APPENDIX K

CONSTRUCTION

APPENDIX K.1

GENERAL CONSTRUCTION

Detailed Engine Profile

Note: Since no real schedule exists for re-zoned private sites, dates for private rezoned sites are displayed as +# where # is the month in which activity starts or ends for each engine relative to the start of activity for the entire site.

Columbia University Master Plan

Equipment & Manpower usage

Re-zoned Construction

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
Site 19											
SITE DEMOLITION			40						2		
20 yd dump trucks	diesel	400	100%	10	10	10			20	+1	+2
excavator	diesel	200	75%	1			1	1	20	+1	+2
EXCAVATION & FOUNDATIONS			80						4		
20 yd dump trucks	diesel	400		10	10	10			20	+3	+6
backhoe	diesel	200	75%	1			1	1	20	+3	+6
compressors	diesel	250	90%	1			1	1	20	+3	+6
CONSTRUCT SUPERSTRUCTURE			80						4		
concrete truck	diesel	450		4	4	20			20	+6	+9
concrete pump	diesel	400	90%	1			0.2	1	20	+6	+9
trailers of steel	diesel	500		1	1	2.5			20	+6	+9
rebar bender	diesel	200	50%	1			1	1	20	+6	+9
arc welder	electric	20	50%	1			1	1	20	+6	+9
troweling machine	gas	11	50%	1			1	1	20	+6	+9
MEP			60						3		
plumbing deliveries	diesel	500		0.01	0.01	2			20	+12	+14
sprinkler deliveries	diesel	500		0.01	0.01	2			20	+12	+14
HVAC - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
electric - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
scissor lift	electric	20	50%	1.00			1	1	20	+12	+14
NG forklift	gas	250	50%	1.00			1	1	20	+12	+14
BUILDING ENCLOSURE & ROOFING			40						2		
trailers	diesel	500		0.5	0.5	1			20	+10	+11
INTERIORS / FIT-OUT			80						4		
drywall trailers	diesel	500		0.01	0.01	1			20	+12	+15
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	+12	+15
FF&E	diesel	500		0.01	0.01	1			20	+12	+15
scissor lift	electric	20	50%	1			1	1	20	+12	+15
NG forklift	gas	250	50%	0.01			0.01	1	20	+12	+15
trash hauling	diesel	400		0.5	0.5	1			20	+1	+15
fuel trucks - 1 every 2 weeks on average	gas	400		0.1	0.1	1			20	+1	+12
rubber tire crane	diesel	300	25%	1			1	1	20	+6	+12
dual hoist	electric	100 amp	90%	0			0	0	20		
miscellaneous equipment											
chain saw	gas	3	20%	1			1	1	20	+1	+2
compressor	GAS	5	40%	1			1	1	20	+1	+9
generator	gas	10	40%	1			1	1	20	+1	+6
impact wrench	air	0	20%	2			2	2	20	+6	+10
jack hammer	air	0	20%	1			1	1	20	+1	+3
table saw	electric	5	20%	1			1	1	20	+12	+15
portable water pump	electric	15	5%	1			1	1	20	+1	+15
circular saw	electric	1.5	25%	2			2	2	20	+3	+15

Site 18	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			40						2		
20 yd dump trucks	diesel	400	100%	10	10	10			20	+1	+2
excavator	diesel	200	75%	1			1	1	20	+1	+2
EXCAVATION & FOUNDATIONS			80						4		
20 yd dump trucks	diesel	400		10	10	10			20	+3	+6
backhoe	diesel	200	75%	1			1	1	20	+3	+6
compressors	diesel	250	90%	1			1	1	20	+3	+6
CONSTRUCT SUPERSTRUCTURE			80						4		
concrete truck	diesel	450		4	4	20			20	+6	+9
concrete pump	diesel	400	90%	1			0.2	1	20	+6	+9
trailers of steel	diesel	500		1	1	2.5			20	+6	+9
rebar bender	diesel	200	50%	1			1	1	20	+6	+9
arc welder	electric	20	50%	1			1	1	20	+6	+9
troweling machine	gas	11	50%	1			1	1	20	+6	+9
MEP			60						3		
plumbing deliveries	diesel	500		0.01	0.01	2			20	+12	+14
sprinkler deliveries	diesel	500		0.01	0.01	2			20	+12	+14
HVAC - deliveries	diesel	500		0.01	0.01	2			20	+12	+14

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
electric - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
scissor lift	electric	20	50%	1.00			1	1	20	+12	+14
NG forklift	gas	250	50%	1.00			1	1	20	+12	+14
BUILDING ENCLOSURE & ROOFING			40						2		
trailers	diesel	500		0.5	0.5	1			20	+10	+11
INTERIORS / FIT-OUT			80						4		
drywall trailers	diesel	500		0.01	0.01	1			20	+12	+15
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	+12	+15
FF&E	diesel	500		0.1	0.1	1			20	+12	+15
scissor lift	electric	20	50%	1			1	1	20	+12	+15
NG forklift	gas	250	50%	0.01			0.01	1	20	+12	+15
trash hauling	diesel	400		0.5	0.5	1			20	+1	+15
fuel trucks - 1 every 2 weeks on average	gas	400		0.1	0.1	1			20	+1	+12
rubber tire crane	diesel	300	25%	1			1	1	20	+6	+12
dual hoist	electric	100 amp	90%	0			0	0	20		
miscellaneous equipment											
chain saw	gas	3	20%	1			1	1	20	+1	+2
compressor	gas	5	40%	1			1	1	20	+1	+8
generator	gas	10	40%	1			1	1	20	+1	+5
impact wrench	air	0	20%	2			2	2	20	+6	+8
jack hammer	air	0	20%	1			1	1	20	+1	+2
table saw	electric	5	20%	1			1	1	20	+12	+15
portable water pump	electric	15	5%	1			1	1	20	+1	+15
circular saw	electric	1.5	25%	2			2	2	20	+3	+15

Site 20	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			40						2		
20 yd dump trucks	diesel	400	100%	10	10	10			20	+1	+2
excavator	diesel	200	75%	1			1	1	20	+1	+2
EXCAVATION & FOUNDATIONS			80						4		
20 yd dump trucks	diesel	400		10	10	10			20	+3	+6
backhoe	diesel	200	75%	1			1	1	20	+3	+6
compressors	diesel	250	90%	1			1	1	20	+3	+6
CONSTRUCT SUPERSTRUCTURE			80						4		
concrete truck	diesel	450		4	4	20			20	+6	+9
concrete pump	diesel	400	90%	1			0.2	1	20	+6	+9
trailers of steel	diesel	500		1	1	2.5			20	+6	+9
rebar bender	diesel	200	50%	1			1	1	20	+6	+9
arc welder	electric	20	50%	1			1	1	20	+6	+9
troweling machine	gas	11	50%	1			1	1	20	+6	+9
MEP			60						3		
plumbing deliveries	diesel	500		0.01	0.01	2			20	+12	+14
sprinkler deliveries	diesel	500		0.01	0.01	2			20	+12	+14
HVAC - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
electric - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
scissor lift	electric	20	50%	1.00			1	1	20	+12	+14
NG forklift	gas	250	50%	1.00			1	1	20	+12	+14
BUILDING ENCLOSURE & ROOFING			40						2		
trailers	diesel	500		0.5	0.5	1			20	+10	+11
INTERIORS / FIT-OUT			80						4		
drywall trailers	diesel	500		0.01	0.01	1			20	+12	+15
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	+12	+15
FF&E	diesel	500		0.01	0.01	1			20	+12	+15
scissor lift	electric	20	50%	1			1	1	20	+12	+15
NG forklift	gas	250	50%	0.01			0.01	0.01	20	+12	+15
trash hauling	diesel	400		0.5	0.5	1			20	+1	+15
fuel trucks - 1 every 2 weeks on average	gas	400		0.1	0.1	1			20	+1	+12
rubber tire crane	diesel	300	25%	1			1	1	20	+6	+12
dual hoist	electric	100 amp	90%	0			0	0	20		
miscellaneous equipment											
chain saw	gas	3	20%	1			1	1	20	+1	+2
compressor	gas	5	40%	1			1	1	20	+1	+9
generator	gas	10	40%	1			1	1	20	+1	+5
impact wrench	air	0	20%	2			2	2	20	+6	+9
jack hammer	air	0	20%	1			1	1	20	+1	+2
table saw	electric	5	20%	1			1	1	20	+12	+15
portable water pump	electric	15	5%	1			1	1	20	+1	+15
circular saw	electric	1.5	25%	2			2	2	20	+3	+15

Site 21	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			40						2		
20 yd dump trucks	diesel	400	100%	10	10	10			20	+1	+2
excavator	diesel	200	75%	1			1	1	20	+1	+2
EXCAVATION & FOUNDATIONS			80						4		
20 yd dump trucks	diesel	400		10	10	10			20	+3	+6
backhoe	diesel	200	75%	1			1	1	20	+3	+6
compressors	diesel	250	90%	1			1	1	20	+3	+6
CONSTRUCT SUPERSTRUCTURE			80						4		
concrete truck	diesel	450		4	4	20			20	+6	+9
concrete pump	diesel	400	90%	1			0.2	1	20	+6	+9
trailers of steel	diesel	500		1	1	2.5			20	+6	+9
rebar bender	diesel	200	50%	1			1	1	20	+6	+9
arc welder	electric	20	50%	1			1	1	20	+6	+9
troweling machine	gas	11	50%	1			1	1	20	+6	+9
MEP			60						3		
plumbing deliveries	diesel	500		0.01	0.01	2			20	+12	+14
sprinkler deliveries	diesel	500		0.01	0.01	2			20	+12	+14
HVAC - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
electric - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
scissor lift	electric	20	50%	1.00			1	1	20	+12	+14
NG forklift	gas	250	50%	1.00			1	1	20	+12	+14
BUILDING ENCLOSURE & ROOFING			40						2		
trailers	diesel	500		0.5	0.5	1			20	+10	+11
INTERIORS / FIT-OUT			80						4		
man-days				20					20	+12	+15
drywall trailers	diesel	500		0.01	0.01	1			20	+12	+15
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	+12	+15
FF&E	diesel	500		0.01	0.01	1			20	+12	+15
scissor lift	electric	20	50%	1			1	1	20	+12	+15
NG forklift	gas	250	50%	0.01			0.01	1	20	+12	+15
trash hauling	diesel	400		0.5	0.5	1			20	+1	+15
fuel trucks - 1 every 2 weeks on average	gas	400		0.1	0.1	1			20	+1	+12
rubber tire crane	diesel	300	25%	1			1	1	20	+6	+12
dual hoist	electric	100 amp	90%	0			0	0	20		
miscellaneous equipment											
chain saw	gas	3	20%	1			1	1	20	+1	+2
compressor	gas	5	40%	1			1	1	20	+1	+10
generator	gas	10	40%	1			1	1	20	+1	+5
impact wrench	air	0	20%	2			2	2	20	+6	+10
jack hammer	air	0	20%	1			1	1	20	+1	+2
table saw	electric	5	20%	1			1	1	20	+12	+15
portable water pump	electric	15	5%	1			1	1	20	+1	+15
circular saw	electric	1.5	25%	2			2	2	20	+3	+15

Site 22	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			40						2		
20 yd dump trucks	diesel	400	100%	10	10	10			20	+1	+2
excavator	diesel	200	75%	1			1	1	20	+1	+2
EXCAVATION & FOUNDATIONS			80						4		
20 yd dump trucks	diesel	400		10	10	10			20	+3	+6
backhoe	diesel	200	75%	1			1	1	20	+3	+6
compressors	diesel	250	90%	1			1	1	20	+3	+6
CONSTRUCT SUPERSTRUCTURE			80						4		
concrete truck	diesel	450		4	4	20			20	+6	+9
concrete pump	diesel	400	90%	1			0.2	1	20	+6	+9
trailers of steel	diesel	500		1	1	2.5			20	+6	+9
rebar bender	diesel	200	50%	1			1	1	20	+6	+9
arc welder	electric	20	50%	1			1	1	20	+6	+9
troweling machine	gas	11	50%	1			1	1	20	+6	+9
MEP			60						3		
plumbing deliveries	diesel	500		0.01	0.01	2			20	+12	+14
sprinkler deliveries	diesel	500		0.01	0.01	2			20	+12	+14
HVAC - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
electric - deliveries	diesel	500		0.01	0.01	2			20	+12	+14
scissor lift	electric	20	50%	1.00			1	1	20	+12	+14
NG forklift	gas	250	50%	1.00			1	1	20	+12	+14
BUILDING ENCLOSURE & ROOFING			40						2		
trailers	diesel	500		0.5	0.5	1			20	+10	+11
INTERIORS / FIT-OUT			80						4		
drywall trailers	diesel	500		0.01	0.01	1			20	+12	+15
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	+12	+15
FF&E	diesel	500		0.01	0.01	1			20	+12	+15
scissor lift	electric	20	50%	1			1	1	20	+12	+15

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
NG forklift	gas	250	50%	0.01			0.01	1	20	+12	+15
trash hauling	diesel	400		0.5	0.5	1			20	+1	+15
fuel trucks - 1 every 2 weeks on average	gas	400		0.1	0.1	1			20	+1	+12
rubber tire crane	diesel	300	25%	1			1	1	20	+6	+12
dual hoist	electric	100 amp	90%	0			0	0	20		
miscellaneous equipment											
chain saw	gas	3	20%	1			1	1	20	+1	+2
compressor	gas	5	40%	1			1	1	20	+1	+10
generator	gas	10	40%	1			1	1	20	+1	+5
impact wrench	air	0	20%	2			2	2	20	+6	+10
jack hammer	air	0	20%	1			1	1	20	+1	+2
table saw	electric	5	20%	1			1	1	20	+12	+15
portable water pump	electric	15	5%	1			1	1	20	+1	+15
circular saw	electric	1.5	25%	2			2	2	20	+3	+15
Site 23	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			40						2		
man-days				4					20	+1	+2
20 yd dump trucks	diesel	400	100%	10	10	10			20	+1	+2
excavator	diesel	200	75%	1			1	1	20	+1	+2
EXCAVATION & FOUNDATIONS			80						4		
man-days				10					20	+3	+5
20 yd dump trucks	diesel	400		10	10	10			20	+3	+5
backhoe	diesel	200	75%	1			1	1	20	+3	+5
compressors	diesel	250	90%	1			1	1	20	+3	+5
CONSTRUCT SUPERSTRUCTURE			80						4		
man-days				30					20	+6	+9
concrete truck	diesel	450		4	4	20			20	+6	+9
concrete pump	diesel	400	90%	1			0.2	1	20	+6	+9
trailers of steel	diesel	500		1	1	2.5			20	+6	+9
rebar bender	diesel	200	50%	1			1	1	20	+6	+9
arc welder	electric	20	50%	1			1	1	20	+6	+9
troweling machine	gas	11	50%	1			1	1	20	+6	+9
MEP			60						3		
man-days				20.00					20	+12	+13
plumbing deliveries	diesel	500		0.01	0.01	2			20	+12	+13
sprinkler deliveries	diesel	500		0.01	0.01	2			20	+12	+13
HVAC - deliveries	diesel	500		0.01	0.01	2			20	+12	+13
electric - deliveries	diesel	500		0.01	0.01	2			20	+12	+13
scissor lift	electric	20	50%	1.00			1	1	20	+12	+13
NG forklift	gas	250	50%	1.00			1	1	20	+12	+13
BUILDING ENCLOSURE & ROOFING			40						2		
man-days				20					20	+10	+11
trailers	diesel	500		0.5	0.5	1			20	+10	+11
INTERIORS / FIT-OUT			80						4		
man-days				20					20	+12	+13
drywall trailers	diesel	500		0.01	0.01	1			20	+12	+13
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	+12	+13
FF&E	diesel	500		0.01	0.01	1			20	+12	+13
scissor lift	electric	20	50%	1			1	1	20	+12	+13
NG forklift	gas	250	50%	0.01			0.01	1	20	+12	+13
trash hauling	diesel	400		0.5	0.5	1			20	+1	+13
fuel trucks - 1 every 2 weeks on average	gas	400		0.1	0.1	1			20	+1	+12
rubber tire crane	diesel	300	25%	1			1	1	20	+6	+12
dual hoist	electric	100 amp	90%	0			0	0	20		
miscellaneous equipment											
chain saw	gas	3	20%	1			1	1	20	+1	+2
compressor	gas	5	40%	1			1	1	20	+1	+10
generator	gas	10	40%	1			1	1	20	+1	+5
impact wrench	air	0	20%	2			2	2	20	+6	+10
jack hammer	air	0	20%	1			1	1	20	+1	+2
table saw	electric	5	20%	1			1	1	20	+12	+13
portable water pump	electric	15	5%	1			1	1	20	+1	+13
circular saw	electric	1.5	25%	2			2	2	20	+3	+13
Site 24	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			40						2		
20 yd dump trucks	diesel	400	100%	10	10	10			20	+1	+2
excavator	diesel	200	75%	1			1	1	20	+1	+2
EXCAVATION & FOUNDATIONS			80						4		
20 yd dump trucks	diesel	400		10	10	10			20	+3	+6
backhoe	diesel	200	75%	1			1	1	20	+3	+6
compressors	diesel	250	90%	1			1	1	20	+3	+6

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			80						4		
concrete truck	diesel	450		4	4	20			20	+6	+9
concrete pump	diesel	400	90%	1			0.2	1	20	+6	+9
trailers of steel	diesel	500		1	1	2.5			20	+6	+9
rebar bender	diesel	200	50%	1			1	1	20	+6	+9
arc welder	electric	20	50%	1			1	1	20	+6	+9
troweling machine	gas	11	50%	1			1	1	20	+6	+9
MEP			60						3		
plumbing deliveries	diesel	500		0.01	0.01	2			20	+9	+13
sprinkler deliveries	diesel	500		0.01	0.01	2			20	+9	+13
HVAC - deliveries	diesel	500		0.01	0.01	2			20	+9	+13
electric - deliveries	diesel	500		0.01	0.01	2			20	+9	+13
scissor lift	electric	20	50%	1.00			1	1	20	+9	+13
forklift	propane	250	50%	1.00			1	1	20	+9	+13
BUILDING ENCLOSURE & ROOFING			40						2		
trailers	diesel	500		0.5	0.5	1			20	+9	+10
INTERIORS / FIT-OUT			80						4		
drywall trailers	diesel	500		0.01	0.01	1			20	+10	+14
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	+10	+14
FF&E	diesel	500		0.01	0.01	1			20	+10	+14
scissor lift	electric	20	50%	1			1	1	20	+10	+14
forklift	propane	250	50%	0.01			0.01	1	20	+10	+14
trash hauling	diesel	400		0.5	0.5	1			20	+1	+14
fuel trucks - 1 every 2 weeks on average	gas	400		0.1	0.1	1			20	+1	+12
rubber tire crane	diesel	300	25%	1			1	1	20	+6	+12
dual hoist	electric	100 amp	90%	0			0	0	20		
miscellaneous equipment											
chain saw	gas	3	20%	1			1	1	20	+1	+2
compressor	gas	5	40%	1			1	1	20	+1	+10
generator	gas	10	40%	1			1	1	20	+1	+5
impact wrench		0	20%	2			2	2	20	+6	+10
jack hammer		0	20%	1			1	1	20	+1	+2
table saw	electric	5	20%	1			1	1	20	+12	+14
portable water pump	electric	15	5%	1			1	1	20	+1	+14
circular saw	electric	1.5	25%	2			2	2	20	+3	+14
Site 25	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			40						2		
20 yd dump trucks	diesel	400	100%	10	10	10			20	+1	+2
excavator	diesel	200	75%	1			1	1	20	+1	+2
EXCAVATION & FOUNDATIONS			80						4		
20 yd dump trucks	diesel	400		10	10	10			20	+3	+5
backhoe	diesel	200	75%	1			1	1	20	+3	+5
compressors	diesel	250	90%	1			1	1	20	+3	+5
CONSTRUCT SUPERSTRUCTURE			80						4		
concrete truck	diesel	450		4	4	20			20	+5	+11
concrete pump	diesel	400	90%	1			0.2	1	20	+5	+11
trailers of steel	diesel	500		1	1	2.5			20	+5	+11
rebar bender	diesel	200	50%	1			1	1	20	+5	+11
arc welder	electric	20	50%	1			1	1	20	+5	+11
troweling machine	gas	11	50%	1			1	1	20	+5	+11
MEP			60						3		
plumbing deliveries	diesel	500		0.01	0.01	2			20	+11	+19
sprinkler deliveries	diesel	500		0.01	0.01	2			20	+11	+19
HVAC - deliveries	diesel	500		0.01	0.01	2			20	+11	+19
electric - deliveries	diesel	500		0.01	0.01	2			20	+11	+19
scissor lift	electric	20	50%	1.00			1	1	20	+11	+19
forklift	gas	250	50%	1.00			1	1	20	+11	+19
BUILDING ENCLOSURE & ROOFING			40						2		
trailers	diesel	500		0.5	0.5	1			20	+10	+13
INTERIORS / FIT-OUT			80						4		
drywall trailers	diesel	500		0.01	0.01	1			20	+13	+20
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	+13	+20
FF&E	diesel	500		0.01	0.01	1			20	+13	+20
scissor lift	electric	20	50%	1			1	1	20	+13	+20
forklift	gas	250	50%	0.01			0.01	1	20	+13	+20
trash hauling	diesel	400		0.5	0.5	1			20	+1	+20
fuel trucks - 1 every 2 weeks on average	gas	400		0.1	0.1	1			20	+1	+14
rubber tire crane	diesel	300	25%	1			1	1	20	+7	+14
dual hoist	electric	100 amp	90%	0			0	0	20		
miscellaneous equipment											
chain saw	gas	3	20%	1			1	1	20	+1	+2

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
compressor	gas	5	40%	1			1	1	20	+1	+20
generator	gas	10	40%	1			1	1	20	+1	+6
impact wrench		0	20%	2			2	2	20	+7	+20
jack hammer		0	20%	1			1	1	20	+1	+2
table saw	electric	5	20%	1			1	1	20	+14	+20
portable water pump	electric	15	5%	1			1	1	20	+1	+20
circular saw	electric	1.5	25%	2			2	2	20	+3	+20
Package A											
West 130th Street Sewer relocation	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Dec-2008	Nov-2010
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			120						6		
20 yd dump trucks	diesel	400	100%	4	4	10			20	Jan-2008	Jun-2008
excavator	diesel	200	75%	1			1	1	20	Jan-2008	Jun-2008
REMOVAL/RELOCATION OF SEWER			200						10		
20 yd dump trucks - removal of fill	diesel	400	100%	32	32	32			20	Mar-2008	Dec-2008
pavement cutter	gas	27	50%	1			1	1	20	Mar-2008	Mar-2008
excavator - removal of fill	diesel	200	50%	1			1	1	20	Mar-2008	Dec-2008
trailers - delivery of pipe	diesel	500	100%	1	1	2			20	Mar-2008	Dec-2008
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Mar-2008	Dec-2008
tamper	diesel	25	75%	1			1	1	20	Mar-2008	Dec-2008
20 yd dump trucks - supply of gravel & fill	diesel	400	100%	32	32	32			20	Mar-2008	Dec-2008
SITE IMPROVEMENTS/STREETSCAPE			160						8		
trailers - delivery of material	diesel	500	100%	0.5	0.5	1			20	May-2008	Dec-2008
concrete truck	diesel	450	100%	1	1	3			20	May-2008	Dec-2008
rebar bender	electric	10	50%	1			1	1	20	May-2008	Dec-2008
portable cement mixer	gas	5	50%	1			1	1	20	May-2008	Dec-2008
unit paver cutter	electric	20	50%	1			1	1	20	May-2008	Dec-2008
20 yd dump trucks - delivery of asphalt	diesel	400	25%	10	10	10			20	May-2008	Dec-2008
asphalt paving equipment	diesel	300	25%	1			1	1	20	May-2008	Dec-2008
tamper	diesel	25	75%	1			1	1	20	May-2008	Dec-2008
roller	diesel	350	25%	1			1	1	20	May-2008	Dec-2008
trash hauling	diesel	400	100%	0.5	0.5	1			20	Jan-2008	Dec-2008
fuel trucks - 1 every 2 weeks on average	gas	400	100%	0.025	0.025	1			20	Jan-2008	Dec-2008
rubber tire crane	diesel	300	25%	1			1	1	20	Jan-2008	Dec-2008
miscellaneous equipment										Jan-2008	Dec-2008
chain saw	gas	3	20%	4			2	2	20	Jan-2008	Dec-2008
compressor	gas	5	40%	4			4	4	20	Jan-2008	Dec-2008
generator	gas	10	40%	4			4	4	20	Jan-2008	Dec-2008
impact wrench	air	0	20%	0				0	20	Jan-2008	Dec-2008
jack hammer	air	0	20%	4			4	4	20	Jan-2008	Dec-2008
table saw	electric	5	20%	0				0	20	Jan-2008	Dec-2008
portable water pump	electric	15	5%	2			2	2	20	Jan-2008	Dec-2008
circular saw	electric	1.5	25%	4			4	4	20	Jan-2008	Dec-2008
12th Avenue Sewer Relocations	engine type	horse power	duration	equipment per day					days per month	Nov-2008	Sep-2009
						peak day		peak day			
REMOVAL/RELOCATION OF SEWER			200						10		
20 yd dump trucks - removal of fill	diesel	400	75%	10	10	10			20	Feb-2008	Aug-2008
excavator - removal of fill	diesel	200	50%	1			1	1	20	Feb-2008	Aug-2008
pavement cutter	gas	27	50%	1			1	1	20	Jan-2008	Jan-2008
trailers - delivery of pipe	diesel	500	75%	1	1	2			20	Mar-2008	Aug-2008
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Mar-2008	Sep-2008
tamper	diesel	25	75%	1			1	1	20	May-2008	Sep-2008
20 yd dump trucks - supply of gravel & fill	diesel	400	75%	10	10	10			20	Apr-2008	Sep-2008
SITE IMPROVEMENTS/STREETSCAPE			160						8		
trailers - delivery of material	diesel	500	75%	0.5	0.5	1			20	Aug-2008	Nov-2008
concrete truck	diesel	450	100%	1	1	3			20	Aug-2008	Nov-2008
rebar bender	electric	10	50%	1			1	1	20	Aug-2008	Nov-2008
portable cement mixer	gas	5	50%	1			1	1	20	Aug-2008	Nov-2008
unit paver cutter	electric	20	50%	1			1	1	20	Aug-2008	Nov-2008
20 yd dump trucks - delivery of asphalt	diesel	400	25%	10	10	10			20	Sep-2008	Nov-2008
asphalt paving equipment	diesel	300	25%	1			1	1	20	Sep-2008	Nov-2008
tamper	diesel	25	75%	1			1	1	20	Sep-2008	Nov-2008
roller	diesel	350	25%	1			1	1	20	Sep-2008	Nov-2008
trash hauling	diesel	400	100%	0.5	0.5	1			20	Jan-2008	Nov-2008
fuel trucks - 1 every 2 weeks on average	gas	400	100%	0.025	0.025	1			20	Jan-2008	Nov-2008
rubber tire crane	diesel	300	25%	1			1	1	20	Mar-2008	Nov-2008
miscellaneous equipment										Jan-2008	Nov-2008
chain saw	gas	3	20%	4			2	2	20	Jan-2008	Nov-2008
compressor	gas	5	40%	4			4	4	20	Jan-2008	Nov-2008
generator	gas	10	40%	4			4	4	20	Jan-2008	Nov-2008
jack hammer	air	0	20%	4			4	4	20	Jan-2008	Oct-2008
portable water pump	electric	15	5%	2			2	2	20	Jan-2008	Nov-2008
circular saw	electric	1.5	25%	4			4	4	20	Jan-2008	Nov-2008

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
Package B	**5 levels**										
Below grade space + F	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
aka Phase I Factory					equip.	peak day	equip.	peak day			
SITE DEMOLITION			280						14		
20 yd dump trucks	diesel	400	75%	30	30	30			20	Mar-2008	Apr-2009
excavator	diesel	200	75%	3			3	3	20	Mar-2008	Apr-2009
INSTALL 70' SLURRY WALL @ PERIMETER			240						12		
20 yd dump trucks	diesel	400	75%	7.4	7.4	14.8			20	Oct-2008	Sep-2009
concrete truck	diesel	450	75%	14.9	14.9	14.9			20	Oct-2008	Sep-2009
trailers of steel - rebar	diesel	500	50%	4.7	2.3	4.6			20	Oct-2008	Sep-2009
rebar bender	electric	200	50%	6			6	6	20	Oct-2008	Sep-2009
arc welder	electric	20	50%	6			6	6	20	Oct-2008	Sep-2009
skylift forklift	gas	200	40%	4			4	4	20	Oct-2008	Sep-2009
375 HP air compresser	diesel	375	50%	4			4	4	20	Oct-2008	Sep-2009
40 ton hydraulic crane (handling rebar cages)	diesel	450	50%	3			1	1	20	Oct-2008	Sep-2009
bull dozer	diesel	400	25%	3			1	1	20	Oct-2008	Sep-2009
slurry supply system	diesel	400	25%	3			1	1	20	Oct-2008	Sep-2009
crawler crane (handling slurry /clamshell machine)	diesel	450	75%	3			1	1	20	Oct-2008	Sep-2009
EXCAVATE WITHIN SLURRY WALL			400						20		
20 yd dump trucks	diesel	400	75%	123	123	123			20	Oct-2009	Dec-2011
excavator	diesel	200	75%	3			3	3	20	Oct-2009	Dec-2011
drilling rig (not really needed - no rock)	diesel	250	75%	0			0	2	20	Oct-2009	Dec-2011
compressors	diesel	250	90%	3			3	2	20	Oct-2009	Dec-2011
CONSTRUCT BELOW GRADE SUPERSTRUCTURE			140						7		
structure											
concrete truck	diesel	450	90%	18	18	90			20	Aug-2009	Feb-2012
concrete pump	diesel	400	90%	2			0.4	2	20	Aug-2009	Feb-2012
trailers of steel	diesel	500	50%	3	3	7.5			20	Aug-2009	Feb-2012
crawler crane	diesel	450	90%	1			1	1	20	Aug-2009	Feb-2012
rebar bender	electric	200	50%	1			1	1	20	Aug-2009	Feb-2012
arc welder	electric	20	50%	1			1	1	20	Aug-2009	Feb-2012
troweling machine	gas	11	50%	2			2	2	20	Aug-2009	Feb-2012
below grade support system											
concrete truck	diesel	450	90%	1	1	5			20	Apr-2009	Sep-2009
concrete pump	diesel	400	21%	1			0.2	1	20	Apr-2009	Sep-2009
trailers of steel	diesel	500	100%	1	1	2.5			20	Apr-2009	Sep-2009
rebar bender	electric	200	50%	2			2	2	20	Apr-2009	Sep-2009
arc welder	electric	20	50%	2			2	2	20	Apr-2009	Sep-2009
pile driving rig	diesel	450	90%	4			4	4	20	Apr-2009	Sep-2009
MEP			420						21		
plumbing deliveries	diesel	500	100%	0.13	0.13	2			20	Jul-2010	Dec-2012
sprinkler deliveries	diesel	500	100%	0.09	0.09	2			20	Jul-2010	Dec-2012
HVAC - deliveries	diesel	500	100%	0.38	0.38	2			20	Jul-2010	Dec-2012
electric - deliveries	diesel	500	100%	0.25	0.25	2			20	Jul-2010	Dec-2012
scissor lift	electric	20	50%	4			4	4	20	Jul-2010	Dec-2012
forklift	air	250	50%	1			1	1	20	Jul-2010	Dec-2012
										Jul-2010	Dec-2012
BELOW GRADE INTERIORS / FIT-OUT			420						21		
drywall trailers	diesel	500	100%	0.02	0.02	1			20	Jul-2010	Dec-2012
additional interiors - box trailer	diesel	500	100%	0.1	0.1	1			20	Jul-2010	Dec-2012
scissor lift	electric	20	50%	4			4	4	20	Jul-2010	Dec-2012
forklift	air	250	50%	1.00			1	1	20	Jul-2010	Dec-2012
FF&E deliveries	diesel	500	100%	0.02	0.02	1			20	Jul-2010	Dec-2012
trash hauling - 3 loads per day	diesel	400	100%	1	1	1			20	Mar-2008	Dec-2012
fuel trucks - 1 every 2 weeks on average	gas	400	100%	0.5	0.5	1			20	Mar-2008	Sep-2011
tower crane	electric	200 amp	90%	1			1	1	20	Mar-2011	Sep-2011
rubber tire crane	diesel	350	50%	1			1	1	20	Oct-2008	Sep-2009
dual hoist	electric	100 amp	90%	1			1	1	20	Mar-2011	Dec-2012
miscellaneous equipment											
chain saw	gas	3	20%	4			4	4	20	Mar-2008	May-2010
compressor	gas	5	40%	6			6	6	20	Mar-2008	Sep-2011
generator	gas	10	40%	4			4	4	20	Mar-2008	Sep-2011
impact wrench	air	0	20%	8			8	8	20	Nov-2009	May-2010
jack hammer	air	0	20%	4			4	4	20	Mar-2008	May-2010
table saw	electric	5	20%	8			8	8	20	Nov-2009	Sep-2011
portable water pump	electric	15	5%	4			4	4	20	Mar-2008	May-2010
circular saw	electric	1.5	25%	15			15	15	20	Mar-2008	Jun-2010
Package C	**10 levels**	**260' high**									
#2 Science building	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
aka Mind Brain Behavior Center					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			220						11		
concrete truck	diesel	450		4	4	20			20	Jan-2011	Nov-2011
concrete pump	diesel	400	90%	1			0.2	1	20	Jan-2011	Nov-2011
trailers of steel	diesel	500		3	3	7.5			20	Jan-2011	Nov-2011
rebar bender	electric	200	50%	1			1	1	20	Jan-2011	Nov-2011

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
arc welder	electric	20	50%	2			2	2	20	Jan-2011	Nov-2011
troweling machine	gas	11	50%	2			2	2	20	Jan-2011	Nov-2011
MEP			500						25		
plumbing deliveries	diesel	500		0.08	0.08	2			20	Jul-2011	Jul-2013
sprinkler deliveries	diesel	500		0.06	0.06	2			20	Jul-2011	Jul-2013
HVAC - deliveries	diesel	500		0.23	0.23	2			20	Jul-2011	Jul-2013
electric - deliveries	diesel	500		0.11	0.11	2			20	Jul-2011	Jul-2013
scissor lift	electric	20	50%	4			4	4	20	Jul-2011	Jul-2013
forklift	air	250	50%	1.00			1	1	20	Jul-2011	Jul-2013
BUILDING ENCLOSURE & ROOFING			240						12		
man-days				76					20	Aug-2011	Jul-2012
trailers	diesel	500		0.5	0.5	2			20	Aug-2011	Jul-2012
INTERIORS / FIT-OUT			360						18		
drywall trailers	diesel	500		0.01	0.01	1			20	Aug-2011	Aug-2013
additional interiors - box trailer	diesel	500		0.05	0.05	1			20	Aug-2011	Aug-2013
FF&E	diesel	500		0.03	0.03	1			20	Aug-2011	Aug-2013
scissor lift	electric	20	50%	4			4	4	20	Aug-2011	Aug-2013
forklift	air	250	50%	1.00			1	1	20	Aug-2011	Aug-2013
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2011	Aug-2013
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2011	Mar-2012
tower crane	electric	200amp	90%	1			1	1	20	Jan-2011	Aug-2012
dual hoist	electric	100amp	90%	1			1	1	20	Jan-2011	Aug-2013
miscellaneous equipment											
chain saw	gas	3	20%	2			2	2	20	Jan-2011	Mar-2011
compressor	gas	5	40%	2			2	2	20	Jan-2011	Jun-2011
generator	gas	10	40%	2			2	2	20	Jan-2011	Jun-2011
impact wrench	air	0	20%	6			6	6	20	Jan-2011	Nov-2011
jack hammer	air	0	20%	2			2	2	20	Jan-2011	Jun-2011
table saw	electric	5	20%	2			2	2	20	Feb-2012	Sep-2012
portable water pump	electric	15	5%	1			1	1	20	Jan-2011	Jul-2011
circular saw	electric	1.5	25%	6			6	6	20	Jan-2011	Aug-2013
Package D	**8 levels**	**180' high**									
#3 Academic building	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
aka Lantern Building					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			120						6	Jul-2011	Oct-2011
concrete truck	diesel	450		1	1	5			20	Mar-2011	Aug-2011
concrete pump	diesel	400	21%	1			0.2	1	20	Mar-2011	Aug-2011
rebar bender	electric	200	50%	1			1	1	20	Mar-2011	Aug-2011
arc welder	electric	20	50%	2			2	2	20	Mar-2011	Aug-2011
troweling machine	diesel	200	50%	2			2	2	20	Mar-2011	Aug-2011
trailers of steel	diesel	500		1	1	2.5			20	Mar-2011	Aug-2011
MEP			260						13		
plumbing deliveries	diesel	500		0.09	0.09	2			20	Sep-2011	Sep-2012
sprinkler deliveries	diesel	500		0.09	0.09	2			20	Sep-2011	Sep-2012
HVAC - deliveries	diesel	500		0.21	0.21	2			20	Sep-2011	Sep-2012
electric - deliveries	diesel	500		0.24	0.24	2			20	Sep-2011	Sep-2012
scissor lift	electric	20	50%	4			4	4	20	Sep-2011	Sep-2012
forklift	air	250	50%	1.00			1	1	20	Sep-2011	Sep-2012
BUILDING ENCLOSURE & ROOFING			120						6		
trailers	diesel	500		0.5	0.5	2			20	Sep-2011	Feb-2012
INTERIORS / FIT-OUT			280						14		
drywall trailers	diesel	500		0.01	0.01	1			20	Aug-2011	Sep-2012
additional interiors - box trailer	diesel	500		0.02	0.02	1			20	Aug-2011	Sep-2012
FF&E	diesel	500		0.04	0.04	1			20	Aug-2011	Sep-2012
scissor lift	electric	20	50%	4			4	4	20	Aug-2011	Sep-2012
forklift	air	250	50%	1.00			1	1	20	Aug-2011	Sep-2012
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Mar-2011	Sep-2012
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Mar-2011	Jun-2012
tower crane	electric	200amp	90%	1			1	1	20	Mar-2011	Jan-2012
dual hoist	electric	100amp	90%	1			1	1	20	Mar-2011	May-2012
miscellaneous equipment											
chain saw	gas	3	20%	2			2	2	20	Mar-2011	May-2011
compressor	gas	5	40%	2			2	2	20	Mar-2011	Sep-2012
generator	gas	10	40%	2			2	2	20	Mar-2011	Sep-2012
impact wrench	air	0	20%	6			6	6	20	Mar-2011	Sep-2012
jack hammer	air	0	20%	2			2	2	20	Mar-2011	Sep-2012
table saw	electric	5	20%	2			2	2	20	Jul-2011	Sep-2012
portable water pump	electric	15	5%	1			1	1	20	Mar-2011	Dec-2011
circular saw	electric	1.5	25%	6			6	6	20	Mar-2011	Sep-2012
Package E	**13 levels**	**240' high**									
#4 Academic building (business school)	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
aka Business School Building					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			440						22		
concrete truck	diesel	450		4	4	20			20	Feb-2011	Nov-2012

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
concrete pump	diesel	400	90%	1			0.2	1	20	Feb-2011	Nov-2012
rebar bender	electric	200	50%	1			1	1	20	Feb-2011	Nov-2012
arc welder	electric	20	50%	2			2	2	20	Feb-2011	Nov-2012
troweling machine	gas	11	50%	2			2	2	20	Feb-2011	Nov-2012
trailers of steel	diesel	500		3	3	7.5			20	Feb-2011	Nov-2012
MEP			520						26		
plumbing deliveries	diesel	500		0.08	0.08	2			20	Jul-2011	Aug-2013
sprinkler deliveries	diesel	500		0.06	0.06	2			20	Jul-2011	Aug-2013
HVAC - deliveries	diesel	500		0.23	0.23	2			20	Jul-2011	Aug-2013
electric - deliveries	diesel	500		0.11	0.11	2			20	Jul-2011	Aug-2013
scissor lift	electric	20	50%	4			4	4	20	Jul-2011	Aug-2013
forklift	air	250	50%	1.00			1	1	20	Jul-2011	Aug-2013
BUILDING ENCLOSURE & ROOFING			300						15		
trailers	diesel	500		0.5	0.5	2			20	Jun-2011	Aug-2012
INTERIORS / FIT-OUT			480						24		
drywall trailers	diesel	500		0.01	0.01	1			20	Sep-2011	Aug-2013
additional interiors - box trailer	diesel	500		0.06	0.06	1			20	Sep-2011	Aug-2013
FF&E	diesel	500		0.04	0.04	1			20	Sep-2011	Aug-2013
scissor lift	electric	20	50%	4			4	4	20	Sep-2011	Aug-2013
forklift	air	250	50%	1.00			1	1	20	Sep-2011	Aug-2013
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Feb-2011	Sep-2012
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Feb-2011	Mar-2012
tower crane	electric	200amp	90%	1			1	1	20	Feb-2011	Sep-2012
dual hoist	electric	100amp	90%	1			1	1	20	Feb-2011	Apr-2013
miscellaneous equipment											
chain saw	gas	3	20%	2			2	2	20	Feb-2011	Sep-2012
compressor	gas	5	40%	2			2	2	20	Feb-2011	Sep-2012
generator	gas	10	40%	2			2	2	20	Feb-2011	Sep-2012
impact wrench	air	0	20%	6			6	6	20	Feb-2011	Nov-2012
jack hammer	air	0	20%	2			2	2	20	Feb-2011	Sep-2012
table saw	electric	5	20%	2			2	2	20	Sep-2011	Sep-2012
portable water pump	electric	15	5%	1			1	1	20	Feb-2011	Sep-2012
circular saw	electric	1.5	25%	6			6	6	20	Feb-2011	Aug-2013
Package G	**13 levels**	**316' high**									
#6 & 6B Science/Academic building	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			180						9		
concrete truck	diesel	450	1	4	4	20			20	Apr-2013	Dec-2013
concrete pump	diesel	400	90%	1			0.2	1	20	Apr-2013	Dec-2013
rebar bender	electric	200	50%	1			1	1	20	Apr-2013	Dec-2013
arc welder	electric	20	50%	2			2	2	20	Apr-2013	Dec-2013
troweling machine	gas	11	50%	2			2	2	20	Apr-2013	Dec-2013
trailers of steel	diesel	500	1	3	3	7.5			20	Apr-2013	Dec-2013
MEP			580						29		
plumbing deliveries	diesel	500	1	0.05	0.05	2			20	Aug-2013	Dec-2015
sprinkler deliveries	diesel	500	1	0.05	0.05	2			20	Aug-2013	Dec-2015
HVAC - deliveries	diesel	500	1	0.11	0.11	2			20	Aug-2013	Dec-2015
electric - deliveries	diesel	500	1	0.12	0.12	2			20	Aug-2013	Dec-2015
scissor lift	electric	20	50%	4			4	4	20	Aug-2013	Dec-2015
forklift	air	250	50%	1.00			1	1	20	Aug-2013	Dec-2015
BUILDING ENCLOSURE & ROOFING			260						13		
trailers	diesel	500		0.5	0.5	2			20	Jul-2013	Jul-2014
INTERIORS / FIT-OUT			560						28		
drywall trailers	diesel	500	1	0.02	0.02	1			20	Sep-2013	Dec-2015
additional interiors - box trailer	diesel	500	1	0.07	0.07	1			20	Sep-2013	Dec-2015
FF&E	diesel	500	1	0.03	0.03	1			20	Sep-2013	Dec-2015
scissor lift	electric	20	50%	4			4	4	20	Sep-2013	Dec-2015
forklift	air	250	50%	1.00			1	1	20	Sep-2013	Dec-2015
trash hauling - 3 loads per day	diesel	400	1	3	3	1			20	Apr-2013	Dec-2015
fuel trucks - 1 every 2 weeks on average	gas	400	1	0.5	0.5	1			20	Apr-2013	Jun-2015
tower crane	electric	200amp	90%	1			1	1	20	Apr-2013	Sep-2014
dual hoist	electric	100amp	90%	1			1	1	20	Apr-2013	Jan-2015
miscellaneous equipment										May-2013	Dec-2015
chain saw	gas	3	20%	2			2	2	20	Apr-2013	Dec-2015
compressor	gas	5	40%	2			2	2	20	Apr-2013	Dec-2015
generator	gas	10	40%	2			2	2	20	Apr-2013	Dec-2015
impact wrench	air	0	20%	6			6	6	20	Apr-2013	Dec-2015
jack hammer	air	0	20%	2			2	2	20	Apr-2013	Dec-2015
table saw	electric	5	20%	2			2	2	20	Sep-2013	May-2016
portable water pump	electric	15	5%	1			1	1	20	Apr-2013	Dec-2015
circular saw	electric	1.5	25%	6			6	6	20	Apr-2013	Dec-2015

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
Package H											
The Square	engine type	horse power	duration	equipment per day					days per month		
CONSTRUCT SUPERSTRUCTURE			60						3		
concrete truck	diesel	450	1	1	1	5			20	Feb-2015	Apr-2015
concrete pump	diesel	400	21%	1			0.2	1	20	Feb-2015	Apr-2015
trailers of steel	diesel	500	1	1	1	2.5			20	Feb-2015	Apr-2015
rebar bender	electric	200	50%	1			1	1	20	Feb-2015	Apr-2015
arc welder	electric	20	50%	2			2	2	20	Feb-2015	Apr-2015
troweling machine	gas	11	50%	2			2	2	20	Feb-2015	Apr-2015
MEP			80						4		
plumbing deliveries	diesel	500	1	0.10	0.1	2			20	Apr-2015	Jul-2015
sprinkler deliveries	diesel	500	1	-	0	0			20	Apr-2015	Jul-2015
HVAC - deliveries	diesel	500	1	-	0	0			20	Apr-2015	Jul-2015
electric - deliveries	diesel	500	1	0.38	0.38	2			20	Apr-2015	Jul-2015
forklift	air	250	50%	1.00			1	1	20	Apr-2015	Jul-2015
SITE IMPROVEMENTS/STREETSCAPE			160						8		
trailers - delivery of material	diesel	500	1	0.5	0.5	1			20	May-2015	Dec-2015
concrete truck	diesel	450	1	1	1	3			20	May-2015	Dec-2015
rebar bender	electric	200	50%	1			1	1	20	May-2015	Dec-2015
cement mixer	gas	200	50%	1			1	1	20	May-2015	Dec-2015
unit paver cutter	electric	20	50%	1			1	1	20	May-2015	Dec-2015
20 yd dump trucks - delivery of asphalt	diesel	400	1	10	10	10			20	May-2015	Dec-2015
asphalt laying equipment	diesel	300	25%	1			1	1	20	May-2015	Dec-2015
tamper	diesel	25	75%	1			1	1	20	May-2015	Dec-2015
roller	diesel	350	25%	1			1	1	20	May-2015	Dec-2015
trash hauling - 3 loads per day	diesel	400	1	3	3	1			20	Feb-2015	Dec-2015
fuel trucks - 1 every 2 weeks on average	gas	400	1	0.025	0.025	1			20	Feb-2015	Dec-2015
rubber tire crane	diesel	350	25%	1			1	1	20	Feb-2015	Dec-2015
backhoe	diesel	200	50%	1			1	1	20	Feb-2015	Dec-2015
miscellaneous equipment										Feb-2015	Dec-2015
chain saw	gas	3	20%	2			2	2	20	Feb-2015	Dec-2015
compressor	gas	5	40%	1			1	1	20	Feb-2015	Dec-2015
generator	gas	10	40%	1			1	1	20	Feb-2015	Dec-2015
impact wrench	air	0	20%	0			0	0	20	Feb-2015	Dec-2015
jack hammer	air	0	20%	2			2	2	20	Feb-2015	Dec-2015
table saw	electric	5	20%	0			0	0	20	Feb-2015	Dec-2015
portable water pump	electric	15	5%	1			1	1	20	Feb-2015	Dec-2015
circular saw	electric	1.5	25%	6			6	6	20	Feb-2015	Dec-2015
Package I	**14 levels**	**250' high**									
#7 Residential building	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Sep-2013	Mar-2017
					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			120						6		
man-days				53					20	Jun-2012	Nov-2012
concrete truck	diesel	450		2	2	10			20	Jan-2012	Jun-2012
concrete pump	diesel	400	42%	1			0.2	1	20	Jan-2012	Jun-2012
trailers of steel	diesel	500		2	2	5			20	Jan-2012	Jun-2012
rebar bender	electric	200	50%	1			1	1	20	Jan-2012	Jun-2012
arc welder	electric	20	50%	2			2	2	20	Jan-2012	Jun-2012
troweling machine	gas	11	50%	2			2	2	20	Jan-2012	Jun-2012
										Jan-2012	Jun-2012
MEP			440						22		
man-days				20					20		
plumbing deliveries	diesel	500		0.06	0.06	2			20	Mar-2012	Dec-2013
sprinkler deliveries	diesel	500		0.06	0.06	2			20	Mar-2012	Dec-2013
HVAC - deliveries	diesel	500		0.15	0.15	2			20	Mar-2012	Dec-2013
electric - deliveries	diesel	500		0.16	0.16	2			20	Mar-2012	Dec-2013
scissor lift	electric	20	50%	4			4	4	20	Mar-2012	Dec-2013
forklift	air	250	50%	1			1	1	20	Mar-2012	Dec-2013
										Mar-2012	Dec-2013
BUILDING ENCLOSURE & ROOFING			160						8		
man-days				49					20		
trailers	diesel	500		0.5	0.5	2			20	Feb-2012	Sep-2012
										Feb-2012	Sep-2012
INTERIORS / FIT-OUT			420						21		
man-days				41					20		
drywall trailers	diesel	500		0.01	0.01	1			20	Apr-2012	Dec-2013
additional interiors - box trailer	diesel	500		0.03	0.03	1			20	Apr-2012	Dec-2013
FF&E	diesel	500		0.05	0.05	1			20	Apr-2012	Dec-2013
scissor lift	electric	20	50%	4			4	4	20	Apr-2012	Dec-2013
forklift	air	250	50%	1.00			1	1	20	Apr-2012	Dec-2013
										Apr-2012	Dec-2013
trash hauling - 3 loads per day	diesel	400		3	3	1			20		
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2012	Dec-2013
tower crane	electric	200 amp	90%	1			1	1	20	Jan-2012	Jun-2013
dual hoist	electric	100 amp	90%	1			1	1	20	Jan-2012	Nov-2012
										Jan-2012	Mar-2013
miscellaneous equipment											
chain saw	gas	3	20%	2			2	2	20	Jan-2012	Dec-2013
compressor	gas	5	40%	2			2	2	20	Jan-2012	Dec-2013
compressor	electric	5	40%	2			2	2	20	Jan-2012	Dec-2013

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
generator	gas	10	40%	2			2	2	20	May-2012	Apr-2014
impact wrench	air	0	20%	6			6	6	0	Jan-2012	Dec-2013
jack hammer	air	0	20%	2			2	2	20	Jan-2012	Dec-2013
table saw	electric	5	20%	2			2	2	20	Jan-2012	Dec-2013
portable water pump	electric	15	5%	1			1	1	20	Jan-2012	Dec-2013
circular saw	electric	1.5	25%	8			8	8	20	Jan-2012	Dec-2013
										Jan-2012	Dec-2013
Package J	**7 levels**										
Below grade space	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
aka Phase III Factory					equip.	peak day	equip.	peak day			
SITE DEMOLITION			180						9.0		
20 yd dump trucks	diesel	400		10	10	10			20	Jan-2020	Sep-2020
excavator	diesel	200	75%	1			1	1	20	Jan-2020	Sep-2020
REMOVAL/RELOCATION OF EXISTING UTILITIES			180						9		
20 yd dump trucks	diesel	400		65	65	65			20	Feb-2020	Oct-2020
excavator	diesel	200	75%	1			1	1	20	Feb-2020	Oct-2020
trailers - delivery of pipe	diesel	500	50%	1	1	2			20	Feb-2020	Oct-2020
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Feb-2020	Oct-2020
tamper	diesel	25	75%	1			1	1	20	Feb-2020	Oct-2020
20 yd dump trucks - supply of gravel & fill	diesel	400		32	32	32			20	Feb-2020	Oct-2020
site utilities trucks	diesel	400		0.24	0.24	0.24			20	Feb-2020	Oct-2020
electric trucks	diesel	400		0.12	0.12	0.12			20	Feb-2020	Oct-2020
INSTALL 70' SLURRY WALL @ PERIMETER			340						17.0		
20 yd dump trucks	diesel	400		1.6	1.6	16			20	Jul-2020	Nov-2021
concrete truck	diesel	450		6	6	6			20	Jul-2020	Nov-2021
trailers of steel - rebar	diesel	500		0.9	0.9	4.5			20	Jul-2020	Nov-2021
rebar bender	electric	200	50%	1			1	1	20	Jul-2020	Nov-2021
arc welder	electric	20	50%	2			2	2	20	Jul-2020	Nov-2021
skylift forklift	gas	200	40%	2			2	2	20	Jul-2020	Nov-2021
375 HP air compresser	diesel	375	50%	2			2	2	20	Jul-2020	Nov-2021
40 ton hydraulic crane (handling rebar cages)	diesel	450	50%	1			1	1	20	Jul-2020	Nov-2021
bull dozer	diesel	400	25%	1			1	1	20	Jul-2020	Nov-2021
slurry supply system	diesel	400	50%	1			1	1	20	Jul-2020	Nov-2021
crawler crane	diesel	450	90%	1			1	1	20	Jul-2020	Nov-2021
EXCAVATE WITHIN SLURRY WALL			220						11.0		
20 yd dump trucks	diesel	400		203	203	203			20	May-2021	Mar-2022
excavator	diesel	200	75%	2			2	2	20	May-2021	Mar-2022
drilling rig - some rock below grade	diesel	250	75%	2			2	2	20	May-2021	Mar-2022
compressors	diesel	250	90%	2			2	2	20	May-2021	Mar-2022
CONSTRUCT BELOW GRADE SUPERSTRUCTURE			130						6.5		
structure											
concrete truck	diesel	450		27.2	27.2	136			20	Nov-2021	May-2022
concrete pump	diesel	400	90%	1			0.2	1	20	Nov-2021	May-2022
trailers of steel	diesel	500		4.3	4.3	10.75			20	Nov-2021	May-2022
crawler crane	diesel	450	90%	1			1	1	20	Nov-2021	May-2022
rebar bender	electric	200	50%	1			1	1	20	Nov-2021	May-2022
arc welder	electric	20	50%	2			2	2	20	Nov-2021	May-2022
troweling machine	gas	11	50%	2			2	2	20	Nov-2021	May-2022
piles:											
concrete truck	diesel	450		2.4	2.4	12			20	Nov-2021	May-2022
concrete pump	diesel	400	50%	1			0.2	1	20	Nov-2021	May-2022
trailers of steel	diesel	500		2	2	5			20	Nov-2021	May-2022
rebar bender	electric	200	50%	1			1	1	20	Nov-2021	May-2022
arc welder	electric	20	50%	2			2	2	20	Nov-2021	May-2022
pile rig	diesel	450	90%	1			1	1	20	Nov-2021	May-2022
RESTORE EXISTING UTILITIES			180						9		
20 yd dump trucks	diesel	400		65	65	65			20	May-2022	Jan-2023
excavator	diesel	200	75%	1			1	1	20	May-2022	Jan-2023
trailers - delivery of pipe	diesel	500	50%	1	1	2			20	May-2022	Jan-2023
excavator - setting of pipe	diesel	200	50%	1			1	1	20	May-2022	Jan-2023
tamper	diesel	25	75%	1			1	1	20	May-2022	Jan-2023
20 yd dump trucks - supply of gravel & fill	diesel	400		32	32	32			20	May-2022	Jan-2023
site utilities trucks	diesel	400		0.30	0.3	0.3			20	May-2022	Jan-2023
electric trucks	diesel	400		0.21	0.21	0.21			20	May-2022	Jan-2023
SITE IMPROVEMENTS/STREETSCAPE			180						9		
trailers - delivery of material	diesel	500	100%	0.5	0.5	1			20	Jul-2022	Mar-2023
concrete truck	diesel	450	100%	1	1	3			20	Jul-2022	Mar-2023
rebar bender	electric	200	50%	1			1	1	20	Jul-2022	Mar-2023
cement mixer	gas	200	50%	1			1	1	20	Jul-2022	Mar-2023
unit paver cutter	electric	20	50%	1			1	1	20	Jul-2022	Mar-2023
20 yd dump trucks - delivery of asphalt	diesel	400	100%	10	10	10			20	Jul-2022	Mar-2023
asphalt laying equipment	diesel	300	25%	1			1	1	20	Jul-2022	Mar-2023
tamper	diesel	25	75%	1			1	1	20	Jul-2022	Mar-2023
roller	diesel	350	25%	1			1	1	20	Jul-2022	Mar-2023
MEP			280						14.0		
plumbing deliveries	diesel	500		0.10	0.1	2			20	Feb-2022	Mar-2023
sprinkler deliveries	diesel	500		0.20	0.2	2			20	Feb-2022	Mar-2023
HVAC - deliveries	diesel	500		0.20	0.2	2			20	Feb-2022	Mar-2023
electric - deliveries	diesel	500		0.20	0.2	2			20	Feb-2022	Mar-2023
scissor lift	electric	20	50%	4			4	4	20	Feb-2022	Mar-2023

