





PRESENTATION OUTLINE

- Electrical connection to CHP
- BIM and Facility Management Integration
- Conclusion and Recommendations



AFTER

PR	SENTATION OUTLINE	PROJEC
	Structural Lateral Bracing	
	Structural Loads	
	Computer Model	
	Conclusion and Recommendations	Location :
	Electrical Connection to CHP	Function:
-	Electrical Loads	➢ Size: 54,64
-	Electrical Equipment	Stories: 6
	Conclusion and Recommendations	Construct
	Matrix Schedule	Project De
	Create Zones	
	Create Matrix Schedule	PROJECT TI
	Conclusion and Recommendations	Contractor:
	BIM and Facility Integration	Architect: M
	Conclusion and Recommendations	Structural : F MEP: FMC A

T OVERVIEW

PROJECT OVERVIEW

- New York City, NY
- Office building and theatre
- 40 Square Feet
- levels
- tion Schedule: August 2008- July 2010 elivery: Fast track with CM At Risk
- EAM:
- SKANSKA
- IA Architects
- Robert Silman Assoc.
- ssociates





Google

PR	ESENTATION OUTLINE	PROJEC
	Structural Lateral Bracing	STRUCTUR
	Structural Loads	10" DEEP I
	Computer Model	COLUMINS
	Conclusion and Recommendations	
	Electrical Connection to CHP	
	Electrical Loads	GRANITE B
	Electrical Equipment	MASONRY
	Conclusion and Recommendations	GLASS CUP
	Matrix Schedule	IERACCOL
	Create Zones	
	Create Matrix Schedule	ELECIRICA
	Conclusion and Recommendations	208Y/120V, 3
	BIM and Facility Integration	
	Conclusion and Recommendations	MECHANIC/ HW/CW SUF

T OVERVIEW

AL SYSTEM: WO-WAY FLAT PLATE FLOOR SLAB

24° X 24°

ENCLOSURE: ASE **BRICK WITH CMU BACKUP** RTAIN WALL **A CROWN**

AL SYSTEM: **3-PHASE**

AL SYSTEM: PPLIED BY CENTRAL UTILITY PLANT

PROJECT OVERVIEW





DR	FSENITATION OUTI INF	
	Project Overview	
	Structural Lateral Bracing	
	Structural Loads	
	Computer Model	
	Conclusion and Recommendations	
	Electrical Connection to CHP	
	Electrical Loads	
	Electrical Equipment	S
	Conclusion and Recommendations	
	Matrix Schedule	
	Create Zones	
	Create Matrix Schedule	
	Conclusion and Recommendations	
	BIM and Facility Integration	
	Conclusion and Recommendations	

STRUCTURAL BRACING

 Computer Model 	
Conclusion and Recommendations PROBLEM	:
Electrical Connection to CHP The original connection to CHP	inal t
Electrical Loads The original sectors in the sector of the sec	inal t
Electrical Equipment	
Conclusion and Recommendations	
Matrix Schedule	
 Create Zones 	
Create Matrix Schedule	
Conclusion and Recommendations	
BIM and Facility Integration	
Conclusion and Recommendations	

ding 33,000 SF since 1918

theater to remain

wo story k-bracing increased site congestion two story k-bracing was only used temporary



STRUCTURAL BRACING GOALS Increase productivity on site by reducing site congestion >Use the light wt. bracing for temporary shoring of the concrete Slah EXISTING BUILDING PROPOSED BUILDING 133 – 139 MacDougal 133 – 139 MacDougal Current Theater Shaded in Blue Theater Volume and Footprint Remain as Shaded in Blue EXISTING BUILDING SHOWING THEATER (SHADED) PROPOSED BUILDING SHOWING THEATER TO REMAIN (SHADED



PR	ESENTATION OUTLINE Project Overview	S	TRUCT
	Structural Lateral Bracing		
	Structural Loads	W	IND LOADS:
	Computer Model	F	=q _z GC _f A _f (lb)(N
	Conclusion and Recommendations Electrical Connection to CHP	S	ELF WEIGHT:
	Electrical Loads	I	pe wi monar tr
	Electrical Equipment	С	
	Conclusion and Recommendations	D	=1.2DL+1.6W
	Matrix Schedule		5
	Create Zones		
	Create Matrix Schedule		
	Conclusion and Recommendations		≻Structural
	BIM and Facility Integration		Loads
	Conclusion and Recommendations		

)=0.0171ksf

hree coarses thick brick=2klf

G LOAD COMBINATION:



STRUCTURAL BRACING



Pressure - Shells

0.0171[Kip/ft2]

0.0171[Kip/ft2]

Z.

