APPENDIX F

DRAFT CONFORMITY DETERMINATION

LOWER MANHATTAN DEVELOPMENT CORPORATION

World Trade Center Memorial and Redevelopment Plan

DRAFT

Conformity Determination

April 2004

A. BACKGROUND

The Proposed Action involves the construction of a World Trade Center Memorial and memorial-related improvements, as well as commercial, retail, museum and cultural facilities, new open space areas, new street configurations, and certain infrastructure improvements at the World Trade Center Site (WTC Site) bounded by Liberty, Church, and Vesey Streets and Route 9A and the Southern Site, which comprises two city blocks south of the WTC Site and portions of Liberty Street and Washington Street. A detailed description of the project components and the proposed construction process can be found in the FGEIS. The Draft Conformity Determination available for public review explicitly states which portions of the Proposed Action would be funded by HUD (or by another federal agency) as well as portions that might be federally–funded (but could be funded by a non-federal entity); however, all emissions that would be federally–funded or might be federally–funded have been included in the Draft Conformity analysis in order to present a conservative analysis. Specifically, the federally–funded portions of the Proposed Action might include portions of the following uses: a) cultural uses in the northwest and southwest quadrants of the WTC Site; b) the Memorial; c) open spaces; d) deconstruction of the building at 130 Liberty Street (Deutsche Bank); and e) sub-grade construction at the Southern Site.

The Clean Air Act (CAA), as amended in 1990, defines a non-attainment area (NAA) as a geographic region that has been designated as not meeting one or more of the National Ambient Air Quality Standards (NAAQS). The Proposed Action is located in Lower Manhattan, New York County, which has been designated by the EPA as a moderate NAA of the NAAQS for PM_{10} and severe NAA for ozone. No formal designation has been made to date regarding attainment of the NAAQS for fine particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$), which became effective September 16, 1997. The area is in attainment of all other criteria pollutants: nitrogen dioxide (NO_2), lead, sulfur dioxide (SO_2) and carbon monoxide (CO). EPA had re-designated New York City as in attainment for CO on April 19, 2002 (67 FR 19337); the CAA requires that a maintenance plan ensure continued compliance with the CO NAAQS for former NAAs.

A State Implementation Plan (SIP) is a state's plan on how it will meet the NAAQS under the deadlines established by the CAA. In November 1998, New York State submitted its *Phase II Alternative Attainment Demonstration for Ozone*, which addressed attainment of the NAAQS by 2007, and has recently submitted revisions to the SIP for the attainment of the one-hour ozone NAAQS. These SIP revisions included additional emission reductions that EPA requested to demonstrate attainment of the standard and also update the SIP estimates using a new EPA model to predict mobile source emissions (MOBILE6).

The general conformity requirements in 40 CFR Part 93, Subpart B, apply to those federal actions that are located in a non-attainment or maintenance area, and that are not subject to transportation conformity requirements at 40 CFR Part 51, Subpart T, or Part 93, Subpart A, where the action's direct and indirect emissions have the potential to emit one or more of the six criteria pollutants (or precursors, in the case of ozone) at emission rates equal to or exceeding the prescribed rates at 40 CFR § 93.153(b), or where the action encompasses 10 percent or more of a NAA or maintenance area's total emissions inventory for that pollutant. In the case of New York City, the prescribed annual rates are 25 tons of VOCs or NO_x (severe ozone NAA), 100 tons of CO (maintenance area), and in New York County only, 100 tons of PM_{10} (moderate PM_{10} NAA).

LMDC, as the recipient of HUD Community Development Block Grant Funds, has determined that the total annual direct and indirect emissions of CO, VOCs and PM_{10} from the Proposed Action that could be applicable to the general conformity regulations are less than the rates prescribed in 40 CFR Part 93 that would trigger the requirement to conduct a general conformity determination. Therefore, a general conformity determination for CO and PM_{10} emissions is not required. Temporarily, during some of the construction years, annual NO_x emissions are predicted to exceed the prescribed rate of 25 tons per year; accordingly, LMDC has concluded that a determination of conformity with the ozone SIP is required.

B. REQUIREMENTS OF THE CONFORMITY DETERMINATION

The purpose of the conformity analysis is to establish that the federally–funded portions of the Proposed Action would conform to the New York ozone SIP, thereby demonstrating that total direct and indirect emissions of the ozone precursors, NO_x and VOC, from the project would not:

- cause or contribute to any new violation of any standard in the area,
- interfere with provisions in the applicable SIP for maintenance of any standard,
- increase the frequency or severity of any existing violation of any standard in any area, or
- delay timely attainment of any standard or any required interim emission reductions or other milestones in the SIP for purposes of—
  1. a demonstration of reasonably further progress (RFP),
  2. a demonstration of attainment, or
  3. a maintenance plan.

For the purposes of a general conformity determination, direct and indirect emissions are defined as follows (40 CFR § 93.152):

- Direct Emissions: Those emissions of a criteria pollutant or its precursors that are caused or initiated by the federal action and occur at the same time and place as the action;
- Indirect Emissions: Those emissions of a criteria pollutant or its precursors that—
  1. are caused by the federal action, but may occur later in time and/or may be further removed in distance from the action itself but are still reasonably foreseeable; and
  2. the federal agency can practicably control and will maintain control over due to a continuing program responsibility of the federal agency.