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
forklift	air	250	50%	1.00			1	1	20	Feb-2022	Mar-2023
BELOW GRADE INTERIORS / FIT-OUT			280						14.0		
drywall trailers	diesel	500		0.02	0.02	1			20	Feb-2022	Mar-2023
additional interiors - box trailer	diesel	500		0.09	0.09	1			20	Feb-2022	Mar-2023
FF&E	diesel	500		0.03	0.03	1			20	Feb-2022	Mar-2023
scissor lift	electric	20	50%	4			4	4	20	Feb-2022	Mar-2023
forklift	air	250	50%	1.00			1	1	20	Feb-2022	Mar-2023
trash hauling - 3 loads per day	diesel	400		4	4	1			20	Jan-2020	Mar-2023
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2020	Mar-2023
tower crane	electric	200 amp	90%	0			0	0	20	Feb-2022	Mar-2023
rubber tire crane	diesel	350	50%	2			2	2	20	Jan-2020	Mar-2023
dual hoist	electric	100 amp	90%	1			1	1	20	Nov-2021	Jan-2023
miscellaneous equipment										Jan-2020	Mar-2023
chain saw	gas	3	20%	4			4	4	20	Jan-2020	Mar-2023
compressor	gas	5	40%	6			6	6	20	Jan-2020	Mar-2023
compressor	gas	5	40%	6			6	6	20	Mar-2022	#REF!
generator	gas	10	40%	4			4	4	20	Jan-2020	Mar-2023
impact wrench	air	0	20%	8			8	8	20	Nov-2021	#REF!
jack hammer	air	0	20%	4			4	4	20	Jan-2020	Mar-2023
table saw	electric	5	20%	8			8	8	20	Feb-2022	#REF!
portable water pump	electric	15	5%	4			4	4	20	Jan-2020	Mar-2023
circular saw	electric	1.5	25%	15			15	15	20	Jan-2020	Mar-2023
Package K	**13 levels**	**330' high**									
#8 Science building	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			160						8	Aug-2023	Feb-2024
concrete truck	diesel	450		3	3	15			20	Jan-2023	Aug-2023
concrete pump	diesel	400	63%	1			0.2	1	20	Jan-2023	Aug-2023
trailers of steel	diesel	500		2	2	5			20	Jan-2023	Aug-2023
rebar bender	diesel	200	50%	1			1	1	20	Jan-2023	Aug-2023
arc welder	electric	20	50%	2			2	2	20	Jan-2023	Aug-2023
troweling machine	diesel	200	50%	2			2	2	20	Jan-2023	Aug-2023
MEP			520						26		
plumbing	diesel	500		0.08	0.08	2			20	May-2023	Jun-2025
sprinkler	diesel	500		0.05	0.05	2			20	May-2023	Jun-2025
HVAC	diesel	500		0.22	0.22	2			20	May-2023	Jun-2025
electric	diesel	500		0.11	0.11	2			20	May-2023	Jun-2025
scissor lift	electric	20	50%	4			4	4	20	May-2023	Jun-2025
NG Forklift	gas	250	50%	1.00			1	1	20	May-2023	Jun-2025
BUILDING ENCLOSURE & ROOFING			220						11		
trailers	diesel	500		0.5	0.5	1			20	Mar-2023	Jan-2024
INTERIORS / FIT-OUT			520						26		
drywall trailers	diesel	500		0.01	0.01	1			20	May-2023	Jun-2025
additional interiors - box trailer	diesel	500		0.05	0.05	1			20	May-2023	Jun-2025
FF&E	diesel	500		0.04	0.04	1			20	May-2023	Jun-2025
scissor lift	electric	20	50%	4			4	4	20	May-2023	Jun-2025
NG Forklift	gas	250	50%	1.00			1	1	20	May-2023	Jun-2025
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2023	Jun-2025
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2023	Dec-2024
tower crane	electric	200 amp	90%	1			1	1	20	Jan-2023	Mar-2024
dual hoist	electric	100 amp	90%	1			1	1	20	Jan-2023	Jul-2024
miscellaneous equipment										Jan-2023	Jun-2025
chain saw	gas	3	20%	2			2	2	20	Jan-2023	Sep-2023
compressor	gas	5	40%	2			2	2	20	Jan-2023	Jun-2025
generator	gas	10	40%	2			2	2	20	Jan-2023	Jun-2025
impact wrench	air	0	20%	6			6	6	20	Jan-2023	Aug-2023
jack hammer	air	0	20%	2			2	2	20	Jan-2023	Jun-2025
table saw	electric	5	20%	2			2	2	20	May-2023	Jan-2024
portable water pump	electric	15	5%	1			1	1	20	Jan-2023	Feb-2024
circular saw	electric	1.5	25%	8			8	8	20	May-2023	Jun-2025
Package L	**10 levels**	**245' high**									
#9 Recreational building	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			120						6	Jun-2023	Oct-2023
concrete truck	diesel	450		3	3	15			20	Jan-2023	Jun-2023
concrete pump	diesel	400	63%	1			0.2	1	20	Jan-2023	Jun-2023
trailers of steel	diesel	500		2	2	5			20	Jan-2023	Jun-2023
rebar bender	electric	200	50%	1			1	1	20	Jan-2023	Jun-2023
arc welder	electric	20	50%	2			2	2	20	Jan-2023	Jun-2023
troweling machine	gas	11	50%	2			2	2	20	Jan-2023	Jun-2023
MEP			300						15		

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
plumbing	diesel	500		0.11	0.11	2			20	Apr-2023	Jun-2024
sprinkler	diesel	500		0.09	0.09	2			20	Apr-2023	Jun-2024
HVAC	diesel	500		0.21	0.21	2			20	Apr-2023	Jun-2024
electric	diesel	500		0.24	0.24	2			20	Apr-2023	Jun-2024
scissor lift	electric	20	50%	4			4	4	20	Apr-2023	Jun-2024
forklift	air	250	50%	1.00			1	1	20	Apr-2023	Jun-2024
BUILDING ENCLOSURE & ROOFING			160						8		
trailers	diesel	500		0.5	0.5	1			20	Mar-2023	Oct-2023
INTERIORS / FIT-OUT			280						14		
drywall trailers	diesel	500		0.02	0.02	1			20	May-2023	Jun-2024
additional interiors - box trailer	diesel	500		0.07	0.07	1			20	May-2023	Jun-2024
FF&E	diesel	500		0.06	0.06	1			20	May-2023	Jun-2024
scissor lift	electric	20	50%	4			4	4	20	May-2023	Jun-2024
forklift	air	250	50%	1.00			1	1	20	May-2023	Jun-2024
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2023	Jun-2024
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2023	Mar-2024
tower crane	electric	200 amp	90%	1			1	1	20	Jan-2023	Dec-2023
dual hoist	electric	100 amp	90%	1			1	1	20	Jan-2023	Feb-2024
miscellaneous equipment										Jan-2023	Jun-2024
chain saw	gas	3	20%	2			2	2	20	Jan-2023	Jun-2024
compressor	gas	5	40%	2			2	2	20	Jan-2023	Jun-2024
generator	gas	10	40%	2			2	2	20	Jan-2023	Jun-2024
impact wrench	air	0	20%	6			6	6	20	Jan-2023	Jun-2024
jack hammer	air	0	20%	2			2	2	20	Jan-2023	Jun-2024
table saw	electric	5	20%	2			2	2	20	May-2023	Oct-2024
portable water pump	electric	15	5%	1			1	1	20	Jan-2023	Jun-2024
circular saw	electric	1.5	25%	8			8	8	20	May-2023	Oct-2024
Package M	**13 levels**	**260' high**									
#10 Academic Building	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
CONSTRUCT SUPERSTRUCTURE			120						6	Jun-2023	Nov-2023
concrete truck	diesel	450		3	3	15			20	Jan-2023	Jun-2023
concrete pump	diesel	400	63%	1			0.2	1	20	Jan-2023	Jun-2023
trailers of steel	diesel	500		2	2	5			20	Jan-2023	Jun-2023
rebar bender	electric	200	50%	1			1	1	20	Jan-2023	Jun-2023
arc welder	electric	20	50%	2			2	2	20	Jan-2023	Jun-2023
troweling machine	gas	11	50%	2			2	2	20	Jan-2023	Jun-2023
MEP			340						17		
plumbing	diesel	500		0.08	0.08	2			20	Apr-2023	Aug-2024
sprinkler	diesel	500		0.08	0.08	2			20	Apr-2023	Aug-2024
HVAC	diesel	500		0.09	0.09	2			20	Apr-2023	Aug-2024
electric	diesel	500		0.09	0.09	2			20	Apr-2023	Aug-2024
scissor lift	electric	20	50%	4			4	4	20	Apr-2023	Aug-2024
forklift	air	250	50%	1.00			1	1	20	Apr-2023	Aug-2024
BUILDING ENCLOSURE & ROOFING			180						9		
trailers	diesel	500		0.5	0.5	1			20	Mar-2023	Nov-2023
INTERIORS / FIT-OUT			320						16		
drywall trailers	diesel	500		0.02	0.02	1			20	May-2023	Aug-2024
additional interiors - box trailer	diesel	500		0.06	0.06	1			20	May-2023	Aug-2024
FF&E	diesel	500		0.06	0.06	1			20	May-2023	Aug-2024
scissor lift	electric	20	50%	4			4	4	20	May-2023	Aug-2024
forklift	air	250	50%	1.00			1	1	20	May-2023	Aug-2024
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2023	Aug-2024
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2023	May-2024
tower crane	electric	200 amp	90%	1			1	1	20	Jan-2023	Jan-2024
dual hoist	electric	100 amp	90%	1			1	1	20	Jan-2023	Mar-2024
miscellaneous equipment										Jan-2023	Aug-2024
chain saw	gas	3	20%	2			2	2	20	Jan-2023	Aug-2024
compressor	gas	5	40%	2			2	2	20	Jan-2023	Aug-2024
generator	gas	10	40%	2			2	2	20	Jan-2023	Aug-2024
impact wrench	air	0	20%	6			6	6	20	Jan-2023	Aug-2024
jack hammer	air	0	20%	2			2	2	20	Jan-2023	Aug-2024
table saw	electric	5	20%	2			2	2	20	May-2023	Dec-2024
portable water pump	electric	15	5%	1			1	1	20	Jan-2023	Aug-2024
circular saw	electric	1.5	25%	8			8	8	20	May-2023	Dec-2024
Package N	**7 levels**										
Below grade space @ West 132nd Street	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			60						3.0		

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
20 yd dump trucks	diesel	400		10	10	10			20	Jan-2025	Mar-2025
excavator	diesel	200	75%	1			1	1	20	Jan-2025	Mar-2025
REMOVAL/RELOCATION OF EXISTING UTILITIES			80						4		
20 yd dump trucks	diesel	400		65	65	65			20	Feb-2025	May-2025
excavator	diesel	200	75%	1			1	1	20	Feb-2025	May-2025
trailers - delivery of pipe	diesel	500	50%	1	1	2			20	Feb-2025	May-2025
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Feb-2025	May-2025
tamper	diesel	25	75%	1			1	1	20	Feb-2025	May-2025
20 yd dump trucks - supply of gravel & fill	diesel	400		32	32	32			20	Feb-2025	May-2025
site utilities trucks	diesel	400		0.24	0.24	0.24			20	Feb-2025	May-2025
electric trucks	diesel	400		0.12	0.12	0.12			20	Feb-2025	May-2025
INSTALL 70' SLURRY WALL @ PERIMETER			220						11.0		
20 yd dump trucks	diesel	400		1.6	1.6	16			20	Feb-2025	Dec-2025
concrete truck	diesel	450		6	6	6			20	Feb-2025	Dec-2025
trailers of steel - rebar	diesel	500		0.9	0.9	4.5			20	Feb-2025	Dec-2025
rebar bender	electric	200	50%	1			1	1	20	Feb-2025	Dec-2025
arc welder	electric	20	50%	2			2	2	20	Feb-2025	Dec-2025
skylift forklift	gas	200	40%	2			2	2	20	Feb-2025	Dec-2025
375 HP air compresser	diesel	375	50%	2			2	2	20	Feb-2025	Dec-2025
40 ton hydraulic crane (handling rebar cages)	diesel	450	50%	1			1	1	20	Feb-2025	Dec-2025
bull dozer	diesel	400	25%	1			1	1	20	Feb-2025	Dec-2025
slurry supply system	diesel	400	50%	1			1	1	20	Feb-2025	Dec-2025
crawler crane	diesel	450	90%	1			1	1	20	Feb-2025	Dec-2025
EXCAVATE WITHIN SLURRY WALL			100						5.0		
20 yd dump trucks	diesel	400		27.5	27.5	27.5			20	Jan-2026	May-2026
excavator	diesel	200	75%	1			1	1	20	Jan-2026	May-2026
drilling rig	diesel	250	75%	1			1	1	20	Jan-2026	May-2026
compressors	diesel	250	90%	1			1	1	20	Jan-2026	May-2026
CONSTRUCT BELOW GRADE SUPERSTRUCTURE			120						6.0		
structure											
concrete truck	diesel	450		7.9	7.9	39.5			20	Mar-2026	Aug-2026
concrete pump	diesel	400	90%	1			0.2	1	20	Mar-2026	Aug-2026
trailers of steel	diesel	500		0.9	0.9	2.25			20	Mar-2026	Aug-2026
crawler crane	diesel	450	90%	1			1	1	20	Mar-2026	Aug-2026
rebar bender	electric	200	50%	1			1	1	20	Mar-2026	Aug-2026
arc welder	electric	20	50%	2			2	2	20	Mar-2026	Aug-2026
troweling machine	gas	11	50%	2			2	2	20	Mar-2026	Aug-2026
piles:											
concrete truck	diesel	450		1.2	1.2	6			20	Mar-2026	Aug-2026
concrete pump	diesel	400	25%	1			0.2	1	20	Mar-2026	Aug-2026
trailers of steel	diesel	500		0.4	0.4	1			20	Mar-2026	Aug-2026
rebar bender	electric	200	50%	1			1	1	20	Mar-2026	Aug-2026
arc welder	electric	20	50%	2			2	2	20	Mar-2026	Aug-2026
pile driving rig	diesel	450	90%	1			1	1	20	Mar-2026	Aug-2026
RESTORE EXISTING UTILITIES			180						9		
20 yd dump trucks	diesel	400		65	65	65			20	Sep-2026	May-2027
excavator	diesel	200	75%	1			1	1	20	Sep-2026	May-2027
trailers - delivery of pipe	diesel	500	50%	1	1	2			20	Sep-2026	May-2027
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Sep-2026	May-2027
tamper	diesel	25	75%	1			1	1	20	Sep-2026	May-2027
20 yd dump trucks - supply of gravel & fill	diesel	400		32	32	32			20	Sep-2026	May-2027
site utilities trucks	diesel	400		0.30	0.3	0.3			20	Sep-2026	May-2027
electric trucks	diesel	400		0.21	0.21	0.21			20	Sep-2026	May-2027
SITE IMPROVEMENTS/STREETSCAPE			180						9		
trailers - delivery of material	diesel	500		0.5	0.5	1			20	Nov-2026	Jul-2027
concrete truck	diesel	450		1	1	3			20	Nov-2026	Jul-2027
rebar bender	electric	200	50%	1			1	1	20	Nov-2026	Jul-2027
cement mixer	gas	200	50%	1			1	1	20	Nov-2026	Jul-2027
unit paver cutter	electric	20	50%	1			1	1	20	Nov-2026	Jul-2027
20 yd dump trucks - delivery of asphalt	diesel	400		10	10	10			20	Nov-2026	Jul-2027
asphalt laying equipment	diesel	300	25%	1			1	1	20	Nov-2026	Jul-2027
tamper	diesel	25	75%	1			1	1	20	Nov-2026	Jul-2027
roller	diesel	350	25%	1			1	1	20	Nov-2026	Jul-2027
MEP			260						13.0		
plumbing deliveries	diesel	500		0.08	0.08	2			20	May-2026	May-2027
sprinkler deliveries	diesel	500		0.08	0.08	2			20	May-2026	May-2027
HVAC - deliveries	diesel	500		0.09	0.09	2			20	May-2026	May-2027
electric - deliveries	diesel	500		0.09	0.09	2			20	May-2026	May-2027
scissor lift	electric	20	50%	4			4	4	20	May-2026	May-2027
forklift	air	250	50%	1.00			1	1	20	May-2026	May-2027
BELOW GRADE INTERIORS / FIT-OUT			240						12.0		
drywall trailers	diesel	500		0.02	0.02	1			20	Jun-2026	May-2027
additional interiors - box trailer	diesel	500		0.09	0.09	1			20	Jun-2026	May-2027
FF&E	diesel	500		0.03	0.03	1			20	Jun-2026	May-2027
scissor lift	electric	20	50%	4			4	4	20	Jun-2026	May-2027
forklift	air	250	50%	1.00			1	1	20	Jun-2026	May-2027
trash hauling - 3 loads per day	diesel	400		4	4	1			20	Jan-2025	May-2027
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2025	May-2027
tower crane	electric	200 amp	90%	0			0	0	20	Jan-2025	May-2027
rubber tire crane	diesel	350	50%	1			1	1	0	Jan-2025	May-2027

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
dual hoist	electric	100 amp	90%	1			1	1	20	Mar-2026	May-2027
miscellaneous equipment										Jan-2025	May-2027
chain saw	gas	3	20%	4			4	4	20	Jan-2025	May-2027
compressor	gas	5	40%	6			6	6	20	Jan-2025	May-2027
generator	gas	10	40%	4			4	4	20	Jan-2025	May-2027
impact wrench	air	0	20%	8			8	8	20	Mar-2026	Jul-2028
jack hammer	air	0	20%	4			4	4	20	Jan-2025	May-2027
table saw	electric	5	20%	8			8	8	20	May-2026	Sep-2028
portable water pump	electric	15	5%	4			4	4	20	Jan-2025	May-2027
circular saw	electric	1.5	25%	15			15	15	20	Jan-2025	May-2027
Package O	**5 levels**										
Below grade space	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
aka Phase IV Factory					equip.	peak day	equip.	peak day			
SITE DEMOLITION			120						6.0		
20 yd dump trucks	diesel	400		10	10	10			20	Jan-2025	Jun-2025
excavator	diesel	200	75%	1			1	1	20	Jan-2025	Jun-2025
REMOVAL/RELOCATION OF EXISTING UTILITIES			120						6.0		
20 yd dump trucks	diesel	400		65	65	65			20	Feb-2025	Jul-2025
excavator	diesel	200	75%	1			1	1	20	Feb-2025	Jul-2025
trailers - delivery of pipe	diesel	500	50%	1	1	2			20	Feb-2025	Jul-2025
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Feb-2025	Jul-2025
tamper	diesel	25	75%	1			1	1	20	Feb-2025	Jul-2025
20 yd dump trucks - supply of gravel & fill	diesel	400		32	32	32			20	Feb-2025	Jul-2025
site utilities trucks	diesel	400		0.24	0.24	0.24			20	Feb-2025	Jul-2025
electric trucks	diesel	400		0.12	0.12	0.12			20	Feb-2025	Jul-2025
INSTALL 70' SLURRY WALL @ PERIMETER			230						11.5		
20 yd dump trucks	diesel	400		1.9	1.9	19			20	May-2025	Apr-2026
concrete truck	diesel	450		6	6	6			20	May-2025	Apr-2026
trailers of steel - rebar	diesel	500		1	1	5			20	May-2025	Apr-2026
rebar bender	electric	200	50%	1			1	1	20	May-2025	Apr-2026
arc welder	electric	20	50%	2			2	2	20	May-2025	Apr-2026
skylift forklift	gas	200	40%	2			2	2	20	May-2025	Apr-2026
375 HP air compresser	diesel	375	50%	2			2	2	20	May-2025	Apr-2026
40 ton hydraulic crane (handling rebar cages)	diesel	450	50%	1			1	1	20	May-2025	Apr-2026
bull dozer	diesel	400	25%	1			1	1	20	May-2025	Apr-2026
slurry supply system	diesel	400	50%	1			1	1	20	May-2025	Apr-2026
crawler crane	diesel	450	90%	1			1	1	20	May-2025	Apr-2026
EXCAVATE WITHIN SLURRY WALL			210						10.5		
20 yd dump trucks	diesel	400		64.5	64.5	64.5			20	Sep-2025	Dec-2026
excavator	diesel	200	75%	2			2	2	20	Sep-2025	Dec-2026
drilling rig	diesel	250	75%	2			2	2	20	Sep-2025	Dec-2026
compressors	diesel	250	90%	2			2	2	20	Sep-2025	Dec-2026
CONSTRUCT BELOW GRADE SUPERSTRUCTURE			120						6.0		
structure											
concrete truck	diesel	450		18.9	18.9	94.5			20	Apr-2026	Feb-2027
concrete pump	diesel	400	90%	1			0.2	1	20	Apr-2026	Feb-2027
trailers of steel	diesel	500		1.6	1.6	4			20	Apr-2026	Feb-2027
crawler crane	diesel	450	90%	1			1	1	20	Apr-2026	Feb-2027
rebar bender	electric	200	50%	1			1	1	20	Apr-2026	Feb-2027
arc welder	electric	20	50%	2			2	2	20	Apr-2026	Feb-2027
troweling machine	gas	11	50%	2			2	2	20	Apr-2026	Feb-2027
piles:											
concrete truck	diesel	450		2.1	2.1	10.5			20	Apr-2026	Feb-2027
concrete pump	diesel	400	44%	1			0.2	1	20	Apr-2026	Feb-2027
trailers of steel	diesel	500		1.2	1.2	3			20	Apr-2026	Feb-2027
rebar bender	electric	200	50%	1			1	1	20	Apr-2026	Feb-2027
arc welder	electric	20	50%	2			2	2	20	Apr-2026	Feb-2027
pile driving rig	diesel	450	90%	1			1	1	20	Apr-2026	Feb-2027
RESTORE EXISTING UTILITIES			180						9		
20 yd dump trucks	diesel	400		65	65	65			20	Feb-2027	Oct-2027
excavator	diesel	200	75%	1			1	1	20	Feb-2027	Oct-2027
trailers - delivery of pipe	diesel	500	50%	1	1	2			20	Feb-2027	Oct-2027
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Feb-2027	Oct-2027
tamper	diesel	25	75%	1			1	1	20	Feb-2027	Oct-2027
20 yd dump trucks - supply of gravel & fill	diesel	400	100%	32	32	32			20	Feb-2027	Oct-2027
site utilities trucks	diesel	400		0.30	0.3	0.3			20	Feb-2027	Oct-2027
electric trucks	diesel	400		0.21	0.21	0.21			20	Feb-2027	Oct-2027
SITE IMPROVEMENTS/STREETSCAPE			180						9		
trailers - delivery of material	diesel	500	100%	0.5	0.5	1			20	Apr-2027	Dec-2027
concrete truck	diesel	450	100%	1	1	3			20	Apr-2027	Dec-2027
rebar bender	electric	200	50%	1			1	1	20	Apr-2027	Dec-2027
cement mixer	gas	200	50%	1			1	1	20	Apr-2027	Dec-2027
unit paver cutter	electric	20	50%	1			1	1	20	Apr-2027	Dec-2027
20 yd dump trucks - delivery of asphalt	diesel	400	100%	10	10	10			20	Apr-2027	Dec-2027
asphalt laying equipment	diesel	300	25%	1			1	1	20	Apr-2027	Dec-2027
tamper	diesel	25	75%	1			1	1	20	Apr-2027	Dec-2027
roller	diesel	350	25%	1			1	1	20	Apr-2027	Dec-2027

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
MEP			270						13.5		
plumbing deliveries	diesel	500		0.08	0.08	2			20	Aug-2026	Jan-2028
sprinkler deliveries	diesel	500		0.08	0.08	2			20	Aug-2026	Jan-2028
HVAC - deliveries	diesel	500		0.60	0.6	2			20	Aug-2026	Jan-2028
electric - deliveries	diesel	500		0.10	0.1	2			20	Aug-2026	Jan-2028
scissor lift	electric	20	50%	4			4	4	20	Aug-2026	Jan-2028
forklift	air	250	50%	1.00			1	1	20	Aug-2026	Jan-2028
BELOW GRADE INTERIORS / FIT-OUT			250						12.5		
drywall trailers	diesel	500		0.02	0.02	1			20	Sep-2026	Jan-2028
air compressors	diesel	250		0.09	0.09	1			20	Sep-2026	Jan-2028
additional interiors - box trailer	diesel	500		0.09	0.09	1			20	Sep-2026	Jan-2028
FF&E	diesel	500		0.03	0.03	1			20	Sep-2026	Jan-2028
scissor lift	electric	20	50%	4			4	4	20	Sep-2026	Jan-2028
forklift	air	250	50%	1.00			1	1	20	Sep-2026	Jan-2028
trash hauling - 3 loads per day	diesel	400		4	4	1			20	Jan-2025	Jan-2028
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2025	Jan-2028
tower crane	electric	200 amp	90%	0			0	0	20	Jan-2025	Jan-2028
rubber tire crane	diesel	350	50%	2			2	2	0	Jan-2025	Jan-2027
dual hoist	electric	100 amp	90%	1			1	1	20	Apr-2026	May-2027
miscellaneous equipment										Jan-2025	May-2027
chain saw	gas	3	20%	4			4	4	20	Jan-2025	May-2027
compressor	gas	5	40%	6			6	6	20	Jan-2025	May-2027
generator	gas	10	40%	4			4	4	20	Jan-2025	May-2027
impact wrench	air	0	20%	8			8	8	20	Apr-2026	Aug-2028
jack hammer	air	0	20%	4			4	4	20	Jan-2025	May-2027
table saw	electric	5	20%	8			8	8	20	May-2026	Sep-2028
portable water pump	electric	15	5%	4			4	4	20	Jan-2025	May-2027
circular saw	electric	1.5	25%	15			15	15	20	Jan-2025	May-2027
Package P	**16 levels**	**363' high**									
#11 Science building w/cellars	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			60						3		
20 yd dump trucks	diesel	400		10	10	10			20		
excavator	diesel	200	75%	1			1	1	20		
EXCAVATION & FOUNDATIONS			160						8		
20 yd dump trucks	diesel	400		31	31	31			20		
excavator	diesel	200	75%	1			1	1	20		
drilling rig	diesel	250	75%	1			1	1	20		
compressors	diesel	250	90%	1			1	1	20		
pile driver	diesel	450	90%	0			0	0	20		
CONSTRUCT SUPERSTRUCTURE			160						8	Oct-2027	May-2028
concrete truck	diesel	450		4	4	20			20	Mar-2027	Oct-2027
concrete pump	diesel	400	90%	1			0.2	1	20	Mar-2027	Oct-2027
trailers of steel	diesel	500		3	3	7.5			20	Mar-2027	Oct-2027
rebar bender	electric	200	50%	1			1	1	20	Mar-2027	Oct-2027
arc welder	electric	20	50%	2			2	2	20	Mar-2027	Oct-2027
troweling machine	gas	11	50%	2			2	2	20	Mar-2027	Oct-2027
MEP			560						28		
plumbing deliveries	diesel	500		0.08	0.08	2			20	Jun-2027	Aug-2029
sprinkler deliveries	diesel	500		0.08	0.08	2			20	Jun-2027	Aug-2029
HVAC - deliveries	diesel	500		0.09	0.09	2			20	Jun-2027	Aug-2029
electric - deliveries	diesel	500		0.09	0.09	2			20	Jun-2027	Aug-2029
scissor lift	electric	20	50%	4			4	4	20	Jun-2027	Aug-2029
forklift	air	250	50%	1.00			1	1	20	Jun-2027	Aug-2029
BUILDING ENCLOSURE & ROOFING			220						11		
trailers	diesel	500		0.5	0.5	2			20	May-2027	Mar-2028
INTERIORS / FIT-OUT			580						29		
drywall trailers	diesel	500		0.02	0.02	1			20	Jun-2027	Sep-2029
additional interiors - box trailer	diesel	500		0.07	0.07	1			20	Jun-2027	Sep-2029
FF&E	diesel	500		0.05	0.05	1			20	Jun-2027	Sep-2029
scissor lift	electric	20	50%	4			4	4	20	Jun-2027	Sep-2029
forklift	air	250	50%	1.00			1	1	20	Jun-2027	Sep-2029
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Mar-2027	Sep-2029
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Mar-2027	Mar-2029
tower crane	electric	200 amp	90%	1			1	1	20	Mar-2027	May-2028
dual hoist	electric	100 amp	90%	1			1	1	20	Mar-2027	Sep-2028
miscellaneous equipment										Mar-2027	Sep-2029
chain saw	gas	3	20%	2			2	2	20	Mar-2027	Aug-2029
compressor	gas	5	40%	2			2	2	20	Mar-2027	Sep-2029
generator	gas	10	40%	2			2	2	20	Mar-2027	Sep-2029
impact wrench	air	0	20%	6			6	6	20	Mar-2027	Aug-2029
jack hammer	air	0	20%	2			2	2	20	Mar-2027	Aug-2029
table saw	electric	5	20%	2			2	2	20	Mar-2027	Sep-2029
portable water pump	electric	15	5%	1			1	1	20	Mar-2027	Aug-2029
circular saw	electric	1.5	25%	8			8	8	20	Mar-2027	Sep-2029

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
Package Q	**10 levels**	**265' high**									
#12 Science building w/cellars	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			60						3		
20 yd dump trucks	diesel	400		10	10	10			20		
excavator	diesel	200	75%	1			1	1	20		
EXCAVATION & FOUNDATIONS			140						7		
20 yd dump trucks	diesel	400		29	29	29			20		
excavator	diesel	200	75%	1			1	1	20		
drilling rig	diesel	250	75%	1			1	1	20		
compressors	diesel	250	90%	1			1	1	20		
pile driving rig	diesel	450	90%	0			0	0	20		
CONSTRUCT SUPERSTRUCTURE			160						8	Oct-2027	May-2028
concrete truck	diesel	450		3	3	15			20	Mar-2027	Oct-2027
concrete pump	diesel	400	63%	1			0.2	1	20	Mar-2027	Oct-2027
trailers of steel	diesel	500		2	2	5			20	Mar-2027	Oct-2027
rebar bender	electric	200	50%	1			1	1	20	Mar-2027	Oct-2027
arc welder	electric	20	50%	2			2	2	20	Mar-2027	Oct-2027
troweling machine	gas	11	50%	2			2	2	20	Mar-2027	Oct-2027
										Mar-2027	Oct-2027
MEP			440						22		
plumbing deliveries	diesel	500		0.09	0.09	2			20		
sprinkler deliveries	diesel	500		0.06	0.06	2			20	Jun-2027	Mar-2029
HVAC - deliveries	diesel	500		0.26	0.26	2			20	Jun-2027	Mar-2029
electric - deliveries	diesel	500		0.13	0.13	2			20	Jun-2027	Mar-2029
scissor lift	electric	20	50%	4			4	4	20	Jun-2027	Mar-2029
forklift	air	250	50%	1.00			1	1	20	Jun-2027	Mar-2029
										Jun-2027	Mar-2029
BUILDING ENCLOSURE & ROOFING			180						9		
trailers	diesel	500		0.5	0.5	1			20		
										Jun-2027	Feb-2028
INTERIORS / FIT-OUT			440						22		
man-days				61					20		
drywall trailers	diesel	500		0.01	0.01	1			20	Jun-2027	Mar-2029
additional interiors - box trailer	diesel	500		0.05	0.05	1			20	Jun-2027	Mar-2029
FF&E	diesel	500		0.05	0.05	1			20	Jun-2027	Mar-2029
scissor lift	electric	20	50%	4			4	4	20	Jun-2027	Mar-2029
forklift	air	250	50%	1.00			1	1	20	Jun-2027	Mar-2029
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Mar-2027	Mar-2029
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Mar-2027	Sep-2028
tower crane	electric	200 amp	90%	1			1	1	20	Mar-2027	Apr-2028
dual hoist	electric	100 amp	90%	1			1	1	20	Mar-2027	Aug-2028
miscellaneous equipment										Mar-2027	Mar-2029
chain saw	gas	3	20%	2			2	2	20	Mar-2027	Feb-2029
compressor	gas	5	40%	2			2	2	20	Mar-2027	Mar-2029
generator	gas	10	40%	2			2	2	20	Mar-2027	Mar-2029
impact wrench	air	0	20%	6			6	6	20	Mar-2027	Feb-2029
jack hammer	air	0	20%	2			2	2	20	Mar-2027	Feb-2029
table saw	electric	5	20%	2			2	2	20	Mar-2027	Mar-2029
portable water pump	electric	15	5%	1			1	1	20	Mar-2027	Feb-2029
circular saw	electric	1.5	25%	8			8	8	20	Mar-2027	Mar-2029
Package R	**12 levels**	**275' high**									
#13 Academic building w/cellars (also Factory)	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
EXCAVATION & FOUNDATIONS			120						6		
20 yd dump trucks	diesel	400		30	30	30			20	Jan-2027	Jun-2027
excavator	diesel	200	75%	1			1	1	20	Jan-2027	Jun-2027
drilling rig	diesel	250	75%	1			1	1	20	Jan-2027	Jun-2027
compressors	diesel	250	90%	1			1	1	20	Jan-2027	Jun-2027
pile driving rig	diesel	450	90%	0			0	0	20	Jan-2027	Jun-2027
CONSTRUCT SUPERSTRUCTURE			140						7	Dec-2027	May-2028
concrete truck	diesel	450		3	3	15			20	Jun-2027	Dec-2027
concrete pump	diesel	400	63%	1			0.2	1	20	Jun-2027	Dec-2027
trailers of steel	diesel	500		2	2	5			20	Jun-2027	Dec-2027
rebar bender	electric	200	50%	1			1	1	20	Jun-2027	Dec-2027
arc welder	electric	20	50%	2			2	2	20	Jun-2027	Dec-2027
troweling machine	gas	11	50%	2			2	2	20	Jun-2027	Dec-2027
MEP			420						21		
plumbing deliveries	diesel	500		0.07	0.07	2			20	Oct-2027	Jun-2029
sprinkler deliveries	diesel	500		0.07	0.07	2			20	Oct-2027	Jun-2029
HVAC - deliveries	diesel	500		0.15	0.15	2			20	Oct-2027	Jun-2029
electric - deliveries	diesel	500		0.17	0.17	2			20	Oct-2027	Jun-2029
scissor lift	electric	20	50%	4			4	4	20	Oct-2027	Jun-2029
forklift	air	250	50%	1.00			1	1	20	Oct-2027	Jun-2029
BUILDING ENCLOSURE & ROOFING			140						7		

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
trailers	diesel	500		0.5	0.5	1			20	Sep-2027	Mar-2028
										Sep-2027	Mar-2028
INTERIORS / FIT-OUT			400						20		
man-days				77					20		
drywall trailers	diesel	500		0.01	0.01	1			20	Nov-2027	Jun-2029
additional interiors - box trailer	diesel	500		0.05	0.05	1			20	Nov-2027	Jun-2029
FF&E	diesel	500		0.09	0.09	1			20	Nov-2027	Jun-2029
scissor lift	electric	20	50%	4			4	4	20	Nov-2027	Jun-2029
forklift	air	250	50%	1.00			1	1	20	Nov-2027	Jun-2029
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2027	Jun-2029
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2027	Dec-2028
tower crane	electric	200 amp	90%	1			1	1	20	Jun-2027	May-2028
dual hoist	electric	100 amp	90%	1			1	1	20	Jun-2027	Sep-2028
miscellaneous equipment									20	Jan-2027	Jun-2029
chain saw	gas	3	20%	2			2	2	20	Jan-2027	Jun-2029
compressor	gas	5	40%	2			2	2	20	Jan-2027	Jun-2029
generator	gas	10	40%	2			2	2	20	Jan-2027	Jun-2029
impact wrench	air	0	20%	6			6	6	20	Jun-2027	Jun-2029
jack hammer	air	0	20%	2			2	2	20	Jan-2027	Jun-2029
table saw	electric	5	20%	2			2	2	20	Jun-2027	Jun-2029
portable water pump	electric	15	5%	1			1	1	20	Jan-2027	Jun-2029
circular saw	electric	1.5	25%	8			8	8	20	Jun-2027	Jun-2029
Package S	**20 levels**	**312' high**									
#14 Residential building w/cellars (and Factory)	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
EXCAVATION & FOUNDATIONS			140						7		
20 yd dump trucks	diesel	400		30	30	30			20	Jan-2027	Jul-2027
excavator	diesel	200	75%	1			1	1	20	Jan-2027	Jul-2027
drilling rig	diesel	250	75%	1			1	1	20	Jan-2027	Jul-2027
compressors	diesel	250	90%	1			1	1	20	Jan-2027	Jul-2027
pile driving rig	diesel	450	90%	0			0	0	20	Jan-2027	Jul-2027
CONSTRUCT SUPERSTRUCTURE			160						8	Feb-2028	Sep-2028
concrete truck	diesel	450		3	3	15			20	Jul-2027	Feb-2028
concrete pump	diesel	400	63%	1			0.2	1	20	Jul-2027	Feb-2028
trailers of steel	diesel	500		2.3	2.3	5.75			20	Jul-2027	Feb-2028
rebar bender	electric	200	50%	1			1	1	20	Jul-2027	Feb-2028
arc welder	electric	20	50%	2			2	2	20	Jul-2027	Feb-2028
troweling machine	gas	11	50%	2			2	2	20	Jul-2027	Feb-2028
MEP			460						23		
plumbing deliveries	diesel	500		0.06	0.06	2			20	Dec-2027	Oct-2029
sprinkler deliveries	diesel	500		0.06	0.06	2			20	Dec-2027	Oct-2029
HVAC - deliveries	diesel	500		0.07	0.07	2			20	Dec-2027	Oct-2029
electric - deliveries	diesel	500		0.07	0.07	2			20	Dec-2027	Oct-2029
scissor lift	electric	20	50%	4			4	4	20	Dec-2027	Oct-2029
forklift	air	250	50%	1.00			1	1	20	Dec-2027	Oct-2029
BUILDING ENCLOSURE & ROOFING			180						9		
trailers	diesel	500		0.5	0.5	1			20	Nov-2027	Jul-2028
INTERIORS / FIT-OUT			460						23		
drywall trailers	diesel	500		0.01	0.01	1			20	Dec-2027	Oct-2029
additional interiors - box trailer	diesel	500		0.06	0.06	1			20	Dec-2027	Oct-2029
FF&E	diesel	500		0.07	0.07	1			20	Dec-2027	Oct-2029
scissor lift	electric	20	50%	4			4	4	20	Dec-2027	Oct-2029
forklift	air	250	50%	1.00			1	1	20	Dec-2027	Oct-2029
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2027	Oct-2029
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2027	Apr-2029
tower crane	electric	200 amp	90%	1			1	1	20	Jul-2027	Sep-2028
dual hoist	electric	100 amp	90%	1			1	1	20	Jul-2027	Jan-2029
miscellaneous equipment										Jan-2027	Oct-2029
chain saw	gas	3	20%	2			2	2	20	Jan-2027	Oct-2029
compressor	gas	5	40%	2			2	2	20	Jan-2027	Oct-2029
generator	gas	10	40%	2			2	2	20	Jan-2027	Oct-2029
impact wrench	air	0	20%	6			6	6	20	Jul-2027	Oct-2029
jack hammer	air	0	20%	2			2	2	20	Jan-2027	Oct-2029
table saw	electric	5	20%	2			2	2	20	Jul-2027	Oct-2029
portable water pump	electric	15	5%	1			1	1	20	Jan-2027	Oct-2029
circular saw	electric	1.5	25%	8			8	8	20	Jul-2027	Oct-2029
Package T	**9 levels**	**202' high**									
#1 Academic building w/cellar	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
aka Conference Center					equip.	peak day	equip.	peak day			
SITE DEMOLITION			100						5	May-2011	Sep-2011
20 yd dump trucks	diesel	400		10	10	10			20	Jan-2011	May-2011
excavator	diesel	200	75%	1			1	1	20	Jan-2011	May-2011
EXCAVATION & FOUNDATIONS			120						6		

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
20 yd dump trucks	diesel	400		18	18	18			20	May-2011	Oct-2011
excavator	diesel	200	75%	1			1	1	20	May-2011	Oct-2011
drilling rig	diesel	250	75%	1			1	1	20	May-2011	Oct-2011
compressors	diesel	250	90%	1			1	1	20	May-2011	Oct-2011
pile driving rig	diesel	450	90%	0			0	0	20	May-2011	Oct-2011
CONSTRUCT SUPERSTRUCTURE			120						6	Mar-2012	Aug-2012
concrete truck	diesel	450		2	2	10			20	Oct-2011	Mar-2012
concrete pump	diesel	400	42%	1			0.2	1	20	Oct-2011	Mar-2012
trailers of steel	diesel	500		1	1	2.5			20	Oct-2011	Mar-2012
rebar bender	electric	200	50%	1			1	1	20	Oct-2011	Mar-2012
arc welder	electric	20	50%	2			2	2	20	Oct-2011	Mar-2012
troweling machine	gas	11	50%	2			2	2	20	Oct-2011	Mar-2012
MEP			300						15		
plumbing deliveries	diesel	500		0.09	0.09	2			20	Jan-2012	Mar-2013
sprinkler deliveries	diesel	500		0.09	0.09	2			20	Jan-2012	Mar-2013
HVAC - deliveries	diesel	500		0.21	0.21	2			20	Jan-2012	Mar-2013
electric - deliveries	diesel	500		0.24	0.24	2			20	Jan-2012	Mar-2013
scissor lift	electric	20	50%	4			4	4	20	Jan-2012	Mar-2013
forklift	air	250	50%	1.00			1	1	20	Jan-2012	Mar-2013
BUILDING ENCLOSURE & ROOFING			160						8		
trailers	diesel	500		0.5	0.5	1			20	Jan-2012	Aug-2012
INTERIORS / FIT-OUT			300						15		
drywall trailers	diesel	500		0.01	0.01	1			20	Jan-2012	Mar-2013
additional interiors - box trailer	diesel	500		0.04	0.04	1			20	Jan-2012	Mar-2013
FF&E	diesel	500		0.06	0.06	1			20	Jan-2012	Mar-2013
scissor lift	electric	20	50%	4			4	4	20	Jan-2012	Mar-2013
forklift	air	250	50%	1.00			1	1	20	Jan-2012	Mar-2013
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2011	Jan-2013
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2011	Oct-2012
tower crane	electric	200 amp	90%	1			1	1	20	Aug-2011	May-2012
dual hoist	electric	100 amp	90%	1			1	1	20	Aug-2011	Sep-2012
miscellaneous equipment										Jan-2011	Mar-2013
chain saw	gas	3	20%	2			2	2	20	Jan-2011	Mar-2013
compressor	gas	5	40%	2			2	2	20	Jan-2011	Mar-2013
compressor	electric	5	40%	2			2	2	20	Feb-2012	Apr-2014
generator	gas	10	40%	2			2	2	20	Jan-2011	Mar-2013
impact wrench	air	0	20%	6			6	6	20	Oct-2011	Mar-2013
jack hammer	air	0	20%	2			2	2	20	Jan-2011	Mar-2013
table saw	electric	5	20%	2			2	2	20	Oct-2011	Mar-2013
portable water pump	electric	15	5%	1			1	1	20	Jan-2011	Mar-2013
circular saw	electric	1.5	25%	8			8	8	20	Jan-2011	Mar-2013
Package U	**3 levels**	**90' high**									
#5 Retail	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Apr-2021	Jul-2022
aka Cotton Club					equip.	peak day	equip.	peak day		Apr-2021	May-2021
SITE DEMOLITION			60						3		
20 yd dump trucks	diesel	400		10	10	10			20	Jan-2020	Mar-2020
excavator	diesel	200	75%	1			1	1	20	Jan-2020	Mar-2020
EXCAVATION & FOUNDATIONS			80						4		
20 yd dump trucks	diesel	400		9	9	9			20	Mar-2020	Jun-2020
excavator	diesel	200	75%	1			1	1	20	Mar-2020	Jun-2020
drilling rig	diesel	250	75%	1			1	1	20	Mar-2020	Jun-2020
compressors	diesel	250	90%	1			1	1	20	Mar-2020	Jun-2020
pile driving rig	diesel	450	90%	0			0	0	20	Mar-2020	Jun-2020
CONSTRUCT SUPERSTRUCTURE			60						3	Aug-2020	Oct-2020
concrete truck	diesel	450		1	1	5			20	Jun-2020	Aug-2020
concrete pump	diesel	400	21%	1			0.2	1	20	Jun-2020	Aug-2020
trailers of steel	diesel	500		1	1	2.5			20	Jun-2020	Aug-2020
rebar bender	electric	200	50%	1			1	1	20	Jun-2020	Aug-2020
arc welder	electric	20	50%	2			2	2	20	Jun-2020	Aug-2020
troweling machine	gas	11	50%	2			2	2	20	Jun-2020	Aug-2020
MEP			180						9		
plumbing deliveries	diesel	500		0.09	0.09	2			20	Aug-2020	Apr-2021
sprinkler deliveries	diesel	500		0.16	0.16	2			20	Aug-2020	Apr-2021
HVAC - deliveries	diesel	500		0.16	0.16	2			20	Aug-2020	Apr-2021
electric - deliveries	diesel	500		0.16	0.16	2			20	Aug-2020	Apr-2021
scissor lift	electric	20	50%	4			4	4	20	Aug-2020	Apr-2021
forklift	air	250	50%	1.00			1	1	20	Aug-2020	Apr-2021
BUILDING ENCLOSURE & ROOFING			80						4		
trailers	diesel	500		0.5	0.5	2			20	Aug-2020	Nov-2020
INTERIORS / FIT-OUT			160						8		
drywall trailers	diesel	500		0.01	0.01	1			20	Sep-2020	Apr-2021
additional interiors - box trailer	diesel	500		0.01	0.01	1			20	Sep-2020	Apr-2021
FF&E	diesel	500		0.04	0.04	1			20	Sep-2020	Apr-2021
scissor lift	electric	20	50%	4			4	4	20	Sep-2020	Apr-2021

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
forklift	air	250	50%	1.00			1	1	20	Sep-2020	Apr-2021
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2020	Apr-2021
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2020	Jan-2021
tower crane	electric	200 amp	90%	1			1	1	20	Jul-2020	Dec-2020
dual hoist	electric	100 amp	90%	1					20	Jul-2020	Feb-2021
miscellaneous equipment										Jan-2020	Apr-2021
chain saw	gas	3	20%	2			2	2	20	Jan-2020	Apr-2021
compressor	gas	5	40%	2			2	2	20	Jan-2020	Apr-2021
compressor	gas	5	40%	2			2	2	20	Sep-2020	Dec-2021
generator	gas	10	40%	2			2	2	20	Jan-2020	Apr-2021
impact wrench	air	0	20%	6			6	6	20	Jun-2020	Apr-2021
jack hammer	air	0	20%	2			2	2	20	Jan-2020	Apr-2021
table saw	electric	5	20%	2			2	2	20	Jun-2020	Apr-2021
portable water pump	electric	15	5%	1			1	1	20	Jan-2020	Apr-2021
circular saw	electric	1.5	25%	8			8	8	20	Jan-2020	Apr-2021
Package V	**13 levels**	**315' high**									
#15 Science building w/cellars	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			100						5		
20 yd dump trucks	diesel	400		10	10	10			20	Oct-2026	Feb-2027
excavator	diesel	200	75%	1			1	1	20	Oct-2026	Feb-2027
EXCAVATION & FOUNDATIONS			140						7		
20 yd dump trucks	diesel	400		49	49	49			20	Feb-2027	Aug-2027
excavator	diesel	200	75%	1			1	1	20	Feb-2027	Aug-2027
drilling rig	diesel	250	75%	1			1	1	20	Feb-2027	Aug-2027
compressors	diesel	250	90%	1			1	1	20	Feb-2027	Aug-2027
pile driving rig	diesel	450	90%	0			0	0	20	Feb-2027	Aug-2027
CONSTRUCT SUPERSTRUCTURE			160						8	Mar-2028	Sep-2028
concrete truck	diesel	450		4	4	20			20	Aug-2027	Mar-2028
concrete pump	diesel	400	90%	1			0.2	1	20	Aug-2027	Mar-2028
trailers of steel	diesel	500		3	3	7.5			20	Aug-2027	Mar-2028
rebar bender	electric	200	50%	1			1	1	20	Aug-2027	Mar-2028
arc welder	electric	20	50%	2			2	2	20	Aug-2027	Mar-2028
troweling machine	gas	11	50%	2			2	2	20	Aug-2027	Mar-2028
MEP			500						25		
plumbing deliveries	diesel	500		0.08	0.08	2			20	Dec-2027	Dec-2029
sprinkler deliveries	diesel	500		0.06	0.06	2			20	Dec-2027	Dec-2029
HVAC - deliveries	diesel	500		0.23	0.23	2			20	Dec-2027	Dec-2029
electric - deliveries	diesel	500		0.11	0.11	2			20	Dec-2027	Dec-2029
scissor lift	electric	20	50%	4			4	4	20	Dec-2027	Dec-2029
forklift	air	250		1.00			1	1	20	Dec-2027	Dec-2029
BUILDING ENCLOSURE & ROOFING			200						10		
trailers	diesel	500		0.5	0.5	2			20	Nov-2027	Aug-2028
INTERIORS / FIT-OUT			500						25		
drywall trailers	diesel	500		0.02	0.02	1			20	Dec-2027	Dec-2029
additional interiors - box trailer	diesel	500		0.08	0.08	1			20	Dec-2027	Dec-2029
FF&E	diesel	500		0.05	0.05	1			20	Dec-2027	Dec-2029
scissor lift	electric	20	50%	4			4	4	20	Dec-2027	Dec-2029
forklift	air	250		1.00			1	1	20	Dec-2027	Dec-2029
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Oct-2026	Dec-2029
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Oct-2026	Jun-2029
tower crane	electric	200 amp	90%	1			1	1	20	Aug-2027	Oct-2028
dual hoist	electric	100 amp	90%	1			1	1	20	Aug-2027	Feb-2029
miscellaneous equipment									20	Oct-2026	Dec-2029
chain saw	gas	3	20%	2			2	2	20	Oct-2026	Nov-2029
compressor	gas	5	40%	2			2	2	20	Oct-2026	Dec-2029
generator	gas	10	40%	2			2	2	20	Oct-2026	Dec-2029
impact wrench	air	0	20%	6			6	6	20	Aug-2027	Nov-2029
jack hammer	air	0	20%	2			2	2	20	Oct-2026	Nov-2029
table saw	electric	5	20%	2			2	2	20	Aug-2027	Dec-2029
portable water pump	electric	15	5%	1			1	1	20	Oct-2026	Dec-2029
circular saw	electric	1.5	25%	8			8	8	20	Aug-2027	Dec-2029
Package W	**7 levels**	**120' high**									
#16 Nash Building renovation	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SELECTIVE DEMO & ABATE			200						10		
20 yd dump trucks	diesel	400		10	10	10			20	Jan-2014	Oct-2014
excavator	diesel	200	75%	1			1	1	20	Jan-2014	Oct-2014
BUILDING MODIFICATIONS			120						6		

