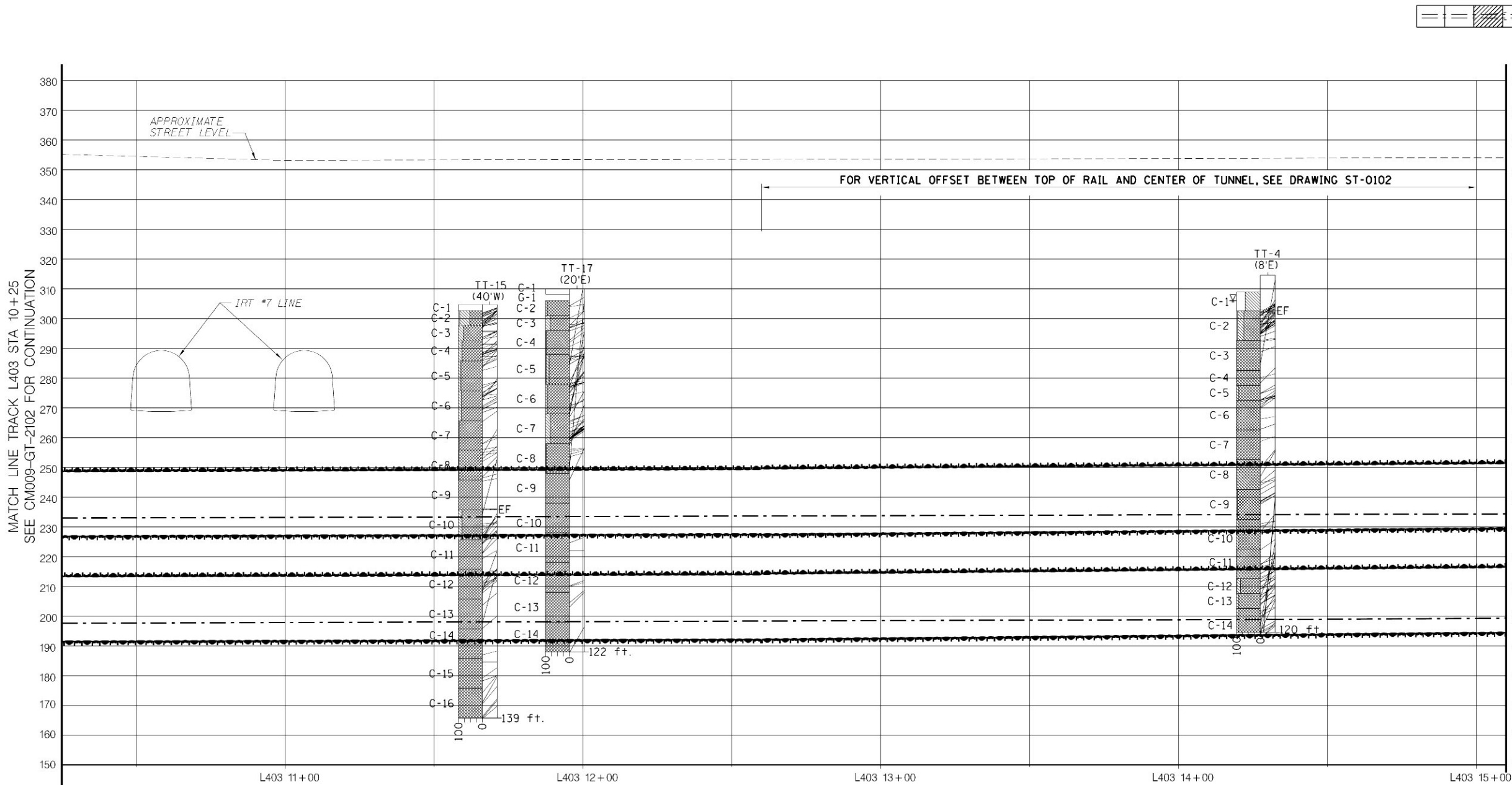
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MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK L303/L403 (WB)  
SHEET 2

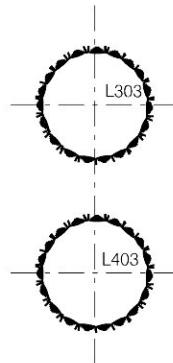
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DRAWING NUMBER CM009-GT-2102	ISSUE
DATE: 5-26-06	SHEET No. 69 OF 276
REVISION NUMBER: 0	

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\$REF\$ 61  
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- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1003 (LOWER LEVEL) AND CM009-ST-1103 (UPPER LEVEL)
  3. SUPPORT CLASS III WITHOUT STEEL MAT LAGGING INSTALLED DUE TO PROXIMITY OF IRT NO. 7 LINE.



TYPICAL TUNNEL CONFIGURATION

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST AND GNEISS WITH MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS AND RARE SHEARS LESS THAN 1" THICK. SOME LOCALLY DECOMPOSED ROCK
-----------------------	--

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	L303 10+45 SC I TBM L303 11+25 SC III TBM (SEE NOTE 3) L303 11+92 SC I E TBM
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	L403 11+92 SC I E TBM
OTHER MEASURES	



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MANHATTAN TUNNELS EXCAVATION

GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK L303/L403 (WB)  
SHEET 3

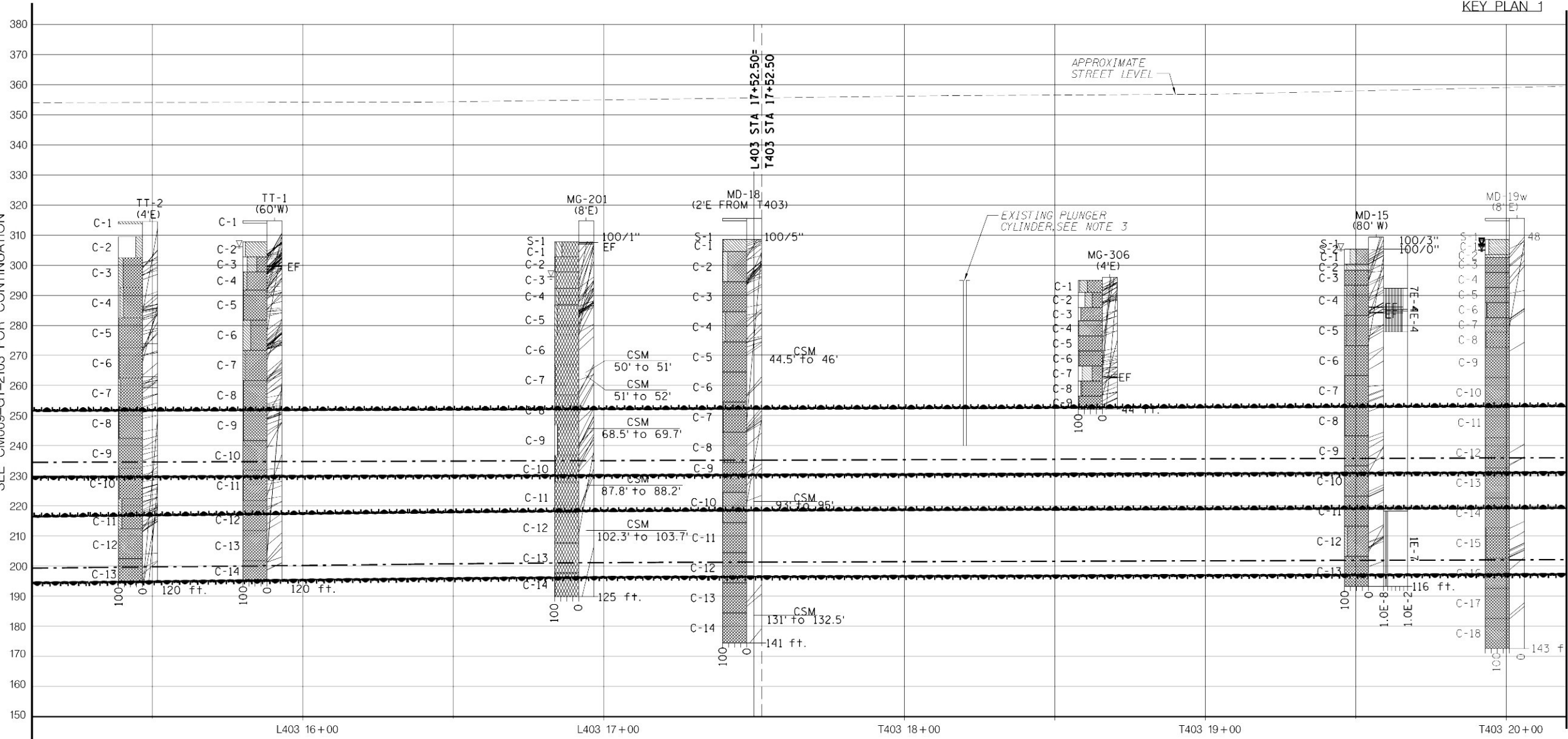
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DRAWING NUMBER CM009-GT-2103	ISSUE
DATE: 5-26-06	SHEET No. 70 OF 276
REVISION NUMBER: 0	

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\$REF 63  
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MATCH LINE TRACK L403 STA 15+10  
SEE CM009-GT-2103 FOR CONTINUATION

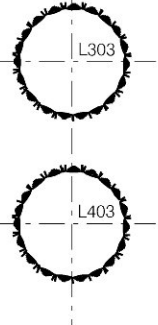


KEY PLAN 1

NOTES:

1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1004 (LOWER LEVEL) AND CM009-ST-1104 (UPPER LEVEL).
3. FOR PLUNGER CYLINDER LOCATION SEE ALSO SECTION ON DWG CM009-CT-2020.

MATCH LINE TRACK T403 STA 20+20  
SEE CM009-GT-2105 FOR CONTINUATION



TYPICAL TUNNEL  
CONFIGURATION

### ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST AND GNEISS WITH MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS AND RARE SHEARS LESS THAN 1" THICK. SOME LOCALLY DECOMPOSED ROCK	UNWEATHERED SCHIST GNEISS AND MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH OCCASIONAL CLUSTERS OF VERY CLOSELY TO CLOSELY SPACED JOINTS
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### SUPPORT CLASS RANGES UPPER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	L303 15+29 SC I E TBM	L303 17+25 SC I TBM	SC I E TBM
OTHER MEASURES	L303 15+88		

### SUPPORT CLASS RANGES LOWER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	L403 15+29 SC I E TBM	L403 17+25 SC I TBM	SC I E TBM
OTHER MEASURES			

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

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MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK L303/L403 AND T303/T403 (WB)  
SHEET 4

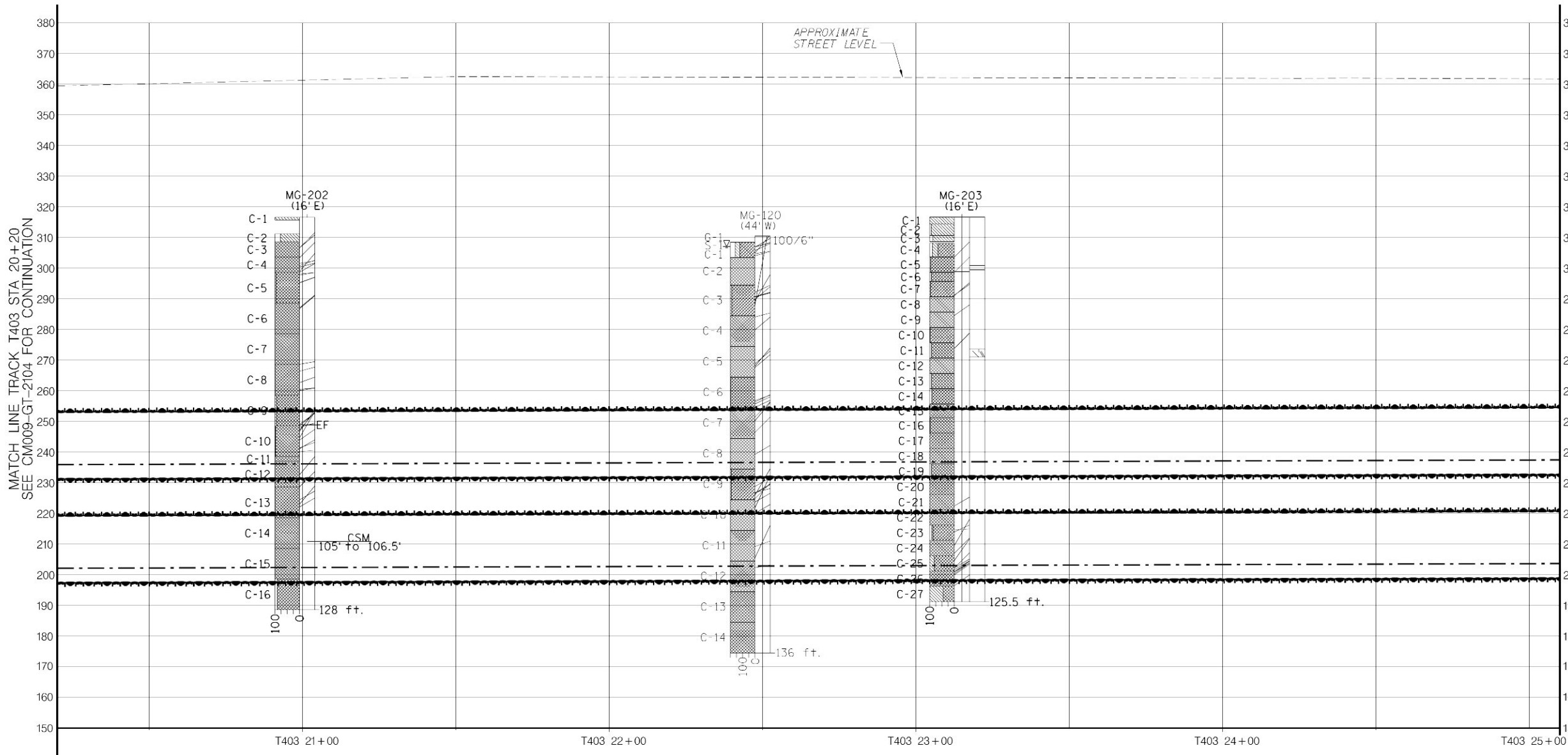
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ISSUE  
SHEET No.  
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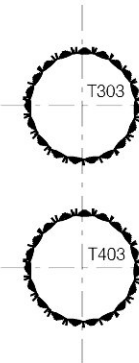
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KEY PLAN 1

NOTES:

1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1005 (LOWER LEVEL) AND CM009-ST-1105 (UPPER LEVEL).



TYPICAL TUNNEL CONFIGURATION

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	UNWEATHERED SCHIST GNEISS AND MINOR PEGMATITE. MODERATELY TO WIDELY SPACED JOINTS WITH OCCASIONAL CLUSTERS OF VERY CLOSELY TO CLOSELY SPACED JOINTS
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SUPPORT CLASS RANGES UPPER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I E TBM
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I E TBM
OTHER MEASURES	



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CHECKED BY: V. GALL	
COORDINATED BY: M. DELLA POSTA	
APPROVED BY: J. SCHABIB	

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&  
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MANHATTAN TUNNELS EXCAVATION

GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK T303/T403 (WB)  
SHEET 5

SCALE AS NOTED	CONTRACT No. CM009
DRAWING NUMBER CM009-GT-2105	ISSUE
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REVISION NUMBER: 0	

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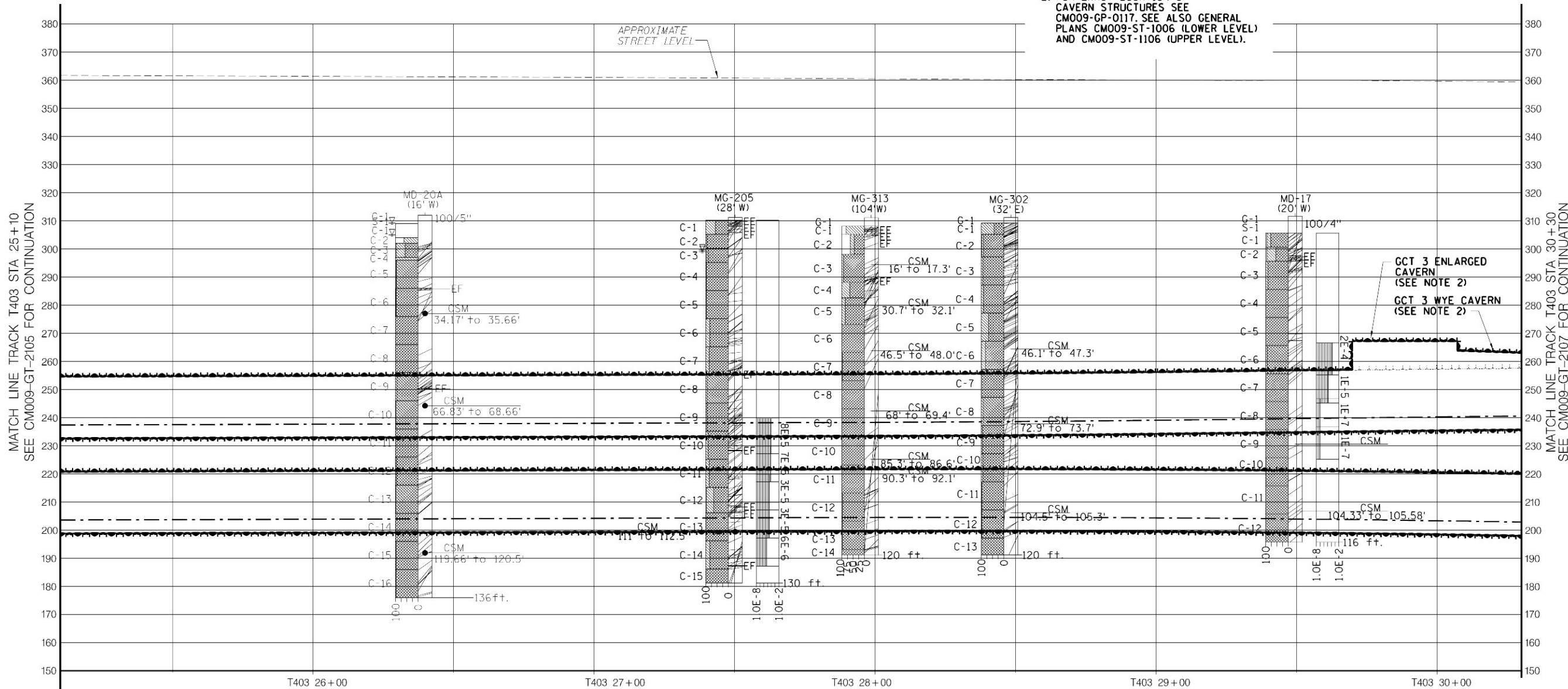
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NOTES:

1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
2. FOR EXACT LOCATION OF CAVERN STRUCTURES SEE CM009-GP-0117. SEE ALSO GENERAL PLANS CM009-ST-1006 (LOWER LEVEL) AND CM009-ST-1106 (UPPER LEVEL).

KEY PLAN 1



ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	UNWEATHERED SCHIST GNEISS AND MINOR PEGMATITE, MODERATELY TO VERY WIDELY SPACED JOINTS WITH OCCASIONAL CLUSTERS OF VERY CLOSELY TO CLOSELY SPACED JOINTS
-----------------------	--

SUPPORT CLASS RANGES UPPER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I E TBM
OTHER MEASURES	

SUPPORT CLASS RANGES LOWER TBM TUNNELS (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC I E TBM
OTHER MEASURES	

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

TYPICAL TUNNEL CONFIGURATION

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DRAWN BY:  
D. VASQUEZ  
CHECKED BY:  
V. GALL  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK T303/T403 (WB)  
SHEET 6

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2106  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
73 OF 276

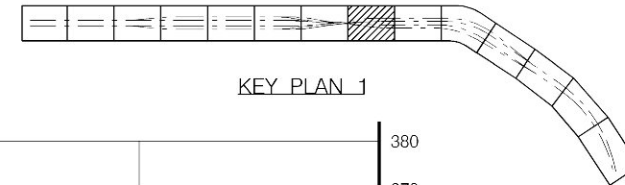




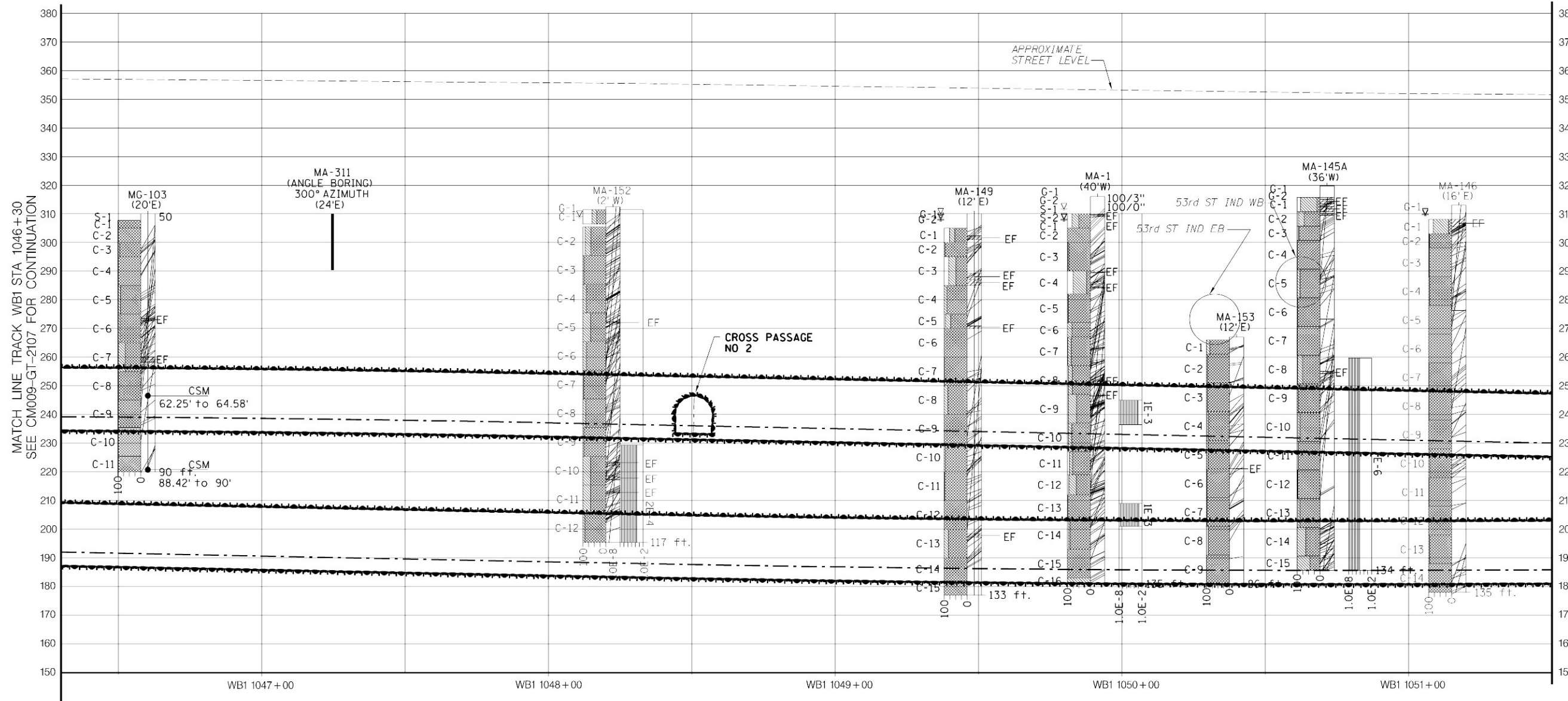
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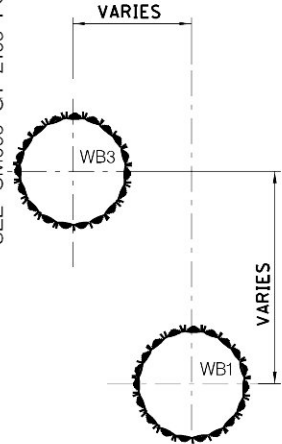


KEY PLAN 1



- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. FOR EXACT LOCATION OF CAVERN STRUCTURES SEE GP-0119. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1008 (LOWER LEVEL) AND CM009-ST-1108 (UPPER LEVEL)

MATCH LINE TRACK WB1 STA 1051+50  
SEE CM009-GT-2109 FOR CONTINUATION



TYPICAL TUNNEL CONFIGURATION

ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED SCHIST GNEISS WITH MINOR PEGMATITE. CLOSELY TO MODERATELY SPACED JOINTS WITH CLUSTERS, OF VERY CLOSELY SPACED JOINTS.
-----------------------	--

SUPPORT CLASS RANGES UPPER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	WB3 1046+70 SC II E TBM	SC II TBM	WB3 1050+00	SC III TBM	WB3 1051+00	SC II TBM
OTHER MEASURES	PILLAR REINFORCEMENT SEE CM009-RS-1104			PRE-EXCAVATION GROUTING AS REQUIRED POSSIBLE FAULT WITH OPEN JOINTS AND SLICKENSIDES		

SUPPORT CLASS RANGES LOWER TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG CM009-GT-2000)

SUPPORT CLASS	WB1 1049+36 SC II E TBM	SC II TBM	WB1 1050+00	WB1 1051+00
OTHER MEASURES	PILLAR REINFORCEMENT SEE CM009-RS-1104		PRE-EXCAVATION GROUTING AS REQUIRED POSSIBLE FAULT WITH OPEN JOINTS AND SLICKENSIDES	



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V. GALL  
COORDINATED BY:  
M. DELLA POSTA  
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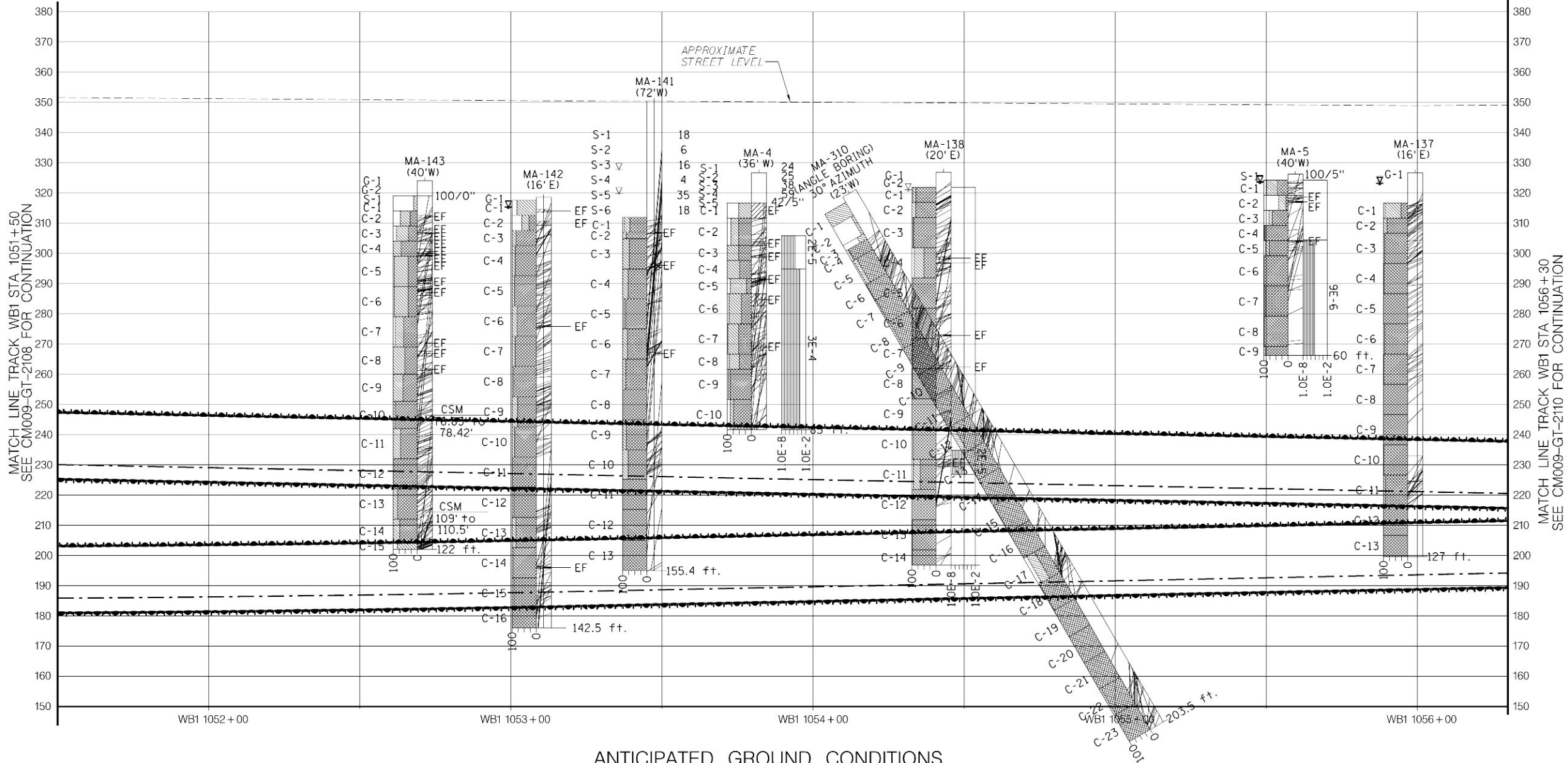
MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK WB3WB1  
SHEET 8

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2108  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
75 OF 276

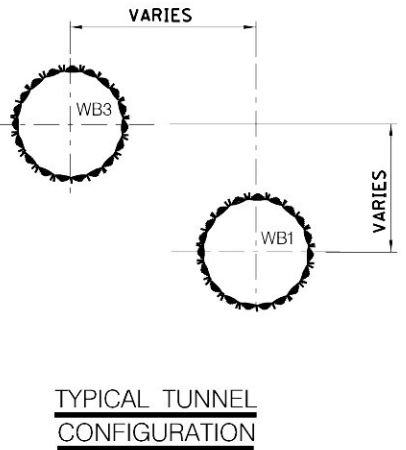
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s:\PLOT\DRV

\$REF 63  
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KEY PLAN 1

- NOTES:
- FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  - SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1009 (LOWER LEVEL) AND CM009-ST-1109 (UPPER LEVEL)



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

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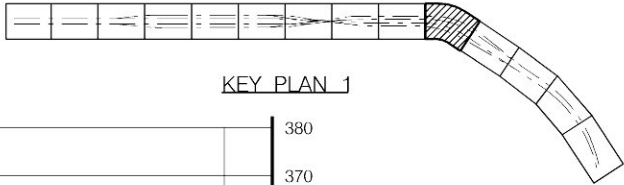
MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK WB3WB1  
SHEET 9

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2109  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
76 OF 276

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\$REF 63  
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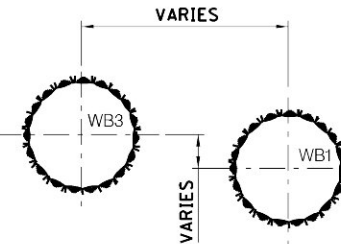
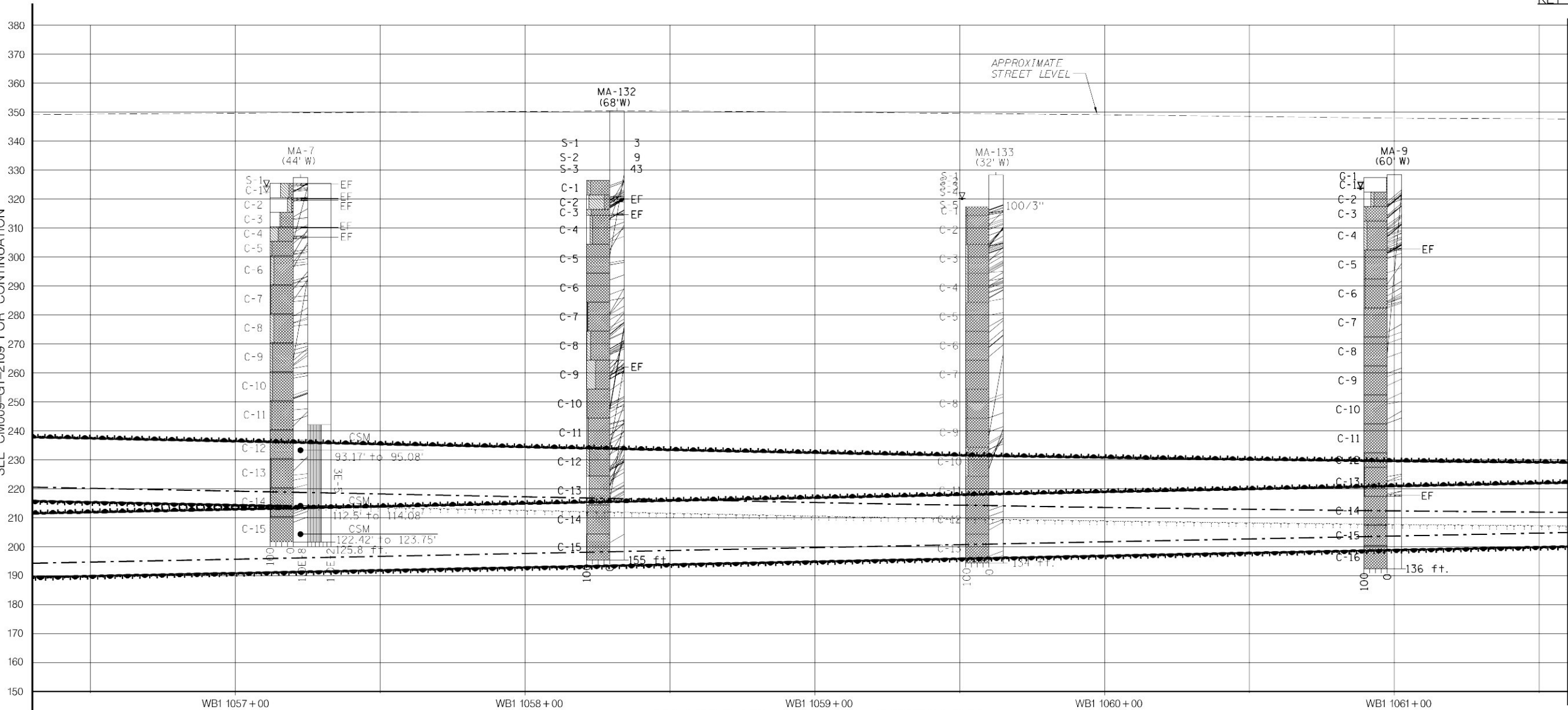
KEY PLAN 1

MATCH LINE TRACK WB1 STA 1056+30  
SEE CM009-GT-2109 FOR CONTINUATION

NOTES:

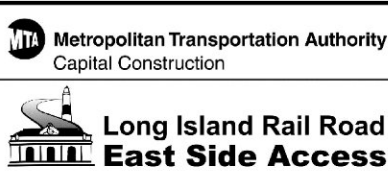
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
2. SEE ALSO STRUCTURAL GENERAL PLANS CM009-ST-1010 (LOWER LEVEL) AND CM009-ST-1110 (UPPER LEVEL).

MATCH LINE TRACK WB1 STA 1061+60  
SEE CM009-GT-2111 FOR CONTINUATION



TYPICAL TUNNEL CONFIGURATION

ROCK MASS DESCRIPTION	UNWEATHERED SCHIST GNEISS AND MAJOR PEGMATITE, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS
SUPPORT CLASS	SC I TBM
OTHER MEASURES	
SUPPORT CLASS	SC I TBM
OTHER MEASURES	



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MANHATTAN TUNNELS EXCAVATION

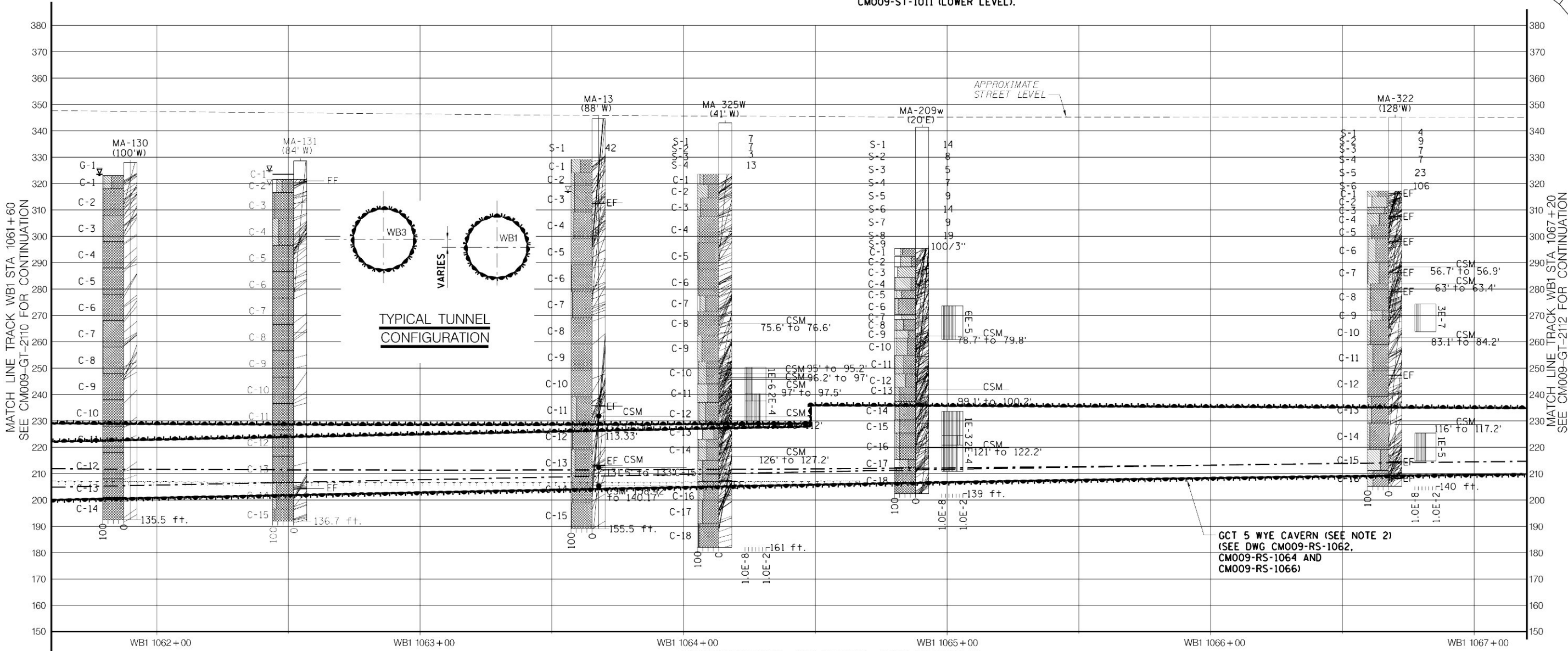
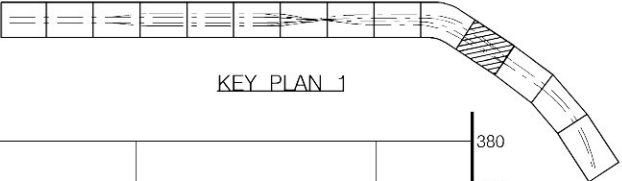
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK WB3WB1  
SHEET 10

SCALE AS NOTED
DRAWING NUMBER CM009-GT-2110
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 77 OF 276



- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. FOR EXACT LOCATION OF CAVERN STRUCTURES SEE CM009-GP-0119. SEE STRUCTURAL GENERAL PLAN CM009-ST-1011 (LOWER LEVEL).



ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED HEALED BRECCIATED SCHIST AND PEGMATITE, VERY CLOSELY SPACED JOINTS, WITH STEEPLY DIPPING OPEN JOINTS (DEFINED AS SHEAR ZONE IN GBR)	
-----------------------	--	--

SUPPORT CLASS RANGES UPPER TBM TUNNEL	
SUPPORT CLASS	WB3 1063+25 WB3 1064+33.90
OTHER MEASURES	SC I TBM SC III TBM PILLAR REINF SEE CM009-PS-1104 PRE-EXCAVATION GROUTING AS REQUIRED

SUPPORT CLASS RANGES LOWER TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)		SUPPORT CLASS RANGES TBM TUNNEL (SEE NOTE 5, 8, AND 9, ON DWG. CM009-GT-2000)	
SUPPORT CLASS	WB1 1063+00 WB1 1064+08.69 WB1 1064+48.64	WB1 1066+00	
OTHER MEASURES	SC I TBM SC III TBM STARTER TUNNEL TYPE II SC III TBM SC II E TBM PRE-EXCAVATION GROUTING AS REQUIRED		



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DATE:	REVISIONS	No.

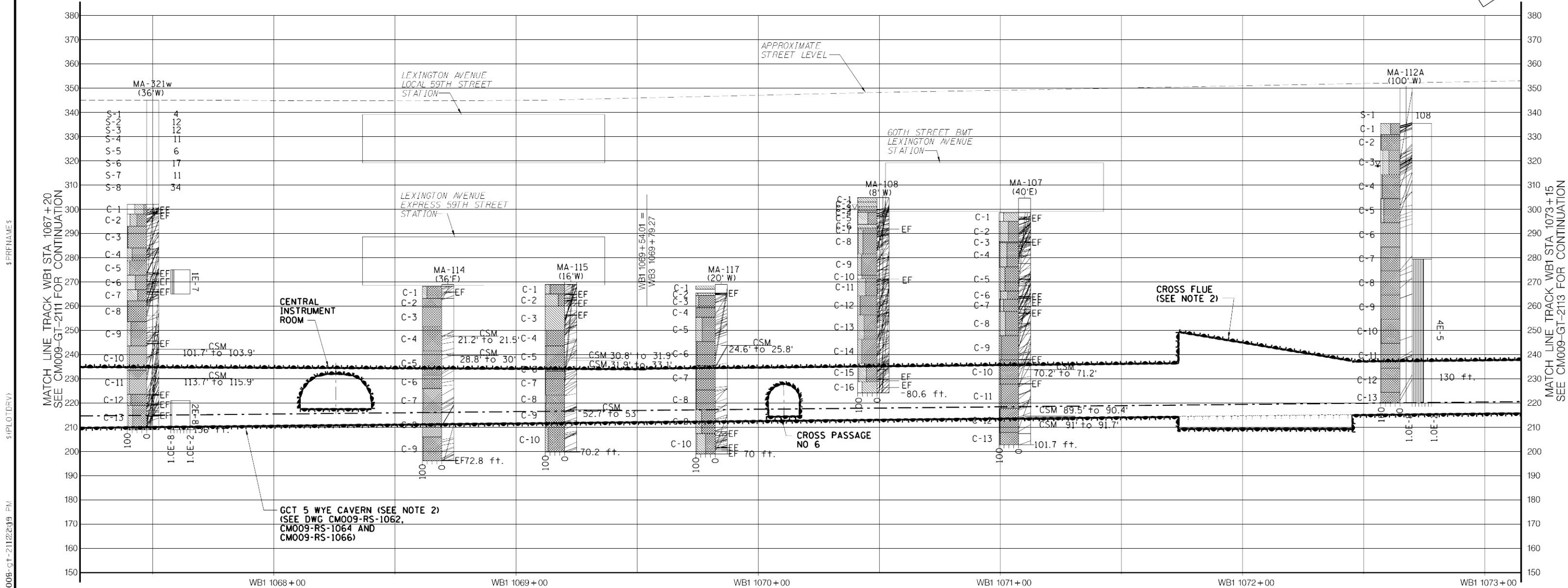
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MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK WB3WB1  
SHEET 11

SCALE: AS NOTED	CONTRACT No. CM009
DRAWING NUMBER: CM009-GT-2111	ISSUE
DATE: 5-26-06	SHEET No. 78 OF 276
REVISION NUMBER: 0	

- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. FOR EXACT LOCATION OF CAVERN STRUCTURES SEE CM009-GP-0119. SEE ALSO STRUCTURAL GENERAL PLAN CM009-ST-1012.

KEY PLAN 1



ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED, ALTERED SCHIST, GNEISS, GRANOFELS AND PEGMATITE. THIN TO THICK DECOMPOSED AMPHIBOLITE WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED AND STEEPLY DIPPING OPEN JOINTS
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SUPPORT CLASS RANGES TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

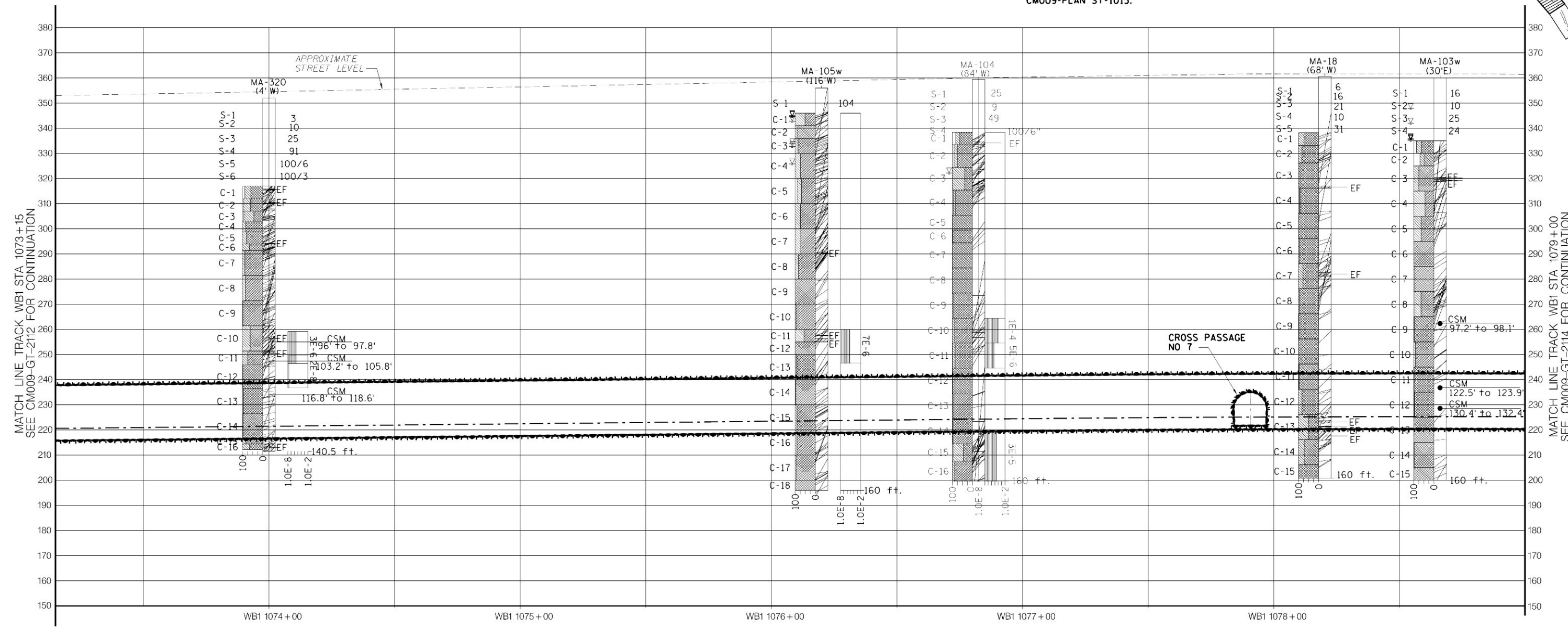
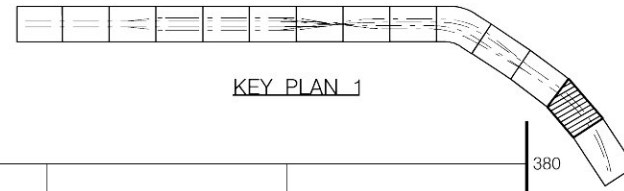
SUPPORT CLASS	SC II E TBM	WB1 1069 + 63.67	SC II TBM	WB1 1071 + 74	SC II E TBM	WB1 1072 + 45	SC II TBM
OTHER MEASURES							



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\$PLOTDIR\$

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\$FILE\$  
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conformed set (may 2006) [code] [date] [time] PM

- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. SEE ALSO STRUCTURAL GENERAL CM009-PLAN ST-1013.

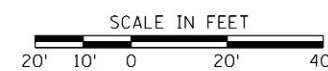


ANTICIPATED GROUND CONDITIONS

ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED, ALTERED SCHIST, GNEISS, GRANOFELS AND PEGMATITE. THIN TO THICK DECOMPOSED AMPHIBOLITE WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED AND STEEPLY DIPPING OPEN JOINTS
-----------------------	---

SUPPORT CLASS RANGES TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)

SUPPORT CLASS	SC II TBM	WB1 1077+00	SC I TBM
OTHER MEASURES			



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D. VASQUEZ  
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M. DELLA POSTA  
APPROVED BY:  
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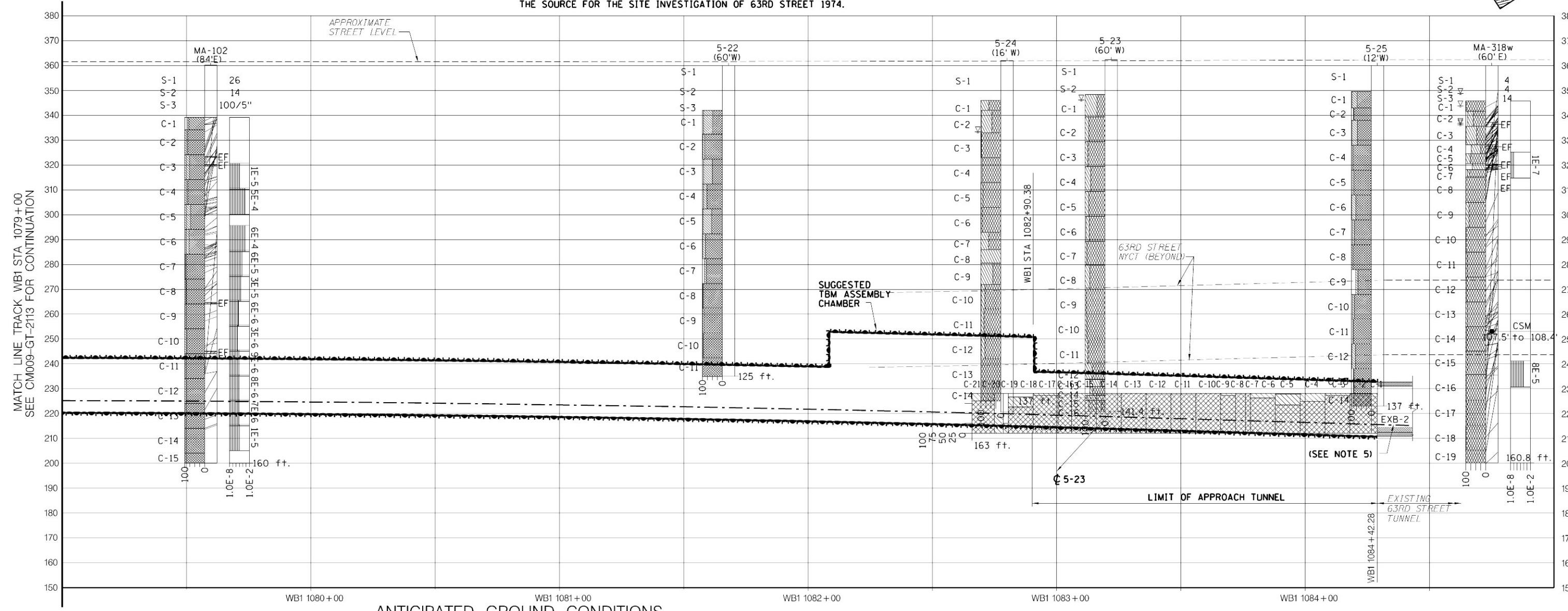
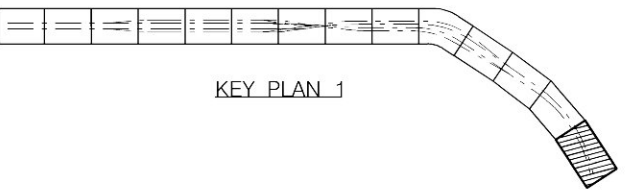
MANHATTAN TUNNELS EXCAVATION  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK WB1  
SHEET 13

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2113  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
80 OF 276



- NOTES:
1. FOR NOTES AND LEGEND, SEE DWG CM009-GT-2000.
  2. FOR EXACT LOCATION OF SUGGESTED TBM ASSEMBLY CHAMBER STRUCTURE SEE STRUCTURAL GENERAL PLAN CM009-ST-1014.
  3. FOR SUPPORT AND EXCAVATION SEQUENCE SEE DWG CM009-RS-1032.
  4. BORE HOLE NUMBER 5-22, 5-23, 5-24 AND 5-25 WAS TAKEN FROM THE SOURCE FOR THE SITE INVESTIGATION OF 63RD STREET 1974.
  5. FOR INFORMATION ON BOREHOLE NO EXB-2 SEE REFERENCE DOCUMENT OF ESA CONTRACT CM016, "GEOTECHNICAL INFORMATION FOR RECORD."



ROCK MASS DESCRIPTION	SLIGHTLY WEATHERED, ALTERED SCHIST, GNEISS AND GRANOFELS WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS		UNWEATHERED SCHIST AND GNEISS, MINOR GRANOFELS AND PEGMATITE, WITH GARNET, CLOSELY TO WIDELY SPACED JOINTS WITH CLUSTERS OF VERY CLOSELY SPACED JOINTS, HIGHLY FRACTURE ZONE UP TO 10 FEET THICK	
SUPPORT CLASS RANGES TBM TUNNEL (SEE NOTE 5, 8, AND 9 ON DWG. CM009-GT-2000)				
SUPPORT CLASS	SC I TBM		SUGGESTED STARTER TUNNEL TYPE II	SUGGESTED TBM ASSEMBLY CHAMBER SEE NOTE 2, 3
OTHER MEASURES			PILLAR REINFORCEMENT SEE CM009-RS-1104	
SUPPORT CLASS RANGES APPROACH TUNNEL				
SUPPORT CLASS IN APPROACH TUNNEL			SC I-B	SC I-A
OTHER MEASURES			LINE DRILLING AS REQUIRED	EXTENT OF LINE DRILLING

20'10'020'

SCALE IN FEET

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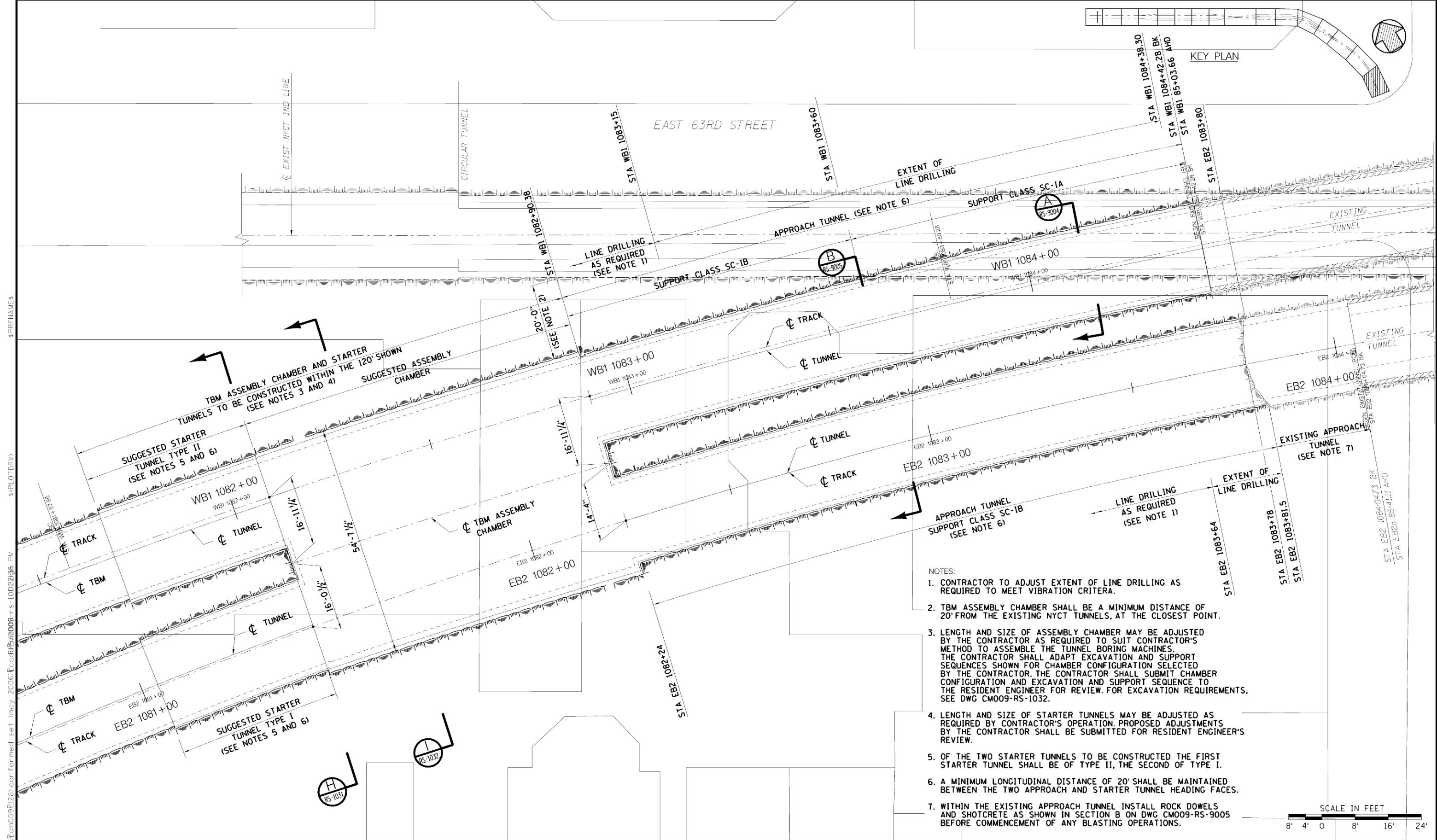
DESIGNED BY: C. STEWART  
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CHECKED BY: V. GALL  
COORDINATED BY: M. DELLA POSTA  
APPROVED BY: J. SCHABIB

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**MANHATTAN TUNNELS EXCAVATION**  
GEOTECHNICAL PROFILE/SUPPORT CLASS RANGES  
TRACK WB1  
SHEET 14

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GT-2114  
DATE: 5-26-06  
REVISION NUMBER: 0

CONTRACT No.  
**CM009**  
ISSUE  
SHEET No.  
**81** OF 276



- NOTES:
1. CONTRACTOR TO ADJUST EXTENT OF LINE DRILLING AS REQUIRED TO MEET VIBRATION CRITERIA.
  2. TBM ASSEMBLY CHAMBER SHALL BE A MINIMUM DISTANCE OF 20' FROM THE EXISTING NYCT TUNNELS, AT THE CLOSEST POINT.
  3. LENGTH AND SIZE OF ASSEMBLY CHAMBER MAY BE ADJUSTED BY THE CONTRACTOR AS REQUIRED TO SUIT CONTRACTOR'S METHOD TO ASSEMBLE THE TUNNEL BORING MACHINES. THE CONTRACTOR SHALL ADAPT EXCAVATION AND SUPPORT SEQUENCES SHOWN FOR CHAMBER CONFIGURATION SELECTED BY THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT CHAMBER CONFIGURATION AND EXCAVATION AND SUPPORT SEQUENCE TO THE RESIDENT ENGINEER FOR REVIEW. FOR EXCAVATION REQUIREMENTS, SEE DWG CM009-RS-1032.
  4. LENGTH AND SIZE OF STARTER TUNNELS MAY BE ADJUSTED AS REQUIRED BY CONTRACTOR'S OPERATION. PROPOSED ADJUSTMENTS BY THE CONTRACTOR SHALL BE SUBMITTED FOR RESIDENT ENGINEER'S REVIEW.
  5. OF THE TWO STARTER TUNNELS TO BE CONSTRUCTED THE FIRST STARTER TUNNEL SHALL BE OF TYPE II, THE SECOND OF TYPE I.
  6. A MINIMUM LONGITUDINAL DISTANCE OF 20' SHALL BE MAINTAINED BETWEEN THE TWO APPROACH AND STARTER TUNNEL HEADING FACES.
  7. WITHIN THE EXISTING APPROACH TUNNEL INSTALL ROCK DOWELS AND SHOTCRETE AS SHOWN IN SECTION B ON DWG CM009-RS-9005 BEFORE COMMENCEMENT OF ANY BLASTING OPERATIONS.



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DRAWN BY:  
D. VASQUEZ  
CHECKED BY:  
V. GALL  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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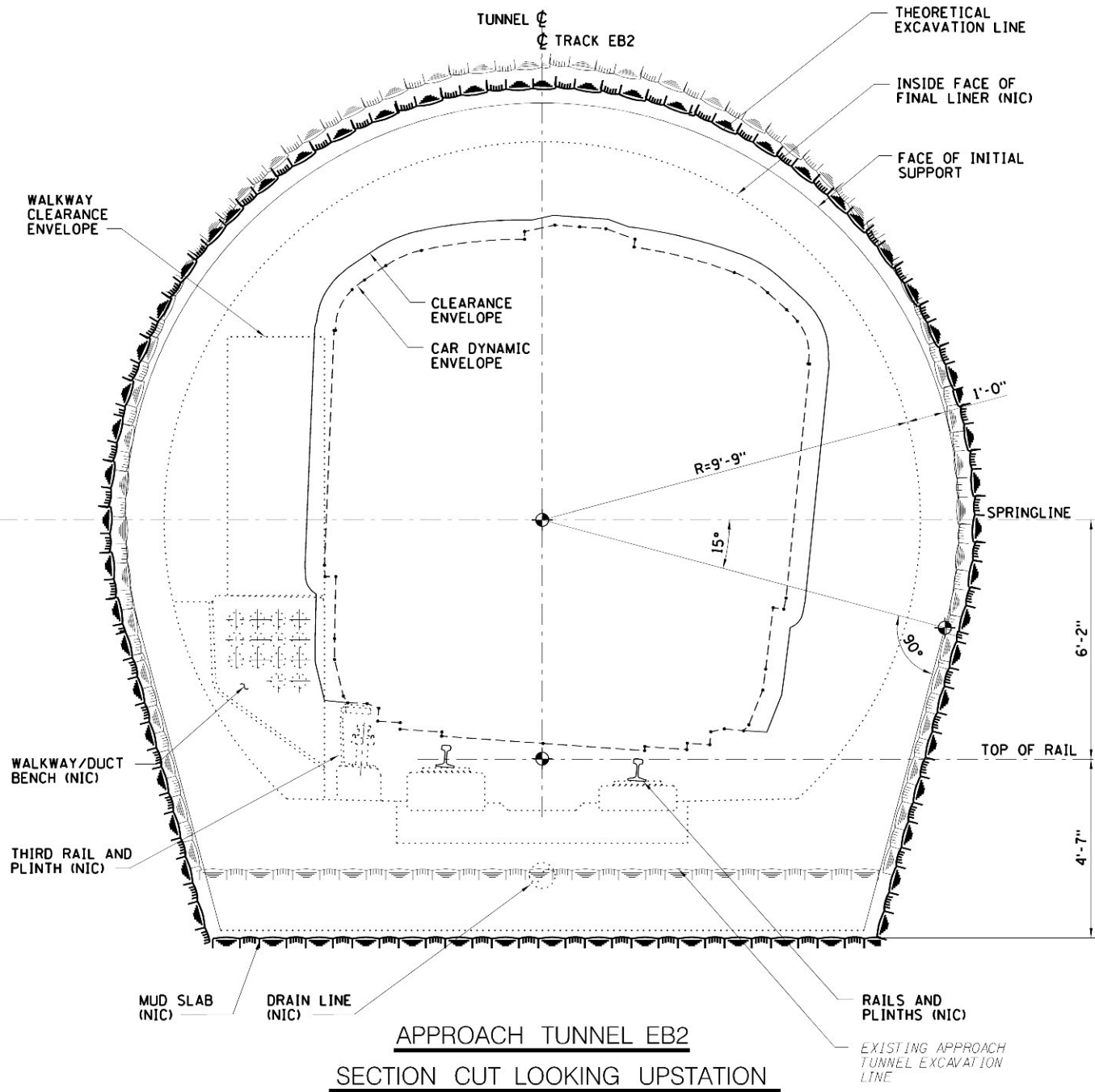
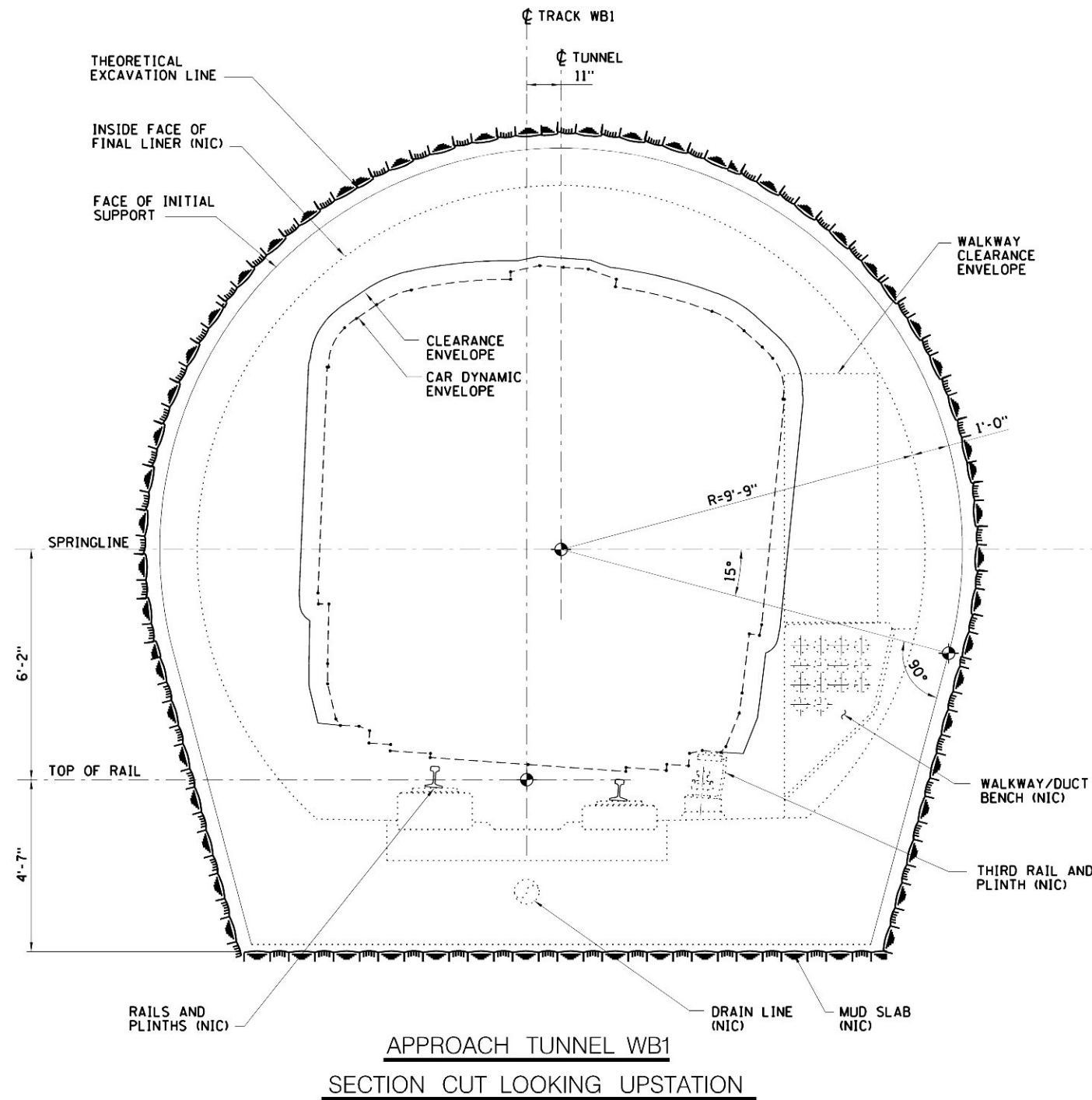
DATE: \_\_\_\_\_

**MANHATTAN TUNNELS EXCAVATION**

INITIAL SUPPORT - APPROACH TUNNELS AND  
SUGGESTED TBM ASSEMBLY CHAMBER - PLAN

SCALE AS NOTED	CONTRACT No. CM009
DRAWING NUMBER CM009-RS-1001	ISSUE
DATE 5-26-06	SHEET No. 82 OF 276
REVISION NUMBER: 0	

NOTES:  
1. SETTING OUT IS SYMMETRIC ABOUT  $\phi$  OF TUNNEL.



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MANHATTAN TUNNELS EXCAVATION  
GENERAL ARRANGEMENT  
APPROACH TUNNELS

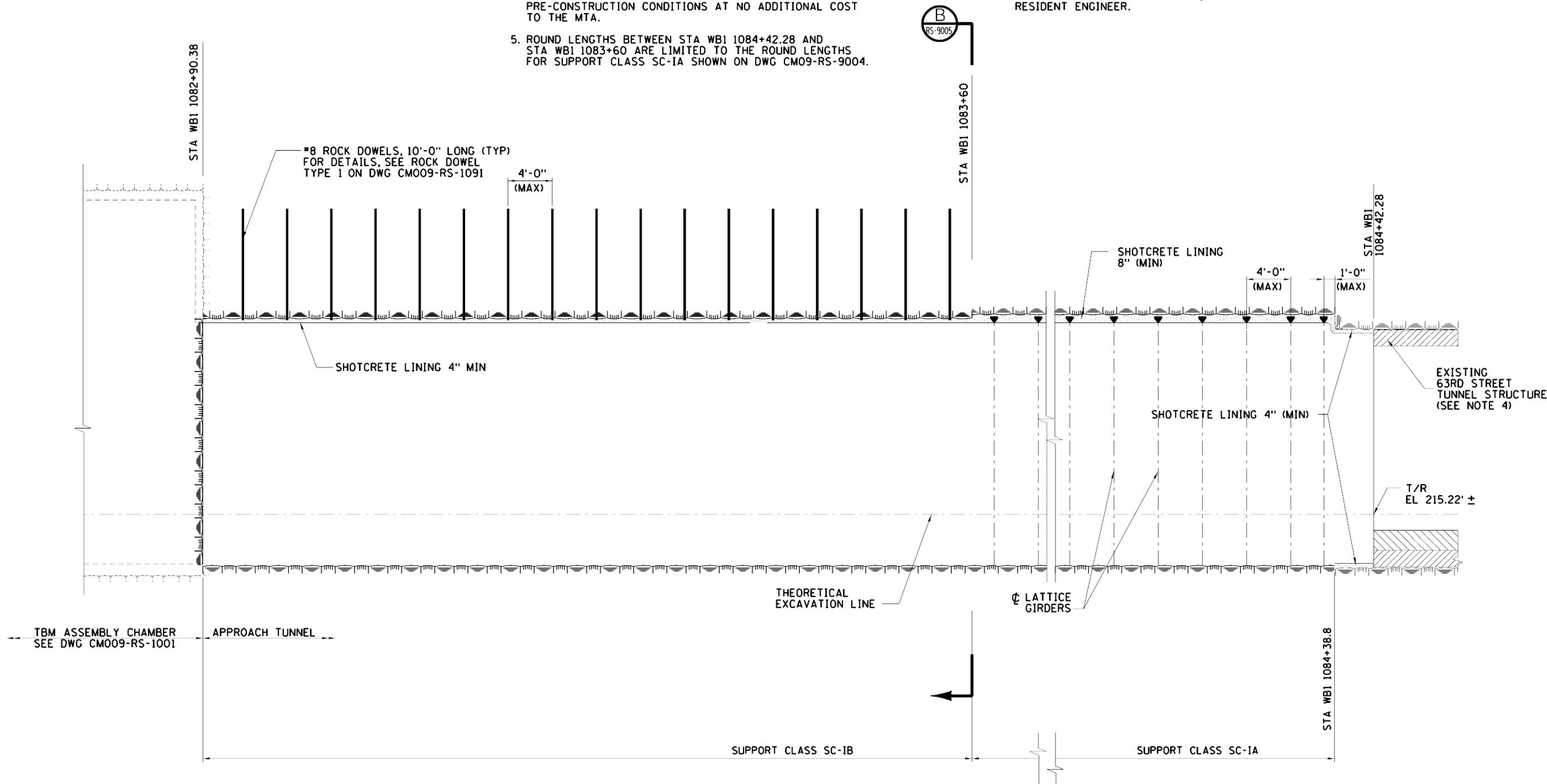
SCALE AS NOTED
DRAWING NUMBER CM009-GP-0102
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 83 OF 276



- NOTES:
1. FOR EXCAVATION SEQUENCE AND SUPPORT, SEE DWGS CM009-RS-9004 AND CM009-RS-9005.
  2. EXTENT OF LINE DRILLING NOT SHOWN.
  3. PROCEDURES FOR "BREAK-OUT" FROM EXISTING TUNNELS TO BE AS SUBMITTED BY THE CONTRACTOR, SUBJECT TO REVIEW BY THE RESIDENT ENGINEER.
  4. EXISTING TUNNELS ARE LINED WITH CAST-IN PLACE CONCRETE, 1'-6" THICK, TYPICAL, AND STEEL SETS. LOCATION OF STEEL SETS NOT KNOWN. ANY DAMAGE OF THE EXISTING LINING THAT MAY OCCUR DURING CONSTRUCTION SHALL BE REPAIRED AND TUNNELS RESTORED TO PRE-CONSTRUCTION CONDITIONS AT NO ADDITIONAL COST TO THE MTA.
  5. ROUND LENGTHS BETWEEN STA WB1 1084+42.28 AND STA WB1 1083+60 ARE LIMITED TO THE ROUND LENGTHS FOR SUPPORT CLASS SC-1A SHOWN ON DWG CM09-RS-9004.

6. ROUND LENGTHS BETWEEN STA WB1 1083+60 AND STA WB1 1082+90.38 SHALL NOT EXCEED THOSE ROUND LENGTHS FOR SUPPORT CLASS SC-1B SHOWN ON DWG CM009-RS-9005, UNLESS THE CONTRACTOR DEMONSTRATES THROUGH TEST BLASTS THAT VIBRATION AND DEFORMATION RESPONSE LEVELS AT ADJACENT AND OVERLYING STRUCTURES ARE NOT EXCEEDED, AND THE STABILITY OF THE EXCAVATED TUNNEL IS MAINTAINED, SUBJECT TO REVIEW BY THE RESIDENT ENGINEER.
7. ROCK DOWEL SPACING FOR INITIAL ROCK SUPPORT CLASS SC-1B SHALL BE AS SHOWN, INDEPENDENT OF THE ROUND LENGTH. ADDITIONAL INITIAL SUPPORT SHALL BE INSTALLED AS REQUIRED BY ACTUAL GROUND CONDITIONS, OR AS DIRECTED BY THE RESIDENT ENGINEER.



LONGITUDINAL SECTION



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		COORDINATED BY: M. DELLA POSTA
		APPROVED BY: J. SCHABIB
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MANHATTAN TUNNELS EXCAVATION

INITIAL ROCK SUPPORT  
APPROACH TUNNEL WB1  
LONGITUDINAL SECTION

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-RS-9002  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
84 OF 276

- NOTES:
1. FOR EXCAVATION SEQUENCE AND SUPPORT, SEE DWGS CM009-RS-9004 AND CM009-RS-9005.