	ESENTATION OUTLINE Project Overview Structural Lateral Bracing Structural Loads	S M 0.	OMENT CAPA 88 kip*ft/ft
	Computer Model	Μ	
-	Electrical Connection to CHP	3.	91 kip*ft/ft
•	Electrical Loads	M	OMENT OF M
	Electrical Equipment	0.	8kip*ft/ft
	Conclusion and Recommendations		
	Matrix Schedule	D	EFLECTION:
	Create Zones	L/	'240=0.85in
	Create Matrix Schedule		
	Conclusion and Recommendations	M	
	BIM and Facility Integration	0	.33IN
	Conclusion and Recommendations		
			Structural Loads

ACITY OF MASONRY WALL:

OUT BRACING:

ASONRY WITH BRACING:

MUM DEFLECTION:



STRUCTURAL BRACING





Internal forces Shells [Kip*ft/ft] 0.80 0.70 0.70 0.59 0.48 0.27 0.17 0.06

> -0.15 -0.26 -0.36 -0.47 -0.57 -0.68 -0.78



• Church to the locate line



0.50 0.41 0.23 0.14 0.05 -0.04 -0.13 -0.22 -0.31 -0.41 -0.59 -0.68 -0.77 -0.8

RAM Structural

• Structural Analysis and

RAM ELEMENTS

 Design masonry, wood, CFMF/LGMS Analysis and Design Toolkit

PR	ESENTATION OUTLINE	S	TRUCT
	Project Overview	\sim	
	Structural Lateral Bracing	N	ATERIAI TAK
	Structural Loads		<u> 3x3x3/16</u>
	Computer Model		L 5x5x5/16
	Conclusion and Recommendations		MC 6x12
	Electrical Connection to CHP		W6x9
	Electrical Loads		
	Electrical Equipment	C	OST
	Conclusion and Recommendations	\$;	32,000
	Matrix Schedule	C	
	Create Zones	Э Л	CHEDULE Original 18 0 d
	Create Matrix Schedule		Alternative 25
	Conclusion and Recommendations		
	BIM and Facility Integration		
	Conclusion and Recommendations		Structural
			Loads

EOFF WITH RAM ELEMENTS



STRUCTURAL BRACING



PR	ESENTATION OUTLINE Project Overview	STRUCT
	Structural Lateral Bracing	
	Structural Loads	
	Computer Model	Decreased site
	Conclusion and Recommendations	Decreased requ
	Electrical Connection to CHP	
	Electrical Loads	ISADVANTAGE
	Electrical Equipment	Increased steel
	Conclusion and Recommendations	
	Matrix Schedule	
	Create Zones	
	Create Matrix Schedule	
	Conclusion and Recommendations	
	BIM and Facility Integration	
	Conclusion and Recommendations	Structural Loads

STRUCTURAL BRACING



l installation time







PR	ESENTATION OUTLINE	
	Project Overview	
	Structural Lateral Bracing	
	Structural Loads	
	Computer Model	
	Conclusion and Recommendations	
	Electrical Connection to CHP	
	Electrical Loads	
	Electrical Equipment	
	Conclusion and Recommendations	ELECI
	Matrix Schedule	
	Create Zones	
	Create Matrix Schedule	
	Conclusion and Recommendations	
	BIM and Facility Integration	
	Conclusion and Recommendations	

RICAL CHP CONNECTION

PR	ESENTATION OUTLINE	ELECTR
	Structural Lateral Bracing	BACKGROUND
	Structural Loads	Three steam
	Computer Model	Emergency e
•	Conclusion and Recommendations	Connected to
	Electrical Connection to CHP	Currently Pro
	Electrical Loads	
	Electrical Equipment	PROBLEM :
	Conclusion and Recommendations	➢Project X is n
	Matrix Schedule	Rising electri
	Create Zones	GOALS
	Create Matrix Schedule	Reduce peak
	Conclusion and Recommendations	Identify finan
	BIM and Facility Integration	
	Conclusion and Recommendations	

RICAL CHP CONNECTION

):

turbines producing a total of 13.4 MW

lectrical power to 18 University's buildings o 40 cw/hw Universit's buildings

pject X is connected to CHP's Plant cw/hw piping

not connected to CHP electrical supply icity costs

demand electrical lo ncial incentives in Nev



ELECTRICAL CHP CONNECTION



4

PR	ESENTATION OUTLINE Project Overview	ŀ	ELECTR
	Structural Lateral Bracing		
	Structural Loads		
	Computer Model		
	Conclusion and Recommendations		FCTRICAL L
	Electrical Connection to CHP		
	Electrical Loads		Fauest
	Electrical Equipment		Takes into
	Conclusion and Recommendations		Summer p
	Matrix Schedule		
	Create Zones		
	Create Matrix Schedule		
	Conclusion and Recommendations		
	BIM and Facility Integration		
	Conclusion and Recommendations		➤Electrical
			LOAds

ICAL CHP CONNECTION

ELECTRICAL CHP CONNECTION

OADS:

o account cw/hw chp plant peak electrical load 330 kW





Area Lighting Task Lighting Misc. Equipment Exterior Usage



Pumps & Aux. Ventilation Fans Water Heating Ht Pump Supp.