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
concrete truck	diesel	450		2	2	10			20	Jul-2014	Dec-2014
concrete pump	diesel	400	42%	1			0.2	1	20	Jul-2014	Dec-2014
trailers of steel	diesel	500		2	2	2			20	Jul-2014	Dec-2014
rebar bender	electric	200	50%	0.5			0.5	0.5	20	Jul-2014	Dec-2014
arc welder	electric	20	50%	1			1	1	20	Jul-2014	Dec-2014
MEP			360						18		
plumbing deliveries	diesel	500		0.08	0.08	2			20	Jan-2015	Jun-2016
sprinkler deliveries	diesel	500		0.08	0.08	2			20	Jan-2015	Jun-2016
HVAC - deliveries	diesel	500		0.16	0.16	2			20	Jan-2015	Jun-2016
electric - deliveries	diesel	500		0.19	0.19	2			20	Jan-2015	Jun-2016
scissor lift	electric	20	50%	4			4	4	20	Jan-2015	Jun-2016
forklift	air	250	50%	1			1	1	20	Jan-2015	Jun-2016
BUILDING ENCLOSURE & ROOFING			120						6		
trailers	diesel	500		0.5	0.5	1			20	Sep-2014	Dec-2014
INTERIORS / FIT-OUT			360						18		
drywall trailers	diesel	500		0.01	0.01	1			20	Jan-2015	Jun-2016
additional interiors - box trailer	diesel	500		0.04	0.04	1			20	Jan-2015	Jun-2016
FF&E	diesel	500		0.03	0.03	1			20	Jan-2015	Jun-2016
scissor lift	electric	20	50%	4			4	4	20	Jan-2015	Jun-2016
forklift	air	250	50%	1			1	1	20	Jan-2015	Jun-2016
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2014	Jun-2016
fuel trucks - 1 every 2 weeks on average	gas	400		0	0	1			20	Jan-2014	May-2015
tower crane	electric	200 amp	90%	0			0	0	20		
dual hoist	electric	100 amp	90%	1			1	1	20	Jan-2014	Jun-2015
miscellaneous equipment										Jan-2014	Jun-2016
chain saw	gas	3	20%	0			0	0	20	Jan-2014	Jun-2016
compressor	gas	5	40%	1			1	1	20	Jan-2014	Jun-2016
generator	gas	10	40%	1			1	1	20	Jan-2014	Jun-2016
impact wrench	air	0	20%	0			0	0	20	Jan-2014	Jun-2016
jack hammer	air	0	20%	0			0	0	20	Jan-2014	Jun-2016
table saw	electric	5	20%	2			2	2	20	Jan-2014	Jun-2016
portable water pump	electric	15	5%	0			0	0	20	Jan-2014	Jun-2016
circular saw	electric	1.5	25%	8			8	8	20	Jan-2014	Jun-2016
Package X	**15 levels**	**366' high**									
#17 Science building w/cellars	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			100						5		
20 yd dump trucks	diesel	400		10	10	10			20	Jan-2018	May-2018
excavator	diesel	200	75%	1			1	1	20	Jan-2018	May-2018
EXCAVATION & FOUNDATIONS			140						7		
20 yd dump trucks	diesel	400		34	34	34			20	May-2018	Nov-2018
excavator	diesel	200	75%	1			1	1	20	May-2018	Nov-2018
drilling rig	diesel	250	75%	1			1	1	20	May-2018	Nov-2018
compressors	diesel	250	90%	1			1	1	20	May-2018	Nov-2018
pile driving rig	diesel	450	90%	0			0	0	20	May-2018	Nov-2018
CONSTRUCT SUPERSTRUCTURE			160						8	Jun-2019	Jan-2020
concrete truck	diesel	450		4	4	20			20	Nov-2018	Jun-2019
concrete pump	diesel	400	90%	1			0.2	1	20	Nov-2018	Jun-2019
trailers of steel	diesel	500		3	3	7.5			20	Nov-2018	Jun-2019
rebar bender	electric	200	50%	1			1	1	20	Nov-2018	Jun-2019
arc welder	electric	20	50%	2			2	2	20	Nov-2018	Jun-2019
troweling machine	gas	11	50%	2			2	2	20	Nov-2018	Jun-2019
MEP			500						25		
plumbing deliveries	diesel	500		0.08	0.08	2			20	Mar-2019	Mar-2021
sprinkler deliveries	diesel	500		0.06	0.06	2			20	Mar-2019	Mar-2021
HVAC - deliveries	diesel	500		0.23	0.23	2			20	Mar-2019	Mar-2021
electric - deliveries	diesel	500		0.11	0.11	2			20	Mar-2019	Mar-2021
scissor lift	electric	20	50%	4			4	4	20	Mar-2019	Mar-2021
forklift	air	250	50%	1.00			1	1	20	Mar-2019	Mar-2021
BUILDING ENCLOSURE & ROOFING			180						9		
trailers	diesel	500		0.5	0.5	1			20	Jan-2019	Sep-2019
INTERIORS / FIT-OUT			500						25		
man-days				194.91					20	Mar-2019	Mar-2021
drywall trailers	diesel	500		0.02	0.02	1			20	Mar-2019	Mar-2021
additional interiors - box trailer	diesel	500		0.08	0.08	1			20	Mar-2019	Mar-2021
FF&E	diesel	500		0.05	0.05	1			20	Mar-2019	Mar-2021
scissor lift	electric	20	50%	4			4	4	20	Mar-2019	Mar-2021
forklift	air	250	50%	1.00			1	1	20	Mar-2019	Mar-2021
trash hauling - 3 loads per day	diesel	400		3	3	1			20	Jan-2018	Mar-2021
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2018	Sep-2020
tower crane	electric	200 amp	90%	1			1	1	20	Nov-2018	Nov-2019
dual hoist	electric	100 amp	90%	1			1	1	20	Nov-2018	Mar-2020

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
miscellaneous equipment										Jan-2018	Mar-2021
chain saw	gas	3	20%	2			2	2	20	Jan-2018	Mar-2021
compressor	gas	5	40%	2			2	2	20	Jan-2018	Mar-2021
generator	gas	10	40%	2			2	2	20	Jan-2018	Mar-2021
impact wrench	air	0	20%	6			6	6	20	Nov-2018	Mar-2021
jack hammer	air	0	20%	2			2	2	20	Jan-2018	Mar-2021
table saw	electric	5	20%	2			2	2	20	Nov-2018	Mar-2021
portable water pump	electric	15	5%	1			1	1	20	Jan-2018	Mar-2021
circular saw	electric	1.5	25%	8			8	8	20	Jan-2018	Mar-2021
Package Y	**4 levels**										
Below grade space @ West 131st Street	engine type	horse power	duration	equipment per day	truck		off-road		days per month		
					equip.	peak day	equip.	peak day			
SITE DEMOLITION			60						3.0		
20 yd dump trucks	diesel	400		10	10	10			20	Jan-2020	Mar-2020
excavator	diesel	200	75%	1			1	1	20	Jan-2020	Mar-2020
REMOVAL/RELOCATION OF EXISTING UTILITIES			80						4		
20 yd dump trucks	diesel	400		65	65	65			20	Feb-2020	May-2020
excavator	diesel	200	75%	1			1	1	20	Feb-2020	May-2020
trailers - delivery of pipe	diesel	500	50%	1	1	2			20	Feb-2020	May-2020
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Feb-2020	May-2020
tamper	diesel	25	75%	1			1	1	20	Feb-2020	May-2020
20 yd dump trucks - supply of gravel & fill	diesel	400		32	32	32			20	Feb-2020	May-2020
site utilities trucks	diesel	400		0.30	0.30	0.30			20	Feb-2020	May-2020
electric trucks	diesel	400		0.21	0.21	0.21			20	Feb-2020	May-2020
INSTALL 70' SLURRY WALL @ PERIMETER			220						11.0		
20 yd dump trucks	diesel	400		1.6	1.6	16			20	Feb-2020	Dec-2020
concrete truck	diesel	450		6	6	6			20	Feb-2020	Dec-2020
trailers of steel - rebar	diesel	500		0.9	0.9	9			20	Feb-2020	Dec-2020
rebar bender	electric	200	50%	1			1	1	20	Feb-2020	Dec-2020
arc welder	electric	20	50%	2			2	2	20	Feb-2020	Dec-2020
skylift forklift	gas	200	40%	2			2	2	20	Feb-2020	Dec-2020
375 HP air compresser	diesel	375	50%	2			2	2	20	Feb-2020	Dec-2020
40 ton hydraulic crane (handling rebar cages)	diesel	450	50%	1			1	1	20	Feb-2020	Dec-2020
bull dozer	diesel	400	25%	1			1	1	20	Feb-2020	Dec-2020
slurry supply system	diesel	400	50%	1			1	1	20	Feb-2020	Dec-2020
crawler crane	diesel	450	90%	1			1	1	20	Feb-2020	Dec-2020
EXCAVATE WITHIN SLURRY WALL			100						5.0		
20 yd dump trucks	diesel	400		27.5	27.5	27.5			20	Jan-2021	May-2021
excavator	diesel	200	75%	1			1	1	20	Jan-2021	May-2021
drilling rig	diesel	250	75%	1			1	1	20	Jan-2021	May-2021
compressors	diesel	250	90%	1			1	1	20	Jan-2021	May-2021
CONSTRUCT BELOW GRADE SUPERSTRUCTURE			120						6.0		
structure											
concrete truck	diesel	450		7.9	7.9	39.5			20	Mar-2021	Aug-2021
concrete pump	diesel	400	90%	1			0.2	1	20	Mar-2021	Aug-2021
trailers of steel	diesel	500		0.9	0.9	2.25			20	Mar-2021	Aug-2021
crawler crane	diesel	450	90%	1			1	1	20	Mar-2021	Aug-2021
rebar bender	electric	200	50%	1			1	1	20	Mar-2021	Aug-2021
arc welder	electric	20	50%	2			2	2	20	Mar-2021	Aug-2021
troweling machine	gas	11	50%	2			2	2	20	Mar-2021	Aug-2021
piles:											
concrete truck	diesel	450		1.2	1.2	6			20	Mar-2021	Aug-2021
concrete pump	diesel	400	25%	1			0.2	1	20	Mar-2021	Aug-2021
trailers of steel	diesel	500		0.4	0.4	1			20	Mar-2021	Aug-2021
rebar bender	electric	200	50%	1			1	1	20	Mar-2021	Aug-2021
arc welder	electric	20	50%	2			2	2	20	Mar-2021	Aug-2021
pile driving rig	diesel	450	90%	1			1	1	20	Mar-2021	Aug-2021
RESTORE EXISTING UTILITIES			180						9		
20 yd dump trucks	diesel	200		65	65	65			20	Sep-2021	May-2022
excavator	diesel	200	75%	1			1	1	20	Sep-2021	May-2022
trailers - delivery of pipe	diesel	500	50%	1	1	2			20	Sep-2021	May-2022
excavator - setting of pipe	diesel	200	50%	1			1	1	20	Sep-2021	May-2022
tamper	diesel	25	75%	1			1	1	20	Sep-2021	May-2022
20 yd dump trucks - supply of gravel & fill	diesel	400	100%	32	32	32			20	Sep-2021	May-2022
site utilities trucks	diesel	400		0.30	0.3	0.3			20	Sep-2021	May-2022
electric trucks	diesel	400		0.21	0.21	0.21			20	Sep-2021	May-2022
SITE IMPROVEMENTS/STREETSCAPE			180						9		
trailers - delivery of material	diesel	500	100%	0.5	0.5	1			20	Nov-2021	Jul-2022
concrete truck	diesel	450	100%	1	1	3			20	Nov-2021	Jul-2022
rebar bender	electric	200	50%	1			1	1	20	Nov-2021	Jul-2022
cement mixer	gas	200	50%	1			1	1	20	Nov-2021	Jul-2022
unit paver cutter	electric	20	50%	1			1	1	20	Nov-2021	Jul-2022
20 yd dump trucks - delivery of asphalt	diesel	400	100%	10	10	10			20	Nov-2021	Jul-2022
asphalt laying equipment	diesel	300	25%	1			1	1	20	Nov-2021	Jul-2022
tamper	diesel	25	75%	1			1	1	20	Nov-2021	Jul-2022
roller	diesel	350	25%	1			1	1	20	Nov-2021	Jul-2022
MEP			260						13.0		
plumbing deliveries	diesel	500		0.08	0.08	2			20	May-2021	May-2022

Site / Task / Engine	engine type	horse power	duration	equipment per day	truck		off-road		days per month	Start Month	End Month
					equip.	peak day	equip.	peak day			
sprinkler deliveries	diesel	500		0.08	0.08	2			20	May-2021	May-2022
HVAC - deliveries	diesel	500		0.09	0.09	2			20	May-2021	May-2022
electric - deliveries	diesel	500		0.09	0.09	2			20	May-2021	May-2022
scissor lift	electric	20	50%	4			4	4	20	May-2021	May-2022
forklift	air	250	50%	1.00			1	1	20	May-2021	May-2022
BELOW GRADE INTERIORS / FIT-OUT			240						12.0		
drywall trailers	diesel	500		0.02	0.02	1			20	Jun-2021	May-2022
additional interiors - box trailer	diesel	500		0.09	0.09	1			20	Jun-2021	May-2022
FF&E	diesel	500		0.03	0.03	1			20	Jun-2021	May-2022
scissor lift	electric	20	50%	4			4	4	20	Jun-2021	May-2022
forklift	air	250	50%	1.00			1	1	20	Jun-2021	May-2022
trash hauling - 3 loads per day	diesel	400		4	4	1			20	Jan-2020	May-2022
fuel trucks - 1 every 2 weeks on average	gas	400		0.5	0.5	1			20	Jan-2020	May-2022
tower crane	electric	200 amp	90%	0			0	0	20	Jan-2020	Jan-2022
rubber tire crane	diesel	350	50%	1			1	1	20	Jan-2020	Jan-2022
dual hoist	electric	100 amp	90%	1			1	1	20	Mar-2021	Mar-2022
miscellaneous equipment										Jan-2020	Jul-2022
chain saw	gas	3	20%	4			4	4	20	Jan-2020	Jul-2022
compressor	gas	5	40%	6			6	6	20	Jan-2020	Jul-2022
compressor	electric	5	40%	6			6	6	20	Jun-2021	Jul-2022
generator	gas	10	40%	4			4	4	20	Jan-2020	Jul-2022
impact wrench	air	0	20%	12			12	12	20	Mar-2021	Jul-2022
jack hammer	air	0	20%	4			4	4	20	Jan-2020	Jul-2022
table saw	electric	5	20%	8			8	8	20	Mar-2021	Jul-2022
portable water pump	electric	15	5%	4			4	4	20	Jan-2020	Jul-2022
circular saw	electric	1.5	25%	15			15	15	20	Jan-2020	Jul-2022

APPENDIX K.2

TRAFFIC AND PARKING

Proposed Manhattanville in West Harlem Rezoning FEIS

Construction Vehicle Trip Projections

Auto Split: 59%
Auto Occupancy: 1.20
6 - 7 AM Distribution: 80%
8 - 9 AM Distribution: 0%
3 - 4 PM Distribution: 80%
4 - 5 PM Distribution: 10%

In/Out Trips in Same Hour: 2
Truck PCE: 2.00
6 - 7 AM Distribution: 25%
8 - 9 AM Distribution: 10%
3 - 4 PM Distribution: 0%
4 - 5 PM Distribution: 0%

		Auto Trip									Truck Trip								Truck PCE								Total PCE			
	Daily	6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		Daily	6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		6-7 AM	8-9 AM	3-4 PM	4-5 PM
Month	Worker	In	Out	In	Out	In	Out	In	Out	Truck	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In & Out	In & Out	In & Out	In & Out
Jan-2008	34	13	0	0	0	0	13	0	2	9	2	2	1	1	0	0	0	0	4	4	2	2	0	0	0	0	21	4	13	2
Feb-2008	34	13	0	0	0	0	13	0	2	9	2	2	1	1	0	0	0	0	4	4	2	2	0	0	0	0	21	4	13	2
Mar-2008	217	85	0	0	0	0	85	0	11	163	41	41	16	16	0	0	0	0	82	82	32	32	0	0	0	0	249	64	85	11
Apr-2008	217	85	0	0	0	0	85	0	11	163	41	41	16	16	0	0	0	0	82	82	32	32	0	0	0	0	249	64	85	11
May-2008	381	150	0	0	0	0	150	0	19	169	42	42	17	17	0	0	0	0	84	84	34	34	0	0	0	0	318	68	150	19
Jun-2008	381	150	0	0	0	0	150	0	19	169	42	42	17	17	0	0	0	0	84	84	34	34	0	0	0	0	318	68	150	19
Jul-2008	347	136	0	0	0	0	136	0	17	161	40	40	16	16	0	0	0	0	80	80	32	32	0	0	0	0	296	64	136	17
Aug-2008	347	136	0	0	0	0	136	0	17	161	40	40	16	16	0	0	0	0	80	80	32	32	0	0	0	0	296	64	136	17
Sep-2008	347	136	0	0	0	0	136	0	17	161	40	40	16	16	0	0	0	0	80	80	32	32	0	0	0	0	296	64	136	17
Oct-2008	493	194	0	0	0	0	194	0	24	180	45	45	18	18	0	0	0	0	90	90	36	36	0	0	0	0	374	72	194	24
Nov-2008	493	194	0	0	0	0	194	0	24	180	45	45	18	18	0	0	0	0	90	90	36	36	0	0	0	0	374	72	194	24
Dec-2008	493	194	0	0	0	0	194	0	24	180	45	45	18	18	0	0	0	0	90	90	36	36	0	0	0	0	374	72	194	24
Jan-2009	265	104	0	0	0	0	104	0	13	43	11	11	4	4	0	0	0	0	22	22	8	8	0	0	0	0	148	16	104	13
Feb-2009	265	104	0	0	0	0	104	0	13	43	11	11	4	4	0	0	0	0	22	22	8	8	0	0	0	0	148	16	104	13
Mar-2009	265	104	0	0	0	0	104	0	13	43	11	11	4	4	0	0	0	0	22	22	8	8	0	0	0	0	148	16	104	13
Apr-2009	265	104	0	0	0	0	104	0	13	46	11	11	5	5	0	0	0	0	22	22	10	10	0	0	0	0	148	20	104	13
May-2009	146	58	0	0	0	0	58	0	7	23	6	6	2	2	0	0	0	0	12	12	4	4	0	0	0	0	82	8	58	7
Jun-2009	146	58	0	0	0	0	58	0	7	23	6	6	2	2	0	0	0	0	12	12	4	4	0	0	0	0	82	8	58	7
Jul-2009	146	58	0	0	0	0	58	0	7	23	6	6	2	2	0	0	0	0	12	12	4	4	0	0	0	0	82	8	58	7
Aug-2009	214	84	0	0	0	0	84	0	11	43	11	11	4	4	0	0	0	0	22	22	8	8	0	0	0	0	128	16	84	11
Sep-2009	214	84	0	0	0	0	84	0	11	43	11	11	4	4	0	0	0	0	22	22	8	8	0	0	0	0	128	16	84	11
Oct-2009	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
Nov-2009	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
Dec-2009	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
Jan-2010	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
Feb-2010	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
Mar-2010	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
Apr-2010	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
May-2010	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
Jun-2010	133	52	0	0	0	0	52	0	7	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	164	44	52	7
Jul-2010	133	52	0	0	0	0	52	0	7	319	80	80	32	32	0	0	0	0	160	160	64	64	0	0	0	0	372	128	52	7
Aug-2010	133	52	0	0	0	0	52	0	7	319	80	80	32	32	0	0	0	0	160	160	64	64	0	0	0	0	372	128	52	7
Sep-2010	133	52	0	0	0	0	52	0	7	319	80	80	32	32	0	0	0	0	160	160	64	64	0	0	0	0	372	128	52	7
Oct-2010	133	52	0	0	0	0	52	0	7	319	80	80	32	32	0	0	0	0	160	160	64	64	0	0	0	0	372	128	52	7
Nov-2010	133	52	0	0	0	0	52	0	7	319	80	80	32	32	0	0	0	0	160	160	64	64	0	0	0	0	372	128	52	7
Dec-2010	133	52	0	0	0	0	52	0	7	319	80	80	32	32	0	0	0	0	160	160	64	64	0	0	0	0	372	128	52	7
Jan-2011	215	85	0	0	0	0	85	0	11	344	86	86	34	34	0	0	0	0	172	172	68	68	0	0	0	0	429	136	85	11
Feb-2011	294	116	0	0	0	0	116	0	14	356	89	89	36	36	0	0	0	0	178	178	72	72	0	0	0	0	472	144	116	14
Mar-2011	316	124	0	0	0	0	124	0	16	362	91	91	36	36	0	0	0	0	182	182	72	72	0	0	0	0	488	144	124	16
Apr-2011	316	124	0	0	0	0	124	0	16	362	91	91	36	36	0	0	0	0	182	182	72	72	0	0	0	0	488	144	124	16
May-2011	353	139	0	0	0	0	139	0	17	380	95	95	38	38	0	0	0	0	190	190	76	76	0	0	0	0	519	152	139	17
Jun-2011	516	203	0	0	0	0	203	0	25	371	93	93	37	37	0	0	0	0	186	186	74	74	0	0	0	0	575	148	203	25
Jul-2011	606	238	0	0	0	0	238	0	30	371	93	93	37	37	0	0	0	0	186	186	74	74	0	0	0	0	610	148	238	30
Aug-2011	809	318	0	0	0	0	318	0	40	372	93	93	37	37	0	0	0	0	186	186	74	74	0	0	0	0	690	148	318	40
Sep-2011	917	361	0	0	0	0	361	0	45	370	93	93	37	37	0	0	0	0	186	186	74	74	0	0	0	0	733	148	361	45
Oct-2011	954	375	0	0	0	0	375	0	47	374	93	93	37	37	0	0	0	0	186	186	74	74	0	0	0	0	747	148	375	47
Nov-2011	917	361	0	0	0	0	361	0	45	356	89	89	36	36	0	0	0	0	178	178	72	72	0	0	0	0	717	144	361	45
Dec-2011	838	330	0	0	0	0	330	0	41	348	87	87	35	35	0	0	0	0	174	174	70	70	0	0	0	0	678	140	330	41
Jan-2012	963	379	0	0	0	0	379	0	47	263	66	66	26	26	0	0	0	0	132	132	52	52	0	0	0	0	643	104	379	47
Feb-2012	1,012	398	0	0	0	0	398	0	50	264	66	66	26	26	0	0	0	0	132	132	52	52	0	0	0	0	662	104	398	50
Mar-2012	936	368	0	0	0	0	368	0	46	244	61	61	24	24	0	0	0	0	122	122	48	48	0	0	0	0	612	96	368	46
Apr-2012	940	370	0	0	0	0	370	0	46	239	60	60	24	24	0	0	0	0	120	120	48	48	0	0	0	0	610	96	370	46
May-2012	940	370	0	0	0	0	370	0	46	239	60	60	24	24	0	0	0	0	120	120	48	48	0	0	0	0	610	96	370	46
Jun-2012	940	370	0	0	0	0	370	0	46	239	60	60	24	24	0	0	0	0	120	120	48	48	0	0	0	0	610	96	370	46
Jul-2012	887	349	0	0	0	0	349	0	44	236	59	59	24	24	0	0	0	0	118	118	48	48	0	0	0	0	585	96	349	44
Aug-2012	811	319	0	0	0	0	319	0	40	236	59	59	24	24	0	0	0	0	118	118	48	48	0	0	0	0	555	96	319	40
Sep-2012	588	231	0	0	0	0	231	0	29	235	59	59	23	23	0	0	0	0	118	118	46	46	0	0	0	0	467	92	231	29
Oct-2012	501	197	0	0	0	0	197	0	25	227	57	57	23	23	0	0	0	0	114	114	46	46	0	0	0	0	425	92	197	25
Nov-2012	501	197	0	0	0	0	197	0	25	227	57	57	23	23	0	0	0	0	114	114	46	46	0	0	0	0	425	92	197	25
Dec-2012	422	166	0	0	0	0	166	0	21	219	55	55	22	22	0	0	0	0	110	110	44	44	0	0	0	0	386	88	166	21
Jan-2013	422	166	0	0	0	0	166	0	21	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	178	4	166	21
Feb-2013	422	166	0	0	0	0	166	0	21	9	2	2	1	1	0	0	0	0	4	4	2	2	0	0	0	0	174	4	166	21
Mar-2013	422	166	0	0	0	0	166	0	21	9	2	2	1	1	0	0	0	0	4	4	2	2	0	0	0	0	174	4	166	21
Apr-2013	431	170	0	0	0	0	170	0	21	20	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	190	8	170	21
May-2013	431	170	0	0	0	0	170	0	21	20	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	190	8	170	21
Jun-2013	431	170	0	0	0	0	170	0	21	20	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	190	8	170	21
Jul-2013	572	225	0	0	0	0	225	0	28	19	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	245	8	225	28
Aug-2013	565	222	0	0	0	0	222	0	28	19	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	242	8	222	28
Sep-2013	440	173	0	0	0	0	173	0	22	15	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	189	8	173	22
Oct-2013	440	173	0	0	0	0	173	0	22	15	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	189	8	173	22
Nov-2013	440	173	0	0	0	0	173	0	22	15	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	189	8	173	22
Dec-2013	440	173	0	0	0	0	173	0	22	15	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	189	8	173	22

Proposed Manhattanville in West Harlem Rezoning FEIS

Construction Vehicle Trip Projections

Auto Split: 59%
Auto Occupancy: 1.20
6 - 7 AM Distribution: 80%
8 - 9 AM Distribution: 0%
3 - 4 PM Distribution: 80%
4 - 5 PM Distribution: 10%

In/Out Trips in Same Hour: 2
Truck PCE: 2.00
6 - 7 AM Distribution: 25%
8 - 9 AM Distribution: 10%
3 - 4 PM Distribution: 0%
4 - 5 PM Distribution: 0%

		Auto Trip									Truck Trip								Truck PCE								Total PCE			
	Daily	6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		Daily	6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		6-7 AM	8-9 AM	3-4 PM	4-5 PM
Month	Worker	In	Out	In	Out	In	Out	In	Out	Truck	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In & Out	In & Out	In & Out	In & Out
Jan-2014	295	116	0	0	0	0	116	0	15	17	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	132	8	116	15
Feb-2014	295	116	0	0	0	0	116	0	15	17	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	132	8	116	15
Mar-2014	295	116	0	0	0	0	116	0	15	17	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	132	8	116	15
Apr-2014	295	116	0	0	0	0	116	0	15	17	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	132	8	116	15
May-2014	295	116	0	0	0	0	116	0	15	17	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	132	8	116	15
Jun-2014	295	116	0	0	0	0	116	0	15	17	4	4	2	2	0	0	0	0	8	8	4	4	0	0	0	0	132	8	116	15
Jul-2014	300	118	0	0	0	0	118	0	15	22	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	138	8	118	15
Aug-2014	159	63	0	0	0	0	63	0	8	22	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	83	8	63	8
Sep-2014	191	75	0	0	0	0	75	0	9	22	6	6	2	2	0	0	0	0	12	12	4	4	0	0	0	0	99	8	75	9
Oct-2014	191	75	0	0	0	0	75	0	9	22	6	6	2	2	0	0	0	0	12	12	4	4	0	0	0	0	99	8	75	9
Nov-2014	186	73	0	0	0	0	73	0	9	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	85	4	73	9
Dec-2014	186	73	0	0	0	0	73	0	9	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	85	4	73	9
Jan-2015	247	97	0	0	0	0	97	0	12	8	2	2	1	1	0	0	0	0	4	4	2	2	0	0	0	0	105	4	97	12
Feb-2015	269	106	0	0	0	0	106	0	13	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	118	4	106	13
Mar-2015	269	106	0	0	0	0	106	0	13	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	118	4	106	13
Apr-2015	288	113	0	0	0	0	113	0	14	14	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	125	4	113	14
May-2015	280	110	0	0	0	0	110	0	14	23	6	6	2	2	0	0	0	0	12	12	4	4	0	0	0	0	134	8	110	14
Jun-2015	280	110	0	0	0	0	110	0	14	23	6	6	2	2	0	0	0	0	12	12	4	4	0	0	0	0	134	8	110	14
Jul-2015	280	110	0	0	0	0	110	0	14	22	6	6	2	2	0	0	0	0	12	12	4	4	0	0	0	0	134	8	110	14
Aug-2015	261	103	0	0	0	0	103	0	13	22	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	123	8	103	13
Sep-2015	261	103	0	0	0	0	103	0	13	22	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	123	8	103	13
Oct-2015	261	103	0	0	0	0	103	0	13	22	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	123	8	103	13
Nov-2015	261	103	0	0	0	0	103	0	13	22	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	123	8	103	13
Dec-2015	261	103	0	0	0	0	103	0	13	22	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	123	8	103	13
Jan-2016	98	39	0	0	0	0	39	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	43	0	39	5
Feb-2016	98	39	0	0	0	0	39	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	43	0	39	5
Mar-2016	98	39	0	0	0	0	39	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	43	0	39	5
Apr-2016	98	39	0	0	0	0	39	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	43	0	39	5
May-2016	98	39	0	0	0	0	39	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	43	0	39	5
Jun-2016	98	39	0	0	0	0	39	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	43	0	39	5
Jul-2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug-2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sep-2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nov-2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec-2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sep-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nov-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec-2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-2018	4	1	0	0	0	0	1	0	0	14	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	13	4	1	0
Feb-2018	4	1	0	0	0	0	1	0	0	14	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	13	4	1	0
Mar-2018	4	1	0	0	0	0	1	0	0	14	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	13	4	1	0
Apr-2018	4	1	0	0	0	0	1	0	0	14	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	13	4	1	0
May-2018	132	52	0	0	0	0	52	0	6	48	12	12	5	5	0	0	0	0	24	24	10	10	0	0	0	0	100	20	52	6
Jun-2018	128	51	0	0	0	0	51	0	6	38	9	9	4	4	0	0	0	0	18	18	8	8	0	0	0	0	87	16	51	6
Jul-2018	128	51	0	0	0	0	51	0	6	38	9	9	4	4	0	0	0	0	18	18	8	8	0	0	0	0	87	16	51	6
Aug-2018	128	51	0	0	0	0	51	0	6	38	9	9	4	4	0	0	0	0	18	18	8	8	0	0	0	0	87	16	51	6
Sep-2018	128	51	0	0	0	0	51	0	6	38	9	9	4	4	0	0	0	0	18	18	8	8	0	0	0	0	87	16	51	6
Oct-2018	128	51	0	0	0	0	51	0	6	38	9	9	4	4	0	0	0	0	18	18	8	8	0	0	0	0	87	16	51	6
Nov-2018	242	95	0	0	0	0	95	0	12	45	11	11	5	5	0	0	0	0	22	22	10	10	0	0	0	0	139	20	95	12
Dec-2018	114	45	0	0	0	0	45	0	6	11	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	57	4	45	6
Jan-2019	218	86	0	0	0	0	86	0	11	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	98	4	86	11
Feb-2019	218	86	0	0	0	0	86	0	11	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	98	4	86	11
Mar-2019	526	207	0	0	0	0	207	0	26	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	219	4	207	26
Apr-2019	526	207	0	0	0	0	207	0	26	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	219	4	207	26
May-2019	526	207	0	0	0	0	207	0	26	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	219	4	207	26
Jun-2019	526	207	0	0	0	0	207	0	26	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	219	4	207	26
Jul-2019	413	162	0	0	0	0	162	0	20	5	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	166	0	162	20
Aug-2019	413	162	0	0	0	0	162	0	20	5	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	166	0	162	20
Sep-2019	413	162	0	0	0	0	162	0	20	5	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	166	0	162	20
Oct-2019	309	121	0	0	0	0	121	0	15	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	125	0	121	15
Nov-2019	309	121	0	0	0	0	121	0	15	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	125	0	121	15
Dec-2019	309	121	0	0	0	0	121	0	15	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	125	0	121	15

Proposed Manhattanville in West Harlem Rezoning FEIS

Construction Vehicle Trip Projections

Auto Split: 59%
Auto Occupancy: 1.20
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8 - 9 AM Distribution: 0%
3 - 4 PM Distribution: 80%
4 - 5 PM Distribution: 10%

In/Out Trips in Same Hour: 2
Truck PCE: 2.00
6 - 7 AM Distribution: 25%
8 - 9 AM Distribution: 10%
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4 - 5 PM Distribution: 0%

		Auto Trip									Truck Trip									Truck PCE								Total PCE			
	Daily	6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		Daily	6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		6-7 AM	8-9 AM	3-4 PM	4-5 PM
Month	Worker	In	Out	In	Out	In	Out	In	Out	Truck	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In & Out	In & Out	In & Out	In & Out
Jan-2020	332	130	0	0	0	0	130	0	16	47	12	12	5	5	0	0	0	0	24	24	10	10	0	0	0	0	178	20	130	16
Feb-2020	413	162	0	0	0	0	162	0	20	187	47	47	19	19	0	0	0	0	94	94	38	38	0	0	0	0	350	76	162	20
Mar-2020	419	165	0	0	0	0	165	0	21	196	49	49	20	20	0	0	0	0	98	98	40	40	0	0	0	0	361	80	165	21
Apr-2020	410	161	0	0	0	0	161	0	20	176	44	44	18	18	0	0	0	0	88	88	36	36	0	0	0	0	337	72	161	20
May-2020	410	161	0	0	0	0	161	0	20	176	44	44	18	18	0	0	0	0	88	88	36	36	0	0	0	0	337	72	161	20
Jun-2020	391	154	0	0	0	0	154	0	19	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	266	44	154	19
Jul-2020	476	187	0	0	0	0	187	0	23	112	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	299	44	187	23
Aug-2020	497	195	0	0	0	0	195	0	24	113	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	307	44	195	24
Sep-2020	498	196	0	0	0	0	196	0	24	111	28	28	11	11	0	0	0	0	56	56	22	22	0	0	0	0	308	44	196	24
Oct-2020	484	190	0	0	0	0	190	0	24	100	25	25	10	10	0	0	0	0	50	50	20	20	0	0	0	0	290	40	190	24
Nov-2020	452	178	0	0	0	0	178	0	22	34	9	9	3	3	0	0	0	0	18	18	6	6	0	0	0	0	214	12	178	22
Dec-2020	436	171	0	0	0	0	171	0	21	34	8	8	3	3	0	0	0	0	16	16	6	6	0	0	0	0	203	12	171	21
Jan-2021	449	176	0	0	0	0	176	0	22	53	13	13	5	5	0	0	0	0	26	26	10	10	0	0	0	0	228	20	176	22
Feb-2021	449	176	0	0	0	0	176	0	22	52	13	13	5	5	0	0	0	0	26	26	10	10	0	0	0	0	228	20	176	22
Mar-2021	547	215	0	0	0	0	215	0	27	64	16	16	6	6	0	0	0	0	32	32	12	12	0	0	0	0	279	24	215	27
Apr-2021	238	94	0	0	0	0	94	0	12	61	15	15	6	6	0	0	0	0	30	30	12	12	0	0	0	0	154	24	94	12
May-2021	398	157	0	0	0	0	157	0	20	261	65	65	26	26	0	0	0	0	130	130	52	52	0	0	0	0	417	104	157	20
Jun-2021	388	153	0	0	0	0	153	0	19	233	58	58	23	23	0	0	0	0	116	116	46	46	0	0	0	0	385	92	153	19
Jul-2021	388	153	0	0	0	0	153	0	19	233	58	58	23	23	0	0	0	0	116	116	46	46	0	0	0	0	385	92	153	19
Aug-2021	388	153	0	0	0	0	153	0	19	233	58	58	23	23	0	0	0	0	116	116	46	46	0	0	0	0	385	92	153	19
Sep-2021	322	127	0	0	0	0	127	0	16	319	80	80	32	32	0	0	0	0	160	160	64	64	0	0	0	0	447	128	127	16
Oct-2021	322	127	0	0	0	0	127	0	16	319	80	80	32	32	0	0	0	0	160	160	64	64	0	0	0	0	447	128	127	16
Nov-2021	591	232	0	0	0	0	232	0	29	368	92	92	37	37	0	0	0	0	184	184	74	74	0	0	0	0	600	148	232	29
Dec-2021	500	197	0	0	0	0	197	0	25	360	90	90	36	36	0	0	0	0	180	180	72	72	0	0	0	0	557	144	197	25
Jan-2022	500	197	0	0	0	0	197	0	25	360	90	90	36	36	0	0	0	0	180	180	72	72	0	0	0	0	557	144	197	25
Feb-2022	721	284	0	0	0	284	0	0	35	361	90	90	36	36	0	0	0	0	180	180	72	72	0	0	0	0	644	144	284	35
Mar-2022	721	284	0	0	0	0	284	0	35	361	90	90	36	36	0	0	0	0	180	180	72	72	0	0	0	0	644	144	284	35
Apr-2022	562	221	0	0	0	0	221	0	28	158	39	39	16	16	0	0	0	0	78	78	32	32	0	0	0	0	377	64	221	28
May-2022	594	234	0	0	0	0	234	0	29	256	64	64	26	26	0	0	0	0	128	128	52	52	0	0	0	0	490	104	234	29
Jun-2022	335	132	0	0	0	0	132	0	16	115	29	29	11	11	0	0	0	0	58	58	22	22	0	0	0	0	248	44	132	16
Jul-2022	417	164	0	0	0	0	164	0	21	126	32	32	13	13	0	0	0	0	64	64	26	26	0	0	0	0	292	52	164	21
Aug-2022	335	132	0	0	0	0	132	0	16	115	29	29	11	11	0	0	0	0	58	58	22	22	0	0	0	0	248	44	132	16
Sep-2022	335	132	0	0	0	0	132	0	16	115	29	29	11	11	0	0	0	0	58	58	22	22	0	0	0	0	248	44	132	16
Oct-2022	335	132	0	0	0	0	132	0	16	115	29	29	11	11	0	0	0	0	58	58	22	22	0	0	0	0	248	44	132	16
Nov-2022	335	132	0	0	0	0	132	0	16	115	29	29	11	11	0	0	0	0	58	58	22	22	0	0	0	0	248	44	132	16
Dec-2022	335	132	0	0	0	0	132	0	16	115	29	29	11	11	0	0	0	0	58	58	22	22	0	0	0	0	248	44	132	16
Jan-2023	538	212	0	0	0	0	212	0	26	143	36	36	14	14	0	0	0	0	72	72	28	28	0	0	0	0	356	56	212	26
Feb-2023	506	199	0	0	0	0	199	0	25	45	11	11	5	5	0	0	0	0	22	22	10	10	0	0	0	0	243	20	199	25
Mar-2023	778	306	0	0	0	0	306	0	38	47	12	12	5	5	0	0	0	0	24	24	10	10	0	0	0	0	354	20	306	38
Apr-2023	561	221	0	0	0	0	221	0	28	31	8	8	3	3	0	0	0	0	16	16	6	6	0	0	0	0	253	12	221	28
May-2023	861	339	0	0	0	0	339	0	42	32	8	8	3	3	0	0	0	0	16	16	6	6	0	0	0	0	371	12	339	42
Jun-2023	861	339	0	0	0	0	339	0	42	32	8	8	3	3	0	0	0	0	16	16	6	6	0	0	0	0	371	12	339	42
Jul-2023	718	282	0	0	0	0	282	0	35	20	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	302	8	282	35
Aug-2023	718	282	0	0	0	0	282	0	35	20	5	5	2	2	0	0	0	0	10	10	4	4	0	0	0	0	302	8	282	35
Sep-2023	658	259	0	0	0	0	259	0	32	14	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	271	4	259	32
Oct-2023	658	259	0	0	0	0	259	0	32	14	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	271	4	259	32
Nov-2023	586	230	0	0	0	0	230	0	29	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	242	4	230	29
Dec-2023	472	186	0	0	0	0	186	0	23	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	198	4	186	23
Jan-2024	472	186	0	0	0	0	186	0	23	13	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	198	4	186	23
Feb-2024	386	152	0	0	0	0	152	0	19	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	164	4	152	19
Mar-2024	386	152	0	0	0	0	152	0	19	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	164	4	152	19
Apr-2024	386	152	0	0	0	0	152	0	19	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	164	4	152	19
May-2024	386	152	0	0	0	0	152	0	19	12	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	164	4	152	19
Jun-2024	386	152	0	0	0	0	152	0	19	11	3	3	1	1	0	0	0	0	6	6	2	2	0	0	0	0	164	4	152	19
Jul-2024	253	100	0	0	0	0	100	0	12	8	2	2	1	1	0	0	0	0	4	4	2	2	0	0	0	0	108	4	100	12
Aug-2024	253	100	0	0	0	0	100	0	12	8	2	2	1	1	0	0	0	0	4	4	2	2	0	0	0	0	108	4	100	12
Sep-2024	111	44	0	0	0	0	44	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	48	0	44	5
Oct-2024	111	44	0	0	0	0	44	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	48	0	44	5
Nov-2024	111	44	0	0	0	0	44	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	48	0	44	5
Dec-2024	111	44	0	0	0	0	44	0	5	4	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	48	0	44	5
Jan-2025	132	52	0	0	0	0	52	0	6	33	8	8	3	3	0	0	0	0	16	16	6	6	0	0	0	0	84	12	52	6
Feb-2025	213	84	0	0	0	0	84	0	10	221	55	55	22	22	0	0	0	0	110	110	44	44	0	0	0	0	304	88	84	10
Mar-2025	213	84	0	0	0	0	84	0	10	221	55	55	22	22	0	0	0	0	110	110	44	44	0	0	0	0	304	88	84	10
Apr-2025	206	81	0	0	0	0	81	0	10	211	53	53	21	21	0	0	0	0	106	106	42	42	0	0	0	0	293	84	81	10
May-2025	299	118	0	0	0	0	118	0	15	220	55	55	22	22	0	0	0	0	110	110	44	44	0	0	0	0	338	88	118	15
Jun-2025	267	105	0	0	0	0	105	0	13	138	34	34	14	14	0	0	0	0	68	68	28	28	0	0	0	0	241	56	105	13
Jul-2025	142	56	0	0	0	0	56	0	7	124	31	31	12	12	0	0	0	0	62	62	24	24	0	0	0	0	180	48	56	7
Aug-2025	110	43	0	0	0	0	43	0	5	26	7	7	3	3	0	0	0	0	14	14	6	6	0	0	0	0	71	12	43	5
Sep-2025	181	71	0	0	0	0	71	0	9	126	32	32	13	13	0	0	0	0	64	64	26	26	0	0	0	0	199	52	71	9
Oct-2025	181	71	0	0	0	0	71	0	9	126	32	32	13	13	0	0	0	0	64	64	26	26	0	0	0	0	199	52	71	9
Nov-2025	181	71	0	0	0	0	71	0	9	126	32	32	13	13	0	0	0	0	64	64	26	26	0	0	0	0	199	52	71	9
Dec-2025	181	71	0	0	0	0	71	0	9	126	32	32	13	13	0	0	0	0	64	64	26	26	0	0	0	0	199	52	71	9

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		Auto Trip									Truck Trip									Truck PCE									Total PCE			
	Daily	6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		Daily	6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM			6 - 7 AM		8 - 9 AM		3 - 4 PM		4 - 5 PM		6-7 AM	8-9 AM	3-4 PM	4-5 PM
Month	Worker	In	Out	In	Out	In	Out	In	Out	Truck	In	Out	In	Out	In	Out	In	Out		In	Out	In	Out	In	Out	In	Out		In & Out	In & Out	In & Out	In & Out
Jan-2026	194	76	0	0	0	0	76	0	10	145	36	36	15	15	0	0	0	0		72	72	30	30	0	0	0	0		220	60	76	10
Feb-2026	194	76	0	0	0	0	76	0	10	145	36	36	15	15	0	0	0	0		72	72	30	30	0	0	0	0		220	60	76	10
Mar-2026	292	115	0	0	0	0	115	0	14	158	39	39	16	16	0	0	0	0		78	78	32	32	0	0	0	0		271	64	115	14
Apr-2026	416	164	0	0	0	0	164	0	20	183	46	46	18	18	0	0	0	0		92	92	36	36	0	0	0	0		348	72	164	20
May-2026	343	135	0	0	0	0	135	0	17	175	44	44	17	17	0	0	0	0		88	88	34	34	0	0	0	0		311	68	135	17
Jun-2026	333	131	0	0	0	0	131	0	16	147	37	37	15	15	0	0	0	0		74	74	30	30	0	0	0	0		279	60	131	16
Jul-2026	333	131	0	0	0	0	131	0	16	147	37	37	15	15	0	0	0	0		74	74	30	30	0	0	0	0		279	60	131	16
Aug-2026	470	185	0	0	0	0	185	0	23	148	37	37	15	15	0	0	0	0		74	74	30	30	0	0	0	0		333	60	185	23
Sep-2026	423	166	0	0	0	0	166	0	21	234	59	59	23	23	0	0	0	0		118	118	46	46	0	0	0	0		402	92	166	21
Oct-2026	431	170	0	0	0	0	170	0	21	248	62	62	25	25	0	0	0	0		124	124	50	50	0	0	0	0		418	100	170	21
Nov-2026	513	202	0	0	0	0	202	0	25	259	65	65	26	26	0	0	0	0		130	130	52	52	0	0	0	0		462	104	202	25
Dec-2026	513	202	0	0	0	0	202	0	25	259	65	65	26	26	0	0	0	0		130	130	52	52	0	0	0	0		462	104	202	25
Jan-2027	599	236	0	0	0	0	236	0	29	226	57	57	23	23	0	0	0	0		114	114	46	46	0	0	0	0		464	92	236	29
Feb-2027	755	297	0	0	0	0	297	0	37	373	93	93	37	37	0	0	0	0		186	186	74	74	0	0	0	0		669	148	297	37
Mar-2027	756	297	0	0	0	0	297	0	37	351	88	88	35	35	0	0	0	0		176	176	70	70	0	0	0	0		649	140	297	37
Apr-2027	838	330	0	0	0	0	330	0	41	363	91	91	36	36	0	0	0	0		182	182	72	72	0	0	0	0		694	144	330	41
May-2027	945	372	0	0	0	0	372	0	46	363	91	91	36	36	0	0	0	0		182	182	72	72	0	0	0	0		736	144	372	46
Jun-2027	1,223	481	0	0	0	0	481	0	60	268	67	67	27	27	0	0	0	0		134	134	54	54	0	0	0	0		749	108	481	60
Jul-2027	1,226	482	0	0	0	0	482	0	60	244	61	61	24	24	0	0	0	0		122	122	48	48	0	0	0	0		726	96	482	60
Aug-2027	1,168	459	0	0	0	0	459	0	57	210	53	53	21	21	0	0	0	0		106	106	42	42	0	0	0	0		671	84	459	57
Sep-2027	1,129	444	0	0	0	0	444	0	56	162	40	40	16	16	0	0	0	0		80	80	32	32	0	0	0	0		604	64	444	56
Oct-2027	1,162	457	0	0	0	0	457	0	57	162	41	41	16	16	0	0	0	0		82	82	32	32	0	0	0	0		621	64	457	57
Nov-2027	1,299	511	0	0	0	0	511	0	64	52	13	13	5	5	0	0	0	0		26	26	10	10	0	0	0	0		563	20	511	64
Dec-2027	1,552	610	0	0	0	0	610	0	76	53	13	13	5	5	0	0	0	0		26	26	10	10	0	0	0	0		662	20	610	76
Jan-2028	1,406	553	0	0	0	0	553	0	69	35	9	9	4	4	0	0	0	0		18	18	8	8	0	0	0	0		589	16	553	69
Feb-2028	1,250	492	0	0	0	0	492	0	61	30	7	7	3	3	0	0	0	0		14	14	6	6	0	0	0	0		520	12	492	61
Mar-2028	1,117	439	0	0	0	0	439	0	55	23	6	6	2	2	0	0	0	0		12	12	4	4	0	0	0	0		463	8	439	55
Apr-2028	820	323	0	0	0	0	323	0	40	14	4	4	1	1	0	0	0	0		8	8	2	2	0	0	0	0		339	4	323	40
May-2028	820	323	0	0	0	0	323	0	40	14	4	4	1	1	0	0	0	0		8	8	2	2	0	0	0	0		339	4	323	40
Jun-2028	820	323	0	0	0	0	323	0	40	14	4	4	1	1	0	0	0	0		8	8	2	2	0	0	0	0		339	4	323	40
Jul-2028	820	323	0	0	0	0	323	0	40	14	4	4	1	1	0	0	0	0		8	8	2	2	0	0	0	0		339	4	323	40
Aug-2028	741	291	0	0	0	0	291	0	36	14	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		303	4	291	36
Sep-2028	595	234	0	0	0	0	234	0	29	13	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		246	4	234	29
Oct-2028	595	234	0	0	0	0	234	0	29	13	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		246	4	234	29
Nov-2028	595	234	0	0	0	0	234	0	29	13	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		246	4	234	29
Dec-2028	595	234	0	0	0	0	234	0	29	13	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		246	4	234	29
Jan-2029	595	234	0	0	0	0	234	0	29	13	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		246	4	234	29
Feb-2029	595	234	0	0	0	0	234	0	29	13	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		246	4	234	29
Mar-2029	595	234	0	0	0	0	234	0	29	13	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		246	4	234	29
Apr-2029	500	197	0	0	0	0	197	0	25	12	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		209	4	197	25
May-2029	500	197	0	0	0	0	197	0	25	12	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		209	4	197	25
Jun-2029	500	197	0	0	0	0	197	0	25	12	3	3	1	1	0	0	0	0		6	6	2	2	0	0	0	0		209	4	197	25
Jul-2029	390	153	0	0	0	0	153	0	19	8	2	2	1	1	0	0	0	0		4	4	2	2	0	0	0	0		161	4	153	19
Aug-2029	390	153	0	0	0	0	153	0	19	8	2	2	1	1	0	0	0	0		4	4	2	2	0	0	0	0		161	4	153	19
Sep-2029	339	133	0	0	0	0	133	0	17	7	2	2	1	1	0	0	0	0		4	4	2	2	0	0	0	0		141	4	133	17
Oct-2029	253	100	0	0	0	0	100	0	12	7	2	2	1	1	0	0	0	0		4	4	2	2	0	0	0	0		108	4	100	12
Nov-2029	166	65	0	0	0	0	65	0	8	4	1	1	0	0	0	0	0	0		2	2	0	0	0	0	0	0		69	0	65	8
Dec-2029	166	65	0	0	0	0	65	0	8	4	1	1	0	0	0	0	0	0		2	2	0	0	0	0	0	0		69	0	65	8

Proposed Manhattanville in West Harlem Rezoning EIS

Construction Vehicle Trip Projections

Worker and Truck Delivery Temporal Distribution

Hour	Workers			Trucks		
	In	Out	Total	In	Out	Total
6:00 AM - 7:00 AM	80%		80%	25%	25%	50%
7:00 AM - 8:00 AM	20%		20%	10%	10%	20%
8:00 AM - 9:00 AM			0%	10%	10%	20%
9:00 AM - 10:00 AM			0%	10%	10%	20%
10:00 AM - 11:00 AM			0%	10%	10%	20%
11:00 AM - 12:00 PM			0%	10%	10%	20%
12:00 PM - 1:00 PM			0%	10%	10%	20%
1:00 PM - 2:00 PM			0%	10%	10%	20%
2:00 PM - 3:00 PM		10%	10%	5%	5%	10%
3:00 PM - 4:00 PM		80%	80%			0%
4:00 PM - 5:00 PM		10%	10%			0%
7-3 Work Shift	100%	100%	200%	100%	100%	200%

2008 Peak Month

Daily Worker Vehicles: 242
Daily Truck Deliveries: 180

Oct-2008

Hour	Workers			Trucks			Passenger Car Equivalents (PCEs)		
	In	Out	Total	In	Out	Total	In	Out	Total
6:00 AM - 7:00 AM	194		194	45	45	90	284	90	374
7:00 AM - 8:00 AM	48		48	18	18	36	84	36	120
8:00 AM - 9:00 AM			0	18	18	36	36	36	72
9:00 AM - 10:00 AM			0	18	18	36	36	36	72
10:00 AM - 11:00 AM			0	18	18	36	36	36	72
11:00 AM - 12:00 PM			0	18	18	36	36	36	72
12:00 PM - 1:00 PM			0	18	18	36	36	36	72
1:00 PM - 2:00 PM			0	18	18	35	35	35	70
2:00 PM - 3:00 PM		24	24	9	9	18	18	42	60
3:00 PM - 4:00 PM		194	194			0	0	194	194
4:00 PM - 5:00 PM		24	24			0	0	24	24
7-3 Work Shift	242	242	485	180	180	359	602	602	1,203

2011 Peak Month

Daily Worker Vehicles: 469
Daily Truck Deliveries: 374

Oct-2011

Hour	Workers			Trucks			Passenger Car Equivalents (PCEs)		
	In	Out	Total	In	Out	Total	In	Out	Total
6:00 AM - 7:00 AM	375		375	93	93	186	561	186	747
7:00 AM - 8:00 AM	94		94	37	37	74	168	74	242
8:00 AM - 9:00 AM			0	37	37	74	74	74	148
9:00 AM - 10:00 AM			0	37	37	74	74	74	148
10:00 AM - 11:00 AM			0	37	37	74	74	74	148
11:00 AM - 12:00 PM			0	37	37	74	74	74	148
12:00 PM - 1:00 PM			0	37	37	74	74	74	148
1:00 PM - 2:00 PM			0	40	40	80	80	80	159
2:00 PM - 3:00 PM		47	47	19	19	38	38	85	123
3:00 PM - 4:00 PM		375	375			0	0	375	375
4:00 PM - 5:00 PM		47	47			0	0	47	47
7-3 Work Shift	469	469	938	374	374	748	1,217	1,217	2,434

2022 Peak Month

Daily Worker Vehicles: 354
Daily Truck Deliveries: 361

Feb-2022

Hour	Workers			Trucks			Passenger Car Equivalents (PCEs)		
	In	Out	Total	In	Out	Total	In	Out	Total
6:00 AM - 7:00 AM	284		284	90	90	180	464	180	644
7:00 AM - 8:00 AM	70		70	36	36	72	142	72	214
8:00 AM - 9:00 AM			0	36	36	72	72	72	144
9:00 AM - 10:00 AM			0	36	36	72	72	72	144
10:00 AM - 11:00 AM			0	36	36	72	72	72	144
11:00 AM - 12:00 PM			0	36	36	72	72	72	144
12:00 PM - 1:00 PM			0	36	36	72	72	72	144
1:00 PM - 2:00 PM			0	37	37	73	73	73	146
2:00 PM - 3:00 PM		35	35	18	18	36	36	71	107
3:00 PM - 4:00 PM		284	284			0	0	284	284
4:00 PM - 5:00 PM		35	35			0	0	35	35
7-3 Work Shift	354	354	709	361	361	721	1,076	1,076	2,151

2027 Peak Month

Daily Worker Vehicles: 601
Daily Truck Deliveries: 268

Jun-2027

Hour	Workers			Trucks			Passenger Car Equivalents (PCEs)		
	In	Out	Total	In	Out	Total	In	Out	Total
6:00 AM - 7:00 AM	481		481	67	67	134	615	134	749
7:00 AM - 8:00 AM	120		120	27	27	54	174	54	228
8:00 AM - 9:00 AM			0	27	27	54	54	54	108
9:00 AM - 10:00 AM			0	27	27	54	54	54	108
10:00 AM - 11:00 AM			0	27	27	54	54	54	108
11:00 AM - 12:00 PM			0	27	27	54	54	54	108
12:00 PM - 1:00 PM			0	27	27	54	54	54	108
1:00 PM - 2:00 PM			0	26	26	52	52	52	103
2:00 PM - 3:00 PM		60	60	13	13	26	26	86	112
3:00 PM - 4:00 PM		481	481			0	0	481	481
4:00 PM - 5:00 PM		60	60			0	0	60	60
7-3 Work Shift	601	601	1,203	268	268	536	1,137	1,137	2,274

Source: Bovis Construction September 20, 2007 Projections.

