
**APPENDIX E – CUMULATIVE EFFECTS ANALYSIS
CONSTRUCTION ASSUMPTIONS and FEDERALLY-SPONSORED
LOWER MANHATTAN RECOVERY PROJECTS COORDINATION
MATRIX**

	Fulton Street Transit Center	Permanent PATH Terminal Construction	WTC Memorial and Redevelopment	Route 9A - Short Bypass Alternative	South Ferry Station
1. Work Hours	Monday to Saturday – two shifts over a 16 hour period from 0700 to 2300	Monday to Saturday – one 10 Hour Shift from 0700 to 1800	Monday to Saturday – one 10 Hour Shift from 0700 to 1800	Monday to Saturday – one 10 Hour Shift from 0700 to 1800	Monday to Saturday – two shifts over a 16 hour period from 0700 to 2300.
2. Work Location	a) Dey Street Concourse between Church Street and Broadway b) Fulton Street between Broadway and William Street c) Transit Center Entry Facility on western portion of block bordered by Broadway, Church Street, and John Street. d) Dey Street Entrance House e) 4/5 Southbound entrance at 195 Broadway f) Various Elevator and Stairwell entrances on Nassau, John, and William Streets g) 2/3 Station, 4/5 Station rehabilitation h) Connection to FSTC under N/R underpasses under 4/5 line i) 2	a) Tracks, Platform, Mezzanine – Entirely within the west bathtub b) Tunnels under 1 & 9 Subway – Within existing 1 & 9 Subway tunnels and from west bathtub. c) Temporary and Permanent PATH Station – Within east bathtub and along Church Street with sidewalk closings for truck staging and material removal/delivery area. d) Underpasses for concourses (in addition to tunnels under 1/9). • Cortlandt St. Connection under Church St. • Liberty Plaza Connection under Church St. • WFC Connection under 9A Short Bypass	a) East of 1 & 9 Subway to Church St. – north and south of Temporary PATH Station. b) West Bathtub surrounding Permanent PATH Terminal c) Expanded southern site south of Liberty Street including site of Deutsche Bank Building	a) Route 9A from Barclay Street intersection to Albany Street intersection. b) Entire width of roadway and associated ROW will be utilized	a) Northeastern Portion of Battery Park b) Sub-grade space within existing 1/9 loop c) N/R connection to the east of existing 1/9 loop d) Bellmouth structure and fan plant beneath intersection of Battery Place and Greenwich St.
3. Site Access	a) Dey Street Concourse – at either end of street from Broadway and Church Street b) Transit Center Entrance House – from Broadway, Fulton and John Streets c) Additional sites - from adjacent streets	a) West bathtub – Existing ramp from Liberty Street. b) East of 1 & 9 – From Liberty Street and from Church Street/Vesey St.	a) East of 1 & 9 – From Liberty Street to southeast section of site and from Vesey Street to northeast section of site. b) West of 1 & 9 – From Liberty Street along existing ramp. c) Liberty and Vesey Streets to remain closed for delivery of materials and staging of trucks. d) Pedestrian access on north side of Vesey and south side of Liberty to remain open at all times. e) Church Street left lane and west sidewalk closure between Liberty and Vesey Streets. (if necessary)	a) Route 9A from north and south.	Battery Place and State Street
4. Equipment and Material Laydown Area	a) Full width and length of Dey Street throughout concourse construction – truck staging will occur at either end of Dey Street at intersections of Broadway and Dey, and Church and Dey b) The full width of Fulton Street from Broadway to Nassau Street c) The eastern sidewalk of Broadway between Fulton Street and John Street d) The western sidewalk of Broadway outside 195 Broadway. e) In locations of new stairwells/elevators etc. the sidewalk and nearside lane may be used.	a) West bathtub – within bathtub area/Vesey St./ Liberty St. b) East of 1 & 9 – within footprint of site and adjacent to site along Church St sidewalk area. c) No construction equipment sited within 1WTC and 2WTC footprints. d) Assumes use of Greenwich street for staging and locating site trailers	a) Within existing bathtub area west of 1 & 9 and within footprint of site east of 1 & 9. b) Liberty and Vesey Streets to remain closed to public for materials delivery and staging of equipment and trucks in addition to Church St. c) Assumes use of Greenwich street for staging and locating site trailers	a. Temporary haulage and lay-down areas will be established in strip sections adjacent and between operational traffic lanes and work and areas under construction.	Peter Minuit Plaza
5. Construction Methods	a) Demolition will be incremental top-down deconstruction. b) Permanent and temporary retaining walls – Slurry Wall construction c) Majority of structures are steel framed. d) Concrete floor diaphragms. No internal floor diaphragms in Entrance House above street level. e) Entrance House and Dey Street Entrance is supported on piles. Dey Street Concourse is supported by slurry walls to the north and south of tunnel. No major rock excavation is expected. f) Underpasses/tunnels constructed using incremental under-pinning methods in combination with soil jet-grouting. Existing MTA subway lines are not supported on piles. g) Tunneling under 1 & 9 subway may require use of roadheader	a) Permanent and temporary retaining walls – Slurry Wall construction b) Majority of structures are steel framed. c) Concrete floor diaphragms. d) No major elements supported on piles (except underpasses). Supported on bedrock with minor rock excavation expected. e) Underpasses/tunnels constructed using incremental under-pinning methods in combination with soil jet-grouting. f) Tunneling under 1 & 9 subway may require use of roadheader in northern and southern (bus) tunnels and hand mining in center tunnel.	