Space Heating Refrigeration Heat Rejection Space Cooling 4

PR	ESENTATION OUTLINE Project Overview	e	ECTRICAL
	Structural Lateral Bracing Structural Loads		Woodward SF
	Computer Model Conclusion and Recommendations Electrical Connection to CHP Electrical Loads Electrical Equipment Conclusion and Recommendations Matrix Schedule Create Zones Create Matrix Schedule Conclusion and Recommendations BIM and Facility Integration Conclusion and Recommendations	G A Is	Woodward 23 enerator GE 100kVA tra > Δ 13.8kVA Circuit breake = $\frac{kVA}{kV_{secondary}}$ x 1.25 = $\frac{10}{0.2}$

EGRENT CHP CONNECTION

PM-D21

301D Load sharing and speed control for

- ansformer to 208Y/120
- ers, conductors, conduit

 $Ip = \frac{KVA}{KV_{primary}\sqrt{3}} \times 6 = \frac{100KVA}{13.8KV\sqrt{3}} = 25 A$ $\frac{00kVA}{208kV\sqrt{3}} \times 1.25 = 347A$



ELECTRICAL CHP CONNECTION

SPM-D21/PSVX



Figure 3-2: Wiring diagram SPM-D21/PSVX

Synchronizing Unit





100kVA \(13.8 to) 208Y/120V 2 SETS OF (3)#2/0 & #2G IN 2" C (3)#6 IN 1-1/4"C $\leftarrow O -$

PRESENTATIO Project Overview	N OUTLINE	ELECTR
Structural Lateral Brack	ing	SYSTEM COST
 Structural Loads Computer Model Conclusion and Record Electrical Connection to Electrical Loads Electrical Loads Electrical Equipment Conclusion Matrix Schedule 	nmendations to CHP	>\$25,000 INCENTIVES: > Con Edison's > Program activ > Summer p > System cr
 Create Zones Create Matrix Schedul Conclusion and Reco BIM and Facility Integr Conclusion and Recor 	e mmendations ation nmendations	Con Edison Cor
		Loads

RICAL CHP CONNECTION

ELECTRICAL CHP CONNECTION

Commercial System Relief Program
vated by Con Edison during:
eak days

ritical situation

Annual Savings	
Peak Demand	\$6,517.05
mmercial System Relief Program	\$1,650.00
Total	\$8,167.05

➢Results



	Demand &	System	
Year	Incentives	Cost	Payback
	\$8,167.05	24617	-\$16,449.95
	\$14,684.10	24617	-\$9,932.90
	\$\$21,201.15	24617	-\$3,415.85
	\$27,718.21	24617	\$3,101.21
Ľ	\$\$34,235.26	24617	\$9,618.26
ť	\$40,752.31	24617	\$16,135.31
-	\$47,269.36	24617	\$22,652.36
8	\$53,786.41	24617	\$29,169.41
<u> </u>	\$60,303.46	24617	\$35,686.46
10	\$66,820.52	24617	\$42,203.52
11	\$73,337.57	24617	\$48,720.57



PRESENTATION OUTLINE Project Overview

- Structural Lateral Bracing
- Structural Loads
- Computer Model
- Conclusion and Recommendations
- Electrical Connection to CHP
- Electrical Loads
- Electrical Equipment
- Conclusion and Recommendations
- Matrix Schedule
- Create Zones
- Create Matrix Schedule
- Conclusion and Recommendations
- BIM and Facility Integration
- Conclusion and Recommendations

PR	ESENTATION OUTLINE Project Overview	MATRIX
	Structural Lateral Bracing	
	Computer Model Conclusion and Recommendations Electrical Connection to CHP	The undergree masonry const
	Electrical Loads Electrical Equipment	PROBLEM :
	Conclusion and Recommendations Matrix Schedule Create Zones	Project delays
	Create Matrix Schedule Conclusion and Recommendations BIM and Facility Integration	
	Conclusion and Recommendations	

SCHEDULE

ound utilities work was scheduled after the truction

vs caused u/g utilities to final month of project

MATRIX SCHEDULE

GOALS

of the project





Re-sequence the under ground utilities during the demolition

Stage	2				Stag	e 3					Stage 4	1
Jul 09	Aug 09	Sep 09	Oct 09	Nov 09	Dec 09	Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10
								-				
Exc	avation	Mat Slab Fnd Wal. SOG										
			Cellar Column Basement 1st Slab					1				
				2nd Slab 3rd Slab 4th Slab 5th Slab								
				Remove Playhouse Bracing	6th Slab							
				Basement	Roof Slab							<u> </u>
			3	Perim. 1st Perim.								
					2nd Perim. 3rd Perim.	4th Perim.						
						5th Perim. 6th Perim.	Front	-				
_							Elevation					
				Cellar Interi Basement Ir	Interior Fitout						-	
					2nd Floor I 3rd Floor Ir	nterior Fitou nterior Fitou	ut t					
					4th Floor Ir	Sth Floor In	t nterior Fitou	ut				
						6th Floor Interior Fitout						

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- Structural Lateral Bracing
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- Create Matrix Schedule
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- Conclusion and Recommendations





PR	ESENTATION OUTLIN Project Overview	E		MATRIX
	Structural Lateral Bracing Structural Loads			
	Computer Model Conclusion and Recommendations Electrical Connection to CHP Electrical Loads Electrical Equipment Conclusion and Recommendations			 Stage 1: UND Stage 2: EXC Stage 3: CAS
•	Matrix Schedule Create Zones Create Matrix Schedule		KEY DUMP TRUCK/MATERIAL DELIVERY MATERIAL DELIVERY	INTERIOR FIT-0
	BIM and Facility Integration Conclusion and Recommendations		CRANE OVERHEAD PROTECTION TRASH SHOOTS/ CONSTRUCTION FENCE TRASH SHOOTS/ MASONRY SCAFFOLD SITE UTILITY TIE-IN MEP TIE-IN SERVICES VIA FOUNDATION WALL SOUTH BRACING NORTH BRACING	