Proposed Manhattanville in West Harlem Rezoning EIS

Comparison of Construction and Operational Trip Projections

	2008 Construction Analysis Year									2015 Operational Year		
	Construction Traffic (PCE)			Operational Traffic (PCE)			Total Traffic (PCE)			Operational Traffic (PCE)		
Hour	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
12:00 AM - 1:00 AM	0	0	0	0	0	0	0	0	0	2	9	11
1:00 AM - 2:00 AM	0	0	0	0	0	0	0	0	0	1	10	11
2:00 AM - 3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM - 4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 AM - 5:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
5:00 AM - 6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
6:00 AM - 7:00 AM	284	90	374	0	0	0	284	90	374	0	0	0
7:00 AM - 8:00 AM	84	36	120	0	0	0	84	36	120	51	8	59
8:00 AM - 9:00 AM	36	36	72	0	0	0	36	36	72	248	54	302
9:00 AM - 10:00 AM	36	36	72	0	0	0	36	36	72	196	64	260
10:00 AM - 11:00 AM	36	36	72	0	0	0	36	36	72	169	59	228
11:00 AM - 12:00 PM	36	36	72	0	0	0	36	36	72	53	39	92
12:00 PM - 1:00 PM	36	36	72	0	0	0	36	36	72	74	74	148
1:00 PM - 2:00 PM	35	35	70	0	0	0	35	35	70	62	67	129
2:00 PM - 3:00 PM	18	42	60	0	0	0	18	42	60	32	36	68
3:00 PM - 4:00 PM	0	194	194	0	0	0	0	194	194	35	57	92
4:00 PM - 5:00 PM	0	24	24	0	0	0	0	24	24	58	231	289
5:00 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	48	180	228
6:00 PM - 7:00 PM	0	0	0	0	0	0	0	0	0	51	134	185
7:00 PM - 8:00 PM	0	0	0	0	0	0	0	0	0	33	70	103
8:00 PM - 9:00 PM	0	0	0	0	0	0	0	0	0	36	42	78
9:00 PM - 10:00 PM	0	0	0	0	0	0	0	0	0	17	19	36
10:00 PM - 11:00 PM	0	0	0	0	0	0	0	0	0	8	15	23
11:00 PM - 12:00 AM	0	0	0	0	0	0	0	0	0	3	9	12
Total	602	602	1,204	0	0	0	602	602	1,204	1,177	1,177	2,354

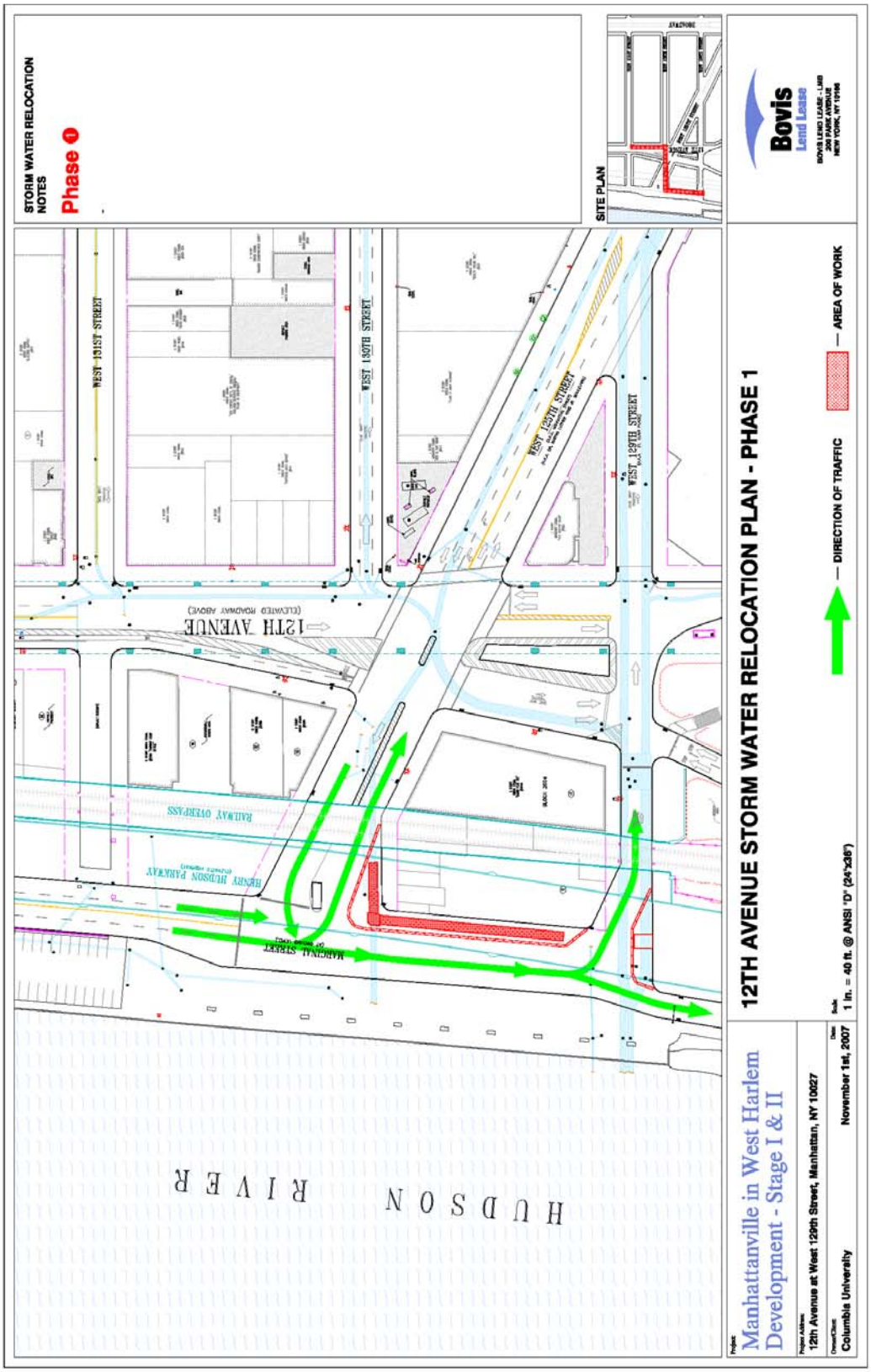
	2011 Construction Analysis Year									2015 Operational Year		
	Construction Traffic (PCE)			Operational Traffic (PCE)			Total Traffic (PCE)			Operational Traffic (PCE)		
Hour	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
12:00 AM - 1:00 AM	0	0	0	0	0	0	0	0	0	2	9	11
1:00 AM - 2:00 AM	0	0	0	0	0	0	0	0	0	1	10	11
2:00 AM - 3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM - 4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 AM - 5:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
5:00 AM - 6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
6:00 AM - 7:00 AM	561	186	747	0	0	0	561	186	747	0	0	0
7:00 AM - 8:00 AM	168	74	242	0	0	0	168	74	242	51	8	59
8:00 AM - 9:00 AM	74	74	148	0	0	0	74	74	148	248	54	302
9:00 AM - 10:00 AM	74	74	148	0	0	0	74	74	148	196	64	260
10:00 AM - 11:00 AM	74	74	148	0	0	0	74	74	148	169	59	228
11:00 AM - 12:00 PM	74	74	148	0	0	0	74	74	148	53	39	92
12:00 PM - 1:00 PM	74	74	148	0	0	0	74	74	148	74	74	148
1:00 PM - 2:00 PM	80	80	160	0	0	0	80	80	160	62	67	129
2:00 PM - 3:00 PM	38	85	123	0	0	0	38	85	123	32	36	68
3:00 PM - 4:00 PM	0	375	375	0	0	0	0	375	375	35	57	92
4:00 PM - 5:00 PM	0	47	47	0	0	0	0	47	47	58	231	289
5:00 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	48	180	228
6:00 PM - 7:00 PM	0	0	0	0	0	0	0	0	0	51	134	185
7:00 PM - 8:00 PM	0	0	0	0	0	0	0	0	0	33	70	103
8:00 PM - 9:00 PM	0	0	0	0	0	0	0	0	0	36	42	78
9:00 PM - 10:00 PM	0	0	0	0	0	0	0	0	0	17	19	36
10:00 PM - 11:00 PM	0	0	0	0	0	0	0	0	0	8	15	23
11:00 PM - 12:00 AM	0	0	0	0	0	0	0	0	0	3	9	12
Total	1,217	1,217	2,434	0	0	0	1,217	1,217	2,434	1,177	1,177	2,354

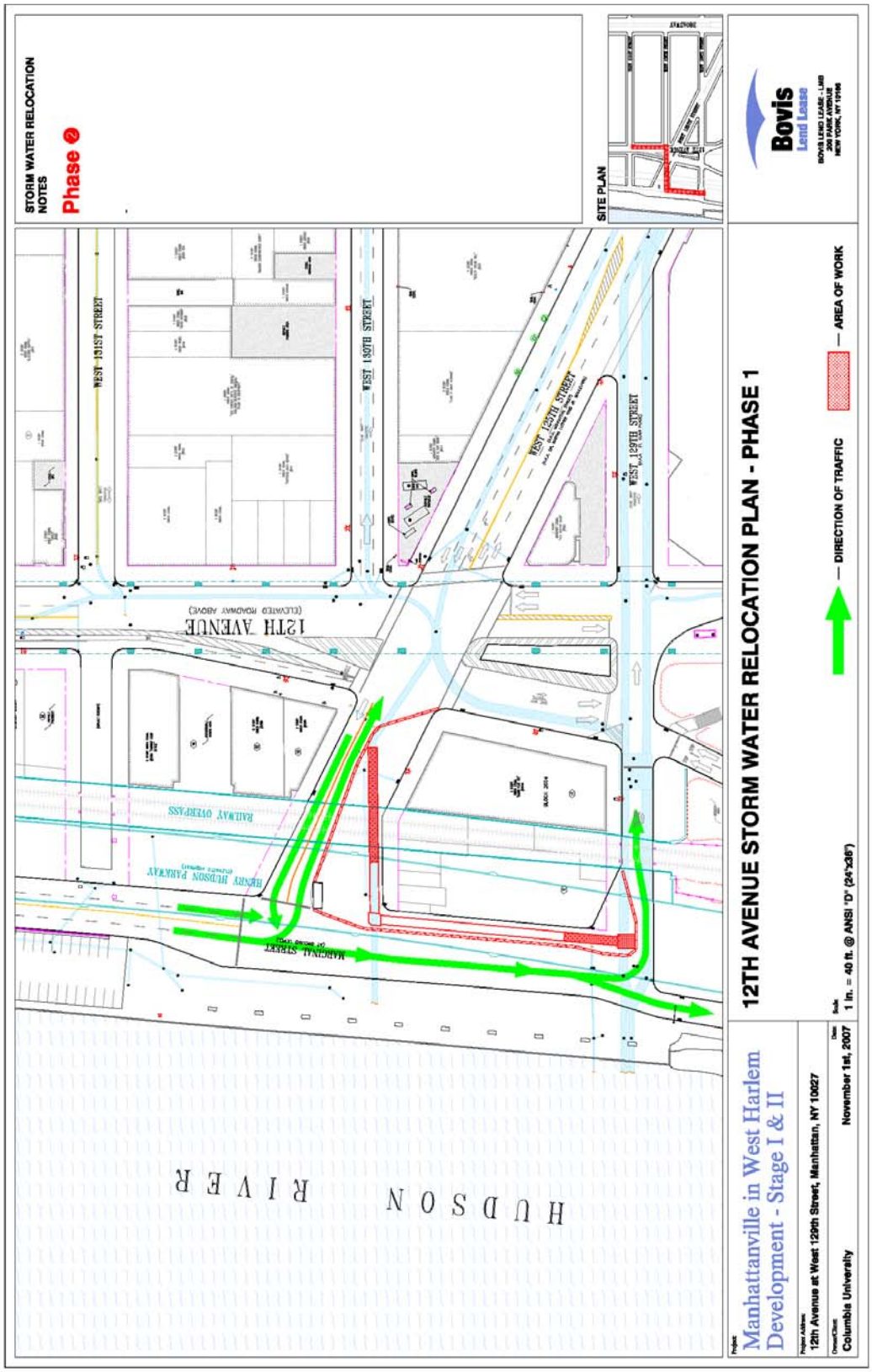
Proposed Manhattanville in West Harlem Rezoning EIS

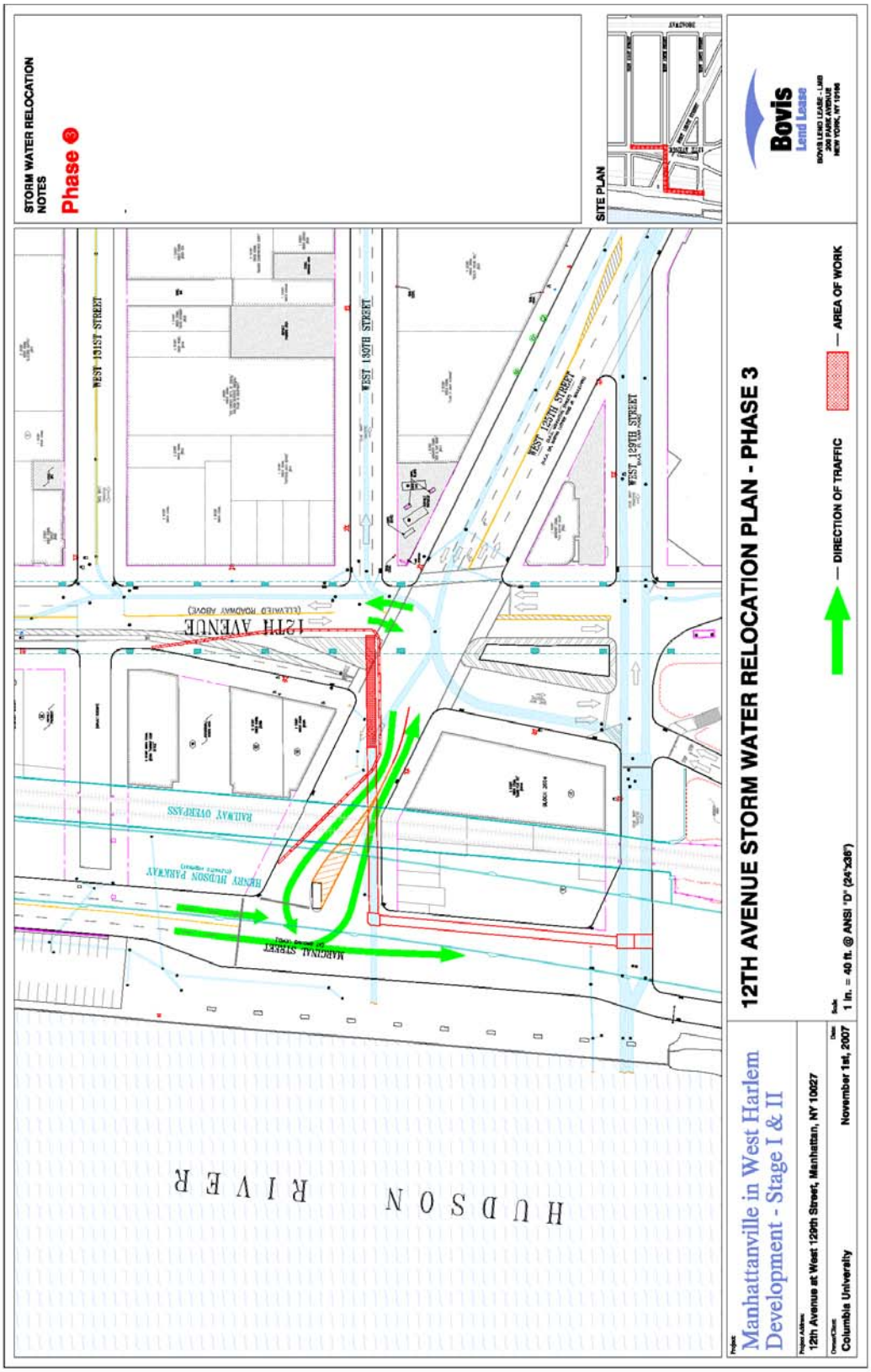
Comparison of Construction and Operational Trip Projections

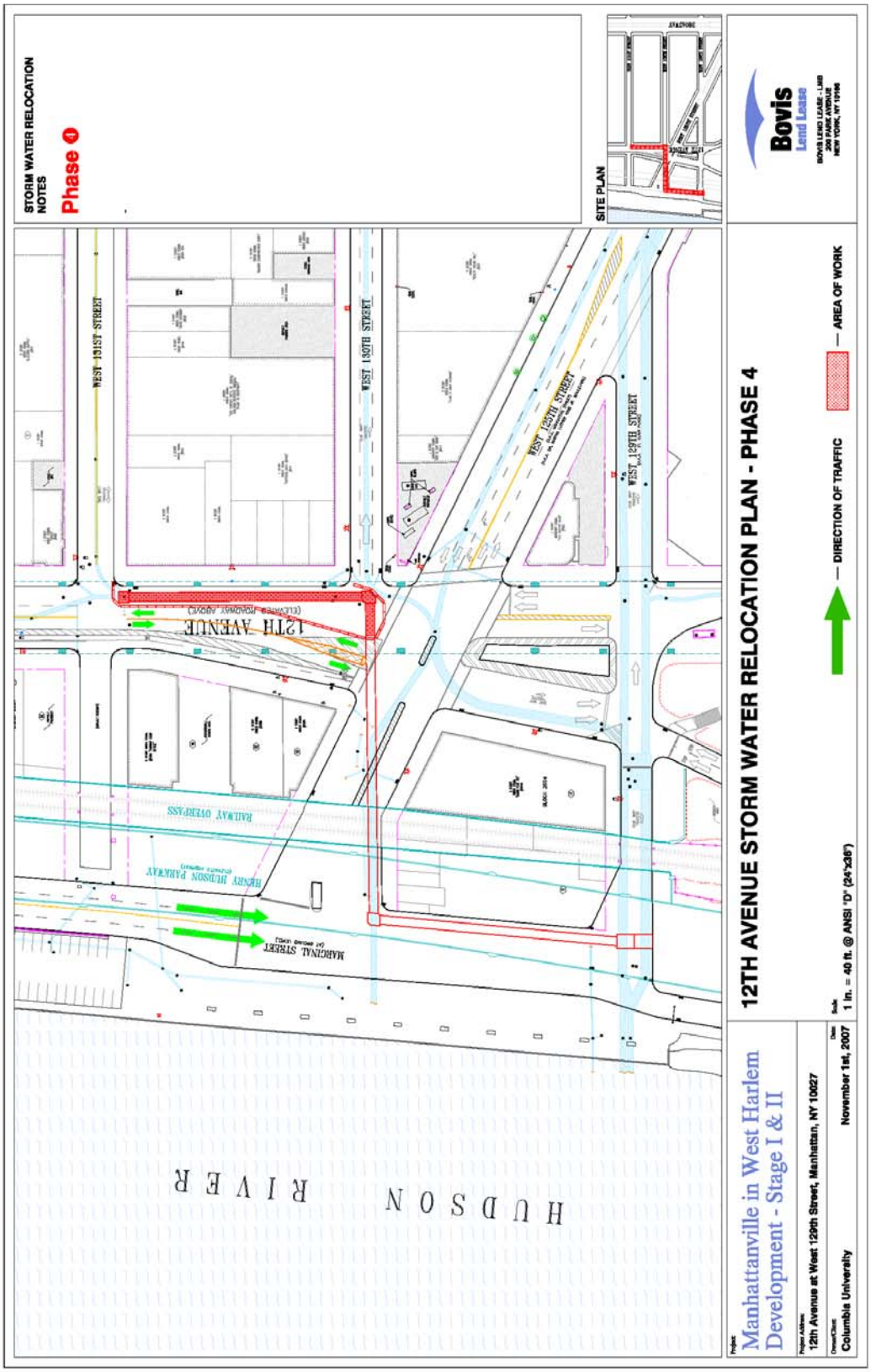
	2022 Construction Analysis Year									2030 Operational Year		
	Construction Traffic (PCE)			Operational Traffic (PCE)			Total Traffic (PCE)			Operational Traffic (PCE)		
Hour	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
12:00 AM - 1:00 AM	0	0	0	6	18	24	6	18	24	12	35	47
1:00 AM - 2:00 AM	0	0	0	5	18	23	5	18	23	7	31	38
2:00 AM - 3:00 AM	0	0	0	0	1	1	0	1	1	0	1	1
3:00 AM - 4:00 AM	0	0	0	0	1	1	0	1	1	0	1	1
4:00 AM - 5:00 AM	0	0	0	0	1	1	0	1	1	0	1	1
5:00 AM - 6:00 AM	0	0	0	0	1	1	0	1	1	0	1	1
6:00 AM - 7:00 AM	464	180	644	0	1	1	464	181	645	0	1	1
7:00 AM - 8:00 AM	142	72	214	90	18	108	232	90	322	172	35	207
8:00 AM - 9:00 AM	72	72	144	441	100	541	513	172	685	864	200	1,064
9:00 AM - 10:00 AM	72	72	144	354	118	472	426	190	616	695	233	928
10:00 AM - 11:00 AM	72	72	144	290	110	400	362	182	544	559	216	775
11:00 AM - 12:00 PM	72	72	144	88	68	156	160	140	300	165	132	297
12:00 PM - 1:00 PM	72	72	144	126	126	252	198	198	396	235	235	470
1:00 PM - 2:00 PM	73	73	146	106	114	220	179	187	366	195	212	407
2:00 PM - 3:00 PM	36	71	107	53	60	113	89	131	220	98	112	210
3:00 PM - 4:00 PM	0	284	284	63	93	156	63	377	440	122	174	296
4:00 PM - 5:00 PM	0	35	35	106	410	516	106	445	551	210	806	1,016
5:00 PM - 6:00 PM	0	0	0	87	318	405	87	318	405	176	626	802
6:00 PM - 7:00 PM	0	0	0	88	235	323	88	235	323	171	461	632
7:00 PM - 8:00 PM	0	0	0	61	116	177	61	116	177	119	220	339
8:00 PM - 9:00 PM	0	0	0	62	66	128	62	66	128	122	124	246
9:00 PM - 10:00 PM	0	0	0	31	34	65	31	34	65	61	65	126
10:00 PM - 11:00 PM	0	0	0	15	27	42	15	27	42	28	51	79
11:00 PM - 12:00 AM	0	0	0	8	20	28	8	20	28	15	38	53
Total	1,076	1,076	2,152	2,080	2,074	4,154	3,156	3,150	6,306	4,026	4,011	8,037

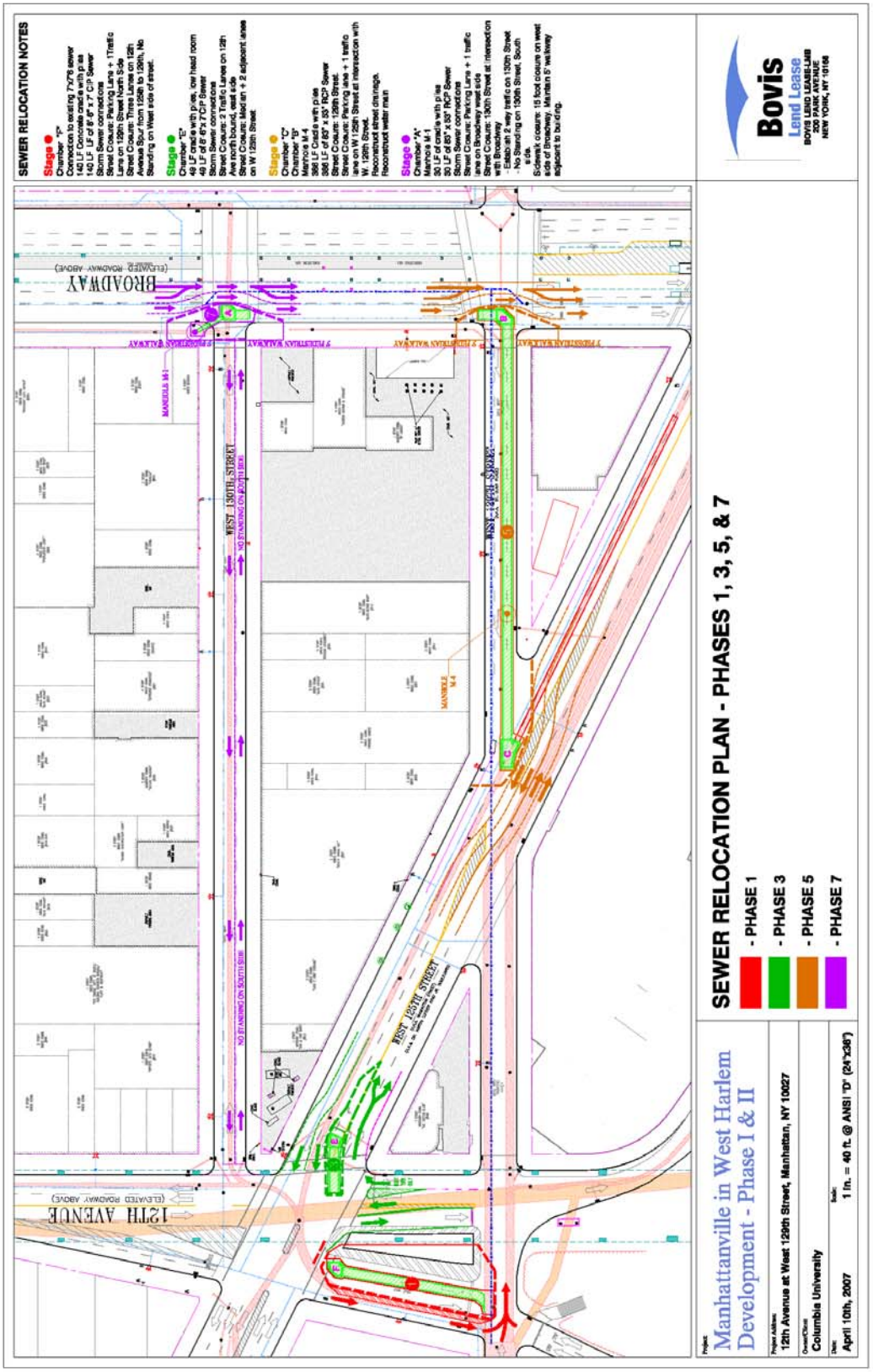
	2027 Construction Analysis Year									2030 Operational Year		
	Construction Traffic (PCE)			Operational Traffic (PCE)			Total Traffic (PCE)			Operational Traffic (PCE)		
Hour	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
12:00 AM - 1:00 AM	0	0	0	7	23	30	7	23	30	12	35	47
1:00 AM - 2:00 AM	0	0	0	5	21	26	5	21	26	7	31	38
2:00 AM - 3:00 AM	0	0	0	0	1	1	0	1	1	0	1	1
3:00 AM - 4:00 AM	0	0	0	0	1	1	0	1	1	0	1	1
4:00 AM - 5:00 AM	0	0	0	0	1	1	0	1	1	0	1	1
5:00 AM - 6:00 AM	0	0	0	0	1	1	0	1	1	0	1	1
6:00 AM - 7:00 AM	615	134	749	0	1	1	615	135	750	0	1	1
7:00 AM - 8:00 AM	174	54	228	116	24	140	290	78	368	172	35	207
8:00 AM - 9:00 AM	54	54	108	580	134	714	634	188	822	864	200	1,064
9:00 AM - 10:00 AM	54	54	108	468	157	625	522	211	733	695	233	928
10:00 AM - 11:00 AM	54	54	108	377	146	523	431	200	631	559	216	775
11:00 AM - 12:00 PM	54	54	108	114	91	205	168	145	313	165	132	297
12:00 PM - 1:00 PM	54	54	108	162	162	324	216	216	432	235	235	470
1:00 PM - 2:00 PM	52	52	104	136	147	283	188	199	387	195	212	407
2:00 PM - 3:00 PM	26	86	112	68	77	145	94	163	257	98	112	210
3:00 PM - 4:00 PM	0	481	481	84	120	204	84	601	685	122	174	296
4:00 PM - 5:00 PM	0	60	60	140	538	678	140	598	738	210	806	1,016
5:00 PM - 6:00 PM	0	0	0	116	417	533	116	417	533	176	626	802
6:00 PM - 7:00 PM	0	0	0	114	307	421	114	307	421	171	461	632
7:00 PM - 8:00 PM	0	0	0	79	147	226	79	147	226	119	220	339
8:00 PM - 9:00 PM	0	0	0	81	83	164	81	83	164	122	124	246
9:00 PM - 10:00 PM	0	0	0	39	42	81	39	42	81	61	65	126
10:00 PM - 11:00 PM	0	0	0	19	35	54	19	35	54	28	51	79
11:00 PM - 12:00 AM	0	0	0	11	26	37	11	26	37	15	38	53
Total	1,137	1,137	2,274	2,716	2,702	5,418	3,853	3,839	7,692	4,026	4,011	8,037

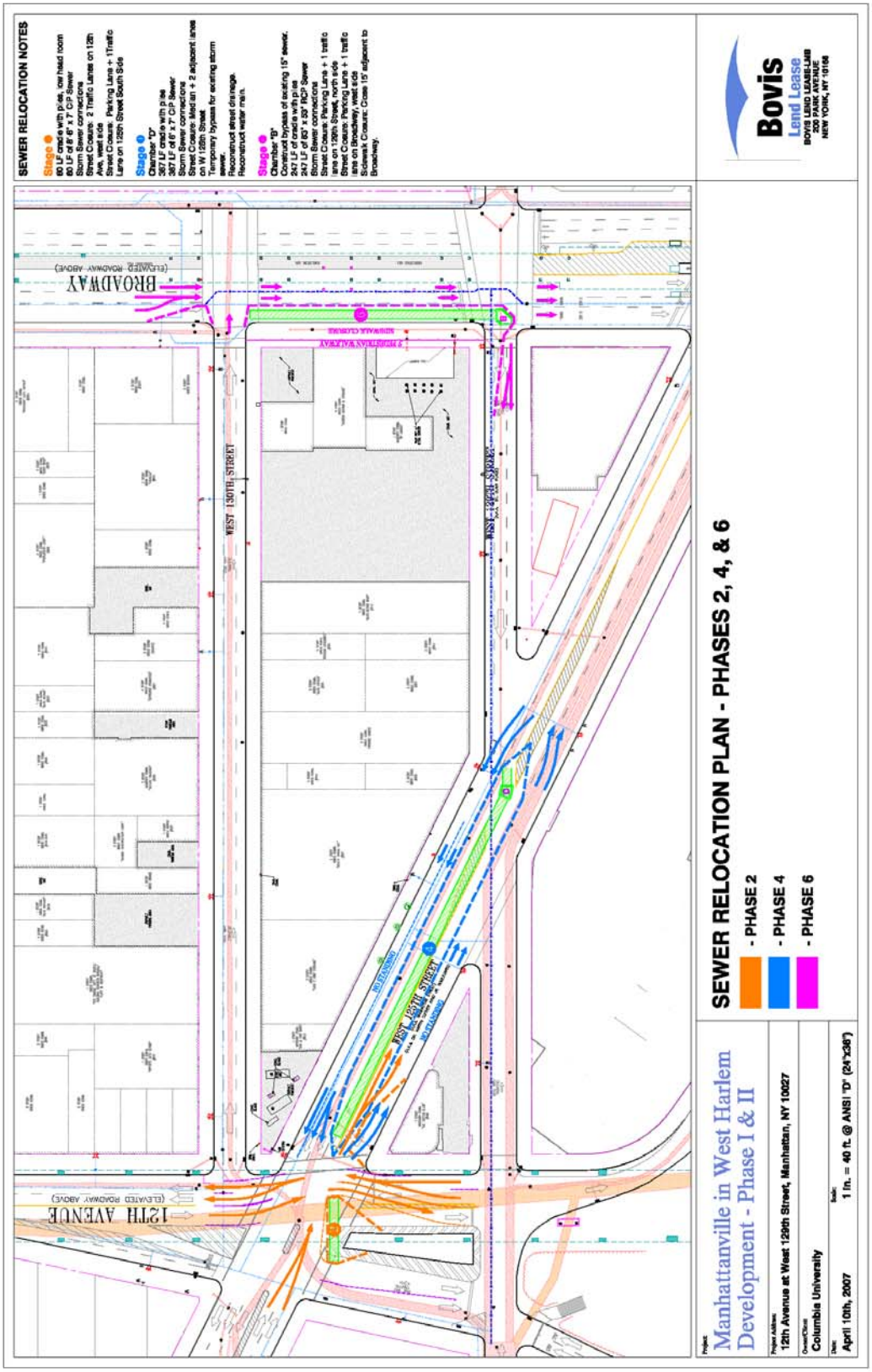

STORM WATER RELOCATION NOTES
Phase 0
SITE PLAN
Bovis
Land Lease
12TH AVENUE STORM WATER RELOCATION PLAN - PHASE 1
— DIRECTION OF TRAFFIC
— AREA OF WORK
Manhattanville in West Harlem Development - Stage I & II
12th Avenue at West 129th Street, Manhattan, NY 10027
Columbia University
November 1st, 2007
1 in. = 40 ft. @ ANSI "D" (24"x36")
WEST 131ST STREET
WEST 130TH STREET
WEST 129TH STREET
12TH AVENUE
(ELEVATED ROADWAY ABOVE)
RAILWAY OVERPASS
HENRY HUDSON PARKWAY
MARGINAL STREET
HUDSON RIVER


STORM WATER RELOCATION NOTES
Phase 2
SITE PLAN
Bovis
Lend Lease
12TH AVENUE STORM WATER RELOCATION PLAN - PHASE 1
— DIRECTION OF TRAFFIC
— AREA OF WORK
Manhattanville in West Harlem Development - Stage I & II
12th Avenue at West 129th Street, Manhattan, NY 10027
Columbia University
November 1st, 2007
1 in. = 40 ft. @ ANSI "D" (24"x36")
WEST 131ST STREET
WEST 130TH STREET
WEST 129TH STREET
WEST 125TH STREET
12TH AVENUE
(ELEVATED ROADWAY ABOVE)
RAILWAY OVERPASS
HENRY HUDSON PARKWAY
MARGINAL STREET
HUDSON RIVER


STORM WATER RELOCATION NOTES
Phase 3
SITE PLAN
Bovis
Land Lease
12TH AVENUE STORM WATER RELOCATION PLAN - PHASE 3
— DIRECTION OF TRAFFIC
— AREA OF WORK
Manhattanville in West Harlem Development - Stage I & II
12th Avenue at West 129th Street, Manhattan, NY 10027
Columbia University
November 1st, 2007
1 in. = 40 ft. @ ANSI "D" (24"x36")
WEST 131ST STREET
WEST 130TH STREET
WEST 129TH STREET
12TH AVENUE
RAILWAY OVERPASS
HENRY HUDSON PARKWAY
MARGINAL STREET
HUDSON RIVER


STORM WATER RELOCATION NOTES
Phase 4
SITE PLAN
Bovis
Lend Lease
12TH AVENUE STORM WATER RELOCATION PLAN - PHASE 4
— DIRECTION OF TRAFFIC
— AREA OF WORK
Manhattanville in West Harlem Development - Stage I & II
12th Avenue at West 129th Street, Manhattan, NY 10027
Columbia University
November 1st, 2007
1 in. = 40 ft. @ ANSI "D" (24"x36")
WEST 131ST STREET
WEST 130TH STREET
WEST 129TH STREET
WEST 125TH STREET
12TH AVENUE
RAILWAY OVERPASS
HENRY HUDSON PARKWAY
MARGINAL STREET
HUDSON RIVER


SEWER RELOCATION NOTES
Stage 1
Chamber "F"
Demolish existing 7'x7'6 sewer
140 LF Concrete encased with pipe
140 LF LF of 8' x 7' CIP Sewer
Storm Sewer connections
Street Closure: Parking Lane + 1Traffic Lane on 129th Street North Side
Street Closure: Three Lanes on 12th Avenue north bound, east side
Standing on West side of street.
Stage 2
Chamber "E"
49 LF cradle with piles, row head room
49 LF of 8' 6"x 7'CIP Sewer
Storm Sewer connections
Street Closure: 3 Traffic Lanes on 12th Ave north bound, east side
Street Closure: Mod on + 2 adjacent lanes on W 129th Street.
Stage 3
Chamber "D"
Manhole M-4
386 LF Cradle with piles
386 LF of 83" x 53" RCP Sewer
Street Closure: 129th Street.
Street Closure: Parking lane + 1 traffic lane on W 125th Street at intersection with W. 12oth Street.
Reconstruct street drainage.
Reconstruct water main
Stage 4
Chamber "A"
Manhole M-1
30 LF of cradle with pile
30 LF of 83" x 53" RCP Sewer
Storm Sewer connections
Street Closure: Parking Lane + 1 traffic lane on Broadway west side
Street Closure: 130th Street at intersection with Broadway
- Establish 2 way traffic on 130th Street
- No Standing on 130th Street, South side.
Sidewalk closure: 15 foot closure on west side of Broadway. Maintain 5' walkway adjacent to building.
Bovis
Lend Lease
BOVIS LEND LEASE LMB
200 PARK AVENUE
NEW YORK, NY 10166
SEWER RELOCATION PLAN - PHASES 1, 3, 5, & 7
- PHASE 1
- PHASE 3
- PHASE 5
- PHASE 7
Project:
Manhattanville in West Harlem Development - Phase I & II
Project Address:
12th Avenue at West 129th Street, Manhattan, NY 10027
Owner/Client:
Columbia University
Date:
April 10th, 2007
Scale:
1 in. = 40 ft. @ ANSI "D" (24"x36")
BROADWAY
(ELEVATED ROADWAY ABOVE)
12TH AVENUE
WEST 130TH STREET
WEST 129TH STREET
MANHOLE M-1
MANHOLE M-4
NO STANDING ON SOUTH SIDE


SEWER RELOCATION NOTES
Stage ●
80 LF cradle with piles, raw head room
80 LF of 8'-6" x 7' CIP Sewer
Storm Sewer connections
Street Closure: 2 Traffic Lanes on 12th Ave, west side
Street Closure: Parking Lane + 1Traffic Lane on 129th Street South Side
Stage ●
Chamber "D"
367 LF cradle with piles
367 LF of 8'-6" x 7' CIP Sewer
Storm Sewer connections
Street Closure: Median + 2 adjacent lanes on W 129th Street
Temporary bypass for existing storm sewer.
Reconstruct street drainage.
Reconstruct water main.
Stage ●
Chamber "B"
Construct bypass of existing 15" sewer.
247 LF of cradle with piles
247 LF of 83" x 59" RCP Sewer
Storm Sewer connections
Street Closure: Parking Lane + 1 traffic lane on Broadway, west side
Street Closure: Parking Lane + 1 traffic lane on Broadway, west side
Sidewalk Closure: Cross 15' adjacent to Broadway.
Bovis
Land Lease
BOVIS LEND LEASE LMB
200 PARK AVENUE
NEW YORK, NY 10166
BROADWAY
(ELEVATED ROADWAY ABOVE)
WEST 130TH STREET
WEST 129TH STREET
12TH AVENUE
SEWER RELOCATION PLAN - PHASES 2, 4, & 6
- PHASE 2
- PHASE 4
- PHASE 6
Project:
Manhattanville in West Harlem Development - Phase I & II
Project Address:
12th Avenue at West 129th Street, Manhattan, NY 10027
Owner/Client:
Columbia University
Date:
April 10th, 2007
Scale:
1 in. = 40 ft. @ ANSI "D" (24"x36")

✷

APPENDIX K.3

AIR QUALITY

Phase 1, 2008 Short-Term Emissions	Source Parameters						Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Short Term Engine Emissions (g/s)				Short Term Fugitive Dust (g/s)				Total Short-Term Emission Rate (Area: g/s-m2; Point: g/s)			
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Trucks per day	Nonroad Engines	PM2.5	PM10	CO	Idle	Running	PM2.5	PM10	CO 1-Hr	CO 8-Hr	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers	Short-Term Source Area (m2)	PM2.5	PM10	CO 1-Hr	CO 8-HR
Site 19																									
MEP																									
plumbing deliveries			MDT	diesel	500		2					7.78E-06	3.35E-07	8.11E-06	8.87E-06	5.86E-04	2.93E-04		1.05E-04						
sprinkler deliveries			MDT	diesel	500		2					7.78E-06	3.35E-07	8.11E-06	8.87E-06	5.86E-04	2.93E-04		1.05E-04						
HVAC - deliveries			MDT	diesel	500		2					7.78E-06	3.35E-07	8.11E-06	8.87E-06	5.86E-04	2.93E-04		1.05E-04						
electric - deliveries			MDT	diesel	500		2					7.78E-06	3.35E-07	8.11E-06	8.87E-06	5.86E-04	2.93E-04		1.05E-04						
NG forklift			NGFL	gas	250	0.5		1	0.017	0.017	1.427			6.01E-04	6.01E-04	9.91E-02	4.95E-02								
INTERIORS / FIT-OUT																									
drywall trailers			TT	diesel	500		1					3.89E-06	1.68E-07	4.06E-06	4.44E-06	2.93E-04	1.47E-04		5.25E-05						
additional interiors - box trailer			TT	diesel	500		1					3.89E-06	1.68E-07	4.06E-06	4.44E-06	2.93E-04	1.47E-04		5.25E-05						
FF&E			MDT	diesel	500		1					3.89E-06	1.68E-07	4.06E-06	4.44E-06	2.93E-04	1.47E-04		5.25E-05						
NG forklift			NGFL	gas	250	0.5		1	0.017	0.017	1.427			6.01E-04	6.01E-04	9.91E-02	4.95E-02								
trash hauling			RR	diesel	400		1					6.48E-06	1.68E-07	6.65E-06	7.26E-06	4.79E-04	2.39E-04		2.61E-04						
miscellaneous equipment																									
compressor			LCAC	gas	5	0.4		1	0.092	0.099	404.270			5.08E-05	5.53E-05	5.61E-01	2.25E-01								
Forklift	9Area3	2.74												1.20E-03	1.20E-03	1.98E-01	9.91E-02				220.3	5.45E-06	5.45E-06	9.00E-04	4.50E-04
Trucks - Trailers, Deliveries etc	9Area4	2.74												5.13E-05	5.61E-05	3.70E-03	1.85E-03				220.3	2.33E-07	2.54E-07	1.68E-05	8.40E-06
Fugitive Dust	9Area9	0.00													8.39E-04						220.3	0.00E+00	3.81E-06	0.00E+00	0.00E+00
Compressor	9POINT4	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Site 18																									
CONSTRUCT SUPERSTRUCTURE																									
concrete truck			CT	diesel	450		20					5.83E-04	3.35E-06	5.87E-04	6.39E-04	4.20E-02	2.10E-02		4.15E-03						
concrete pump			OCE	diesel	400	0.9		1	0.027	0.260	1.708			2.67E-03	2.60E-02	1.90E-01	1.71E-01								
trailers of steel			TT	diesel	500		2.5					9.72E-06	4.19E-07	1.01E-05	1.11E-05	7.33E-04	3.66E-04		1.31E-04						
rebar bender			OCE	diesel	200	0.5		1	0.209	0.215	0.992			5.80E-03	5.98E-03	5.51E-02	2.75E-02								
troweling machine			PE	gas	11	0.5		1	0.062	0.067	423.319			9.45E-05	1.03E-04	1.29E+00	6.47E-01								
trash hauling			RR	diesel	400		1					6.48E-06	1.68E-07	6.65E-06	7.26E-06	4.79E-04	2.39E-04		2.61E-04						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	1.68E-07	4.06E-06	4.44E-06	2.93E-04	1.47E-04		5.25E-05						
rubber tire crane			C	diesel	300	0.25		1	0.109	0.112	0.405			2.27E-03	2.34E-03	3.37E-02	8.44E-03								
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		1	5.134	5.580	213.445			8.56E-04	9.30E-04	1.78E-01	3.56E-02								
compressor			LCAC	gas	5	0.4		1	0.092	0.099	404.270			5.08E-05	5.53E-05	5.61E-01	2.25E-01								
generator			LCGS	gas	10	0.4		1	0.072	0.078	476.944			7.98E-05	8.68E-05	1.32E+00	5.30E-01								
Chain Saw	8Area1	1.52												8.56E-04	9.30E-04	1.78E-01	3.56E-02				1,228.1	6.97E-07	7.57E-07	1.45E-04	2.90E-05
Troweling Machine	8Area2	0.00												9.45E-05	1.03E-04	1.29E+00	6.47E-01				1,228.1	7.70E-08	8.37E-08	1.05E-03	5.27E-04
Trucks - Trailers, Deliveries etc	8Area4	2.74												2.08E-05	2.28E-05	1.50E-03	7.52E-04				198.6	1.05E-07	1.15E-07	7.57E-06	3.79E-06
Fugitive Dust	8Area9	0.00													4.60E-03						198.6	0.00E+00	2.31E-05	0.00E+00	0.00E+00
Concrete Truck 1	8POINT1	2.74												2.93E-04	3.20E-04	2.10E-02	1.05E-02					2.93E-04	3.20E-04	2.10E-02	1.05E-02
Concrete Truck 2	8POINT2	2.74												2.93E-04	3.20E-04	2.10E-02	1.05E-02					2.93E-04	3.20E-04	2.10E-02	1.05E-02
Concrete Pump	8POINT3	2.74												2.67E-03	2.60E-02	1.90E-01	1.71E-01					2.67E-03	2.60E-02	1.90E-01	1.71E-01
Compressor	8POINT4	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Generator	8POINT6	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
Rebar Bender	8POINT8	1.52												5.80E-03	5.98E-03	5.51E-02	2.75E-02					5.80E-03	5.98E-03	5.51E-02	2.75E-02
Rubber tire crane	8POINT9	3.66												2.27E-03	2.34E-03	3.37E-02	8.44E-03					2.27E-03	2.34E-03	3.37E-02	8.44E-03
Package B **Below grade space + F** **aka Phase I Factory**																									
SITE DEMOLITION																									
20 yd dump trucks			DT	diesel	400		30					1.94E-04	3.48E-05	2.29E-04	2.53E-04	1.70E-02	8.48E-03		8.78E-02						
excavator			E	diesel	200	0.75		3	0.009	0.009	0.728			1.08E-03	1.11E-03	1.21E-01	9.11E-02	9.33E-04		2.97E-03					
trash hauling - 3 loads per day			RR	diesel	400		1					6.48E-06	1.16E-06	7.64E-06	8.45E-06	5.66E-04	2.83E-04		2.93E-03						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	1.16E-06	5.05E-06	5.62E-06	3.80E-04	1.90E-04		1.81E-03						
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		4	5.134	5.580	213.445			3.42E-03	3.72E-03	7.11E-01	1.42E-01								
compressor			LCAC	gas	5	0.4		6	0.092	0.099	404.270			3.05E-04	3.32E-04	3.37E+00	1.35E+00								
generator			LCGS	gas	10	0.4		4	0.072	0.078	476.944			3.19E-04	3.47E-04	5.30E+00	2.12E+00								
Site Demolition	PKBSD1	2.74												5.67E-03	1.01E-01	8.51E-01	2.42E-01				30,385.0	1.87E-07	3.31E-06	2.80E-05	7.97E-06
Generator 1	PKBGN1	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
Generator 2	PKBGN2	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
Generator 3	PKBGN3	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
Generator 4	PKBGN4	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
Compressor 1	PKBAC1	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Compressor 2	PKBAC2	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Compressor 3	PKBAC3	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Compressor 4	PKBAC4	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Compressor 5	PKBAC5	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Compressor 6	PKBAC6	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01

Phase 1, 2008 Short-Term Emissions	Source Parameters						Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Short Term Engine Emissions (g/s)				Short Term Fugitive Dust (g/s)				Total Short-Term Emission Rate (Area: g/s-m2; Point: g/s)			
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Trucks per day	Nonroad Engines	PM2.5	PM10	CO	Idle	Running	PM2.5	PM10	CO 1-Hr	CO 8-Hr	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers	Short-Term Source Area (m2)	PM2.5	PM10	CO 1-Hr	CO 8-HR
Package A **West 130th Street Sewer relocation**																									
SITE DEMOLITION																									
20 yd dump trucks			DT	diesel	400		10					6.48E-05	5.15E-06	7.00E-05	7.68E-05	5.09E-03	2.55E-03		8.05E-03						
excavator			E	diesel	200	0.75		1	0.009	0.009	0.728			3.59E-04	3.70E-04	4.05E-02	3.04E-02	3.11E-04		9.90E-04					
REMOVAL/RELOCATION OF SEWER																									
20 yd dump trucks - removal of fill			DT	diesel	400		32					2.07E-04	1.65E-05	2.24E-04	2.46E-04	1.63E-02	8.15E-03	9.96E-04	2.57E-02	3.17E-03					
excavator - removal of fill			E	diesel	200	0.5		1	0.009	0.009	0.728			2.39E-04	2.47E-04	4.05E-02	2.02E-02								
trailers - delivery of pipe			TT	diesel	500		2					7.78E-06	1.03E-06	8.81E-06	9.71E-06	6.47E-04	3.24E-04		3.23E-04						
excavator - setting of pipe			E	diesel	200	0.5		1	0.009	0.009	0.728			2.39E-04	2.47E-04	4.05E-02	2.02E-02								
tamper			PC	diesel	25	0.75		1	0.240	0.247	1.501			1.25E-03	1.29E-03	1.04E-02	7.82E-03								
20 yd dump trucks - supply of gravel & fill			DT	diesel	400		32					2.07E-04	1.65E-05	2.24E-04	2.46E-04	1.63E-02	8.15E-03	9.96E-04	2.57E-02	3.17E-03					
SITE IMPROVEMENTS/STREETSCAPE																									
trailers - delivery of material			TT	diesel	500		1					3.89E-06	5.15E-07	4.40E-06	4.85E-06	3.24E-04	1.62E-04		1.62E-04						
concrete truck			CT	diesel	450		3					8.75E-06	1.55E-06	1.03E-05	1.14E-05	7.62E-04	3.81E-04		1.92E-03						
portable cement mixer			CMM	gas	5	0.5		1	0.136	0.148	389.989			9.44E-05	1.03E-04	5.42E-01	2.71E-01								
20 yd dump trucks - delivery of asphalt			DT	diesel	400		10					6.48E-05	5.15E-06	7.00E-05	7.68E-05	5.09E-03	2.55E-03		8.05E-03						
asphalt paving equipment			P	diesel	300	0.25		1	0.008	0.008	0.796			1.72E-04	1.77E-04	6.63E-02	1.66E-02	3.11E-04		9.90E-04					
tamper			PC	diesel	25	0.75		1	0.240	0.247	1.501			1.25E-03	1.29E-03	1.04E-02	7.82E-03								
roller			R	diesel	350	0.25		1	0.008	0.008	1.382			1.88E-04	1.94E-04	1.34E-01	3.36E-02								
trash hauling			RR	diesel	400		1					6.48E-06	5.15E-07	7.00E-06	7.68E-06	5.09E-04	2.55E-04		8.05E-04						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	5.15E-07	4.40E-06	4.85E-06	3.24E-04	1.62E-04		1.62E-04						
rubber tire crane			C	diesel	300	0.25		1	0.004	0.004	0.405			8.45E-05	8.71E-05	3.37E-02	8.44E-03								
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		2	5.134	5.580	213.445			1.71E-03	1.86E-03	3.56E-01	7.11E-02								
compressor			LCAC	gas	5	0.4		4	0.092	0.099	404.270			2.03E-04	2.21E-04	2.25E+00	8.98E-01								
generator			LCGS	gas	10	0.4		4	0.072	0.078	476.944			3.19E-04	3.47E-04	5.30E+00	2.12E+00								
W130th St. Sewer Removal/Relocation 1	PKA3RR1	2.74												2.89E-03	3.57E-02	1.74E-01	6.68E-02				806.8	3.58E-06	4.42E-05	2.16E-04	8.28E-05
W130th St. Sewer Removal/Relocation 2	PKA3RR2	2.74												2.89E-03	3.57E-02	1.74E-01	6.68E-02				576.2	5.01E-06	6.19E-05	3.02E-04	1.16E-04
W130th St. Site Improvement 1	PKA3SI1	2.74												1.47E-03	7.19E-03	4.68E-01	1.84E-01				199.0	7.41E-06	3.61E-05	2.35E-03	9.23E-04
W130th St. Site Improvement 2	PKA3SI2	2.74												1.47E-03	7.19E-03	4.68E-01	1.84E-01				1,143.8	1.29E-06	6.28E-06	4.09E-04	1.61E-04
W130th St Concrete Truck 1	PKA3CT1	2.74												5.15E-06	5.69E-06	3.81E-04	1.90E-04					5.15E-06	5.69E-06	3.81E-04	1.90E-04
W130th St Concrete Truck 2	PKA3CT2	2.74												5.15E-06	5.69E-06	3.81E-04	1.90E-04					5.15E-06	5.69E-06	3.81E-04	1.90E-04
W130th St Compressor 1	PKA3AC1	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
W130th St Compressor 2	PKA3AC2	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
W130th St Compressor 3	PKA3AC3	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
W130th St Compressor 4	PKA3AC4	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
W130th St Generator 1	PKA3GN1	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
W130th St Generator 2	PKA3GN2	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
W130th St Generator 3	PKA3GN3	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
W130th St Generator 4	PKA3GN4	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
W130th St Rubber Tire Crane 1	PKA3CR1	3.66												4.23E-05	4.36E-05	1.69E-02	4.22E-03					4.23E-05	4.36E-05	1.69E-02	4.22E-03
W130th St Rubber Tire Crane 2	PKA3CR2	3.66												4.23E-05	4.36E-05	1.69E-02	4.22E-03					4.23E-05	4.36E-05	1.69E-02	4.22E-03
Package A **12th Avenue Sewer Relocations**																									
REMOVAL/RELOCATION OF SEWER																									
20 yd dump trucks - removal of fill			DT	diesel	400		10					6.48E-05	5.15E-06	7.00E-05	7.68E-05	5.09E-03	2.55E-03		8.05E-03						
excavator - removal of fill			E	diesel	200	0.5		1	0.009	0.009	0.728			2.39E-04	2.47E-04	4.05E-02	2.02E-02	3.11E-04		9.90E-04					
trailers - delivery of pipe			TT	diesel	500		2					7.78E-06	1.03E-06	8.81E-06	9.71E-06	6.47E-04	3.24E-04		3.23E-04						
excavator - setting of pipe			E	diesel	200	0.5		1	0.009	0.009	0.728			2.39E-04	2.47E-04	4.05E-02	2.02E-02								
tamper			PC	diesel	25	0.75		1	0.240	0.247	1.501			1.25E-03	1.29E-03	1.04E-02	7.82E-03	3.11E-04		9.90E-04					
20 yd dump trucks - supply of gravel & fill			DT	diesel	400		10					6.48E-05	5.15E-06	7.00E-05	7.68E-05	5.09E-03	2.55E-03		8.05E-03						
trash hauling			RR	diesel	400		1					6.48E-06	5.15E-07	7.00E-06	7.68E-06	5.09E-04	2.55E-04		8.05E-04						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	5.15E-07	4.40E-06	4.85E-06	3.24E-04	1.62E-04		1.62E-04						
rubber tire crane			C	diesel	300	0.25		1	0.004	0.004	0.405			8.45E-05	8.71E-05	3.37E-02	8.44E-03								
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		2	5.134	5.580	213.445			1.71E-03	1.86E-03	3.56E-01	7.11E-02								
compressor			LCAC	gas	5	0.4		4	0.092	0.099	404.270			2.03E-04	2.21E-04	2.25E+00	8.98E-01								
generator			LCGS	gas	10	0.4		4	0.072	0.078	476.944			3.19E-04	3.47E-04	5.30E+00	2.12E+00								
12th Avenue Sewer Removal/Relocation 1 Phase 4	PKA2RR1	2.74												2.11E-03	1.16E-02	2.29E-01	6.26E-02				666.2	3.17E-06	1.74E-05	3.44E-04	9.40E-05
12th Avenue Sewer Removal/Relocation 2 Phase 1	PKA2RR2	2.74												1.05E-03	5.79E-03	1.15E-01	3.13E-02				314.2	3.36E-06	1.84E-05	3.65E-04	9.97E-05
12th Avenue Sewer Removal/Relocation 3 Phase 1	PKA2RR3	2.74												1.05E-03	5.79E-03	1.15E-01	3.13E-02				108.0	9.77E-06	5.36E-05	1.06E-03	2.90E-04
12h Ave Compressor 1	PKA2AC1	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
12h Ave Compressor 2	PKA2AC2	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
12h Ave Compressor 3	PKA2AC3	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
12h Ave Compressor 4	PKA2AC4	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
12h Ave Generator 1	PKA2GN1	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
12h Ave Generator 2	PKA2GN2	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
12h Ave Generator 3	PKA2GN3	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
12h Ave Generator 4	PKA2GN4	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
12h Ave Rubber Tire Crane	PKA2CR1	3.66												8.45E-05	8.71E-05	3.37E-02	8.44E-03					8.45E-05	8.71E-05	3.37E-02	8.44E-03