a) Permanent and temporary retaining walls – Slurry Wall construction b) Majority of structures are steel framed c) Concrete floor diaphragms d) No major elements supported on piles (except underpasses). Supported on bedrock with minor rock excavation expected e) Deutsche Bank to be staged de-constructed in pieces and to occur in 2007 following removal of contamination.	a) Existing utilities relocated to new dedicated conduits beneath east and west sidewalks of new roadway b) Permanent and temporary retaining walls – 3' Slurry Wall construction to bedrock. c) Bypass construction to be cast-in-place concrete. d) 3' concrete base to sub-grade roadway to counteract buoyancy. e) 3' concrete support walls at west and east boundaries of sub-grade roadway f) 1' concrete divider walls to separate northbound, southbound, and service access tunnels (non structural) g) permanent road deck to be pre-cast concrete box-beams overlaid with 6" cast-in-place concrete deck h) Assumes that the sub-grade box structure is built in two phases; the permanent southbound tunnel and the permanent northbound tunnel. i) Vehicular traffic will be maintained on 9A at all times. j) The first tunnel phase will be constructed within the confines of two slurry walls; one permanent and one temporary. k) Construction of the subsequent tunnel phase will require the demolition of the temporary slurry wall l) Left turn movements from SB 9A onto Liberty and Vesey Streets will be maintained	a) Cut and Cover Construction b) Staged Underpinning of 4/5 line and existing 1/9 loop. c) Permanent and temporary retaining walls – 3' Slurry Wall construction to bedrock. d) Base to be concrete slab. Tunnel roof and walls to be supported by structural steel. e) Assumes that the project is built in three components; Battery Park cut and cover tunnel, station/mezzanine, and the Bellmouth structure beneath Battery Place. Cut and Cover construction occur concurrently in a maximum of two locations. f) The entire street level area of the project will be closed to pedestrian and vehicular traffic during construction of tunnel structure
6. Crane Placement	a) Demolition – Crawler Crane within Entrance House site. b) Slurry Wall – Crawler Cranes within Entrance House site, and on Dey Street and Fulton Street c) Tower Crane located somewhere within Entrance House site.	a) Demolition – Crawler Crane within west bathtub and footprint of temporary terminal east of 1 & 9 subway. b) Slurry Wall – Crawler Cranes within footprint of Permanent Terminal c) Construction of Platforms, Mezzanine, etc. in west bathtub – Crawler Crane within west bathtub. d) Construction of Permanent Terminal – Crawler crane within footprint of Permanent Terminal east of 1 & 9 subway and in sidewalk area of Church St. Tower crane within footprint of Permanent Terminal.	a) Demolition – Crawler Crane within west and east bathtub. b) Slurry Wall – Crawler Cranes within footprint of east bathtub. c) Construction to Street Level and Towers – Crawler Crane within footprint of building and Tower Cranes within the footprint of the buildings. (To be attached to side of towers) d) De-construction of Deutsche Bank Building – Tower Cranes and crawler crane within the sidewalk area and closed lanes of Greenwich, Liberty, Albany and Washington Streets.	a) Slurry Wall – Crawler Cranes within work area boundaries	a) Slurry Wall – Crawler Cranes within work area boundaries
7. Slurry Mixing and Desanding Plant	Located within footprint of Entrance House, on Fulton Street, and on Dey Street.	Located within footprint of Permanent Terminal.	Located within the footprint of Zones 4 and 5	Located within work area boundaries	Located within work area boundaries
8. Removal of Demo Debris	15 CY Tri-axle Dump Trucks or 30 CY Demolition Trailers, maximum load – 20 Tons on either truck.	15 CY Tri-axle Dump Trucks or 30 CY Demolition Trailers, maximum load – 20 Tons on either truck.	15 CY Tri-axle Dump Trucks or 30 CY Demolition Trailers, maximum load – 20 Tons on either truck.	15 CY Tri-axle Dump Trucks or 30 CY Demolition Trailers, maximum load – 20 Tons on either truck.	15 CY Tri-axle Dump Trucks or 30 CY Demolition Trailers, maximum load – 20 Tons on either truck.
9. Spoil Removal	15 CY Tri-axle Dump Trucks	20-40 CY Tri-axle Dump Trucks.	20-40CY Tri-axle Dump Trucks	20-40 CY Tri-axle Dump Trucks	15 CY Tri-axle Dump Trucks
10. Concrete Delivery	10 CY Tri-axle or tandem axle transit mix concrete truck – delivered and pumped from staging areas on street.	10 CY Tri-axle or tandem axle transit mix concrete truck – delivered and pumped from staging areas on street.	10 CY Tri-axle or tandem axle transit mix concrete truck – delivered and pumped from staging areas on street	10 CY Tri-axle or tandem axle transit mix concrete truck – delivered on haulage routes to positions immediately adjacent final placement.	10 CY Tri-axle or tandem axle transit mix concrete truck – delivered on haulage routes to positions immediately adjacent final placement.