SCHEDULE

SES

DER GROUND CHP/UTILITY, DEMOLITION

AVATION, FOUNDATIONS

ST-IN-PLACE BUILDING FRAME, FAÇADE, OUT

EATER INTERIOR FIT-OUT, LANDSCAPING

	Stage 1							Stage 2					Stag	e 3					Stage 4							
	Jun 08	Jul 08	Aug 08	Sep 08	Oct 08	Nov 08	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	Jun 09	Jul 09	Aug 09	Sep 09	Oct 09	Nov 09	Dec 09	Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10
Demolition			HV	/AC Units,	, Scaffoldi	ng, Walks	vay			Roof 4th Flr	3rd Flr	2nd Flr 1stFlr	Below Grade													
Excavation/ Foundation											Jnderpinn	ing, Sheeti	ng	Ехсач	vation	Mat Slab Fnd Wal. SOG	a,									
Cast-In-Place Concrete																	Cellar Column Basement 1st Slab	2nd Slab 3rd Slab 4th Slab 5th Slab Remove Playhouse Bracing	6th Slab Roof Slab							
Masonry																		Basement Perim. 1st Perim.	2nd Perim. 3rd Perim.	4th Perim. 5th Perim. 6th Perim.	Front Elevation					
Interior Fitout																		Cellar Interio Basement In	Cellar Interior Fitout Basement Interior Fitout Ist Floor Interior Fitout 2nd Floor Interior Fitout 3rd Floor Interior Fitout 4th Floor Interior Fitout Sth Floor Interior Fitout 6th Floor Interior Fitou		t t		Playhouse	Fitout		
ZONE 1	DUMP	TRUCH	(/MAT	ERIAL	DELIVE	RY	NC	ORTH B	RACING	ì	DUMP	TRUCK	/MAT.	DELIVE	RY	MATERIAL DELIVERY MATERIAL DEL			DELIVER	Y						
ZONE 2	DUMP	TRUCH	(/MAT	ERIAL	DELIVE	RY		DUM	IP TRUC	K/MA	FERIAL	DELIVE	RY		10210	MATERIAL DELIVERY				MAT	ERIAL D	DELIVER	Y			
ZONE 3	DUMP	TRUCH	(/MAT	ERIAL	DELIVE	RY	DUMF	TRUC	K/MAT.	. DELIV	ER.	CRA	NE	CRA	NE	E CRANE CRANE		CRAI	NE	Unesta	MA	TERIAL	DELIVER	RY		
ZONE 4	DUMP	TRUCH	(/MATI	ERIAL	DELIVE	RY			UTILITY TIE-IN			BRAC.	MA	TÉRIAL	DELIVE	RY	MEP TI	E-IN				MAT	FERIAL	DÉLIVER	<u>IY</u>	
ZONE 5																										
ZONE 6	TRASH	SHOO	TS/ CO	INSTRU		I FENC	E				TRASH	SHOOT	IS/ CON	UNSTRUCTION FEACE TRASH / MASONRY SCAFFOLD TRASH SHOOTS/ CNST			TR. FEN	CE								
ZONE 7	OVERH	IEAD P	ROTEC	TION							OVERH	IEAD PI	ROTECT	ION		OVERHEAD PROTECTION										



<u>PR</u>	ESENTATION OUTLIN	E							Sta	age 1					
	Project Overview			lus 09	1	Aug 00	Sen 09	0-+ 09	Nov 09	Dec 09	lan 00	Feb 00	Mar 00	Arr 00	May 00
	Structural Lateral Bracing		-	Junios	101.08	Aug vo	sep vo	001 08	1107.08	Decito	Jan 09	Feb 09	Iviar 09	Apr 09	Iviay 09 D
	Structural Loads		_		T	Н	VAC Units	;, Scaffold	ing, Walky	way 	T		Roof	-	
	Computer Model		litio										4th Flr	3rd Flr	-
	Conclusion and Recommendations		emo												2nd Flr 1ctFlr
	Electrical Connection to CHP		ă												ISLE II
	Electrical Loads		on/ ion											Underpin	ning, Sheetin
	Electrical Equipment		avati												
	Conclusion and Recommendations		Exc: Fou		5. II			Dell.			8.0				
	Matrix Schedule		ZONE 1	DUMP	TRUC		ERIAL	DELIVE	RY	N	ORTH B	BRACIN	G	DUM	TRUCK
	Create Zones	КЕҮ	LOILI	DUMP	TRUC		ERIAL	DELIVE	RY		DUN		ск/ма	TERIAL	DELIVER
	Create Matrix Schedule		ZONE 2							1					
	Conclusion and Recommendations	CRANE	ZONE 3	DUMP	TRUC	K/MAI	ERIAL	DELIVE	RY	DUM	PTRUC		. DELIN	/ER.	CRAN
	BIM and Facility Integration	OVERHEAD PROTECTION	ZONE 4	DUMP	TRUC	K/MAT	FERIAL	DELIVE	RY			Interv			SOUTH BRAC.
	Conclusion and Recommendations	TRASH SHOOTS/ CONSTRUCTION FENCE				1	1				1	TIE-IN			
		SITE UTILITY TIE-IN	ZONE 5											_	
		MEP TIE-IN SERVICES VIA FOUNDATION WALL	ZONE 6	TRASH	I SHOC	DTS/ CO	ONSTR	UCTIOI	N FENC	E				TRASI	I SHOOT
		SOUTH BRACING NORTH BRACING	ZONE Z	OVER	HEAD F	ROTE	TION							OVER	HEAD PR