LMDC has concluded that the pollutants of concern regarding the ozone SIP conformity are the ozone precursors: NO_x and VOCs. These precursors were the basis for the ozone SIP analysis for the ozone NAA, and are therefore used for this general conformity determination. LMDC has determined that the only predicted emissions due to the project would include direct emissions from engines operating on-site during construction, and indirect emissions from construction-related vehicles traveling to and from the site.[1]

C. PRESUMPTION OF CONFORMITY

LMDC has reviewed the air quality analysis conducted for the Proposed Action consistent with the requirement of 40 CFR Part 93, ‘‘Determining Conformity of General Federal Actions to State or Federal Implementation Plans (SIP).” A detailed description of the methodology and results of the project emissions inventory analysis are presented in the appendix.

The Proposed Action would be located in an area designated as a moderate non-attainment area for PM_{10}, and CO attainment maintenance area. LMDC has determined that maximum predicted direct and indirect emissions of CO and PM_{10} from the federally–funded portions of the Proposed Action is predicted to be 58.0 and 3.2 tons per year, respectively. The CO and PM_{10} emissions would be below the prescribed level of 100 tons per year as defined at 40 CFR § 93.153; therefore, no further conformity determination was deemed necessary for CO or PM_{10}.

The Proposed Action would be located in an area designated as a severe ozone non-attainment area under the 1-hour average ozone NAAQS. The direct and indirect emissions during construction of the federally–funded portions of the Proposed Action were predicted to exceed the prescribed level for severe ozone non-attainment areas (25 tons per year of NO_x). Therefore, LMDC has reviewed the local NO_x and VOC emissions modeling analyses for the Proposed Action and has determined the following:

- The methods for estimating direct and indirect emissions from the Proposed Action meet the requirements of 40 CFR § 93.159. The emissions scenario used in the air quality analysis is expected to produce the greatest off-site impacts on a daily and annual basis. Non-road engine emissions were predicted using the NONROAD model—the latest EPA model for determining emissions from non-road engines. On-road emissions were predicted using the MOBILE6 model—the latest EPA model for predicting emissions from on-road vehicles. Resuspension of road dust by on-road vehicles was estimated using the latest EPA guidance set forth in “AP-42—Compilation of Emission Factors.” All of the above emissions modeling procedures were conducted based on the latest EPA guidance.

[1] Pursuant to the direction of the Interagency Consultation Group, LMDC is coordinating with the New York State Department of Transportation, New York State Department of Environmental Conservation, EPA, and the Metropolitan Planning Organization in order to make transportation data from the operational phase of the Proposed Action available for inclusion in the regional transportation Best Practices model and in the regional Transportation Improvement Program (TIP).

- The federally–funded portions of the Proposed Action were predicted to result in the following emissions of NOx and VOCs (total tons per year):

Year	2004	2005	2006	2007	2008	2009-2013
NO_x	4.2	61.4	39.6	19.2	16.1	None
VOCs	0.4	6.2	3.6	1.5	1.3	None

- Pursuant to 40 CFR § 93.158(a)(5)(i)(A), the New York State Department of Environmental Conservation (NYSDEC) has determined and documented that the total of direct and indirect VOC and NO_x emissions from the federally–funded portions of the Proposed Action, together with all other emissions in the non-attainment area, would not exceed the emissions budget specified in the "New York State Implementation Plan for Ozone—Phase II Alternative Attainment Demonstration." NYSDEC's letter of determination and documentation is attached in the Appendix.
- The Proposed Action does not cause or contribute to any new violation, or increase the frequency or severity of any existing violation, of the standards for the pollutants addressed in 40 CFR § 93.158.
- The Proposed Action does not violate any requirements or milestones in the ozone SIP.

Based on these determinations, the federally–funded portions of the Proposed Action are presumed to conform to the applicable SIPs for the project area. The activities that are presumed to conform include construction-related activities of the portions of the Proposed Action that may be federally–funded.

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION LETTER OF CONCURRENCE

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New York State Department of Environmental Conservation
Division of Air Resources
Bureau of Air Quality Planning, 2nd Floor
625 Broadway, Albany, New York 12233-3251
Phone: (518) 402-8396 • **FAX:** (518) 402-9035
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

April 28, 2004

Mr. Michael Lee
President, AKRF
117 East 29th Street (5th Floor)
New York, New York 10016

Dear Mr. Lee:

My staff has completed their review of the general conformity statement prepared for those portions of the World Trade Center Memorial and Redevelopment Plan to be funded by the United States Department of Housing and Urban Development (HUD) as forwarded by your staff by e-mail to the New York State Department of Environmental Conservation's (Department) Division of Air Resources.

The Department concurs with the analysis demonstrating that the emission levels for carbon monoxide, particulate matter of 10 microns or less, and volatile organic compounds do not exceed the limits of the conformity requirements of the Clean Air Act (Act) as regulated under 40 CFR Part 93 (General Conformity). General Conformity would apply to Nitrogen Oxide (NOx) emissions in the New York Metropolitan severe ozone nonattainment area.

The Department further concurs with the determination that the total direct and indirect NOx emissions resulting from constructing those portions of the World Trade Center Memorial and Redevelopment Plan funded by HUD will, when combined with all other NOx emissions in the nonattainment area, result in a level of emissions which neither exceeds the emission budgets specified in the applicable State Implementation Plan (SIP) nor delay the attainment of the applicable National Ambient Air Quality Standard. This determination is based on three contributing factors.