11. Steel Deliveries	20 Ton loads on 45-foot trailers pulled by tandem axle cabs	20 Ton loads on 45-foot trailers pulled by tandem axle cabs.	20 Ton loads on 45-foot trailers pulled by tandem axle cabs.	20 Ton loads on 45-foot trailers pulled by tandem axle cabs.	20 Ton loads on 45-foot trailers pulled by tandem axle cabs
12. Service/Fuel/Utility	single axle light duty utility trucks and tankers.	single axle light duty utility trucks and tankers.	single axle light duty utility trucks and tankers	single axle light duty utility trucks and tankers	single axle light duty utility trucks and tankers
13. Light Trucks	single axle pickups, flatbeds or vans	single axle pickups, flatbeds or vans.	single axle pickups, flatbeds or vans	single axle pickups, flatbeds or vans	single axle pickups, flatbeds or vans
14. Traffic Management - Vehicular and Pedestrian	a) Lane Closures • Dey Street closed entirely during construction to traffic • Fulton closed to traffic between Broadway and Nassau Street • Easternmost and westernmost lanes of Broadway between Fulton and John Street (NOT simultaneously). • The northern lane of John Street from Broadway to rear of proposed Entry Facility. • Eastern lane of Church Street at Dey Street b) Building Displacements and Sidewalk closures – it is assumed that all businesses and building occupants on Dey Street, Fulton Street between Broadway and Nassau, and the west side of Broadway between Dey street and Fulton street, will be subject to a single period where pedestrian access is prohibited for a single period of between 2 weeks and 2 months. Outside of this period, a 5 foot minimum egress will be maintained to all buildings. Residents and businesses will relocate during this period. The loading dock of Century 21 will also be subject to access restrictions. c) Pedestrian Traffic/Construction Truck Flagmen Crossover points • The eastern side of intersection of Fulton Street and Broadway • The eastern side of intersection of John Street and Broadway • The western side of intersection of Broadway and Dey Street • The eastern side of intersection of Church and Dey Streets.	a) Left turn movements from SB 9A onto Liberty and Vesey Streets will be required to greatest extent possible except for temporary closures required for unavoidable 9A construction activities. b) The use of Greenwich Street from Vesey to Liberty, will be necessary for the following reasons • Truck haulage routes • Staging areas for construction activities east of the 1/9 line • Location of contractors trailers in an elevated multi-tiered platform above the road surface.	a) Left turn movements from SB 9A onto Liberty and Vesey Streets will be required to greatest extent possible except for temporary closures required for unavoidable 9A construction activities. b) The use of Greenwich Street from Vesey to Liberty, will be necessary for the following reasons • Truck haulage routes • Staging areas for construction activities east of the 1/9 line • Location of contractors trailers in an elevated multi-tiered platform above the road surface.	a) Northbound/Southbound Traffic maintained throughout construction on West Street. b) 4 lanes in constant operation c) Left turn movements from SB 9A onto Liberty and Vesey Streets will be required to greatest extent possible except for temporary closures required for unavoidable 9A construction activities.	No access to northeast of Battery Park No access to Peter Minuit Plaza

Federally-Sponsored Lower Manhattan Recovery Projects

Coordination Matrix

		WTC Memorial and Redevelopment Plan Generic Environmental Impact Statement (WTC)	Fulton Street Transit Center Environmental Impact Statement (FSTC)	Permanent WTC PATH Terminal Environmental Impact Statement (PATH)	South Ferry Terminal Environmental Assessment (SoFe)	Route 9A Supplemental Environmental Impact Statement (9A)
Federal Lead Agency		U.S. Department of Housing and Urban Development	U.S. Department of Transportation, Federal Transit Administration	U.S. Department of Transportation, Federal Transit Administration	U.S. Department of Transportation, Federal Transit Administration	U.S. Department of Transportation, Federal Highway Administration
Local Sponsoring Agency		Lower Manhattan Development Corporation	Metropolitan Transportation Authority, New York City Transit	Port Authority of New York and New Jersey	Metropolitan Transportation Authority, New York City Transit	New York State Department of Transportation
EIS Consultant Team		AKRF, Inc.; Louis Berger Group; Eng- Wong, Taub & Associates; ETC; EMP; Historic Perspectives, Inc.	Louis Berger Group, SIMCO, EPM	AKRF, Inc.; Eng-Wong Taub & Associates; Hatch Mott MacDonald; Howard/Stein- Hudson Associates; Louis Berger Group	Louis Berger Group	AKRF, Inc.; Eng-Wong, Taub & Associates; EPM; Vollmer Associates
EIS Schedule	Draft Scoping Document	20-Jun-03	Apr-04	24-Sep-03	N/A	N/A