2. EXTENT OF LINE DRILLING NOT SHOWN. ADJUST EXTENT OF LINE DRILLING TO MEET VIBRATION CRITERIA.

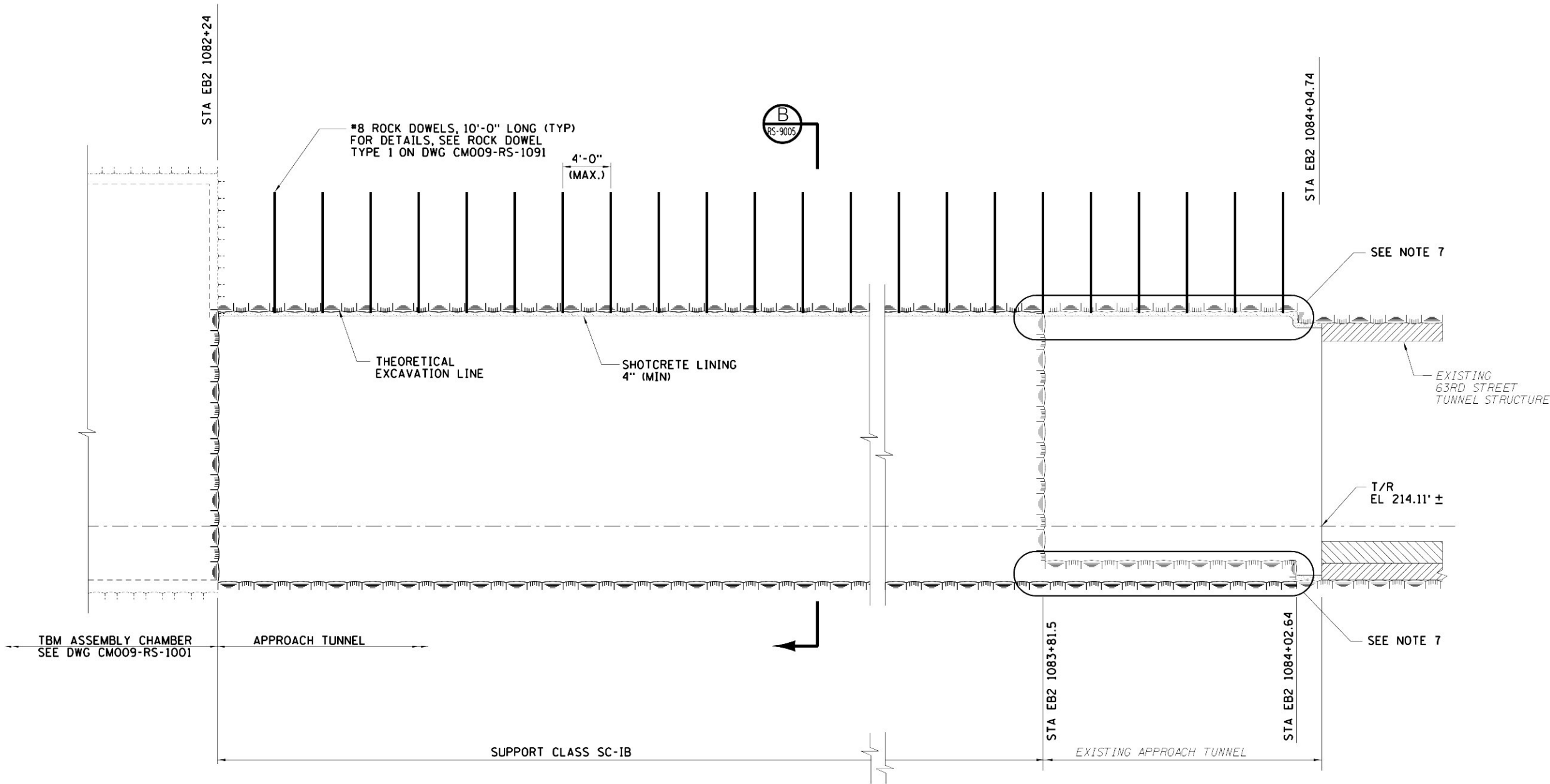
3. EXISTING TUNNELS ARE LINED WITH CAST-IN PLACE CONCRETE, 1'-6" THICK, TYPICAL, AND STEEL SETS. LOCATION OF STEEL SETS NOT KNOWN. ANY DAMAGE OF THE EXISTING LINING THAT MAY OCCUR DURING CONSTRUCTION SHALL BE REPAIRED AND TUNNELS RESTORED TO PRE-CONSTRUCTION CONDITIONS AT NO ADDITIONAL COST TO THE MTA.

4. ROUND LENGTHS BETWEEN STA EB2 1083+81.5 AND STA EB2 1083+64 ARE LIMITED TO THE ROUND LENGTHS FOR SUPPORT CLASS SC-1A SHOWN ON DWG CM009-RS-9004.

5. ROUND LENGTHS BETWEEN STA EB2 1083+64 AND STA EB2 1082+24 SHALL NOT EXCEED THOSE ROUND LENGTHS FOR SUPPORT CLASS SC-1B SHOWN ON DWG CM009-RS-9005, UNLESS THE CONTRACTOR DEMONSTRATES THROUGH TEST BLASTS, THAT VIBRATION AND DEFORMATION RESPONSE LEVELS AT ADJACENT AND OVERLYING STRUCTURES ARE NOT EXCEEDED. THE STABILITY OF THE EXCAVATED TUNNEL IS MAINTAINED AND IS CONSISTENT WITH THE INITIAL SUPPORT REQUIREMENTS, SUBJECT TO REVIEW BY THE RESIDENT ENGINEER.

6. ROCK DOWEL SPACING FOR INITIAL ROCK SUPPORT CLASS SC-1B SHALL BE AS SHOWN, INDEPENDENT OF THE ROUND LENGTH. ADDITIONAL INITIAL SUPPORT SHALL BE INSTALLED AS REQUIRED BY ACTUAL GROUND CONDITIONS, OR AS DIRECTED BY THE RESIDENT ENGINEER.

7. ENLARGE EXISTING APPROACH TUNNEL TO THE THEORETICAL EXCAVATION LINE AND INSTALL ROCK DOWELS AS SHOWN ON SECTION B, SEE DWG CM009-RS-9005.



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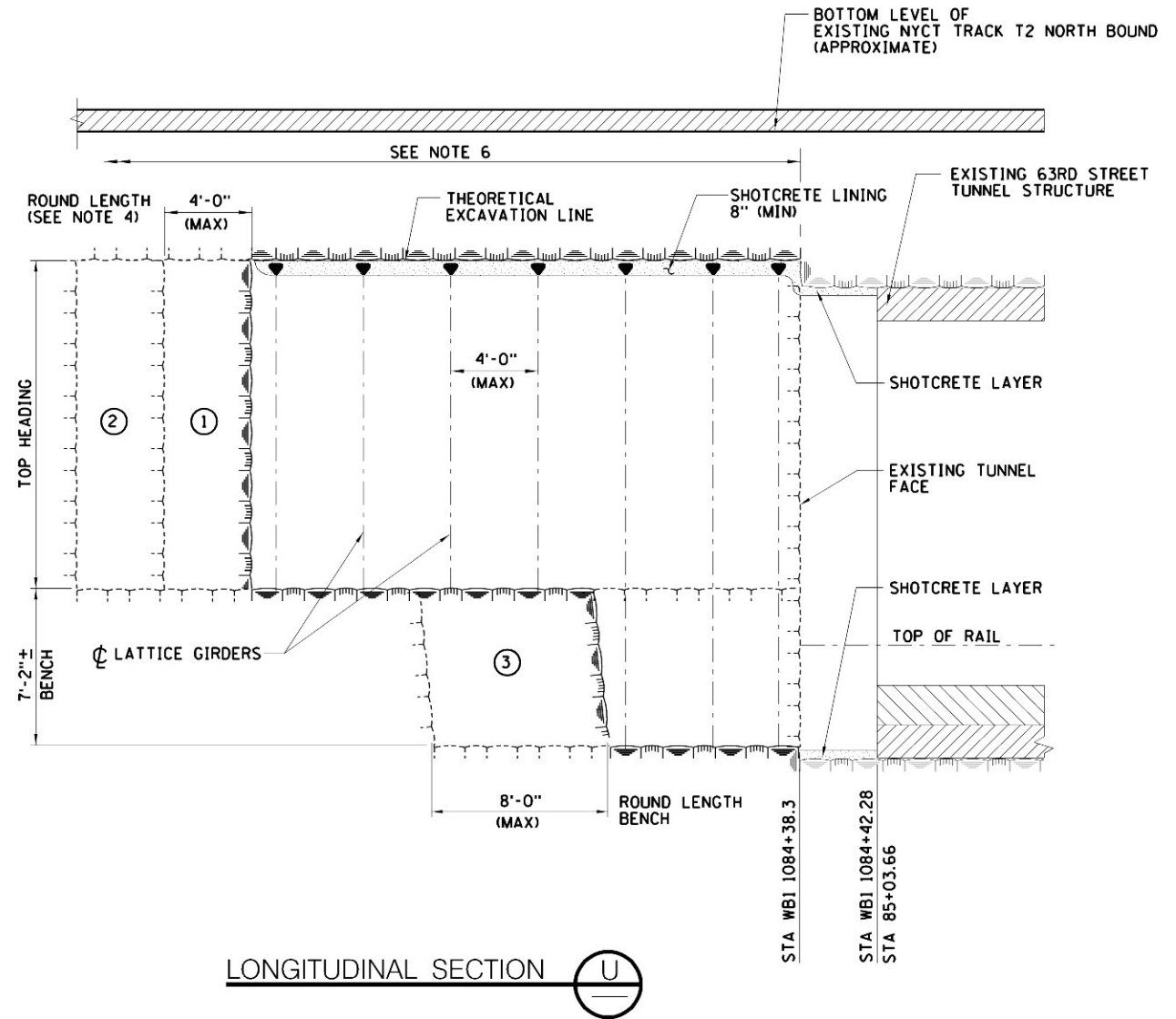
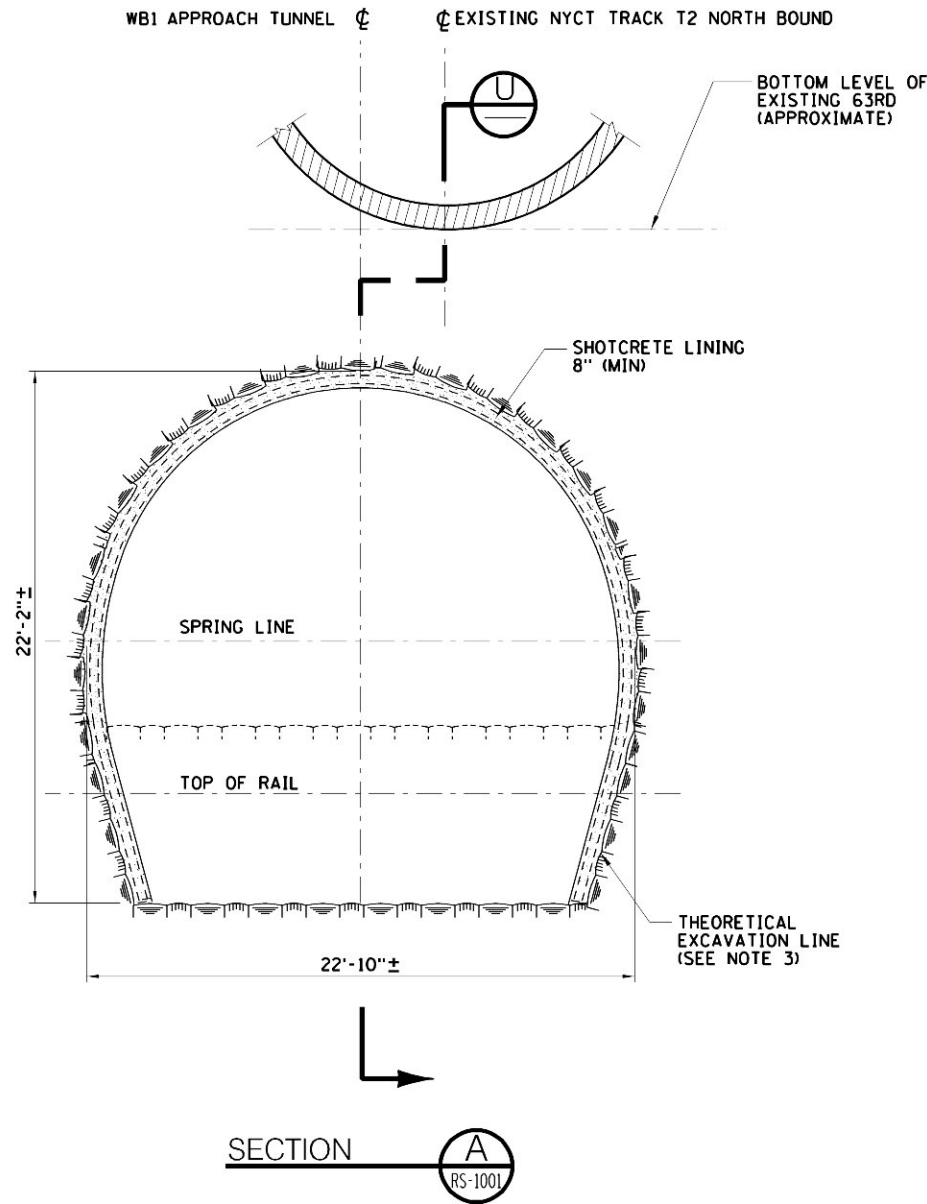
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		APPROVED BY: J. SCHABIB	
DATE:	REVISIONS	No.	DATE:

MANHATTAN TUNNELS EXCAVATION

INITIAL SUPPORT  
APPROACH TUNNEL EB2  
LONGITUDINAL SECTION

SCALE AS NOTED	CONTRACT No. CM009
DRAWING NUMBER CM009-RS-9003	ISSUE
DATE: 5-26-06	SHEET No.
REVISION NUMBER: 0	85 OF 276



NOTES:

- EXCAVATION SEQUENCE SHOWN IS SUGGESTED ONLY.
- SUBJECT TO PRIOR REVIEW BY THE RESIDENT ENGINEER, THE CONTRACTOR MAY EXCAVATE THE TUNNELS USING FULL-FACE EXCAVATION METHODS, PROVIDED THAT VIBRATION AND DEFORMATION RESPONSE LEVELS AT ADJACENT AND OVERLYING STRUCTURES ARE NOT EXCEEDED, AND THE STABILITY OF THE EXCAVATED TUNNEL IS MAINTAINED AND IS CONSISTENT WITH INITIAL SUPPORT REQUIREMENTS.
- FOR TUNNEL GEOMETRY, SEE DWG CM009-GP-0102.
- FOR ADDITIONAL NOTES ON ROUND LENGTH, INITIAL SUPPORT AND SHOTCRETE LINING REQUIREMENTS, SEE DWG CM009-RS-9002.
- FOR SHOTCRETE LINING DETAILS, SHOTCRETE SMOOTHNESS CRITERIA, AND LATTICE GIRDER DETAILS, SEE DWGS CM009-RS-1100, CM009-RS-1101, AND CM009-RS-1102.
- THE MAXIMUM RADIAL DISTANCE BETWEEN THE ACTUAL EXCAVATION LINE AND THE THEORETICAL EXCAVATION LINE SHALL NOT EXCEED 6" WITHIN THE TOP 120 DEGREES OF THE WB1 TUNNEL PERIMETER FROM STA. WB1 1084+38.3 TO STA. WB1 1083+60 (SUPPORT CLASS 1-A AREA).

SUGGESTED EXCAVATION SEQUENCE:

- ROUNDS 1 & 2. EXCAVATE AND SUPPORT TOP HEADING.
- ROUND 3 EXCAVATE AND SUPPORT BENCH

TOP HEADING:

- STEP 1 - EXCAVATE TOP HEADING ROUND ①
- STEP 2 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 3 - INSTALL WWF
- STEP 4 - INSTALL LATTICE GIRDER
- STEP 5 - SHOTCRETE TO 8" (MIN) WITH INSTALLATION OF 2ND WWF LAYER
- STEP 6 - REPEAT STEPS 1-5 FOR ROUND ②

BENCH:

- STEP 1 - EXCAVATE BENCH ROUND ③
- STEP 2 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 3 - INSTALL WWF
- STEP 4 - INSTALL LATTICE GIRDER
- STEP 5 - SHOTCRETE TO 8" (MIN) WITH INSTALLATION OF 2ND WWF LAYER
- STEP 6 - REPEAT STEPS 1-5 FOR NEXT ROUND



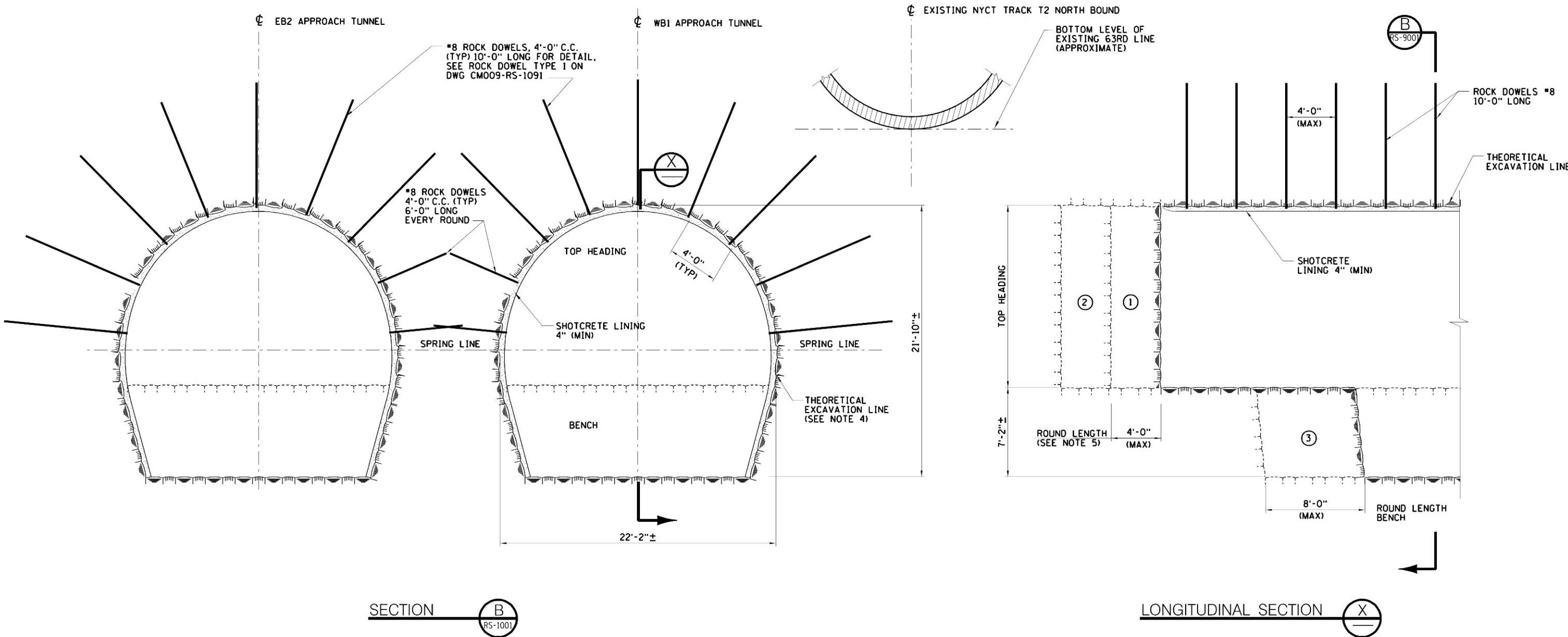


- NOTES:
- EXCAVATION SEQUENCE SHOWN IS SUGGESTED ONLY.
  - SUBJECT TO PRIOR REVIEW BY THE RESIDENT ENGINEER, THE CONTRACTOR MAY EXCAVATE THE TUNNELS USING FULL-FACE EXCAVATION METHODS, PROVIDED THAT VIBRATION AND DEFORMATION RESPONSE LEVELS AT ADJACENT AND OVERLYING STRUCTURES ARE NOT EXCEEDED, AND THE STABILITY OF THE EXCAVATED TUNNEL IS MAINTAINED AND IS CONSISTENT WITH INITIAL SUPPORT REQUIREMENTS.
  - LENGTH OF ROCK DOWELS IN THE PILLAR BETWEEN THE TWO TUNNELS SHALL BE A MINIMUM OF 6', AS SHOWN.
  - FOR TUNNEL GEOMETRY, SEE DWG CM009-GP-0102.
  - FOR ADDITIONAL NOTES ON ROUND LENGTH, INITIAL SUPPORT AND SHOTCRETE LINING REQUIREMENTS, SEE DRAWING NUMBER CM009-RS-9003.
  - FOR SHOTCRETE LINING DETAILS AND SHOTCRETE SMOOTHNESS CRITERIA SEE DWGS CM009-RS-1100 AND CM009-RS-1102.

- SUGGESTED EXCAVATION SEQUENCE:
- ROUND ① & ② - EXCAVATE AND SUPPORT TOP HEADING.
- ROUND ③ - EXCAVATE AND SUPPORT BENCH.

- TOP HEADING:
- STEP 1 - EXCAVATE TOP HEADING ROUND ①
- STEP 2 - INSTALL ROCK DOWELS
- STEP 3 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 4 - INSTALL WWF
- STEP 5 - INSTALL SHOTCRETE TO 4" (MIN)
- STEP 6 - REPEAT STEPS 1-5 FOR ROUND ②

- BENCH:
- STEP 1 - EXCAVATE BENCH ROUND ③
- STEP 2 - SHOTCRETE 1ST LAYER 2" (MIN)
- STEP 3 - INSTALL WWF
- STEP 4 - SHOTCRETE TO 4" (MIN)



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				DRAWN BY: D. VASQUEZ				DRAWING NUMBER CM009-RS-9005	DATE: 5-26-06
 Long Island Rail Road East Side Access				CHECKED BY: F. BUDAY				REVISION NUMBER: 0	SHEET No. 87 OF 276
				COORDINATED BY: M. DELLA POSTA					
				APPROVED BY: J. SCHABIB					

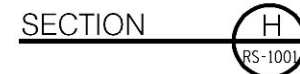
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6. STARTER TUNNELS ARE SYMMETRICAL ABOUT CENTERLINES.



CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
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NOTES:

1. FOR CONTRACTOR'S PROPOSED ALTERNATIVE CHAMBER CONSTRUCTION, SEE NOTE 3 ON DWG CM009-RS-1001.

2. FOR GEOMETRY OF SUGGESTED ASSEMBLY CHAMBER SEE DWG CM009-RS-1031.

3. EXCAVATION SHALL BE BY TOP HEADING AND BENCH OPERATION AS SHOWN. THE CONTRACTOR MAY CHOOSE TO EXCAVATE THE TOP HEADING FOR THE ENTIRE LENGTH OF CHAMBER AND THEN EXCAVATE THE BENCH SUBJECT TO REVIEW BY THE RESIDENT ENGINEER.

4. TBM ASSEMBLY CHAMBER CONSTRUCTION SEQUENCE OF SLASHES I, II, AND III AS WELL AS BENCH IS A SUGGESTED METHOD. THE CONTRACTOR SHALL SUBMIT EXCAVATION SEQUENCE INCLUDING THE DISTANCES BETWEEN ADVANCING SLASHES TO THE RESIDENT ENGINEER FOR REVIEW.
5. THE ROUND LENGTH OF TOP HEADING INDICATED MAY BE INCREASED UP TO A MAXIMUM OF 6'-0" IF ALL BLASTING VIBRATION CRITERIA ARE MET.

6. THE ROUND LENGTH IN THE BENCH INDICATED MAY BE INCREASED UP TO A MAXIMUM OF 12'-0" IF ALL BLASTING VIBRATION CRITERIA ARE MET.

7. MAXIMUM SPACING OF ROCK BOLTS IN LONGITUDINAL DIRECTION SHALL BE EQUAL TO ROUND LENGTH IN THE TOP HEADING.

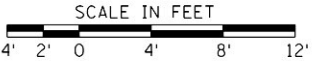
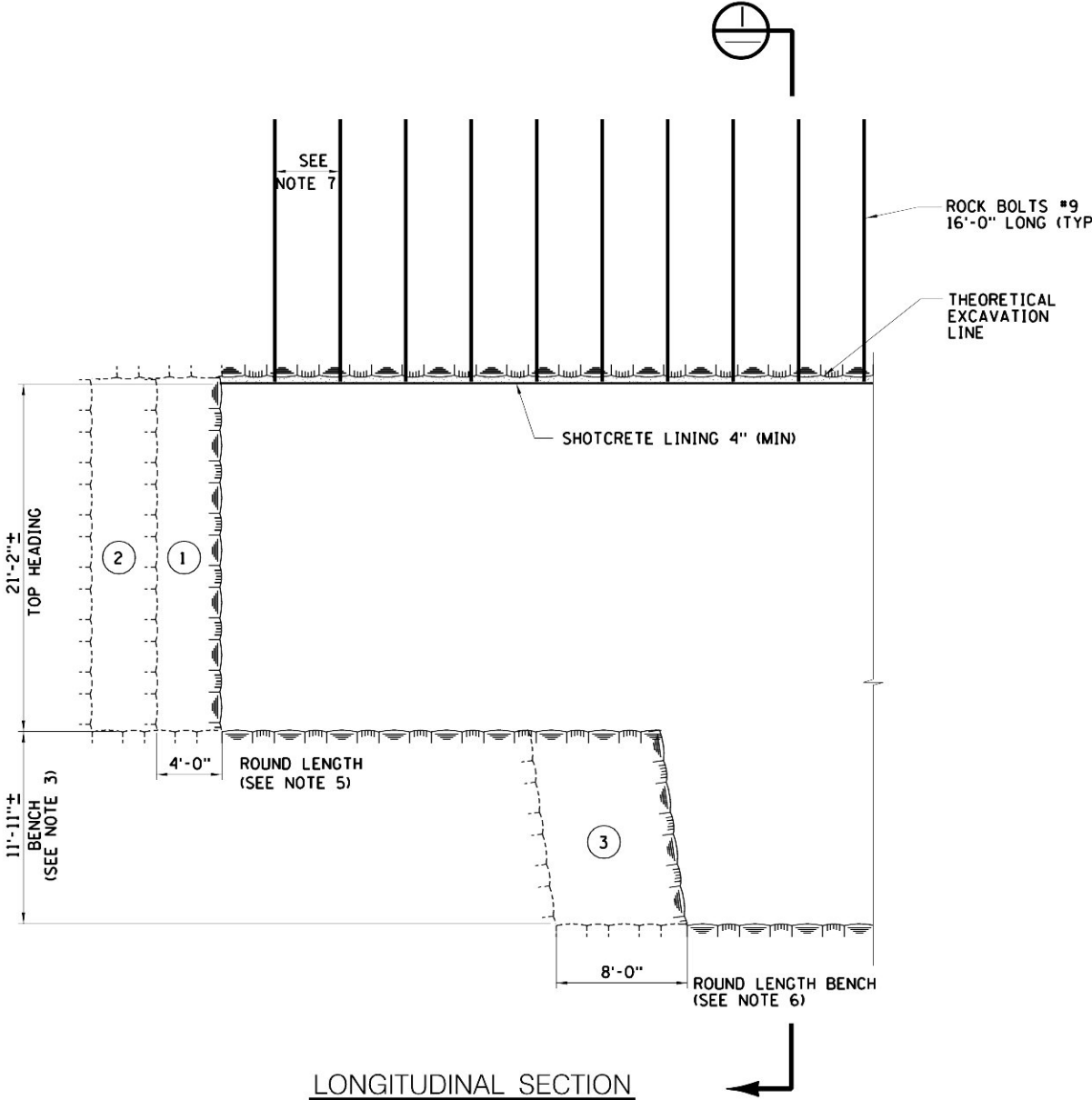
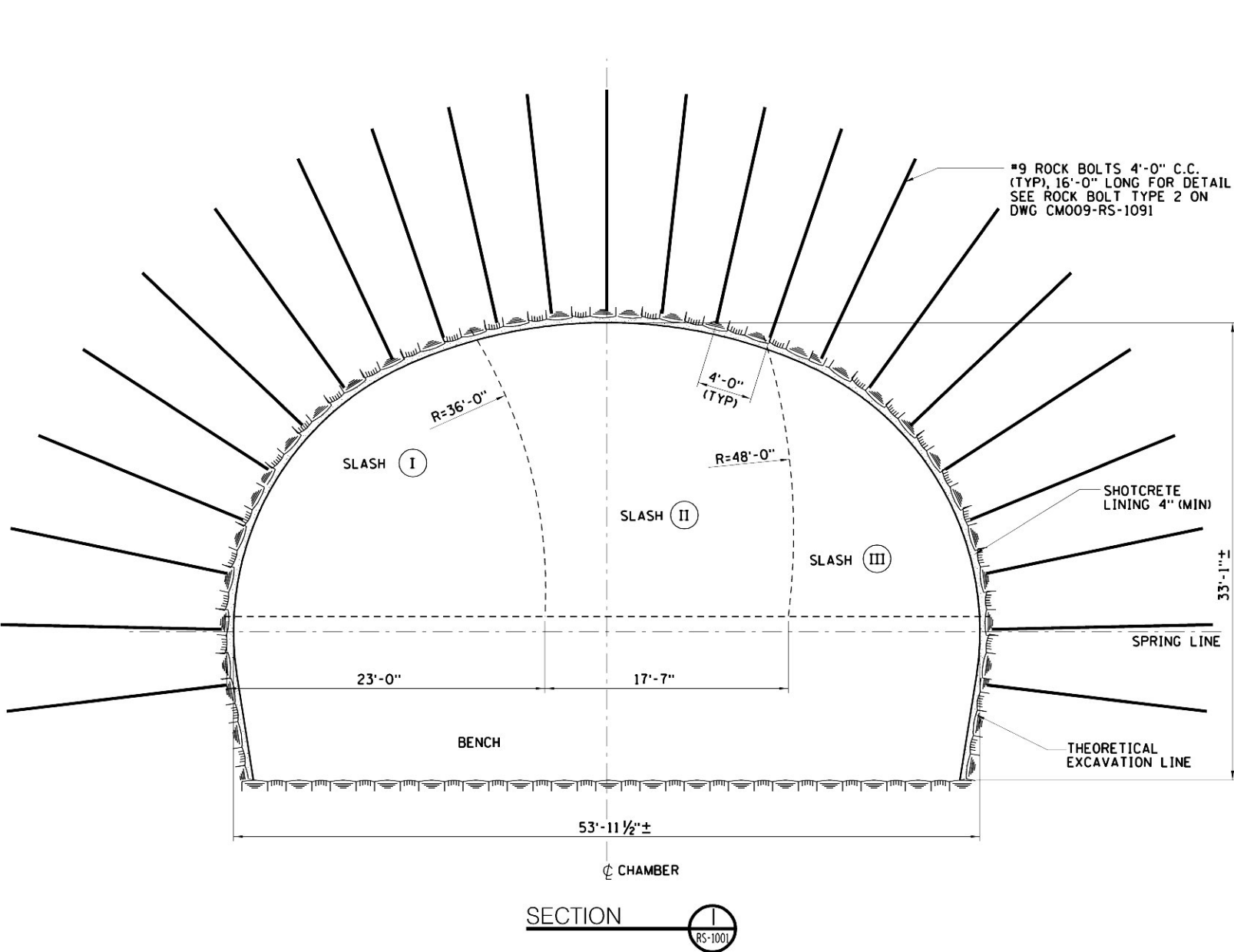
8. FOR SHOTCRETE LINING DETAILS AND SHOTCRETE SMOOTHNESS CRITERIA, SEE DWGS CM009-RS-1100 AND CM009-RD-1102.


EXCAVATION SEQUENCE:


- ROUND ① & ②


EXCAVATION AND SUPPORT OF TOP HEADING IN SLASHES ① ② AND ③ (SEE NOTE 3)
- ROUND ③

EXCAVATION AND SUPPORT OF BENCH (SEE NOTE 3)



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MANHATTAN TUNNELS EXCAVATION

INITIAL SUPPORT AND EXCAVATION SEQUENCE  
SUGGESTED TBM ASSEMBLY CHAMBER

SCALE AS NOTED	CONTRACT No. CM009
DRAWING NUMBER CM009-RS-1032	ISSUE
DATE: 5-26-06	SHEET No. 89 OF 276
REVISION NUMBER: 0	

EXCAVATION SEQUENCE (TYPE I):

ROUND ① - EXCAVATE AND SUPPORT FULL TUNNEL PROFILE EVERY ROUND

- STEP 1 - EXCAVATE ROUND ①
- STEP 2 - INSTALL ROCK DOWELS
- STEP 3 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 4 - INSTALL WWF
- STEP 5 - INSTALL SHOTCTETE TO 4" (MIN)
- STEP 6 - REPEAT STEPS 1-5 FOR NEXT ROUND

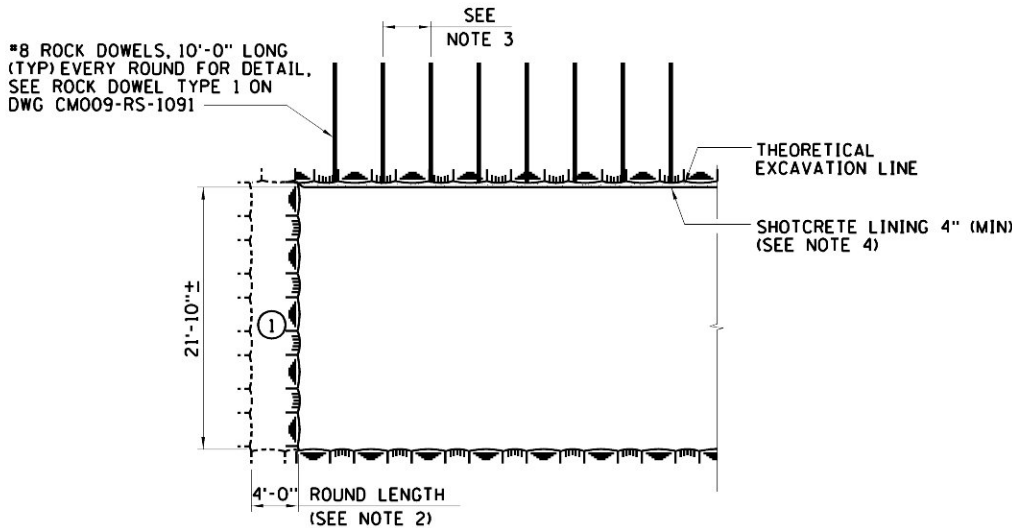
EXCAVATION SEQUENCE (TYPE II):

ROUND ① - EXCAVATE AND SUPPORT FULL TUNNEL PROFILE EVERY ROUND

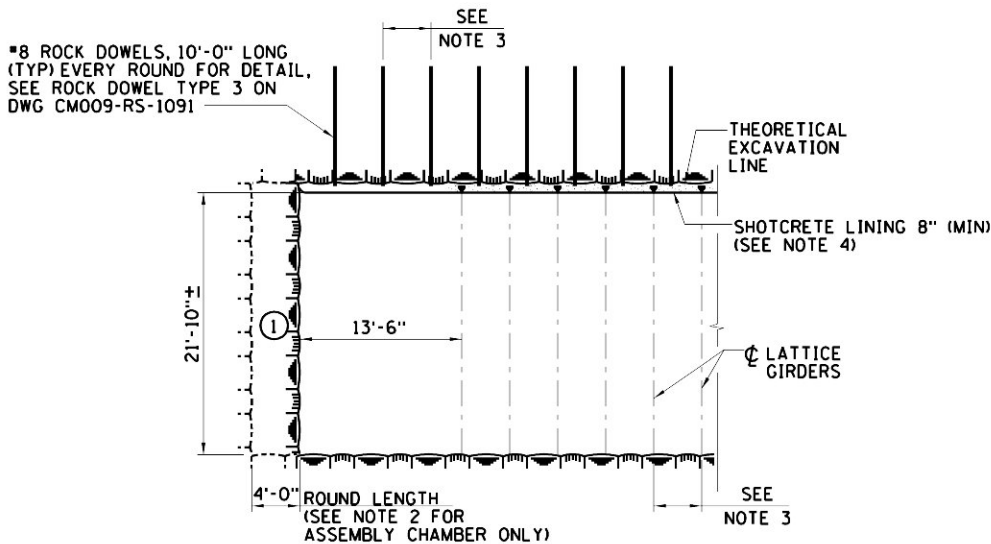
- STEP 1 - EXCAVATE ROUND ① (SEE NOTE 2)
- STEP 2 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 3 - INSTALL ROCK DOWELS
- STEP 4 - REPEAT STEPS 1-3 FOR NEXT ROUND
- COMPLETE LAST 6" (MIN) OF SHOTCRETE LINING AT DISTANCE OF 13'-6" (MAX) FROM FACE AND AS FOLLOWS:
- STEP 5 - INSTALL 1ST LAYER OF WWF
- STEP 6 - INSTALL LATTICE GIRDERS
- STEP 7 - INSTALL SHOTCRETE TO 8" (MIN) IN LAYERS WITH INSTALLATION OF 2ND LAYER OF WWF
- STEP 8 - REPEAT STEPS 5-7 FOR NEXT ROUND

NOTES:

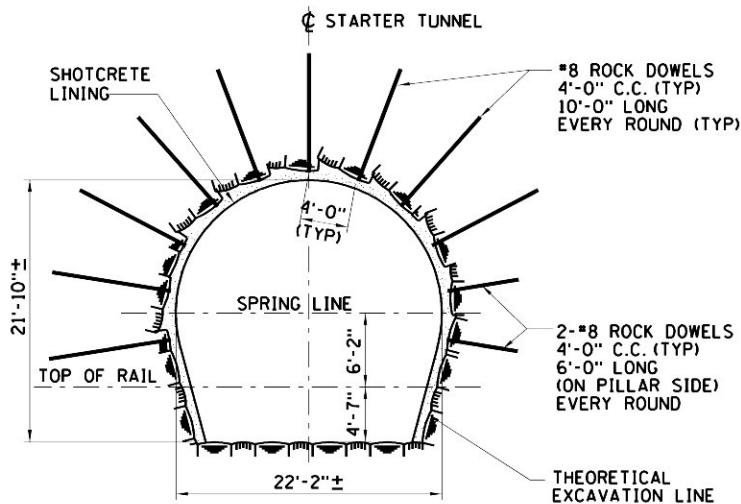
1. LENGTH AND SIZE OF STARTER TUNNELS MAY BE ADJUSTED BY THE CONTRACTOR AS REQUIRED TO SUIT TBM LAUNCHING SUBJECT TO REVIEW BY THE RESIDENT ENGINEER.
2. THE ROUND LENGTH INDICATED MAY BE INCREASED UP TO A MAXIMUM OF 6'-0" IF ALL BLASTING VIBRATION CRITERIA ARE MET.
3. MAXIMUM SPACING OF ROCK DOWELS AND LATTICE GIRDERS (IF APPLICABLE) IN LONGITUDINAL DIRECTION SHALL BE EQUAL TO ROUND LENGTH OR 6'-0" WHICHEVER IS SMALLER. ROCK DOWELS SHALL BE CENTERED (TYPICAL) BETWEEN LATTICE GIRDERS.
4. FOR SHOTCRETE LINING DETAILS, SHOTCRETE SMOOTHNESS CRITERIA AND LATTICE GIRDER DETAILS SEE DWGS CM009-RS-1100, CM009-RS-1101 AND CM009-RS-1102.
5. PROVIDE FACE SUPPORT AS SPECIFIED.



LONGITUDINAL SECTION  
TYPE I STARTER TUNNEL



LONGITUDINAL SECTION  
TYPE II STARTER TUNNEL

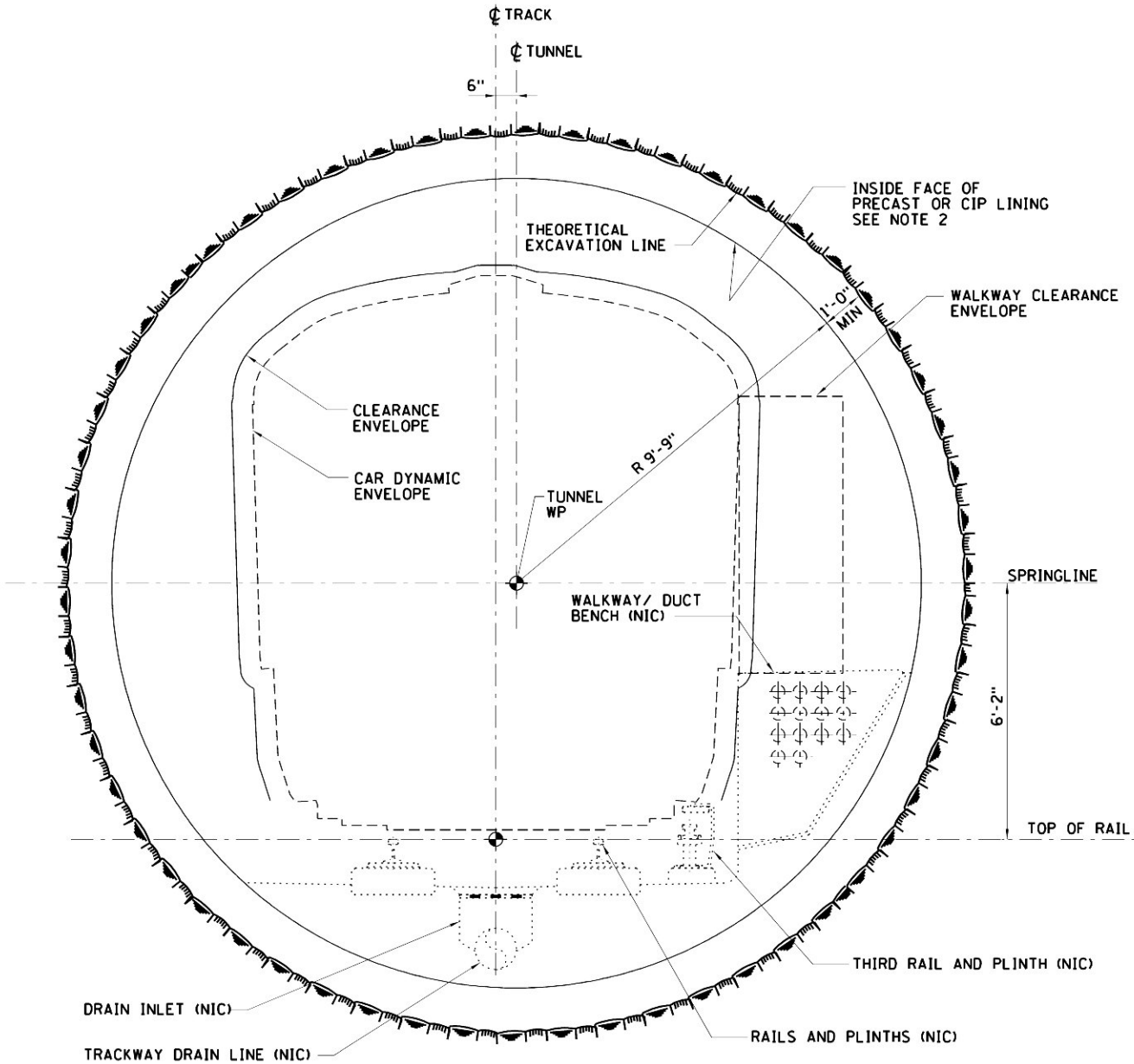


TYPICAL CROSS SECTION  
FOR TUNNEL GEOMETRY  
SEE DWG CM009-RS-1031








- NOTES:
1. INITIAL SUPPORT NOT SHOWN.  
SEE CM009-RS-1051 THROUGH CM009-RS-1055  
FOR INITIAL SUPPORT.
  2. FOR LIMITS OF TUNNEL LINING INSTALLATION  
SEE DWG CM009-ST-1008 THROUGH  
CM009-ST-1014 AND CM009-ST-1108 THROUGH  
CM009-ST-1110.



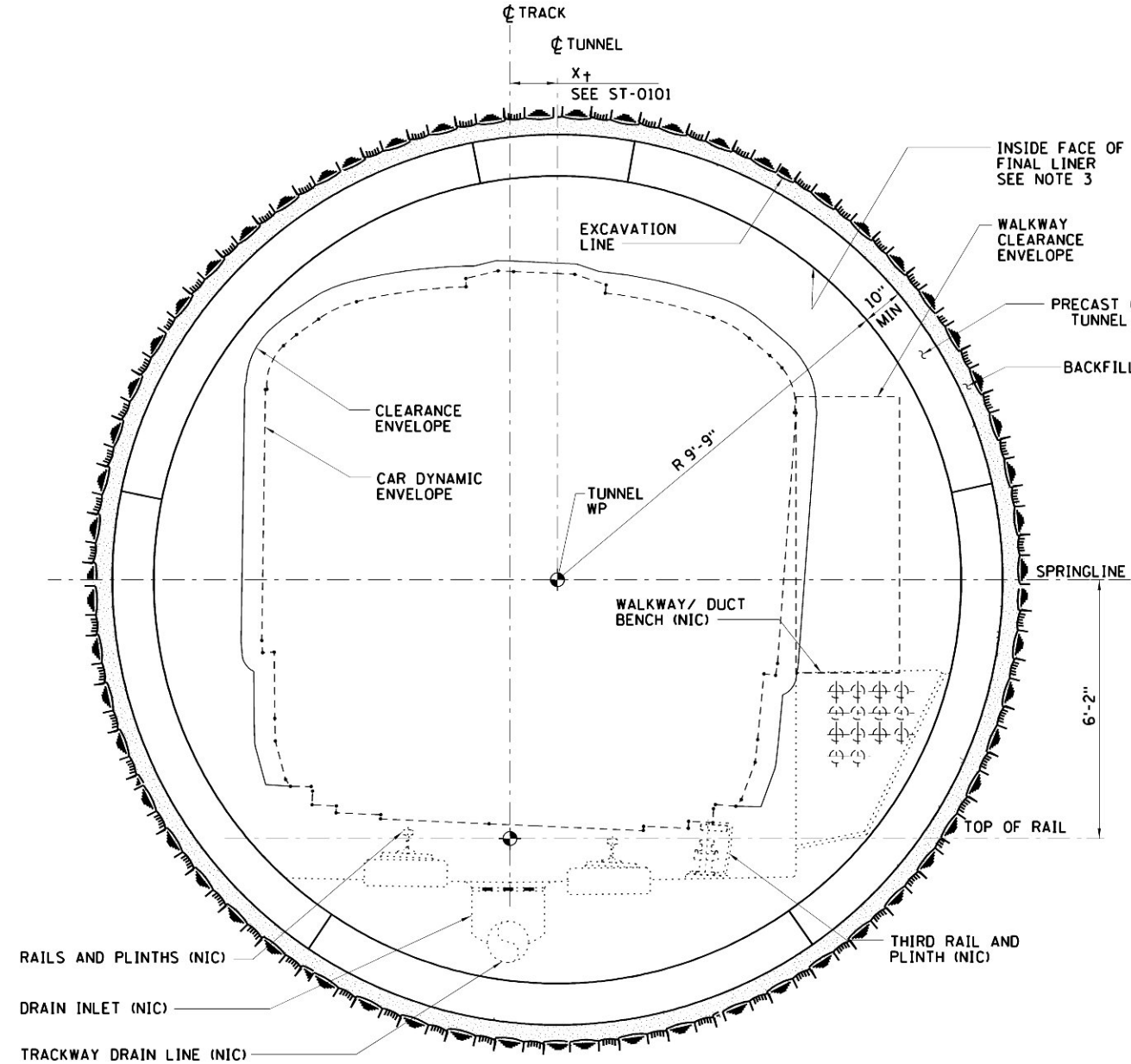
TYPICAL TBM TUNNEL SECTION – TANGENT TRACK  
SECTION CUT LOOKING UPSTATION  
FOR WALKWAY /DUCT BENCH ON LEFT, SECTION IS OPPOSITE HAND

NOTE:  
FOR PURPOSES OF ILLUSTRATING THE  
TUNNEL GENERAL ARRANGEMENT,  
CAST-IN-PLACE CONCRETE LINING IS  
SHOWN. GENERAL TUNNEL ARRANGEMENT IN  
PRECAST CONCRETE SECTIONS IS SIMILAR.

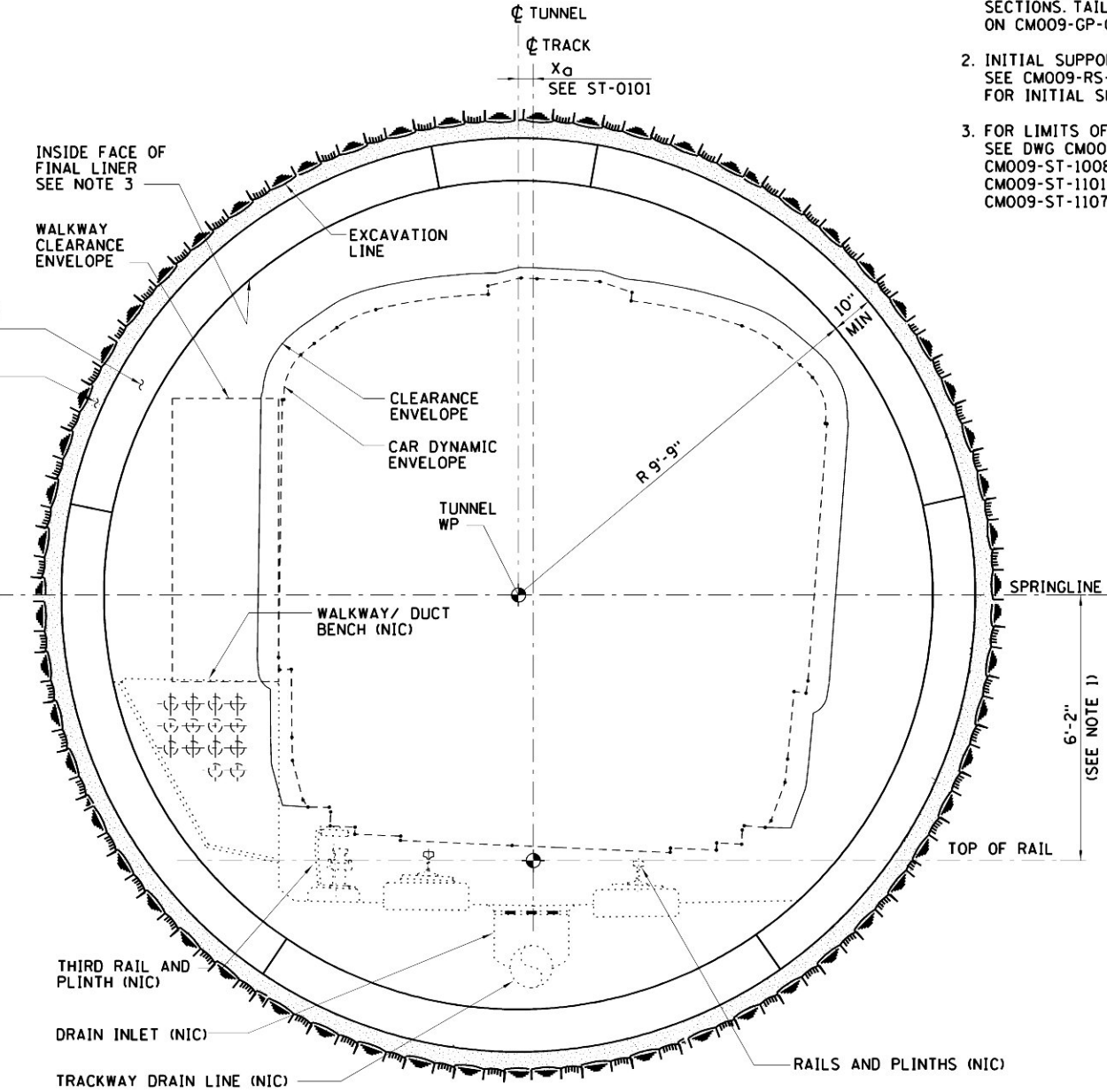


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				DRAWN BY: <b>L. LUBIN</b>					DRAWING NUMBER: <b>CM009-GP-0111</b>	ISSUE
 <b>Long Island Rail Road</b> <b>East Side Access</b>				CHECKED BY: <b>G. AYVAS</b>		COORDINATED BY: <b>M. DELLA POSTA</b>		GENERAL ARRANGEMENT TBM TUNNEL – TANGENT	DATE: <b>5-26-06</b>	SHEET No. <b>91</b> OF <b>276</b>
				COORDINATED BY: <b>M. DELLA POSTA</b>					REVISION NUMBER: <b>0</b>	
5/26/06 CONFORMED DRAWING				DATE:		DATE:				

- NOTES:
1. SEE CM009-ST-0102 FOR TRANSITION IN DIMENSION FROM SPRINGLINE TO TOP OF RAIL BETWEEN TYPICAL AND TAIL TRACK SECTIONS. TAIL TRACK SECTION IS SHOWN ON CM009-GP-0113.
  2. INITIAL SUPPORT NOT SHOWN. SEE CM009-RS-1051 THROUGH CM009-RS-1055 FOR INITIAL SUPPORT.
  3. FOR LIMITS OF TUNNEL LINING INSTALLATION SEE DWG CM009-ST-1001 THROUGH CM009-ST-1003, CM009-ST-1008 THROUGH CM009-ST-1014, CM009-ST-1101 THROUGH CM009-ST-1103 AND CM009-ST-1107 THROUGH CM009-ST-1110.



TYPICAL SECTION TBM TUNNEL – BENCH INSIDE CURVE  
SECTION CUT LOOKING UPSTATION



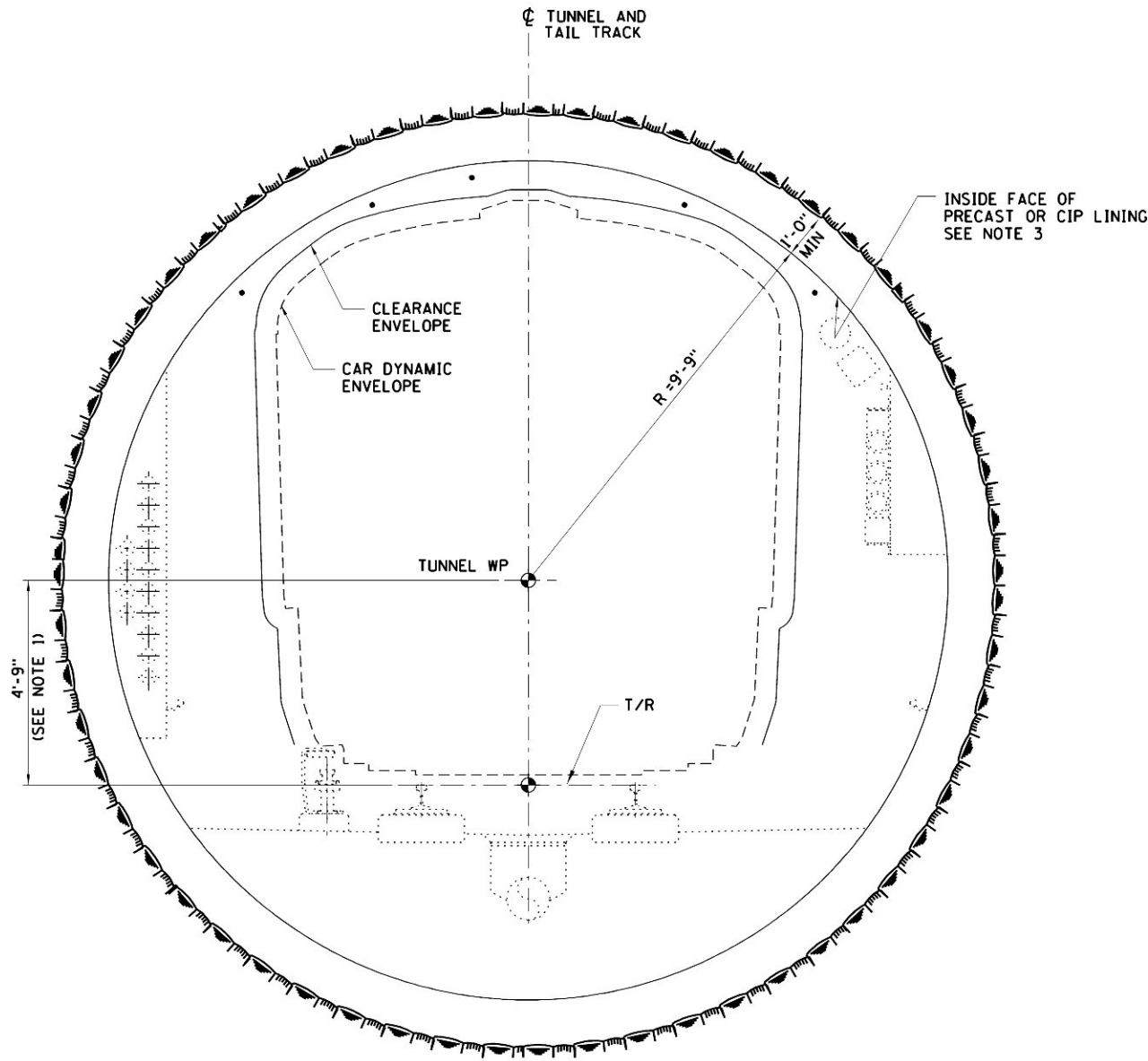
TYPICAL SECTION TBM TUNNEL – BENCH OUTSIDE CURVE  
SECTION CUT LOOKING UPSTATION

NOTE:  
FOR PURPOSES OF ILLUSTRATING THE TUNNEL GENERAL ARRANGEMENT, PRECAST CONCRETE LINING IS SHOWN. GENERAL TUNNEL ARRANGEMENT IN CAST-IN-PLACE CONCRETE SECTIONS IS SIMILAR.

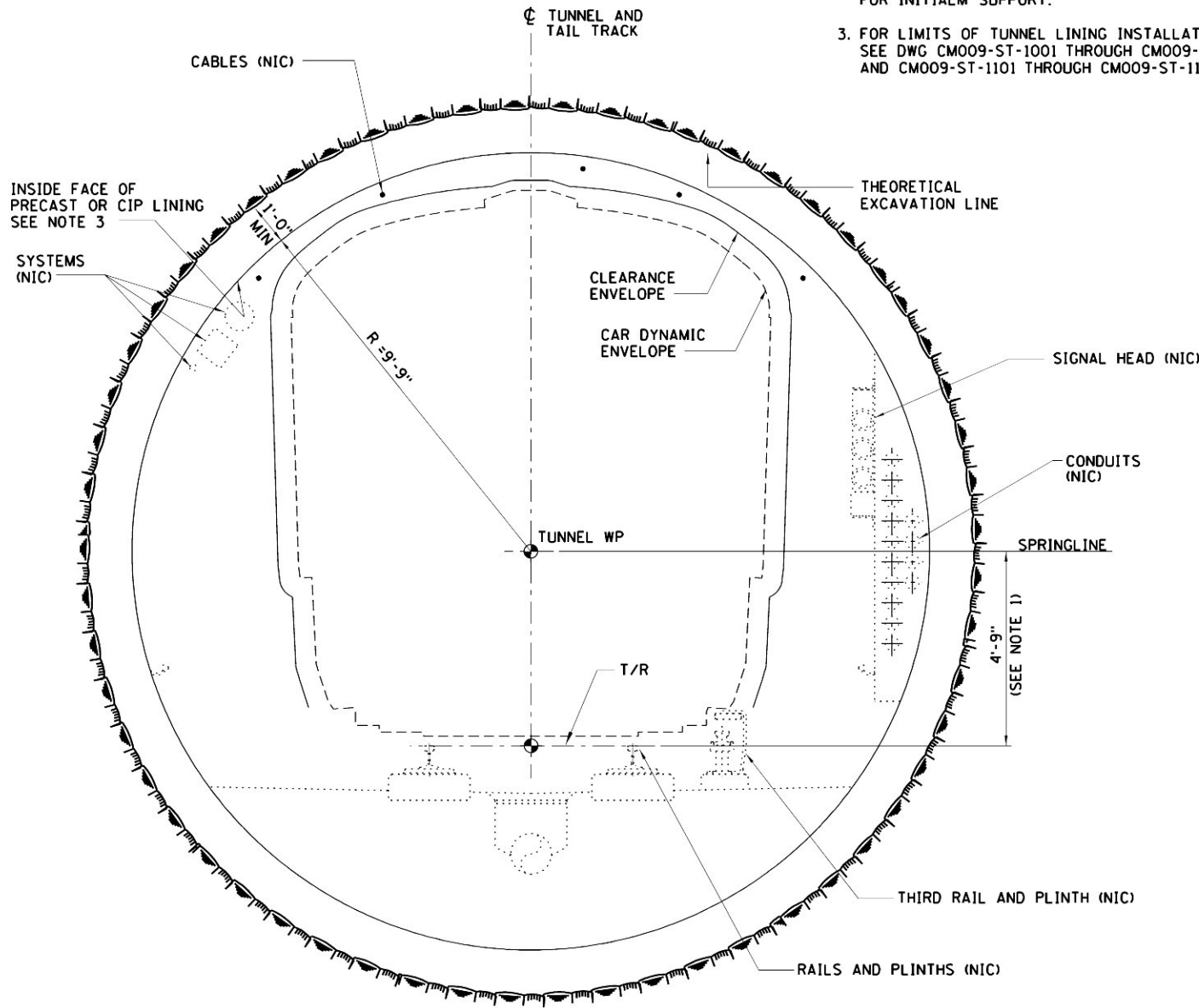


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- NOTES:
1. SEE CM009-ST-0102 FOR TRANSITION IN DIMENSION FROM SPRINGLINE TO TOP OF RAIL BETWEEN TYPICAL AND TAIL TRACK SECTIONS. TYPICAL TUNNEL ARRANGEMENTS ARE SHOWN ON CM009-GP-0111 AND CM009-GP-0112.
  2. INITIAL SUPPORT NOT SHOWN. SEE CM009-RS-1051 THROUGH CM009-RS-1055 FOR INITIALM SUPPORT.
  3. FOR LIMITS OF TUNNEL LINING INSTALLATION SEE DWG CM009-ST-1001 THROUGH CM009-ST-1003 AND CM009-ST-1101 THROUGH CM009-ST-1103.



TYPICAL SECTION TBM TUNNEL AT TAIL TRACKS – L303 AND L403  
SECTION CUT LOOKING UPSTATION



TYPICAL SECTION TBM TUNNEL AT TAIL TRACKS – L302 AND L402  
SECTION CUT LOOKING UPSTATION

NOTE:  
FOR PURPOSES OF ILLUSTRATING THE TUNNEL GENERAL ARRANGEMENT, CAST-IN-PLACE CONCRETE LINING IS SHOWN. GENERAL TUNNEL ARRANGEMENT IN PRECAST CONCRETE SECTIONS IS SIMILAR.

SCALE IN FEET  
2' 1' 0' 2' 4'

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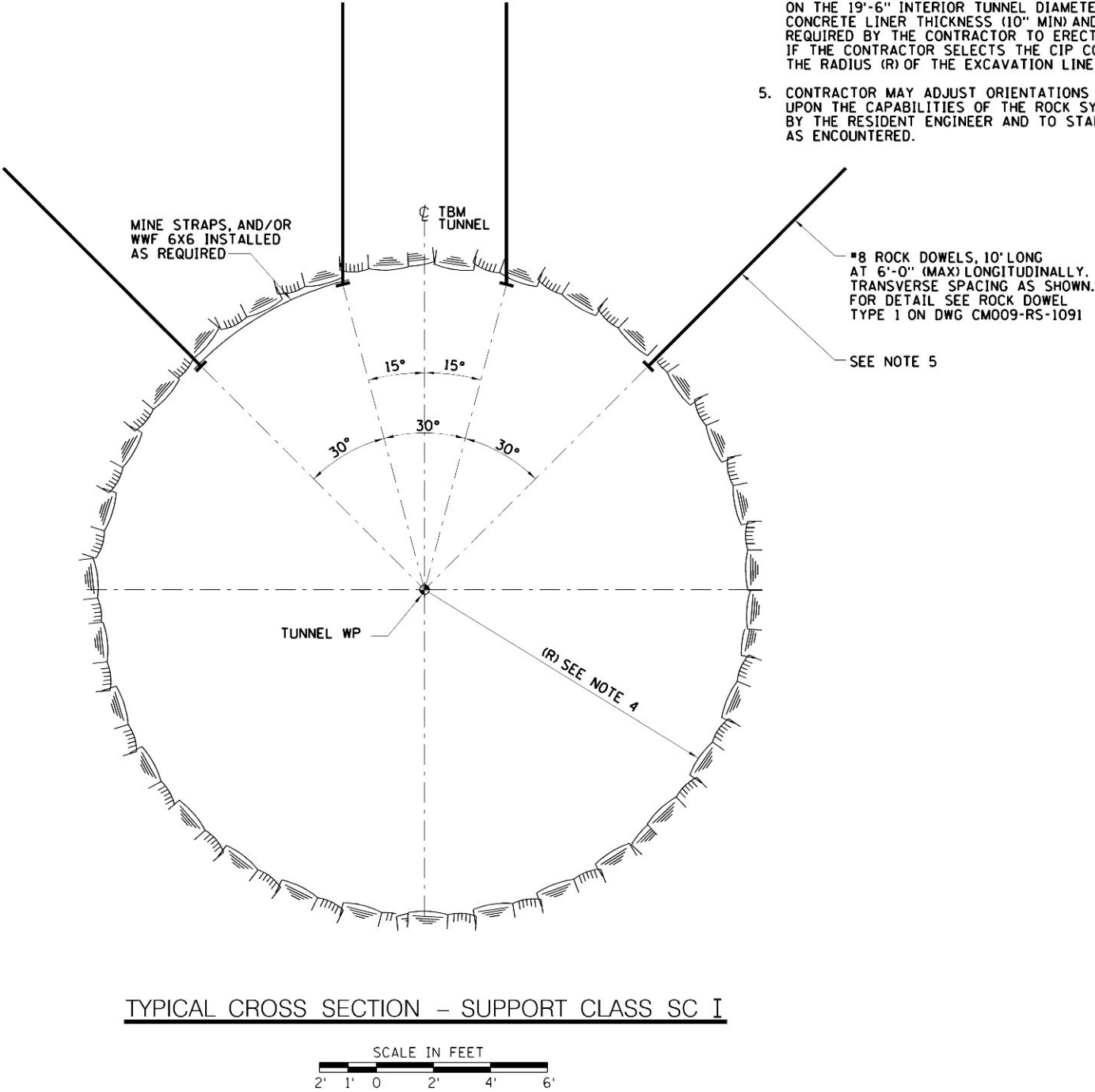
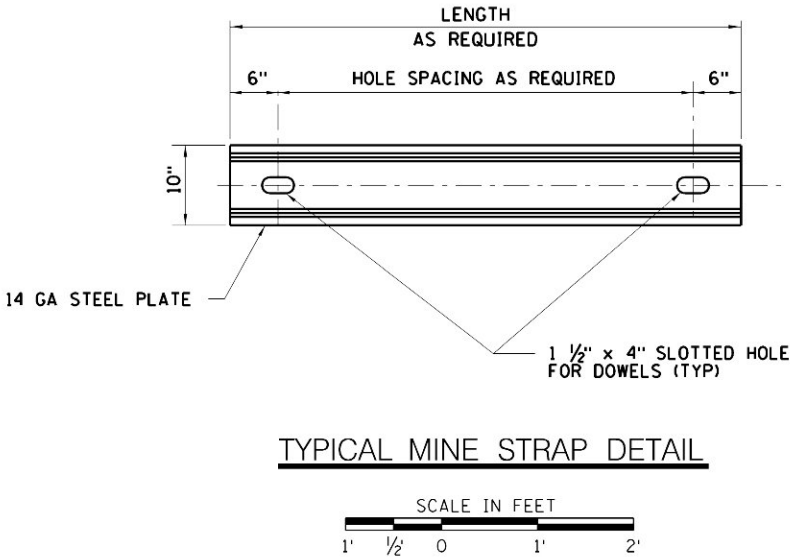
MANHATTAN TUNNELS EXCAVATION

GENERAL ARRANGEMENT  
TBM TUNNEL AT TAIL TRACKS

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-GP-0113  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
93 OF 276

- NOTES:
1. FOR SUPPORT CLASS RANGES SEE DWGS CM009-GT-2001 TO CM009-GT-2014 AND CM009-GT-2101 TO CM009-GT-2114.
  2. FOR GEOTECHNICAL GENERAL NOTES, ADDITIONAL INITIAL SUPPORT AND OTHER MEASURES SEE DWG CM009-GT-2000.
  3. INSTALL INITIAL SUPPORT IMMEDIATELY BEHIND THE CUTTERHEAD WHILE THE ROCK IS RESTRAINED BY THE FINGERSHIELD.
  4. IF THE CONTRACTOR SELECTS THE PRECAST LINING ALTERNATIVE, THE RADIUS (R) OF THE EXCAVATION LINE IS DETERMINED BASED ON THE 19'-6" INTERIOR TUNNEL DIAMETER, THE PRECAST CONCRETE LINER THICKNESS (10" MIN) AND THE ROCK/LINER ANNULUS REQUIRED BY THE CONTRACTOR TO ERECT THE PRECAST RINGS. IF THE CONTRACTOR SELECTS THE CIP CONCRETE LINING ALTERNATIVE, THE RADIUS (R) OF THE EXCAVATION LINE SHALL BE 10'-9" MINIMUM.
  5. CONTRACTOR MAY ADJUST ORIENTATIONS OF THE DOWELS BASED UPON THE CAPABILITIES OF THE ROCK SYSTEM, SUBJECT TO REVIEW BY THE RESIDENT ENGINEER AND TO STABILIZE THE ROCK MASS AS ENCOUNTERED.



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MANHATTAN TUNNELS EXCAVATION

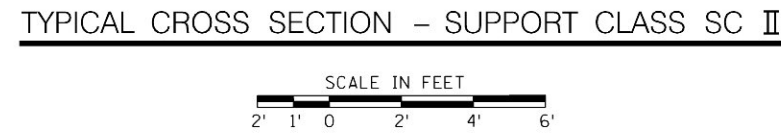
INITIAL SUPPORT  
TBM TUNNEL  
SUPPORT CLASS SC I

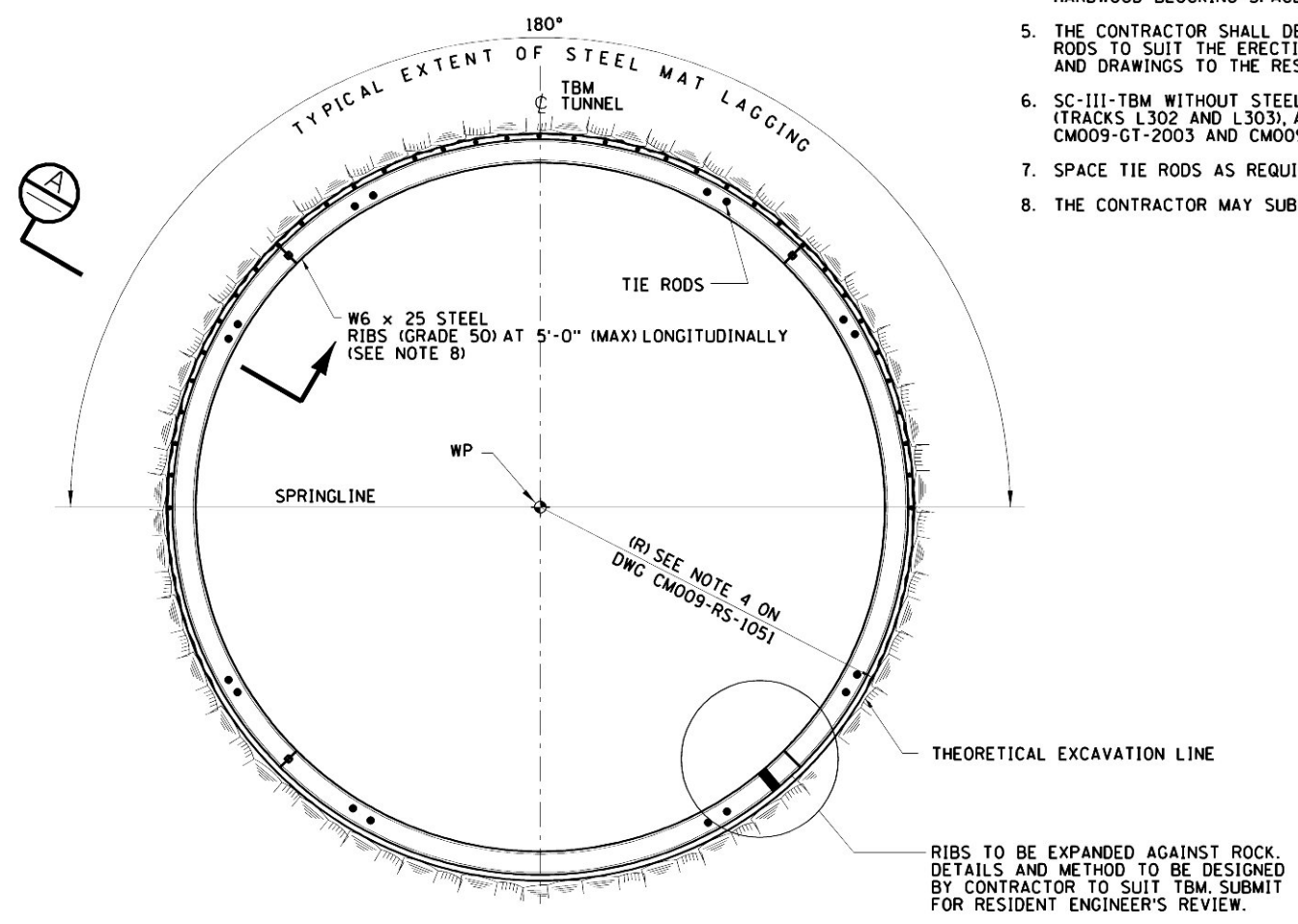
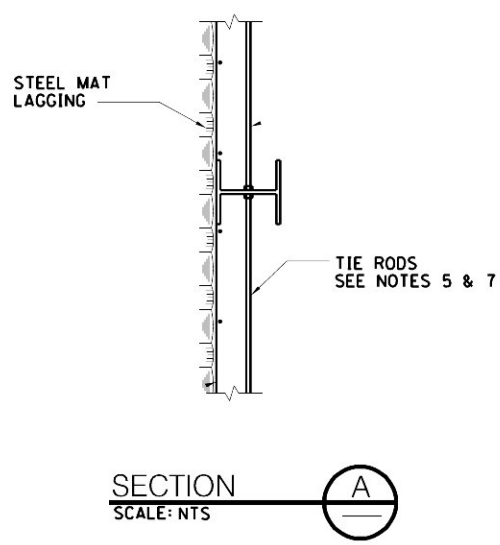
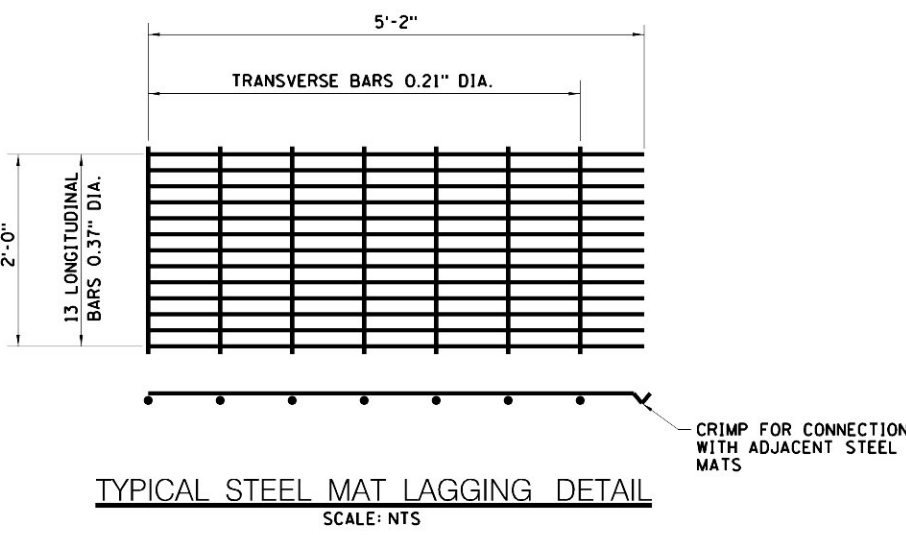
SCALE  
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DRAWING NUMBER  
CM009-RS-1051  
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CONTRACT No.  
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SHEET No.  
94 OF 276



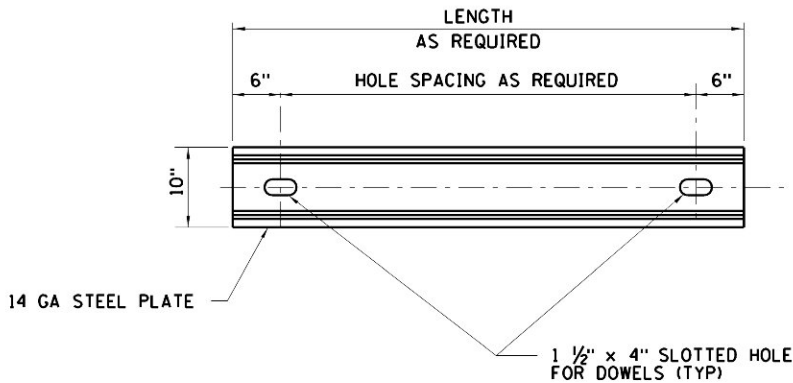
1. FOR SUPPORT CLASS RANGES SEE DWGS CM009-GT-2001 TO CM009-GT-2014 AND CM009-GT-2101 TO CM009-GT-2114.
2. FOR GEOTECHNICAL GENERAL NOTES, ADDITIONAL INITIAL SUPPORT AND OTHER MEASURES SEE DWG CM009-GT-2000.
3. INSTALL INITIAL SUPPORT IMMEDIATELY BEHIND THE CUTTERHEAD WHILE THE ROCK IS RESTRAINED BY THE FINGERSHIELD.
4. CHANNELS INSTALLED FOR EACH ROW OF DOWELS.