		_			_	Sta	age 1						Stage 2			
	Jun 08	Jul 08	Aug 08	Sep 08	Oct 08	Nov 08	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	Jun 09	Jul 09	Aug 09	Sep
Demolition	2		HY	/AC Units	, Scaffoldi	ng, Walki	way			Roof 4th Fir	3rd Flr	2nd Flr 1stFlr	Below			
Excavation/ Foundation											Underpinn	ing, Sheeti	ng	Exca	vation	Ma Fnd SO(
Cast-In-Place Concrete																
Masonry																
Interior Fitout																
ZONE 1	DUMP	TRUC	K/MAT	ERIAL		RY	NC			5 5 7 / MAA	DUMP	TRUCK	/MAT.	DELIVE	RY	
ZONE 2	DUMP	TRUC					DUM		VIP TRUC			CDA		CDA		
ZONE 3	DUMP TRUCK/MATERIAL DELIVERY				RY	DOW			. DELIV	- L.K.	SOUTH	MA	TERIAL		RY_	
ZONE 4									UTERY TIE-IN	-		BRAC.				
ZONE 5	TRASH SHOOTS/ CONSTRUCTION FEN				I FENC	E				TRASH	SHOOT	rs/ coi	NSTRUC	TION F	ENC	
ZONE 7	OVERI	OVERHEAD PROTECTION									OVERH	IEAD PI	ROTECT	TION		
																_



			Stag	e 3			-		Stage 4	L			
p 09	Oct 09	Nov 09	Dec 09	Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10			
1. ClL													
d Wal.													
3	Collor			-									
	Column												
	Basement												
	151 3140	2nd Slab	1										
		3rd Slab											
		5th Slab											
		Remove											
		Bracing											
			6th Slab Roof Slab										
		Basement	no or or do										
	2	Perim. 1st Perim.											
			2nd Perim.										
			3rd Perim.	4th Perim.									
				5th Perim.	1								
				6th Perim.	Front								
		C.I. 1			Elevation								
		Basement In	or Fitout Iterior Fitou	t									
			1st Floor In	terior Fitou	t				Į.				
		8	3rd Floor I	nterior Fitou	it								
			4th Floor Ir	terior Fitou	it sterior Eiter	+							
				6th Floor In	nterior Fitou	t							
	-	a start and a start and			-		Same and see	Playhouse	Fitout				
	MAT	ERIAL DE	LIVERY	MATERIAL DELIVERY									
	MAT	ERIAL DE	LIVERY			DELIVER	Y						
CRA	NE	CRA	NE	CRA	DELIVE	RY							
	MEP TI	E-IN				MATERIAL DELIVERY							
CE		TRASH/	MASON	RY SCAF	FOLD	TRASH	SHOO.	rs/ cns	TR. FEI				
			OVERH	EAD PRO	DTECTIO	N							
			10.201 - 20130	196 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	and the second second	79.10 							

PR	ESENTATION OUTLIN Project Overview	MATRIX	
	Structural Lateral Bracing		
	Structural Loads		
	Computer Model		
	Conclusion and Recommendations		
	Electrical Connection to CHP		CONCLUSION
	Electrical Loads		FOR LOGIST
	Electrical Equipment		THE SITE U/G
	Conclusion and Recommendations		CONSTRUCTIO
	Matrix Schedule		
	Create Zones	KEY	THE IDEAL SE
	Create Matrix Schedule	DUMP TRUCK/MATERIAL DELIVERY	
	Conclusion and Recommendations	CRANE	
	RIM and Eacility Integration	OVERHEAD PROTECTION	
		TRASH SHOOTS/ CONSTRUCTION FENCE	
	Conclusion and Recommendations	TRASH SHOOTS/ MASONRY SCAFFOLD	
		SITE UTILITY TIE-IN	

MEP TIE-IN SERVICES VIA FOUNDATION WAL

SOUTH BRACING NORTH BRACING

SCHEDULE

- FICAL REASONS IT IS ALWAYS BETTER TO DO UTILITY BEFORE THE SUPER STRUCTURE **ON BEGINS**
- DED CONSTRUCTION SITE IN NYC PROVED TO BE ELECTION FOR CREATING A MATRIX SCHEDULE

