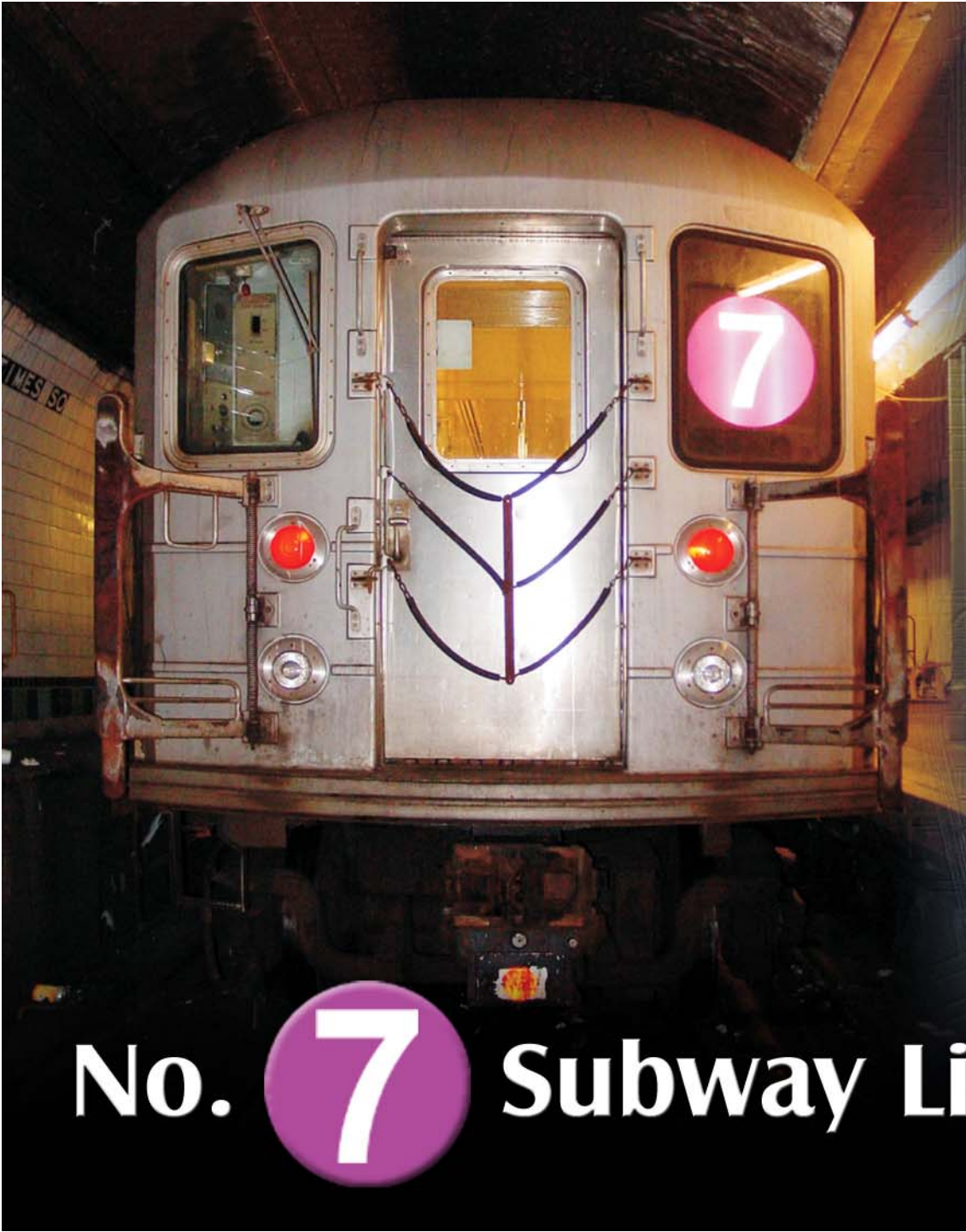




NJ PMI Chapter
May 6th Symposium 2013

*“Keys To Successful Project Controls in Mega Transit
Projects – A Case Study of Number 7 Line ”*

Shawn Kildare, Sr. V.P and Program Executive, MTACC
Saibal Basuroy, Sr. Project Controls Manager, Hill International Inc.



Number **7**
Extension

Keys to Successful
Project Controls in
Mega Transit Projects
— A Case Study of
Number 7 Line

Presentation to
PMI, NJ

May 6, 2013

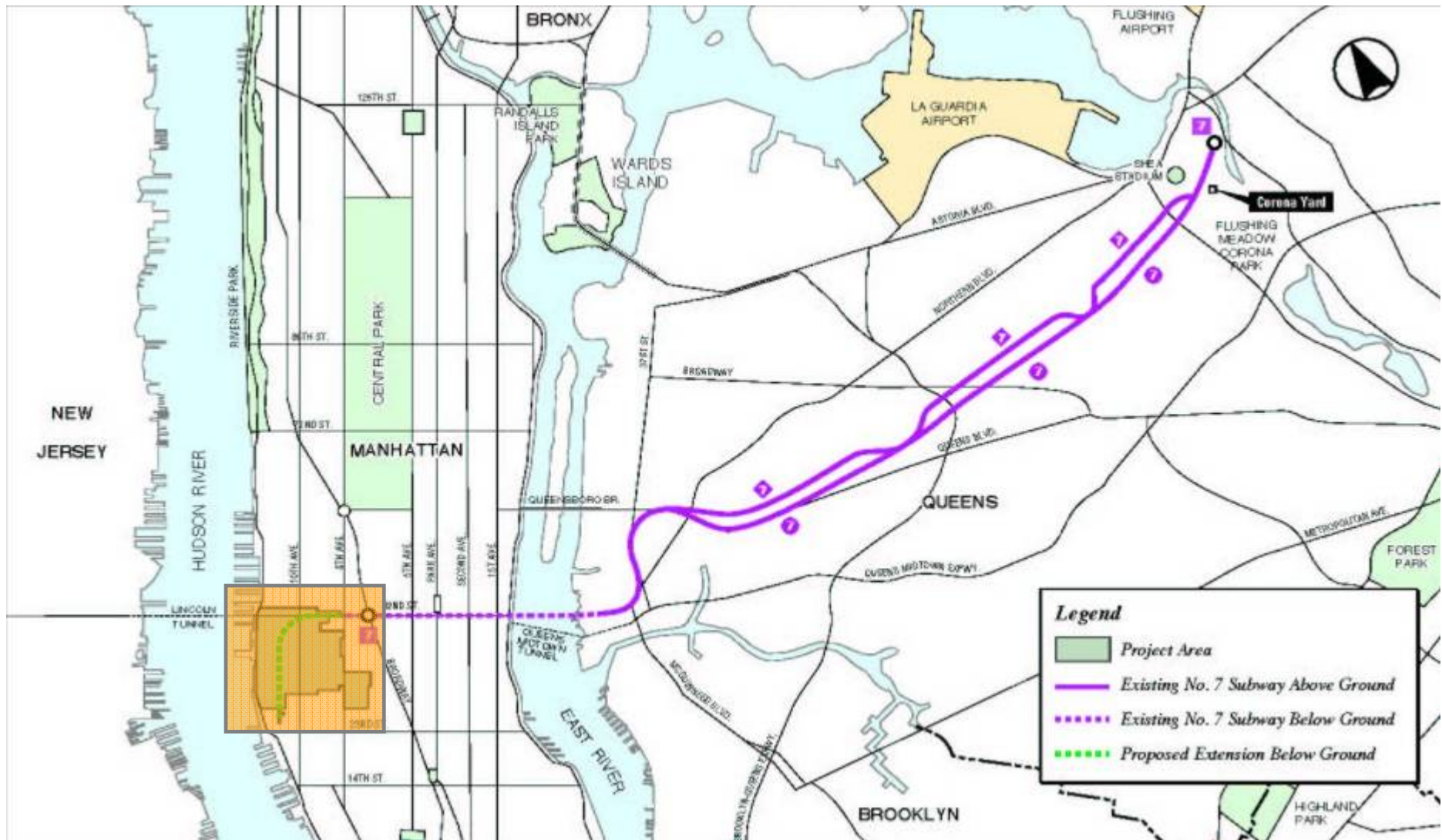
No. **7** Subway Line Extension

AGENDA

- Project Overview
- Project Status
- Key Aspects of Successful Project Controls
- Key Control Measures Implemented for
Number 7 Line
- Q&A