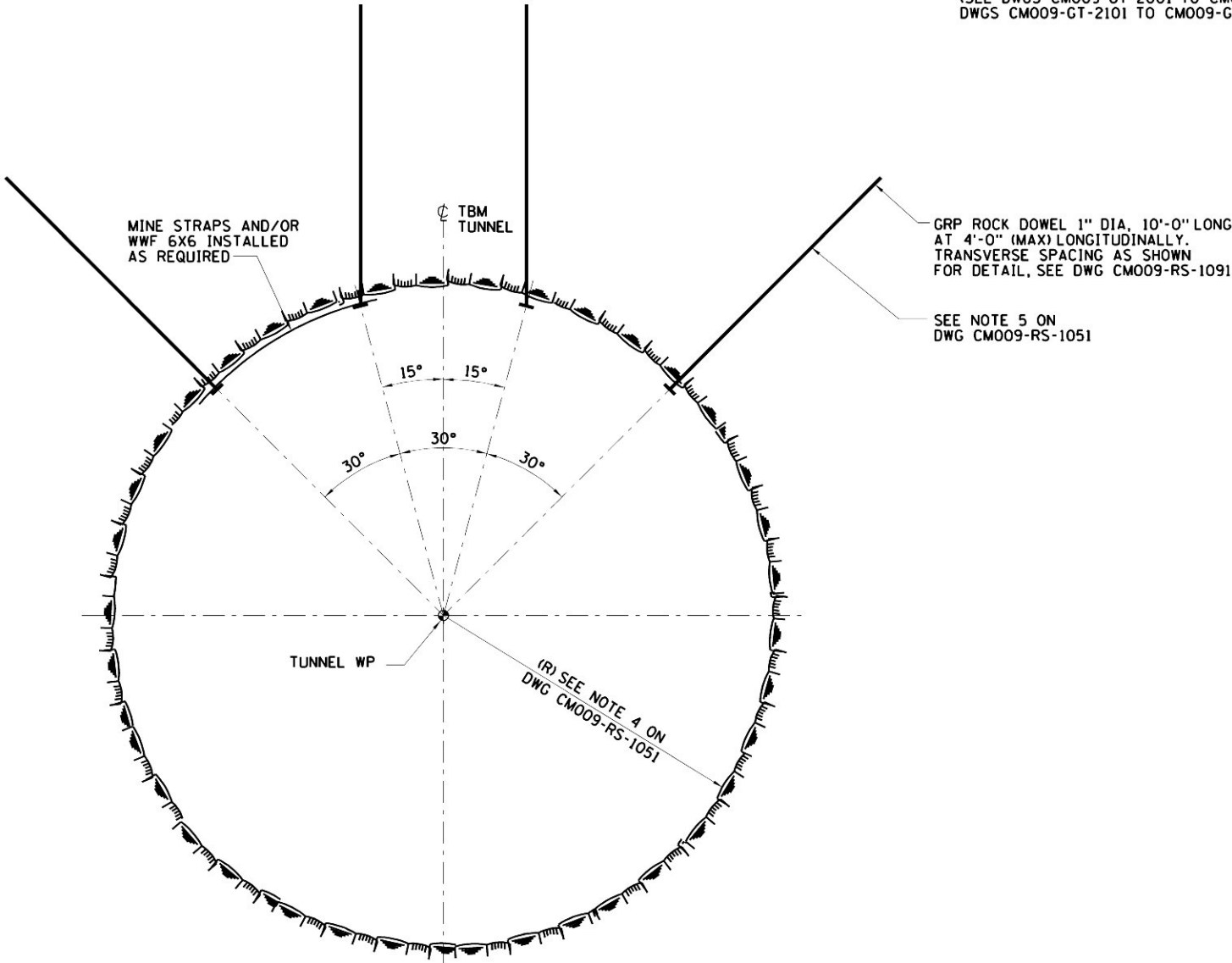


- NOTES:
1. FOR SUPPORT CLASS RANGES SEE DWGS CM009-GT-2001 TO CM009-GT-2014 AND CM009-GT-2101 TO CM009-GT-2114.
  2. FOR GEOTECHNICAL GENERAL NOTES, ADDITIONAL INITIAL SUPPORT AND OTHER MEASURES SEE DWG CM009-GT-2000.
  3. INSTALL INITIAL SUPPORT IMMEDIATELY BEHIND THE CUTTERHEAD WHILE THE ROCK IS RESTRAINED BY THE FINGERSHIELD.
  4. AT OVERBREAKS, RIBS SHALL BE BLOCKED TO ROCK FACE WITH HARDWOOD BLOCKING SPACED AT 18" MAX CIRCUMFERENTIALLY.
  5. THE CONTRACTOR SHALL DESIGN SPLICES, SPACERS AND TIE RODS TO SUIT THE ERECTION SEQUENCE. SUBMIT CALCULATIONS AND DRAWINGS TO THE RESIDENT ENGINEER FOR REVIEW.
  6. SC-III-TBM WITHOUT STEEL MAT LAGGING IS APPLIED IN UPPER TUNNELS (TRACKS L302 AND L303), AS INDICATED ON DRAWINGS CM009-GT-2003 AND CM009-GT-2103.
  7. SPACE TIE RODS AS REQUIRED TO ACCOMMODATE TBM GRIPPERS.
  8. THE CONTRACTOR MAY SUBMIT ALTERNATE RIB DESIGN.

- NOTES:
1. FOR SUPPORT CLASS RANGES SEE DWGS CM009-GT-2001 TO CM009-GT-2014 AND CM009-GT-2101 TO CM009-GT-2114.
  2. FOR GEOTECHNICAL GENERAL NOTES,-ADDITIONAL INITIAL SUPPORT AND OTHER MEASURES SEE DWG CM009-GT-2000.
  3. INSTALL INITIAL SUPPORT IMMEDIATELY BEHIND THE CUTTERHEAD WHILE THE ROCK IS RESTRAINED BY THE FINGERSHIELD.
  4. SUPPORT CLASS SC-IE - TBM APPLIED IN FUTURE ENLARGEMENTS (SEE DWGS CM009-GT-2001 TO CM009-GT-2014 AND DWGS CM009-GT-2101 TO CM009-GT-2114).



TYPICAL MINE STRAP DETAIL



TYPICAL CROSS SECTION - SUPPORT CLASS SC IE



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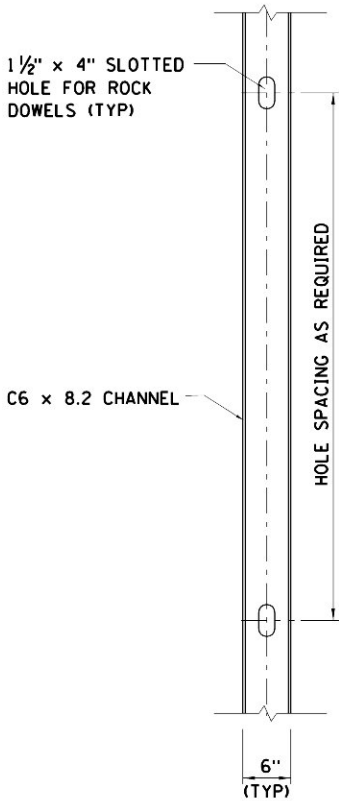
MANHATTAN TUNNELS EXCAVATION

INITIAL SUPPORT  
TBM TUNNEL  
SUPPORT CLASS SC IE

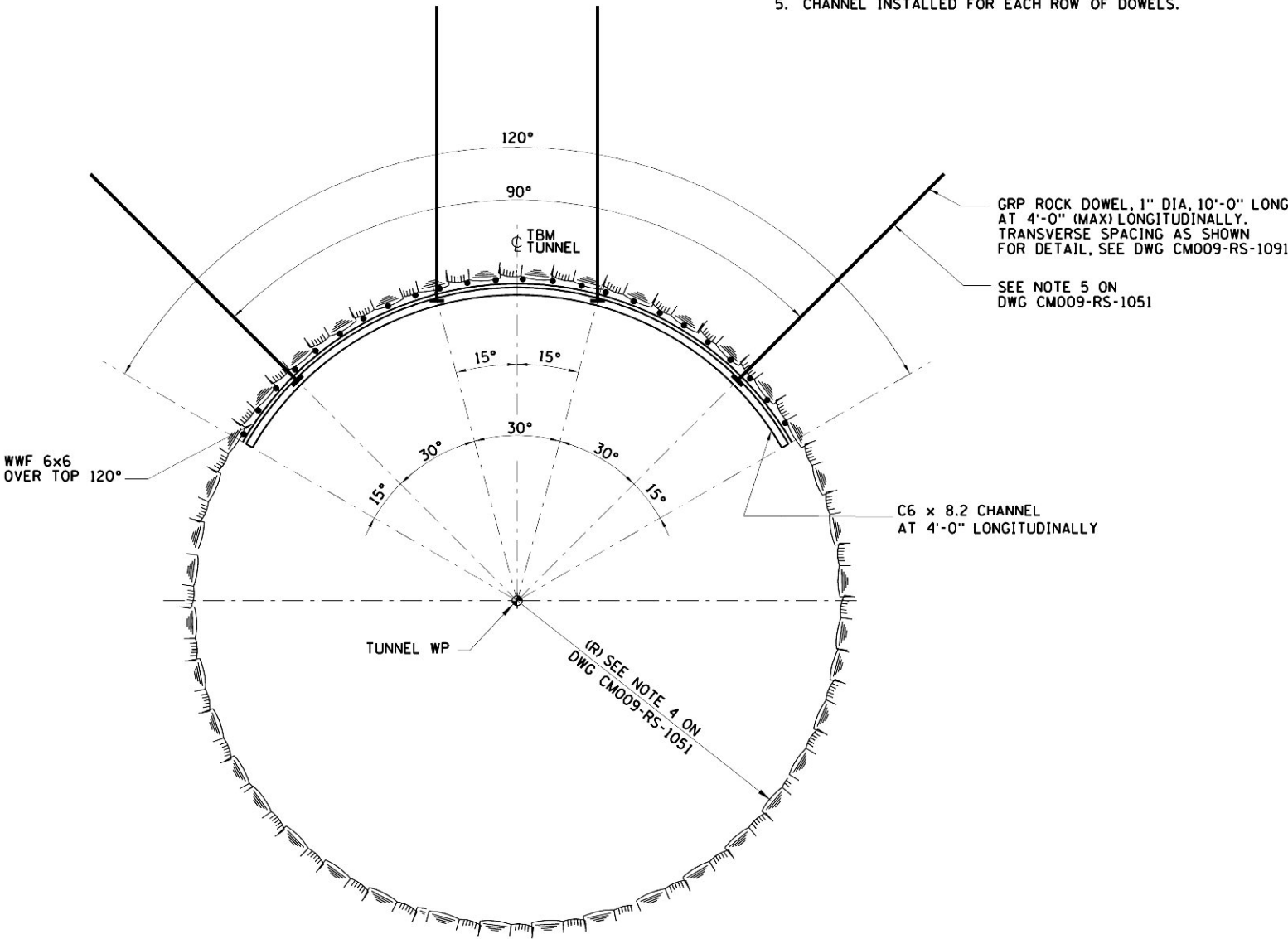
SCALE AS NOTED
DRAWING NUMBER CM009-RS-1054
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 97 OF 276

- NOTES:
1. FOR SUPPORT CLASS RANGES SEE DWGS CM009-GT-2001 TO CM009-GT-2014 AND CM009-GT-2101 TO CM009-GT-2114.
  2. FOR GEOTECHNICAL GENERAL NOTES, ADDITIONAL INITIAL SUPPORT AND OTHER MEASURES SEE DWG CM009-GT-2000.
  3. INSTALL INITIAL SUPPORT IMMEDIATELY BEHIND THE CUTTERHEAD WHILE THE ROCK IS RESTRAINED BY THE FINGERSHIELD.
  4. SUPPORT CLASS SC-II E - TBM APPLIED IN FUTURE ENLARGEMENTS. (SEE DWGS CM009-GT-2001 TO CM009-GT-2014 AND DWGS CM009-GT-2101 TO CM009-GT-2114).
  5. CHANNEL INSTALLED FOR EACH ROW OF DOWELS.



CHANNEL DETAIL



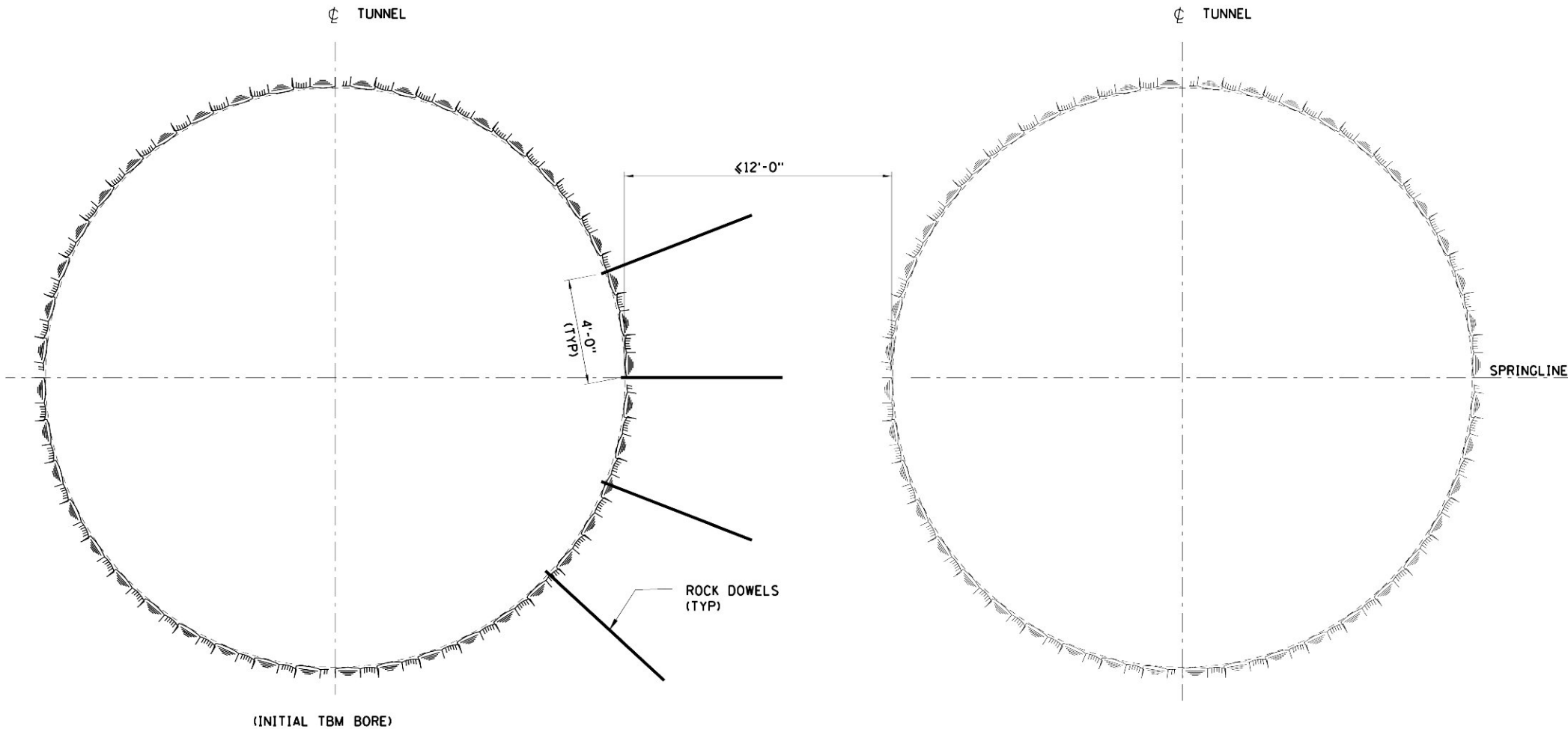
TYPICAL CROSS SECTION - SUPPORT CLASS SC II E





NOTES:

1. ROCK DOWELS TO REINFORCE THE ROCK PILLAR BETWEEN THE TUNNELS SHALL BE #8, LENGTH 6FT, SPACED AT 4FT X 4FT CENTERS APPLIED AS SHOWN, WHEN THE PILLAR WIDTH MEASURED AT SPRINGLINE IS LESS THAN OR EQUAL TO 12- FEET, ROCK DOWELS SHALL BE INSTALLED WITHIN THE TUNNEL THAT IS EXCAVATED FIRST (INITIAL BORE) PRIOR TO EXCAVATING ADJACENT TUNNEL. USE GRP ROCK DOWELS FOR SUPPORT CLASS SC-IE AND SC-IIE.
2. SUPPORT FOR TBM TUNNELS NOT SHOWN.
3. EXACT LOCATION OF DOWELS SHALL BE ADJUSTED TO SUIT GROUND CONDITIONS ENCOUNTERED, AND PLACEMENT OF TBM GRIPPERS.



TYPICAL CROSS SECTION – PILLAR ≤12'  
BETWEEN TWO TBM TUNNELS



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MANHATTAN TUNNELS EXCAVATION

INITIAL SUPPORT DETAILS  
TBM TUNNELS, PILLAR REINFORCEMENT

SCALE AS NOTED
DRAWING NUMBER CM009-RS-1104
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 99 OF 276

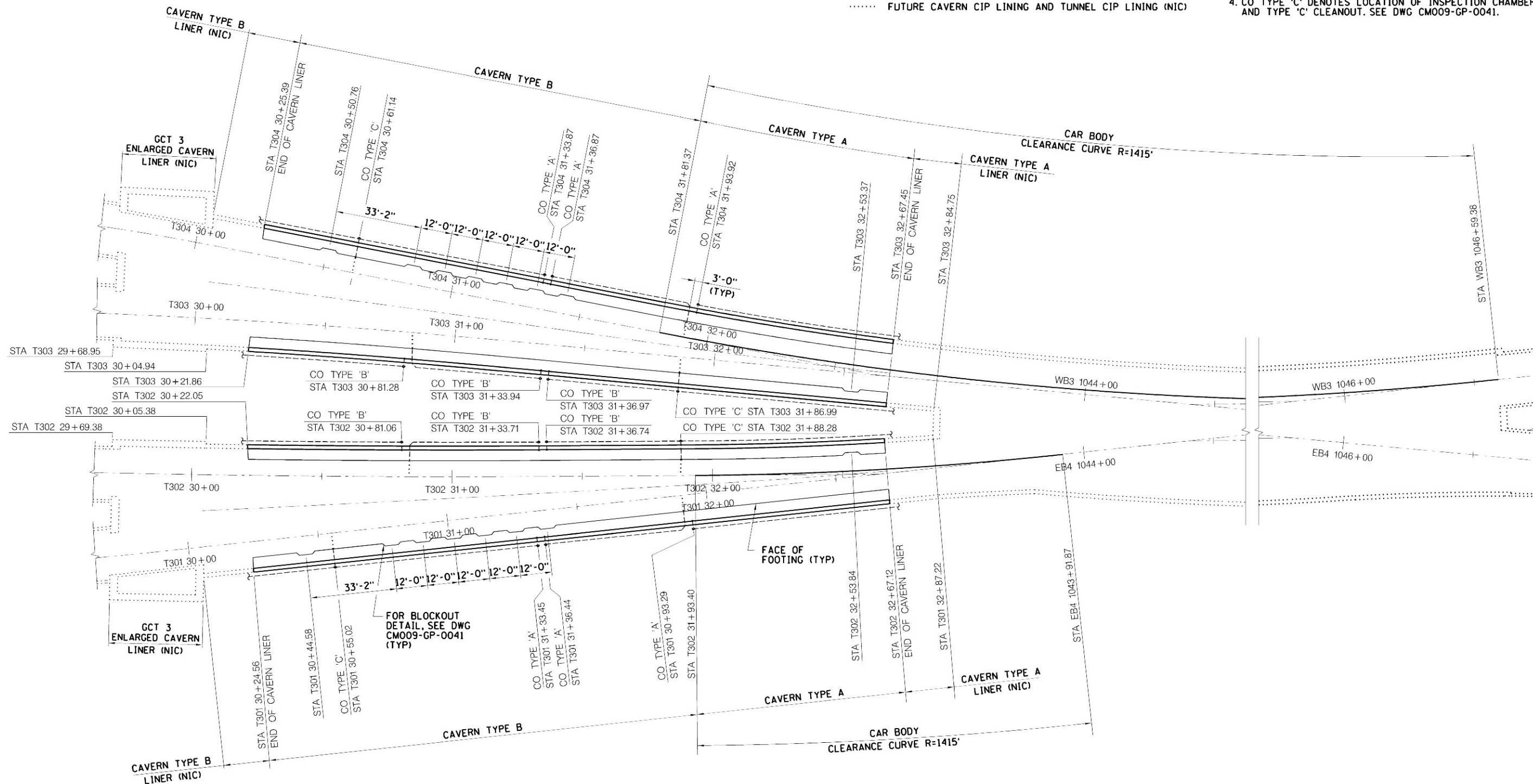


## LEGEND:

- FUTURE MANHOLE AND DRAIN PIPE CONNECTION (NIC)  
---+--- CLEANOUT (CO)  
--- PERFORATED SIDE WALL SUBSOIL DRAINAGE PIPE  
---> PIPE TO PROJECT 6" BEYOND POROUS CONCRETE AND CAPPED FOR PROTECTION.  
..... FUTURE CAVERN CIP LINING AND TUNNEL CIP LINING (NIC)

## NOTES:

1. FOR CAVERN TYPES & SETTING OUT INFORMATION, REFER TO DWG CM009-GP-0120.
2. CO TYPE 'A' DENOTES LOCATION OF TYPE 'A' CLEANOUT AT FUTURE BENCH LOCATIONS. SEE DWG CM009-GP-0040.
3. CO TYPE 'B' DENOTES LOCATION OF TYPE 'B' CLEANOUT. SEE DWG CM009-GP-0040.
4. CO TYPE 'C' DENOTES LOCATION OF INSPECTION CHAMBER AND TYPE 'C' CLEANOUT. SEE DWG CM009-GP-0041.



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CHECKED BY: C. BARRATT
COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

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## MANHATTAN TUNNELS EXCAVATION

GENERAL ARRANGEMENT PLAN  
GCT 3 WYE CAVERN  
SHEET 1

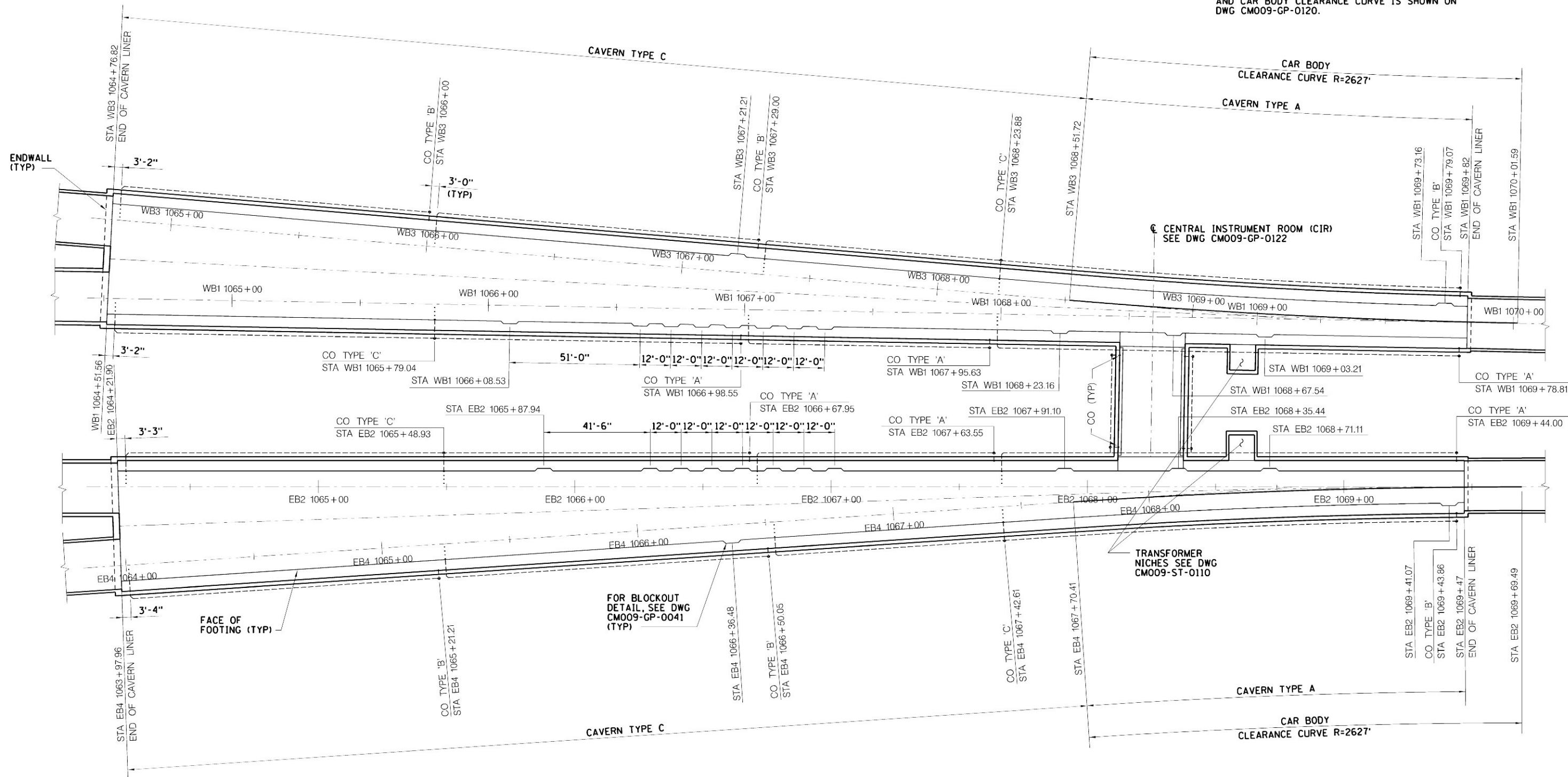
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DRAWING NUMBER CM009-GP-0117
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 100 OF 276



NOTES:

1. SEE NOTES AND LEGEND ON DWG CM009-GP-0117.
2. SETTING OUT OF CAVERNS RELATIVE TO TRACKS AND CAR BODY CLEARANCE CURVE IS SHOWN ON DWG CM009-GP-0120.



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COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

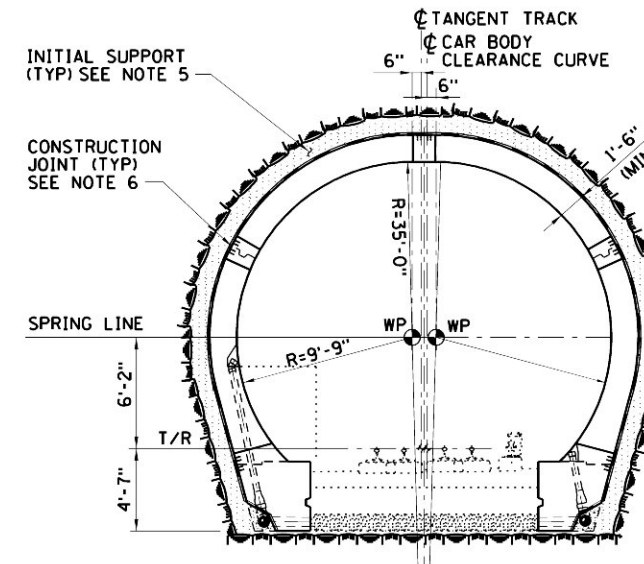
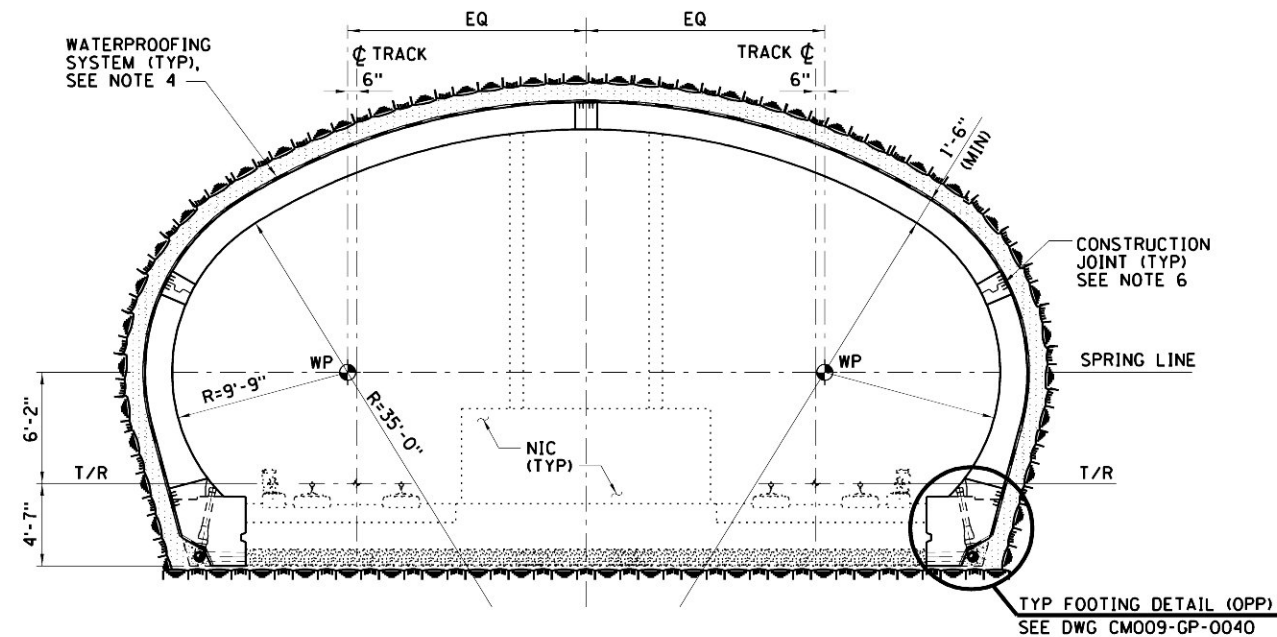
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## MANHATTAN TUNNELS EXCAVATION

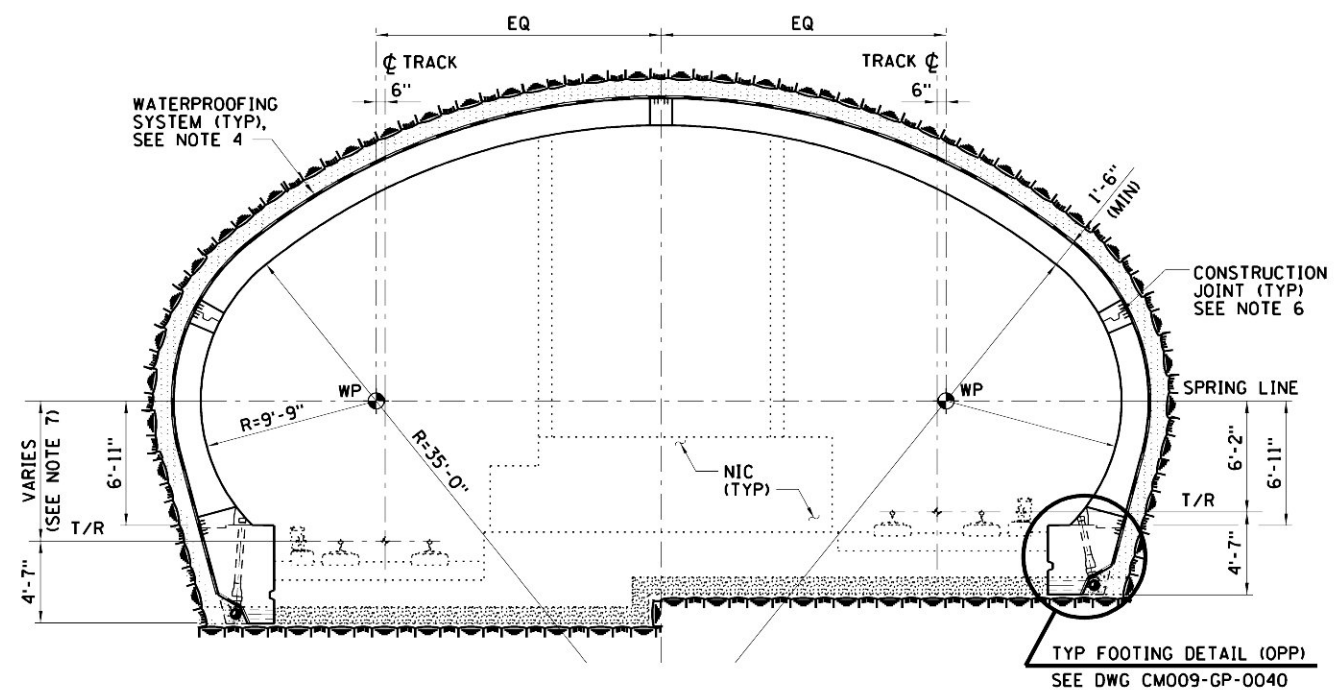
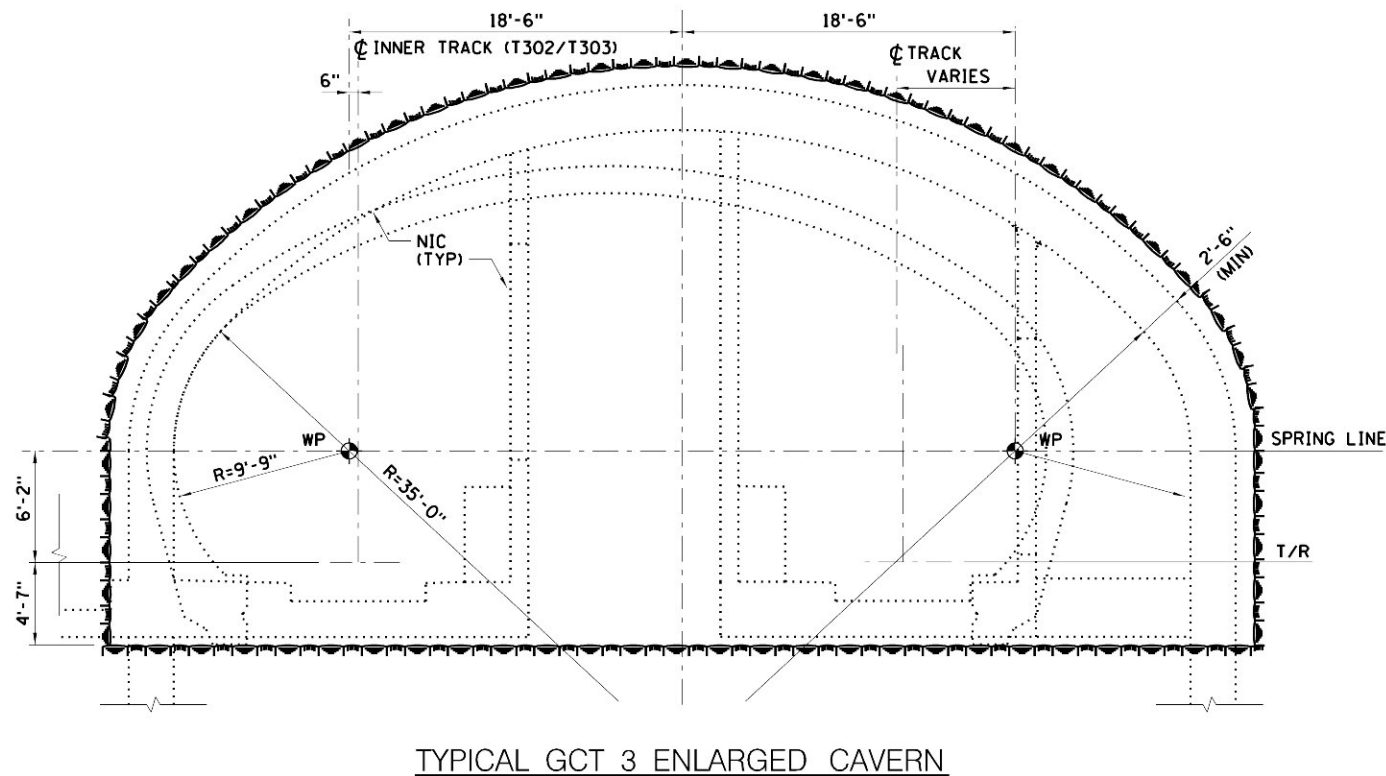
GENERAL ARRANGEMENT PLAN  
GCT 5 WYE CAVERN

SCALE AS NOTED
DRAWING NUMBER CM009-GP-0119
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. <b>CM009</b>
ISSUE
SHEET No. <b>101</b> OF <b>276</b>



- NOTES:
1. SEE DWG CMO09-GP-0117 AND CMO09 GP-0119 FOR GENERAL ARRANGEMENT PLANS AND CAVERN LIMITS.
  2. CAVERNS ARE SET OUT TO CENTERLINES OF TRACKS EXCEPT AT CAR BODY CLEARANCE CURVES WHERE THE CAVERNS ARE SET OUT TO TANGENT TRACKS AND CAR BODY/CLEARANCE CURVE. EXCEPT AT GCT3 ENLARGED CAVERN, SEE DWG CMO09-GP-0117.
  3. FOR REINFORCEMENT DETAILS SEE DWG CMO09-ST-1201.
  4. FOR WATERPROOFING SYSTEM SEE DWG CMO09-WS-0101.
  5. FOR INITIAL SUPPORT DETAILS SEE DWGS CMO09-RS-1062 THROUGH RS-1066.
  6. LOCATIONS OF CONSTRUCTION JOINTS ARE SUGGESTED THEY SHALL BE COORDINATED WITH THE WATERPROOFING SYSTEM SHOWN ON DWG CMO09-WS-0101.
  7. FOR GCT 5; SPRINGLINE IS SET OUT TO HIGHEST TRACK. INVERT EXCAVATION IS SET OUT TO BOTH TRACKS WITH A TRANSITION AS SHOWN ON TYPE "C".

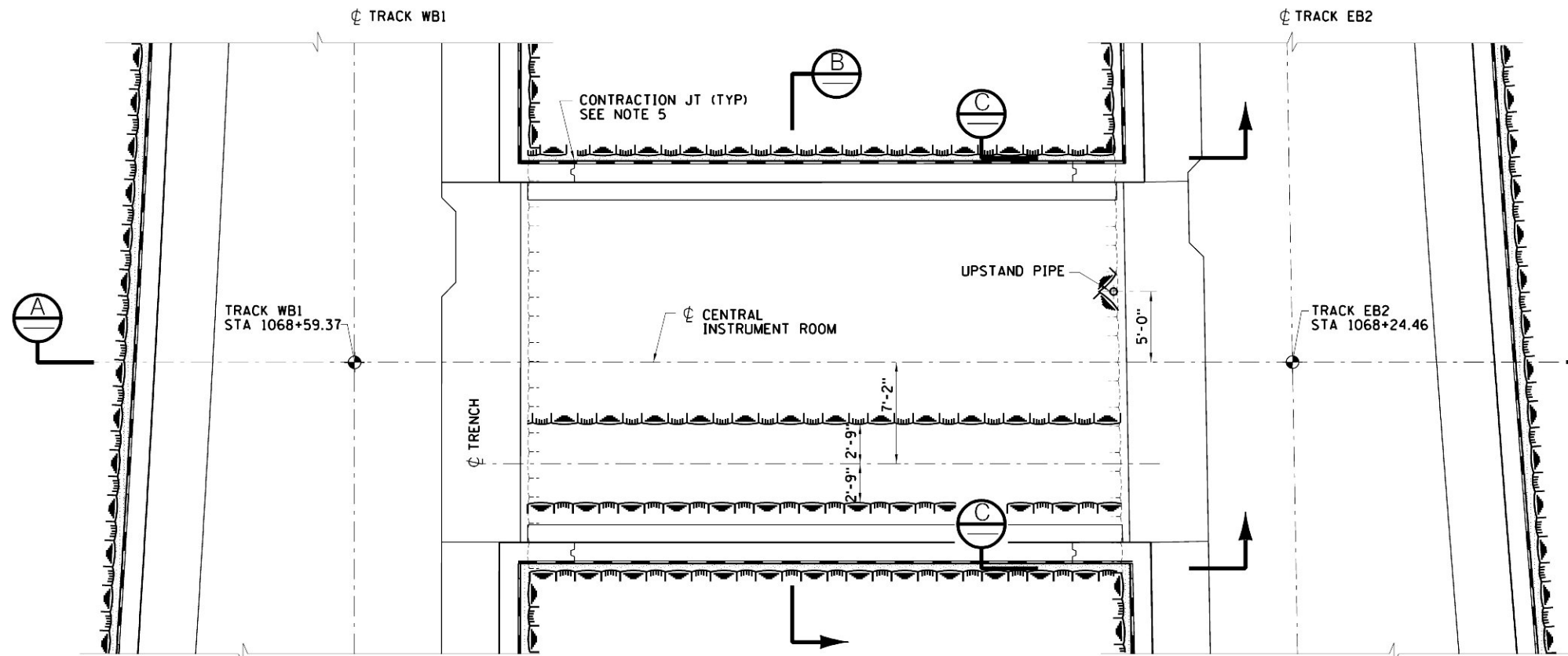


SCALE IN FEET

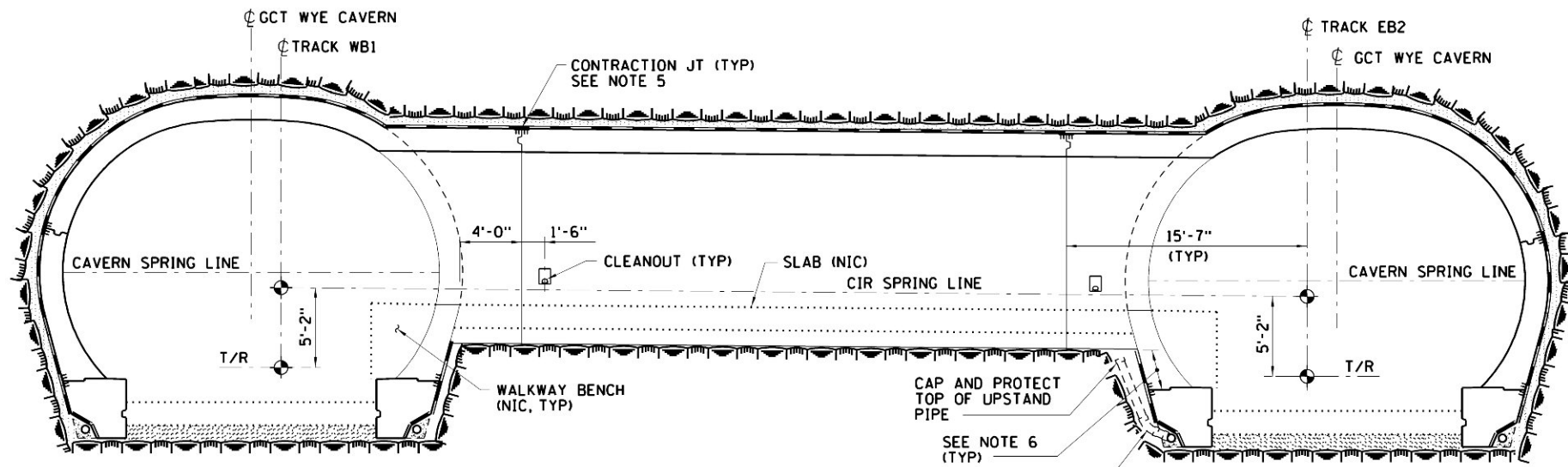


4' 2' 0 4' 8' 12'

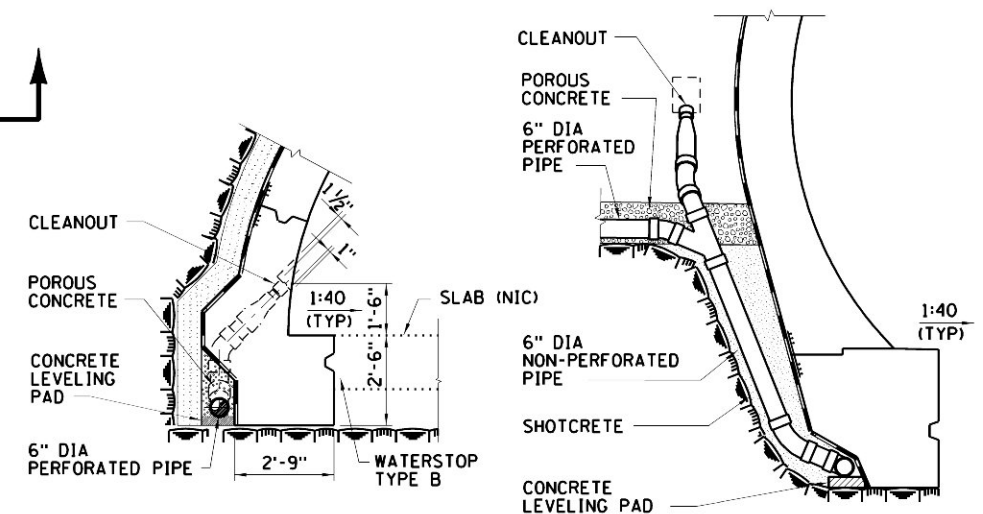




PLAN AT CENTRAL INSTRUMENT ROOM (CIR)



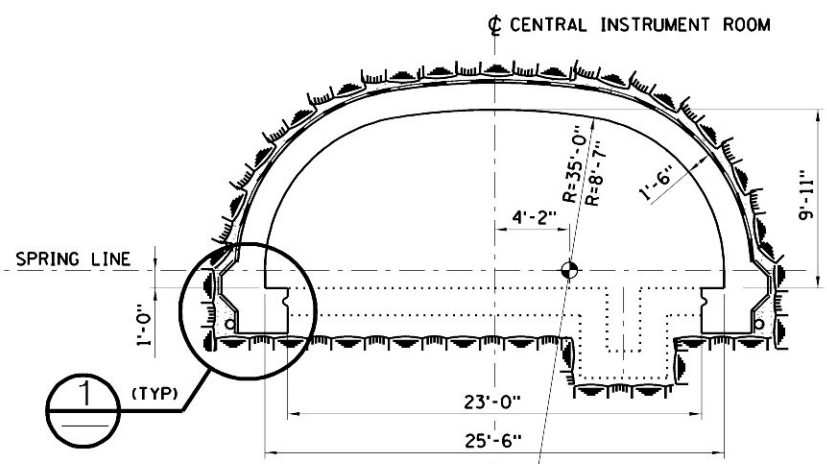
SECTION A



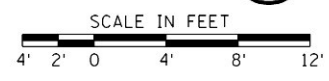
DETAIL 1



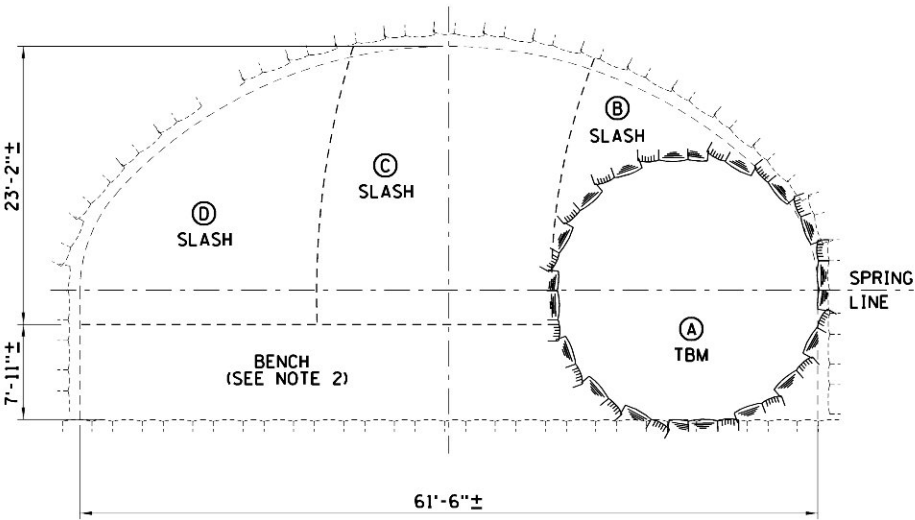
SECTION C



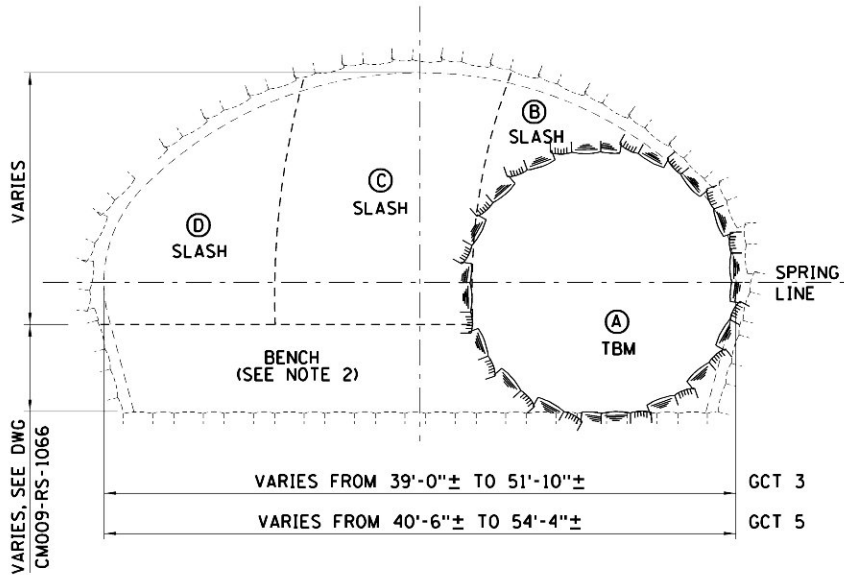
SECTION B



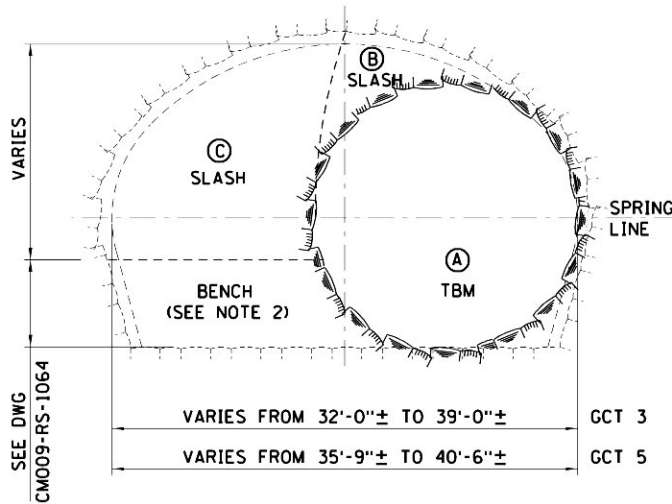
- NOTES:
1. INITIAL SUPPORT NOT SHOWN. SEE DWG CM009-RS-1124.
  2. SEE DWG CM009-GP-0120 FOR SETTING OUT OF WYE CAVERNS.
  3. SEE DWG CM009-GP-0040 FOR SETTING OUT TYPICAL CAVERN FOOTINGS.
  4. FOR REINFORCEMENT DETAILS SEE DWG CM009-ST-1204.
  5. SEE DWG STD-SS-0101 FOR TYPICAL JOINT DETAILS.
  6. EXPOSED WATERPROOFING TO BE PROTECTED BY SANDBAGS, IN LOCATIONS INDICATED.
  7. SIDEWALL PIPES AND CLEANOUTS OMITTED IN PLAN FOR CLARITY, FOR LOCATION SEE DWG CM009-GP-0119.



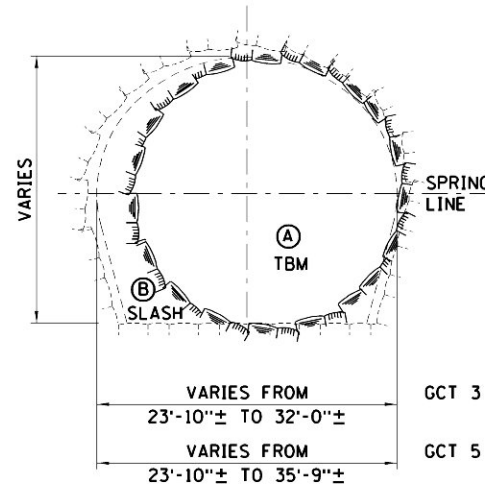
TYPICAL SECTION – ENLARGED CAVERN (GCT 3)  
NTS  
FOR INITIAL SUPPORT  
SEE DWG CM009-RS-1066



TYPICAL SECTION – WIDE  
NTS  
FOR INITIAL SUPPORT  
SEE DWG CM009-RS-1066

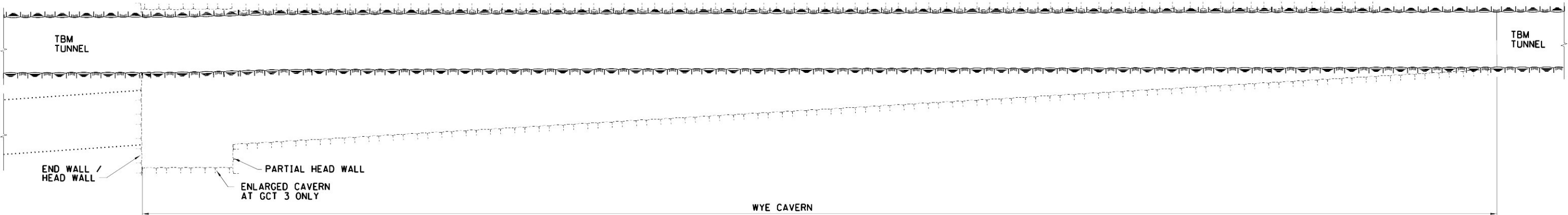


TYPICAL SECTION – MEDIUM  
NTS  
FOR INITIAL SUPPORT  
SEE DWG CM009-RS-1064

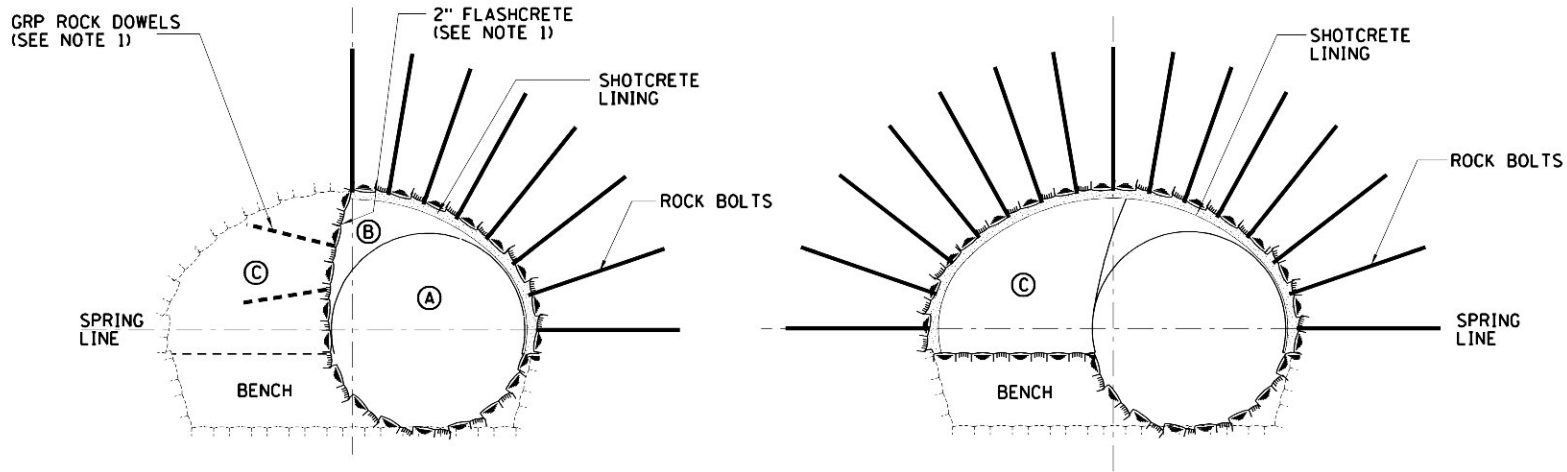


TYPICAL SECTION – NARROW  
NTS  
FOR INITIAL SUPPORT  
SEE DWG CM009-RS-1062

- NOTES:
1. CONSTRUCTION SEQUENCES SHOWN ARE SUGGESTED EXCEPT AT THE SHEAR ZONES IN GCT 5 AND AS DEFINED IN GBR. THE CONSTRUCTION SEQUENCE SHALL BE AS SHOWN.
  2. CONSTRUCTION SEQUENCE ASSUMES THAT CAVERNS WILL BE CONSTRUCTED STARTING AT THE NORTH END OF THE WYE CAVERN AND PROCEED THROUGH TO THE SOUTH END OF THE WYE CAVERN. IF THE CONTRACTOR ELECTS TO INITIALLY CONSTRUCT ONLY PART OF THE WYE CAVERN, SUBMIT ALTERNATE SEQUENCE TO THE RESIDENT ENGINEER FOR REVIEW.
  3. CONSTRUCTION STAGES SHOWN ARE FOR TOP HEADING AND FULL FACE ONLY. FOR BENCH EXCAVATION SEE DWGS CM009-RS-1064 AND CM009-RS-1066.

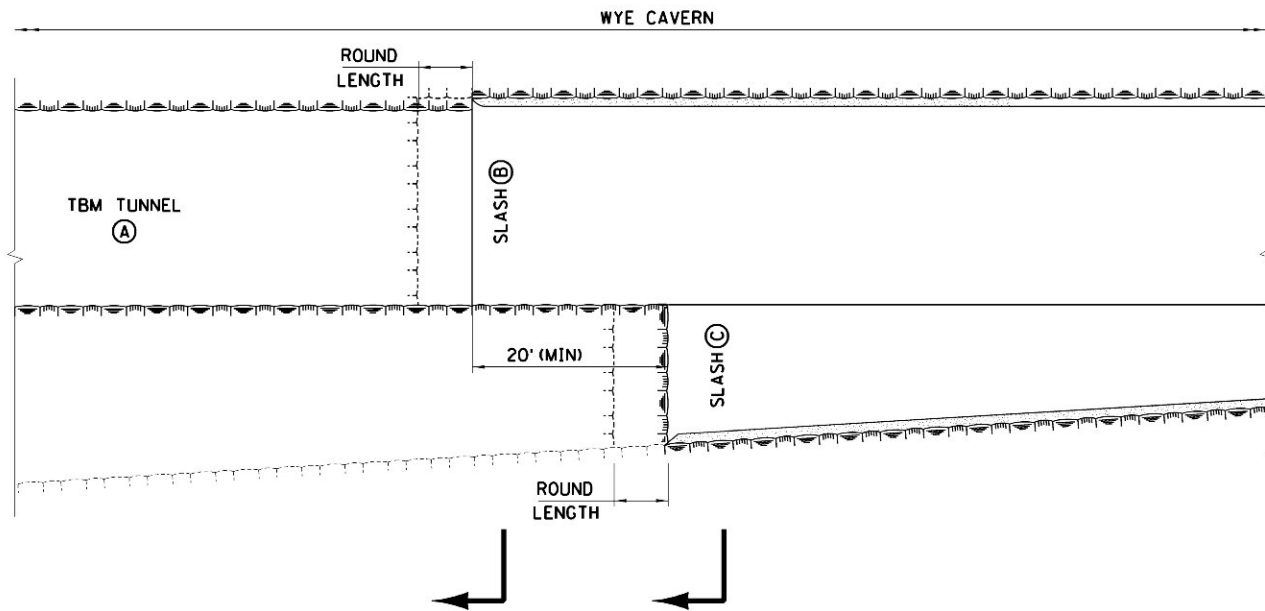


PLAN  
SCALE IN FEET  
20' 10' 0 20' 40'



SECTION A

SECTION B



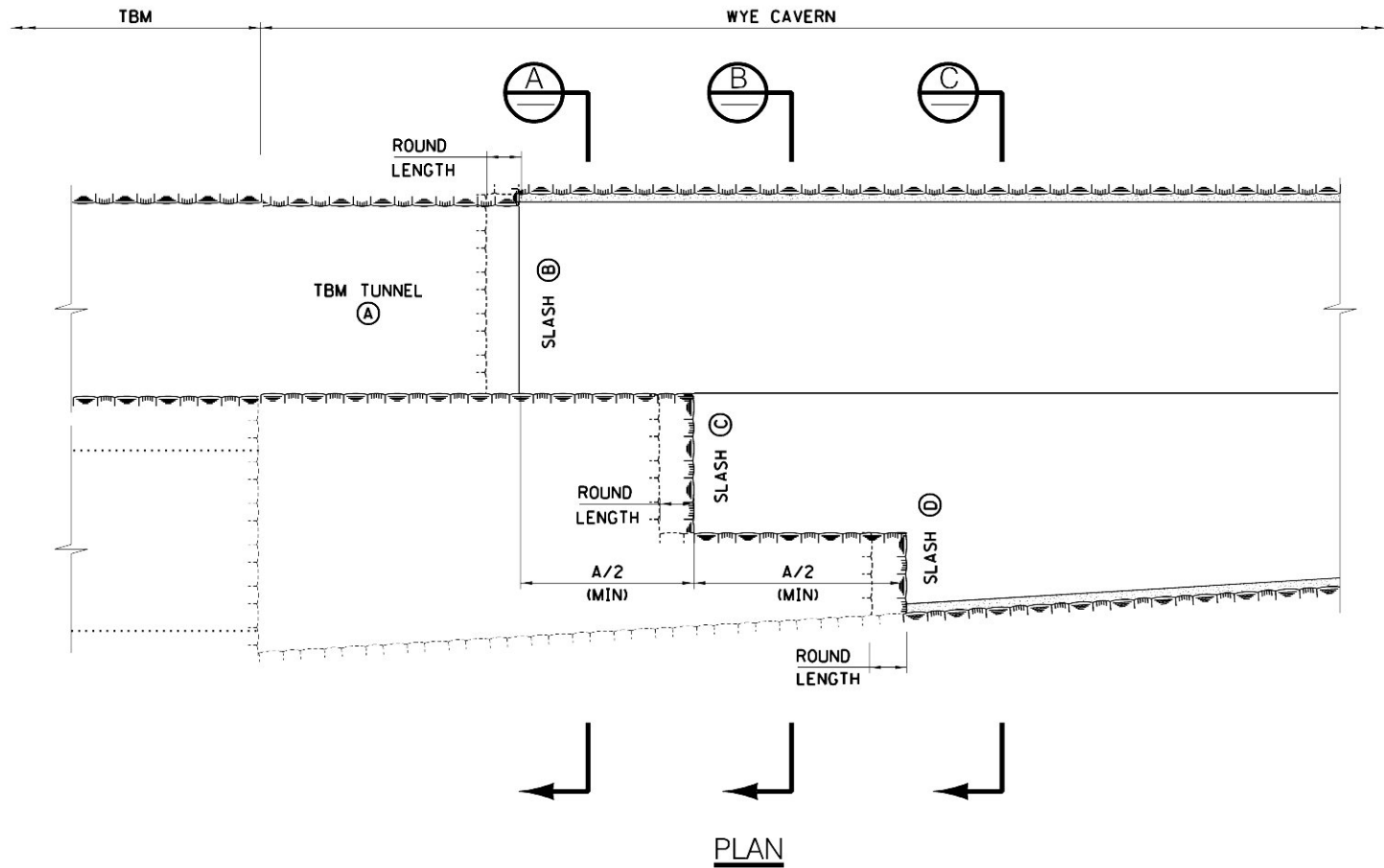
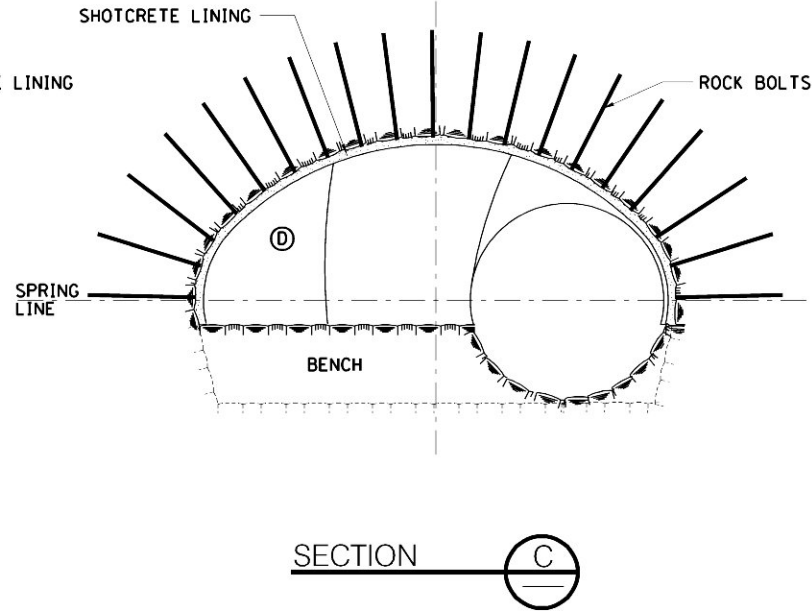
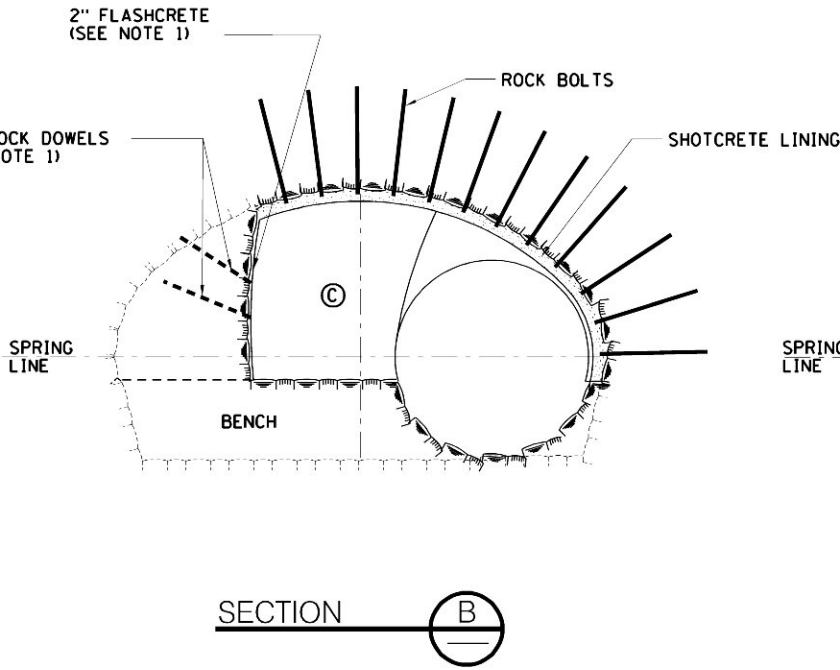
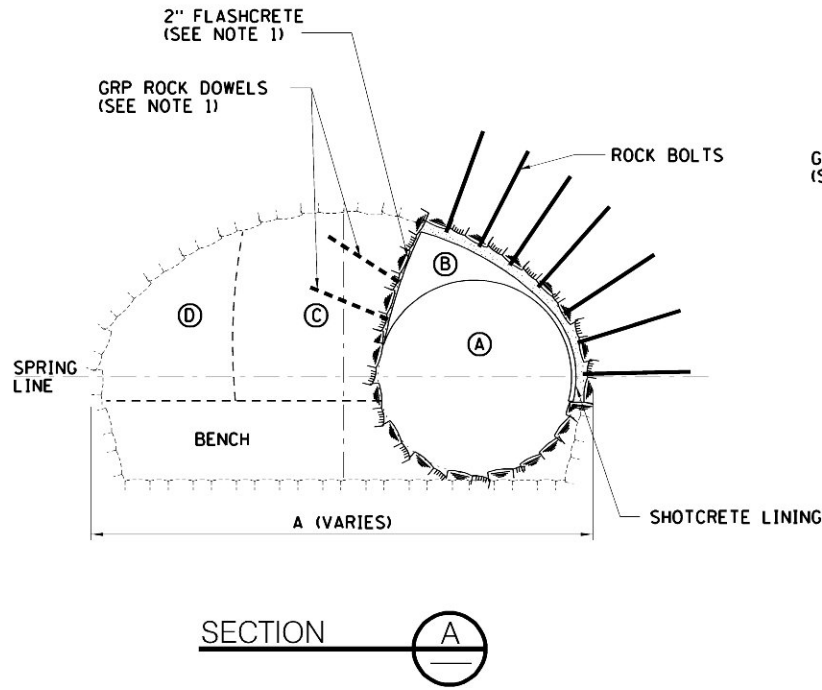
PLAN

CONSTRUCTION SEQUENCE:

EXCAVATE AND SUPPORT SLASHES B AND C AS SHOWN ON DWG CM009-RS-1064 MAINTAINING MINIMUM DISTANCE BETWEEN HEADINGS AS SHOWN.

NOTES:

1. INSTALL GRP ROCK DOWELS 1" DIA, 10' LONG AND 2" FLASHCRETE AS REQUIRED TO SUPPORT TEMPORARY EXCAVATION.
2. BOLTING NOT SHOWN ON PLAN.



CONSTRUCTION SEQUENCE:

EXCAVATE AND SUPPORT SLASHES B, C AND D AS SHOWN ON DWG CM009-RS-1066 MAINTAINING MINIMUM DISTANCE BETWEEN HEADINGS AS SHOWN

NOTES:

1. INSTALL GRP ROCK DOWELS 1" DIA, 10' LONG AND 2" FLASHCRETE AS REQUIRED TO SUPPORT TEMPORARY EXCAVATION.
2. APPLICATION OF PRE-SUPPORT SPILING SHALL BE AS REQUIRED BY GROUND CONDITIONS. FOR DETAILS SEE DWG CM009-RS-1102.
3. BOLTING NOT SHOWN ON PLAN.



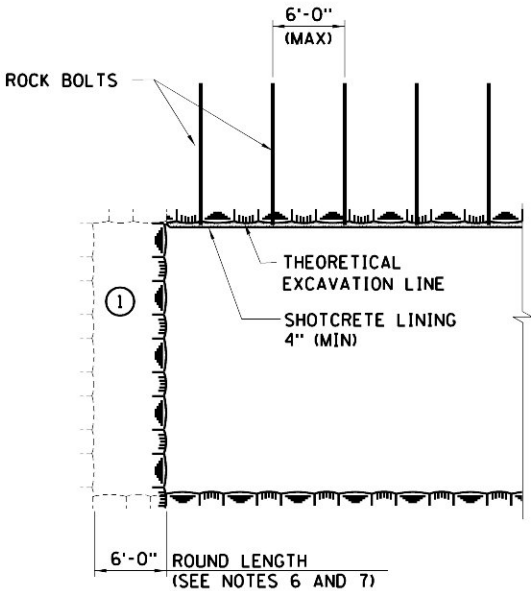
EXCAVATION SEQUENCE:

ROUND ① - EXCAVATE AND SUPPORT FULL TUNNEL PROFILE EVERY ROUND (SEE NOTE 2 AND 5)

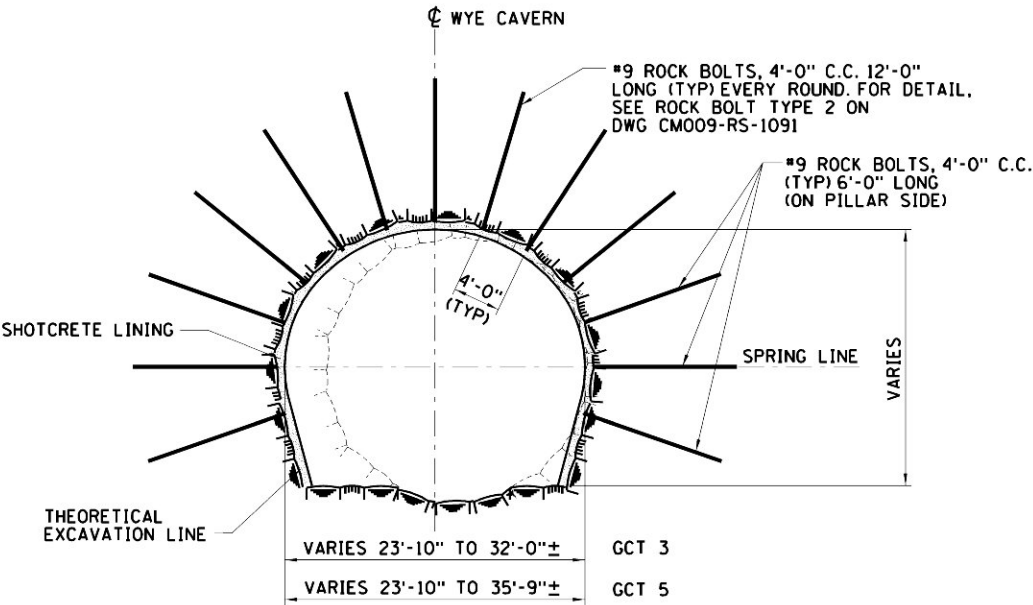
- STEP 1 - EXCAVATE ROUND ① (SEE NOTES 6 AND 7)  
STEP 2 - INSTALL ROCK BOLTS  
STEP 3 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)  
STEP 4 - INSTALL WWF  
STEP 5 - INSTALL SHOTCRETE TO 4" (MIN)  
STEP 6 - REPEAT STEPS 1-5 FOR NEXT ROUND

NOTES:

1. FOR SHOTCRETE LINING DETAILS AND SHOTCRETE SMOOTHNESS CRITERIA SEE DWG CM009-RS-1100 AND CM009-RS-1102.  
2. FOR ADDITIONAL INFORMATION RELATED TO CONSTRUCTION SEQUENCE OF GCT 3 AND GCT 5 SEE DWG CM009-RS-2021.  
3. SEE CM009-GP-0120 FOR EXCAVATION GEOMETRY.  
4. PROVIDE FACE SUPPORT AS SPECIFIED.  
5. EXCAVATION OF EACH ROUND SHALL BE FOLLOWED BY THE INSTALLATION OF INITIAL SUPPORT.  
6. IN SECTIONS WHERE THE PILLAR IS LESS THAN 12FT WIDE REDUCE ROUND LENGTH TO 4'-0" (MAX).  
7. THE ROUND LENGTH INDICATED MAY BE INCREASED UP TO A MAXIMUM OF 8'-0" IF ALL BLASTING VIBRATION CRITERIA ARE MET.