1) The total nonroad portion of the Reasonable Further Progress (RFP) budget for 2005 is 166.0 tons per day (tpd), and the RFP emission for all sources for the nonattainment region in that year is over 600 tpd (see the approved New York State Implementation Plan - Phase II Alternative Attainment Demonstration). The highest annual total of direct and indirect emissions resulting from those actions funded by HUD occurs in 2005 at a conservative level of 61.4 tons per year. When converted to "tpd" for comparison to the emission budgets in the applicable approved SIP, the amount of NOx emissions would be 0.17 tpd or less than 0.1 percent of the nonroad emissions in the region, and less than 0.03 percent of the total NOx emissions planned for in that year. Therefore, the impact of these emissions on the nine and one-half county New York Metropolitan severe ozone nonattainment area would be negligible.

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2.

2) To demonstrate RFP, the emissions of the base year must be adjusted for future years to account for expected growth in emissions. The growth factors used in the approved applicable SIP were based on Bureau of Economic Growth's factors for the construction industry. The growth rates used were consistently higher than one percent (see the approved New York State Implementation Plan - Phase I and Phase II Alternative Attainment Demonstration). In order to ascertain if this growth rate was sufficient to accommodate the actual growth that has occurred, New York State Department of Labor's (DOL) statistics for the construction industry were reviewed. For the New York City area, DOL statistics show an average growth rate of 0.1 percent, which is considerably lower than the emission growth rate accommodated in the SIP.

3 Finally, the World Trade Center power consumption was significant when functional. As this usage will be discontinued until the World Trade Center is reconstructed, there would be an accompanying drop in emissions. While this "offset" is not normally used in General Conformity analyses, given the unique situation, it is an undeniable impact on regional emissions.

Should your or your staff have any questions, please contact Elizabeth Bartlett of my staff at (518) 402-8396.

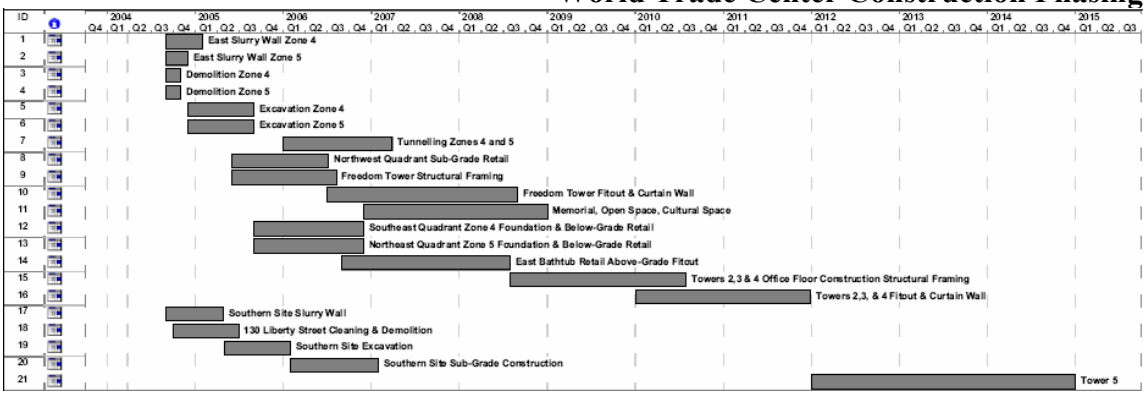
Sincerely,

Carl Johnson
Deputy Commissioner
Office of Air and Waste Management

INVENTORY OF REGIONAL EMISSIONS FROM THE PROPOSED ACTION

An inventory of annual emissions related to the portions of the construction of the Proposed Action funded by federal agencies—including construction engines which would be operating on-site and vehicles serving the construction operations—was prepared, and is presented below. Emission factors were modeled using EPA's MOBILE6.2, AP-42 and NONROAD emissions models. A detailed description of the construction process, associated on road trips and the engines predicted to be operating on-site throughout the construction years can be found in Attachment 1. The construction schedule of the entire project is presented in Fig 1.

Figure 1
World Trade Center Construction Phasing



MOBILE SOURCE EMISSIONS

Vehicular exhaust emission factors were computed using the EPA Mobile Source Emissions Model, MOBILE6.2. This is the latest, recently released, emissions model, capable of calculating engine emission factors for various vehicle types, based on the fuel (gas, diesel, or alternative technologies), meteorological conditions, vehicle speeds, roadway types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs.

NYSDEC has submitted detailed draft MOBILE6 regional emissions modeling results to EPA for 2007 as an update to the ozone SIP, including a breakdown of miles traveled on all roadway types and speeds by all vehicle classes. This model was used to generate NO_x, PM_{10} and VOC emissions for all model years. This input included meteorological conditions from the SIP determination, reflecting the summer ozone season conditions. The same model was revised in order to produce worst case winter CO emissions; ambient temperature of 52.5° Fahrenheit was used. This temperature, calculated based on the latest guidance from EPA, NYSDEC, and NYCDEP, represents the average temperature measured at the Central Park meteorological station during the 10 highest 8-hour CO events measured at the East 34th Street NYSDEC *air quality* monitoring station during the years 2000 through 2002. All construction trucks were assumed to be of the heaviest category, greater than 70,000 lb GVWR. Travel was assumed to take place 80% on urban principal arterial, 10% on minor arterial and 10% on collector roads. These calculated emissions factors, presented in Table 1 below by year and vehicle type, were used in the inventory.