PROJECT OVERVIEW

No. 7 Project Context



No. 7 Alignment





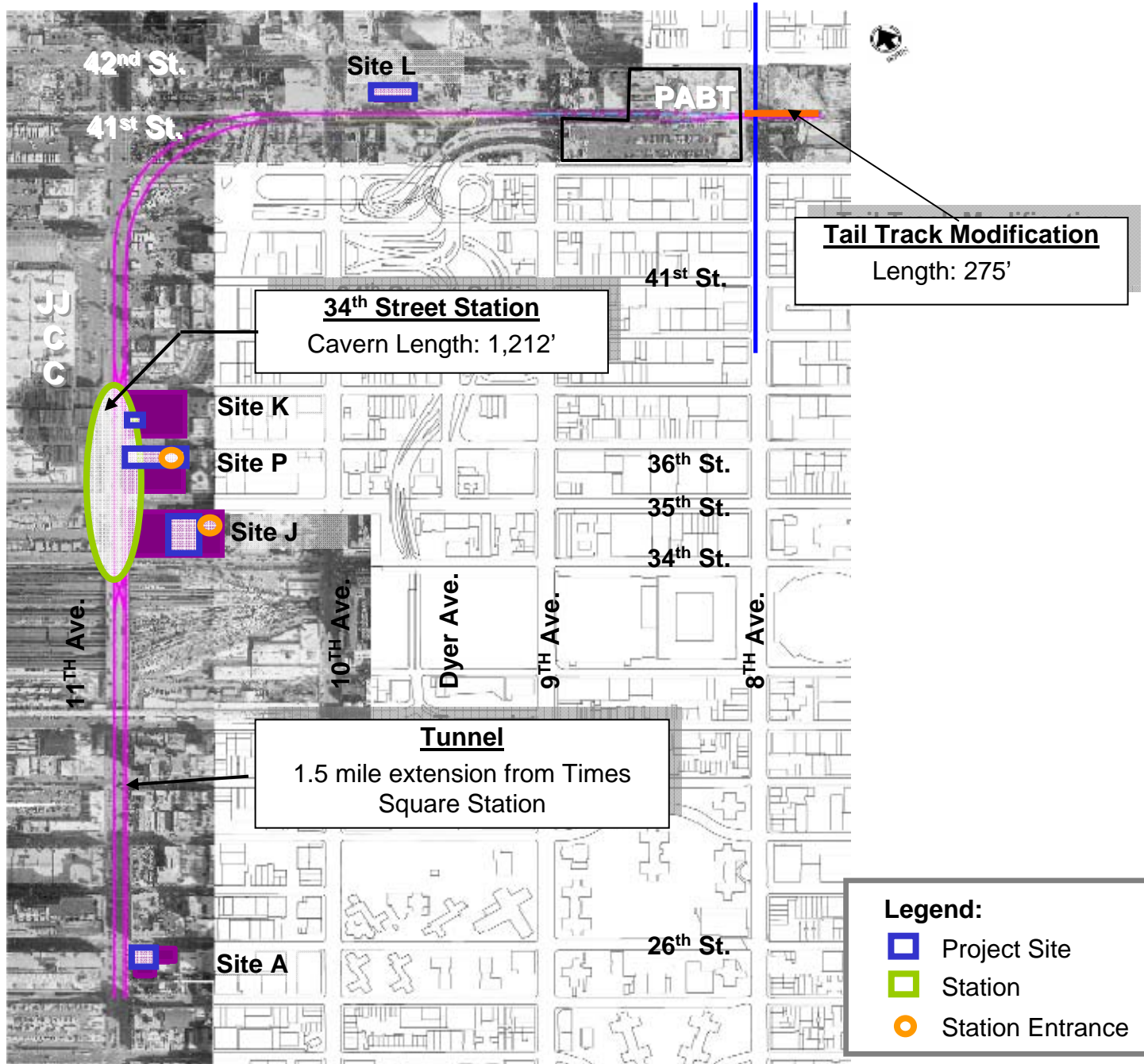
11th AVENUE LOOKING NORTH

2025 Projected Development

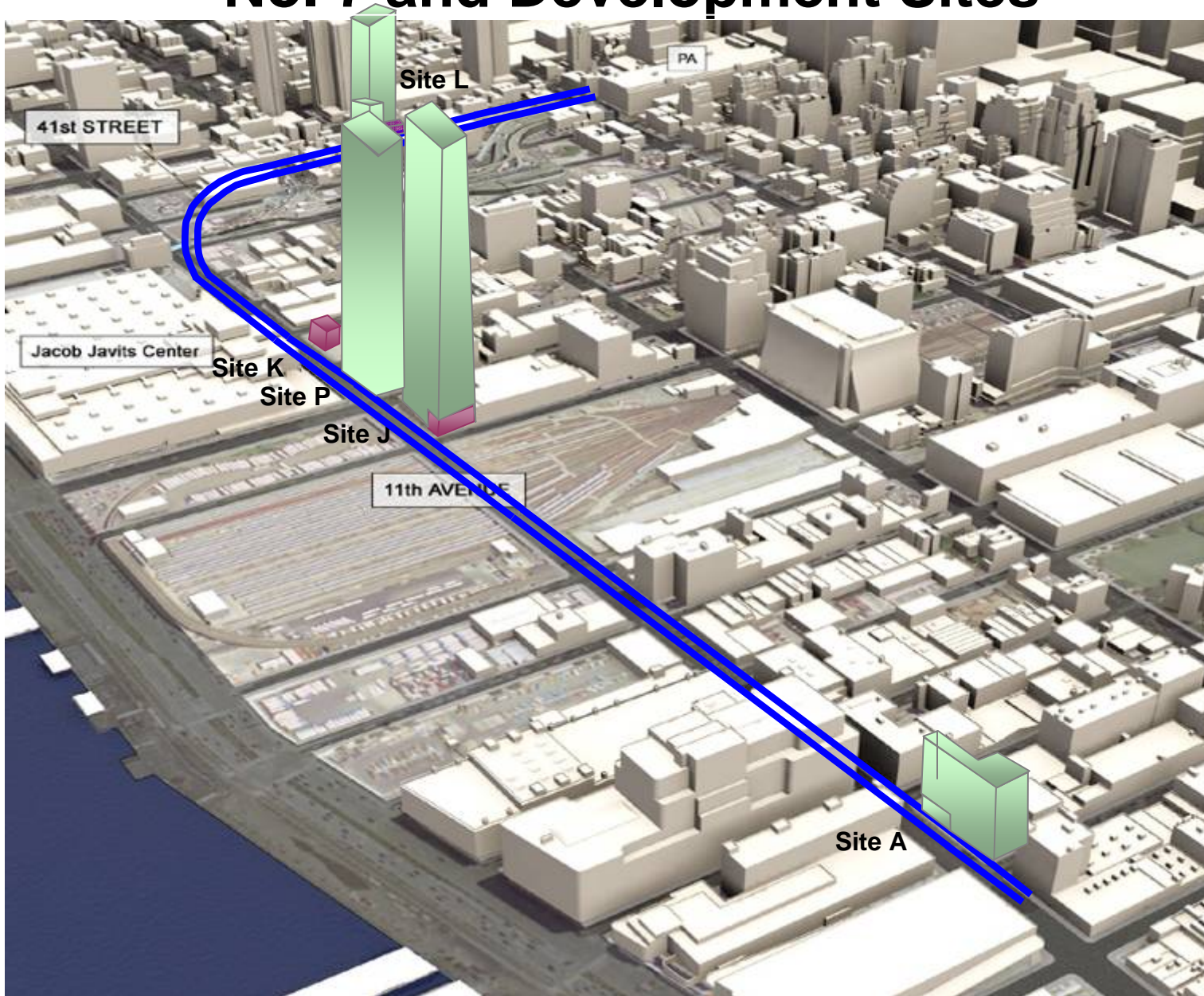


Number 7 Subway Line Extension

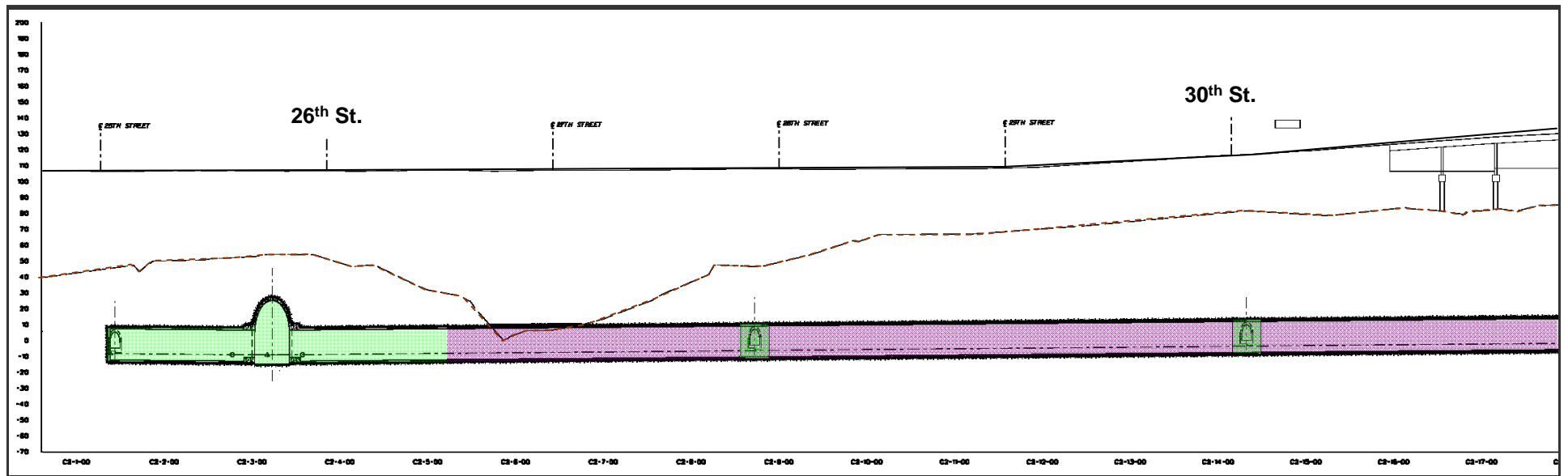
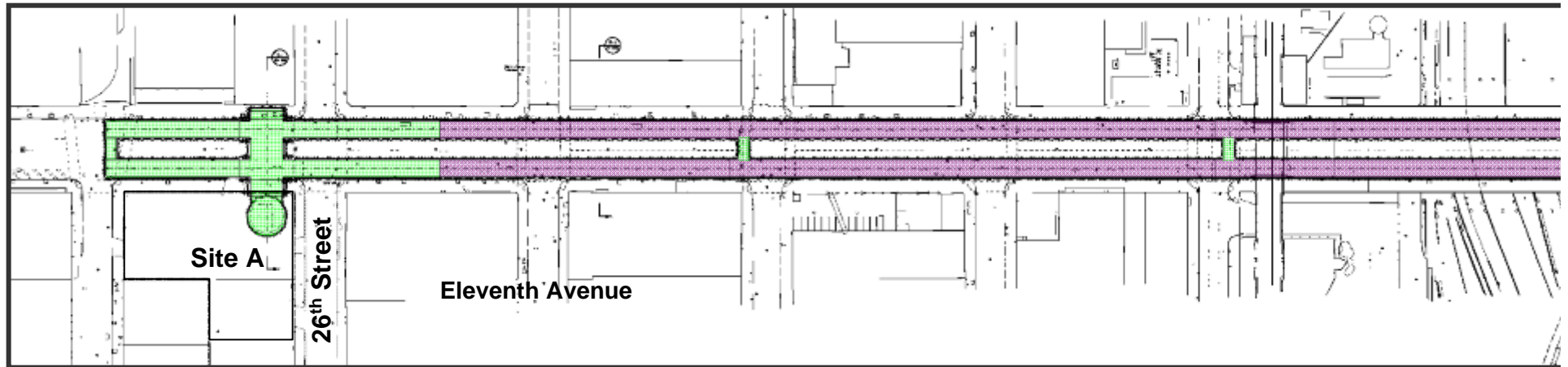
Project Scope Key Plan



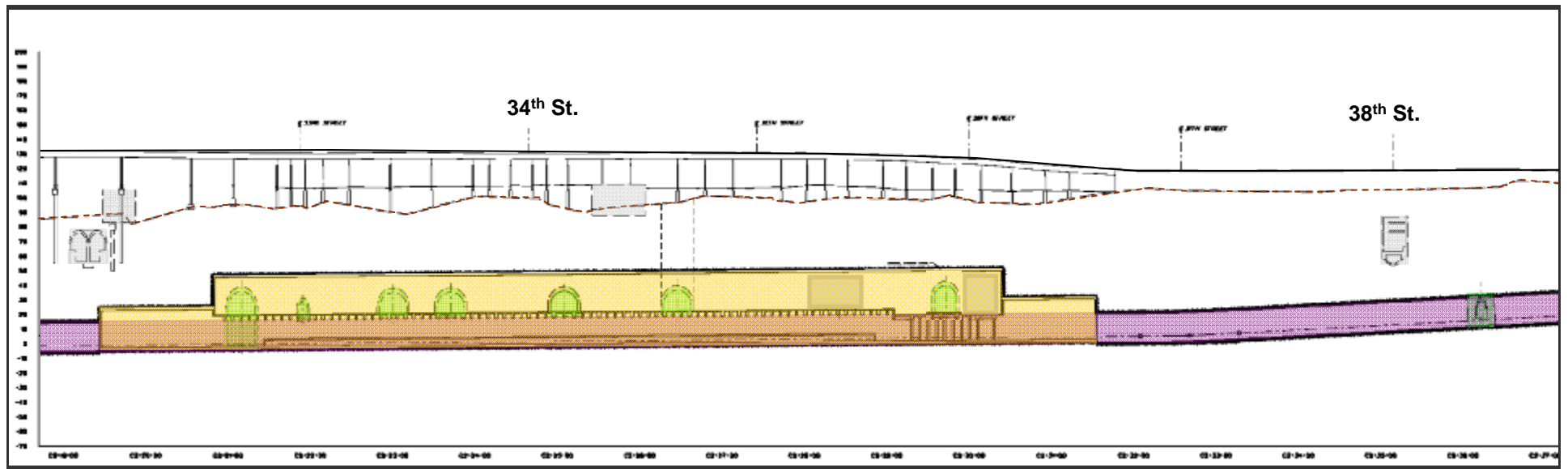
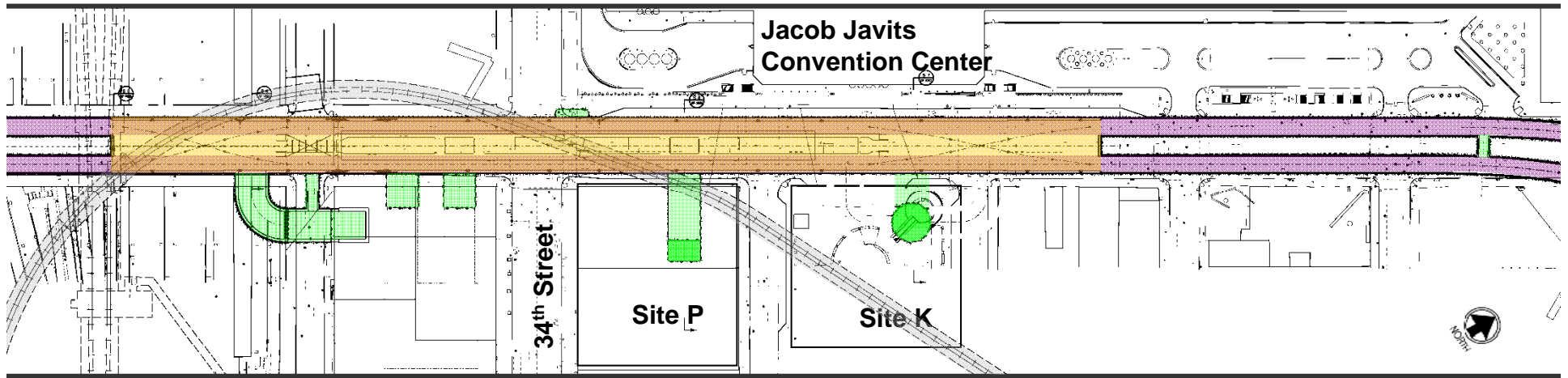
No. 7 and Development Sites