Phase 1, 2008 Annual Emissions	Source Parameters							Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Annual Average Engine Emissions (g/s)			Annual Fugitive Dust (g/s)			Annual Source Area (m2)	Total Annual Emission Rate (Area: g/s-m2; Point: g/s)		
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Months On-Site	Trucks per day	Nonroad Engines	PM2.5	PM10	NOx	Idle	Running	PM2.5	PM10	NOx	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers		PM2.5	PM10	NOx
Site 19																								
CONSTRUCT SUPERSTRUCTURE																								
concrete truck			CT	diesel	450		1	4					9.72E-06	5.58E-08	6.98E-06	7.61E-06	2.26E-04		4.94E-05					
concrete pump			OCE	diesel	400	0.9	1		0.2	0.027	0.260	3.398			2.65E-05	2.58E-04	3.37E-03							
trailers of steel			TT	diesel	500		1	1					3.24E-07	1.40E-08	2.41E-07	2.64E-07	7.87E-06		3.12E-06					
rebar bender			OCE	diesel	200	0.5	1		1	0.209	0.215	2.844			3.45E-04	3.56E-04	4.70E-03							
troweling machine			PE	gas	11	0.5	1		1	0.062	0.067	1.669			5.63E-06	6.12E-06	1.52E-04							
MEP																								
plumbing deliveries			MDT	diesel	500		3	0.01					9.72E-09	4.19E-10	7.24E-09	7.92E-09	2.36E-07		9.37E-08					
sprinkler deliveries			MDT	diesel	500		3	0.01					9.72E-09	4.19E-10	7.24E-09	7.92E-09	2.36E-07		9.37E-08					
HVAC - deliveries			MDT	diesel	500		3	0.01					9.72E-09	4.19E-10	7.24E-09	7.92E-09	2.36E-07		9.37E-08					
electric - deliveries			MDT	diesel	500		3	0.01					9.72E-09	4.19E-10	7.24E-09	7.92E-09	2.36E-07		9.37E-08					
NG forklift			NGFL	gas	250	0.5	3		1	0.017	0.017	0.291			1.07E-04	1.07E-04	1.80E-03							
BUILDING ENCLOSURE & ROOFING																								
trailers			TT	diesel	500		2	0.5					3.24E-07	1.40E-08	2.41E-07	2.64E-07	7.87E-06		3.12E-06					
INTERIORS / FIT-OUT																								
drywall trailers			TT	diesel	500		4	0.01					1.30E-08	5.58E-10	9.66E-09	1.06E-08	3.15E-07		1.25E-07					
additional interiors - box trailer			TT	diesel	500		4	0.01					1.30E-08	5.58E-10	9.66E-09	1.06E-08	3.15E-07		1.25E-07					
FF&E			MDT	diesel	500		4	0.01					1.30E-08	5.58E-10	9.66E-09	1.06E-08	3.15E-07		1.25E-07					
NG forklift			NGFL	gas	250	0.5	4		0.01	0.017	0.017	0.291			1.43E-06	1.43E-06	2.40E-05							
trash hauling			RR	diesel	400		7	0.5					1.89E-06	4.89E-08	1.39E-06	1.51E-06	4.50E-05		5.45E-05					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		4	0.1					1.30E-07	5.58E-09	9.66E-08	1.06E-07	3.15E-06		1.25E-06					
rubber tire crane			C	diesel	300	0.25	4		1	0.109	0.112	2.015			5.40E-04	5.56E-04	1.00E-02							
miscellaneous equipment																								
compressor			LCAC	gas	5	0.4	1		1	0.092	0.099	1.098			3.03E-06	3.29E-06	3.63E-05							
Ground Level Equipments (RB, COMP, GEN)	9Area1	0.00													3.48E-04	3.59E-04	4.74E-03				1739.8	2.00E-07	2.07E-07	2.72E-06
Troweling Machine	9Area2	0.00													5.63E-06	6.12E-06	1.52E-04				1739.8	3.23E-09	3.52E-09	8.72E-08
Rubber Tire Crane	9Area3	3.66													5.40E-04	5.56E-04	1.00E-02				279.4	1.93E-06	1.99E-06	3.58E-05
Trucks + Forklifts	9Area4	2.74													1.11E-04	1.11E-04	1.89E-03				220.3	5.03E-07	5.03E-07	8.59E-06
Concrete Truck	9Area5A	2.74													6.98E-06	7.61E-06	2.26E-04				109.6	6.37E-08	6.95E-08	2.06E-06
Concrete Pump	9Area5B	2.74													2.65E-05	2.58E-04	3.37E-03				109.6	2.42E-07	2.35E-06	3.08E-05
Fugitive Dust	9Area9	0.00													0.00E+00	1.12E-04	0.00E+00				220.3	0.00E+00	5.09E-07	0.00E+00
Site 18																								
SITE DEMOLITION																								
20 yd dump trucks			DT	diesel	400		2	10					1.08E-05	2.79E-07	7.92E-06	8.64E-06	2.57E-04		5.03E-04					
excavator			E	diesel	200	0.75	2		1	0.173	0.178	2.339			8.58E-04	8.85E-04	1.16E-02	3.70E-05		1.18E-04				
EXCAVATION & FOUNDATIONS																								
20 yd dump trucks			DT	diesel	400		4	10					2.16E-05	5.58E-07	1.58E-05	1.73E-05	5.14E-04		1.01E-03					
backhoe			TLB	diesel	200	0.75	4		1	0.148	0.153	1.390			1.47E-03	1.51E-03	1.38E-02	7.41E-05		2.36E-04				
compressors			LCAC	diesel	250	0.9	4		1	0.120	0.123	2.143			1.78E-03	1.83E-03	3.19E-02							
CONSTRUCT SUPERSTRUCTURE																								
concrete truck			CT	diesel	450		4	4					3.89E-05	2.23E-07	2.79E-05	3.04E-05	9.03E-04		1.98E-04					
concrete pump			OCE	diesel	400	0.9	4		0.2	0.027	0.260	3.398			1.06E-04	1.03E-03	1.35E-02							
trailers of steel			TT	diesel	500		4	1					1.30E-06	5.58E-08	9.66E-07	1.06E-06	3.15E-05		1.25E-05					
rebar bender			OCE	diesel	200	0.5	4		1	0.209	0.215	2.844			1.38E-03	1.42E-03	1.88E-02							
troweling machine			PE	gas	11	0.5	4		1	0.062	0.067	1.669			2.25E-05	2.45E-05	6.07E-04							
MEP																								
plumbing deliveries			MDT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
sprinkler deliveries			MDT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
HVAC - deliveries			MDT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
electric - deliveries			MDT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
NG forklift			NGFL	gas	250	0.5	1		1	0.017	0.017	0.291			3.58E-05	3.58E-05	6.01E-04							
BUILDING ENCLOSURE & ROOFING																								
trailers			TT	diesel	500		2	0.5					3.24E-07	1.40E-08	2.41E-07	2.64E-07	7.87E-06		3.12E-06					
INTERIORS / FIT-OUT																								
drywall trailers			TT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
additional interiors - box trailer			TT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
FF&E			MDT	diesel	500		1	0.1					3.24E-08	1.40E-09	2.41E-08	2.64E-08	7.87E-07		3.12E-07					
NG forklift			NGFL	gas	250	0.5	1		0.01	0.017	0.017	0.291			3.58E-07	3.58E-07	6.01E-06							
trash hauling			RR	diesel	400		12	0.5					3.24E-06	8.38E-08	2.37E-06	2.59E-06	7.71E-05		1.51E-04					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		12	0.1					3.89E-07	1.68E-08	2.90E-07	3.17E-07	9.44E-06		1.86E-05					
rubber tire crane			C	diesel	300	0.25	7		1	0.109	0.112	2.015			9.44E-04	9.74E-04	1.75E-02							
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	2		1	5.134	5.580	0.993			1.02E-04	1.11E-04	1.97E-05							
compressor			LCAC	gas	5	0.4	8		1	0.092	0.099	1.098			2.42E-05	2.63E-05	2.90E-04							
generator			LCGS	gas	10	0.4	5		1	0.072	0.078	1.986			2.38E-05	2.58E-05	6.57E-04							
Ground Level Equipments (RB, CS, COMP, GEN)	8Area1	0.00													1.48E-03	1.53E-03	1.95E-02				1228.1	1.20E-06	1.24E-06	1.59E-05
Troweling Machine	8Area2	0.00													2.25E-05	2.45E-05	6.07E-04				1228.1	1.83E-08	1.99E-08	4.94E-07
Rubber Tire Crane	8Area3	3.66													9.44E-04	9.74E-04	1.75E-02				277.9	3.40E-06	3.50E-06	6.29E-05
Trucks + Forklifts	8Area4	2.74													3.94E-05	3.97E-05	7.12E-04				198.6	1.98E-07	2.00E-07	3.59E-06
Concrete Truck	8Area5A	2.74													2.79E-05	3.04E-05	9.03E-04				100.2	2.79E-07	3.04E-07	9.01E-06
Concrete Pump	8Area5B	2.74													1.06E-04	1.03E-03	1.35E-02				100.2	1.06E-06	1.03E-05	1.35E-04
Excavation Equipments (BH, EX, COMP etc)	8Area6	0.00													3.32E-03	3.43E-03	4.65E-02				1228.1	2.70E-06	2.79E-06	3.78E-05
Demolition Equipments (Dump Truck + Excavator)	8Area7	2.74													8.66E-04	8.93E-04	1.19E-02				1228.1	7.05E-07	7.27E-07	9.66E-06
Onsite Fugitive Dust	8Area8	0.00													1.11E-04	1.91E-03	0.00E+00				1228.1	9.05E-08	1.55E-06	0.00E+00
Fugitive Dust	8Area9	0.00													0.00E+00	3.41E-04	0.00E+00				198.6	0.00E+00	1.72E-06	0.00E+00

Phase 1, 2008 Annual Emissions	Source Parameters							Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Annual Average Engine Emissions (g/s)			Annual Fugitive Dust (g/s)			Annual Source Area (m2)	Total Annual Emission Rate (Area: g/s-m2; Point: g/s)		
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Months On-Site	Trucks per day	Nonroad Engines	PM2.5	PM10	NOx	Idle	Running	PM2.5	PM10	NOx	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers		PM2.5	PM10	NOx
Package B **Below grade space + F** **aka Phase I Factory**																								
SITE DEMOLITION																								
20 yd dump trucks			DT	diesel	400		10	30					1.62E-04	2.90E-05	1.36E-04	1.51E-04	4.56E-03		5.23E-02					
excavator			E	diesel	200	0.75	10		3	0.009	0.009	2.339			6.40E-04	6.60E-04	1.74E-01	5.56E-04		1.77E-03				
INSTALL 70' SLURRY WALL @ PERIMETER																								
20 yd dump trucks			DT	diesel	400		3	7					1.20E-05	2.15E-06	1.01E-05	1.12E-05	3.37E-04		3.87E-03					
concrete truck			CT	diesel	450		3	15					1.09E-05	4.32E-06	1.08E-05	1.21E-05	3.73E-04		7.26E-03					
trailers of steel - rebar			TT	diesel	500		3	2					2.24E-06	6.67E-07	2.07E-06	2.31E-06	7.05E-05		7.42E-04					
skylift forklift			FL	gas	200	0.4	3		4	0.019	0.021	1.698			3.09E-04	3.36E-04	2.70E-02							
375 HP air compresser			LCAC	diesel	375	0.5	3		4	0.004	0.004	2.477			1.43E-04	1.47E-04	9.22E-02							
40 ton hydraulic crane (handling rebar cages)			C	diesel	450	0.5	3		1	0.004	0.004	2.402			4.39E-05	4.53E-05	2.68E-02							
bull dozer			CTD	diesel	400	0.25	3		1	0.008	0.008	2.793			3.94E-05	4.07E-05	1.39E-02	4.11E-05		1.31E-04				
slurry supply system			OCE	diesel	400	0.25	3		1	0.008	0.008	3.398			3.74E-05	3.85E-05	1.69E-02							
crawler crane (handling slurry /clamshell machine)			C	diesel	450	0.75	3		1	0.004	0.004	2.402			6.59E-05	6.79E-05	4.02E-02							
trash hauling - 3 loads per day			RR	diesel	400		10	1					5.40E-06	9.66E-07	4.55E-06	5.03E-06	1.52E-04		1.74E-03					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		10	0.5					1.62E-06	4.83E-07	1.50E-06	1.67E-06	5.11E-05		5.38E-04					
rubber tire crane			C	diesel	350	0.5	3		1	0.004	0.004	2.402			3.41E-05	3.52E-05	2.09E-02							
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	4		4	5.134	5.580	0.993			8.15E-04	8.86E-04	1.58E-04							
compressor			LCAC	gas	5	0.4	10		6	0.092	0.099	1.098			1.82E-04	1.97E-04	2.18E-03							
generator			LCGS	gas	10	0.4	10		4	0.072	0.078	1.986			1.90E-04	2.07E-04	5.25E-03							
Site Demolition	PKBSD1	2.74													2.28E-03	5.76E-02	2.01E-01				30,558.7	7.45E-08	1.89E-06	6.57E-06
Slurry Wall Installation	PKBSW1	2.74													9.86E-04	1.35E-02	2.24E-01				18,426.5	5.35E-08	7.35E-07	1.22E-05
Package A **West 130th Street Sewer relocation**																								
SITE DEMOLITION																								
20 yd dump trucks			DT	diesel	400		6	4					1.30E-05	1.03E-06	1.00E-05	1.10E-05	3.28E-04		1.86E-03					
excavator			E	diesel	200	0.75	6		1	0.009	0.009	2.339			1.28E-04	1.32E-04	3.48E-02	4.56E-05		1.45E-04				
REMOVAL/RELOCATION OF SEWER																								
20 yd dump trucks - removal of fill			DT	diesel	400		10	32					1.73E-04	1.37E-05	1.33E-04	1.46E-04	4.37E-03		2.48E-02					
pavement cutter			OCE	gas	27	0.5	1		1	0.030	0.033	3.154			6.78E-06	7.37E-06	7.04E-04	5.93E-05		1.89E-04				
excavator - removal of fill			E	diesel	200	0.5	10		1	0.009	0.009	2.339			1.42E-04	1.47E-04	3.87E-02							
trailers - delivery of pipe			TT	diesel	500		10	1					3.24E-06	4.29E-07	2.62E-06	2.89E-06	8.69E-05		4.78E-04					
excavator - setting of pipe			E	diesel	200	0.5	10		1	0.009	0.009	2.339			1.42E-04	1.47E-04	3.87E-02							
tamper			PC	diesel	25	0.75	10		1	0.240	0.247	2.555			7.43E-04	7.66E-04	7.92E-03	5.93E-04		1.89E-03				
20 yd dump trucks - supply of gravel & fill			DT	diesel	400		10	32					1.73E-04	1.37E-05	1.33E-04	1.46E-04	4.37E-03		2.48E-02					
SITE IMPROVEMENTS/STREETSCAPE																								
trailers - delivery of material			TT	diesel	500		8	0.5					1.30E-06	1.72E-07	1.05E-06	1.16E-06	3.48E-05		1.91E-04					
concrete truck			CT	diesel	450		8	1					1.94E-06	3.44E-07	1.63E-06	1.81E-06	5.46E-05		5.78E-04					
portable cement mixer			CMM	gas	5	0.5	8		1	0.136	0.148	1.784			4.50E-05	4.89E-05	5.90E-04							
20 yd dump trucks - delivery of asphalt			DT	diesel	400		8	10					4.32E-05	3.44E-06	3.33E-05	3.66E-05	1.09E-03		6.19E-03					
asphalt paving equipment			P	diesel	300	0.25	8		1	0.008	0.008	2.552			8.17E-05	8.42E-05	2.53E-02	1.48E-04		4.71E-04				
tamper			PC	diesel	25	0.75	8		1	0.240	0.247	2.555			5.94E-04	6.13E-04	6.34E-03							
roller			R	diesel	350	0.25	8		1	0.008	0.008	3.060			8.95E-05	9.23E-05	3.54E-02							
trash hauling			RR	diesel	400		12	0.5					3.24E-06	2.58E-07	2.50E-06	2.74E-06	8.20E-05		4.64E-04					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		12	0.025					9.72E-08	1.29E-08	7.86E-08	8.67E-08	2.61E-06		1.43E-05					
rubber tire crane			C	diesel	300	0.25	12		1	0.004	0.004	2.015			6.04E-05	6.22E-05	3.00E-02							
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	6		2	5.134	5.580	0.993			6.11E-04	6.64E-04	1.18E-04							
compressor			LCAC	gas	5	0.4	12		4	0.092	0.099	1.098			1.45E-04	1.58E-04	1.74E-03							
generator			LCGS	gas	10	0.4	12		4	0.072	0.078	1.986			2.28E-04	2.48E-04	6.30E-03							
W130th St. Sewer Removal/Relocation 1	PKA3RR1	1.52													1.33E-03	2.82E-02	7.45E-02				806.8	1.65E-06	3.50E-05	9.24E-05
W130th St. Sewer Removal/Relocation 2	PKA3RR2	1.52													1.33E-03	2.82E-02	7.45E-02				576.2	2.31E-06	4.90E-05	1.29E-04
W130th St. Site Improvement 1	PKA3SI1	1.52													7.59E-04	4.56E-03	4.40E-02				199.0	3.81E-06	2.29E-05	2.21E-04
W130th St. Site Improvement 2	PKA3SI2	1.52													7.59E-04	4.56E-03	4.40E-02				1,143.8	6.64E-07	3.99E-06	3.85E-05
12th Avenue Sewer Relocations																								
REMOVAL/RELOCATION OF SEWER																								
20 yd dump trucks - removal of fill			DT	diesel	400		6	10					3.24E-05	2.58E-06	2.50E-05	2.74E-05	8.20E-04		4.64E-03					
excavator - removal of fill			E	diesel	200	0.5	7		1	0.009	0.009	2.339			9.96E-05	1.03E-04	2.71E-02	1.30E-04		4.13E-04				
pavement cutter			OCE	gas	27	0.5	1		1	0.030	0.033	3.154			6.78E-06	7.37E-06	7.04E-04							
trailers - delivery of pipe			TT	diesel	500		6	1					1.94E-06	2.58E-07	1.57E-06	1.73E-06	5.21E-05		2.87E-04					
excavator - setting of pipe			E	diesel	200	0.5	7		1	0.009	0.009	2.339			9.96E-05	1.03E-04	2.71E-02							
tamper			PC	diesel	25	0.75	5		1	0.240	0.247	2.555			3.71E-04	3.83E-04	3.96E-03	9.26E-05		2.95E-04				
20 yd dump trucks - supply of gravel & fill			DT	diesel	400		6	10					3.24E-05	2.58E-06	2.50E-05	2.74E-05	8.20E-04		4.64E-03					
SITE IMPROVEMENTS/STREETSCAPE																								
trailers - delivery of material			TT	diesel	500		4	0.5					6.48E-07	8.59E-08	5.24E-07	5.78E-07	1.74E-05		9.56E-05					
concrete truck			CT	diesel	450		4	1					9.72E-07	1.72E-07	8.17E-07	9.03E-07	2.73E-05		2.89E-04					
portable cement mixer			CMM	gas	5	0.5	4		1	0.136	0.148	1.784			2.25E-05	2.44E-05	2.95E-04							
20 yd dump trucks - delivery of asphalt			DT	diesel	400		3	10					1.62E-05	1.29E-06	1.25E-05	1.37E-05	4.10E-04		2.32E-03					
asphalt paving equipment			P	diesel	300	0.25	3		1	0.008	0.008	2.552			3.06E-05	3.16E-05	9.49E-03	5.56E-05		1.77E-04				
tamper			PC	diesel	25	0.75	3		1	0.240	0.247	2.555			2.23E-04	2.30E-04	2.38E-03							
roller			R	diesel	350	0.25	3		1	0.008	0.008	3.060			3.36E-05	3.46E-05	1.33E-02							
trash hauling			RR	diesel	400		11	0.5					2.97E-06	2.36E-07	2.29E-06	2.51E-06	7.52E-05		4.26E-04					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		11	0.025					8.91E-08	1.18E-08	7.21E-08	7.94E-08	2.39E-06		1.32E-05					
rubber tire crane			C	diesel	300	0.25	9		1	0.004	0.004	2.015			4.53E-05	4.67E-05	2.25E-02							
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	6		2	5.134	5.580	0.993			6.11E-04	6.64E-04	1.18E-04							
compressor			LCAC	gas	5	0.4	11		4	0.092	0.099	1.098			1.33E-04	1.45E-04	1.60E-03							
generator			LCGS	gas	10	0.4	11		4	0.072	0.078	1.986			2.09E-04	2.27E-04	5.78E-03							
12th Avenue Sewer Work Phase 1-3	PKA2RR1														1.67E-03	1.18E-02	8.74E-02				2,270.0	7.37E-07	5.18E-06	3.85E-05
12th Avenue Sewer Work Phase 4	PKA2RR2														5.58E-04	3.92E-03	2.91E-02				666.2	8.37E-07	5.88E-06	4.37E-05

Phase 1, 2011 Short-Term Emissions	Source Parameters						Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Short Term Engine Emissions (g/s)				Short Term Fugitive Dust (g/s)			Short-Term Source Area (m2)	Total Short-Term Emission Rate (Area: g/s-m2; Point: g/s)			
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Trucks per day	Nonroad Engines	PM2.5	PM10	CO	Idle	Running	PM2.5	PM10	CO 1-Hr	CO 8-Hr	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers		PM2.5	PM10	CO 1-Hr	CO 8-HR
Site 19																									
MEP																									
plumbing deliveries			MDT	diesel	500		2					7.78E-06	3.35E-07	8.11E-06	8.87E-06	5.86E-04	2.93E-04		1.05E-04						
sprinkler deliveries			MDT	diesel	500		2					7.78E-06	3.35E-07	8.11E-06	8.87E-06	5.86E-04	2.93E-04		1.05E-04						
HVAC - deliveries			MDT	diesel	500		2					7.78E-06	3.35E-07	8.11E-06	8.87E-06	5.86E-04	2.93E-04		1.05E-04						
electric - deliveries			MDT	diesel	500		2					7.78E-06	3.35E-07	8.11E-06	8.87E-06	5.86E-04	2.93E-04		1.05E-04						
NG forklift			NGFL	gas	250	0.5		1	0.017	0.017	1.427			6.01E-04	6.01E-04	9.91E-02	4.95E-02								
INTERIORS / FIT-OUT																									
drywall trailers			TT	diesel	500		1					3.89E-06	1.68E-07	4.06E-06	4.44E-06	2.93E-04	1.47E-04		5.25E-05						
additional interiors - box trailer			TT	diesel	500		1					3.89E-06	1.68E-07	4.06E-06	4.44E-06	2.93E-04	1.47E-04		5.25E-05						
FF&E			MDT	diesel	500		1					3.89E-06	1.68E-07	4.06E-06	4.44E-06	2.93E-04	1.47E-04		5.25E-05						
NG forklift			NGFL	gas	250	0.5		1	0.017	0.017	1.427			6.01E-04	6.01E-04	9.91E-02	4.95E-02								
trash hauling			RR	diesel	400		1					6.48E-06	1.68E-07	6.65E-06	7.26E-06	4.79E-04	2.39E-04		2.61E-04						
miscellaneous equipment																									
compressor			LCAC	GAS	5	0.4		1	0.092	0.099	404.270			5.08E-05	5.53E-05	5.61E-01	2.25E-01								
Forklift	9Area3	2.74												1.20E-03	1.20E-03	1.98E-01	9.91E-02				220.3	5.45E-06	5.45E-06	9.00E-04	4.50E-04
Trucks - Trailers, Deliveries etc	9Area4	2.74												5.13E-05	5.61E-05	3.70E-03	1.85E-03				220.3	2.33E-07	2.54E-07	1.68E-05	8.40E-06
Fugitive Dust	9Area9	0.00													8.39E-04						220.3	0.00E+00	3.81E-06	0.00E+00	0.00E+00
Compressor	9POINT4	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Site 18																									
CONSTRUCT SUPERSTRUCTURE																									
concrete truck			CT	diesel	450		20					5.83E-04	3.35E-06	5.87E-04	6.39E-04	4.20E-02	2.10E-02		4.15E-03						
concrete pump			OCE	diesel	400	0.9		1	0.027	0.260	1.708			2.67E-03	2.60E-02	1.90E-01	1.71E-01								
trailers of steel			TT	diesel	500		2.5					9.72E-06	4.19E-07	1.01E-05	1.11E-05	7.33E-04	3.66E-04		1.31E-04						
rebar bender			OCE	diesel	200	0.5		1	0.209	0.215	0.992			5.80E-03	5.98E-03	5.51E-02	2.75E-02								
troweling machine			PE	gas	11	0.5		1	0.062	0.067	423.319			9.45E-05	1.03E-04	1.29E+00	6.47E-01								
trash hauling			RR	diesel	400		1					6.48E-06	1.68E-07	6.65E-06	7.26E-06	4.79E-04	2.39E-04		2.61E-04						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	1.68E-07	4.06E-06	4.44E-06	2.93E-04	1.47E-04		5.25E-05						
rubber tire crane			C	diesel	300	0.25		1	0.109	0.112	0.405			2.27E-03	2.34E-03	3.37E-02	8.44E-03								
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		1	5.134	5.580	213.445			8.56E-04	9.30E-04	1.78E-01	3.56E-02								
compressor			LCAC	gas	5	0.4		1	0.092	0.099	404.270			5.08E-05	5.53E-05	5.61E-01	2.25E-01								
generator			LCGS	gas	10	0.4		1	0.072	0.078	476.944			7.98E-05	8.68E-05	1.32E+00	5.30E-01								
Chain Saw	8Area1	1.52												8.56E-04	9.30E-04	1.78E-01	3.56E-02				1,228.1	6.97E-07	7.57E-07	1.45E-04	2.90E-05
Troweling Machine	8Area2	0.00												9.45E-05	1.03E-04	1.29E+00	6.47E-01				1,228.1	7.70E-08	8.37E-08	1.05E-03	5.27E-04
Trucks - Trailers, Deliveries etc	8Area4	2.74												2.08E-05	2.28E-05	1.50E-03	7.52E-04				198.6	1.05E-07	1.15E-07	7.57E-06	3.79E-06
Fugitive Dust	8Area9	0.00													4.60E-03						198.6	0.00E+00	2.31E-05	0.00E+00	0.00E+00
Concrete Truck 1	8POINT1	2.74												2.93E-04	3.20E-04	2.10E-02	1.05E-02					2.93E-04	3.20E-04	2.10E-02	1.05E-02
Concrete Truck 2	8POINT2	2.74												2.93E-04	3.20E-04	2.10E-02	1.05E-02					2.93E-04	3.20E-04	2.10E-02	1.05E-02
Concrete Pump	8POINT3	2.74												2.67E-03	2.60E-02	1.90E-01	1.71E-01					2.67E-03	2.60E-02	1.90E-01	1.71E-01
Compressor	8POINT4	1.52												5.08E-05	5.53E-05	5.61E-01	2.25E-01					5.08E-05	5.53E-05	5.61E-01	2.25E-01
Generator	8POINT6	1.52												7.98E-05	8.68E-05	1.32E+00	5.30E-01					7.98E-05	8.68E-05	1.32E+00	5.30E-01
Rebar Bender	8POINT8	1.52												5.80E-03	5.98E-03	5.51E-02	2.75E-02					5.80E-03	5.98E-03	5.51E-02	2.75E-02
Rubber tire crane	8POINT9	3.66												2.27E-03	2.34E-03	3.37E-02	8.44E-03					2.27E-03	2.34E-03	3.37E-02	8.44E-03
Package B **Below grade space + F** **aka Phase I Factory**																									
EXCAVATE WITHIN SLURRY WALL																									
20 yd dump trucks			DT	diesel	400		123					7.97E-04	1.43E-04	9.40E-04	1.04E-03	6.96E-02	3.48E-02		3.60E-01						
excavator			E	diesel	200	0.75		3	0.009	0.009	0.728			1.08E-03	1.11E-03	1.21E-01	9.11E-02	3.83E-03		1.22E-02					
compressors			LCAC	diesel	250	0.9		2	0.004	0.004	0.477			4.95E-04	5.10E-04	6.62E-02	5.96E-02								
CONSTRUCT BELOW GRADE SUPERSTRUCTURE																									
concrete truck			CT	diesel	450		90					2.63E-04	1.04E-04	3.67E-04	4.11E-04	2.79E-02	1.40E-02		2.46E-01						
concrete pump			OCE	diesel	400	0.9		2	0.003	0.008	1.708			5.34E-04	1.55E-03	3.79E-01	3.42E-01								
trailers of steel			TT	diesel	500		7.5					2.92E-05	8.70E-06	3.79E-05	4.22E-05	2.85E-03	1.43E-03		1.36E-02						
crawler crane			C	diesel	450	0.9		1	0.004	0.004	0.664			4.43E-04	4.56E-04	8.30E-02	7.47E-02								
troweling machine			PE	gas	11	0.5		2	0.062	0.067	423.319			1.89E-04	2.05E-04	2.59E+00	1.29E+00								
MEP																									
plumbing deliveries			MDT	diesel	500		2					7.78E-06	2.32E-06	1.01E-05	1.12E-05	7.60E-04	3.80E-04		3.62E-03						
sprinkler deliveries			MDT	diesel	500		2					7.78E-06	2.32E-06	1.01E-05	1.12E-05	7.60E-04	3.80E-04		3.62E-03						
HVAC - deliveries			MDT	diesel	500		2					7.78E-06	2.32E-06	1.01E-05	1.12E-05	7.60E-04	3.80E-04		3.62E-03						
electric - deliveries			MDT	diesel	500		2					7.78E-06	2.32E-06	1.01E-05	1.12E-05	7.60E-04	3.80E-04		3.62E-03						
BELOW GRADE INTERIORS / FIT-OUT																									
drywall trailers			TT	diesel	500		1					3.89E-06	1.16E-06	5.05E-06	5.62E-06	3.80E-04	1.90E-04		1.81E-03						
additional interiors - box trailer			TT	diesel	500		1					3.89E-06	1.16E-06	5.05E-06	5.62E-06	3.80E-04	1.90E-04		1.81E-03						
FF&E deliveries			MDT	diesel	500		1					3.89E-06	1.16E-06	5.05E-06	5.62E-06	3.80E-04	1.90E-04		1.81E-03						
trash hauling - 3 loads per day			RR	diesel	400		1					6.48E-06	1.16E-06	7.64E-06	8.45E-06	5.66E-04	2.83E-04		2.93E-03						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	1.16E-06	5.05E-06	5.62E-06	3.80E-04	1.90E-04		1.81E-03						
Concrete Pump 1	PKBCP1	2.74												2.67E-04	7.77E-04	1.90E-01	1.71E-01				1.0	2.67E-04	7.77E-04	1.90E-01	1.71E-01
Concrete Pump 2	PKBCP2	2.74												2.67E-04	7.77E-04	1.90E-01	1.71E-01				1.0	2.67E-04	7.77E-04	1.90E-01	1.71E-01
Concrete Truck 1	PKBCT1	2.74												9.17E-05	1.03E-04	6.98E-03	3.49E-03				1.0	9.17E-05	1.03E-04	6.98E-03	3.49E-03
Concrete Truck 2	PKBCT2	2.74												9.17E-05	1.03E-04	6.98E-03	3.49E-03				1.0	9.17E-05	1.03E-04	6.98E-03	3.49E-03
Concrete Truck 3	PKBCT3	2.74												9.17E-05	1.03E-04	6.98E-03	3.49E-03				1.0	9.17E-05	1.03E-04	6.98E-03	3.49E-03
Concrete Truck 4	PKBCT4	2.74												9.17E-05	1.03E-04	6.98E-03	3.49E-03				1.0	9.17E-05	1.03E-04	6.98E-03	3.49E-03
Below Grade Equipments	PKBBG1	0.00												7.04E-04	2.72E-01	2.68E+00	1.37E+00				2,640.0	2.67E-07	1.03E-04	1.01E-03	5.19E-04
Excavation Equipment	PKBEC1	0.00												6.37E-03	3.87E-01	2.60E-01	1.87E-01				2,410.4	2.64E-06	1.61E-04	1.08E-04	7.75E-05

Phase 1, 2011 Short-Term Emissions	Source Parameters						Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Short Term Engine Emissions (g/s)				Short Term Fugitive Dust (g/s)			Short-Term Source Area (m2)	Total Short-Term Emission Rate (Area: g/s-m2; Point: g/s)			
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Trucks per day	Nonroad Engines	PM2.5	PM10	CO	Idle	Running	PM2.5	PM10	CO 1-Hr	CO 8-Hr	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers		PM2.5	PM10	CO 1-Hr	CO 8-HR
Package C																									
#2 Science building																									
aka Mind Brain Behavior Center																									
CONSTRUCT SUPERSTRUCTURE																									
concrete truck			CT	diesel	450		20					5.83E-05	7.73E-06	6.61E-05	7.28E-05	4.85E-03	2.43E-03		9.58E-03						
concrete pump			OCE	diesel	400	0.9		1	0.003	0.008	1.383			2.67E-04	7.77E-04	1.54E-01	1.38E-01								
trailers of steel			TT	diesel	500		7.5					2.92E-05	2.90E-06	3.21E-05	3.52E-05	2.34E-03	1.17E-03		9.09E-04						
troweling machine			PE	gas	11	0.5		2	0.061	0.066	424.787			1.86E-04	2.03E-04	2.60E+00	1.30E+00								
INTERIORS / FIT-OUT																									
trash hauling - 3 loads per day			RR	diesel	400		1					6.48E-06	3.87E-07	6.87E-06	7.52E-06	4.98E-04	2.49E-04		6.03E-04						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	3.87E-07	4.28E-06	4.70E-06	3.12E-04	1.56E-04		1.21E-04						
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		2	5.134	5.580	213.445			1.71E-03	1.86E-03	3.56E-01	7.11E-02								
compressor			LCAC	gas	5	0.4		2	0.085	0.093	403.381			9.46E-05	1.03E-04	1.12E+00	4.48E-01								
generator			LCGS	gas	10	0.4		2	0.070	0.076	481.444			1.55E-04	1.68E-04	2.67E+00	1.07E+00								
Compressor 1	PKCCM1	1.52												4.73E-05	5.14E-05	5.60E-01	2.24E-01				1.0	4.73E-05	5.14E-05	5.60E-01	2.24E-01
Compressor 2	PKCCM2	1.52												4.73E-05	5.14E-05	5.60E-01	2.24E-01				1.0	4.73E-05	5.14E-05	5.60E-01	2.24E-01
Concrete Pump	PKCCP1	2.74												2.67E-04	7.77E-04	1.54E-01	1.38E-01				1.0	2.67E-04	7.77E-04	1.54E-01	1.38E-01
Chain Saw	PKCCS1	1.52												1.71E-03	1.86E-03	3.56E-01	7.11E-02				3,251.8	5.26E-07	5.72E-07	1.09E-04	2.19E-05
Concrete Truck 1	PKCCT1	2.74												3.30E-05	3.64E-05	2.43E-03	1.21E-03				1.0	3.30E-05	3.64E-05	2.43E-03	1.21E-03
Concrete Truck 2	PKCCT2	2.74												3.30E-05	3.64E-05	2.43E-03	1.21E-03				1.0	3.30E-05	3.64E-05	2.43E-03	1.21E-03
Fugitive Dust	PKCDS1	0.00												0.00E+00	1.12E-02	0.00E+00	0.00E+00				555.5	0.00E+00	2.02E-05	0.00E+00	0.00E+00
Generator 1	PKCGN1	1.52												7.73E-05	8.40E-05	1.34E+00	5.35E-01				1.0	7.73E-05	8.40E-05	1.34E+00	5.35E-01
Generator 2	PKCGN2	1.52												7.73E-05	8.40E-05	1.34E+00	5.35E-01				1.0	7.73E-05	8.40E-05	1.34E+00	5.35E-01
Trucks - Trailers, Deliveries etc	PKCTK1	1.52												4.32E-05	4.75E-05	3.15E-03	1.58E-03				555.5	7.78E-08	8.54E-08	5.67E-06	2.84E-06
Troweling Machine	PKCTM1	7.62	~Working on 3rd Story											1.86E-04	2.03E-04	2.60E+00	1.30E+00				3,251.8	5.73E-08	6.23E-08	7.98E-04	3.99E-04
Package D																									
#3 Academic building																									
aka Lantern Building																									
CONSTRUCT SUPERSTRUCTURE																									
concrete truck			CT	diesel	450		5					1.46E-05	3.22E-06	1.78E-05	1.97E-05	1.33E-03	6.63E-04		3.99E-03						
concrete pump			OCE	diesel	400	0.208333		1	0.003	0.008	1.383			6.18E-05	1.80E-04	1.54E-01	3.20E-02								
troweling machine			PE	diesel	200	0.5		2	0.008	0.008	0.766			4.42E-04	4.56E-04	8.51E-02	4.25E-02								
trailers of steel			TT	diesel	500		2.5					9.72E-06	1.61E-06	1.13E-05	1.25E-05	8.37E-04	4.19E-04		5.05E-04						
trash hauling - 3 loads per day			RR	diesel	400		1					6.48E-06	6.44E-07	7.13E-06	7.83E-06	5.20E-04	2.60E-04		1.01E-03						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	6.44E-07	4.53E-06	5.01E-06	3.35E-04	1.67E-04		2.02E-04						
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		2	5.134	5.580	213.445			1.71E-03	1.86E-03	3.56E-01	7.11E-02								
compressor			LCAC	gas	5	0.4		2	0.085	0.093	403.381			9.46E-05	1.03E-04	1.12E+00	4.48E-01								
generator			LCGS	gas	10	0.4		2	0.070	0.076	481.444			1.55E-04	1.68E-04	2.67E+00	1.07E+00								
Compressor 1	PKDCM1	1.52												4.73E-05	5.14E-05	5.60E-01	2.24E-01				1.0	4.73E-05	5.14E-05	5.60E-01	2.24E-01
Compressor 2	PKDCM2	1.52												4.73E-05	5.14E-05	5.60E-01	2.24E-01				1.0	4.73E-05	5.14E-05	5.60E-01	2.24E-01
Concrete Pump 1	PKDCP1	2.74												6.18E-05	1.80E-04	1.54E-01	3.20E-02				1.0	6.18E-05	1.80E-04	1.54E-01	3.20E-02
Chain Saw	PKDCS1	1.52												1.71E-03	1.86E-03	3.56E-01	7.11E-02				922.8	1.85E-06	2.02E-06	3.86E-04	7.71E-05
Concrete Truck 1	PKDCT1	2.74												8.90E-06	9.87E-06	6.63E-04	3.32E-04				1.0	8.90E-06	9.87E-06	6.63E-04	3.32E-04
Concrete Truck 2	PKDCT2	2.74												8.90E-06	9.87E-06	6.63E-04	3.32E-04				1.0	8.90E-06	9.87E-06	6.63E-04	3.32E-04
Fugitive Dust	PKDDS1	0												0.00E+00	5.70E-03	0.00E+00	0.00E+00				511.1	0.00E+00	1.12E-05	0.00E+00	0.00E+00
Generator 1	PKDGN1	1.52												7.73E-05	8.40E-05	1.34E+00	5.35E-01				1.0	7.73E-05	8.40E-05	1.34E+00	5.35E-01
Generator 2	PKDGN2	1.52												7.73E-05	8.40E-05	1.34E+00	5.35E-01				1.0	7.73E-05	8.40E-05	1.34E+00	5.35E-01
Trucks	PKDTK1	0												2.30E-05	2.54E-05	1.69E-03	8.46E-04				511.1	4.50E-08	4.96E-08	3.31E-06	1.66E-06
Troweling Machine	PKDTM1	0	~Ground Floor											4.42E-04	4.56E-04	8.51E-02	4.25E-02				922.8	4.79E-07	4.94E-07	9.22E-05	4.61E-05
Package E			0	0	0	0	0	0											0.00E+00						
#4 Academic building (business school)			0	0	0	0	0	0											0.00E+00						
aka Business School Building			0	0	0	0	0	0											0.00E+00						
CONSTRUCT SUPERSTRUCTURE																									
concrete truck			CT	diesel	450		20					5.83E-05	7.73E-06	6.61E-05	7.28E-05	4.85E-03	2.43E-03		9.58E-03						
concrete pump			OCE	diesel	400	0.9		1	0.003	0.008	1.383			2.67E-04	7.77E-04	1.54E-01	1.38E-01								
troweling machine			PE	gas	11	0.5		2	0.061	0.066	424.787			1.86E-04	2.03E-04	2.60E+00	1.30E+00								
trailers of steel			TT	diesel	500		7.5					2.92E-05	2.90E-06	3.21E-05	3.52E-05	2.34E-03	1.17E-03		9.09E-04						
trash hauling - 3 loads per day			RR	diesel	400		1					6.48E-06	3.87E-07	6.87E-06	7.52E-06	4.98E-04	2.49E-04		6.03E-04						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	3.87E-07	4.28E-06	4.70E-06	3.12E-04	1.56E-04		1.21E-04						
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		2	5.134	5.580	213.445			1.71E-03	1.86E-03	3.56E-01	7.11E-02								
compressor			LCAC	gas	5	0.4		2	0.085	0.093	403.381			9.46E-05	1.03E-04	1.12E+00	4.48E-01								
generator			LCGS	gas	10	0.4		2	0.070	0.076	481.444			1.55E-04	1.68E-04	2.67E+00	1.07E+00								
Compressor 1	PKECM1	1.52												4.73E-05	5.14E-05	5.60E-01	2.24E-01				1.0	4.73E-05	5.14E-05	5.60E-01	2.24E-01
Compressor 2	PKECM2	1.52												4.73E-05	5.14E-05	5.60E-01	2.24E-01				1.0	4.73E-05	5.14E-05	5.60E-01	2.24E-01
Concrete Pump	PKECP1	2.74												2.67E-04	7.77E-04	1.54E-01	1.38E-01				1.0	2.67E-04	7.77E-04	1.54E-01	1.38E-01
Chain Saw	PKECS1	1.52												1.71E-03	1.86E-03	3.56E-01	7.11E-02				2,605.1	6.57E-07	7.14E-07	1.37E-04	2.73E-05
Concrete Truck 1	PKECT1	2.74												3.30E-05	3.64E-05	2.43E-03	1.21E-03				1.0	3.30E-05	3.64E-05	2.43E-03	1.21E-03
Concrete Truck 2	PKECT2	2.74												3.30E-05	3.64E-05	2.43E-03	1.21E-03				1.0	3.30E-05	3.64E-05	2.43E-03	1.21E-03
Fugitive Dust	PKEDS1	0.00												0.00E+00	1.12E-02	0.00E+00	0.00E+00				954.6	0.00E+00	1.17E-05	0.00E+00	0.00E+00
Generator 1	PKEGN1	1.52												7.73E-05	8.40E-05	1.34E+00	5.35E-01				1.0	7.73E-05	8.40E-05	1.34E+00	5.35E-01
Generator 2	PKEGN2	1.52												7.73E-05	8.40E-05	1.34E+00	5.35E-01				1.0	7.73E-05	8.40E-05	1.34E+00	5.35E-01
Trucks - Trailers, Deliveries etc	PKETK1	2.74												4.32E-05	4.75E-05	3.15E-03	1.58E-03				954.6	4.53E-08	4.97E-08	3.30E-06	1.65E-06
Troweling Machine	PKETM1	4.57	~2nd Story											1.86E-04	2.03E-04	2.60E+00	1.30E+00				2,605.1	7.16E-08	7.78E-08	9.96E-04	4.98E-04

Phase 1, 2011 Short-Term Emissions	Source Parameters						Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Short Term Engine Emissions (g/s)				Short Term Fugitive Dust (g/s)			Short-Term Source Area (m2)	Total Short-Term Emission Rate (Area: g/s-m2; Point: g/s)			
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Trucks per day	Nonroad Engines	PM2.5	PM10	CO	Idle	Running	PM2.5	PM10	CO 1-Hr	CO 8-Hr	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers		PM2.5	PM10	CO 1-Hr	CO 8-HR
Package T **#1 Academic building w/cellar** **aka Conference Center**																									
SITE DEMOLITION																									
20 yd dump trucks			DT	diesel	400		10					6.48E-05	3.48E-06	6.83E-05	7.48E-05	4.94E-03	2.47E-03		8.78E-03						
excavator			E	diesel	200	0.75		1	0.009	0.009	0.638			3.59E-04	3.70E-04	3.55E-02	2.66E-02	3.11E-04		9.90E-04					
trash hauling - 3 loads per day			RR	diesel	400		1					6.48E-06	3.48E-07	6.83E-06	7.48E-06	4.94E-04	2.47E-04		8.78E-04						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	3.48E-07	4.24E-06	4.65E-06	3.09E-04	1.54E-04		5.42E-04						
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		2	5.134	5.580	213.445			1.71E-03	1.86E-03	3.56E-01	7.11E-02								
compressor			LCAC	gas	5	0.4		2	0.085	0.093	403.381			9.46E-05	1.03E-04	1.12E+00	4.48E-01								
generator			LCGS	gas	10	0.4		2	0.070	0.076	481.444			1.55E-04	1.68E-04	2.67E+00	1.07E+00								
Compressor 1	PKTCM1	1.52												4.73E-05	5.14E-05	5.60E-01	2.24E-01				1.0	4.728E-05	5.139E-05	5.603E-01	2.241E-01
Compressor 2	PKTCM2	1.52												4.73E-05	5.14E-05	5.60E-01	2.24E-01				1.0	4.728E-05	5.139E-05	5.603E-01	2.241E-01
Chain Saw 1	PKTCS1	1.52												1.71E-03	1.86E-03	3.56E-01	7.11E-02				1,526.9	1.121E-06	1.218E-06	2.330E-04	4.660E-05
Fugitive Dust	PKTDS1	0												3.11E-04	1.12E-02	0.00E+00	0.00E+00				1,526.9	2.038E-07	7.328E-06	0.000E+00	0.000E+00
Excavator 1	PKTEX1	2.74												3.59E-04	3.70E-04	3.55E-02	2.66E-02				1,526.9	2.349E-07	2.422E-07	2.322E-05	1.741E-05
Generator 1	PKTGN1	1.52												7.73E-05	8.40E-05	1.34E+00	5.35E-01				1.0	7.730E-05	8.402E-05	1.337E+00	5.349E-01
Generator 2	PKTGN2	1.52												7.73E-05	8.40E-05	1.34E+00	5.35E-01				1.0	7.730E-05	8.402E-05	1.337E+00	5.349E-01
Trucks	PKTTK1	2.74												7.94E-05	8.69E-05	5.75E-03	2.87E-03				1,526.9	5.197E-08	5.691E-08	3.764E-06	1.882E-06

Phase 1, 2011 Annual Emissions	Source Parameters							Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Annual Average Engine Emissions (g/s)			Annual Fugitive Dust (g/s)			Annual Source Area (m2)	Total Annual Emission Rate (Area: g/s-m2; Point: g/s)		
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Months On-Site	Trucks per day	Nonroad Engines	PM2.5	PM10	NOx	Idle	Running	PM2.5	PM10	NOx	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers		PM2.5	PM10	NOx
Site 19																								
CONSTRUCT SUPERSTRUCTURE																								
concrete truck			CT	diesel	450		1	4					9.72E-06	5.58E-08	6.98E-06	7.61E-06	2.26E-04		4.94E-05					
concrete pump			OCE	diesel	400	0.9	1		0.2	0.027	0.260	3.398			2.65E-05	2.58E-04	3.37E-03							
trailers of steel			TT	diesel	500		1	1					3.24E-07	1.40E-08	2.41E-07	2.64E-07	7.87E-06		3.12E-06					
rebar bender			OCE	diesel	200	0.5	1		1	0.209	0.215	2.844			3.45E-04	3.56E-04	4.70E-03							
troweling machine			PE	gas	11	0.5	1		1	0.062	0.067	1.669			5.63E-06	6.12E-06	1.52E-04							
MEP																								
plumbing deliveries			MDT	diesel	500		3	0.01					9.72E-09	4.19E-10	7.24E-09	7.92E-09	2.36E-07		9.37E-08					
sprinkler deliveries			MDT	diesel	500		3	0.01					9.72E-09	4.19E-10	7.24E-09	7.92E-09	2.36E-07		9.37E-08					
HVAC - deliveries			MDT	diesel	500		3	0.01					9.72E-09	4.19E-10	7.24E-09	7.92E-09	2.36E-07		9.37E-08					
electric - deliveries			MDT	diesel	500		3	0.01					9.72E-09	4.19E-10	7.24E-09	7.92E-09	2.36E-07		9.37E-08					
NG forklift			NGFL	gas	250	0.5	3		1	0.017	0.017	0.291			1.07E-04	1.07E-04	1.80E-03							
BUILDING ENCLOSURE & ROOFING																								
trailers			TT	diesel	500		2	0.5					3.24E-07	1.40E-08	2.41E-07	2.64E-07	7.87E-06		3.12E-06					
INTERIORS / FIT-OUT																								
drywall trailers			TT	diesel	500		4	0.01					1.30E-08	5.58E-10	9.66E-09	1.06E-08	3.15E-07		1.25E-07					
additional interiors - box trailer			TT	diesel	500		4	0.01					1.30E-08	5.58E-10	9.66E-09	1.06E-08	3.15E-07		1.25E-07					
FF&E			MDT	diesel	500		4	0.01					1.30E-08	5.58E-10	9.66E-09	1.06E-08	3.15E-07		1.25E-07					
NG forklift			NGFL	gas	250	0.5	4		0.01	0.017	0.017	0.291			1.43E-06	1.43E-06	2.40E-05							
trash hauling			RR	diesel	400		7	0.5					1.89E-06	4.89E-08	1.39E-06	1.51E-06	4.50E-05		5.45E-05					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		4	0.1					1.30E-07	5.58E-09	9.66E-08	1.06E-07	3.15E-06		1.25E-06					
rubber tire crane			C	diesel	300	0.25	4		1	0.109	0.112	2.015			5.40E-04	5.56E-04	1.00E-02							
miscellaneous equipment																								
compressor			LCAC	GAS	5	0.4	1		1	0.092	0.099	1.098			3.03E-06	3.29E-06	3.63E-05							
Ground Level Equipments (RB, COMP, GEN)	9Area1	0.00													3.48E-04	3.59E-04	4.74E-03				1739.8	2.00E-07	2.07E-07	2.72E-06
Troweling Machine	9Area2	0.00													5.63E-06	6.12E-06	1.52E-04				1739.8	3.23E-09	3.52E-09	8.72E-08
Rubber Tire Crane	9Area3	3.66													5.40E-04	5.56E-04	1.00E-02				279.4	1.93E-06	1.99E-06	3.58E-05
Trucks + Forklifts	9Area4	2.74													1.11E-04	1.11E-04	1.89E-03				220.3	5.03E-07	5.03E-07	8.59E-06
Concrete Truck	9Area5A	2.74													6.98E-06	7.61E-06	2.26E-04				109.6	6.37E-08	6.95E-08	2.06E-06
Concrete Pump	9Area5B	2.74													2.65E-05	2.58E-04	3.37E-03				109.6	2.42E-07	2.35E-06	3.08E-05
Fugitive Dust	9Area9	0.00													0.00E+00	1.12E-04	0.00E+00				220.3	0.00E+00	5.09E-07	0.00E+00
Site 18																								
SITE DEMOLITION																								
20 yd dump trucks			DT	diesel	400		2	10					1.08E-05	2.79E-07	7.92E-06	8.64E-06	2.57E-04		5.03E-04					
excavator			E	diesel	200	0.75	2		1	0.173	0.178	2.339			8.58E-04	8.85E-04	1.16E-02	3.70E-05		1.18E-04				
EXCAVATION & FOUNDATIONS																								
20 yd dump trucks			DT	diesel	400		4	10					2.16E-05	5.58E-07	1.58E-05	1.73E-05	5.14E-04		1.01E-03					
backhoe			TLB	diesel	200	0.75	4		1	0.148	0.153	1.390			1.47E-03	1.51E-03	1.38E-02	7.41E-05		2.36E-04				
compressors			LCAC	diesel	250	0.9	4		1	0.120	0.123	2.143			1.78E-03	1.83E-03	3.19E-02							
CONSTRUCT SUPERSTRUCTURE																								
concrete truck			CT	diesel	450		4	4					3.89E-05	2.23E-07	2.79E-05	3.04E-05	9.03E-04		1.98E-04					
concrete pump			OCE	diesel	400	0.9	4		0.2	0.027	0.260	3.398			1.06E-04	1.03E-03	1.35E-02							
trailers of steel			TT	diesel	500		4	1					1.30E-06	5.58E-08	9.66E-07	1.06E-06	3.15E-05		1.25E-05					
rebar bender			OCE	diesel	200	0.5	4		1	0.209	0.215	2.844			1.38E-03	1.42E-03	1.88E-02							
troweling machine			PE	gas	11	0.5	4		1	0.062	0.067	1.669			2.25E-05	2.45E-05	6.07E-04							
MEP																								
plumbing deliveries			MDT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
sprinkler deliveries			MDT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
HVAC - deliveries			MDT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
electric - deliveries			MDT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
NG forklift			NGFL	gas	250	0.5	1		1	0.017	0.017	0.291			3.58E-05	3.58E-05	6.01E-04							
BUILDING ENCLOSURE & ROOFING																								
trailers			TT	diesel	500		2	0.5					3.24E-07	1.40E-08	2.41E-07	2.64E-07	7.87E-06		3.12E-06					
INTERIORS / FIT-OUT																								
drywall trailers			TT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
additional interiors - box trailer			TT	diesel	500		1	0.01					3.24E-09	1.40E-10	2.41E-09	2.64E-09	7.87E-08		3.12E-08					
FF&E			MDT	diesel	500		1	0.1					3.24E-08	1.40E-09	2.41E-08	2.64E-08	7.87E-07		3.12E-07					
NG forklift			NGFL	gas	250	0.5	1		0.01	0.017	0.017	0.291			3.58E-07	3.58E-07	6.01E-06							
trash hauling			RR	diesel	400		12	0.5					3.24E-06	8.38E-08	2.37E-06	2.59E-06	7.71E-05		1.51E-04					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		12	0.1					3.89E-07	1.68E-08	2.90E-07	3.17E-07	9.44E-06		1.86E-05					
rubber tire crane			C	diesel	300	0.25	7		1	0.109	0.112	2.015			9.44E-04	9.74E-04	1.75E-02							
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	2		1	5.134	5.580	0.993			1.02E-04	1.11E-04	1.97E-05							
compressor			LCAC	gas	5	0.4	8		1	0.092	0.099	1.098			2.42E-05	2.63E-05	2.90E-04							
generator			LCGS	gas	10	0.4	5		1	0.072	0.078	1.986			2.38E-05	2.58E-05	6.57E-04							
Ground Level Equipments (RB, CS, COMP, GEN)	8Area1	0.00													1.48E-03	1.52E-03	1.95E-02				1228.1	1.20E-06	1.24E-06	1.58E-05
Troweling Machine	8Area2	0.00													2.25E-05	2.45E-05	6.07E-04				1228.1	1.83E-08	1.99E-08	4.94E-07
Rubber Tire Crane	8Area3	3.66													9.44E-04	9.74E-04	1.75E-02				277.9	3.40E-06	3.50E-06	6.29E-05
Trucks + Forklifts	8Area4	2.74													3.94E-05	3.97E-05	7.12E-04				198.6	1.98E-07	2.00E-07	3.59E-06
Concrete Truck	8Area5A	2.74													2.79E-05	3.04E-05	9.03E-04				100.2	2.79E-07	3.04E-07	9.01E-06
Concrete Pump	8Area5B	2.74													1.06E-04	1.03E-03	1.35E-02				100.2	1.06E-06	1.03E-05	1.35E-04
Excavation Equipments (BH, EX, COMP etc)	8Area6	0.00													3.32E-03	3.43E-03	4.65E-02				1228.1	2.70E-06	2.79E-06	3.78E-05
Demolition Equipments (Dump Truck + Excavator)	8Area7	2.74													8.66E-04	8.93E-04	1.19E-02				1228.1	7.05E-07	7.27E-07	9.66E-06
Onsite Fugitive Dust	8Area8	0.00													1.11E-04	1.91E-03	0.00E+00				1228.1	9.05E-08	1.55E-06	0.00E+00
Fugitive Dust	8Area9	0.00													0.00E+00	3.41E-04	0.00E+00				198.6	0.00E+00	1.72E-06	0.00E+00