All worker, supervisor, service, utilities and fuel trips were assumed to be a round-trip distance of 18.4 miles, which is the average distance traveled for work related trips as reported by the New York Metropolitan Transportation Council (NYMTC). Concrete trucks were assumed to travel a distance of 26.2 miles—the average distances to four major concrete plants that were identified as potential suppliers. All other materials and excavated material removed from the site were assumed to travel across the George Washington Bridge, a round trip distance of 20.6 miles within the New York Metropolitan area.

Table 1
Vehicle Engine Emission Factors by Year

Vehicle Type	Pollutant	Emission Factor by year (g/VMT)				
		2004	**2005**	**2006**	**2007**	**2008**
Car	NO_x	1.42	1.27	0.95	0.88	0.81
	VOC	1.77	1.60	1.40	1.29	1.19
	CO	20.79	19.31	15.52	13.38	12.96
	PM_{10}	0.0271	0.0263	0.0251	0.0251	0.0250
Truck	NO_x	16.43	14.53	13.15	11.77	10.53
	VOC	1.31	1.21	1.11	1.02	0.97
	CO	9.79	9.14	8.61	8.04	6.87
	PM_{10}	0.4029	0.3804	0.3566	0.3154	0.2695
Notes: Assumes 80% urban principal arterial, 10% minor arterial, 10% collector roads **Sources:** MOBILE6 based on NYSDEC data						

All worker, supervisor, service, utilities and fuel trips were assumed to be a round-trip distance of 18.4 miles, which is the average distance traveled for work related trips as reported by the New York Metropolitan Transportation Council (NYMTC). Concrete trucks were assumed to travel a distance of 26.2 miles—the average distances to four major concrete plants that were identified as potential suppliers. All other materials and excavated material removed from the site were assumed to travel across the George Washington Bridge, a round trip distance of 20.6 miles within the New York Metropolitan area.

ON-SITE CONSTRUCTION ENGINES

Base emission factors (without tailpipe reduction technologies) for all analyzed pollutants emitted from the combustion of fuel by onsite construction equipment (excluding delivery trucks/heavy vehicles), presented in Table 2, were developed using the Draft USEPA NONROAD2002a Emissions Model (NONROAD)[1,2]. The model is based on source inventory

[1] EPA, *EPA's Newest Draft Nonroad Emission Inventory Model*; www.epa.gov/otaq/nonrdmdl.htm, April 2003

[2] EPA, *User's Guide for the EPA Nonroad Emissions Model Draft NONROAD 2002*, EPA420-P-02-013, December 2002

data accumulated for specific categories of nonroad equipment. Data provided in the output files from NONROAD were used to derive (i.e., back-calculate from regional emission estimates) the emission factors for each type of equipment that is expected to be present on-site during construction activities. Emission rates associated with fugitive dust emissions were calculated using the procedures defined in USEPA's AP-42[1].

Factors for emission reduction technologies were then applied to the base PM and VOC emission factors, representing the minimum reduction of 40% PM and 50% VOC expected to be achieved by employing diesel oxidation catalysts to these engines. Engine emissions are generally predicted to diminish over the years, as newer technologies are introduced; VOC and PM emissions were not assumed to decrease throughout the duration of the construction, since emissions of these pollutants are expected to be lower at the start of construction due to the introduction of new engines and additional emissions reductions technologies. NO_x emissions were predicted to gradually decrease over the years, as presented in Table 3, as newer technologies become available.

RESULTS

Total annual emissions from construction engines were obtained by multiplying the emission factor by the hours of operation per day and the duration in days for each engine. On-road emissions were calculated by multiplying the average region-wide emission factors for each vehicle type by the distance traveled for each trip. The sum of all of these emissions for each construction year and each pollutant is presented in Table 4.

The total emission of NO_x in the years 2005 and 2006 is predicted to exceed 25 tons per year—the threshold defined at 40 CFR § 93.153(b), above which a determination needs to be made regarding the regional significance of the emissions and the conformity with the state implementation plan (SIP) for ozone. Emissions of other pollutants were predicted to be considerably lower than their applicable conformity determination thresholds, and therefore no further conformity determination is warranted.

[1] USEPA, *Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*, www.epa.gov/ttn/chief/ap42, NC, January 1995—updates and draft sections through 2003.

Table 2
Base NONROAD Emission Factors for Construction Equipment—2006

Equipment Type	Power Output (horsepower)	Unmitigated NONROAD Emission Factor (g/hp-hr)			
		CO	NO_x	PM_{10}	VOC
Air Compressors	310, 360, 460	0.929	2.78	0.172	0.206
Air Compressors	80	1.271	2.53	0.267	0.298
Concrete Pumps	300	1.189	2.94	0.265	0.310
Concrete Saws	50	1.926	2.83	0.362	1.613
Crawler Crane	350	0.736	2.69	0.144	0.166
Diesel Generator	500	1.671	3.17	0.358	0.366
Diesel Generator	750	1.700	3.16	0.360	0.363
Diesel Generator	100	1.758	2.97	0.389	0.430
Crawler/Tractor/Dozers	100	2.328	3.04	0.371	0.333
Crawler/Tractor/Dozers	150	0.904	2.87	0.214	0.235
Gas Generator	10	459.0	2.07	0.078	5.801
Hi-Lift (Forklift)	120	1.165	3.17	0.242	0.267
Hydraulic	165	0.495	2.36	0.137	0.178
Hydraulic	150	1.076	3.22	0.232	0.279
Hydraulic	320	1.128	2.92	0.167	0.145
Roadheader	120	0.868	2.78	0.208	0.231
Rubber	196	0.839	2.86	0.199	0.214
Skid	40	1.737	2.76	0.343	1.613
Slurry	50	1.763	3.68	0.383	0.410
Tower	250	0.414	2.24	0.119	0.154
Track	160	1.062	1.58	0.176	0.278
Welding	35	2.111	1.40	0.315	0.613