LONGITUDINAL SECTION  
GCT 3 AND GCT 5



TYPICAL CROSS SECTION



- EXCAVATION SEQUENCE (GCT 5):
- ROUND ① & ② - EXCAVATE AND SUPPORT TOP HEADING FOR EACH SLASH B AND C (SEE NOTES 2 AND 7)
- ROUND ③ - EXCAVATE AND SUPPORT BENCH

TOP HEADING:

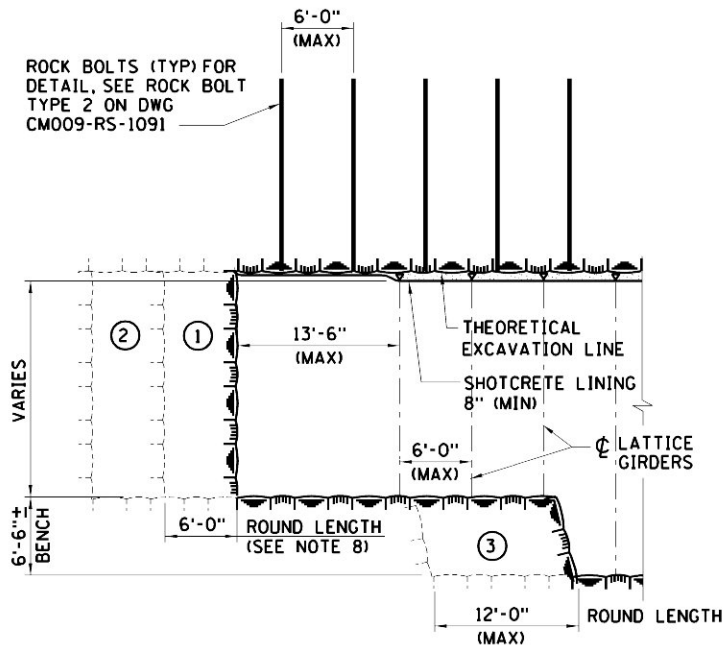
- STEP 1 - EXCAVATE SLASH B (C) IN ROUND ① (SEE NOTE 8)
- STEP 2 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 3 - INSTALL ROCK BOLTS
- STEP 4 - REPEAT STEPS 1-3 FOR NEXT ROUND

COMPLETE LAST 6" (MIN) OF SHOTCRETE LINING AT DISTANCE OF 13'-6" (MAX) FROM FACE AND AS FOLLOWS:

- STEP 5 - INSTALL 1 ST LAYER OF WWF
- STEP 6 - INSTALL LATTICE GIRDERS
- STEP 7 - INSTALL SHOTCRETE TO 8" (MIN) IN LAYERS WITH INSTALLATION OF 2ND LAYER OF WWF
- STEP 8 - REPEAT STEPS 5-7 FOR ROUND ②

BENCH:

- STEP 1 - EXCAVATE BENCH IN ROUND ③
- STEP 2 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 3 - INSTALL ROCK BOLTS
- STEP 4 - INSTALL 1 ST LAYER OF WWF
- STEP 5 - INSTALL LATTICE GIRDERS
- STEP 6 - INSTALL SHOTCRETE TO 8" (MIN) IN LAYERS WITH INSTALLATION OF 2ND LAYER OF WWF
- STEP 7 - REPEAT STEPS 1-6 FOR NEXT ROUND



LONGITUDINAL SECTION  
GCT 5

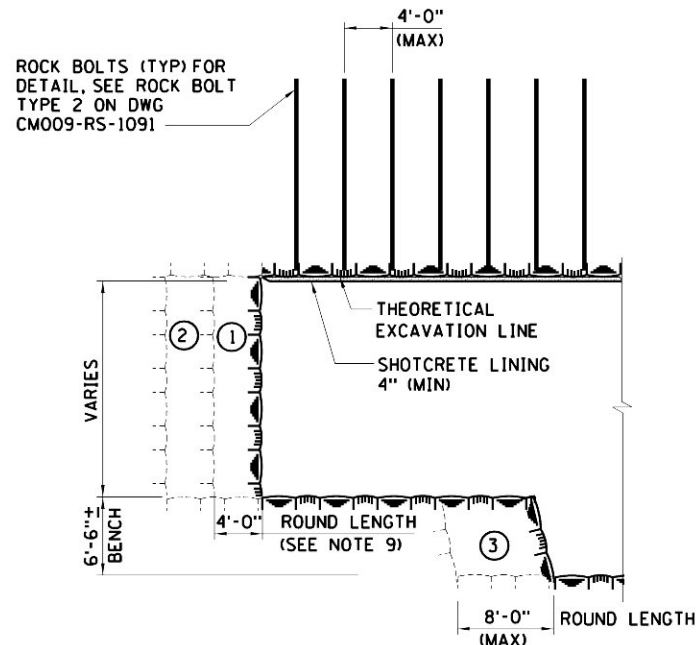
- EXCAVATION SEQUENCE (GCT 3):
- ROUND ① & ② - EXCAVATE AND SUPPORT TOP HEADING FOR EACH SLASH B AND C (SEE NOTES 2 AND 7)
- ROUND ③ - EXCAVATE AND SUPPORT BENCH

TOP HEADING:

- STEP 1 - EXCAVATE SLASH B (C) IN ROUND ① (SEE NOTE 9)
- STEP 2 - INSTALL ROCK BOLTS
- STEP 3 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 4 - INSTALL WWF
- STEP 5 - INSTALL SHOTCRETE TO 4" (MIN)
- STEP 6 - REPEAT STEPS 1-5 FOR ROUND ②

BENCH:

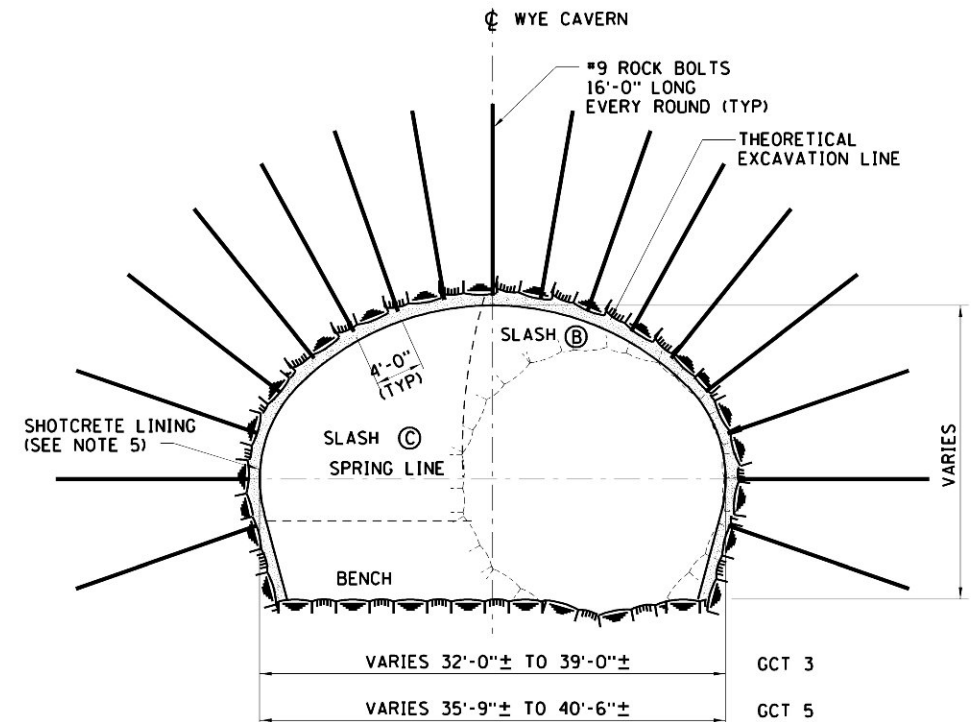
- STEP 1 - EXCAVATE BENCH IN ROUND ③
- STEP 2 - INSTALL ROCK BOLTS
- STEP 3 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 4 - INSTALL WWF
- STEP 5 - INSTALL SHOTCRETE TO 4" (MIN)
- STEP 6 - REPEAT STEPS 1-5 FOR NEXT ROUND



LONGITUDINAL SECTION  
GCT 3

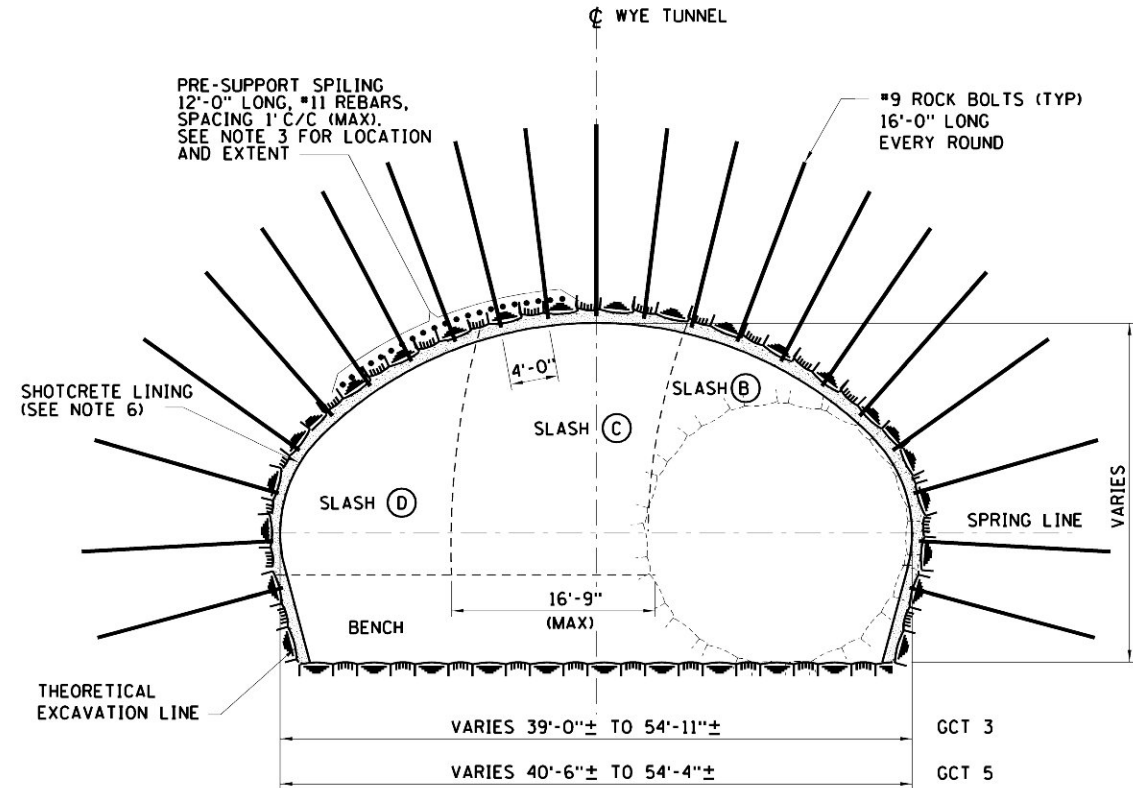
NOTES:

- FOR SHOTCRETE LINING DETAILS, SHOTCRETE SMOOTHNESS CRITERIA AND GIRDER DETAILS, SEE DWGS CM009-RS-1100, CM009-RD-1101 AND CM009-RS-1102.
- FOR ADDITIONAL INFORMATION RELATED TO CONSTRUCTION SEQUENCE SEE DWGS CM009-RS-2021 AND CM009-RS-2022.
- SEE CM009-GP-0120 FOR EXCAVATION GEOMETRY.
- EAST AND WEST WYE CAVERNS ARE SIMILAR BUT OPPOSITE HAND.
- FOR SHOTCRETE LINING THICKNESS SEE LONGITUDINAL SECTIONS.
- PROVIDE FACE SUPPORT AS SPECIFIED.
- EXCAVATION OF EACH ROUND SHALL BE FOLLOWED BY THE INSTALLATION OF INITIAL SUPPORT.
- THE ROUND LENGTH INDICATED FOR GCT 5 MAY BE INCREASED UP TO A MAXIMUM OF 8'-0" IF ALL BLASTING VIBRATION CRITERIA ARE MET.
- THE ROUND LENGTH INDICATED FOR GCT 3 MAY BE INCREASED UP TO A MAXIMUM OF 6'-0" IF ALL BLASTING VIBRATION CRITERIA ARE MET AND TBM TUNNELS HAVE NOT BEEN EXCAVATED.

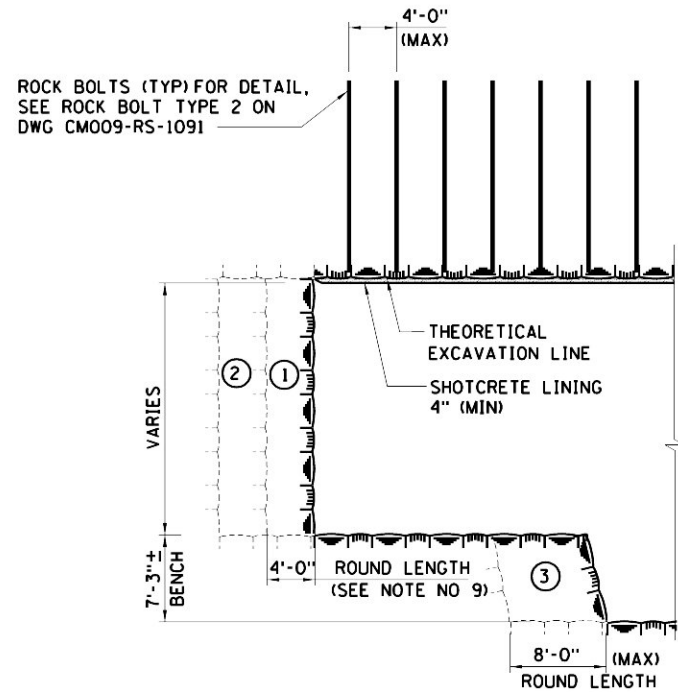


TYPICAL CROSS SECTION

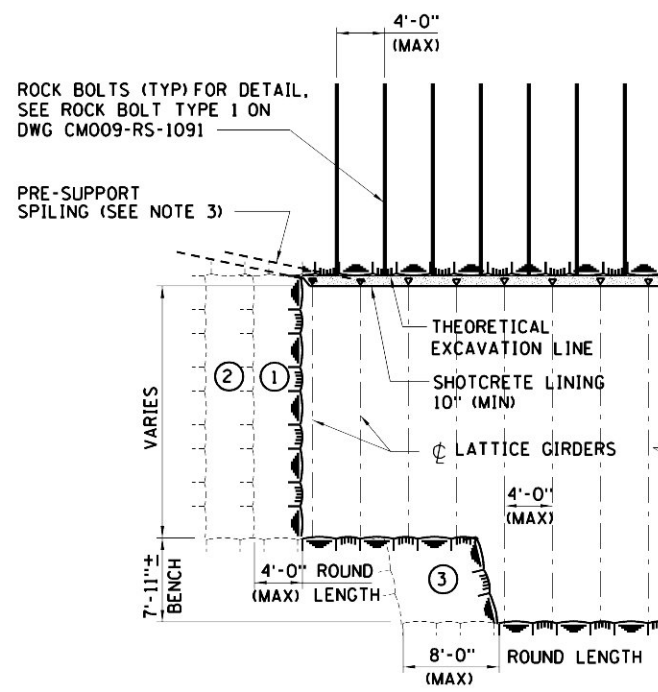




TYPICAL CROSS SECTION



LONGITUDINAL SECTION  
GCT 3

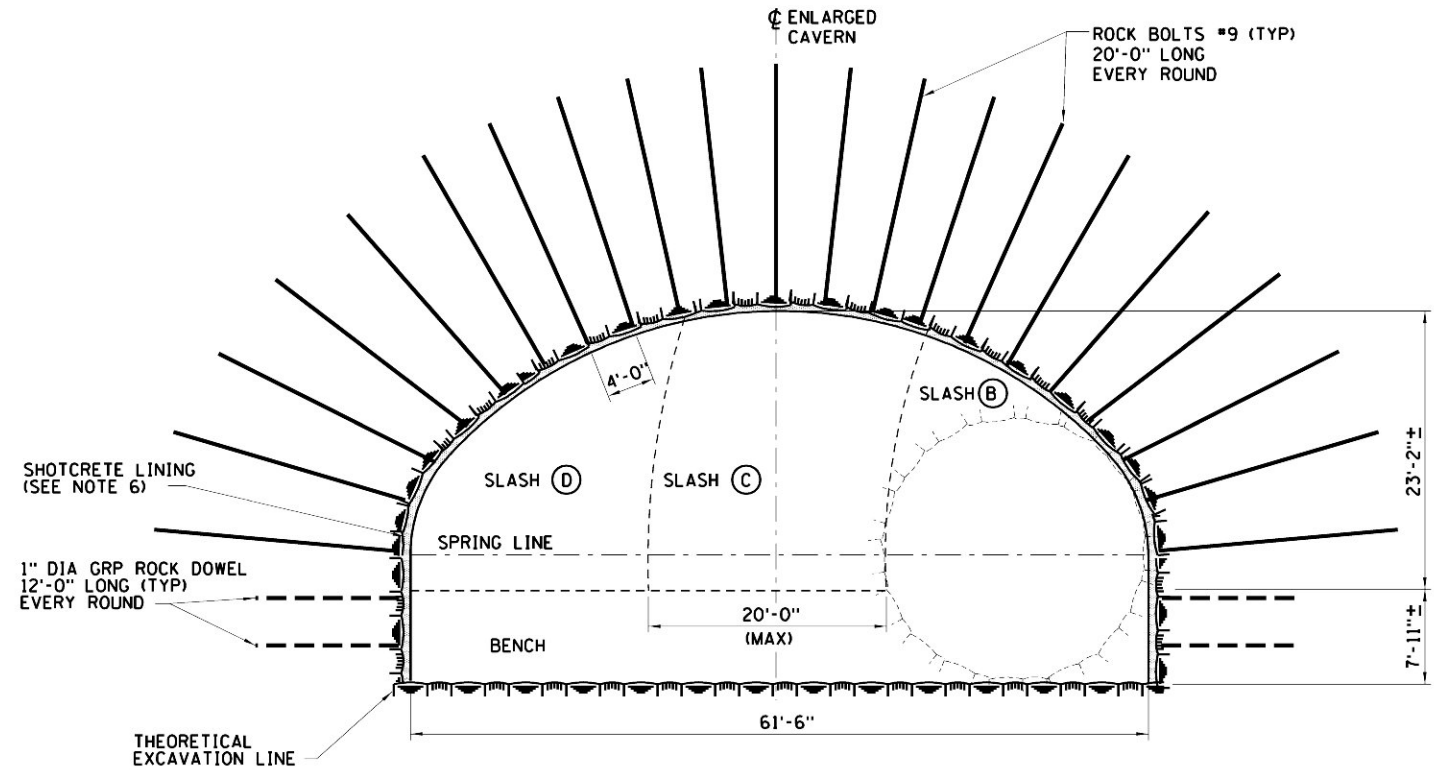


LONGITUDINAL SECTION  
GCT 5 (ANTICIPATED SHEAR ZONE)

- EXCAVATION SEQUENCE (GCT 5):
- ROUND ① & ② - EXCAVATE AND SUPPORT TOP HEADING FOR EACH SLASH B, C AND D (SEE NOTES 2 AND 7)
- ROUND ③ - EXCAVATE AND SUPPORT BENCH
- TOP HEADING:
- STEP 1 - EXCAVATE SLASH B (C, D) IN ROUND ①
- STEP 2 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 3 - INSTALL ROCK BOLTS
- STEP 4 - INSTALL 1 ST LAYER OF WWF
- STEP 5 - INSTALL LATTICE GIRDERS
- STEP 6 - INSTALL SHOTCRETE TO 10" (MIN) IN LAYERS WITH INSTALLATION OF 2ND LAYER OF WWF
- STEP 7 - REPEAT STEPS 1-6 FOR NEXT ROUND ②
- BENCH:
- STEP 1 - EXCAVATE BENCH IN ROUND ③
- STEP 2 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 3 - INSTALL ROCK BOLTS
- STEP 4 - INSTALL 1 ST LAYER OF WWF
- STEP 5 - INSTALL LATTICE GIRDERS
- STEP 6 - INSTALL SHOTCRETE TO 10" (MIN) IN LAYERS WITH INSTALLATION OF 2ND LAYER OF WWF
- STEP 7 - REPEAT STEPS 1-6 NEXT ROUND

- EXCAVATION SEQUENCE (GCT 3):
- ROUND ① & ② - EXCAVATE AND SUPPORT TOP HEADING FOR EACH SLASH B, C, D AND E (SEE NOTES 2, 7 AND 11)
- ROUND ③ - EXCAVATE AND SUPPORT BENCH
- TOP HEADING:
- STEP 1 - EXCAVATE SLASH B (C, D, E) IN ROUND ①
- STEP 2 - INSTALL ROCK BOLTS
- STEP 3 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 4 - INSTALL WWF
- STEP 5 - INSTALL SHOTCRETE TO 4" (MIN)
- STEP 6 - REPEAT STEPS 1-5 FOR ROUND ②
- BENCH:
- STEP 1 - EXCAVATE BENCHES IN ROUND ③
- STEP 2 - INSTALL ROCK BOLTS
- STEP 3 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 4 - INSTALL WWF
- STEP 5 - INSTALL SHOTCRETE TO 4" (MIN)
- STEP 6 - REPEAT STEPS 1-5 FOR NEXT ROUND

- NOTES:
- FOR SHOTCRETE LINING DETAILS, SHOTCRETE SMOOTHNESS CRITERIA AND LATTICE GIRDER DETAILS, SEE DWGS CM009-RS-1100, CM009-RS-1101 AND CM009-RS-1102.
  - FOR ADDITIONAL INFORMATION RELATED TO CONSTRUCTION SEQUENCE SEE DWGS CM009-RS-2024 AND CM009-RS-2021.
  - APPLICATION OF PRE-SUPPORT SPILING IN GCT 5 SHALL BE AS REQUIRED BY ACTUAL GROUND CONDITIONS ENCOUNTERED OR AS DIRECTED BY THE RESIDENT ENGINEER. FOR DETAILS SEE DWG CM009-RS-1102.
  - SEE CM009-GP-0120 FOR EXCAVATION GEOMETRY.
  - EAST AND WEST WYE CAVERNS ARE SIMILAR BUT OPPOSITE HAND.
  - FOR SHOTCRETE LINING THICKNESS SEE LONGITUDINAL SECTIONS.
  - EXCAVATION OF EACH ROUND SHALL BE FOLLOWED BY THE INSTALLATION OF INITIAL SUPPORT.
  - PROVIDE FACE SUPPORT AS SPECIFIED.
  - THE ROUND LENGTH INDICATED (FOR GCT 3 ONLY) MAY BE INCREASED UP TO A MAXIMUM OF 6'-0" IF ALL BLASTING VIBRATION CRITERIA ARE MET.
  - END WALL / HEAD WALL AND PARTIAL HEAD WALL SUPPORT NOT SHOWN. INSTALL 10'-0" LONG #8 ROCK DOWELS TYPE 1, ONE PER 30 SQ FT AND 4" REINFORCED SHOTCRETE LAYER. MINIMUM SPACING OF ROCK DOWELS SHALL BE 6'-0".

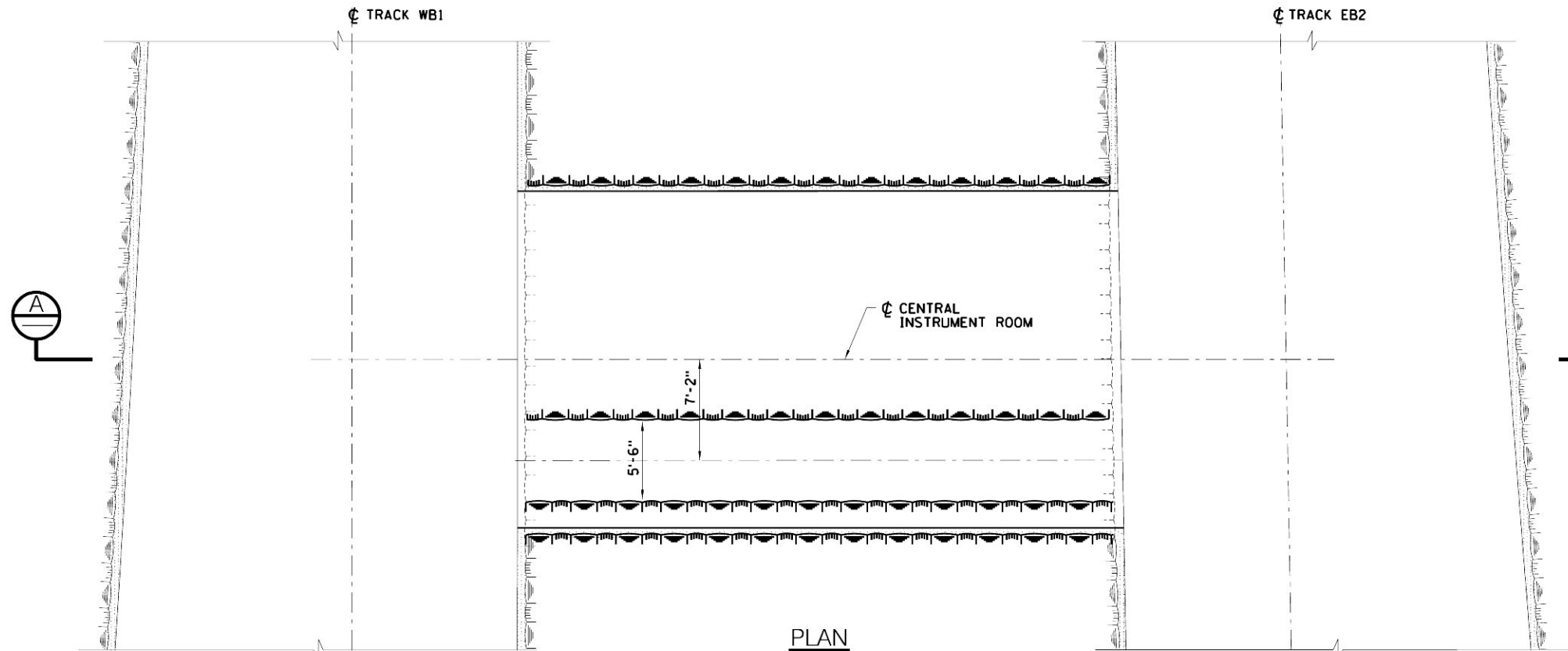


TYPICAL CROSS SECTION  
GCT 3 ENLARGED CAVERN

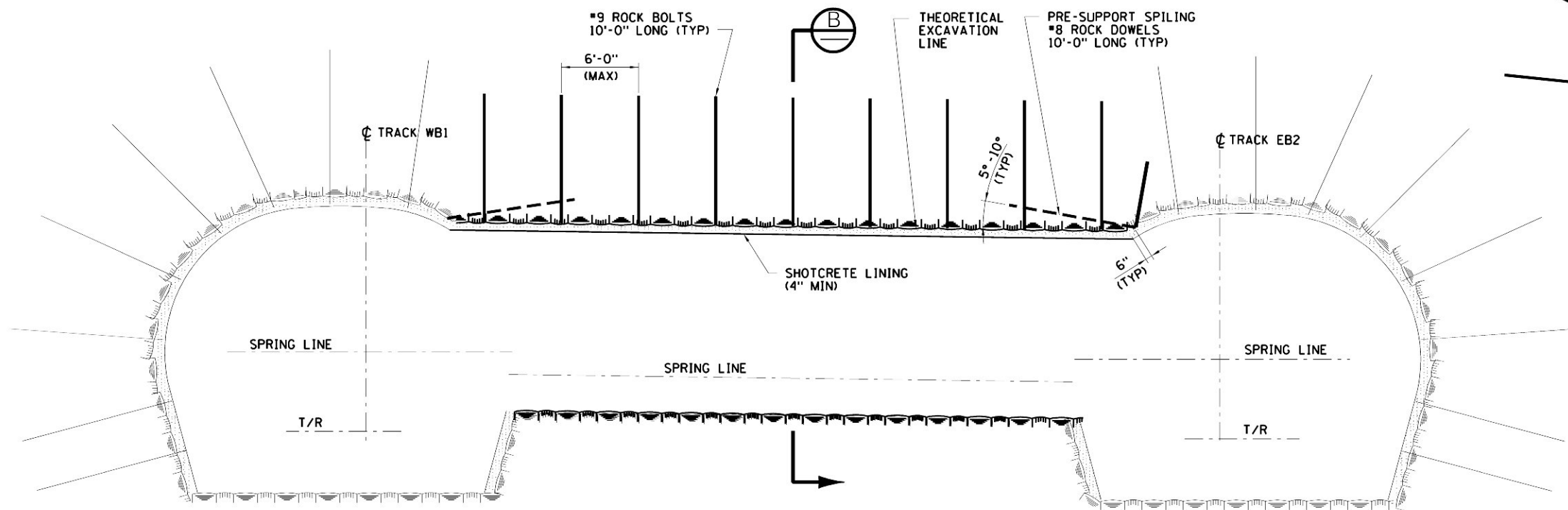


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PLAN



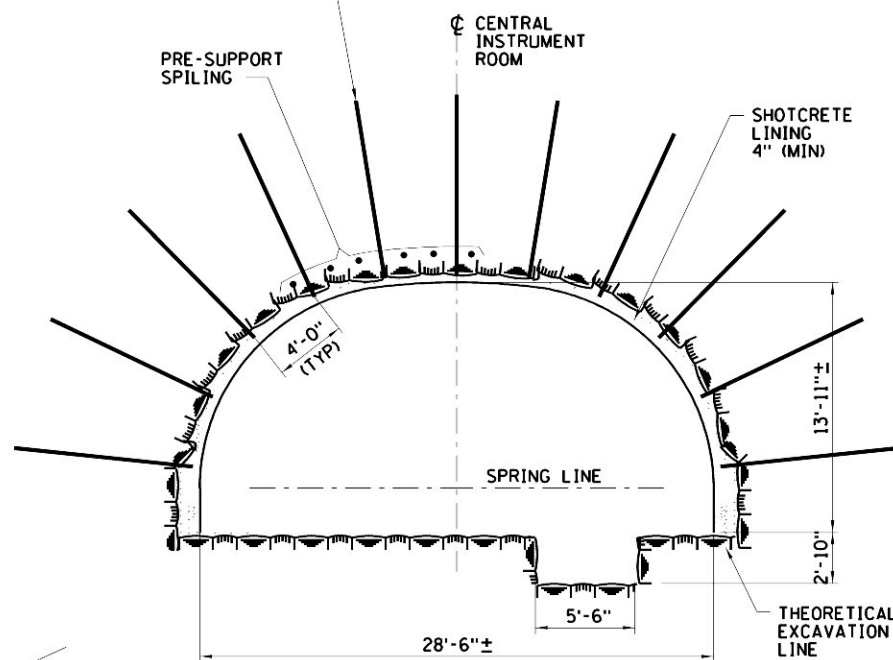
LONGITUDINAL SECTION



NOTES:

1. FOR SHOTCRETE LINING DETAILS AND SHOTCRETE SMOOTHNESS CRITERIA, SEE DWGS CM009-RS-1100 AND CM009-RS-1102.
2. FOR THE SETTING OUT OF THE CENTRAL INSTRUMENT ROOM REFER TO DWG CM009-GP-0122.
3. EXCAVATION SEQUENCE SHALL BE SIMILAR TO THE EXCAVATION SEQUENCE OF WYE CAVERNS SHOWN ON DWG CM009-RS-1062.
4. FOR LOCATION OF THE CENTRAL INSTRUMENT ROOM SEE DWG CM009-ST-1012.

#9 ROCK BOLTS 10'-0" LONG (TYP)  
6'-0" C/C LONGITUDINAL  
FOR DETAIL SEE ROCK BOLT TYPE 2  
ON DWG CM009-RS-1091



CROSS-SECTION



**MTA** Metropolitan Transportation Authority  
Capital Construction

**Long Island Rail Road**  
East Side Access

**GEC** PB  
STV  
PARSONS  
General Engineering Consultant

PARSONS BRINCKERHOFF  
STV INCORPORATED  
PARSONS TRANSPORTATION  
GROUP OF NEW YORK, INC.  
469 Seventh Avenue • New York, NY • 10018

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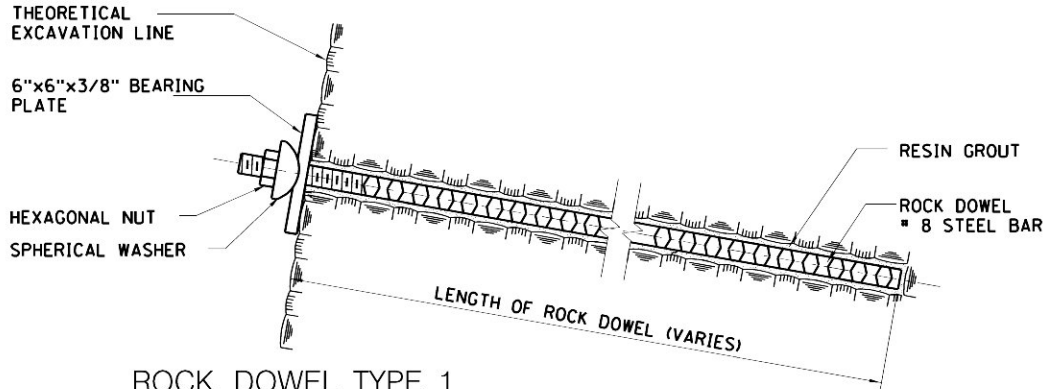
DATE: \_\_\_\_\_

**MANHATTAN TUNNELS EXCAVATION**  
EXCAVATION & INITIAL SUPPORT  
CENTRAL INSTRUMENT ROOM

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-RS-1124  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
110 OF 276





### ROCK DOWEL TYPE 1

(SEE NOTE 1)

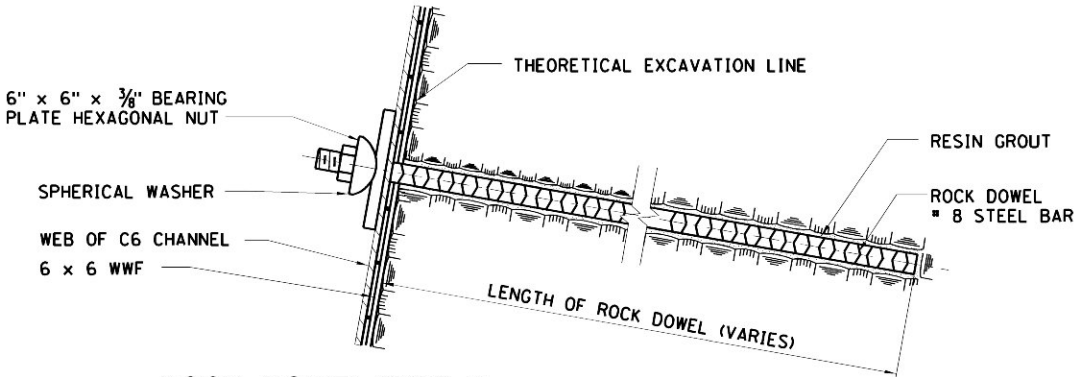
APPLICABLE TO:

SC-I TBM, SEE DWG CM009-RS-1051

STARTER TUNNEL TYPE I, SEE DWG CM009-RS-1042

APPROACH TUNNELS, SEE DWGS CM009-RS-9002, CM009-RS-9003 AND CM009-RS-9005

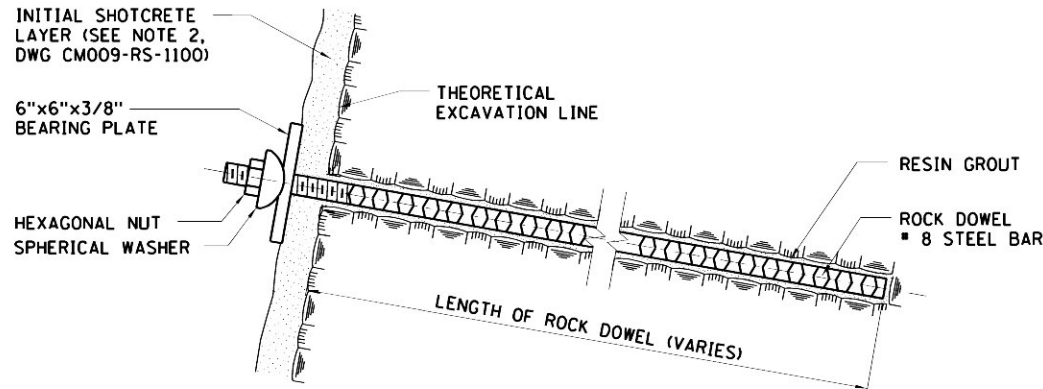
CROSS PASSAGES, SEE DWG CM009-RS-1067



### ROCK DOWEL TYPE 2

APPLICABLE TO:

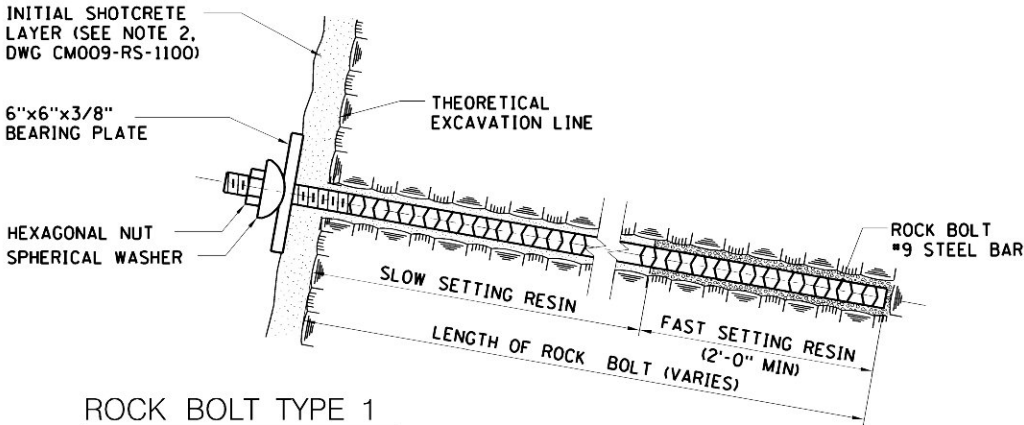
SC-II TBM, SEE DWG CM009-RS-1052



### ROCK DOWEL TYPE 3

APPLICABLE TO:

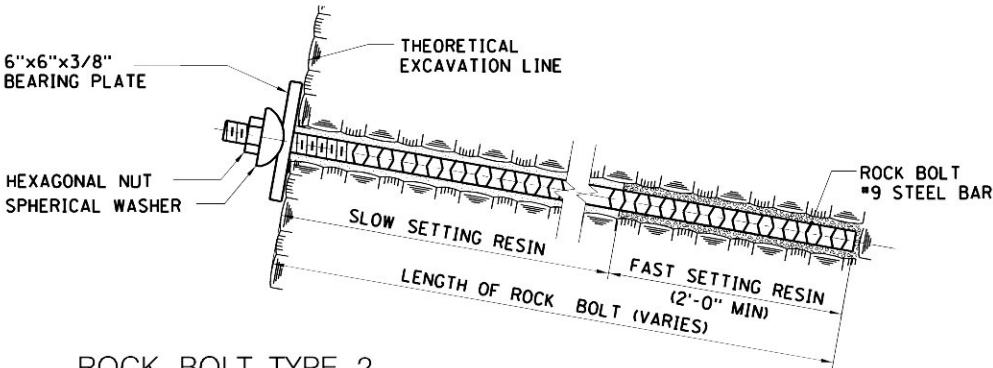
STARTER TUNNEL TYPE-II, SEE DWG CM009-RS-1042



### ROCK BOLT TYPE 1

APPLICABLE TO:

GCT 5 WYE CAVERN, SEE DWGS CM009-RS-1064 & CM009-RS-1066



### ROCK BOLT TYPE 2

APPLICABLE TO:

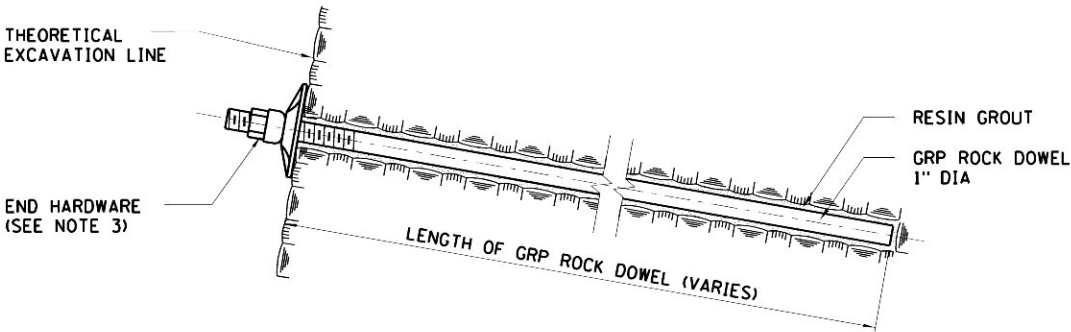
ASSEMBLY CHAMBER, SEE DWG CM009-RS-1032

GCT 3 WYE CAVERN, SEE DWGS CM009-RS-1062, CM009-RS-1064 AND CM009-RS-1066

GCT 5 WYE CAVERN, SEE DWG CM009-RS-1062

CIR, SEE DWG CM009-RS-1062

CROSS FLUE, SEE DWG CM009-RS-1127



### GRP ROCK DOWEL

(SEE NOTE 1)

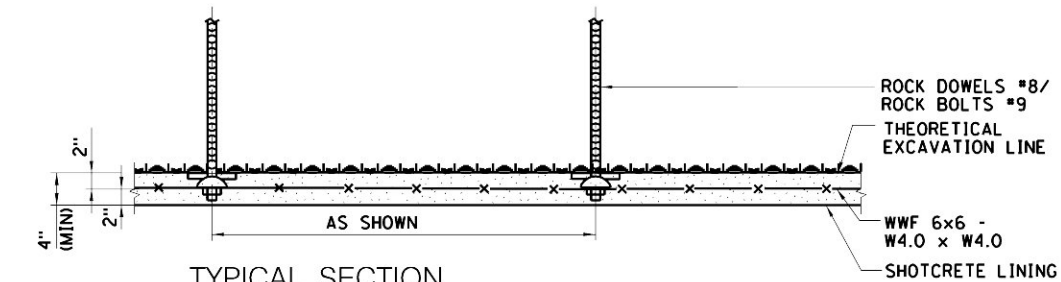
APPLICABLE TO:

SC-IE TBM, SEE DWG CM009-RS-1054

SC-IIIE TBM, SEE DWG CM009-RS-1055

NOTES:

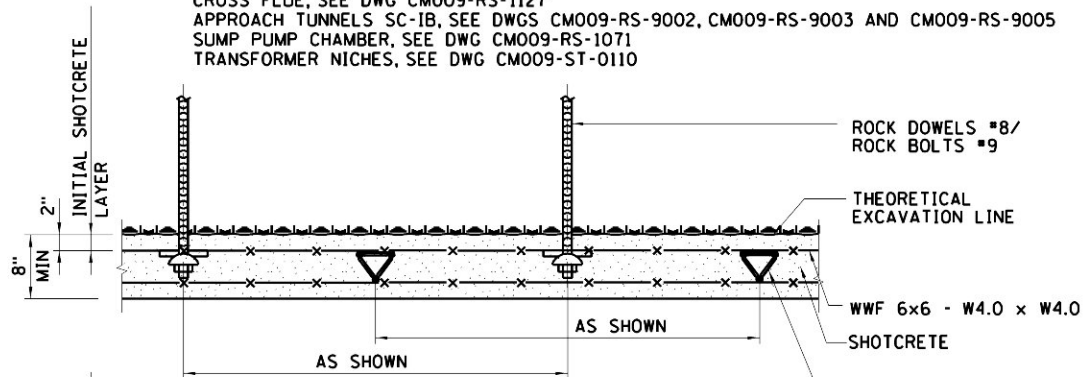
1. MINE STRAPS AND/OR WWF APPLIED AS PART OF THE INITIAL SUPPORT NOT SHOWN.
2. BOREHOLE DIAMETERS FOR DOWEL/BOLT INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDATIONS.
3. END HARDWARE FOR GRP DOWELS SHALL BE ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
4. IN LIEU OF RESIN GROUTED BOLTS/DOWELS CEMENT GROUTED BOLTS/DOWELS MAY BE USED.
5. LENGTHS OF ROCK DOWELS AND ROCK BOLTS INDICATED ON THE DRAWINGS ARE EMBEDDED LENGTHS IN THE ROCK. CONTRACTOR SHALL PROVIDE SUFFICIENT LENGTHS OF BARS OR RODS TO ALLOW FOR INSTALLATION OF END HARDWARE.



TYPICAL SECTION

4" SHOTCRETE

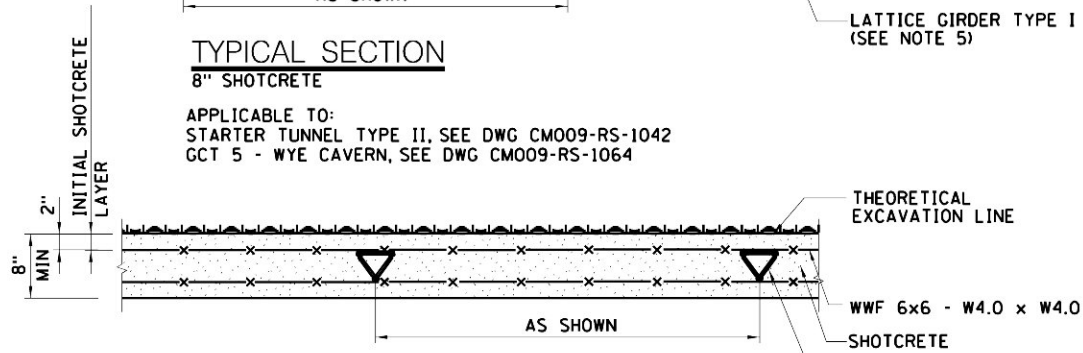
APPLICABLE TO:  
ASSEMBLY CHAMBER, SEE DWG CM009-RS-1032  
STARTER TUNNEL TYPE I, SEE DWG CM009-RS-1042  
GCT 3 - WYE CAVERN, SEE DWGS CM009-RS-1062, CM009-RS-1064, AND CM009-RS-1066  
AT CROSS PASSAGES, SEE DWG CM009-RS-1067, CM009-RS-1069 AND CM009-RS-1070  
CIR, SEE DWG CM009-RS-1124  
GCT 5 - WYE CAVERN, SEE DWG CM009-RS-1062  
CROSS FLUE, SEE DWG CM009-RS-1127  
APPROACH TUNNELS SC-IB, SEE DWGS CM009-RS-9002, CM009-RS-9003 AND CM009-RS-9005  
SUMP PUMP CHAMBER, SEE DWG CM009-RS-1071  
TRANSFORMER NICHES, SEE DWG CM009-ST-0110



TYPICAL SECTION

8" SHOTCRETE

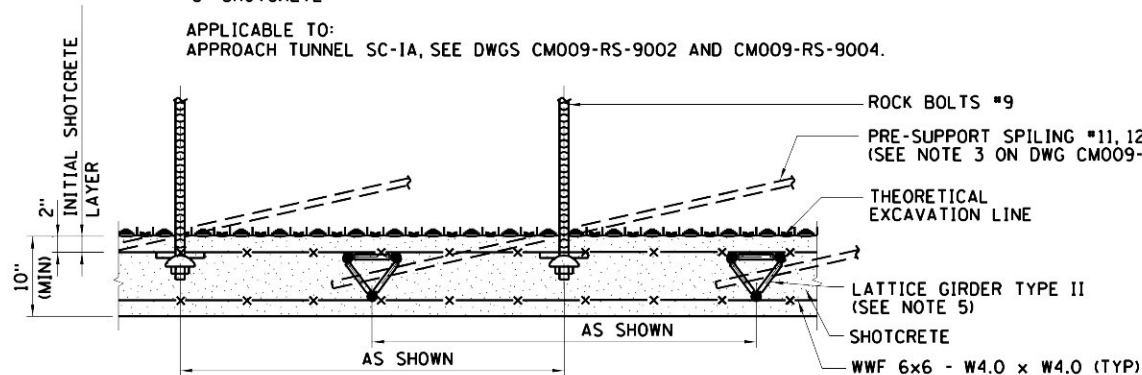
APPLICABLE TO:  
STARTER TUNNEL TYPE II, SEE DWG CM009-RS-1042  
GCT 5 - WYE CAVERN, SEE DWG CM009-RS-1064



TYPICAL SECTION

8" SHOTCRETE

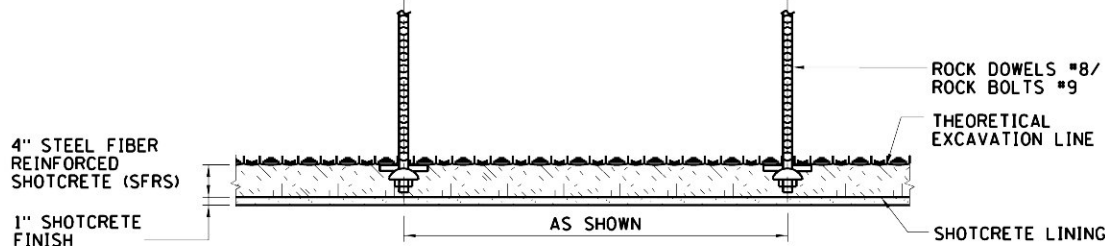
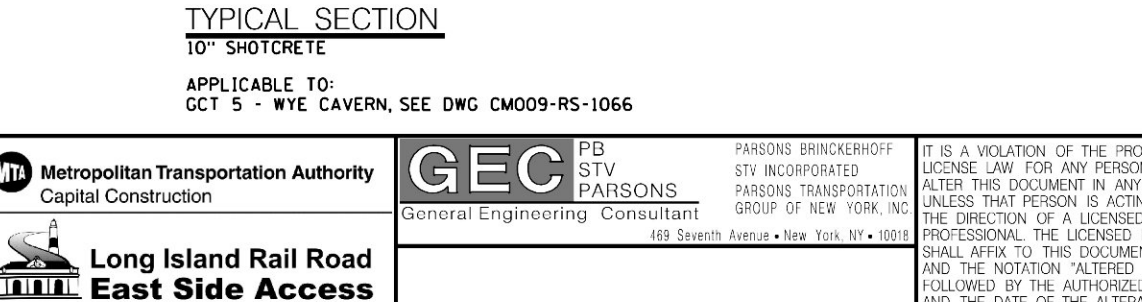
APPLICABLE TO:  
APPROACH TUNNEL SC-1A, SEE DWGS CM009-RS-9002 AND CM009-RS-9004.



TYPICAL SECTION

10" SHOTCRETE

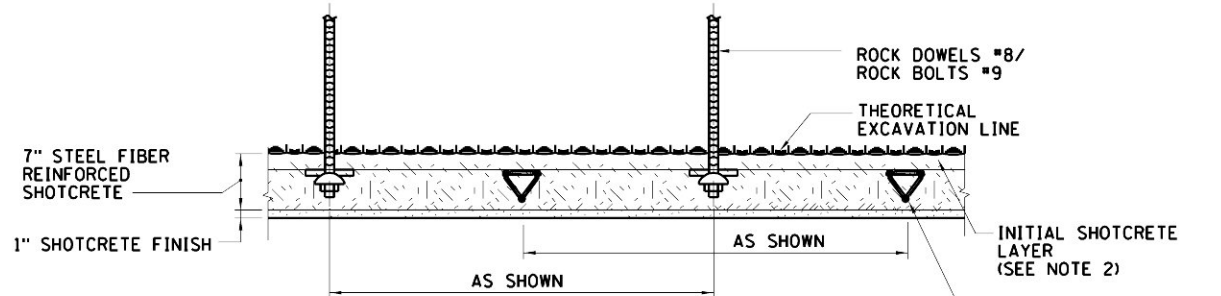
APPLICABLE TO:  
GCT 5 - WYE CAVERN, SEE DWG CM009-RS-1066



TYPICAL SECTION

4" SFRS + FINISH

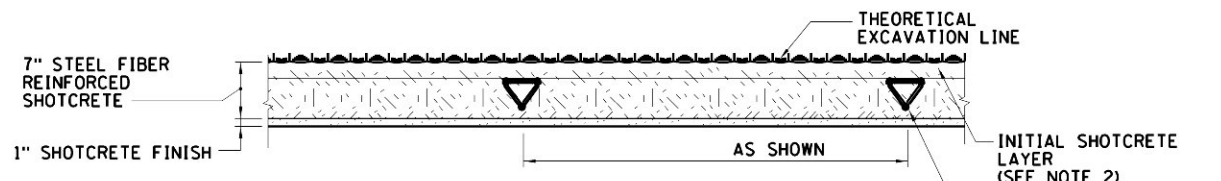
APPLICABLE TO:  
ASSEMBLY CHAMBER, SEE DWG CM009-RS-1032  
STARTER TUNNEL TYPE I, SEE DWG CM009-RS-1042  
GCT 3 - WYE CAVERN, SEE DWGS CM009-RS-1062, CM009-RS-1064, AND CM009-RS-1066  
AT CROSS PASSAGES, SEE DWG CM009-RS-1067, CM009-RS-1069 AND CM009-RS-1071  
CIR, SEE DWG CM009-RS-1124  
GCT 5 - WYE CAVERN, SEE DWG CM009-RS-1062  
CROSS FLUE, SEE DWG CM009-RS-1127  
APPROACH TUNNELS SC-IB, SEE DWGS CM009-RS-9002, CM009-RS-9003 AND CM009-RS-9005  
SUMP PUMP CHAMBER, SEE DWG CM009-RS-1071  
TRANSFORMER NICHES, SEE DWG CM009-ST-0110



TYPICAL SECTION

7" SFRS + FINISH

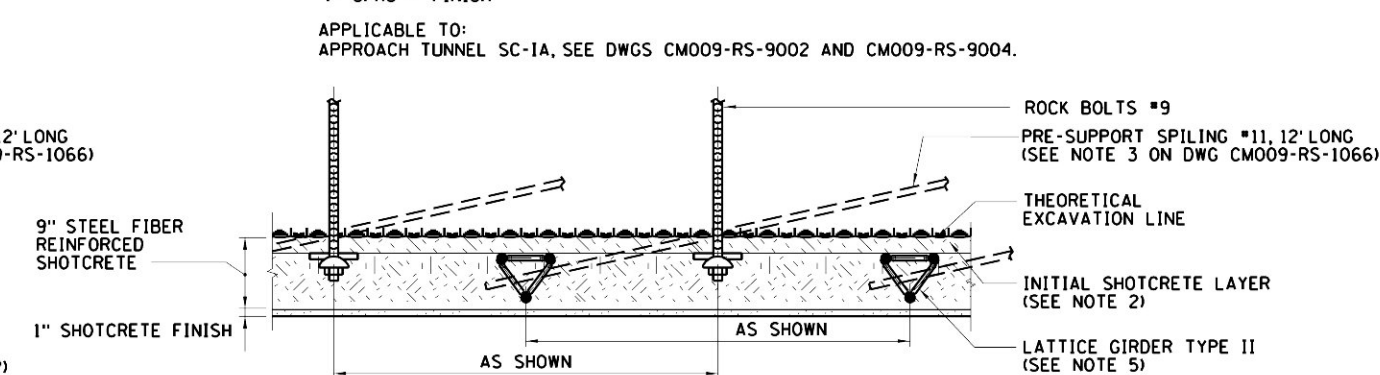
APPLICABLE TO:  
STARTER TUNNEL TYPE II, SEE DWG CM009-RS-1042  
GCT 5 - WYE CAVERN, SEE DWG CM009-RS-1064



TYPICAL SECTION

7" SFRS + FINISH

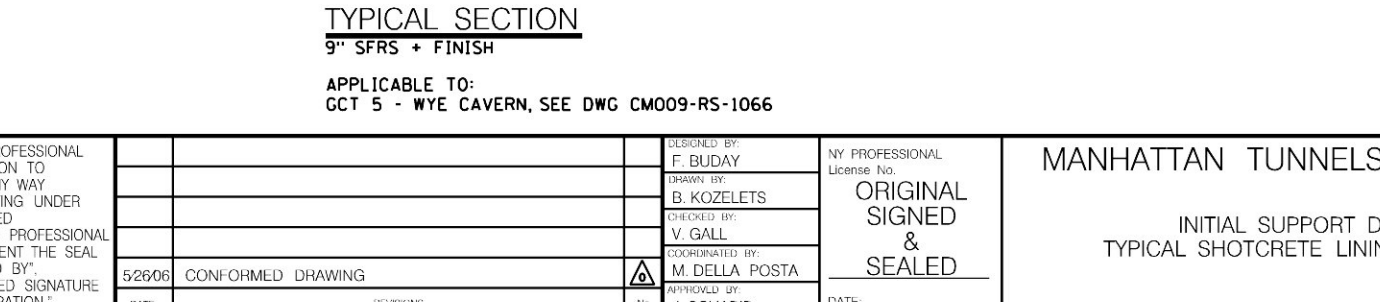
APPLICABLE TO:  
APPROACH TUNNEL SC-1A, SEE DWGS CM009-RS-9002 AND CM009-RS-9004.



TYPICAL SECTION

9" SFRS + FINISH

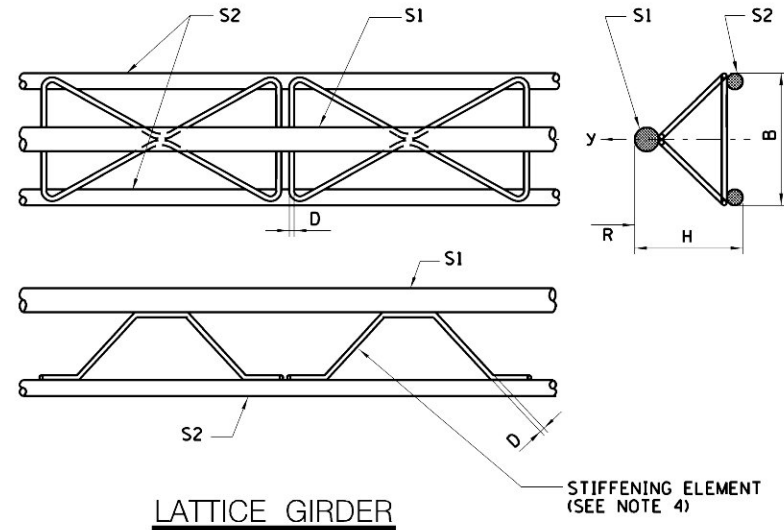
APPLICABLE TO:  
GCT 5 - WYE CAVERN, SEE DWG CM009-RS-1066



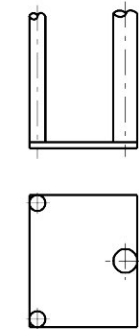
NOTES:

1. STEEL FIBER REINFORCED SHOTCRETE (SFRS) MAY BE USED IN LIEU OF SHOTCRETE REINFORCED WITH WELDED WIRE FABRIC (WWF) AS SHOWN. A 1.0-INCH UNREINFORCED FINISH SHOTCRETE LAYER SHALL BE APPLIED WHEN SFRS IS USED. FOR SHOTCRETE LININGS OF 8, 10 AND 12 INCH (MIN.) THE FINISH LAYER IS PART OF THE SHOTCRETE LINING THICKNESS. FOR SHOTCRETE LININGS OF 4" (MIN) THE FINISH LAYER IS ADDED TO THE THICKNESS AND THE EXCAVATION SHALL BE INCREASED BY 1.0 INCH.
2. SUBJECT TO GROUND CONDITIONS AND REVIEW BY THE RESIDENT ENGINEER ROCK DOWELS/BOLTS MAY BE APPLIED PRIOR TO SHOTCRETING.
3. FOR SHOTCRETE SMOOTHNESS CRITERIA, SEE DWG CM009-RS-1102.
4. ROCK DOWEL/BOLT DETAILS SEE DWG CM009-RS-1091.
5. FOR LATTICE GIRDER DETAILS SEE DWG CM009-RS-1101.
6. FOR SPILING SEE DWG CM009-RS-1102.
7. PANNING FOR GROUNDWATER INFLOWS BY MEANS OF WATER SHEETS AND DRAIN HOSES NOT SHOWN.

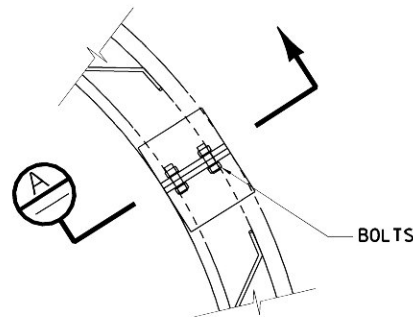




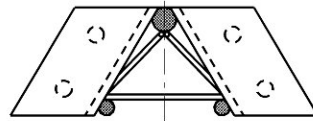
LATTICE GIRDER



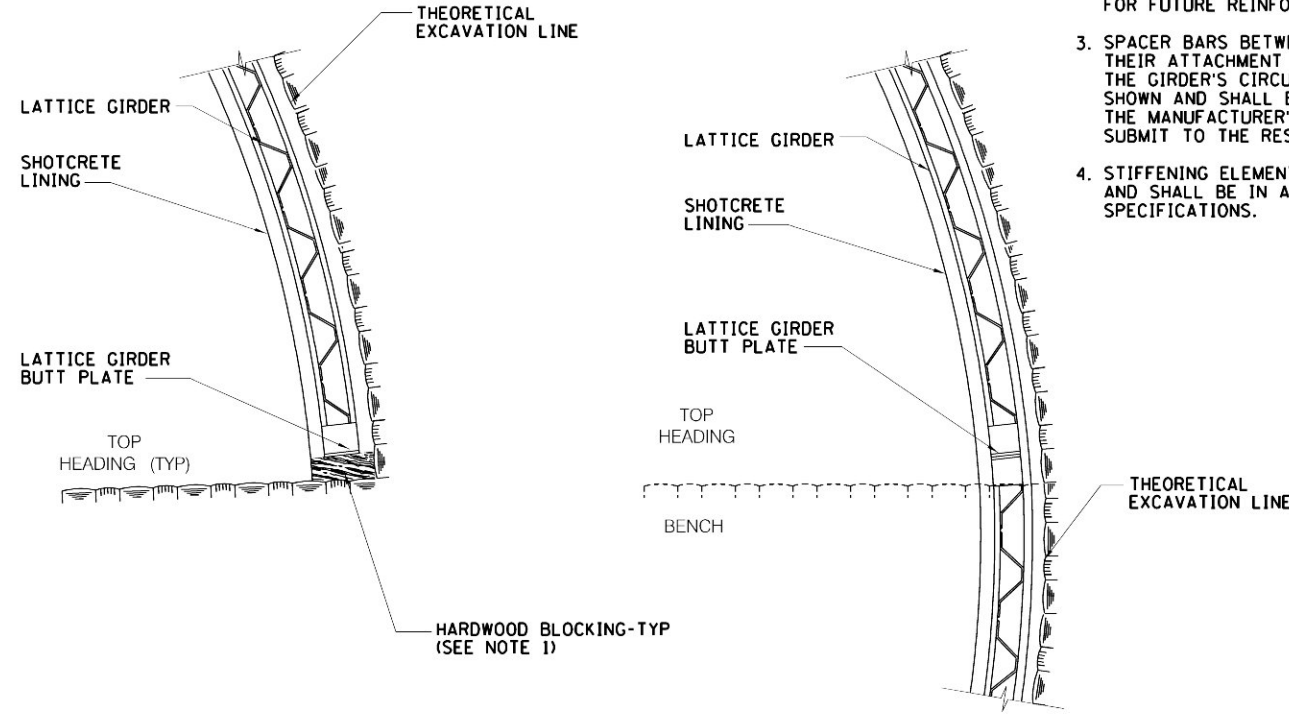
END PLATE



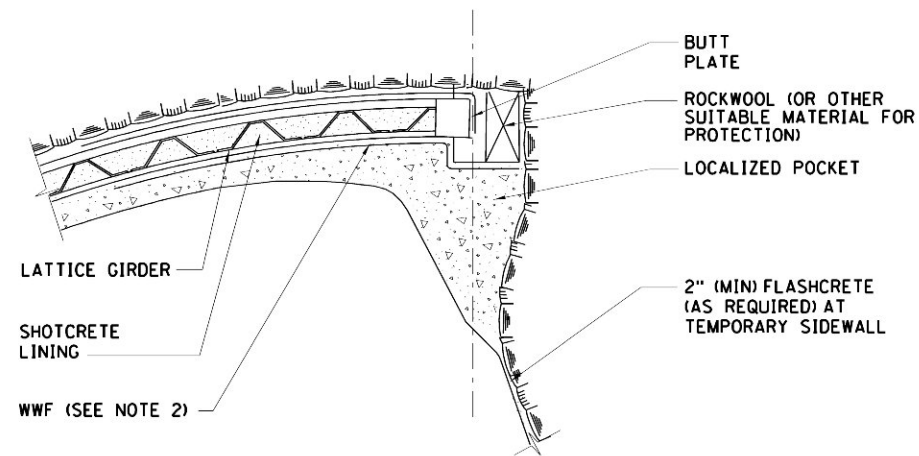
BUTT PLATE DETAIL



SECTION A



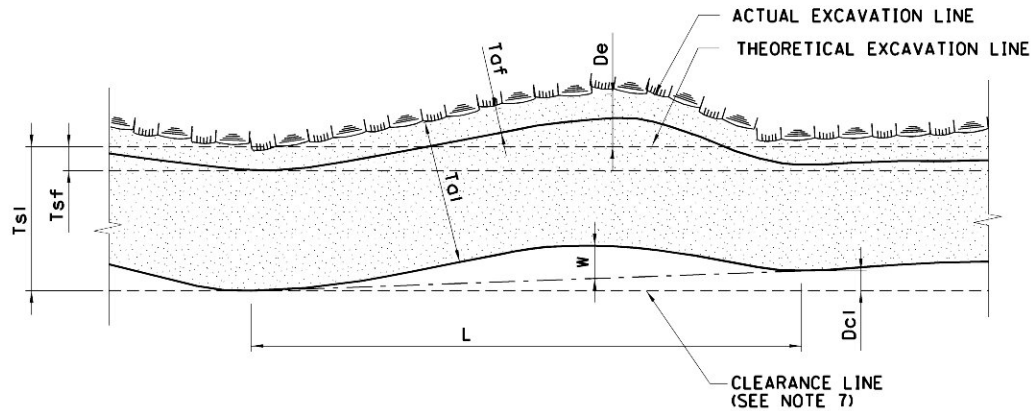
INITIAL LINING CONNECTION, TOP HEADING-BENCH (TYP)



ROOF DETAIL (TYP)

- NOTES:
1. REMOVE HARDWOOD BLOCKING PRIOR TO LATTICE GIRDER INSTALLATION IN BENCH.
  2. PROVIDE SUITABLE PROTECTION OF WWF FOR FUTURE REINFORCEMENT LAP IN ARCH.
  3. SPACER BARS BETWEEN LATTICE GIRDERS, THEIR ATTACHMENT AND SPACING ALONG THE GIRDER'S CIRCUMFERENCE ARE NOT SHOWN AND SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION. SUBMIT TO THE RESIDENT ENGINEER FOR REVIEW.
  4. STIFFENING ELEMENTS SHOWN ARE TYPICAL AND SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.

3-BAR LATTICE GIRDER PROPERTIES											
LOCATIONS	TYPE	BAR SIZE			H	B	Ix	Sx	BUTT PLATE		END PLATE
		S2	S1	D	(in)	(in)	(in4)	(in3)	SIZE (in)	LENGTH (in)	SIZE (in)
APPROACH TUNNEL SC-1A STARTER TUNNEL TYPE II GCT 5 - WYE CAVERN	TYPE I	6	10	0.39"	3.94	3.94	4.676	2.226	L4x3x 3/8 x LENGTH	4 9/16	3/8x5x5
GCT 5 - WYE CAVERN (SHEAR ZONE)	TYPE II	8	11	0.39"	6.16	7.09	18.883	5.854		7 1/16	3/8x7x8

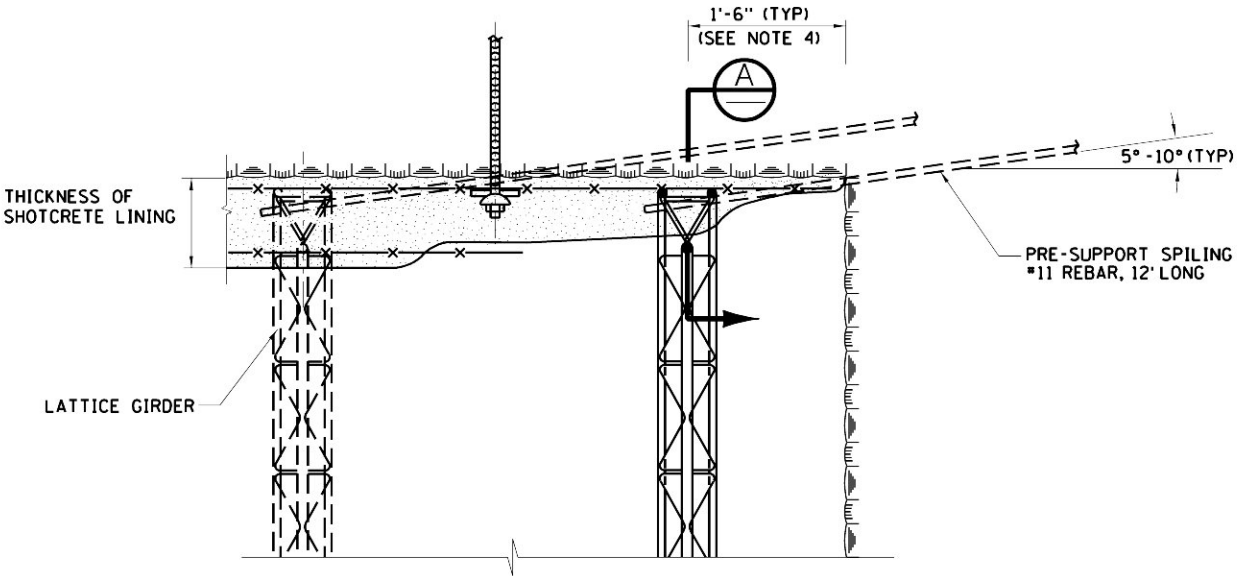


GENERAL SHOTCRETE SMOOTHNESS CRITERIA

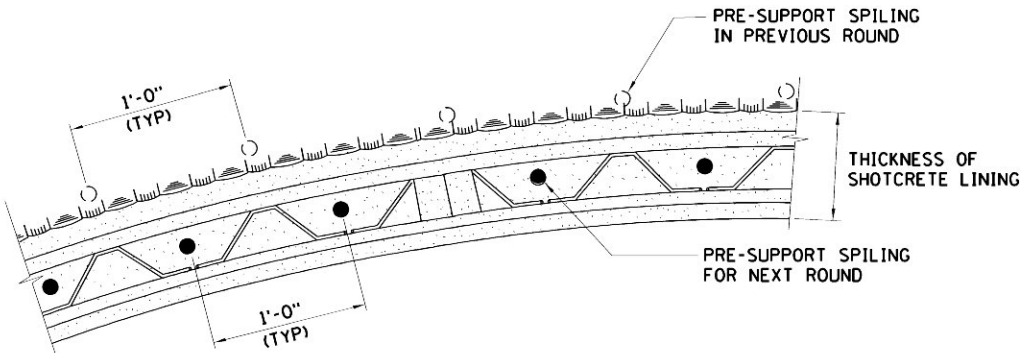
- Tsf DESIGN THICKNESS OF INITIAL SHOTCRETE LAYER (AS APPLICABLE)  
Tof ACTUAL THICKNESS OF INITIAL SHOTCRETE LAYER (AS APPLICABLE)  
Tsi DESIGN THICKNESS OF SHOTCRETE LINING (IN)  
Tol ACTUAL THICKNESS OF SHOTCRETE LINING (IN)  
(INCLUDES FINISH SHOTCRETE, SEE NOTE 6)  
De DEVIATION FROM THEORETICAL EXCAVATION LINE (IN)  
Dcl DEVIATION FROM CLEARANCE LINE (IN)  
  
W WAVINESS OF SHOTCRETE LINING (IN)  
L DISTANCE BETWEEN TWO CRESTS (IN)

CRITERIA:

GCT 5, APPROACH TUNNEL SC - IA STARTER TUNNEL TYPE II	ALL OTHER LOCATIONS
1. Tol ≥ Tsi	1. Tol ≥ Tsi
2. 0" ≤ Dcl < 4"	2. 0" ≤ Dcl < 18"
3. W < 4" AND W < L/10	3. W < L/5
4. De ≥ 0"	4. De ≥ 0"



LONGITUDINAL SECTION



SECTION

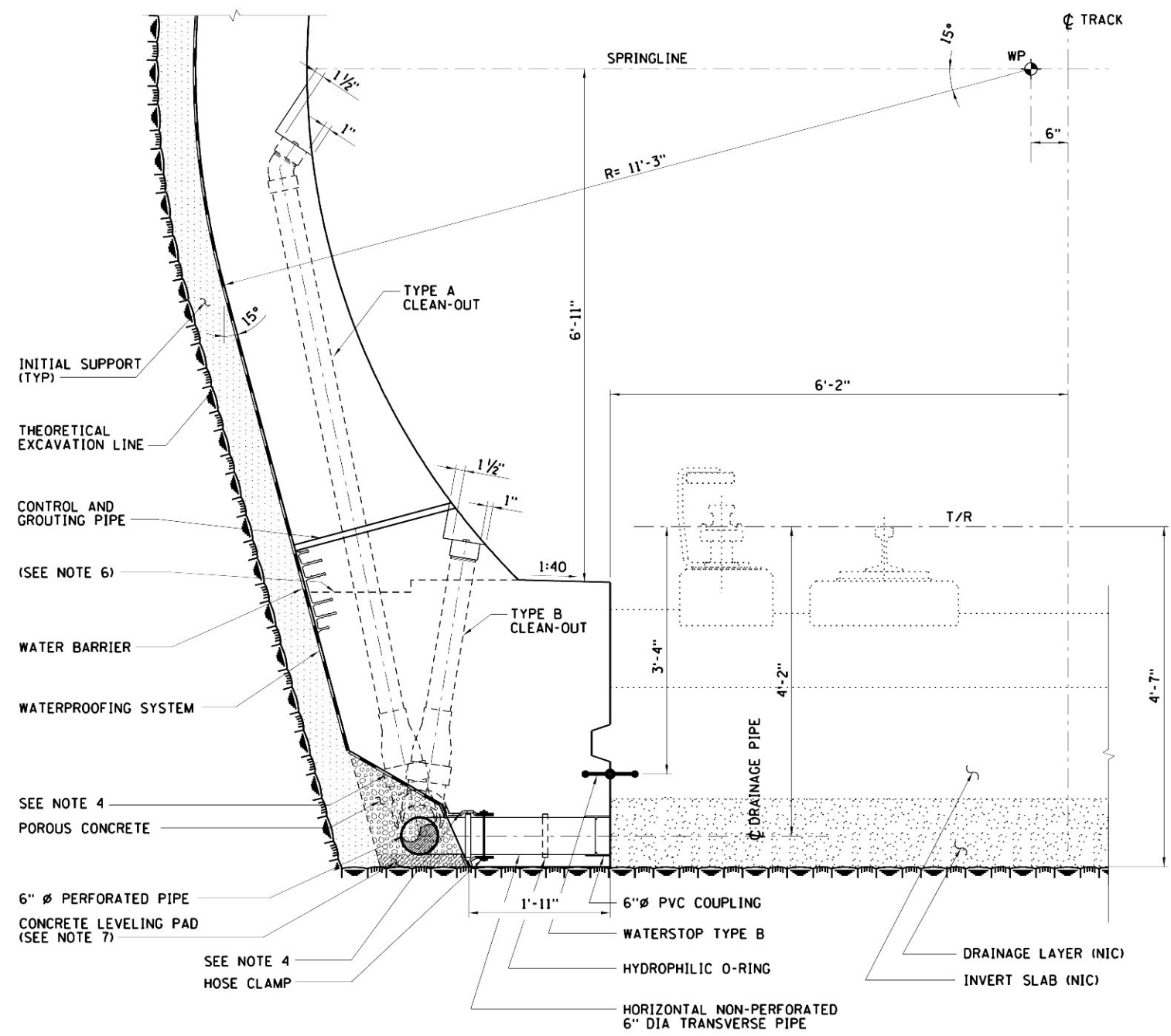


- NOTES:
- SELF DRILLING GROUTED PRE-SUPPORT SPILING MAY BE USED IN FAULTS AND SHEAR ZONES, WHERE THE ROCK IS GROUTABLE (I.E. OPEN JOINTS).
  - PRE-SUPPORT SPILING MAY BE INSTALLED THROUGH LATTICE GIRDER, OR ABOVE IT, DEPENDING ON ACTUAL GROUND CONDITIONS ENCOUNTERED.
  - PRE-SUPPORT SPILING MAY RANGE FROM LOCALIZED INSTALLATION OF SPILES TO SYSTEMATIC APPLICATION AROUND CROWN PERIMETER. PRE-SUPPORT SPILING SHALL BE INSTALLED AT 1' CC (TYP).
  - MAINTAIN DISTANCE SHOWN FOR ALL LATTICE GIRDER INSTALLATIONS IRRESPECTIVE OF PRE-SUPPORT SPILING.
  - FOR TYPICAL SHOTCRETE LINING SECTION SEE DWG CM009-RS-1100.
  - APPLY FINISH SHOTCRETE TO MEET GENERAL SMOOTHNESS CRITERIA AS REQUIRED.
  - CLEARANCE LINE IS THE INSIDE FACE OF THE DESIGN THICKNESS OF THE SHOTCRETE LINING AS SHOWN ON THE DRAWINGS.
  - STEEL FIBER REINFORCED SHOTCRETE (SFRS) MAY BE USED IN LIEU OF SHOTCRETE REINFORCED WITH WELDED WIRE FABRIC (WWF) AS SHOWN. A 1.0-INCH UNREINFORCED FINISH SHOTCRETE LAYER SHALL BE APPLIED WHEN SFRS IS USED. FOR SFRS LININGS OF 8 AND 10 INCH (MIN.) THE FINISH LAYER IS PART OF THE SHOTCRETE LINING THICKNESS. FOR SFRS LININGS OF 4" (MIN.) THE FINISH LAYER IS ADDED TO THE THICKNESS AND THE EXCAVATION HAS TO BE INCREASED BY 1.0 INCH.
  - ROCK BOLT DETAILS SEE DWG CM009-RS-1091.
  - FOR LATTICE GIRDER DETAILS SEE DWG CM009-RS-1101.
  - PANNING FOR GROUNDWATER INFLOWS BY MEANS OF WATER SHEETS AND DRAIN HOSES NOT SHOWN.