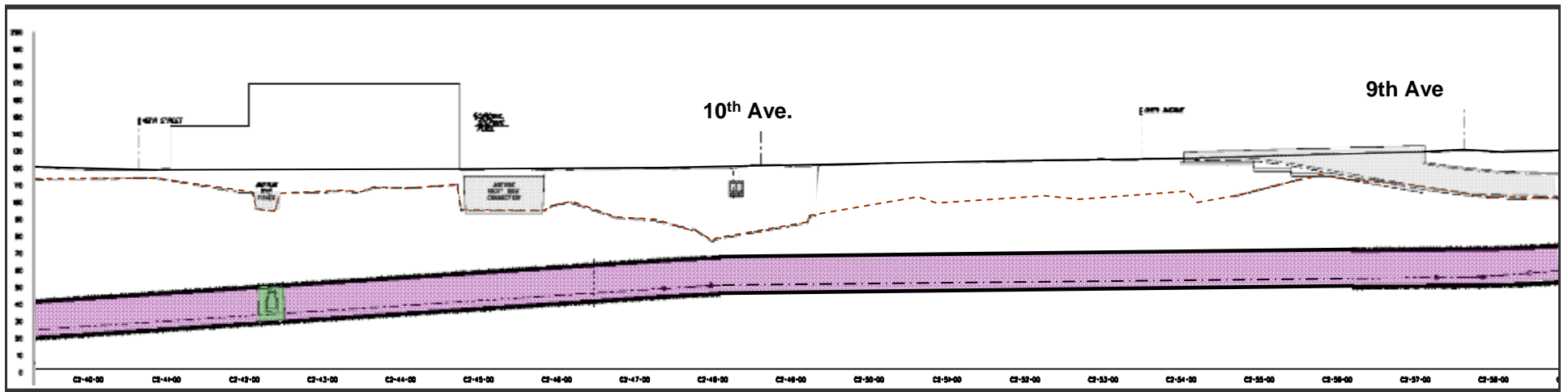
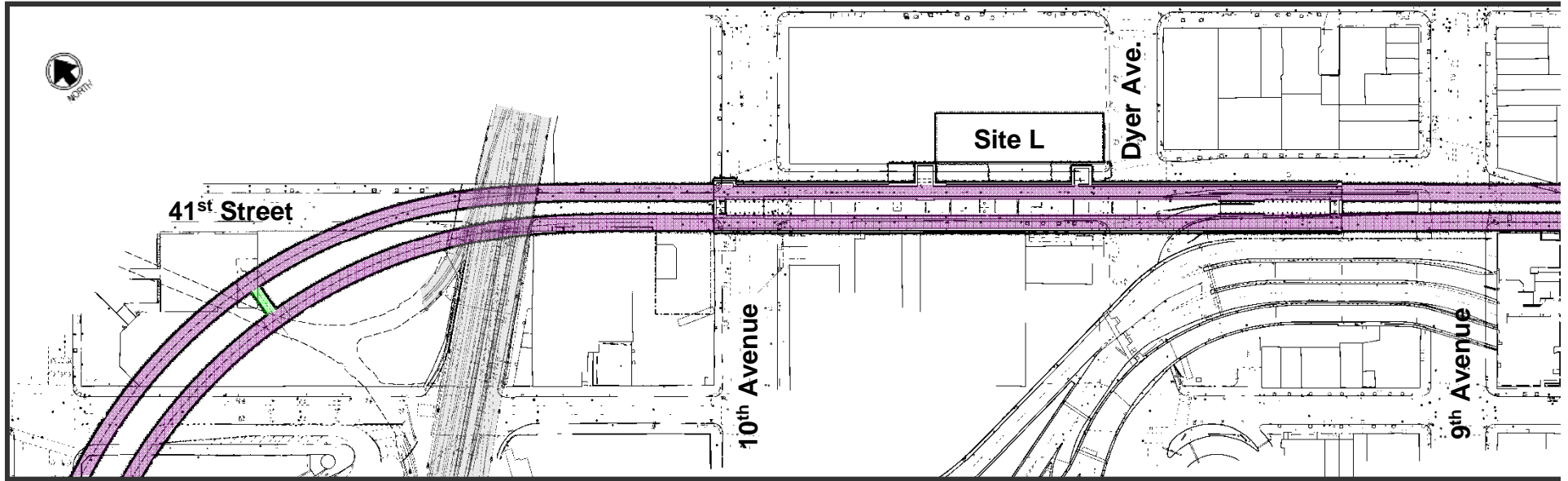
11th Avenue - 25th to 31st Streets



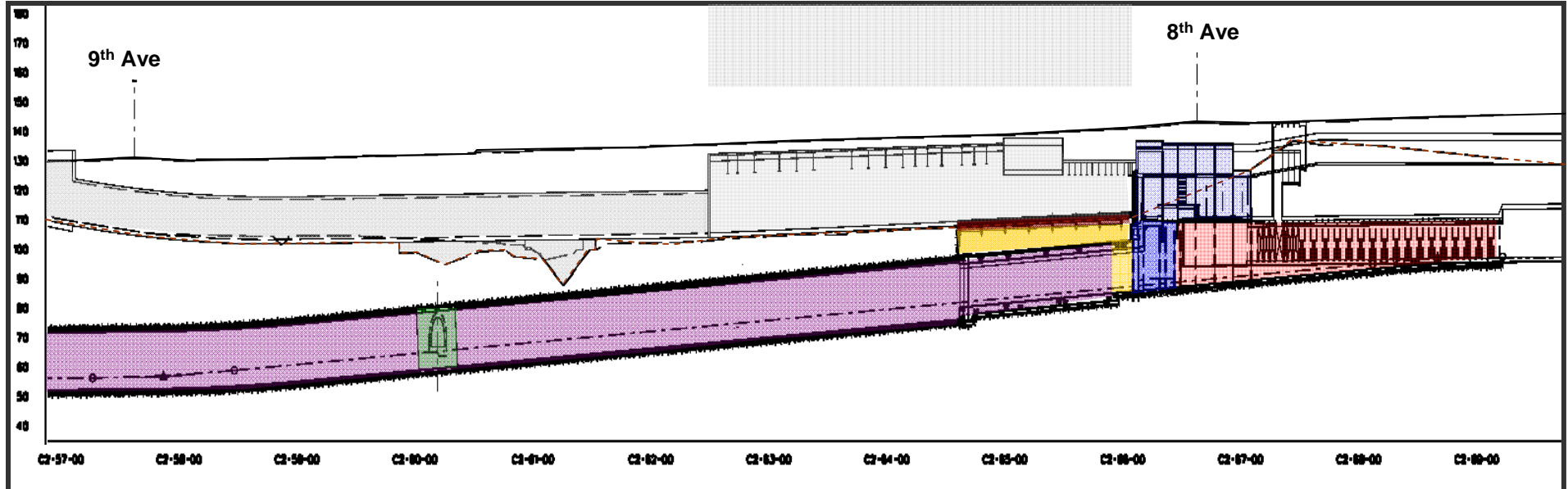
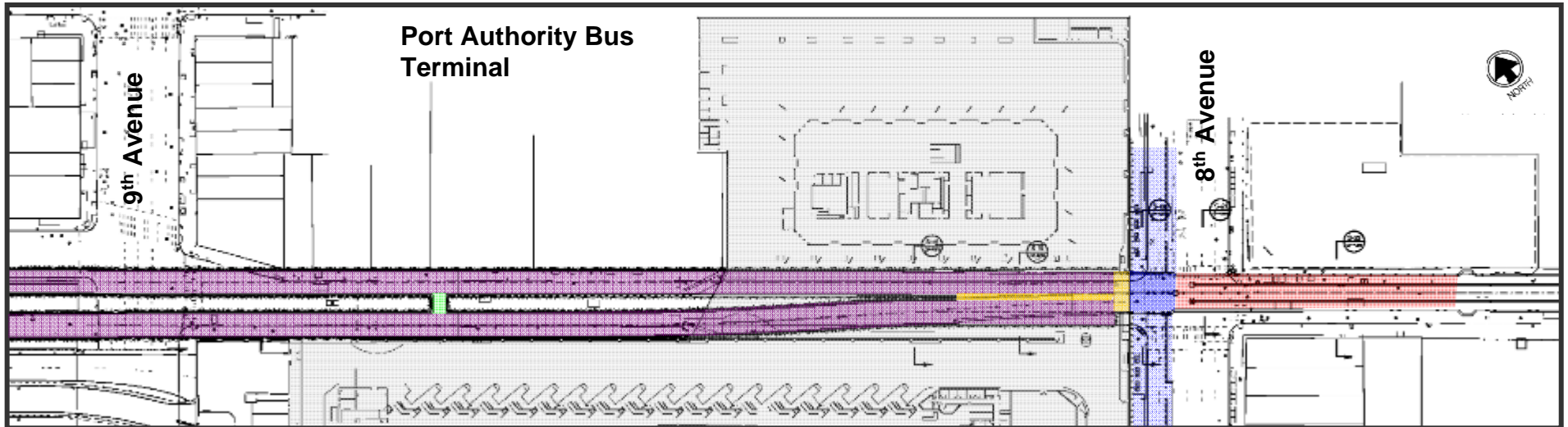
11th Avenue – 31st to 39th Streets