Sources: NONROAD2003a model

Table 3
Base NONROAD NO_x Emission Factors for Construction Equipment

Equipment Type	Power Output (horsepower)	Unmitigated NONROAD NO_x Emission Factor (g/hp-hr)				
		2004	2005	2006	2007	2008
Air Compressors	310, 360, 460	3.15	2.98	2.78	2.74	2.71
Air Compressors	80	2.87	2.71	2.53	2.49	2.46
Concrete Pumps	300	3.33	3.15	2.94	2.90	2.86
Concrete Saws	50	3.02	2.89	2.83	2.78	2.74
Crawler Crane	350	2.95	2.84	2.69	2.53	2.38
Diesel Generator	500	3.59	3.39	3.17	3.12	3.08
Diesel Generator	750	3.58	3.38	3.16	3.11	3.08
Diesel Generator	100	3.37	3.18	2.97	2.93	2.89
Crawler/Tractor/Dozers	100	3.23	3.12	3.04	2.97	2.81
Crawler/Tractor/Dozers	150	3.14	2.99	2.87	2.66	2.47
Gas Generator	10	2.34	2.21	2.07	2.04	2.01
Hi-Lift (Forklift)	120	3.53	3.34	3.17	2.94	2.76
Hydraulic	165	2.65	2.50	2.36	2.20	2.07
Hydraulic	150	3.46	3.34	3.22	3.08	2.94
Hydraulic	320	3.31	3.13	2.92	2.72	2.53
Roadheader	120	3.06	2.91	2.78	2.55	2.35
Rubber	196	3.24	3.05	2.86	2.69	2.53
Skid	40	2.88	2.81	2.76	2.72	2.69
Slurry	50	3.82	3.75	3.68	3.61	3.52
Tower	250	2.53	2.39	2.24	2.10	1.98
Track	160	1.71	1.65	1.58	1.51	1.44
Welding	35	4.23	4.05	3.97	3.90	3.84
Sources: NONROAD2003a model						

Table 4
Total Direct and Indirect Emissions—tons per year
Construction of the federally–funded Portions of the Proposed Action

Year	2004	2005	2006	2007	2008	2009-2013
PM_{10}	0.2	3.2	2.5	1.1	1.0	**None**
CO	10.8	58.0	31.5	10.7	8.8	**None**
NO_x	4.2	61.4	39.6	19.2	16.1	**None**
VOCs	0.4	6.2	3.6	1.5	1.3	**None**
Notes: **PM_{10} emissions include both engine emissions and resuspended road dust.**						

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1. Northwest Quadrant Subgrade Retail – WTC Concourse, Freedom Tower Foundations (Zone 2) – Traffic and Construction Equipment

Construction – This activity includes the construction of all structural elements in Zone 2 within the northwest quadrant (north of WTC Tower 2 footprint) of the site and within the west bathtub for the foundations and subgrade levels for WTC Concourses, cultural space and performing arts program to El. 364'. The activity does not include Permanent WTC PATH platforms, track, mezzanine and concourse areas in Zone 2. Preliminary estimates for the duration of the construction of these areas are 13 months commencing fourth quarter 2005 thru fourth quarter 2006. Initial construction will commence within the west bathtub with truck access from the existing ramp from Liberty Street. Lane closings on Vesey and Greenwich will be required as construction reaches ground level and rises to El. 364'. Concrete Truck Trips have been generated based on a worst-case scenario of a maximum pour of 600 CY.

Delivery Type ***Section 1.01 Northwest Quadrant***	Quantity	Units	Total No. Of Loads	Trips per Day (Peak Day impact Calculation)	Trips per Day (cumulative impact calculation)	Estimated Duration
Concrete	11,000	CY	1,100	120	7	13 Months
Reinforcing Steel*	1,800	Tons	90	4	0.6	
Structural Steel 306' to 364'*	5,000	Tons	250	6	1.6	
Curtain Wall*	87,000	SF	116	8	0.74	
Interior Fitout*	464,000	SF	700	6	4.5	
Service/Utility /Fuel				36	32	
Subcontractors Light Trucks				44	40	
Construction Workers	300 to 400					
Arriving by Personal Vehicle	60 to 80					
Arriving by Mass Transit	240 to 320					
Supervisory/QA	40 to 45					
Arriving by Personal Vehicle	8 to 9					
Arriving by Mass Transit	32 to 36					

Construction Equipment – In general the construction within the Northwest Quadrant will be performed from within the footprint of the proposed structures. Lane closures along Vesey Street and Greenwich Street will be necessary for receiving material deliveries. Foundation and subbasement work will be primarily of concrete construction to street level. Percentage of Daily Use for construction equipment has been based on operating 9 hours out of a 10-hour shift. The 9 hours are based on allowing for morning start-up, coffee breaks, lunch break and daily fueling/maintenance. Percentage of Use for Concrete Trucks and Tractor Trailers are based on waiting time and unloading time on site only. The following construction equipment will be required:

Equipment Type	Size	Engine Type	Size HP	Quantity (peak calculation)	Quantity (cumulative calculation)	Percentage Daily Use	Duration
Crawler Crane	200 Ton	Diesel	450	2	2	90%	13 months
Tower Crane	100 Ton	Diesel	250	4	4	90%	
Hi-Lift (Forklift)	5 ton – 40' boom	Diesel	120	1	1	90%	
Concrete Pump	150 CY/Hour – 100 foot boom	Diesel	300	1	1	60%	
Concrete Trucks	10 Cubic Yard Tandem or Tri-Axle	Diesel	325	60	3.5	5%	
Diesel Generators	500 HP	Diesel	100	1	1	35%	
Tractor Trailer	Tandem Axle Tractor w' 45' Trailer	Diesel	325	12	3.7	5%	
Welding Machines	35 HP Engine	Diesel	35	0	0	80%	
Air Compressor for Impact Wrenches	800 CFM	Diesel	310	1	1	80%	
Impact Wrenches	1” Socket Drive			10	10	60%	

2. Memorial, Open Space, Cultural Space (Zones 1 & 2) – Traffic and Construction Equipment

Construction – This activity includes the construction of all structural elements in Zone 1 & 2 within the west bathtub for the Memorial Site, Open Space and Cultural Space from the proposed location of Fulton Street on the north and Liberty Street on the south to El. 364’. This activity does not include Permanent WTC PATH platforms, track, mezzanine and concourse areas in Zone 2. Preliminary estimates for the duration of the construction of these areas are 25 months. For the Cultural Spaces it is anticipated that some of the structural steel framing will be pre-fabricated trusses to span the width of the atrium/open areas and should not require lane closings, since the affected streets, Greenwich, Fulton and Liberty will be under construction within the boundaries of the WTC Redevelopment. Concrete Truck Trips have been generated based on a worst-case scenario of a maximum pour of 600 CY.

Delivery Type ***Section 1.02 Memorial, Open and Cultural Spaces***	Quantity	Units	Total No. Of Loads	Trips per Day (Peak Day impact Calculation)	Trips per Day (cumulative impact calculation)	Estimated Duration
Concrete	25,500	CY	2,550	120	8.5	25 Months
Reinforcing Steel	4,100	Tons	205	2	0.68	
Structural Steel 306' to 364'*	3,000	Tons	150	4	0.5	
Curtain Wall*	67,000	SF	90	4	0.3	
Interior Fitout*	766,000	SF	1,150	10	3.8	
Service/Utility /Fuel				36	32	
Subcontractors Light Trucks				44	40	
Construction Workers	200 to 250					
Arriving by Personal Vehicle	10 to 15					
Arriving by Mass Transit	190 to 235					
Supervisory/QA	40 to 45					
Arriving by Personal Vehicle	4 to 6					
Arriving by Mass Transit	36 to 39					

Construction Equipment – In general the construction within the Memorial Site, Open Space and Cultural Space will be performed from within the footprint of the proposed structures over the Permanent PATH Terminal. Lane closures along Liberty Street and Greenwich Street will be necessary for receiving material deliveries. Foundation and subbasement work will be primarily of concrete construction to street level. Percentage of Daily Use for construction equipment has been based on operating 9 hours out of a 10-hour shift. The 9 hours are based on allowing for morning start-up, coffee breaks, lunch break and daily fueling/maintenance. Percentage of Use for Concrete Trucks and Tractor Trailers are based on waiting time and unloading time on site only. The following construction equipment will be required:

Equipment Type	Size	Engine Type	Size HP	Quantity (peak calculation)	Quantity (cumulative calculation)	Percentage Daily Use	Duration
Crawler Crane	200 Ton	Diesel	450	1	1	90%	25 months
Tower Crane	100 Ton	Diesel	250	2	2	90%	
Hi-Lift (Forklift)	5 ton – 40 foot boom	Diesel	120	2	2	90%	
Concrete Pump	150 CY/Hour – 100 foot boom	Diesel	300	1	1	60%	
Concrete Trucks	10 Cubic Yard Tandem or Tri-Axle	Diesel	325	60	4.2	5%	
Diesel Generators	500 HP	Diesel	100	1	1	20%	
Tractor Trailer	Tandem Axle Tractor w/45 Foot Trailer	Diesel	325	10	2.65	5%	
Welding Machines	35 HP Diesel Engine	Diesel	35	0	0	80%	
Air Compressor for Impact Wrenches	800 CFM	Diesel	310	1	1	80%	
Impact Wrenches	1" Socket Drive			10	10	60%	

3. De-construction of Deutsche Bank Building – Traffic and Construction Equipment

The de-construction of the Deutsche Bank Building will require sidewalk and lane closings on Greenwich, Liberty, Albany and Washington Streets for the entire duration. The building is a 40-story building with a height of 565 feet and an approximate footprint of 40,000 SF per floor. Our estimate is that it will require a minimum of 12 months to take down the structure after the completion of any hazardous abatement for asbestos and mold. The demolition has been estimated on a single 8-hour shift.