Phase 1, 2011 Annual Emissions	Source Parameters							Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Annual Average Engine Emissions (g/s)			Annual Fugitive Dust (g/s)				Total Annual Emission Rate (Area: g/s-m2; Point: g/s)		
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Months On-Site	Trucks per day	Nonroad Engines	PM2.5	PM10	NOx	Idle	Running	PM2.5	PM10	NOx	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers	Annual Source Area (m2)	PM2.5	PM10	NOx
Package C **#2 Science building** **aka Mind Brain Behavior Center**																								
CONSTRUCT SUPERSTRUCTURE																								
concrete truck			CT	diesel	450		11	4					1.07E-05	1.42E-06	8.65E-06	9.53E-06	2.87E-04		1.25E-03					
concrete pump			OCE	diesel	400	0.9	11		0.2	0.003	0.008	2.883			3.50E-05	1.02E-04	3.78E-02							
trailers of steel			TT	diesel	500		11	3					1.07E-05	1.06E-06	8.40E-06	9.23E-06	2.77E-04		2.38E-04					
troweling machine			PE	gas	11	0.5	11		2	0.061	0.066	1.638			1.22E-04	1.33E-04	3.28E-03							
MEP																								
plumbing deliveries			MDT	diesel	500		6	0.08					1.56E-07	1.55E-08	1.22E-07	1.34E-07	4.02E-06		3.46E-06					
sprinkler deliveries			MDT	diesel	500		6	0.06					1.17E-07	1.16E-08	9.16E-08	1.01E-07	3.02E-06		2.60E-06					
HVAC - deliveries			MDT	diesel	500		6	0.23					4.47E-07	4.45E-08	3.51E-07	3.86E-07	1.16E-05		9.95E-06					
electric - deliveries			MDT	diesel	500		6	0.11					2.14E-07	2.13E-08	1.68E-07	1.85E-07	5.53E-06		4.76E-06					
BUILDING ENCLOSURE & ROOFING																								
trailers			TT	diesel	500		5	0.5					8.10E-07	8.05E-08	6.36E-07	6.99E-07	2.10E-05		1.80E-05					
INTERIORS / FIT-OUT																								
drywall trailers			TT	diesel	500		5	0.01					1.62E-08	1.61E-09	1.27E-08	1.40E-08	4.19E-07		3.61E-07					
additional interiors - box trailer			TT	diesel	500		5	0.05					8.10E-08	8.05E-09	6.36E-08	6.99E-08	2.10E-06		1.80E-06					
FF&E			MDT	diesel	500		5	0.03					4.86E-08	4.83E-09	3.82E-08	4.20E-08	1.26E-06		1.08E-06					
trash hauling - 3 loads per day			RR	diesel	400		12	3					1.94E-05	1.16E-06	1.47E-05	1.61E-05	4.81E-04		1.29E-03					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		12	0.5					1.94E-06	1.93E-07	1.53E-06	1.68E-06	5.03E-05		4.33E-05					
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	3		2	5.134	5.580	0.993			3.06E-04	3.32E-04	5.91E-05							
compressor			LCAC	gas	5	0.4	6		2	0.085	0.093	1.027			3.38E-05	3.67E-05	4.08E-04							
generator			LCGS	gas	10	0.4	6		2	0.070	0.076	1.897			5.52E-05	6.00E-05	1.51E-03							
Fugitive Dust	PKCDS1	0.00													0.00E+00	2.87E-03	0.00E+00				555.5	0.00E+00	5.17E-06	0.00E+00
Ground Level Equipments (CS, COMP, GEN)	PKCEQ1	1.52													3.95E-04	4.29E-04	1.97E-03				3251.8	1.21E-07	1.32E-07	6.06E-07
Trucks	PKCTK1	2.74													2.61E-05	2.87E-05	8.57E-04				555.5	4.70E-08	5.16E-08	1.54E-06
Troweling Machine	PKCTM1	0.00	60.96 (200')												1.22E-04	1.33E-04	3.28E-03				3251.8	3.75E-08	4.08E-08	1.01E-06
Concrete Truck + Concrete Pump	PKCTP1	2.74													4.36E-05	1.11E-04	3.80E-02				265.3	1.64E-07	4.20E-07	1.43E-04
Package D **#3 Academic building** **aka Lantern Building**																								
CONSTRUCT SUPERSTRUCTURE							4																	
concrete truck			CT	diesel	450		6	1					1.46E-06	3.22E-07	1.27E-06	1.41E-06	4.28E-05		2.85E-04					
concrete pump			OCE	diesel	400	0.208333	6		0.2	0.003	0.008	2.883			4.41E-06	1.28E-05	4.77E-03							
troweling machine			PE	diesel	200	0.5	6		2	0.008	0.008	2.290			1.58E-04	1.63E-04	4.54E-02							
trailers of steel			TT	diesel	500		6	1					1.94E-06	3.22E-07	1.62E-06	1.79E-06	5.40E-05		7.21E-05					
MEP																								
plumbing deliveries			MDT	diesel	500		4	0.09					1.17E-07	1.93E-08	9.71E-08	1.07E-07	3.24E-06		4.33E-06					
sprinkler deliveries			MDT	diesel	500		4	0.09					1.17E-07	1.93E-08	9.71E-08	1.07E-07	3.24E-06		4.33E-06					
HVAC - deliveries			MDT	diesel	500		4	0.21					2.72E-07	4.51E-08	2.27E-07	2.50E-07	7.55E-06		1.01E-05					
electric - deliveries			MDT	diesel	500		4	0.24					3.11E-07	5.15E-08	2.59E-07	2.86E-07	8.63E-06		1.15E-05					
BUILDING ENCLOSURE & ROOFING																								
trailers			TT	diesel	500		4	0.5					6.48E-07	1.07E-07	5.40E-07	5.96E-07	1.80E-05		2.40E-05					
INTERIORS / FIT-OUT																								
drywall trailers			TT	diesel	500		5	0.01					1.62E-08	2.68E-09	1.35E-08	1.49E-08	4.50E-07		6.01E-07					
additional interiors - box trailer			TT	diesel	500		5	0.02					3.24E-08	5.37E-09	2.70E-08	2.98E-08	8.99E-07		1.20E-06					
FF&E			MDT	diesel	500		5	0.04					6.48E-08	1.07E-08	5.40E-08	5.96E-08	1.80E-06		2.40E-06					
trash hauling - 3 loads per day			RR	diesel	400		10	3					1.62E-05	1.61E-06	1.27E-05	1.40E-05	4.19E-04		1.80E-03					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		10	0.5					1.62E-06	2.68E-07	1.35E-06	1.49E-06	4.50E-05		6.01E-05					
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	3		2	5.134	5.580	0.993			3.06E-04	3.32E-04	5.91E-05							
compressor			LCAC	gas	5	0.4	6		2	0.085	0.093	1.027			3.38E-05	3.67E-05	4.08E-04							
generator			LCGS	gas	10	0.4	6		2	0.070	0.076	1.897			5.52E-05	6.00E-05	1.51E-03							
Fugitive Dust	PKDDS1	0.00													0.00E+00	2.27E-03	0.00E+00				511.1	0.00E+00	4.44E-06	0.00E+00
Ground Level Equipments (CS, COMP, GEN)	PKDEQ1	1.52													3.95E-04	4.29E-04	1.97E-03				922.8	4.28E-07	4.65E-07	2.14E-06
Trucks	PKDTK1	2.74													1.70E-05	1.87E-05	5.62E-04				511.1	3.33E-08	3.66E-08	1.10E-06
Troweling Machine	PKDTM1	0.00	42.37 (139.29')												1.58E-04	1.63E-04	4.54E-02				922.8	1.71E-07	1.76E-07	4.92E-05
Concrete Truck + Concrete Pump	PKDTP1	2.74													5.69E-06	1.43E-05	4.81E-03				511.1	1.11E-08	2.79E-08	9.41E-06
Package E **#4 Academic building (business school)** **aka Business School Building**																								
CONSTRUCT SUPERSTRUCTURE																								
concrete truck			CT	diesel	450		11	4					1.07E-05	1.42E-06	8.65E-06	9.53E-06	2.87E-04		1.25E-03					
concrete pump			OCE	diesel	400	0.9	11		0.2	0.003	0.008	2.883			3.50E-05	1.02E-04	3.78E-02							
troweling machine			PE	gas	11	0.5	11		2	0.061	0.066	1.638			1.22E-04	1.33E-04	3.28E-03							
trailers of steel			TT	diesel	500		11	3					1.07E-05	1.06E-06	8.40E-06	9.23E-06	2.77E-04		2.38E-04					
MEP																								
plumbing deliveries			MDT	diesel	500			0.08																
sprinkler deliveries			MDT	diesel	500		6	0.06					1.17E-07	1.16E-08	9.16E-08	1.01E-07	3.02E-06		2.60E-06					
HVAC - deliveries			MDT	diesel	500		6	0.23					4.47E-07	4.45E-08	3.51E-07	3.86E-07	1.16E-05		9.95E-06					
electric - deliveries			MDT	diesel	500		6	0.11					2.14E-07	2.13E-08	1.68E-07	1.85E-07	5.53E-06		4.76E-06					
BUILDING ENCLOSURE & ROOFING																								
man-days							7																	
trailers			TT	diesel	500		7	0.5					1.13E-06	1.13E-07	8.91E-07	9.79E-07	2.93E-05		2.52E-05					
INTERIORS / FIT-OUT																								
man-days							4																	
drywall trailers			TT	diesel	500		4	0.01					1.30E-08	1.29E-09	1.02E-08	1.12E-08	3.35E-07		2.88E-07					
additional interiors - box trailer			TT	diesel	500		4	0.06					7.78E-08	7.73E-09	6.11E-08	6.71E-08	2.01E-06		1.73E-06					
FF&E			MDT	diesel	500		4	0.04					5.19E-08	5.15E-09	4.07E-08	4.48E-08	1.34E-06		1.15E-06					
trash hauling - 3 loads per day			RR	diesel	400		11	3					1.78E-05	1.06E-06	1.35E-05	1.48E-05	4.41E-04		1.19E-03					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		11	0.5					1.78E-06	1.77E-07	1.40E-06	1.54E-06	4.61E-05		3.97E-05					
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	5		2	5.134	5.580	0.993			5.09E-04	5.54E-04	9.85E-05							
compressor			LCAC	gas	5	0.4	11		2	0.085	0.093	1.027			6.19E-05	6.73E-05	7.47E-04							
generator			LCGS	gas	10	0.4	11		2	0.070	0.076	1.897			1.01E-04	1.10E-04	2.76E-03							
Fugitive Dust	PKEDS1	0.00													0.00E+00	2.76E-03	0.00E+00				954.6	0.00E+00	2.89E-06	0.00E+00
Ground Level Equipments (CS, COMP, GEN)	PKEEQ1	1.52													6.72E-04	7.31E-04	3.61E-03				2605.1	2.58E-07	2.81E-07	1.38E-06
Trucks	PKETK1	2.74													2.49E-05	2.73E-05	8.17E-04				954.6	2.61E-08	2.86E-08	8.56E-07
Troweling Machine	PKETM1	0.00	30.48 (100')												1.22E-04	1.33E-04	3.28E-03				2605.1	4.69E-08	5.09E-08	1.26E-06
Concrete Truck + Concrete Pump	PKETP1	2.74													4.36E-05	1.11E-04	3.80E-02				453.7	9.61E-08	2.45E-07	8.39E-05

Phase 1, 2011 Annual Emissions	Source Parameters							Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Annual Average Engine Emissions (g/s)			Annual Fugitive Dust (g/s)				Total Annual Emission Rate (Area: g/s-m2; Point: g/s)		
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Months On-Site	Trucks per day	Nonroad Engines	PM2.5	PM10	NOx	Idle	Running	PM2.5	PM10	NOx	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers	Annual Source Area (m2)	PM2.5	PM10	NOx
Package T **#1 Academic building w/cellar** **aka Conference Center**																								
SITE DEMOLITION																								
20 yd dump trucks			DT	diesel	400		5	10					2.70E-05	1.45E-06	2.03E-05	2.23E-05	6.64E-04		2.61E-03					
excavator			E	diesel	200	0.75	5		1	0.009	0.009	1.775			1.07E-04	1.10E-04	2.20E-02	9.26E-05		2.95E-04				
EXCAVATION & FOUNDATIONS																								
20 yd dump trucks			DT	diesel	400		6	18					5.83E-05	3.13E-06	4.39E-05	4.81E-05	1.43E-03		5.64E-03					
excavator			E	diesel	200	0.75	6		1	0.009	0.009	1.775			1.28E-04	1.32E-04	2.64E-02	2.00E-04		6.36E-04				
drilling rig			BDR	diesel	250	0.75	6		1	0.004	0.004	2.391			6.98E-05	7.20E-05	4.45E-02							
compressors			LCAC	diesel	250	0.9	6		1	0.004	0.004	1.736			8.83E-05	9.10E-05	3.88E-02							
CONSTRUCT SUPERSTRUCTURE																								
concrete truck			CT	diesel	450		3	2					1.46E-06	1.74E-07	1.17E-06	1.28E-06	3.86E-05		1.54E-04					
concrete pump			OCE	diesel	400	0.416667	3		0.2	0.003	0.008	2.883			4.41E-06	1.28E-05	4.77E-03							
trailers of steel			TT	diesel	500		3	1					9.72E-07	8.70E-08	7.57E-07	8.31E-07	2.49E-05		1.95E-05					
troweling machine			PE	gas	11	0.5	3		2	0.061	0.066	1.638			3.33E-05	3.62E-05	8.94E-04							
trash hauling - 3 loads per day			RR	diesel	400		12	3					1.94E-05	1.04E-06	1.46E-05	1.60E-05	4.78E-04		1.16E-03					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		12	0.5					1.94E-06	1.74E-07	1.51E-06	1.66E-06	4.98E-05		3.89E-05					
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	5		2	5.134	5.580	0.993			5.09E-04	5.54E-04	9.85E-05							
compressor			LCAC	gas	5	0.4	12		2	0.085	0.093	1.027			6.75E-05	7.34E-05	8.15E-04							
generator			LCGS	gas	10	0.4	12		2	0.070	0.076	1.897			1.10E-04	1.20E-04	3.01E-03							
Demolition Equipments	PKTDM1	2.74													7.25E-04	7.83E-04	2.47E-02				1526.9	4.75E-07	5.13E-07	1.62E-05
Truck Fugitive Dust	PKTDS1	0.00													0.00E+00	1.38E-03	0.00E+00				159.6	0.00E+00	8.62E-06	0.00E+00
Site Fugitive Dust	PKTDS2	0.00													2.93E-04	9.19E-03	0.00E+00				1526.9	1.92E-07	6.02E-06	0.00E+00
Excavation	PKTEC1	0.00													4.19E-04	4.40E-04	1.13E-01				1526.9	2.74E-07	2.88E-07	7.40E-05
Ground Level Equipments (CS, COMP, GEN)	PKTEQ1	1.52													0.00E+00	0.00E+00	0.00E+00				1526.9	0.00E+00	0.00E+00	0.00E+00
Trucks	PKTTK1	2.74													1.69E-05	1.85E-05	5.53E-04				159.6	1.06E-07	1.16E-07	3.46E-06
Troweling Machine	PKTTM1	0.00													3.33E-05	3.62E-05	8.94E-04				1526.9	2.18E-08	2.37E-08	5.85E-07
Concrete Truck + Concrete Pump	PKTTP1	2.74													5.58E-06	1.41E-05	4.81E-03				75.3	7.41E-08	1.88E-07	6.38E-05
Package B **Below grade space + F** **aka Phase I Factory**																								
EXCAVATE WITHIN SLURRY WALL																								
20 yd dump trucks			DT	diesel	400		12	123					7.97E-04	1.43E-04	6.71E-04	7.42E-04	2.24E-02		2.57E-01					
excavator			E	diesel	200	0.75	12		3	0.009	0.009	2.339			7.69E-04	7.92E-04	2.09E-01	2.73E-03		8.70E-03				
drilling rig (not really needed - no rock)			BDR	diesel	250	0.75			0	0.004	0.004	2.801												
compressors			LCAC	diesel	250	0.9	12		3	0.004	0.004	2.143			5.30E-04	5.46E-04	2.87E-01							
CONSTRUCT BELOW GRADE SUPERSTRUCTURE																								
concrete truck			CT	diesel	450		12	18					5.25E-05	2.09E-05	5.24E-05	5.87E-05	1.80E-03		3.51E-02					
concrete pump			OCE	diesel	400	0.9	12		0.4	0.003	0.008	3.398			7.63E-05	2.22E-04	9.71E-02							
trailers of steel			TT	diesel	500		12	3					1.17E-05	3.48E-06	1.08E-05	1.21E-05	3.68E-04		3.87E-03					
crawler crane			C	diesel	450	0.9	12		1	0.004	0.004	2.402			3.16E-04	3.26E-04	1.93E-01							
troweling machine			PE	gas	11	0.5	12		2	0.062	0.067	1.669			1.35E-04	1.47E-04	3.64E-03							
MEP																								
plumbing deliveries			MDT	diesel	500		12	0.13					5.06E-07	1.51E-07	4.69E-07	5.22E-07	1.59E-05		1.68E-04					
sprinkler deliveries			MDT	diesel	500		12	0.09					3.50E-07	1.04E-07	3.25E-07	3.62E-07	1.10E-05		1.16E-04					
HVAC - deliveries			MDT	diesel	500		12	0.38					1.48E-06	4.41E-07	1.37E-06	1.53E-06	4.66E-05		4.91E-04					
electric - deliveries			MDT	diesel	500		12	0.25					9.72E-07	2.90E-07	9.02E-07	1.00E-06	3.06E-05		3.23E-04					
							12																	
BELOW GRADE INTERIORS / FIT-OUT																								
drywall trailers			TT	diesel	500		12	0.02					7.78E-08	2.32E-08	7.21E-08	8.03E-08	2.45E-06		2.58E-05					
additional interiors - box trailer			TT	diesel	500		12	0.1					3.89E-07	1.16E-07	3.61E-07	4.02E-07	1.23E-05		1.29E-04					
FF&E deliveries			MDT	diesel	500		12	0.02					7.78E-08	2.32E-08	7.21E-08	8.03E-08	2.45E-06		2.58E-05					
trash hauling - 3 loads per day			RR	diesel	400		12	1					6.48E-06	1.16E-06	5.46E-06	6.03E-06	1.82E-04		2.09E-03					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		9	0.5					1.46E-06	4.35E-07	1.35E-06	1.51E-06	4.59E-05		4.84E-04					
Misc Equipments	PKBPKF	0.00													5.30E-03	3.11E-01	8.15E-01				6696.9	7.92E-07	4.65E-05	1.22E-04

Projected Redevelopment Site 25, Short-Term Emissions	Source Parameters						Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Short Term Engine Emissions (g/s)				Short Term Fugitive Dust (g/s)			Short-Term Source Area (m2)	Total Short-Term Emission Rate (Area: g/s-m2; Point: g/s)			
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Trucks per day	Nonroad Engines	PM2.5	PM10	CO	Idle	Running	PM2.5	PM10	CO 1-Hr	CO 8-Hr	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers		PM2.5	PM10	CO 1-Hr	CO 8-HR
Site 25																									
EXCAVATION & FOUNDATIONS																									
20 yd dump trucks			DT	diesel	400		10					6.48E-05	1.29E-06	6.61E-05	7.21E-05	4.75E-03	2.38E-03		2.01E-03						
backhoe			TLB	diesel	200	0.75		1	0.005	0.005	0.860			2.05E-04	2.12E-04	4.78E-02	3.58E-02	6.22E-04		1.98E-03					
compressors			LCAC	diesel	250	0.9		1	0.004	0.004	0.477			2.47E-04	2.55E-04	3.31E-02	2.98E-02								
trash hauling			RR	diesel	400		1					6.48E-06	1.29E-07	6.61E-06	7.21E-06	4.75E-04	2.38E-04		2.01E-04						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1					3.89E-06	1.29E-07	4.02E-06	4.39E-06	2.90E-04	1.45E-04		4.04E-05						
miscellaneous equipment																									
chain saw			CS	gas	3	0.2		1	5.134	5.580	213.445			8.56E-04	9.30E-04	1.78E-01	3.56E-02								
compressor			LCAC	gas	5	0.4		1	0.092	0.099	404.270			5.08E-05	5.53E-05	5.61E-01	2.25E-01								
generator			LCGS	gas	10	0.4		1	0.072	0.078	476.944			7.98E-05	8.68E-05	1.32E+00	5.30E-01								
Backhoe	WC25AR1	2.74												2.05E-04							1,338.9	1.53E-07			
Trucks - Trailers, Deliveries etc	WC25AR2	2.74												7.67E-05							142.8	5.37E-07			
On-site Dust	WC25AR3	0												6.22E-04							1,330.3	4.68E-07			
Chain Saw	WC25AR4	1.52												8.56E-04							1,334.7	6.41E-07			
Compressor 1	WCCOMP1	1.52												2.47E-04								2.47E-04			
Compressor 2	WCCOMP2	1.52												5.08E-05								5.08E-05			
Generator	WCGEN1	1.52												7.98E-05								7.98E-05			

Projected Redevelopment Site 25, Annual Emissions	Source Parameters							Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Annual Average Engine Emissions (g/s)			Annual Fugitive Dust (g/s)				Total Annual Emission Rate (Area: g/s-m2; Point: g/s)		
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Months On-Site	Trucks per day	Nonroad Engines	PM2.5	PM10	NOx	Idle	Running	PM2.5	PM10	NOx	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers	Annual Source Area (m2)	PM2.5	PM10	NOx
Site 25																								
SITE DEMOLITION							1																	
20 yd dump trucks			DT	diesel	400		2	10					1.08E-05	2.15E-07	7.87E-06	8.59E-06	2.55E-04		5.03E-04					
excavator			E	diesel	200	0.75	2		1	0.009	0.009	2.339			4.27E-05	4.40E-05	1.16E-02	7.41E-05		2.36E-04				
EXCAVATION & FOUNDATIONS							1																	
20 yd dump trucks			DT	diesel	400		3	10					1.62E-05	3.22E-07	1.18E-05	1.29E-05	3.83E-04		3.59E-04					
backhoe			TLB	diesel	200	0.75	3		1	0.005	0.005	1.390			3.67E-05	3.78E-05	1.03E-02	1.11E-04		3.54E-04				
compressors			LCAC	diesel	250	0.9	3		1	0.004	0.004	2.143			4.42E-05	4.55E-05	2.39E-02							
CONSTRUCT SUPERSTRUCTURE							1																	
concrete truck			CT	diesel	450		7	4					6.81E-06	3.01E-07	5.08E-06	5.55E-06	1.65E-04		2.66E-04					
concrete pump			OCE	diesel	400	0.9	7		0.2	0.003	0.008	3.398			1.85E-05	5.40E-05	2.36E-02							
trailers of steel			TT	diesel	500		7	1					2.27E-06	7.52E-08	1.67E-06	1.83E-06	5.44E-05		1.68E-05					
rebar bender			OCE	diesel	200	0.5	7		1	0.008	0.008	2.844			9.18E-05	9.46E-05	3.29E-02							
troweling machine			PE	gas	11	0.5	7		1	0.062	0.067	1.669			3.94E-05	4.28E-05	1.06E-03							
MEP																								
man-days							2																	
plumbing deliveries			MDT	diesel	500		2	0.01					6.48E-09	2.15E-10	4.78E-09	5.23E-09	1.56E-07		4.81E-08					
sprinkler deliveries			MDT	diesel	500		2	0.01					6.48E-09	2.15E-10	4.78E-09	5.23E-09	1.56E-07		4.81E-08					
HVAC - deliveries			MDT	diesel	500		2	0.01					6.48E-09	2.15E-10	4.78E-09	5.23E-09	1.56E-07		4.81E-08					
electric - deliveries			MDT	diesel	500		2	0.01					6.48E-09	2.15E-10	4.78E-09	5.23E-09	1.56E-07		4.81E-08					
NG forklift			NGFL	gas	250	0.5	2		1	0.017	0.017	0.291			7.15E-05	7.15E-05	1.20E-03							
BUILDING ENCLOSURE & ROOFING																								
trailers			TT	diesel	500		3	0.5					4.86E-07	1.61E-08	3.59E-07	3.92E-07	1.17E-05		3.61E-06					
trash hauling			RR	diesel	400		12	0.5					3.24E-06	6.44E-08	2.36E-06	2.58E-06	7.65E-05		1.51E-04					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		12	0.1					3.89E-07	1.29E-08	2.87E-07	3.14E-07	9.33E-06		1.86E-05					
rubber tire crane			C	diesel	300	0.25	6		1	0.004	0.004	2.015			3.02E-05	3.11E-05	1.50E-02							
miscellaneous equipment																								
chain saw			CS	gas	3	0.2	2		1	5.134	5.580	0.993			1.02E-04	1.11E-04	1.97E-05							
compressor			LCAC	gas	5	0.4	12		1	0.092	0.099	1.098			3.63E-05	3.95E-05	4.36E-04							
generator			LCGS	gas	10	0.4	6		1	0.072	0.078	1.986			2.85E-05	3.10E-05	7.88E-04							
Ground Level Equipments (RB, CS, COMP, GEN)	WC25AR1	0.00													1.99E-04						1338.9	1.48E-07		
Troweling Machine	WC25AR2	0.00													3.94E-05						1334.8	2.95E-08		
Rubber Tire Crane	WC25AR3	3.66													3.02E-05						1330.3	2.27E-08		
Trucks + Forklifts	WC25AR4	2.74													7.55E-05						139.1	5.43E-07		
Concrete Truck	WC25AR5	2.74													5.08E-06						136.9	3.71E-08		
Concrete Pump	WC25AR6	2.74													1.85E-05						139	1.33E-07		
Excavation Equipments (BH, EX, COMP etc)	WC25AR7	0.00													1.68E-04						1334.8	1.26E-07		
Demolition Equipments (Dump Truck + Excavator)	WC25AR8	2.74													5.06E-05						1330.9	3.80E-08		
Onsite Fugitive Dust	WC25AR9	0.00													1.85E-04						1332.1	1.39E-07		

Phase 2 Short-Term Emissions	Source Parameters						Quantity		NONROAD Emission Factor (g/hp-hr)			Nonroad CO Emissions (g/hp-hr)	Truck Engine Emission Rate (g/s)		Short Term Engine Emissions (g/s)				Short Term Fugitive Dust (g/s)			Short-Term Source Area (m2)	Total Short-Term Emission Rate (Area: g/s-m2; Point: g/s)			
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Trucks per day	Nonroad Engines	PM2.5	PM10	CO		Idle	Running	PM2.5	PM10	CO 1-Hr	CO 8-Hr	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers		PM2.5	PM10	CO 1-Hr	CO 8-HR
Package N **Below grade space @ West 132nd Street**																										
EXCAVATE WITHIN SLURRY WALL																										
20 yd dump trucks			DT	diesel	400		27.5						1.78E-04	2.83E-05	2.07E-04	2.28E-04	7.62E-03	7.62E-03		7.15E-02						
excavator			E	diesel	200	0.75		1	0.007	0.007	0.071	0.071			2.82E-04	2.91E-04	3.94E-03	2.95E-03	1.91E-03		6.07E-03					
drilling rig			BDR	diesel	250	0.75		1	0.007	0.011	0.189	0.189			3.55E-04	5.49E-04	1.31E-02	9.84E-03								
compressors			LCAC	diesel	250	0.9		1	0.008	0.010	0.057	0.057			4.70E-04	6.43E-04	3.96E-03	3.56E-03								
CONSTRUCT BELOW GRADE SUPERSTRUCTURE																										
structure																										
concrete truck			CT	diesel	450		39.5						1.15E-04	4.07E-05	1.56E-04	1.74E-04	5.91E-03	5.91E-03		5.04E-02						
concrete pump			OCE	diesel	400	0.9		1	0.010	0.015	0.332	0.332			9.78E-04	1.51E-03	3.69E-02	3.32E-02								
trailers of steel			TT	diesel	500		2.25						8.75E-06	2.32E-06	1.11E-05	1.23E-05	4.15E-04	4.15E-04		7.27E-04						
rebar bender			OCE	diesel	200	0.5		1	0.014	0.018	0.120	0.120			3.91E-04	4.92E-04	6.64E-03	3.32E-03								
troweling machine			PE	diesel	200	0.5		2	0.014	0.017	0.116	0.116			7.86E-04	9.34E-04	1.29E-02	6.44E-03								
crawler crane			C	diesel	450	0.9		1	0.005	0.008	0.107	0.107			5.93E-04	9.17E-04	1.33E-02	1.20E-02								
piles:																										
concrete truck			CT	diesel	450		6						1.75E-05	6.18E-06	2.37E-05	2.65E-05	8.97E-04	8.97E-04		7.66E-03						
concrete pump			OCE	diesel	400	0.25		1	0.010	0.015	0.332	0.332			2.72E-04	4.20E-04	3.69E-02	9.23E-03								
trailers of steel			TT	diesel	500		1						3.89E-06	1.03E-06	4.92E-06	5.47E-06	1.84E-04	1.84E-04		3.23E-04						
rebar bender			OCE	diesel	200	0.5		1	0.014	0.018	0.120	0.120			3.91E-04	4.92E-04	6.64E-03	3.32E-03								
pile driving rig			C	diesel	450	0.9		1	0.005	0.008	0.107	0.107			5.93E-04	9.17E-04	1.33E-02	1.20E-02								
trash hauling - 3 loads per day			RR	diesel	400		1						6.48E-06	1.03E-06	7.51E-06	8.29E-06	2.77E-04	2.77E-04		2.60E-03						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1						3.89E-06	1.03E-06	4.92E-06	5.47E-06	1.84E-04	1.84E-04		1.61E-03						
rubber tire crane			C	diesel	350	0.5		1	0.005	0.008	0.107	0.107			2.56E-04	3.96E-04	1.04E-02	5.18E-03								
miscellaneous equipment																										
chain saw			CS	gas	3	0.2		4	6.278	6.824	244.210	244.210			4.19E-03	4.55E-03	8.14E-01	1.63E-01								
compressor			LCAC	gas	5	0.4		2	0.085	0.093	403.381	403.381			9.46E-05	1.03E-04	1.12E+00	4.48E-01								
generator			LCGS	gas	10	0.4		4	0.069	0.075	482.704	482.704			3.08E-04	3.35E-04	5.36E+00	2.15E+00								
***Excavation for Package N is lumped together with Package O**																										
Construction Below Super Structure	NArea1	0.00													5.18E-03	6.44E-03	3.71E+00	1.42E+00				3,947.4	1.31E-06	1.63E-06	9.39E-04	3.59E-04
Trucks For Below Grade Superstructure	NArea2	2.74													2.22E-05	2.47E-05	8.30E-04	8.30E-04				431.4	5.15E-08	5.72E-08	1.92E-06	1.92E-06
Trucks For Below Grade Fugitive Dust	NArea3	0.00													0.00E+00	5.26E-03	0.00E+00	0.00E+00				431.4	0.00E+00	1.22E-05	0.00E+00	0.00E+00
Concrete Truck Fugitive Dust	NArea4	0.00													0.00E+00	5.81E-02	0.00E+00	0.00E+00				180.6	0.00E+00	3.22E-04	0.00E+00	0.00E+00
Concrete Truck 1	NPoint1	2.74													8.98E-05	1.00E-04	3.40E-03	3.40E-03					8.98E-05	1.00E-04	3.40E-03	3.40E-03
Concrete Truck 2	NPoint2	2.74													8.98E-05	1.00E-04	3.40E-03	3.40E-03					8.98E-05	1.00E-04	3.40E-03	3.40E-03
Concrete Pump	NPoint3	2.74													6.25E-04	9.66E-04	3.69E-02	2.12E-02					6.25E-04	9.66E-04	3.69E-02	2.12E-02
Concrete Pump	NPoint4	2.74													6.25E-04	9.66E-04	3.69E-02	2.12E-02					6.25E-04	9.66E-04	3.69E-02	2.12E-02
Package O **Below grade space** **aka Phase IV Factory**																										
INSTALL 70' SLURRY WALL @ PERIMETER																										
20 yd dump trucks			DT	diesel	400		19						1.23E-04	1.96E-05	1.43E-04	1.58E-04	5.27E-03	5.27E-03		3.06E-02						
concrete truck			CT	diesel	450		6						1.75E-05	6.18E-06	2.37E-05	2.65E-05	8.97E-04	8.97E-04		7.66E-03						
trailers of steel - rebar			TT	diesel	500		5						1.94E-05	5.15E-06	2.46E-05	2.73E-05	9.22E-04	9.22E-04		1.61E-03						
rebar bender			OCE	diesel	200	0.5		1	0.014	0.018	0.120	0.120			3.91E-04	4.92E-04	6.64E-03	3.32E-03								
skylift forklift			FL	gas	200	0.4		2	0.021	0.022	4.822	4.822			9.20E-04	1.00E-03	5.36E-01	2.14E-01								
375 HP air compresser			LCAC	diesel	375	0.5		2	0.005	0.008	0.157	0.157			5.26E-04	8.14E-04	3.27E-02	1.63E-02								
40 ton hydraulic crane (handling rebar cages)			C	diesel	450	0.5		1	0.005	0.008	0.107	0.107			3.29E-04	5.10E-04	1.33E-02	6.66E-03								
bull dozer			CTD	diesel	400	0.25		1	0.011	0.016	0.135	0.135			2.95E-04	4.49E-04	1.50E-02	3.76E-03	1.32E-03		4.19E-03					
slurry supply system			OCE	diesel	400	0.5		1	0.010	0.015	0.332	0.332			5.43E-04	8.40E-04	3.69E-02	1.85E-02								
crawler crane			C	diesel	450	0.9		1	0.005	0.008	0.107	0.107			5.93E-04	9.17E-04	1.33E-02	1.20E-02								
EXCAVATE WITHIN SLURRY WALL																										
man-days																										
20 yd dump trucks			DT	diesel	400		100						6.48E-04	1.03E-04	7.51E-04	8.29E-04	2.77E-02	2.77E-02		2.60E-01						
excavator			E	diesel	200	0.75		1	0.007	0.007	0.071	0.071			2.82E-04	2.91E-04	3.94E-03	2.95E-03	6.93E-03		2.21E-02					
drilling rig			BDR	diesel	250	0.75		1	0.007	0.011	0.189	0.189			3.55E-04	5.49E-04	1.31E-02	9.84E-03								
compressors			LCAC	diesel	250	0.9		1	0.008	0.010	0.057	0.057			4.70E-04	6.43E-04	3.96E-03	3.56E-03								
trash hauling - 3 loads per day			RR	diesel	400		1						6.48E-06	1.03E-06	7.51E-06	8.29E-06	2.77E-04	2.77E-04		2.60E-03						
fuel trucks - 1 every 2 weeks on average			FT	gas	400		1						3.89E-06	1.03E-06	4.92E-06	5.47E-06	1.84E-04	1.84E-04		1.61E-03						
rubber tire crane			C	diesel	350	0.5		2	0.005	0.008	0.107	0.107			5.13E-04	7.93E-04	2.07E-02	1.04E-02								
miscellaneous equipment																										
chain saw			CS	gas	3	0.2		4	6.278	6.824	244.210	244.210			4.19E-03	4.55E-03	8.14E-01	1.63E-01								
compressor			LCAC	gas	5	0.4		2	0.085	0.093	403.381	403.381			9.46E-05	1.03E-04	1.12E+00	4.48E-01								
generator			LCGS	gas	10	0.4		4	0.069	0.075	482.704	482.704			3.08E-04	3.35E-04	5.36E+00	2.15E+00								
Slurry Wall Equipment	OArea1	0.00													3.48E-03	3.91E-03	9.64E-01	3.06E-01				1,857.1	1.87E-06	2.11E-06	5.19E-04	1.65E-04
Slurry Wall Fugitive Dust	OArea2	0.00													1.32E-03	4.61E-02	0.00E+00	0.00E+00				1,857.1	0.00E+00	2.48E-05	0.00E+00	0.00E+00
Excavation Equipment Including N	OArea3	0.00													8.16E-03	9.62E-03	7.39E+00	2.83E+00				7,135.8	1.14E-06	1.35E-06	1.04E-03	3.97E-04
Excavation Fugitive Dust Including N	OArea4	0.00													8.84E-03	3.64E-01	0.00E+00	0.00E+00				7,135.8	1.24E-06	5.10E-05	0.00E+00	0.00E+00
Concrete Truck	OPOINT1	2.74													2.37E-05	2.65E-05	8.97E-04	8.97E-04					2.37E-05	2.65E-05	8.97E-04	8.97E-04
Rebar Bender	OPOINT2	1.52													3.91E-04	4.92E-04	6.64E-03	3.32E-03					3.91E-04	4.92E-04	6.64E-03	3.32E-03
375 HP Air Compressor 1	OPOINT3	1.52													2.63E-04	4.07E-04	1.63E-02	8.17E-03					2.63E-04	4.07E-04	1.63E-02	8.17E-03
375 HP Air Compressor 2	OPOINT4	1.52													2.63E-04	4.07E-04	1.63E-02	8.17E-03					2.63E-04	4.07E-04	1.63E-02	8.17E-03
Hydraulic Crane	OPOINT5	3.66													3.29E-04	5.10E-04	1.33E-02	6.66E-03					3.29E-04	5.10E-04	1.33E-02	6.66E-03
Slurry Supply System	OPOINT6	1.52													5.43E-04	8.40E-04	3.69E-02	1.85E-02					5.43E-04	8.40E-04	3.69E-02	1.85E-02
Crawler Crane	OPOINT7	3.66													5.93E-04	9.17E-04	1.33E-02	1.20E-02					5.93E-04	9.17E-04	1.33E-02	1.20E-02
Compressor	OPOINT8	1.52													4.73E-05	5.14E-05	5.60E-01	2.24E-01					4.73E-05	5.14E-05	5.60E-01	2.24E-01
Rubber Tire Crane	OPOINT9	3.66													2.56E-04	3.96E-04	1.04E-02	5.18E-03					2.56E-04	3.96E-04	1.04E-02	5.18E-03
Generator 1	XPOINT1	1.52													7.71E-05	8.38E-05	1.34E+00	5.36E-01					7.71E-05	8.38E-05	1.34E+00	5.36E-01
Generator 2	XPOINT2	1.52													7.71E-05	8.38E-05	1.34E+00	5.36E-01					7.71E-05	8.38E-05	1.34E+00	5.36E-01

Phase 2 Annual Emissions	Source Parameters							Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Annual Average Engine Emissions (g/s)			Annual Fugitive Dust (g/s)				Total Annual Emission Rate (Area: g/s-m2; Point: g/s)		
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Months On-Site	Trucks per day	Nonroad Engines	PM2.5	PM10	NOx	Idle	Running	PM2.5	PM10	NOx	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers	Annual Source Area (m2)	PM2.5	PM10	NOx
Package N **Below grade space @ West 132nd Street**																								
INSTALL 70' SLURRY WALL @ PERIMETER																								
20 yd dump trucks			DT	diesel	400		6	1.6					5.19E-06	8.24E-07	4.29E-06	4.74E-06	1.58E-04		9.19E-04					
concrete truck			CT	diesel	450		6	6					1.31E-05	3.09E-06	1.16E-05	1.29E-05	4.32E-04		2.74E-03					
trailers of steel - rebar			TT	diesel	500		6	0.9					1.75E-06	4.64E-07	1.58E-06	1.76E-06	5.93E-05		1.04E-04					
rebar bender			OCE	diesel	200	0.5	6		1	0.014	0.018	0.359			1.40E-04	1.76E-04	3.56E-03							
skylift forklift			FL	gas	200	0.4	6		2	0.021	0.022	0.237			3.29E-04	3.57E-04	3.76E-03							
375 HP air compresser			LCAC	diesel	375	0.5	6		2	0.005	0.008	0.567			1.88E-04	2.91E-04	2.11E-02							
40 ton hydraulic crane (handling rebar cages)			C	diesel	450	0.5	6		1	0.005	0.008	0.411			1.18E-04	1.82E-04	9.17E-03							
bull dozer			CTD	diesel	400	0.25	6		1	0.011	0.016	0.333			1.06E-04	1.60E-04	3.30E-03	3.96E-05		1.26E-04				
slurry supply system			OCE	diesel	400	0.5	6		1	0.010	0.015	0.769			1.94E-04	3.00E-04	1.53E-02							
crawler crane			C	diesel	450	0.9	6		1	0.005	0.008	0.411			2.12E-04	3.28E-04	1.65E-02							
EXCAVATE WITHIN SLURRY WALL																								
20 yd dump trucks			DT	diesel	400		5	27.5					7.43E-05	1.18E-05	6.15E-05	6.79E-05	2.27E-03		2.13E-02					
excavator			E	diesel	200	0.75	5		1	0.007	0.007	0.175			8.40E-05	8.66E-05	2.17E-03	5.67E-04		1.81E-03				
drilling rig			BDR	diesel	250	0.75	5		1	0.007	0.011	0.784			1.06E-04	1.63E-04	1.21E-02							
compressors			LCAC	diesel	250	0.9	5		1	0.008	0.010	0.267			1.40E-04	1.91E-04	4.96E-03							
CONSTRUCT BELOW GRADE SUPERSTRUCTURE																								
structure																								
concrete truck			CT	diesel	450		4	7.9					1.15E-05	2.71E-06	1.02E-05	1.13E-05	3.79E-04		2.40E-03					
concrete pump			OCE	diesel	400	0.9	4		0.2	0.010	0.015	0.769			4.66E-05	7.20E-05	3.66E-03							
trailers of steel			TT	diesel	500		4	0.9					1.17E-06	3.09E-07	1.05E-06	1.17E-06	3.95E-05		6.92E-05					
rebar bender			OCE	diesel	200	0.5	4		1	0.014	0.018	0.359			9.31E-05	1.17E-04	2.37E-03							
troweling machine			PE	diesel	200	0.5	4		2	0.014	0.017	0.337			1.87E-04	2.22E-04	4.46E-03							
crawler crane			C	diesel	450	0.9	4		1	0.005	0.008	0.411			1.41E-04	2.18E-04	1.10E-02							
piles:																								
concrete truck			CT	diesel	450		4	1.2					1.75E-06	4.12E-07	1.54E-06	1.71E-06	5.76E-05		3.65E-04					
concrete pump			OCE	diesel	400	0.25	4		0.2	0.010	0.015	0.769			1.29E-05	2.00E-05	1.02E-03							
trailers of steel			TT	diesel	500		4	0.4					5.19E-07	1.37E-07	4.69E-07	5.21E-07	1.76E-05		3.08E-05					
rebar bender			OCE	diesel	200	0.5	4		1	0.014	0.018	0.359			9.31E-05	1.17E-04	2.37E-03							
pile driving rig			C	diesel	450	0.9	4		1	0.005	0.008	0.411			1.41E-04	2.18E-04	1.10E-02							
MEP																								
man-days							2																	
plumbing			MDT	diesel	500		2	0.08					5.19E-08	1.37E-08	4.69E-08	5.21E-08	1.76E-06		3.08E-06					
sprinkler			MDT	diesel	500		2	0.08					5.19E-08	1.37E-08	4.69E-08	5.21E-08	1.76E-06		3.08E-06					
HVAC			MDT	diesel	500		2	0.09					5.83E-08	1.55E-08	5.27E-08	5.86E-08	1.98E-06		3.46E-06					
electric			MDT	diesel	500		2	0.09					5.83E-08	1.55E-08	5.27E-08	5.86E-08	1.98E-06		3.46E-06					
NG Forklift			NGFL	gas	250	0.5	2		1	0.017	0.017	0.291			7.15E-05	7.15E-05	1.20E-03							
BELOW GRADE INTERIORS / FIT-OUT																								
man-days							1																	
drywall trailers			TT	diesel	500		1	0.02					6.48E-09	1.72E-09	5.86E-09	6.51E-09	2.19E-07		3.84E-07					
additional interiors - box trailer			TT	diesel	500		1	0.09					2.92E-08	7.73E-09	2.64E-08	2.93E-08	9.88E-07		1.73E-06					
FF&E			MDT	diesel	500		1	0.03					9.72E-09	2.58E-09	8.78E-09	9.77E-09	3.29E-07		5.77E-07					
NG Forklift			NGFL	gas	250	0.5	1		1	0.017	0.017	0.291			3.58E-05	3.58E-05	6.01E-04							
trash hauling - 3 loads per day			RR	diesel	400		12	4					2.59E-05	4.12E-06	2.15E-05	2.37E-05	7.92E-04		4.60E-03					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		12	0.5					1.94E-06	5.15E-07	1.76E-06	1.95E-06	6.58E-05		1.15E-04					
rubber tire crane			C	diesel	350	0.5	12		1	0.005	0.008	0.411			1.83E-04	2.83E-04	1.43E-02							
miscellaneous equipment																								
compressor			LCAC	gas	5	0.4	11		2	0.085	0.093	1.027			6.19E-05	6.73E-05	7.47E-04							
generator			LCGS	gas	10	0.4	11		4	0.069	0.075	1.886			2.02E-04	2.20E-04	5.49E-03							

Phase 2 Annual Emissions	Source Parameters							Quantity		NONROAD Emission Factor (g/hp-hr)			Truck Engine Emission Rate (g/s)		Annual Average Engine Emissions (g/s)			Annual Fugitive Dust (g/s)				Total Annual Emission Rate (Area: g/s-m2; Point: g/s)		
	Source Name	Release Height (m)	Abbreviation	Engine	Power Output (hp)	Usage Factor (%)	Months On-Site	Trucks per day	Nonroad Engines	PM2.5	PM10	NOx	Idle	Running	PM2.5	PM10	NOx	PM2.5 from Transfers	PM10 from Resuspended Road Dust	PM10 from Transfers	Annual Source Area (m2)	PM2.5	PM10	NOx
Package O																								
Below grade space																								
aka Phase IV Factory																								
REMOVAL/RELOCATION OF EXISTING UTILITIES																								
20 yd dump trucks			DT	diesel	400		1	65					3.51E-05	5.58E-06	2.91E-05	3.21E-05	1.07E-03	2.68E-04	6.22E-03	8.53E-04				
excavator			E	diesel	200	0.75	1		1	0.007	0.007	0.175			1.68E-05	1.73E-05	4.34E-04							
trailers - delivery of pipe			TT	diesel	500		1	1					3.24E-07	8.59E-08	2.93E-07	3.26E-07	1.10E-05		1.92E-05					
excavator - setting of pipe			E	diesel	200	0.5	1		1	0.007	0.007	0.175			1.12E-05	1.15E-05	2.89E-04							
tamper			PC	diesel	25	0.75	1		1	0.145	0.150	1.920			4.50E-05	4.64E-05	5.95E-04							
20 yd dump trucks - supply of gravel & fill			DT	diesel	400		1	32					1.73E-05	2.75E-06	1.43E-05	1.58E-05	5.28E-04	1.32E-04	3.06E-03	4.20E-04				
site utilities trucks			SUT	diesel	400		1	0.24					7.78E-08	2.06E-08	7.03E-08	7.81E-08	2.63E-06		4.61E-06					
electric trucks			SUT	diesel	400		1	0.12					3.89E-08	1.03E-08	3.51E-08	3.91E-08	1.32E-06		2.31E-06					
INSTALL 70' SLURRY WALL @ PERIMETER																								
20 yd dump trucks			DT	diesel	400		10	1.9					1.03E-05	1.63E-06	8.50E-06	9.38E-06	3.13E-04		1.82E-03					
concrete truck			CT	diesel	450		10	6					2.19E-05	5.15E-06	1.93E-05	2.14E-05	7.21E-04		4.56E-03					
trailers of steel - rebar			TT	diesel	500		10	1					3.24E-06	8.59E-07	2.93E-06	3.26E-06	1.10E-04		1.92E-04					
rebar bender			OCE	diesel	200	0.5	10		1	0.014	0.018	0.359			2.33E-04	2.93E-04	5.93E-03							
skylift forklift			FL	gas	200	0.4	10		2	0.021	0.022	0.237			5.48E-04	5.95E-04	6.27E-03							
375 HP air compresser			LCAC	diesel	375	0.5	10		2	0.005	0.008	0.567			3.13E-04	4.85E-04	3.51E-02							
40 ton hydraulic crane (handling rebar cages)			C	diesel	450	0.5	10		1	0.005	0.008	0.411			1.96E-04	3.03E-04	1.53E-02							
bull dozer			CTD	diesel	400	0.25	10		1	0.011	0.016	0.333			1.76E-04	2.67E-04	5.50E-03	7.84E-05		2.49E-04				
slurry supply system			OCE	diesel	400	0.5	10		1	0.010	0.015	0.769			3.23E-04	5.00E-04	2.54E-02							
crawler crane			C	diesel	450	0.9	10		1	0.005	0.008	0.411			3.53E-04	5.46E-04	2.75E-02							
EXCAVATE WITHIN SLURRY WALL																								
20 yd dump trucks			DT	diesel	400		10	100					5.40E-04	8.59E-05	4.47E-04	4.94E-04	1.65E-02		1.55E-01					
excavator			E	diesel	200	0.75	10		1	0.007	0.007	0.175			1.68E-04	1.73E-04	4.34E-03	4.13E-03		1.31E-02				
drilling rig			BDR	diesel	250	0.75	10		1	0.007	0.011	0.784			2.11E-04	3.27E-04	2.43E-02							
compressors			LCAC	diesel	250	0.9	10		1	0.008	0.010	0.267			2.80E-04	3.83E-04	9.93E-03							
CONSTRUCT BELOW GRADE SUPERSTRUCTURE																								
structure																								
concrete truck			CT	diesel	450		3	18.9					2.07E-05	4.87E-06	1.82E-05	2.02E-05	6.81E-04		4.31E-03					
concrete pump			OCE	diesel	400	0.9	3		0.2	0.010	0.015	0.769			3.49E-05	5.40E-05	2.75E-03							
trailers of steel			TT	diesel	500		3	1.6					1.56E-06	4.12E-07	1.41E-06	1.56E-06	5.27E-05		9.23E-05					
rebar bender			OCE	diesel	200	0.5	3		1	0.014	0.018	0.359			6.98E-05	8.78E-05	1.78E-03							
troweling machine			PE	diesel	200	0.5	3		2	0.014	0.017	0.337			1.40E-04	1.67E-04	3.34E-03							
crawler crane			C	diesel	450	0.9	3		1	0.005	0.008	0.411			1.06E-04	1.64E-04	8.25E-03							
piles:																								
concrete truck			CT	diesel	450		3	2.1					2.30E-06	5.41E-07	2.03E-06	2.25E-06	7.57E-05		4.79E-04					
concrete pump			OCE	diesel	400	0.4375	3		0.2	0.010	0.015	0.769			1.70E-05	2.62E-05	1.34E-03							
trailers of steel			TT	diesel	500		3	1.2					1.17E-06	3.09E-07	1.05E-06	1.17E-06	3.95E-05		6.92E-05					
rebar bender			OCE	diesel	200	0.5	3		1	0.014	0.018	0.359			6.98E-05	8.78E-05	1.78E-03							
pile driving rig			C	diesel	450	0.9	3		1	0.005	0.008	0.411			1.06E-04	1.64E-04	8.25E-03							
trash hauling - 3 loads per day			RR	diesel	400		12	4					2.59E-05	4.12E-06	2.15E-05	2.37E-05	7.92E-04		4.60E-03					
fuel trucks - 1 every 2 weeks on average			FT	gas	400		12	0.5					1.94E-06	5.15E-07	1.76E-06	1.95E-06	6.58E-05		1.15E-04					
rubber tire crane			C	diesel	350	0.5	12		2	0.005	0.008	0.411			3.66E-04	5.66E-04	2.85E-02							
miscellaneous equipment																								
compressor			LCAC	gas	5	0.4	12		2	0.085	0.093	1.027			6.75E-05	7.34E-05	8.15E-04							
generator			LCGS	gas	10	0.4	11		4	0.069	0.075	1.886			2.02E-04	2.20E-04	5.49E-03							
Below Grade Equipments	AREA1	0.00													3.14E-03	4.12E-03	1.59E-01				13138.29	2.39E-07	3.14E-07	1.21E-05
Below Grade Equipment Dust	AERA2	0.00													4.69E-03	1.96E-01	0.00E+00				13138.29	3.57E-07	1.49E-05	0.00E+00
Above Grade Equipments	AREA3	1.52													3.46E-03	4.71E-03	1.83E-01				8956.8	3.86E-07	5.25E-07	2.04E-05
Above Grade Equipment Dust	AREA4	0.00													5.18E-04	3.66E-02	0.00E+00				8956.8	5.79E-08	4.09E-06	0.00E+00
Concrete Trucks + Pump	AREA5	2.74													1.43E-04	2.08E-04	9.96E-03				1310.9	1.09E-07	1.58E-07	7.60E-06
Concrete Truck Dust	AREA6	0.00													0.00E+00	7.56E-03	0.00E+00				1310.9	0.00E+00	5.76E-06	0.00E+00
Deilivery Trucks	AREA7	2.74													1.11E-04	1.12E-04	1.96E-03				1310.9	8.50E-08	8.54E-08	1.50E-06
Delivery Trucks Fugitive Dust	AREA8	0.00													0.00E+00	2.77E-04	0.00E+00				1310.9	0.00E+00	2.11E-07	0.00E+00
Relocation of Utility Equipments	AREA9	1.52													1.17E-04	1.24E-04	2.93E-03				2203.1	5.30E-08	5.61E-08	1.33E-06
Relocation Fugitive Dust	AREA10	0.00													4.00E-04	1.06E-02	0.00E+00				2203.1	1.82E-07	4.81E-06	0.00E+00
Slurry Supply System	SLRY1-SLRY5	3.66													1.03E-04	1.60E-04	8.14E-03					1.03E-04	1.60E-04	8.14E-03

Estimated Peak-Hour Emission Rates
Fugitive Dust Sources - PM10
Mobile Equipment Operating on Paved Roads

		Analysis Period	Surface Type	k	sL (g/m2)	W	PM10 Emission Factor g/VMT
Concrete Truck	CT	Short Term	Paved	7.3	12	30	739.81
Dump Truck	DT	Short Term	Paved	7.3	12	35	932.27
Heavy Truck		Short Term	Paved	7.3	12	12	187.16
Concrete Truck	CT	Annualb	Paved	7.3	12	30	528.44
Dump Truck	DT	Annualb	Paved	7.3	12	35	665.91
Heavy Truck		Annualb	Paved	7.3	12	12	133.68

Notes: a. Road dust emissions were not calculated on a per vehicle basis but rather on a fleet-wide basis. Excavators, loaders, and backhoes move about in small incremental steps as the excavation progresses (i.e., minimal distances) and would therefore generate negligible amounts of fugitive dust.
b. Annual emissions were multiplied by 5/7 to account for a five day work week.