	Stage 1											Stage 2					Stag	tage 3			-	Stage 4				
	Jun 08	Jul 08	Aug 08	Sep 08	Oct 08	Nov 08	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	Jun 09	Jul 09	Aug 09	Sep 09	Oct 09	Nov 09	Dec 09	Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10
Demolition			HX	AC Units,	, Scaffoldi	ing, Walky	vay			Roof 4th Flr	3rd Flr	2nd Flr 1stFlr	Below Grade													
Excavation/ Foundation											Underpinni	ing, Sheeti	ng	Ехсач	vation	Mat Slab Fnd Wal. SOG										
Cast-In-Place Concrete																	Cellar Column Basement 1st Slab	2nd Slab 3rd Slab 4th Slab 5th Slab Remove Playhouse Bracing	6th Slab Roof Slab							
Masonry																		Basement Perim. 1st Perim.	2nd Perim. 3rd Perim.	4th Perim. 5th Perim. 6th Perim.	Front Elevation					
Interior Fitout																		Cellar Interit	r Fitout terior Fitou 1st Floor In 2nd Floor In 3rd Floor Ir 4th Floor Ir	t terior Fitou hterior Fitou iterior Fitou terior Fitou Sth Floor Ir 6th Floor Ir	t t t iterior Fitou iterior Fitou	t t		Playhouse	Fitout	
ZONE 1	DUMP	TRUCK	(/MAT	ERIAL	DELIVE	RY	NC	ORTH B	RACING	6	DUMP	TRUCK	/MAT.	DELIVER	RY		MAT	ERIAL DEI	IVERY			MAT	ERIAL D	DELIVER	Y	
ZONE 2	DUMP	TRUCK	(/MAT	ERIAL	DELIVE	RY		DUN	IP TRUC	CK/MA	TERIAL	DELIVE	RY		- CETTA		MAT	ERIAL DEI	.IVERY			MAT	ERIAL D	DELIVER	Y	
ZONE 3	DUMP	TRUCK	(/MAT	ERIAL	DELIVE	RY	DUM	PTRUC	к/мат.	. DELIV	ER.	CRA	NE	CRA	NE	CRA	NE	CRA	VE	CRAI	NE	Winsels	MA	TERIALI	DELIVEI	RY
ZONE 4	DUMP	TRUCK	(/MAT	ERIAL	DELIVE	RY			UTILITY TIE-IN			BRAC.	MA	TERIAL	DELIVEI	RY	MEPTI	E-IN				MA	TERIAL	DELIVER	ι γ	
ZONE 5																										
ZONE 6	TRASH	SHOO	TS/ CO	NSTRU	IOITOL	I FENC	E				TRASH	SHOOT	rs/ con	ISTRUC	TION FE			TRASH/	MASON	RY SCAF	FOLD	TRASH	I SHOOT	rs/ CNS	TR. FEN	
ZONE 7	OVERH	EAD P	ROTEC	TION							OVERH	IEAD PI	ROTECT	ION					OVERH	EAD PRO	DTECTIO	N				



EXECUTE: Structural Lateral Bracing Structural Loads	
Computer Model Conclusion and Recommendations	
Flectrical Connection to CHP	
Electrical Loads	
Electrical Equipment	
Conclusion and Recommendations	BIM A
Matrix Schedule	
Utilities Schedule	
Facade Schedule	
Super Structure Schedule	
Integrated Schedule	
Conclusion and Recommendations	
BIM and Facility Integration	
Conclusion and Recommendations	

PR	Frence ION OUTLINE	BIMANI
	Structural Lateral Bracing	
	Structural Loads	
	Computer Model	BACKGROUND
	Conclusion and Recommendations	
	Electrical Connection to CHP	50% of the build
	Electrical Loads	
	Electrical Equipment	
	Conclusion and Recommendations	
	Matrix Schedule	Building owne
	Utilities Schedule	the BIM
	Facade Schedule	LIC DIVI
	Super Structure Schedule	Monogoment Su
	Integrated Schedule	management Sy
	Conclusion and Recommendations	
	BIM and Facility Integration	
	Conclusion and Recommendations	

BIM AND FM INTEGRATION

ding construction industry is now using BIM

ers don't know how to use BIM after construction ers don't require the FM data to be included in

data into CMMS (Computer Maintenance ystem) can take up to six months

GOALS

Develop a way to utilize the BIM for the ov

Identify necessary BIM's assets for maintenance

wner's CMMS AND HVAC Controls

PR	ESENTATION OUTLINE Project Overview	BIMANI
	Structural Lateral Bracing	
	Structural Loads	≻Job
	Computer Model	Shadowing
	Conclusion and Recommendations	≻Field D
	Electrical Connection to CHP	
	Electrical Loads	
	Electrical Equipment	
	Conclusion and Recommendations	
	Matrix Schedule	
	Create Zones	
	Create Matrix Schedule	
	Conclusion and Recommendations	
	BIM and Facility Integration	
	Conclusion and Recommendations	



>Available Technology Most technicians don't have laptops ➤Most only have a PDA Limited screen size and Limited File Size Computer work stations are available throughout campus

Facility Management Work Orders

Description of Work: Room too cold. HVAC Unit Blowing Cold Air

Location: 0503000-543 DEIKE Building -05 Staff Office

Equipment:

F/P: Facility planning

RPT: 3:45pm 12/15/2010 Location: Hyperlink to drawing Confact: Name Equipment: link to equipment's Excel file Phone Number:

PR	ESENTATION OUTLINE Project Overview	R	BIMANI
	Structural Lateral Bracing		
	Structural Loads		≻Job
	Computer Model		Shadowing
	Conclusion and Recommendations		→ Field D
	Electrical Connection to CHP		
	Electrical Loads		
	Electrical Equipment		
	Conclusion and Recommendations		
	Matrix Schedule		
	Create Zones		
	Create Matrix Schedule		
	Conclusion and Recommendations		
	BIM and Facility Integration		
	Conclusion and Recommendations		

➢Parameters ➢Process Map			
	Asset Informat	ion organized according to PSU l	JNIFORMAT Standard
→ Uniformat /	D30 HVAC		
	D3060 Controls & Instrumentation		
	D3068 Building Automation Systems		
		Equipment Number	
		Operate Range Temp	-20ºF to 140ºF (-29ºC to 60ºC)
		Operate Range Humidity	10 to 90% relative humidity,
	Multi-Equipment Contoller & Router	Туре	Controller & Router
	Controller, receiver	Model #	ME-LGR Line
	Electric, Single Snap switch	Manufacturer	ALC
		Communication	BACnet Building Controller (B-BC)
		Communication	EIA-232-485 port 156kbps
		Microprocessor	32-bit
linitormat		Memory	16 Mbyte
Omornat		Protection	Built-in surge and transient protection
		Voltage	24 V-ac ± 10%
		Frequency	50 to 60Hz
		Power	10 Watts
		Services	MS-TP Channel for ctrl integration

 PRESENTATION OUT Project Overview Structural Lateral Bracing Structural Loads 	LINE	BIM AND FM INTEGRATIC
 Computer Model Conclusion and Recommendation Electrical Connection to CHP Electrical Loads Electrical Equipment Conclusion and Recommendation Matrix Schedule Create Zones Create Matrix Schedule 	Facility design Floor Type (and Warranty) Resource Space Component (and installation) Spare Zones Systems build	Shadowing → Field Data Type worksheet: → Overview of the designers, builders, and manufactures' information.
 Conclusion and Recommendation BIM and Facility Integration Conclusion and Recommendations 	Issues Connections	Type Worksheet Resource Worksheet Job Resource Worksheet Component Worksheet



	Type Wo	rksheet		
	Name		Contolle	er & Router
	CreatedBy		lag290@	Øpsu.edu
	CreatedOn		7/31/20	11
	Category		ATC	
	Description			
	AssetType			
	Manufacturer		ALC	
	ModelNumber		ME-LGR	Line
Multi-Equipment Contoll	er PartsWarranty	Guarantor		
& Router Controller,	PartsWarranty	EndDate		
receiver Electric, Single	LaborWarranty	Guarantor		
Snap switch	LaborWarranty	StartDate		
	LaborWarranty	EndDate		
	ExtSystem			
	ExtObject			
	ExtIdentifier			
	ReplacementCo	ost		
	ExpectedLife			
	DurationUnit			
	WarrantyDescr	iption		
Dee				
res		Canata Han /	Devetere	
	Name	Contoller/	Router	
Multi-Equipment	CreatedBy	Tag290@p	su.eau	
Contoller & Router	CreatedOn			
Controller, receiver	Category	AIC		
Electric, Single Snap	Description	_		
switch	ExtSystem			
	ExtObject			
	Extldentifier			

Com	nponent Worksheet	
	Name	
	CreatedBy	
	CreatedOn	
	TypeName	
Multi Equipment	Space Names	
Contoller & Bouter	Description	
Controller receiver	ExtSystem	
Electric Single Span	ExtObject	
switch	Extldentifier	
SWILCH	SerialNumber	
	Insta llatio nD ate	
	TagNumber	
	BarCode	
	AssetIdentifier	
 S	pare Worksheet	
	Name	
	Name CreatedBy	
	Name CreatedBy CreatedOn	
Multi-Equipment	Name CreatedBy CreatedOn Category	
Multi-Equipment	Name CreatedBy CreatedOn Category Description	
 Multi-Equipment Contoller & Router Controller receiver	Name CreatedBy CreatedOn Category Description TypeName	
Multi-Equipment Contoller & Router Controller, receiver Electric, Single Span	Name CreatedBy CreatedOn Category Description TypeName Suppliers	
Multi-Equipment Contoller & Router Controller, receiver Electric, Single Snap switch	Name CreatedBy CreatedOn Category Description TypeName Suppliers ExtSystem	
Multi-Equipment Contoller & Router Controller, receiver Electric, Single Snap switch	Name CreatedBy CreatedOn Category Description TypeName Suppliers ExtSystem ExtObject	
Multi-Equipment Contoller & Router Controller, receiver Electric, Single Snap switch	Name CreatedBy CreatedOn Category Description TypeName Suppliers ExtSystem ExtObject ExtIdentifier	
Multi-Equipment Contoller & Router Controller, receiver Electric, Single Snap switch	Name CreatedBy CreatedOn Category Description TypeName Suppliers ExtSystem ExtObject ExtIdentifier SetNumber	