Delivery Type	Quantity	Units	Total No. Of Loads	Trips per Day (Peak Day impact Calculation)	Trips per Day (cumulative impact calculation)	Estimated Duration
Gutting Floors	72,000	CY	1,800	18	12.5	12 Months
Concrete Floors	40,000	Tons	2,800	24	19.4	
Curtain Wall	3,400	Tons	225	4	1.6	
Structural Steel	18,400	Tons	1,000	10	7	
Service/Utility /Fuel				12	8	
Subcontractors Light Trucks				10	6	
Construction Workers	60 to 80					
Arriving by Personal Vehicle	12 to 16					
Arriving by Mass Transit	48 to 64					
Supervisory/QA	3 to 8					
Arriving by Personal Vehicle	1 to 2					
Arriving by Mass Transit	2 to 6					

Demolition Equipment – All demolition work occurs within the footprint and the adjacent sidewalk areas and lane closings around the perimeter of the site. Demolition is assumed to commence after hazardous materials abatement and will consist of the systematic gutting of the interiors prior to the cutting and removal of structural floor slabs and structural steel. It is assumed that the pieces will be cut in place, lifted free and brought down to street level using four tower cranes positioned at the four corners of the building. Percentage of Daily Use for construction equipment has been based on operating 9 hours out of a 10-hour shift. The 9 hours are based on allowing for morning start-up, coffee breaks, lunch break and daily fueling/maintenance. Percentage of Use for Demolition Trailers is based on waiting time and loading time on site only. Equipment required is as follows:

Equipment Type	Size	Engine Type	Size HP	Quantity (peak calculation)	Quantity (cumulative calculation)	Percentage Daily Use	Duration
Fixed Leg Derrick	100 Ton	Diesel	250	1	1	90%	12 months
Hydraulic All Terrain Crane	50 Ton	Diesel	165	1	1	50%	
Concrete Saws – Diamond Blade	50 HP Diesel Engines	Diesel	50	4	4	80%	
Skid Steer Loaders w/Demolition Hammers		Diesel	40	8	8	90%	
Hydraulic Excavator w/Thumb	3.5 Cubic Yard	Diesel	320	1	1	80%	
Hydraulic Excavator w/Concrete Pulverizer Attachment	3.5 Cubic Yards	Diesel	320	4	4	90%	
Rubber Tire Loader	3.5 Cubic Yard	Diesel	196	1	1	80%	
Demolition Trailers	Tandem Axle Tractor w/25 CY Dump Trailer	Diesel	325	19	20	5%	
Air Compressor for Pavement Breakers	1600 CFM	Diesel	460	1	1	100%	
Pavement Breakers	90 lbs.			8	8	80%	

4. Southern Expansion – 5TH Tower South of Liberty Street – Traffic and Construction Equipment

Slurry Wall – The existing western bathtub will be enlarged to encompass the area south of Liberty Street from West Street to Greenwich Street and south to Cedar Street and including the city block bounded by Washington Street, Albany Street and Greenwich Street south of Cedar Street. The slurry wall construction will follow the demolition/de-construction of the Deutsche Bank Building. The slurry wall and excavation will be conducted down to a level of EL 238'. As the Slurry Wall progresses around the site, the area immediately adjacent to the wall will be benched down to the first level of tieback anchors, to allow installation of the anchors to commence prior to completion of the wall. Some excavation activities will coincide with the slurry wall and tieback anchoring activities. Traffic and Construction Equipment for the tie back installation is covered under Excavation below.

Delivery Type **South of Liberty St.**	Quantity	Units	Total No. Of Loads	Trips per Day (Peak Day impact Calculation)	Trips per Day (cumulative impact calculation)	Estimated Duration Worst Case
Slurry Wall – Exc.	10,300	CY	674	10	7	8 Months
Slurry Wall – Conc.	10,300	CY	1,010	16	10.5	
Slurry Wall – Rebar	2,275	Tons	114	2	1.2	
Service/Utility /Fuel				14	12	
Subcontractors Light Trucks				8	6	
Construction Workers	20 to 30					
Arriving by Personal Vehicle	4 to 6					
Arriving by Mass Transit	16 to 24					
Supervisory/QA	4 to 6					
Arriving by Personal Vehicle	1 to 2					
Arriving by Mass Transit	3 to 4					

Construction Equipment – Construction of the Slurry Wall surrounding the southern expansion south of Liberty Street will be performed from within the footprint of the proposed development. Access to the site will be from Liberty Street, which will require complete closure between Greenwich and West Streets. The Slurry Wall will be constructed by the panel method and will require one crew of men and equipment to meet the proposed schedule. Percentage of Daily Use for construction equipment has been based on operating 9 hours out of a 10-hour shift. The 9 hours are based on allowing for morning start-up, coffee breaks, lunch break and daily fueling/maintenance. Percentage of Use for Concrete Trucks and Dump Trucks are based on waiting time and unloading/loading time on site only. Equipment required is as follows:

Equipment Type	Size	Engine Type	Size HP	Quantity (peak calculation)	Quantity (cumulative calculation)	Percentage Daily Use	Duration
Slurry Plant Mixing Plant	100 m^3 per hour –50 HP	Diesel	50	1	1	90%	8 months
Desanding Plant	100 m^3 per hour –50 HP	Diesel	50	1	1	50%	
Crawler Crane w/clam shell	100 Ton	Diesel	350	1	1	90%	
Hydraulic All Terrain Crane	50 Ton	Diesel	165	1	1	25%	
Crawler Crane for rebar placement)	200 Ton	Diesel	450	1	1	50%	
Hi-Lift (Forklift)	5 ton – 40 foot boom	Diesel	120	1	1	90%	
Concrete Pump	150 CY/Hour – 100 foot boom	Diesel	300	1	1	50%	
Concrete Trucks	10 Cubic Yard Tandem or Tri-Axle	Diesel	325	8	5.2	5%	
Dump Trucks	Tandem Axle – 15 CY	Diesel	325	5	3.5	10%	
Hydraulic Excavators (lead in trench)	3.5 CY	Diesel	320	1	1	10%	
Dozer (maintain site grading)	150 HP	Diesel	150	1	1	10%	
Generators	10 HP	Gas	10	2	2	90%	

Excavation - After completion of the slurry wall construction for the southern expansion area, Liberty Street will be closed between Greenwich and West Street so that the southern bathtub can be created by excavating within the slurry walls to bedrock at EL 247'. The area immediately adjacent to the slurry walls will be benched to allow the installation of the tieback anchors for temporary support of the slurry wall during construction of the basement levels of the southern expansion area development. The soil excavation can continue in the central portions of the bathtub during the tieback anchors operation. Areas immediately adjacent to the slurry wall will be conducted last until the final row of tieback anchors has been completed.