Paved Road Emission Factor - Sample Calculation (Short Term): Equation 1 from Section 13.2.1 of USEPA's AP-42

$Ef = k * (sL/2)^{0.65} * (W/3)^{1.5} - C$

where:
Ef = size specific emission factor in pounds per vehicle mile traveled (g/VMT)
k = an empirical constant selected from AP-42 Table 13.2.1-1 for PM10
sL = road surface silt loading in grams per square meter selected from AP-42 Table 13.2.1-3 for conditions with a low average daily traffic (ADT) classification.
W = mean vehicle weight in tons
C = emission factor for 1980's vehicle fleet exhaust, break wear and tire wear

$Ef = 7.3 * (12/2)^{0.65} * (36/3)^{1.5} - 0.00047$
Ef = 740 g/VMT

Sample Emission Rate Calculation (Short Term):
ER = (Ef paved * VMT) / 60 (min/hr) / 60 (s/min) * 0.5
where:
ER = PM10 emission rate in grams per second
Ef paved = paved road emission factor in g/VMT
VMT = vehicle miles traveled
0.5 = 50% control for watering program

ER = (740 * x) * 453.59 (g/lb) / 60 (min/hr) / 60 (s/min) * 0.5

Estimated Peak-Hour Emission Rates
Fugitive Dust Sources - PM10
Mobile Equipment Operating on Unpaved Roads

		Analysis Period	Surface Type	k	s (% silt)	W	PM10 Emission Factor g/VMT
Concrete Truck	CT	Short Term	Unpaved	1.5	8.5	30	1405.95
Dump Truck	DT	Short Term	Unpaved	1.5	8.5	35	1506.94
Heavy Truck		Short Term	Unpaved	1.5	8.5	12	930.89
Concrete Truck	CT	Annualb	Unpaved	1.5	8.5	30	1004.25
Dump Truck	DT	Annualb	Unpaved	1.5	8.5	35	1076.39
Heavy Truck		Annualb	Unpaved	1.5	8.5	12	664.92

Notes: a. Road dust emissions were not calculated on a per vehicle basis but rather on a fleet-wide basis. Excavators, loaders, and backhoes move about in small incremental steps as the excavation progresses (i.e., minimal distances) and would therefore generate negligible amounts of fugitive dust.
b. Annual emissions were multiplied by 5/7 to account for a five day work week.

Unpaved Road Emission Factor - Sample Calculation (Short Term):
$Ef = k * (s/12)^a * (W/3)^b$ Equation 1a from Section 13.2.2 of USEPA's AP-42
where:
Ef = size specific emission factor in pounds per vehicle mile traveled (lb/VMT)
k = an empirical constant selected from AP-42 Table 13.2.2-2 for PM10
s = surface material silt content in percent silt selected from AP-42 Table 13.2.2-1 (for a construction site)
a = an empirical constant selected from AP-42 Table 13.2.2-2 for PM10
W = mean vehicle weight in tons
b = an empirical constant selected from AP-42 Table 13.2.2-2 for PM10

$Ef = 1.5 * (8.5/12)^{0.9} * (30/3)^{0.45}$
Ef = 3.10 lb/VMT

Sample Emission Rate Calculation (Short Term):
ER = (Ef unpaved * VMT) * 453.59 (g/lb) / 60 (min/hr) / 60 (s/min) * 0.5
where:
ER = PM10 emission rate in grams per second
Ef unpaved = unpaved road emission factor in lb/VMT
VMT = vehicle miles traveled
0.5 = 50% control for watering program

ER = (3.10 * x) * 453.59 (g/lb) / 60 (min/hr) / 60 (s/min) *0.5

Estimated Peak-Hour Short-Term Emission Rates
Fugitive Dust Sources - PM10 and PM2.5
Transfer Operations - Excavation

Equipment	Activity		Emission Factor2 lb/ton	Number of Trucks	Volume Removed Hourly cubic yards1	Default Soil Density lbs/cubic yard	Tons Removed Hourly	PM10 Emission Rate lb/hr	PM10 Emission Rate g/s	PM2.5 Emission Rate lb/hr	PM2.5 Emission Rate g/s
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	18	45.0	2,600	59	0.014	1.78E-03	4.4E-03	5.6E-04
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	10	25.0	2,600	33	0.008	9.90E-04	2.5E-03	3.1E-04
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	4.1	10.3	2,600	13	0.003	4.06E-04	1.0E-03	1.3E-04
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	103	257.5	2,600	335	0.081	1.02E-02	2.5E-02	3.2E-03
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	27.5	68.8	2,600	89	0.022	2.72E-03	6.8E-03	8.6E-04
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	19	47.5	2,600	62	0.015	1.88E-03	4.7E-03	5.9E-04
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	100	250.0	2,600	325	0.079	9.90E-03	2.5E-02	3.1E-03
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	1.6	4.0	2,600	5	0.001	1.58E-04	4.0E-04	5.0E-05
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	65	162.5	2,600	211	0.051	6.44E-03	1.6E-02	2.0E-03
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	32	80.0	2,600	104	0.025	3.17E-03	7.9E-03	1.0E-03
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	1.9	4.8	2,600	6	0.001	1.88E-04	4.7E-04	5.9E-05
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	123	307.5	2,600	400	0.097	1.22E-02	3.0E-02	3.8E-03
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	30	75.0	2,600	98	0.024	2.97E-03	7.4E-03	9.3E-04
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	7.4	18.5	2,600	24	0.006	7.33E-04	1.8E-03	2.3E-04
Excavators	Excavates/Transfers to 20 cy Truck		2.42E-04	16	40.0	2,600	52	0.013	1.58E-03	4.0E-03	5.0E-04

Notes: wind spd 12.5

1. A maximum "excavation" transfer is based on….. moist. % 14
2. Emission factors for soil transfer operations are based on Equation 1 from Section 13.2.4 of AP-42. Emission factor calculations are provided below.

Transfer/Drop Operation Emission Factor - Sample Calculation for PM10:

$Ef = k * (0.0032) * (U/5)^{1.3} / (M/2)^{1.4}$

where:

Ef = size specific emission factor in pounds per ton (lb/ton)

k = an empirical constant selected from AP-42 (0.35 for PM10 and 0.11 for PM2.5)

U = mean wind speed in miles per hour (mph)

M = material moisture content in percent moisture (%) from Table 13.2.4-1 of AP-42 (for overburden)

$Ef = 0.35 * (0.0032) * (12.5/5)^{1.3} / (14/2)^{1.4}$

Ef = 2.42E-04 lb/ton

Sample Emission Rate Calculation for PM10 (loader):

ER = Ef PM10 * (soil volume * soil density / 2,000 lbs/ton) * 453.59 / 60 / 60

where:

ER = PM10 emission rate in grams per second

Ef PM10 = PM10 emission factor in lb/ton

soil volume = volume of soil handled in cubic yards per hour

soil density = 2,600 lbs/YD3

0.5 = Fugitive Emissions reduction program factor

ER = 2.42E-04 * (45 * 2,600 / 2,000) * 2* 0.5*453.59 / 60 / 60

ER = 1.78E-03 g/s

APPENDIX K.4

NOISE

Table K.4-1

Construction Noise Analysis Results for Phase 1 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 1-2008 Analysis Year			Phase 1-2009 Analysis Year			Phase 1-2010 Analysis Year			Phase 1-2011 Analysis Year			Phase 1-2012 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase
	1st floor	70.7	43.3	70.8	0.1	43.8	70.9	0.2	42.9	71.0	0.3	47.2	71.1	0.4	57.1	71.4	0.7
	3rd floor	70.6	46.2	70.7	0.1	46.9	70.8	0.2	45.7	70.9	0.3	51.1	71.1	0.5	57.9	71.3	0.7
	5th floor	70.5	55.4	70.7	0.2	57.0	70.9	0.4	54.7	70.9	0.4	61.6	71.4	0.9	57.7	71.2	0.7
	7th floor	70.2	58.3	70.6	0.4	59.4	70.8	0.6	57.6	70.8	0.6	63.0	71.3	1.1	58.9	71.1	0.9
	10th floor	69.6	60.9	70.3	0.7	63.3	70.7	1.1	61.6	70.5	0.9	64.8	71.2	1.6	61.6	70.8	1.2
1	12th floor	69.3	61.1	70.0	0.7	63.6	70.5	1.2	62.2	70.4	1.1	65.0	71.0	1.7	61.8	70.5	1.2
	1st floor	70.7	46.5	70.8	0.1	47.2	70.9	0.2	46.5	71.0	0.3	54.7	71.2	0.5	53.9	71.3	0.6
2	3rd floor	70.6	54.4	70.8	0.2	54.6	70.9	0.3	52.6	71.0	0.4	62.9	71.7	1.1	57.9	71.3	0.7
3	5 feet	70.4	59.1	70.8	0.4	60.2	71.0	0.6	58.5	71.0	0.6	63.5	71.6	1.2	59.5	71.2	0.8
	1st floor	71.7	50.0	71.9	0.2	50.1	72.0	0.3	52.0	72.1	0.4	58.0	72.4	0.7	54.6	72.4	0.7
	3rd floor	71.6	53.3	71.8	0.2	55.4	71.9	0.3	53.9	72.0	0.4	59.9	72.3	0.7	55.2	72.3	0.7
	5th floor	71.4	57.0	71.7	0.3	57.7	71.8	0.4	56.3	71.9	0.5	61.7	72.3	0.9	57.0	72.1	0.7
	7th floor	71.1	59.8	71.5	0.4	59.7	71.6	0.5	58.2	71.6	0.5	62.8	72.1	1.0	58.4	71.9	0.8
	10th floor	70.5	62.0	71.2	0.7	61.4	71.2	0.7	60.8	71.3	0.8	63.8	71.7	1.2	59.7	71.4	0.9
	12th floor	70.1	62.5	70.9	0.8	61.8	70.9	0.8	61.3	71.0	0.9	65.2	71.7	1.6	61.4	71.2	1.1
	15th floor	69.6	63.2	70.6	1.0	62.9	70.6	1.0	62.3	70.7	1.1	66.0	71.5	1.9	62.7	70.9	1.3
	17th floor	69.3	62.7	70.3	1.0	63.0	70.4	1.1	63.1	70.5	1.2	66.2	71.4	2.1	62.9	70.7	1.4
	20th floor	68.9	62.9	70.0	1.1	63.1	70.1	1.2	63.6	70.3	1.4	66.6	71.2	2.3	63.2	70.5	1.6
	22nd floor	68.6	63.4	69.9	1.3	63.0	69.9	1.3	63.6	70.1	1.5	66.8	71.2	2.6	63.4	70.3	1.7
	25th floor	68.3	64.0	69.8	1.5	62.9	69.6	1.3	63.7	69.9	1.6	66.9	71.0	2.7	63.4	70.1	1.8
	27th floor	67.9	64.1	69.5	1.6	62.9	69.3	1.4	63.8	69.7	1.8	66.8	70.8	2.9	63.1	69.8	1.9
4	30th floor	67.8	64.2	69.5	1.7	62.9	69.3	1.5	63.8	69.6	1.8	66.8	70.7	2.9	63.2	69.7	1.9
	5th floor	63.8	55.7	64.5	0.7	56.4	64.7	0.9	54.4	64.5	0.7	60.9	65.8	2.0	55.4	64.8	1.0
	7th floor	63.7	59.0	65.0	1.3	59.0	65.1	1.4	57.3	64.8	1.1	62.6	66.4	2.7	58.3	65.2	1.5
	10th floor	63.7	61.2	65.7	2.0	61.8	66.0	2.3	60.2	65.5	1.8	63.6	66.8	**3.1**	59.0	65.3	1.6
	12th floor	63.6	62.1	66.0	2.4	63.1	66.5	2.9	61.2	65.8	2.2	64.1	67.0	**3.4**	59.8	65.4	1.8
	15th floor	63.6	62.2	66.0	2.4	63.1	66.5	2.9	61.4	65.8	2.2	64.5	67.2	**3.6**	59.9	65.4	1.8
	17th floor	63.5	62.5	66.1	2.6	63.1	66.4	2.9	61.6	65.8	2.3	64.8	67.4	**3.9**	60.5	65.6	2.1
	20th floor	63.4	62.8	66.2	2.8	63.4	66.5	**3.1**	62.4	66.1	2.7	65.3	67.6	**4.2**	60.8	65.6	2.2
	22nd floor	63.3	63.1	66.3	**3.0**	63.5	66.5	**3.2**	62.9	66.2	2.9	65.4	67.6	**4.3**	60.7	65.5	2.2
	25th floor	63.2	62.3	65.8	2.6	62.4	65.9	2.7	62.1	65.8	2.6	65.0	67.3	**4.1**	60.5	65.3	2.1
	27th floor	63.1	62.5	65.9	2.8	62.4	65.9	2.8	62.5	66.0	2.9	65.0	67.3	**4.2**	60.6	65.3	2.2
5	30th floor	63.9	62.8	66.4	2.5	61.6	66.0	2.1	62.5	66.4	2.5	65.2	67.8	**3.9**	62.6	66.6	2.7
	5th floor	63.2	54.1	63.8	0.6	53.9	63.8	0.6	53.9	63.9	0.7	61.5	65.7	2.5	55.7	64.3	1.1
	7th floor	63.2	56.8	64.2	1.0	57.1	64.3	1.1	56.2	64.2	1.0	63.0	66.3	**3.1**	58.1	64.7	1.5
	10th floor	63.2	58.9	64.6	1.4	60.4	65.1	1.9	59.3	64.9	1.7	64.1	66.8	**3.6**	60.0	65.2	2.0
	12th floor	63.2	59.2	64.7	1.5	61.0	65.4	2.2	59.9	65.0	1.8	64.3	67.0	**3.8**	60.2	65.3	2.1
	15th floor	63.9	60.0	65.5	1.6	61.6	66.0	2.1	60.8	65.8	1.9	64.7	67.5	**3.6**	60.7	65.9	2.0
	17th floor	63.9	60.2	65.5	1.6	61.4	66.0	2.1	60.9	65.9	2.0	64.8	67.6	**3.7**	60.6	65.9	2.0
	19th floor	63.9	60.7	65.7	1.8	62.0	66.2	2.3	61.7	66.1	2.2	65.2	67.8	**3.9**	61.1	66.1	2.2
5a	21st floor	63.9	61.0	65.8	1.9	62.2	66.3	2.4	61.9	66.2	2.3	65.7	68.1	**4.2**	62.0	66.4	2.5

Table K.4-1 (cont'd)
Construction Noise Analysis Results for Phase 1 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 1-2008 Analysis Year			Phase 1-2009 Analysis Year			Phase 1-2010 Analysis Year			Phase 1-2011 Analysis Year			Phase 1-2012 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase
	5th floor	65.1	60.1	66.4	1.3	60.6	66.6	1.5	58.2	66.1	1.0	65.1	68.3	**3.2**	60.4	66.7	1.6
	7th floor	65.3	62.5	67.2	1.9	62.4	67.2	1.9	60.9	66.8	1.5	66.1	68.9	**3.6**	61.7	67.2	1.9
	10th floor	65.3	64.3	67.9	2.6	65.4	68.4	**3.1**	63.4	67.6	2.3	67.1	69.4	**4.1**	62.6	67.4	2.1
	12th floor	65.3	64.3	67.9	2.6	65.6	68.5	**3.2**	63.5	67.6	2.3	67.0	69.4	**4.1**	62.4	67.4	2.1
	15th floor	65.2	64.7	68.0	2.8	65.6	68.5	**3.3**	64.4	68.0	2.8	67.5	69.6	**4.4**	63.0	67.5	2.3
	17th floor	65.1	65.0	68.1	**3.0**	66.0	68.7	**3.6**	64.6	68.0	2.9	68.4	70.2	**5.1**	64.9	68.2	**3.1**
	20th floor	64.9	65.1	68.1	**3.2**	66.4	68.8	**3.9**	65.4	68.3	**3.4**	68.8	70.4	**5.5**	65.2	68.3	**3.4**
	22nd floor	64.9	64.4	67.7	2.8	65.7	68.4	**3.5**	64.9	68.0	**3.1**	68.1	69.9	**5.0**	64.5	68.0	**3.1**
	25th floor	64.9	64.4	67.7	2.8	65.2	68.2	**3.3**	65.1	68.2	**3.3**	68.1	69.9	**5.0**	64.6	68.0	**3.1**
	27th floor	64.8	64.6	67.8	**3.0**	65.1	68.1	**3.3**	65.1	68.1	**3.3**	68.1	69.9	**5.1**	64.5	67.9	**3.1**
	30th floor	64.6	64.1	67.4	2.8	63.8	67.3	2.7	64.0	67.5	2.9	67.2	69.2	**4.6**	63.5	67.4	2.8
	33rd floor	64.5	64.4	67.5	**3.0**	63.6	67.2	2.7	64.0	67.4	2.9	67.1	69.1	**4.6**	63.3	67.2	2.7
5b	36th floor	64.4	64.2	67.4	**3.0**	62.9	66.8	2.4	63.5	67.2	2.8	66.8	68.9	**4.5**	63.4	67.2	2.8
6	5 feet	69.7	70.9	73.4	**3.7**	61.5	70.6	0.9	65.5	71.5	1.8	69.6	73.1	**3.4**	66.7	72.1	2.4
	7th floor	60.6	65.2	66.5	**5.9**	66.3	67.4	**6.8**	67.4	68.3	**7.7**	70.8	71.2	**10.6**	67.2	68.2	**7.6**
	10th floor	62.9	71.8	72.4	**9.5**	71.1	71.8	**8.9**	70.3	71.2	**8.3**	73.0	73.5	**10.6**	69.2	70.5	**7.6**
	12th floor	63.2	73.5	73.9	**10.7**	71.6	72.3	**9.1**	70.7	71.6	**8.4**	73.3	73.8	**10.6**	69.7	70.9	**7.7**
	15th floor	63.1	73.9	74.3	**11.2**	71.6	72.2	**9.1**	71.1	71.9	**8.8**	73.9	74.3	**11.2**	69.7	70.9	**7.8**
	17th floor	63.1	73.9	74.3	**11.2**	71.7	72.3	**9.2**	71.2	71.9	**8.8**	73.9	74.3	**11.2**	69.7	70.8	**7.7**
	20th floor	63.1	73.6	74.0	**10.9**	71.4	72.1	**9.0**	71.2	71.9	**8.8**	73.9	74.3	**11.2**	69.7	70.8	**7.7**
	23rd floor	63.1	73.3	73.7	**10.6**	71.2	71.9	**8.8**	71.0	71.8	**8.7**	74.0	74.4	**11.3**	69.7	70.8	**7.7**
7	26th floor	62.9	72.8	73.2	**10.3**	70.9	71.6	**8.7**	70.7	71.5	**8.6**	74.1	74.5	**11.6**	69.5	70.6	**7.7**
	1st floor	68.6	78.1	78.7	**10.1**	67.0	71.9	**3.3**	69.3	73.3	**4.7**	73.5	75.8	**7.2**	69.7	74.4	**5.8**
	3rd floor	68.4	78.4	78.9	**10.5**	69.7	72.8	**4.4**	71.8	74.3	**5.9**	75.1	76.7	**8.3**	71.8	75.0	**6.6**
	5th floor	68.2	77.1	77.7	**9.5**	71.7	73.8	**5.6**	72.8	74.8	**6.6**	77.6	78.5	**10.3**	74.7	76.5	**8.3**
	7th floor	68.4	76.9	77.6	**9.2**	72.5	74.4	**6.0**	72.9	74.9	**6.5**	78.1	78.9	**10.5**	74.6	76.5	**8.1**
	10th floor	68.6	76.5	77.3	**8.7**	72.3	74.3	**5.7**	73.3	75.2	**6.6**	78.0	78.9	**10.3**	74.3	76.4	**7.8**
	12th floor	68.6	76.0	76.8	**8.2**	72.0	74.1	**5.5**	73.1	75.1	**6.5**	77.9	78.8	**10.2**	74.2	76.3	**7.7**
	15th floor	68.5	75.4	76.3	**7.8**	71.6	73.8	**5.3**	72.7	74.8	**6.3**	77.7	78.6	**10.1**	73.9	76.0	**7.5**
	17th floor	68.4	74.9	75.9	**7.5**	71.3	73.6	**5.2**	72.4	74.5	**6.1**	77.6	78.5	**10.1**	73.7	75.9	**7.5**
	20th floor	68.4	74.3	75.4	**7.0**	70.8	73.3	**4.9**	71.9	74.2	**5.8**	77.3	78.2	**9.8**	73.2	75.6	**7.2**
	23rd floor	68.3	73.7	75.0	**6.7**	70.3	73.0	**4.7**	71.4	73.9	**5.6**	76.8	77.8	**9.5**	72.9	75.4	**7.1**
8	26th floor	68.2	73.2	74.6	**6.4**	69.9	72.8	**4.6**	70.8	73.6	**5.4**	76.5	77.6	**9.4**	72.4	75.1	**6.9**
	1st floor	75.8	79.7	81.2	**5.4**	60.2	76.2	0.4	61.7	76.3	0.5	65.3	76.6	0.8	59.9	76.5	0.7
9	3rd floor	75.5	79.7	81.1	**5.6**	63.0	76.0	0.5	63.8	76.1	0.6	65.1	76.3	0.8	62.4	76.3	0.8
10	5 feet	76.7	82.6	83.6	**6.9**	59.7	77.0	0.3	60.2	77.2	0.5	69.2	77.8	1.1	62.0	77.4	0.7

Table K.4-1 (cont'd)

Construction Noise Analysis Results for Phase 1 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 1-2008 Analysis Year			Phase 1-2009 Analysis Year			Phase 1-2010 Analysis Year			Phase 1-2011 Analysis Year			Phase 1-2012 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase
	1st floor	72.3	77.3	78.5	**6.2**	58.1	72.7	0.4	57.4	72.8	0.5	67.4	73.9	1.6	62.1	73.3	1.0
	3rd floor	71.8	77.5	78.6	**6.8**	61.1	72.4	0.6	61.2	72.5	0.7	67.5	73.6	1.8	62.8	72.9	1.1
	5th floor	71.9	77.6	78.7	**6.8**	64.2	72.8	0.9	63.2	72.8	0.9	68.4	73.9	2.0	63.9	73.1	1.2
	7th floor	71.8	77.5	78.6	**6.8**	65.0	72.8	1.0	65.6	73.0	1.2	68.9	73.9	2.1	64.4	73.1	1.3
	10th floor	71.9	77.3	78.4	**6.5**	65.8	73.0	1.1	66.5	73.3	1.4	69.8	74.3	2.4	65.0	73.2	1.3
	12th floor	71.8	77.1	78.2	**6.4**	65.8	72.9	1.1	67.0	73.3	1.5	69.7	74.1	2.3	64.9	73.0	1.2
	15th floor	71.5	74.9	76.6	**5.1**	65.5	72.7	1.2	67.1	73.1	1.6	69.4	73.9	2.4	64.3	72.8	1.3
	17th floor	71.5	74.7	76.4	**4.9**	65.6	72.7	1.2	67.2	73.1	1.6	69.5	73.9	2.4	64.1	72.7	1.2
11	20th floor	71.4	69.3	73.5	2.1	65.6	72.6	1.2	67.3	73.0	1.6	69.9	74.0	2.6	65.0	72.7	1.3
	1st floor	69.9	49.8	70.0	0.1	48.0	70.1	0.2	46.9	70.1	0.2	49.6	70.2	0.3	47.6	70.3	0.4
	3rd floor	70.5	50.6	70.6	0.1	48.9	70.6	0.1	48.5	70.6	0.1	50.8	70.7	0.2	49.5	70.7	0.2
	5th floor	70.5	51.9	70.6	0.1	50.8	70.6	0.1	51.1	70.6	0.1	52.5	70.7	0.2	50.9	70.7	0.2
	10th floor	70.4	53.1	70.5	0.1	51.9	70.5	0.1	52.3	70.5	0.1	53.5	70.6	0.2	52.2	70.6	0.2
	12th floor	70.3	53.1	70.4	0.1	51.7	70.4	0.1	52.4	70.4	0.1	53.6	70.5	0.2	52.1	70.5	0.2
	15th floor	70.1	53.1	70.2	0.1	51.7	70.2	0.1	52.6	70.3	0.2	53.6	70.3	0.2	52.3	70.3	0.2
	17th floor	70.0	53.1	70.1	0.1	51.7	70.1	0.1	52.6	70.2	0.2	53.6	70.2	0.2	52.4	70.2	0.2
12	20th floor	70.6	56.7	70.8	0.2	55.6	70.8	0.2	55.9	70.8	0.2	62.0	71.2	0.6	56.9	70.9	0.3
	1st floor	74.9	77.4	79.4	**4.5**	61.8	75.5	0.6	61.7	75.7	0.8	67.9	76.3	1.4	62.5	76.1	1.2
	3rd floor	75.1	77.8	79.7	**4.6**	65.0	75.9	0.8	65.5	76.1	1.0	69.3	76.7	1.6	64.6	76.4	1.3
	5th floor	75.1	77.9	79.8	**4.7**	69.0	76.4	1.3	69.0	76.5	1.4	71.7	77.3	2.2	67.2	76.6	1.5
	7th floor	75.0	77.8	79.7	**4.7**	69.0	76.3	1.3	70.0	76.6	1.6	72.3	77.3	2.3	67.1	76.4	1.4
	10th floor	74.7	76.1	78.5	**3.8**	69.1	76.0	1.3	70.6	76.5	1.8	71.9	77.0	2.3	67.3	76.2	1.5
	12th floor	74.6	76.0	78.4	**3.8**	69.1	76.0	1.4	71.3	76.7	2.1	72.9	77.3	2.7	67.5	76.2	1.6
	15th floor	74.3	70.5	75.9	1.6	69.1	75.7	1.4	71.6	76.5	2.2	73.3	77.3	**3.0**	67.7	75.9	1.6
	17th floor	74.1	71.3	76.0	1.9	68.8	75.5	1.4	71.4	76.3	2.2	73.2	77.1	**3.0**	67.5	75.7	1.6
12a	20th floor	74.0	69.9	75.6	1.6	68.6	75.4	1.4	71.1	76.2	2.2	72.9	76.9	2.9	67.3	75.6	1.6
	1st floor	69.3	54.4	69.5	0.2	54.4	69.6	0.3	54.5	69.6	0.3	55.5	69.7	0.4	49.9	69.7	0.4
	3rd floor	70.1	58.2	70.4	0.3	55.1	70.3	0.2	56.2	70.4	0.3	57.3	70.5	0.4	52.6	70.3	0.2
	5th floor	70.0	60.0	70.5	0.5	59.4	70.4	0.4	59.3	70.5	0.5	60.3	70.6	0.6	54.8	70.3	0.3
	7th floor	70.0	60.5	70.5	0.5	60.1	70.5	0.5	60.8	70.6	0.6	61.2	70.7	0.7	55.6	70.4	0.4
	10th floor	70.1	61.1	70.6	0.5	60.3	70.6	0.5	61.2	70.7	0.6	61.7	70.8	0.7	56.3	70.4	0.3
	12th floor	70.2	60.8	70.7	0.5	60.3	70.6	0.4	61.0	70.7	0.5	61.6	70.8	0.6	56.2	70.4	0.2
	15th floor	70.1	61.0	70.6	0.5	60.8	70.6	0.5	61.6	70.7	0.6	62.1	70.7	0.6	56.8	70.3	0.2
	17th floor	70.0	60.1	70.4	0.4	60.7	70.5	0.5	61.8	70.6	0.6	62.3	70.7	0.7	56.9	70.2	0.2
13	20th floor	70.0	61.5	70.6	0.6	61.0	70.5	0.5	62.1	70.7	0.7	64.5	71.1	1.1	58.3	70.3	0.3

Table K.4-1 (cont'd)

Construction Noise Analysis Results for Phase 1 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 1-2008 Analysis Year			Phase 1-2009 Analysis Year			Phase 1-2010 Analysis Year			Phase 1-2011 Analysis Year			Phase 1-2012 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase
	1st floor	63.1	52.3	63.4	0.3	52.1	63.4	0.3	50.5	63.3	0.2	59.7	64.7	1.6	55.6	63.8	0.7
	3rd floor	63.0	56.6	63.9	0.9	55.4	63.7	0.7	53.8	63.5	0.5	60.3	64.9	1.9	57.2	64.0	1.0
	5th floor	63.0	58.5	64.3	1.3	58.2	64.2	1.2	57.0	64.0	1.0	61.4	65.3	2.3	58.3	64.2	1.2
	7th floor	63.0	58.3	64.3	1.3	59.3	64.5	1.5	58.6	64.3	1.3	62.1	65.6	2.6	58.9	64.4	1.4
	10th floor	63.1	60.6	65.0	1.9	60.6	65.0	1.9	60.4	64.9	1.8	63.1	66.0	2.9	59.7	64.6	1.5
	12th floor	63.3	61.3	65.4	2.1	61.0	65.2	1.9	60.9	65.2	1.9	63.1	66.1	2.8	60.0	64.8	1.5
	15th floor	63.3	61.7	65.6	2.3	61.1	65.3	2.0	61.6	65.5	2.2	63.4	66.3	**3.0**	59.8	64.8	1.5
	17th floor	63.3	62.0	65.7	2.4	61.4	65.4	2.1	61.9	65.6	2.3	63.7	66.5	**3.2**	59.7	64.8	1.5
14	20th floor	63.2	61.3	65.4	2.2	61.8	65.6	2.4	62.4	65.8	2.6	64.3	66.8	**3.6**	59.3	64.7	1.5
	1st floor	73.5	68.0	74.7	1.2	65.3	74.4	0.9	63.9	74.4	0.9	69.1	75.4	1.9	64.2	74.8	1.3
	3rd floor	73.3	69.4	74.9	1.6	65.6	74.2	0.9	66.7	74.5	1.2	71.3	75.8	2.5	66.2	74.7	1.4
	5th floor	73.4	71.1	75.5	2.1	67.1	74.5	1.1	67.6	74.7	1.3	74.1	77.0	**3.6**	68.8	75.1	1.7
	7th floor	73.3	71.2	75.4	2.1	67.3	74.4	1.1	67.6	74.6	1.3	73.7	76.7	**3.4**	67.6	74.7	1.4
	10th floor	73.2	71.1	75.3	2.1	66.8	74.3	1.1	67.5	74.5	1.3	74.0	76.8	**3.6**	68.7	74.9	1.7
	12th floor	73.1	71.3	75.4	2.3	66.8	74.2	1.1	67.7	74.4	1.3	73.7	76.6	**3.5**	68.8	74.8	1.7
	15th floor	73.2	71.3	75.4	2.2	66.9	74.2	1.0	67.7	74.5	1.3	73.5	76.5	**3.3**	68.7	74.8	1.6
	17th floor	73.1	71.2	75.3	2.2	66.8	74.1	1.0	67.7	74.4	1.3	73.3	76.4	**3.3**	68.6	74.7	1.6
	19th floor	73.2	71.3	75.4	2.2	66.9	74.2	1.0	67.7	74.5	1.3	73.4	76.5	**3.3**	68.7	74.8	1.6
15	21st floor	72.9	71.0	75.1	2.2	66.6	74.0	1.1	67.6	74.2	1.3	73.1	76.2	**3.3**	68.3	74.5	1.6

Table K.4-1 (cont'd)
Construction Noise Analysis Results for Phase 1 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 1-2013 Analysis Year			Phase 1-2014 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase
	1st floor	70.7	57.0	71.5	0.8	51.0	71.5	0.8
	3rd floor	70.6	57.2	71.4	0.8	56.0	71.5	0.9
	5th floor	70.5	57.2	71.3	0.8	57.1	71.4	0.9
	7th floor	70.2	58.0	71.1	0.9	57.2	71.2	1.0
	10th floor	69.6	59.6	70.7	1.1	57.4	70.6	1.0
1	12th floor	69.3	59.9	70.4	1.1	57.5	70.3	1.0
	1st floor	70.7	53.2	71.4	0.7	59.8	71.7	1.0
2	3rd floor	70.6	60.5	71.6	1.0	62.0	71.8	1.2
3	5 feet	70.4	60.0	71.4	1.0	58.4	71.4	1.0
	1st floor	71.7	54.4	72.5	0.8	63.2	73.1	1.4
	3rd floor	71.6	58.8	72.5	0.9	64.0	73.0	1.4
	5th floor	71.4	59.4	72.3	0.9	63.9	72.8	1.4
	7th floor	71.1	59.6	72.0	0.9	63.8	72.5	1.4
	10th floor	70.5	59.8	71.5	1.0	63.7	72.0	1.5
	12th floor	70.1	60.3	71.3	1.2	63.4	71.7	1.6
	15th floor	69.6	60.6	70.8	1.2	63.3	71.2	1.6
	17th floor	69.3	60.8	70.5	1.2	62.8	70.9	1.6
	20th floor	68.9	60.9	70.2	1.3	62.6	70.6	1.7
	22nd floor	68.6	61.3	70.1	1.5	62.5	70.4	1.8
	25th floor	68.3	61.4	69.8	1.5	62.3	70.1	1.8
	27th floor	67.9	61.4	69.6	1.7	61.3	69.7	1.8
4	30th floor	67.8	61.5	69.5	1.7	61.2	69.6	1.8
	5th floor	63.8	59.0	65.4	1.6	51.3	64.6	0.8
	7th floor	63.7	59.3	65.5	1.8	52.0	64.6	0.9
	10th floor	63.7	59.8	65.6	1.9	52.8	64.6	0.9
	12th floor	63.6	60.0	65.6	2.0	54.0	64.6	1.0
	15th floor	63.6	59.5	65.4	1.8	53.8	64.6	1.0
	17th floor	63.5	59.9	65.4	1.9	54.4	64.5	1.0
	20th floor	63.4	60.2	65.4	2.0	55.0	64.5	1.1
	22nd floor	63.3	60.3	65.4	2.1	55.5	64.5	1.2
	25th floor	63.2	60.1	65.3	2.1	55.3	64.4	1.2
	27th floor	63.1	60.3	65.3	2.2	54.8	64.2	1.1
5	30th floor	63.9	62.6	66.6	2.7	54.9	65.0	1.1
	5th floor	63.2	59.8	65.2	2.0	51.1	64.0	0.8
	7th floor	63.2	59.9	65.2	2.0	51.5	64.1	0.9
	10th floor	63.2	60.1	65.3	2.1	51.4	64.0	0.8
	12th floor	63.2	60.2	65.3	2.1	51.7	64.1	0.9
	15th floor	63.9	59.6	65.7	1.8	52.4	64.9	1.0
	17th floor	63.9	59.7	65.7	1.8	53.1	64.9	1.0
	19th floor	63.9	59.9	65.8	1.9	53.6	65.0	1.1
5a	21st floor	63.9	60.0	65.9	2.0	54.2	65.0	1.1

Table K.4-1 (cont'd)
Construction Noise Analysis Results for Phase 1 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 1-2013 Analysis Year			Phase 1-2014 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase
	5th floor	65.1	61.9	67.2	2.1	53.4	66.0	0.9
	7th floor	65.3	61.9	67.3	2.0	54.8	66.2	0.9
	10th floor	65.3	62.1	67.3	2.0	57.7	66.5	1.2
	12th floor	65.3	61.8	67.2	1.9	58.5	66.6	1.3
	15th floor	65.2	61.7	67.2	2.0	58.0	66.4	1.2
	17th floor	65.1	61.9	67.1	2.0	57.9	66.4	1.3
	20th floor	64.9	62.0	67.1	2.2	57.2	66.1	1.2
	22nd floor	64.9	61.5	66.9	2.0	56.3	66.0	1.1
	25th floor	64.9	61.6	67.0	2.1	56.0	66.0	1.1
	27th floor	64.8	61.9	67.0	2.2	55.7	65.9	1.1
	30th floor	64.6	61.0	66.6	2.0	55.3	65.7	1.1
	33rd floor	64.5	61.1	66.5	2.0	54.2	65.5	1.0
5b	36th floor	64.4	61.6	66.6	2.2	55.6	65.6	1.2
6	5 feet	69.7	61.2	71.3	1.6	50.2	71.0	1.3
	7th floor	60.6	61.4	64.4	**3.8**	45.2	61.5	0.9
	10th floor	62.9	66.0	68.4	**5.5**	48.2	65.2	2.3
	12th floor	63.2	66.8	69.0	**5.8**	49.5	65.4	2.2
	15th floor	63.1	66.8	68.9	**5.8**	50.6	65.2	2.1
	17th floor	63.1	66.8	68.9	**5.8**	51.4	65.1	2.0
	20th floor	63.1	66.7	68.8	**5.7**	53.9	65.3	2.2
	23rd floor	63.1	66.5	68.7	**5.6**	57.1	65.7	2.6
7	26th floor	62.9	66.4	68.6	**5.7**	58.6	65.8	2.9
	1st floor	68.6	64.3	73.9	**5.3**	57.6	74.3	**5.7**
	3rd floor	68.4	68.7	74.4	**6.0**	57.3	73.9	**5.5**
	5th floor	68.2	72.2	75.5	**7.3**	56.3	73.5	**5.3**
	7th floor	68.4	72.1	75.5	**7.1**	55.4	73.6	**5.2**
	10th floor	68.6	71.7	75.4	**6.8**	54.8	73.7	**5.1**
	12th floor	68.6	71.8	75.3	**6.7**	55.5	73.5	**4.9**
	15th floor	68.5	71.7	75.2	**6.7**	55.2	73.4	**4.9**
	17th floor	68.4	71.4	75.0	**6.6**	55.3	73.3	**4.9**
	20th floor	68.4	71.1	74.9	**6.5**	56.2	73.3	**4.9**
	23rd floor	68.3	70.8	74.7	**6.4**	58.1	73.2	**4.9**
8	26th floor	68.2	70.4	74.5	**6.3**	58.8	73.2	**5.0**
	1st floor	75.8	56.9	76.6	0.8	56.4	76.7	0.9
9	3rd floor	75.5	56.3	76.3	0.8	55.4	76.4	0.9
10	5 feet	76.7	62.4	77.6	0.9	60.4	77.7	1.0

Table K.4-1 (cont'd)
Construction Noise Analysis Results for Phase 1 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 1-2013 Analysis Year			Phase 1-2014 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase
	1st floor	72.3	60.2	73.3	1.0	61.6	73.5	1.2
	3rd floor	71.8	64.1	73.2	1.4	62.2	73.1	1.3
	5th floor	71.9	65.3	73.4	1.5	63.4	73.3	1.4
	7th floor	71.8	65.9	73.4	1.6	63.0	73.1	1.3
	10th floor	71.9	65.3	73.3	1.4	63.5	73.2	1.3
	12th floor	71.8	65.8	73.3	1.5	64.4	73.1	1.3
	15th floor	71.5	65.7	73.1	1.6	64.4	73.0	1.5
	17th floor	71.5	65.6	73.0	1.5	64.5	72.9	1.4
11	20th floor	71.4	65.5	72.9	1.5	64.5	72.8	1.4
	1st floor	69.9	47.4	70.4	0.5	51.0	70.5	0.6
	3rd floor	70.5	48.9	70.7	0.2	52.5	70.8	0.3
	5th floor	70.5	50.4	70.7	0.2	56.4	70.9	0.4
	10th floor	70.4	51.8	70.6	0.2	60.4	71.0	0.6
	12th floor	70.3	51.7	70.5	0.2	62.3	71.1	0.8
	15th floor	70.1	51.9	70.3	0.2	63.6	71.2	1.1
	17th floor	70.0	51.9	70.2	0.2	64.4	71.2	1.2
12	20th floor	70.6	54.7	70.8	0.2	64.3	71.6	1.0
	1st floor	74.9	66.1	76.5	1.6	58.6	76.3	1.4
	3rd floor	75.1	66.8	76.7	1.6	61.0	76.6	1.5
	5th floor	75.1	68.2	76.8	1.7	63.1	76.6	1.5
	7th floor	75.0	67.3	76.6	1.6	62.9	76.4	1.4
	10th floor	74.7	67.3	76.3	1.6	63.0	76.1	1.4
	12th floor	74.6	68.5	76.5	1.9	63.2	76.1	1.5
	15th floor	74.3	68.7	76.2	1.9	63.1	75.8	1.5
	17th floor	74.1	68.8	76.0	1.9	63.1	75.5	1.4
12a	20th floor	74.0	68.7	76.0	2.0	63.1	75.5	1.5
	1st floor	69.3	51.4	69.8	0.5	51.3	69.8	0.5
	3rd floor	70.1	52.6	70.4	0.3	55.2	70.5	0.4
	5th floor	70.0	53.5	70.4	0.4	57.5	70.5	0.5
	7th floor	70.0	53.7	70.3	0.3	58.9	70.6	0.6
	10th floor	70.1	55.2	70.4	0.3	61.3	70.8	0.7
	12th floor	70.2	55.2	70.3	0.1	62.1	70.8	0.6
	15th floor	70.1	55.3	70.3	0.2	63.8	71.0	0.9
	17th floor	70.0	55.4	70.2	0.2	64.7	71.2	1.2
13	20th floor	70.0	56.8	70.2	0.2	65.8	71.4	1.4

Table K.4-1 (cont'd)
Construction Noise Analysis Results for Phase 1 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 1-2013 Analysis Year			Phase 1-2014 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase
	1st floor	63.1	55.4	63.8	0.7	65.3	67.3	**4.2**
	3rd floor	63.0	58.6	64.3	1.3	69.7	70.5	**7.5**
	5th floor	63.0	58.3	64.2	1.2	73.0	73.4	**10.4**
	7th floor	63.0	57.3	64.0	1.0	73.9	74.2	**11.2**
	10th floor	63.1	57.9	64.1	1.0	73.4	73.8	**10.7**
	12th floor	63.3	58.6	64.4	1.1	73.0	73.4	**10.1**
	15th floor	63.3	58.9	64.5	1.2	72.5	73.0	**9.7**
	17th floor	63.3	59.1	64.6	1.3	72.0	72.5	**9.2**
14	20th floor	63.2	59.7	64.8	1.6	71.3	71.9	**8.7**
	1st floor	73.5	58.7	74.7	1.2	56.7	74.8	1.3
	3rd floor	73.3	60.0	74.3	1.0	56.4	74.4	1.1
	5th floor	73.4	60.2	74.2	0.8	55.2	74.2	0.8
	7th floor	73.3	61.5	74.1	0.8	53.9	74.0	0.7
	10th floor	73.2	62.2	74.1	0.9	53.0	74.0	0.8
	12th floor	73.1	62.1	74.0	0.9	52.7	73.8	0.7
	15th floor	73.2	62.0	73.9	0.7	52.2	73.8	0.6
	17th floor	73.1	61.9	73.9	0.8	52.3	73.7	0.6
	19th floor	73.2	62.0	73.9	0.7	52.3	73.8	0.6
15	21st floor	72.9	61.7	73.7	0.8	53.1	73.6	0.7

Table K.4-2

Construction Noise Analysis Results for Phase 2 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 2-2024 Analysis Year			Phase 2-2025 Analysis Year			Phase 2-2026 Analysis Year			Phase 2-2027 Analysis Year			Phase 2-2028 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase
	1st floor	70.7	58.4	72.6	1.9	60.5	66.7	-4.0	56.5	66.0	-4.7	70.2	71.5	0.8	68.9	70.5	-0.2
	3rd floor	70.6	58	72.5	1.9	69.1	70.7	0.1	62.4	67.3	-3.3	78.1	78.3	**7.7**	70	71.3	0.7
	5th floor	70.5	58.7	72.5	2.0	74.0	74.6	**4.1**	68.5	70.3	-0.2	78.5	78.7	**8.2**	70	71.3	0.8
	7th floor	70.2	59.5	72.4	2.2	74.3	74.9	**4.7**	71.7	72.7	2.5	78.7	78.9	**8.7**	69.8	71.2	1.0
	10th floor	69.6	60.3	71.9	2.3	74.2	74.8	**5.2**	73.7	74.3	**4.7**	78.1	78.3	**8.7**	69.6	71.1	1.5
1	12th floor	69.3	60.3	71.6	2.3	74.2	74.8	**5.5**	73.5	74.2	**4.9**	77.6	77.9	**8.6**	69.2	70.8	1.5
	1st floor	70.7	56.7	72.5	1.8	65.7	68.7	-2.0	58.4	66.4	-4.3	74.7	75.2	**4.5**	69.4	70.9	0.2
2	3rd floor	70.6	57.2	72.6	2.0	74.4	75.0	**4.4**	66.6	69.3	-1.3	78.4	78.6	**8.0**	69.3	71.0	**0.4**
3	5 feet	70.4	58.4	72.4	2.0	71.0	72.2	1.8	65.7	69.0	-1.4	73.5	74.2	**3.8**	68.2	70.3	-0.1
	1st floor	71.7	56.4	73.9	2.2	62.8	70.8	-0.9	59.0	70.4	-1.3	70.5	73.3	1.6	66.2	71.5	-0.2
	3rd floor	71.6	56.8	73.7	2.1	71.1	73.5	1.9	64.6	70.9	-0.7	71.0	73.4	1.8	66	71.3	-0.3
	5th floor	71.4	57.3	73.5	2.1	75.1	76.2	**4.8**	71.7	73.8	2.4	70.8	73.3	1.9	65.9	71.2	-0.2
	7th floor	71.1	57.2	73.1	2.0	75.2	76.2	**5.1**	72.8	74.4	**3.3**	70.8	73.2	2.1	65.7	71.0	-0.1
	10th floor	70.5	57.5	72.7	2.2	75.1	76.1	**5.6**	74.0	75.3	**4.8**	70.9	73.2	2.7	65.4	70.8	0.3
	12th floor	70.1	57.9	72.5	2.4	75.1	76.1	**6.0**	73.7	75.1	**5.0**	70.9	73.2	**3.1**	65	70.7	0.6
	15th floor	69.6	58.2	71.9	2.3	74.8	75.8	**6.2**	73.5	74.8	**5.2**	71.4	73.4	**3.8**	64.6	70.4	0.8
	17th floor	69.3	58.3	71.7	2.4	74.6	75.6	**6.3**	73.3	74.7	**5.4**	71.3	73.3	**4.0**	64.3	70.2	0.9
	20th floor	68.9	59.2	71.4	2.5	74.2	75.3	**6.4**	73.2	74.6	**5.7**	71.5	73.4	**4.5**	64	70.1	1.2
	22nd floor	68.6	59.2	71.3	2.7	73.9	75.1	**6.5**	73.0	74.4	**5.8**	71.5	73.4	**4.8**	63.7	70.0	1.4
	25th floor	68.3	59.2	71.0	2.7	73.4	74.6	**6.3**	72.8	74.2	**5.9**	71.5	73.3	**5.0**	63.2	69.7	1.4
	27th floor	67.9	59.5	70.9	3.0	73.1	74.4	**6.5**	72.7	74.1	**6.2**	71.5	73.2	**5.3**	63.1	69.5	1.6
4	30th floor	67.8	59.4	70.9	3.1	72.7	74.1	**6.3**	72.3	73.8	**6.0**	71.7	73.4	**5.6**	64.5	69.9	2.1
	5th floor	63.8	56.0	65.7	1.9	56.5	64.1	0.3	51.3	63.5	-0.3	68.4	69.6	**5.8**	64.9	67.2	**3.4**
	7th floor	63.7	56.4	65.8	2.1	59.5	64.8	1.1	52.5	63.6	-0.1	69.0	70.0	**6.3**	64.9	67.2	**3.5**
	10th floor	63.7	57	65.8	2.1	65.1	67.3	**3.6**	54.7	63.8	0.1	70.2	71.0	**7.3**	64.9	67.1	**3.4**
	12th floor	63.6	57.3	65.8	2.2	67.3	68.7	**5.1**	57.3	64.2	0.6	71.4	72.0	**8.4**	64.9	67.1	**3.5**
	15th floor	63.6	57.8	65.7	2.1	69.9	70.7	**7.1**	61.3	65.3	1.7	71.6	72.2	**8.6**	64.8	67.0	**3.4**
	17th floor	63.5	58.1	65.8	2.3	70.8	71.5	**8.0**	62.9	66.0	2.5	71.9	72.4	**8.9**	64.7	67.0	**3.5**
	20th floor	63.4	58.5	65.8	2.4	71.2	71.8	**8.4**	66.2	67.9	**4.5**	72.0	72.5	**9.1**	63.6	66.3	**2.9**
	22nd floor	63.3	57.1	65.4	2.1	71.5	72.1	**8.8**	66.7	68.2	**4.9**	72.0	72.5	**9.2**	63.6	66.2	**2.9**
	25th floor	63.2	57.3	65.3	2.1	71.5	72.0	**8.8**	68.3	69.4	**6.2**	72.0	72.5	**9.3**	63.5	66.1	**2.9**
	27th floor	63.1	57.5	65.4	2.3	71.2	71.8	**8.7**	67.9	69.0	**5.9**	71.7	72.2	**9.1**	64	66.4	**3.3**
5	30th floor	63.9	57.9	66.1	2.2	70.9	71.5	**7.6**	68.2	69.3	**5.4**	71.3	71.9	**8.0**	64.2	66.6	**2.7**
	5th floor	63.2	52.0	64.9	1.7	56.6	63.1	-0.1	51.5	62.4	-0.8	68.6	69.5	**6.3**	65.6	67.2	**4.0**
	7th floor	63.2	53.1	65.0	1.8	58.7	63.7	0.5	52.5	62.5	-0.7	69.2	70.0	**6.8**	65.8	67.3	**4.1**
	10th floor	63.2	56.3	65.2	2.0	64.1	66.2	**3.0**	55.8	63.0	-0.2	70.9	71.4	**8.2**	65.4	67.1	**3.9**
	12th floor	63.2	56.7	65.3	2.1	66.4	67.8	**4.6**	58.8	63.8	0.6	72.0	72.4	**9.2**	65.5	67.1	**3.9**
	15th floor	63.9	57	66.2	2.3	69.8	70.5	**6.6**	64.0	66.3	2.4	72.2	72.6	**8.7**	65.5	67.2	**3.3**
	17th floor	63.9	57.1	66.1	2.2	70.3	71.0	**7.1**	65.2	67.0	**3.1**	72.1	72.5	**8.6**	65.5	67.2	**3.3**
	19th floor	63.9	57.3	66.3	2.4	70.2	70.9	**7.0**	65.8	67.4	**3.5**	72.2	72.6	**8.7**	65.2	67.0	**3.1**
5a	21st floor	63.9	57.5	66.4	2.5	70.5	71.1	**7.2**	66.4	67.9	**4.0**	72.2	72.6	**8.7**	65.3	67.1	**3.2**

Table K.4-2 (cont'd)