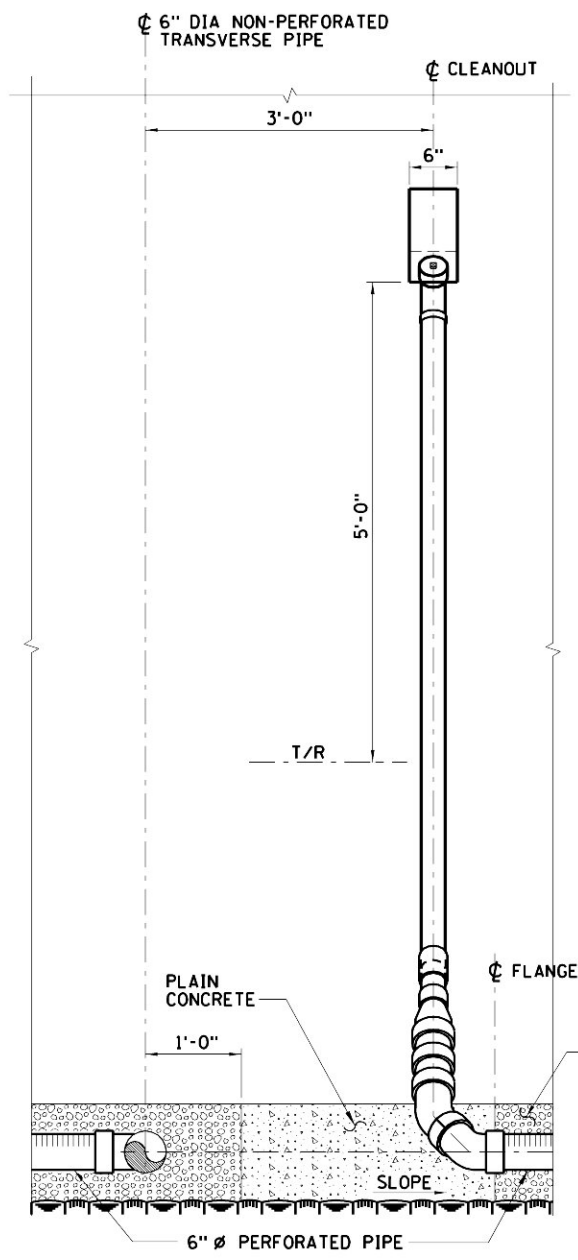




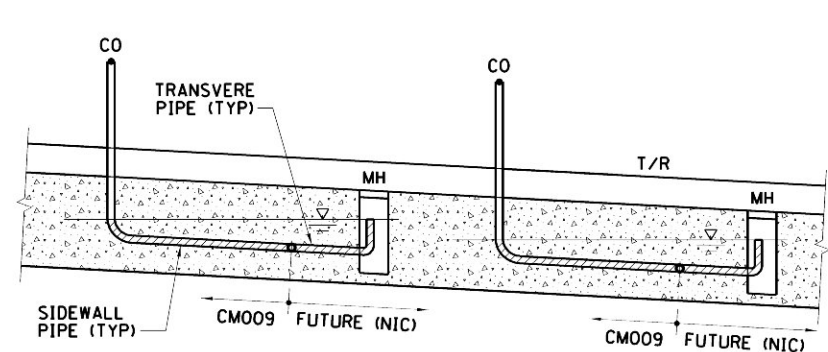
- NOTES:
1. FOR WATERSTOP TYPE B DETAIL, SEE DWG STD-SS-0101.
  2. FOR SETTING OUT OF WYE CAVERNS AND WORKING POINTS, SEE DWG CM009-GP-0120.
  3. LOCATION OF CONSTRUCTION JOINTS SHALL BE COORDINATED WITH THE WATERPROOFING SYSTEM SHOWN ON DWG CM009-WS-0101.
  4. WHERE PIPE PENETRATES THE WATERPROOFING MEMBRANE, PROVIDE PVC MEMBRANE SLEEVE WELDED TO MAIN PVC MEMBRANE SHEET. INSTALL STAINLESS STEEL HOSE CLAMP CLEAR OF BENDS AND TAPERS. APPLY SILICON PASTE OR APPROVED EQUAL, BETWEEN PIPE AND SLEEVE AT CLAMP LOCATION.
  5. FOR LOCATION OF TYPE A AND TYPE B CLEANOUT, SEE DWGS CM009-GP-0117 AND CM009-GP-0119.
  6. FOR JOINT DIMENSIONS, SEE KEYWAY DETAIL ON DWG STD-SS-0101.
  7. CONCRETE LEVELING PAD SHALL CONTINUOUSLY SUPPORT PERFORATED PIPE AT THE CONSTANT DISTANCE BELOW TOP OF RAIL INDICATED. MINIMUM THICKNESS ONE INCH.



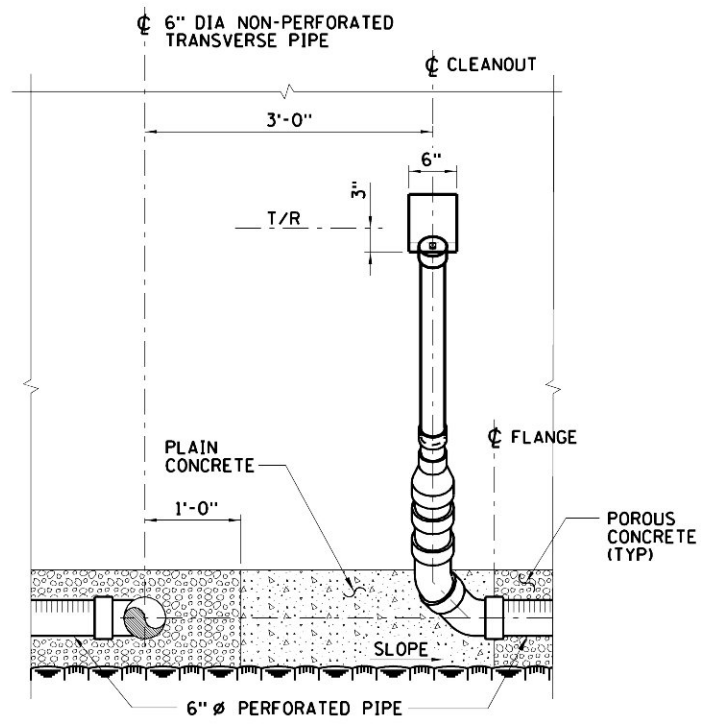
TYPICAL FOOTING DETAIL



TYPE A CLEAN-OUT ELEVATION

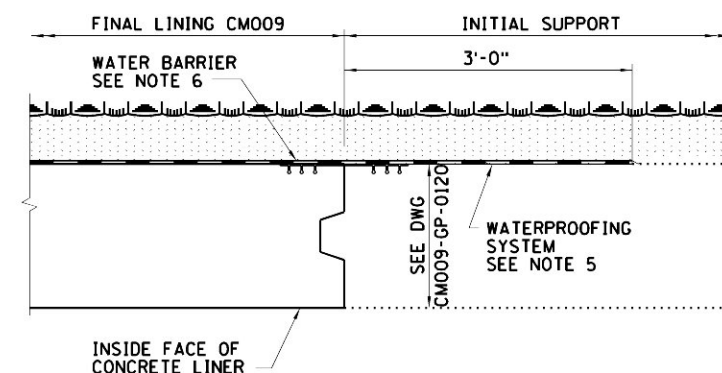


SUBMERGED SIDEWALL PIPE SYSTEM SCHEMATIC  
SCALE: NTS

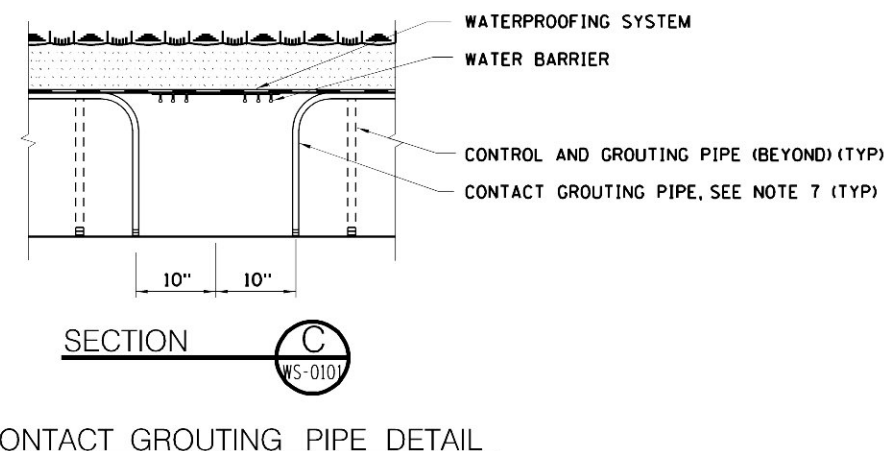
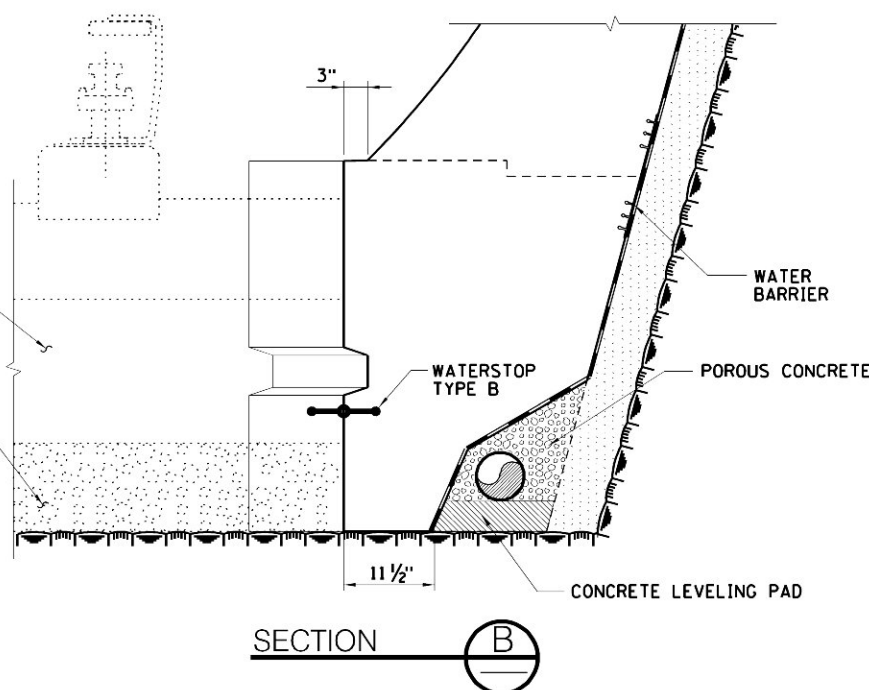


TYPE B CLEAN-OUT ELEVATION





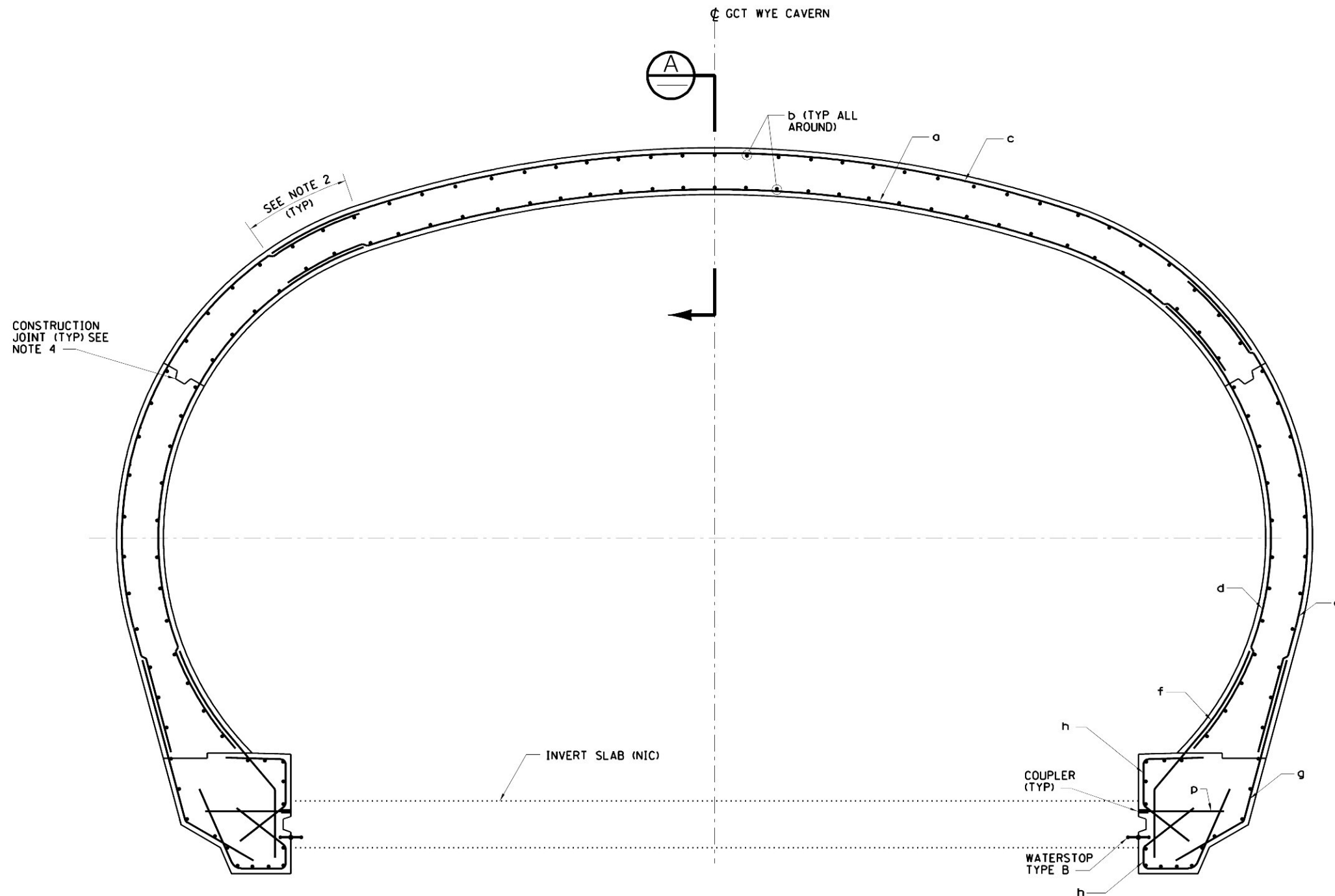
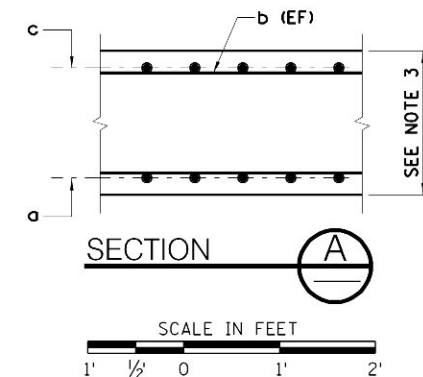
TYPICAL SECTION AT BOTH ENDS OF GCT 3  
CAVERN LINER  
FOR LOCATION, SEE DWG CM009-GP-0117



SCALE IN FEET

1'  $\frac{1}{2}$  0 1' 2'

- NOTES:
1. REINFORCEMENT IS SYMMETRICAL ABOUT CENTERLINE OF TUNNEL.
  2. LAP SPlice LOCATIONS ARE SUGGESTED, THEY SHALL BE STAGGERED AND ALTERNATELY PLACED. FOR FULL TENSION SPlice LENGTHS AND FULL TENSION DEVELOPMENT LENGTHS, SEE DWG STD-SS-1004.
  3. FOR SETTING OUT OF WYE CAVERNS AND WORKING POINTS, SEE DWG CM009-GP-0120.
  4. LOCATIONS OF CONSTRUCTION JOINTS ARE SUGGESTED. THEY SHALL BE COORDINATED WITH THE WATERPROOFING SYSTEM SHOWN ON DWG CM009-WS-0101.
  5. FOR REINFORCEMENT SCHEDULES, SEE TABLES ON DWG CM009-ST-1203.



GCT WYE CAVERN TYPICAL TUNNEL LINER

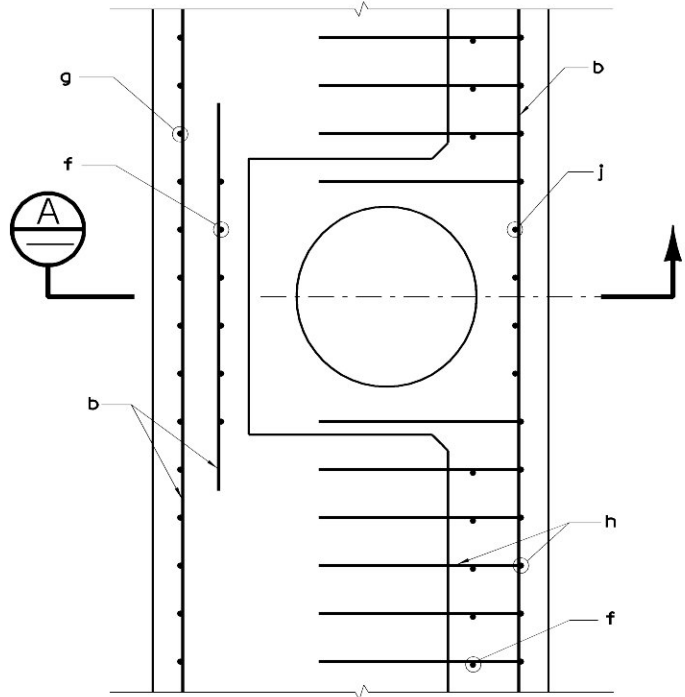




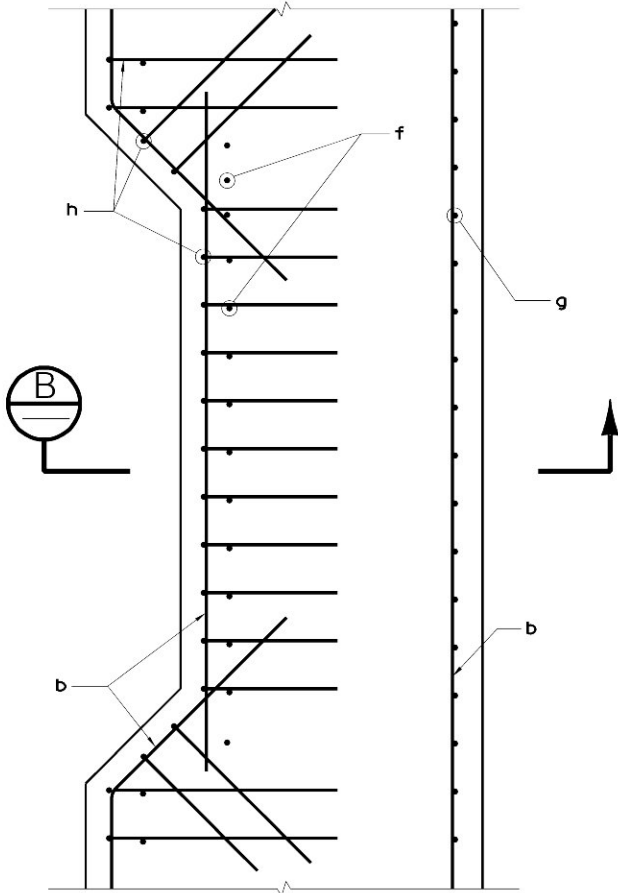
\$PRNAME\$

\$PLOTIDRV\$

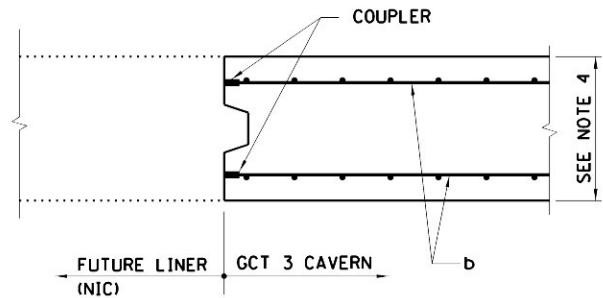
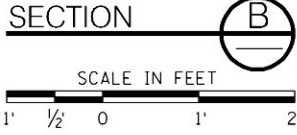
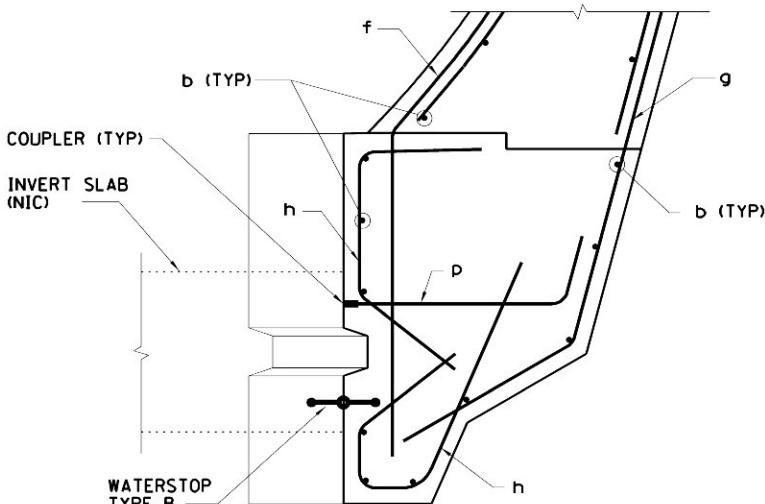
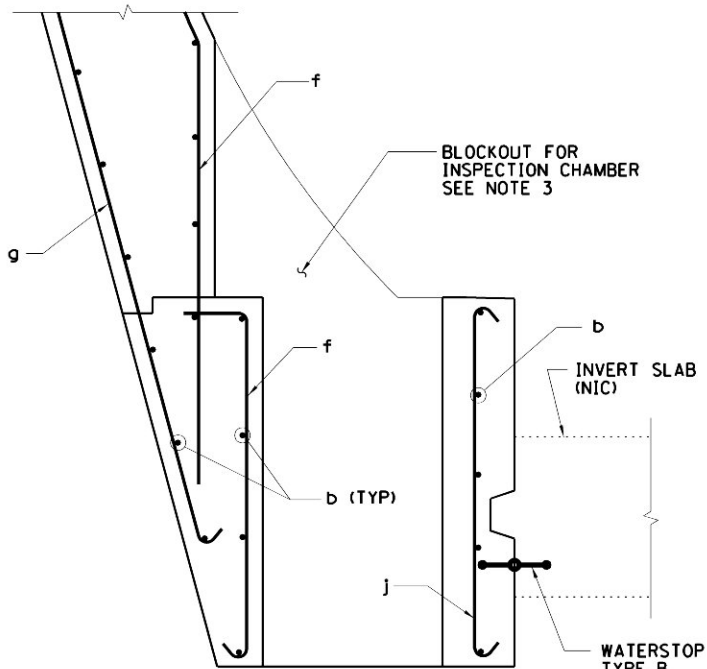
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PLAN AT INSPECTION CHAMBER AND CLEANOUT TYPE C



PLAN AT TYPICAL BLOCKOUT



SECTION AT GCT 3 CAVERN LINER AND FUTURE LINER INTERFACE



NOTES:

1. FOR TYPICAL LINER REINFORCEMENT DETAILS, SEE DWGS CM009-ST-1201.
2. NOT USED
3. FOR GENERAL ARRANGEMENT DETAILS, SEE DWG CM009-GP-0041.
4. FOR SETTING OUT OF WYE CAVERNS, SEE DWG CM009-GP-0120.
5. FOR LOCATION OF GCT 3 AND GCT 5 CAVERNS SEE DWGS CM009-GP-0117 AND GP-0119 RESPECTIVELY.

REINFORCEMENT SCHEDULE		
BAR MARK	BAR TYPE	BAR SPACING C-C
"a"	#9	@9"
"b"	#7	@12"
"c"	#9	@9"
"d"	#9	@9"
"e"	#9	@9"
"f"	#9	@9"
"g"	#9	@9"
"h"	#7	@9"
"j"	#5	@9"
"k"	#9	@9"
"n"	#6	@9"
"p"	#7	@18"

**MTA** Metropolitan Transportation Authority  
Capital Construction

**Long Island Rail Road**  
East Side Access

**GEC** PB  
STV PARSONS  
General Engineering Consultant

PARSONS BRINCKERHOFF  
STV INCORPORATED  
PARSONS TRANSPORTATION  
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5/26/06	CONFORMED DRAWING	
DATE:	REVISIONS	No.

DESIGNED BY:  
V. SHEY  
DRAWN BY:  
D. VASQUEZ  
CHECKED BY:  
H. REZAEI  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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DATE: \_\_\_\_\_

**MANHATTAN TUNNELS EXCAVATION**

GCT WYE CAVERNS  
FINAL LINER REINFORCEMENT DETAILS  
SHEET 2

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-ST-1203  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
119 OF 276

1. LAP SPlice LOCATIONS ARE SUGGESTED, THEY SHALL BE STAGGERED AND ALTERNATELY PLACED. FOR FULL SPlice LENGTH AND FULL TENSION DEVELOPMENT LENGTHS, SEE DWG STD-SS-1004.
2. LOCATION OF CONSTRUCTION JOINTS ARE SUGGESTED. THEY SHALL BE COORDINATED WITH THE WATERPROOFING SYSTEM SHOWN ON DWG CMO09-WS-0101.
3. FOR REINFORCEMENT SCHEDULES, SEE TABLES ON DWG CMO09-ST-1203.
4. FOR SETTING OUT OF LINERS, SEE DWGS CMO09-GP-0120 AND CMO09-GP-0122.
5. BAR SIZES SHOWN ON THIS DWG SUPERSEDE THE REINFORCEMENT SCHEDULES.



SCALE IN FEET

0 20 40



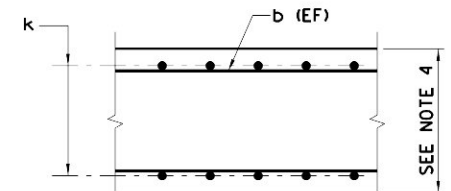
SCALE IN FEET

2' 1' 0 2' 4'



SCALE IN FEET

2' 1' 0 2' 4'

SECTION 

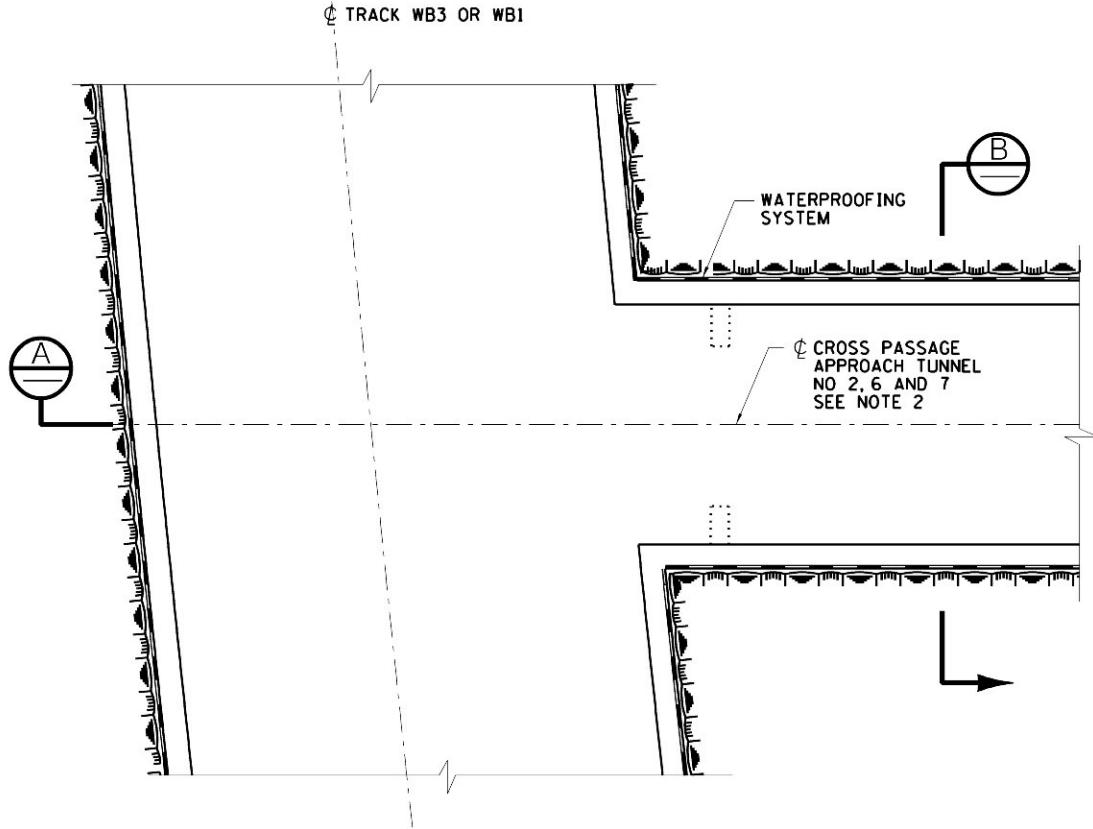
B
_____

SCALE IN FEET

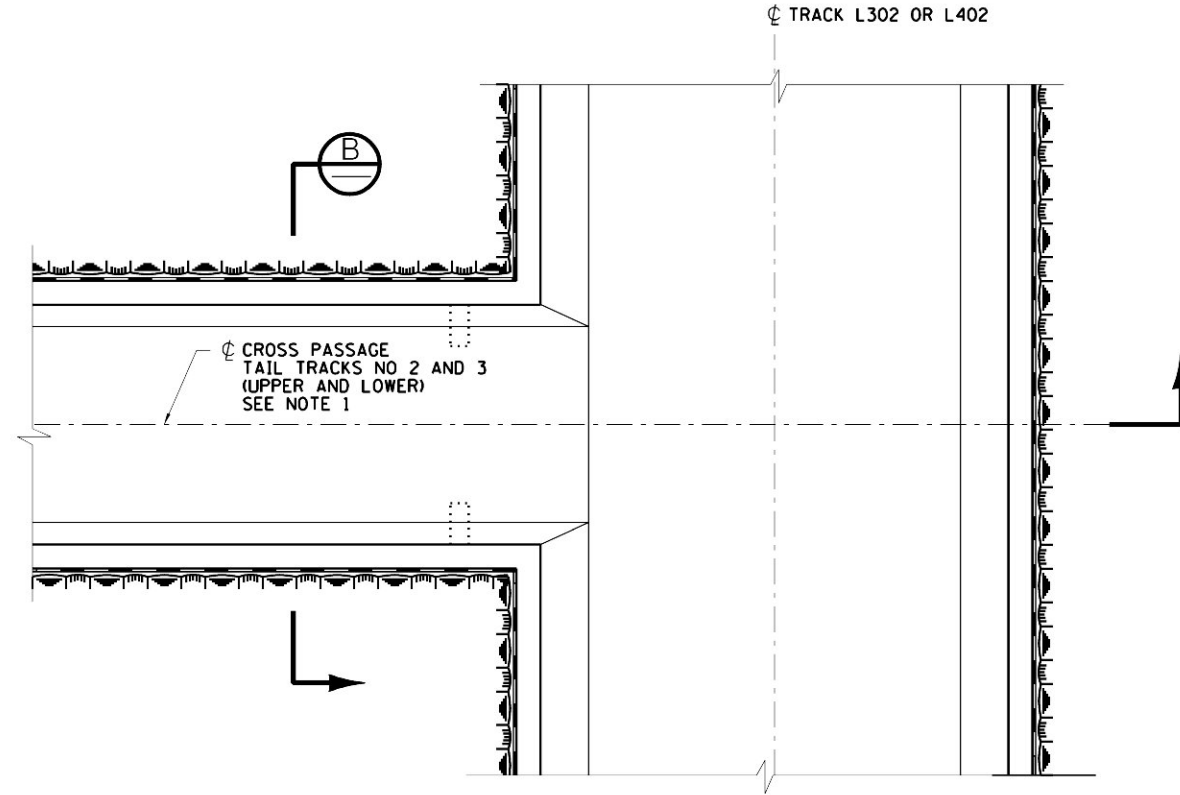
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SPRINT (PLOTTER)

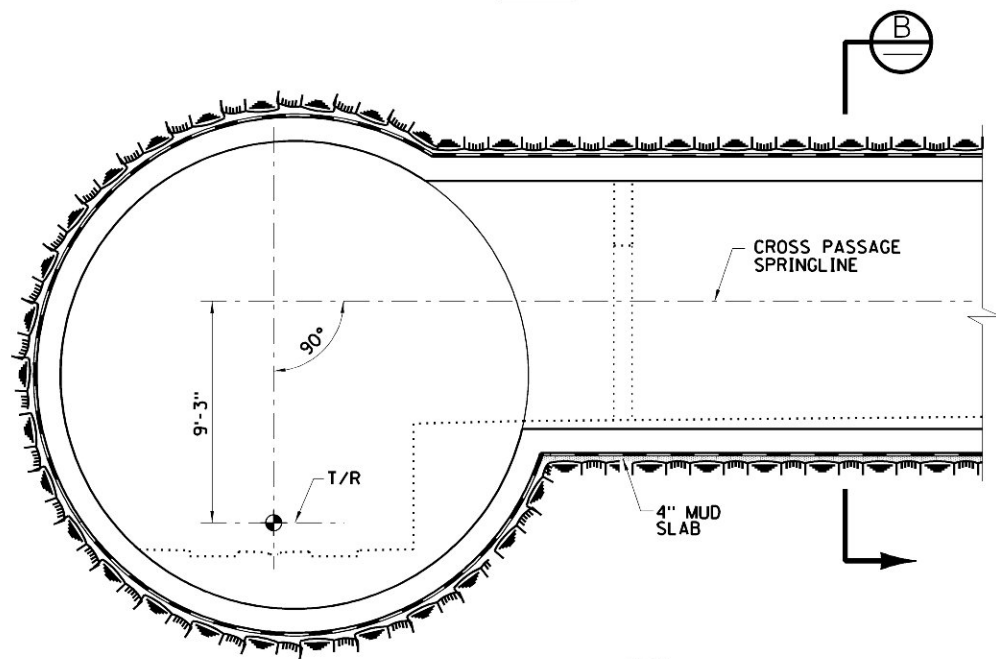
submissions\man009\126\conformed set (may 2006)\cadd\cm009-gp-0126.dwg PM



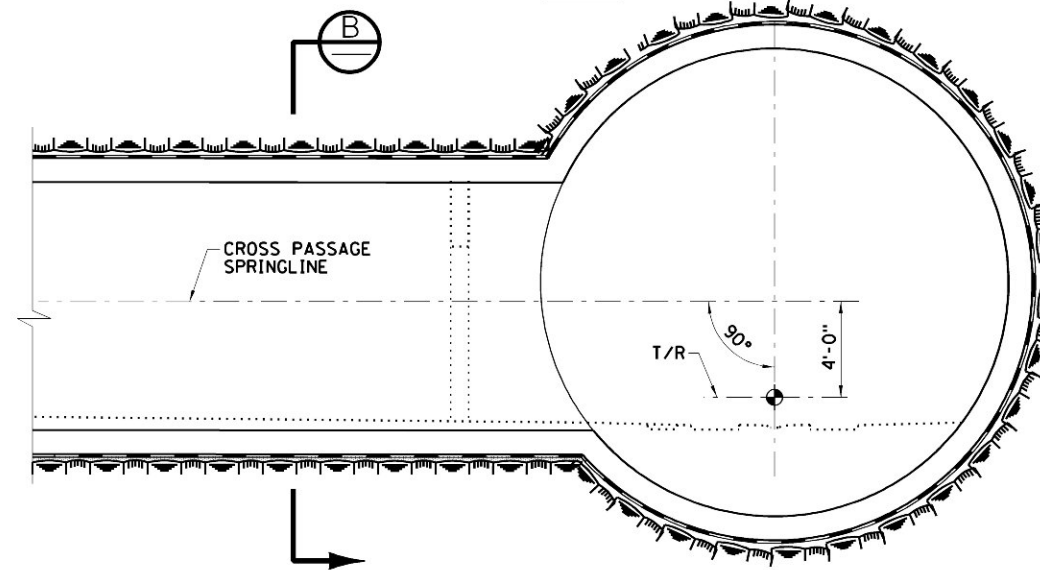
TYPICAL APPROACH  
TUNNEL CROSS PASSAGE  
PLAN



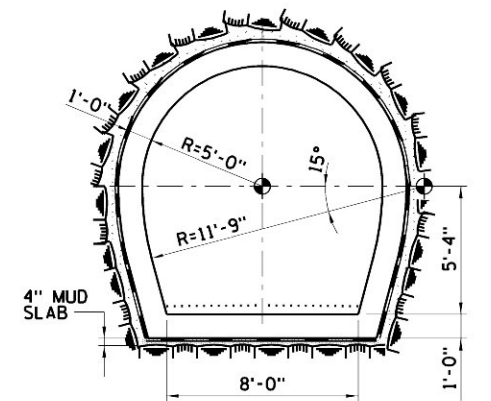
TYPICAL TAIL TRACKS  
CROSS PASSAGE  
PLAN



SECTION A



SECTION A



SECTION B ST-0110

NOTES:

1. FOR LOCATION OF TAIL TRACKS CROSS PASSAGES, SEE DWGS CM009-ST-1002 AND CM009-ST-1102.
2. FOR LOCATION OF APPROACH TUNNEL CROSS PASSAGES, SEE DWGS CM009-ST-1012, CM009-ST-1013 AND CM009-ST-1108.
3. INITIAL SUPPORT NOT SHOWN. SEE DWGS CM009-ST-1211 AND CM009-RS-1069 FOR DETAILS.
4. FOR REINFORCEMENT DETAILS, SEE DWG CM009-ST-1206.
5. FOR WATERPROOFING DETAILS, SEE DWG CM009-WS-0103.

SCALE IN FEET  
4' 2' 0 4' 8'

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Capital Construction

Long Island Rail Road  
East Side Access

GEC PB  
STV STV  
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No.			

DESIGNED BY: W. CAO	NY PROFESSIONAL License No.
DRAWN BY: J. RICCARDI	
CHECKED BY: M. ELLWOOD	
COORDINATED BY: M. DELLA POSTA	
APPROVED BY: J. SCHABIB	

ORIGINAL SIGNED & SEALED	DATE: _____
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MANHATTAN TUNNELS EXCAVATION

CROSS PASSAGES  
PLAN AND SECTIONS – FINAL LINER

SCALE AS NOTED	CONTRACT No. CM009
DRAWING NUMBER: CM009-GP-0121	ISSUE
DATE: 5-26-06	SHEET No. 121 OF 276
REVISION NUMBER: 0	



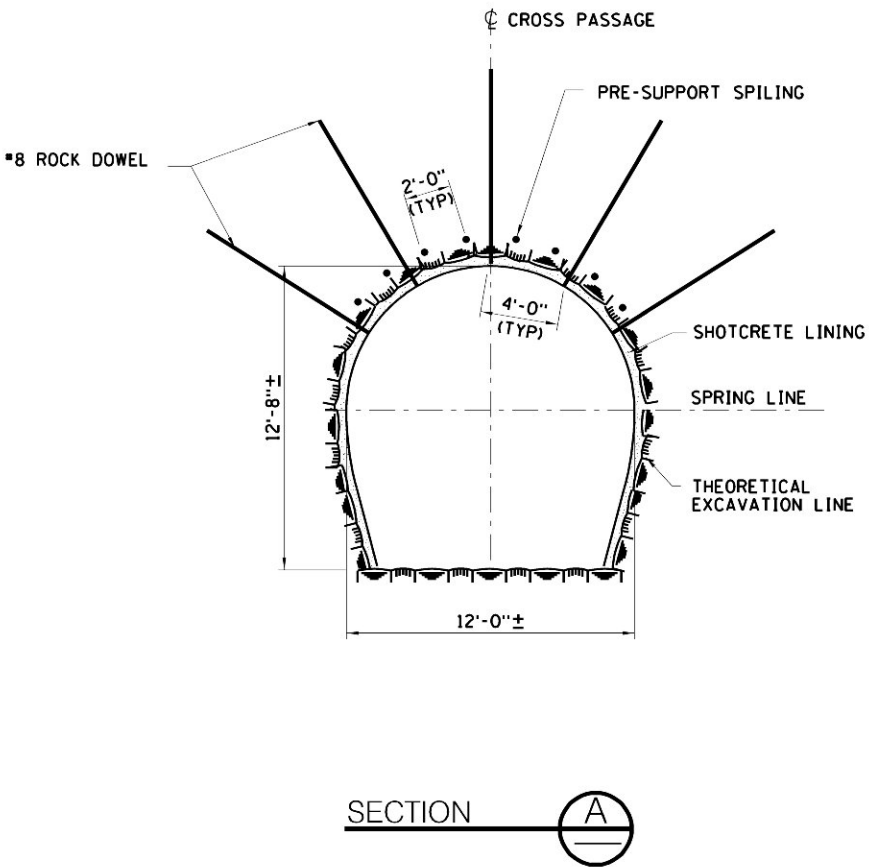
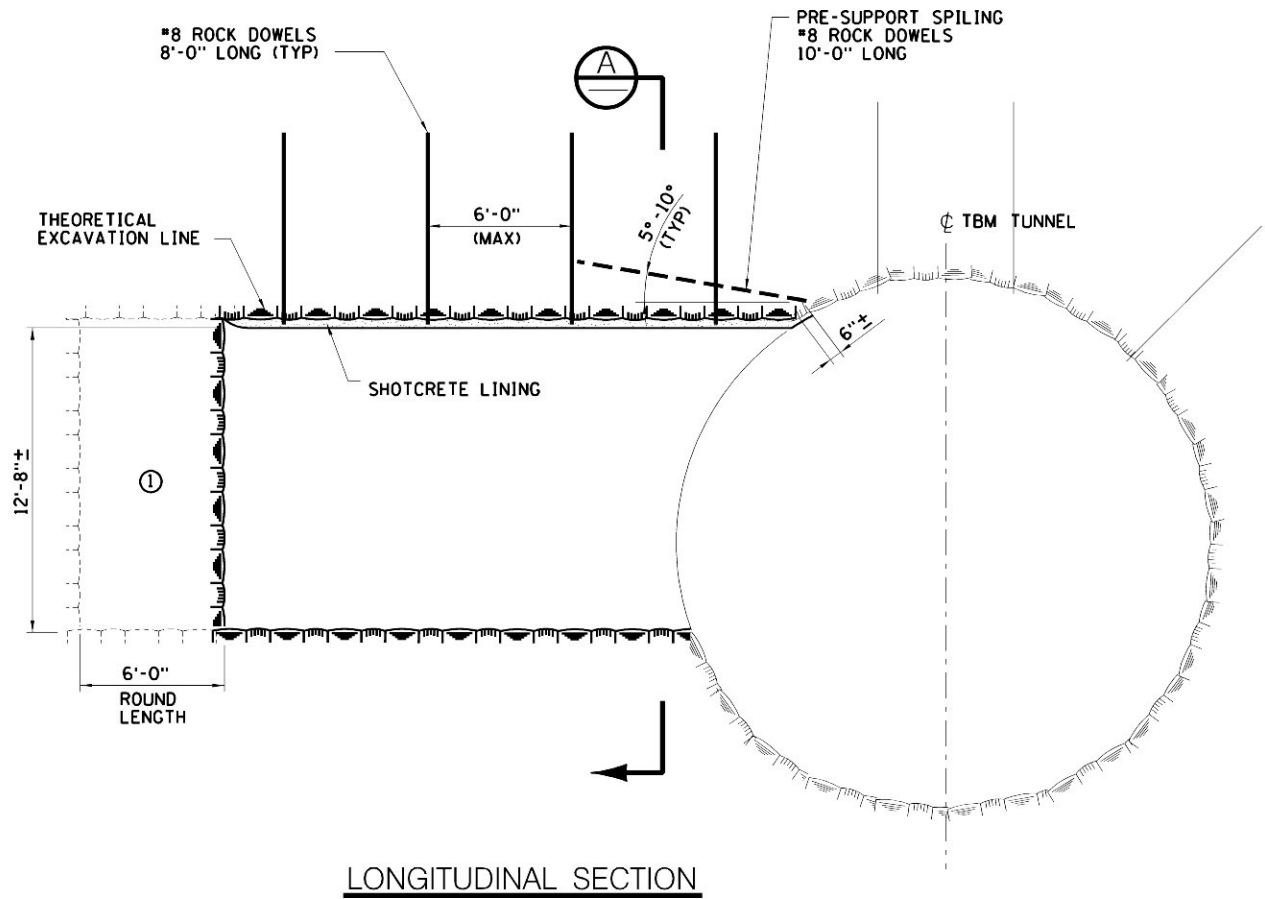


EXCAVATION SEQUENCE

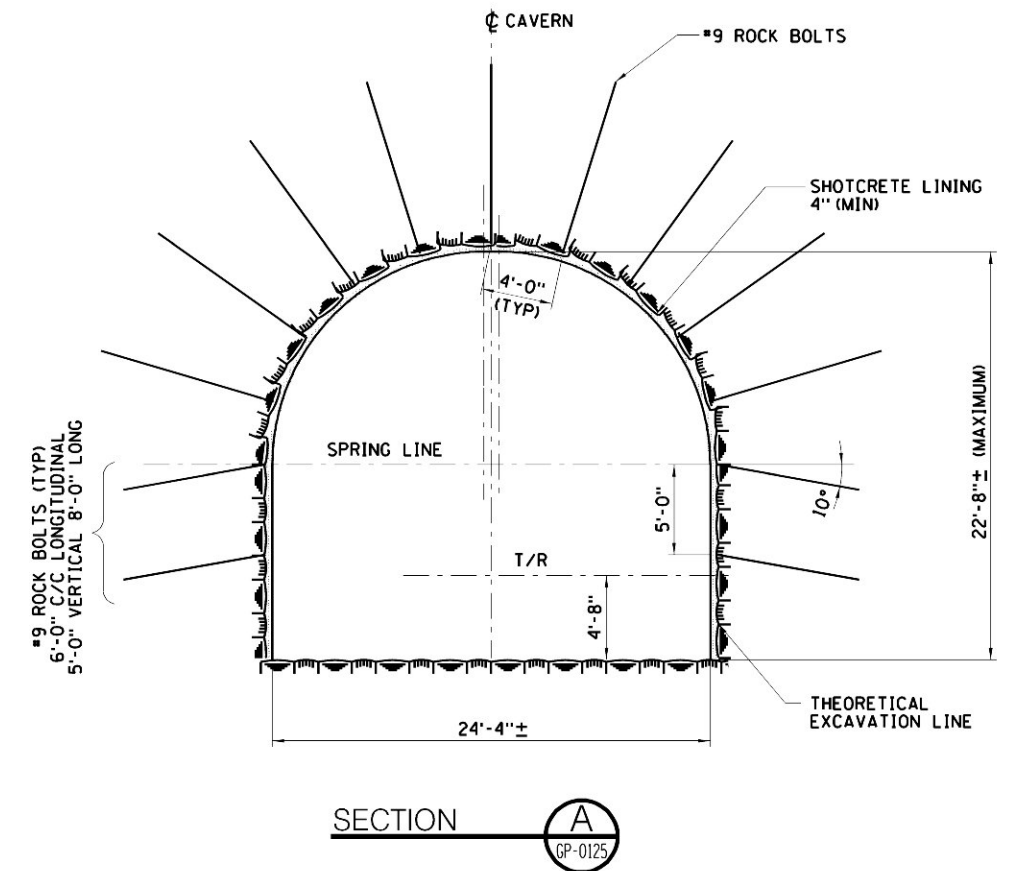
- STEP 1 - EXCAVATE ROUND ①
- STEP 2 - INSTALL ROCK DOWELS
- STEP 3 - APPLY INITIAL SHOTCRETE LAYER 2" (MIN)
- STEP 4 - INSTALL WWF
- STEP 5 - INSTALL SHOTCRETE TO 4" (MIN)
- STEP 6 - REPEAT STEPS 1-5 FOR NEXT ROUND

NOTES:

1. FOR SETTING OUT OF CROSS PASSAGE SEE DWG CM009-GP-0121.
2. FOR CONFIGURATION OF INVERT SLAB SEE WATERPROOFING DRAWINGS.
3. FOR SHOTCRETE LINING SECTIONS AND SHOTCRETE SMOOTHNESS CRITERIA SEE DWGS CM009-RS-1100 AND CM009-RS-1102.



1. FOR SHOTCRETE LINING DETAILS AND SHOTCRETE SMOOTHNESS CRITERIA, SEE DWGS CMO09-RS-1100 AND CMO09-RS-1102.
2. FOR LOCATION OF THE CROSS FLUE SEE DWG CMO09-ST-1012.
3. EXCAVATION SEQUENCE OF CROSS FLUE SHALL BE SIMILAR TO EXCAVATION SEQUENCE OF WYE CAVERNS SHOWN ON DWGS CMO09-RS-1062, CMO09-RS-1064 AND CMO09-RS-1066. SEE DWG CMO09-RS-1130 FOR PERMANENT ROCK ANCHOR INSTALLATION DETAILS.
4. FOR THE SETTING OUT OF CROSS FLUE, SEE DWGS CMO09-GP-0124 AND CMO09-GP-0125.
5. DO NOT INSTALL ROCK BOLTS IN THE PILLAR FROM THE CROSS FLUE IN THE AREA WHERE PERMANENT ROCK ANCHORS ARE TO BE INSTALLED. SEE DWG CMO09-RS-1130.



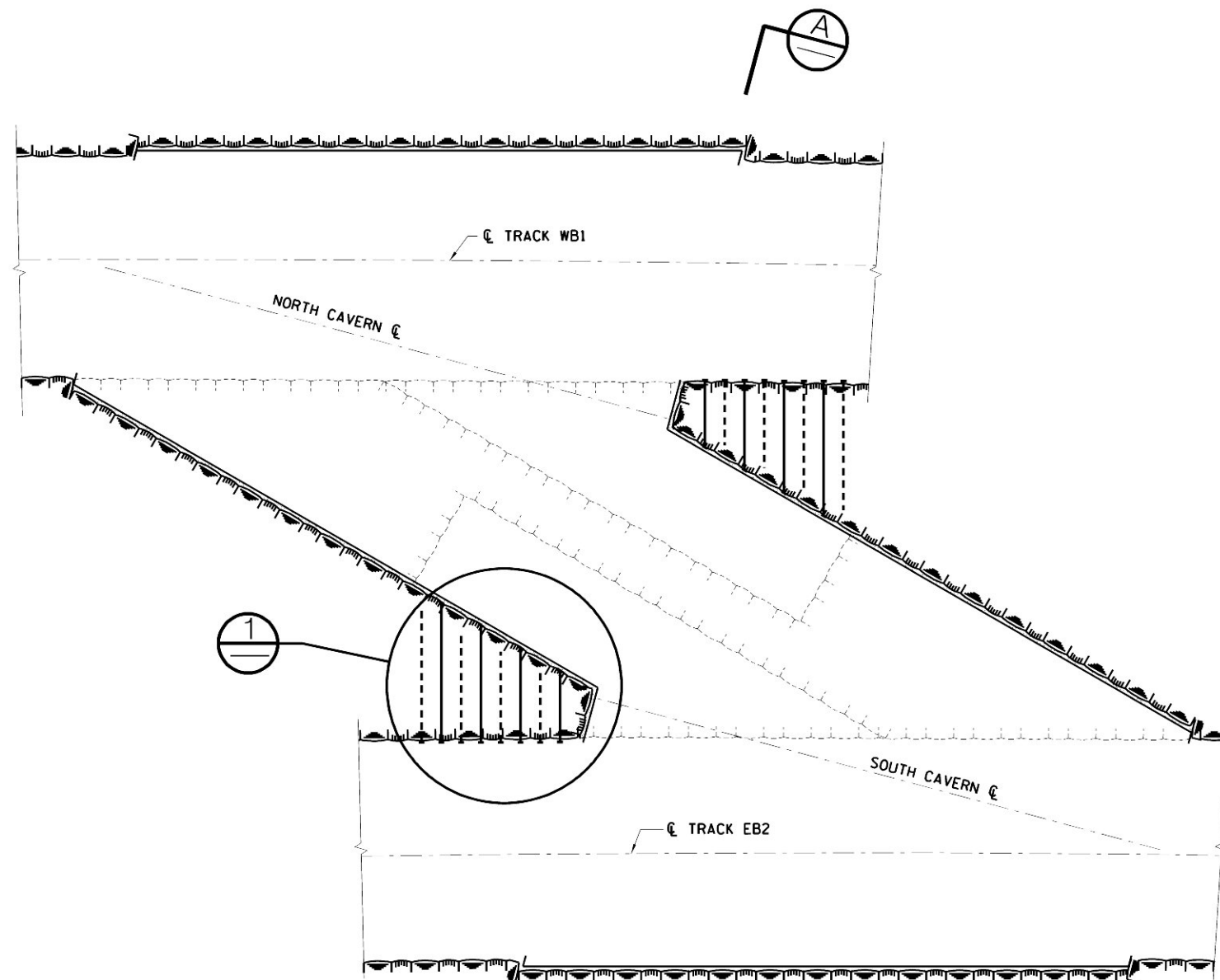
SCALE IN FEET

4' 2' 0 4' 8' 12'



NOTES:

1. FOR LOCATION OF CROSS FLUE, SEE DWG CM009-ST-1012.
2. FOR GEOMETRY OF CROSS FLUE SEE DWG CM009-GP-0124 AND CM009-GP-0125.

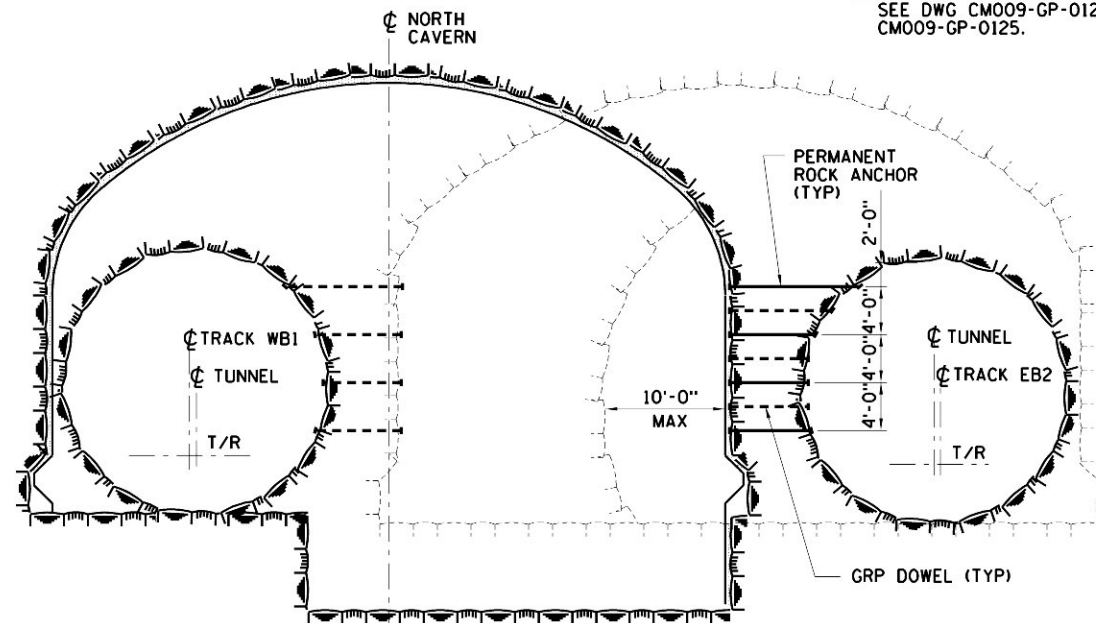


PLAN OF CROSS FLUE

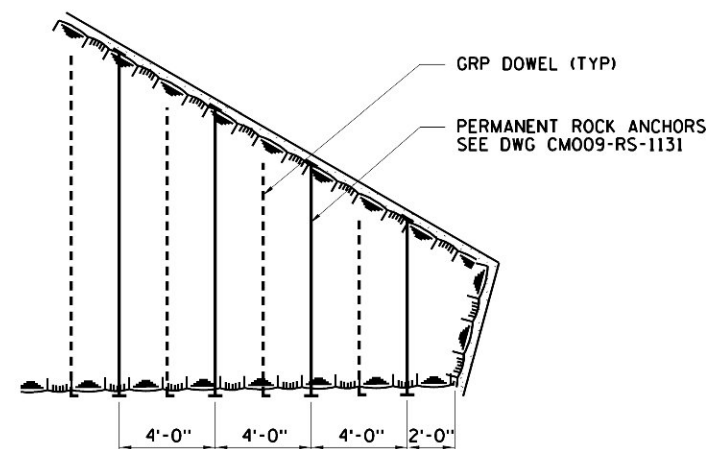


SEQUENCE OF CONSTRUCTION:

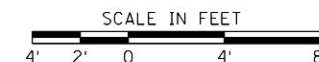
1. INSTALL GRP DOWELS FROM TBM TUNNEL AS SHOWN.
2. INSTALL PERMANENT ROCK ANCHORS AS SHOWN DURING EXCAVATION OF CROSS FLUE ALONG THE PILLAR.
3. PERMANENT ROCK ANCHORS SHALL BE INSTALLED AS EXCAVATION PROCEEDS, PRIOR TO EXCAVATING THE FULL WIDTH OF THE CROSS FLUE.
4. PERMANENT ROCK ANCHOR LENGTHS VARY AND SHALL BE ADJUSTED TO ALLOW INSTALLATION AS SHOWN IN DWG CM009-RS-1131.
5. PERMANENT ROCK ANCHOR INSTALLATION SHALL BE PART OF THE CONSTRUCTION SEQUENCE OF THE CROSSFLUE.



SECTION A



DETAIL 1



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		DRAWN BY: J. RICCARDI
		CHECKED BY: A. MUKHERJEE
		COORDINATED BY: M. DELLA POSTA
		APPROVED BY: J. SCHABIB
DATE:	REVISIONS	No.

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&  
SEALED**

DATE: \_\_\_\_\_

MANHATTAN TUNNELS EXCAVATION

CROSS FLUE  
PILLAR REINFORCEMENT

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-RS-1130  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
124A OF 276

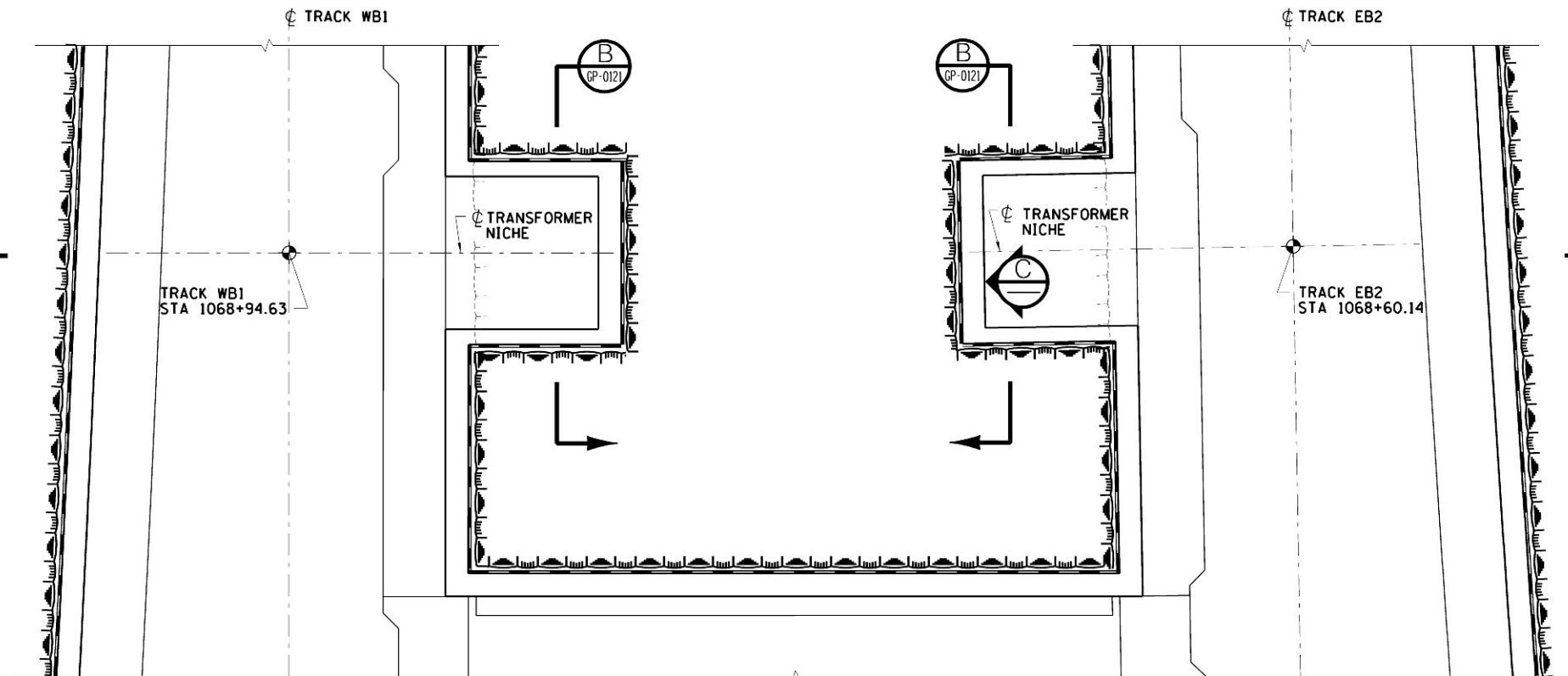




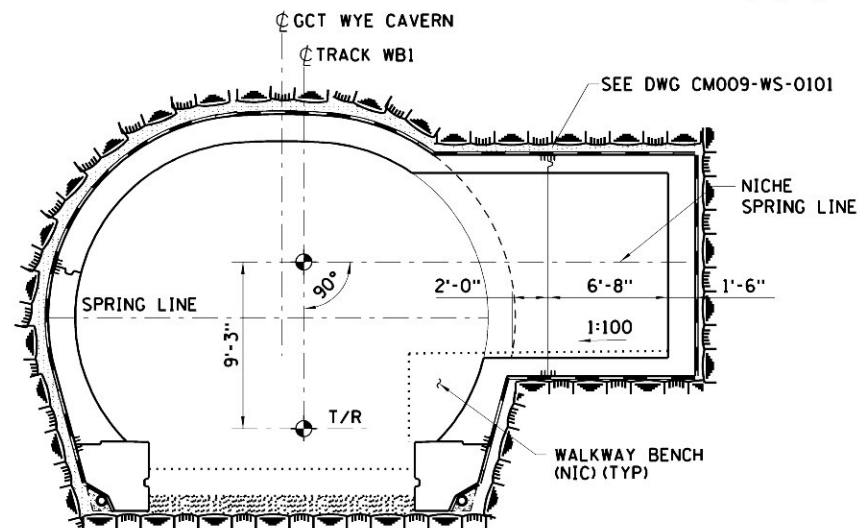
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\$PLOTDRV

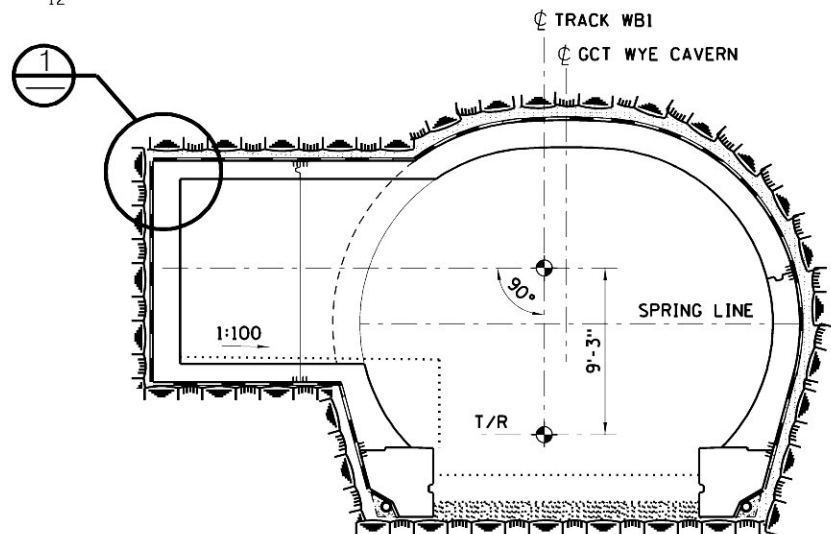
\$REF63  
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PLAN AT TRANSFORMER NICHES

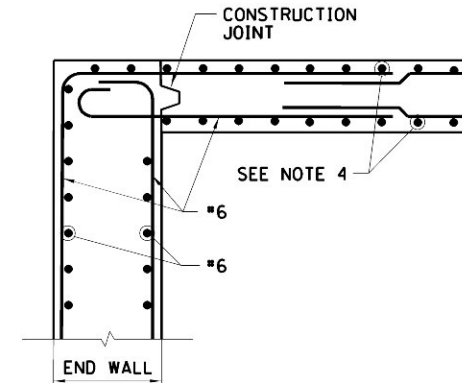


SECTION A

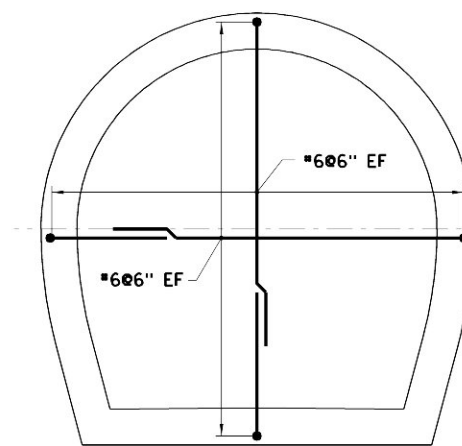
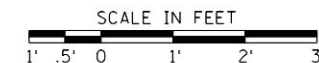


NOTES:

1. SEE DWG CM009-GP-0121 FOR FINAL LINER GEOMETRY.
2. INITIAL SUPPORT NOT SHOWN. SEE DWG CM009-RS-1067.
3. SEE DWG CM009-GP-0120 FOR SETTING OUT OF WYE CAVERNS.
4. FOR REINFORCEMENT DETAILS SEE DWG CM009-ST-1206.
5. SEE DWG STD-SS-0101 FOR TYPICAL JOINT DETAILS.



DETAIL 1



ELEVATION C

END WALL REINFORCEMENT



MTA Metropolitan Transportation Authority  
Capital Construction

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AND THE DATE OF THE ALTERATION."

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		DRAWN BY: J. RICCARDI
		CHECKED BY: C. BARRETT
		COORDINATED BY: M. DELLA POSTA
		APPROVED BY: J. SCHABIB
DATE:	REVISIONS	No.

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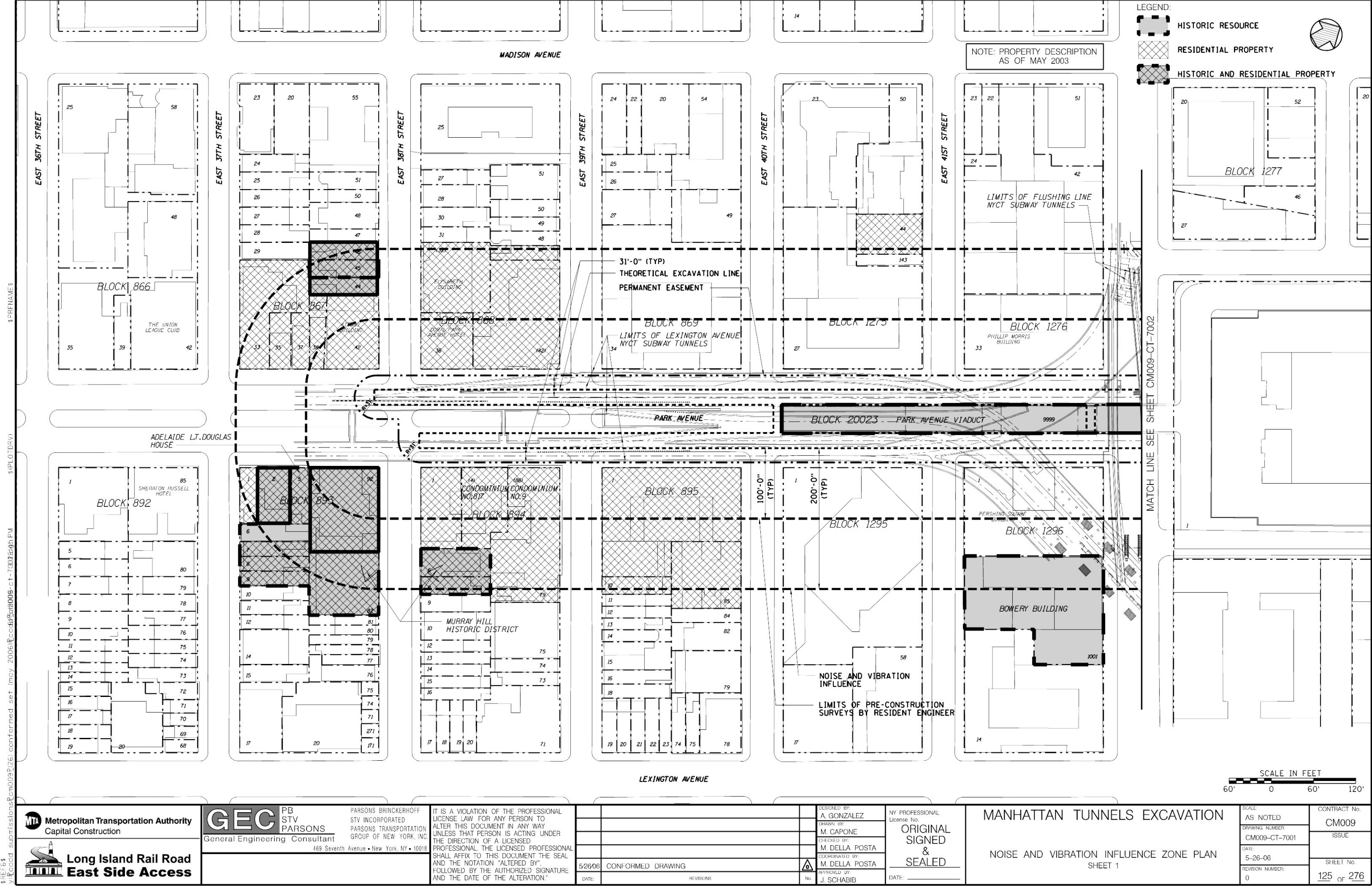
DATE: \_\_\_\_\_

MANHATTAN TUNNELS EXCAVATION

GENERAL ARRANGEMENT  
TRANSFORMER NICHES  
PLAN AND SECTION

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-ST-0110  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
124C OF 276



LEGEND:

- HISTORIC RESOURCE
- RESIDENTIAL PROPERTY
- HISTORIC AND RESIDENTIAL PROPERTY

NOTE: PROPERTY DESCRIPTION  
AS OF MAY 2003

MATCH LINE SEE SHEET CM009-CT-7002



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AND THE DATE OF THE ALTERATION."

5/26/06	CONFORMED DRAWING	
DATE:	REVISIONS	No.