Delivery Type **Southern Expansion Bathtub**	Quantity	Units	Total No. Of Loads	Trips per Day (Peak Day impact Calculation)	Trips per Day (cumulative impact calculation)	Estimated Duration Worst Case
Soil/Rock Anchors	1,680	Ea	21	2	.2	9 Months
Excavate to 241'	350,000	CY	23,500	260	217	
Service/Utility /Fuel				12	10	
Subcontractors Light Trucks				8	6	
Construction Workers	20 to 30					
Arriving by Personal Vehicle	4 to 6					
Arriving by Mass Transit	16 to 24					
Supervisory/QA	4 to 6					
Arriving by Personal Vehicle	1 to 2					
Arriving by Mass Transit	3 to 4					

Construction Equipment – Excavation work will be performed from within the southern bathtub and will not require a staging area outside of the bathtub. The installation of the soil/rock anchor tiebacks will also be performed from within the bathtub and will not require a staging area outside of the bathtub. A lane closure will be required along Liberty Street to facilitate the staging of dump trucks and for receiving materials for the tie back operation. Percentage of Daily Use for construction equipment has been based on operating 9 hours out of a 10-hour shift. The 9 hours are based on allowing for morning start-up, coffee breaks, lunch break and daily fueling/maintenance. Percentage of Use for Dump Trucks is based on waiting time and loading time on site only. Equipment required is as follows:

Equipment Type	Size	Engine Type	Size HP	Quantity (peak calculation)	Quantity (cumulative calculation)	Percentage Daily Use	Duration
Hydraulic Drill Rig for Anchors	Diesel 150 HP	Diesel	150	2	2	90%	9 months
Crawler Crane to support Anchor Oper.	100 Ton	Diesel	350	1	1	50%	
Hi-Lift(Forklift) for Anchor Oper.	5 ton – 40 foot boom	Diesel	120	1	1	90%	
Hydraulic Excavators	3.5 CY	Diesel	320	3	3	90%	
Dozer	150 HP	Diesel	150	2	2	90%	
Dump Trucks	Tandem Axle – 15 CY	Diesel	325	130	109	5%	
Generators	10 HP	Gas	10	2	2	90%	

Construction – This activity includes the construction of all of the structural elements for the non-tower subgrade development within the southern expansion area to El. 364'. Concrete Truck Trips have been generated based on a worst-case scenario of a maximum pour of 600 CY.

Delivery Type ***Section 1.03 South of Liberty Street to El. 364'***	Quantity	Units	Total No. Of Loads	Trips per Day (Peak Day impact Calculation)	Trips per Day (cumulative impact calculation)	Estimated Duration
Concrete	13,300	CY	1,330	120	9.2	12 Months
Reinforcing Steel	2,100	Tons	105	4	0.7	
Structural Steel to 364'	1,300	Tons	65	8	0.45	
Interior Fitout				26	26	
Service/Utility /Fuel				36	30	
Subcontractors Light Trucks				44	40	
Construction Workers	300 to 400					
Arriving by Personal Vehicle	60 to 80					
Arriving by Mass Transit	240 to 320					
Supervisory/QA	40 to 45					
Arriving by Personal Vehicle	8 to 9					
Arriving by Mass Transit	32 to 36					

Construction Equipment – In general the construction within the southern expansion area will be performed from within the footprint of the proposed structures. Lane closures along Greenwich and Albany Streets will continue to be necessary for receiving material deliveries. Liberty Street will be closed between Greenwich and West Street until the subgrade structures are complete. Foundation and subbasement work will be primarily of concrete construction to street level. Percentage of Daily Use for construction equipment has been based on operating 9 hours out of a 10-hour shift. The 9 hours are based on allowing for morning start-up, coffee breaks, lunch break and daily fueling/maintenance. Percentage of Use for Concrete Trucks and Tractor Trailers are based on waiting time and unloading time on site only. The following construction equipment will be required:

Equipment Type	Size	Engine Type	Size HP	Quantity (peak calculation)	Quantity (cumulative calculation)	Percentage Daily Use	Duration
Crawler Crane	200 Ton	Diesel	450	2	2	90%	12 months
Tower Crane	100 Ton	Diesel	250	2	2	90%	
Hi-Lift (Forklift)	5 ton – 40' boom	Diesel	120	2	2	90%	
Concrete Pump	150 CY/Hour – 100 foot boom	Diesel	300	2	2	60%	
Concrete Trucks	10 CY Tandem or Tri-Axle	Diesel	325	60	5	5%	
Generators	500 HP	Diesel	500	1	1	20%	
Tractor Trailer	Tandem Axle w/45' Trailer	Diesel	325	19	14	5%	
Welding Machines	35 HP Engine	Diesel	35	0	0	90%	
Air Compressor	1600 CFM	Diesel	460	1	1	90%	
Impact Wrenches	1" Socket Drive			8	8	80%	

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