Construction Noise Analysis Results for Phase 2 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 2-2024 Analysis Year			Phase 2-2025 Analysis Year			Phase 2-2026 Analysis Year			Phase 2-2027 Analysis Year			Phase 2-2028 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase
	5th floor	65.1	57.9	67.2	2.1	60.7	66.2	1.1	54.4	65.2	0.1	71.6	72.4	**7.3**	68	69.7	**4.6**
	7th floor	65.3	58.2	67.3	2.0	66.9	69.0	**3.7**	55.8	65.3	0.0	72.1	72.8	**7.5**	68	69.7	**4.4**
	10th floor	65.3	58.5	67.3	2.0	71.8	72.6	**7.3**	60.9	66.2	0.9	73.3	73.9	**8.6**	67.8	69.5	**4.2**
	12th floor	65.3	57.9	67.2	1.9	72.5	73.2	**7.9**	63.6	67.2	1.9	73.2	73.8	**8.5**	67.1	69.1	**3.8**
	15th floor	65.2	58.7	67.3	2.1	73.3	73.8	**8.6**	66.5	68.6	**3.4**	74.2	74.6	**9.4**	67.1	69.0	**3.8**
	17th floor	65.1	59.4	67.3	2.2	74.0	74.5	**9.4**	70.0	71.1	**6.0**	74.2	74.6	**9.5**	67	68.9	**3.8**
	20th floor	64.9	60.0	67.3	2.4	74.0	74.4	**9.5**	70.3	71.3	**6.4**	74.1	74.5	**9.6**	66.5	68.5	**3.6**
	22nd floor	64.9	58.9	67.1	2.2	73.2	73.7	**8.8**	69.8	70.9	**6.0**	73.3	73.8	**8.9**	65.6	68.0	**3.1**
	25th floor	64.9	59.1	67.2	2.3	73.1	73.6	**8.7**	70.4	71.4	**6.5**	72.9	73.5	**8.6**	65.5	68.0	**3.1**
	27th floor	64.8	59.2	67.1	2.3	73.0	73.5	**8.7**	70.5	71.4	**6.6**	72.9	73.5	**8.7**	66.1	68.3	**3.5**
	30th floor	64.6	58.8	66.9	2.3	72.3	72.9	**8.3**	70.6	71.5	**6.9**	71.9	72.6	**8.0**	65.6	67.9	**3.3**
	33rd floor	64.5	58.2	66.7	2.2	71.1	71.9	**7.4**	69.8	70.8	**6.3**	71.6	72.3	**7.8**	65.1	67.6	**3.1**
5b	36th floor	64.4	58.5	66.8	2.4	70.7	71.5	**7.1**	70.5	71.4	**7.0**	71.3	72.0	**7.6**	65	67.5	**3.1**
6	5 feet	69.7	53.1	71.4	1.7	51.0	71.4	1.7	50.6	71.4	1.7	57.9	71.5	1.8	58.4	71.6	1.9
	7th floor	60.6	45.0	61.0	0.4	44.6	61.0	0.4	44.3	60.9	0.3	48.2	60.9	0.3	47.6	60.9	0.3
	10th floor	62.9	50.1	65.4	2.5	49.9	65.4	2.5	49.9	65.4	2.5	51.0	65.4	2.5	50.3	65.4	2.5
	12th floor	63.2	52	65.7	2.5	52.0	65.7	2.5	51.9	65.7	2.5	52.8	65.7	2.5	52.2	65.7	2.5
	15th floor	63.1	53.3	65.6	2.5	53.2	65.6	2.5	53.1	65.6	2.5	53.8	65.7	2.6	53.4	65.6	2.5
	17th floor	63.1	53.7	65.6	2.5	53.6	65.5	2.4	53.5	65.5	2.4	54.1	65.6	2.5	53.8	65.6	2.5
	20th floor	63.1	54.1	65.7	2.6	53.7	65.6	2.5	53.6	65.7	2.6	54.2	65.7	2.6	54.1	65.7	2.6
	23rd floor	63.1	54.7	65.8	2.7	53.7	65.7	2.6	53.6	65.7	2.6	54.4	65.8	2.7	54.9	65.8	2.7
7	26th floor	62.9	57.1	65.9	**3.0**	53.9	65.6	2.7	53.8	65.6	2.7	55.7	65.7	2.8	57.1	65.9	**3.0**
	1st floor	68.6	63.9	75.9	**7.3**	63.8	75.9	**7.3**	63.8	76.0	**7.4**	63.9	76.0	**7.4**	63.9	76.1	**7.5**
	3rd floor	68.4	63.5	75.4	**7.0**	63.4	75.4	**7.0**	63.4	75.5	**7.1**	63.5	75.5	**7.1**	63.4	75.6	**7.2**
	5th floor	68.2	62.4	74.9	**6.7**	62.3	75.0	**6.8**	62.3	75.0	**6.8**	62.4	75.1	**6.9**	62.4	75.2	**7.0**
	7th floor	68.4	61.5	75.0	**6.6**	61.4	75.0	**6.6**	61.4	75.1	**6.7**	61.5	75.2	**6.8**	61.4	75.2	**6.8**
	10th floor	68.6	60.4	75.0	**6.4**	60.2	75.1	**6.5**	60.2	75.1	**6.5**	60.4	75.2	**6.6**	60.3	75.3	**6.7**
	12th floor	68.6	59.8	74.8	**6.2**	59.5	74.9	**6.3**	59.5	74.9	**6.3**	59.7	75.0	**6.4**	59.6	75.1	**6.5**
	15th floor	68.5	59	74.6	**6.1**	58.6	74.7	**6.2**	58.6	74.7	**6.2**	58.9	74.8	**6.3**	58.7	74.8	**6.3**
	17th floor	68.4	58.6	74.5	**6.1**	58.1	74.6	**6.2**	58.0	74.6	**6.2**	58.3	74.7	**6.3**	58.1	74.7	**6.3**
	20th floor	68.4	58.1	74.5	**6.1**	57.3	74.5	**6.1**	57.3	74.6	**6.2**	57.7	74.7	**6.3**	57.4	74.7	**6.3**
	23rd floor	68.3	57.8	74.4	**6.1**	56.7	74.4	**6.1**	56.6	74.5	**6.2**	57.2	74.6	**6.3**	57.1	74.6	**6.3**
8	26th floor	68.2	58.6	74.4	**6.2**	56.2	74.4	**6.2**	56.1	74.5	**6.3**	57.5	74.6	**6.4**	58	74.6	**6.4**
	1st floor	75.8	61.0	77.2	1.4	61.0	77.2	1.4	61.0	77.3	1.5	61.2	77.3	1.5	61.3	77.3	1.5
9	3rd floor	75.5	59.6	76.8	1.3	59.7	76.9	1.4	59.7	76.9	1.4	60.0	76.9	1.4	60.1	77.0	1.5
10	5 feet	76.7	57.7	77.9	1.2	57.8	77.9	1.2	57.7	77.9	1.2	59.1	78.0	1.3	59.9	78.0	1.3

Table K.4-2 (cont'd)

Construction Noise Analysis Results for Phase 2 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 2-2024 Analysis Year			Phase 2-2025 Analysis Year			Phase 2-2026 Analysis Year			Phase 2-2027 Analysis Year			Phase 2-2028 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase
	1st floor	72.3	50.2	73.5	1.2	50.4	73.5	1.2	50.3	73.5	1.2	51.4	73.5	1.2	51.7	73.5	1.2
	3rd floor	71.8	51.9	73.0	1.2	52.1	73.0	1.2	52.0	73.0	1.2	52.7	73.0	1.2	52.9	73.1	1.3
	5th floor	71.9	52.9	73.1	1.2	53.1	73.2	1.3	53.0	73.2	1.3	53.5	73.2	1.3	53.7	73.2	1.3
	7th floor	71.8	53.1	73.0	1.2	53.3	73.0	1.2	53.2	73.0	1.2	53.8	73.0	1.2	54	73.0	1.2
	10th floor	71.9	52.8	72.9	1.0	53.0	73.0	1.1	52.9	73.0	1.1	53.5	73.0	1.1	53.6	73.0	1.1
	12th floor	71.8	52.7	72.8	1.0	52.9	72.8	1.0	52.9	72.8	1.0	53.5	72.8	1.0	53.6	72.8	1.0
	15th floor	71.5	52.4	72.6	1.1	52.6	72.6	1.1	52.5	72.6	1.1	53.2	72.6	1.1	53.4	72.6	1.1
	17th floor	71.5	52.3	72.5	1.0	52.5	72.6	1.1	52.4	72.6	1.1	53.1	72.6	1.1	55.3	72.6	1.1
11	20th floor	71.4	51.9	72.3	0.9	52.2	72.4	1.0	52.0	72.4	1.0	53.1	72.4	1.0	57.2	72.5	1.1
	1st floor	69.9	48.9	70.6	0.7	50.3	70.6	0.7	49.7	70.6	0.7	61.5	71.1	1.2	66.5	72.0	2.1
	3rd floor	70.5	51.5	70.9	0.4	53.0	70.9	0.4	52.5	70.9	0.4	65.8	72.1	1.6	66.3	72.2	1.7
	5th floor	70.5	53.6	70.9	0.4	55.0	70.9	0.4	54.3	70.9	0.4	70.2	73.5	**3.0**	66.4	72.2	1.7
	10th floor	70.4	55.7	70.8	0.4	57.7	70.9	0.5	55.2	70.8	0.4	70.5	73.6	**3.2**	66.4	72.1	1.7
	12th floor	70.3	55.8	70.7	0.4	58.4	70.9	0.6	55.5	70.7	0.4	70.4	73.5	**3.2**	66.3	72.0	1.7
	15th floor	70.1	55.9	70.6	0.5	59.2	70.7	0.6	55.7	70.6	0.5	70.2	73.3	**3.2**	66.2	71.8	1.7
	17th floor	70.0	55.9	70.4	0.4	59.7	70.7	0.7	56.0	70.5	0.5	69.9	73.1	**3.1**	65.9	71.7	1.7
12	20th floor	70.6	55.5	70.8	0.2	59.2	71.0	0.4	55.3	70.8	0.2	68.3	72.7	2.1	63.9	71.5	0.9
	1st floor	74.9	59.1	76.7	1.8	59.3	76.7	1.8	59.2	76.7	1.8	60.6	76.7	1.8	60.7	76.8	1.9
	3rd floor	75.1	61.6	76.9	1.8	61.8	76.9	1.8	61.7	76.9	1.8	62.8	76.9	1.8	62.7	76.9	1.8
	5th floor	75.1	61.7	76.8	1.7	61.9	76.8	1.7	61.7	76.8	1.7	63.6	76.9	1.8	63.3	76.9	1.8
	7th floor	75.0	61.3	76.7	1.7	61.7	76.7	1.7	61.2	76.7	1.7	64.1	76.8	1.8	63.7	76.8	1.8
	10th floor	74.7	61.2	76.4	1.7	61.4	76.4	1.7	60.6	76.4	1.7	63.6	76.5	1.8	62.1	76.5	1.8
	12th floor	74.6	61	76.3	1.7	61.3	76.3	1.7	60.2	76.3	1.7	63.4	76.5	1.9	61.8	76.4	1.8
	15th floor	74.3	60.7	76.0	1.7	61.6	76.0	1.7	59.6	76.0	1.7	63.2	76.1	1.8	61.4	76.0	1.7
	17th floor	74.1	60.4	75.7	1.6	62.0	75.7	1.6	59.3	75.6	1.5	63.1	75.8	1.7	62.2	75.8	1.7
12a	20th floor	74.0	60.4	75.6	1.6	62.3	75.7	1.7	58.8	75.6	1.6	62.8	75.7	1.7	64.3	75.8	1.8
	1st floor	69.3	55.8	70.1	0.8	51.9	70.0	0.7	47.3	70.0	0.7	59.9	70.4	1.1	65.2	71.2	1.9
	3rd floor	70.1	57.6	70.8	0.7	54.0	70.7	0.6	49.7	70.6	0.5	65.1	71.7	1.6	65.2	71.7	1.6
	5th floor	70.0	59.8	70.9	0.9	55.8	70.7	0.7	50.9	70.6	0.6	69.5	73.1	**3.1**	65.2	71.7	1.7
	7th floor	70.0	62.7	71.2	1.2	58.6	70.8	0.8	52.0	70.6	0.6	69.5	73.1	**3.1**	65.2	71.7	1.7
	10th floor	70.1	63.6	71.2	1.1	61.0	70.9	0.8	53.9	70.6	0.5	69.4	73.0	2.9	65.1	71.6	1.5
	12th floor	70.2	63.6	71.2	1.0	60.7	70.8	0.6	54.0	70.5	0.3	69.4	72.9	2.7	65	71.5	1.3
	15th floor	70.1	65.1	71.4	1.3	62.2	70.9	0.8	54.3	70.4	0.3	69.2	72.8	2.7	64.8	71.4	1.3
	17th floor	70.0	65	71.3	1.3	62.4	70.8	0.8	54.3	70.3	0.3	69.0	72.6	2.6	64.7	71.3	1.3
13	20th floor	70.0	64.9	71.2	1.2	62.7	70.8	0.8	54.9	70.2	0.2	68.7	72.5	2.5	64.8	71.2	1.2

Table K.4-2 (cont'd)

Construction Noise Analysis Results for Phase 2 (Leq(1) values in dBA)

Noise Receptor	Receptor Height	Existing	Phase 2-2024 Analysis Year			Phase 2-2025 Analysis Year			Phase 2-2026 Analysis Year			Phase 2-2027 Analysis Year			Phase 2-2028 Analysis Year		
			Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase	Construction	Total	Increase
	1st floor	63.1	48.3	63.8	0.7	53.8	64.1	1.0	51.9	64.1	1.0	63.0	66.5	**3.4**	66.5	68.4	**5.3**
	3rd floor	63.0	49.9	63.6	0.6	58.8	64.8	1.8	53.2	63.9	0.9	70.2	71.1	**8.1**	71.3	72.0	**9.0**
	5th floor	63.0	50.6	63.6	0.6	60.1	65.1	2.1	54.4	64.0	1.0	72.5	73.0	**10.0**	74.7	75.0	**12.0**
	7th floor	63.0	51.7	63.7	0.7	60.9	65.4	2.4	55.8	64.2	1.2	72.5	73.0	**10.0**	74.6	74.9	**11.9**
	10th floor	63.1	53.1	63.7	0.6	64.0	66.7	**3.6**	56.4	64.2	1.1	72.8	73.3	**10.2**	74.5	74.8	**11.7**
	12th floor	63.3	53.6	63.8	0.5	65.3	67.5	**4.2**	57.7	64.5	1.2	72.9	73.4	**10.1**	74.1	74.5	**11.2**
	15th floor	63.3	53.6	63.8	0.5	66.7	68.4	**5.1**	59.3	64.8	1.5	72.6	73.1	**9.8**	73.6	74.0	**10.7**
	17th floor	63.3	53.9	63.8	0.5	67.3	68.8	**5.5**	61.6	65.6	2.3	72.4	72.9	**9.6**	73.3	73.7	**10.4**
14	20th floor	63.2	54.8	63.8	0.6	67.7	69.0	**5.8**	64.1	66.7	**3.5**	72.2	72.7	**9.5**	72.8	73.3	**10.1**
	1st floor	73.5	63.4	75.7	2.2	63.4	75.7	2.2	63.4	75.8	2.3	63.4	75.8	2.3	63.4	75.9	2.4
	3rd floor	73.3	62.9	75.2	1.9	62.9	75.2	1.9	62.9	75.3	2.0	63.0	75.3	2.0	63	75.4	2.1
	5th floor	73.4	61.7	74.9	1.5	61.7	75.0	1.6	61.7	75.0	1.6	61.8	75.1	1.7	61.8	75.1	1.7
	7th floor	73.3	60.6	74.7	1.4	60.6	74.8	1.5	60.6	74.8	1.5	60.7	74.9	1.6	60.7	74.9	1.6
	10th floor	73.2	59.4	74.6	1.4	59.4	74.7	1.5	59.4	74.7	1.5	59.7	74.8	1.6	59.5	74.8	1.6
	12th floor	73.1	58.7	74.5	1.4	58.7	74.5	1.4	58.7	74.6	1.5	59.0	74.7	1.6	58.8	74.7	1.6
	15th floor	73.2	57.8	74.4	1.2	57.8	74.5	1.3	57.8	74.6	1.4	58.2	74.6	1.4	58	74.7	1.5
	17th floor	73.1	57.3	74.3	1.2	57.3	74.4	1.3	57.3	74.4	1.3	57.7	74.5	1.4	57.6	74.6	1.5
	19th floor	73.2	57.6	74.4	1.2	57.7	74.5	1.3	57.7	74.5	1.3	58.0	74.6	1.4	57.8	74.7	1.5
15	21st floor	72.9	56.6	74.2	1.3	56.4	74.3	1.4	56.3	74.3	1.4	57.0	74.4	1.5	58.4	74.5	1.6

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APPENDIX K.5

CENTRAL BELOW-GRADE SERVICE AREA: MEMORANDA ON FLOODING AND SEISMIC ISSUES

Golder Associates Inc.

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October 29, 2007

Project No.: 073-86652
ELECTRONIC AND U.S. MAIL

Mark A. Chertok, Esq.
Sive, Paget & Riesel, P.C.
460 Park Avenue
New York, New York 10022-1906

Re: REVIEW OF MRCE OCTOBER 26, 2007 MEMORANDUM
COLUMBIA UNIVERSITY DEVELOPMENT PROJECT
WEST HARLEM, MANHATTAN, NEW YORK COUNTY, NEW YORK

Dear Mr. Chertok:

As you are aware, Golder Associates Inc. (Golder) was retained by Sive, Paget & Riesel, P.C. (SPR), legal counsel for the Empire State Development Corporation (ESDC), to provide professional geotechnical/foundation engineering "peer review" services in connection with the Manhattanville Educational Mixed-use Development Land Use Improvement and Civic Project located in West Harlem, New York County, New York.

INTRODUCTION

Golder is a premier global group of consulting companies, specializing in ground engineering and environmental science, which was founded in 1960 and currently includes more than six-thousand (6,000) dedicated professionals operating in local companies, with offices across Africa, Asia, Australasia, Europe, North America, and South America.

Our technical staff has expertise in a number of disciplines including, but not limited to, geotechnical and environmental engineering, engineering geology, geology, hydrogeology, environmental sciences, and construction services.

Locally, Golder has worked on a number of civil, transportation, land development, and "Brownfields" development projects for various public and private clients within the New York City region including, but not limited to, the Port Authority of New York and New Jersey, the Metropoitan Transportation Athority New York City Transit, and the New York State Thruway Authority.

In particular, Golder was/is involved on the following projects within the New York City region: a) the Dey Street Connector Project in Lower Manhattan; b) the Exchange Place Improvements Project in Jersey City, New Jersey; c) the 63rd Street Tunnel Connector Project in Long Island City, New York; d) the Lafayette Street-Rockwell Place Vent Plant Improvements Project in Brooklyn, New York; and e) the Hudson Bergen Light Rail Transit System in Hudson County, New Jersey.

BACKGROUND

Based on information provided, Golder understands the following with respect to the nature and scope of the subject Columbia University (CU) development project:

- The proposed Manhattanville Educational Mixed-Use Development Land Use Improvement and Civic Project is intended to achieve the following basic goals: 1) allow CU to fulfill its role as a leading academic and academic research institution, and thereby assist the City of New York in maintaining its status as a center for higher educational programs and scientific research; 2) facilitate the revitalization, improvement, and redevelopment of a portion of the Manhattanville section of West Harlem; 3) create new employment opportunities; and 4) provide new park-like open spaces within this section of West Harlem;

- The main portion of the CU development project site (Site) is located within a section of the Manhattanville neighborhood in West Harlem, which is bounded by West 125th Street and St. Claire Place to the south, West 133rd Street to the north, Broadway to the east, and 12th Avenue to the west;

- The proposed CU development is envisioned to be a modern, open, urban integrated teaching and academic research campus with about 6.8 million gross square feet of new, "state-of-the-art" above- and below-grade facilities housed within up to sixteen (16) new buildings;

- CU retained the services of Mueser Rutledge Consulting Engineers (MRCE) to serve as its designated Geotechnical/Foundation Engineer on its Project Design Team; and

- In concept, Golder understands that the planned foundation-construction activities will begin with the installation of a series of soil retention and slurry wall (or comparable) systems around the planned excavation perimeter, which would serve to provide temporary excavation support and control (i.e., "cut off") groundwater inflows. Once these walls are installed, mass excavation activities, up to approximately eighty (80) feet below grade, will start to remove the underlying soil/rock materials to achieve specified foundation subgrade levels. After these foundation subgrade levels have been reached, the proposed above- and below-grade structures will be constructed, per CU's design and Contract Document requirements.

Generally speaking, it is Golder's experience that all development projects, including the subject CU development project, have the same four (4) distinct project development stages/phases: 1) design investigation; 2) design analysis and evaluation; 3) contract document preparation; and 4) construction.

That said, Golder understands CU/MRCE have initiated and are actively in the process of undertaking the requisite subsurface exploration work (i.e., Stage 1), and have started some conceptual-level geotechnical/foundation design analyses (i.e., Stage 2) in connection with the subject project.

Accordingly, there is more geotechnical/foundation engineering design work to be performed before CU/MRCE can prepare and finalize the necessary construction documents and commence construction activities at the subject Site.

REVIEW OF MRCE OCTOBER 26, 2007 MEMORANDUM

Over the course of the subject project's public review process, Golder understands that third parties have expressed questions/concerns with respect to the design feasibility of the subject project. In particular, those parties have raised the following issues relative to the geotechnical/foundation design aspects of the project:

- Uncertainty with respect to subsurface conditions;
- Flooding of below-grade facilities; and
- Seismicity of the 125th Street Fault.

In response to these design concerns, MRCE has prepared a memorandum (see attached) responding to each of the above noted design feasibility issues, dated October 26, 2007, and Golder has reviewed this memorandum.

Golder also received a copy of an electronic mail (i.e., email) message (see attached) from Mr. Jan Cermak of MRCE, dated October 25, 2007, which briefly describes the scope and status of a number of seismic design studies, which are planned in connection with the subject project.

In subsequent sections herein, you will find the following information: a) brief synopses of each design concern; b) summaries of MRCE's responses to each concern; and c) Golder's comments and opinions relative to MRCE's responses.

Design Issue #1: ***Uncertainty with Respect to Subsurface Conditions***

Synopsis of Concern: This concern appears to be focused on the belief that variable subsurface conditions underlie the Site, and the perception that the underlying soil/rock masses can be characterized as "poor soil and foundation condition". To that end, there was reference to available historical borings within the vicinity of the Site indicate depths to bedrock vary widely across the Site and are deep (i.e., well over 100 feet and upwards of 200+ feet below ground surface) beneath portions of the Site. Hence, it is inferred that these depths to bedrock may pose considerable foundation design and construction challenges on the subject project.

MRCE Response: Based on its October 26, 2007 memorandum, the following provides selected highlighted points/comments made by MRCE relative to this design feasibility issue:

- "The site is in a geologic valley which was formed by a fault in the bedrock, known as the "125th Street Fault" that trends northwest-southeast. The subsurface profile varies greatly within the site. At the northeast corner of the site, bedrock is very shallow. At the southern portion of the site, the rock is deep and the soil consists of layers of sand, silt and glacial till."

- "Large variations in soil and rock stratigraphy occur at many sites in the New York Metropolitan area. While the deep soil and rock profile within the southern portion of ... the project make excavation support, construction dewatering and building support more difficult, these challenges have been overcome many time on other projects in New York City and throughout the world."

- "MRCE has undertaken a comprehensive subsurface investigation program to adequately characterize the subsurface profile. The initial phase of the boring investigation has been completed, providing information necessary for design of the excavation support systems and foundations. An extensive laboratory testing program has also been completed to provide design properties of the soil strata encountered in the borings. Additional investigations of in-situ geotechnical tests will be performed shortly to confirm the design soil properties."

- MRCE also indicates it will use this subsurface exploration design information in its geotechnical/foundation design analyses and evaluations. Golder understands MRCE is actively in the process of evaluating various types or shallow (i.e., mat/raft foundations) and deep (i.e., piles, drilled shafts, and/or caissons) foundation and excavation support systems/alternatives, and they plan to utilize a combination of analytical and numerical modeling methods to aid in their foundation design efforts.

Golder Comments: As stated above, this design concern appears to be centered on apparent uncertainties in the underlying subsurface profile, and perceived design and construction risks in connection with deep depths to bedrock.

MRCE's October 26, 2007 memorandum indicates that CU/MRCE was aware of this design concern during the early stages of the subject project, and is cognizant of and experienced with the potential design and construction issues associated with such subsurface uncertainties.

Furthermore, CU/MRCE has commenced, and is committed to completing the necessary Site-specific subsurface exploration programs to adequately investigate, define, and quantify these subsurface uncertainties and associated risks.

To date, Golder understands MRCE has completed an initial subsurface exploration program, including about seventy (70) new borings and an extensive amount of geotechnical laboratory testing performed on both disturbed and undisturbed samples collected from these borings.

Overall, at this time, Golder believes that MRCE's subsurface exploration approach is reasonable, is in general accordance with sound geotechnical engineering practices, and is consistent with how Golder would approach similar projects.

In addition, Golder believes that MRCE has collected an adequate amount of information to enable it to establish reasonable, preliminary geologic and hydrogeologic models for the subject project, which can be used to:

- Quantify subsurface uncertainties and risk;
- Define the nature and characteristic of the underlying subsurface conditions;
- Create subsurface design profiles;
- Establish preliminary design parameters; and
- Perform preliminary-level foundation design analyses and evaluations.

That said, as the project's foundation design process advances, Golder believes there may be a need for additional subsurface investigations and "in-situ" testing, and additional borings may be required to comply with the New York City Building Code (NYCBC) foundation design requirements.

Golder also believes that MRCE is adequately qualified to identify any apparent needs for additional subsurface investigations and testing, and they are possibly the firm most knowledgeable with the NYCBC foundation design requirements. Hence, Golder believes that MRCE has the necessary capabilities and resources to adequately undertake and complete the requisite subsurface explorations and foundation designs for the subject project.

Based on our review of information made available and our knowledge of similar construction projects and practices, Golder believes that MRCE is knowledgeable of the subsurface uncertainties and risks, has conducted appropriate studies to date, and is prepared to undertake the necessary foundation design studies to ensure that this design challenge adequately addressed.

It is also Golder's opinion that the subsurface conditions underlying the Site, as currently defined, do not represent or pose insurmountable or otherwise extraordinary foundation design obstacles or challenges. This conclusion is further supported by other large-scale deep excavation projects, as identified in MRCE's October 26, 2007 memorandum, that have been successfully completed with the New York City metropolitan region and throughout the world.

Design Issue #2: ***Flooding of Below-Grade Facilities***

Synopsis of Concern: This concern appears to be focused on the potential for flooding of the subject project's planned below-grade facilities, and can be further illustrated by the following questions:

- "What is or should be the design flood level for the project?";
- "To what extent are sea levels rising, and what future sea level will be used to establish the design flood level for the project?";
- "How will the proposed below-grade structures be designed to address flooding?"; and
- "To what degree and extent will hurricane storming surge flooding be incorporated into the project design?".

MRCE Response: Based on its October 26, 2007 memorandum, the following provides selected highlighted points/comments made by MRCE relative to this design feasibility issue:

- "Groundwater observed in the initial borings generally ranges from Elev. -1 to Elev. -5, with a gradient sloping downward from Broadway towards Twelfth Avenue. The street elevations within the site range from Elev. +8 on Twelfth Avenue to Elev. +20 to +60 on Broadway (sloping upward to north)."

- "Deep below-grade structures extending well below the groundwater table are not uncommon in New York City and are designed using standard engineering techniques in order to address potential flooding conditions."

- "[T]he walls and bottom of the below-grade structure will be designed to resist pressure from both the permanent groundwater levels and temporary flood condition. The bottom slab will provide a horizontal groundwater cut-off (bottom to the "bathtub") and will be designed to resist uplift pressures by weight of structure or tiedown elements."

- "A probabilistic risk-based analysis will be performed by a flood risk management specialist to evaluate risk levels associated with different flood hazard levels... The design flood levels will be determined based on the results of that study. The predicted estimates of the potential sea level rise will be accommodated by the design."

- "The underground spaces will similarly be designed to accommodate hydrostatic pressures from the design flood elevation and will be designed to prevent flooding by inundation. Measures to prevent flooding may include flood protection mechanisms (e.g., elevated thresholds and flood gates at the entrance ramps). As a further precaution, consideration is being given to compartmentalizing certain areas of the below ground space so that they can be sealed off in the unlikely event of a breach that could allow water to enter the underground space."

Golder Comments: This design concern/issue appears to be focused on the potential for adverse impacts flooding may have on the planned below-grade facilities. However, flooding is not the only design challenge associated with water levels external to the proposed below-grade facilities. As noted in MRCE's memorandum, the planned below-grade facilities will be subjected to the following two (2) design water conditions:

- Groundwater-induced hydrostatic (i.e., water) pressures; and
- Flooding of the Site.

In general, groundwater-induced hydrostatic pressures represent a "permanent" design condition, while flooding of the Site is considered to be a "temporary" design condition. Furthermore, it should be noted the requisite design "factors of safety" corresponding to each of these design conditions will likely be different, and each condition should be (and, according to the MRCE October 26, 2007 memorandum, are being) approached differently.

Because the planned below-grade facilities will be constructed upwards of fifty (50) to sixty (60) feet below the seasonal high water table (i.e., groundwater), the proposed foundation must be designed to accommodate (i.e., carry) imposed lateral hydrostatic pressures and uplift loads. In addition, design of the project's foundation systems should consider the potential for higher water pressures/loads to account for the temporary flooding events. As noted earlier, Golder believes MRCE is appropriately addressing both of these design loading conditions.

With respect to Site flooding, the magnitude and return periods (i.e., frequency of flooding) of potential flooding events are not easily established, and the risks associated with this design condition are directly tied to the statistical probability and size of such flooding events.

Hence, Golder believes that the project's design flood levels should be established utilizing probabilistic, risk-based analyses, which correlate design, construction, and operational uncertainties and risks to the frequency and magnitude of potential future flooding events. As noted in its October 26, 2006 memorandum, MRCE has committed to having a flood risk management specialist conduct these probabilistic flood hazard analyses.

Based on our review of the available information and our knowledge of similar construction projects and practices, Golder believes that MRCE is aware of the uncertainties and risks associated with the establishment of design groundwater and flooding levels, and is prepared to

undertake the necessary studies to ensure appropriate design water levels are incorporated into the project's foundation designs.

Overall, once design groundwater and flood levels are established for the subject project, Golder believes the process of incorporating these design water levels into the requisite foundation designs should be reasonably achieved utilizing standard design practices, and the MRCE memorandum provides examples of such techniques.

Design Issue #3: ***Seismicity of the 125th Street Fault***

Synopsis of Concern: This concern appears to be focused on the presence of the 125th Street Fault, which underlies the southern portion of the Site and generally parallels West 125th Street. Overall, the ability of structures to survive seismic events without significant losses of service and/or structural damage will be an important factor in the successful design and construction of the subject project.

MRCE Response: Based on its October 26, 2007 memorandum and Mr. Cermak's October 25, 2007 email, the following provides selected highlighted points/comments made by MRCE relative to this design feasibility issue:

- "The 125th Street Fault is one of six identified geologic faults or fault zones in New York City with locations ranging from lower Manhattan to the Harlem River at the northern tip of Manhattan. The 125th Street Fault is not a sharply defined fault, but rather a zone of sheared and broken rock."

- "The Manhattanville Development will be designed in accordance with the Code and its seismic design requirements."

- "A comprehensive site specific study of seismic issues at the site is underway. The study will evaluate potential earthquake hazards and associated risks to the proposed development using probabilistic analyses... As part of the seismic studies, MRCE is also evaluating the impact of potential soil liquefaction and the fault presence on the proposed development."

- MRCE has also been investigating the geologic parameters of the 125th Street Fault. The geometry and characteristic of the fault are not well defined.... Based on the assumed fault geometry and earthquake hazard studies, MRCE will evaluate the risk of potential movements along the fault."

Golder Comments: Design of structures within near proximity to known seismic faults are confronted with multiple design challenges, such as, but not limited to, the following:

- Structures must be designed to carry large seismic induced loads and ground displacements; and
- The potential of foundation subgrade soil liquefaction[1] must be evaluated.

[1] **Soil liquefaction** describes the behavior of loose, saturated, cohesionless soils (i.e. loose sands), which go from being in a solid state to having the consistency of a heavy liquid, as a consequence of being subjected to seismic (i.e., earthquake) loading events.

In concept, seismic events release large amounts of energy, which propagate radially from the epicenter of the seismic event through the underlying soil/rock formations, and in turn, are imparted onto the structures within the vicinity of the fault. Therefore, to quantify and evaluate the risks associated with seismic events, designers must establish the location (with respect to the Site), geometry, nature, and seismic history of the originating fault system.

At this time, Golder believes there is no definitive consensus with respect to the what seismic design parameters, in connection with the 125th Street Fault, should be incorporated into the subject project's designs. In addition, it appears the geometry, characteristic, and seismic history of the 125th Street Fault are not well known.

Hence, there will be a need for additional seismic design investigations to address this design concern, and the purpose of these seismic design investigations would be to adequately quantify geologic uncertainties associated with the 125th Street Fault and to establish Site-specific seismic design parameters, which would be incorporated into the subject project's design.

Furthermore, it should be noted that, as indicated in its October 26, 2007 memorandum and its October 25, 2007 email, MRCE is actively in the process of undertaking said additional seismic design investigations and analyses.

The NYCBC also contains specific seismic design requirements, which must be adhered to for the design of any new building structures in New York City, and Golder believes the combination of these NYCBC design requirements and the additional seismic design investigations and analyses, as anticipated and planned by MRCE, should adequately address this design concern.

If shallow (i.e., mat/raft foundations) foundation systems are considered, Golder believes the potential for soil liquefaction will likely be critical to the design of the planned foundation systems. As noted in its October 26, 2006 memorandum, MRCE is committed to undertaking and completing the necessary soil liquefaction analyses.

Furthermore, if the foundation subgrade soils are determined to be liquefiable, Golder believes said liquefaction susceptible materials could be improved utilizing standard ground improvement techniques (e.g., in-situ grouting, stone columns, vibrofloatation, compaction piles, and/or vertical drains).

Alternatively, there may also be a need to utilize deep (i.e., piles, drilled shafts, and/or caisson) foundations in lie of shallow foundation systems, if the liquefaction susceptible materials cannot be reasonable or economically addressed utilizing standard ground improvement methods.

Based on our review of the available information and our knowledge of similar construction projects and practices, Golder believes that MRCE is taking appropriate steps to evaluate the seismicity of the 125th Street Fault, and MRCE's approach to evaluating risks associated with potential movements along this fault system seem reasonable and appropriate.

Lastly, based on Golder's understanding of the NYCBC seismic design requirements, the seismic design studies currently envisioned and planned by MRCE, as defined in Mr. Cermak's October 25, 2007 email, appear to be in compliance with and potentially exceed the NYCBC seismic design requirements.

CONCLUSION

The proposed CU development will be a complex undertaking within a highly congested, urban Site, which poses a number of geotechnical/foundation design challenges. Among these design challenges are those described herein, each of which represent valid design concerns that must be evaluated, addressed, and incorporated into the subject project's foundation design process.

However, it is Golder's opinion that each of these design concerns can be effectively "engineered" to protect the safety of the community and people and utilities services within the proposed below-grade structures. Furthermore, Golder recognizes that similar design challenges have been encountered and successfully addressed (by MRCE, among others) on other projects throughout the New York City metropolitan region.

In addition, Golder recognizes that MRCE is an international geotechnical/foundation engineering design firm with possibly the most foundation design experience in the New York City metropolitan region. After reviewing MRCE's October 26, 2007 memorandum and Mr. Cermak's October 25, 2007 email, Golder is of the opinion that MRCE not only has the requisite technical expertise to undertake and complete the project's evolving geotechnical/foundation engineering design process, but has commenced and is prepared to undertake and complete the appropriate foundation design analyses to address the design concerns identified herein consistent with sound engineering practices.

CLOSURE

Golder is pleased to have the opportunity to prepare this letter, and looks forward to its continued involvement on the subject project, on behalf of SPR and ESDC. If you have any questions or require addition information, please feel free to contact the undersigned at (973) 645-1922 (ext. 31303).

Very truly yours,

GOLDER ASSOCIATES INC.

Mark F. McNeilly, P.E.
Practice Leader and Associate

Attachments
C.c.: D. Chorost (SPR)
R. Stetkar (Golder)
file

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MEMORANDUM

To: New York City Planning Commission
From: Alfred H. Brand and George J. Tamaro
Re: Columbia University, Proposed Manhattanville Development
Discussion of Feasibility Issues
File: 9924
Date: October 26, 2007

Columbia University is planning to develop a new campus in New York City. The main portion of the project, with a large interconnected underground space is between West 125th Street, West 133rd Street, Broadway and 12th Avenue. An elevated roadway, Riverside Drive Viaduct, is located above 12th Avenue and elevated IRT subway tracks run above Broadway.

Columbia University has retained Mueser Rutledge Consulting Engineers (MRCE) because of our firm's experience with structural foundation design and geotechnical issues not uncommon on projects adjacent to any waterfront. We understand that during the public review process, questions have been raised about the feasibility of the proposed large underground space ("bathtub") and about the potential environmental impacts of such a space. Specifically, the comments have cited poor soil conditions, vulnerability to flooding and storm surges, seismic conditions on the 125th Street fault line, and constructability. We have addressed those concerns in this memorandum. In particular we have been given memoranda by Dr. Klaus Jacob dated May 5, 2004 and August 25, 2004 and have been asked to comment on points raised.

Dr. Jacob's memo of May 5, 2004 also contains points numbered 1 and 2, which deal with positioning of tall buildings and transportation patterns. Those are planning issues which are not within our expertise and will not be discussed.

Subsurface Conditions and Constructability

Issue Description. Dr. Jacob refers to "the poor soil and foundation conditions" in Paragraph a of his May 5, 2004 memo. He notes that those conditions would make any deep structure on the site overly expensive or effectively impossible to build (he refers to very deep bedrock and "extensive and costly" piling). He also noted that the soils on the site could be "dynamically disturbed" during construction and pile driving. The May 5, 2004 memo notes that the fractured zones of the bedrock in the deepest portions of the site may be permeable. However, as set forth below, deep below-grade structures in poor subsurface conditions are not uncommon in New York City and engineering solutions are available to address those conditions.

Dr. Jacob's August 25, 2004 memo also describes reported construction difficulties during installation of caissons for the MTA bus garage at the northern end of the Manhattanville development. As discussed below, those difficulties were related to founding elements on sloping rock and they will be addressed in design.

Response. Historic maps of Manhattan Island prior to any development in the area show that the project site included swamp areas, lakes and a stream and show the Hudson River shoreline just west of the site. The site is in a geologic valley which was formed by a fault in the bedrock, known as the "125th Street Fault" that trends northwest-southeast. The subsurface profile varies greatly within the site. At the northeast corner of the site, bedrock is very shallow. At the southern portion of the site, the rock is deep and the soil consists of layers of sand, silt and glacial till.

Large variations in soil and rock stratigraphy occur at many sites in the New York Metropolitan area. While the deep soil and rock profile within the southern portion of the development to the project make excavation support, construction dewatering and building support more difficult, these challenges have been overcome many times on other projects in New York City and throughout the world. Deep below-grade structures extending well below the groundwater table and into soils sensitive to construction disturbance are not uncommon in New York City and will be addressed through standard engineering techniques.

MRCE has undertaken a comprehensive subsurface investigation program to adequately characterize the subsurface profile. The initial phase of the boring investigation has been completed, providing information necessary for design of the excavation support systems and foundations. An extensive laboratory testing program has also been completed to provide design properties of the soil strata encountered in the borings. Additional investigations of in-situ geotechnical tests will be performed shortly to confirm the design soil properties.

MRCE is using the information obtained from the subsurface investigation in its design of excavation support and foundations. Construction of the deep basement will require a partial or full groundwater cutoff using a slurry wall or similar earth support technology to reduce the amount of construction dewatering. Temporary dewatering will be required during construction to lower groundwater in advance of excavation to provide suitable subgrade conditions for construction. Furthermore, pumping from deeper deposits may be required to prevent or minimize heave of the excavation subgrade. The dewatering system will be designed based on results of field pump tests and will consider the presence of all permeable deposits.

Following foundation construction, the bottom slab will provide a horizontal groundwater cut-off (bottom to the "bathtub"). Pumping of groundwater from beneath the "bathtub" will not be

necessary after adequate downward resistance is in place by means of dead weight and uplift resisting elements.

An important factor in our design is to address the potential effects of the excavation and construction dewatering on adjacent structures. The excavation support system at the southern portion of the development will rely on deep concrete diaphragm walls (slurry walls) with internal and external support to resist lateral forces from the pressures of earth and groundwater surrounding the slurry wall. The external supports (e.g., tiebacks) will be designed so as to not interfere with any foundations of adjacent transit structures and existing buildings (e.g., the Studebaker Building). Within the northeast portion of the site, where bedrock is closer to the surface, excavation support systems including steel sheeting and steel soldier piles with lagging will be considered.

The excavation support system is intended to minimize the effects of excavation and construction dewatering. For example, with slurry wall construction, the installation of each slurry wall panel requires relatively little excavation under slurry to provide stability. Once the slurry wall and its lateral supports are installed, they act to hold the soils and groundwater outside the "bathtub" in place, so that major excavation for the below grade structure can go forward while significantly reducing the risk of damage to any foundations outside the slurry wall. In addition, any excavation and foundation work near other buildings is subject to the protection requirements of the New York City Department of Buildings.

Because the excavation will remove significant weight of overburden soils, the net increase in bearing pressure at the bottom of the new structures on the soils below may not be large, so that a foundation mat may be used. This mat is a concrete slab that transfers the weight of the structures above directly onto the soil, without the need for deep piles. The selection of the foundation support will depend on loading and subsurface conditions within the particular portion of the site. Our design of the foundation systems will consider all available foundation systems and will include numerical modeling of the entire system to estimate potential settlements and their impact on the structure.

MRCE has worked on similar large-scale projects involving deep excavations in New York City with difficult subsurface conditions. For example: the combined sewage overflow tank at Paerdegat Basin in Brooklyn, NY, which is a five-acre concrete tank structure about 45 to 55 feet deep surrounded by slurry walls 190 feet deep in sandy soils immediately adjacent to Jamaica Bay. The concrete tank structure is analogous to a deep basement with its base founded on soil at a depth about 40 feet below the groundwater table. It is normally empty and is held down against hydrostatic uplift by soil anchors. Another example is the 17-acre World Trade Center bathtub in Downtown Manhattan, which is a 70-foot deep basement surrounded by slurry walls up to 100

feet deep. That site and the World Financial Center at Battery Park City which has similarly deep basements are very close to the Hudson River. In fact, the World Financial Center sits on what used to be the bed of the Hudson River.

With regard to Dr. Jacob's comment about construction of the Bus Depot, we are aware of those difficulties through our involvement in that project. Those difficulties were related to founding elements on sloping rock. Such conditions have occurred on other projects as well. Proper site characterization through borings and appropriate technical specifications and controls will be used to identify and address such conditions during construction.

An internationally recognized construction management firm, Bovis Lend Lease (Bovis), has been retained by Columbia University to further review construction issues and provide detailed cost estimates for the proposed development. Bovis has extensive experience with projects of a similar magnitude. Additionally, potential construction issues related to both the excavation support and foundation systems have been discussed with contractors experienced in similar construction.

Groundwater, Hydrostatic Head and Flood Levels

Issue Description. Other concerns of Dr. Jacob and those commenting on the DEIS are that the area would be subject to flooding and storm surges, such that the deep below-grade basement and all its important facilities would be at continual risk. Dr. Jacob also noted that rising sea levels (up to 3 feet in next 100 years) have to be considered.

Dr. Jacob has provided case histories showing that the PATH system at Hoboken NJ was flooded in 1992 and LaGuardia Airport was flooded in 1950. Those sites are not similar to the Manhattanville project because those sites are at lower elevations and are within the present 100-year flood zone define by the Federal Emergency Management Agency (FEMA), which the project site is not, as discussed below.

Response. Groundwater observed in the initial borings generally ranges from Elev. -1 to Elev. +5, with a gradient sloping downward from Broadway towards Twelfth Avenue. The street elevations within the site range from Elev. +8 on Twelfth Avenue to Elev. +20 to +60 on Broadway (sloping upward to the north). Flood Insurance Rate Maps (FIRMs) published by FEMA define the 100-year flood level for the project vicinity. The 100-year flood level for the area is at 10 feet above the 1929 Mean Sea Level (MSL), which equals Elev. +7.25 BPM Datum.1 The FIRM maps also

1 All elevations herein refer to Borough President of Manhattan (City) Datum (BPM Datum) which is 2.75 feet above Mean Sea Level (M.S.L.) at Sandy Hook, New Jersey, in 1929.

show areas subject to flooding during a 500-year flood. However, the maps do not define the 500-year flood elevation, and only show the extent of the area of expected flooding. The limits of both the 100-year flood and 500-year flood are shown west of Twelfth Avenue and do not extend into the project site.

The Corps of Engineers in the past estimated a maximum flood level at 15 feet above Mean Sea Level datum, which is equal to Elev. +12.25 in BPM Datum. This flood could result in flooding to about 50 feet to 200 feet east of Twelfth Avenue within the project site. More recent studies indicate that under the worst case conditions higher flood levels may occur.

Deep below-grade structures extending well below the groundwater table are not uncommon in New York City and are designed using standard engineering techniques in order to address potential flood conditions. As noted above, the walls and bottom slab of the below-grade structure will be designed to resist pressure from both the permanent groundwater levels and temporary flood conditions. The bottom slab will provide a horizontal groundwater cut-off (bottom to the "bathtub") and will be designed to resist uplift pressures by weight of structure or tiedown elements.

A probabilistic risk-based analysis will be performed by a flood risk management specialist to evaluate risk levels associated with different flood hazard levels and will include considerations of rising sea levels. The potential future change to 100-year and 500-year flood levels will be addressed in the study. The final design flood levels will be determined based on the results of that study. The predicted estimates of the potential sea level rise will be accommodated by the design.

Unlike this project site, significant portions of Downtown Manhattan are located within the 100-year and 500-year flood zones, including the Financial District area southeast of Water Street and the West Street area. Many projects containing deep basement are in or abutting those areas, such as the World Trade Center Development reconstruction projects, the World Financial Center, a recent commercial tower at Battery Park City, and other high-rise developments along West Street (at Chambers Street and Warren Street) and on South Street. For example: buildings at the World Financial Center at Battery Park City have deep basements constructed with slurry walls within as little as 20 feet of the Hudson River. These basements have entrances above the predicted flood level or include provisions for water barriers to be activated in anticipation of a flood.

The underground spaces will similarly be designed to accommodate hydrostatic pressures from the design flood elevation and will also be designed to prevent flooding by inundation. Measures to prevent flooding may include flood protection mechanisms (e.g., elevated thresholds and flood

gates at the entrance ramps). As a further precaution, consideration is being given to compartmentalizing certain areas of the below ground space so that they can be sealed off in the unlikely event of a breach that could allow water to enter the underground space.

The New York City Office of Emergency Management has mapped the present site as an evacuation zone "C" area. Zone "C" areas are subject to storm surge flooding should a category 3 or 4 hurricane make landfall just south of New York City. The evacuation zone map identifies such an occurrence as unlikely, but not impossible. The evacuation zone map shows large areas of metropolitan New York in Zone "C", including most of eastern Harlem area (east of Lenox Ave.) and broad areas of lower Manhattan within several blocks of the Hudson and East Rivers. The map does not provide the actual flood elevation assumed. However, we believe that the Manhattanville site was mapped as Zone "C" because the western end of the site is within the extreme flood elevation and the designation was extended to cover the entire site even though the elevations along Broadway are substantially higher. The design of the Columbia University project will accommodate flooding risk from hurricane events through techniques described above.

Seismic Issues

Issue Description. Design of structures in New York City requires consideration of potential seismic loading. Design must be in accordance with seismic requirements of the new New York City Building Code (Code). Dr. Jacob correctly states (May 5, 2004 memo top of page 2) that the potential for soil liquefaction must be studied. The analysis of liquefaction is required by the Code.

Response. The largest earthquakes recorded in the New York City metropolitan area have not been associated with the 125th Street Fault or any other specific fault. Two recent minor seismic tremors of magnitude M = 2.4 to 2.6 have been attributed to the 125th Street Fault by local geologists. Both of those tremors were located deep below the ground surface in the eastern part of Manhattan or even farther to the east.

The 125th Street Fault is one of six identified geologic faults or fault zones in New York City with locations ranging from lower Manhattan to the Harlem River at the northern tip of Manhattan. The 125th Street Fault is not a sharply defined fault, but rather a zone of sheared and broken rock. The nearest two other faults are the East River Fault in Midtown Manhattan and Harlem River Fault. The East River Fault crosses Midtown Manhattan diagonally (from the Lower East Side to Upper West Side) and the Harlem River Fault lies underneath Harlem River and may cross Manhattan under Washington Heights. The New York City area is not near any continental plate boundaries, so the nature of faults and potential movement on faults are different

from other areas of the country, such as the west coast.

The Manhattanville Development will be designed in accordance with the Code and its seismic design requirements. Design of structures in New York City requires buildings to withstand a seismic event of magnitude on the order of M = 6 with a return period of 2,500 years, which represent substantially higher energies than those of the observed small tremors (about 100,000 times higher) and higher than any recorded earthquakes in New York City. All known seismic hazard studies used to establish the Code design criteria do not consider any of the faults in the rock below Manhattan to be active earthquake mechanisms.

A comprehensive site specific study of the seismic issues at the site is underway. The study will evaluate potential earthquake hazards and associated risks to the proposed development using probabilistic analyses. Such a study is typically not performed for most buildings in New York City. However, high-rise buildings, stadiums, and large transportation facilities may require a comprehensive study depending on the subsurface conditions and performance requirements. We have recently performed similar studies for several high-rise buildings in Manhattan (e.g., Freedom Tower and Battery Park City Site 26 Tower), stadiums (e.g. new Yankee and Shea Stadiums) and transportation projects (e.g., JFK Light Rail and Williamsburg Bridge).

We have completed a study of the area seismicity and a field testing program to determine the in-situ dynamic properties of soil strata. Additional in-situ testing will be performed shortly to confirm the soil properties. The data is being used for our analyses of the soil profile response to a seismic event. Due to the complex geology of the Manhattanville Valley, a two-dimensional analysis is being prepared. The site-specific analysis will provide seismic parameters for structural seismic design of the proposed structures.

As part of the seismic studies, MRCE is also evaluating the impact of potential soil liquefaction and the fault presence on the proposed development. Liquefaction refers to the loss of strength that some soils experience upon being shaken. The initial boring program has produced a substantial amount of data to enable the liquefaction potential to be studied. That data with the additional in-situ testing data, will allow a comprehensive evaluation of the liquefaction potential to be made. If it is determined that there is a potential for liquefaction, its effects will be studied and engineering solutions such as ground improvement to reduce the risk of groundwater pressure build up will be used to solve the issue (e.g., grouting, stone columns).

MRCE has also been investigating the geologic parameters of the 125th Street Fault. The geometry and characteristics of the fault are not well defined. Results from other area investigations and construction observation from other projects (e.g., NYC Water Tunnel) have been used to estimate the fault geometry. Based on the assumed fault geology and earthquake

hazard studies, MRCE will evaluate the risk of potential movement along the fault. If it is determined that there is a reasonable risk of such a movement, MRCE will perform an analysis to estimate the magnitude and character of the movement and its effect on the proposed structure, and investigate measures to mitigate the associated risk. Those may include forms of flexible construction to allow for some displacement, or rigid construction to withstand the displacement. We have already been in contact with geo-seismic engineers at earthquake centers at the University of Buffalo and University of California, Berkeley to discuss possible design issues related to the potential fault movement risk. Potential movements of active faults have been considered in design of several structures in active seismic areas (e.g., California).

Closure

We recognize that the site has unique geotechnical characteristics. However, these do not include any that have not been encountered and addressed on other projects. These characteristics have been and will continue to be explored, and will be addressed in the design process. Appropriate engineering solutions are available and will be applied to address all site-specific issues that may arise during design.

By: _____
Alfred H. Brand, P.E.

By: _____
George J. Tamaro, P.E.

Subject: FW: Seismic study
Date: Thursday, October 25, 2007 6:39 PM
From: Leland, Richard G. <Richard.Leland@friedfrank.com>
To: Mark McNeilly <mark_mcneilly@golder.com>
Cc: Dan Chorost <dchorost@sprlaw.com>, Mark Chertok <mchertok@sprlaw.com>, DAVID KARNOVSKY <dkarnov@planning.nyc.gov>, <DAllee@akrf.com>
Conversation: Seismic study

As per Mark Chertok's request, below is list of the studies performed or to be performed by Muesser-Rutledge on behalf of Columbia University.

Richard G. Leland
Partner
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One New York Plaza
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212.859.8978 (voice)
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richard.leland@friedfrank.com

From: Jan Cermak [mailto:jcermak@mrce.com]
Sent: Thursday, October 25, 2007 5:23 PM
To: Leland, Richard G.
Cc: Velez, Marcelo
Subject: Seismic study

MRCE seismic study includes:
1. Research of general seismicity of the area including the 125th Street fault and provide detailed specification for site testing. (completed)

2. Performance of crosshole seismic testing. (completed)

3. Perform one-dimensional site-specific seismic analyses to provide preliminary recommendations for design. (completed)

4. Detailed research of the 125th street fault history, geology and geometry. Includes contributions from Prof. Merguerian of Hofstra University who personally observed rock conditions during the construction of the City Water Tunnel #3 which crossed the fault. (mostly completed).

5. Review existing probabilistic seismic hazard analyses by USGS which was used to determine

NYC Building Code seismic design requirements and, if necessary, perform an independent analysis to evaluate potential seismic hazard due to the seismic sources around the site. In addition, we will evaluate the seismic hazard in a deterministic manner assuming an earthquake event that may occur along the 125th Fault. The result of this task will be to determine the final design rock input design motions. (started)

6. Due to the complex geology of the site, perform a two-dimensional wave propagation analysis to determine the seismic soil response, including the effects of the topography. The dynamic soils profile will be based on data from the cross-hole seismic testing and additional in-situ seismic testing to be performed shortly. The input earthquake at the rock level will be determined in task 5 and will be propagated through the soil profile. The design ground accelerations will be evaluated under free-field conditions at the ground surface and elevations of interest for design.

7. An assessment of kinematic effects, i.e., effects the deep slurry wall will have on the design ground motions. This will require modeling of the proposed foundation system with the surrounding soil that will be accelerating with the free field motions. The design motions which will include the effects of the foundations may provide significant filtering of stresses in the soil that affect the liquefaction risk and pressures on below-grade walls.

8. A detail study to investigate liquefaction potential of existing soils. Results from previous three tasks will be used to determine demand that will be imposed on the soil due to the design earthquake. This demand will be compared to the soil resistance derived from the field and laboratory tests. If there is liquefaction potential, we will investigate its risk and its impact on design. We will provide recommendations to address or mitigate the risk. Considerations will be given to the soil gradation and gologic history. (started)

9. An investigation of potential of fault movement due to seismic events. This investigation will consider an earthquake on the fault and seismic activity in the vicinity of the fault. The investigation will determine if there is a reasonable potential for movement of the fault. If necessary, a magnitude of the potential displacement and its propagation through the subsurface profile will be determined. As this type of a detailed investigation has only recently been developed by researches, outside experts on geo-seismic issues related to soil-foundation interaction under fault movements will be consulted (Profs. Bray and Gazetas). We may need to model the foundation under a displacement of the fault. (started)

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