DESIGNED BY:  
**A. GONZALEZ**  
DRAWN BY:  
**M. CAPONE**  
CHECKED BY:  
**M. DELLA POSTA**  
COORDINATED BY:  
**M. DELLA POSTA**  
APPROVED BY:  
**J. SCHABIB**

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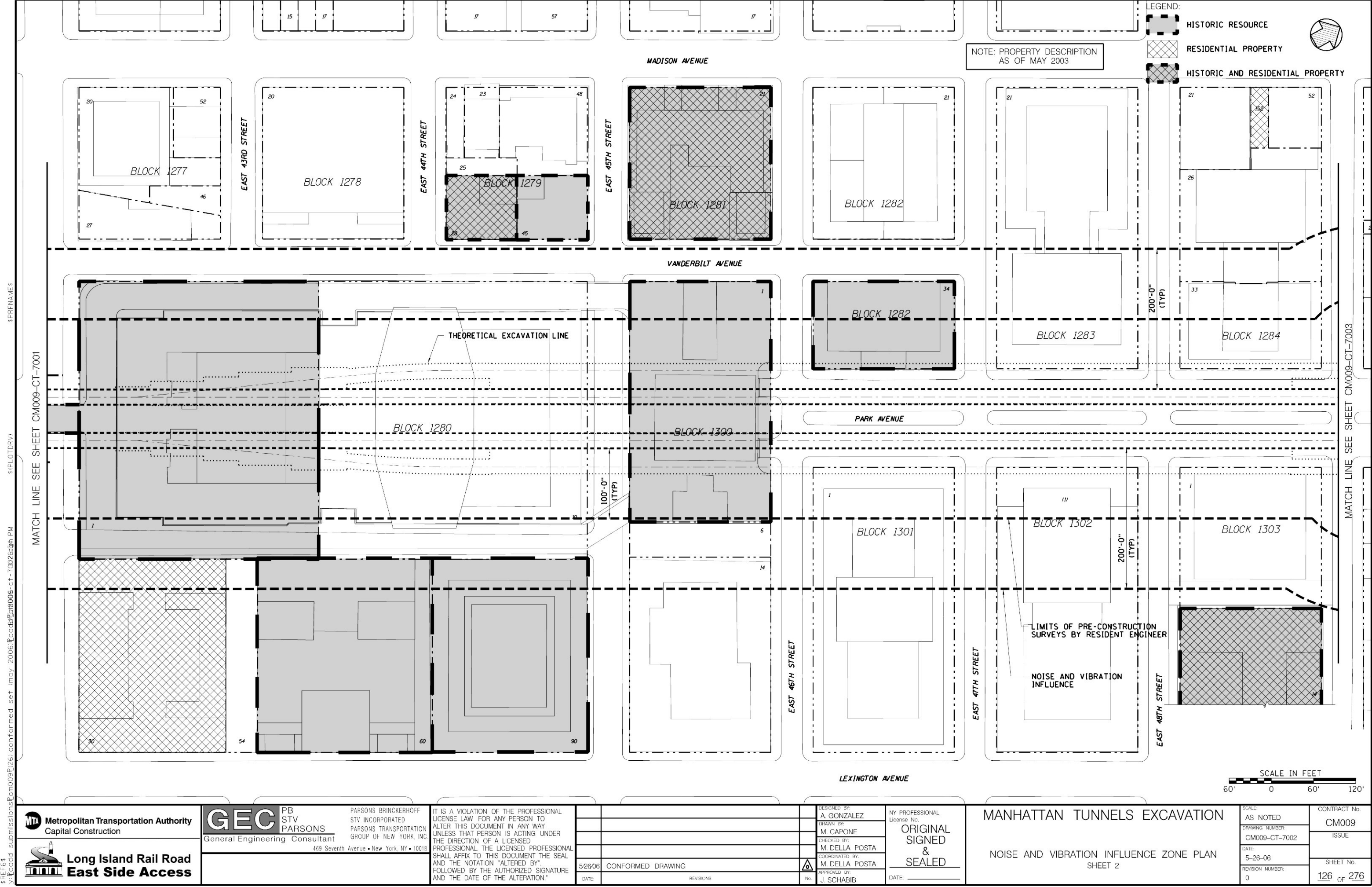
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DATE: \_\_\_\_\_

**MANHATTAN TUNNELS EXCAVATION**


**NOISE AND VIBRATION INFLUENCE ZONE PLAN**  
SHEET 1

SCALE: AS NOTED	CONTRACT No. <b>CM009</b>
DRAWING NUMBER: <b>CM009-CT-7001</b>	ISSUE
DATE: <b>5-26-06</b>	SHEET No. <b>125</b> OF <b>276</b>
REVISION NUMBER: <b>0</b>	






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M. CAPONE  
CHECKED BY:  
M. DELLA POSTA  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

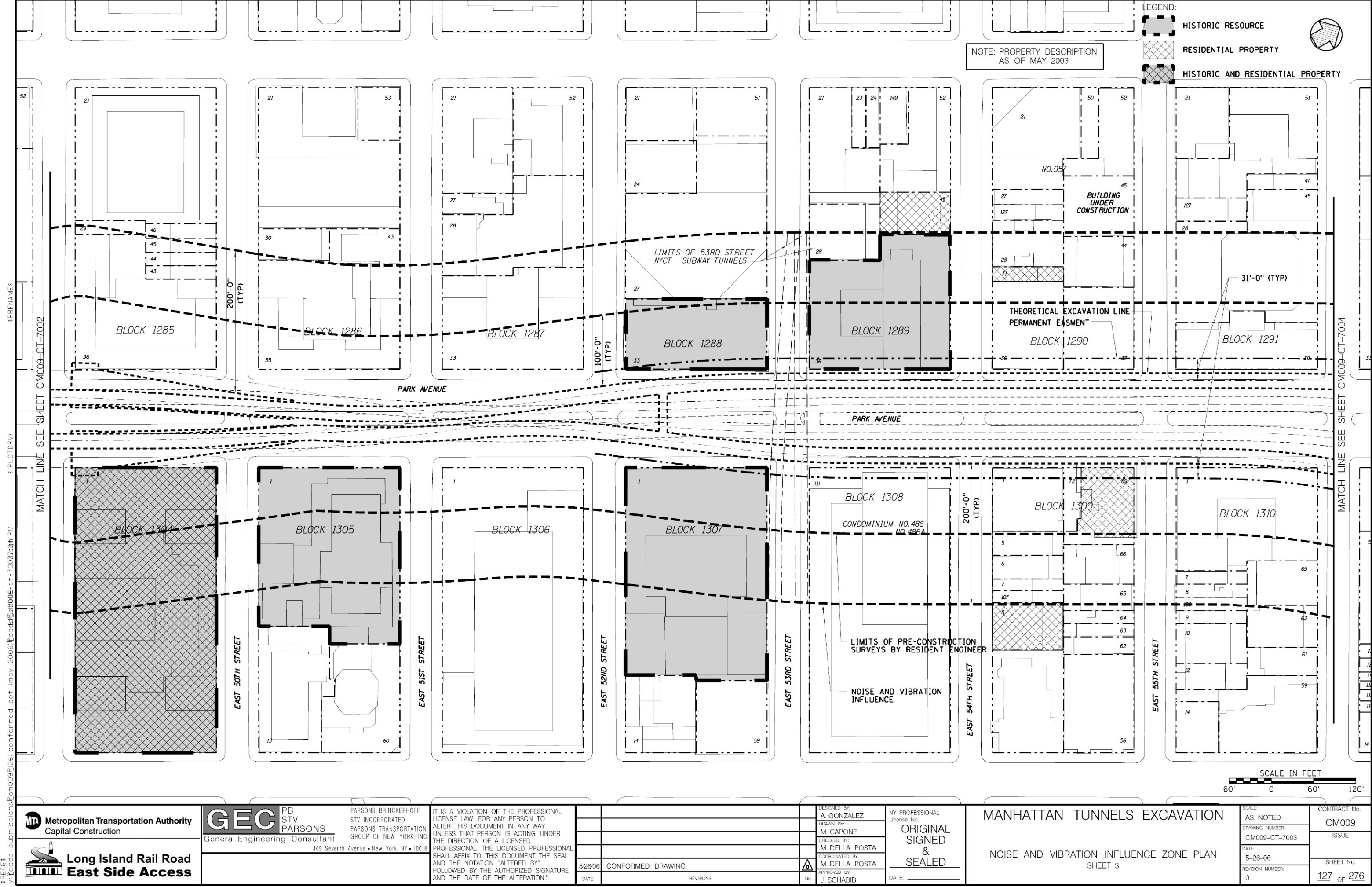
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MANHATTAN TUNNELS EXCAVATION

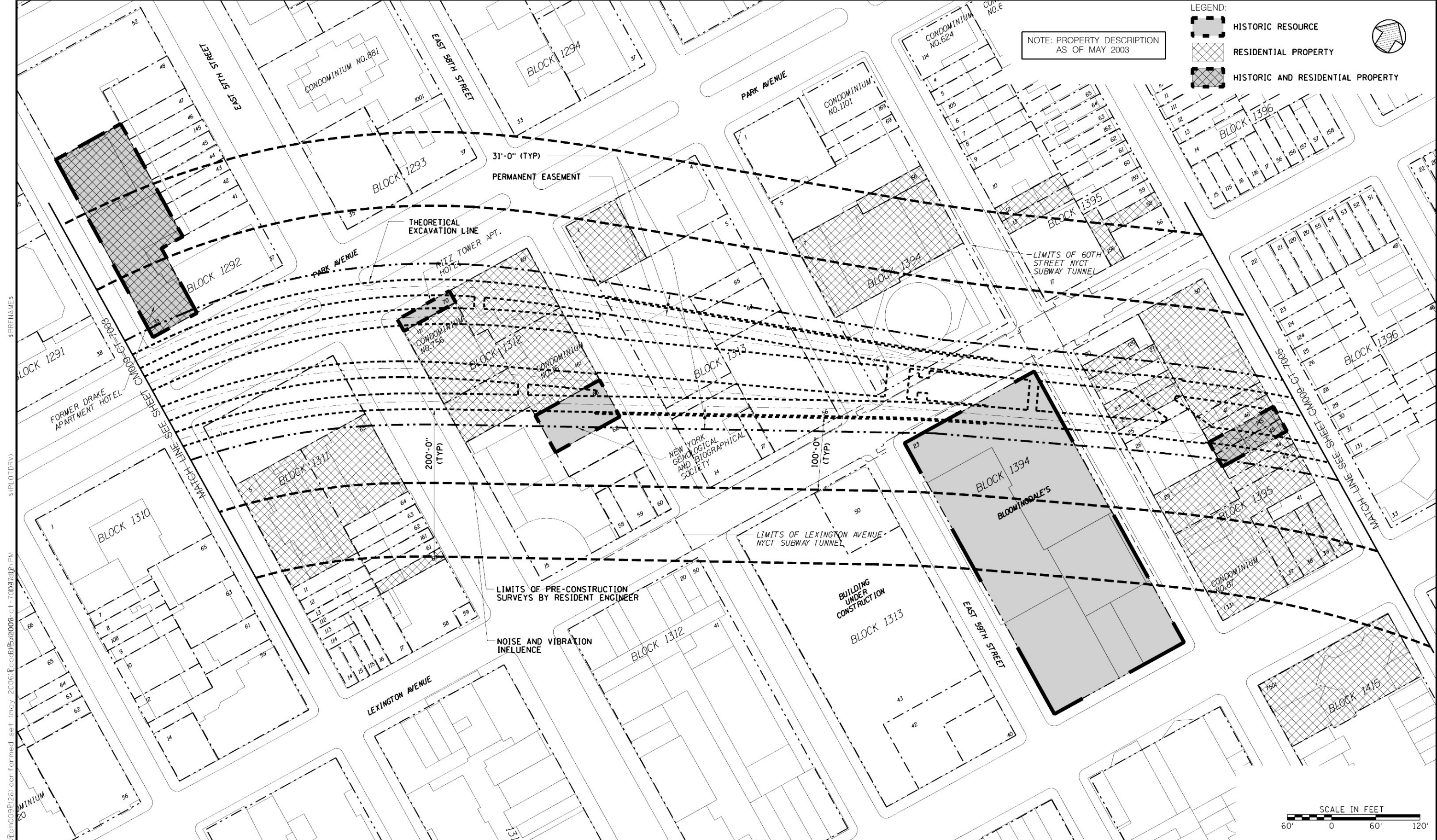
NOISE AND VIBRATION INFLUENCE ZONE PLAN  
SHEET 2

SCALE AS NOTED	CONTRACT No. CM009
DRAWING NUMBER CM009-CT-7002	ISSUE
DATE: 5-26-06	SHEET No. 126 OF 276
REVISION NUMBER: 0	









NOTE: PROPERTY DESCRIPTION  
AS OF MAY 2003

LEGEND:

- HISTORIC RESOURCE
- RESIDENTIAL PROPERTY
- HISTORIC AND RESIDENTIAL PROPERTY



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5/26/06	CONFORMED DRAWING
DATE:	REVISIONS

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DRAWN BY: M. CAPONE
CHECKED BY: M. DELLA POSTA
COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

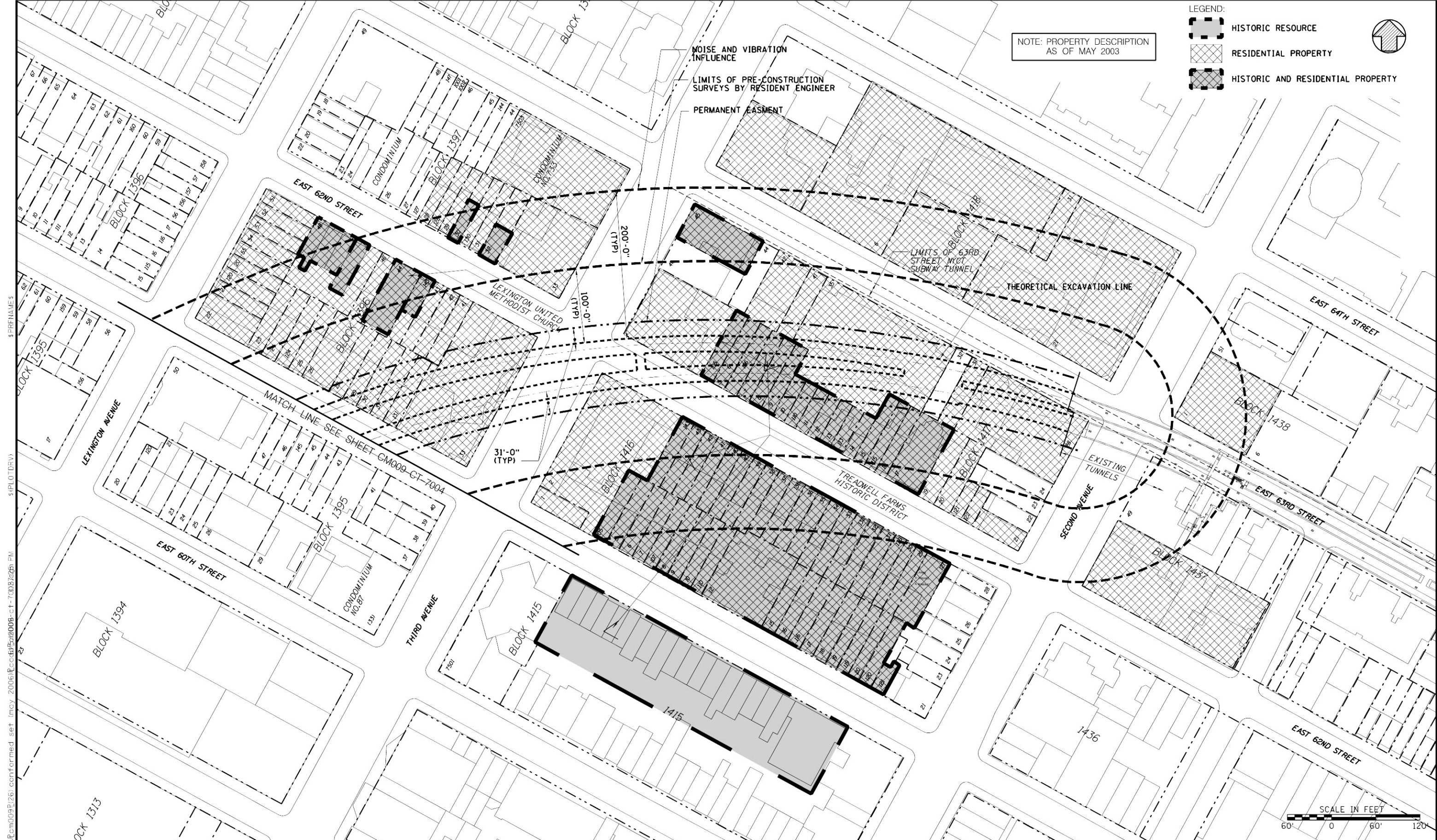
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**MANHATTAN TUNNELS EXCAVATION**  
  
NOISE AND VIBRATION INFLUENCE ZONE PLAN  
SHEET 4

SCALE  
AS NOTED  
DRAWING NUMBER:  
CM009-CT-7004  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
**CM009**  
ISSUE  
  
SHEET No.  
**128** OF 276





NOTE: PROPERTY DESCRIPTION  
AS OF MAY 2003

LEGEND:

- HISTORIC RESOURCE
- RESIDENTIAL PROPERTY
- HISTORIC AND RESIDENTIAL PROPERTY



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5/26/06	CONFORMED DRAWING
DATE:	REVISIONS

DESIGNED BY: A. GONZALEZ
DRAWN BY: M. CAPONE
CHECKED BY: M. DELLA POSTA
COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

NY PROFESSIONAL  
License No.

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SIGNED  
&  
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DATE: \_\_\_\_\_

**MANHATTAN TUNNELS EXCAVATION**

NOISE AND VIBRATION INFLUENCE ZONE PLAN  
SHEET 5




SCALE: AS NOTED
DRAWING NUMBER: CM009-CT-7005
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. <b>CM009</b> ISSUE
SHEET No. <b>129</b> OF <b>276</b>






BLOCK NO.	LOT NO.	BUILDING ADDRESS	NO. OF STORIES	HISTORIC LANDMARKS	COMMENTS	
1303	1	299 PARK AVENUE	42		OFFICE BUILDING	E
1303	14	518 LEXINGTON AVENUE	14	HOTEL INTERCONTINENTAL/ (FORMERLY BARCLAY HOTEL)	HOTEL	R/H
1304	1	301 PARK AVENUE	43	WALDORF ASTORIA HOTEL	LUXURY HOTEL	R/E/H
1305	1	321 PARK AVENUE	5	ST. BARTHOLOMEWS CHURCH	CHURCH	E/H
1306	1	345 PARK AVENUE	44		OFFICE BUILDING	E
1307	1	375 PARK AVENUE	38	SEAGRAM BUILDING (FOUR SEASONS INTERIOR)	OFFICE BUILDING	W/E/H
1308	(1)	399 PARK AVENUE	39		OFFICE BUILDING/CONDOMINIUM NO. 486 /CONDOMINIUM NO. 486A	W/E
1309	1	405 PARK AVENUE	17		OFFICE BUILDING	W/E
1309	5	111 EAST 54TH STREET	5		PRIVATE CLUB	E
1309	6	115 EAST 54TH STREET	5		OFFICE BUILDING	
1309	7	119 EAST 54TH STREET	4		OFFICE BUILDING	
1309	107	121 EAST 54TH STREET	4		OFFICE BUILDING	
1309	8	123 EAST 54TH STREET	15		ELEVATOR APARTMENT BUILDING	R
1309	72	407 PARK AVENUE	2		COMMERCIAL BUILDING	W/E
1309	69	417 PARK AVENUE	13		RESIDENTIAL COOPERATIVE	W/R/E
1309	66	110 EAST 55TH STREET	19		OFFICE BUILDING	
1309	65	116 EAST 55TH STREET	4		OFFICE BUILDING	
1310	1	425 PARK AVENUE	31		OFFICE BUILDING	W/E
1310	7	113 EAST 55TH STREET	3		OFFICE BUILDING	
1310	8	115 EAST 55TH STREET	4		OFFICE BUILDING	
1310	108	117 EAST 55TH STREET	5		OFFICE BUILDING	
1310	65	120 EAST 56TH STREET	15		OFFICE BUILDING	
1310	63	124-26 EAST 56TH STREET	33		OFFICE BUILDING	
1311	11	125 EAST 56TH STREET	5		OFFICE BUILDING	
1311	1	445 PARK AVENUE	21		OFFICE BUILDING	W/E
1311	5	111 EAST 56TH STREET	22		RESIDENTIAL COOPERATIVE	R/E
1311	65	110 EAST 57TH STREET	20		RESIDENTIAL COOPERATIVE	W/R/E
1311	64	116 EAST 57TH STREET	5		COMMERCIAL BUILDING	
1311	63	118 EAST 57TH STREET	5		OFFICE BUILDING	
1311	62	120 EAST 57TH STREET	5		COMMERCIAL BUILDING	
1311	161	122 EAST 57TH STREET	5		COMMERCIAL BUILDING	
1311	61	124 EAST 57TH STREET	5		COMMERCIAL BUILDING	
1311	60	126 EAST 57TH STREET	5		MIXED USE: RESIDENTIAL & COMMERCIAL	R
1312	70	465 PARK AVENUE	3	RITZ TOWER APT. HOTEL	COMMERCIAL BUILDING	W/E/H
1312	15	135 EAST 57TH STREET	32		OFFICE BUILDING	W/E
1312	62	128 EAST 58TH STREET	4		VACANT BUILDING	W/E
1312	63	124 EAST 58TH STREET	4	NY GENOLOGICAL & BIOGRAPHICAL SOCIETY	LIBRARY/MUSEUM	W/E/H
1312	69	475 PARK AVENUE	15		RESIDENTIAL COOPERATIVE	W/R/E
1312	58	714 LEXINGTON AVENUE	4		COMMERCIAL BUILDING	E
1312	59	716-18 LEXINGTON AVENUE	2		COMMERCIAL BUILDING	E
1312	60	720 LEXINGTON AVENUE	4		COMMERCIAL BUILDING/CONDOMINIUM NO. 756	E
1312	(1)	465 PARK AVENUE	42		RESIDENTIAL COOPERATIVE/CONDOMINIUM NO.16	R/E/W
1312	(6)	117 EAST 57TH STREET	57		MIXED USE: RESIDENTIAL & COMMERCIAL	R/E/W
1312	50	715-21 LEXINGTON AVENUE	4		COMMERCIAL BUILDING	
1312	20	711 LEXINGTON AVENUE	2		COMMERCIAL BUILDING	
1313	1	485 PARK AVENUE	14		RESIDENTIAL COOPERATIVE	W/R/E
1313	5	110 EAST 59TH STREET	37		OFFICE BUILDING	W/E
1313	14	133 EAST 58TH STREET	15		OFFICE BUILDING	W/E
1313	17	730 LEXINGTON AVENUE	4		COMMERCIAL BUILDING	W/E
1313	56	130 EAST 59TH STREEET	17		OFFICE BUILDING	W/E
1313	63	120 EAST 59TH STREET	4		COMMERCIAL BUILDING	W/E
1313	65	116 EAST 59TH STREET	6		COMMERCIAL LOFT BUILDING	W/E
1313	4	499 PARK AVENUE	27		OFFICE BUILDING	E
1313	50	735-41 LEXINGTON AVENUE	N/A		UNDER CONSTRUCTION	E
1313	43	723-33 LEXINGTON AVENUE	N/A		UNDER CONSTRUCTION	

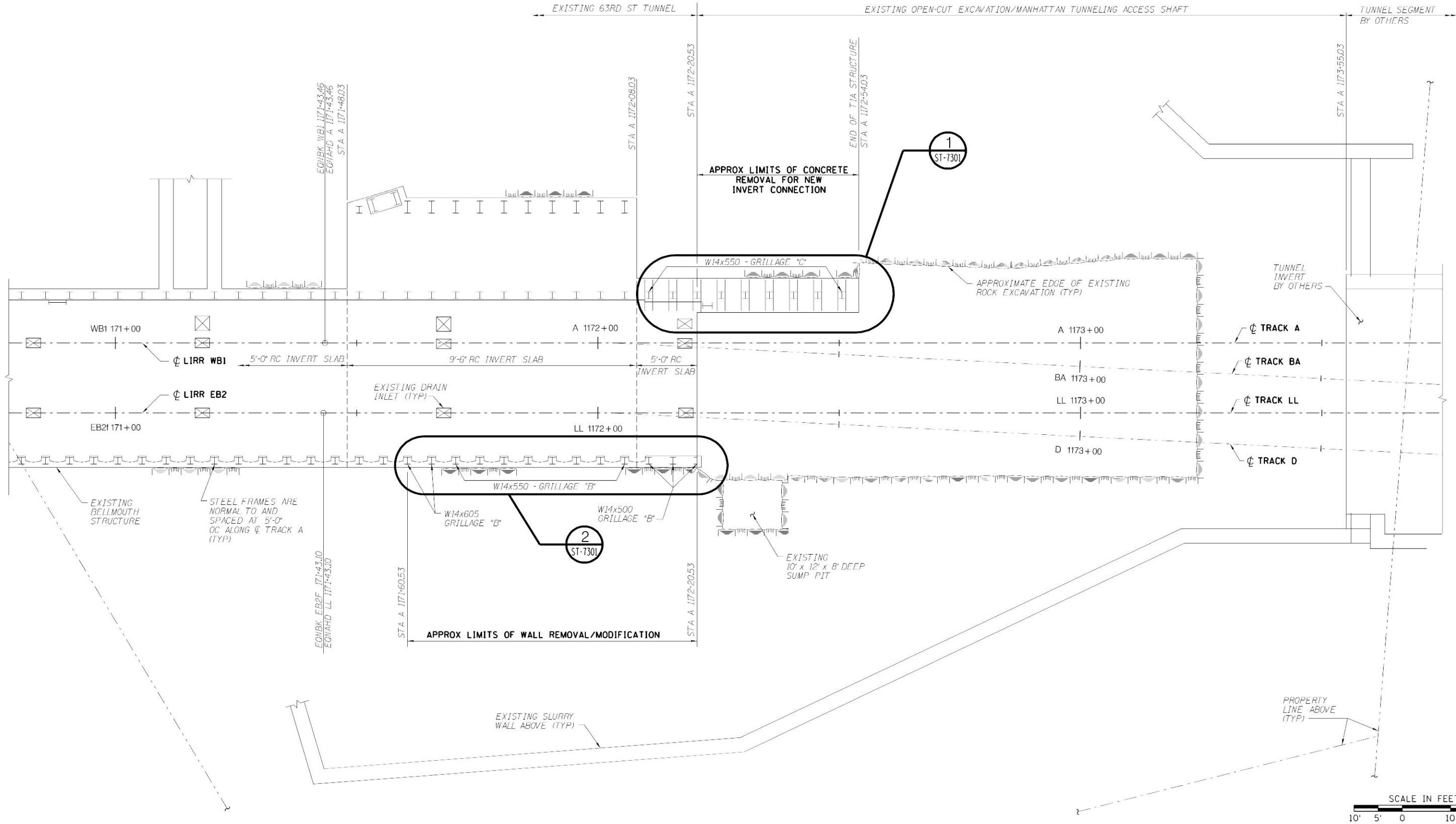
 <b>Metropolitan Transportation Authority</b> Capital Construction	 <b>Long Island Rail Road East Side Access</b>	 <b>PARSONS</b> General Engineering Consultant 469 Seventh Avenue • New York, NY • 10018	PARSONS BRINCKERHOFF STV INCORPORATED PARSONS TRANSPORTATION GROUP OF NEW YORK, INC.	IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DOCUMENT IN ANY WAY UNLESS THAT PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL. THE LICENSED PROFESSIONAL SHALL AFFIX TO THIS DOCUMENT THE SEAL AND THE NOTATION "ALTERED BY". FOLLOWED BY THE AUTHORIZED SIGNATURE AND THE DATE OF THE ALTERATION."		
				5/26/06	CONFORMED DRAWING	DATE:

BLOCK NO.	LOT NO.	BUILDING ADDRESS	NO. OF STORIES	HISTORIC LANDMARKS	COMMENTS	
1394	1	505 PARK AVENUE	22		OFFICE BUILDING	
1394	5	111 EAST 59TH STREET	14		OFFICE BUILDING	
1394	7	118 EAST 60TH STREET	33		RESIDENTIAL COOPERATIVE	R/E
1394	13	750 LEXINGTON AVENUE	31		OFFICE BUILDING	W/E
1394	66	116 EAST 60TH STREET	5		COMMERCIAL & RESIDENTIAL	R
1394	23	1000 THIRD AVENUE	12	BLOOMINGDALE'S	DEPARTMENT STORE	W/E/H
1395	13	129 EAST 60TH STREET	5		RESIDENTIAL W/COMMERCIAL	R
1395	17	770 LEXINGTON AVENUE	18		OFFICE BUILDING	E
1395	56	782 LEXINGTON AVENUE	2		COMMERCIAL BUILDING	
1395	156	780 LEXINGTON AVENUE	4		RETAIL & RESIDENTIAL APTS.	R
1395	58	136 EAST 61ST STREET	4		MIXED USE: RESIDENTIAL & COMMERCIAL	R
1395	12	127 EAST 60TH STREET	5		MIXED USE: RESIDENTIAL & COMMERCIAL	R
1395	20	767 LEXINGTON AVENUE	6		OFFICE BUILDING	W/E
1395	120	143 EAST 60TH STREET	5		APARTMENT BUILDING	W/R/E
1395	21	145 EAST 60TH STREET	5		WALK-UP APARTMENTS	W/R/E
1395	23	149 EAST 60TH STREET	5		APARTMENT BUILDING	W/R/E
1395	24	151 EAST 60TH STREET	5		APARTMENT BUILDING	W/R/E
1395	25	153 EAST 60TH STREET	2		COMMERCIAL BUILDING	W/E
1395	26	155 EAST 60TH STREET	11		OFFICE BUILDING	W/E
1395	29	165 EAST 60TH STREET	6		RESIDENTIAL COOPERATIVE	R/E
1395	(133)	1010-18 THIRD AVENUE	20		CONDOMINIUM NO. 87	W/R/E
1395	37	1020 THIRD AVENUE	5		WALK-UP APARTMENTS	W/R/E
1395	38	1022 THIRD AVENUE	4		WALK-UP APARTMENTS	W/R/E
1395	39	1026 THIRD AVENUE	4		RETAIL & RESIDENTIAL APTS.	W/R/E
1395	40	1028 THIRD AVENUE	4		WALK-UP APARTMENTS	W/R/E
1395	41	170 EAST 61ST STREET	7		COMMERCIAL BUILDING	E
1395	50	150 EAST 61ST STREET	16		RESIDENTIAL COOPERATIVE	W/R/E
1395	47	154 EAST 61ST STREET	5		APARTMENT BUILDING	W/R/E
1395	46	156 EAST 61ST STREET	5		WALK-UP APARTMENT BUILDING	W/R/E
1395	145	158 EAST 61ST STREET	5		WALK-UP APARTMENTS	W/R/E
1395	45	160 EAST 61ST STREET	4		TWO-FAMILY RESIDENTIAL	W/R/E
1395	44	162 EAST 61ST STREET	4		WALK-UP APARTMENTS	W/R/E
1395	43	164 EAST 61ST STREET	4		WALK-UP APARTMENTS	W/R/E
1396	20	791 LEXINGTON AVENUE	5		WALK-UP APARTMENTS	R
1396	120	789 LEXINGTON AVENUE	5		RESIDENTIAL W/COMMERCIAL	R
1396	21	787 LEXINGTON AVENUE	5		RESIDENTIAL W/COMMERCIAL	R
1396	22	783 LEXINGTON AVENUE	5		WALK-UP APARTMENTS	R
1396	23	145 EAST 61ST STREET	5		RESIDENTIAL W/COMMERCIAL	R/E
1396	24	147 EAST 61ST STREET	5		WALK-UP APARTMENTS	R/E
1396	124	149 EAST 61ST STREET	5		WALK-UP APARTMENTS	R/E
1396	25	151 EAST 61ST STREET	4		SINGLE FAMILY RESIDENTIAL	R/E
1396	26	153-55 EAST 61ST STREET	5		OFFICE W/RESIDENTIAL APARTMENTS	R/E
1396	28	157 EAST 61ST STREET	5		APARTMENT BUILDING	W/R/E
1396	29	159 EAST 61ST STREET	4		SINGLE FAMILY RESIDENTIAL	W/R/E
1396	30	161 EAST 61ST STREET	4		WALK-UP APARTMENT BUILDING	W/R/E
1396	31	163 EAST 61ST STREET	4		WALK-UP APARTMENT BUILDING	W/R/E
1396	131	165 EAST 61ST STREET	4		WALK-UP APARTMENT BUILDING	W/R/E
1396	33	167 EAST 61ST STREET	38		RESIDENTIAL COOPERATIVE	W/R/E
1396	41	158 EAST 62ND STREET	5		RESIDENTIAL COOPERATIVE	R/E
1396	42	156 EAST 62ND STREET	5		SINGLE FAMILY RESIDENTIAL	R/E
1396	43	154 EAST 61ST STREET	4		SINGLE FAMILY RESIDENTIAL	R/E
1396	143	152 EAST 62ND STREET	3		TWO- FAMILY RESIDENTIAL	R/E/H
1396	44	148-50 EAST 62ND STREET	3	LEXINGTON UNITED METHODIST CHURCH	CHURCH	R/E/H
1396	46	146 EAST 62ND STREET	5		TWO- FAMILY RESIDENTIAL	R/E
1396	48	136-144 EAST 62ND STREET	5		OFFICE W/ RESIDENTIAL (5 BLDGS)	R/E/H
1396	54	795 LEXINGTON AVENUE	5		MIXED USE: RESIDENTIAL & COMMERCIAL	R
1396	55	793 LEXINGTON AVENUE	4		MIXED USE: RESIDENTIAL & COMMERCIAL	R
					W RIGHT OF WAY	
				NOTE: PROPERTY DESCRIPTION AS OF MAY 2003	E LIMITS OF PRE-CONSTRUCTION BUILDING SURVEYS BY RESIDENT ENGINEER	
					H HISTORIC RESOURCE / POTENTIAL HISTORIC RESOURCE	
					R RESIDENTIAL PROPERTY	

	DESIGNED BY: A. GONZALEZ	NY PROFESSIONAL License No.	<h1 style="text-align: center;">MANHATTAN TUNNELS EXCAVATION</h1> <h2 style="text-align: center;">NOISE AND VIBRATION INFLUENCE ZONE PLAN</h2> <h3 style="text-align: center;">SHEET 7</h3>	SCALE: NONE	CONTRACT No. CM009
	DRAWN BY: M. CAPONE	<h2 style="text-align: center;">ORIGINAL SIGNED &amp; SEALED</h2>		DRAWING NUMBER: CM009-CT-7007	ISSUE
	CHECKED BY: M. DELLA POSTA			DATE: 5-26-06	SHEET No.
	COORDINATED BY: M. DELLA POSTA			REVISION NUMBER: 0	131 OF 27
	APPROVED BY: J. SCHABIB			DATE: _____	
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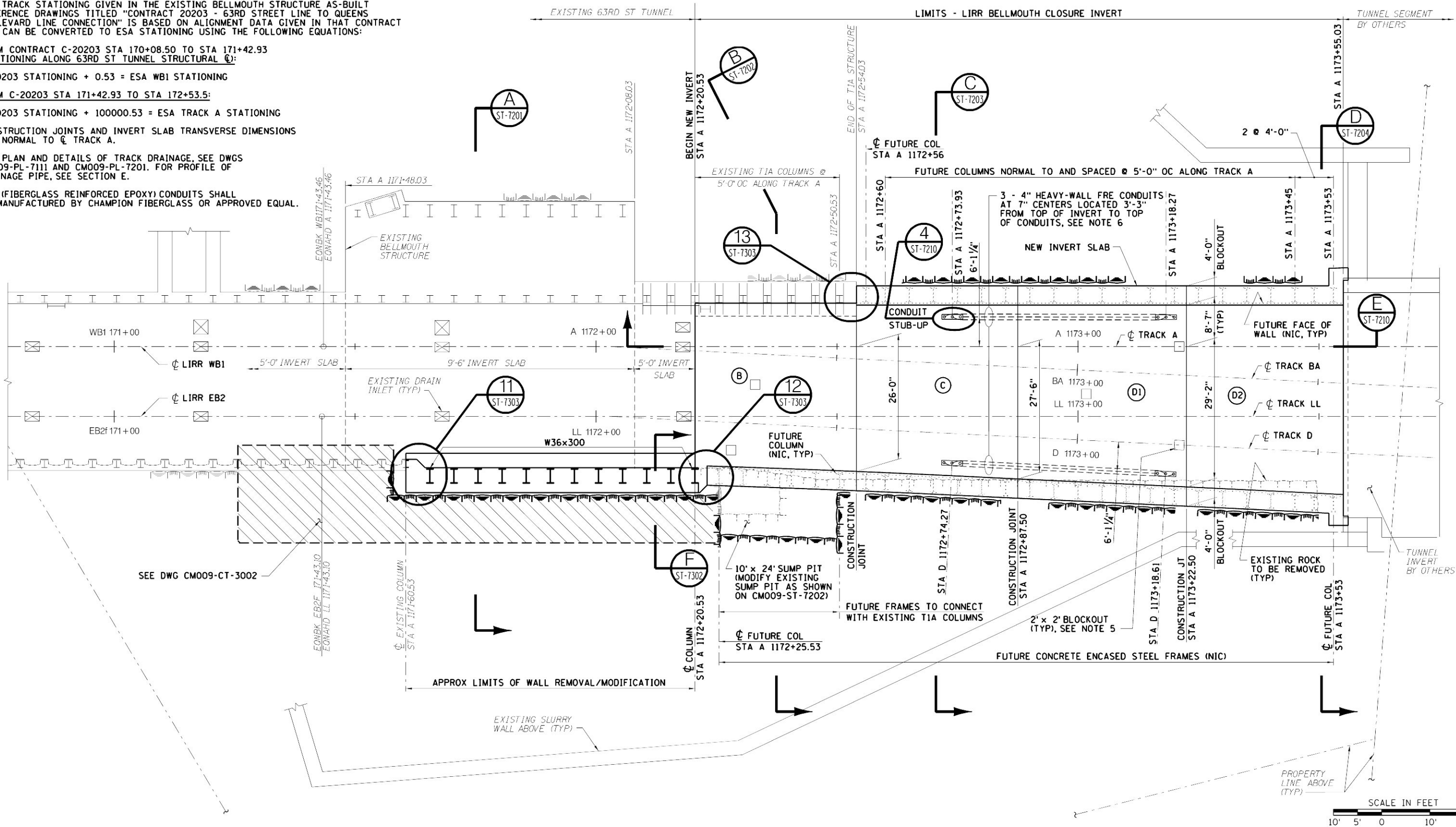






NOTES:

1. FOR GENERAL NOTES, SEE DWGS CM009-GP-0051 THRU CM009-GP-0055.
2. TRACK STATIONING SHOWN FOR EXISTING AND NEW WORK IS BASED ON ESA ALIGNMENT DATA GIVEN IN THE REFERENCE DOCUMENTS, SEE TRACK DRAWINGS.
3. THE TRACK STATIONING GIVEN IN THE EXISTING BELLMOUTH STRUCTURE AS-BUILT REFERENCE DRAWINGS TITLED "CONTRACT 20203 - 63RD STREET LINE TO QUEENS BOULEVARD LINE CONNECTION" IS BASED ON ALIGNMENT DATA GIVEN IN THAT CONTRACT AND CAN BE CONVERTED TO ESA STATIONING USING THE FOLLOWING EQUATIONS:  
  
FROM CONTRACT C-20203 STA 170+08.50 TO STA 171+42.93  
(STATIONING ALONG 63RD ST TUNNEL STRUCTURAL C):  
  
C-20203 STATIONING + 0.53 = ESA WB1 STATIONING  
  
FROM C-20203 STA 171+42.93 TO STA 172+53.5:  
  
C-20203 STATIONING + 100000.53 = ESA TRACK A STATIONING
4. CONSTRUCTION JOINTS AND INVERT SLAB TRANSVERSE DIMENSIONS ARE NORMAL TO C TRACK A.
5. FOR PLAN AND DETAILS OF TRACK DRAINAGE, SEE DWGS CM009-PL-7111 AND CM009-PL-7201. FOR PROFILE OF DRAINAGE PIPE, SEE SECTION E.
6. FRE (FIBERGLASS REINFORCED EPOXY) CONDUITS SHALL BE MANUFACTURED BY CHAMPION FIBERGLASS OR APPROVED EQUAL.



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CHECKED BY:  
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COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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MANHATTAN TUNNELS EXCAVATION

BELLMOUTH STRUCTURE  
PLAN AT LIRR INVERT LEVEL

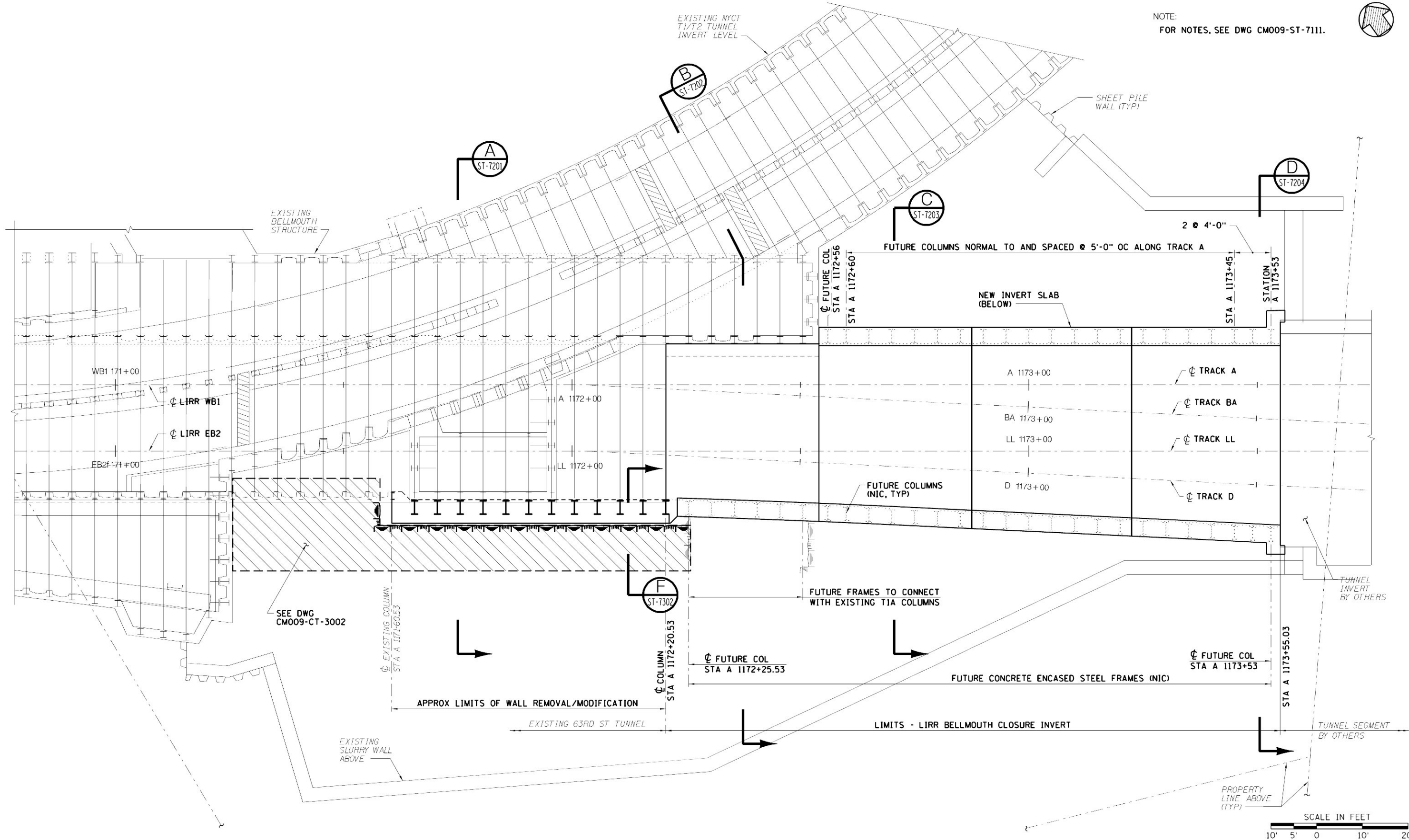
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CM009-ST-7111  
DATE:  
5-26-06  
REVISION NUMBER:  
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CM009  
ISSUE  
SHEET No.  
135 OF 276





NOTE:  
FOR NOTES, SEE DWG CM009-ST-7111.



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M. DELLA POSTA  
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## MANHATTAN TUNNELS EXCAVATION

BELLMOUTH STRUCTURE  
PLAN AT LIRR ROOF LEVEL

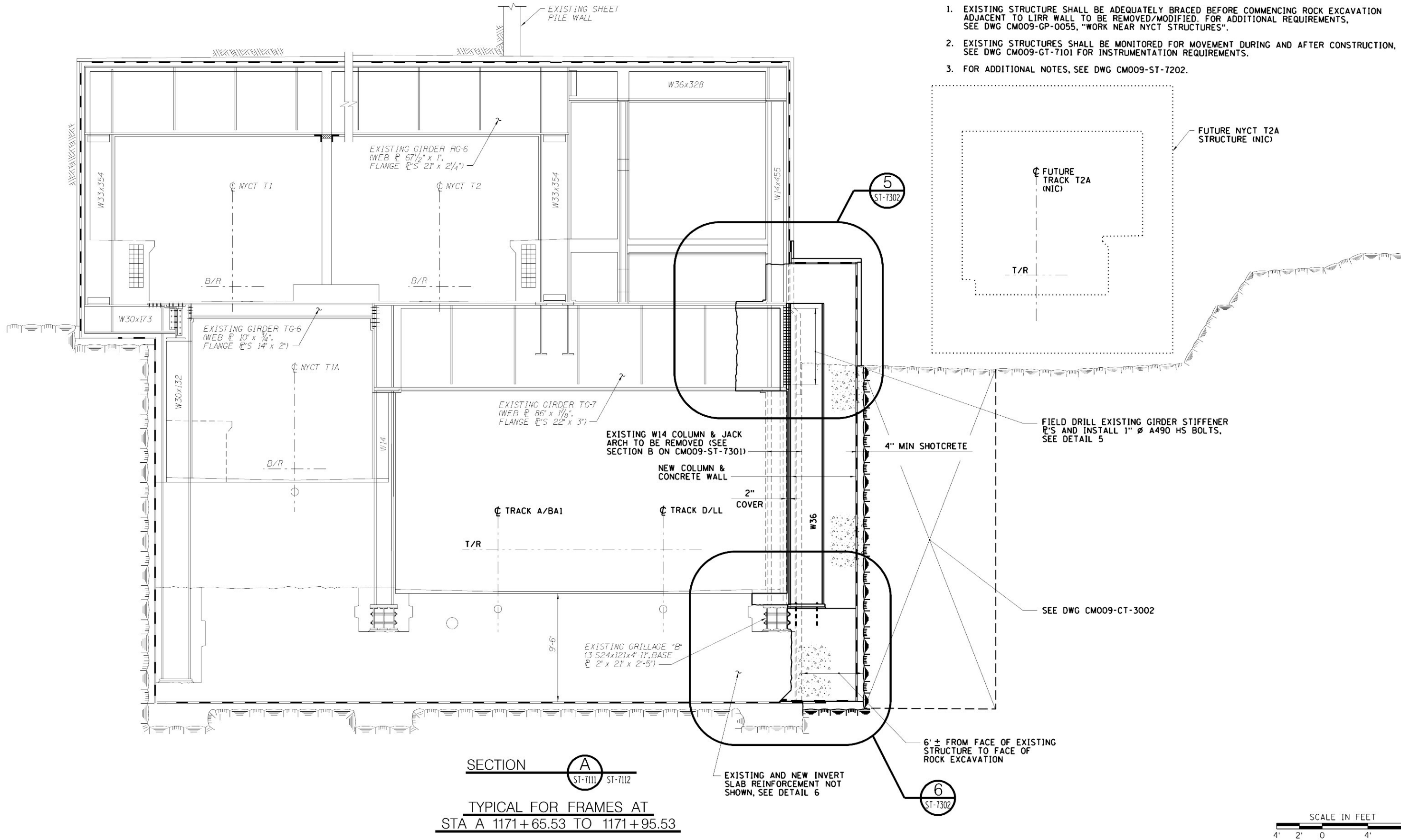
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AS NOTED  
DRAWING NUMBER  
CM009-ST-7112  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
**CM009**  
ISSUE  
SHEET No.  
**136** OF 276

\$PRNAME\$


\$PLOTDRW\$


\$REF\$3  
y:\p000d\submissions\cm009\p126\conformed set (may 2006)\cc06\cm009-st-7202.dwg PM



- NOTES:
1. EXISTING STRUCTURE SHALL BE ADEQUATELY BRACED BEFORE COMMENCING ROCK EXCAVATION ADJACENT TO LIRR WALL TO BE REMOVED/MODIFIED. FOR ADDITIONAL REQUIREMENTS, SEE DWG CM009-GP-0055, "WORK NEAR NYCT STRUCTURES".
  2. EXISTING STRUCTURES SHALL BE MONITORED FOR MOVEMENT DURING AND AFTER CONSTRUCTION, SEE DWG CM009-GT-7101 FOR INSTRUMENTATION REQUIREMENTS.
  3. FOR ADDITIONAL NOTES, SEE DWG CM009-ST-7202.



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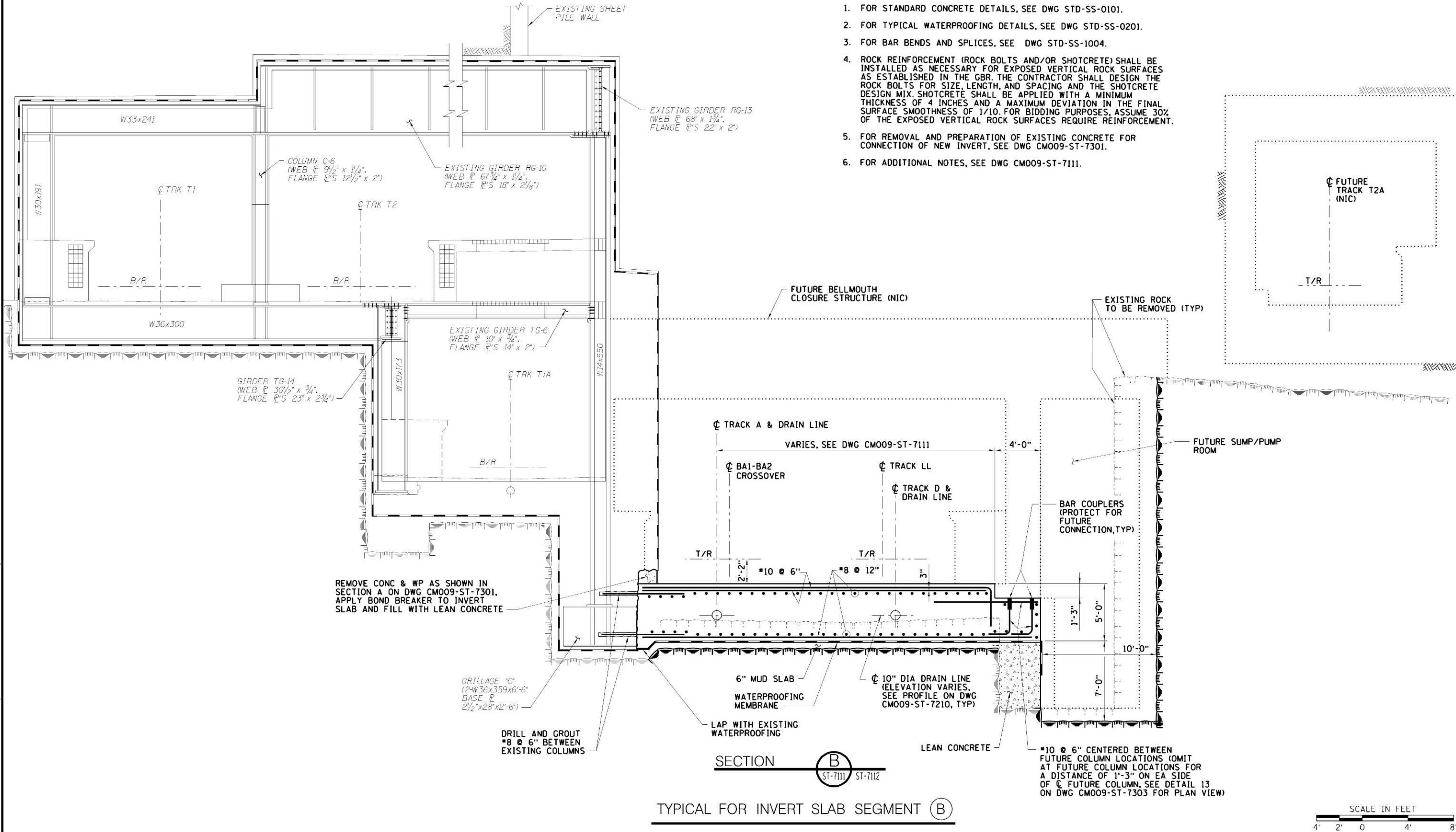
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**MANHATTAN TUNNELS EXCAVATION**  
  
BELLMOUTH STRUCTURE  
SECTIONS  
SHEET 1

SCALE AS NOTED	CONTRACT No. <b>CM009</b>
DRAWING NUMBER CM009-ST-7201	ISSUE
DATE: 5-26-06	SHEET No. <b>137</b> OF <b>276</b>
REVISION NUMBER: 0	

NOTES:

1. FOR STANDARD CONCRETE DETAILS, SEE DWG STD-SS-0101.
2. FOR TYPICAL WATERPROOFING DETAILS, SEE DWG STD-SS-0201.
3. FOR BAR BENDS AND SPLICES, SEE DWG STD-SS-1004.
4. ROCK REINFORCEMENT (ROCK BOLTS AND/OR SHOTCRETE) SHALL BE INSTALLED AS NECESSARY FOR EXPOSED VERTICAL ROCK SURFACES AS ESTABLISHED IN THE GBR. THE CONTRACTOR SHALL DESIGN THE ROCK BOLTS FOR SIZE, LENGTH, AND SPACING AND THE SHOTCRETE DESIGN MIX. SHOTCRETE SHALL BE APPLIED WITH A MINIMUM THICKNESS OF 4 INCHES AND A MAXIMUM DEVIATION IN THE FINAL SURFACE SMOOTHNESS OF 1/10. FOR BIDDING PURPOSES, ASSUME 30% OF THE EXPOSED VERTICAL ROCK SURFACES REQUIRE REINFORCEMENT.
5. FOR REMOVAL AND PREPARATION OF EXISTING CONCRETE FOR CONNECTION OF NEW INVERT, SEE DWG CM009-ST-7301.
6. FOR ADDITIONAL NOTES, SEE DWG CM009-ST-7111.



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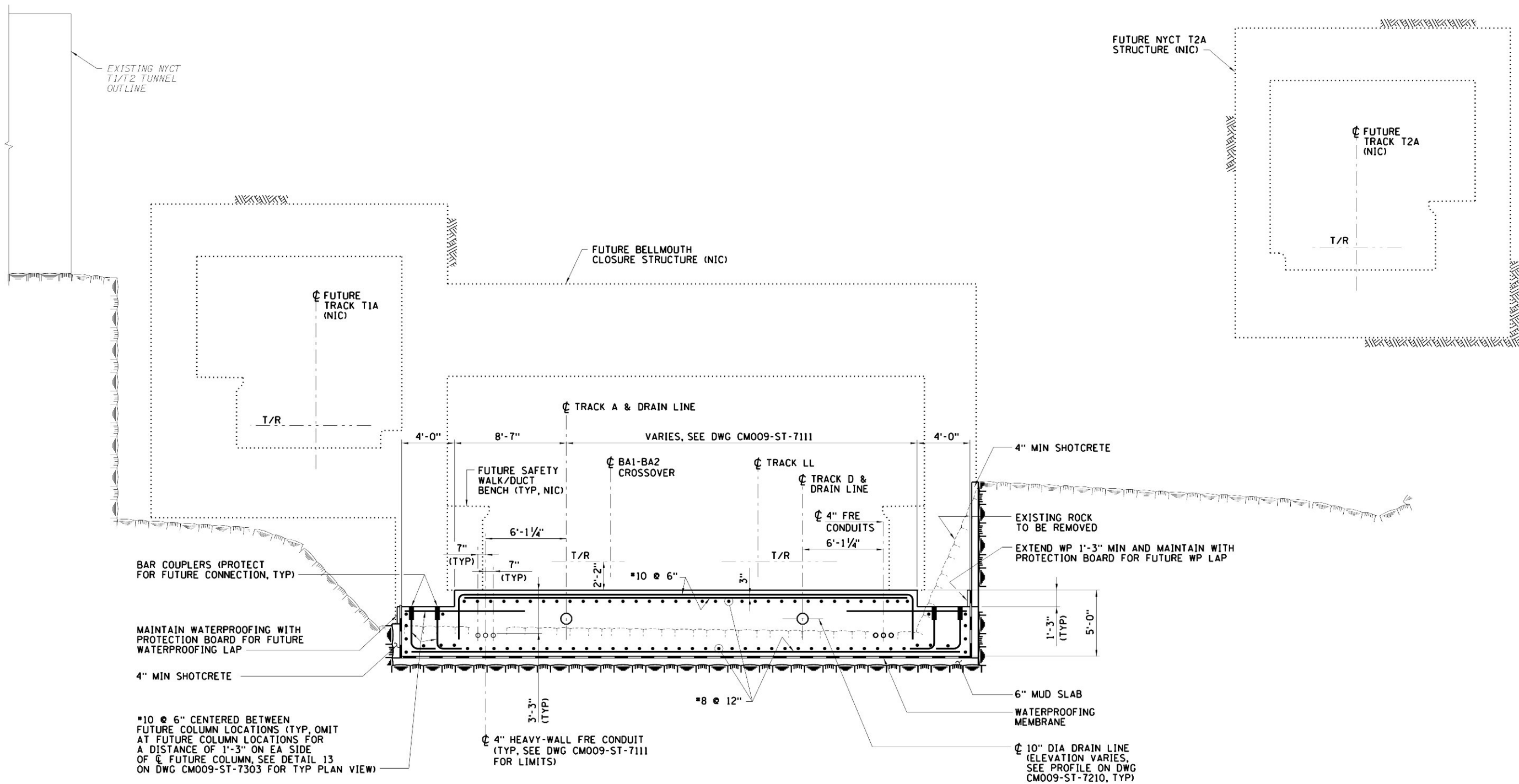
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**MANHATTAN TUNNELS EXCAVATION**

BELLMOUTH STRUCTURE  
SECTIONS  
SHEET 2

SCALE AS NOTED	CONTRACT No. CM009
DRAWING NUMBER CM009-ST-7202	ISSUE
DATE: 5-26-06	SHEET No.
REVISION NUMBER: 0	138 OF 276

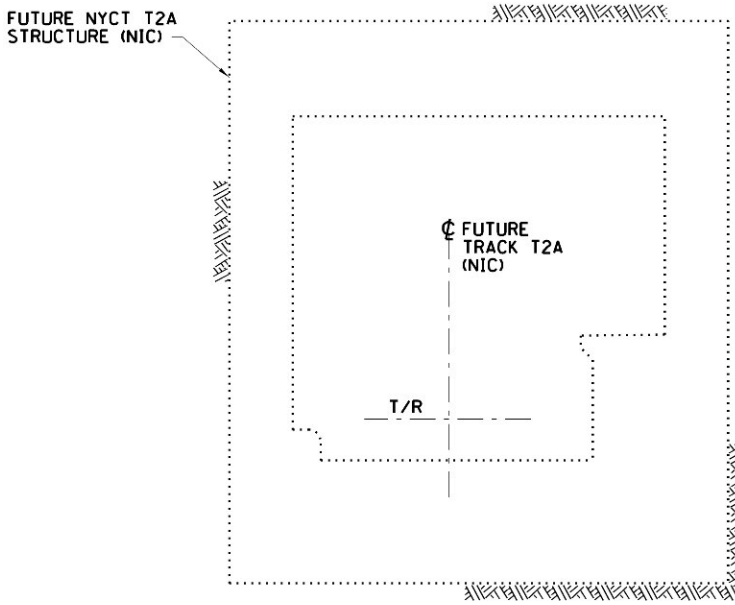
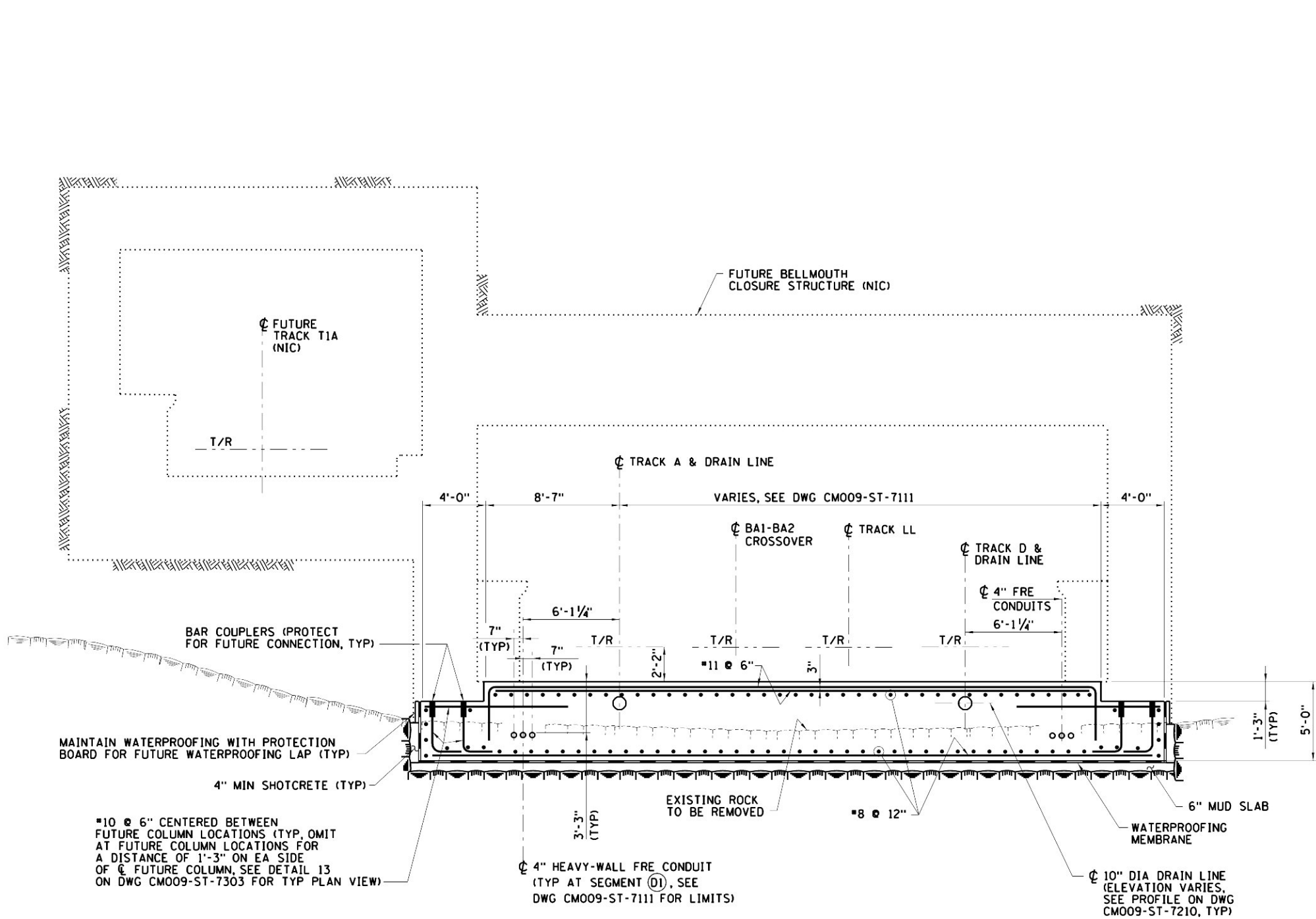


SECTION **C**  
ST-7111 ST-7112  
TYPICAL FOR INVERT SLAB SEGMENT **(C)**

SCALE IN FEET  
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NOTE:  
FOR NOTES, SEE DWG CM009-ST-7202.



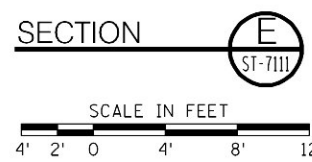
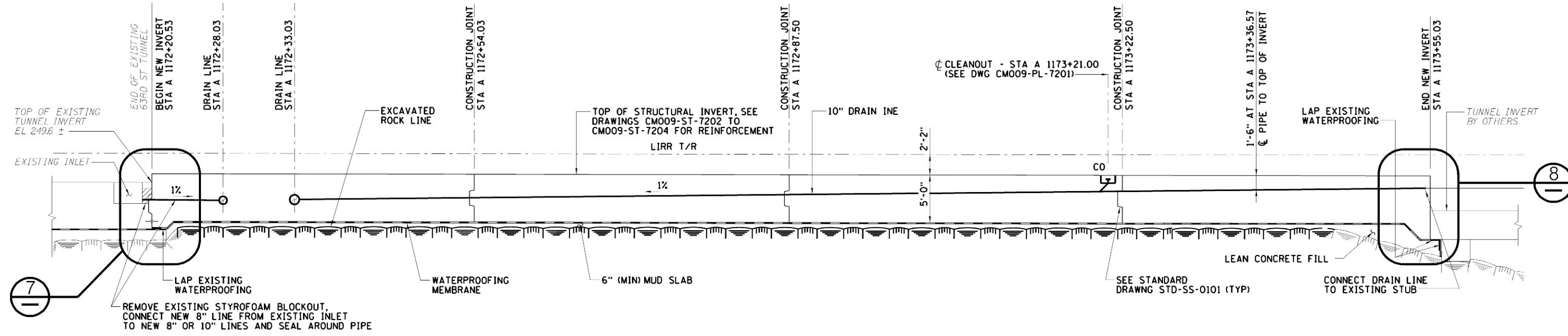
SECTION **D**  
ST-7111 ST-7112

TYPICAL FOR INVERT SLAB SEGMENTS **D1** AND **D2**



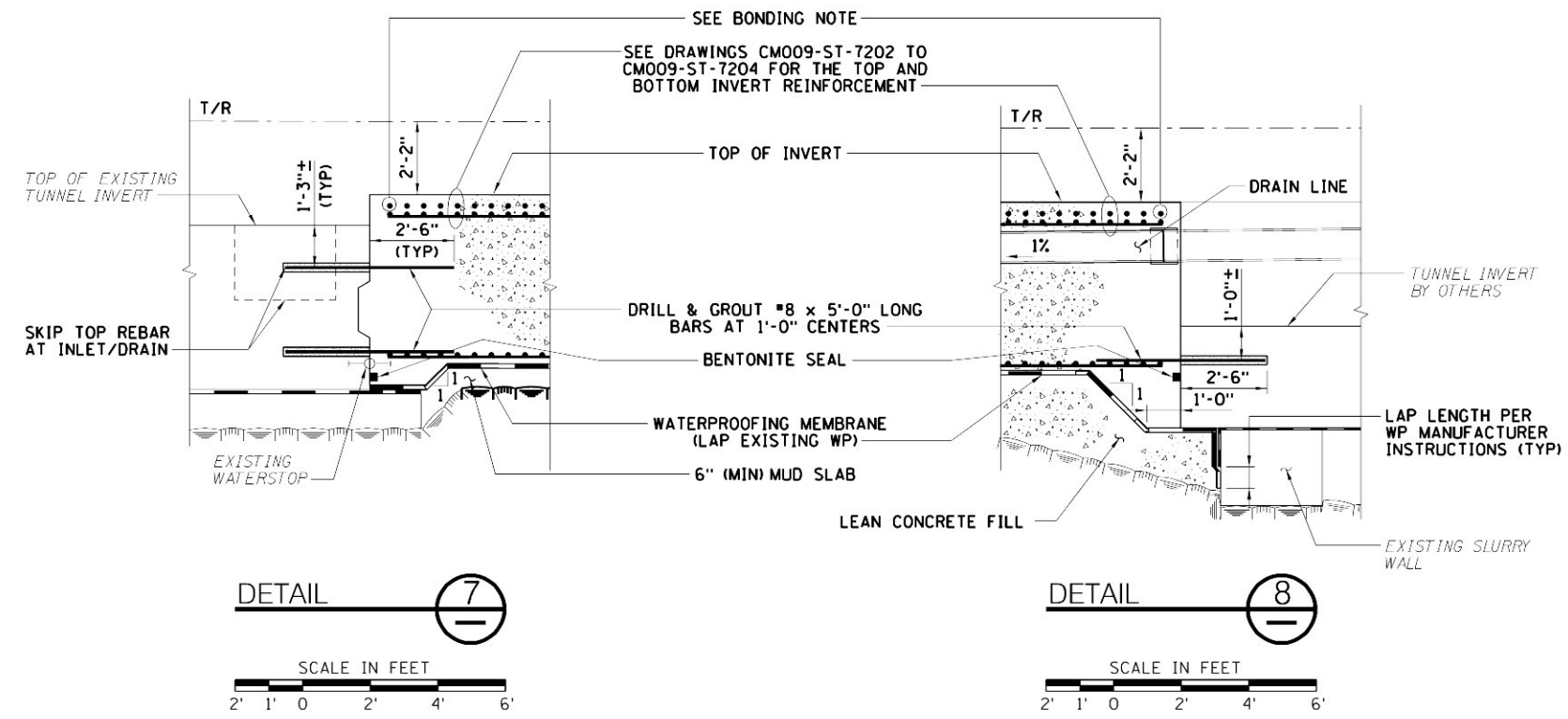
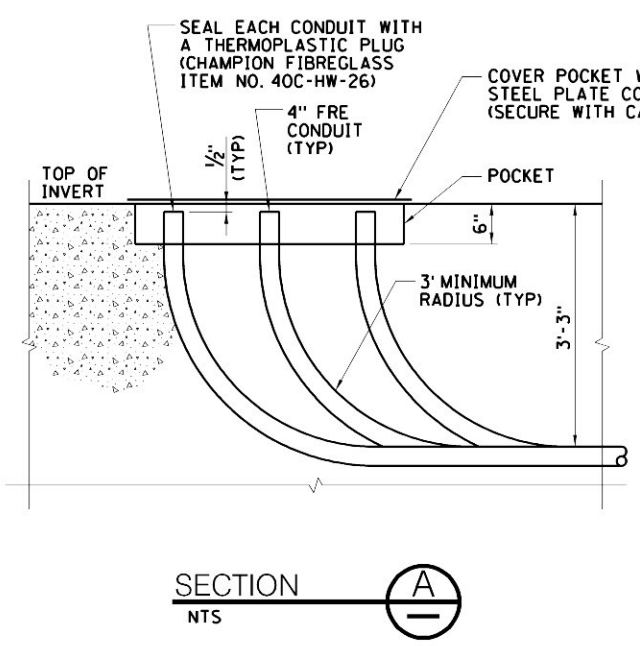
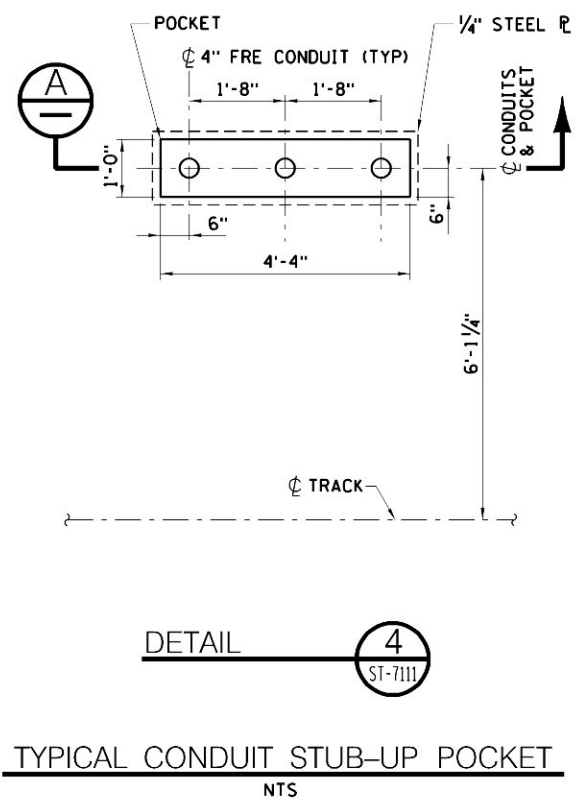
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NOTE:  
FOR NOTES, SEE DWG CM009-ST-7202.

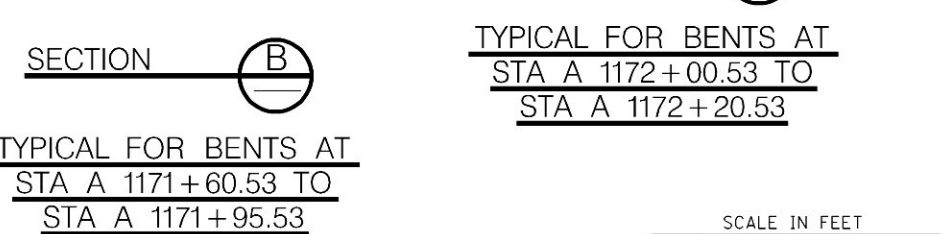
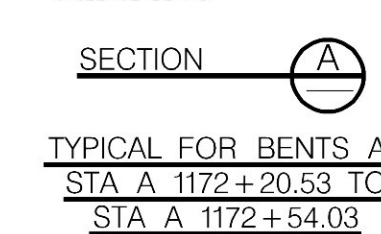


BONDING NOTE:

ALL LONGITUDINAL BARS SHALL BE FULLY BONDED. TRANSVERSE BARS SHALL BE FULLY BONDED TO THE LONGITUDINAL BARS AT EACH END OF THE INVERT TO PROVIDE ELECTRICAL CONTINUITY. SEE STANDARD DRAWING STD-CC-0007. CONNECT A 1/0 CABLE TO EACH LAYER OF REINFORCING AT THE FOUR CORNERS OF THE INVERT. SEE SPECIFICATION SECTION 16062. EXTEND THE 1/0 CABLES 10' MINIMUM ABOVE THE TOP OF THE INVERT (LOOP AND SECURE CABLES TO AVOID DAMAGE).