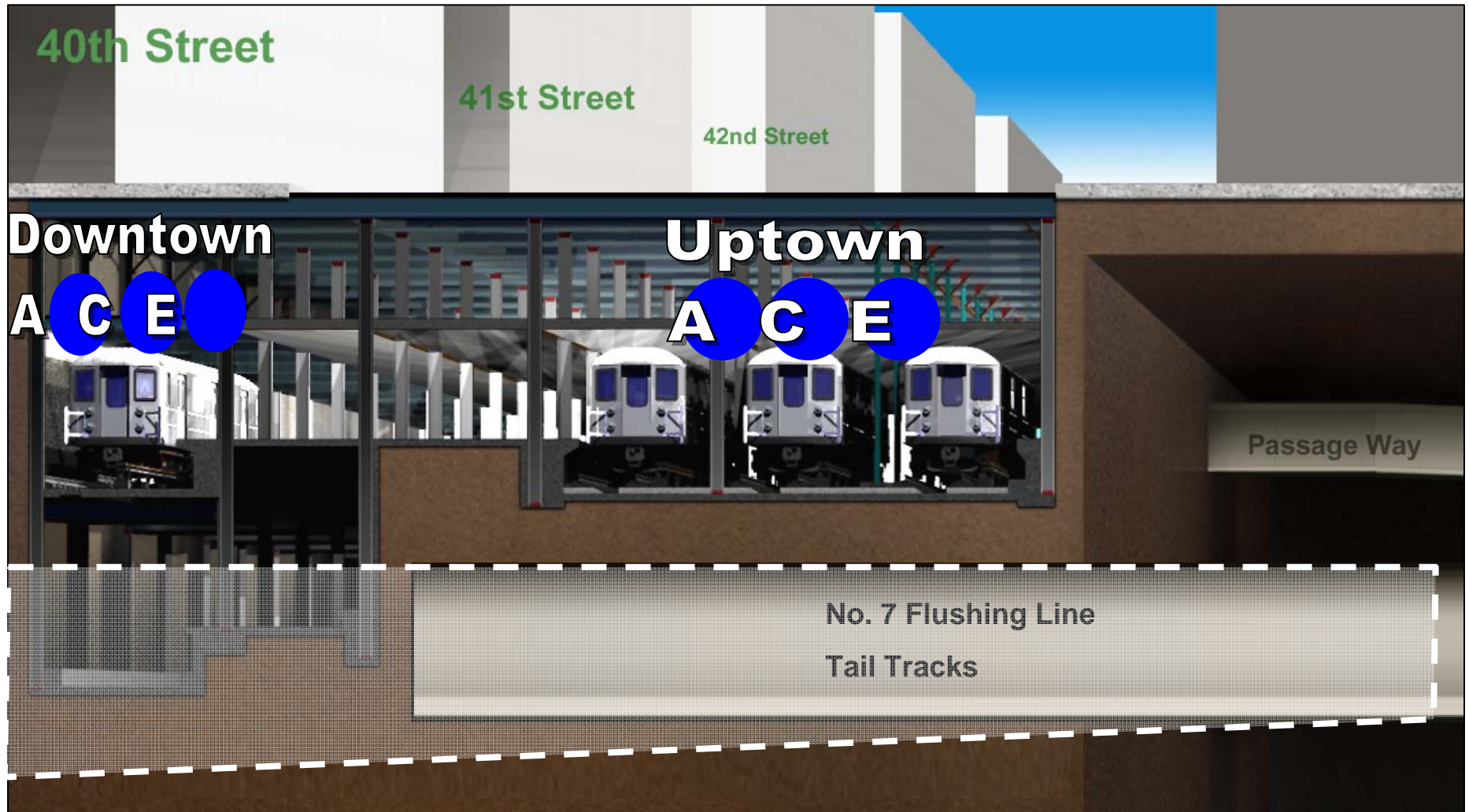
41st Street – 11th to 9th Avenues



41st Street – 9th to 8th Avenues



Eighth Avenue Section

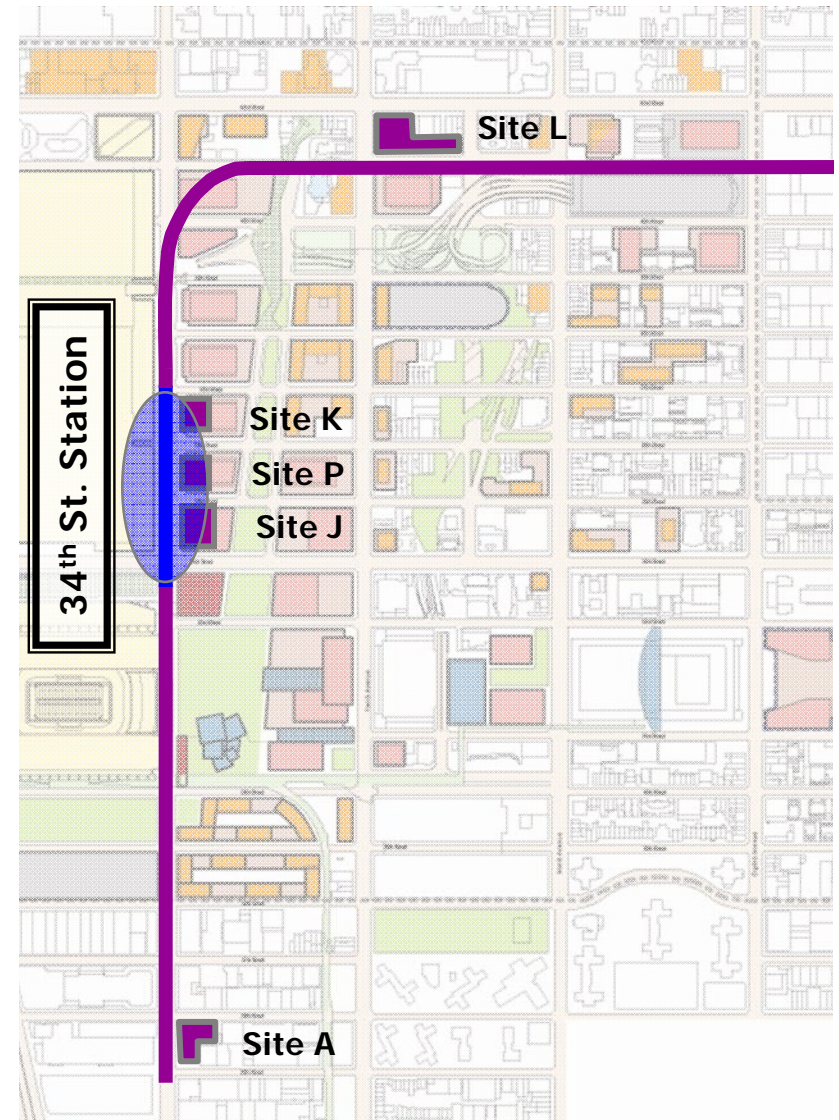


Project Facts

Length:	1.5 mile extension
34 th Street Station:	1,212 ft
Project cost:	\$2.366B
Completion Date:	June 2014
City Representative:	Hudson Yards Development Corp.
Funding:	Hudson Yards Infrastructure Corp.
Design Consultant:	PB Team
Consultant	HLH7
Construction	Hill International, Inc.
Management (CCM):	LiRo Engineers, Incl. HDR Daniel Frankfurt

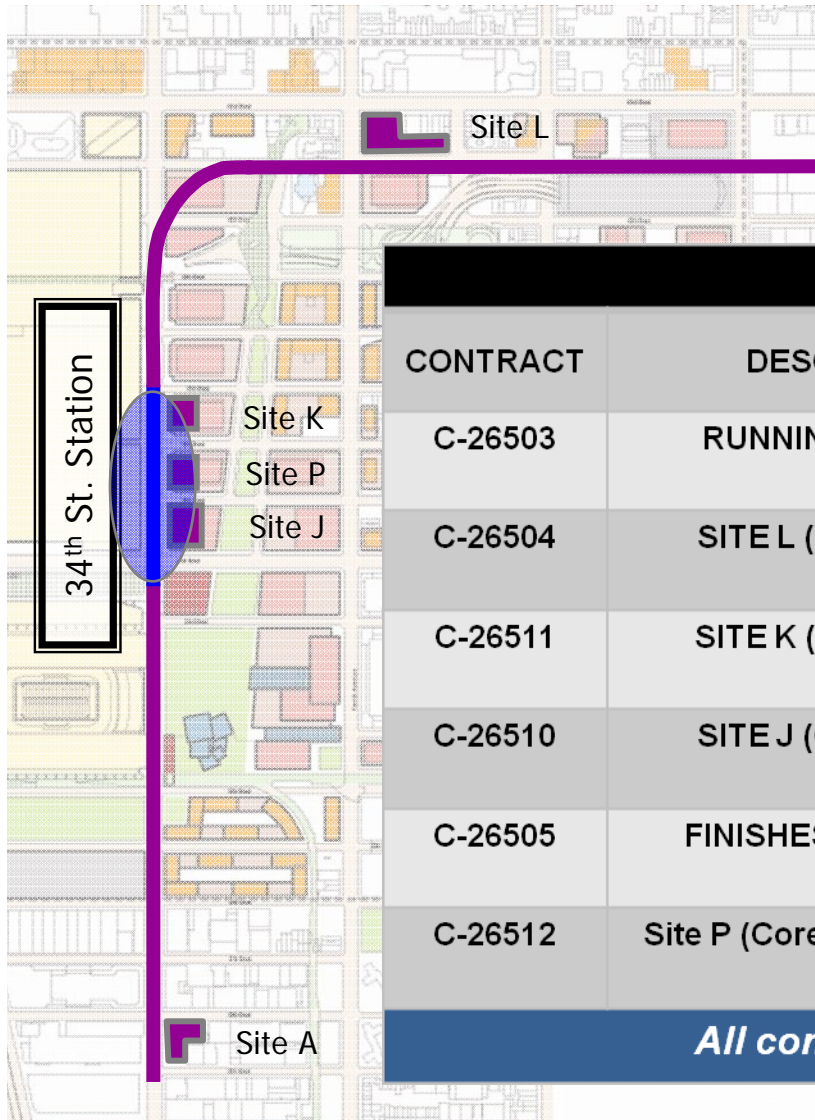
Construction Contracts/Phases

- Running Tunnels (Contract 1)
- Site L Ventilation Building
- Site J Ventilation Building & Station Entrance
- Site K Ventilation Building
- Systems & Finishes
- Secondary Station Entrance (Site P)



Project Status

CONTRACTS/PHASES



IN CONSTRUCTION				
CONTRACT	DESCRIPTION	COST	% COMPLETE 2/28/2013	S.C. DATE
C-26503	RUNNING TUNNELS	\$1,144,995,900	100%	4/27/12 (A)
C-26504	SITE L (Core & Shell)	\$56,826,000	100%	10/9/12 (A)
C-26511	SITE K (Core & Shell)	\$56,447,000	100%	11/26/12 (A)
C-26510	SITE J (Core & Shell)	\$116,211,000	98%	5/31/13
C-26505	FINISHES & SYSTEMS	\$513,700,497	50%	6/9/14
C-26512	Site P (Core, Shell and Sys.)	\$83,886,000	4%	4/13/16
All construction contracts have been awarded				

Key Aspects of Successful Project Controls

To manage it you must measure it

Key Aspects of Successful Project Controls

- **Identify an breakdown project to measurable elements**
- **Estimate target quantities**
- **Develop baseline plan**
- **Compare plan vs actual**
- **Monitor progress / shortfall**
- **Adjust plan as needed**

Key Control Measures Implemented For Number 7 Line

- **Cost Control**
- **Change Control**
- **Schedule Control**
- **Document Control**
- **Quality Assurance/Control**
- **Safety**

Phases of Number 7 Line

- **Engineering Phase**
- **Construction Phase**
- **Testing and Commissioning Phase**

Controls During Engineering Phase

- **Drawings/Stages of Completion**
- **Control of Man-power by Discipline**
- **Cost Control**
 - **Estimating**
 - **Value Engineering**

Controls During Construction Phase

- **Engineering Support During Construction**
 - **Support by Design Consultant**
 - **In-house Engineering Support**
- **CPM and Non-CPM (EFA)**
- **TA Labor**
- **Support by Construction Management Consultant (CCM)**
- **Submittal Management and Controls**

Controls During Construction Phase

- **Construction**
 - **Cost Management**
 - **Time/Schedule Management**
 - **Progress Indicators**
 - **Quality**
 - **Safety**

COST CONTROL

Cost Control

- Develop Baseline Budget
- Develop Baseline Cash Flow
- Monthly Expenditure Tracking
- Track Actual against Plan
- Trend Analysis
- Forecast and “Estimate-At-Completion” (EAC)
- Look for Opportunities

Cost Reporting

- Monthly Progress Report
- Project Status Report (PSR)
- Management Information Tool System (MITS)
- Integrated Management of Payment Accounting and Capital Tracking (IMPACT)

6 Months Labor Distribution Report

3/4/2013 2:36:40 PM

By Job Controller / DM CM / Open PSE / Discipline / Assigned Area /Employee (Hrs)

Program Area : 7 West

Phase: 1 - 3

Construction Manager : Soliman, M.