	Final Scoping Document	16-Sep-03	Dec-03	Dec-03	N/A	N/A
	Draft EIS	Jan-04	Apr-04	Apr-04	Draft EA (Apr-04)	Spring 2004
	Final EIS	Apr-04	Jun-04	Jul-04	N/A	Fall 2004
	Record of Decision	Jun-04	Jul-04	Aug-04	FONSI (Jun-04)	Winter 2004
Project Limits		WTC Site; Southern Site; BPC Site 26	Fulton Street subway complex (4523JMZAC); Dey Street Connection; Above-grade station house (East Side of Broadway between John and Fulton Streets)	WTC Site; Liberty Plaza Park and connection; West Street connection	Bellmouth and the fan plant at Battery Place/Greenwich Street; Approach tunnels through eastern edge of Battery Park; New terminal under Peter Minuit Plaza	Route 9A from Chambers Street to West Thames
Alternatives		No Action Restoration Rebuilding (from 9 plans) WTC Site Only Redistributed Retail Reduced or No Impact Design Alternatives Enhanced Green Construction	No Action Alternative 9 (Isolate the Corbin Building) Alternative 10 (Adaptive Reuse of the Corbin Building)	No Action Terminal with Liberty Plaza Connection Terminal without Liberty Plaza Connection	No Action Proposed Action	No Action (Interim Roadway) At-Grade Short-Bypass
Operational No Build Condition includes (11):		PATH Build condition FSTC Build condition SoFe Build Condition 9A Build Condition (Short-bypass and At- Grade Alternatives) All soft site developments	WTC Build Condition PATH Build Condition SoFe Build Condition 9A Build Condition (Short-bypass) All soft site developments	WTC Build Condition FSTC Build Condition SoFe Build Condition 9A Build Condition (Short-bypass and At- Grade Alternatives) All soft site developments	WTC Build Condition FSTC Build Condition PATH Build Condition 9A Build Condition (Short-bypass) All soft site developments	WTC Build Condition FSTC Build Condition SoFe Build Condition PATH Build Condition with Liberty Plaza Connection All soft site developments
Analysis Years	Operational	Interim Build – 2009 Full-Build - 2015	Opening Year – 2008 Design Year – 2025	Opening Year – 2009 Design Year – 2025	Opening Year - 2007	Opening Year - 2007 Design Year 2025
	Construction (1)	2006	2005/2006	2006	2005/2006	2006
	Cumulative Construction (1)	2006	2005/2006	2006	2005/2006	2006
LAND USE		AKRF, Inc.	Louis Berger Group	AKRF, Inc.	Louis Berger Group	AKRF, Inc.
Study Area	Primary	North limit – Chambers St South limit – Battery Place / Beaver St West limit – Hudson River East limit – Center/Nassau/Broad	¼-mile radius: approximately: North limit – Chambers Street South limit – Wall Street West limit – West Street East limit – Pearl Street	All of the areas of Lower Manhattan south of Canal St and west of Pike St	Battery Place to the north; Whitehall Street to the east; New York Harbor to the south; West Street to the west	Chambers St to the north; Nassau/Broad St to the east; Battery Place/Beaver St to the south; Hudson River to the west
	Secondary	North limit – Canal St West of Pike St, River to River	Lower Manhattan: Area south of Canal and the Manhattan Bridge ramps	N/A	N/A	All of the areas of Lower Manhattan south of Canal St and west of Pike St
Data Source	Pre-9/11	RPAD 2000/Previous EISs	RPAD 2000/Previous EISs	RPAD 2000/Previous EISs	RPAD 2000/Previous EISs	RPAD 2000/Previous EISs
	Post-9/11	RPAD 2000/Previous EISs	RPAD 2000/Previous EISs	RPAD 2000/Previous EISs	RPAD 2000/Previous EISs	RPAD 2000/Previous EISs

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SOCIAL AND ECONOMIC CONDITIONS		AKRF, Inc.	Louis Berger Group	AKRF, Inc.	Louis Berger Group	AKRF, Inc.
Study Area	Primary	Population and Housing analysis: area between Chambers and northern boundary of Battery Park/Beaver Street, and Hudson River and Broad Street. (same as Land Use) Employment and Office Market analyses: Lower Manhattan south of Canal Retail Market analysis: Same as above, but with additional "Immediate Study Area" including blocks surrounding WTC Site.	Population, Housing, and Employment analyses: Census Block Groups within a ¼-mile radius (see Land Use above for approximate boundaries). Retail Market analysis; Fulton Street corridor: North Park Place/Beekman, East; Cliff/Gold Streets, West: Church Street, South: Maiden Lane/Liberty Street Regional Economic impacts; City of New York and 17-county NY/NJ metropolitan area	All of Lower Manhattan south of Canal Street and west of Pine Street	Battery Place to the north; Whitehall Street to the east; New York Harbor to the south; West Street to the west Employment, housing trends, labor force characteristics in study area and Lower Manhattan	Population and Housing analysis: area between Chambers and northern boundary of Battery Park/Beaver Street, and Hudson River and Broad Street. (same as Land Use) Employment and Office Market analyses: Lower Manhattan south of Canal Retail Market analysis: Same as above, but with additional "Immediate Study Area" including blocks surrounding WTC Site.