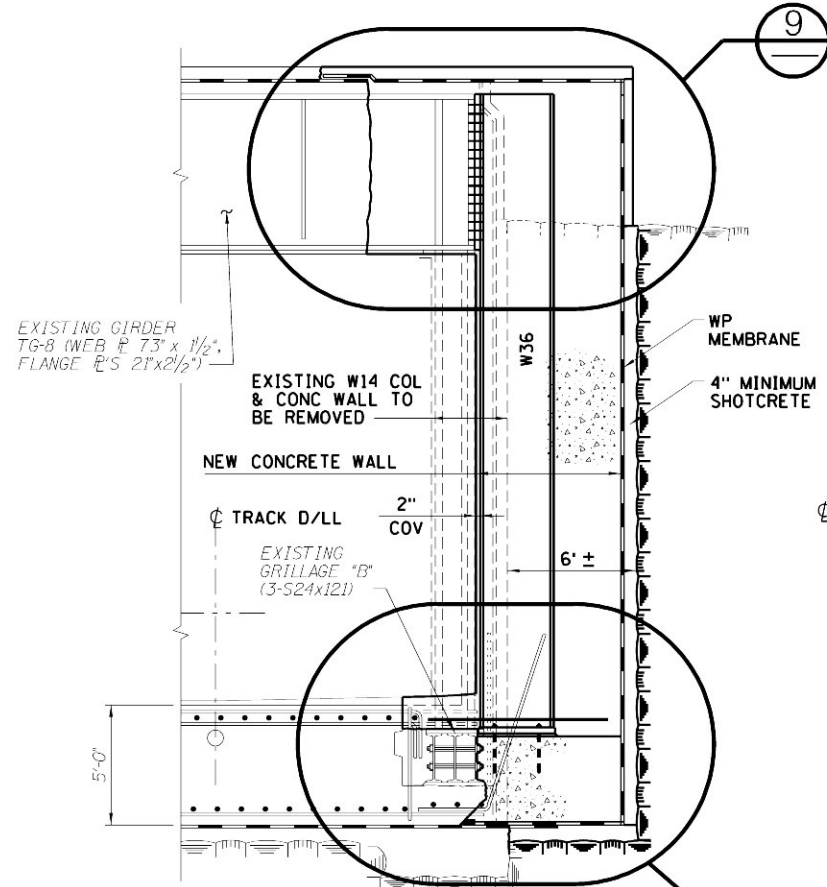
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<b>Long Island Rail Road</b> East Side Access			5/26/06 DATE: 5/26/06 CONFORMED DRAWING				



SCALE IN FEET

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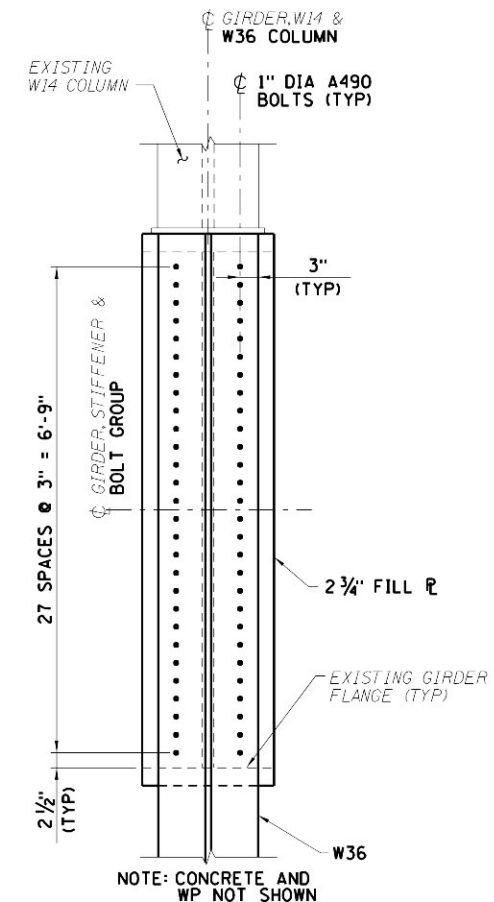
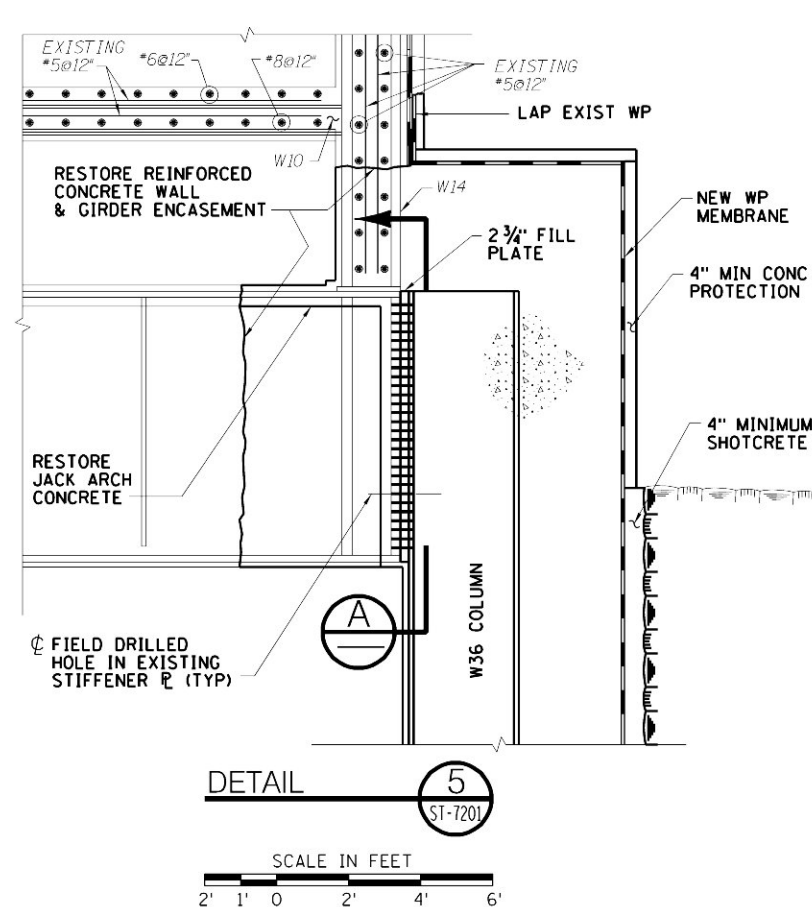
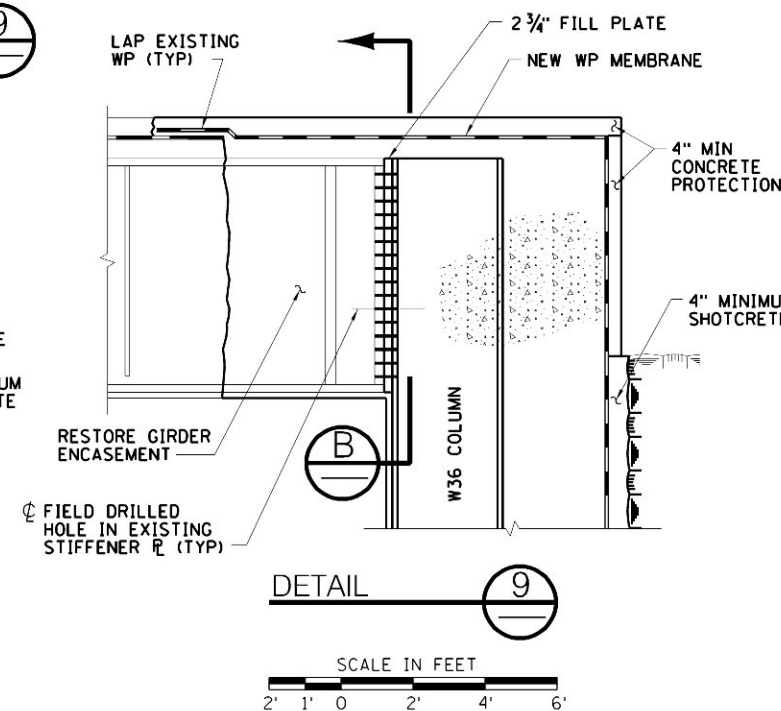
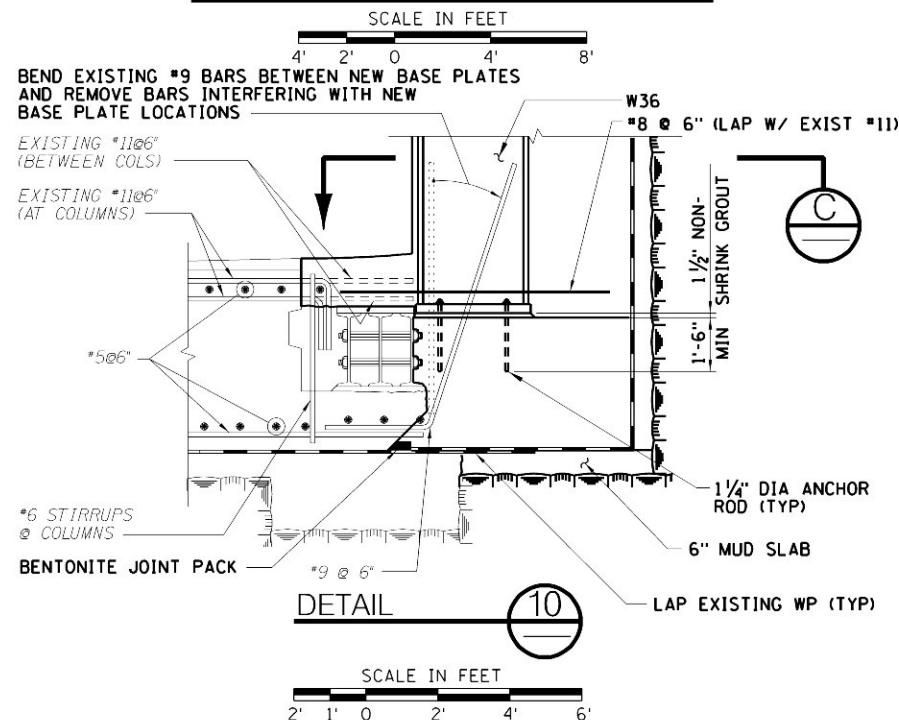
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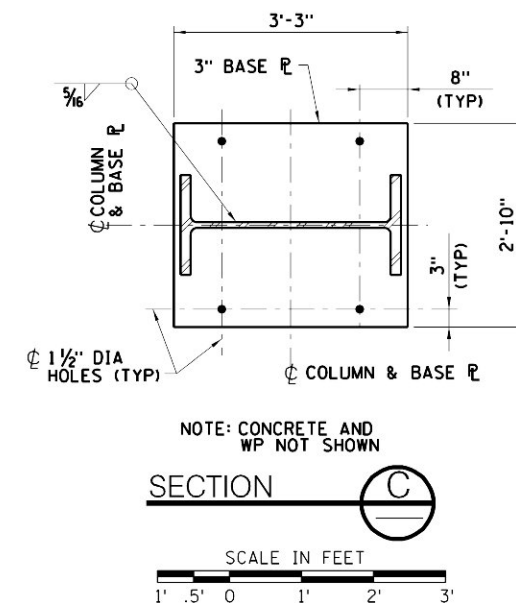
ST-7111 ST-7112

TYPICAL FOR FRAMES AT  
STA A 1172+10.53 TO 1172+20.53



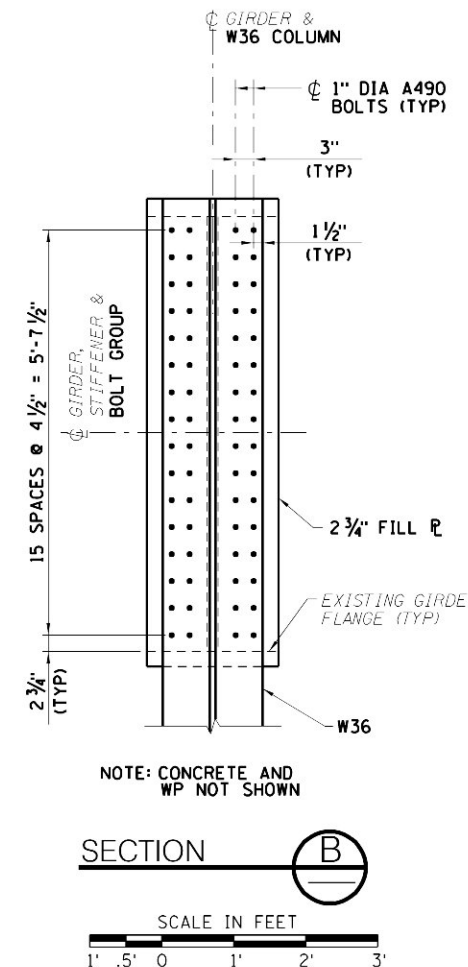
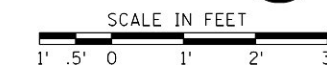
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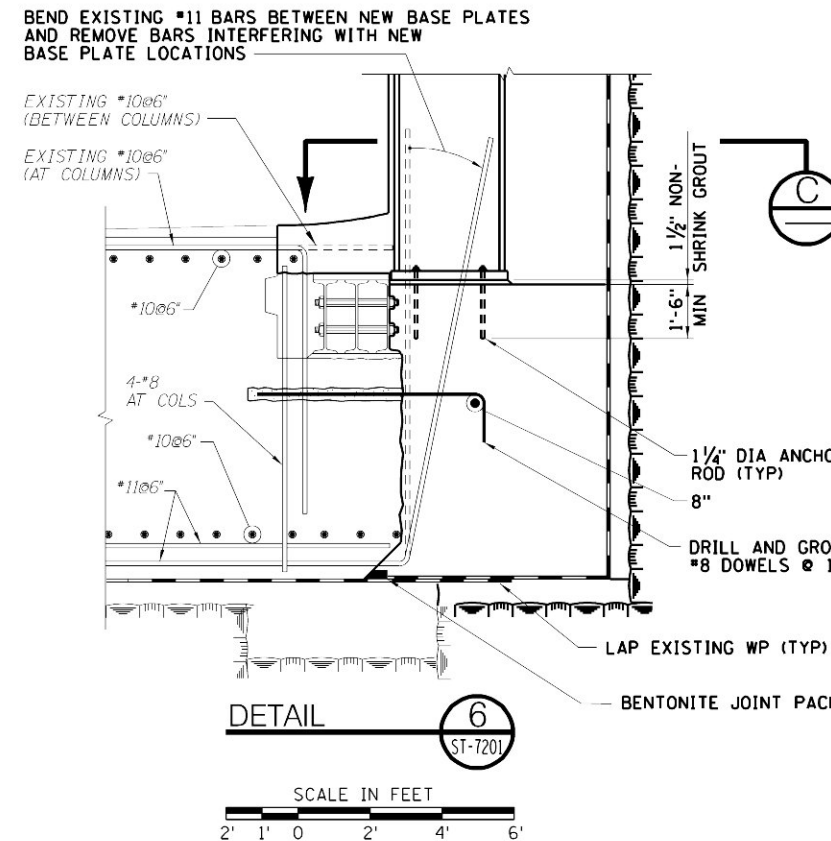
## SECTION

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## SECTION

**B**



## DETAIL

6

ST-7201

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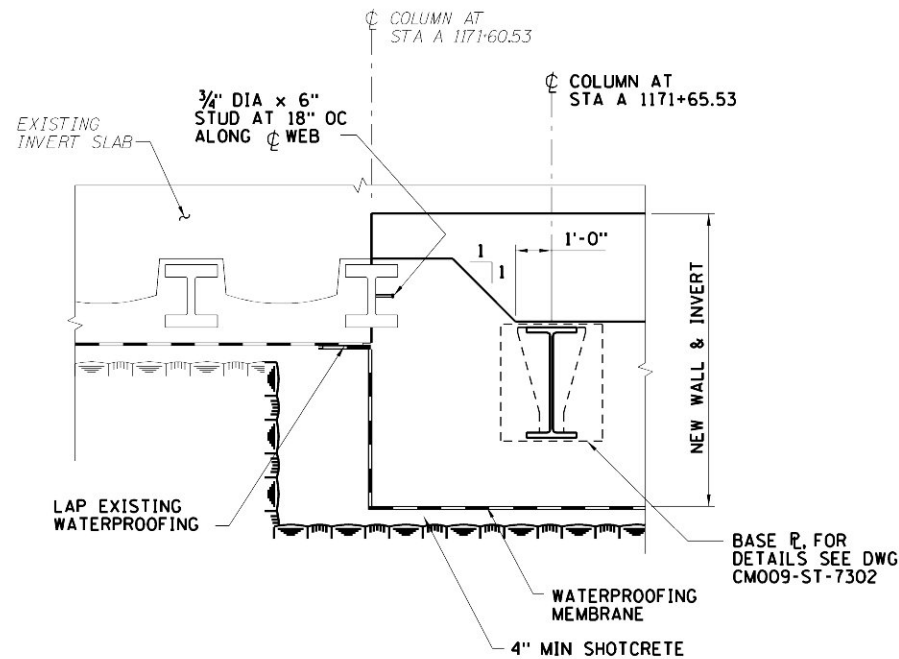
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DRAWING NUMBER CM009-ST-7302	ISSUE
DATE: 5-26-06	SHEET No. 143 OF 276
REVISION NUMBER: 0	



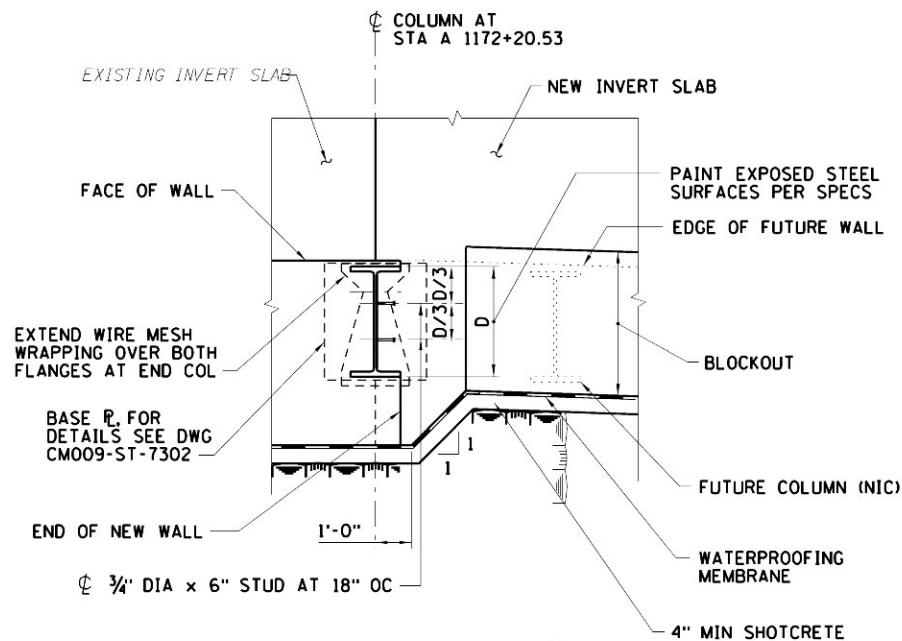
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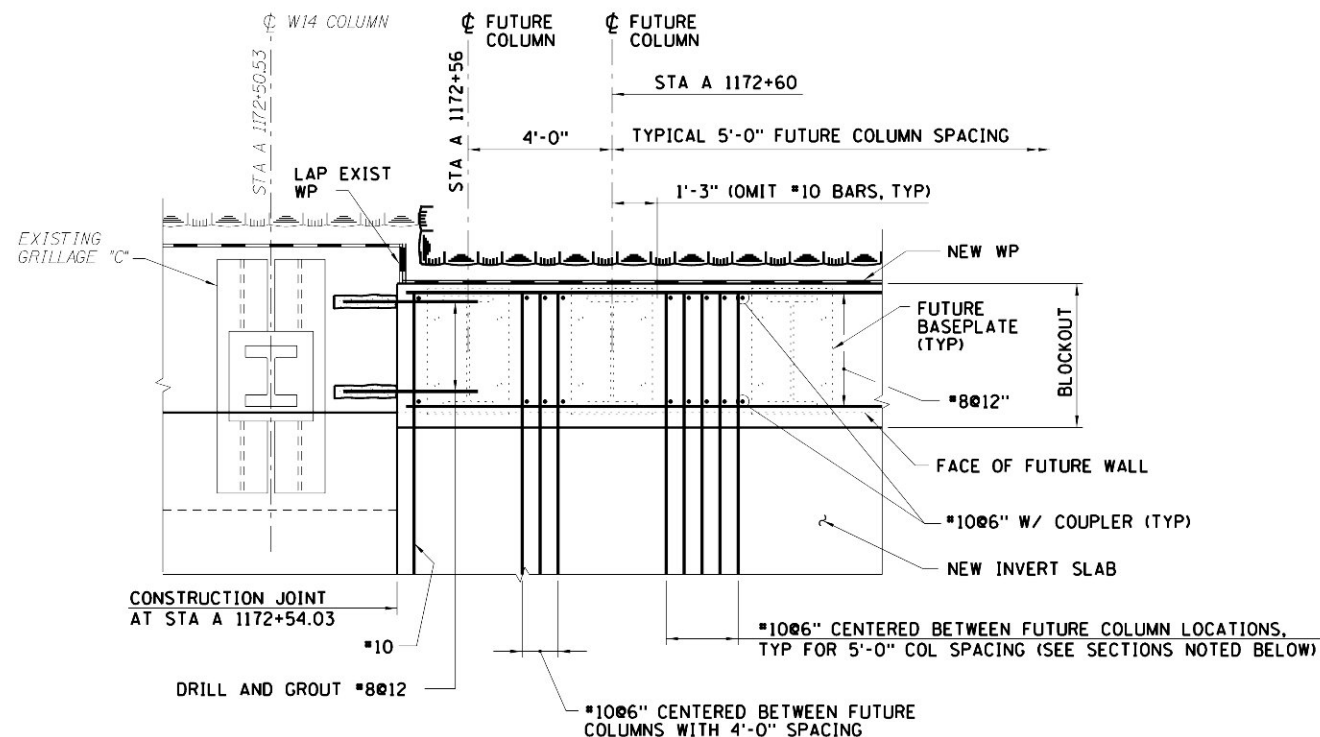
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DETAIL 11  
ST-7111



DETAIL 12  
ST-7111



NOTE: REINFORCEMENT IN SLAB BETWEEN FUTURE COLUMNS SHOWN ONLY. FOR ADDITIONAL SLAB REINFORCEMENT, SEE SECTIONS ON DWGS CM009-ST-7202 THRU CM009-ST-7204.

DETAIL 13  
ST-7111

NOTE:  
FOR NOTES, SEE DWG CM009-ST-7202.

SCALE IN FEET  
2' 1' 0' 2' 4' 6'

MTA Metropolitan Transportation Authority  
Capital Construction

Long Island Rail Road  
East Side Access

GEC PB  
STV PARSONS  
General Engineering Consultant

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5/26/06	CONFORMED DRAWING	
DATE:	REVISIONS	No.

DESIGNED BY:  
C. J. CICILEO  
DRAWN BY:  
C. J. CICILEO  
CHECKED BY:  
S. DIMITRAKIS  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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SIGNED  
&  
SEALED  
DATE: \_\_\_\_\_

MANHATTAN TUNNELS EXCAVATION

BELLMOUTH STRUCTURE  
MISCELLANEOUS SECTIONS & DETAILS  
SHEET 3

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-ST-7303  
DATE:  
5-26-06  
REVISION NUMBER:  
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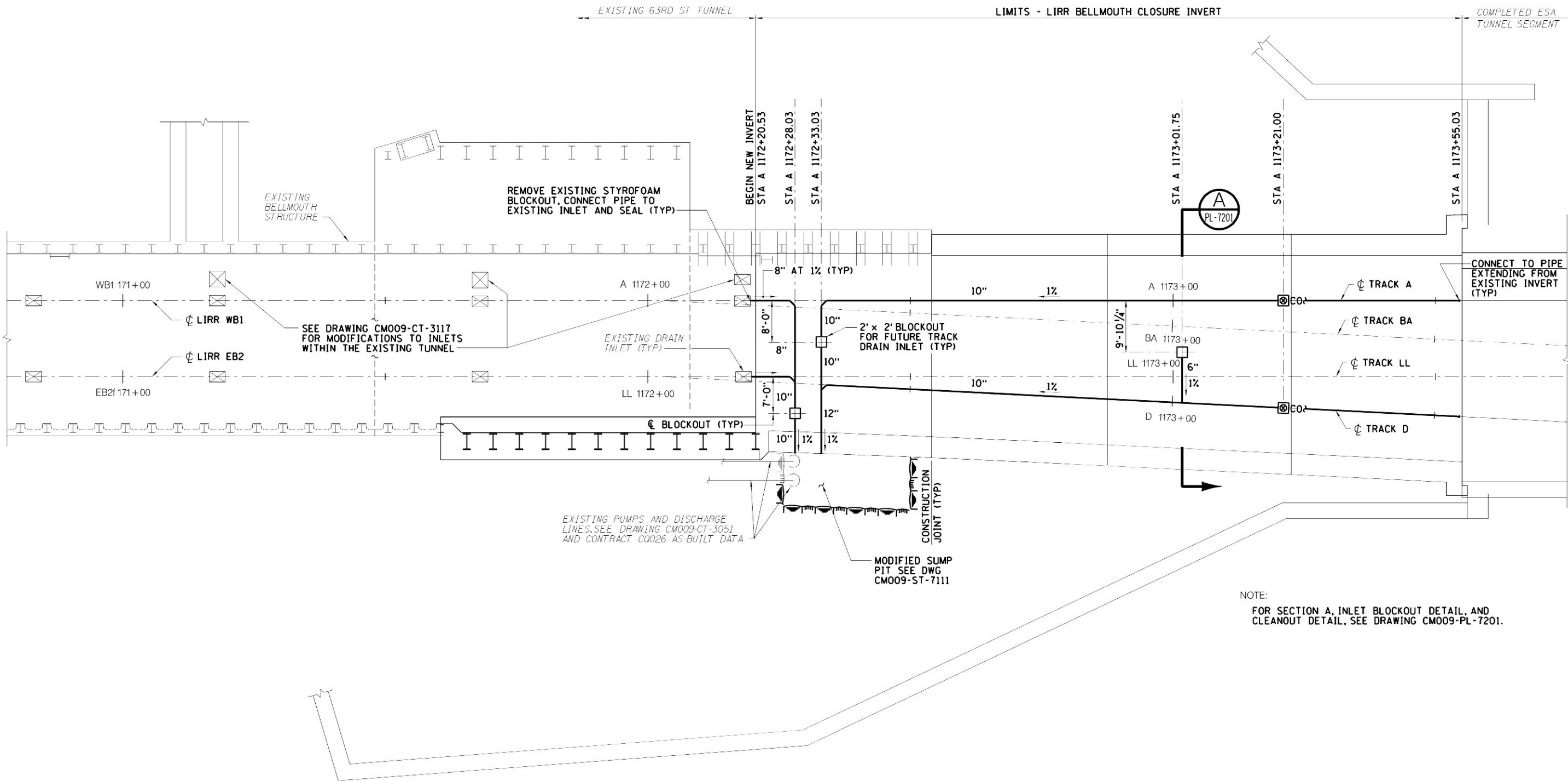
CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
144 OF 276



\$PRNAME\$

\$PLOTIDRV\$

SREF63  
y:\p00dd\submissions\cm0009\p126\conformed\_set.may 2006\p00dd\p0008-pl-711125.dwg PM



NOTE:  
FOR SECTION A, INLET BLOCKOUT DETAIL, AND  
CLEANOUT DETAIL, SEE DRAWING CM009-PL-7201.



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5/26/06	CONFORMED DRAWING	
DATE:	REVISIONS	No.

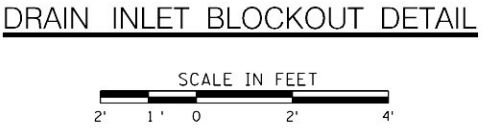
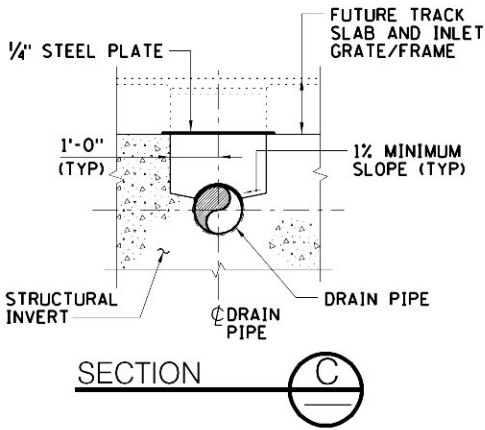
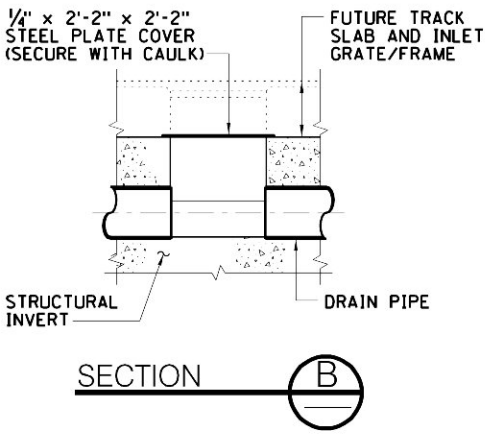
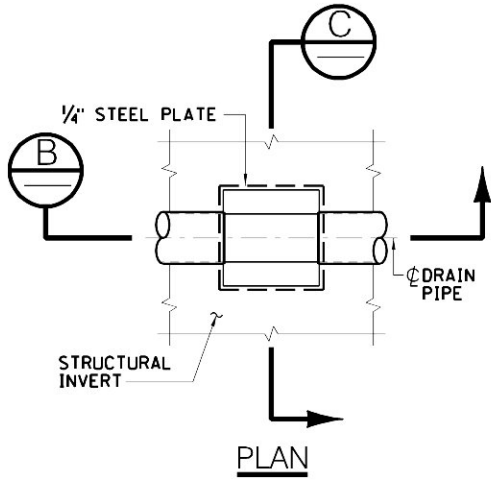
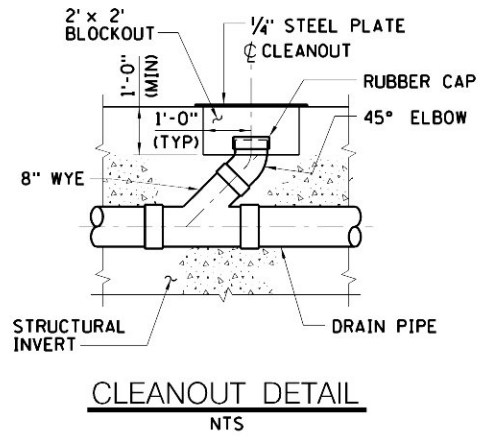
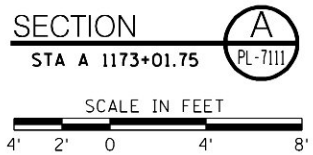
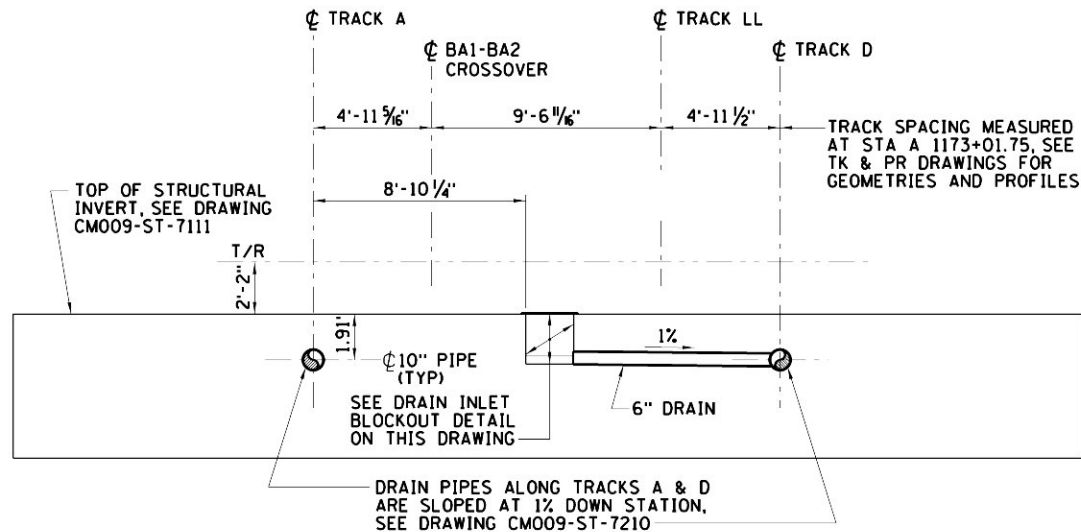
DESIGNED BY:  
N. KORKIDIS  
DRAWN BY:  
M. CAPONE  
CHECKED BY:  
E. CHIA  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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SIGNED  
&  
SEALED**  
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**MANHATTAN TUNNELS EXCAVATION**  
  
BELLMOUTH STRUCTURE  
TRACK DRAINAGE PLAN

SCALE  
AS NOTED  
DRAWING NUMBER:  
CM009-PL-7111  
DATE:  
5-26-06  
REVISION NUMBER:  
0

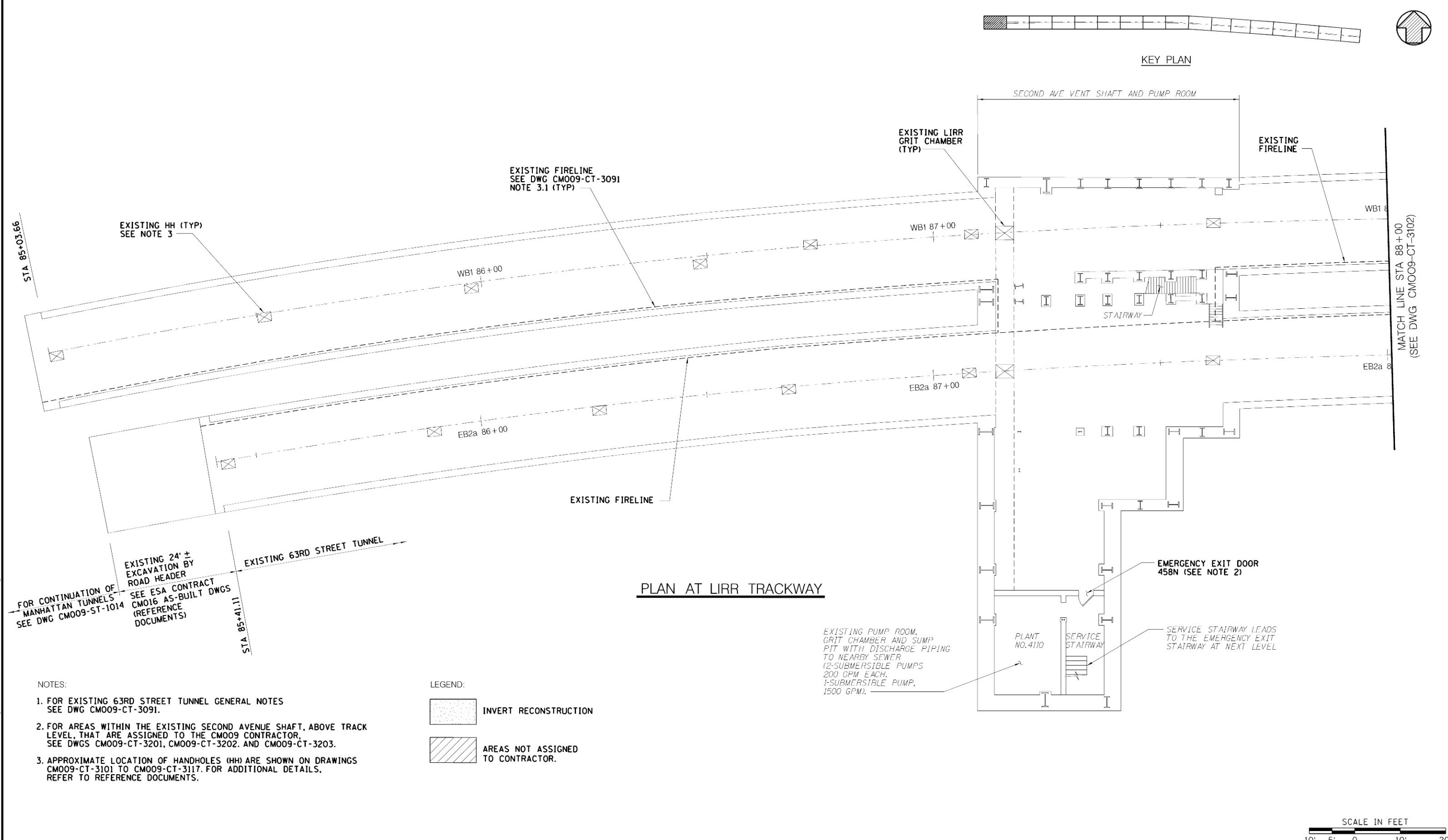
CONTRACT No.  
CM009  
ISSUE  
  
SHEET No.  
145 OF 276



\$PRNAME\$

\$PLOTDRW\$

\$REF 63  
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<b>Metropolitan Transportation Authority</b> Capital Construction	<b>GEC</b> PB STV PARSONS General Engineering Consultant 469 Seventh Avenue • New York, NY • 10018	PARSONS BRINCKERHOFF STV INCORPORATED PARSONS TRANSPORTATION GROUP OF NEW YORK, INC. IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DOCUMENT IN ANY WAY UNLESS THAT PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL. THE LICENSED PROFESSIONAL SHALL AFFIX TO THIS DOCUMENT THE SEAL AND THE NOTATION "ALTERED BY", FOLLOWED BY THE AUTHORIZED SIGNATURE AND THE DATE OF THE ALTERATION."	DESIGNED BY: <b>A. VALDIVIA</b> DRAWN BY: <b>C. PEARSON</b> CHECKED BY: <b>C. BARRATT</b> COORDINATED BY: <b>M. DELLA POSTA</b> APPROVED BY: <b>J. SCHABIB</b>	NY PROFESSIONAL License No. <b>ORIGINAL SIGNED &amp; SEALED</b> DATE: _____	<b>MANHATTAN TUNNELS EXCAVATION</b>  EXISTING 63RD STREET TUNNEL REHABILITATION PLAN SHEET 1	SCALE: AS NOTED DRAWING NUMBER: CM009-CT-3101 DATE: 5-26-06 REVISION NUMBER: 0	CONTRACT No. <b>CM009</b> ISSUE  SHEET No. <b>147</b> OF <b>276</b>
<b>Long Island Rail Road</b> <b>East Side Access</b>			5/26/06 CONFORMED DRAWING				

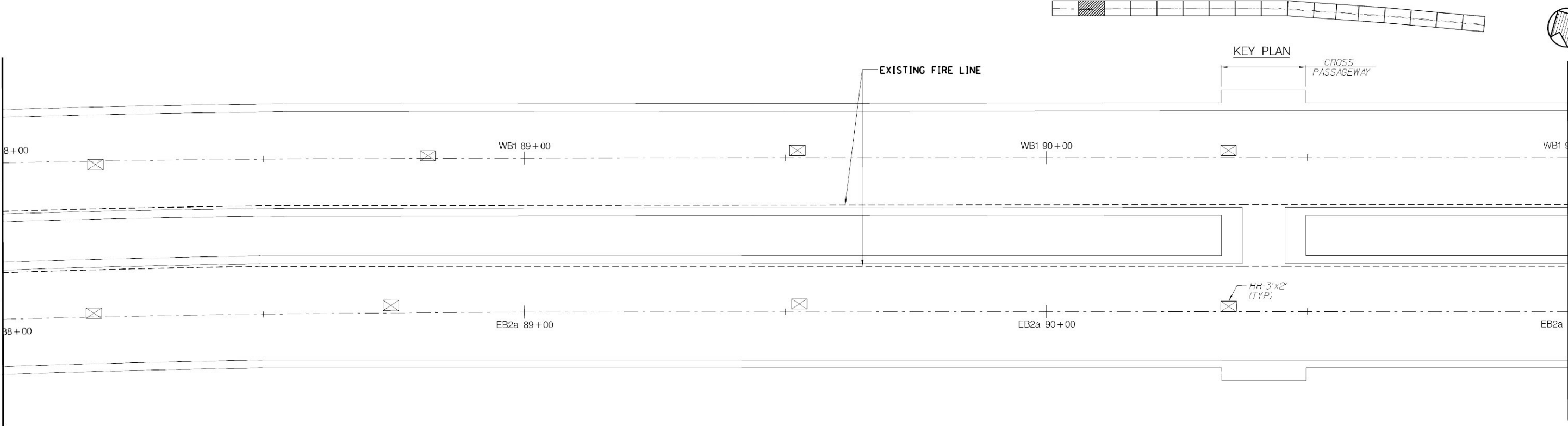


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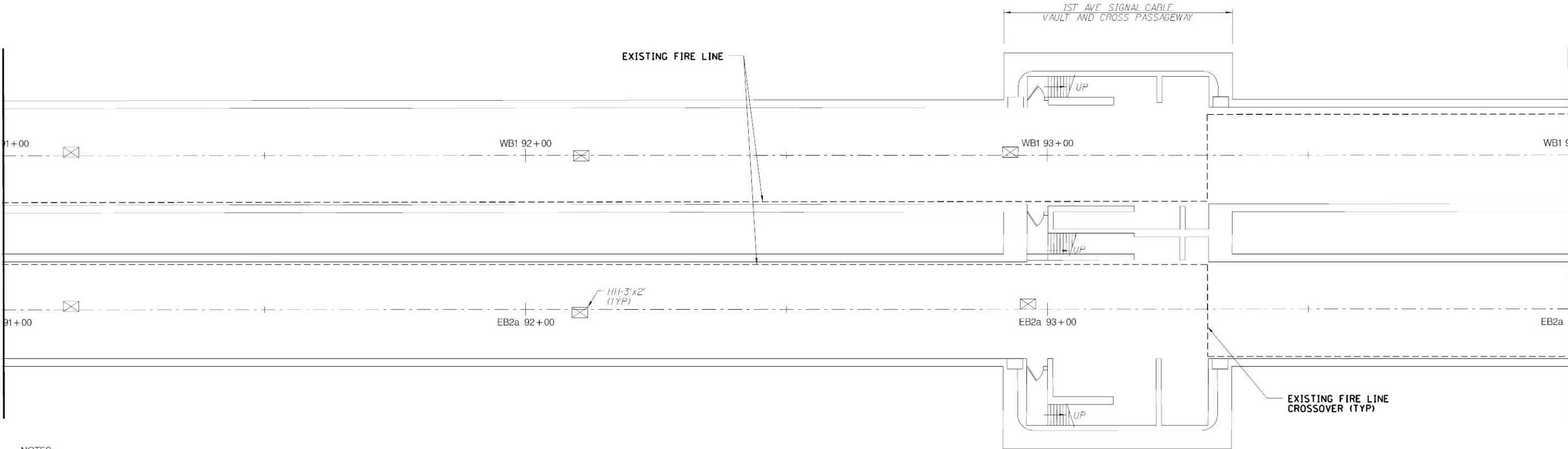
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MATCH LINE STA 88+00  
(SEE CM009-CT-3101)



MATCH LINE STA 91+00

MATCH LINE STA 91+00



MATCH LINE STA 94+00  
(SEE CM009-CT-3103)

NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY

SCALE IN FEET  
10' 5' 0 10' 20'

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DATE:	REVISIONS	

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DRAWN BY:  
**C. PEARSON**  
CHECKED BY:  
**C. BARRATT**  
COORDINATED BY:  
**M. DELLA POSTA**  
APPROVED BY:  
**J. SCHABIB**

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&  
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**MANHATTAN TUNNELS EXCAVATION**  
**EXISTING 63RD STREET TUNNEL REHABILITATION**  
**PLAN**  
**SHEET 2**

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-CT-3102  
DATE:  
5-26-06  
REVISION NUMBER:  
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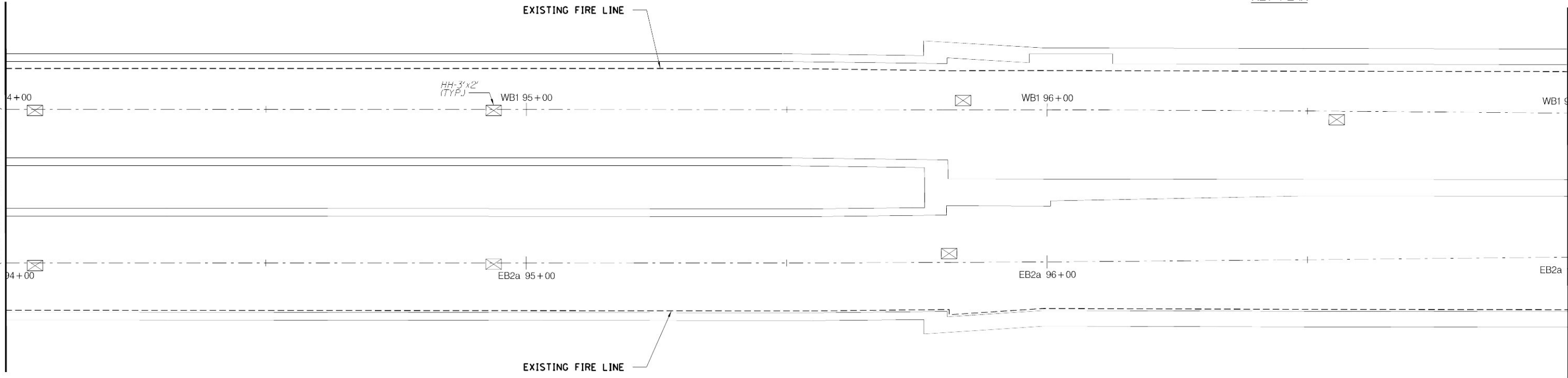
CONTRACT No.  
**CM009**  
ISSUE  
SHEET No.  
**148** OF **276**

\$PRNAME\$

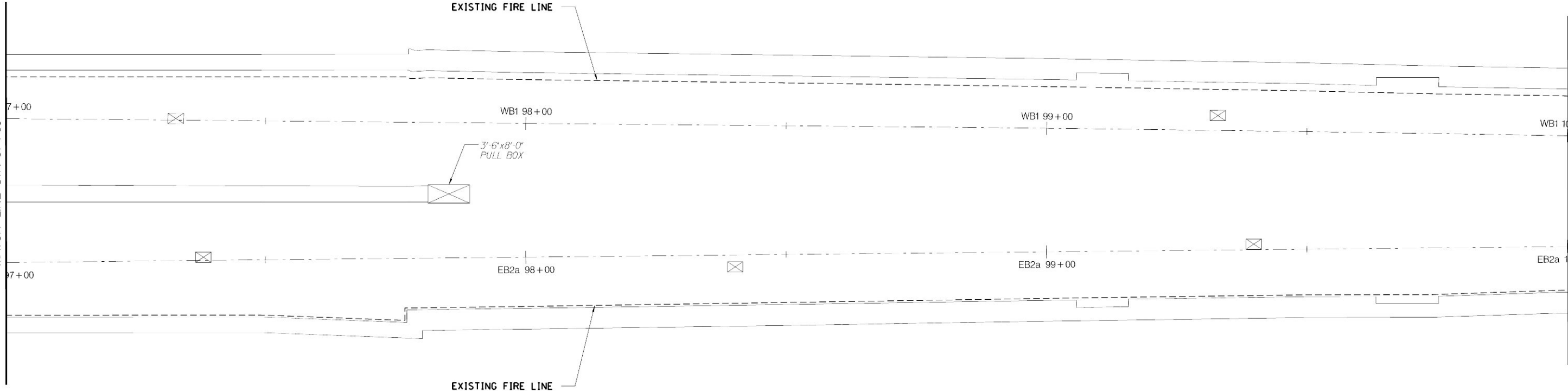
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MATCH LINE STA 94+00  
(SEE DWG CM009-CT-3102)



MATCH LINE STA 97+00



NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY



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**C. PEARSON**  
CHECKED BY:  
**C. BARRATT**  
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**MANHATTAN TUNNELS EXCAVATION**  
  
EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 3

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-CT-3103  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
**CM009**  
ISSUE  
  
SHEET No.  
**149** OF **276**

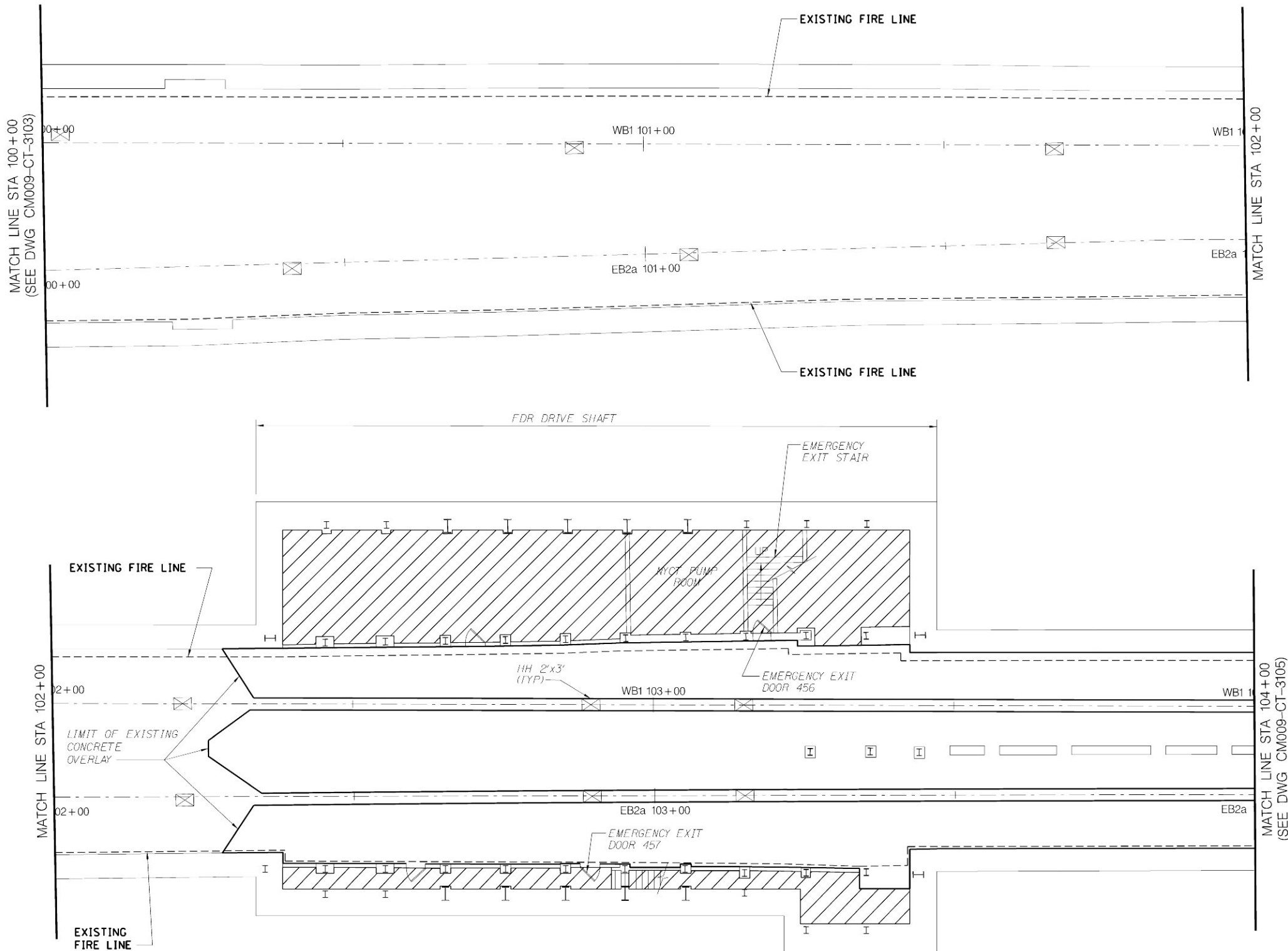
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\$REF 63  
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KEY PLAN



NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY



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DATE:	REVISIONS	No.

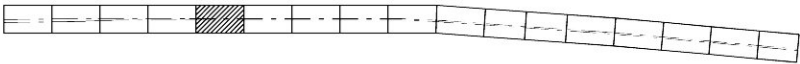
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**A. VALDIVIA**  
DRAWN BY:  
**C. PEARSON**  
CHECKED BY:  
**C. BARRATT**  
COORDINATED BY:  
**M. DELLA POSTA**  
APPROVED BY:  
**J. SCHABIB**

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SIGNED  
&  
SEALED**  
DATE: \_\_\_\_\_

**MANHATTAN TUNNELS EXCAVATION**  
  
EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 4

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-CT-3104  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
**CM009**  
ISSUE  
  
SHEET No.  
**150** OF **276**



KEY PLAN

EXISTING 21" DIA REFERENCE CELL COVER PLATE  
(CATHODIC PROTECTION TEST STATION)  
LOCATED ON WALL 11'± ABOVE FLOOR INVERT.  
SEE DWG CM009-CT-3091 NOTE 2.4

JOINT

20'±

EXISTING FIRE LINE

EXISTING FIRE LINE

EXISTING FIRE LINE

EXISTING FIRE LINE

WB1 105+00

WB1 106+00

EB2a 105+00

EB2b 106+00

WB1 108+00

WB1 109+00

EB2b 108+00

EB2b 109+00

NOTES:

- FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY



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5/26/06	CONFORMED DRAWING	DATE:	REVISIONS
No.			

DESIGNED BY:  
A. VALDIVIA  
DRAWN BY:  
C. PEARSON  
CHECKED BY:  
C. BARRATT  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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License No.  
**ORIGINAL  
SIGNED  
&  
SEALED**  
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MANHATTAN TUNNELS EXCAVATION  
EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 5

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-CT-3105  
DATE:  
5-26-06  
REVISION NUMBER:  
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CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
151 OF 276



\$PRFNAMES

\$PLOTDRW

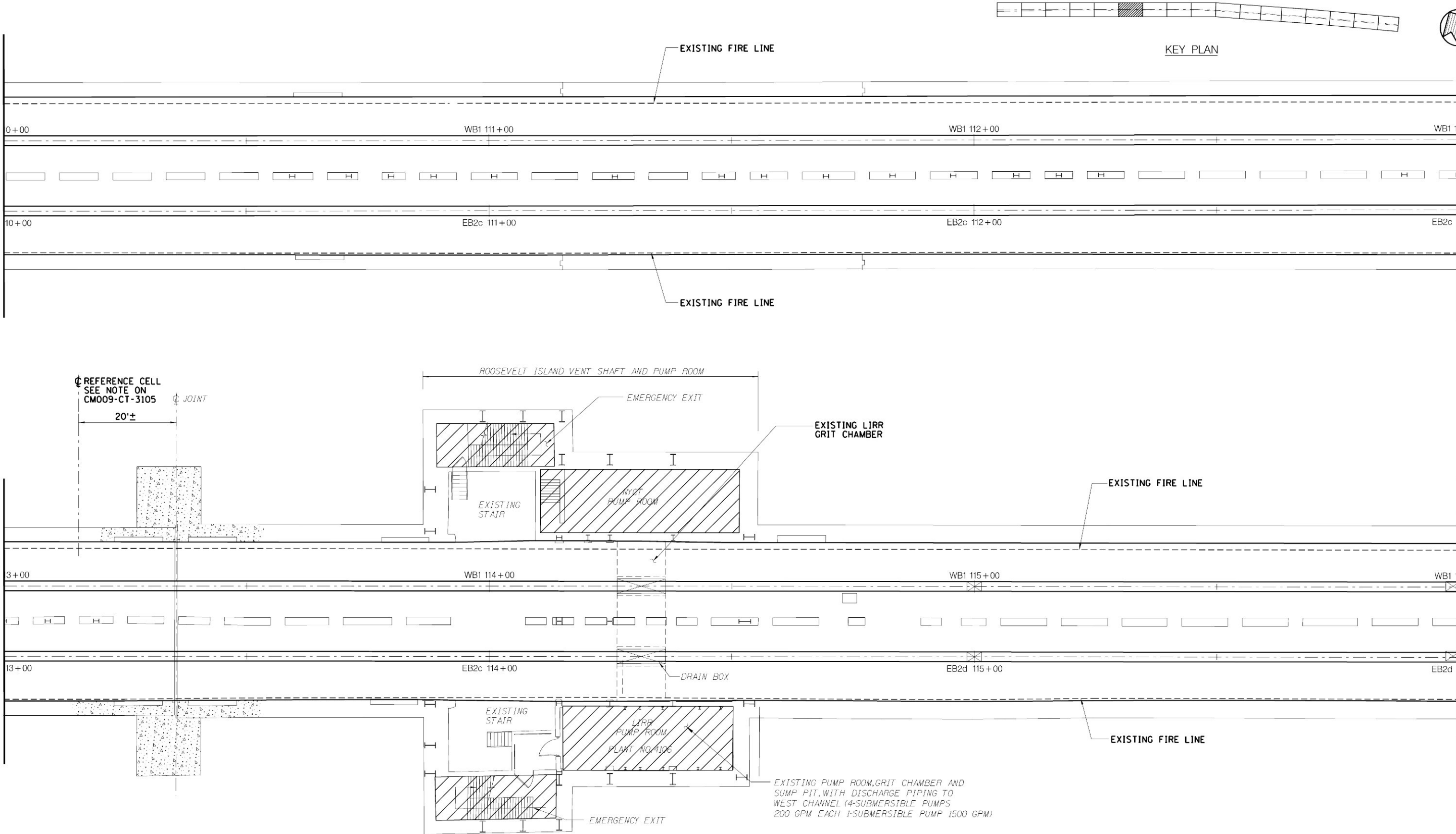
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MATCH LINE STA 110+00  
(SEE DWG CM009-CT-3105)

MATCH LINE STA 113+00

MATCH LINE STA 113+00

MATCH LINE STA 116+00  
(SEE DWG CM009-CT-3107)



NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY

SCALE IN FEET  
10' 5' 0 10' 20'

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5/26/06	CONFORMED DRAWING	DESIGNED BY: A. VALDIVIA
		DRAWN BY: C. PEARSON
		CHECKED BY: C. BARRATT
		COORDINATED BY: M. DELLA POSTA
		APPROVED BY: J. SCHABIB
DATE:	REVISIONS	No.

NY PROFESSIONAL  
License No.  
**ORIGINAL  
SIGNED  
&  
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DATE: \_\_\_\_\_

MANHATTAN TUNNELS EXCAVATION

EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 6

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-CT-3106  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
CM009  
ISSUE  
SHEET No.  
152 OF 276

— EXISTING FIRE LINE

	MATCH LINE STA 119+00	+
--	-----------------------	---

WB1 1

EB2d

MATCH LINE STA 122+00  
SEE DWG CM009-CT-3108)

WB1 13

EB2d

 $20' \pm$ 

☐ REFERENCE CELL  
SEE NOTE ON  
CM009-CT-3105

— EXISTING FIRE LINE

— EXISTING FIRE LINE

NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY

SCALE IN FEET



10' 5' 0 10' 20'



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AND THE DATE OF THE ALTERATION."

DESIGNED BY:

A. VALDIVIA  
121381601.176

C. PEARSON

CHECKED BY:

C. BARRATT  
COORDINATED BY

M. DELLA F.

NY PROFESSIONAL  
License No.

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&  
SEALED

MANHATTAN TUNNELS EXCAVATION

EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 7

SCALE:	AS NOTED
DRAWING NUMBER:	CM009-CT-310
DATE:	5-26-06
REVISION NUMBER:	0

CONTRACT No.	
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CM009

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ISSUE

10002

11/11/2016

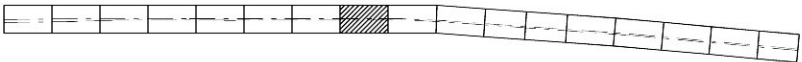
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153 of 276

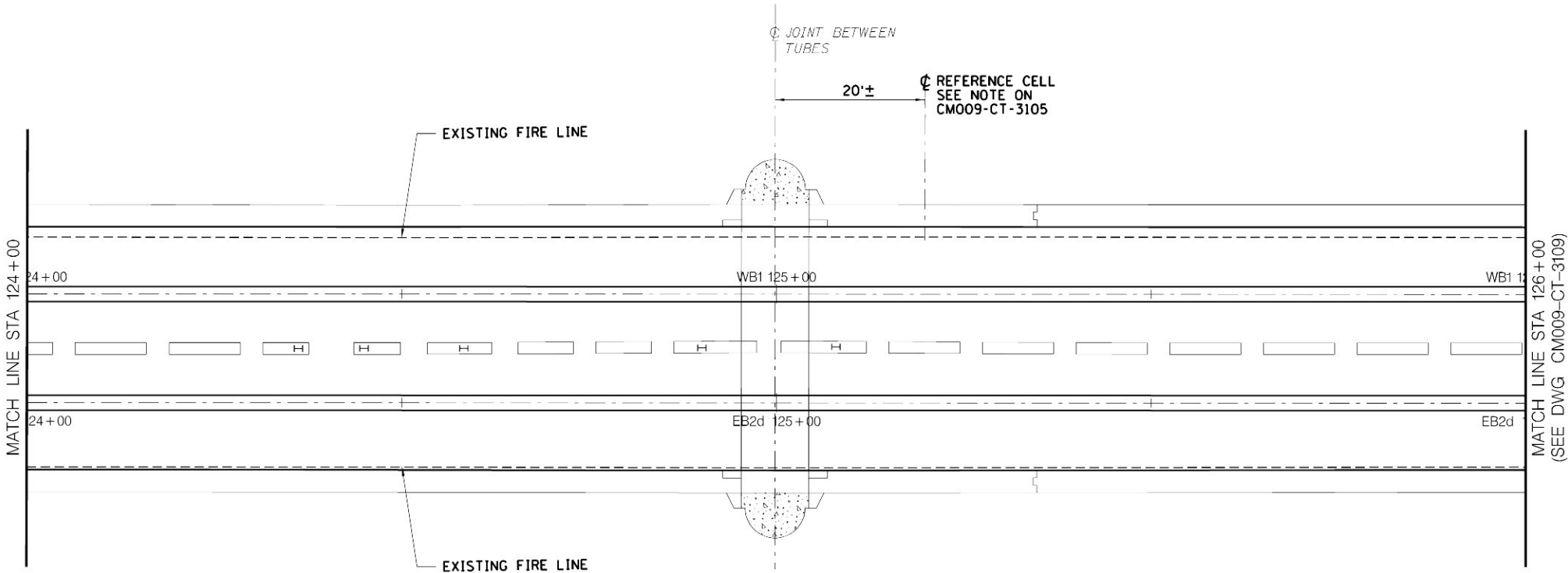
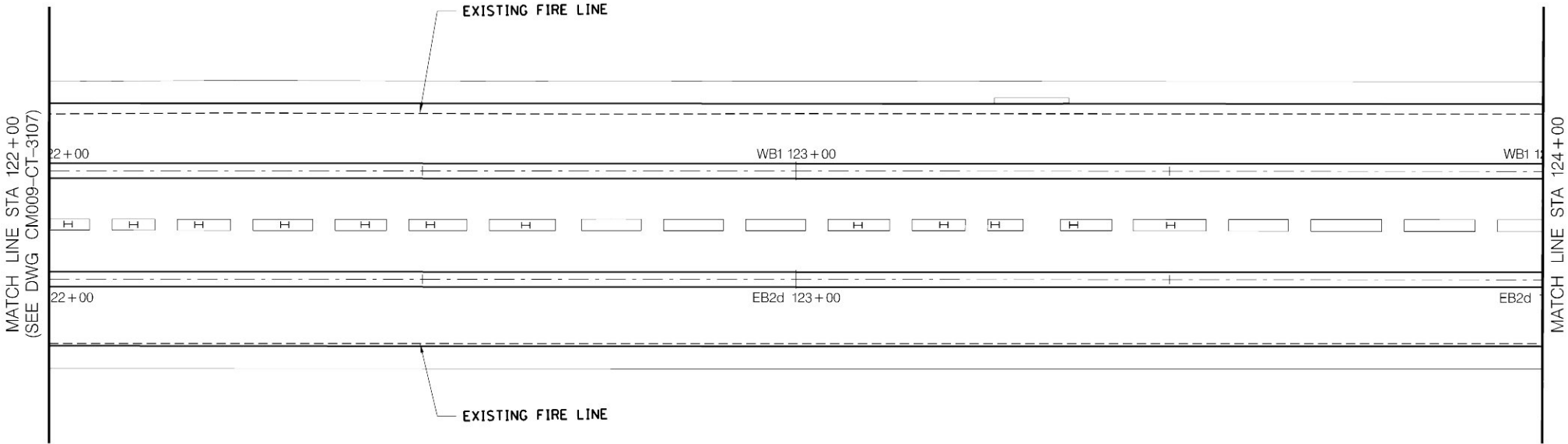
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\$PLOTDRW

\$REF63  
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\$PRFNAMES



KEY PLAN



NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY



**MTA** Metropolitan Transportation Authority  
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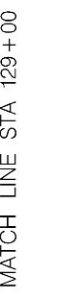
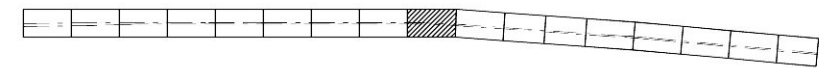
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**MANHATTAN TUNNELS EXCAVATION**  
  
EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 8

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-CT-3108  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
**CM009**  
ISSUE  
  
SHEET No.  
**154** OF **276**



MATCH LINE STA 129+00

SCALE IN FEET

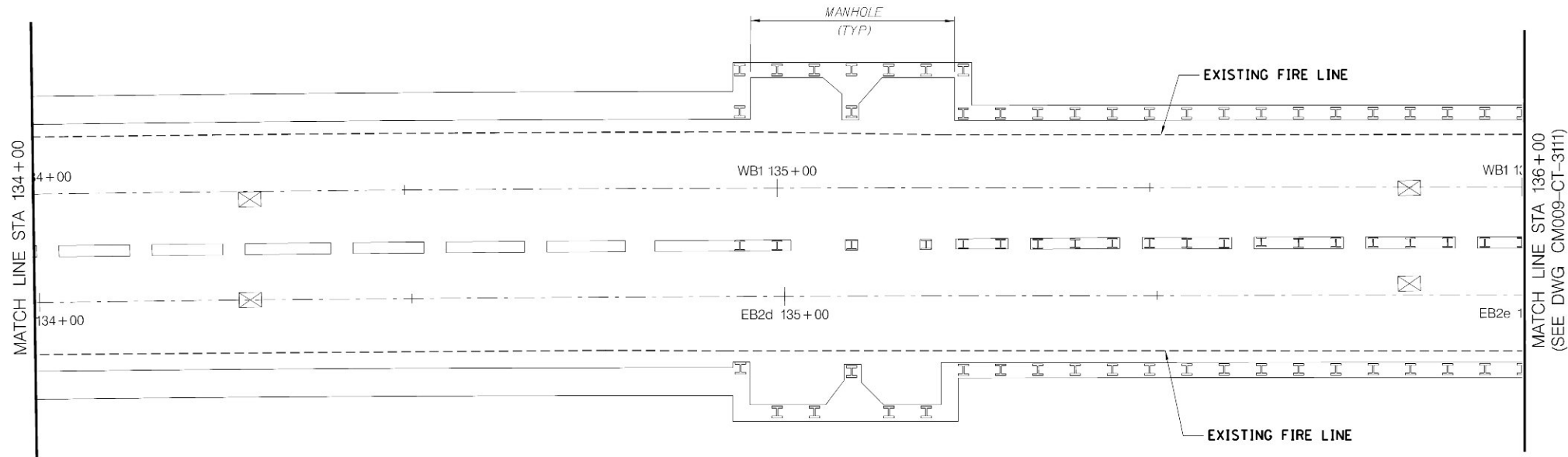
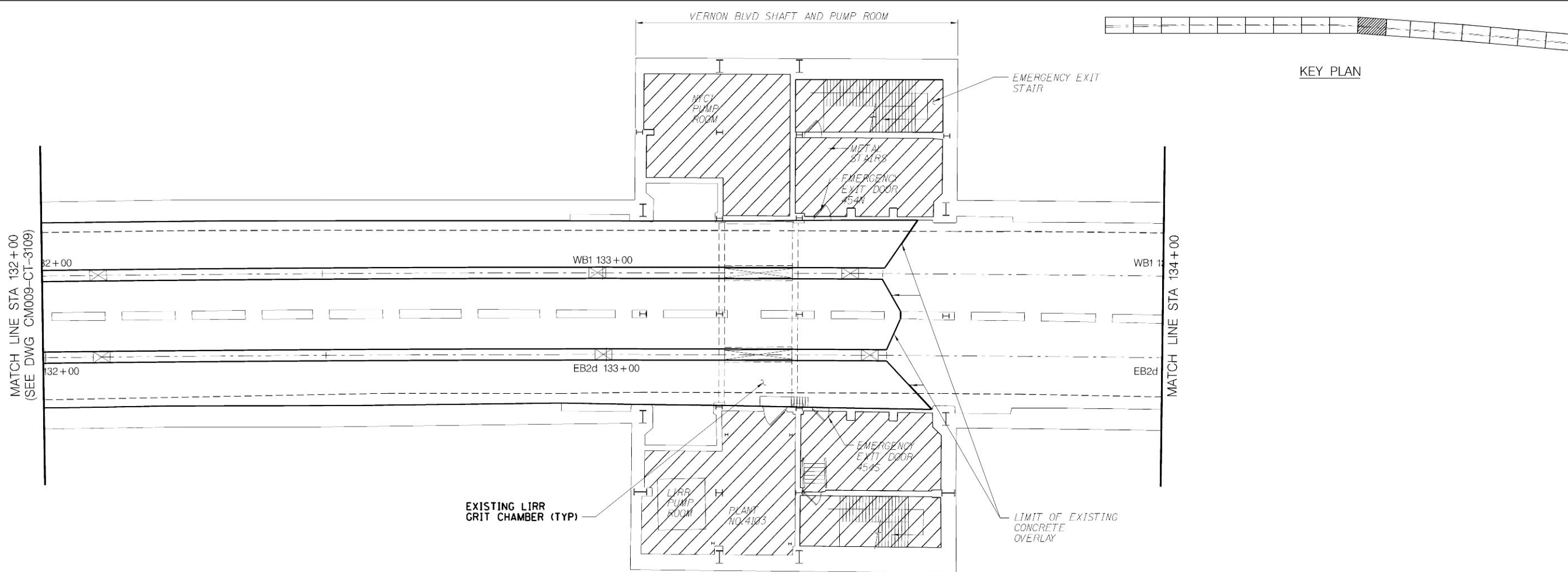
A horizontal scale bar with a black and white alternating pattern. It is labeled "SCALE IN FEET" at the top. Below the bar, there are markings at 10', 5', 0, 10', and 20'. The 0 is in the center, with 5' to its left and 10' to its right. The total length of the bar is 20', with another 10' marking at the far right end.

CONTRACT No.	CM009
ISSUE	
SHEET No.	155 OF 276



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NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY



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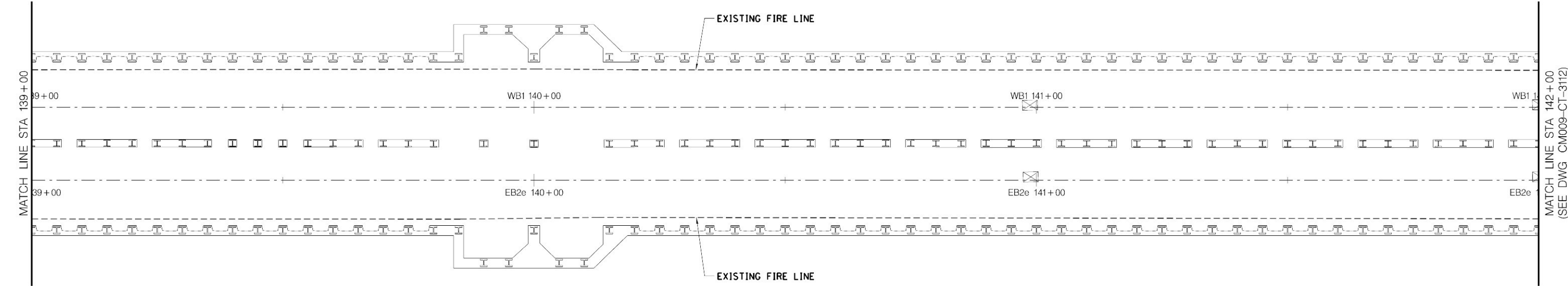
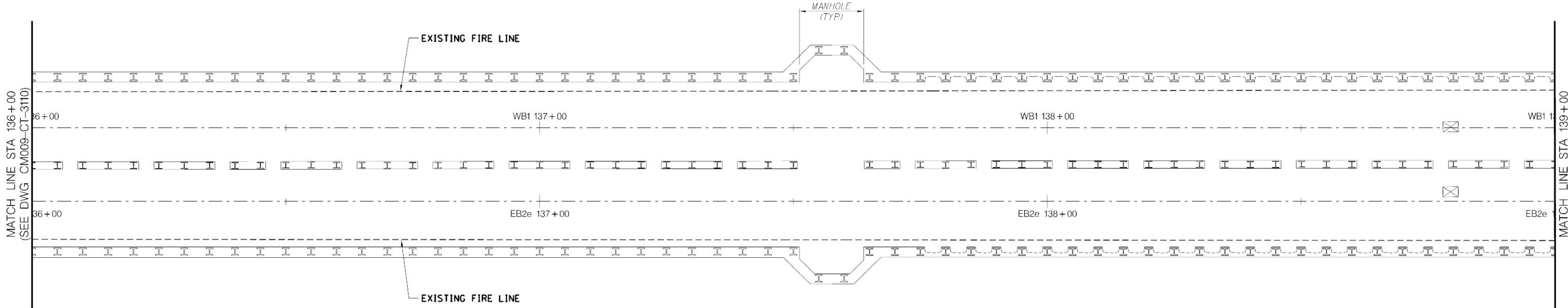
**MANHATTAN TUNNELS EXCAVATION**  
  
EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 10

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-CT-3110  
DATE:  
5-26-06  
REVISION NUMBER:  
0

CONTRACT No.  
**CM009**  
ISSUE  
  
SHEET No.  
**156** OF **276**








KEY PLAN



PLAN AT LIRR TRACKWAY

NOTES:  
1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

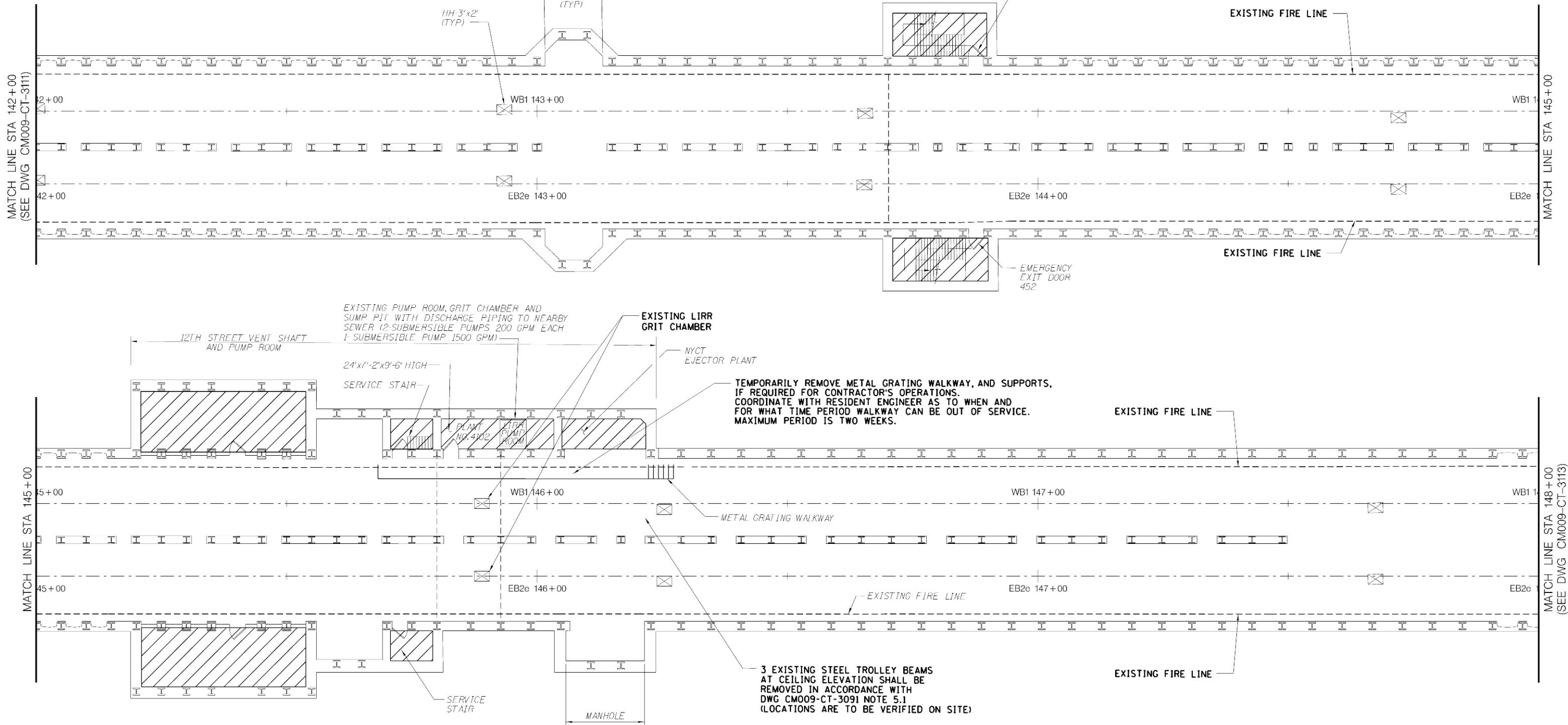


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PLAN AT LIRR TRACKWAY

NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.