Discipline : ALL

Aug 2012 Sep 2012 Oct 2012 Nov 2012 Dec 2012 Jan 2013

C-26505 Phase 3 Finish & Install Finishes & Systems

A-1A DESIGN ASSIST

D

7	DESIGN STAFF	LUONG, MINH KY (541364)	129.5	51.8	105.5	156.8	118.5	104.5
Elec-Adm	J. ESPOSITO	KOLKER, MIKHAIL (484531)	21.0	0.0	0.0	0.0	0.0	0.0
<i>Sub Total for A-1A DESIGN ASSIST</i>			150.5	51.8	105.5	156.8	118.5	104.5

A-2 ARCHITECTURAL

D

Arch-Chf	J. KUNOFF	KUNOFF, JUDITH (494018)	0.0	0.0	0.0	0.0	2.0	0.0
Arch-Prin	R. PALMIERI	PALMIERI, ROBERT (676121)	21.0	2.0	7.0	22.0	7.0	0.0
<i>Sub Total for A-2 ARCHITECTURAL</i>			21.0	2.0	7.0	22.0	9.0	0.0

A-4 MECHANICAL

D

L/E/F-Design	DESIGN STAFF	CONSTANTINIDES, EFSTATHIOS (171411)	28.0	56.0	35.0	80.3	62.5	17.5
STA-Designs	DESIGN STAFF	PATEL, VINOD (683529)	7.0	10.0	34.0	15.0	4.0	29.5
		WELLS, ALLISON (M37250)	7.0	14.0	0.0	0.0	0.0	0.0
Mech-Chf	D. IANNUZZI	DAWSON III, PAUL (206009)	21.0	7.0	0.0	5.0	0.0	7.0
		IANNUZZI, DONALD (424277)	14.0	17.0	17.0	17.0	7.0	14.0
Mech-Prin	R. MONTFORT	MONTFORT, ROBERT W. (618855)	18.0	34.0	24.0	17.0	19.0	3.0
Mech-Prin	P. TANG	TANG, PATRICK S. (878816)	0.0	14.0	21.0	7.0	28.0	28.0
Mech-Prin	J. G. SANCHEZ	SANCHEZ, JOSE G. (780018)	28.0	14.0	7.0	46.0	28.0	53.0
<i>Sub Total for A-4 MECHANICAL</i>			123.0	166.0	138.0	187.3	148.5	152.0

A-5 ELECTRICAL

D

L/E/F-Design	DESIGN STAFF	SCALISE, ENDRIO (786024)	7.0	0.0	14.0	14.0	0.0	0.0
		SAAVEDRA, MONICA E. (M16939)	0.0	0.0	0.0	14.0	0.0	0.0
		GEORGIADIS, KONSTANTINOS (M16948)	0.0	0.0	0.0	14.0	0.0	0.0

CONSTRUCTION STATUS REPORT

3/4/2013

C-26505	Finish & Install Finishes & Systems	Planning No: NE01-6834 MTA CAT:
	Program Manager: Kildare S. Design Manager: DiFiore, A. Construction Manager: Soliman, M.	

CPM charges as of: 1/25/2013 Non CPM charges as of: 12/28/2012 CONSULTANT charges as of: 2/8/2013

	CONSTR MGT (Hours)		DESIGN (Hours)		TOTAL (Hours)			GOAL	ACTUAL / FORECAST
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL			
PM STAFF	6,369	3,349	0	0	6,369	3,349	AWARD	08/10/11	08/10/11 A
DESIGN ASSIST.	0	35	5,313	2,057	5,313	2,092	SUBSTANT'L COMPLETE	06/08/14	06/09/14
ARCHITECTURAL	0	10	2,721	261	2,721	271	CLOSE - OUT	09/09/14	09/09/14
STRUCTURAL	0	223	156	7	156	230			
MECHANICAL	5,460	1,548	1,567	1,524	7,027	3,072			
ELECTRICAL	3,360	1,434	6,004	2,207	9,364	3,641			
POWER	600	123	2,187	1,154	2,787	1,277			
COMMUNICATION	0	51	17,662	5,254	17,662	5,305			
ESTIMATING	0	0	0	0	0	0			
SCHEDULING	0	22	0	0	0	22			
ENVIRONMENTAL	2,013	885	0	0	2,013	885			
COMMISSIONING	1,428	21	0	0	1,428	21			
SIGNALS	8,638	0	11,145	5,568	19,783	5,568			
QUAL ASSURANCE	0	0	0	0	0	0			
INTERNAL CNTL	0	0	0	0	0	0			
ADMIN STAFF	0	29	0	0	0	29			
CLERICAL	0	150	0	0	0	150			
INST/CONTROLS	3,055	0	9,850	1,673	12,905	1,673			
SURVEYS	603	267	272	274	875	541			
UTILITIES	0	0	0	0	0	0			
OTHER	1,439	197	0	0	1,439	197			
PRIOR YEARS	0	0	0	0	0	0			
TOTALS	32,965	8,344	56,877	19,979	89,842	28,322			

TOTAL	BUDGET (\$)	ACTUAL (\$)
	19,969,750	5,278,610
Consultant	0	0
Consultant IQ	11,348	10,781
EFA BUDGET	19,958,402	
Sav Goal	(0)	
Reserve	(342,224)	
TARGET	19,616,178	5,267,829
CPM	13,116,918	4,054,770
Non-CPM	6,499,260	1,213,059
CPM Target HRS	89,842	
Reserve HRS	2,344	
Hourly Rate	\$146	
Actual CPM Hourly Rate	\$143	

Program Title : 8635 - 7 West
Construction Manager : Soliman, M.

Phase: 3 - 3

Planned Hours vs Actuals Report A-2

Run Date: 3/11/2013

PSE : C-26505 - Finish & Install Finishes & Systems

NYC Transit
Capital Program Management

by individual PSE, indicating summarized Disciplines

Pay period : 1/25/2013

Discipline	Funct	PH		Prior Years	Nov12	Dec12	Jan13	Feb13	Mar13	Apr13	May13	Jun13	Jul13	Aug13	Sep13	Oct13	Nov13	Dec13	Jan14	PI To Date Tot Expd	PI To Go	Total PI % Expd
DESIGN ASSIST	D	3	PI	\$251,558	\$16,790	\$16,790	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$305,578	\$470,120	\$775,698
			Act	\$211,527	\$19,065	\$15,018	\$13,280													\$259,690		33.48%
ARCHITECTURAL	D	3	PI	\$32,830	\$2,190	\$2,190	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$20,002	\$57,232	\$340,034	\$397,266
			Act	\$34,402	\$3,944	\$1,731	\$0													\$40,076		10.09%
STRUCTURAL	D	3	PI	\$3,986	\$380	\$380	\$613	\$613	\$613	\$949	\$949	\$949	\$949	\$949	\$949	\$949	\$949	\$949	\$949	\$7,300	\$15,461	\$22,761
			Act	\$1,408	\$0	\$0	\$0													\$1,408		6.19%
MECHANICAL	D	3	PI	\$177,828	\$11,826	\$11,826	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$1,606	\$203,086	\$25,686	\$228,782
			Act	\$168,305	\$29,651	\$23,613	\$25,917													\$248,485		106.61%
ELECTRICAL	D	3	PI	\$438,000	\$29,200	\$29,200	\$22,484	\$22,484	\$22,484	\$22,484	\$22,484	\$22,484	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$518,884	\$367,700	\$886,584
			Act	\$252,553	\$33,643	\$20,770	\$14,259													\$321,225		36.65%
POWER	D	3	PI	\$138,954	\$10,658	\$10,658	\$12,264	\$12,264	\$12,264	\$10,220	\$10,220	\$10,220	\$10,220	\$10,220	\$10,220	\$10,220	\$10,220	\$10,220	\$10,220	\$172,134	\$147,168	\$319,302
			Act	\$123,484	\$21,572	\$15,310	\$8,473													\$168,839		52.88%
COMMUNICATIONS	D	3	PI	\$609,112	\$43,508	\$43,508	\$122,640	\$122,640	\$122,640	\$122,640	\$122,640	\$122,640	\$122,640	\$122,640	\$122,640	\$112,420	\$112,420	\$112,420	\$102,200	\$818,788	\$1,759,884	\$2,578,672
			Act	\$493,884	\$38,220	\$47,660	\$57,950													\$637,490		24.72%
SIGNALS	D	3	PI	\$667,930	\$44,530	\$44,530	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$51,100	\$808,110	\$819,060	\$1,627,170
			Act	\$612,780	\$56,802	\$47,611	\$51,287													\$768,459		47.23%
INST & CONTROL	D	3	PI	\$201,188	\$15,476	\$15,476	\$40,880	\$40,880	\$40,880	\$71,540	\$71,540	\$71,540	\$71,540	\$71,540	\$71,540	\$81,760	\$81,760	\$81,760	\$81,760	\$273,020	\$1,165,080	\$1,438,100
			Act	\$200,413	\$21,576	\$11,891	\$12,288													\$246,168		17.12%
SURVEYS	D	3	PI	\$34,427	\$2,628	\$2,628	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$39,712	\$0	\$39,712
			Act	\$31,262	\$0	\$0	\$0													\$31,262		78.72%
Total By Function:	D		PI	\$2,557,453	\$177,186	\$177,186	\$292,029	\$292,029	\$292,029	\$320,981	\$320,981	\$320,981	\$318,937	\$318,937	\$318,937	\$318,937	\$318,937	\$318,937	\$308,717	\$3,203,824	\$5,100,203	\$8,304,027
			Act	\$2,130,777	\$225,274	\$183,602	\$183,454													\$2,723,107		32.79%
PM STAFF	I	3	PI	\$387,630	\$25,842	\$25,842	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$20,440	\$459,754	\$470,120	\$929,874
			Act	\$489,867	\$53,010	\$55,418	\$46,214													\$644,509		69.31%
DESIGN ASSIST	I	3	PI																			
			Act	\$4,356	\$0	\$0	\$0													\$4,356		
ARCHITECTURAL	I	3	PI																			
			Act	\$1,491	\$0	\$0	\$0													\$1,491		
STRUCTURAL	I	3	PI																			
			Act	\$28,968	\$597	\$2,161	\$621													\$32,366		