	Secondary	Housing & Population analysis: Lower Manhattan south of Canal, excluding Primary Study Area Employment and Commercial Office & Retail analyses: Manhattan	Lower Manhattan: Area south of Canal and the Manhattan Bridge ramps	Housing & Population analysis: NA Employment and Commercial Office & Retail analyses: Manhattan	N/A	Housing & Population analysis: Lower Manhattan south of Canal, excluding Primary Study Area Employment and Commercial Office & Retail analyses: Manhattan
Data Source	Pre-9/11	Housing & Population: 2000 Census Employment: NYSDOL and NYMTC Office: Cushman & Wakefield Retail: REBNY Retail Report series, Downtown Alliance	Housing & Population: 2000 Census Employment: NYSDOL and NYMTC Office: Cushman & Wakefield Retail: REBNY Retail Report series, Downtown Alliance	Housing & Population: 2000 Census Employment: NYSDOL and NYMTC Office: Cushman & Wakefield Retail: REBNY Retail Report series, Downtown Alliance	Housing & Population: 2000 Census Employment: NYSDOL and NYMTC Office: Cushman & Wakefield Retail: REBNY Retail Report series, Downtown Alliance	Housing & Population: 2000 Census Employment: NYSDOL and NYMTC Office: Cushman & Wakefield Retail: REBNY Retail Report series, Downtown Alliance
	Post-9/11	Housing & Population: 2000 Census with updates from AKRF no build lists Office: Cushman & Wakefield Retail: REBNY, Downtown Alliance, Wall Street Rising, and field surveys	Housing & Population: 2000 Census with updates from AKRF no build lists (confirmed with MTA RTFM) Office: Cushman & Wakefield Retail: REBNY, Downtown Alliance, Wall Street Rising, and field surveys	Housing & Population: 2000 Census with updates from AKRF no build lists Office: Cushman & Wakefield Retail: REBNY, Downtown Alliance, Wall Street Rising, and field surveys	Housing & Population: 2000 Census with updates from AKRF no build lists (confirmed with MTA RTFM) Office: Cushman & Wakefield Retail: REBNY, Downtown Alliance, Wall Street Rising, and field surveys	Housing & Population: 2000 Census with updates from AKRF no build lists Office: Cushman & Wakefield Retail: REBNY, Downtown Alliance, Wall Street Rising, and field surveys
ENVIRONMENTAL JUSTICE		Louis Berger Group	Louis Berger Group	AKRF, Inc.	Louis Berger Group	AKRF, Inc.
Primary Study Area		Same as primary housing and population socioeconomic study area and 500-ft buffer around truck routes	Same as primary housing and population socioeconomic study area and 500-ft buffer around truck routes	N/A	Same as primary housing and population socioeconomic study area and 500-ft buffer around truck routes	Same as primary housing and population socioeconomic study area and 500-ft buffer around truck routes
Secondary Study Area		Area south of Canal and the Manhattan Bridge ramps	Area south of Canal and the Manhattan Bridge ramps	N/A	Area south of Canal and the Manhattan Bridge ramps	N/A
Data Sources		2000 Census	2000 Census	2000 Census	2000 Census	2000 Census
CULTURAL RESOURCES		AKRF, Inc.	Louis Berger Group	AKRF, Inc.	Louis Berger Group	AKRF, Inc.
Area of Potential Effect (APE)	Archeological Resources	SHPO approved APE and resource list	SHPO approved APE and resource list	SHPO Approved APE and resource list (anticipated)	SHPO Approved APE and resource list	SHPO Approved APE and resource list (anticipated)
	Architectural Resources	SHPO approved APE and resource list	SHPO approved APE and resource list	SHPO Approved APE and resource list (anticipated)	SHPO Approved APE and resource list	SHPO Approved APE and resource list (anticipated)
TRAFFIC		AKRF/EWT	Louis Berger Group/SIMCO	AKRF/EWT	Louis Berger Group	Vollmer Associates
Study Area	Primary	Primary: Chambers, Broadway, Rector, 9A, Plus Secondary	Primary: Chambers St, South St, Battery Place, Rte 9A	Similar primary area as WTC, but fewer (e.g. 15) locations	Primary: Chambers St, South St, Battery Place, Rte 9A	Route 9A intersections south of Canal Street; selected interior locations west of and including Broadway
	Secondary	Manhattan south of Canal Street	Manhattan south of Canal Street	Manhattan south of Canal Street	Manhattan south of Canal Street	Manhattan south of Canal Street
Quantitative Analysis?	Operational (2)	Yes	Yes	Qualitative	Qualitative	Yes
	Construction-Period	Yes	Yes	Yes	Yes	Yes
Analysis Periods (construction and operation)	AM	Yes	Yes	Yes	Yes	Yes
	Midday (12)	Yes	No	Yes	No	No
	PM	Yes	Yes	Yes	Yes	Yes