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**MANHATTAN TUNNELS EXCAVATION**

EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 12

SCALE  
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CM009-CT-3112  
DATE:  
5-26-06  
REVISION NUMBER:  
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**CM009**  
ISSUE

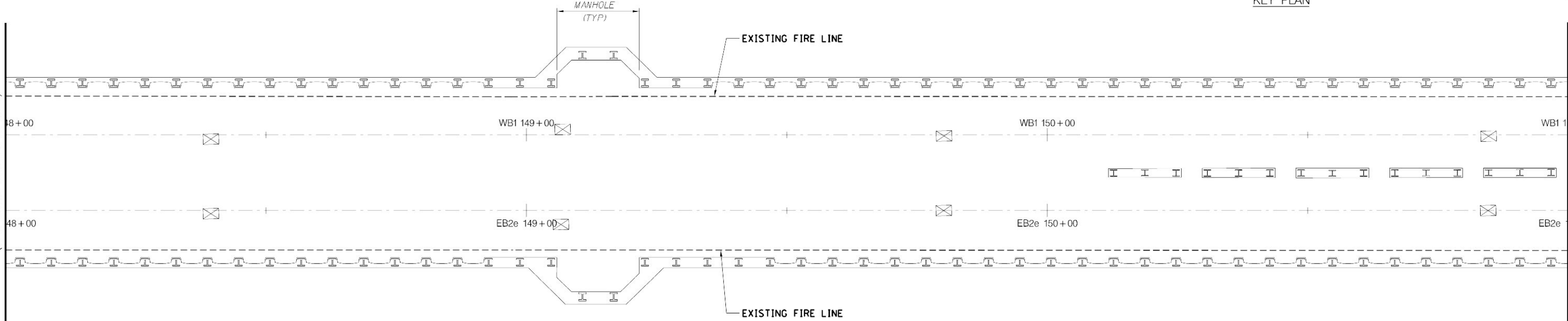
SHEET No.  
**158** OF **276**

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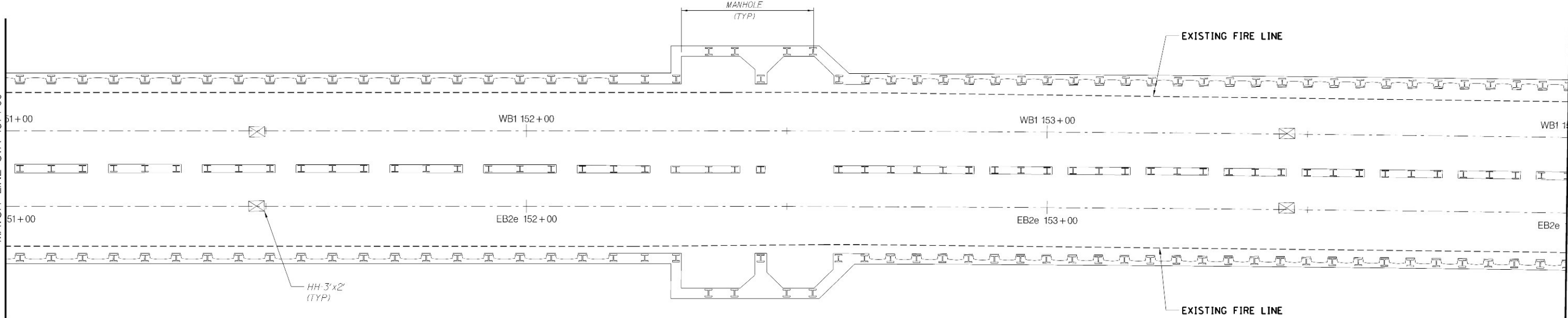
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MATCH LINE STA 148+00  
(SEE DWG CM009-CT-3112)



MATCH LINE STA 151+00





MATCH LINE STA 154+00  
(SEE DWG CM009-CT-3114)

- NOTES:
- FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY



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MANHATTAN TUNNELS EXCAVATION

EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 13

SCALE AS NOTED
DRAWING NUMBER CM009-CT-3113
DATE: 5-26-06
REVISION NUMBER: 0

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ISSUE
SHEET No. 159 OF 276



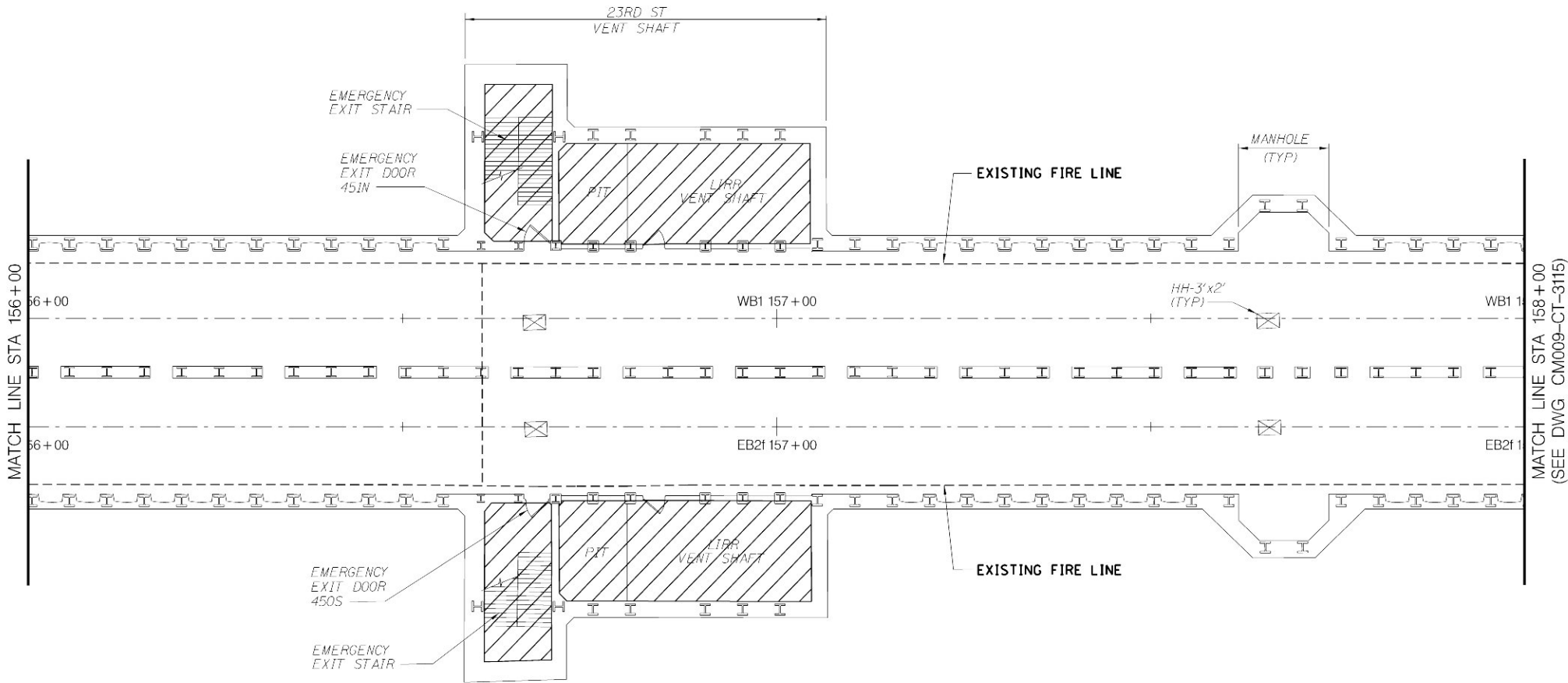
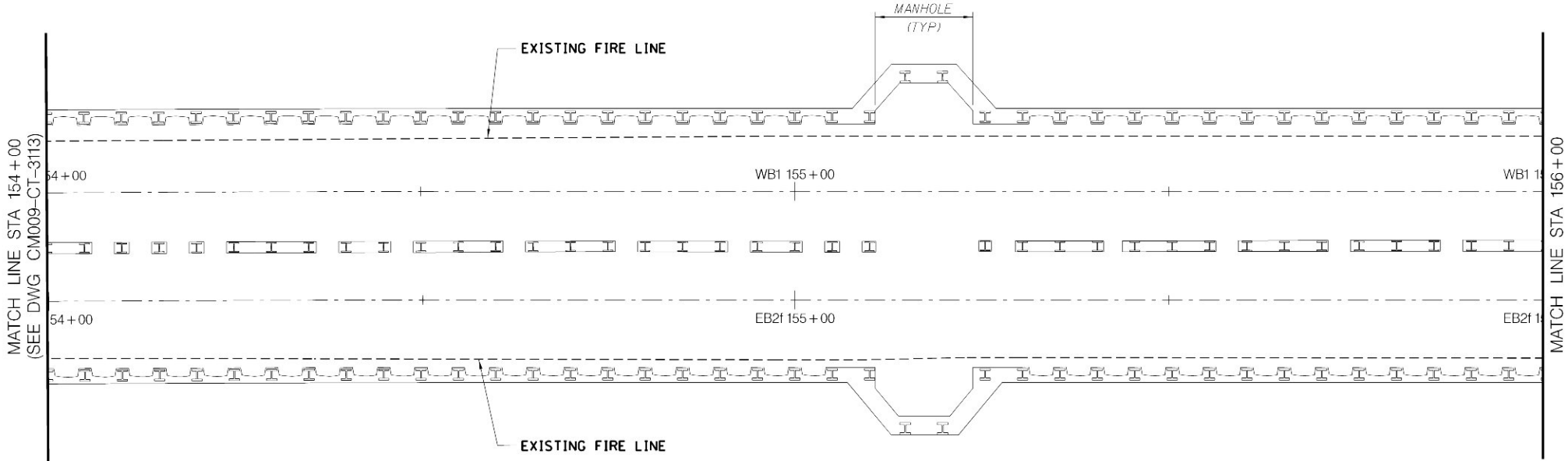
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KEY PLAN



NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY



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**MANHATTAN TUNNELS EXCAVATION**  
  
EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 14

SCALE:  
AS NOTED  
DRAWING NUMBER:  
CM009-CT-3114  
DATE:  
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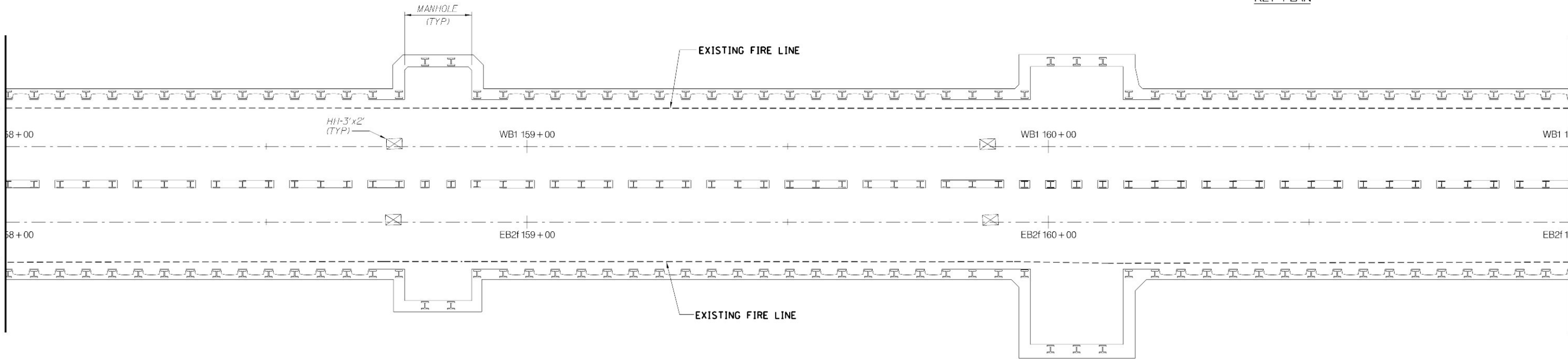
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**CM009**  
ISSUE  
  
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**160** OF **276**

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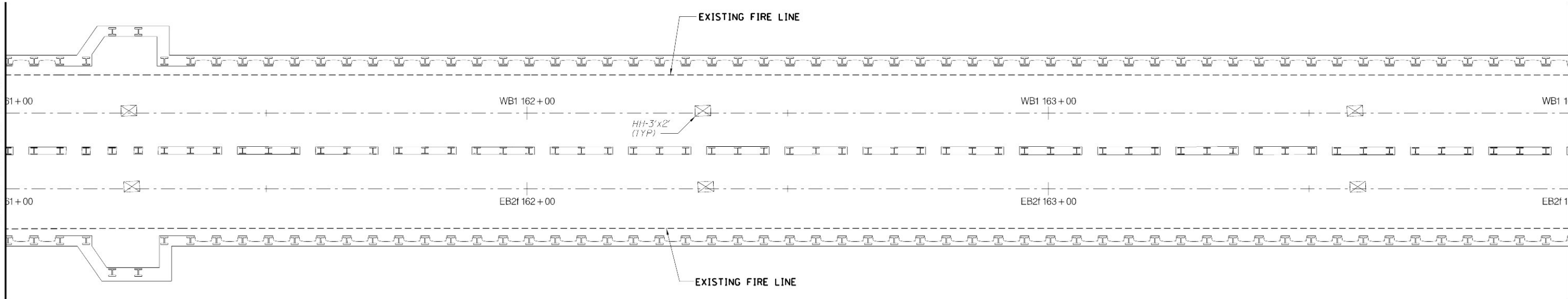
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(SEE DWG CM009-CT-3114)



MATCH LINE STA 161+00

MATCH LINE STA 161+00



MATCH LINE STA 164+00  
(SEE DWG CM009-CT-3116)

NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY




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**MANHATTAN TUNNELS EXCAVATION**

EXISTING 63RD STREET TUNNEL PLAN  
SHEET 15

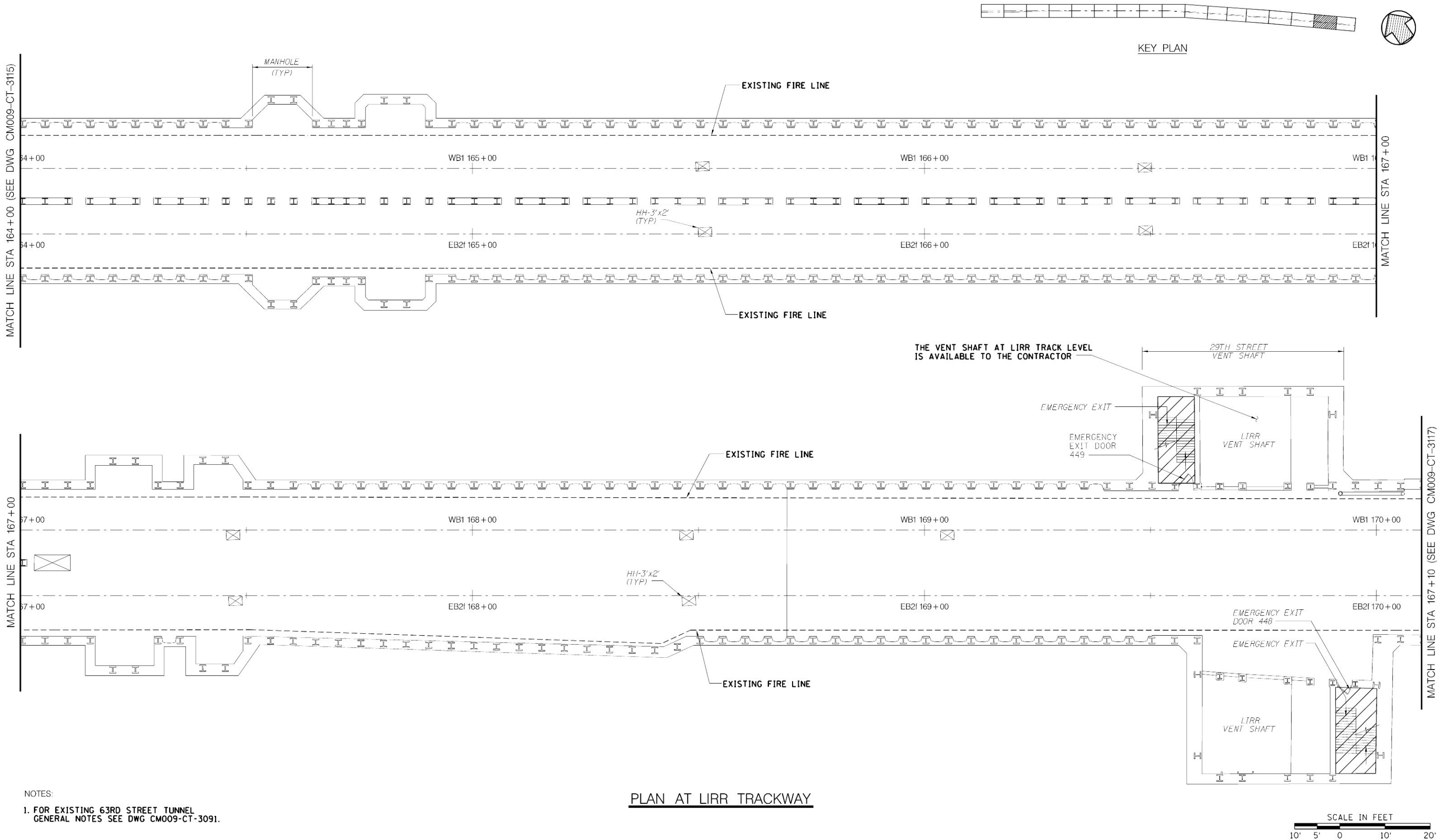
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DATE:  
5-26-06  
REVISION NUMBER:  
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**CM009**  
ISSUE  
SHEET No.  
**161** OF **276**

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NOTES:

1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.

PLAN AT LIRR TRACKWAY

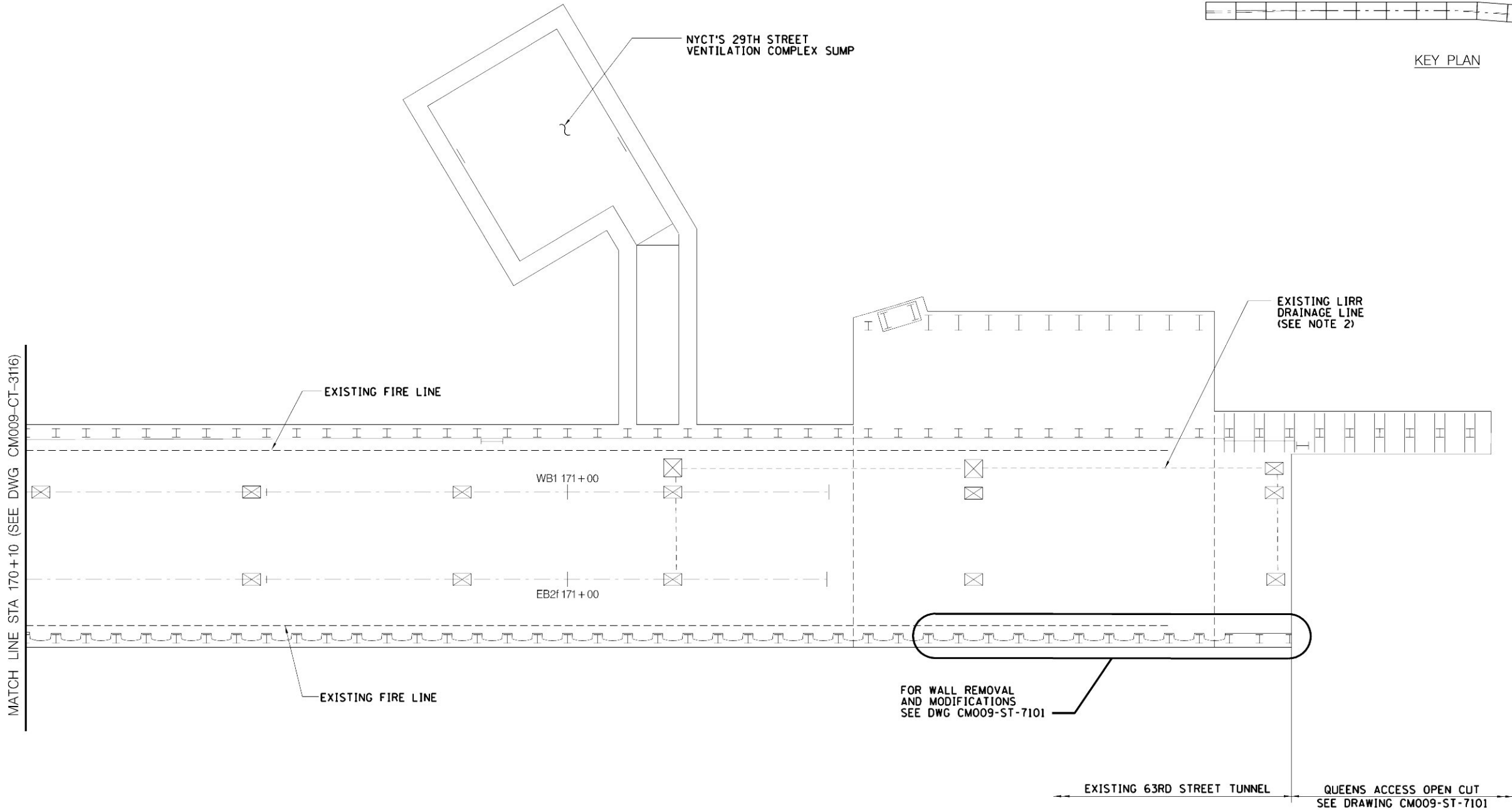
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Long Island Rail Road East Side Access						MANHATTAN TUNNELS EXCAVATION EXISTING 63RD STREET TUNNEL REHABILITATION PLAN SHEET 16		SCALE AS NOTED DRAWING NUMBER CM009-CT-3116 DATE: 5-26-06 REVISION NUMBER: 0		CONTRACT No. CM009 ISSUE SHEET No. 162 OF 276					

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\$PLOTDEV\$  
submissions\cm009\26\conformed set (may 2006)\cm009-ct-3117.dwg




KEY PLAN




PLAN AT LIRR TRACKWAY

- NOTES:
1. FOR EXISTING 63RD STREET TUNNEL  
GENERAL NOTES SEE DWG CM009-CT-3091.
  2. THE CONTRACTOR SHALL PERMANENTLY CAP THE EXISTING LIRR DRAIN LINE LEADING INTO THE SUMP OF THE NYCT'S 29TH STREET VENTILATION COMPLEX. THE CONTRACTOR SHALL EXTEND THE EXISTING DRAINAGE LINES WITHIN THE EXISTING INVERT SLAB EAST INTO THE QUEENS OPEN-CUT AND CONNECT TO THE MODIFIED SUMP PIT. SEE DWG CM009-PL-7111. THE REMAINING EXISTING DRAIN LINE DRAINING TO THE NYCT SUMP WILL BE DISCONNECTED, PLUGGED AND ABANDONED.



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MANHATTAN TUNNELS EXCAVATION

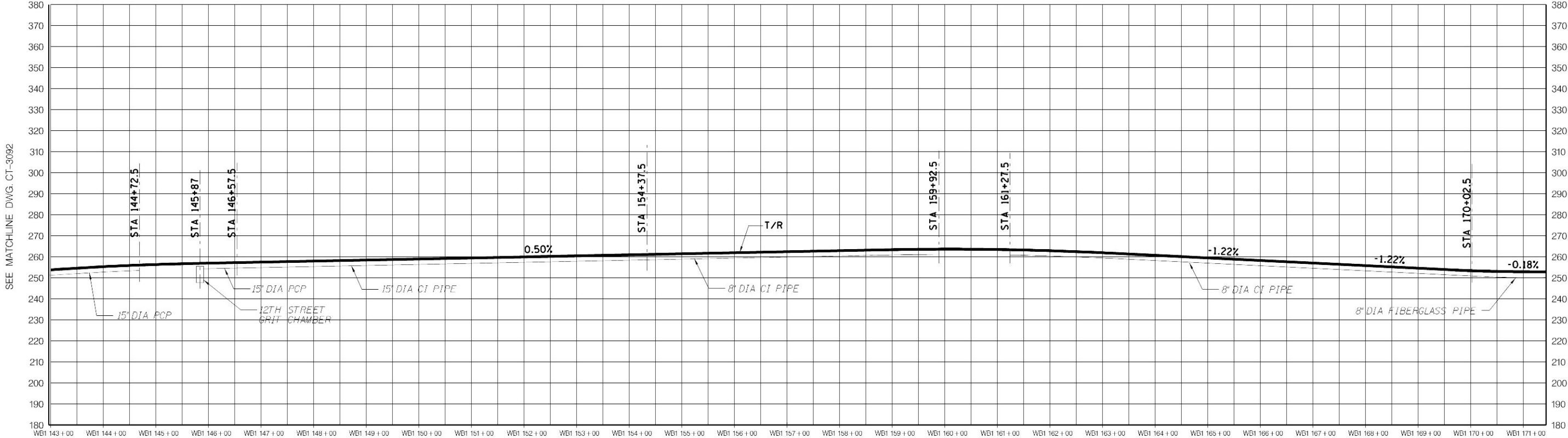
EXISTING 63RD STREET TUNNEL REHABILITATION  
PLAN  
SHEET 17

SCALE: AS NOTED
DRAWING NUMBER: CM009-CT-3117
DATE: 5-26-06
REVISION NUMBER: 0

CONTRACT No. CM009
ISSUE
SHEET No. 163 OF 276








- NOTES:
1. FOR EXISTING 63RD STREET TUNNEL GENERAL NOTES SEE DWG CM009-CT-3091.
  2. SEE DRAWING CM009-CT-3117 FOR DETAILS OF MODIFYING EXISTING DRAINAGE SYSTEM TO BE DISCONNECTED FROM NYCT 29TH STREET SUMP.


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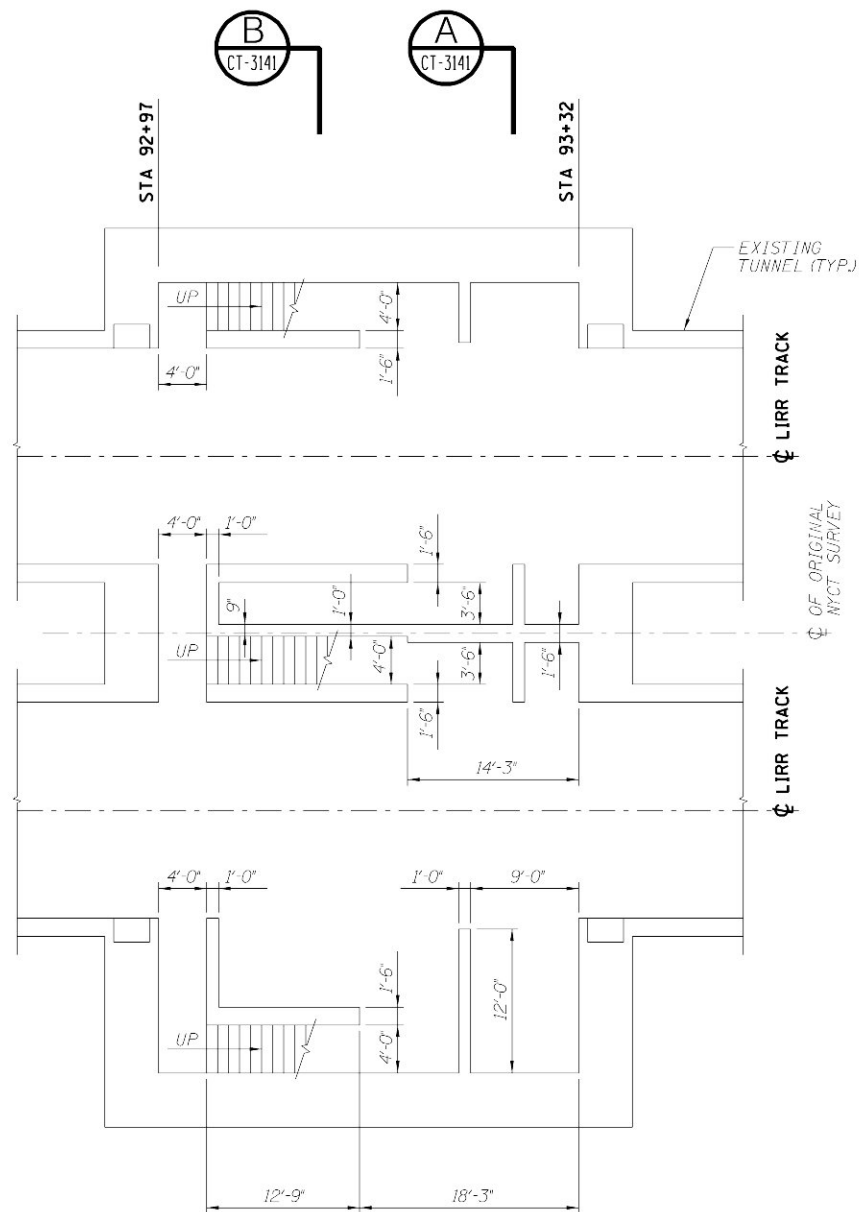
MANHATTAN TUNNELS EXCAVATION

EXISTING 63RD STREET TUNNEL REHABILITATION  
TRACK DRAINAGE SYSTEM

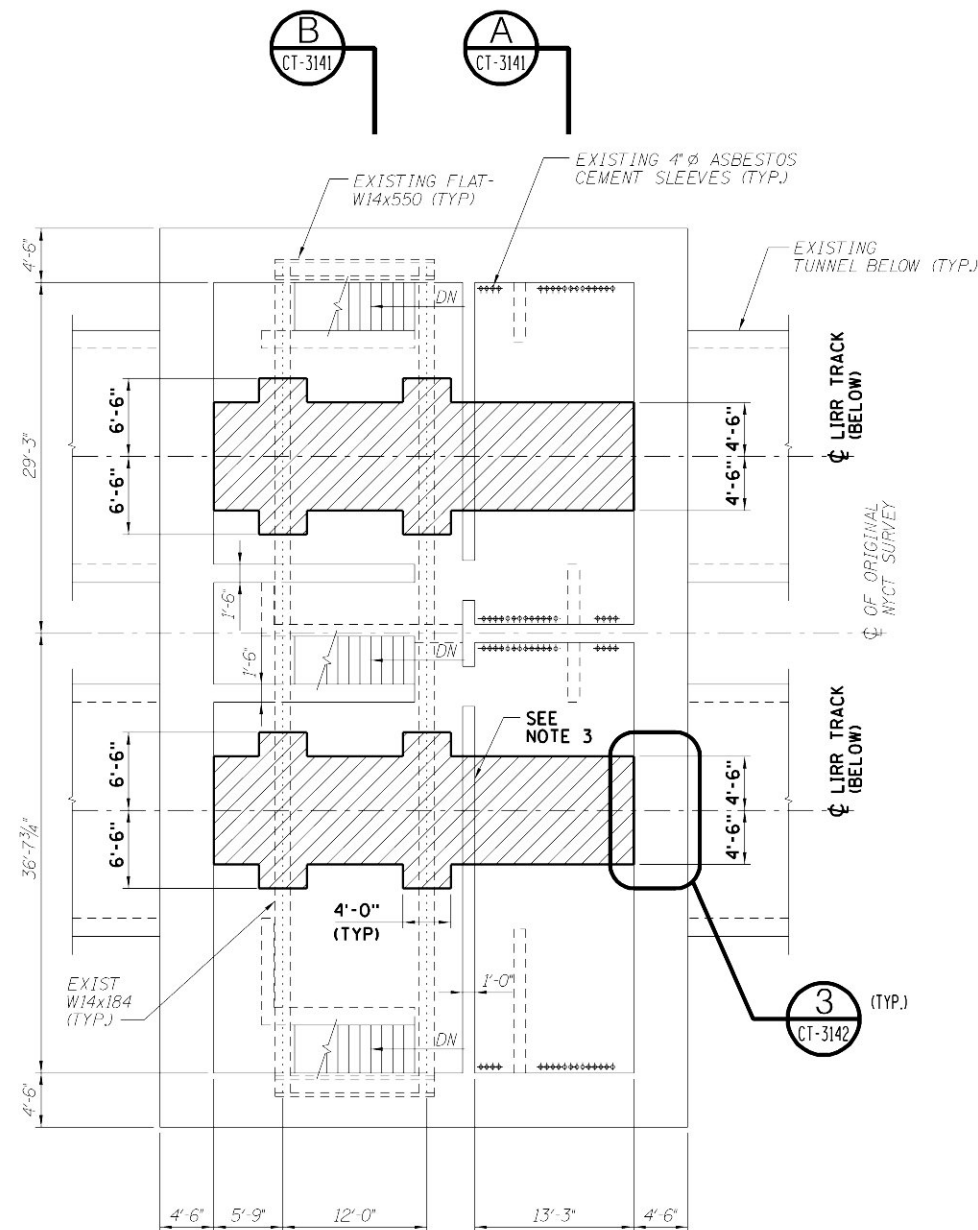
SHEET 2

SCALE: AS NOTED
DRAWING NUMBER: CM009-CT-3093
DATE: 5-26-06
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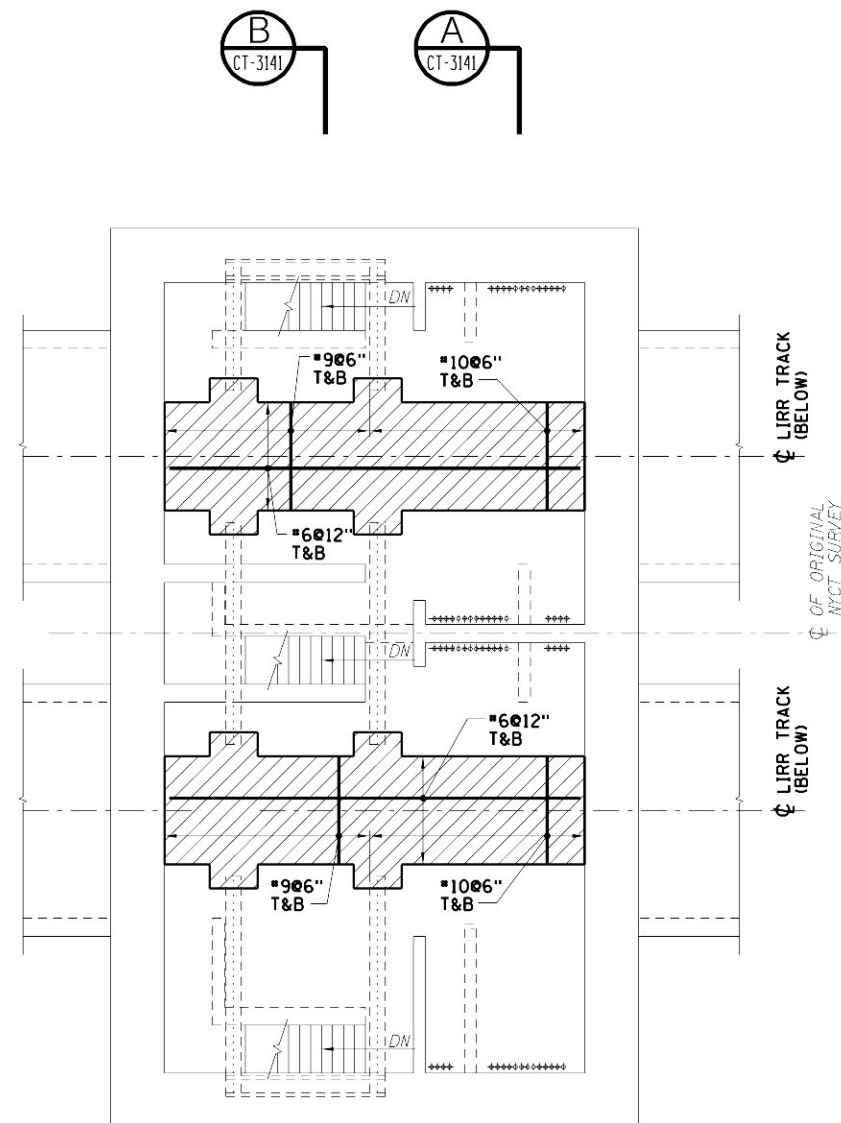
CONTRACT No. CM009
ISSUE
SHEET No. 165 OF 276



EXISTING LIRR TRACK LEVEL PLAN



PARTIAL DEMOLITION PLAN



REINFORCEMENT PLAN

- NOTES:
1. DESIGN LIVE LOAD FOR LIRR CROSS PASSAGE  
SLAB: 150 (PSF)
  2. FOR ADDITIONAL NOTES AND LEGEND SEE DWG CM009-CT-3141.
  3. EXISTING WALL TO BE PARTIALLY DEMOLISHED FULL HEIGHT,  
SEE DWG CM009-3141.

SCALE IN FEET  
8' 4' 0' 8' 16'

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AND THE DATE OF THE ALTERATION."

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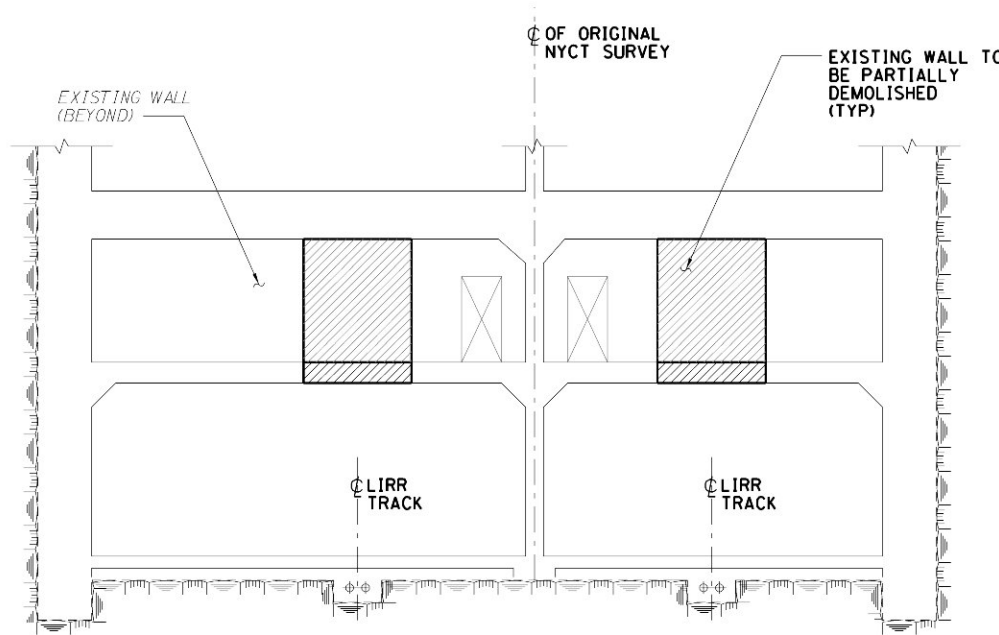
DESIGNED BY:  
A. VALDIVIA  
DRAWN BY:  
D. VASQUEZ  
CHECKED BY:  
C. BARRATT  
COORDINATED BY:  
M. DELLA POSTA  
APPROVED BY:  
J. SCHABIB

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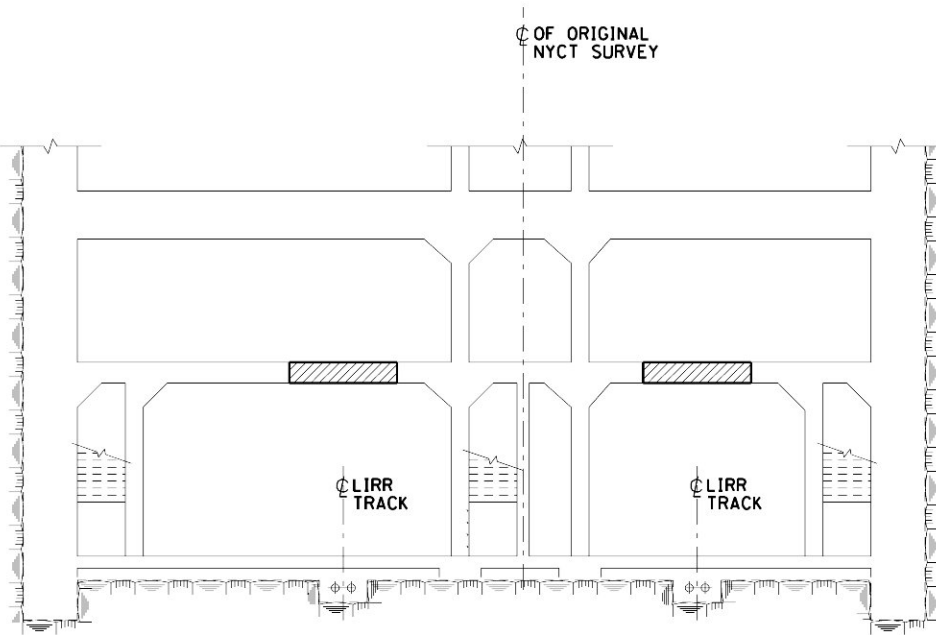
MANHATTAN TUNNELS EXCAVATION  
EXISTING 63RD STREET TUNNEL REHABILITATION  
1ST AVENUE SIGNAL CABLE VAULT AND  
CROSS PASSAGE - PLAN

SCALE  
AS NOTED  
DRAWING NUMBER  
CM009-CT-3140  
DATE:  
5-26-06  
REVISION NUMBER:  
0

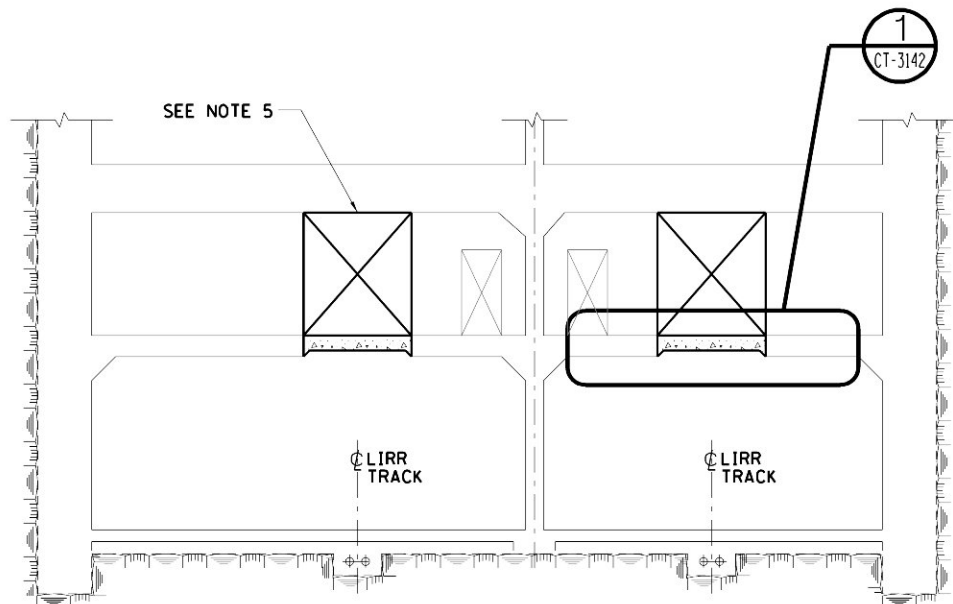
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CM009  
ISSUE  
SHEET No.  
172 OF 276



DEMOLITION OUTLINE

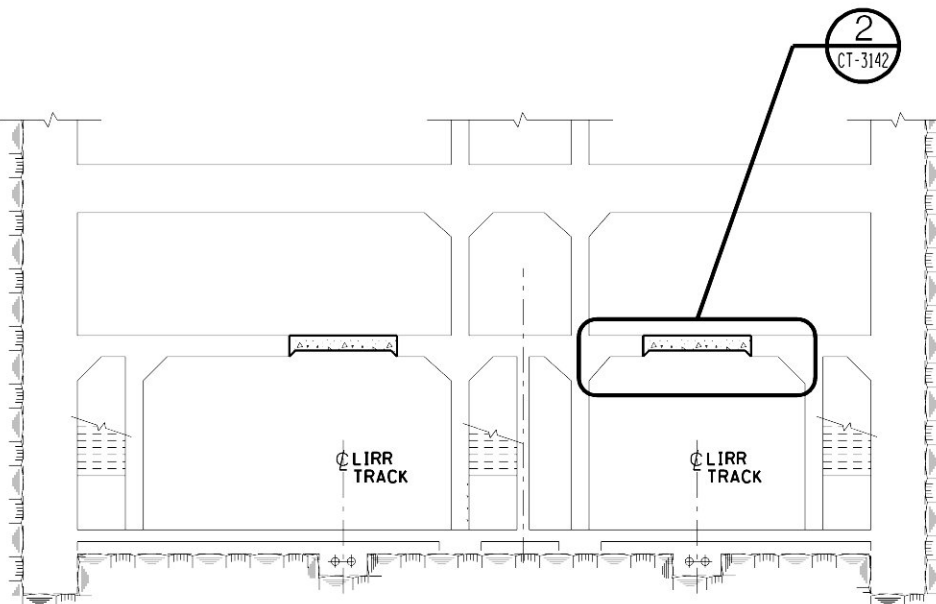


DEMOLITION OUTLINE



FINISHED OUTLINE

SECTION A  
CT-3140



FINISHED OUTLINE

SECTION B  
CT-3140

- NOTES:
1. FOR EXISTING 63RD STREET TUNNEL GENERAL NOTES SEE DWG. CM009-CT-3091.
  2. THE CONTRACTOR SHALL INSTALL TEMPORARY SUPPORTS PRIOR TO THE DEMOLITION AND RECONSTRUCTION OF THE EXISTING SLAB.
  3. FOR REINFORCED CONCRETE SLAB DETAILS AND NOTES SEE DWG. CM009-CT-3142.
  4. FOR LIRR TRACKS REFER TO TRACK ALIGNMENT STANDARD DRAWINGS.
  5. NEW EXPOSED SURFACE SHALL BE SIMILAR TO EXISTING SURFACE.

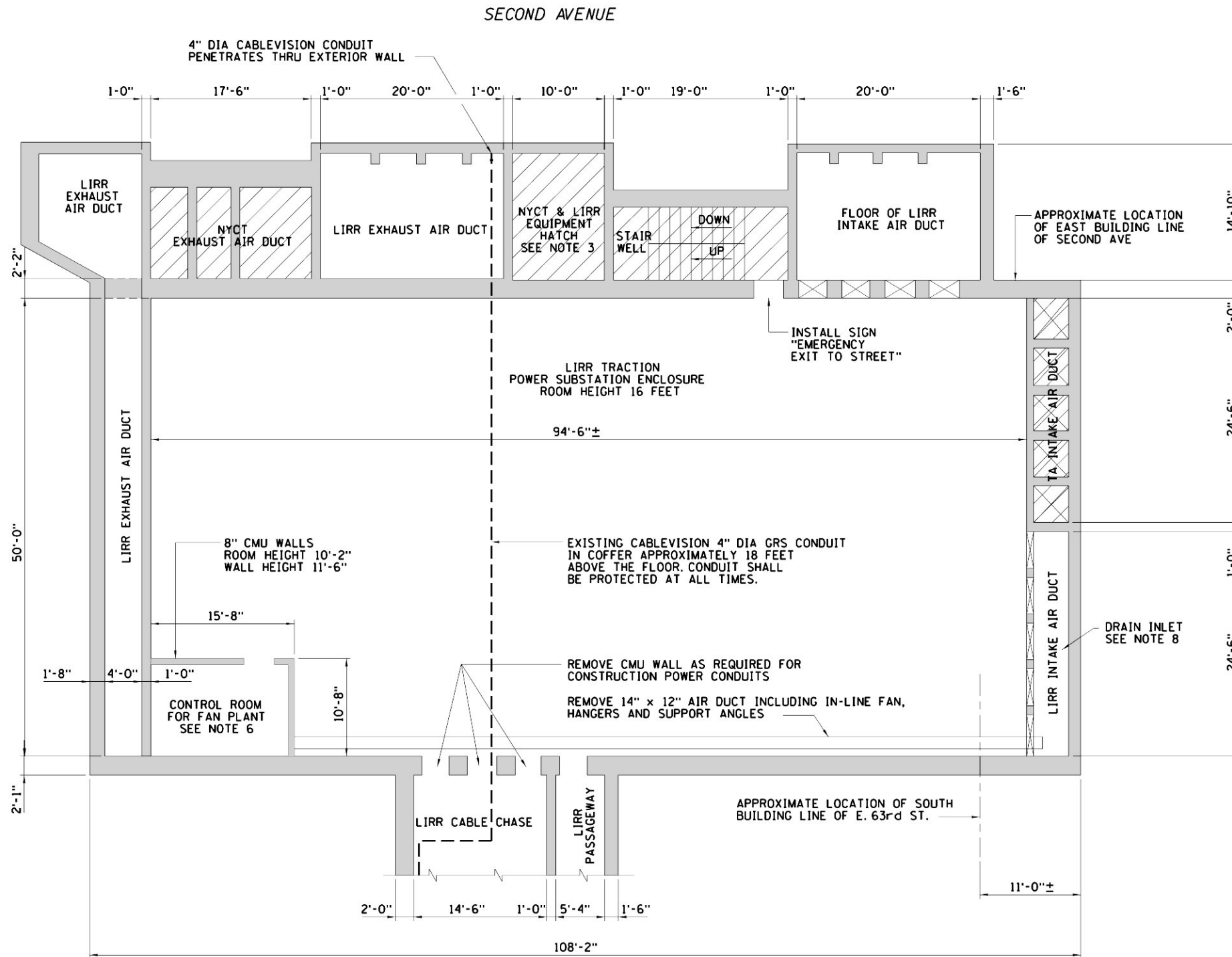
- LEGEND:
- DEMOLITION
  - SLAB RECONSTRUCTION



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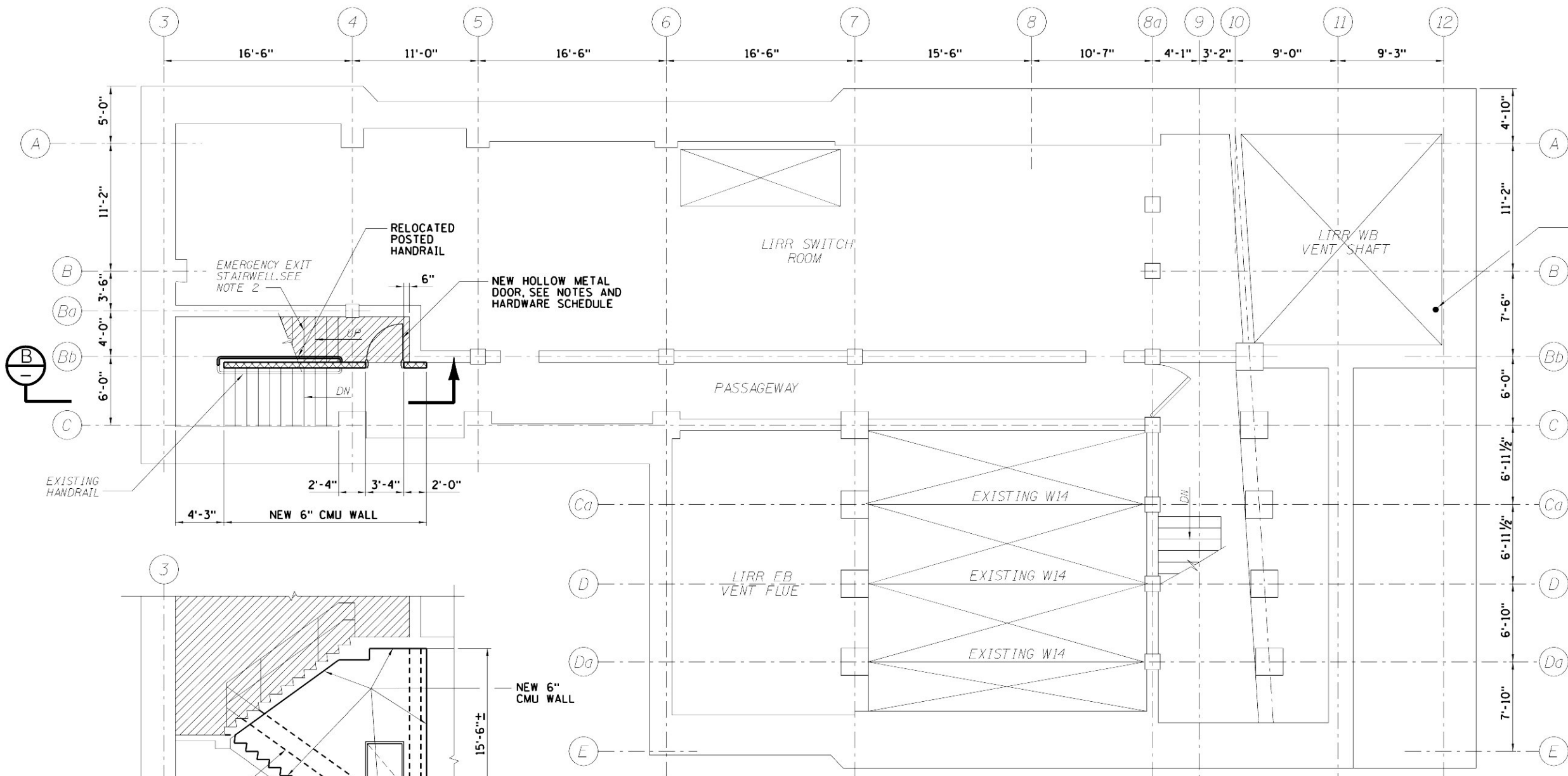
PLAN OF LIRR SUBSTATION ENCLOSURE

NOTES:

1. LIRR SPACES SHOWN ARE ASSIGNED TO THE CONTRACTOR FOR THE DURATION OF THE CONTRACT.
2.  CROSS HATCHED AREAS ARE UNDER THE JURISDICTION OF NYCT AND SHALL NOT BE ENTERED INTO AT ANY TIME, EXCEPT AS AUTHORIZED BY RESIDENT ENGINEER.
3. THE EQUIPMENT HATCH ON SECOND AVENUE SHALL BE AVAILABLE UPON SPECIFIC APPROVAL OF THE RESIDENT ENGINEER.
4. STAIRWELL ON SECOND AVENUE IS NOT AVAILABLE FOR THE CONTRACTOR'S USE EXCEPT AS AUTHORIZED BY THE RESIDENT ENGINEER.
5. ONCE THE CONTRACTOR HAS THE TUNNEL VENTILATION SYSTEM INSTALLED, OPERATING AND HAS NOTIFIED THE RESIDENT ENGINEER, THE EXISTING LIRR TEMPORARY VENTILATION SYSTEM WILL BE TAKEN OFF LINE BY NYCT, AS DIRECTED BY THE RESIDENT ENGINEER.
6. ONCE THE EXISTING LIRR TEMPORARY VENTILATION SYSTEM IS OFF LINE THE CONTRACTOR SHALL DEMOLISH THE EXISTING CONTROL ROOM FOR FAN PLANT ENCLOSURE, INCLUDING THE REMOVAL OF ALL EQUIPMENT, CONDUITS, AND CONTROLS. THE CONDUIT EXTERNAL TO THE EXISTING CONTROL ROOM SHALL BE REMOVED UP TO THE LIRR FAN WORK AREA ENCLOSURE AND TO THE SERVICE END BOX LOCATED BENEATH THE VENTILATION GRATING AT EAST 63RD STREET.
7. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING STEEL / METAL ELEMENTS ON THE FLOOR WITHIN THE LIRR SUBSTATION.
8. THE CONTRACTOR SHALL ENSURE THAT THE DRAIN LINE IS OPERATING PROPERLY.

63RD STREET





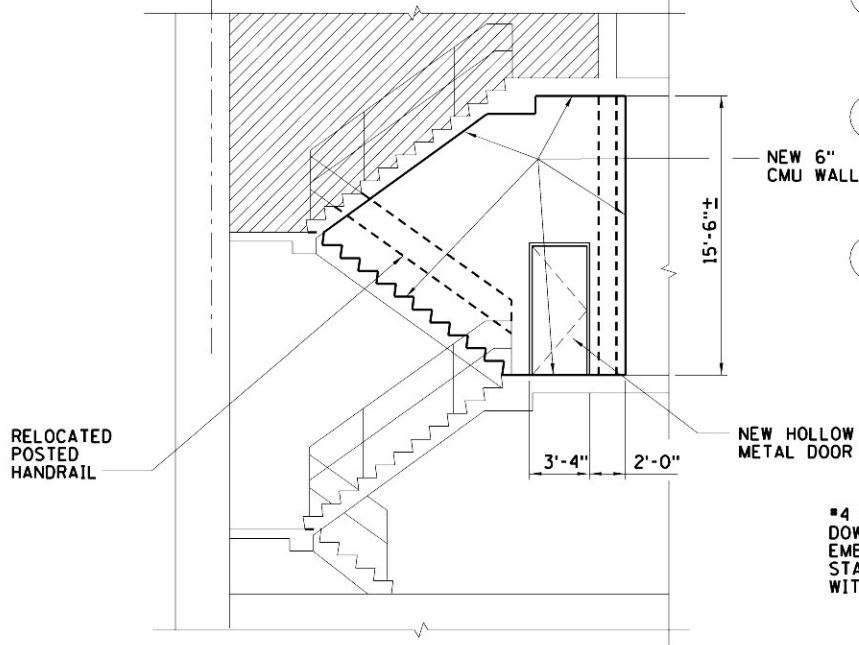
EXISTING CABLEVISION  
4" DIA GRS CONDUIT  
SHALL BE PROTECTED  
AT ALL TIMES

NOTES:

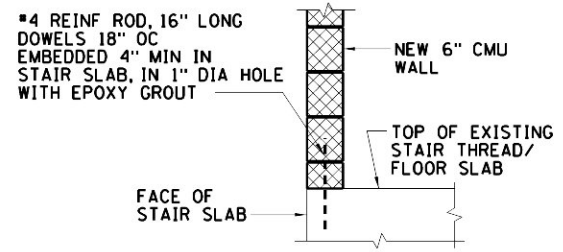
1. THE SPACES SHOWN ARE ASSIGNED TO THE CONTRACTOR FOR THE DURATION OF THE CONTRACT.
2. CONTRACTOR SHALL HAVE ACCESS TO THE EMERGENCY EXIT STAIRWAY FOR EMERGENCY SITUATIONS ONLY.
3. HATCHED AREAS ARE UNDER THE JURISDICTION OF NYCT AND SHALL NOT BE ENTERED INTO ANY TIME, EXCEPT AS AUTHORIZED BY THE RESIDENT ENGINEER.
4. SEE DIVISION 15 AND 16 SPECIFICATIONS FOR MECHANICAL AND ELECTRICAL REQUIREMENTS.
5. FOR DETAILS OF 6" CMU, NON-RATED WALL, REINFORCED CMU LINTEL, DOOR TYPE A, DOOR FRAME TYPE 1 AND DOOR FRAME DETAILS, SEE DWG CM009-CT-3204.
6. NEW HOLLOW METAL DOOR TO BE PAINTED WITH EPOXY PAINT. COLOR TO BE SELECTED BY THE RESIDENT ENGINEER.
7. THE NEW DOOR ALARM SYSTEM WILL BE INSTALLED BY NYCT AND IS TO BE COORDINATED WITH NYCT THROUGH THE RESIDENT ENGINEER. THE EXISTING ALARMED DOOR, 458N, AT LIRR TRACK LEVEL, WILL THEN BE DEACTIVATED BY NYCT.

PLAN OF LIRR SWITCH ROOM  
(ELEVATION 225.45)

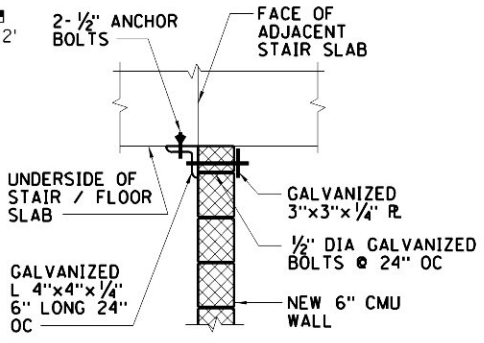
SCALE IN FEET  
4' 2' 0' 4' 8' 12'



SECTION   
SCALE IN FEET  
4' 2' 0' 4' 8' 12'

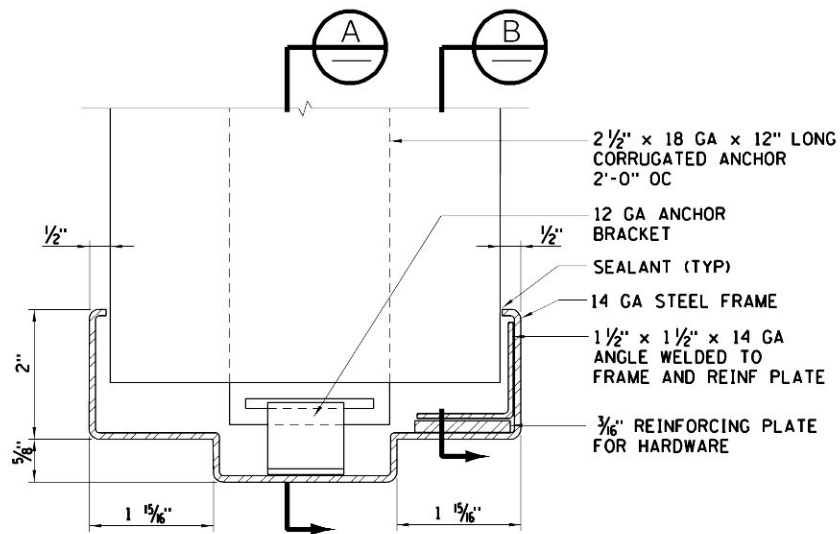


TYPICAL CMU WALL  
NTS

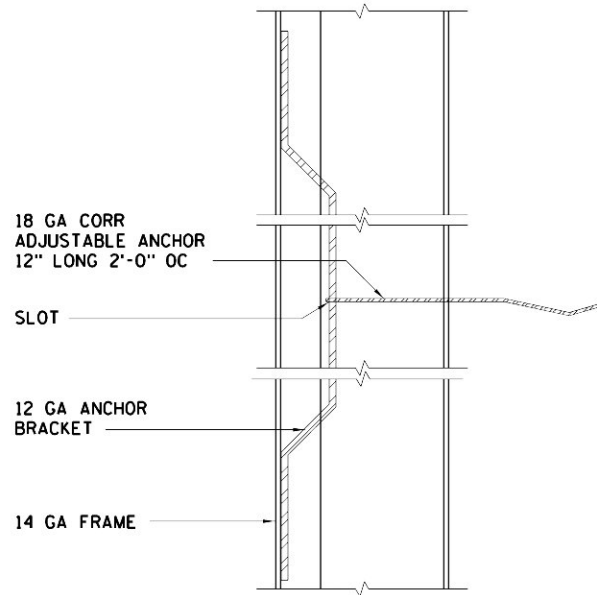


DETAIL AT TOP OF  
NEW CMU WALL  
NTS

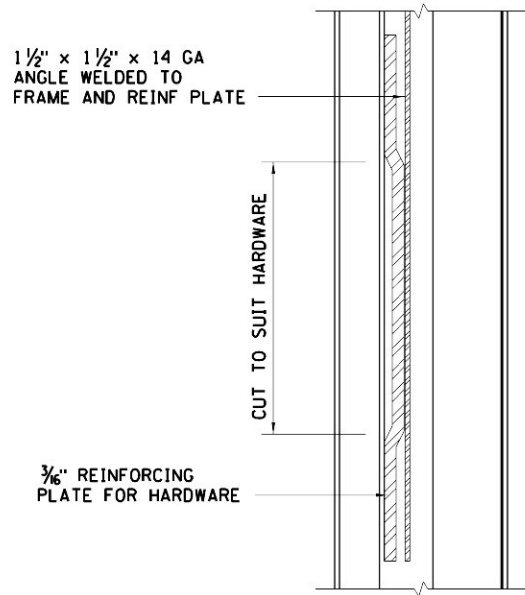
HARDWARE SCHEDULE			
QTY.	DESCRIPTION	MODEL	FINISH
3 EA	STA (STANLEY) - BUTT HINGE	FBB199 4.5 x 4.5 NRP	US32D
1 EA	BES (BEST ACCESS SYSTEM) - CORE I C	IC 72	630 (SATIN STAINLESS STEEL)
1 EA	FAL (FALCON) - MORT LOCKSET	LM581 DG IC7ACC #5 CAM	630 (SATIN STAINLESS STEEL)
1 EA	DOC (DOR-O-MATIC) - CLOSER/STOP	SC70 DS	AL
1 EA	IVE (IVES) - WALL STOP	WS407CVX	US32D



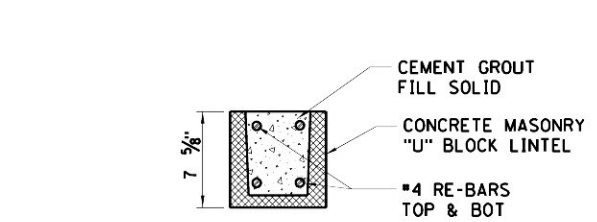
H M INTERIOR DOOR FRAME JAMB



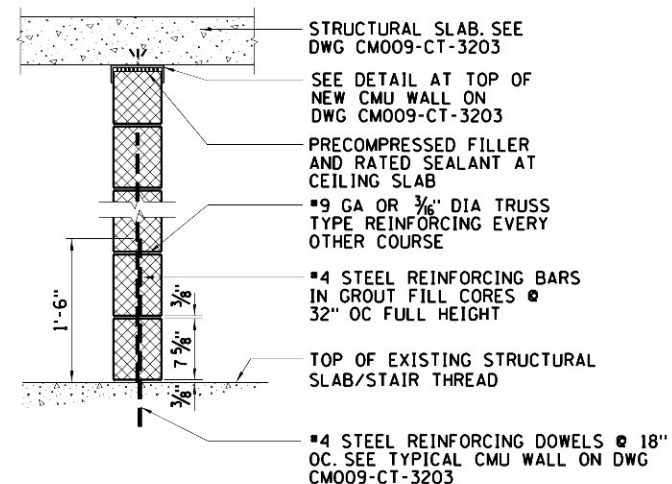
SECTION A



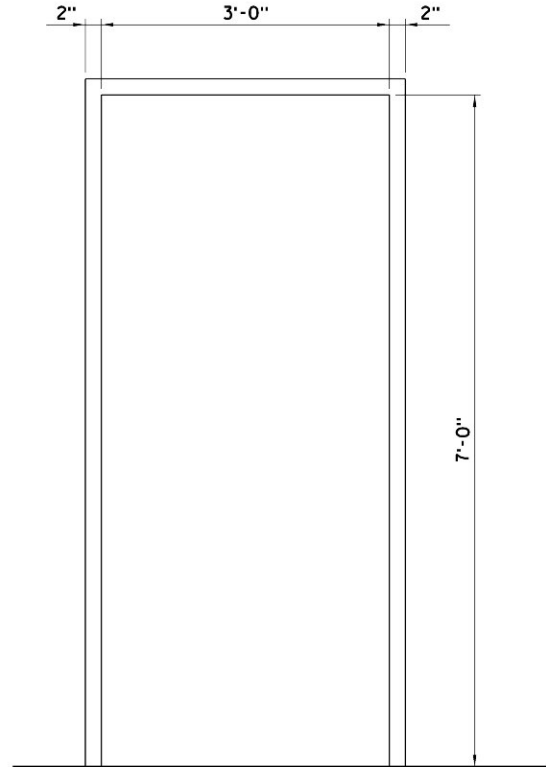
SECTION B



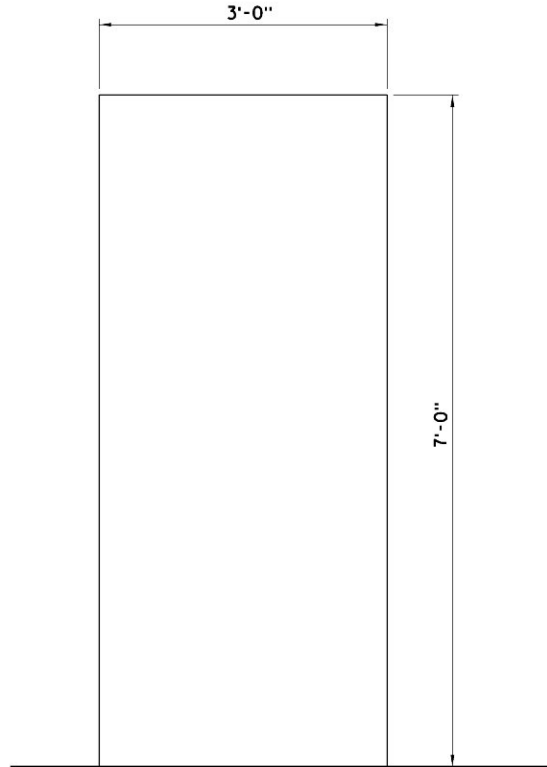
6" REINFORCED CMU LINTEL @ 4'-0" MAX MASONRY OPENING



6" NOM NON-RATED CMU WALL



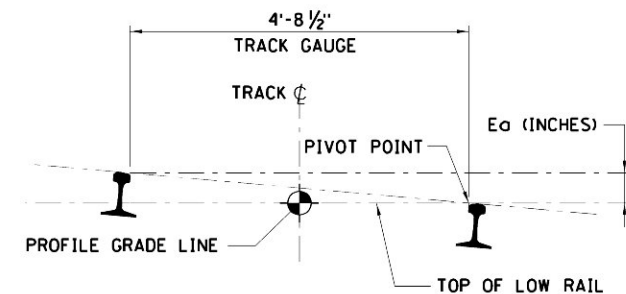
DOOR FRAME TYPE - 1 ELEVATION



DOOR TYPE - A ELEVATION

- NOTES:
1. ALL BOND BEAMS TO COMPLY WITH ASTM SPECIFICATIONS C-476, 3000 PSI GROUT FOR REINFORCED MASONRY.
  2. ALL PRECAST LINTELS AND LINTEL BLOCKS SHALL HAVE 8" BEARING AT BOTH SIDES OF MASONRY OPENINGS.
  3. DOOR FRAMES AT MASONRY WALLS TO BE FILLED SOLID WITH GROUT (TYP.)

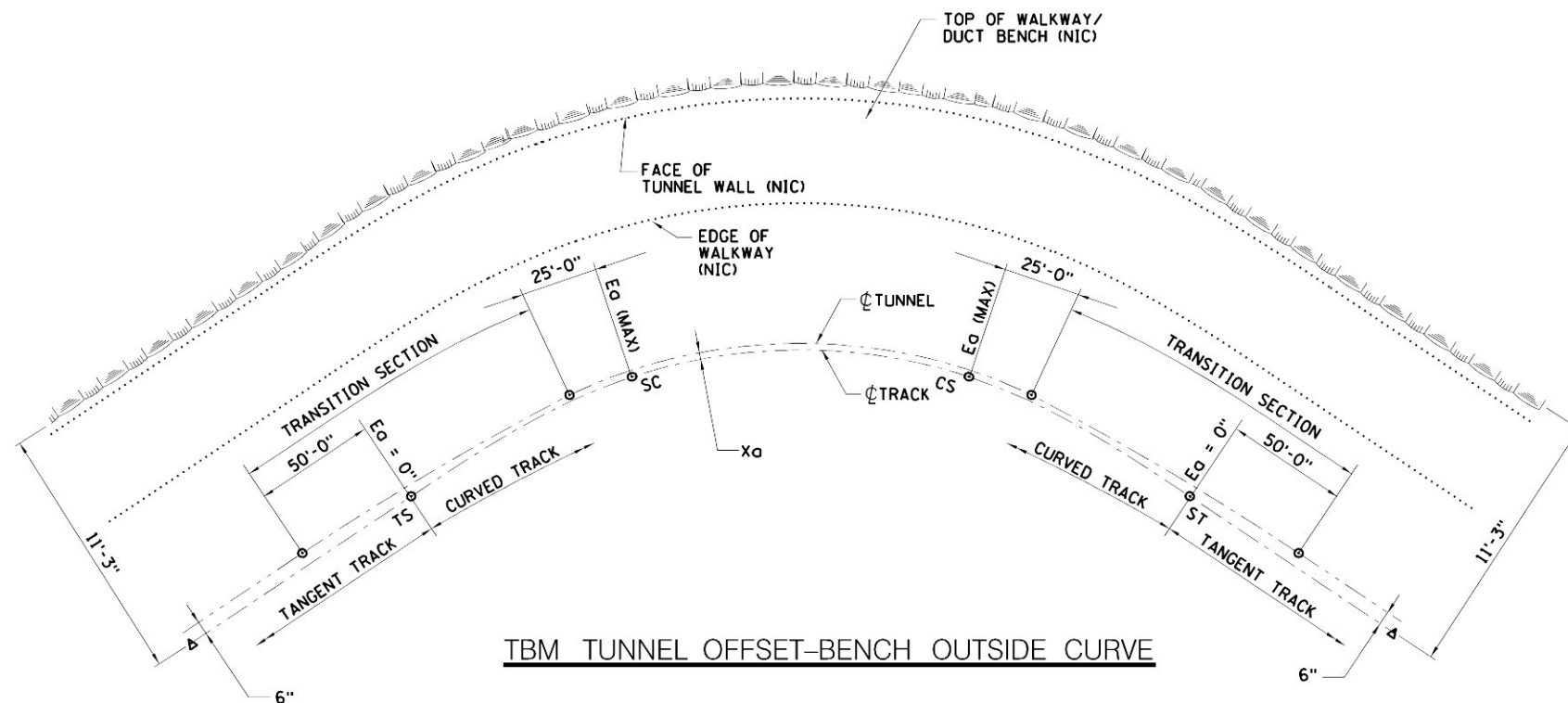




### ROTATION DIAGRAM FOR TRACK SUPERELEVATION

TBM TUNNEL OFFSET-BENCH INSIDE CURVE			
CURVE	X† (INCHES)	REFERENCE DRAWINGS	
		ALIGNMENT	STRUCTURAL
EB2-10	8.50	STD-TK-0105	CM009-ST-1008
WB1-10	7.00	STD-TK-0105	CM009-ST-1008
EB2-20 *	14.75	STD-TK-0106	CM009-ST-1009/1010/1011
WB1-30A *	14.75	STD-TK-0108	CM009-ST-1012/1013/1014
WB3-10	10.25	STD-TK-0125	CM009-ST-1108
EB4-20	10.25	STD-TK-0125	CM009-ST-1108/1109
WB3-20	14.75	STD-TK-0126	CM009-ST-1109/1110/1011
WB1-30B *	11.75	STD-TK-0109	CM009-ST-1014

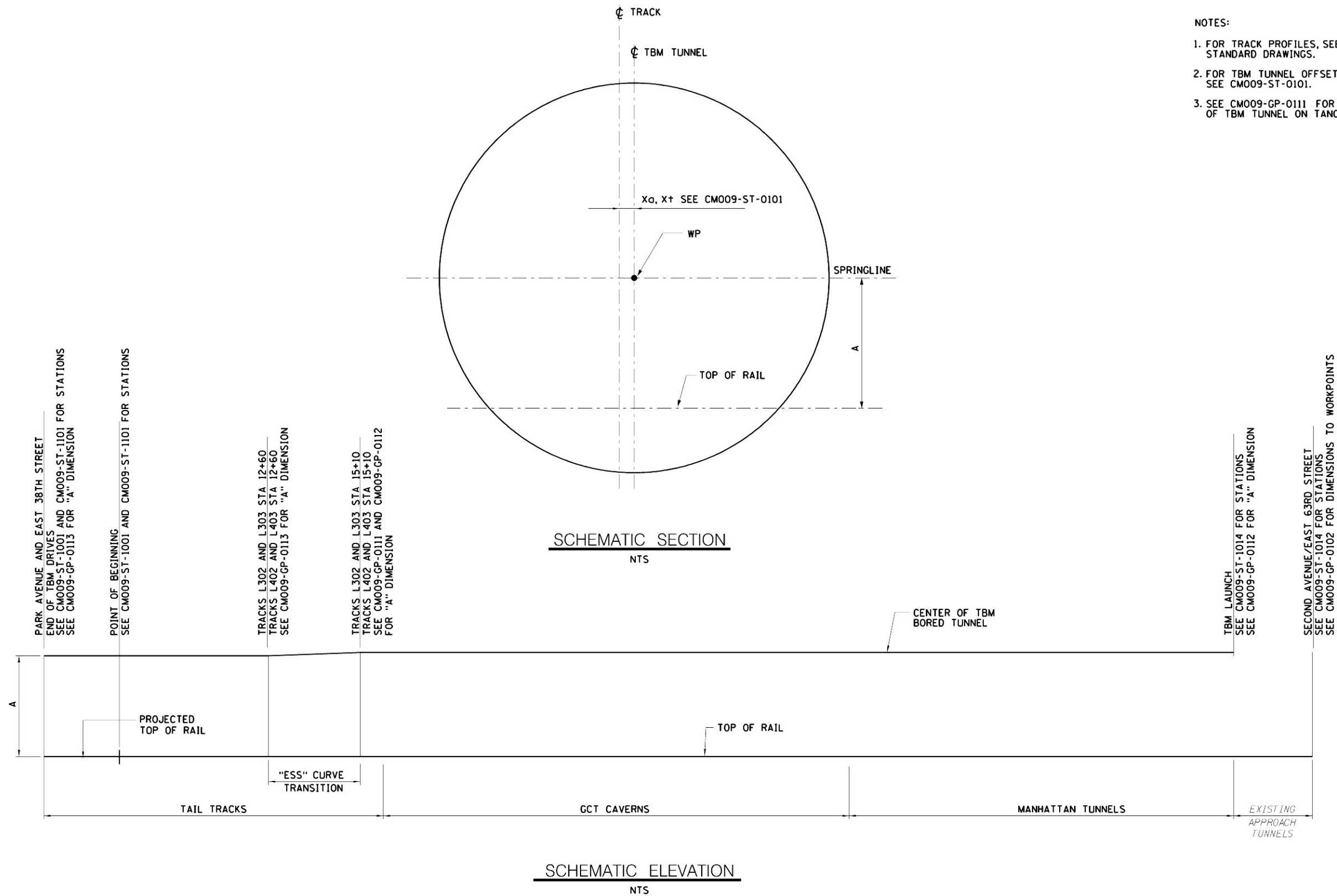
- NOTES:
1.  $E_o$  = ACTUAL SUPERELEVATION.
  2. FOR TRACK ALIGNMENTS SEE MANHATTAN ALIGNMENT STANDARD DRAWINGS.
  3.  $X_o$  = OFFSET OF CENTERLINE OF TUNNEL FROM CENTERLINE OF TRACK, AWAY FROM CURVE CENTER.
  4.  $X_t$  = OFFSET OF CENTERLINE OF TUNNEL FROM CENTERLINE OF TRACK, TOWARDS CURVE CENTER.
  5. VALUES FOR  $X_o$  AND  $X_t$  SHALL VARY LINEARLY THROUGH TRANSITION SECTIONS.
  6.  $X_o$  AND  $X_t$  ARE MEASURED FROM VERTICAL CENTERLINES.
  7. FOR PLANS OF TBM TUNNELS SEE CMO09-ST-1001 THROUGH CMO09-ST-1014 AND CMO09-ST-1101 THROUGH CMO09-ST-1110.
  8. OFFSETS NOT RELATED TO CURVES ARE SHOWN ON THE STRUCTURAL PLANS.
  9. LIMITS OF CURVES SHOWN ON THOSE PLANS EXTEND BEYOND THE ST OR TS POINT TO INCLUDE TRANSITIONS.
  10. SEE CMO09-GP-0112 FOR GENERAL ARRANGEMENT OF TBM TUNNEL AT CURVE.
  11. SEE CMO09-GP-0102 FOR GENERAL ARRANGEMENT OF APPROACH TUNNEL AT CURVE.
  12. SEE CMO09-GP-0111 FOR GENERAL ARRANGEMENT OF TBM TUNNEL ON TANGENT.
  13. FOR TBM TUNNEL OFFSETS FROM TRACK PROFILE SEE CMO09-ST-0102.
  14. FOR CURVES MARKED WITH AN " \* ", SEE THE CORRESPONDING STRUCTURAL DRAWING FOR DEVIATIONS TO THE LENGTH OF THE TRANSITION SECTION.



TBM TUNNEL OFFSET-BENCH OUTSIDE CURVE			
CURVE	X <sub>a</sub> (INCHES)	REFERENCE DRAWINGS	
		ALIGNMENT	STRUCTURAL
T302-10	6.75	STD-TK-0124	CM009-ST-1106/1107
T303-10	7.25	STD-TK-0124	CM009-ST-1106/1107
WB1-20	7.00	STD-TK-0106	CM009-ST-1009/1010/1011
EB2-30	2.5	STD-TK-0108	CM009-ST-1012/1013/1014
EB4-10	7.25	STD-TK-0124	CM009-ST-1107/1108
EB4-30	7.00	STD-TK-0126	CM009-ST-1109/1110/1011
T403-10	7.50	STD-TK-0104	CM009-ST-1006/1007
T402-10	6.75	STD-TK-0104	CM009-ST-1006/1007

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- NOTES:
1. FOR TRACK PROFILES, SEE MANHATTAN ALIGNMENT STANDARD DRAWINGS.
  2. FOR TBM TUNNEL OFFSETS TO TRACK ALIGNMENTS SEE CM009-ST-0101.
  3. SEE CM009-GP-0111 FOR GENERAL ARRANGEMENT OF TBM TUNNEL ON TANGENT.

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DATE:	REVISIONS	No.

DESIGNED BY: D. ROBERTS
DRAWN BY: M. SPYTEK
CHECKED BY: G. AYVAS
COORDINATED BY: M. DELLA POSTA
APPROVED BY: J. SCHABIB

NY PROFESSIONAL License No.
ORIGINAL SIGNED & SEALED
DATE: _____

**MANHATTAN TUNNELS EXCAVATION**  
  
TBM TUNNEL OFFSETS FROM TRACK PROFILES

SCALE: NOT TO SCALE
DRAWING NUMBER: CM009-ST-0102
DATE: 5-26-06
REVISION NUMBER: 0

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