Cost Control

(D) - Design (I) - Const Mgr

Menu : \Reports\Graphs \Actuals \Planned Hours vs Actuals

1 of 3

C-26505

Finish & Install Finishes & Systems

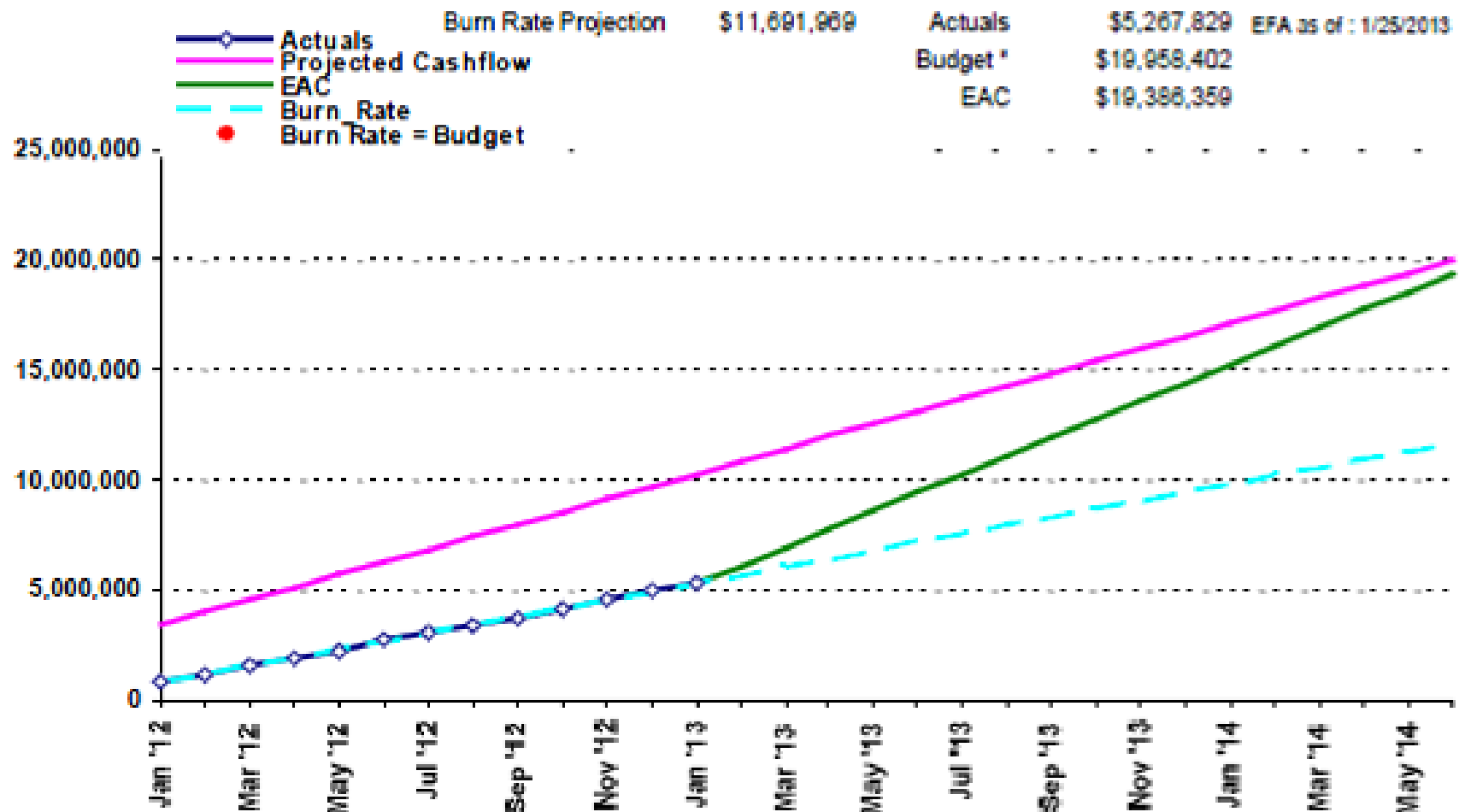
Plan No: NE01-6834

Constr Mgr: Soliman, M.

Dsn Mgr: DiFiore, A.

Construction

EFA/TA Labor

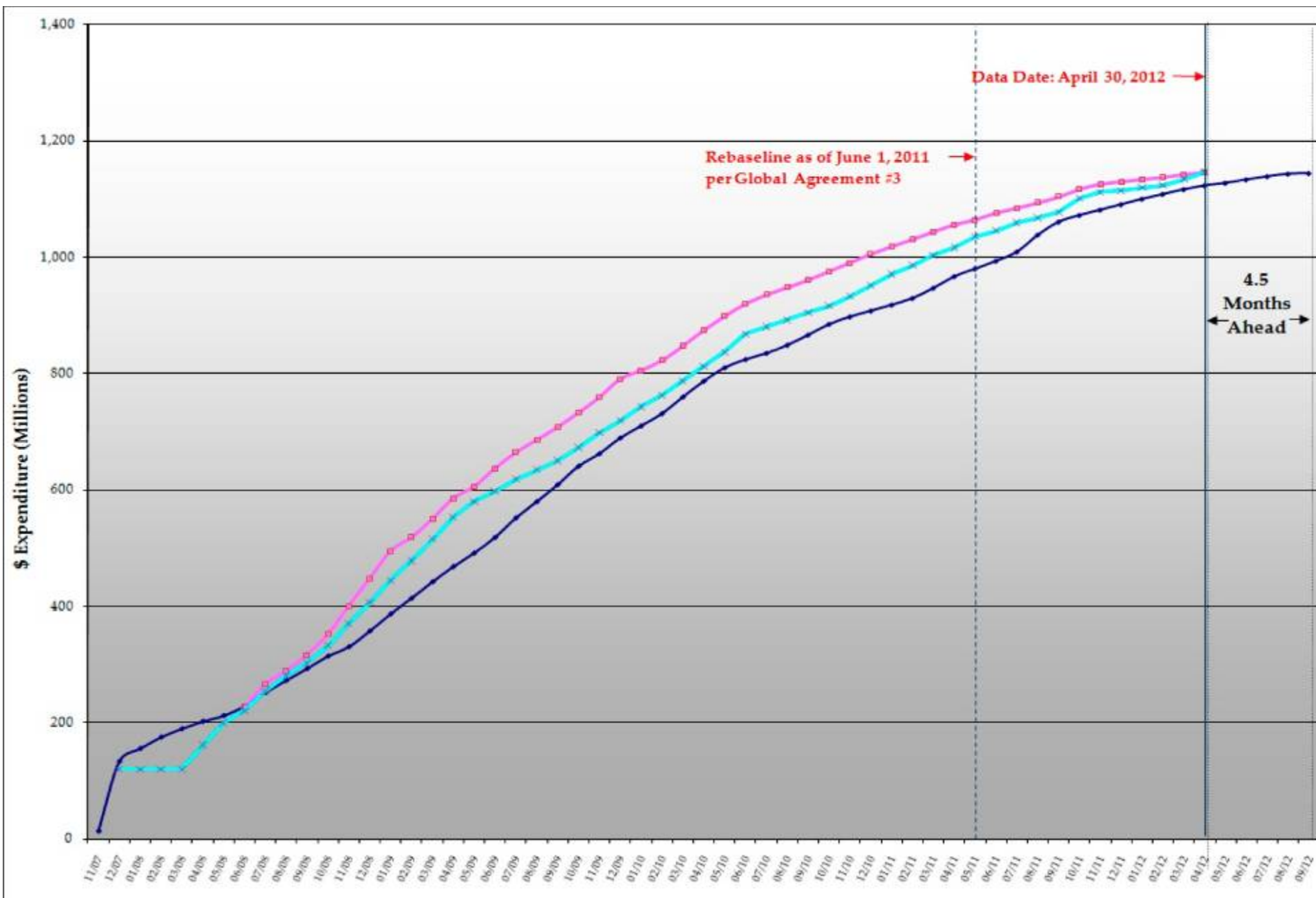


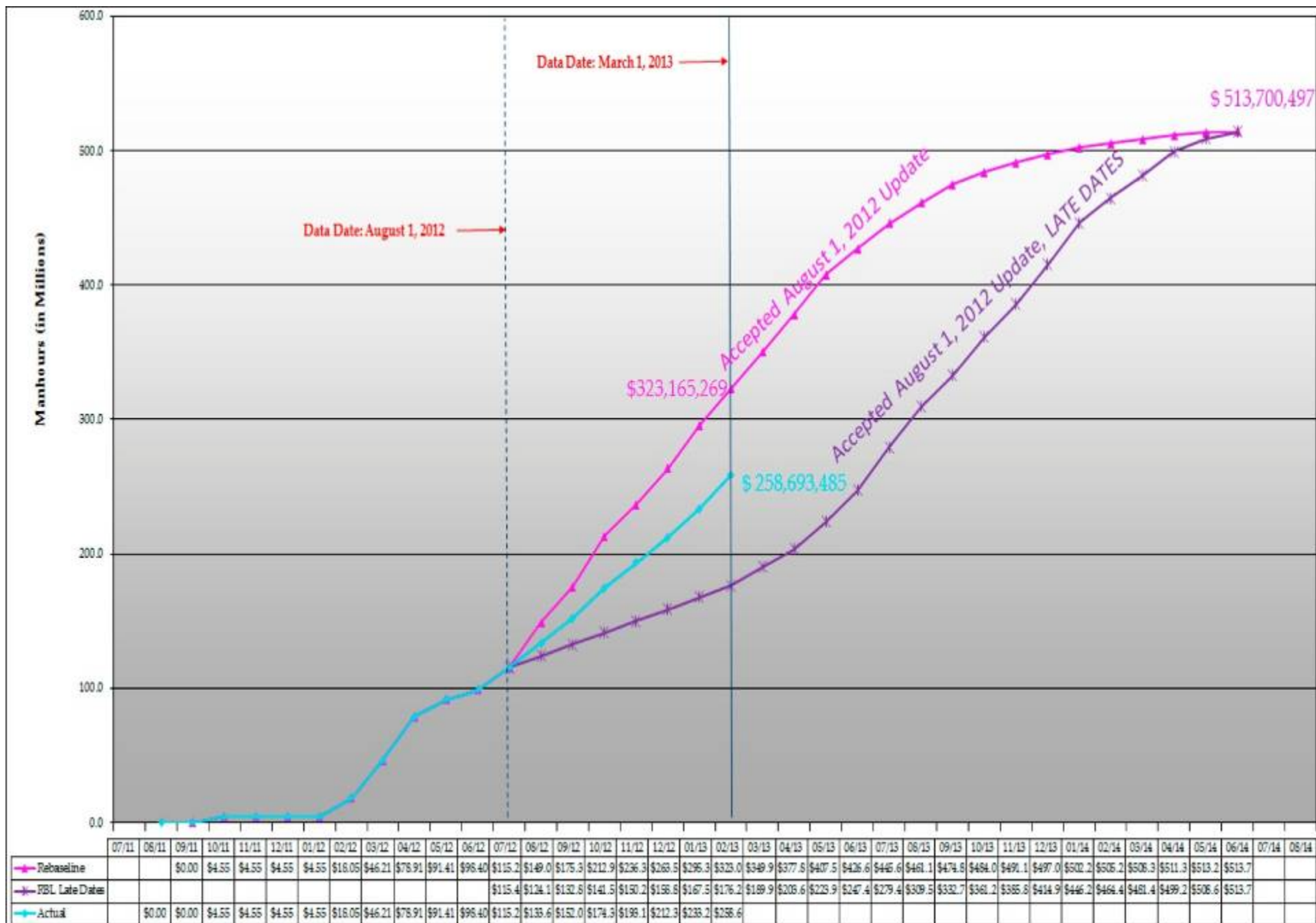
In-house Construction Administration February-13

(* Without Contingency)

EFA BUDGET ANALYSIS

			3 MOS								FORECAST	BURN RATE	
BUDGET			Nov-12	Dec-12	Jan-13	MONTHLY	MONTHS	REMAINING	Mos TO	BURN RATE	CURRENT	SURPLU S/	SURPLUS/
											FORECAST	SHORTFALL	SHORT FALL
IN HOUSE CONSTRUCTION MGMT													
C-26504	\$965,128	CUM COST INCR COST	\$1,060,876 \$2,542	\$1,065,055 \$4,179	\$1,076,351 \$11,296	\$6,006	3.0	(\$111,223)		\$1,094,368	\$1,070,000	(\$104,872)	(\$129,240)
C-26511	\$379,993	CUM COST INCR COST	\$354,296 \$6,103	\$357,575 \$3,279	\$361,625 \$4,050	\$4,477	2.0	\$18,368 \$9,184	4.1	\$370,580	\$370,175	\$9,818	\$9,413
C-26510	\$914,953	CUM COST INCR COST	\$932,067 \$15,556	\$958,560 \$26,493	\$970,134 \$11,574	\$17,874	7.0	(\$55,181)		\$1,095,254	\$1,264,910	(\$349,957)	(\$180,301)
C-26505	\$19,958,402	CUM COST INCR COST	\$4,461,858 \$423,952	\$4,830,217 \$368,359	\$5,267,829 \$437,612	\$409,974	20.0	\$14,690,573 \$734,529	35.8	\$13,467,316	\$18,736,034	\$1,222,368	\$6,491,086
C-26512	\$2,771,069	CUM COST INCR COST	\$31,541 \$15,076	\$47,301 \$15,760	\$61,845 \$14,544	\$15,127	41.0	\$2,709,224 \$66,079	179.1	\$682,038	\$3,595,731	(\$824,662)	\$2,089,031
C-26509 IH	\$4,756,651	CUM COST INCR COST	\$1,154,437 \$71,852	\$1,325,934 \$171,497	\$1,380,847 \$54,913	\$99,421	41.0	\$3,375,804 \$82,337	34.0	\$5,457,094	\$5,412,240	(\$655,589)	(\$700,443)
C-26509 HQ	\$4,159,952	CUM COST INCR COST	\$1,467,889 \$73,551	\$1,541,440 \$73,551	\$1,614,991 \$73,551	\$73,551	41.0	\$2,544,961	34.6	\$4,630,582	\$4,950,546	(\$790,594)	(\$470,630)
C-26509 IQS	\$1,638,672	CUM COST INCR COST	\$557,697 \$0	\$603,629 \$45,932	\$613,466 \$9,837	\$18,590	11.0	\$1,035,043 \$94,095	55.7	\$808,115	\$2,336,087	(\$697,415)	\$830,557
TOTAL	\$48,354,171	CUM COST INCR COST	\$21,824,937 \$623,487	\$22,539,833 \$714,896	\$23,147,199 \$607,366	\$648,583		\$25,206,972		\$39,405,459	\$49,548,983	(\$1,194,812)	\$8,948,712