	Other(s) (12)	Saturday MD qualitative	No	No	No	No

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Coordination Matrix

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Baseline Volumes	Pre-9/11	Berger Base Network	Berger Base Network	Berger Base Network	Berger Base Network	Route 9A Base Network
	Post-9/11	Berger/Route 9A Base Network	Berger/Route 9A Base Network	Berger/Route 9A Base Network	Berger/Route 9A Base Network	Berger/Route 9A Base Network
Methodology (13)		HCM 2000	HCM 2000	HCM 2000	HCM 2000	HCM 2000
No Build Network	Construction Period	Baseline volumes grown per rates from the AKRF Land Use Matrix / MTA RTFM trip rates	Baseline volumes grown per rates from the AKRF Land Use Matrix / MTA RTFM trip rates	Baseline volumes grown per rates from the AKRF Land Use Matrix / MTA RTFM trip rates	Baseline volumes grown per rates from the AKRF Land Use Matrix / MTA RTFM trip rates	Route 9A traffic assignment model for long-term operational effects
	Operational (3)	CEQR Method using 1/2 percent per year growth rate and site specific trip generation for no build projects	Volumes grown per rates from the AKRF Land Use Matrix and MTA RTFM trip rates	NA	N/A	NYMTC Best Practices Model Trip Tables
Impact Criteria	Construction-Period (4)	CEQR Manual	Route 9A FEIS Criteria	Route 9A FEIS Criteria	Route 9A FEIS Criteria	Route 9A FEIS Criteria
	Operational (4)	CEQR Manual	Route 9A FEIS Criteria	N/A	N/A	Route 9A FEIS Criteria
TRANSIT		Louis Berger Group	Louis Berger Group	AKRF/EWT	Louis Berger Group	Vollmer Associates
Analysis Locations		Cortlandt Street (N/R); Fulton Street Complex (4/5); World Trade Center Complex (A/C/E/2/3); (Cortlandt Street (1/9) assumed to open in 2009)	Cortlandt Street (N/R); Fulton Street Complex (4/5,A/C,J/M/Z,2/3); World Trade Center Complex (E); (Cortlandt Street (1/9) assumed to open in 2009)	Cortlandt Street (N/R); Fulton Street Complex (4/5,A/C,J/M/Z,2/3); World Trade Center Complex (E); (Cortlandt Street (1/9) assumed to open in 2009)	South Ferry (1/9), Whitehall Street (N/R)	Qualitative only
Quantified Analysis?	Operational (5)	Yes	Yes	Qualitative	Yes	
	Construction-Period (5)	Yes	Yes	Qualitative	Yes	
Analysis Periods	AM	Yes	Yes	NA	Yes	
	Midday	No	No	NA	No	
	PM	Yes	Yes	NA	Yes	
Baseline Volumes	Pre-9/11	MTA/NYCT Network	MTA/NYCT Network	MTA/NYCT Network	MTA/NYCT Network	
	Post-9/11	MTA/NYCT Network	MTA/NYCT Network	MTA/NYCT Network	MTA/NYCT Network	
Analysis Methodology		MTA/NYCT Guidelines / HCM	MTA/NYCT Guidelines / HCM	N/A	MTA/NYCT Guidelines / HCM	
No Build Network	Growth rate	Baseline volumes grown per rates from the AKRF Land Use Matrix / RTFM trip rates and PATH Trips	Baseline volumes grown per rates from the AKRF Land Use Matrix / RTFM trip rates and PATH Trips	N/A	MTA/NYCT Forecasts for South Ferry Station	
Impact Criteria		NYCT Operations and Planning Methodology	NYCT Operations and Planning Methodology	N/A	NYCT Operations and Planning Methodology	
PEDESTRIANS		Louis Berger Group	Louis Berger Group	EWT	Louis Berger Group	Vollmer Associates
Quantified Analysis?	Operational (6)	Yes	Yes	Yes	Yes	Yes
	Construction-Period (6)	Yes	Yes	Yes	Yes	Yes
Analysis Periods	AM	Yes	Yes	Yes	Yes	Yes
	Midday (7)	Yes	No	Yes	No	Yes
	PM	Yes	Yes	Yes	Yes	Yes
Baseline Volumes	Pre-9/11 (8)	Berger Network	Berger Network	Berger Network	Berger Network	Route 9A Base Network
	Post-9/11 (8)	Berger Network	Berger Network	Berger Network	Berger Network	Route 9A Base Network updated per 2003 counts.
Analysis Software		Highway Capacity Manual (HCM)	Highway Capacity Manual (HCM)	Highway Capacity Manual (HCM)	Highway Capacity Manual (HCM)	Highway Capacity Manual (HCM)
No Build Network		Baseline volumes grown per rates from the AKRF Land Use Matrix / RTFM trip rates and PATH Trips	Baseline volumes grown per rates from the AKRF Land Use Matrix / RTFM trip rates and PATH Trips	Baseline volumes grown per rates from the AKRF Land Use Matrix / RTFM trip rates and PATH Trips	Baseline volumes grown per rates from the AKRF Land Use Matrix / RTFM trip rates and PATH Trips	Baseline volumes grown per rates from the AKRF Land Use Matrix / RTFM trip rates and PATH Trips
Impact Criteria (9)		MTA/NYCT/CEQR Methodology	MTA/NYCT/CEQR Methodology	MTA/NYCT/CEQR Methodology	MTA/NYCT/CEQR Methodology	Route 9A FEIS Criteria (1994 FEIS)

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AIR QUALITY		AKRF, Inc.	Louis Berger Group	AKRF, Inc.	Louis Berger Group	AKRF, Inc.