BIM AND FM INTEGRATION

PROJECT PHASE





PR	ESENTATION OUTLINE Project Overview	BIMANI
	Structural Lateral Bracing	
	Structural Loads	
	Computer Model	CONCLUSION
	Conclusion and Recommendations	Both Maximo
	Electrical Connection to CHP	equipment Exe
	Electrical Loads	≻ODBC-C
	Electrical Equipment	➤Develop a p
	Conclusion and Recommendations	➤Develop a p
	Matrix Schedule	the field
	Create Zones	➤Develop sea
	Create Matrix Schedule	
	Conclusion and Recommendations	
	BIM and Facility Integration	
	Conclusion and Recommendations	

BIMAND FM INTEGRATION

NS:

- o HVAC controls, and Revit can link data to acel file
- Open database connectivity
- prototype for one building
- protocol for flagging changes made to the project in
- archable parameters for BIM

PR	ESENTATION OUTLINE Project Overview	ACKNO
	Structural Lateral Bracing	
	Structural Loads	
	Computer Model	
	Conclusion and Recommendations	➤FRIENDS AN
	Electrical Connection to CHP	≻ARCHITECT
	Electrical Loads	SKANSKA BL
	Electrical Equipment	➢OFFICE OF F
	Conclusion and Recommendations	
	Matrix Schedule	
	Create Zones	
	Create Matrix Schedule	
	Conclusion and Recommendations	
	BIM and Facility Integration	
	Conclusion and Recommendations	

VLEDGEMENTS

STRUCTURAL BRACING Reduce site congestion ONCLUSIONS

ID FAMILY URAL ENGINEERING FACULTY ILDING USA PHYSICAL PLANT (OPP)

Increased installation time

ELECTRICAL CHP CONNECTION System cost \$25,000 with 4 year payback

MATRIX SCHEDULE \succ For logistical reasons it is always better to do the u/g utilities before structure The crowded construction site of NYC proved to be the ideal

selection for creating a matrix schedule.

BIM AND FM INTEGRATION:

Both Maximo HVAC controls and Revit can link data to equipment Excel file

Develop a prototype for one building

> Develop a protocol for flagging changes

N Devialen eserebele nerenetere fer DIM end CM

PRESENTATION OUTLINE

STRUCTURAL BRACING

Project X's Masonry Temporary Bracing

					Project X's N	۸asonry ۱	Nall Tem	porary Br	acing						
						Daily		Bare				Total Incl			Duration
Description	Quantity	Lb/ft	Quantity	Units	Crew	Output	Labor Hours	Material	Bare Labor	Equip-ment	Total	0&P	Total	Duration	Days
Steel Pipe, extra strong, no															
concrete 3" diameter x 12'-0"			8	Ea.	E2	60	0.933	135	39	26	200	245	\$1,960	7.5	0.9
Steel Pipe, extra strong, no															
concrete 4" diameter			40	Ea.	E2	58	0.9660	198.0000	40.5000	27.0000	26.5000	317.5000	\$12,700	38.6	4.8
Angle Framing , shop															
Fabricated, WT6x17.5	96	17.5	1680	Lb.	E3	440	0.055	0.81	3.95	0.29	5.05	8.18	\$13,742	92.4	11.6
L 5x 5/16" x 6'			96	L.F.	E4	250	0.128	17.6	5.55	0.53	23.68	29.98	\$2,878	12.3	1.5
Steel Knife Plate 3/8"			50	S.F.	E2	350	0.008	16.85	5.6		16.85	18.5	\$925	0.4	0.1
												Total Cost	\$32,205	151.2	18.9

Project X's Alternative Masonry Temporary Bracing

Project X's Proposed Masonry Wall Temporary Bracing															
						Daily		Bare				Total Incl		Duration	Duration
Description	Quantity	Lb/ft	Quantity	Units	Crew	Output	Labor Hours	Material	Bare Labor	Equip-ment	Total	O&P	Total	Hours	Days
Angle Framing, shop fabricated, L3"															
x 3" x 3/8"	44.6	7.17	319.782	Lb.	E3	440	0.055	0.81	3.95	0.29	5.05	8.18	\$2,616	17.6	2.2
Angle Framing , shop Fabricated, L4"															
x 4" x 3/8"	246.42	9.72	2395.2024	Lb.	E3	440	0.055	0.81	3.95	0.29	5.05	8.18	\$19,593	131.7	16.5
Angle Framing , shop Fabricated, L5"															
x 5" x 5/16"	27.38	10.4	284.752	Lb.	E3	440	0.055	0.81	3.95	0.29	5.05	8.18	\$2,329	15.7	2.0
Shop fabricated W6 x9			109.5	LF	E-2	600	0.093	14.85	4.06	2.9	21.81	26.5	\$2,902	10.2	1.3
Channel MC6 x 12"			208	LF	E4	225	0.125	12.15	5.45	0.52	18.12	23.82	\$4,955	26.0	3.3
												Total Cost	\$32,394	201.2	25.1

STRUCTURAL BRACING

PRESENTATION OUTLINE



Design Sequence of Operations Sequence of Operation \sim Rotensia Rotensia Rotensia Rotensia Points List Shop DWG Raview Equipment Connectors Perbimana Beeffication Regulation Regulation Equipment Lists Ensignment Lurysout in a define Coordinate System O & M Manuals Outline & Requirements Warranties Submittal Register Approved Submittals Devision Devisioners Devisioners Drawings

STRUCTURAL BRACING