Performance Indicators

	BUDGET		CURRENT FORECAST		INDUSTRY STANDARD
	AMOUNT	PERCENT	AMOUNT	PERCENT	
Design / Construction	\$134M/\$2.03B	6.6%	\$135M/\$2.02B	6.6%	8-10%
DSDC / Construction	\$11.5M/\$2.03B	0.6%	\$20.8M/\$2.02B	1.0%	1-2%
CM / Construction	\$133.8M/\$2.03B	6.6%	\$136.7M/\$2.02B	6.7%	8-10%
AWOs and Contingency / Construction	\$104.7M/\$2.03B	5.1%	\$43.9M/\$2.02B	2.2%	5-10%

Performance Indicators - February 2013

The following progress indices are based on February 2013 progress schedule (C26505.Upd11):

Performance by Man-Hours:		PER REBASELINE (C26505.UPD4)	PER LATEST UPDATE (C26505.UPD11)	Unit
1	Total Man-hours in the approved schedule	1,478,638	1,478,638	Hrs
2	Total Man-Hours Planned	772,952	N/A	Hrs
3	% Man-Hours Planned	52.3%	N/A	%
4	Total Man-hours earned as of 3/01/2013	N/A	586,588	Hrs
5	%Man-Hours Earned	N/A	39.7%	%
6	Man-Hours Spent (as per certified payroll)	N/A	591,718	Hrs
7	% Man-hours spent	N/A	40.0%	%
Performance by Time:		PER REBASELINE (C26505.UPD4)	PER LATEST UPDATE (C26505.UPD11)	Unit
1	Duration Of Project	1,042	1,108	Day
2	Time Currently Elapsed Since NTP (as of 3/01/2013)	570	570	Day
3	% Time Elapsed	54.7%	51.4%	%
Performance by Revenue:		PER REBASELINE (C26505.UPD4)	PER LATEST UPDATE (C26505.UPD11)	Unit
1	Total Contract Value	\$513,700,497	\$513,700,497	\$
2	Planned Payments to-date	\$323,165,269	N/A	\$
3	% Planned Payments To-date	62.9%	N/A	%
4	Earned to-date	N/A	\$241,965,016	\$
5	% Earned To-date	N/A	47.1%	%
6	Actual Payments To- Date	N/A	\$258,693,485	\$
7	% Paid To-Date	N/A	50.4%	%

Performance Indicators - February 2013

ID	LOCATION / SITE	BUDGETED	PLANNED	%	ACTUAL	%	UNIT
SITE A							
4.11 & 5.11	Civil Work - Concrete	2,012	227	100%	227	100%	CY
7.2	Masonry Work	16,643	2,678	16%	1,032	6%	SF
8.2.2.6	HVAC Work - Duct Installation	2,500	0	0%	0	0%	LF
8R.1.2	Fire Standpipe	600	0	0%	304	51%	LF
9.2	Electrical Work - Conduit & Wire	172,880	13,360	10%	0	0%	LF
12.2C	Communication Work - Conduit & Cable	52,100	4,909	26%	735	9%	LF
34th STREET STATION							
5.4	Civil Work - Concrete	873	873	100%	866	99%	CY
7.3	Masonry Work	51,217	51,217	100%	49,601	97%	SF
8.2.2.2	HVAC Work - Duct Installation	14,500	12,134	84%	12,600	87%	LF
8R.1.6	Fire Standpipe	3,200	3,200	100%	3,025	95%	LF
9.4	Electrical Work - Conduit & Wire	536,425	206,035	38%	88,407	16%	LF
12.4	Communication Work - Conduit & Cable	232,490	119,097	51%	36,451	16%	LF
17R.2	Traction Power Work - Conduit & Cable	50,100	680	1%	650	1%	LF
SITE J							
5.5	Civil Work - Concrete	1,488	1,301	87%	1,030	69%	CY
7.4	Masonry Work	103,765	96,903	93%	80,264	77%	SF
8.2.2.3	HVAC Work - Duct Installation	13,500	586	4%	3,869	29%	LF
8R.1.5	Fire Standpipe	4,300	0	0%	3,063	71%	LF
9.3	Electrical Work - Conduit & Wire	710,520	174,241	25%	223,699	31%	LF
12.3	Communication Work - Conduit & Cable	301,530	75,200	25%	28,240	9%	LF
RUNNING TUNNELS							
5.8	Civil Work - Concrete	13,519	13,519	100%	13,519	100%	CY
7.6	Masonry Work	13,458	4,730	35%	13,458	100%	SF
8.1.1	Tunnel Ventilation - Ductwork	3,000	696	23%	1,611	54%	LF
8R.1.1	Fire Standpipe	13,600	13,371	98%	12,894	95%	LF
11R.1	Furn & Inst. Fiber Optic Inner Duct	50,400	46,680	93%	50,400	100%	LF
11R.3	Furn & Inst Fiber Optic Cable (all sizes)	65,000	16,132	25%	17,166	26%	LF
17R.5	Furnish Traction Power Cables	106,520	63,160	59%	69,920	66%	LF
17R.6	FRE Conduits In Ducts and Racks On Ceiling or Wal	922,600	814,783	88%	920,518	100%	LF

CHANGE CONTROL

Change Control

Contingency

- Establish Contingency
 - Project Reserve
 - Reserve for Change Orders (Additional Work Orders or AWOs)
- Track changes, Negotiate changes with Contractors
- Review Contingency Remaining and Re-allocate

SCHEDULE CONTROL

Schedule Control

- Integrated Project Schedule (IPS)
- Scheduling Requirements and Specifications
- Preliminary CPM Schedule
- Baseline Schedule
- Testing & Commissioning Schedule
- Cost and Resource Loading of Schedules
- Schedule Update Cycle
- Identify Critical path and near critical paths
- Identify delays and potential delays

Schedule Control

- Time Impact Analysis
- Delay Mitigations
- Identify Opportunities and Implement
- Measure Progress based on Physical percent complete and Earned Value.
- “What-if” contracting and construction scenarios
- Utilization of BIM (4 Dimensional modeling)

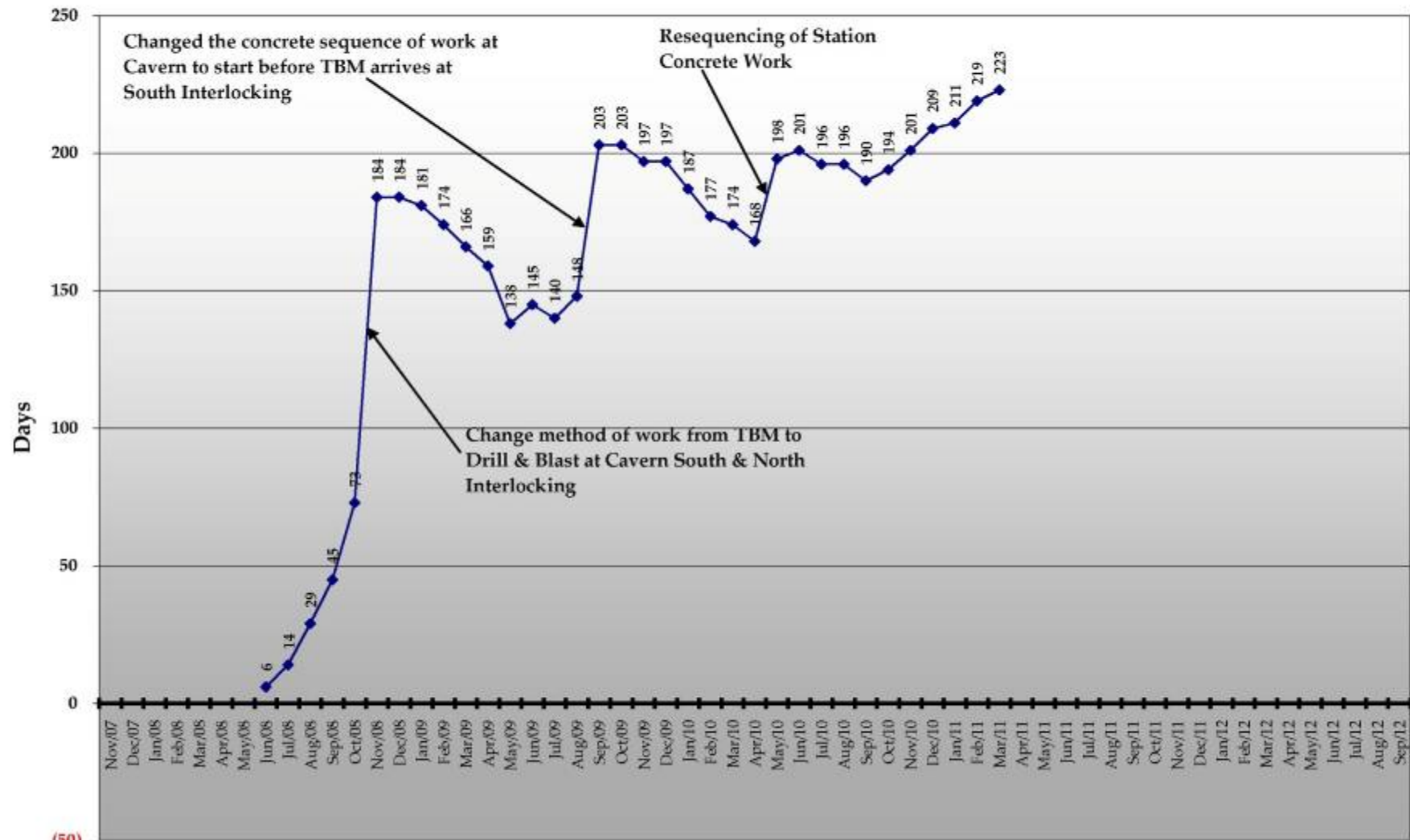
Scheduling Specifications

- Timeline for Development of Baseline Schedule
- Scheduling software
- Cost Loaded Schedule
- Resource Loaded Schedules
 - Labor
 - Material
- Schedule Update Cycle
- Schedule Re-baseline
- Use of Float
- Link Payment to Schedule Submission
 - Detail Cost Breakdown (DCB)
 - Earned Value

Construction of Running Tunnels and Station Structures
 Number 7 (Flushing) Line Extension - "A" Division (IRT)
 Borough of Manhattan