Quantified	Operational (14)	Yes	Stationary Sources Screening Only	Stationary Sources Screening Only	Stationary Sources Screening Only	Yes
Analysis?	Construction-Period	Yes	Yes	Yes	Yes	Yes
Mobile Source	Emission Factors	Mobile 6	Mobile 6	Mobile 6	Mobile 6	Mobile 6
Analysis	Analysis Model	CAL3QHC for CO and CAL3QHCR for PM	CAL3QHC for CO and CAL3QHCR for PM	CAL3QHC for CO and CAL3QHCR for PM	CAL3QHC for CO and CAL3QHCR for PM	CAL3QHC for CO and CAL3QHCR for PM
	Receptor Locations	Sidewalks + neighborhood scale for PM2.5	Sidewalks + neighborhood scale for PM2.5	Sidewalks + neighborhood scale for PM2.5	Sidewalks + neighborhood scale for PM2.5	Sidewalks + neighborhood scale for PM2.5
	Time Periods	Peak for CO, 24-hour and annual for PM	Peak for CO, 24-hour and annual for PM	Peak for CO, 24-hour and annual for PM	Peak for CO, 24-hour and annual for PM	Peak for CO, 24-hour and annual for PM
Stationary Source Analysis	Emission Factors	Construction Equip. NONROAD; AP42	NONROAD; AP42	NONROAD; AP42	NONROAD; AP42	NONROAD; AP42
	Perm. Power Sources	AP42; Designers' Guarantee	N/A	N/A	N/A	N/A
	Analysis Model	ISCST3	ISCST3 for construction only	ISCST3 for construction only	ISCST3 for construction only	ISCST3 for construction only
	Receptor Locations	Public Access, elevated buildings	Public Access, elevated buildings	Public Access, elevated buildings	Public Access, elevated buildings	Public Access, elevated buildings
	Time Periods	According to NAAQS	According to NAAQS	According to NAAQS	According to NAAQS	According to NAAQS
CAL3QHC(R) Inputs		Meteorology – LGA 1998-2002	Meteorology – LGA 1998-2002	Meteorology – LGA 1998-2002	Meteorology – LGA 1998-2002	Meteorology – LGA 1998-2002
Background Factors		NYCDEP/NYSDEC data	NYCDEP/NYSDEC data	NYCDEP/NYSDEC data	NYCDEP/NYSDEC data	NYCDEP/NYSDEC data
Silt Factors		0.10 for north-south streets; 0.16 for east-west streets	0.10 for north-south streets; 0.16 for east-west streets	0.10 for north-south streets; 0.16 for east-west streets	0.10 for north-south streets; 0.16 for east-west streets	0.10 for north-south streets; 0.16 for east-west streets
Impact Criteria	CO	NAAQS, De Minimis	NAAQS, De Minimis	NAAQS, De Minimis	NAAQS, De Minimis	NAAQS, De Minimis
	NO ₂	NAAQS	NAAQS	NAAQS	NAAQS	NAAQS
	PM _{2.5}	NYCDEP/NYSDEC values	NYCDEP/NYSDEC values	NYCDEP/NYSDEC values	NYCDEP/NYSDEC values	NYCDEP/NYSDEC values
	PM ₁₀	NAAQS	NAAQS	NAAQS	NAAQS	NAAQS
	VOCs	NA	NA	NA	NA	NA
NOISE		Louis Berger Group	Louis Berger Group	AKRF, Inc.	Louis Berger Group	AKRF, Inc.
Quantified	Operational	Yes	Yes	Qualitative	Yes	Yes
Analysis?	Construction-Period	Yes	Yes	Yes	Yes	Yes
Analysis Periods		Peak 1-Hour	Peak 1-Hour	Peak 1-Hour	Peak 1-Hour	Peak 1-hour
		8-Hour	8-Hour	8-Hour	8-Hour	
		LDN 30-Day Average	LDN 30-Day Average	LDN 30-Day Average	LDN 30-Day Average	
Baseline Conditions	Pre-9/11	Berger / AKRF Data	Berger / AKRF Data	Berger / AKRF Data	Berger / AKRF Data	Berger / AKRF Data
	Post-9/11	Berger / AKRF Data	Berger / AKRF Data	Berger / AKRF Data	Berger / AKRF Data	Berger / AKRF Data
Construction Emission Factors		FTA Guidance Document	FTA Guidance Document	FTA Guidance Document	FTA Guidance Document	FTA Guidance Document
Analysis Methodology	Construction-Period	CEQR Proportional for screening traffic noise /FTA for construction equipment.	CEQR Proportional for screening traffic noise/ FTA for construction equipment.	CEQR Proportional for screening traffic noise /FTA for construction equipment.	CEQR Proportional for screening traffic noise /FTA for construction equipment.	CEQR Proportional for screening traffic noise /FTA for construction equipment.
	Operational (10)	CEQR Proportional for screening traffic noise - TNM for detailed traffic noise	Qualitative	Qualitative / detailed analysis for vibration at Memorial site	Qualitative	TNM
Impact Criteria	Construction (15)	FTA Detailed Criteria / CEQR Criteria	FTA Detailed Criteria / CEQR Criteria for Cumulative Effects with WTC and PATH	FTA Detailed Criteria / CEQR Criteria for Cumulative Effects with WTC and FSTC	FTA Detailed Criteria	FTA Detailed Criteria / (also CEQR for cumulative effects only)
	Operational (10)	CEQR/HUD/FTA	Qualitative	FTA Detailed Criteria	Qualitative	FHWA/NYS DOT Criteria

Federally-Sponsored Lower Manhattan Recovery Projects
Coordination Matrix

	WTC Memorial and Redevelopment Plan Generic Environmental Impact Statement	Fulton Street Transit Center Environmental Impact Statement	Permanent WTC PATH Terminal Environmental Impact Statement	South Ferry Terminal Environmental Assessment	Route 9A Supplemental Environmental Impact Statement
CUMULATIVE EFFECTS	LBG (Traffic/Noise) AKRF(Air)	Louis Berger Group	AKRF, Inc.	Louis Berger Group	AKRF, Inc.
Project-Specific Construction Analysis	2006 -(No Build = Background Growth + LoMan Construction Projects) (Build = No Build + WTC)	2006 (No Build = Background Growth + LoMan Construction Projects) (Build = No Build + FSTC)	2006 (No Build = Background Growth) (Build = No Build + Permanent PATH)	2006 (No Build = Background Growth + LoMan Construction Projects) (Build = No Build + SOFE)	2006 (No Build = Background Growth) (Build = No Build + Route 9A)
Cumulative Effects Construction Analysis	2006 -(No Build = Background Growth + LoMan Construction Projects) (Build = No Build + WTC)	2006 (No Build = Background Growth + LoMan Construction Projects) (Build = No Build + FSTC)	2006 (No Build = Background Growth) (Build = No Build + LoMan Construction Projects)	2006 (No Build = Background Growth + LoMan Construction Projects) (Build = No Build + SOFE)	2006 (No Build = Background Growth) (Build = No Build + LoMan Construction Projects)
ISSUES, ASSUMPTIONS, AND QUESTIONS TO RESOLVE	ASSUME LEFT TRUCK TURNS AT WEST STREET/VESEY STREET DURING CONSTRUCTION WILL BE POSSIBLE				
	ASSUME NOT USING GREENWICH STREET ON TOP OF 1/9 AS TRUCK ROUTE TO REDUCE TRUCK TRAFFIC ON CHURCH STREET				
	ASSUME FOR 2025 FSTC THAT RAMP OF BB TUNNEL WILL REMAIN CLOSED AS IS				
	ASSUME NO NYCDOT RECONSTRUCTION OF BROADWAY AND CHURCH STREET BETWEEN VESEY AND MAIDEN LANE (BROADWAY) AND VESEY AND MORRIS STREET (CHURCH ST.) IN 2006.				

Notes:

- (1) Quantified analysis considers the peak within all projects; this peak, depending on resource analyzed may fall between the end of 2005 and the end of 2006.
- (2) Qualitative assessments were conducted for the South Ferry and PATH projects in the operational period since new vehicle trips would not be generated; Although FSTC is also a transit project and would not generate traffic during operation, a quantitative traffic analysis was nevertheless conducted for the FSTC Operational Years (2008 and 2025) to provide traffic data for use by other recovery projects, following FSTC.
- (3) LMDC applies conservative approach used for development projects in NYC. FSTC applies MTA approach using MTA RFTM; 9A applies regional analysis approach using NYMTC BMP
- (4) LMDC applies more conservative criteria used for development projects in NYC because it would directly induce vehicle trips; transportation projects apply Route 9A criteria developed for regional transportation projects
- (5) Path assesses effects to transit service qualitatively because the Permanent Terminal would not physically alter local transit service (other than PATH) or destinations of riders as compared to pre-September 11, 2001 conditions; Route 9A project would not have direct impacts to transit.
- (6) South Ferry considers circulation changes from new station plan, which would not impact on-street pedestrian flows.
- (7) LMDC, 9A, and PATH consider midday for pedestrian trips to WTC retail/PATH concourses; FSTC and South Ferry consider peak AM and PM peaks for subway trips, which are far greater than midday peak
- (8) Route 9A, as a highway project with pedestrian crossings with a pre-existing FEIS (1994) applies more conservative criteria consistent with the 1994 Route 9A FEIS.
- (9) LMDC applies CEQR methodology and criteria used for development projects in NYC. Route 9A uses NYSDOT/FHWA analysis methodology and impact criteria for highway projects. FSTC and SoFe noise analyses for operation were conducted via a qualitative screening. Subway noise due to its underground location is typically not considered a substantial noise impact generator for above ground receptors. Furthermore, these transit rehabilitation/replacement projects during their operation would not substantially change transit operations and would thus not resulting in substantial changes in subway noise, nor would they generate traffic, or substantial stationary noise sources.
- (10) Projects co-located with other projects and thereby having possible design ramifications, such as PATH, WTC and 9A analyzed more than one Build Alternative of the other project(s) in the background. E.g. WTC and PATH analyzed No Build conditions with both (Bypass and At Grade) Rte 9A Alternatives. FSTC and SoFe only analyzed the Rte 9A greatest impact alternative (short bypass) as a conservative basis for analysis.
- (11) Midday traffic was analyzed for PATH and WTC, as WTC analysis of AM and PM peak indicated WTC traffic impacts during construction and operation, therefore midday was also analyzed for potential impacts. FSTC and SoFe did not indicate AM or PM traffic impacts; therefore the midday traffic was not analyzed. WTC also included a Saturday period to account for potential peak conditions associated with memorial visitors.
- (12) HCM-based versions of Synchro and HCS were used. Both software packages are compatible.
- (13) A screening analysis of operational sources associated with transit projects indicated that these projects do not create substantial stationary sources during operation that would require detailed modeling.
- (14) FSTC included CEQR criteria to provide for consistency with WTC noise analysis. SoFe noise analysis interfaces only with the southern portion of Rte 9A with regard to noise impacts.