Total Float Trend



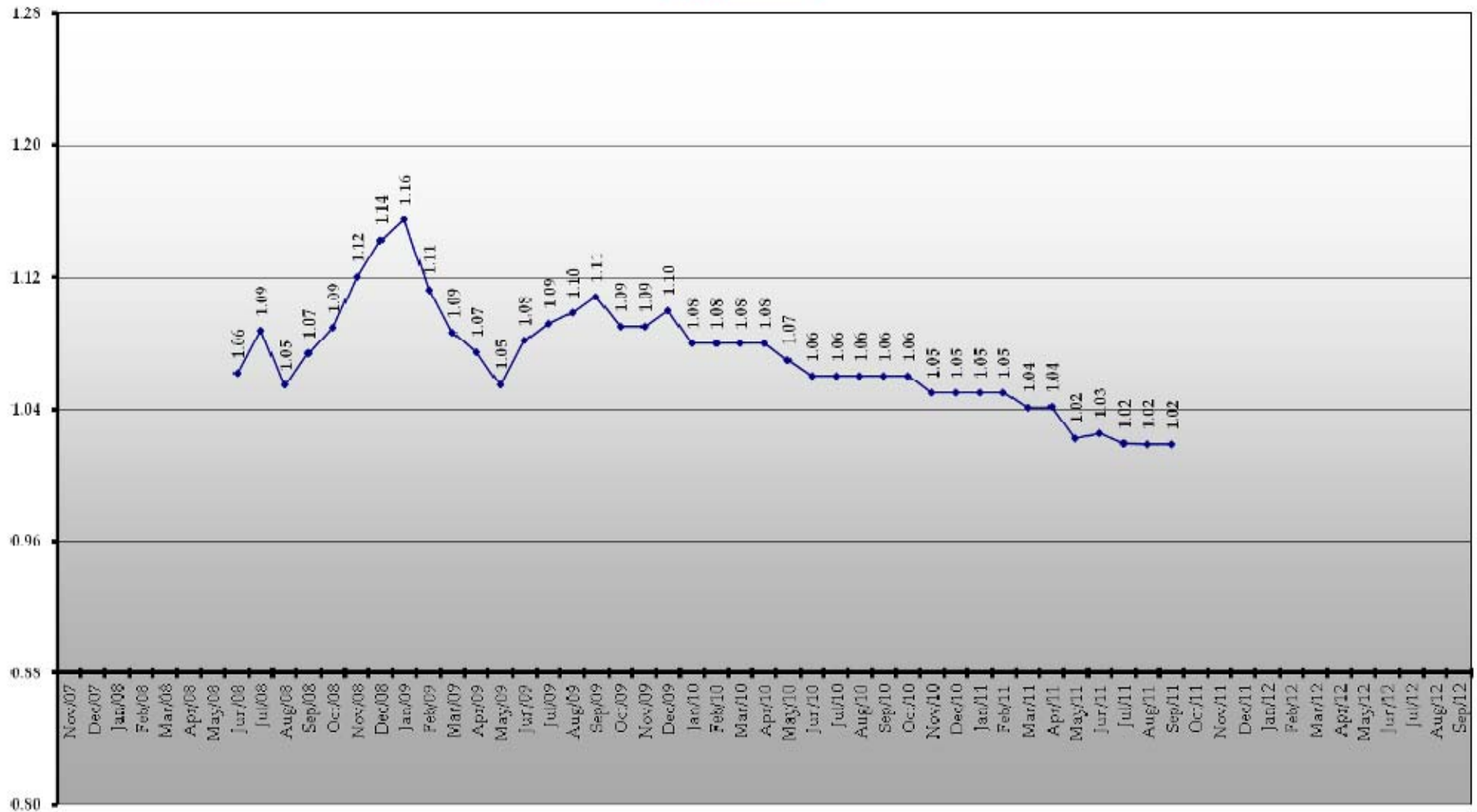
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Construction of Running Tunnels and Station Structures
Number 7 (Flushing) Line Extension - "A" Division (IRT)

Borough of Manhattan

Cost Performance Index (CPI)

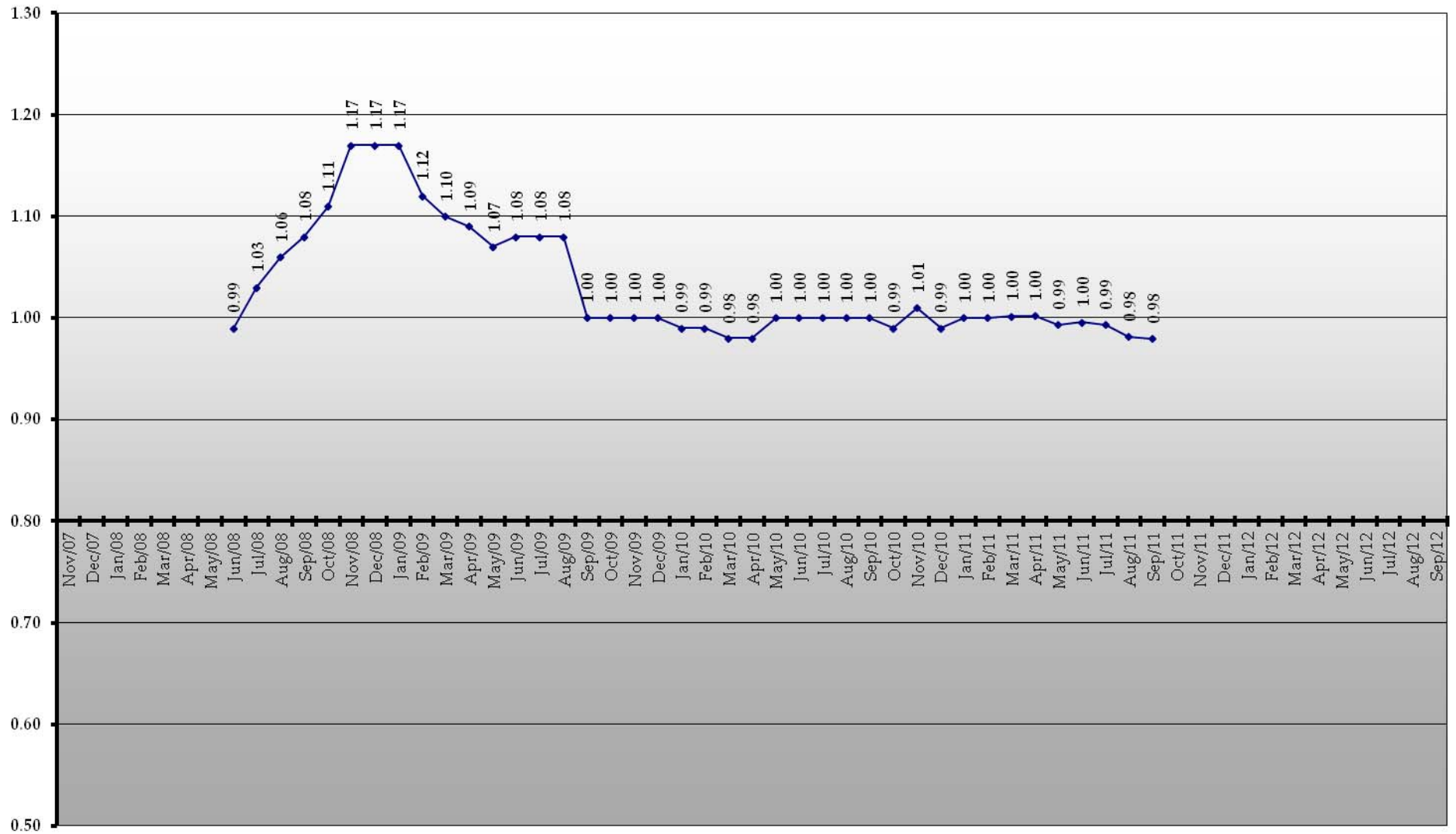
Expenditure



Construction of Running Tunnels and Station Structures
 Number 7 (Flushing) Line Extension - "A" Division (IRT)
 Borough of Manhattan

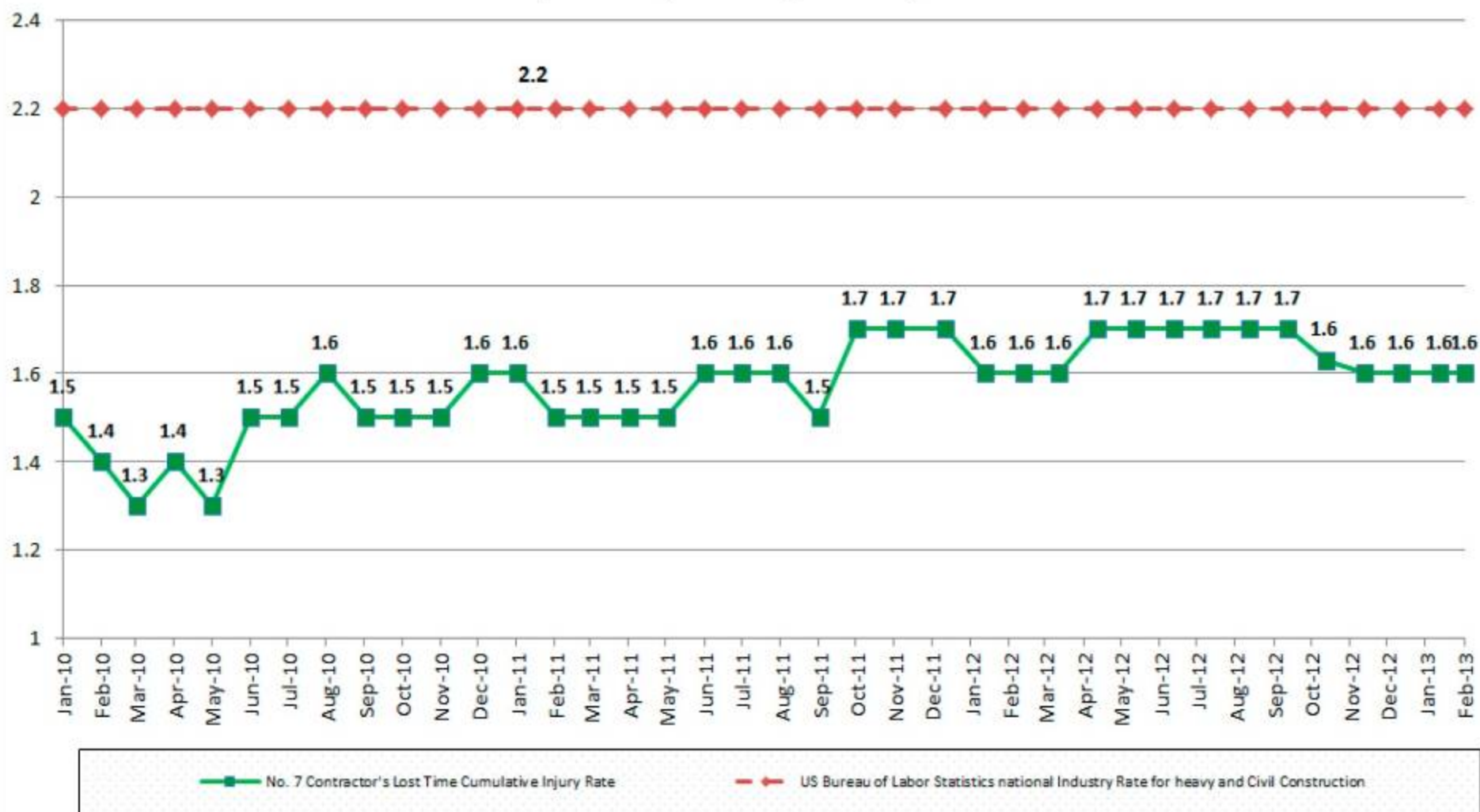


Schedule Performance Index (SPI)
Expenditure



SAFETY

7 Line Ext. Lost Time Injury Rate **2011 thru 2012 Overall No. 7 Line Extension Project** **Contracts C-26503, C-26504, C-26505, C-26510, C-26511 and C-26512**



Note:

Lost Time Injury Rate = Number of Injuries per 100 Full Time Workers
 = $\frac{\text{Number of Injuries} \times 200,000(1)}{\text{Total Hours by all Employees}}$

(1) Base for 100 equivalent full-time workers, working 40 hours/week for 50 weeks/yr

LTA 2010 - 09

LTA 2011 - 13

LTA 2012 - 11

Thank you